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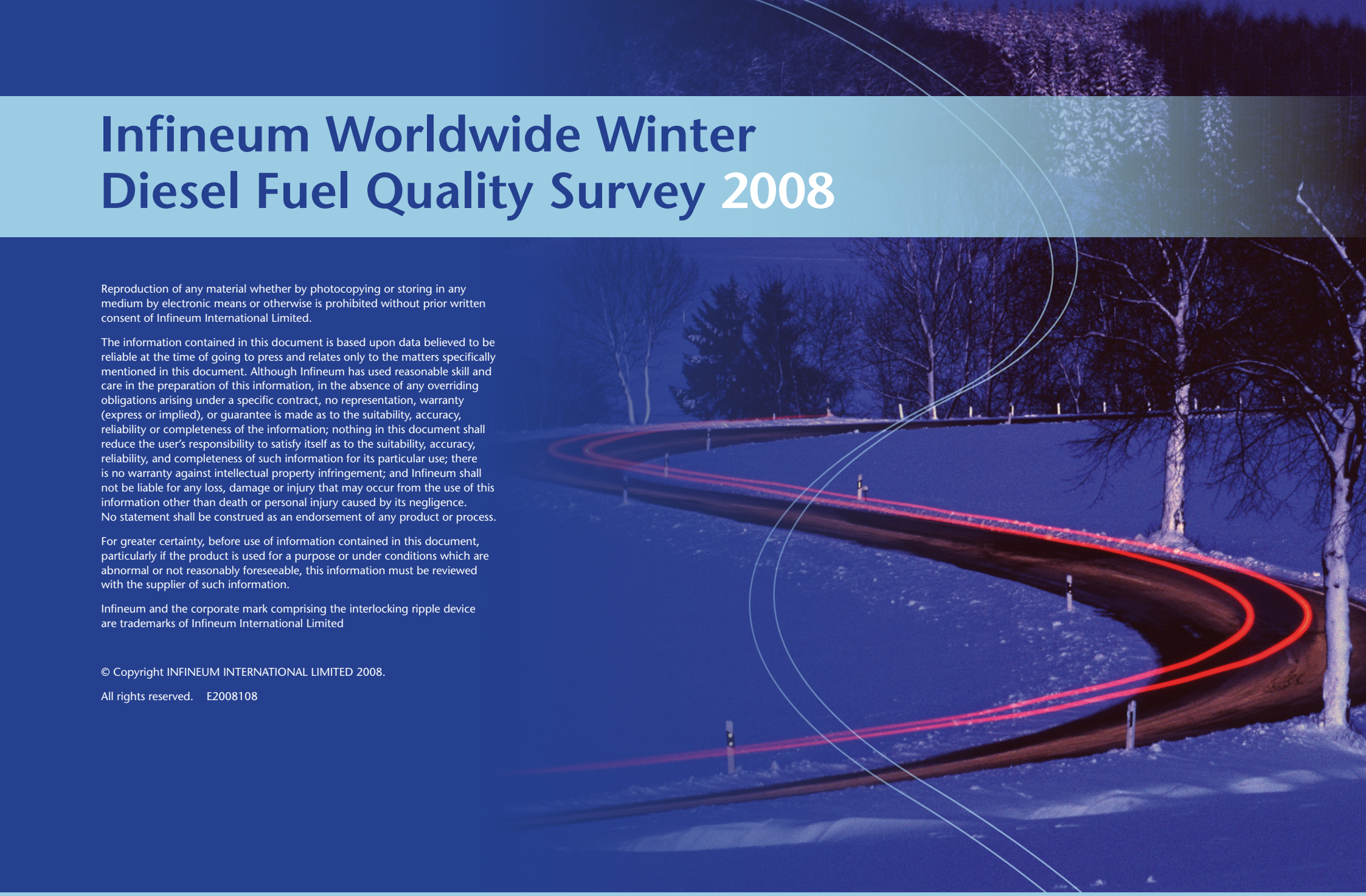
Enclosure 17

Infineum Fuel Surveys

Infineum_2008

Infineum Worldwide Winter Diesel Fuel Quality Survey 2008



Contents

Introduction

The Infineum Worldwide Winter Diesel Fuel Quality Survey aims to provide the petroleum refining and distribution industry with an overview of the quality of automotive diesel in the marketplace, allowing tracking of international trends. To achieve this purpose, the Survey needs to cover as much of the globe as possible. For the winter 2008 survey, some 356 samples were collected in 39 countries around the world. The majority of samples were collected during January and February, deep winter months in the northern hemisphere. In southern hemisphere countries, sampling was delayed until later in the year when true winter grade samples could be obtained.

Samples need to be representative of the diesel purchased by the average consumer so they are gathered from service stations by Infineum colleagues at local area offices. As a general principle, Infineum tries to get one sample that represents the production from each refinery or region in a given country. To minimise the possibility of taking multiple samples from a single refinery, knowledge of local exchange agreements and distribution systems is used to select where each sample is collected. For the larger diesel consuming countries, this procedure results in samples that represent a reasonable average of the overall quality. However, for smaller countries or specific producers, spot sampling over a short period of time will effectively only provide a snapshot of production quality, with data derived from only one or two samples. This can make it more difficult to evaluate trends with any accuracy.

Analysis

The analyses applied to each sample are those we consider to be of most interest to the diesel producers, marketers, distributors and consumers. They cover areas of national specification, exchange specification and performance parameters. A degree of standardisation has been applied to enable diesel from all countries to be compared and the data analysed as a single set. Standardisation, however, means that not all national specifications are reported.

Wherever possible, industry standard test methods have been applied and in-house test methods avoided. This has been done so that the data published here most accurately reflect the results which could or would be generated by organisations within the petroleum industry.

When considering our data, in particular when comparing the various test results with the national specifications, it should be noted that a number of the tests have quite wide reproducibility bands, and very little repeat testing has been conducted to determine compliance or otherwise with specifications.

Test Methods

The majority of testing was carried out at quality accredited laboratories in the USA, Japan and the UK using the following test methods:

Density	ASTM D4052
Kinematic Viscosity	ASTM D445
Sulphur Content	ASTM D2622 / ASTM D4294
Cetane Number	ASTM D613
Cetane Index	ASTM D4737 / ASTM D976
Pour Point	ASTM D97 / ASTM D5950
Distillation	ASTM D86
Cloud Point	ASTM D2500 / ASTM D5772 / ASTM D5771
CFPP	IP309 / ASTM D6371
HFRR D6079	ISO 12156-1 / ASTM
Wax Content	Differential Scanning Calorimetry
LTFT	ASTM D4539
FAME Content	NF M 07-084 (modified)

Samples collected in Mexico, Saudi Arabia and China were tested at local laboratories, using the same or similar test methods.

The Trends

"Continuing change is inevitable and new forces unrelated to sulphur content are emerging that are driving changes in diesel production."

Infineum Winter Diesel Fuel Survey 2006

At the time of publication of the 2006 survey, crude oil had doubled in price in the previous two years to reach $70 per barrel, and the need to reduce global warming through reduction of CO_2 emissions was gaining wider public acceptance. The pace of change seemed fast, but since then it has only accelerated: The price of crude climbed steadily to a peak of $150 per barrel around midyear 2008 before falling sharply back, driving fuel prices to an all-time high in unregulated markets and putting fuel consumption firmly back on the agenda for many motorists.

The topic of global warming is debated almost daily in the media; barely a week passes without emotive news reports of retreating glaciers, shrinking icecaps and the risk of rising sea levels.

Governments have continued to implement legislation backed by tax incentives to encourage the growth of renewable energy sources.

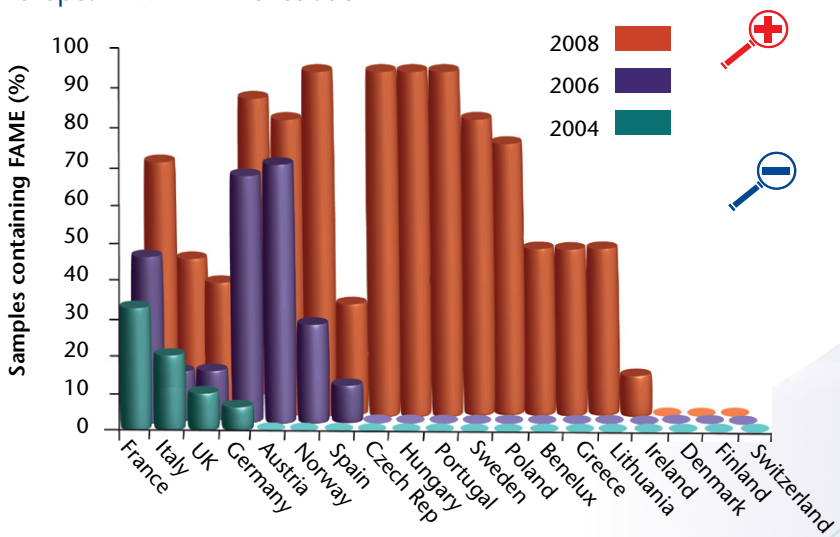
With its global coverage of the major diesel consuming nations, the 2008 Winter Diesel Fuel Survey allows an evaluation of how at least some of these headline items, and other more routine factors, are affecting this fuel segment.

FAME

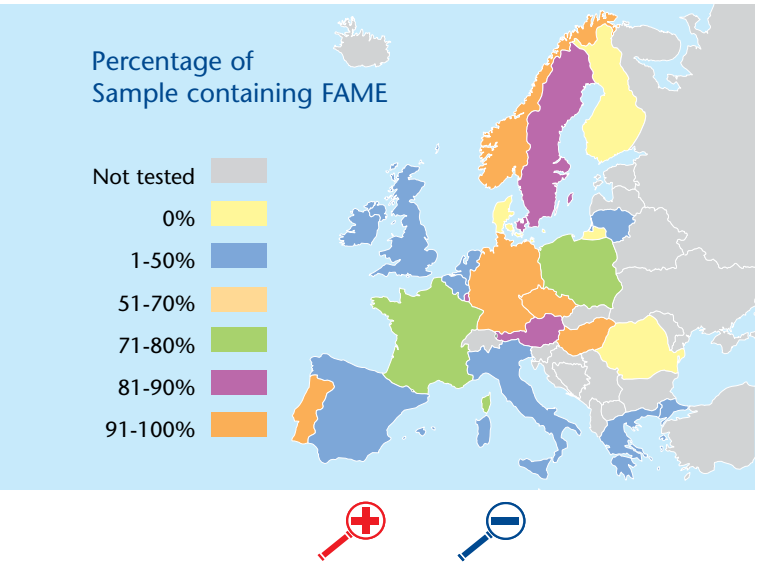
Today the main focus of fuel producers in Europe and the USA has become the need to meet the renewable energy directives; EU Directive 2003/30/EC and the US 2005 Energy Policy Act. However, debate rages on the efficacy of these initiatives making their impact uncertain. For example, there is growing acceptance that many 1st generation biofuels are not as green as some would like to claim, and a number of non-governmental organisations are expressing concern over biofuel sustainability and land usage for fuel versus food. Additionally with respect to diesel, rising vegetable oil prices have ensured that FAME still requires tax incentives to be economically viable despite the high crude oil price.

With so much uncertainty in the market a key feature of this year's survey has been an expansion of the FAME content analysis to cover almost all samples collected during 2008; up from the solely European analyses of 2004 and 2006. Results show that Europe still leads the world in the use of FAME as a diesel blend component, with more than 70% of the samples collected in nine countries seen to contain FAME However Europe is not alone in this approach; in Thailand 80% and in Brazil 100% of the samples collected also contained FAME. Additionally, FAME usage is observed in Argentina, Canada and the USA, though at lower levels.

European Bx FAME Penetration



The Trends (continued)

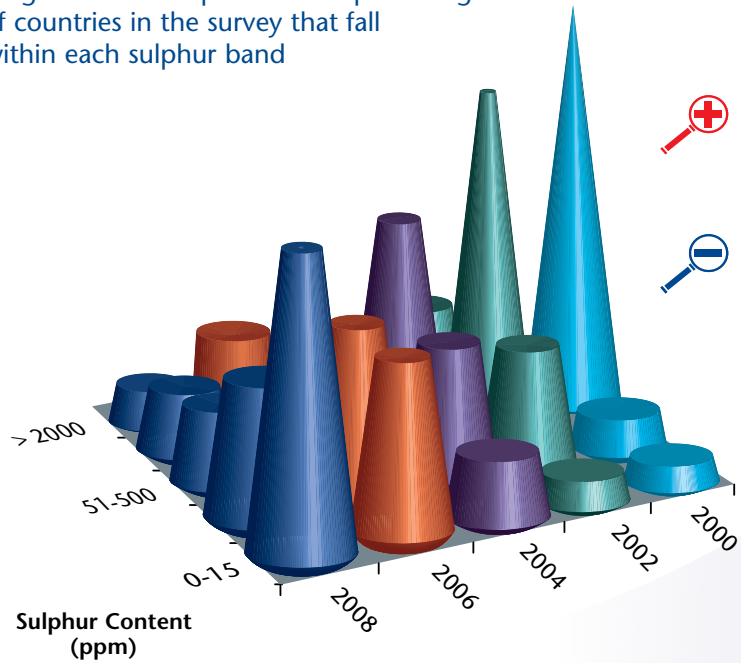


Looking more closely at the European situation, the chart above provides a breakdown of Bx FAME penetration over the five years spanning the last three surveys, whilst the associated map below illustrates the percentage of survey samples containing FAME this year. Taken together they provide a very clear indication of recent developments; slow but steady progress between 2004 and 2006 followed by rapid expansion between 2006 and 2008. It will be interesting to see how this expansion continues and if it is eventually sufficient to fulfil diesel's contribution towards the EU Biofuels Directive indicative target of 5.75% biofuel in transport fuels by 2010.

Sulphur

It sometimes appears that sulphur reduction is yesterday's news, and to some extent it is. Specifications in the USA and Canada have been set at a maximum of 15 ppm sulphur since 2006. Austria, Denmark, Finland, Germany, Hungary, Japan, Norway, Poland, Sweden and Switzerland were all producing to 10 ppm or less at the time of our survey in 2006, and the remainder of Europe will be at <10 ppm from January 2009. However, it is noteworthy that sulphur reduction in the rest of the world continues apace. This year, over two-thirds of the countries surveyed produced diesel with an average of less than 50 ppm sulphur, and even more impressively, almost half of the countries surveyed averaged less than 15 ppm. Additions to the less than 10 ppm sulphur list this year were Benelux, Korea, Lithuania, Singapore and the UK.

Height of cones represents the percentage of countries in the survey that fall within each sulphur band



The Trends (continued)

Lubricity

It is impossible to discuss sulphur reduction without considering lubricity. It is now a well known fact that hydro-desulphurisation has the effect of reducing the natural lubricity of diesel and that reduced lubricity can cause premature failure of fuel injection systems. In general, fuel producers have successfully guarded against this problem over the last fifteen years by the application of lubricity additives, a feature monitored closely in previous diesel fuel surveys.

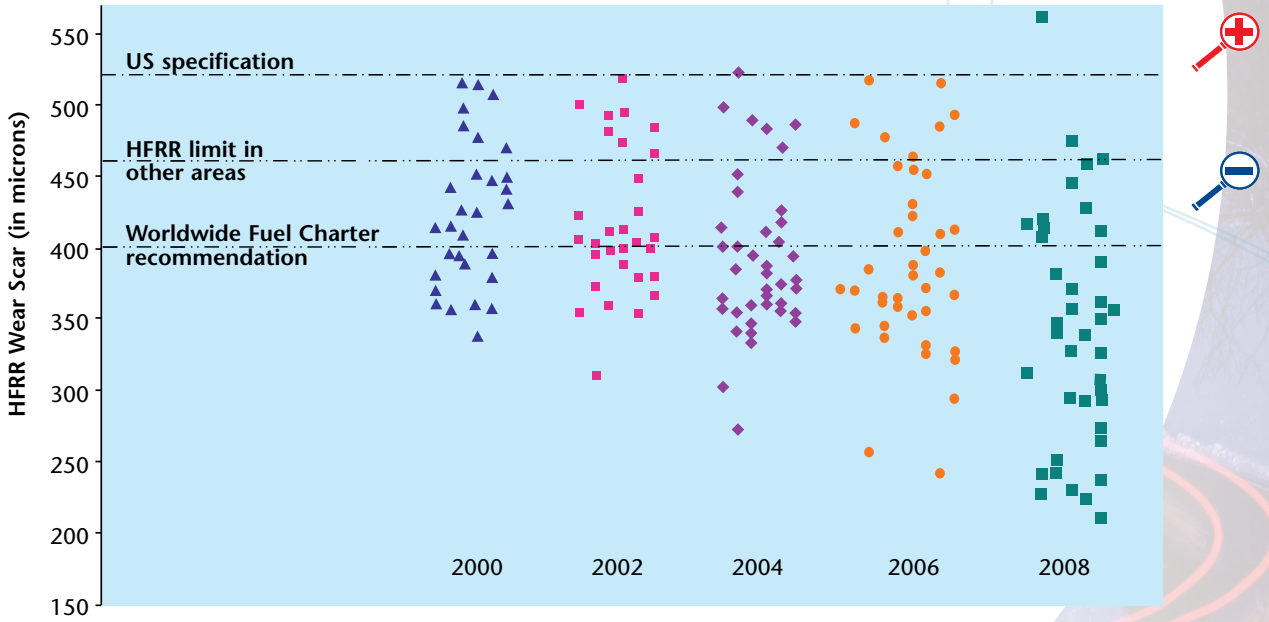
However, it is also widely known that FAME has lubricating qualities and that blends of diesel with more than 1 - 2% of FAME typically have sufficient lubricity to avoid the need to use additives. In fact, if sufficient FAME is used, lubricity performance, as measured in the High Frequency Reciprocating Rig (HFRR), can be very high. The graph below plots the average HFRR wear scar for each country over the past four diesel surveys and shows that wear scar values are falling and the number of very low wear scar measurements is increasing.

Looking to the Future

The well established journey to lower sulphur will continue, though it is difficult to predict how long it will take before all of the samples collected for a future survey are below 10/15 ppm. When it occurs, it will surely be a landmark event.

The future for FAME is considerably more uncertain. Government directives currently ensure a short term future, but there are a number of obstacles to be overcome if FAME is to deliver the expected benefits:

Worldwide Lubricity performance



- High production costs are driving producers to cheaper feedstocks, but these often require additional processing, make poor quality FAME or carry the highest environmental penalties.
- The need to produce renewable energy needs to be balanced with the need to produce food and retain local livelihoods.

Policies need to be refined to ensure maximum GHG (greenhouse gas) savings are obtained and trade based on volume supply of FAME irrespective of GHG credentials is avoided.

Beyond FAME there are of course 2nd generation biofuels, such as fuel from algal sources, cellulose and biomass gasification. Some 2nd generation processes are already here, others are at the pilot plant stage and others in early development. These will add to the changing face of diesel production in future years but at this stage it is too early to comment on the successes and failures of these new approaches.

Worldwide Summary

Worldwide Diesel Fuel Survey - 1

Mean Values

Country	Austria	Benelux	Czech Rep	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Lithuania
No. of Samples	7	8	2	3	6	22	23	4	1	8	15	2
% Sample containing FAME	6	4	2	0	0	16	21	2	1	1	7	1
Cloud Point, °C	-8	-7	-8.5	-11	-30	-7	-8	0	-10	-7	-3	-24
CFPP, °C	-28	-26	-22	-26	-45	-20	-28	-13	-30	-18	-15	-39
LTFT, °C												
Pour Point, °C	-28	-34	-30	-43	-40	-27	-29	-13	-30	-24	-21	-33
HFRR, µm	252	270	292	293	350	242	226	299	230	356	294	311
Wax Content @ 10°C Below Cloud, wt%	1.9	1.8	3.9	1.8	1.2	2.0	1.8	2.0	1.4	2.4	2.0	0.9
Sulphur, wt%	0.0008	0.0007	0.0020	0.0008	0.0005	0.0027	0.0007	0.0029	0.0007	0.0028	0.0030	0.0005
Density @ 15°C, kg/m^3	833.1	836.1	822.1	839.6	822.9	831.8	833.3	831.2	839.6	831.7	831.8	834.3
Viscosity @ 20°C, cSt	4.280	4.241	3.916	4.202	2.767	3.684	4.118	4.260	4.599	3.961	4.011	2.970
Viscosity @ 30°C, cSt												
Viscosity @ 40°C, cSt	2.733	2.727	2.564	2.709	1.898	2.423	2.641	2.811	2.899	2.540	2.605	2.014
Cetane Index 2 Variable	56	54	58	53	50	55	55	56	52	55	56	48
Cetane Index 4 Variable	54	51	57	50	48	52	53	54	52	52	52	47
Cetane Number	59	53	53	51	54	54	54	54	55	54	55	50
Distillation, °C IBP	175	170	171	161	177	165	172	168	188	165	168	165
T_{10}	210	203	200	197	196	196	208	206	216	198	200	197
T_{20}	226	223	214	214	206	213	227	224	232	216	215	210
T_{50}	270	267	264	268	233	261	265	271	273	264	264	244
T_{90}	331	330	333	333	286	331	330	336	334	330	339	302
T_{95}	346	344	348	349	303	345	345	353	346	346	355	321
FBP	355	355	356	357	318	355	354	367	359	355	366	333

Worldwide Diesel Fuel Survey - 2

Mean Values

Country	Norway	Poland	Portugal	Romania	Russia	Spain	Sweden	Switzerland	UK	Ukraine	Australia	China
No. of Samples	4	9	3	3	3	12	7	6	15	3	1	21
% Sample containing FAME	4	7	3	0	0	4	6	0	6	0	0	-
Cloud Point, °C	-26	-10	-5	-10	-21	-3	-34	-13	-8	-6	1	-5
CFPP, °C	-40	-29	-12	-26	-31	-17	-35	-26	-21	-24	0	-9
LTFT, °C												
Pour Point, °C	-50	-36	-18	-27	-35	-23	-36	-35	-26	-25	0	-19
HFRR, µm	241	272	224	237	473	325	264	408	326	411	370	416
Wax Content @ 10°C Below Cloud, wt%	1.4	1.8	1.3	1.5	1.7	1.8	3.7	1.8	2.3	2.1	6.6	
Sulphur, wt%	0.0007	0.0008	0.0031	0.0028	0.0626	0.0029	0.0003	0.0006	0.0007	0.0480	0.0007	0.0830
Density @ 15°C, kg/m^3	834.8	834.1	840.1	839.6	827.5	837.9	816.2	829.3	837.4	837.4	829.8	833.8
Viscosity @ 20°C, cSt	3.250	4.236	3.820	3.846	3.187	4.231	2.898	3.315	4.131	4.736	5.466	3.860
Viscosity @ 30°C, cSt												
Viscosity @ 40°C, cSt	2.112	2.723	2.493	2.509	2.110	2.706	1.964	2.253	2.796	2.987	3.328	
Cetane Index 2 Variable	49	56	51	51	45	55	53	53	54	53	57	50
Cetane Index 4 Variable	47	53	48	49	47	51	52	50	51	53	60	51
Cetane Number	53	54	51	52	54	53	55	52	54	55	58	51
Distillation, °C IBP	174	171	172	172	168	170	184	159	170	192	189	172
T_{10}	198	211	198	206	196	203	203	193	204	227	232	202
T_{20}	210	226	213	222	206	221	212	208	223	239	249	218
T_{50}	244	270	258	261	235	270	234	250	268	269	283	259
T_{90}	306	327	335	328	304	339	278	321	326	331	336	327
T_{95}	322	339	354	345	323	356	293	337	342	348	347	342
FBP	335	349	367	355	338	365	310	347	354	360	354	330

Worldwide Diesel Fuel Survey - 3

Mean Values

Country	India	Indonesia	Japan - Grade 2	Japan - Grade 3	Japan - Special Grade 3	Korea	Malaysia	Singapore	Thailand	Israel	Saudi Arabia	South Africa
No. of Samples	1	1	22	1	2	7	6	4	9	2	4	5
% Sample containing FAME	0	0	-	-	-	0	0	0	7	0	0	0
Cloud Point, °C	8	7	-5	-14	-22	-6	14	6	6	1	7	-1
CFPP, °C	3	5	-10	-15	-34	-24	10	3	1	-11	-6	-10
LTFT, °C												
Pour Point, °C	0	3	-18	-23	<-37.5	-33	11	2	2	-20	-16	-16
HFRR, µm	388	338	417	460	457	347	356	305	224	370	561	340
Wax Content @ 10°C Below Cloud, wt%	3.1	4.4	2.2	3.5	1.7	1.6	6.1	3.2	3.2	3.5	1.1	2.0
Sulphur, wt%	0.0313	0.2140	0.0006	0.0005	0.0003	0.0007	0.1529	0.0004	0.0225	0.0017	0.2028	0.0229
Density @ 15°C, kg/m^3	831.9	847.4	829.1	814.0	810.5	827.3	834.0	848.8	831.2	837.8	825	843.0
Viscosity @ 20°C, cSt	3.992	5.991				4.543	5.584	6.611	5.091	5.798	3.922	5.151
Viscosity @ 30°C, cSt			3.613	2.508	2.115							
Viscosity @ 40°C, cSt	2.232	3.612				2.879	3.517	3.892	3.197	3.566	2.533	3.162
Cetane Index 2 Variable	55	52	56	56	51	59	58	54	57	56	57	51
Cetane Index 4 Variable	53	53	57	56	51	56	57	54	58	57	54	52
Cetane Number	55	55	56	55	51	58	63	54	58	58		53
Distillation, °C IBP	127	184	154	160	149	160	174	201	177	199	172	182
T_{10}	173	232	213	185	172	198	223	240	217	232	199	223
T_{20}	213	252	234	201	185	221	244	256	238	248	214	237
T_{50}	276	290	277	252	230	275	286	294	285	286	262	275
T_{90}	345	348	331	317	310	335	354	358	350	343	356	345
T_{95}	362	363	344	330	325	351	373	375	368	357	381	365
FBP	374	374	356	346	337	363	383	380	378	365	388	374

Worldwide Diesel Fuel Survey - 4

Mean Values

Country	Argentina	Brazil	Canada	Mexico	USA-Mid West	USA-West	USA-East
No. of Samples	20	5	15	7	33	9	10
% Sample containing FAME	3	5	1		12	1	0
Cloud Point, °C	-1	4	-30	-8	-13	-12	-11
CFPP, °C	-12	-8	-30	-11	-18	-15	-15
LTFT, °C			-37		-29	-20	-28
Pour Point, °C	-19	-16	-32	-12	-18	-15	-14
HFRR, µm	380	210	426	409	346	445	361
Wax Content @ 10°C Below Cloud, wt%	1.9	2.4	20		2.6	3.4	2.4
Sulphur, wt%	0.1053	0.0346	<0.001	0.0410	<0.001	<0.001	<0.001
Density @ 15°C, kg/m^3	841.8	847.8	838	834	849.1	849.1	849.1
Viscosity @ 20°C, cSt	4.567	5.399	3.123		4.086	4.273	3.813
Viscosity @ 30°C, cSt							
Viscosity @ 40°C, cSt	2.897	3.353	2.103	2.575	2.655	2.758	2.492
Cetane Index 2 Variable	51	51	45	51	47	48	47
Cetane Index 4 Variable	50	51	42	52	46	48	43
Cetane Number	53	50	45	54	47	52	46
Distillation, °C IBP	163	161	167	183	181	189	171
T_{10}	200	205	190		218	220	202
T_{20}	221	232	204		232	233	220
T_{50}	274	280	243		266	267	262
T_{90}	350	361	301		320	319	318
T_{95}	370	386					
FBP	379	395	330	369	344	345	344

Worldwide Survey- **Europe**

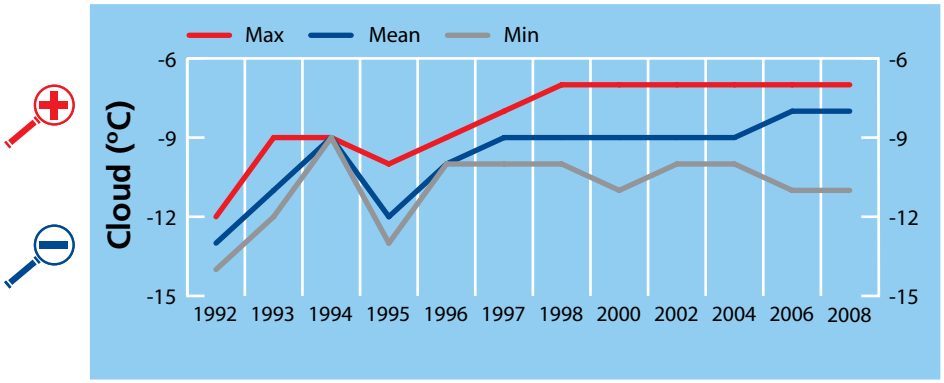
Europe

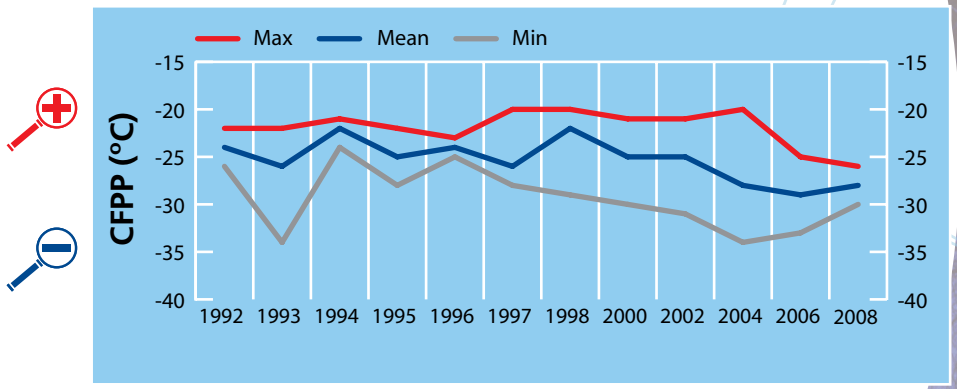
Austria

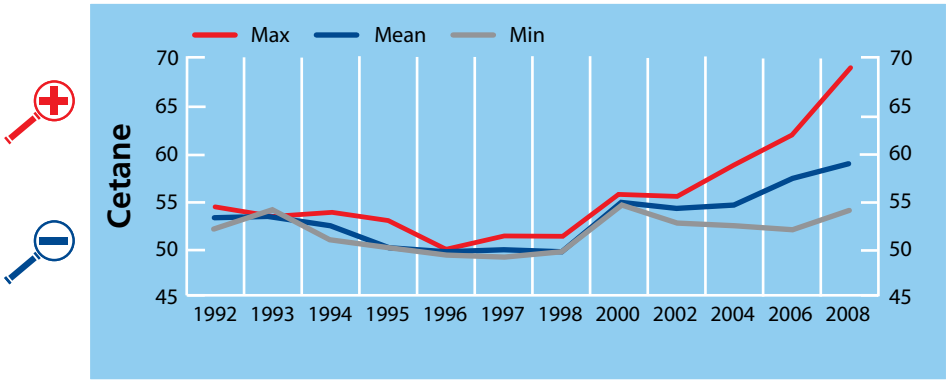
National Standards and physical inspection data

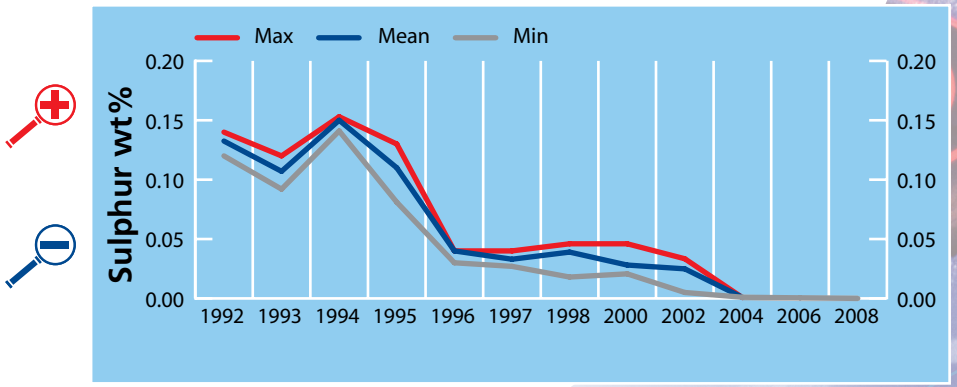
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800973	DIES 0800974	DIES 0800975	DIES 0800976	DIES 0800977	DIES 0800979	DIES 0800980
Cloud Point, ˚C		-7	-8	-10	-9	-8	-8	-10	-8	-9	-7
CFPP, ˚C	-20 (max)	-26	-28	-30	-28	-26	-30	-29	-30	-28	-30
Pour Point, ˚C		-24	-28	-30	-27	-24	-27	-30	-30	-30	-30
HFRR, µm	460 (max)	405	252	208	245	229	208	230	219	227	405
Wax Content @ 10˚C Below Cloud, wt%		2.1	1.9	1.4	2.1	1.9	1.8	2.1	1.4	2.1	1.8
Sulphur, wt%	0.001 (max)	0.0010	0.0008	<0.0003	0.0010	0.0009	0.0005	0.0008	0.0006	0.0008	<0.0003
Density @ 15OC, kg/m3	820 - 845	837.3	833.1	827.8	835.5	837.2	837.3	829.5	829.9	834.2	827.8
Viscosity @ 20˚C, cSt		5.226	4.280	3.435	4.347	4.236	5.226	3.435	3.674	4.058	4.982
Viscosity @ 40˚C, cSt	2.00 - 4.50	3.249	2.733	2.298	2.762	2.746	3.249	2.298	2.388	2.582	3.103
Cetane Index 2 Variable		58	56	53	53	55	57	55	57	56	58
Cetane Index 4 Variable	46 (min)	60	54	52	52	53	57	52	52	52	60
Cetane Number	51 (min)	69	59	54	60	57	61	55	55	54	69
Distillation, ˚C IBP		206	175	160	160	179	177	170	163	173	206
T_{10}		237	210	191	200	213	234	196	191	202	237
T_{20}		251	226	208	221	229	251	211	208	218	247
T_{50}		284	270	258	272	272	284	258	262	266	275
T_{90}		336	331	323	336	332	336	326	334	332	323
T_{95}	360 (max)	352	346	339	352	346	349	340	350	346	339
FBP		364	355	346	364	356	356	350	357	356	346
FAME?					Yes	Yes	Yes	Yes	Yes	Yes	No

Austria - Key Trends







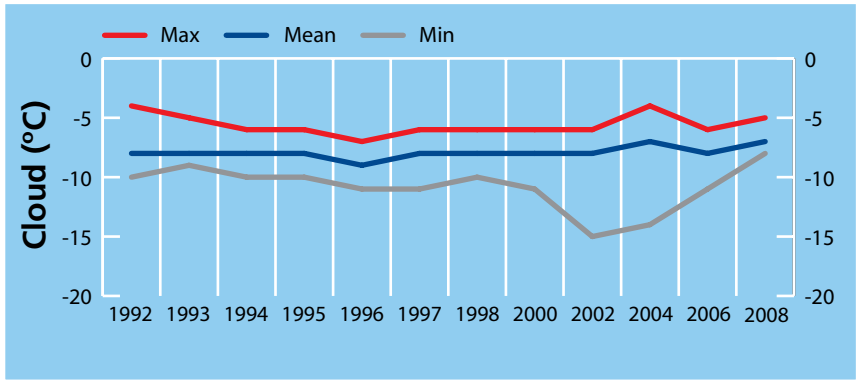


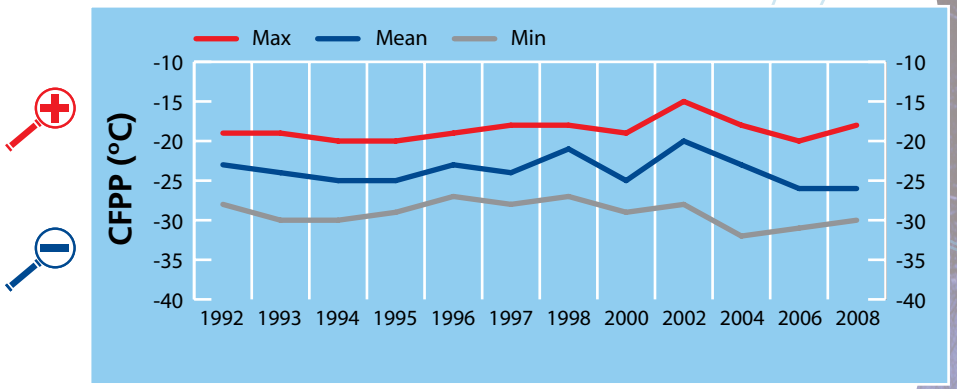
Benelux

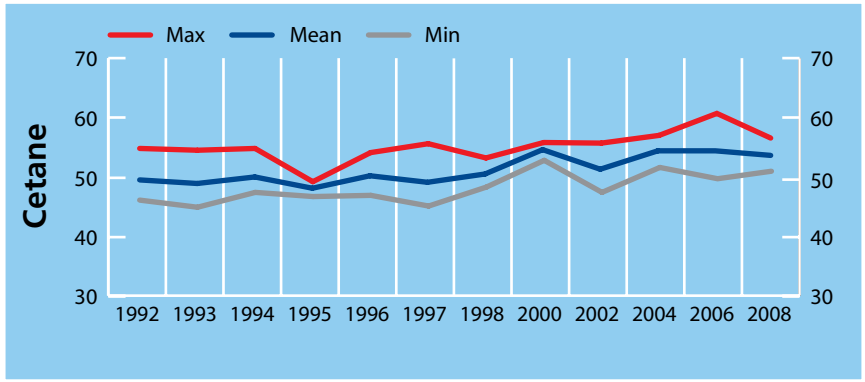
National Standards and physical inspection data

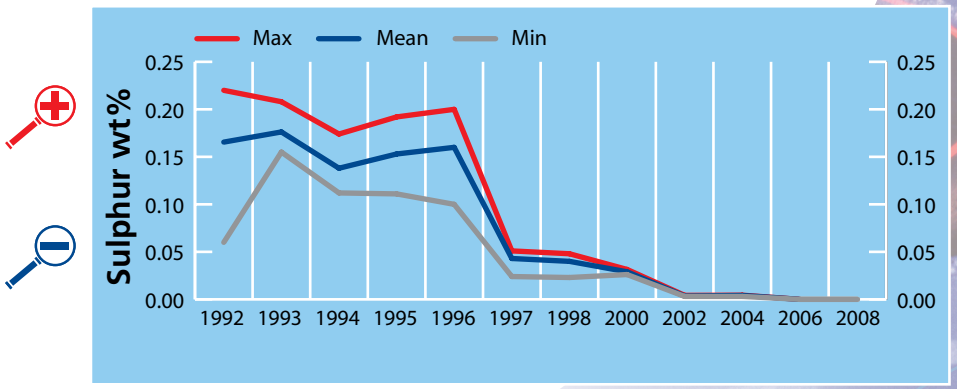
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801461	DIES 0801462	DIES 0801463	DIES 0801464	DIES 0801465	DIES 0801466	DIES 0801467	DIES 0801469
Cloud Point, °C		-5	-7	-8	-8	-8	-8	-7	-5	-7	-8	-8
CFPP, °C	-20 (max)	-18	-26	-30	-30	-30	-28	-28	-18	-27	-23	-29
Pour Point, °C		-24	-34	-51	-27	-51	-39	-33	-39	-27	-24	-30
HFRR, µm	460 (max)	351	270	213	237	238	213	304	331	351	269	220
Wax Content @ 10°C Below Cloud, wt%		2.3	1.8	1.1	2.3	1.3	2.2	1.8	2.3	2.1	1.1	1.6
Sulphur, wt%	0.005 (max)	0.0009	0.0007	0.0005	0.0009	0.0005	0.0008	0.0008	0.0007	0.0008	0.0008	0.0007
Density @15°C, kg/m3	820 - 845	839.1	836.1	829.5	838.7	838.1	837.5	839.1	829.5	839.0	836.2	831.0
Viscosity @ 20°C, cSt		5.041	4.241	3.432	5.041	4.019	4.810	4.208	3.923	4.318	4.179	3.432
Viscosity @ 40°C, cSt	2.00 - 4.50	3.122	2.727	2.268	3.122	2.625	3.022	2.676	2.567	2.755	2.782	2.268
Cetane Index 2 Variable		57	54	53	53	53	55	54	57	54	54	55
Cetane Index 4 Variable	46 (min)	55	51	49	55	49	53	50	52	50	50	50
Cetane Number	51 (min)	56	53	51	56	52	53	52	51	52	51	56
Distillation, °C IBP		195	170	158	195	168	186	164	158	164	169	158
T_{10}		236	203	186	236	205	219	197	188	197	199	186
T_{20}		250	223	200	250	220	240	218	207	220	232	200
T_{50}		279	267	256	279	259	273	269	263	270	264	256
T_{90}		333	330	324	328	333	324	331	332	329	331	330
T_{95}	360 (max)	349	344	335	340	347	335	347	344	344	349	348
FBP		362	355	349	353	358	349	358	354	355	362	355
FAME?					Yes	Yes	Yes	No	No	No	No	Yes

Benelux - Key Trends







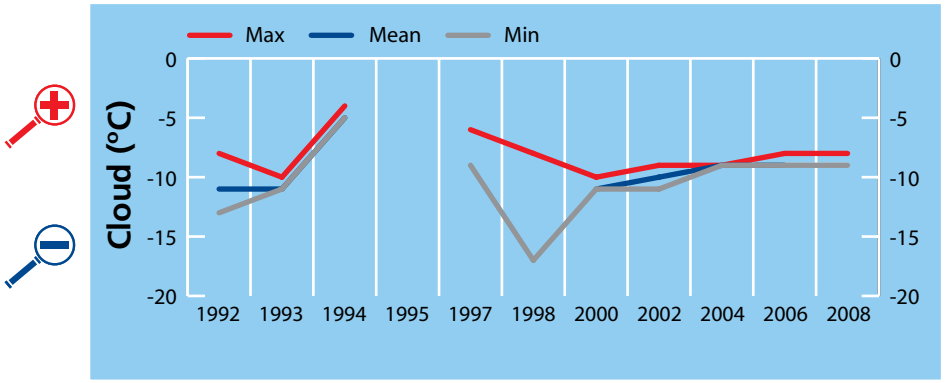


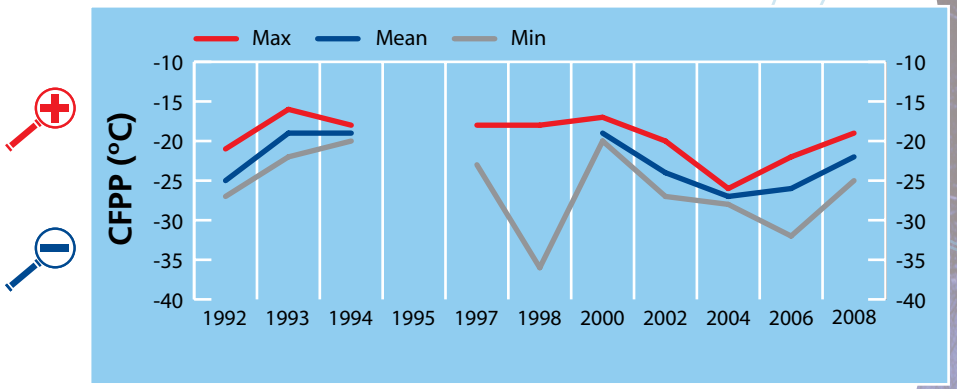
Czech Republic

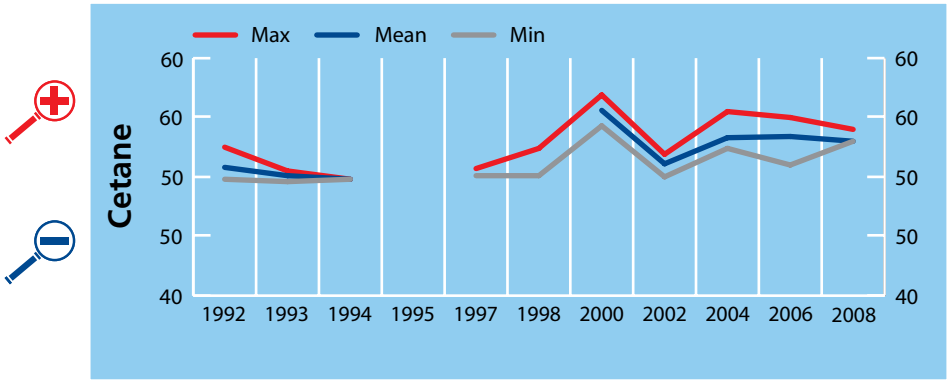
National Standards and physical inspection data

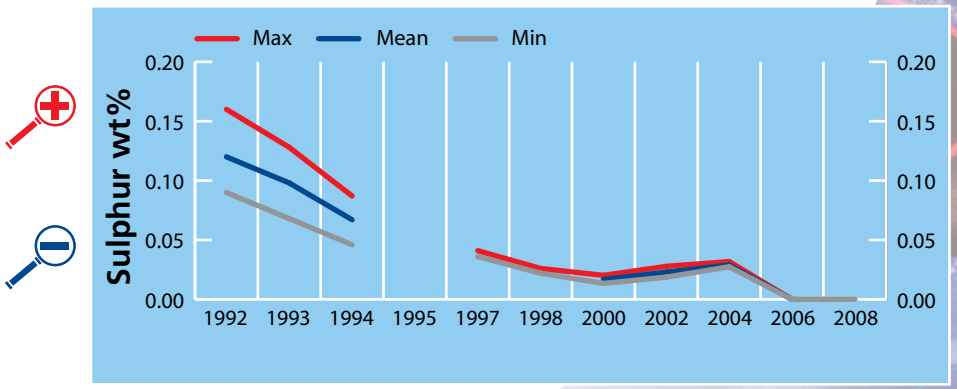
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801683	DIES 0801684
Cloud Point, °C	-8 (max)	-8	-8.5	-9	-9	-8
CFPP, °C	-20 (max)	-19	-22	-25	-25	-19
Pour Point, °C		-30	-30	-30	-30	-30
HFRR, µm	460 (max)	300	292	284	300	284
Wax Content @ 10°C Below Cloud, wt%		4.0	3.9	3.9	4.0	3.9
Sulphur, wt%	0.005 (max)	0.0033	0.0020	0.0006	0.0006	0.0033
Density @15°C, kg/m3	820 - 845	829.8	822.1	814.3	814.3	829.8
Viscosity @ 20°C, cSt		3.979	3.916	3.853	3.979	3.853
Viscosity @ 40°C, cSt	2.00 - 4.50	2.594	2.564	2.534	2.594	2.534
Cetane Index 2 Variable		59	58	57	59	57
Cetane Index 4 Variable	46 (min)	60	57	53	60	53
Cetane Number	51 (min)	54	53	53	53	54
Distillation, °C IBP		172	171	169	172	169
T_{10}		205	200	195	205	195
T_{20}		219	214	210	219	210
T_{50}		265	264	264	264	265
T_{90}		335	333	331	331	335
T_{95}	360 (max)	349	348	346	346	349
FBP		358	356	354	354	358
FAME?					Yes	Yes

Czech Republic - Key Trends







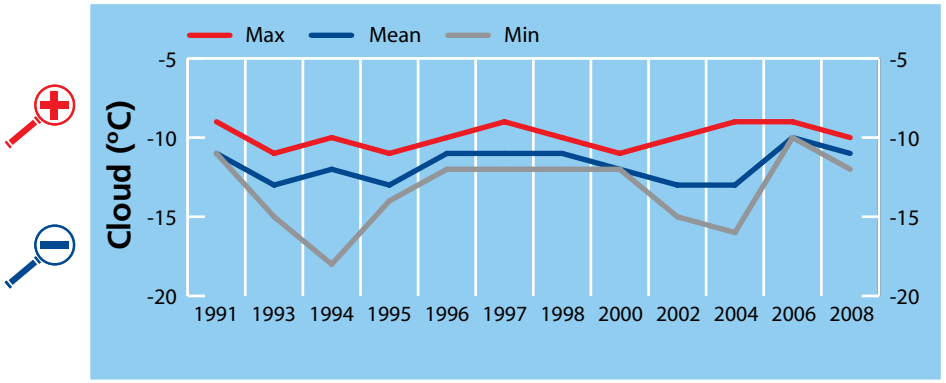


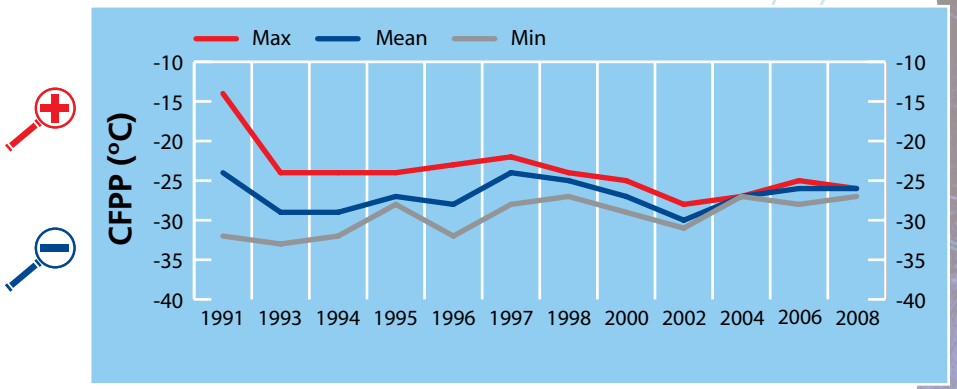
Denmark

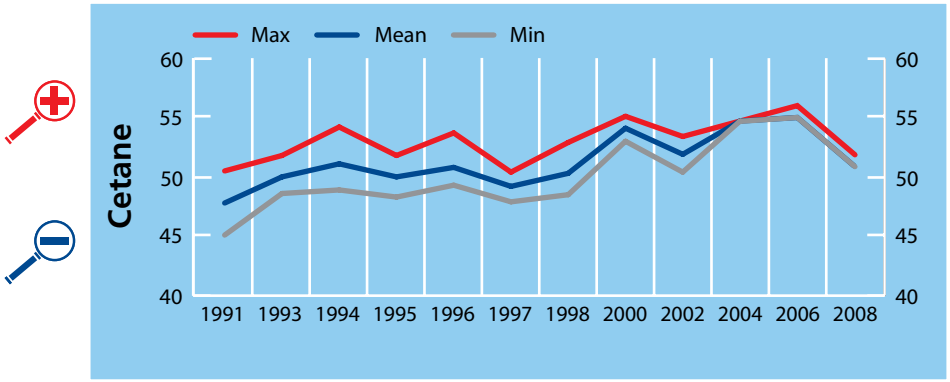
National Standards and physical inspection data

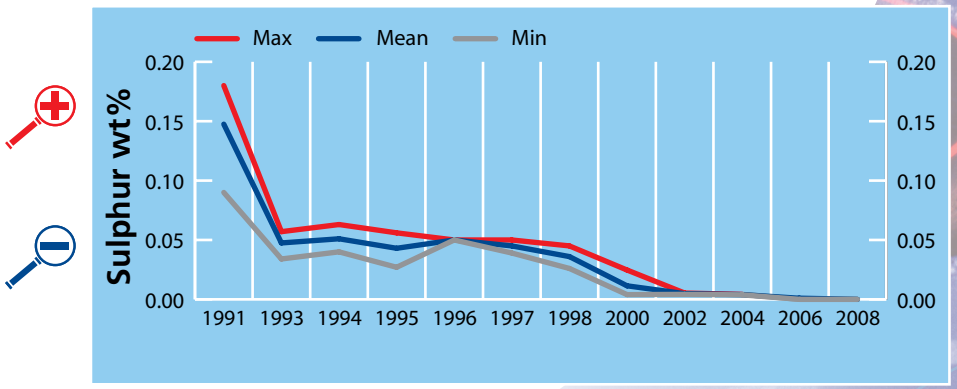
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802007	DIES 0802008	DIES 0802009
Cloud Point, °C		-10	-11	-12	-12	-10	-10
CFPP, °C	-24 (max)	-26	-26	-27	-26	-26	-27
Pour Point, °C		-39	-43	-48	-39	-42	-48
HFRR, µm	460 (max)	316	293	273	316	291	273
Wax Content @ 10°C Below Cloud, wt%		1.9	1.8	1.7	1.7	1.9	1.9
Sulphur, wt%	0.005 (max)	0.0010	0.0008	0.0007	0.0007	0.0010	0.0008
Density @15°C, kg/m3	820 - 845	841.0	839.6	837.5	837.5	841.0	840.4
Viscosity @ 20°C, cSt		4.424	4.202	3.770	3.770	4.424	4.412
Viscosity @ 40°C, cSt	2.00 - 4.50	2.825	2.709	2.487	2.487	2.825	2.815
Cetane Index 2 Variable		54	53	50	50	54	54
Cetane Index 4 Variable	46 (min)	50	50	49	49	50	50
Cetane Number	51 (min)	52	51	51	51	52	51
Distillation, °C IBP		164	161	158	162	164	158
T_{10}		199	197	196	196	199	196
T_{20}		218	214	212	212	218	214
T_{50}		273	268	259	259	273	272
T_{90}		337	333	327	327	337	336
T_{95}	360 (max)	352	349	343	343	352	352
FBP		362	357	350	350	362	358
FAME?					No	No	No

Denmark - Key Trends







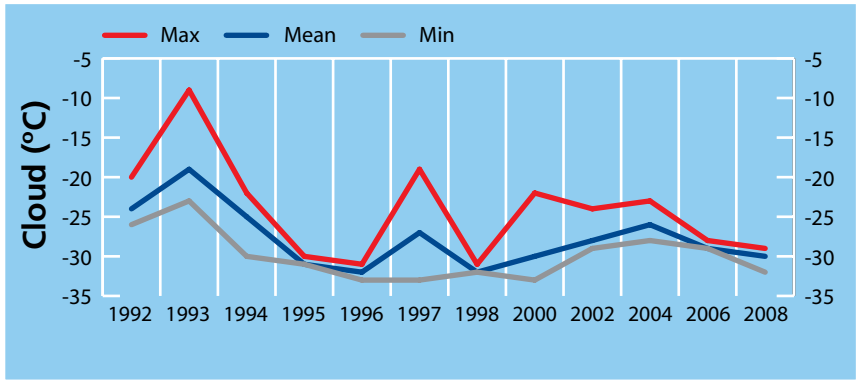


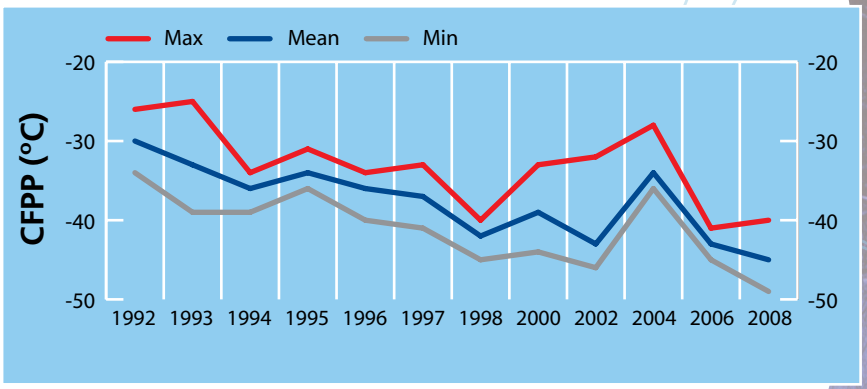
Finland

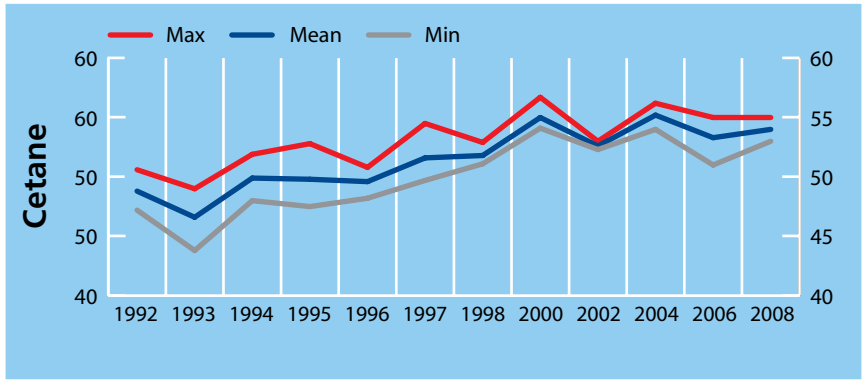
National Standards and physical inspection data

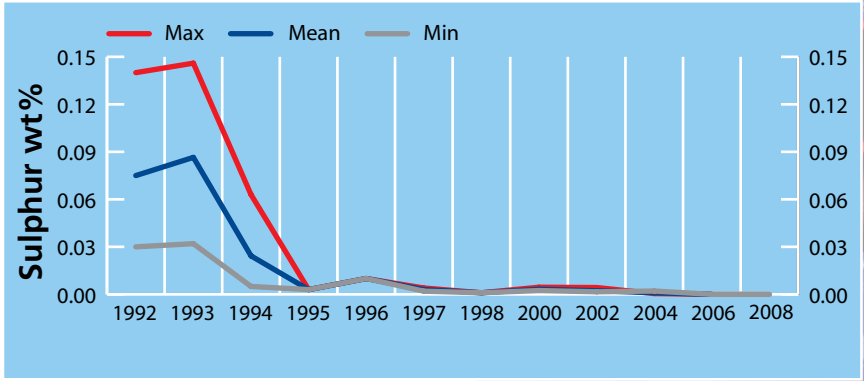
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801396	DIES 0801397	DIES 0801398	DIES 0801399	DIES 0801400	DIES 0801401
Cloud Point, °C	-29 (max)	-29	-30	-32	-30	-29	-29	-30	-32	-30
CFPP, °C	-34 (max)	-40	-45	-49	-46	-44	-46	-40	-49	-46
Pour Point, °C		-39	-40	-42	-39	-39	-42	-39	-39	-42
HFRR, µm	460 (max)	415	350	278	324	333	278	384	366	415
Wax Content @ 10°C Below Cloud, wt%		1.6	1.2	0.7	1.4	1.5	1.2	1.6	0.7	1.0
Sulphur, wt%	0.005 (max)	0.0005	0.0005	0.0004	0.0005	0.0005	0.0005	0.0005	0.0004	0.0004
Density @15°C, kg/m3	800 - 840	825.4	822.9	817.1	825.0	825.1	823.1	825.4	817.1	821.6
Viscosity @ 20°C, cSt		2.889	2.767	2.511	2.888	2.889	2.760	2.876	2.511	2.675
Viscosity @ 40°C, cSt	1.5 - 4.0	1.998	1.898	1.760	1.998	1.955	1.874	1.960	1.760	1.842
Cetane Index 2 Variable		51	50	48	48	51	50	51	50	50
Cetane Index 4 Variable	46 (min)	49	48	48	48	48	48	49	49	48
Cetane Number	51 (min)	55	54	53	54	55	54	55	53	54
Distillation, °C IBP		181	177	173	174	173	176	179	177	181
T_{10}	180 (min)	198	196	195	195	196	196	198	196	196
T_{20}		208	206	205	206	207	205	208	205	206
T_{50}		237	233	226	236	237	232	237	226	231
T_{90}		291	286	276	290	291	288	289	276	284
T_{95}	340 (max)	307	303	294	303	307	304	307	294	303
FBP		321	318	314	321	321	320	319	314	315
FAME?					No	No	No	No	No	No

Finland - Key Trends









France

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800663	DIES 0800664	DIES 0800665	DIES 0800666	DIES 0800667	DIES 0800668	DIES 0800669	DIES 0800670
Cloud Point, °C		-5	-7	-11	-6	-6	-7	-8	-6	-7	-6	-6
CFPP, °C	-15 (max)*	-15	-20	-28	-17	-20	-23	-22	-28	-18	-16	-16
Pour Point, °C		-18	-27	-39	-27	-30	-30	-39	-30	-30	-24	-30
HFRR, µm	460 (max)	324	242	206	208	207	306	231	284	206	236	215
Wax Content @ 10°C Below Cloud, wt%		2.7	2.0	1.3	2.0	1.9	1.7	1.6	1.6	2.0	2.7	2.6
Sulphur, wt%	0.005 (max)	0.0050	0.0027	0.0005	0.0045	0.0045	0.0007	0.0048	0.0017	0.0050	0.0040	0.0050
Density @15°C, kg/m3	820 - 845	843.6	831.8	821.3	840.9	839.5	826.2	827.1	829.0	829.8	827.1	826.8
Viscosity @ 20°C, cSt		4.601	3.684	3.230	3.903	3.796	3.515	3.230	3.623	3.412	3.500	3.630
Viscosity @ 40°C, cSt	2.00 - 4.50	2.909	2.423	2.204	2.570	2.502	2.352	2.204	2.407	2.299	2.323	2.395
Cetane Index 2 Variable		58	55	52	52	54	56	56	56	57	56	57
Cetane Index 4 Variable	46 (min)	55	52	48	50	49	52	51	51	52	52	53
Cetane Number	51 (min)	59	54	51	52	57	56	55	56	51	57	59
Distillation, °C IBP		176	165	151	151	161	161	157	161	158	164	167
T_{10}		214	196	179	194	193	192	179	192	185	195	198
T_{20}		235	213	196	215	213	208	196	208	202	210	213
T_{50}		280	261	252	273	267	253	252	257	261	256	259
T_{90}		336	331	322	336	334	327	331	333	332	325	326
T_{95}	360 (max)	354	345	337	348	346	346	341	352	342	337	340
FBP		364	355	347	356	357	355	352	361	353	352	347
FAME?					Yes	Yes	No	No	No	Yes	Yes	Yes

* Specification for Gazole-Hiver, Grand-Froid is -20˚C

France (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800671	DIES 0800672	DIES 0800673	DIES 0800674	DIES 0800675	DIES 0800676	DIES 0800678	DIES 0800679
Cloud Point, °C		-5	-7	-11	-6	-5	-9	-5	-6	-5	-5	-7
CFPP, °C	-15 (max)*	-15	-20	-28	-16	-15	-27	-19	-21	-21	-22	-17
Pour Point, °C		-18	-27	-39	-27	-27	-30	-18	-24	-30	-33	-21
HFRR, µm	460 (max)	324	242	206	212	290	207	220	227	287	303	207
Wax Content @ 10°C Below Cloud, wt%		2.7	2.0	1.3	2.6	2.7	1.3	2.0	1.8	1.6	1.4	1.6
Sulphur, wt%	0.005 (max)	0.0050	0.0027	0.0005	0.0040	0.0009	0.0040	0.0008	0.0005	0.0006	0.0006	0.0030
Density @15°C, kg/m3	820 - 845	843.6	831.8	821.3	826.7	821.3	836.6	840.1	829.1	829.1	829.1	837.9
Viscosity @ 20°C, cSt		4.601	3.684	3.230	3.586	3.615	3.401	3.973	3.968	2.332	2.328	2.450
Viscosity @ 40°C, cSt	2.00 - 4.50	2.909	2.423	2.204	2.387	2.362	2.276	2.557	2.517	2.332	2.328	2.450
Cetane Index 2 Variable		58	55	52	57	58	52	54	57	56	55	53
Cetane Index 4 Variable	46 (min)	55	52	48	54	55	48	50	54	51	51	49
Cetane Number	51 (min)	59	54	51	53	56	53	53	54	52	54	52
Distillation, °C IBP		176	165	151	173	171	162	170	163	163	159	176
T_{10}		214	196	179	198	200	192	204	200	187	186	203
T_{20}		235	213	196	213	216	207	222	218	204	202	217
T_{50}		280	261	252	260	258	254	271	267	256	254	260
T_{90}		336	331	322	327	324	330	335	333	335	335	332
T_{95}	360 (max)	354	345	337	341	341	346	349	348	354	354	348
FBP		364	355	347	352	350	354	361	355	364	362	358
FAME?					Yes	No	Yes	Yes	Yes	No	No	Yes

* Specification for Gazole-Hiver, Grand-Froid is -20˚C

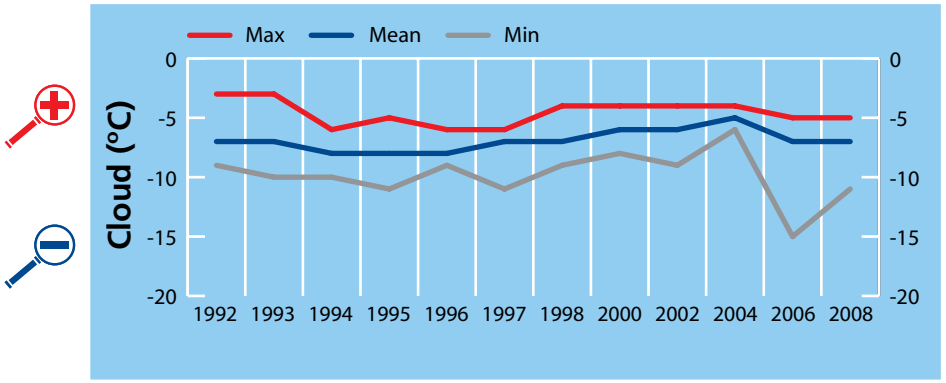
France (continued)

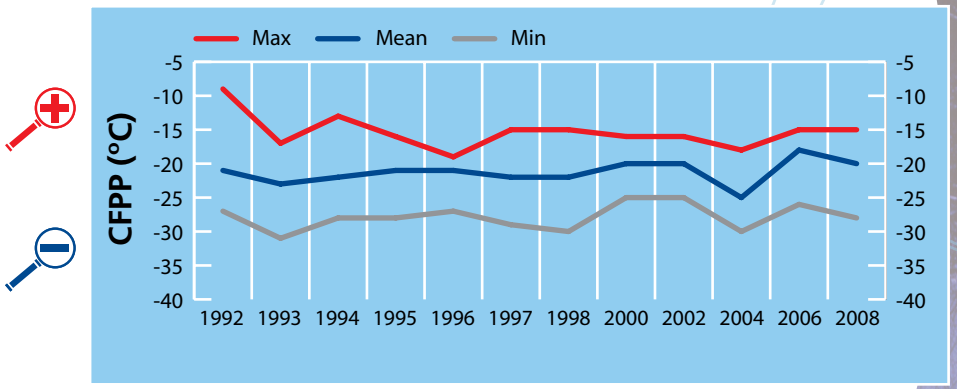
National Standards and physical inspection data

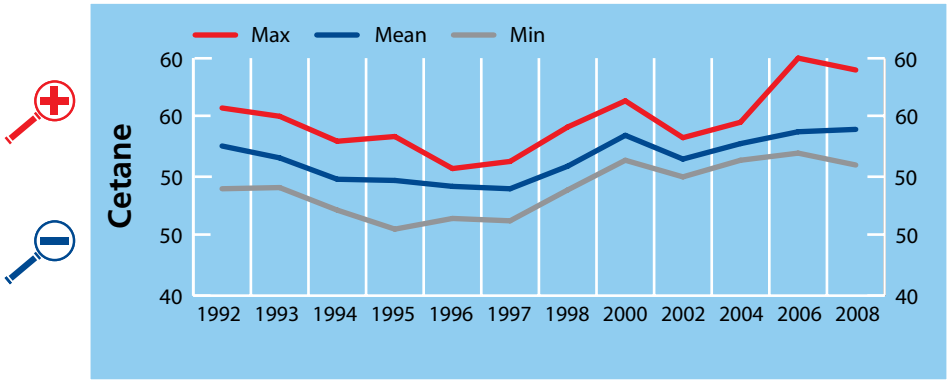
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800680	DIES 0800681	DIES 0800682	DIES 0800683	DIES 0800684	DIES 0800685
Cloud Point, °C		-5	-7	-11	-8	-6	-7	-7	-11	-9
CFPP, °C	-15 (max)*	-15	-20	-28	-22	-18	-17	-17	-16	-25
Pour Point, °C		-18	-27	-39	-27	-21	-24	-30	-24	-24
HFRR, µm	460 (max)	324	242	206	230	230	225	324	219	257
Wax Content @ 10°C Below Cloud, wt%		2.7	2.0	1.3	1.5	2.0	2.3	2.4	2.3	2.1
Sulphur, wt%	0.005 (max)	0.0050	0.0027	0.0005	0.0030	0.0030	0.0040	0.0007	0.0040	0.0010
Density @15°C, kg/m3	820 - 845	843.6	831.8	821.3	837.4	843.6	833.3	831.6	832.4	826.0
Viscosity @ 20°C, cSt		4.601	3.684	3.230	3.686	4.601	4.020	3.927	3.290	3.419
Viscosity @ 40°C, cSt	2.00 - 4.50	2.909	2.423	2.204	2.450	2.909	2.616	2.561	2.222	2.295
Cetane Index 2 Variable		58	55	52	53	54	57	57	54	56
Cetane Index 4 Variable	46 (min)	55	52	48	49	51	54	53	50	53
Cetane Number	51 (min)	59	54	51	56	54	53	53	54	55
Distillation, °C IBP		176	165	151	172	172	171	171	165	164
T_{10}		214	196	179	205	214	207	199	194	195
T_{20}		235	213	196	217	235	226	217	208	212
T_{50}		280	261	252	258	280	274	267	255	256
T_{90}		336	331	322	329	333	336	332	334	322
T_{95}	360 (max)	354	345	337	346	348	352	347	338	339
FBP		364	355	347	354	360	359	356	348	349
FAME?					Yes	Yes	Yes	No	Yes	Yes

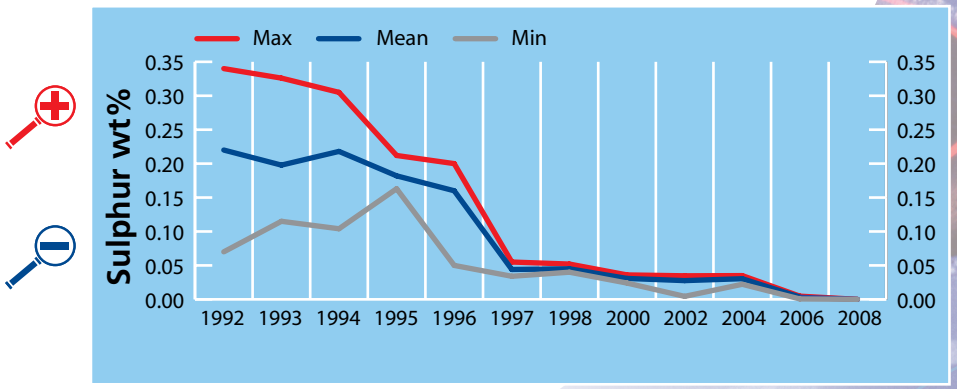
* Specification for Gazole-Hiver, Grand-Froid is -20˚C

France - Key Trends









Germany

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800419	DIES 0800420	DIES 0800421	DIES 0800422	DIES 0800423	DIES 0800424	DIES 0800633
Cloud Point, °C		-6	-8	-13	-8	-11	-8	-8	-6	-9	-7
CFPP, °C	-22 (max)	-24	-28	-35	-26	-24	-30	-32	-29	-24	-24
Pour Point, °C		-21	-29	-33	-24	-24	-30	-30	-33	-27	-30
HFRR, µm	460 (max)	394	226	187	336	241	221	219	394	232	234
Wax Content @ 10°C Below Cloud, wt%		2.5	1.8	1.2	1.6	2.3	1.5	1.3	1.9	2.5	2.2
Sulphur, wt%	0.001 (max)	0.0010	0.0007	<0.0003	0.0006	0.0006	0.0007	0.0007	<0.0003	<0.0003	0.0006
Density @15°C, kg/m3	820 - 845	840.1	833.3	823.5	838.7	823.5	830.4	836.4	828.0	840.1	830.1
Viscosity @ 20°C, cSt		5.385	4.118	3.197	4.594	4.276	3.961	4.050	5.129	5.108	3.343
Viscosity @ 40°C, cSt	2.00 - 4.50	3.298	2.641	2.143	2.892	2.709	2.544	2.600	3.129	3.156	2.243
Cetane Index 2 Variable		59	55	52	52	59	56	54	58	55	55
Cetane Index 4 Variable	46 (min)	59	53	49	52	59	53	51	59	54	50
Cetane Number	51 (min)	61	54	49	59	60	59	50	54	55	55
Distillation, °C IBP		204	172	140	182	176	173	169	204	202	168
T_{10}		237	208	188	219	216	204	206	235	230	193
T_{20}		319	227	202	235	235	218	221	247	241	206
T_{50}		284	265	242	270	273	264	265	275	276	252
T_{90}		337	330	313	329	322	331	333	324	330	328
T_{95}	360 (max)	352	345	330	347	338	346	348	340	343	342
FBP		361	354	344	356	348	353	356	347	351	351
FAME?					No	Yes	Yes	Yes	No	Yes	Yes

Germany (continued)

National Standards and physical inspection data

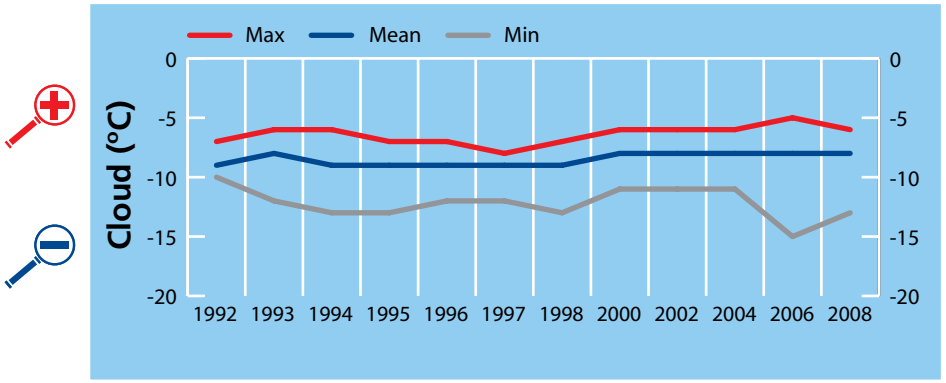
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800634	DIES 0800635	DIES 0800636	DIES 0800637	DIES 0800638	DIES 0800639	DIES 0800640	DIES 0800641
Cloud Point, °C		-6	-8	-13	-9	-10	-8	-9	-7	-8	-7	-8
CFPP, °C	-22 (max)	-24	-28	-35	-34	-35	-29	-25	-26	-30	-25	-28
Pour Point, °C		-26	-24	-30	-33	-33	-27	-33	-33	-30	-21	-27
HFRR, µm	460 (max)	394	226	187	213	204	199	205	211	206	206	207
Wax Content @ 10°C Below Cloud, wt%		2.5	1.8	1.2	1.5	1.7	1.3	2.1	2.1	2.3	1.7	1.7
Sulphur, wt%	0.001 (max)	0.0010	0.0007	<0.0003	0.0008	0.0003	0.0007	0.0008	0.0008	0.0007	0.0010	0.0005
Density @15°C, kg/m3	820 - 845	840.1	833.3	823.5	833.5	837.0	836.3	830.7	835.8	829.3	835.1	837.3
Viscosity @ 20°C, cSt		5.385	4.118	3.197	4.189	3.650	4.036	3.812	4.160	3.419	3.882	5.385
Viscosity @ 40°C, cSt	2.00 - 4.50	3.298	2.641	2.143	2.685	2.406	2.585	2.520	2.671	2.265	2.520	3.298
Cetane Index 2 Variable		59	55	52	56	53	54	57	56	55	54	56
Cetane Index 4 Variable	46 (min)	59	53	49	53	49	51	53	52	51	51	57
Cetane Number	51 (min)	61	54	49	59	49	52	53	50	51	53	61
Distillation, °C IBP		204	172	140	175	162	173	169	169	166	176	175
T_{10}		237	208	188	211	196	206	203	205	194	205	237
T_{20}		319	227	202	225	211	221	218	213	208	218	252
T_{50}		284	265	242	267	257	265	266	269	255	261	284
T_{90}		337	330	313	334	328	334	329	335	327	330	336
T_{95}	360 (max)	352	345	330	348	341	350	341	349	340	345	350
FBP		361	354	344	356	349	358	350	357	349	355	359
FAME?					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

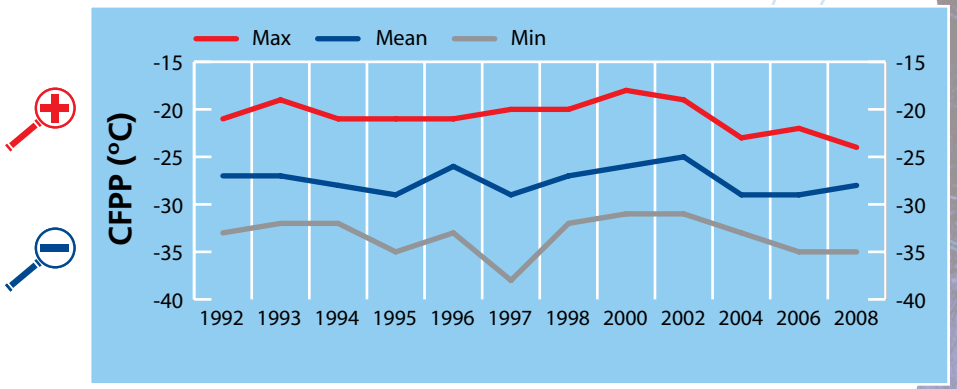
Germany (continued)

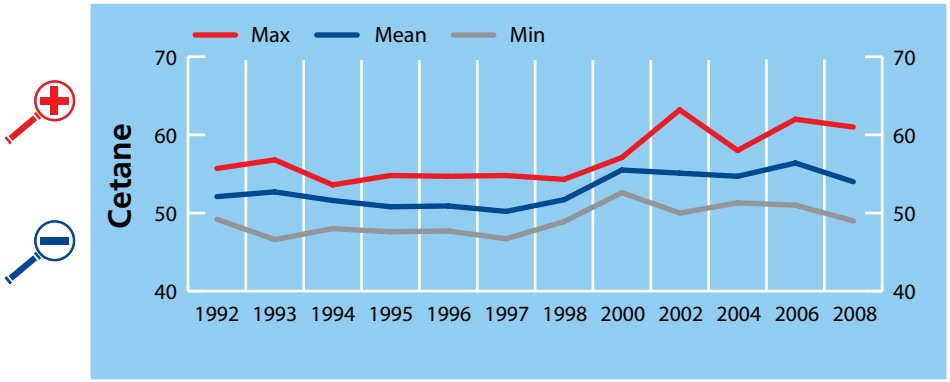
National Standards and physical inspection data

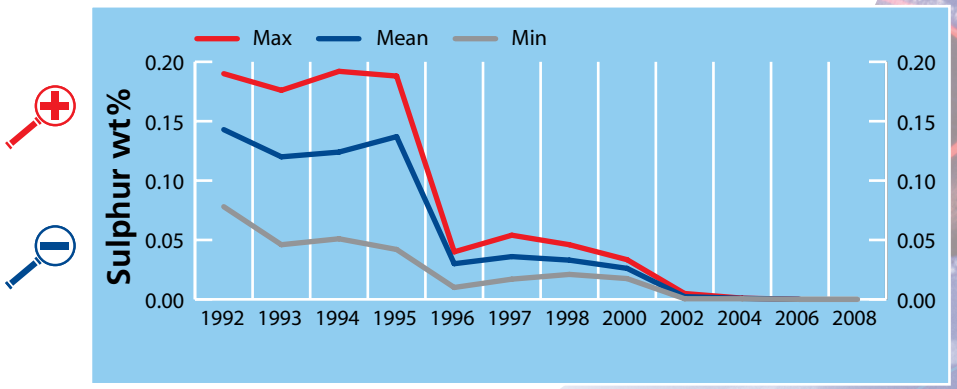
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800642	DIES 0800643	DIES 0800644	DIES 0800645	DIES 0800646	DIES 0800647	DIES 0800648	DIES 0800649
Cloud Point, °C		-6	-8	-13	-7	-7	-8	-8	-7	-8	-13	-8
CFPP, °C	-22 (max)	-24	-28	-35	-26	-28	-29	-29	-28	-26	-26	-30
Pour Point, °C		-26	-24	-30	-27	-30	-27	-27	-27	-30	-30	-30
HFRR, µm	460 (max)	394	226	187	211	193	200	187	283	211	196	210
Wax Content @ 10°C Below Cloud, wt%		2.5	1.8	1.2	1.5	1.7	1.3	2.1	2.1	2.3	1.7	1.7
Sulphur, wt%	0.001 (max)	0.0010	0.0007	<0.0003	0.0008	0.0008	0.0006	0.0009	0.0006	0.0007	0.0008	0.0007
Density @15°C, kg/m3	820 - 845	840.1	833.3	823.5	837.2	837.1	835.0	834.3	837.5	827.9	825.7	830.0
Viscosity @ 20°C, cSt		5.385	4.118	3.197	4.275	4.341	5.137	4.181	3.861	3.226	3.197	3.494
Viscosity @ 40°C, cSt	2.00 - 4.50	3.298	2.641	2.143	2.731	2.762	3.186	2.674	2.552	2.164	2.143	2.315
Cetane Index 2 Variable		59	55	52	55	55	57	56	54	53	55	55
Cetane Index 4 Variable	46 (min)	59	53	49	52	52	57	53	50	49	51	51
Cetane Number	51 (min)	61	54	49	53	52	56	55	54	52	53	52
Distillation, °C IBP		204	172	140	175	174	140	179	175	155	152	168
T_{10}		237	208	188	210	209	229	210	204	188	190	195
T_{20}		319	227	202	226	225	248	224	319	202	206	210
T_{50}		284	265	242	271	271	283	268	263	242	251	256
T_{90}		337	330	313	333	335	337	334	334	325	313	326
T_{95}	360 (max)	352	345	330	348	349	352	349	351	342	330	338
FBP		361	354	344	356	357	358	356	361	356	344	350
FAME?					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Germany - Key Trends







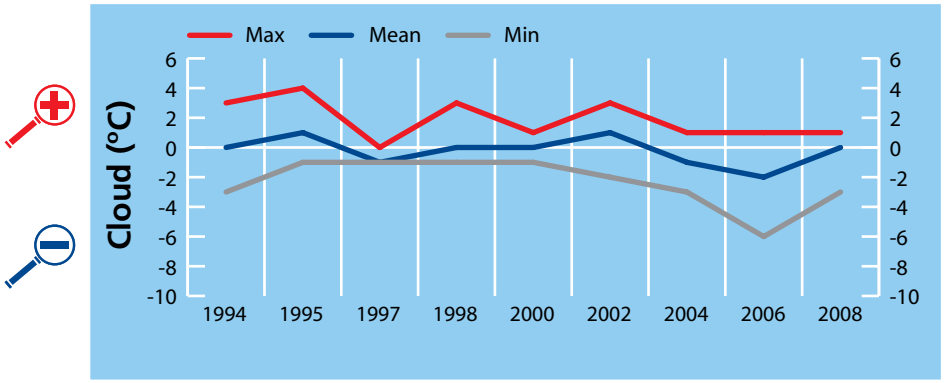


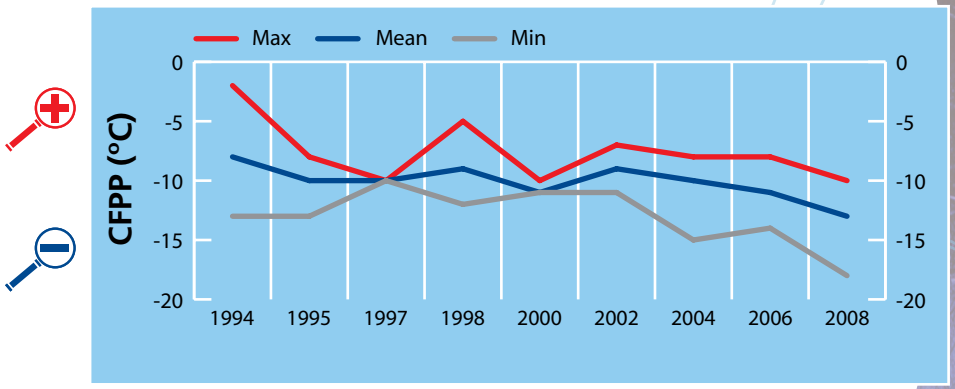
Greece

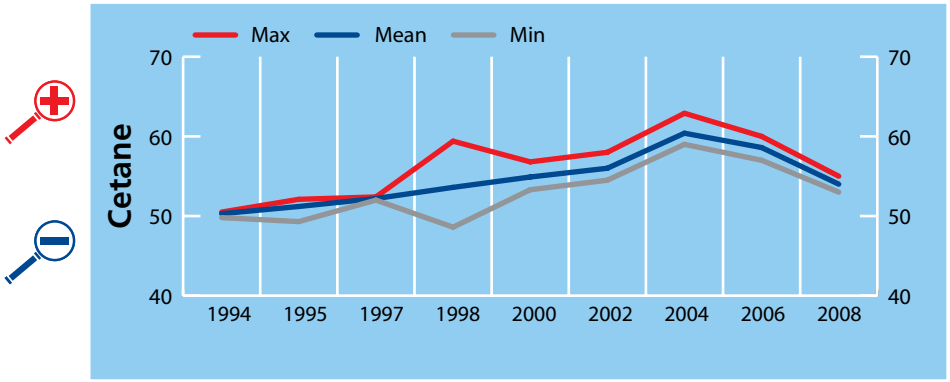
National Standards and physical inspection data

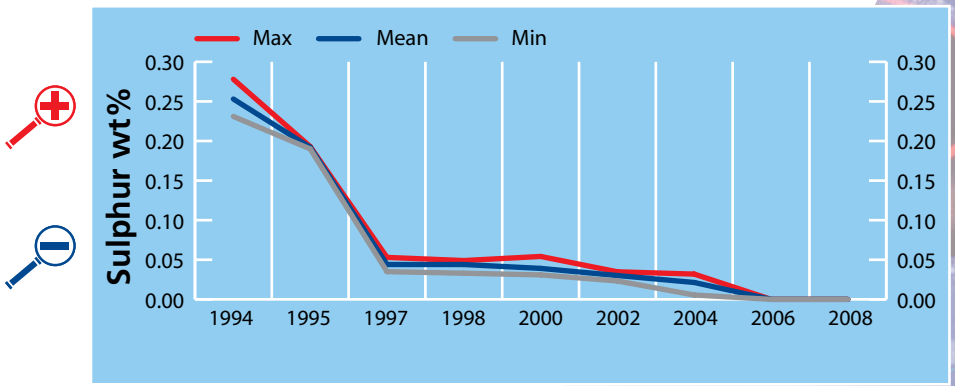
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802201	DIES 0802202	DIES 0802203	DIES 0802204
Cloud Point, °C		1	0	-3	0	-3	1	1
CFPP, °C	-5 (max)	-10	-13	-18	-12	-18	-11	-10
Pour Point, °C		-9	-13	-18	-12	-18	-12	-9
HFRR, µm	460 (max)	341	299	255	261	255	338	341
Wax Content @ 10°C Below Cloud, wt%		2.8	2.0	1.1	1.8	1.1	2.1	2.8
Sulphur, wt%	0.005 (max)	0.0035	0.0029	0.0012	0.0035	0.0012	0.0034	0.0035
Density @15°C, kg/m3	820 - 845	837.1	831.2	825.8	833.1	837.1	828.9	825.8
Viscosity @ 20°C, cSt		4.702	4.260	3.937	4.275	4.702	3.937	4.125
Viscosity @ 40°C, cSt	2.00 - 4.50	2.989	2.811	2.314	2.975	2.965	2.989	2.314
Cetane Index 2 Variable		59	56	55	55	55	57	59
Cetane Index 4 Variable	46 (min)	56	54	53	54	53	54	56
Cetane Number	51 (min)	55	54	53	54	55	54	53
Distillation, °C IBP		176	168	165	167	176	165	166
T_{10}		216	206	200	205	216	200	202
T_{20}		233	224	216	227	233	216	221
T_{50}		275	271	267	275	274	267	269
T_{90}		340	336	332	338	340	334	332
T_{95}	360 (max)	360	353	344	356	360	353	344
FBP		368	367	364	368	368	367	364
FAME?					Yes	Yes	No	No

Greece - Key Trends







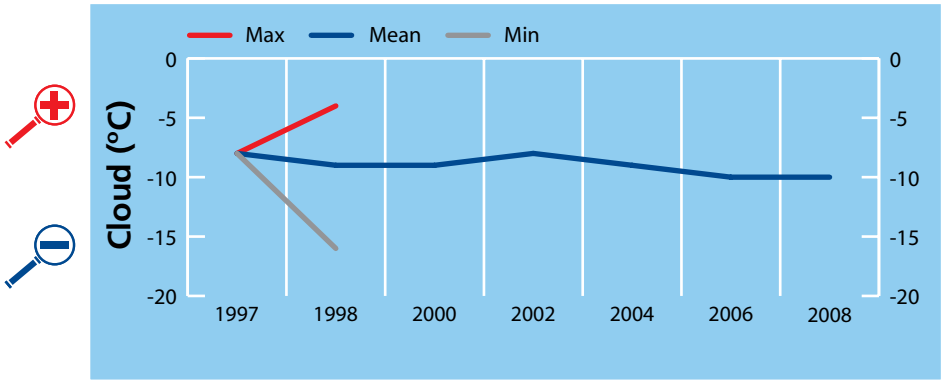


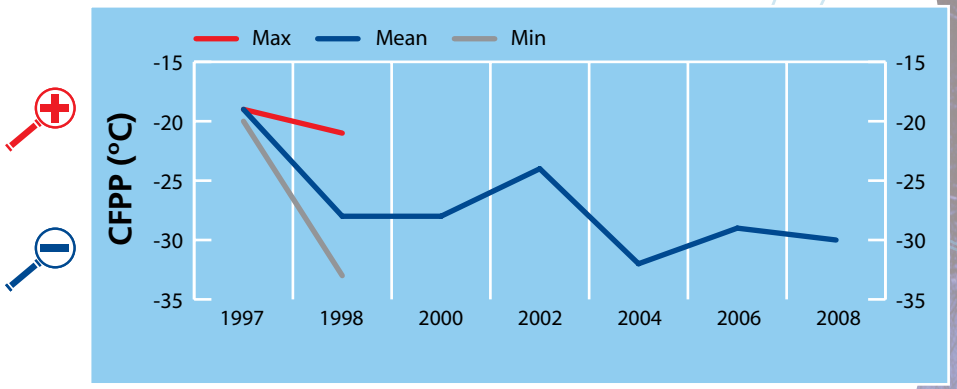
Hungary

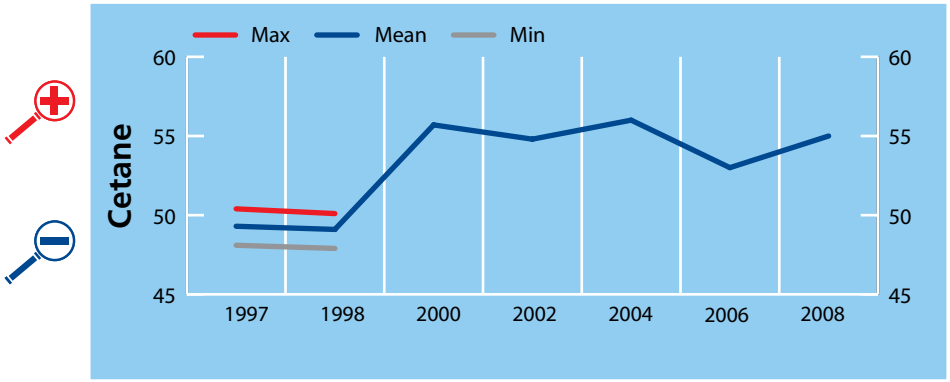
National Standards and physical inspection data

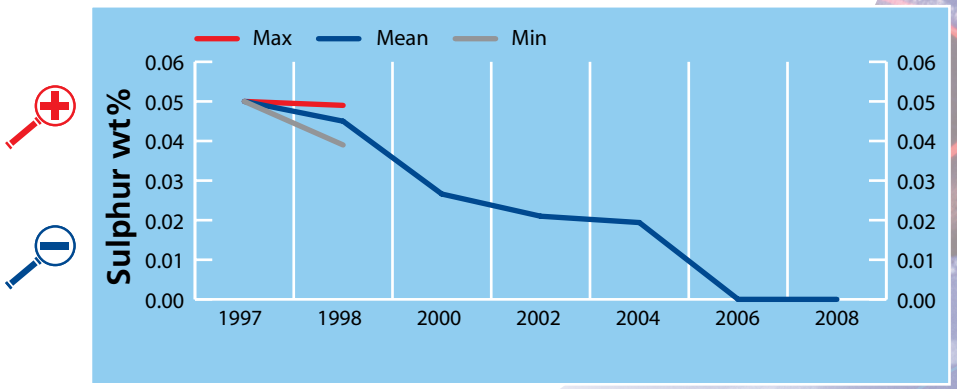
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800604
Cloud Point, °C			-10		-10
CFPP, °C	-20 (max)		-30		-30
Pour Point, °C			-30		-30
HFRR, µm	460 (max)		230		230
Wax Content @ 10°C Below Cloud, wt%			1.4		1.4
Sulphur, wt%	0.005 (max)		0.0007		0.0007
Density @15°C, kg/m3	820 - 845		839.6		839.6
Viscosity @ 20°C, cSt			4.599		4.599
Viscosity @ 40°C, cSt	2.00 - 4.50		2.899		2.899
Cetane Index 2 Variable			52		52
Cetane Index 4 Variable	46 (min)		52		52
Cetane Number	51 (min)		55		55
Distillation, °C IBP			188		188
T_{10}			216		216
T_{20}			232		232
T_{50}			273		273
T_{90}			334		334
T_{95}	360 (max)		346		346
FBP			359		359
FAME?					Yes

Hungary - Key Trends







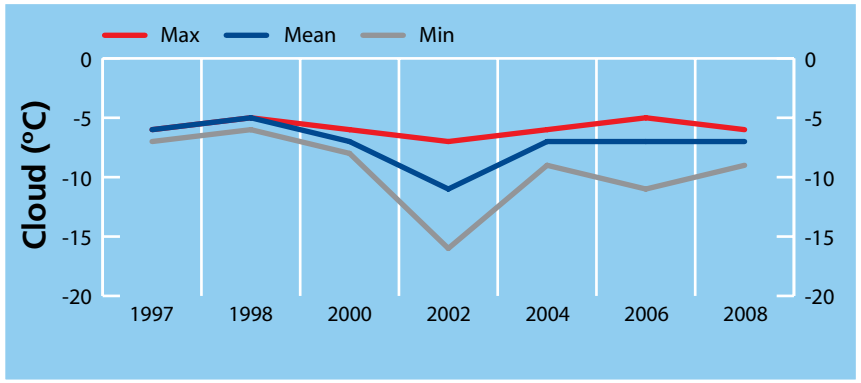


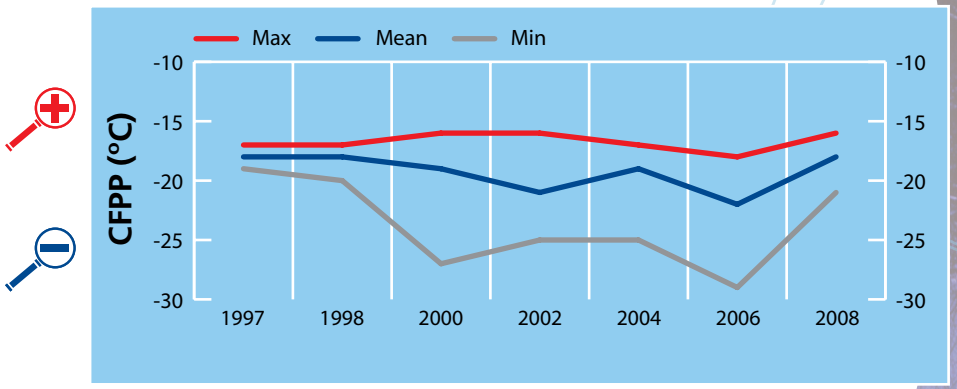
Ireland

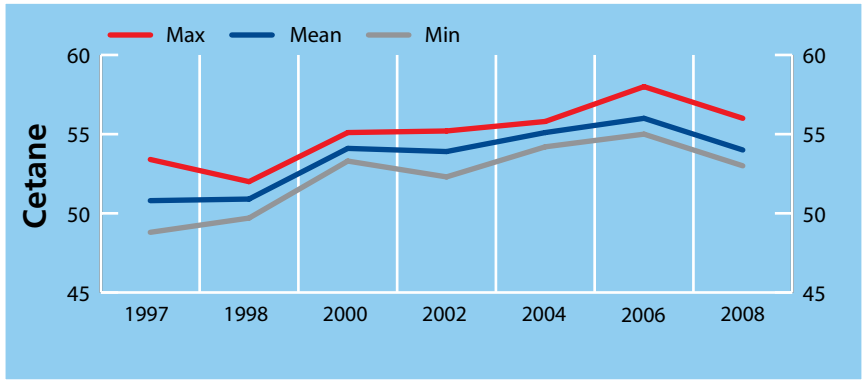
National Standards and physical inspection data

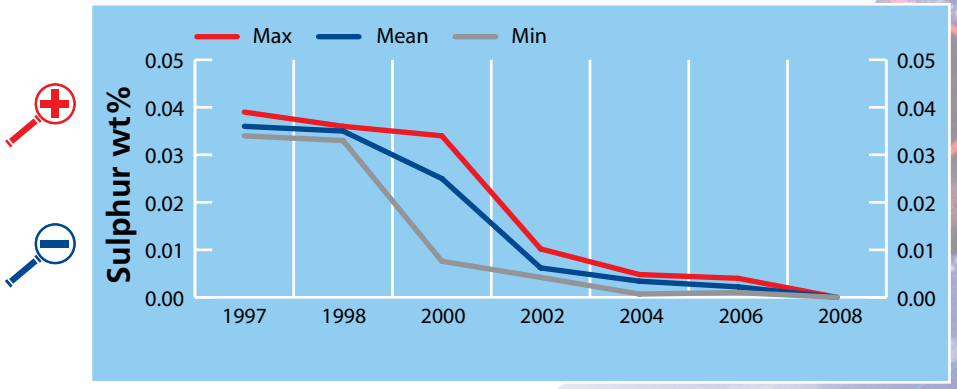
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800985	DIES 0800986	DIES 0800987	DIES 0800988	DIES 0800989	DIES 0800990	DIES 0800991	DIES 0800992
Cloud Point, °C		-6	-7	-9	-9	-7	-6	-6	-6	-7	-7	-6
CFPP, °C	-15 (max)	-16	-18	-21	-21	-16	-17	-20	-19	-18	-17	-18
Pour Point, °C		-21	-24	-27	-21	-24	-24	-24	-24	-21	-24	-27
HFRR, µm	460 (max)	406	356	229	360	358	354	379	229	396	406	366
Wax Content @ 10°C Below Cloud, wt%		2.9	2.4	1.9	2.1	2.9	2.7	2.1	1.9	2.3	2.7	2.1
Sulphur, wt%	0.005 (max)	0.0046	0.0028	0.0013	0.0030	0.0013	0.0020	0.0042	0.0042	0.0013	0.0017	0.0046
Density @15°C, kg/m3	820 - 845	838.8	831.7	826.5	837.3	826.5	829.5	831.1	833.0	838.8	827.6	829.8
Viscosity @ 20°C, cSt		4.475	3.961	3.603	4.211	3.921	3.986	3.767	3.791	4.475	3.932	3.603
Viscosity @ 40°C, cSt	2.00 - 4.50	2.800	2.540	2.360	2.661	2.513	2.556	2.426	2.465	2.800	2.538	2.360
Cetane Index 2 Variable		58	55	51	51	58	57	55	56	54	58	55
Cetane Index 4 Variable	46 (min)	54	52	51	51	54	53	51	51	52	54	51
Cetane Number	51 (min)	56	54	53	54	56	55	54	54	53	55	54
Distillation, °C IBP		171	165	159	169	161	159	164	164	171	163	166
T_{10}		214	198	191	208	192	191	196	197	214	195	193
T_{20}		231	216	210	226	211	211	213	214	231	214	210
T_{50}		269	264	258	267	265	266	259	263	269	267	258
T_{90}		333	330	328	328	329	331	330	333	329	331	330
T_{95}	360 (max)	347	346	343	345	343	346	346	347	347	345	346
FBP		357	355	352	355	352	356	356	356	357	354	356
FAME?					No	No	No	No	Yes	No	No	No

Ireland - Key Trends









Italy

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802196	DIES 0802197	DIES 0802199	DIES 0802218	DIES 0802224	DIES 0802225	DIES 0802247	DIES 0802248
Cloud Point, °C		0	-3	-9	0	-1	-2	-2	-6	-4	0	-2
CFPP, °C	-12 (max)*	-11	-15	-23	-14	-18	-14	-15	-13	-14	-13	-16
Pour Point, °C		-12	-21	-30	-18	-21	-12	-24	-18	-21	-15	-21
HFRR, µm	460 (max)	417	294	200	330	324	219	359	218	349	417	285
Wax Content @ 10°C Below Cloud, wt%		2.9	2.0	1.4	2.8	2.1	2.3	1.5	1.5	2.5	2.9	2.2
Sulphur, wt%	0.005 (max)**	0.0045	0.0030	0.0012	0.0034	0.0027	0.0029	0.0023	0.0024	0.0027	0.0030	0.0021
Density @15°C, kg/m3	820 - 845	842.8	831.8	825.9	832.7	833.9	835.3	834.0	829.9	833.5	827.8	828.0
Viscosity @ 20°C, cSt		4.979	4.011	3.384	4.341	4.645	4.767	3.927	3.468	3.858	3.769	3.671
Viscosity @ 40°C, cSt	2.00 - 4.50	3.114	2.605	2.290	2.792	2.941	3.002	2.527	2.320	2.528	2.454	2.457
Cetane Index 2 Variable		58	56	53	53	56	57	54	54	55	56	57
Cetane Index 4 Variable	46 (min)	55	52	50	53	54	55	50	51	51	53	53
Cetane Number	51 (min)	59	55	52	55	56	55	55	55	55	54	57
Distillation, °C IBP		187	168	151	179	187	184	178	168	167	167	163
T_{10}		220	200	186	208	217	220	199	199	201	198	192
T_{20}		237	215	202	222	230	236	212	212	215	212	208
T_{50}		282	264	253	268	271	278	257	253	260	259	262
T_{90}		346	339	328	342	340	342	339	328	331	336	338
T_{95}	360 (max)	360	355	345	359	356	358	355	346	345	354	355
FBP		371	366	360	367	367	370	370	360	361	365	364
FAME?					No	No	Yes	No	Yes	No	No	Yes

* -16 /-18 CFPP is used for Northern areas **0.001 (max) sulphur fuels are also available in most areas

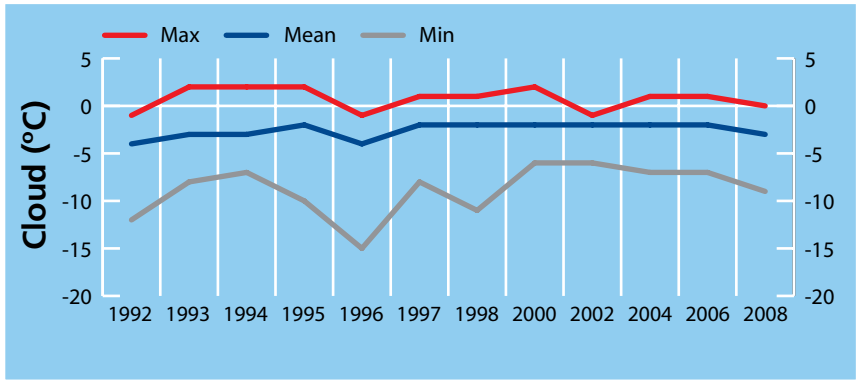
Italy (continued)

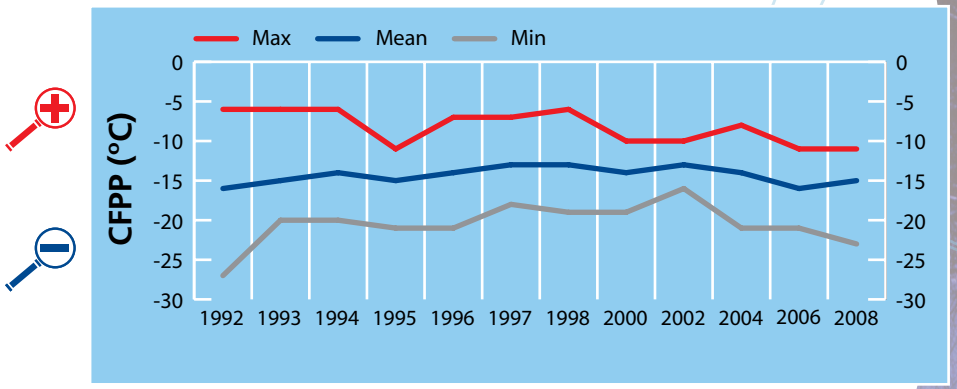
National Standards and physical inspection data

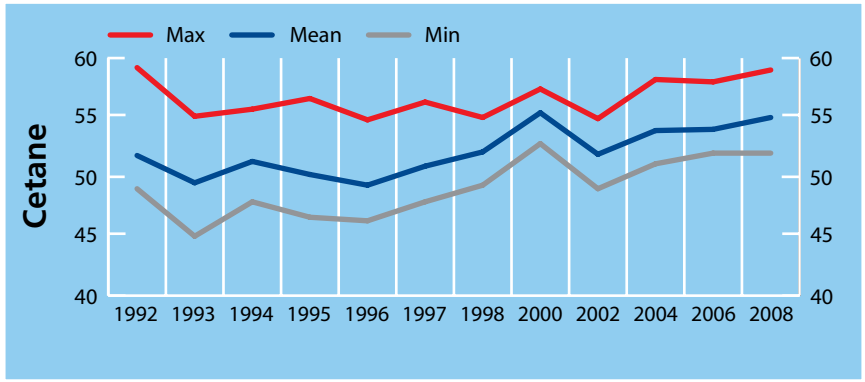
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802249	DIES 0802250	DIES 0802251	DIES 0802256	DIES 0802257	DIES 0802263	DIES 0802264
Cloud Point, °C		0	-3	-9	-9	-1	-3	-1	-3	-3	-2
CFPP, °C	-12 (max)*	-11	-15	-23	-23	-14	-16	-11	-16	-14	-18
Pour Point, °C		-12	-21	-30	-30	-21	-30	-18	-27	-18	-18
HFRR, µm	460 (max)	417	294	200	220	303	383	296	260	250	200
Wax Content @ 10°C Below Cloud, wt%		2.9	2.0	1.4	1.4	1.7	1.8	2.2	1.6	2.3	1.9
Sulphur, wt%	0.005 (max)**	0.0045	0.0030	0.0012	0.0041	0.0039	0.0023	0.0043	0.0045	0.0012	0.0038
Density @15°C, kg/m3	820 - 845	842.8	831.8	825.9	829.6	827.6	834.3	834.1	827.6	825.9	842.8
Viscosity @ 20°C, cSt		4.979	4.011	3.384	3.771	3.668	3.750	4.403	3.767	3.384	4.979
Viscosity @ 40°C, cSt	2.00 - 4.50	3.114	2.605	2.290	2.494	2.437	2.455	2.792	2.475	2.290	3.114
Cetane Index 2 Variable		58	56	53	57	56	55	57	57	58	55
Cetane Index 4 Variable	46 (min)	55	52	50	51	52	50	53	53	53	52
Cetane Number	51 (min)	59	55	52	59	55	55	55	54	56	52
Distillation, °C IBP		187	168	151	159	168	151	170	165	157	160
T_{10}		220	200	186	187	198	190	201	195	186	211
T_{20}		237	215	202	259	256	260	274	259	261	282
T_{50}		282	264	253	341	336	342	346	338	338	342
T_{90}		346	339	328	342	340	342	339	328	331	336
T_{95}	360 (max)	360	355	345	358	350	357	360	353	356	359
FBP		371	366	360	369	369	368	371	366	363	368
FAME?					Yes	No	No	Yes	No	Yes	Yes

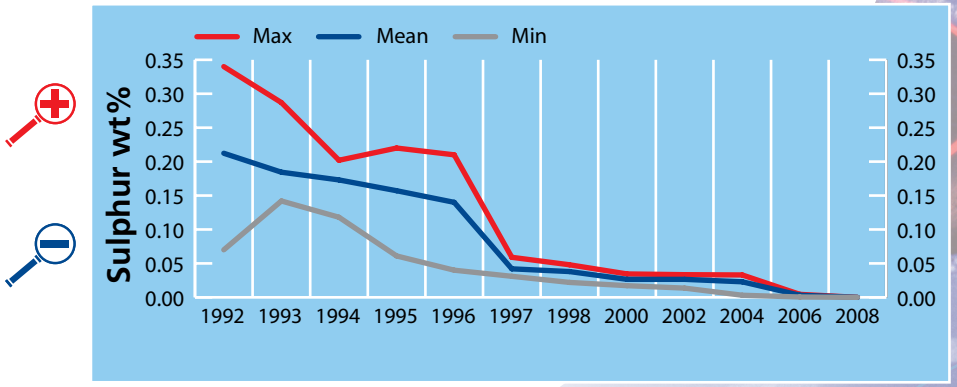
* -16 /-18 CFPP is used for Northern areas **0.001 (max) sulphur fuels are also available in most areas

Italy - Key Trends









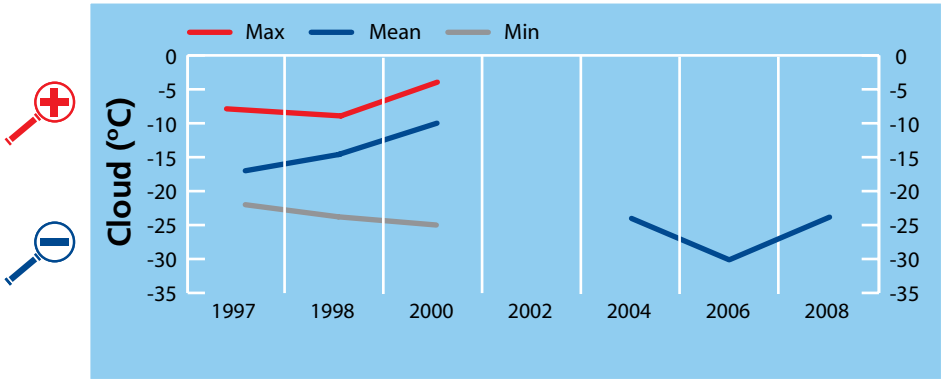
Lithuania

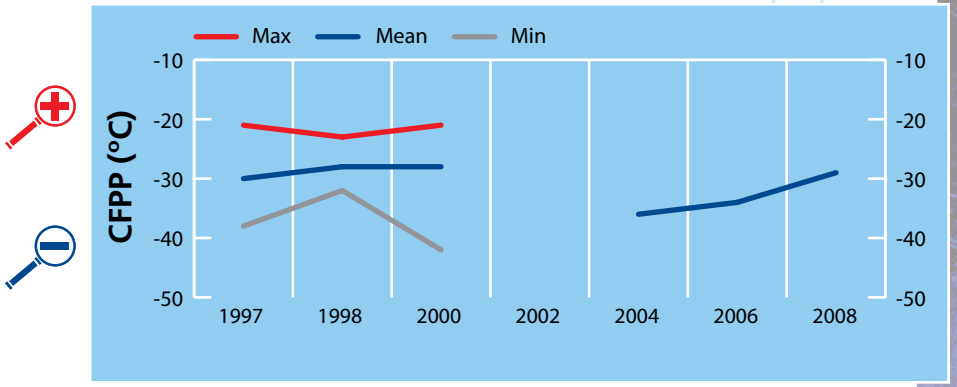
National Standards and physical inspection data

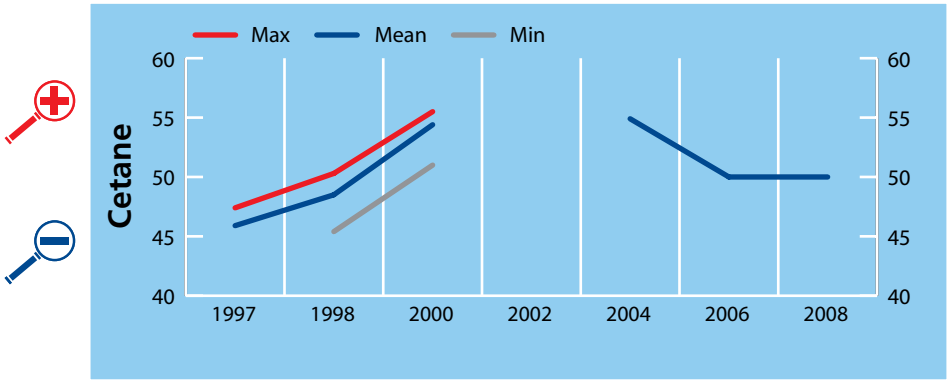
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802013	DIES 0802014
Cloud Point, °C	-22 (max)		-24		-31	-17
CFPP, °C	-32 (max)		-39		-41	-38
Pour Point, °C			-33		-33	-33
HFRR, µm	460 (max)		311		374	248
Wax Content @ 10°C Below Cloud, wt%			0.9		0.9	0.8
Sulphur, wt%	0.005 (max)		0.0005		0.0004	0.0006
Density @15°C, kg/m3	840 (max)		834.3		831.8	836.7
Viscosity @ 20°C, cSt			2.970		2.812	3.128
Viscosity @ 40°C, cSt			2.014		1.930	2.098
Cetane Index 2 Variable			48		47	50
Cetane Index 4 Variable			47		47	47
Cetane Number	48 (min)		50		52	49
Distillation, °C IBP			165		164	165
T_{10}			197		196	199
T_{20}			210		208	212
T_{50}			244		240	248
T_{90}			302		290	313
T_{95}			321		310	332
FBP			333		324	342
FAME?					No	Yes

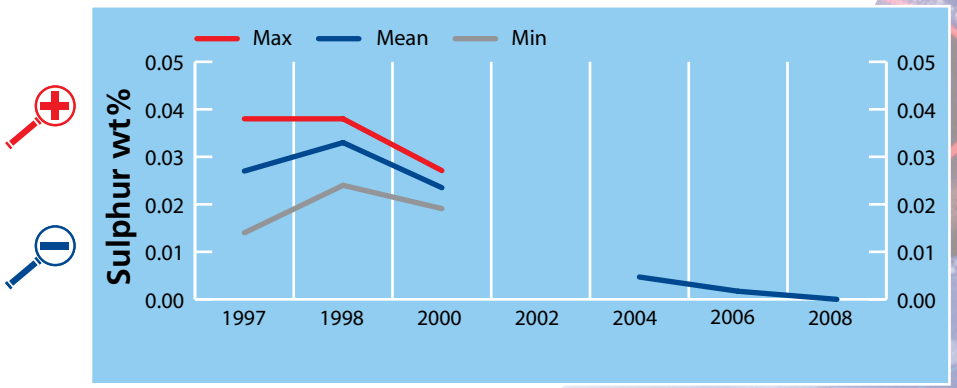
Specification for Artic Diesel Class II

Lithuania - Key Trends









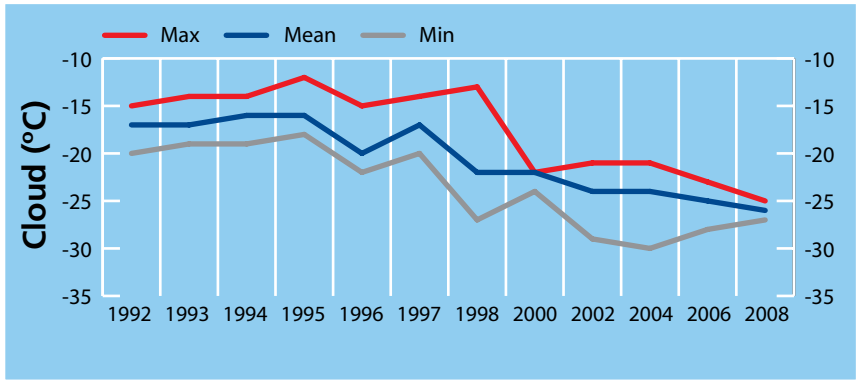
Norway

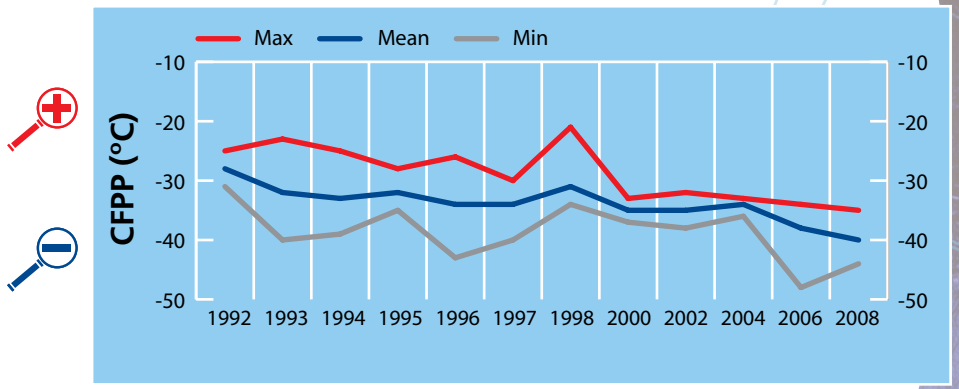
National Standards and physical inspection data

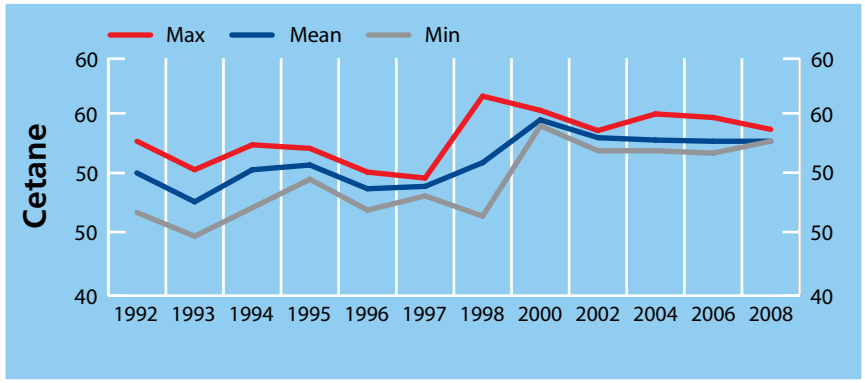
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801602	DIES 0801388	DIES 0801389	DIES 0801395
Cloud Point, °C	-22 (max)	-25	-26	-27	-25	-26	-27	-25
CFPP, °C	-32 (max)	-35	-40	-44	-40	-44	-43	-35
Pour Point, °C		-45	-50	-57	-45	-51	-48	-57
HFRR, µm	460 (max)	279	241	216	216	225	279	246
Wax Content @ 10°C Below Cloud, wt%		2.1	1.4	0.8	1.4	0.8	1.2	2.1
Sulphur, wt%	0.005 (max)	0.0008	0.0007	<0.0003	0.0008	0.0008	0.0006	<0.0003
Density @15°C, kg/m3	800 - 840	839.1	834.8	831.3	836.5	832.4	831.3	839.1
Viscosity @ 20°C, cSt		3.361	3.250	3.032	3.262	3.361	3.032	3.343
Viscosity @ 40°C, cSt	1.5 - 4.0	2.191	2.112	2.028	2.187	2.043	2.028	2.191
Cetane Index 2 Variable		51	49	46	46	50	50	51
Cetane Index 4 Variable	46 (min)	47	47	46	46	47	47	47
Cetane Number	51 (min)	54	53	53	53	54	54	53
Distillation, °C IBP		182	174	171	182	171	172	172
T_{10}	180 (min)	204	198	191	204	191	197	199
T_{20}		216	210	204	213	204	209	216
T_{50}		254	244	240	242	240	241	254
T_{90}		314	306	303	304	314	303	305
T_{95}	340 (max)	330	322	317	318	330	317	322
FBP		342	335	328	328	342	332	338
FAME?					Yes	Yes	Yes	No

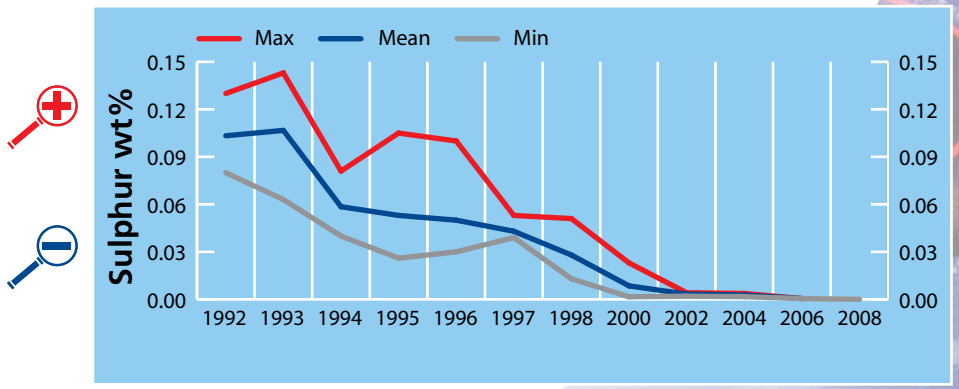
Specification shown is Norwegian Artic Class II

Norway - Key Trends









Poland

National Standards and physical inspection data

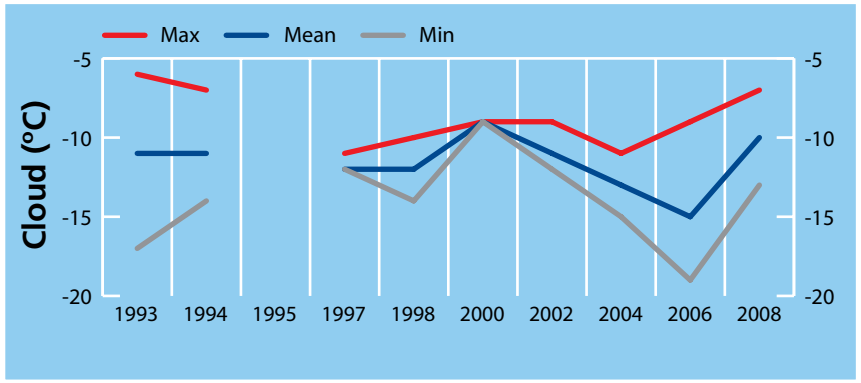
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801513	DIES 0801514	DIES 0801515	DIES 0801516	DIES 0801517
Cloud Point, °C		-7	-10	-13	-9	-12	-7	-9	-12
CFPP, °C	-20 (max)	-24	-29	-32	-25	-31	-31	-30	-33
Pour Point, °C		-27	-36	-51	-27	-39	-33	-51	-33
HFRR, µm	460 (max)	416	272	217	416	237	257	234	217
Wax Content @ 10°C Below Cloud, wt%		2.1	1.8	1.7	2.1	1.7	1.7	1.8	1.7
Sulphur, wt%	0.005 (max)	0.0023	0.0008	0.0005	0.0006	0.0005	0.0023	0.0007	0.0005
Density @15°C, kg/m3	820 - 845	836.2	834.1	830.9	830.9	836.1	832.2	830.9	835.7
Viscosity @ 20°C, cSt		4.532	4.236	4.088	4.199	4.234	4.298	4.532	4.154
Viscosity @ 40°C, cSt	2.00 - 4.50	2.896	2.723	2.636	2.700	2.714	2.788	2.896	2.682
Cetane Index 2 Variable		58	56	54	54	55	57	58	55
Cetane Index 4 Variable	46 (min)	56	53	52	54	52	54	56	52
Cetane Number	51 (min)	57	54	51	57	53	55	56	52
Distillation, °C IBP		180	171	157	179	167	178	180	166
T_{10}		214	211	208	211	210	211	214	210
T_{20}		230	226	225	227	226	225	230	225
T_{50}		277	270	267	267	270	270	277	269
T_{90}		333	327	323	323	325	333	332	323
T_{95}	360 (max)	347	339	330	337	330	347	343	333
FBP		356	349	346	348	346	356	350	347
FAME?					No	Yes	Yes	Yes	Yes

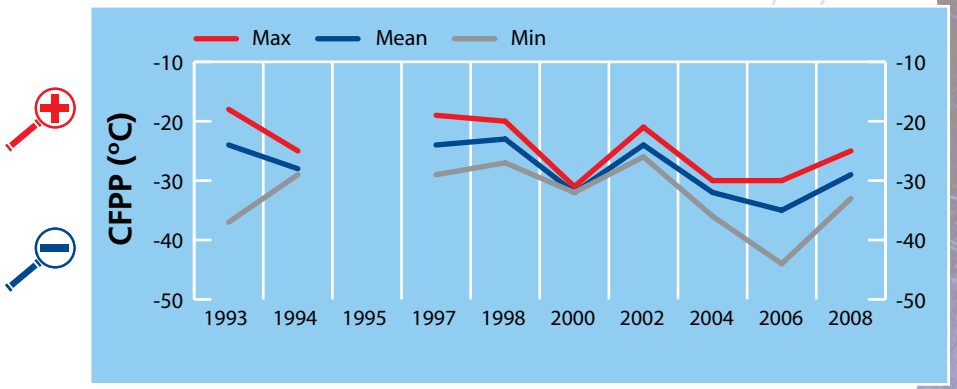
Poland (continued)

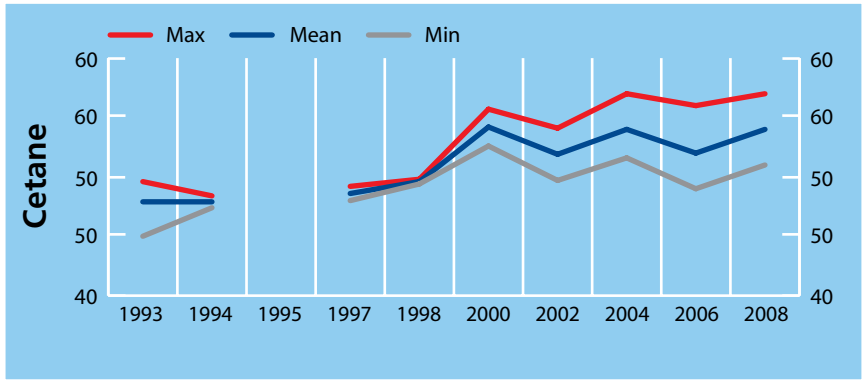
National Standards and physical inspection data

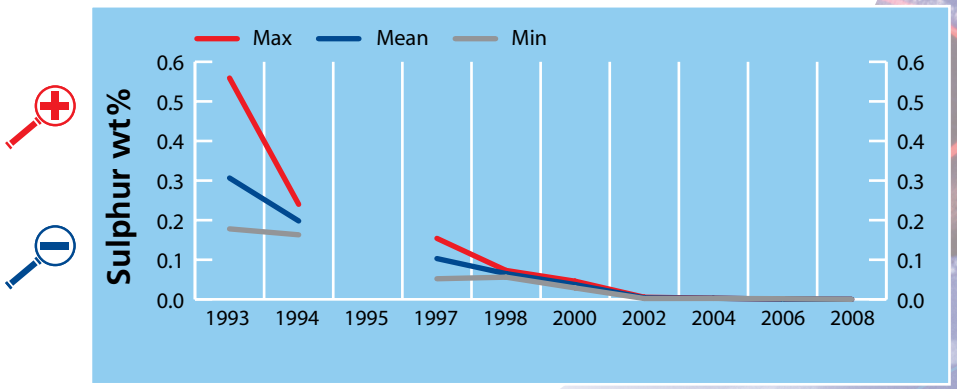
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801518	DIES 0801519	DIES 0801521	DIES 0801522
Cloud Point, °C		-7	-10	-13	-13	-9	-12	-10
CFPP, °C	-20 (max)	-24	-29	-32	-31	-26	-30	-29
Pour Point, °C		-27	-36	-51	-39	-33	-36	-30
HFRR, µm	460 (max)	416	272	217	243	256	250	341
Wax Content @ 10°C Below Cloud, wt%		2.1	1.8	1.7	1.9	1.8	1.8	1.9
Sulphur, wt%	0.005 (max)	0.0023	0.0008	0.0005	0.0005	0.0006	0.0005	0.0006
Density @15°C, kg/m3	820 - 845	836.2	834.1	830.9	836.2	835.7	835.3	834.2
Viscosity @ 20°C, cSt		4.532	4.236	4.088	4.212	4.271	4.140	4.088
Viscosity @ 40°C, cSt	2.00 - 4.50	2.896	2.723	2.636	2.702	2.689	2.699	2.636
Cetane Index 2 Variable		58	56	54	55	55	56	55
Cetane Index 4 Variable	46 (min)	56	53	52	53	52	53	53
Cetane Number	51 (min)	57	54	51	54	55	54	51
Distillation, °C IBP		180	171	157	172	157	172	170
T_{10}		214	211	208	212	208	212	210
T_{20}		230	226	225	228	225	227	225
T_{50}		277	270	267	271	268	270	268
T_{90}		333	327	323	327	327	328	327
T_{95}	360 (max)	347	339	330	339	342	339	341
FBP		356	349	346	347	350	347	352
FAME?					Yes	Yes	Yes	No

Poland - Key Trends









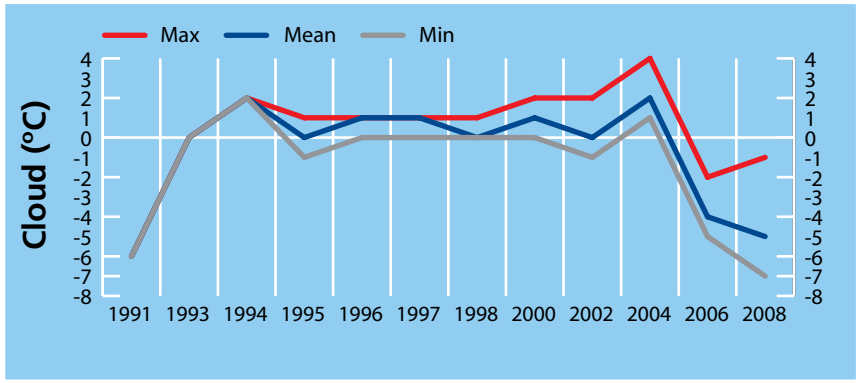
Portugal

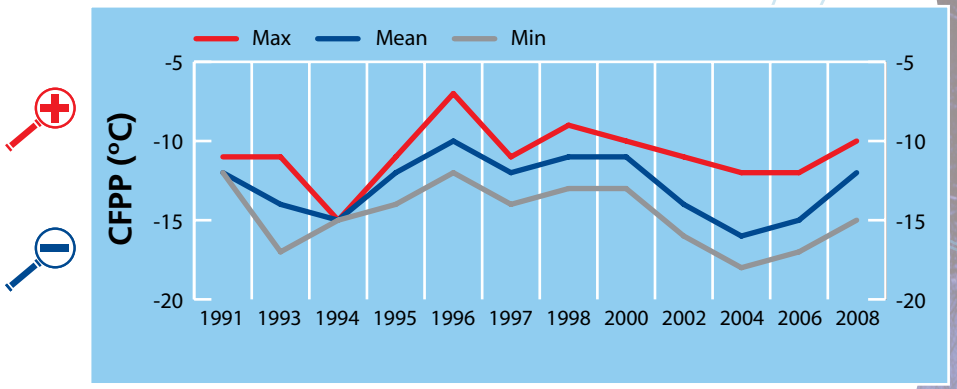
National Standards and physical inspection data

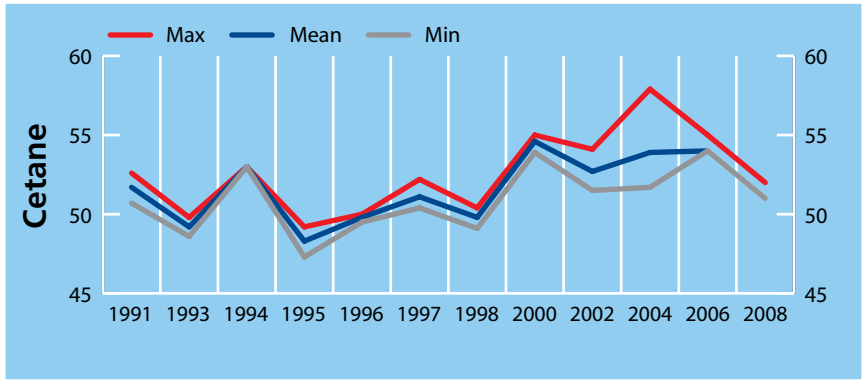
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801345	DIES 0801346	DIES 0801347
Cloud Point, °C		-1	-5	-7	-1	-7	-7
CFPP, °C	-10 (max)*	-10	-12	-15	-15	-10	-10
Pour Point, °C		-18	-18	-18	-18	-18	-18
HFRR, µm	460 (max)	253	224	200	253	200	219
Wax Content @ 10°C Below Cloud, wt%		1.6	1.3	1.1	1.6	1.1	1.1
Sulphur, wt%	0.005 (max)	0.0044	0.0031	0.0007	0.0007	0.0041	0.0044
Density @15°C, kg/m3	820 - 845	845.3	840.1	830.3	830.3	845.3	844.6
Viscosity @ 20°C, cSt		4.163	3.820	3.163	3.163	4.163	4.133
Viscosity @ 40°C, cSt	2.00 - 4.50	2.701	2.493	2.144	2.144	2.701	2.634
Cetane Index 2 Variable		52	51	48	48	52	52
Cetane Index 4 Variable	46 (min)	48	48	48	48	48	48
Cetane Number	51 (min)	52	51	51	52	51	51
Distillation, °C IBP		176	172	167	167	176	172
T_{10}		205	198	187	187	205	203
T_{20}		221	213	198	198	221	219
T_{50}		266	258	245	245	266	264
T_{90}		341	335	327	327	341	338
T_{95}	360 (max)	361	354	348	348	361	354
FBP		368	367	364	364	368	367
FAME?					Yes	Yes	Yes

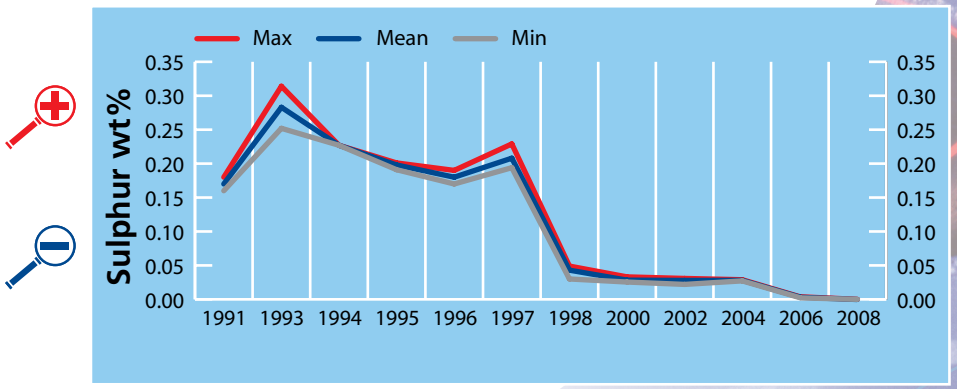
* -5 (max) CFPP used from 1st to 31st March and from 15th October to 30th November

Portugal - Key Trends









Romania

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802193	DIES 0802194	DIES 0802195
Cloud Point, °C		-6	-10	-16	-7	-6	-16
CFPP, °C	-20 (max)	-17	-26	-32	-28	-17	-32
Pour Point, °C		-27	-27	-27	-27	-27	-27
HFRR, µm	460 (max)	257	237	214	214	240	257
Wax Content @ 10°C Below Cloud, wt%		1.8	1.5	1.0	1.8	1.8	1.0
Sulphur, wt%	0.005 (max)	0.0037	0.0028	0.0012	0.0037	0.0036	0.0012
Density @15°C, kg/m3	820 - 845	842.0	839.6	837.0	842.0	839.8	837.0
Viscosity @ 20°C, cSt		4.209	3.846	3.513	4.209	3.817	3.513
Viscosity @ 40°C, cSt	2.00 - 4.50	2.691	2.509	2.307	2.691	2.528	2.307
Cetane Index 2 Variable		53	51	50	50	53	51
Cetane Index 4 Variable	46 (min)	50	49	48	50	50	48
Cetane Number	51 (min)	54	52	51	52	51	54
Distillation, °C IBP		181	172	166	181	166	168
T_{10}		216	206	199	216	204	199
T_{20}		230	222	213	230	222	213
T_{50}		267	261	252	267	265	252
T_{90}		333	328	320	331	333	320
T_{95}	360 (max)	350	345	339	347	350	339
FBP		363	355	347	356	363	347
FAME?					No	No	No

Russia

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801986	DIES 0801987	DIES 0801989
Cloud Point, °C		-6	-21	-40	-6	-40	-16
CFPP, °C		-18	-31	-43	-18	-43	-32
Pour Point, °C		-24	-35	-42	-24	-39	-42
HFRR, µm		655	473	309	309	655	455
Wax Content @ 10°C Below Cloud, wt%		2.3	1.7	0.9	2.3	1.8	0.9
Sulphur, wt%		0.1470	0.0626	0.0192	0.0215	0.1470	0.0192
Density @15°C, kg/m3		841.7	827.5	808.1	841.7	808.1	832.7
Viscosity @ 20°C, cSt		5.111	3.187	2.042	5.111	2.042	2.409
Viscosity @ 40°C, cSt		3.160	2.110	1.469	3.160	1.469	1.701
Cetane Index 2 Variable		52	45	38	52	46	38
Cetane Index 4 Variable		54	47	41	54	47	41
Cetane Number		58	54	51	58	51	52
Distillation, °C IBP		186	168	151	186	151	166
T_{10}		238	196	171	238	178	171
T_{20}		249	206	180	249	187	180
T_{50}		277	235	212	277	212	216
T_{90}		331	304	267	331	267	315
T_{95}		346	323	286	346	286	337
FBP		357	338	304	357	304	353
FAME?					No	No	No

Spain

National Standards and physical inspection data

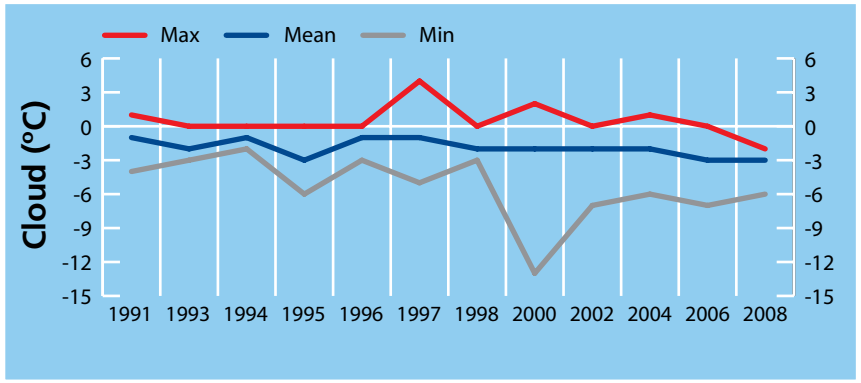
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801331	DIES 0801332	DIES 0801334	DIES 0801335	DIES 0801337	DIES 0801338
Cloud Point, °C		-2	-3	-6	-3	-4	-3	-6	-4	-2
CFPP, °C	-10 (max)	-12	-17	-20	-15	-20	-20	-20	-16	-19
Pour Point, °C		-12	-23	-45	-12	-24	-27	-27	-18	-27
HFRR, µm	460 (max)	458	325	225	230	328	349	348	225	238
Wax Content @ 10°C Below Cloud, wt%		2.2	1.8	1.3	2.2	2.0	1.9	2.1	1.7	2.1
Sulphur, wt%	0.005 (max)	0.0041	0.0029	0.0007	0.0020	0.0031	0.0029	0.0041	0.0036	0.0024
Density @15°C, kg/m3	820 - 845	844.3	837.9	828.1	844.3	838.0	839.0	834.4	840.2	838.0
Viscosity @ 20°C, cSt		4.628	4.231	3.783	4.265	4.463	4.465	4.096	4.464	4.384
Viscosity @ 40°C, cSt	2.00 - 4.50	2.892	2.706	2.461	2.748	2.846	2.803	2.636	2.805	2.806
Cetane Index 2 Variable		58	55	53	53	55	55	56	54	55
Cetane Index 4 Variable	46 (min)	54	51	48	52	52	51	52	51	52
Cetane Number	51 (min)	56	53	52	52	54	52	56	53	54
Distillation, °C IBP		178	170	164	169	172	169	168	178	174
T_{10}		217	203	191	205	212	206	199	208	207
T_{20}		231	221	209	226	229	226	220	225	224
T_{50}		290	270	262	290	273	272	268	271	273
T_{90}		347	339	331	339	339	341	331	338	340
T_{95}	360 (max)	363	356	347	350	356	358	347	355	355
FBP		369	365	356	356	364	367	360	365	364
FAME?					Yes	No	No	No	Yes	Yes

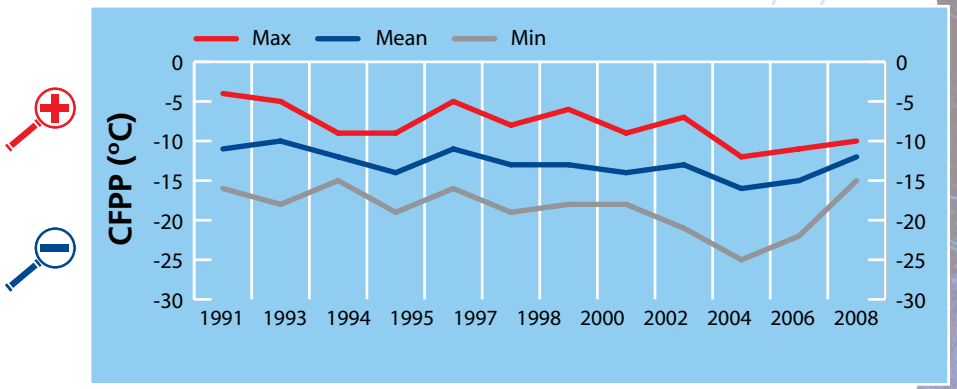
Spain (continued)

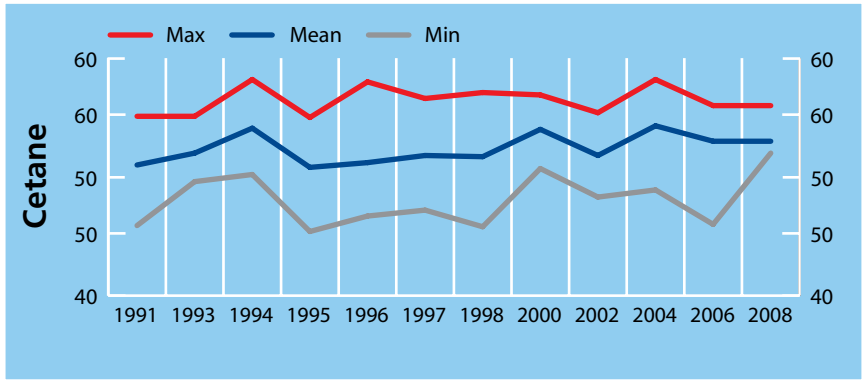
National Standards and physical inspection data

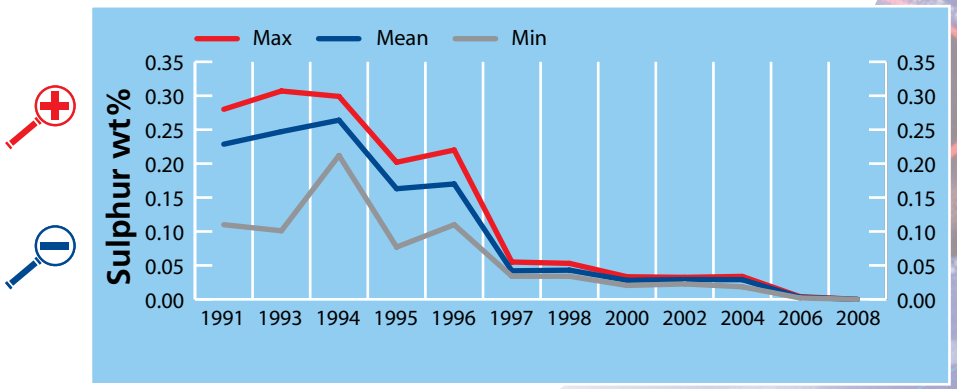
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801339	DIES 0801340	DIES 0801341	DIES 0801342	DIES 0801343	DIES 0801344
Cloud Point, °C		-2	-3	-6	-4	-3	-4	-2	-4	-2
CFPP, °C	-10 (max)	-12	-17	-20	-12	-15	-18	-18	-14	-17
Pour Point, °C		-12	-23	-45	-24	-15	-21	-45	-18	-18
HFRR, µm	460 (max)	458	325	225	426	399	458	412	242	246
Wax Content @ 10°C Below Cloud, wt%		2.2	1.8	1.3	1.3	2.1	1.8	1.3	1.7	1.8
Sulphur, wt%	0.005 (max)	0.0041	0.0029	0.0007	0.0024	0.0032	0.0035	0.0007	0.0034	0.0034
Density @15°C, kg/m3	820 - 845	844.3	837.9	828.1	839.9	836.3	841.7	828.1	835.6	839.7
Viscosity @ 20°C, cSt		4.628	4.231	3.783	3.956	4.628	3.906	3.965	3.783	4.402
Viscosity @ 40°C, cSt	2.00 - 4.50	2.892	2.706	2.461	2.575	2.892	2.516	2.569	2.461	2.811
Cetane Index 2 Variable		58	55	53	53	56	53	58	54	55
Cetane Index 4 Variable	46 (min)	54	51	48	49	54	48	53	50	51
Cetane Number	51 (min)	56	53	52	53	54	52	54	54	54
Distillation, °C IBP		178	170	164	168	174	164	164	164	175
T_{10}		217	203	191	196	217	193	193	191	206
T_{20}		231	221	209	213	231	210	211	209	224
T_{50}		290	270	262	262	274	263	263	262	272
T_{90}		347	339	331	339	339	339	347	337	341
T_{95}	360 (max)	363	356	347	359	357	357	363	356	358
FBP		369	365	356	367	369	367	368	366	369
FAME?					No	No	No	No	No	Yes

Spain - Key Trends









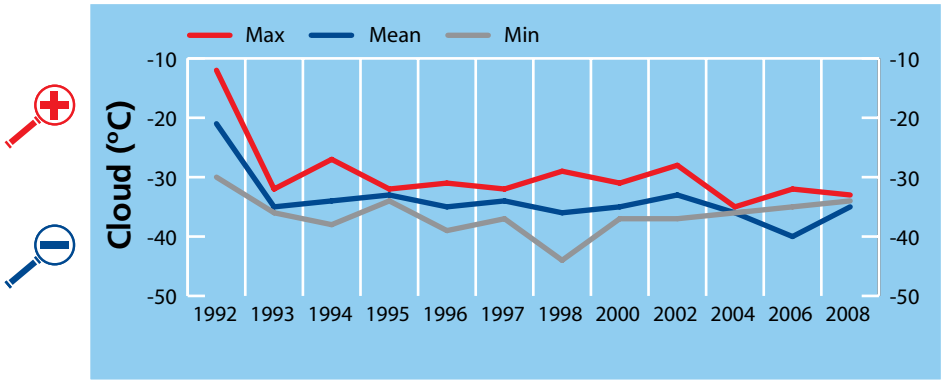
Sweden

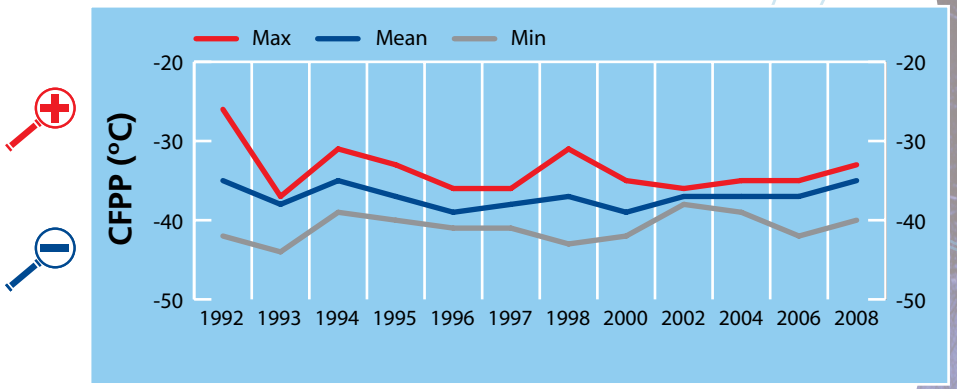
National Standards and physical inspection data

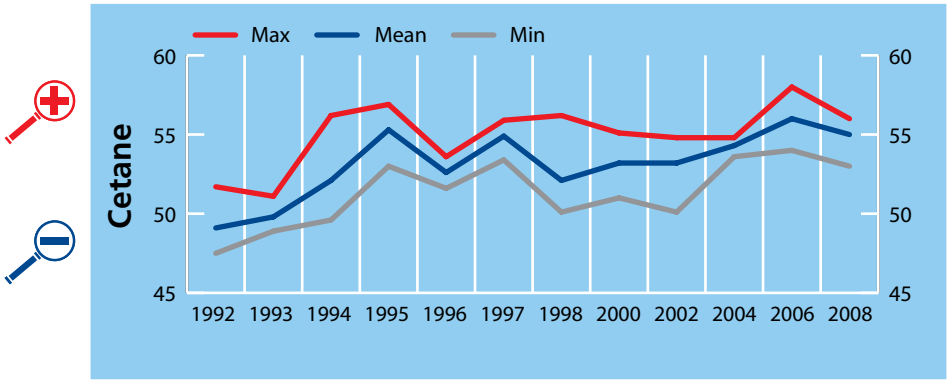
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801384	DIES 0801385	DIES 0801386	DIES 0801387	DIES 0801390	DIES 0801391	DIES 0801393
Cloud Point, °C	-16 (max)	-33	-34	-35	-33	-34	-34	-33	-35	-33	-34
CFPP, °C	-26 (max)	-33	-35	-40	-34	-40	-33	-34	-36	-35	-35
Pour Point, °C		-33	-36	-36	-36	-36	-36	-36	-36	-33	-36
HFRR, µm	400 (max)	301	264	222	296	254	300	301	231	222	246
Wax Content @ 10°C Below Cloud, wt%		4.9	3.7	2.9	3.6	2.9	3.6	3.4	3.4	4.9	3.9
Sulphur, wt%	0.0005 (max)	0.0006	0.0003	<0.0003	<0.0003	0.0006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Density @15°C, kg/m3	800 - 820	817.0	816.2	813.9	816.7	815.1	816.8	817.0	813.9	817.0	816.6
Viscosity @ 20°C, cSt		2.976	2.898	2.775	2.895	2.938	2.901	2.893	2.775	2.976	2.907
Viscosity @ 40°C, cSt	1.7 - 4.0	2.022	1.964	1.920	1.960	1.947	1.987	1.956	1.920	2.022	1.956
Cetane Index 2 Variable		54	53	50	50	53	53	53	54	54	53
Cetane Index 4 Variable	50 (min)	53	52	51	51	52	52	51	53	53	52
Cetane Number	51 (min)	56	55	53	55	56	53	56	56	54	53
Distillation, °C IBP	180 (min)	191	184	181	184	184	183	181	186	191	183
T_{10}		207	203	200	203	204	202	200	205	207	202
T_{20}		215	212	210	211	212	211	210	213	215	211
T_{50}		238	234	232	234	232	235	234	234	238	235
T_{90}		281	278	270	279	278	281	270	280	278	279
T_{95}	285 (max)	297	293	290	292	293	295	294	297	290	292
FBP		315	310	308	309	312	308	309	315	311	308
FAME?					Yes	Yes	Yes	No	Yes	Yes	Yes

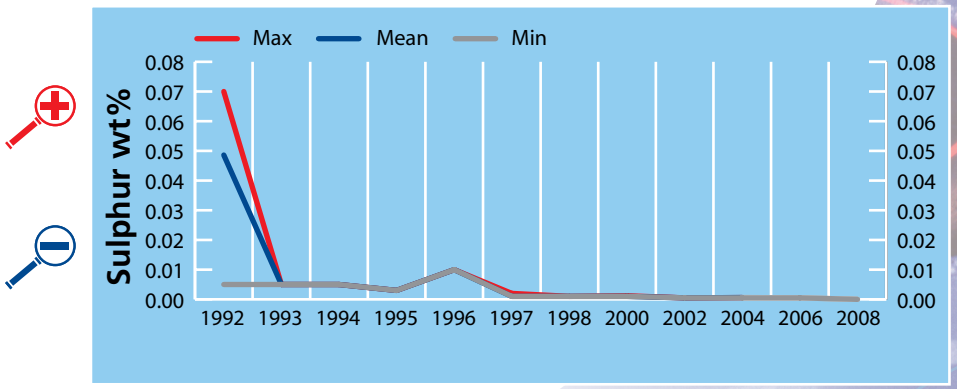
Specification shown is for Swedish Class 1, T95 has been changed since the samples were collected to allow for the addition of B5

Sweden - Key Trends









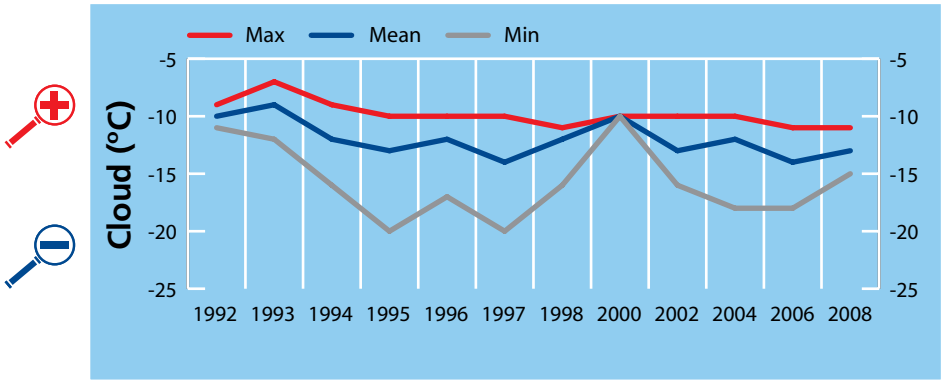
Switzerland

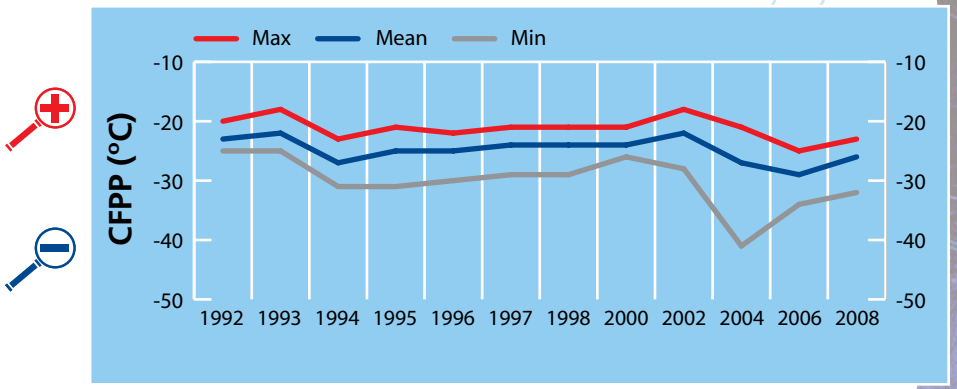
National Standards and physical inspection data

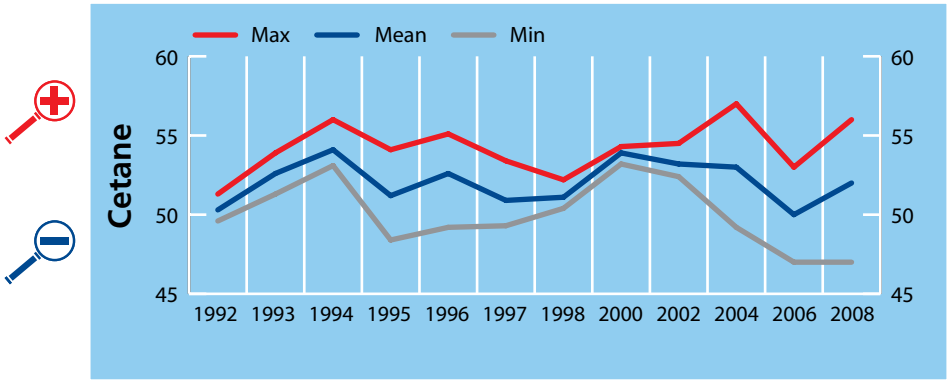
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800843	DIES 0800844	DIES 0800845	DIES 0800847	DIES 0800848	DIES 0800849
Cloud Point, °C	-10 (max)	-11	-13	-15	-13	-12	-15	-11	-15	-12
CFPP, °C	-20 (max)	-23	-26	-32	-25	-23	-28	-24	-26	-32
Pour Point, °C		-30	-35	-39	-36	-30	-39	-36	-39	-30
HFRR, µm	460 (max)	479	408	346	383	404	479	380	459	346
Wax Content @ 10°C Below Cloud, wt%		2.3	1.8	1.5	1.9	2.3	1.5	2.0	1.6	1.6
Sulphur, wt%	0.005 (max)	0.0008	0.0006	0.0005	0.0006	0.0006	0.0005	0.0006	0.0006	0.0008
Density @15°C, kg/m3	800 - 845	832.7	829.3	822.9	830.6	829.3	829.8	822.9	830.4	832.7
Viscosity @ 20°C, cSt		3.775	3.315	2.981	3.343	3.449	2.981	3.314	3.029	3.775
Viscosity @ 40°C, cSt	1.50 - 4.00	2.457	2.253	2.018	2.260	2.441	2.018	2.246	2.098	2.457
Cetane Index 2 Variable		56	53	50	50	56	52	56	52	54
Cetane Index 4 Variable	46 (min)	53	50	47	50	53	47	53	47	51
Cetane Number	49 (min)	56	52	47	49	56	47	56	50	55
Distillation, °C IBP		170	159	145	161	159	145	160	160	170
T_{10}	180 (min)	204	193	186	192	202	186	190	187	204
T_{20}		220	208	199	207	218	199	204	200	220
T_{50}		261	250	240	251	261	240	251	241	260
T_{90}		325	321	318	321	318	323	322	325	318
T_{95}	340 (max)	341	337	333	336	333	339	340	341	335
FBP		349	347	345	346	345	349	346	349	347
FAME?					No	No	No	No	No	No

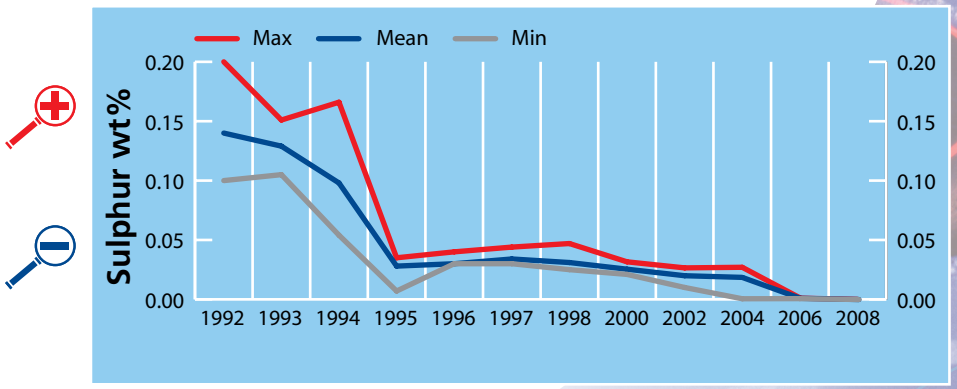
National standard shown is EN590 Artic Class 0

Switzerland - Key Trends









National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801092	DIES 0801093	DIES 0801376	DIES 0801377	DIES 0801378	DIES 0801379	DIES 0801380	DIES 0801381
Cloud Point, °C		-5	-8	-24	-6	-7	-8	-6	-7	-10	-7	-5
CFPP, °C	-15 (max)	-16	-21	-28	-17	-17	-20	-20	-18	-27	-22	-16
Pour Point, °C		-15	-26	-39	-39	-30	-24	-24	-30	-27	-30	-15
HFRR, µm	460 (max)	424	326	232	270	330	252	249	402	371	413	342
Wax Content @ 10°C Below Cloud, wt%		3.8	2.3	1.5	2.9	3.0	2.0	3.1	1.7	1.9	2.2	2.0
Sulphur, wt%	0.001 (max)	0.0013	0.0007	0.0005	0.0009	0.0010	0.0005	0.0008	0.0006	0.0006	0.0007	0.0005
Density @15°C, kg/m3	820 - 845*	841.9	837.4	828.6	836.8	839.4	838.1	841.9	841.9	841.8	833.8	832.6
Viscosity @ 20°C, cSt		5.236	4.131	3.080	3.987	4.335	4.212	5.236	3.822	4.016	4.051	4.269
Viscosity @ 40°C, cSt	2.00 - 4.50	4.743	2.796	2.062	2.609	2.791	2.682	3.221	4.743	2.546	2.613	2.693
Cetane Index 2 Variable		57	54	51	53	55	54	55	52	51	56	56
Cetane Index 4 Variable	46 (min)	54	51	48	52	53	51	54	48	48	53	53
Cetane Number	51 (min)	57	54	52	54	52	56	57	53	52	53	56
Distillation, °C IBP		186	170	163	163	165	170	186	167	170	163	173
T_{10}		233	204	196	198	209	208	233	196	205	199	202
T_{20}		252	223	211	222	234	225	252	213	223	220	221
T_{50}		283	268	249	276	281	267	283	264	261	272	271
T_{90}		335	326	293	330	330	327	331	333	321	328	328
T_{95}	360 (max)*	352	342	306	345	345	342	345	348	339	341	345
FBP		363	354	320	357	355	352	356	361	353	355	356
FAME?					No	No	Yes	Yes	No	No	No	No

* Density is 835 kg/m3 (max) and T95 is 345˚C (max) for 50ppm specification

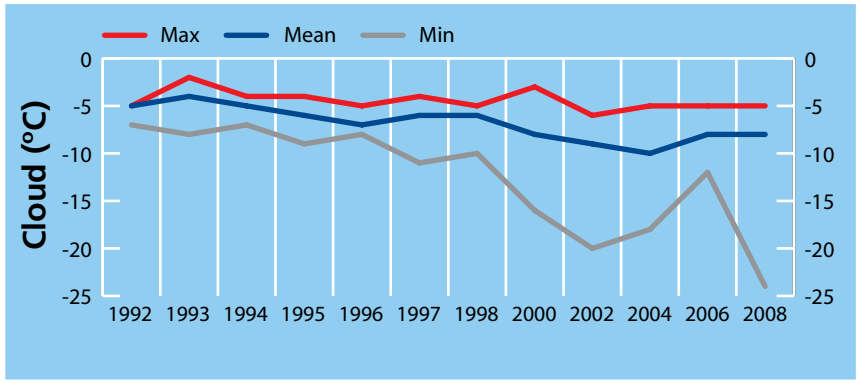
UK (continued)

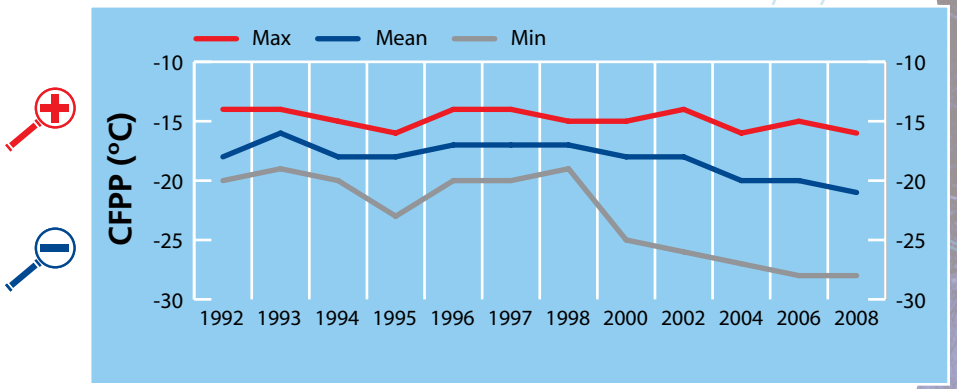
National Standards and physical inspection data

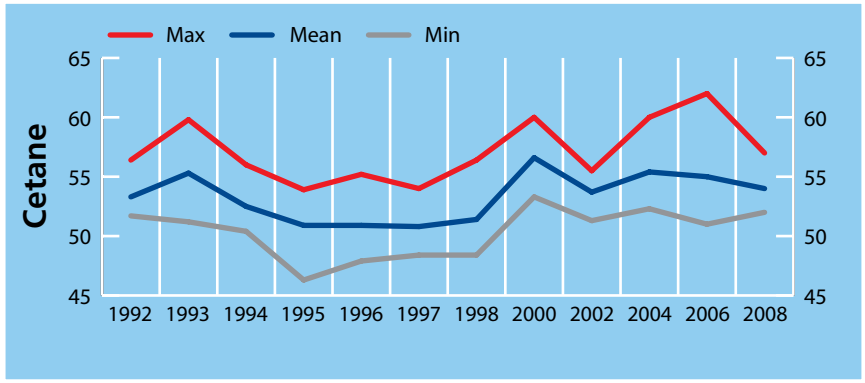
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801382	DIES 0801383	DIES 0801524	DIES 0801525	DIES 0801526	DIES 0801527	DIES 0801604
Cloud Point, °C		-5	-8	-24	-5	-24	-7	-5	-9	-6	-5
CFPP, °C	-15 (max)	-16	-21	-28	-18	-28	-25	-18	-26	-25	-16
Pour Point, °C		-15	-26	-39	-15	-24	-27	-21	-27	-27	-27
HFRR, µm	460 (max)	424	326	232	329	244	328	424	400	308	232
Wax Content @ 10°C Below Cloud, wt%		3.8	2.3	1.5	1.9	3.8	1.6	1.8	1.5	1.7	2.8
Sulphur, wt%	0.001 (max)	0.0013	0.0007	0.0005	0.0005	0.0008	0.0006	0.0008	0.0008	0.0005	0.0013
Density @15°C, kg/m3	820 - 845*	841.9	837.4	828.6	833.7	828.6	841.1	837.4	841.8	839.9	832.2
Viscosity @ 20°C, cSt		5.236	4.131	3.080	4.259	3.080	4.082	4.415	3.974	4.015	4.209
Viscosity @ 40°C, cSt	2.00 - 4.50	4.743	2.796	2.062	2.722	2.062	2.605	2.815	2.545	2.611	2.677
Cetane Index 2 Variable		57	54	51	56	53	52	54	51	54	57
Cetane Index 4 Variable	46 (min)	54	51	48	53	50	48	51	48	50	54
Cetane Number	51 (min)	57	54	52	56	52	53	55	56	53	56
Distillation, °C IBP		186	170	163	174	165	168	171	174	169	171
T_{10}		233	204	196	204	199	196	208	202	200	202
T_{20}		252	223	211	223	213	211	228	219	219	218
T_{50}		283	268	249	272	249	262	268	260	270	273
T_{90}		335	326	293	328	293	326	328	323	335	335
T_{95}	360 (max)*	352	342	306	347	306	344	345	340	352	348
FBP		363	356	320	359	320	360	357	353	363	355
FAME?					No	Yes	Yes	No	No	Yes	Yes

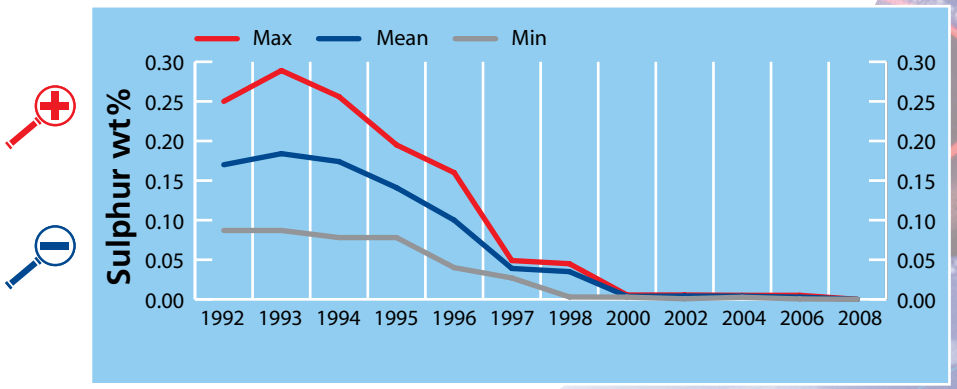
* Density is 835 kg/m3 (max) and T95 is 345˚C (max) for 50ppm specification

UK - Key Trends









Ukraine

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802010	DIES 0802011	DIES 0802012
Cloud Point, °C		-5	-6	-7	-7	-6	-5
CFPP, °C		-19	-24	-28	-28	-19	-26
Pour Point, °C		-24	-25	-27	-27	-24	-24
HFRR, µm	460 (max)	471	411	366	396	471	366
Wax Content @ 10°C Below Cloud, wt%		2.5	2.1	1.8	1.8	2.5	2.1
Sulphur, wt%	0.2 (max)	0.0851	0.0480	0.0045	0.0851	0.0545	0.0045
Density @15°C, kg/m3	820 - 845	839.0	837.4	836.0	836.0	839.0	837.2
Viscosity @ 20°C, cSt		4.939	4.736	4.383	4.383	4.887	4.939
Viscosity @ 40°C, cSt	2.00 - 4.50	3.096	2.987	2.811	2.811	3.055	3.096
Cetane Index 2 Variable	46 (min)	56	53	50	50	54	56
Cetane Index 4 Variable		55	53	51	51	54	55
Cetane Number		56	55	54	56	54	55
Distillation, °C IBP		193	192	191	193	191	191
T_{10}		229	227	223	223	229	228
T_{20}		241	239	234	234	241	241
T_{50}		275	269	257	257	273	275
T_{90}		336	331	328	328	330	336
T_{95}		352	348	345	345	346	352
FBP		364	360	354	364	354	362
FAME?					No	No	No

* T96 specification @ 360˚C maximum

Worldwide Survey- Middle East & Africa

Middle East & Africa

Israel

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0801774	DIES 0801775
Cloud Point, °C			1		0	1
CFPP, °C	-5 (max)		-11		-11	-12
Pour Point, °C			-20		-21	-18
HFRR, µm	460 (max)		370		411	330
Wax Content @ 10°C Below Cloud, wt%			3.5		3.4	3.5
Sulphur, wt%	0.005 (max)		0.0017		0.0018	0.0017
Density @15°C, kg/m3	845 (max)		837.8		836.9	838.6
Viscosity @ 20°C, cSt			5.798		5.645	5.95
Viscosity @ 40°C, cSt	2.0 - 4.5		3.566		3.492	3.639
Cetane Index 2 Variable			56		55	57
Cetane Index 4 Variable	46 (min)		57		57	57
Cetane Number	51 (min)		58		56	60
Distillation, °C IBP			197		199	195
T_{10}			232		232	232
T_{20}			248		248	249
T_{50}			286		286	287
T_{90}			343		343	344
T_{95}	360 (max)		357		357	358
FBP			365		365	365
FAME?					No	No

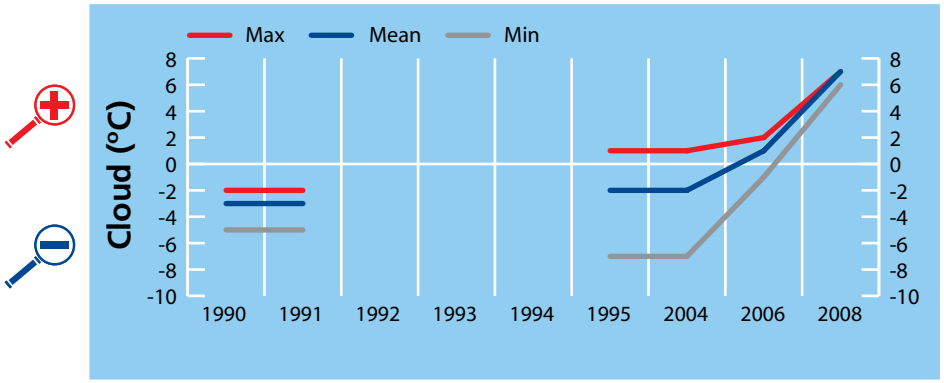
Saudi Arabia

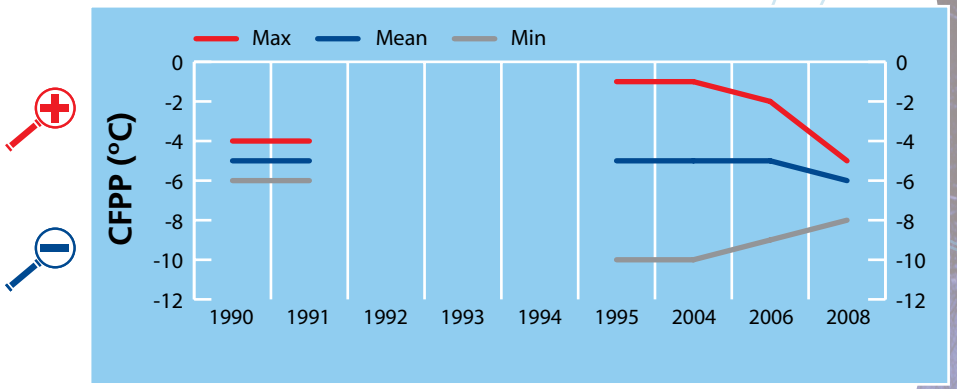
National Standards and physical inspection data

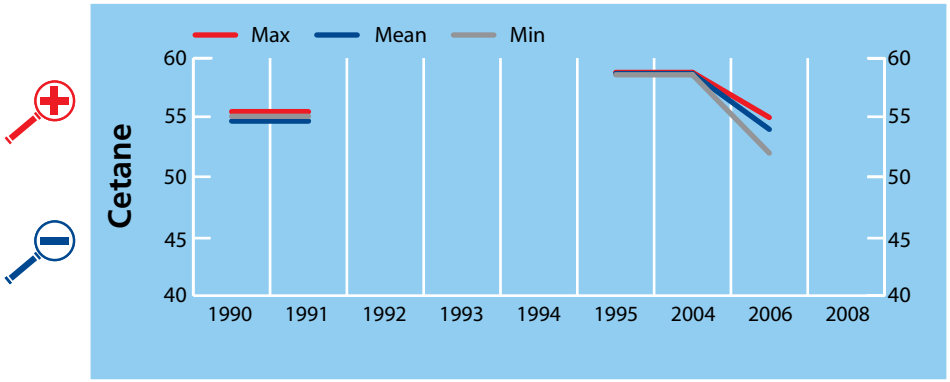
	National Standard	Maximum Observed	Mean	Minimum Observed				
Cloud Point, °C	2 (max)*	7	7	6	7	6	7	6
CFPP, °C	-4 (max)*	-5	-6	-8	-6	-8	-6	-5
Pour Point, °C		-9	-16	-18	-18	-18	-18	-9
HFRR, µm		598	561	529	598	545	572	529
Wax Content @ 10°C Below Cloud, wt%		1.4	1.1	0.9	0.9	1.0	1.1	1.4
Sulphur, wt%	1.0 (max)	0.4010	0.2028	0.1020	0.4010	0.1020	0.1460	0.1620
Density @15°C, kg/m3		826	825	823	825	826	826	823
Viscosity @ 20°C, cSt		4.190	3.922	3.631	3.721	4.190	4.147	3.631
Viscosity @ 40°C, cSt	1.9 - 4.1	2.670	2.533	2.390	2.422	2.67	2.649	2.39
Cetane Index 2 Variable	45 (min)	59	57	54	54	59	59	58
Cetane Index 4 Variable		55	54	53	53	55	55	53
Cetane Number								
Distillation, °C IBP		178	172	164	168	177	178	164
T_{10}		204	199	191	195	204	204	191
T_{20}		220	214	206	209	219	220	206
T_{50}		267	262	256	257	267	267	256
T_{90}		360	356	350	360	357	355	350
T_{95}		387	381	372	387	385	381	372
FBP		391	388	384	388	391	388	384
FAME?					No	No	No	No

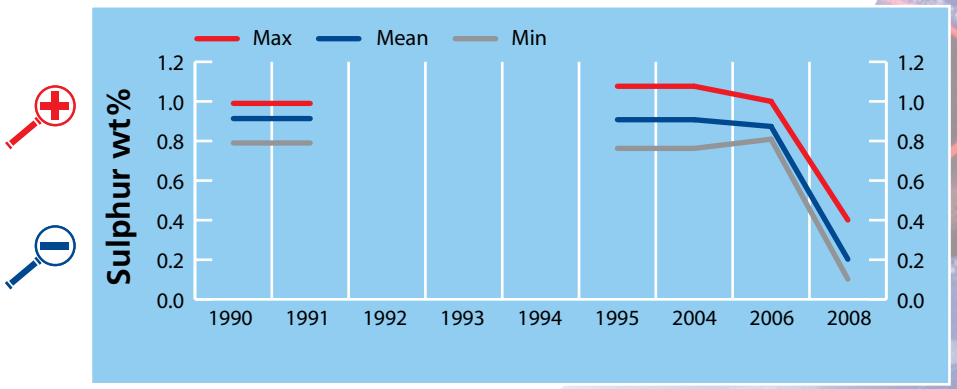
* Cloud point and CFPP are alternative specifications. When CFPP is used the difference between cloud point and CFPP must not exceed 10˚C

Saudi Arabia - Key Trends







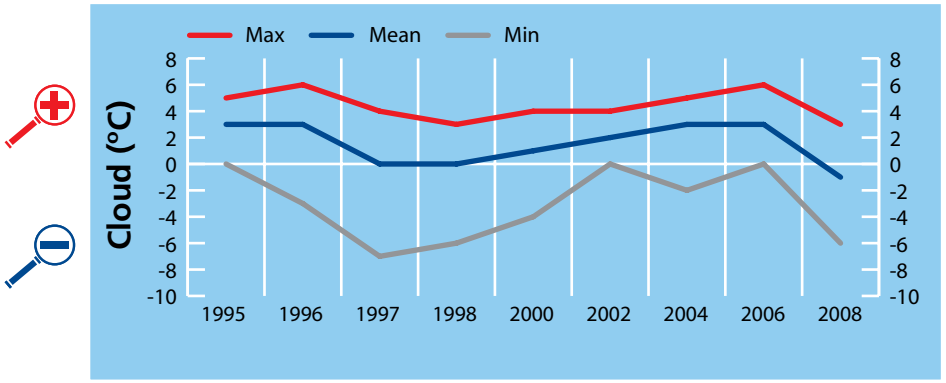


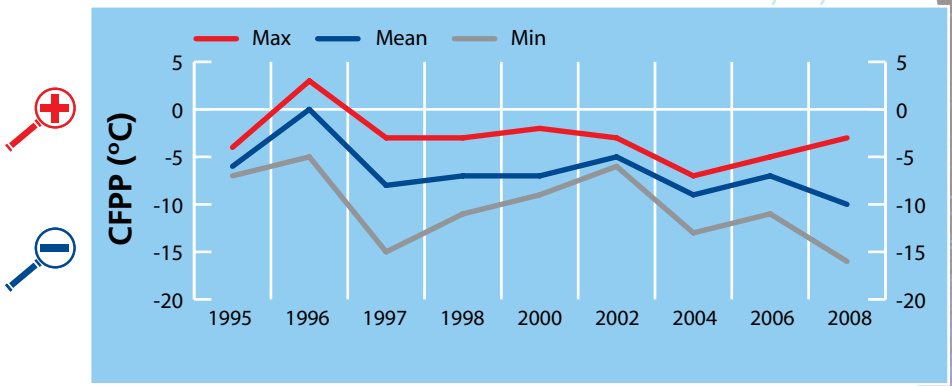
South Africa

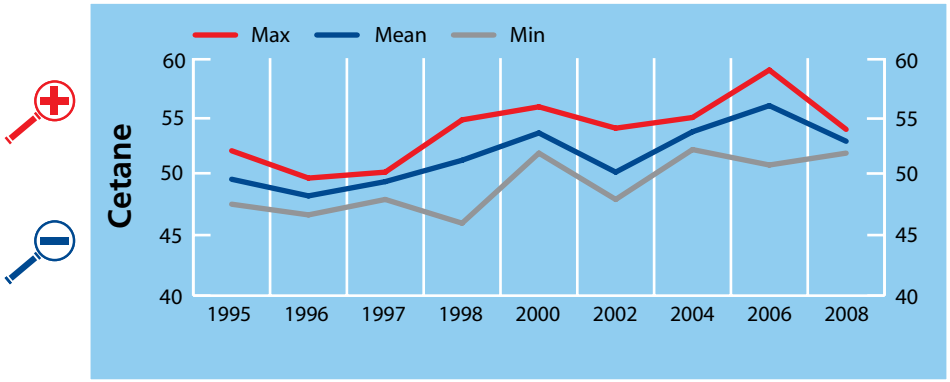
National Standards and physical inspection data

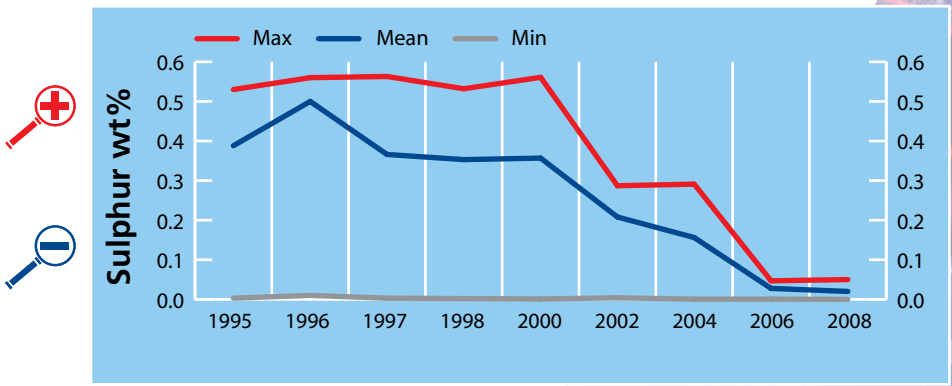
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0804803	DIES 0804804	DIES 0804806	DIES 0804807	DIES 0804808
Cloud Point, °C	6 (max)	3	-1	-6	0	-6	-2	3	-1
CFPP, °C	-4 (max)	-3	-10	-16	-11.5	-16	-5	-3	-16
Pour Point, °C		-12	-16	-21	-18	-12	-15	-15	-21
HFRR, µm		393	340	293	341	338	393	335	293
Wax Content @ 10°C Below Cloud, wt%		2.8	2.0	0.6	2.4	2.2	0.6	2.8	1.9
Sulphur, wt%	0.05 (max)	0.0462	0.0229	0.0010	0.0462	0.0033	0.0010	0.0285	0.0355
Density @15°C, kg/m3		861.3	843.0	825.4	847	840	825	861	842
Viscosity @ 20°C, cSt		7.386	5.151	3.266	5.789	4.662	3.266	7.386	4.652
Viscosity @ 40°C, cSt	1.6 - 5.3	4.266	3.162	2.203	3.504	2.931	2.203	4.266	2.906
Cetane Index 2 Variable		53	51	49	53	52	50	49	52
Cetane Index 4 Variable		53	52	50	53	53	50	50	52
Cetane Number	45 (min)	54	53	52	52	54	53	53	53
Distillation, °C IBP		207	182	159	197	177	173	207	159
T_{10}		252	223	195	228	225	195	252	213
T_{20}		263	237	206	247	241	206	263	229
T_{50}		294	275	243	289	274	243	294	278
T_{90}	362 (max)	351	345	333	350	333	341	351	349
T_{95}		376	365	351	364	351	376	368	366
FBP		392	374	363	372	363	392	371	374
FAME?					No	No	No	No	No

South Africa - Key Trends









Worldwide Survey- Asia Pacific

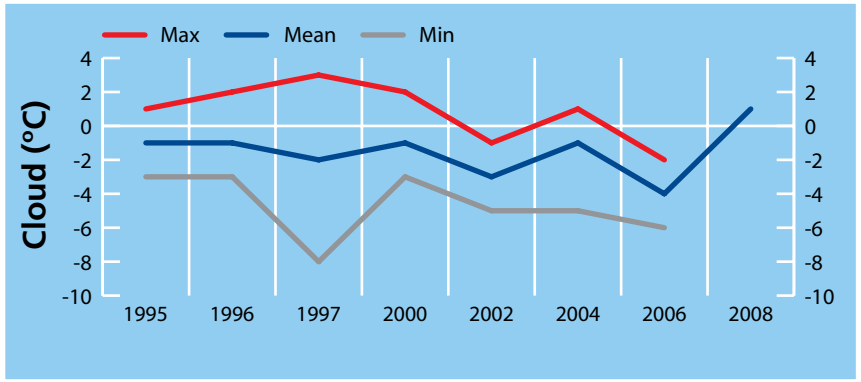
Asia Pacific

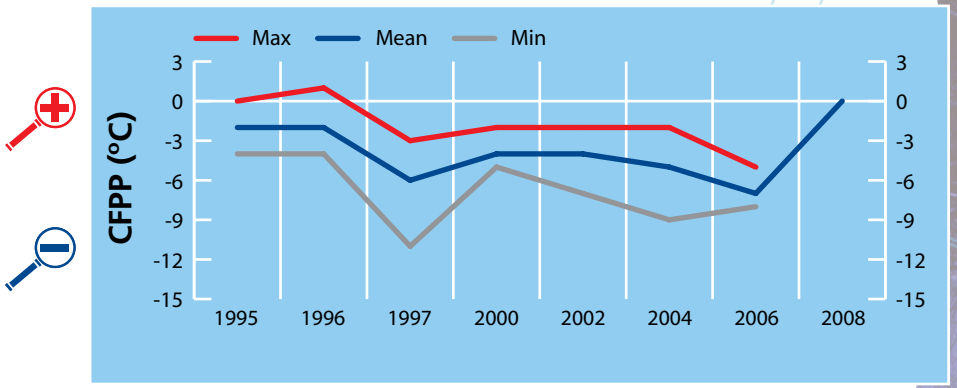
Australia

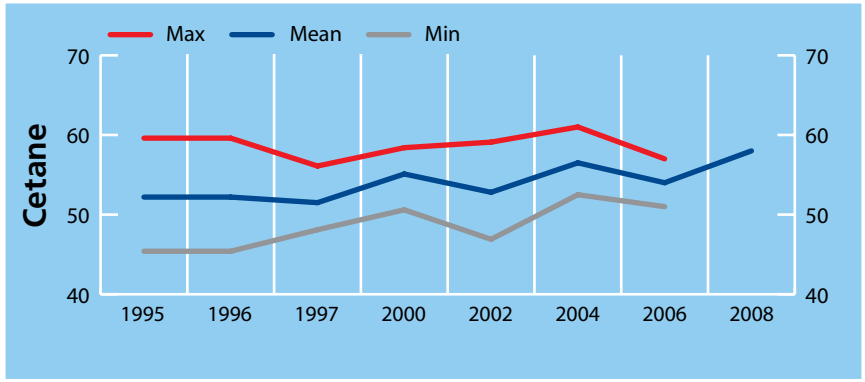
National Standards and physical inspection data

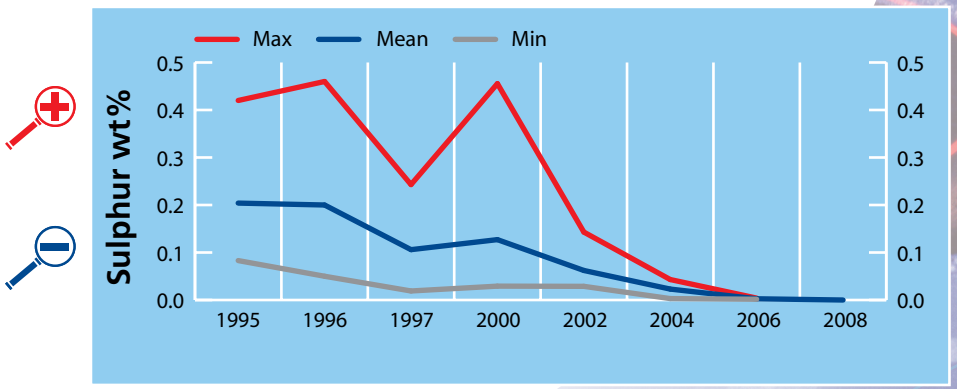
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0805917
Cloud Point, °C			1		1
CFPP, °C			0		0
Pour Point, °C			0		0
HFRR, µm	460 (max)		370		370
Wax Content @ 10°C Below Cloud, wt%			6.6		6.6
Sulphur, wt%	0.005 (max)		0.0007		0.0007
Density @15°C, kg/m3	820 - 850		829.8		830
Viscosity @ 20°C, cSt			5.466		5.466
Viscosity @ 40°C, cSt	2.0 - 4.5		3.328		3.328
Cetane Index 2 Variable			57		57
Cetane Index 4 Variable	46 (min)		60		60
Cetane Number			58		58
Distillation, °C IBP			189		189
T_{10}			232		232
T_{20}			249		249
T_{50}			283		283
T_{90}			336		336
T_{95}	360 (max)		347		347
FBP			354		354
FAME?					No

Australia - Key Trends









Peoples Republic of China

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	SW1	S1	E1	E2	E3	E4	E5
Cloud Point, °C	**	3	-5	-29	-1	1	-3	3	-1	2	-6
CFPP, °C		1	-9	-33	-1	-2	-5	1	-3	0	-7
Solid Point, °C	**	-3	-19	-52	-6	-3	-13	-3	-8	-7	-13
HFRR, µm	460 (max)	652	416	307	378	360	428	384	390	307	338
Wax Content @ 10°C Below Cloud, wt%											
Sulphur, wt%	0.2 (max)	0.3070	0.0830	0.0030	0.3070	0.0630	0.1520	0.0260	0.1460	0.0800	0.0830
Density @15°C, kg/m3	810 - 850	857.6	833.8	810.6	848.3	833.2	820.3	817.2	857.6	842.3	843.7
Viscosity @ 20°C, cSt	3.0 - 8.0 ***	4.752	3.860	2.530	4.380	4.554	3.340	3.853	4.548	4.627	4.752
Viscosity @ 40°C, cSt											
Cetane Index 2 Variable	46 (min)	57	50	39	49	55	51	57	45	51	51
Cetane Index 4 Variable		57	51	43	47	57	53	57	44	51	50
Cetane Number	40 * (min)	60	51	43	46	59	51	60	43	51	53
Distillation, °C IBP		193	172	136	159	181	185	170	168	173	177
T_{10}		229	202	180	199	220	193	191	205	216	210
T_{20}		246	218	194	219	240	205	210	223	235	228
T_{50}	300 (max)	282	259	224	272	281	246	260	271	276	271
T_{90}	355 (max)	344	327	305	343	331	324	335	344	337	334
T_{95}	365 (max)	362	342	323	356	343	342	348	362	351	348
FBP		375	357	338	369	358	365	369	375	364	359

* Cetane number for parafinic crude has a min of 45
*** 2.5 - 8 for -20˚C grade and 1.8 - 7 for -35˚C grade

**Pour and CFPP spec depend on grade, see table below

Grade	10˚C	5˚C	0˚C	-10˚C	-20˚C	-35˚C	-50˚C
Pour Point ˚C max	10	5	0	-10	-20	-35	-50
CFPP ˚C max	12	8	4	-5	-14	-29	-44

Peoples Republic of China (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	NW1	NW2	NW3	NE1	NE2	NE3	NE4
Cloud Point, °C	**	3	-5	-29	-17	2	-3	-29	-10	-17	-2
CFPP, °C		1	-9	-33	-31	1	-5	-29	-18	-33	-6
Solid Point, °C	**	-3	-19	-52	-39	-7	-11	-49	-26	-52	-16
HFRR, µm	460 (max)	652	416	307	565	398	387	643	411	652	380
Wax Content @ 10°C Below Cloud, wt%											
Sulphur, wt%	0.2 (max)	0.3070	0.0830	0.0030	0.0680	0.0360	0.1370	0.0140	0.0910	0.0120	0.0690
Density @15°C, kg/m3	810 - 850	857.6	833.8	810.6	819.1	826.6	833.8	833.7	820.5	810.6	841.0
Viscosity @ 20°C, cSt	3.0 - 8.0 ***	4.752	3.860	2.530	3.033	3.928	3.884	2.530	2.936	2.684	4.291
Viscosity @ 40°C, cSt											
Cetane Index 2 Variable	46 (min)	57	50	39	50	54	51	39	50	49	49
Cetane Index 4 Variable		57	51	43	52	54	52	43	52	52	49
Cetane Number	40 * (min)	60	51	43	49	50	51	47	53	54	48
Distillation, °C IBP		193	172	136	172	175	173	136	171	176	172
T_{10}		229	202	180	196	199	201	180	195	196	204
T_{20}		246	218	194	207	216	217	194	206	204	222
T_{50}	300 (max)	282	259	224	239	262	265	224	244	225	266
T_{90}	355 (max)	344	327	305	305	331	333	324	308	306	337
T_{95}	365 (max)	362	342	323	323	343	349	351	326	327	354
FBP		375	357	338	338	361	361	364	344	340	367

* Cetane number for parafinic crude has a min of 45
*** 2.5 - 8 for -20˚C grade and 1.8 - 7 for -35˚C grade

**Pour and CFPP spec depend on grade, see table below

Grade	10˚C	5˚C	0˚C	-10˚C	-20˚C	-35˚C	-50˚C
Pour Point ˚C max	10	5	0	-10	-20	-35	-50
CFPP ˚C max	12	8	4	-5	-14	-29	-44

Peoples Republic of China (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	NE5	NE6	N1	N2	N3	N4	N5
Cloud Point, °C	**	3	-5	-29	2	2	-13	-8	-7	-5	-4
CFPP, °C		1	-9	-33	0	0	-14	-11	-8	-8	-6
Solid Point, °C	**	-3	-19	-52	-8	-4	-20	-15	-14	-36	-39
HFRR, µm	460 (max)	652	416	307	367	356	392	358	537	358	354
Wax Content @ 10°C Below Cloud, wt%											
Sulphur, wt%	0.2 (max)	0.3070	0.0830	0.0030	0.0280	0.0830	0.0170	0.0030	0.1300	0.1460	0.053
Density @15°C, kg/m3	810 - 850	857.6	833.8	810.6	847.3	843.9	817.6	822.4	836.3	850.6	844.4
Viscosity @ 20°C, cSt	3.0 - 8.0 ***	4.752	3.860	2.530	4.386	4.634	3.004	3.694	3.836	4.170	4.004
Viscosity @ 40°C, cSt											
Cetane Index 2 Variable	46 (min)	57	50	39	47	51	51	53	49	47	47
Cetane Index 4 Variable		57	51	43	47	53	52	55	50	46	47
Cetane Number	40 * (min)	60	51	43	48	53	54	52	48	45	48
Distillation, °C IBP		193	172	136	176	193	170	171	172	154	180
T_{10}		229	202	180	206	229	190	202	202	197	204
T_{20}		246	218	194	225	246	201	217	218	221	218
T_{50}	300 (max)	282	259	224	267	282	241	256	262	273	262
T_{90}	355 (max)	344	327	305	333	330	311	316	323	334	323
T_{95}	365 (max)	362	342	323	345	340	328	331	339	348	334
FBP		375	357	338	363	348	343	346	353	359	350

* Cetane number for parafinic crude has a min of 45
*** 2.5 - 8 for -20˚C grade and 1.8 - 7 for -35˚C grade

**Pour and CFPP spec depend on grade, see table below

Grade	10˚C	5˚C	0˚C	-10˚C	-20˚C	-35˚C	-50˚C
Pour Point ˚C max	10	5	0	-10	-20	-35	-50
CFPP ˚C max	12	8	4	-5	-14	-29	-44

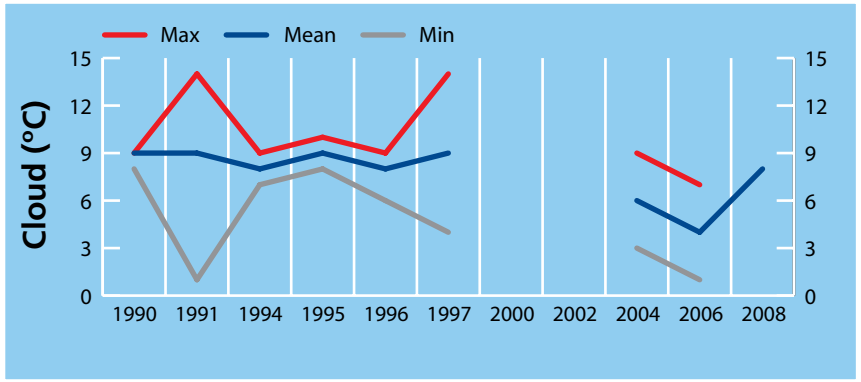
India

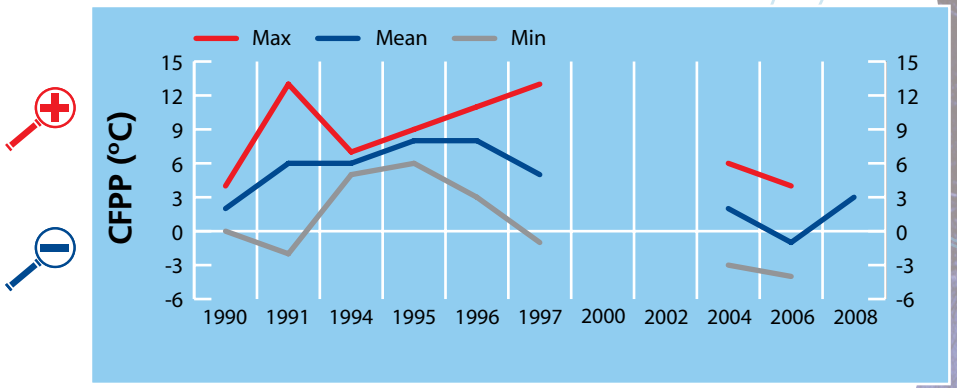
National Standards and physical inspection data

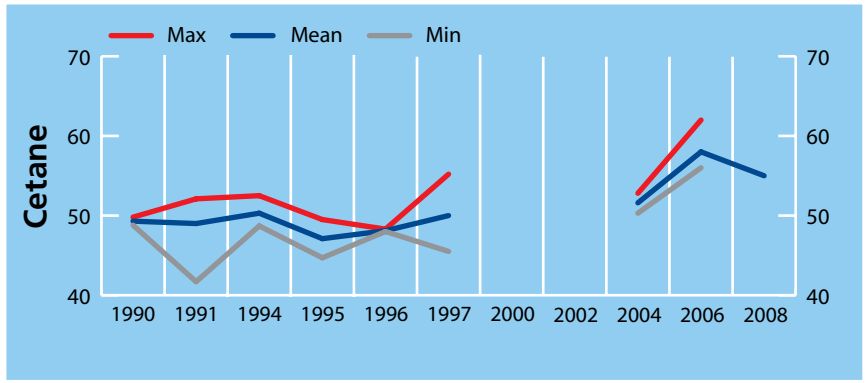
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802894
Cloud Point, °C			8		8
CFPP, °C	6 (max)		3		3
Pour Point, °C			0		0
HFRR, µm	460 (max)		388		388
Wax Content @ 10°C Below Cloud, wt%			3.1		3.1
Sulphur, wt%	0.035 (max)		0.0313		0.0313
Density @15°C, kg/m3	820 - 845		831.9		831.9
Viscosity @ 20°C, cSt	2.0 - 4.5		3.992		3.992
Viscosity @ 40°C, cSt			2.232		2.232
Cetane Index 2 Variable			55		55
Cetane Index 4 Variable	46 (min)		53		53
Cetane Number	51 (min)		55		55
Distillation, °C IBP			127		127
T_{10}			173		173
T_{20}			213		213
T_{50}			276		276
T_{90}			345		345
T_{95}	360 (max)		362		362
FBP			374		374
FAME?					No

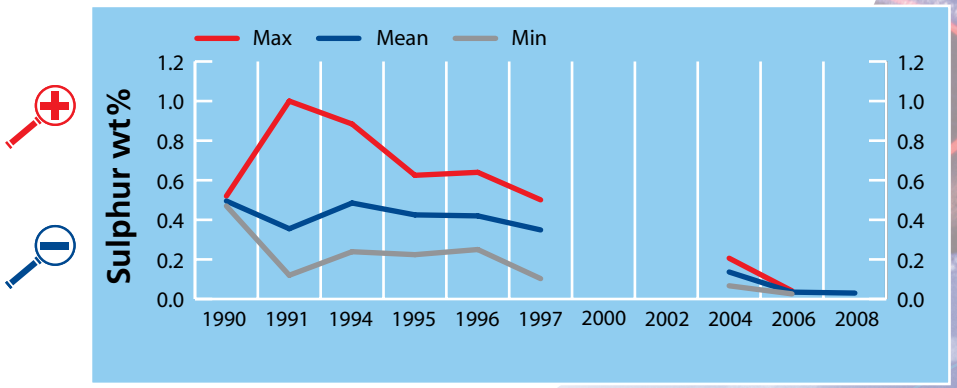
Standard information shown is for Bharat III spec

India - Key Trends









Indonesia

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802893
Cloud Point, °C			7		7
CFPP, °C			5		5
Pour Point, °C	18 (max)		3		3
HFRR, µm			388		338
Wax Content @ 10°C Below Cloud, wt%			4.4		4.4
Sulphur, wt%	0.5 (max)		0.2140		0.2140
Density @15°C, kg/m3	815 - 870		847.4		847.4
Viscosity @ 20°C, cSt			5.991		5.991
Viscosity @ 40°C, cSt			3.612		3.612
Cetane Index 2 Variable			52		52
Cetane Index 4 Variable	45 (min)		53		53
Cetane Number			55		55
Distillation, °C IBP			184		184
T_{10}			232		232
T_{20}			252		252
T_{50}			290		290
T_{90}			348		348
T_{95}			363		363
FBP			374		374
FAME?					No

Japan Grade 2

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	3	4	5	6	7	9	10	11
Cloud Point, °C		-1	-5	-10	-5	-4	-5	-6	-7	-5	-6	-5
CFPP, °C	-5 (max)	-6	-10	-16	-16	-15	-13	-15	-15	-8	-8	-10
Pour Point, °C	-7.5 (max)*	-10	-18	-25	-25	-23	-15	-23	-20	-13	-15	-10
HFRR, µm		501	417	226	226	267	454	271	483	447	411	457
Wax Content @ 10°C Below Cloud, wt%	**	3.2	2.2	0.0	2.1	1.5	1.6	1.3	0.9	2.4	2.7	3.1
Sulphur, wt%	0.005 (max)	0.0008	0.0006	0.0003	0.0004	0.0003	0.0004	0.0004	0.0005	0.0006	0.0006	0.0006
Density @15°C, kg/m3		840.0	829.1	816.0	821.0	826.0	823.0	832.0	824.0	828.0	832.0	827.0
Viscosity @ 20°C, cSt												
Viscosity @ 30°C, cSt	2.5 (min)	4.413	3.613	2.804	3.200	3.742	3.405	3.532	3.142	3.585	3.674	3.689
Cetane Index 2 Variable	45 (min)	59	56	54	58	58	58	55	56	57	56	58
Cetane Index 4 Variable		60	57	53	58	59	58	55	56	58	56	58
Cetane Number		59	56	54	56	56	55	54	54	56	55	56
Distillation, °C IBP		172	154	130	156	131	148	169	156	134	131	157
T_{10}		238	213	184	192	212	202	213	199	209	209	203
T_{20}		258	234	204	214	236	223	232	219	235	234	233
T_{50}		289	277	262	272	279	273	274	265	279	281	282
T_{90}	350 (max)	338	331	320	331	333	330	334	325	328	330	329
T_{95}		352	344	330	345	348	344	351	340	339	341	342
FBP		366	356	342	356	361	357	366	353	350	352	35

* Pour point measured at 2.5˚C intervals (Japanese Industry Standard) **Wax content measured at -10˚C below cloud point

Japan Grade 2 (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	12	13	14	15	16	17	18	19
Cloud Point, °C		-1	-5	-10	-6	-8	-7	-14	-11	-11	-12	-9
CFPP, °C	-5 (max)	-6	-10	-16	-16	-15	-13	-15	-15	-8	-8	-10
Pour Point, °C	-7.5 (max)*	-10	-18	-25	-18	-10	-20	-23	-23	-23	-18	-13
HFRR, µm		501	417	226	480	474	481	501	421	386	455	383
Wax Content @ 10°C Below Cloud, wt%	**	3.2	2.2	0.0	3.2	2.5	2.9	2.1	2.6	2.8	2.6	0.0
Sulphur, wt%	0.005 (max)	0.0008	0.0006	0.0003	0.0006	0.0006	0.0005	0.0004	0.0007	0.0006	0.0008	0.0007
Density @15°C, kg/m3		840.0	829.1	816.0	832.0	833.0	823.0	816.0	820.0	819.0	835.0	837.0
Viscosity @ 20°C, cSt												
Viscosity @ 30°C, cSt	2.5 (min)	4.413	3.613	2.804	4.413	3.808	3.548	2.804	3.194	3.096	3.843	3.566
Cetane Index 2 Variable	45 (min)	59	56	54	57	55	59	58	59	59	55	54
Cetane Index 4 Variable		60	57	53	60	56	60	58	59	58	56	54
Cetane Number		59	56	54	59	56	57	56	54	55	55	56
Distillation, °C IBP		172	154	130	156	172	160	157	157	158	166	171
T_{10}		238	213	184	237	222	202	184	192	190	219	223
T_{20}		258	234	204	256	241	230	204	216	212	239	241
T_{50}		289	277	262	287	279	282	262	273	270	282	277
T_{90}	350 (max)	338	331	320	337	329	330	327	338	337	338	320
T_{95}		352	344	330	349	343	342	340	352	351	351	330
FBP		366	356	342	359	356	354	353	362	361	363	342

* Pour point measured at 2.5˚C intervals (Japanese Industry Standard) **Wax content measured at -10˚C below cloud point

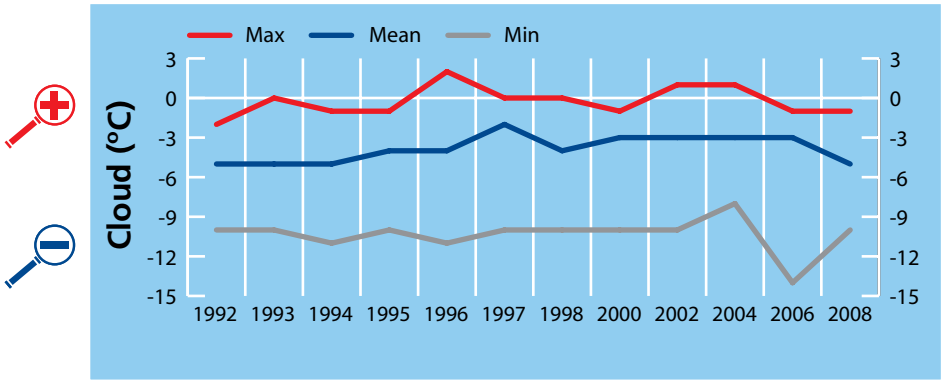
Japan Grade 2 (continued)

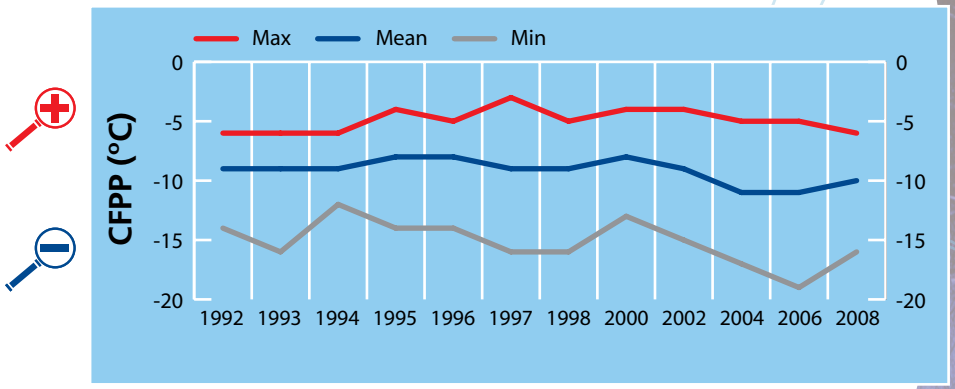
National Standards and physical inspection data

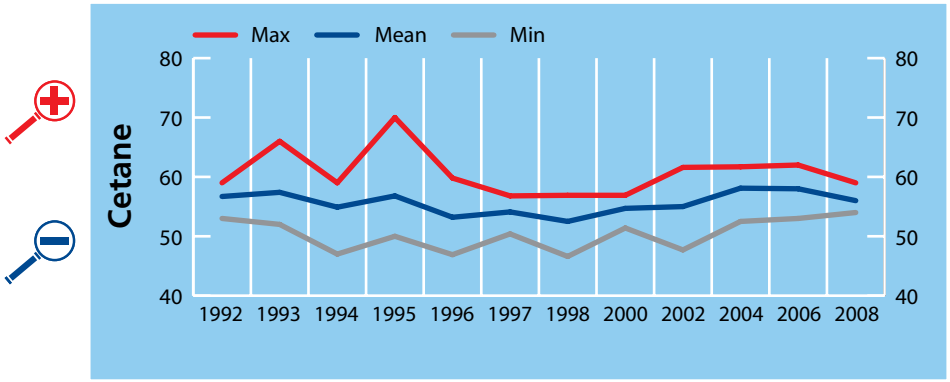
	National Standard	Maximum Observed	Mean	Minimum Observed	20	21	22	23	24	25
Cloud Point, °C		-1	-5	-10	-7	-4	-3	-4	-5	-3
CFPP, °C	-5 (max)	-6	-10	-16	-10	-13	-6	-9	-8	-9
Pour Point, °C	-7.5 (max)*	-10	-18	-25	-25	-20	-18	-13	-18	-23
HFRR, µm		501	417	226	487	482	456	391	404	367
Wax Content @ 10°C Below Cloud, wt%	**	3.2	2.2	0.0	0.9	2.2	2.8	2.6	2.6	2.8
Sulphur, wt%	0.005 (max)	0.0008	0.0006	0.0003	0.0005	0.0007	0.0007	0.0005	0.0006	0.0005
Density @15°C, kg/m3		840.0	829.1	816.0	833.0	835.0	835.0	840.0	833.0	837.0
Viscosity @ 20°C, cSt										
Viscosity @ 30°C, cSt	2.5 (min)	4.413	3.613	2.804	3.908	3.848	3.427	3.825	3.929	4.312
Cetane Index 2 Variable	45 (min)	59	56	54	55	54	56	54	56	56
Cetane Index 4 Variable		60	57	53	57	56	58	53	58	58
Cetane Number		59	56	54	55	58	57	56	56	55
Distillation, °C IBP		172	154	130	130	166	151	164	160	154
T_{10}		238	213	184	238	229	232	211	233	238
T_{20}		258	234	204	250	245	251	237	250	258
T_{50}		289	277	262	276	276	285	282	283	289
T_{90}	350 (max)	338	331	320	324	332	337	335	329	334
T_{95}		352	344	330	336	345	350	349	341	346
FBP		366	356	342	348	358	361	363	355	360

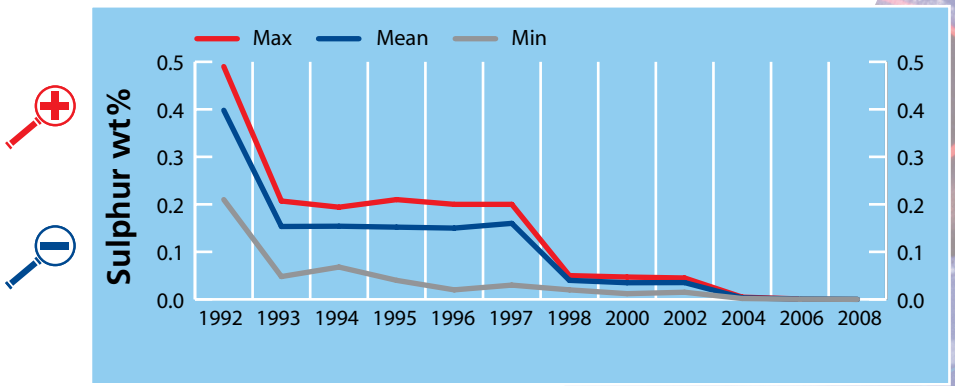
* Pour point measured at 2.5˚C intervals (Japanese Industry Standard) **Wax content measured at -10˚C below cloud point

Japan Grade 2 - Key Trends









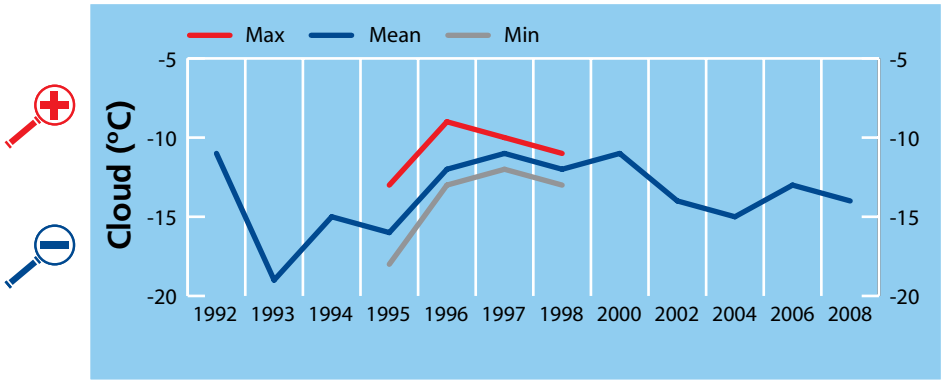
Japan Grade 3

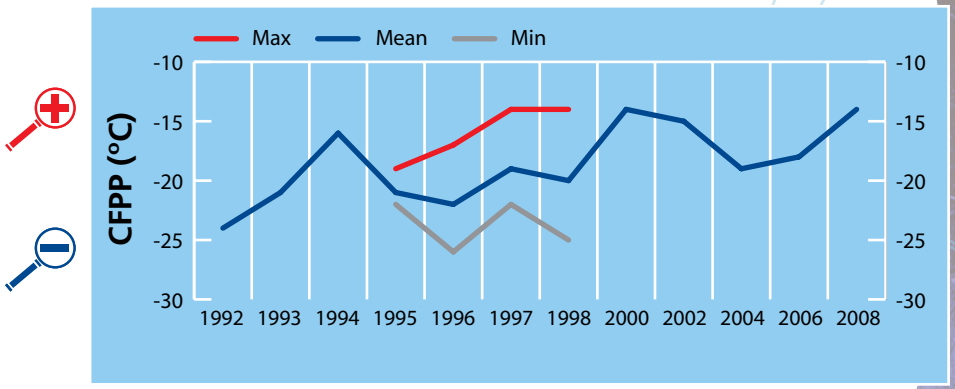
National Standards and physical inspection data

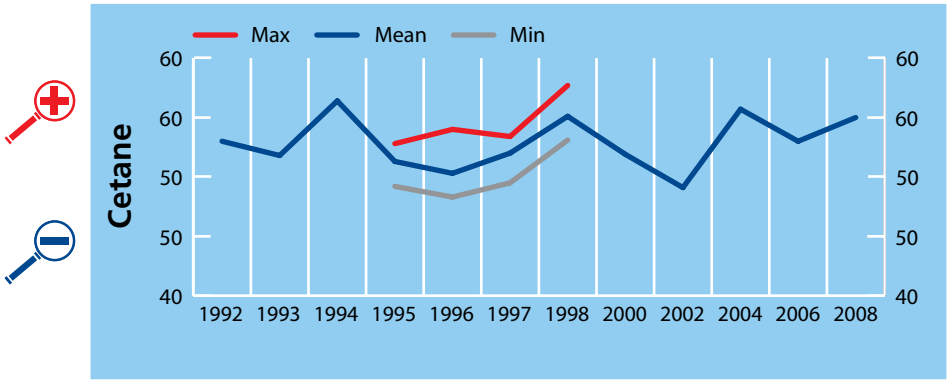
	National Standard	Maximum Observed	Mean	Minimum Observed	2
Cloud Point, °C			-14		-14
CFPP, °C	-12 (max)		-15		-15
Pour Point, °C	-20 (max)*		-23		-23
HFRR, µm			460		460
Wax Content @ 10°C Below Cloud, wt%	**		3.5		3.5
Sulphur, wt%	0.005 (max)		0.0005		0.0005
Density @15°C, kg/m3			814.0		814.0
Viscosity @ 20°C, cSt					
Viscosity @ 30°C, cSt	2.0 (min)		2.508		2.508
Cetane Index 2 Variable	45 (min)		56		56
Cetane Index 4 Variable			56		56
Cetane Number			55		55
Distillation, °C IBP			160		160
T_{10}			185		185
T_{20}			201		201
T_{50}			252		252
T_{90}	330 (max)		317		317
T_{95}			330		330
FBP			346		346

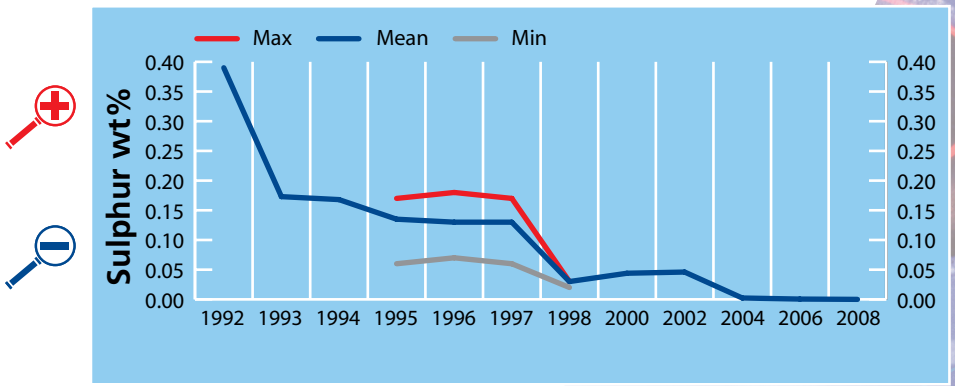
* Pour point measured at 2.5˚C intervals (Japanese Industry Standard) **Wax content measured at -10˚C rather than 10˚C below cloud point

Japan Grade 3 - Key Trends









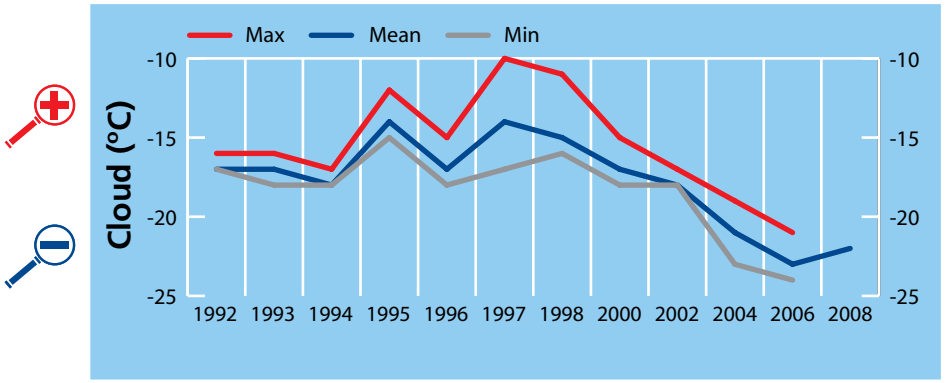
Japan Special Grade 3

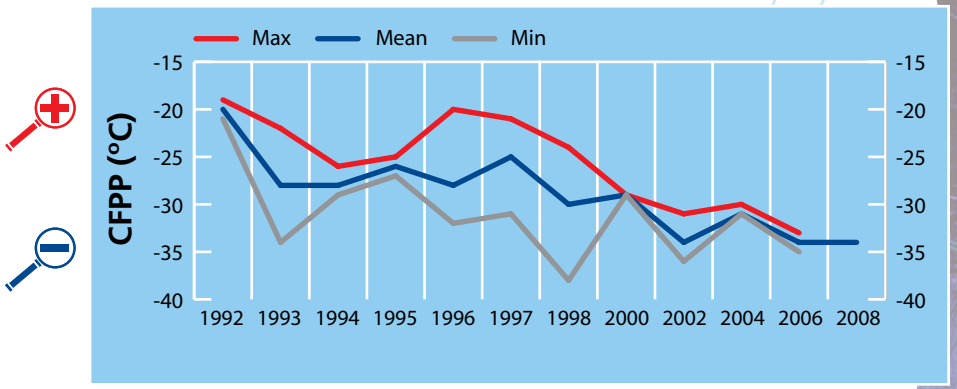
National Standards and physical inspection data

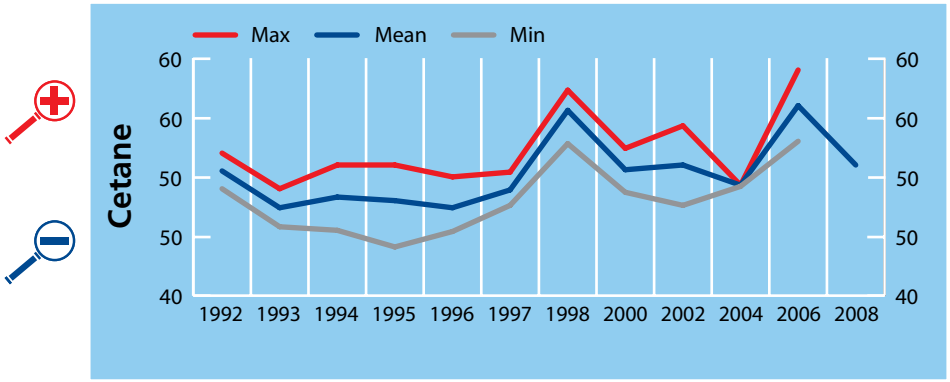
	National Standard	Maximum Observed	Mean	Minimum Observed	1	8
Cloud Point, °C			-22		-20	-23
CFPP, °C	-19 (max)		-25		-15	-35
Pour Point, °C	-30 (max)*		<-37.5		<-37.5	<-37.5
HFRR, µm			457		499	415
Wax Content @ 10°C Below Cloud, wt%	**		1.7		2.2	1.1
Sulphur, wt%	0.005 (max)		0.0003		0.0003	0.0003
Density @15°C, kg/m3			810.5		808.0	813.0
Viscosity @ 20°C, cSt						
Viscosity @ 30°C, cSt	1.7 (min)		2.115		1.900	2.330
Cetane Index 2 Variable	45 (min)		51		49	53
Cetane Index 4 Variable			51		50	53
Cetane Number			51		51	51
Distillation, °C IBP			149		149	149
T_{10}			172		171	173
T_{20}			185		183	188
T_{50}			230		221	240
T_{90}	330 (max)		310		296	324
T_{95}			325		310	341
FBP			337		318	357

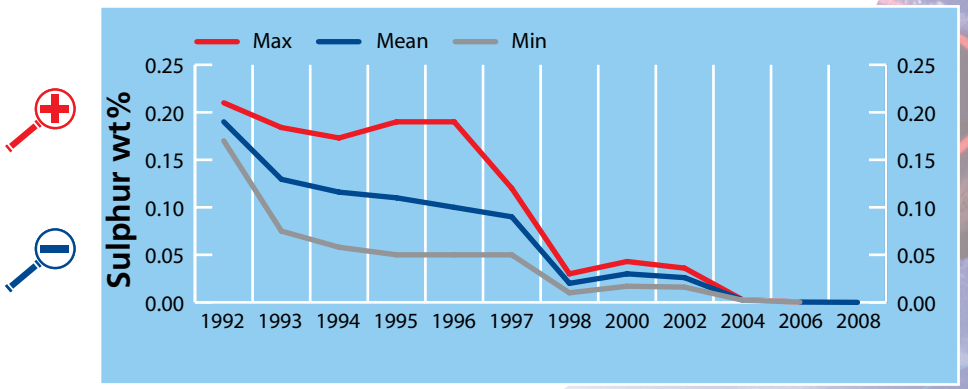
* Pour point measured at 2.5˚C intervals (Japanese Industry Standard) **Wax content measured at -10˚C rather than 10˚C below cloud point

Japan Special Grade 3 - Key Trends







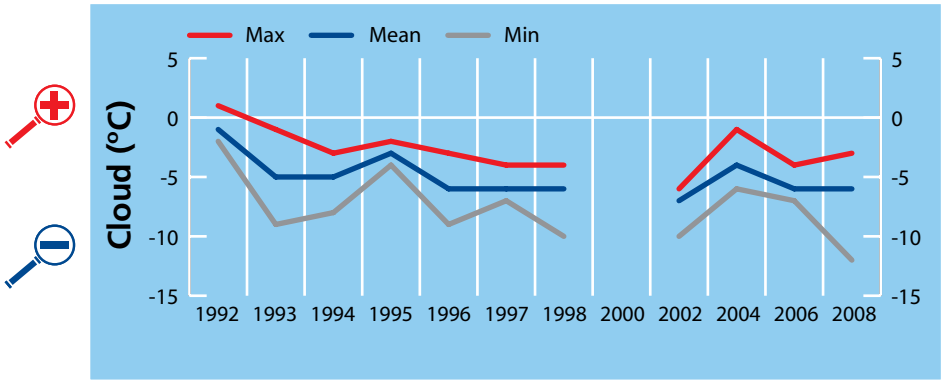


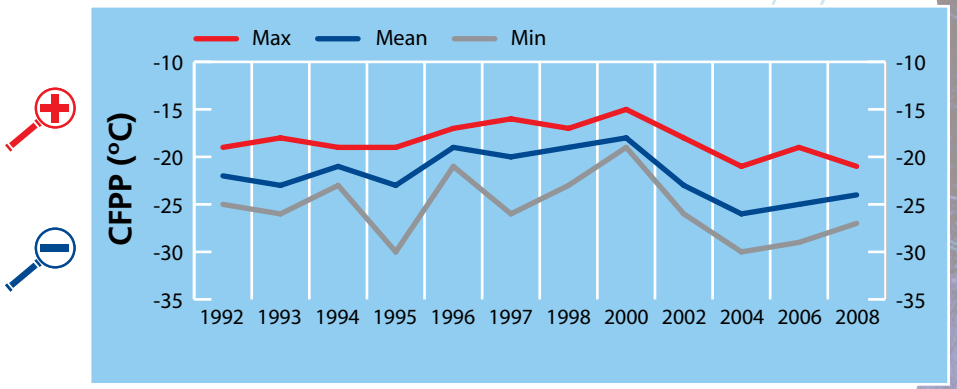
Korea

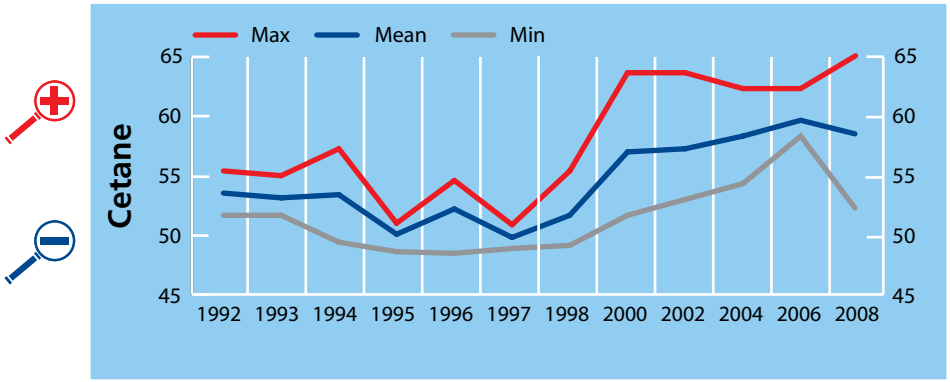
National Standards and physical inspection data

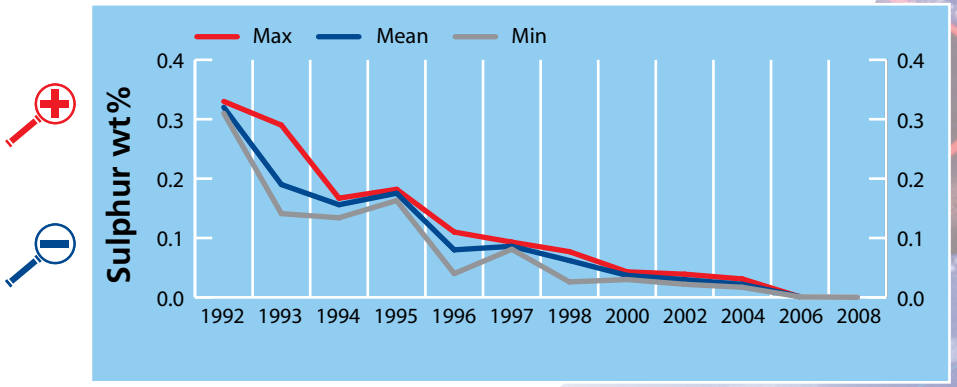
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800009	DIES 0800010	DIES 0800011	DIES 0800012	DIES 0800013	DIES 0800015	DIES 0800016
Cloud Point, °C		-3	-6	-12	-4	-12	-6	-3	-6	-5	-4
CFPP, °C	-16 (max)	-21	-24	-27	-26	-26	-27	-22	-21	-23	-27
Pour Point, °C		-24	-33	-54	-30	-54	-27	-24	-42	-27	-27
HFRR, µm	460 (max)	372	347	318	339	372	336	361	369	318	337
Wax Content @ 10°C Below Cloud, wt%		2.3	1.6	1.2	1.5	1.7	2.3	1.3	1.2	1.8	1.5
Sulphur, wt%	0.003 (max)	0.0008	0.0007	<0.0003	0.0008	<0.0003	0.0005	0.0007	<0.0003	0.0006	0.0008
Density @15°C, kg/m3	815 - 845	832.6	827.3	820.5	827.2	832.6	822.1	820.5	825.4	830.7	832.3
Viscosity @ 20°C, cSt		5.994	4.543	3.560	4.183	4.944	4.260	3.560	5.994	4.346	4.512
Viscosity @ 40°C, cSt	1.9 - 5.5	3.557	2.879	2.359	2.701	3.082	2.728	2.359	3.557	2.744	2.981
Cetane Index 2 Variable		62	59	56	56	58	60	60	62	58	58
Cetane Index 4 Variable	45 (min)	63	56	54	56	54	59	55	63	54	54
Cetane Number		65	58	53	55	65	59	55	65	53	54
Distillation, °C IBP		177	160	145	151	177	177	145	166	152	152
T_{10}		217	198	181	192	197	208	181	217	196	192
T_{20}		244	221	201	216	220	227	201	244	219	219
T_{50}		293	275	262	274	274	271	262	293	272	277
T_{90}	360 (max)	346	335	328	339	331	330	339	328	336	346
T_{95}		366	351	338	358	339	344	361	338	351	366
FBP		372	363	347	368	347	358	369	365	362	372
FAME?					No	No	No	No	No	No	No

Korea - Key Trends







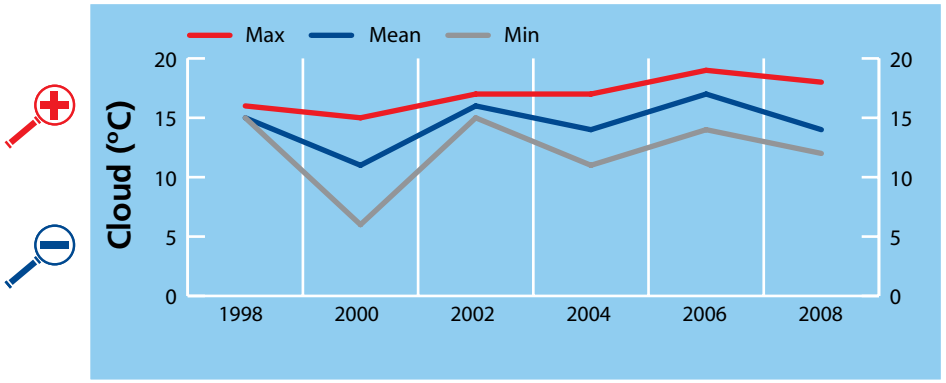


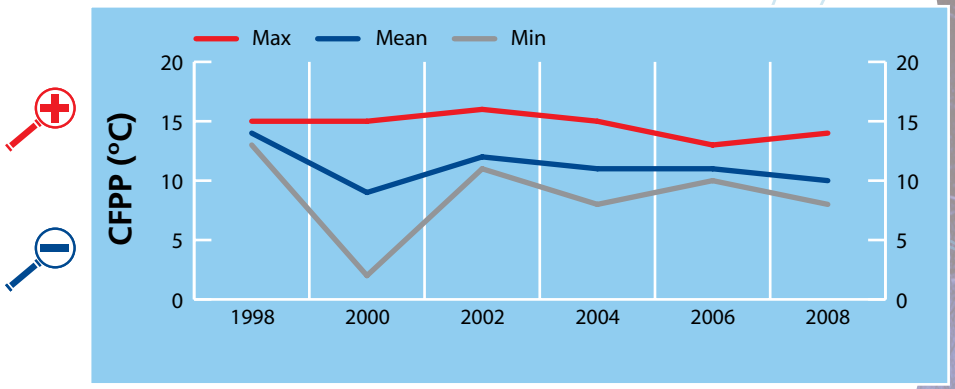
Malaysia

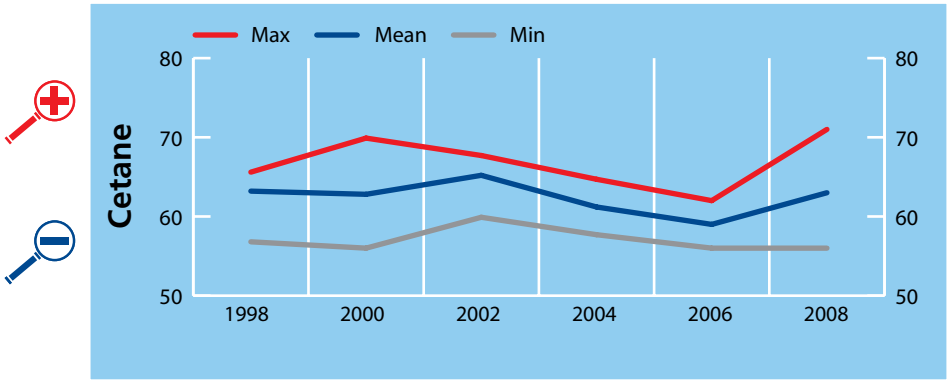
National Standards and physical inspection data

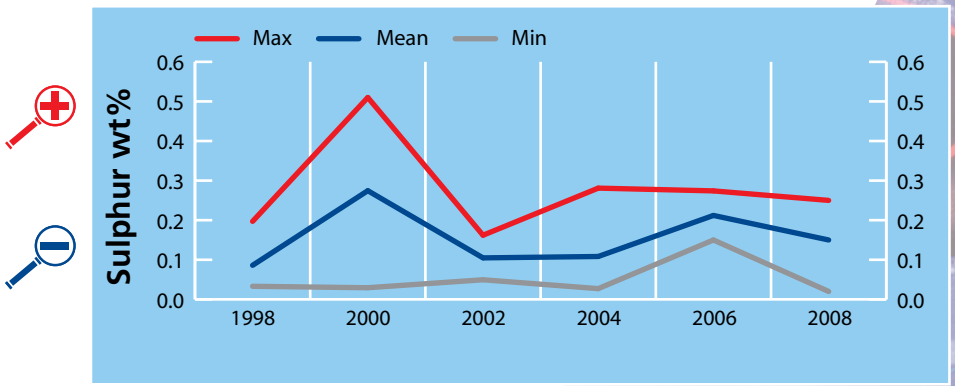
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802887	DIES 0802888	DIES 0802889	DIES 0802890	DIES 0802891	DIES 0802892
Cloud Point, °C	18 (max)	18	14	12	12	17	13	12	18	13
CFPP, °C		14	10	8	10	13	9	9	14	8
Pour Point, °C	15 (max)	12	11	9	9	12	9	12	12	9
HFRR, µm		373	356	317	373	317	358	368	366	357
Wax Content @ 10°C Below Cloud, wt%		7.3	6.1	5.0	7.3	6.4	5.3	5.0	7.3	5.0
Sulphur, wt%	0.3 (max)	0.2520	0.1529	0.0269	0.2520	0.0636	0.1010	0.2490	0.0269	0.2250
Density @15°C, kg/m3		842.4	834.0	819.1	842.0	828.4	830.6	841.2	819.1	842.4
Viscosity @ 20°C, cSt		6.884	5.584	4.399	6.884	5.235	4.399	6.215	4.720	6.053
Viscosity @ 40°C, cSt	1.5 - 5.8	4.093	3.517	3.001	4.093	3.293	3.260	3.764	3.001	3.688
Cetane Index 2 Variable		63	58	56	57	60	56	56	63	56
Cetane Index 4 Variable		61	57	55	58	59	55	56	61	55
Cetane Number	45 (min)	71	63	56	60	66	61	56	71	65
Distillation, °C IBP		176	174	169	174	172	176	175	169	176
T_{10}		233	223	213	226	218	220	233	213	227
T_{20}		259	244	232	259	239	232	253	232	249
T_{50}		309	286	266	309	284	266	290	279	289
T_{90}	370 (max)	362	354	341	359	359	341	347	362	359
T_{95}		383	373	364	370	376	364	369	383	377
FBP		388	383	375	378	387	375	382	388	386
FAME?					No	No	No	No	No	No

Malaysia - Key Trends







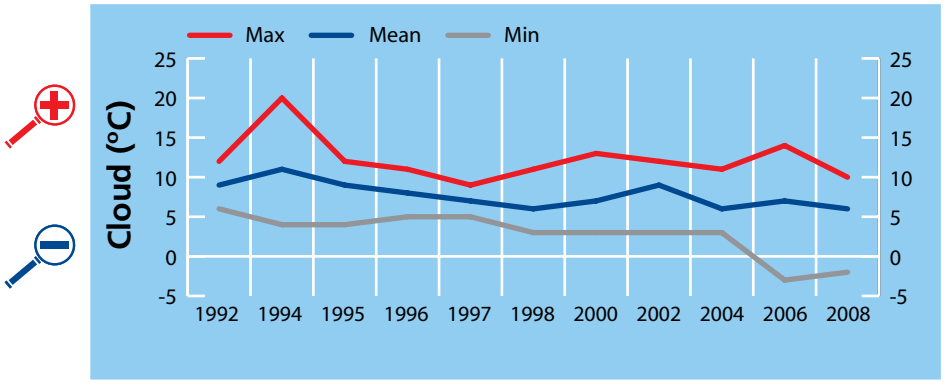


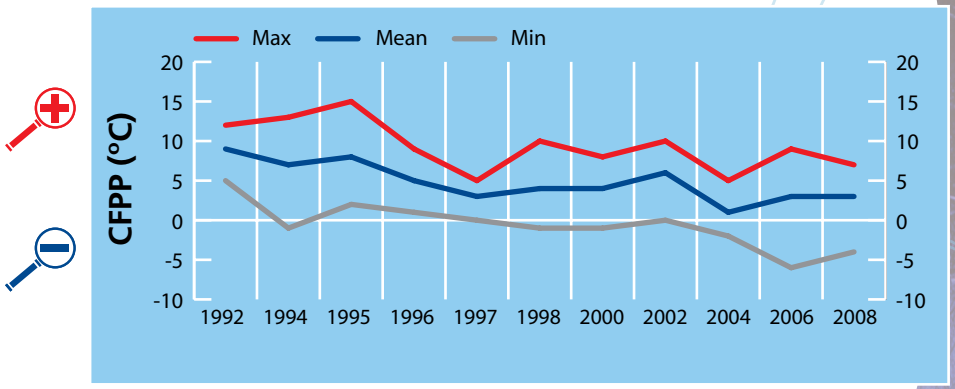
Singapore

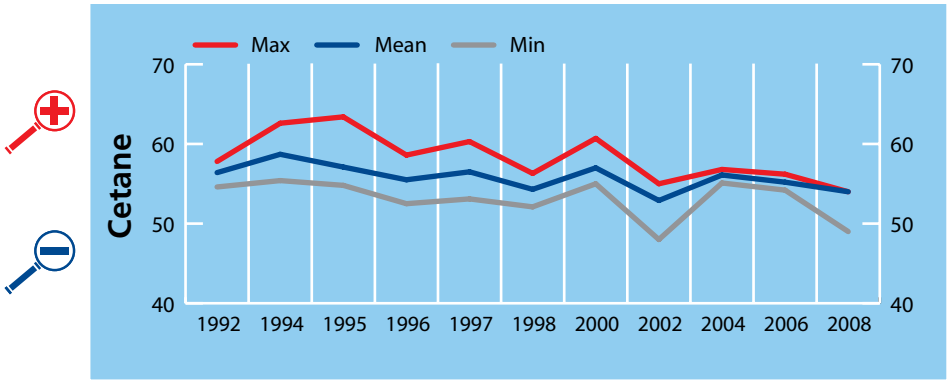
National Standards and physical inspection data

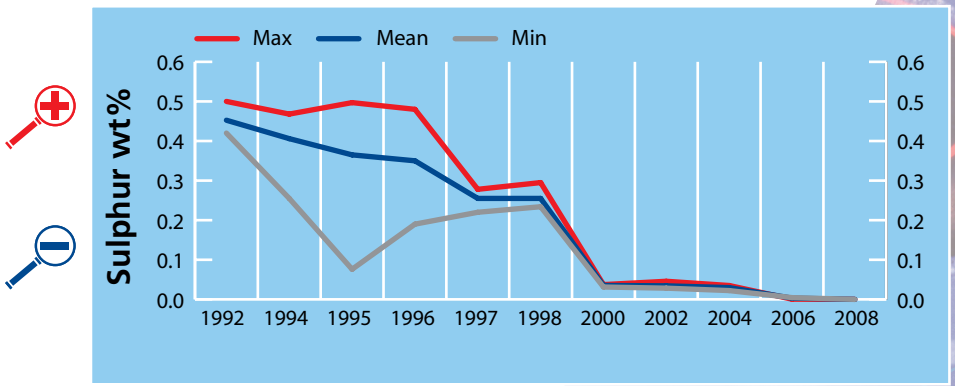
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0800530	DIES 0800531	DIES 0800532	DIES 0800533
Cloud Point, °C		10	6	-2	5	10	-2	10
CFPP, °C		7	3	-4	1	7	-4	7
Pour Point, °C		6	2	-3	-3	6	-3	6
HFRR, µm		332	305	266	266	332	315	308
Wax Content @ 10°C Below Cloud, wt%		5.1	3.2	1.2	1.2	3.2	5.1	3.4
Sulphur, wt%	0.05 (max)	0.0006	0.0004	0.0003	0.0006	0.0005	0.0003	0.0004
Density @15°C, kg/m3		854.6	848.8	832.1	854.0	854.6	832.1	854.6
Viscosity @ 20°C, cSt		6.945	6.611	6.290	6.321	6.945	6.290	6.887
Viscosity @ 40°C, cSt		4.048	3.892	3.752	3.753	4.013	3.752	4.048
Cetane Index 2 Variable		59	54	51	51	53	59	53
Cetane Index 4 Variable		63	54	50	50	52	63	52
Cetane Number		60	54	49	49	53	60	54
Distillation, °C IBP		217	201	179	179	205	217	205
T_{10}		254	240	221	221	241	254	242
T_{20}		266	256	244	244	256	266	257
T_{50}		296	294	292	293	295	292	296
T_{90}		367	358	336	367	365	336	365
T_{95}		385	375	350	385	381	350	382
FBP		390	380	358	390	386	358	388
FAME?					No	No	No	No

Singapore - Key Trends









Thailand

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802848	DIES 0802850	DIES 0802851	DIES 0802852	DIES 0802853
Cloud Point, °C		13	6	1	8	13	8	10	2
CFPP, °C		9	1	-6	1	9	2	7	-1
Pour Point, °C	10 (max)	9	2	-6	3	9	3	6	-6
HFRR, µm	460 (max)	270	224	194	224	194	214	244	220
Wax Content @ 10°C Below Cloud, wt%		4.6	3.2	1.8	3.2	4.6	3.5	4.5	2.2
Sulphur, wt%	0.035 (max)	0.0303	0.0225	0.0068	0.0200	0.0274	0.0220	0.0297	0.0303
Density @15°C, kg/m3	810 - 870	841.2	831.2	821.2	831.4	828.6	830.4	827.3	838.0
Viscosity @ 20°C, cSt		5.308	5.091	4.745	5.276	5.308	5.193	4.801	4.967
Viscosity @ 40°C, cSt	1.8 - 4.1	3.343	3.197	3.030	3.343	3.317	3.241	3.041	3.089
Cetane Index 2 Variable		61	57	54	57.9	58.0	57.7	57.1	54.5
Cetane Index 4 Variable	47 (min)	63	58	54	58.9	60.2	58.5	58.4	53.6
Cetane Number	47 (min)	61	58	54	60.3	60.0	60.0	60.8	54.7
Distillation, °C IBP		191	177	170	176	191	176	183	170
T_{10}		230	217	204	218	230	217	219	204
T_{20}		245	238	227	241	245	239	235	227
T_{50}		290	285	277	290	285	287	277	283
T_{90}	357 (max)	353	350	347	350	351	351	348	353
T_{95}		371	368	365	367	369	369	369	369
FBP		381	378	372	376	380	379	379	379
FAME?					Yes	Yes	Yes	No	Yes

Specification shown is Type II

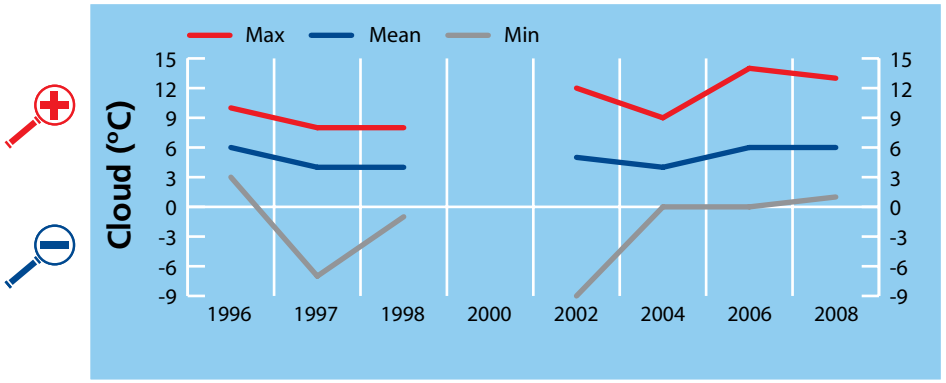
Thailand (continued)

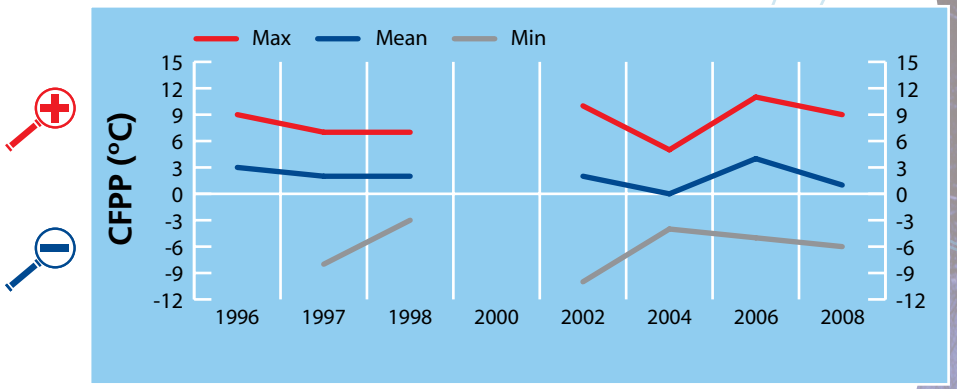
National Standards and physical inspection data

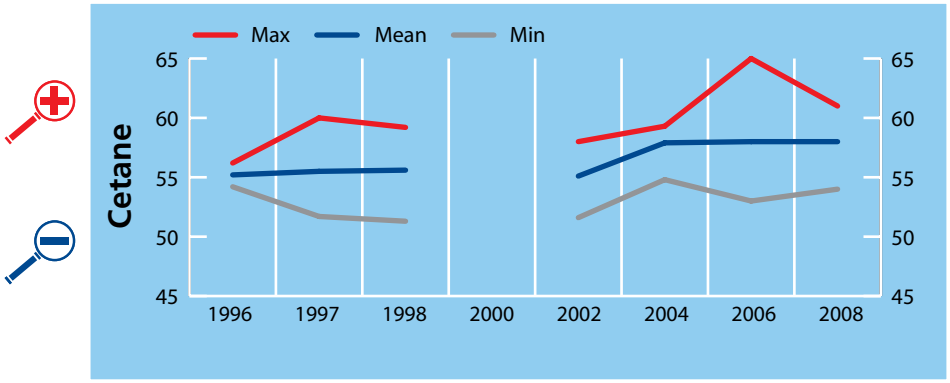
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0802848	DIES 0802850	DIES 0802851	DIES 0802852
Cloud Point, °C		13	6	1	8	5	1	2
CFPP, °C		9	1	-6	3	1	-6	-3
Pour Point, °C	10 (max)	9	2	-6	3	0	-6	3
HFRR, µm	460 (max)	270	224	194	213	270	216	220
Wax Content @ 10°C Below Cloud, wt%		4.6	3.2	1.8	3.2	3.0	1.8	3.1
Sulphur, wt%	0.035 (max)	0.0303	0.0225	0.0068	0.0205	0.0169	0.0293	0.0068
Density @15°C, kg/m3	810 - 870	841.2	831.2	821.2	841.2	830.9	831.9	821.2
Viscosity @ 20°C, cSt		5.308	5.091	4.745	5.215	5.207	4.745	5.105
Viscosity @ 40°C, cSt	1.8 - 4.1	3.343	3.197	3.030	3.331	3.210	3.030	3.170
Cetane Index 2 Variable		61	57	54	54.0	57.6	55.6	61.4
Cetane Index 4 Variable	47 (min)	63	58	54	54.6	58.6	55.7	63.1
Cetane Number	47 (min)	61	58	54	55.1	56.3	54.2	61.4
Distillation, °C IBP		191	177	170	177	173	177	173
T_{10}		230	217	204	225	219	211	212
T_{20}		245	238	227	245	242	230	239
T_{50}		290	285	277	287	287	278	289
T_{90}	357 (max)	353	350	347	353	351	350	347
T_{95}		371	368	365	371	368	369	365
FBP		381	378	372	381	378	378	372
FAME?					Yes	Yes	Yes	No

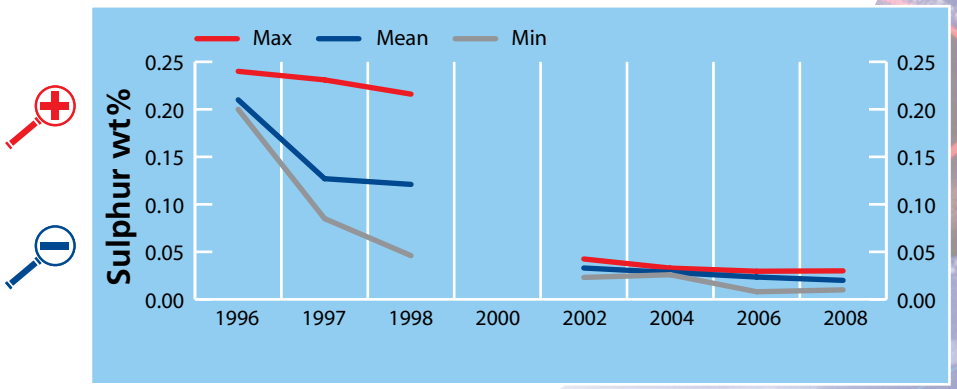
Specification shown is Type II

Thailand - Key Trends









Worldwide Survey- The Americas

The Americas

Argentina

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0804312	DIES 0804313	DIES 0804314	DIES 0804315	DIES 0804410	DIES 0804411	DIES 0804412	DIES 0804414
Cloud Point, °C		4	-1	-9	0	2	1	-4	0	2	1	0
CFPP, °C		-3	-12	-23	-17	-8	-6	-13	-14	-5	-13	-8
Pour Point, °C		-6	-19	-36	-21	-15	-24	-15	-15	-15	-27	-24
HFRR, µm		421	380	336	402	383	383	421	367	387	375	341
Wax Content @ 10°C Below Cloud, wt%		2.7	1.9	1.1	2.3	1.7	1.4	1.7	1.9	1.6	1.1	1.7
Sulphur, wt%	0.25 (max)*	0.1380	0.1053	0.0130	0.0396	0.0985	0.1130	0.1350	0.0130	0.1090	0.1210	0.1110
Density @15°C, kg/m3		854.1	841.8	828.3	848.0	853.8	833.5	840.5	847.9	854.1	828.3	841.7
Viscosity @ 20°C, cSt		5.865	4.567	3.177	5.865	5.603	4.011	4.308	4.965	5.622	3.699	4.256
Viscosity @ 40°C, cSt	2.0 - 5.5	3.594	2.897	2.168	3.594	3.451	2.600	2.750	3.142	3.460	2.428	2.740
Cetane Index 2 Variable		54	51	47	52	49	53	51	51	49	53	52
Cetane Index 4 Variable	48 (min)	53	50	47	52	49	51	50	50	49	51	50
Cetane Number	48 (min)	58	53	48	54	55	54	53	51	58	52	52
Distillation, °C IBP		183	163	149	173	177	153	171	157	178	151	149
T_{10}		223	200	180	220	220	184	206	205	223	180	180
T_{20}		243	221	196	243	240	205	223	231	241	197	205
T_{50}		289	274	240	289	283	267	270	284	284	259	279
T_{90}	360 (max)	360	350	332	352	358	353	340	354	359	355	355
T_{95}		384	370	351	369	380	376	359	373	382	382	377
FBP		391	379	359	379	389	386	372	382	391	389	384
FAME?					No	No	No	No	Yes	No	No	Yes

* Sulphur limit 0.15% maximum in metropolitan zones

Argentina (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0804648	DIES 0804649	DIES 0804650	DIES 0804651	DIES 0805126	DIES 0805127	DIES 0805128	DIES 0805129
Cloud Point, °C		4	-1	-9	-1	-5	-1	-1	1	-2	3	4
CFPP, °C		-3	-12	-23	-15	-13	-7	-15	-15	-17	-3	-9
Pour Point, °C		-6	-19	-36	-18	-18	-18	-18	-18	-24	-6	-9
HFRR, µm		421	380	336	336	378	345	359	397	395	365	398
Wax Content @ 10°C Below Cloud, wt%		2.7	1.9	1.1	1.5	2.0	2.0	1.9	1.8	2.1	1.6	2.7
Sulphur, wt%	0.25 (max)*	0.1380	0.1053	0.0130	0.1150	0.1370	0.1200	0.1300	0.1080	0.0453	0.1330	0.1380
Density @15°C, kg/m3		854.1	841.8	828.3	847.5	842.4	844.0	847.8	851.1	845.5	830.7	833.4
Viscosity @ 20°C, cSt		5.865	4.567	3.177	4.652	4.407	4.673	5.008	5.279	5.056	4.060	4.090
Viscosity @ 40°C, cSt	2.0 - 5.5	3.594	2.897	2.168	2.951	2.792	2.951	3.126	3.241	3.146	2.677	2.650
Cetane Index 2 Variable		54	51	47	51	50	52	51	49	52	54	54
Cetane Index 4 Variable	48 (min)	53	50	47	49	50	50	49	49	51	52	53
Cetane Number	48 (min)	58	53	48	53	51	53	52	51	51	52	54
Distillation, °C IBP		183	163	149	161	179	149	161	183	174	154	158
T_{10}		223	200	180	197	212	186	201	222	211	184	196
T_{20}		243	221	196	221	225	217	228	238	232	202	220
T_{50}		289	274	240	279	269	282	282	280	282	267	271
T_{90}	360 (max)	360	350	332	353	336	353	354	354	348	360	349
T_{95}		384	370	351	373	354	373	374	377	366	384	368
FBP		391	379	359	383	366	380	383	383	376	390	377
FAME?					No	No	No	No	No	No	Yes	No

* Sulphur limit 0.15% maximum in metropolitan zones

Argentina (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0805198	DIES 0805199	DIES 0805200	DIES 0805201
Cloud Point, °C		4	-1	-9	-8	-9	0	-2
CFPP, °C		-3	-12	-23	-23	-17	-12	-15
Pour Point, °C		-6	-19	-36	-36	-27	-12	-24
HFRR, µm		421	380	336	397	402	413	364
Wax Content @ 10°C Below Cloud, wt%		2.7	1.9	1.1	1.4	2.1	2.6	2.2
Sulphur, wt%	0.25 (max)*	0.1380	0.1053	0.0130	0.0830	0.1010	0.1360	0.1190
Density @15°C, kg/m3		854.1	841.8	828.3	831.5	838.3	828.3	848.4
Viscosity @ 20°C, cSt		5.865	4.567	3.177	3.177	3.619	3.662	5.333
Viscosity @ 40°C, cSt	2.0 - 5.5	3.594	2.897	2.168	2.168	2.372	2.416	3.278
Cetane Index 2 Variable		54	51	47	47	49	54	51
Cetane Index 4 Variable	48 (min)	53	50	47	47	48	53	50
Cetane Number	48 (min)	58	53	48	54	48	54	53
Distillation, °C IBP		183	163	149	160	163	151	167
T_{10}		223	200	180	184	192	187	213
T_{20}		243	221	196	196	207	208	236
T_{50}		289	274	240	240	258	263	286
T_{90}	360 (max)	360	350	332	337	332	342	350
T_{95}		384	370	351	358	351	361	367
FBP		391	379	359	371	359	372	373
FAME?					No	Yes	No	No

* Sulphur limit 0.15% maximum in metropolitan zones

Brazil

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0805407	DIES 0805408	DIES 0805409	DIES 0805412	DIES 0805536
Cloud Point, °C		16	4	0	0	16	3	2	0
CFPP, °C		13	-8	-20	-18	13	-20	-12	-5
Pour Point, °C		15	-16	-36	-36	15	-36	-15	-6
HFRR, µm		218	210	200	215	211	200	218	210
Wax Content @ 10°C Below Cloud, wt%		8.0	2.4	0.4	0.7	8.0	0.8	0.4	2.1
Sulphur, wt%	0.25 (max)*	0.0403	0.0346	0.0300	0.0302	0.0300	0.0325	0.0403	0.0398
Density @15°C, kg/m3		861.4	847.8	829.8	857.8	829.8	861	854	836
Viscosity @ 20°C, cSt		6.614	5.399	3.873	5.341	6.614	5.492	3.873	5.675
Viscosity @ 40°C, cSt	2.0 - 5.5	4.016	3.353	2.523	3.319	4.016	3.427	2.523	3.479
Cetane Index 2 Variable		61	51	44	49	61	46	44	56
Cetane Index 4 Variable	48 (min)	65	51	43	48	65	43	43	58
Cetane Number	48 (min)	61	50	42	46	61	42	43	58
Distillation, °C IBP		200	161	144	153	164	144	144	200
T_{10}		239	205	177	188	239	187	177	235
T_{20}		268	232	197	220	268	223	197	250
T_{50}		306	280	259	274	306	277	259	286
T_{90}	360 (max)	370	361	348	361	362	370	365	348
T_{95}		397	386	368	388	378	397	397	368
FBP		406	395	381	402	385	406	403	381
FAME?					Yes	Yes	Yes	Yes	Yes

* Sulphur limit 0.15% maximum in metropolitan zones

National Standards and physical inspection data

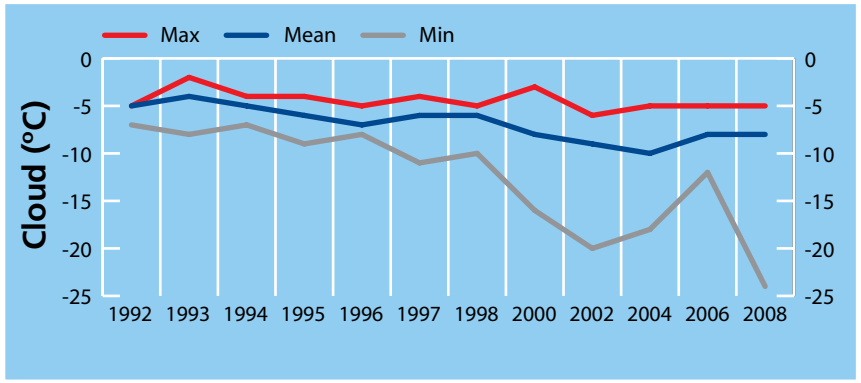
	National Standard	Maximum Observed	Mean	Minimum Observed	30441 129-1	30441 129-2	30441 129-3	30441 129-4	30441 129-5	30441 129-6	30441 129-7	30441 129-8
Cloud Point, °C		-21	-30	-44	-43	-38	-21	-35	-44	-30	-27	-25
CFPP, °C		-21	-30	-43	-43	-38	-21	-38	-41	-31	-27	-26
Pour Point, °C		-30	-37	-48	-48	-45	-42	-45	-48	-45	-30	-33
LTFT, °C		-24	-32	-48	-48	-42	-24	-36	-48	-32	-30	-26
HFRR, µm	460 (max)	623	426	334	361	334	568	429	375	515	384	418
Wax Content @ 10°C Below Cloud, wt%		3.4	2.0	0.5	1.5	1.8	1.2	0.7	1.3	0.5	2.8	2.3
Sulphur, wt%	0.015 (max)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Density @15°C, kg/m3		858	838	820	847.2	843.0	835.8	858.0	841.7	838.8	836.6	841.1
Viscosity @ 20°C, cSt		3.620	3.123	2.710	3.08	3.62	3.33	3.51	3.11	3.25	2.87	3.22
Viscosity @ 40°C, cSt	1.7 - 4.1	2.370	2.103	1.860	2.08	2.37	2.24	2.32	2.1	2.18	1.96	2.17
Cetane Index 2 Variable		50	45	40	43	45	46	40	44	44	45	45
Cetane Index 4 Variable		47	42	37	37	41	43	38	39	41	43	42
Cetane Number	40 (min)	48	45	39	39	44	43	44	44	41	43	47
Distillation, °C IBP		183	167	157	158	169	168	183	162	164	169	168
T_{10}		207	190	174	182	191	188	207	182	186	194	197
T_{20}		218	204	187	196	208	203	218	196	198	208	213
T_{50}		250	243	231	245	250	244	246	242	240	242	246
T_{90}	360 (max)	319	301	287	305	309	319	297	307	314	292	299
T_{95}												
FBP		349	330	311	333	343	349	324	336	343	319	326
FAME?					No	No	No	No	No	No	No	No

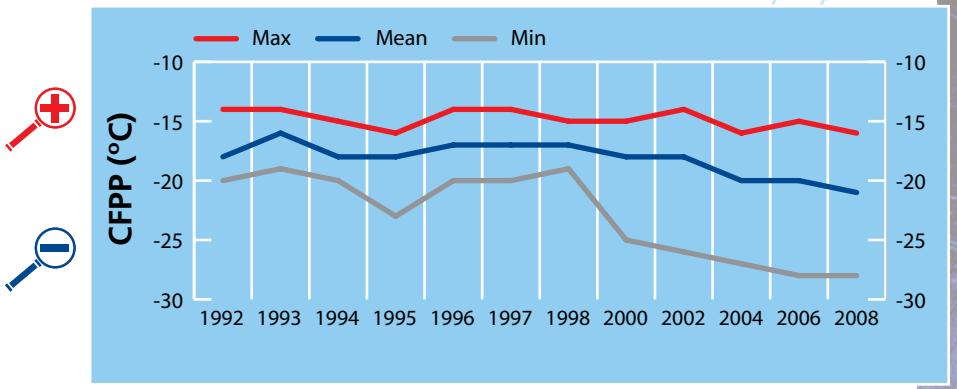
Canada (continued)

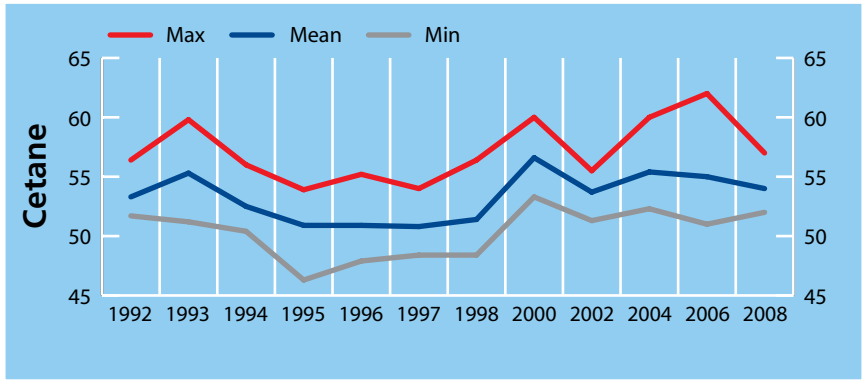
National Standards and physical inspection data

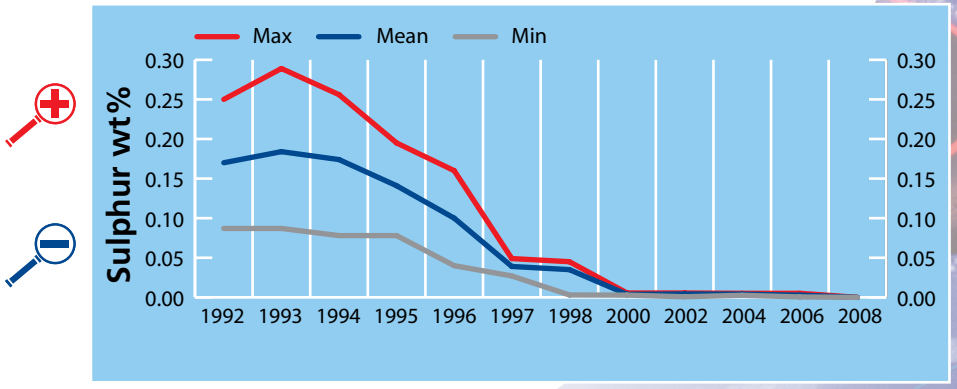
	National Standard	Maximum Observed	Mean	Minimum Observed	30441 129-9	30441 129-10	30441 129-11	30441 129-12	30441 129-13	30441 129-14	30441 129-15
Cloud Point, °C		-21	-30	-44	-27	-28	-24	-25	-26	-28	-28
CFPP, °C		-21	-30	-43	-28	-29	-24	-25	-26	-29	-30
Pour Point, °C		-30	-37	-48	-30	-30	-33	-30	-30	-33	-33
LTFT, °C		-24	-32	-48	-30	-30	-24	-26	-26	-30	-28
HFRR, µm	460 (max)	623	426	334	399	342	385	539	382	623	343
Wax Content @ 10°C Below Cloud, wt%		3.4	2.0	0.5	2.9	2.9	0.9	2.9	1.9	2.3	3.4
Sulphur, wt%	0.015 (max)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Density @15°C, kg/m3		858	838	820	836.8	841.3	827.1	824.5	819.8	839.9	835.5
Viscosity @ 20°C, cSt		3.620	3.123	2.710	3	3.19	2.71	2.83	2.79	3.05	3.28
Viscosity @ 40°C, cSt	1.7 - 4.1	2.370	2.103	1.860	2.03	2.15	1.86	1.94	1.91	2.04	2.19
Cetane Index 2 Variable		50	45	40	46	45	46	49	50	44	47
Cetane Index 4 Variable		47	42	37	43	43	42	46	47	41	46
Cetane Number	40 (min)	48	45	39	46	48	43	47	48	46	45
Distillation, °C IBP		183	167	157	163	177	157	166	158	162	178
T_{10}		207	190	174	191	200	174	188	181	192	204
T_{20}		218	204	187	206	213	187	201	194	207	218
T_{50}		250	243	231	244	247	231	238	236	242	246
T_{90}	360 (max)	319	301	287	296	296	302	289	306	293	287
T_{95}											
FBP		349	330	311	322	330	337	314	338	322	311
FAME?					No	No	Yes	No	No	No	No

Canada - Key Trends





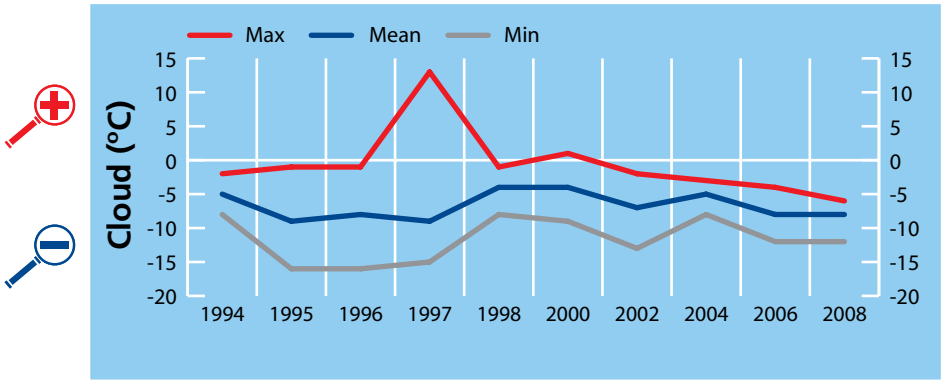


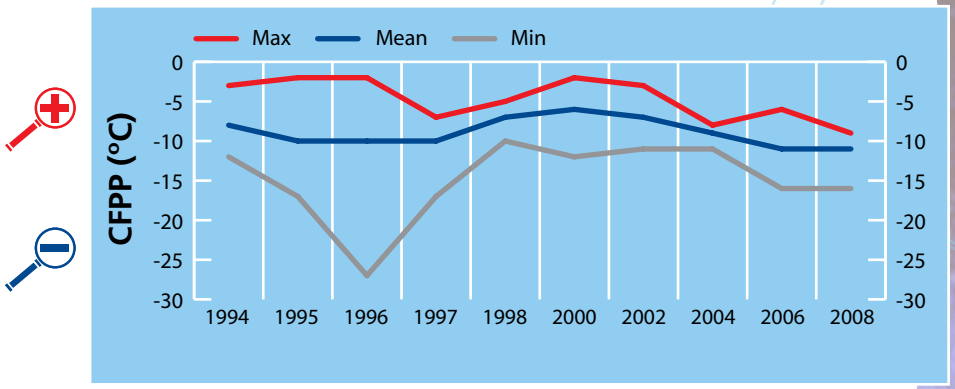


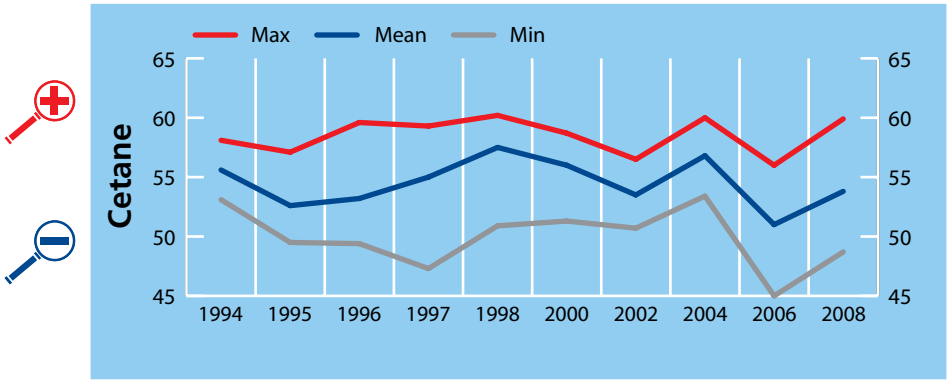
National Standards and physical inspection data

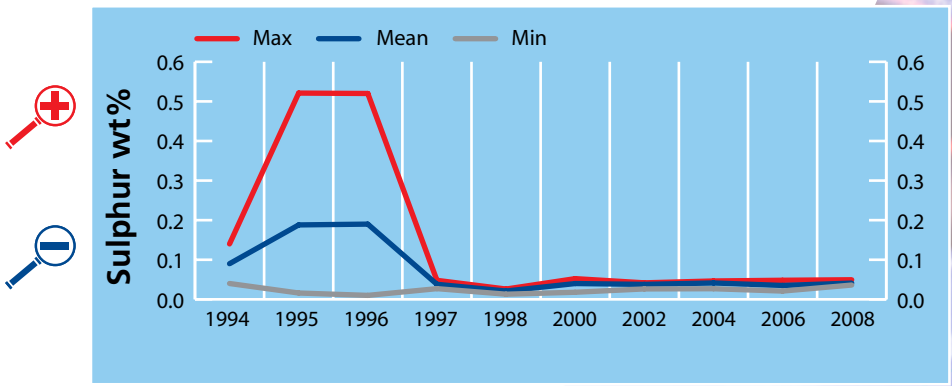
	National Standard	Maximum Observed	Mean	Minimum Observed	E04034	E08963	E03100	E07771	E06246	E04592	E00303
Cloud Point, °C		-6	-8	-12	-6	-6	-6	-12	-9	-6	-9
CFPP, °C		-9	-11	-16	-10	-9	-9	-16	-11	-10	-12
Pour Point, °C	-5 (max)	-9	-12	-18	-12	-9	-9	-18	-12	-12	-15
HFRR, µm	520 (max)	465	409	376			465	389	405	376	411
Wax Content @ 10°C Below Cloud, wt%											
Sulphur, wt%	0.05 (max)	0.0495	0.0410	0.0361	0.0483	0.0361	0.0374	0.0375	0.0368	0.0413	0.0495
Density @15°C, kg/m3		845	834	827	834	834	827	831	839	845	828
Viscosity @ 20°C, cSt											
Viscosity @ 40°C, cSt	1.9 - 4.1	2.817	2.575	2.325	2.758	2.817	2.696	2.325	2.349	2.605	2.474
Cetane Index $_2$ Variable	48 (min)	54.6	50.7	45.8	52.3	54.6	53.2	47.9	49.5	45.8	51.7
Cetane Index $_4$ Variable		54.6	51.5	47.8	52.2	52.0	54.6	50.0	50.9	47.8	53.0
Cetane Number		59.9	53.8	48.7	59.9	55.8	54.1	52.7	49.0	48.7	56.2
Distillation, °C IBP		220	183	163	181	220	174	163	188	184	171
T_{10}	275 (max)										
T_{20}											
T_{50}											
T_{90}	345 (max)										
T_{95}											
FBP		375	369	355	366	375	371	374	366	374	355
FAME?											

Mexico - Key Trends









National Standards and physical inspection data

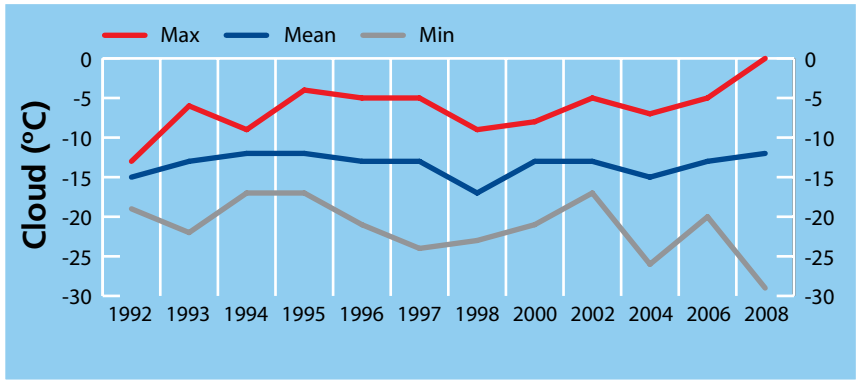
	National Standard	Maximum Observed	Mean	Minimum Observed	30441 127-3	30441 128-20	30441 128-21	30441 128-22	30441 128-33	30441 128-34	30441 128-35
Cloud Point, °C		0	-12	-29	0	-9	-6	-29	-10	-14	-11
CFPP, °C		-3	-15	-30	-3	-9	-8	-30	-12	-14	-13
Pour Point, °C		-3	-20	-42	-3	-12	-12	-42	-15	-24	-15
LTFT, °C		-8	-15	-34	NA	-8	-8	-34	-10	-18	-12
HFRR, µm	520 (max)	563	445	185	185	446	387	507	375	377	563
Wax Content @ 10°C Below Cloud, wt%		10.1	3.4	0.5	10.1	3.3	4.1	0.5	4.0	0.9	4.9
Sulphur, wt%	0.015 (max)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Density @15°C, kg/m3		886.0	849.1	821.0	885.7	840.4	826.2	861.7	830.7	836.5	828.1
Viscosity @ 20°C, cSt		6.420	4.273	3.000	6.42	5.18	3.87	3.7	4.61	3.24	4.4
Viscosity @ 40°C, cSt	1.9 - 4.1	4.070	2.758	2.040	4.07	3.25	2.53	2.41	2.93	2.18	2.81
Cetane Index 2 Variable		56	48	41	46	53	54	41	48	43	56
Cetane Index 4 Variable		65	48	38	65	51	52	38	47	42	54
Cetane Number	40 (min)	58	52	47	54	51	58	51	55	48	56
Distillation, °C IBP		261	189	174	261	177	187	181	181	174	181
T_{10}		347	220	190	347	219	208	206	201	190	213
T_{20}		348	233	199	348	239	222	221	212	199	233
T_{50}		351	267	233	351	282	262	257	244	233	273
T_{90}	360 (max)	355	319	291	355	328	318	315	293	320	322
T_{95}											
FBP		361	345	320	361	352	343	340	320	356	351
FAME?					Yes	No	No	No	No	No	No

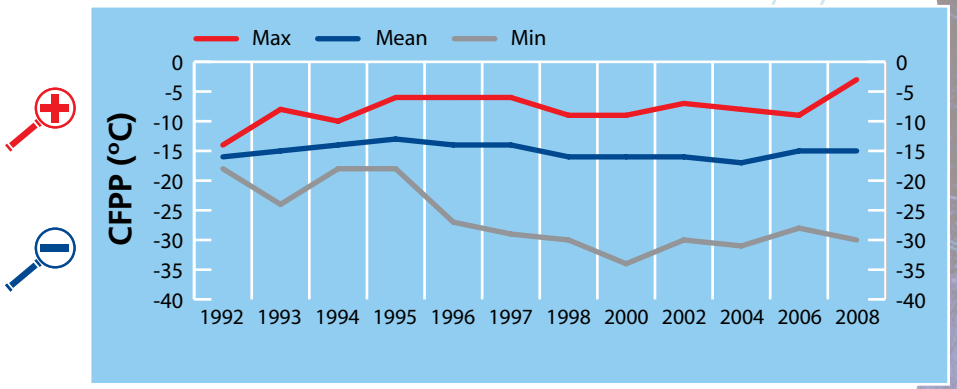
USA - West (continued)

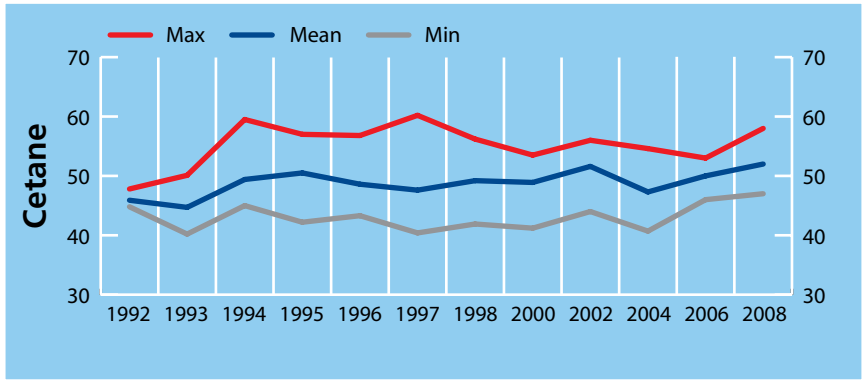
National Standards and physical inspection data

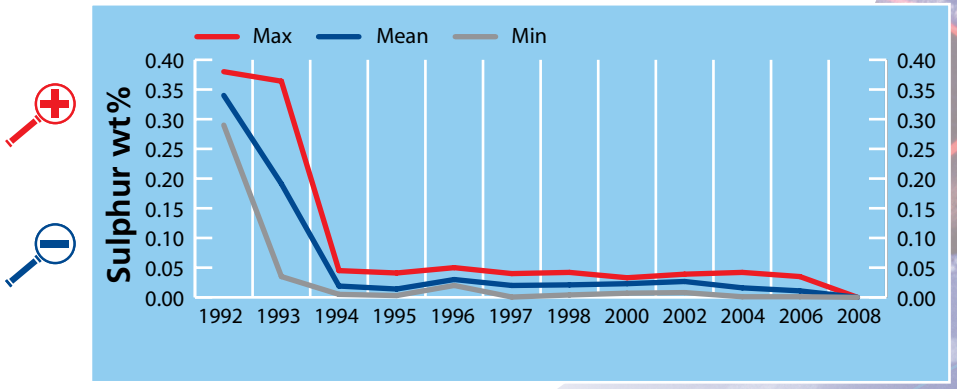
	National Standard	Maximum Observed	Mean	Minimum Observed	30441 128-36	30441 128-37	30441 128-38
Cloud Point, °C		0	-12	-29	-11	-11	-22
CFPP, °C		-3	-15	-30	-16	-17	-28
Pour Point, °C		-3	-20	-42	-27	-24	-30
LTFT, °C		-8	-15	-34	-12	-12	-22
HFRR, µm	520 (max)	563	445	185	526	524	556
Wax Content @ 10°C Below Cloud, wt%		10.1	3.4	0.5	1.6	1.7	2.9
Sulphur, wt%	0.015 (max)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Density @15°C, kg/m3		886.0	849.1	821.0	846.7	846.8	828.3
Viscosity @ 20°C, cSt		6.420	4.273	3.000	4.15	4.16	3.00
Viscosity @ 40°C, cSt	1.9 - 4.1	4.070	2.758	2.040	2.67	2.69	2.04
Cetane Index 2 Variable		56	48	41	47	47	48
Cetane Index 4 Variable		65	48	38	44	45	47
Cetane Number	40 (min)	58	52	47	47	47	48
Distillation, °C IBP		261	189	174	181	184	178
T_{10}		347	220	190	206	208	199
T_{20}		348	233	199	221	222	210
T_{50}		351	267	233	261	262	242
T_{90}	360 (max)	355	319	291	324	324	291
T_{95}							
FBP		361	345	320	350	351	321
FAME?					No	No	No

USA - West - Key Trends









USA - Mid West

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441 127-1	30441 127-2	30441 127-4	30441 127-5	30441 127-6	30441 127-7	30441 127-8
Cloud Point, °C		1	-13	-34	-34	0	-12	-16	-10	-11	-9
CFPP, °C		-3	-18	-35	-35	-4	-20	-35	-16	-13	-13
Pour Point, °C		0	-29	-51	-48	-3	-48	-48	-33	-18	-24
LTFT, °C		-10	-18	-34	-34	NA	-14	-22	-12	-12	-14
HFRR, µm	520 (max)	656	346	189	487	193	210	326	330	382	415
Wax Content @ 10°C Below Cloud, wt%		9.7	2.6	0.6	0.6	9.7	2.6	2.3	2.4	3.6	2.5
Sulphur, wt%	0.015 (max)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Density @15°C, kg/m3		886.0	849.1	821.0	821.0	884.8	849.4	836.9	837.6	834.4	841.5
Viscosity @ 20°C, cSt		6.500	4.086	2.420	2.42	6.44	3.90	3.21	4.43	3.62	4.87
Viscosity @ 40°C, cSt	1.9 - 4.1	4.140	2.655	1.700	1.7	4.09	2.56	2.17	2.83	2.42	3.09
Cetane Index 2 Variable		57	47	43	44	46	47	46	51	50	51
Cetane Index 4 Variable		65	46	40	46	64	43	43	50	46	50
Cetane Number	40 (min)	55	47	42	44	55	47	51	50	49	50
Distillation, °C IBP		241	181	157	174	204	174	174	199	170	196
T_{10}		346	218	193	194	343	204	193	218	193	222
T_{20}		347	232	201	201	347	220	204	229	209	235
T_{50}		349	266	221	221	348	264	243	264	256	271
T_{90}	360 (max)	355	320	267	267	355	327	314	323	311	326
T_{95}											
FBP		362	344	311	311	362	347	341	344	339	349
FAME?					No	Yes	Yes	Yes	Yes	Yes	Yes

USA - Mid West (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441 127-9	30441 127-10	30441 127-11	30441 127-12	30441 128-1	30441 128-2	30441 128-3
Cloud Point, °C		1	-13	-34	-8	-16	1	-12	-17	-17	-16
CFPP, °C		-3	-18	-35	-12	-28	-3	-28	-29	-26	-23
Pour Point, °C		0	-29	-51	-24	-27	0	-45	-48	-39	-39
LTFT, °C		-10	-18	-34	-12	-24	NA	-14	-24	-22	-22
HFRR, µm	520 (max)	656	346	189	189	234	198	232	225	229	196
Wax Content @ 10°C Below Cloud, wt%		9.7	2.6	0.6	1.7	2.0	9.6	2.5	1.8	1.7	1.8
Sulphur, wt%	0.015 (max)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Density @15°C, kg/m3		886.0	849.1	821.0	842.6	842.0	886.0	856.1	865.4	862.6	864.2
Viscosity @ 20°C, cSt		6.500	4.086	2.420	3.95	3.71	6.50	4.23	4.24	4.43	4.39
Viscosity @ 40°C, cSt	1.9 - 4.1	4.140	2.655	1.700	2.59	2.43	4.14	2.76	2.73	2.83	2.81
Cetane Index 2 Variable		57	47	43	48	47	46	48	43	45	44
Cetane Index 4 Variable		65	46	40	46	45	65	44	40	42	41
Cetane Number	40 (min)	55	47	42	47	44	50	49	48	44	44
Distillation, °C IBP		241	181	157	186	179	241	176	180	182	184
T_{10}		346	218	193	207	209	346	212	217	219	216
T_{20}		347	232	201	219	223	347	232	231	233	233
T_{50}		349	266	221	261	255	349	282	269	273	273
T_{90}	360 (max)	355	320	267	327	311	354	334	327	331	330
T_{95}											
FBP		362	344	311	356	342	357	348	348	351	351
FAME?					Yes	Yes	Yes	Yes	Yes	Yes	Yes

USA - Mid West (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441 128-4	30441 128-8	30441 128-9	30441 128-10	30441 128-11	30441 128-15	30441 128-16
Cloud Point, °C		1	-13	-34	-21	-21	-19	-17	-23	-12	-11
CFPP, °C		-3	-18	-35	-33	-32	-24	-17	-22	-13	-9
Pour Point, °C		0	-29	-51	-51	-48	-51	-24	-30	-24	-21
LTFT, °C		-10	-18	-34	-26	-24	-24	-22	-24	-14	-10
HFRR, µm	520 (max)	656	346	189	322	398	367	363	374	264	552
Wax Content @ 10°C Below Cloud, wt%		9.7	2.6	0.6	1.3	1.2	2.5	2.7	2.2	1.7	2.0
Sulphur, wt%	0.015 (max)	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
Density @15°C, kg/m3		886.0	849.1	821.0	859.2	858.5	846.4	847.4	846.5	855.6	849.0
Viscosity @ 20°C, cSt		6.500	4.086	2.420	4.05	4.06	3.82	3.87	3.58	4.59	3.82
Viscosity @ 40°C, cSt	1.9 - 4.1	4.140	2.655	1.700	2.60	2.65	2.48	2.51	2.37	2.90	2.56
Cetane Index 2 Variable		57	47	43	43	43	47	47	45	46	46
Cetane Index 4 Variable		65	46	40	40	40	45	45	43	43	44
Cetane Number	40 (min)	55	47	42	42	42	46	46	44	47	45
Distillation, °C IBP		241	181	157	180	181	178	173	183	157	178
T_{10}		346	218	193	212	212	215	216	206	213	209
T_{20}		347	232	201	227	226	228	231	219	233	224
T_{50}		349	266	221	259	259	259	260	254	270	260
T_{90}	360 (max)	355	320	267	319	318	304	305	304	329	322
T_{95}											
FBP		362	344	311	346	345	325	331	327	354	349
FAME?					No	No	No	No	No	Yes	No

USA - Mid West (continued)

National Standards and physical inspection data

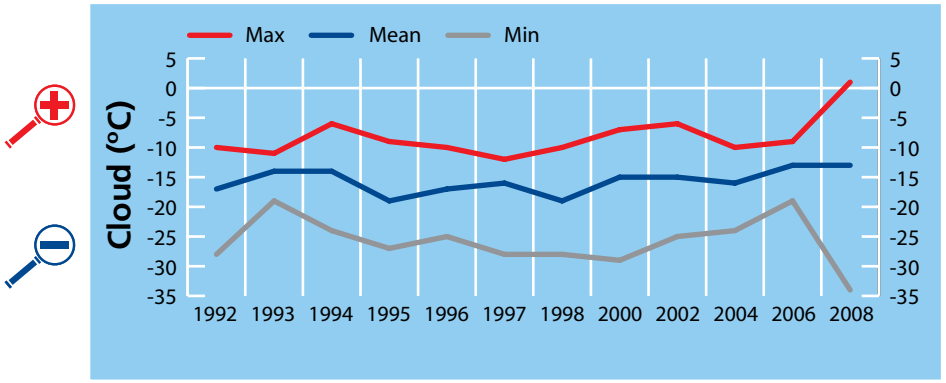
	National Standard	Maximum Observed	Mean	Minimum Observed	30441 128-17	30441 128-18	30441 128-19	30441 128-23	30441 128-24	30441 128-25	30441 128-26
Cloud Point, °C		1	-13	-34	-12	-10	-10	-8	-7	-14	-14
CFPP, °C		-3	-18	-35	-10	-11	-13	-9	-13	-14	-13
Pour Point, °C		0	-29	-51	-21	-18	-21	-15	-21	-24	-24
LTFT, °C		-10	-18	-34	-14	-12	-12	-12	-12	-16	-14
HFRR, µm	520 (max)	656	346	189	549	656	363	352	327	320	361
Wax Content @ 10°C Below Cloud, wt%		9.7	2.6	0.6	2.5	2.5	3.0	1.5	1.9	2.0	1.8
Sulphur, wt%	0.015 (max)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001
Density @15°C, kg/m3		886.0	849.1	821.0	845.4	857.4	838.7	853.4	860.8	845.0	842.0
Viscosity @ 20°C, cSt		6.500	4.086	2.420	4.04	4.8	3.58	4.7	4.57	3.52	3.48
Viscosity @ 40°C, cSt	1.9 - 4.1	4.140	2.655	1.700	2.66	3.00	2.40	2.94	2.88	2.33	2.30
Cetane Index 2 Variable		57	47	43	48	45	49	47	44	45	46
Cetane Index 4 Variable		65	46	40	45	44	45	45	42	44	44
Cetane Number	40 (min)	55	47	42	45	51	48	46	42	44	44
Distillation, °C IBP		241	181	157	178	196	166	188	168	174	176
T_{10}		346	218	193	208	227	197	219	217	207	206
T_{20}		347	232	201	224	238	215	233	235	220	219
T_{50}		349	266	221	264	266	259	270	269	252	250
T_{90}	360 (max)	355	320	267	323	318	319	328	322	311	311
T_{95}											
FBP		362	344	311	349	343	345	356	347	339	336
FAME?					No	No	No	No	No	No	No

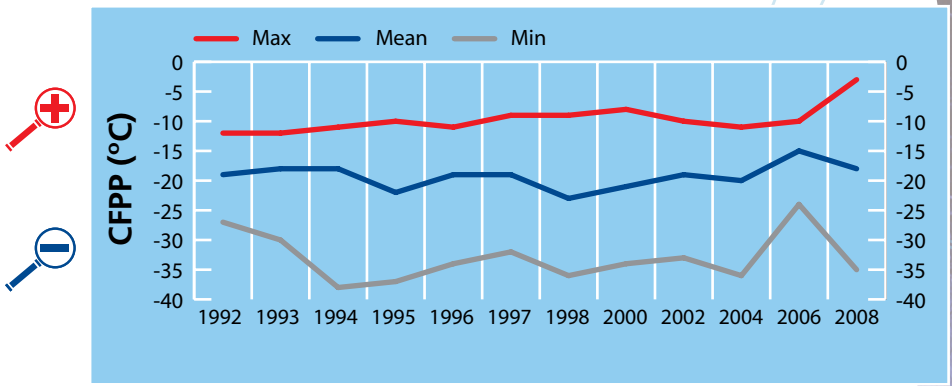
USA - Mid West (continued)

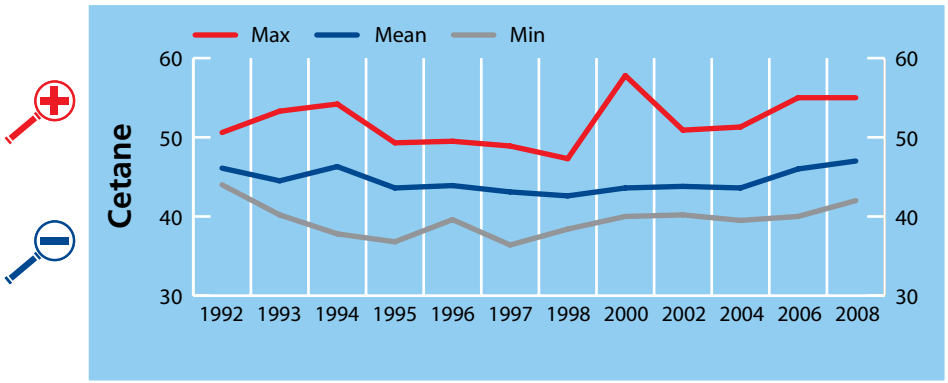
National Standards and physical inspection data

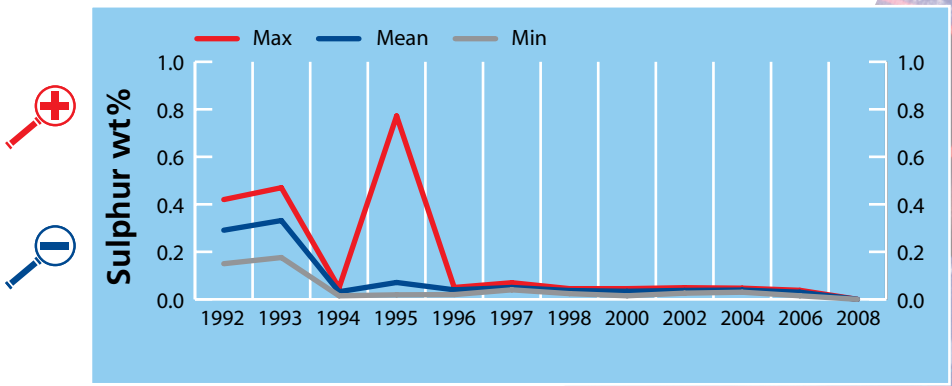
	National Standard	Maximum Observed	Mean	Minimum Observed	30441 128-27	30441 128-28	30441 128-30	30441 128-31	30441 128-32
Cloud Point, °C		1	-13	-34	-18	-13	-20	-8	-21
CFPP, °C		-3	-18	-35	-18	-15	-26	-9	-21
Pour Point, °C		0	-29	-51	-30	-24	-24	-18	-24
LTFT, °C		-10	-18	-34	-22	-14	-22	-12	-22
HFRR, µm	520 (max)	656	346	189	347	253	471	459	462
Wax Content @ 10°C Below Cloud, wt%		9.7	2.6	0.6	2.1	3.3	2.4	2.5	3.3
Sulphur, wt%	0.015 (max)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Density @15°C, kg/m3		886.0	849.1	821.0	860.1	832.2	828.9	840.4	827.8
Viscosity @ 20°C, cSt		6.500	4.086	2.420	4.11	3.53	3.14	4.18	3.06
Viscosity @ 40°C, cSt	1.9 - 4.1	4.140	2.655	1.700	2.64	2.36	2.11	2.71	2.07
Cetane Index 2 Variable		57	47	43	43	51	48	50	57
Cetane Index 4 Variable		65	46	40	40	48	47	46	55
Cetane Number	40 (min)	55	47	42	43	49	48	50	50
Distillation, °C IBP		241	181	157	174	174	177	172	178
T_{10}		346	218	193	211	201	199	202	215
T_{20}		347	232	201	227	216	211	222	235
T_{50}		349	266	221	262	259	243	266	276
T_{90}	360 (max)	355	320	267	316	297	324	327	311
T_{95}									
FBP		362	344	311	333	340	328	352	353
FAME?					No	No	No	No	No

USA - Mid West - Key Trends









National Standards and physical inspection data

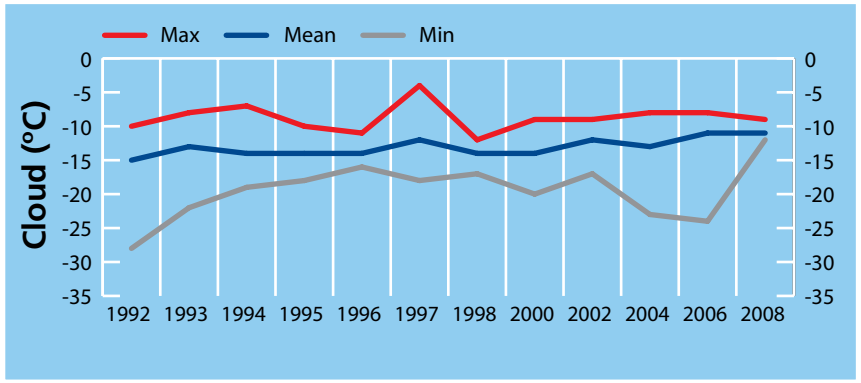
	National Standard	Maximum Observed	Mean	Minimum Observed	30441 128-5	30441 128-6	30441 128-7	30441 128-12	30441 128-13	30441 128-14	30441 128-29
Cloud Point, °C		-9	-11	-12	-11	-12	-12	-11	-11	-9	-10
CFPP, °C		-9	-15	-20	-18	-16	-19	-15	-11	-9	-12
Pour Point, °C		-15	-28	-36	-27	-30	-30	-30	-30	-15	-21
LTFT, °C		-10	-14	-16	-16	-16	-16	-16	-14	-12	-10
HFRR, µm	520 (max)	510	361	305	392	305	318	333	381	320	510
Wax Content @ 10°C Below Cloud, wt%		3.1	2.4	1.7	2.1	2.4	1.7	2.6	2.5	3.1	2.1
Sulphur, wt%	0.015 (max)	0.002	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Density @15°C, kg/m3		886.0	849.1	821.0	852.1	841.5	844.7	845.4	849.3	851.9	846.2
Viscosity @ 20°C, cSt		4.310	3.813	3.340	4.15	4.31	3.75	4.26	3.51	3.53	3.34
Viscosity @ 40°C, cSt	1.9 - 4.1	2.760	2.492	2.220	2.67	2.76	2.46	2.73	2.32	2.36	2.22
Cetane Index 2 Variable		51	47	45	46	50.51	47	49	45	45	45
Cetane Index 4 Variable		48	43	40	43	48.49	44	45	41	41	40
Cetane Number	40 (min)	49	46	43	45	49	47	46	45	45	43
Distillation, °C IBP		177	171	165	169	173	177	176	170	168	165
T_{10}		213	202	187	210	213	205	205	200	200	187
T_{20}		231	220	206	227	231	221	224	216	216	206
T_{50}		271	262	251	266	271	260	270	257	258	251
T_{90}	360 (max)	321	318	314	319	321	317	320	316	317	314
T_{95}											
FBP		347	344	342	347	344	344	344	343	343	344
FAME?					No	No	No	No	No	No	No

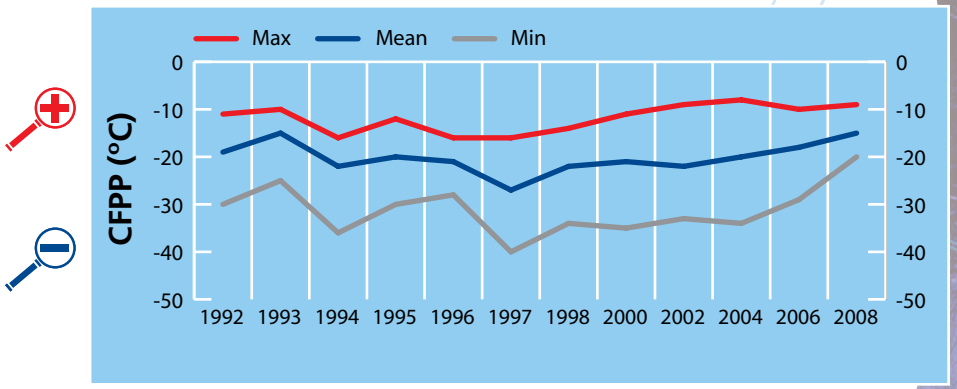
USA - East (continued)

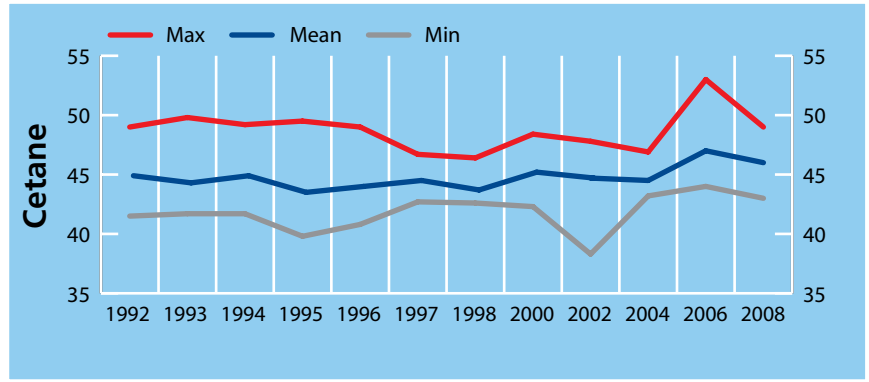
National Standards and physical inspection data

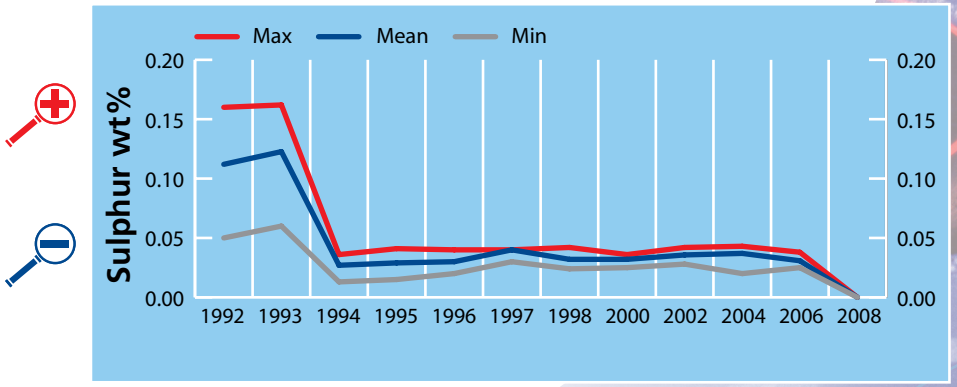
	National Standard	Maximum Observed	Mean	Minimum Observed	30441 128-39	30441 128-40
Cloud Point, °C		-9	-11	-12	-10	-10
CFPP, °C		-9	-15	-20	-13	-20
Pour Point, °C		-15	-28	-36	-30	-36
LTFT, °C		-10	-14	-16	-12	-16
HFRR, µm	520 (max)	510	361	305	331	355
Wax Content @ 10°C Below Cloud, wt%		3.1	2.4	1.7	2.9	2.3
Sulphur, wt%	0.015 (max)	0.002	<0.001	<0.001	<0.001	<0.001
Density @15°C, kg/m3		886.0	849.1	821.0	849.2	847.6
Viscosity @ 20°C, cSt		4.310	3.813	3.340	3.5	3.97
Viscosity @ 40°C, cSt	1.9 - 4.1	2.760	2.492	2.220	2.35	2.56
Cetane Index 2 Variable		51	47	45	45	47
Cetane Index 4 Variable		48	43	40	41	44
Cetane Number	40 (min)	49	46	43	44	49
Distillation, °C IBP		177	171	165	169	175
T_{10}		213	202	187	197	204
T_{20}		231	220	206	214	222
T_{50}		271	262	251	257	264
T_{90}	360 (max)	321	318	314	315	319
T_{95}						
FBP		347	344	342	342	347
FAME?						

USA - East - Key Trends









EA11-003

CHRYSLER

12-9-2011

Enclosure 17

Infineum Fuel Surveys

Diesel Fuel Trends 2005

Welcome to

Diesel Fuel Trends2005

Infineum

Market Drivers

Main Drivers

- Clean Diesel Standards
- Strong Demand Growth
- Energy Security

Market Drivers

EPA Final Sulfur Rule – "Ultra-Low Sulfur Diesel"

- Applies to On-Road Diesel
- Effective June 2006
- 15 ppm maximum sulfur
- 80% of a refiner's production

Canada will harmonize with the U.S. on ULSD timing

Market Drivers

Sulfur Limits On Diesel Additives

- *Sulfur level of diesel fuel additives must be reported on the product transfer documents*
  - *If additive sulfur less than 15 ppm, no special labeling required*
  - *Additive sulfur may exceed 15 ppm provided the treated fuel does not*
    - *Product transfer documents must contain statement that improper use of the additive may result in non-compliant fuel*
  - *Batch testing of the finished fuel is required for affirmative defense*
    - *Exception: anti-stat - Volumetric Additive Reconciliation (VAR) may be used*
- ***Infineum fuel additives sold in North America will all be below 15 ppm sulfur by June 2006.***

Gary Herwick

Director of Mobile Emissions and Fuel Efficiency, General Motors

Sulfur Mandate Critical to Reduce Emissions

15-ppm sulfur

2007 Heavy-Duty Diesel Engines

Enabling Technology: Ultra low sulfur diesel reduces particulates and enables advanced exhaust aftertreatment devices.

Market Drivers

Reducing Diesel Emissions: Fuel and Engine Systems Working Together

EPA estimate:

ULSD + Advanced Vehicle Technology *vs.* *LSD (500 ppm) + Traditional Diesel Engines*

- *NOx reduction: 2.6 million tons per year*
- *Particulates reduction: 110 thousand tons per year*

Investing In Clean Diesel

EPA estimates cost of compliance: *$6.2 billion*
EPA estimates benefits:* *$180 billion*

**Health impacts reduced by:*

- *8,300 premature deaths*
- *5,500 chronic bronchitis cases*
- *17,600 acute bronchitis cases*
- *386,000 cases of asthma in children*
- *1.5 million lost work days*
- *7,100 hospital visits*
- *2,400 ER visits*

Market Drivers

Requirement vs. Reality

EPA surveys indicate that 95% of on-road diesel sold in the US by June 2006 will be ULSD.

Market Drivers

Distribution Issues

Market Drivers

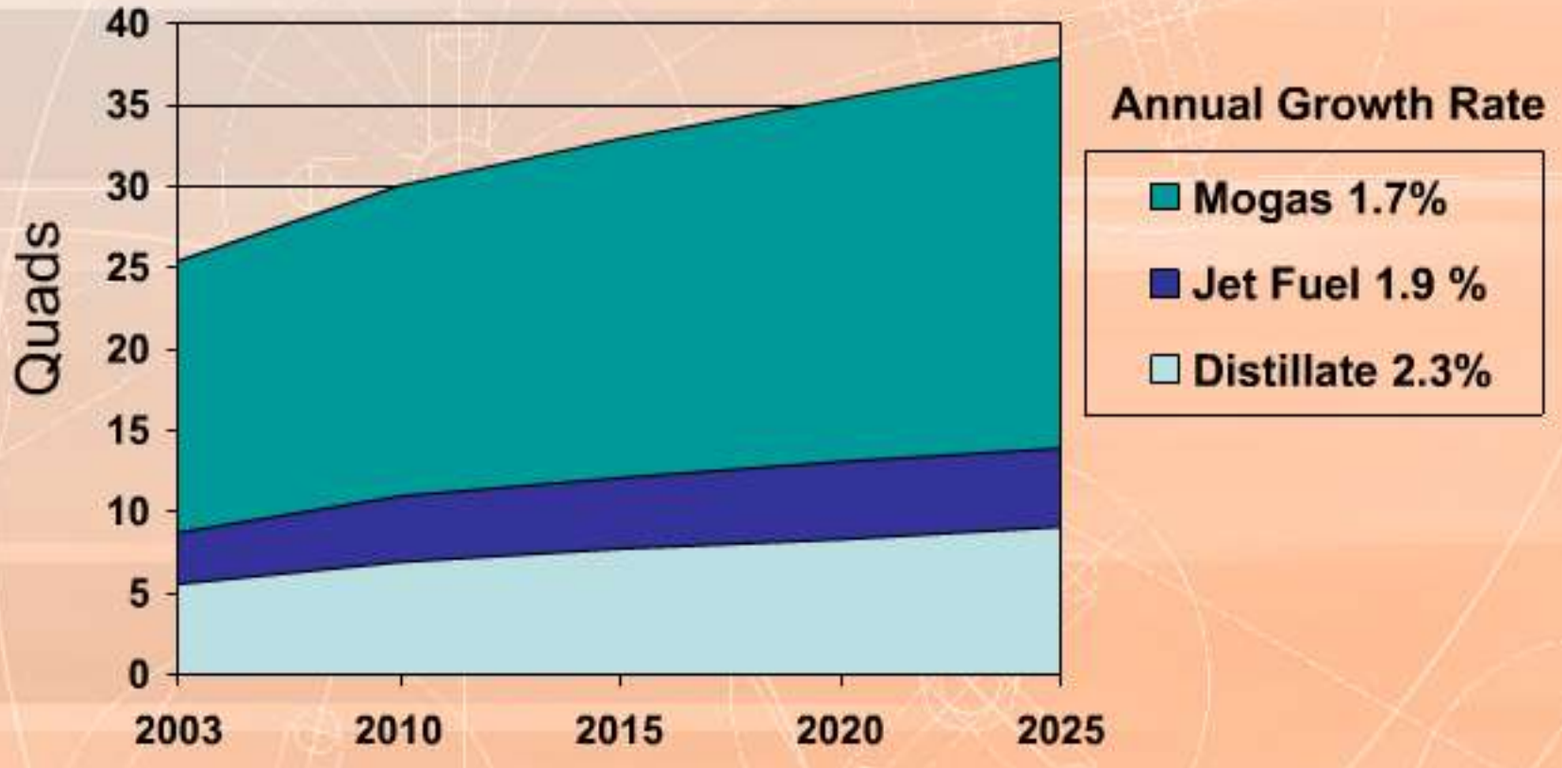
Distribution Issues

15-ppm

<8-ppm

Diesel Fuel Is A Growth Market

U.S. Fuel Demand Growth



Data Source: US EIA

Market Drivers

Competing In Today's Diesel Fuel Marketplace

- Meet regulatory requirements
- Meet vehicle performance requirements
- Refine cost-effectively
- Transport without contamination
- Avoid product downgrades

Market Drivers

Working Together

Understanding ULSD

ULSD Impacts

- Lubricity
- Cold Flow
- Cetane
- Detergency
- Fuel Economy
- Conductivity
- Fuel Stability

Understanding ULSD

Diesel Fuel Lubricity

Photo courtesy of PCS Instruments Ltd.

Current vs Advanced Fuel Systems

	Up to 1995	1995-2000	2005-2010
Max injection pressure,bar	350	1000	2000+
Injections/min, 3000rpm	1500	1500	7500+
Fuel temp@ injector tip, °C	< 230	< 250	300+
No. of injection holes	1	1 - 4	4-8+
Injector hole diameter, mm	<0.5	> 0.25	<0.1
Acceptable Deposit, flow loss, %	>40	>10	<5

Understanding ULSD

ASTM's Lubricity Specification (ASTM D975)

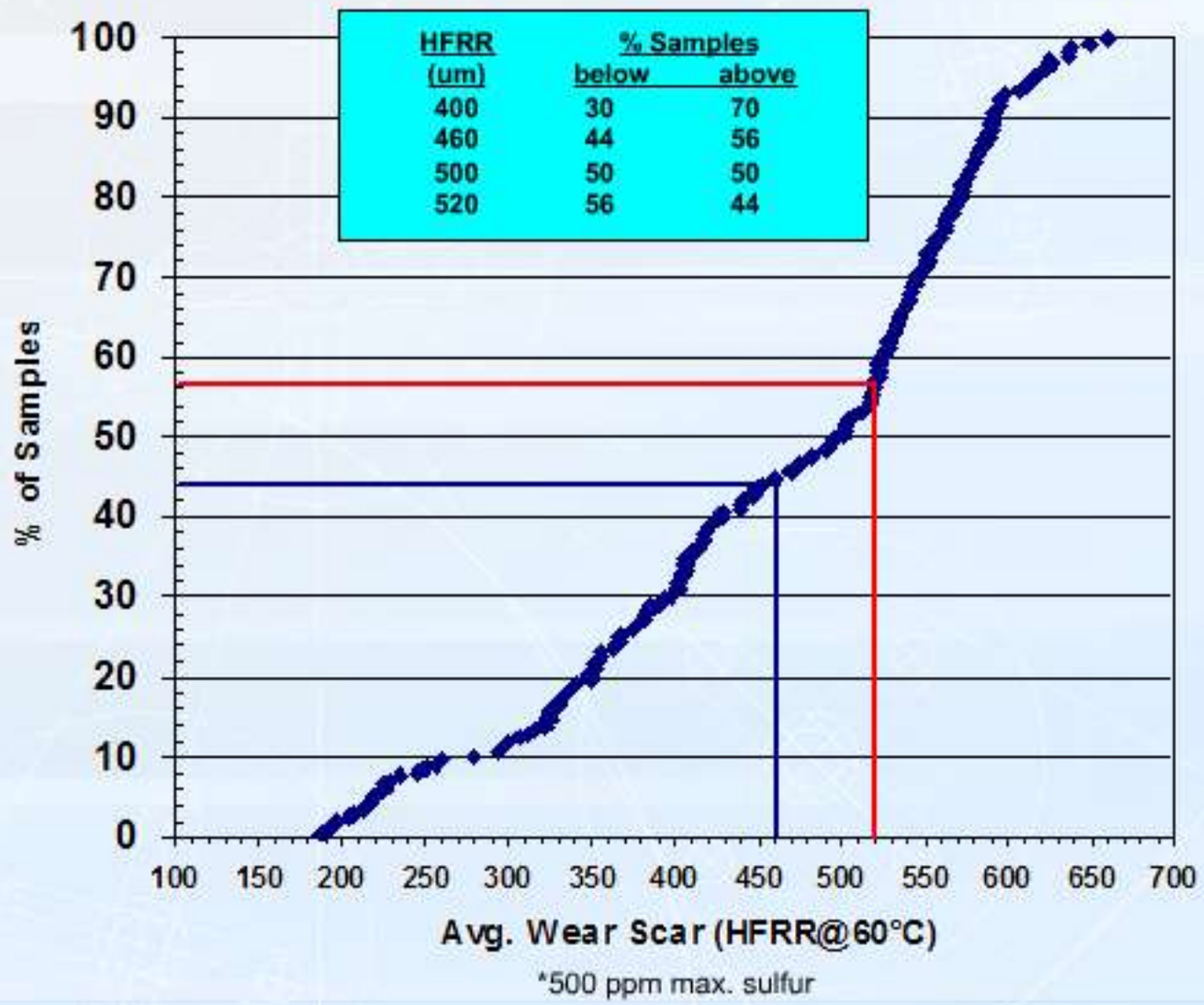
D 975 - 04b ε1

TABLE 1 Detailed Requirements for Diesel Fuel Oils[A]

Property	ASTM Test Method[B]	Grade						
		No. 1-D S15	No. 1-D S500[C]	No. 1-D S5000[D]	No. 2-D S15	No. 2-D S500[C,E]	No. 2-D S5000[D,E]	No. 4-D[D]
Flash Point, ° C, min.	D 93	38	38	38	52[E]	52[E]	52[E]	55
Water and Sediment, % vol, max	D 2709	0.05	0.05	0.05	0.05	0.05	0.05	...
	D 1796	...	...	...	...	...	...	0.50
Distillation: one of the following requirements shall be met:								
1. Physical Distillation	D 86							
Distillation Temperature, ° C 90 % , % vol recovered								
min		...	...	...	282[E]	282[E]	282[E]	...
max		288	288	288	338	338	338	...
2. Simulated Distillation	D 2887							
Distillation Temperature, ° C 90 %, % vol recovered								
min						300[E]	300[E]	
max		304	304			356	356	
Kinematic Viscosity, mm²/S at 40° C	D 445							
min		1.3	1.3	1.3	1.9[E]	1.9[E]	1.9[E]	5.5
max	...	2.4	2.4	2.4	4.1	4.1	4.1	24.0
Ash % mass, max	D 482	0.01	0.01	0.01	0.01	0.01	0.01	0.10
Sulfur, ppm (µg/g)[F] max	D 5453	15	...	...	15	...	...	...
% mass, max	D 2622[G]	...	0.05	...	...	0.05	...	...
% mass, max	D 129	...	...	0.50	...	...	0.50	2.00
Copper strip corrosion rating max 3 h at 50° C	D 130	No. 3	No. 3	No. 3	No. 3	No. 3	No. 3	...
Cetane number, min[H]	D 613	40[I]	40[I]	40[I]	40[I]	40[I]	40[I]	30[I]
One of the following properties must be met:								
(1) Cetane index, min.	D 976-80[G]	40	40	...	40	40	...	...
(2) Aromaticity, % vol, max	D 1319[G]	35	35	...	35	35	...	...
Operability Requirements								
Cloud point, ° C, max	D 2500	[J]	[J]	[J]	[J]	[J]	[J]	[J]
or								
LTFT/CFPP, ° C, max	D 4539/ D 6371							
Ramsbottom carbon residue on 10 % distillation residue, % mass, max	D 524	0.15	0.15	0.15	0.35	0.35	0.35	...
Lubricity, HFRR @ 60°C, micron, max[K]	D 6079	...	520	520	...	520	520	...

Understanding ULSD

Lubricity of 1996-2002 Commercial U.S. Winter Diesel Fuels



Source: Infineum Winter Diesel Fuel Survey

Understanding ULSD

Global HFRR Standards

Specification	Maximum HFRR Spec
ASTM-D975	520 microns
EN-590	460 microns

Swedish Mark I Summary

- *1989 – First ultra-low sulfur diesel (<50 ppm) introduced in Sweden: Mark-1 Diesel*
- *Very low viscosity and lubricity vs. conventional diesel fuel*
- *Numerous field problems related to excessive wear in rotary distributor diesel injection pumps*
- *Catastrophic failure seen in as little as 3,100 miles*
- *Lubricity improvers deployed by Infineum resolved the wear issues*

Understanding ULSD

Comparison of Pump Parts

ADDITIZED
SWEDISH CLASS 1
FUEL - 100,000km

SWEDISH CLASS 1
FUEL - 12,000km

NEW PUMP

Understanding ULSD

Global HFRR Standards

Specification	Maximum HFRR Spec
ASTM-D975	520 microns
EN-590	460 microns

Worldwide Fuel Charter

- Category 1 thru 4 — 400 microns

Lubricity Additives and Diesel Distribution System

- *October 2004: Most multi-product US pipelines banned transport of diesel treated with lubricity improvers*
  - *Additization channel largely shifted to terminals to meet January 1, 2005 ASTM D975 lubricity specification*
- *December 2004 – Many states agreed to delay enforcement of lubricity spec for up to one year*
- *Today – Installation of injection facilities at terminals proceeding smoothly*

Understanding ULSD

Other ULSD Properties

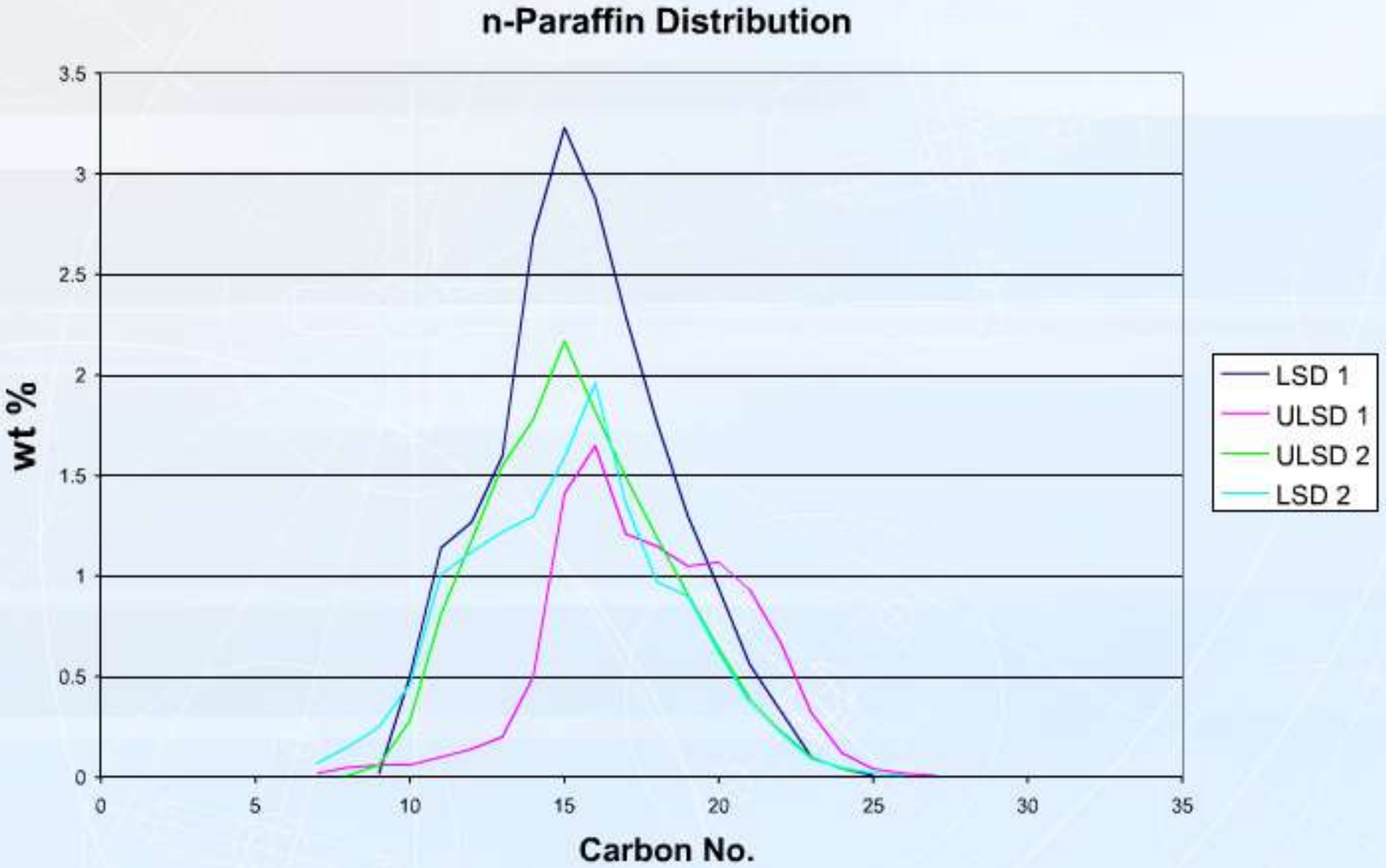
- Cold Flow
- Cetane
- Detergency
- Fuel Economy
- Conductivity
- Fuel Stability

Understanding ULSD

Cold Flow Properties of ULSD

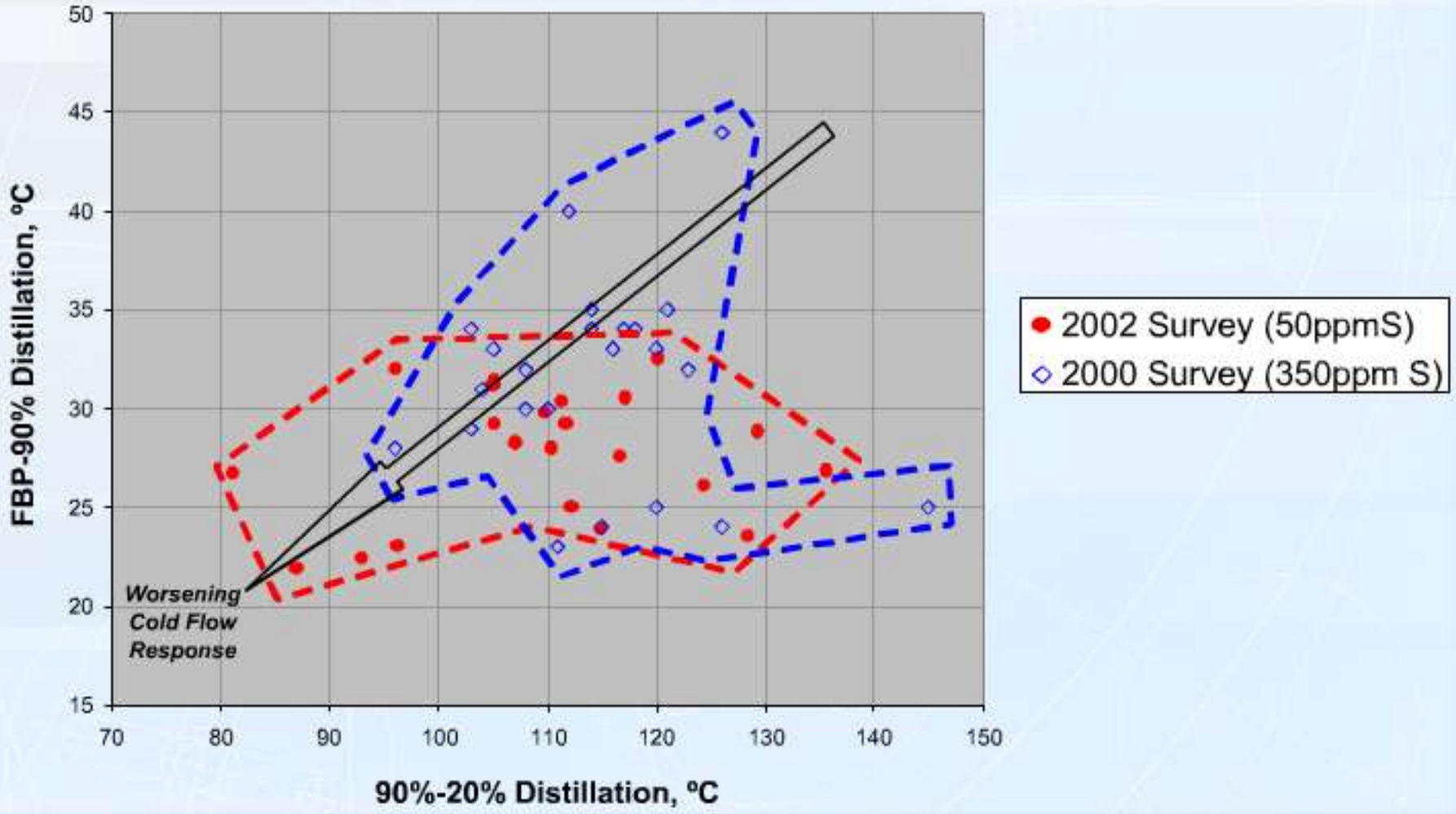
- *Generally no impact before 2006/2007 winter season*
- *Hydrotreating saturates more complex molecules, resulting in more paraffinic fuel*
- *Refiners' flexibility in selecting blending streams reduced*
- *Few representative #2 ULSD's available for study*
- *Content and structure of waxes in No. American ULSD's unknown*
- *Testing on-going*

n-Paraffin Distribution - ULSD vs. LSD Fuels



The European Experience

Infineum Winter Diesel Fuel Survey Germany & Benelux
2002 (50ppmS) vs. 2000 (350ppmS)



Ultra-Low Sulfur Kerosene

- *Will ultra-low-sulfur kerosene supply/demand be in balance in North America in winter 2006/2007?*
- *If not, how will low cloud specs be met?*
- *Will separate tankage for ULS kero be available at terminals for winter blending?*

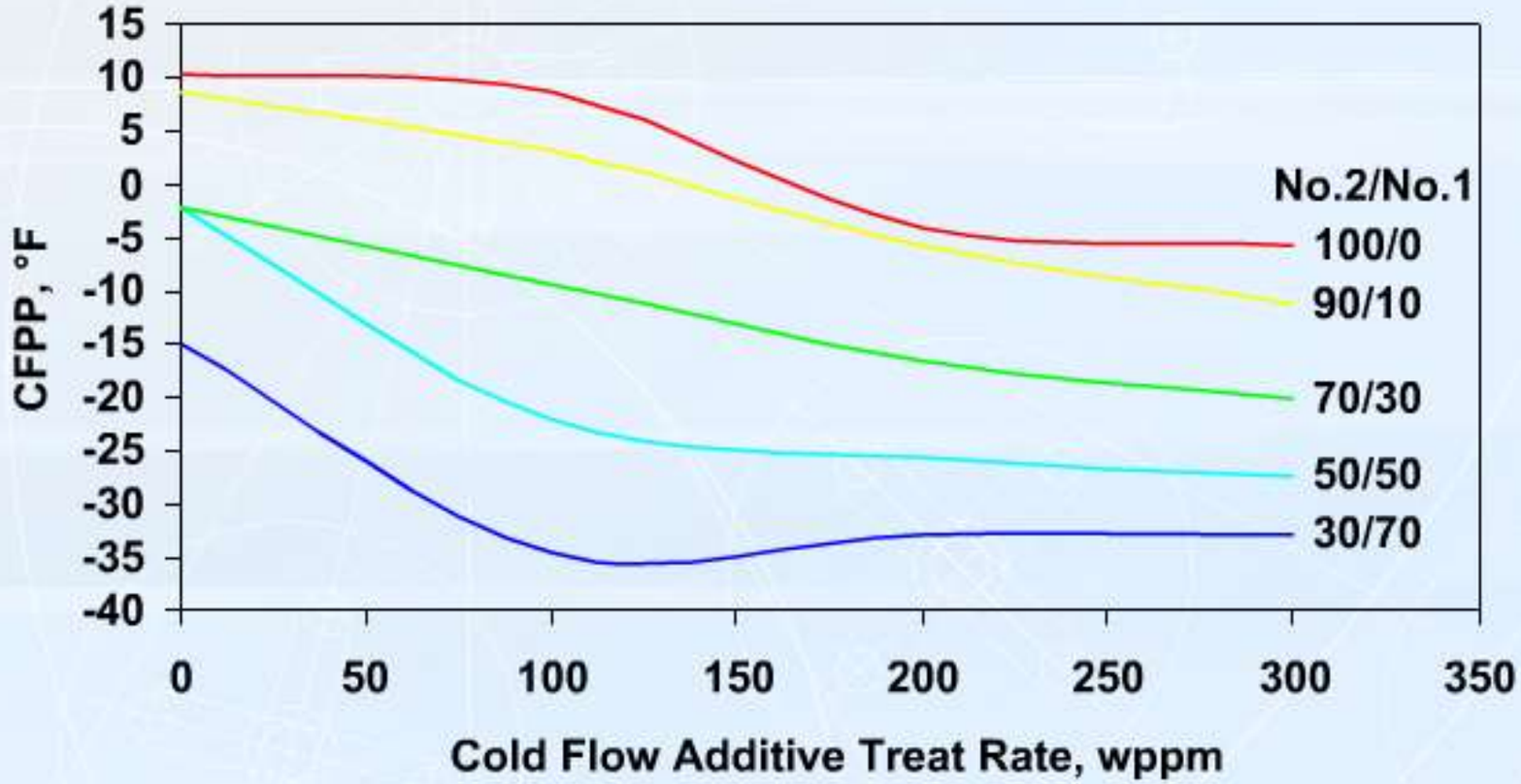
Ensuring Winter Operability

OPTIONS:

- Cold Flow Improvers
- Kerosene
- Cold Flow Improvers + Kerosene

Ensuring Winter Operability

CFPP Response in LSD No. 2 and LSD No. 2/No. 1 Blends

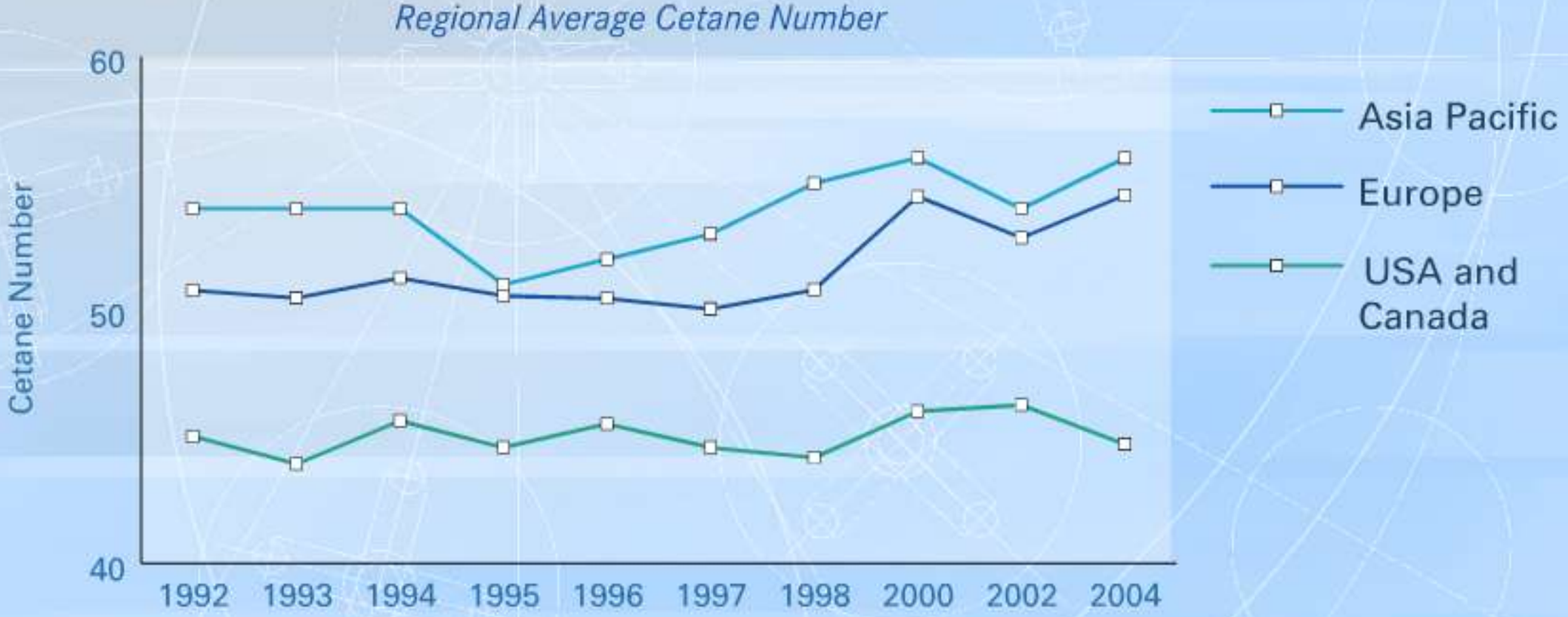


Understanding ULSD

Understanding ULSD

Cetane

- *The US diesel fuel pool has one of the lowest average cetane numbers in the world.*



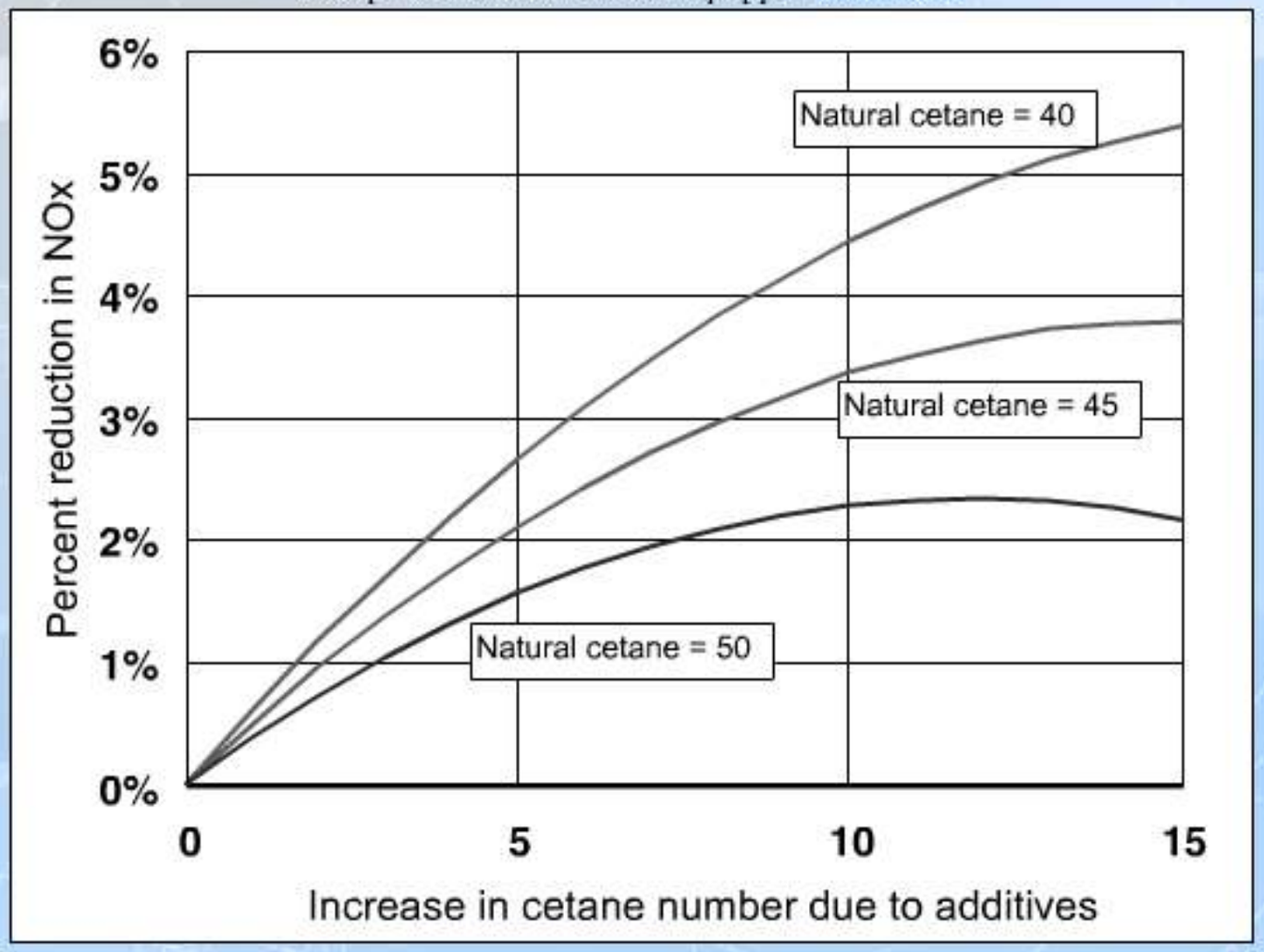
Understanding ULSD

Cetane Standards

- *ASTM D975 minimum cetane number:* *40*
- *Proposal by Engine Manufacturers Association:* *43 (minimum)*
  - *NOx reduction*
  - *Reduced combustion noise*
  - *Better cold start/less white smoke*

Cetane and NOx Reduction

Predicted effect of cetane difference on NOx for all heavy-duty highway engines except 2-strokes and those equipped with EGR



Source: US EPA

Understanding ULSD

Other ULSD Quality Issues

- Fuel Cleanliness
- Seal Swell
- Water Solubility
- Conductivity
- Fuel/Lube Compatibility
- Fuel Economy

Understanding ULSD

Non-Road/Locomotive/Marine Diesel

MVNRLM Diesel Fuel Standards

Who	Covered Fuel	2006	2007	2008	2009	2010	2011	2012	2013	2014
	Highway Diesel Fuel	80% 15 ppm / 20% 500 ppm				100% 15 ppm (including small refiner fuel)				
Large Refiner & Importer	NR		500	500	500	15	15	15	15	15
Large Refiner & Importer	LM		500	500	500	500	500	15	15	15
	NRLM with Credits (Not in NE or AK)		HS	HS	HS	500	500	500	500	15
Small Refiner	NRLM (Not in NE, w/ approval in AK)		HS	HS	HS	500	500	500	500	15
Transmix Processor & In-use	NR (Not in NE or AK)		HS	HS	HS	500	500	500	500	15
Transmix Processor & In-use	LM (Not in NE or AK)		HS	HS	HS	500	500	500	500	500

Source: US EPA

Biodiesel

Federal Tax Credit:

- *Up to $1.00/gallon for agra-based biodiesel*
- *Up to $.50/gallon for non-agra based biodiesel*
- *Program administered by IRS*

Benefits and Debits

Potential Benefits

- Neglible sulfur
- Renewable: reduces oil imports
- High cetane
- Natural lubricity

Potential Debits

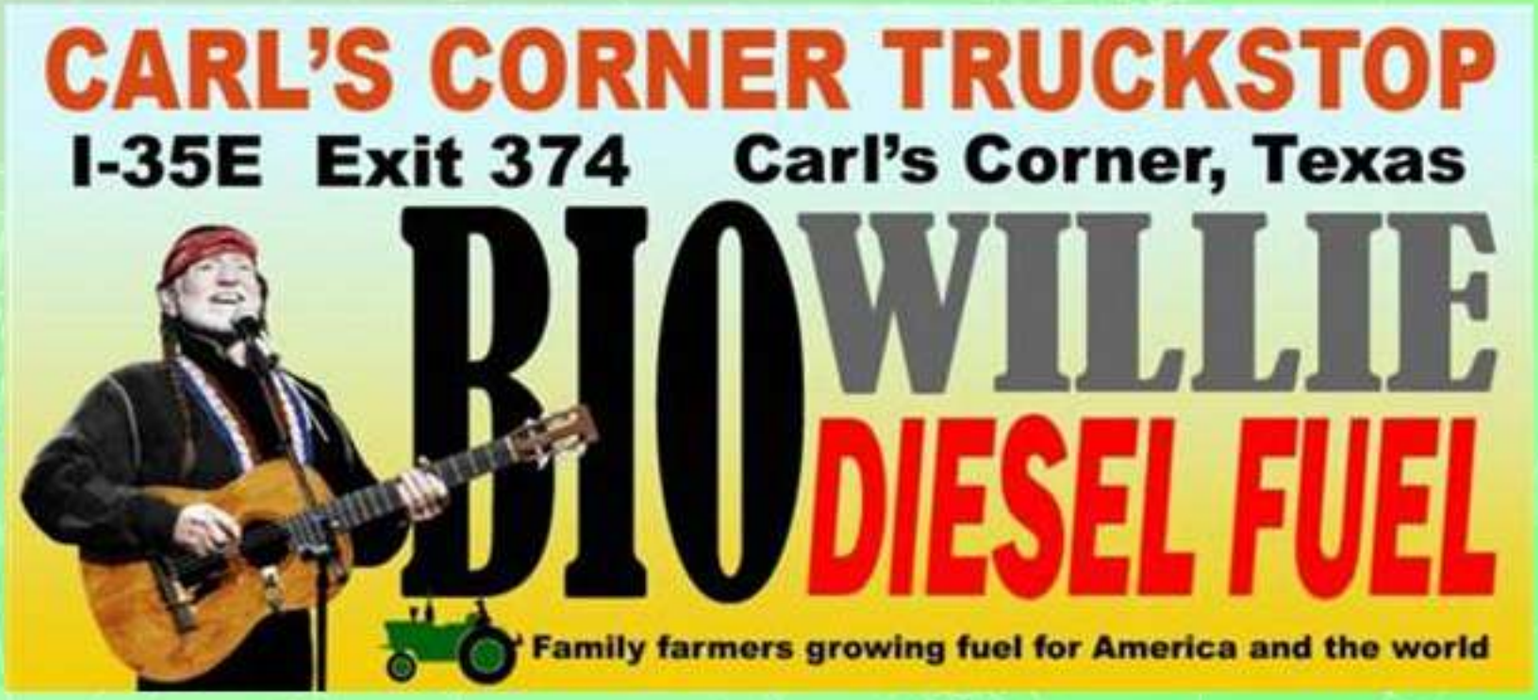
- Limited production volume
- High cost
- Poor cold-flow properties
- Storage difficulties
- NOx debit
- Limited outlet for refined glycerin

Biodiesel Sources and Saturates Levels

- B100 Biodiesel's poor low temperature handling is attributed to the high concentration of saturated esters and the narrow distribution of those esters
- Saturate levels depend on Biodiesel source

	Typical	Range
Rapeseed	7.68%	C16-C22
Soy	13.78%	C14-C18
Peanut Oil	13.75%	C16-C18
Tallow (Animal)	52.95%	C14-C18
Palm Oil	49.40%	C14-C18
Coconut Oil	80.00%	C12-C18

Everybody wants to get into the act!



Industry Perspectives on Biodiesel

- *Not approved for pipeline transport*
- *Oxidation and storage stability – inadequate test methods*
- *Product quality control lacking*
- *U.S. OEMs in general do not warrant blends of >5% volume biodiesel*

Emerging Trends

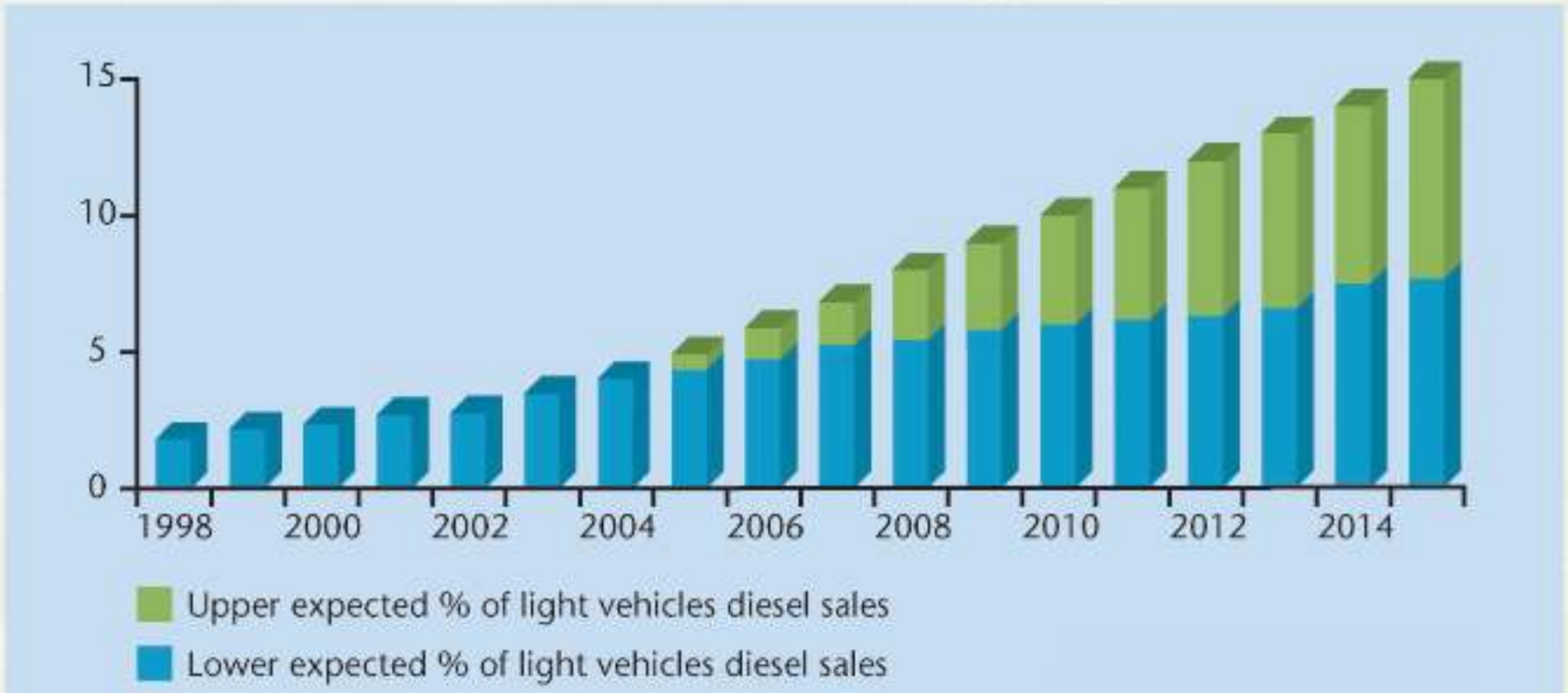
Energy Security

Light Duty Diesel in the U.S.

Benefits of Diesel Engines

- *Reduced CO_2 emissions*
- *30-40% fuel economy improvements*
- *High Power*
- *High Torque*
- *Less Frequent Re-Fueling*
- *Durability*

Light-Duty Diesel Growth Projections



Source: J.D. Power

Improving Light-Duty Diesel Engines

- Common-rail injection systems
- High-pressure electronic injection control
- Injection rate shaping
- Turbocharging

Consumer Acceptance Growing

- *Interest in diesel engines is rising*
- *60% of buyers of new medium-duty trucks in the US are choosing diesel*
- *42% of US service stations offer diesel fuel vs 30% in 2000*

Source: Diesel Technology Forum, March 2005

Light-Duty Diesel Emissions

Tier II, Bin 5 Requirements:

- *0.07 gram/mile max. NOx*
- *125,000 miles*

Status:

- *Automakers have developed catalyst systems that meet the standard*
- *Durability is the issue*

Advanced Combustion Technology: CI Engines

HCCI Engine. Animation edited by G. Leung, Original from Mitsubushi Corp

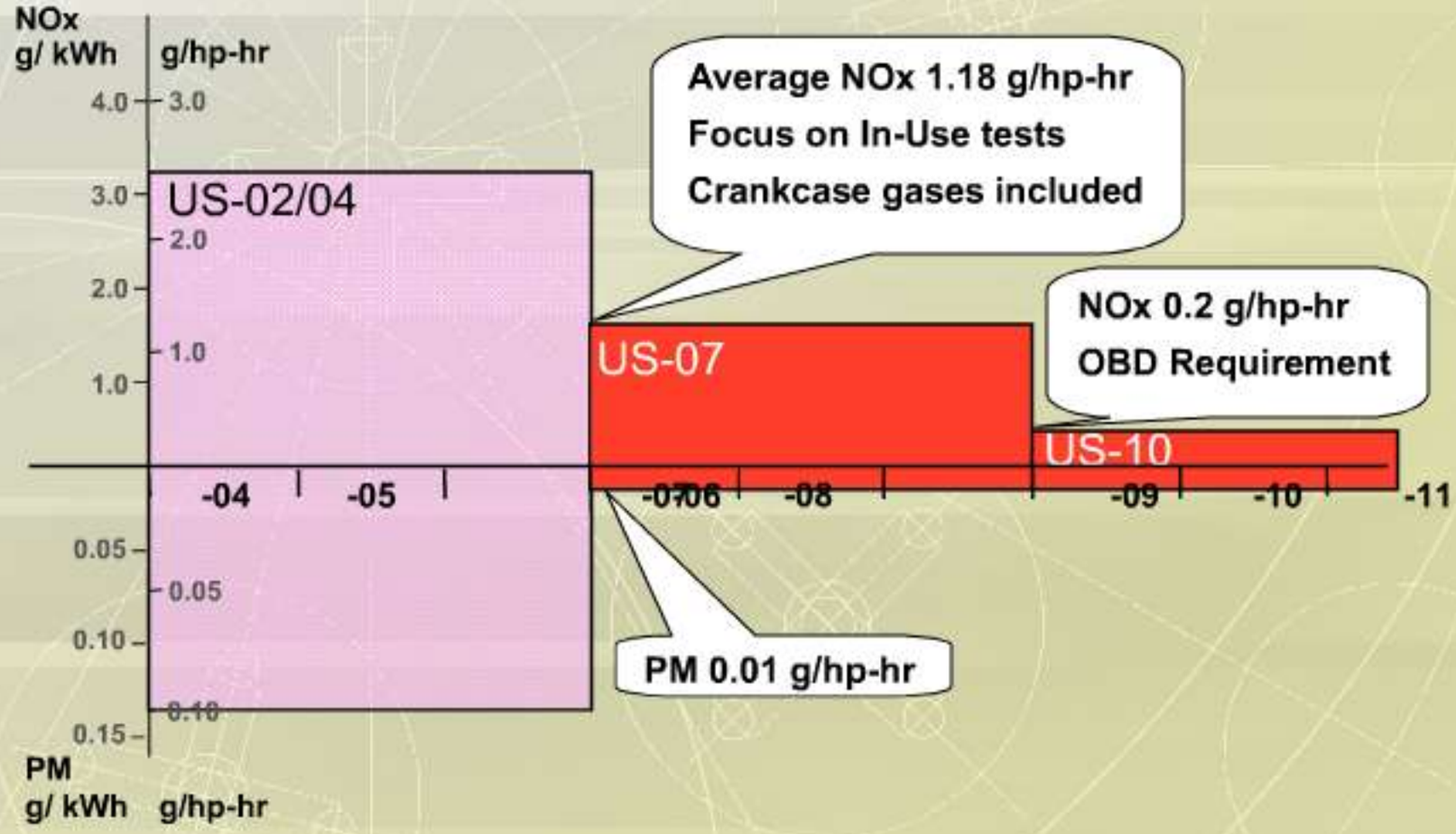
Heavy Duty Manufacturers Target pHCCI

Advanced Combustion Technology:

- *Externally cooled high-EGR*
- *Advanced turbocharger (e.g. 2-stage)*
- *Advanced FIE, up to 2,500 bar, at part load*
- *Multiple injection capability*
- *Low temperature combustion management via advanced electronic controls*

Bold Goal

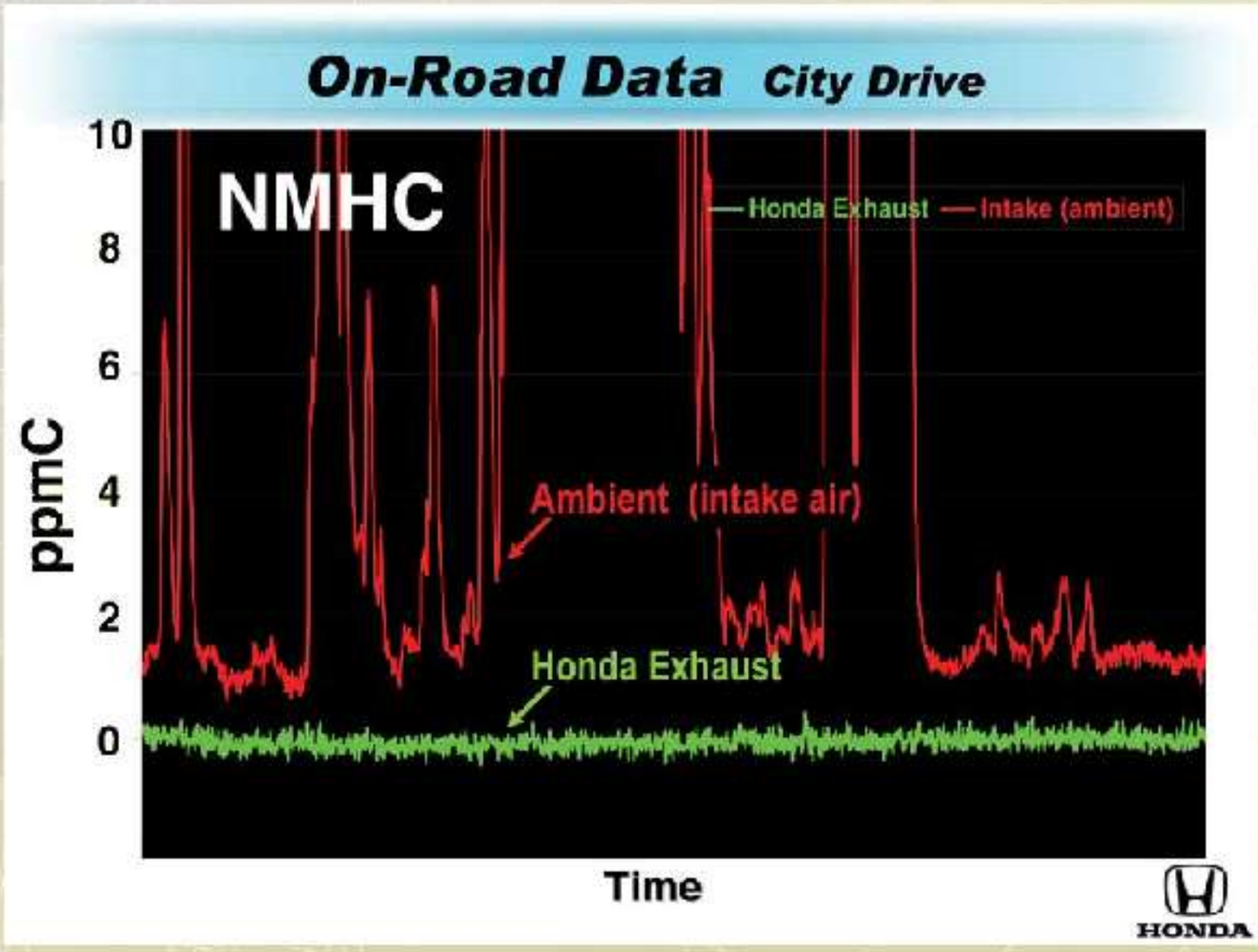
US 2007-2010 emission legislation …



Source: Volvo

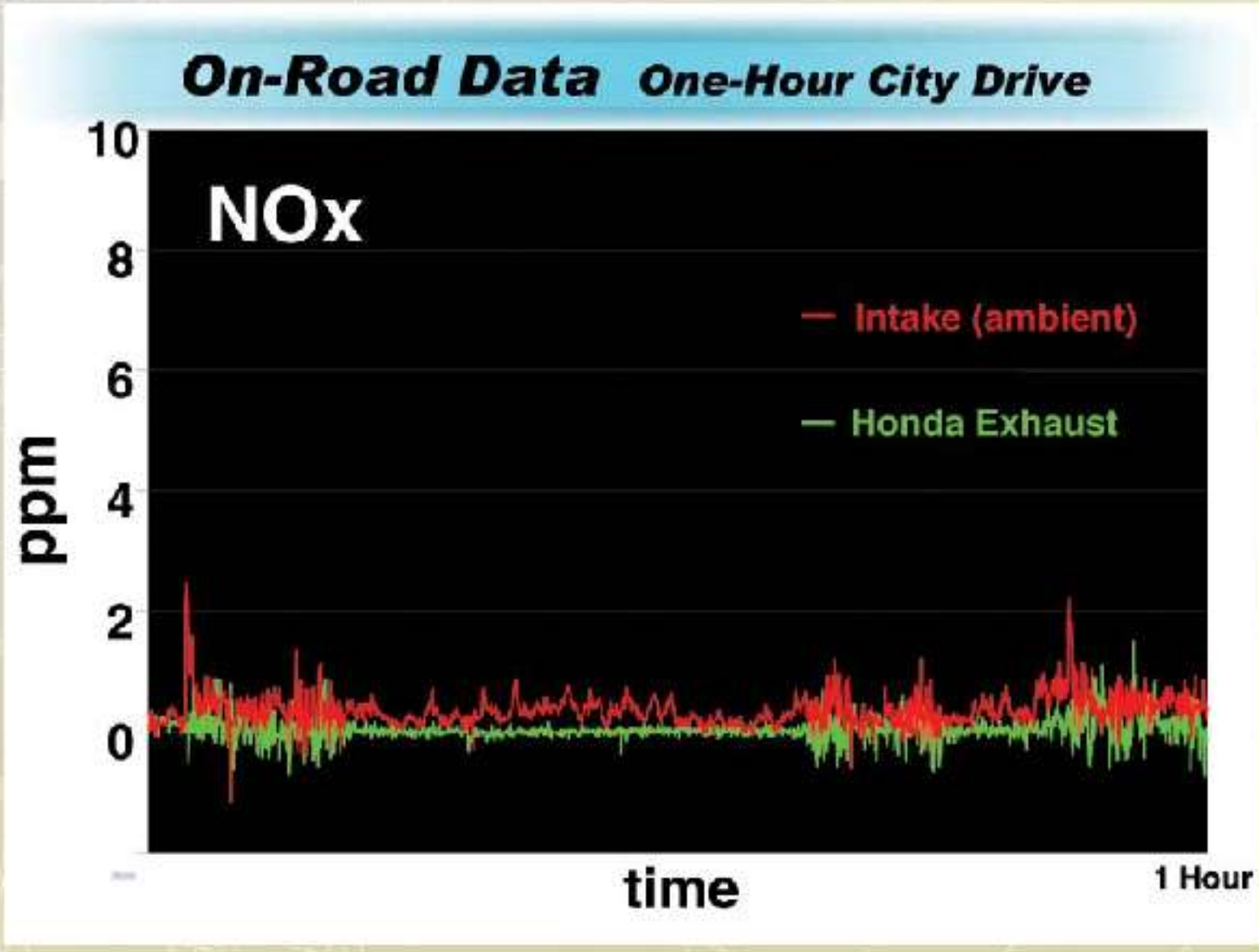
Gasoline – Emissions and Performance

Real World Emissions Measurements - NMHC



Source: Honda

Real World Emissions Measurements - NOx



Source: Honda

Top Tier Gasoline Requirements

Performance Feature	Test Method	Limit
PFI	GM IVS	No more than one inoperative injector
IVD	ASTM D6201	50 mg/valve avg maximum
CCD	ASTM D6201	No more than 140% of base fuel
Valve Stick	Wasserboxer or GM 5.0L Test	No stuck valves

Fuel Cells and Hydrogen Vehicles

18 Month Outlook for North American Diesel Market

- *Supply*

18 Month Outlook for North American Diesel Market

- *Supply*
- *Lubricity*

18 Month Outlook for North American Diesel Market

- *Supply*
- *Lubricity*
- *Cold Flow*

18 Month Outlook for North American Diesel Market

- *Supply*
- *Lubricity*
- *Cold Flow*
- *Cetane*

18 Month Outlook for North American Diesel Market

- *Supply*
- *Lubricity*
- *Cold Flow*
- *Cetane*
- *Biodiesel*

Outlook for North American Diesel Market: 2007 and Beyond

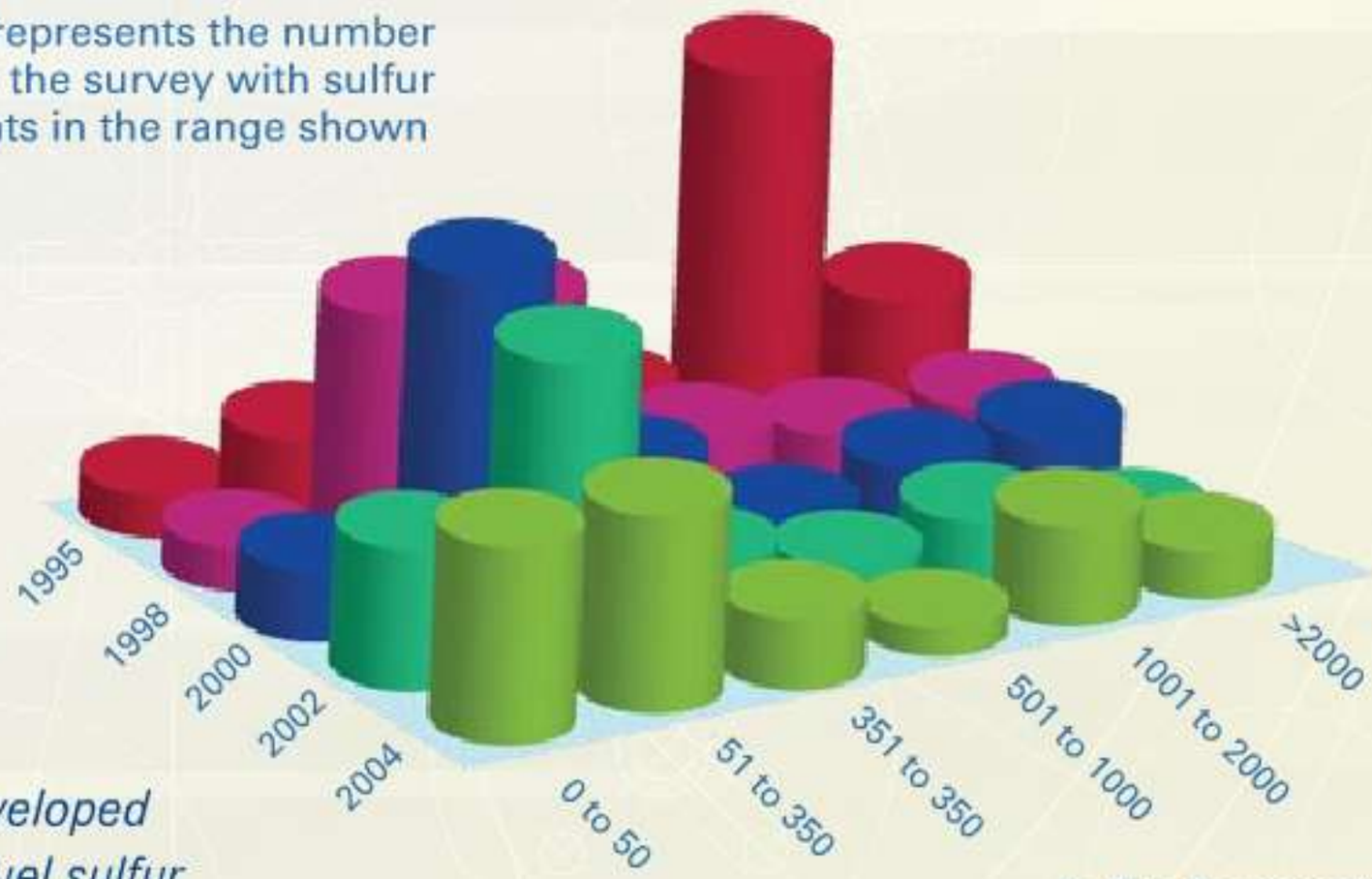
- Continued availability of cleaner diesel fuels
- Fuel/Additive/Hardware Solutions to address market challenges

Desulfurization in North America

- North America completes transition to ULSD by:
  - 2010 – on-road
  - 2012 – non-road

Global Desulfurization

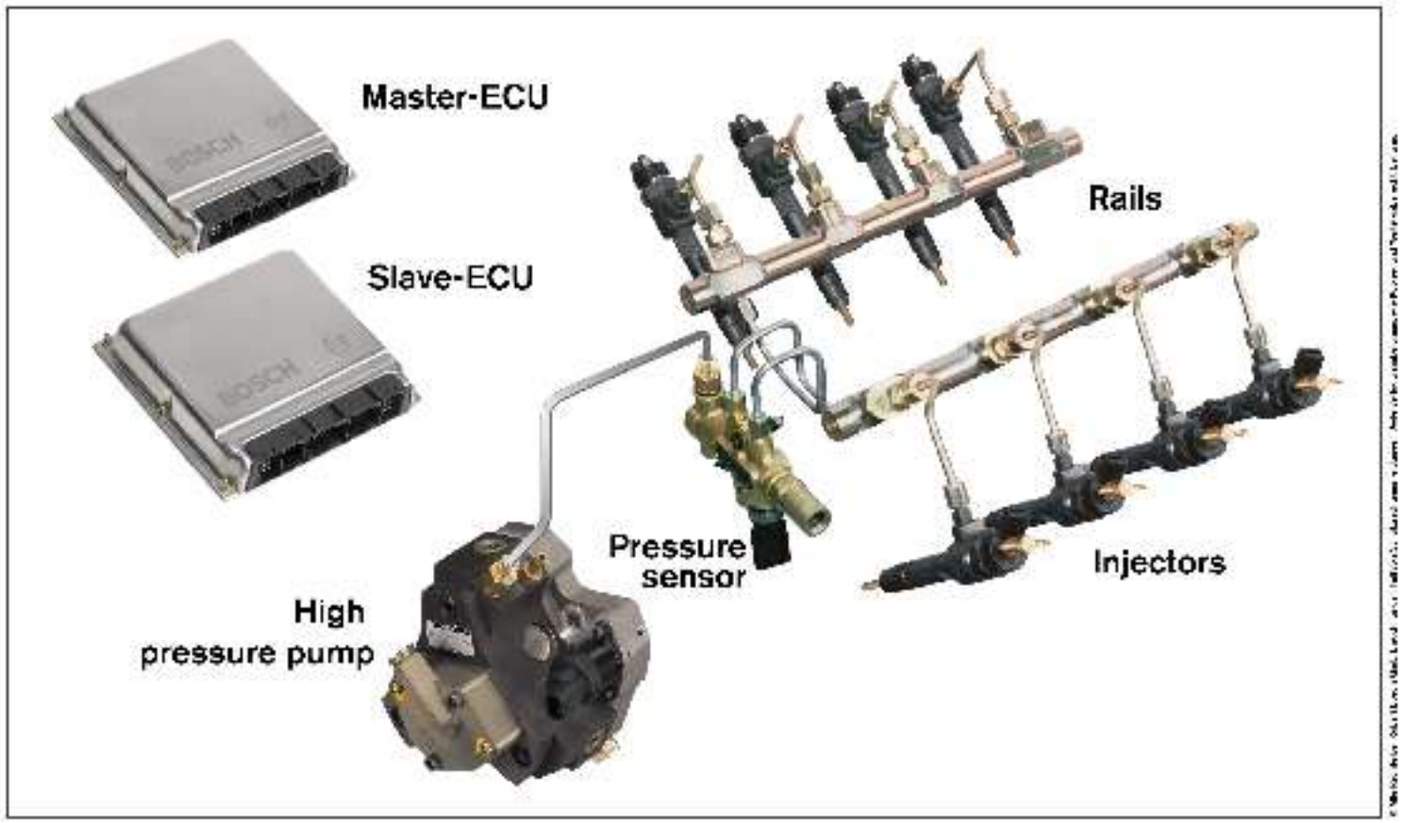
Height of Cylinder represents the number of countries within the survey with sulfur contents in the range shown



By 2010, most of the developed world will have a diesel fuel sulfur maximum of 50 ppm or below.

Lubricity Harmonization

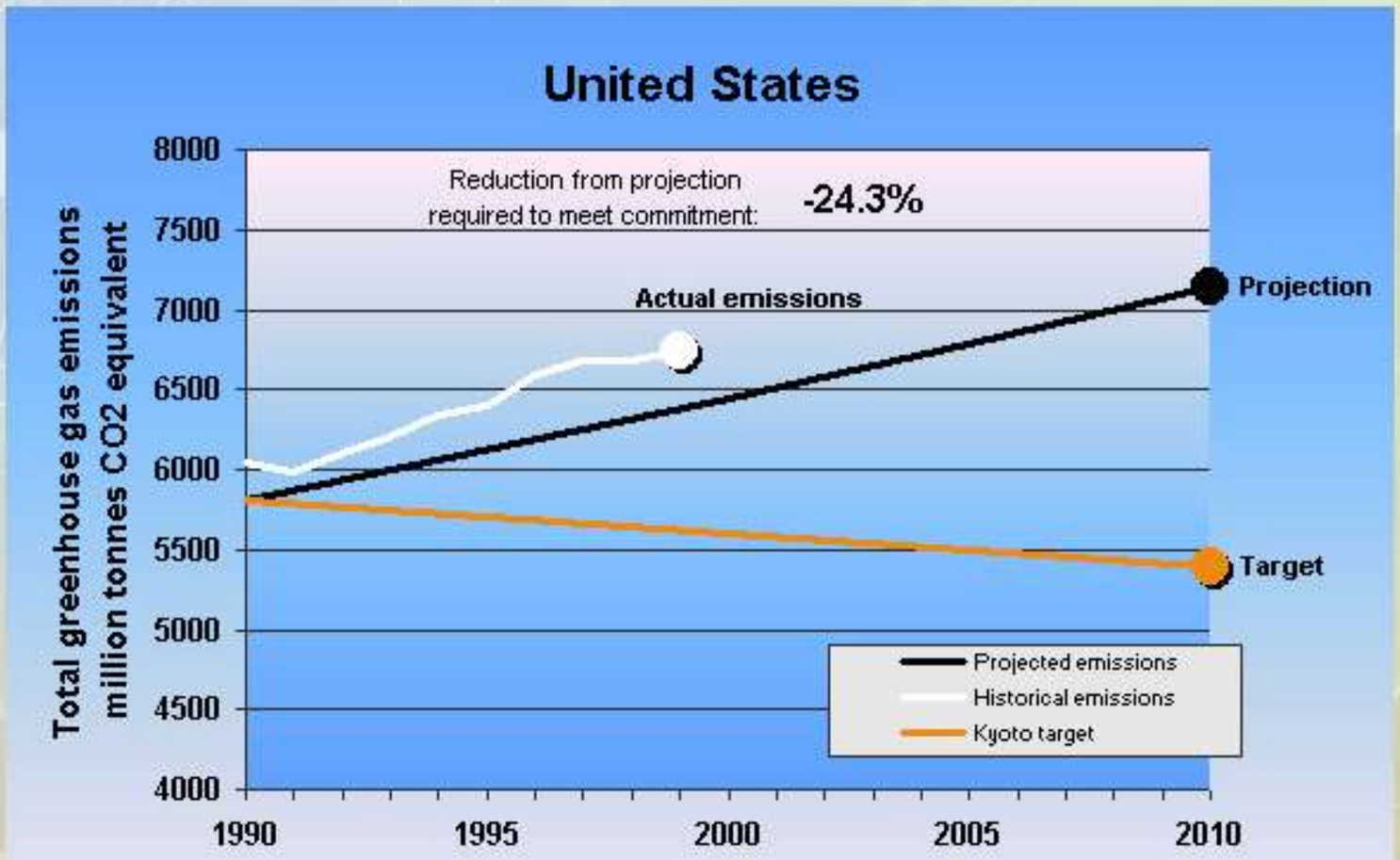
Common Rail System for 8-Cylinder Passenger Car Diesel Engines



BOSCH

1-K5-10680

Greenhouse Emissions



Actual and projected emissions of six greenhouse gases (CO2, CH4, N2O, HFCs, PFCs, SF6)

Sources: Actual emissions UNFCCC/SBI/2000/11 Table B.1. Projected emissions UNFCCC/1998/Add.2 Table C.6.

Low-Emitting Engines Become Standard for Heavy-Duty Operations

Growth of Light-Duty Diesel

Gary Herwick

Director of Mobile Emissions and Fuel Efficiency, General Motors

Thank You

Diesel Fuel Trends2005

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EA11-003

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12-9-2011

Enclosure 17

Infineum Fuel Surveys

Infineum NA Diesel Fuel Trends 2009


ADVANCED ADDITIVES
ADVANTAGED FUELS
Infineum
Infineum Presents North American
DIESEL FUEL TRENDS 2009

ADVANCED ADDITIVES
ADVANTAGED FUELS

Infineum

The Evolution Of Clean Diesel

2009 and Beyond



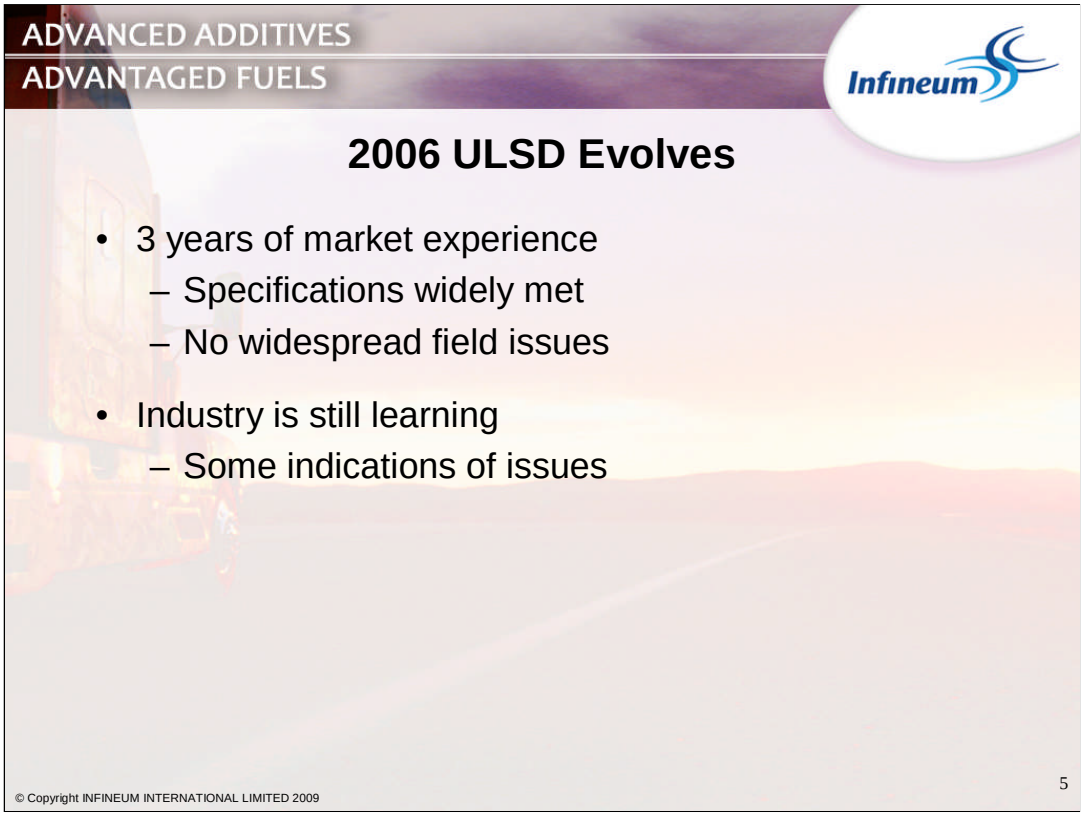




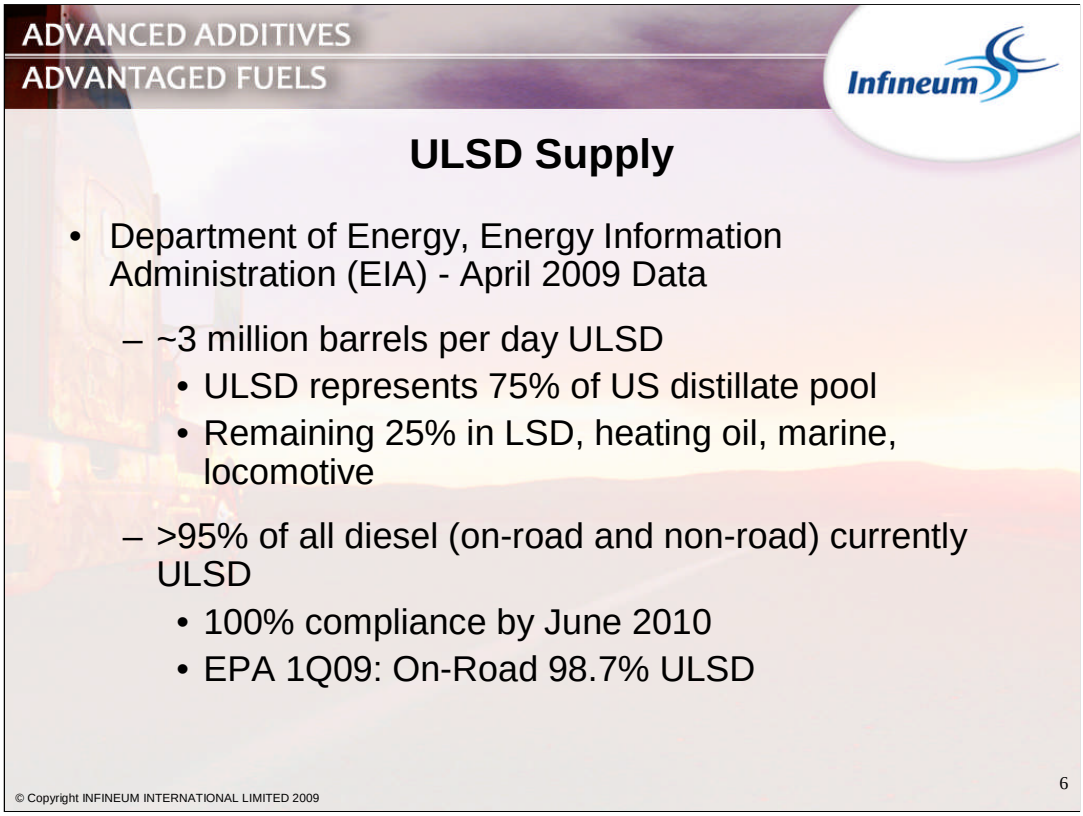
Today we are here with updates on ULSD quality and the rapidly evolving, if not chaotic world of Biofuels, fuel regulations and insights of the impact of fuels on equipment.

Our theme for 2009 is “Turbulent Times” in recognition of the continuing movement in biofuel policies, economic uncertainty and new unforeseen issues in vehicle hardware, and of changing specifications and regulations.

First lets take a look at diesel fuel quality today.

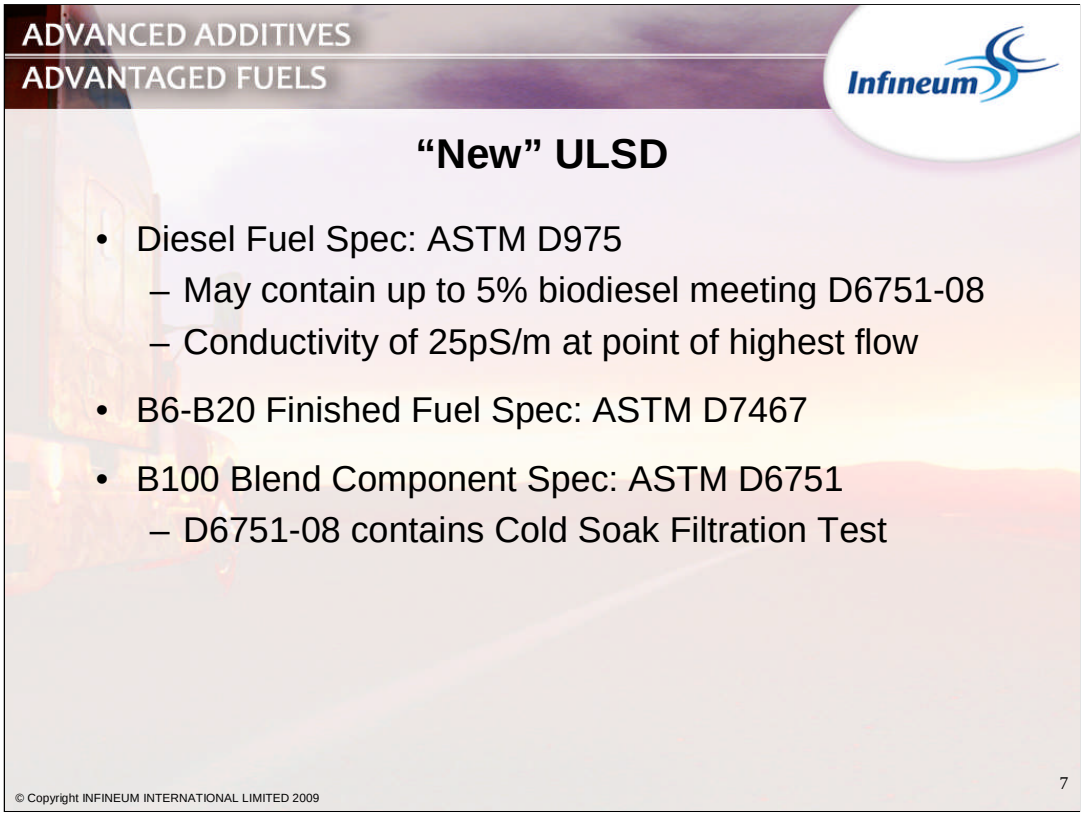


North America now has three years of experience with ULSD. It is apparent that the industry has met the challenge although some unexpected issues started to surface.



In April of 2009 EIA reported the US was producing 3 million bbls/day of ULSD which is ¾ of the total US distillate pool. The remainder of the distillate pool is comprised of approximately equal volumes of 15 - 500 ppm S and >500 ppm S fuels. The share of ULSD has increased from 67% of the distillate pool two years ago to 75% today.

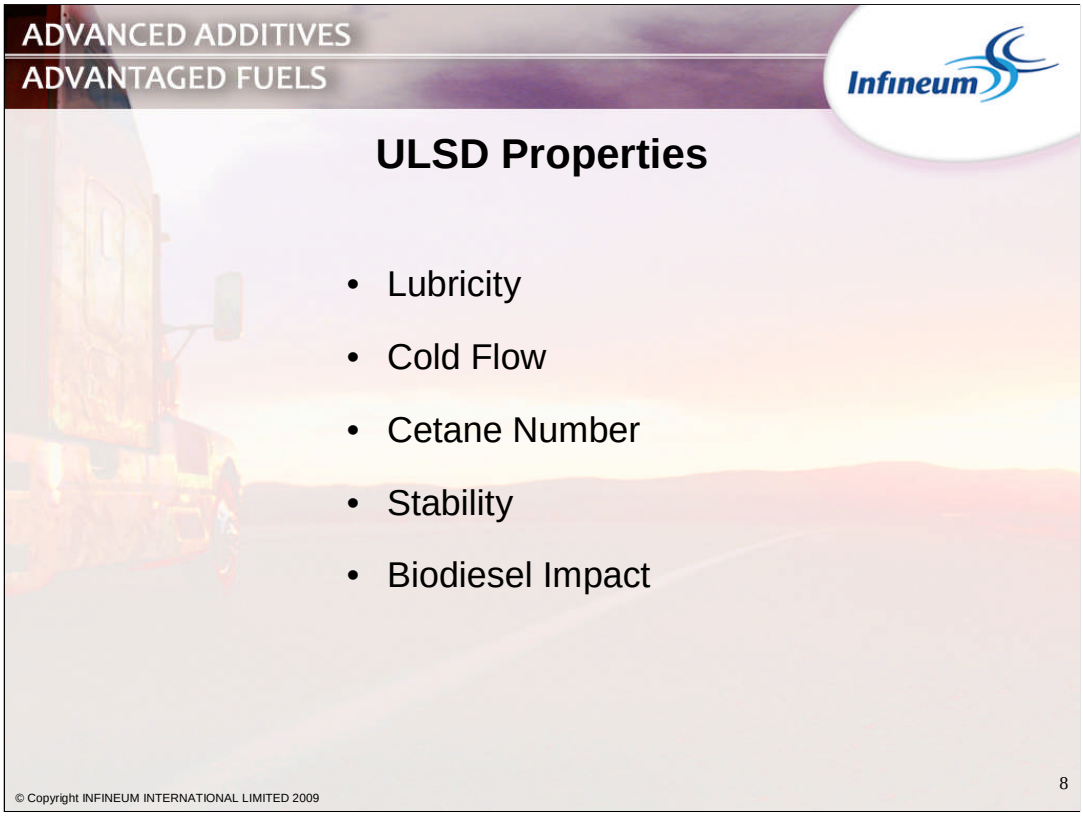
Most non-road diesel meets the 15 ppm limit in anticipation of 2010 compliance date. Latest EPA quarterly pump survey shows on road compliance at 98.7%.



2009 dawned with "NEW" ULSD. The D975 diesel fuel specification now allows up to 5% biodiesel without disclosure. EISA directed the FTC to enact labeling requirements. However, B5 and less do not require labels, and only B6-B20 and higher than B20 require labels.

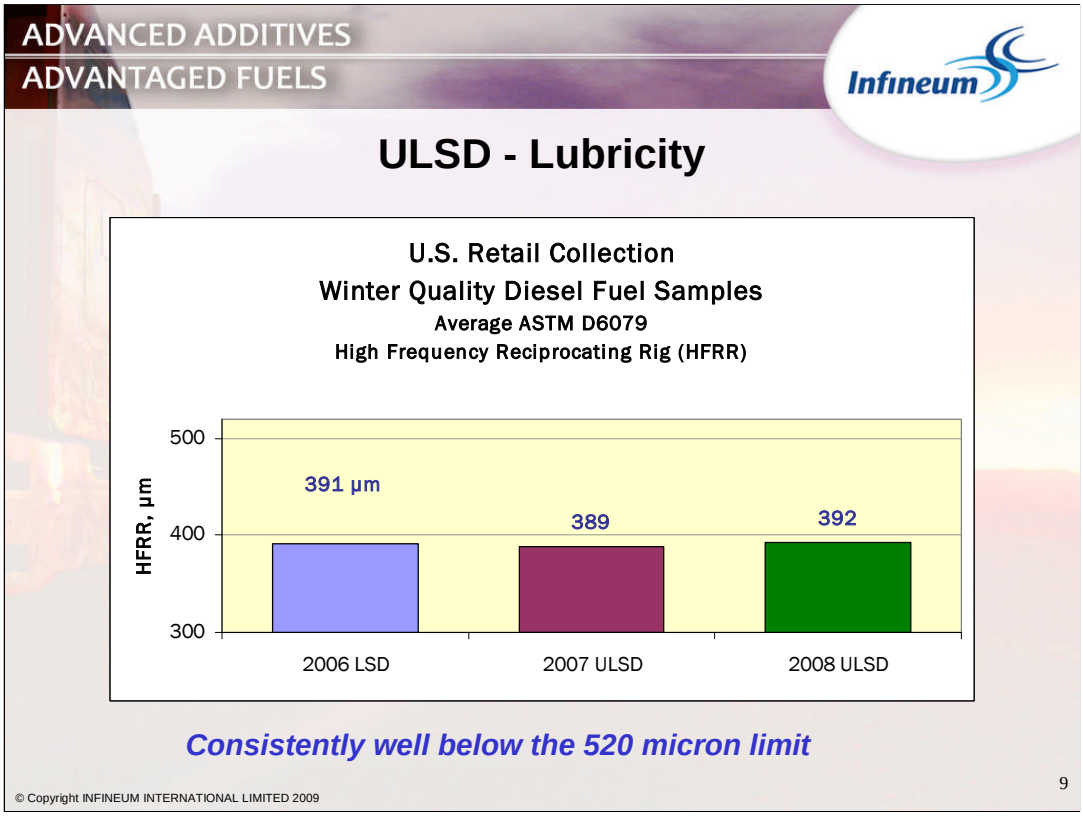
In response to safety concerns associated with the low conductivity of USLD, Conductivity spec has been incorporated into D975 since we last presented Trends.

And there is a new fuel specification D7467 for B6-B20 blends. These changes were predicated on the inclusion of the cold soak filtration test in the B100 blend component specification. The CSFT was introduced to fix the vehicle filter plugging performance observed for B2 in Minnesota and verified by LTFT testing.

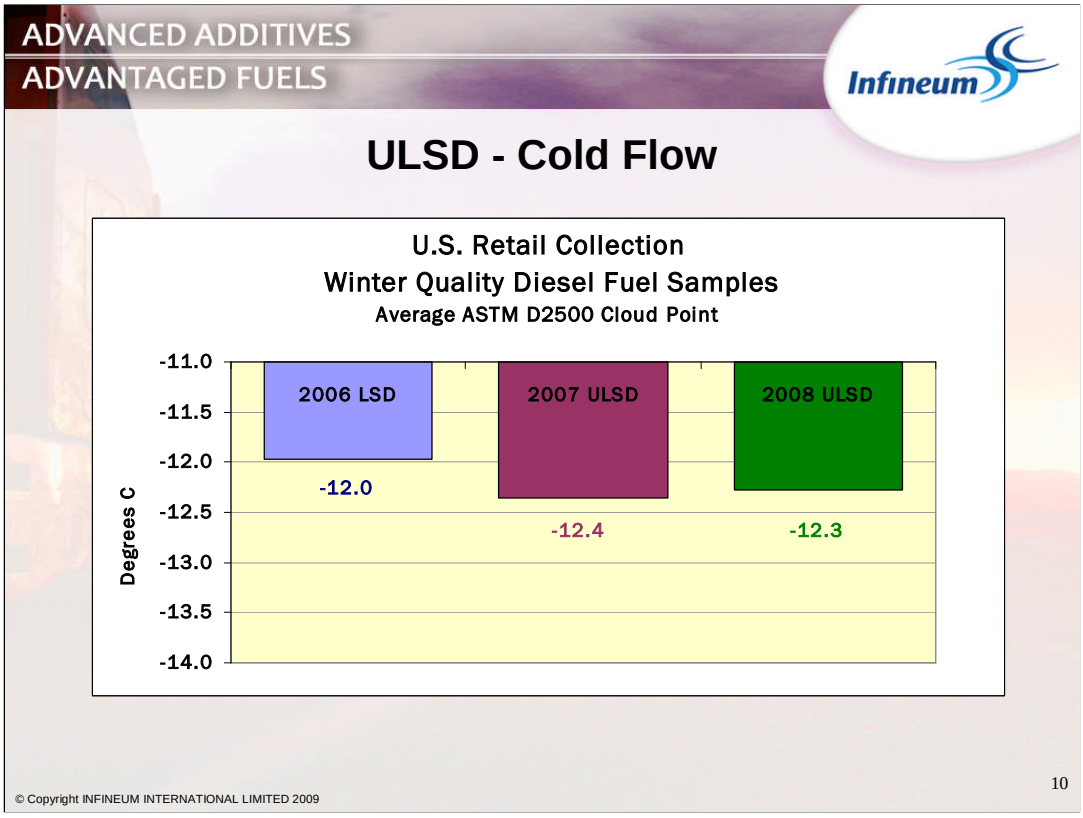


Infineum surveys winter diesel fuel quality on a world wide basis every other year. Additionally we performed a select survey in the US in 2007 to investigate any early trends of ULSD.

The following slides will summarize and compare the results of those surveys to show where ULSD is today in the US.



Lubricity remains constant; Sampling and testing are problematic at terminals. In order to ensure proper protection across broad range of fungible fuels, terminal treatment led to internal generic treat rates that cover 95th percentile scenarios.

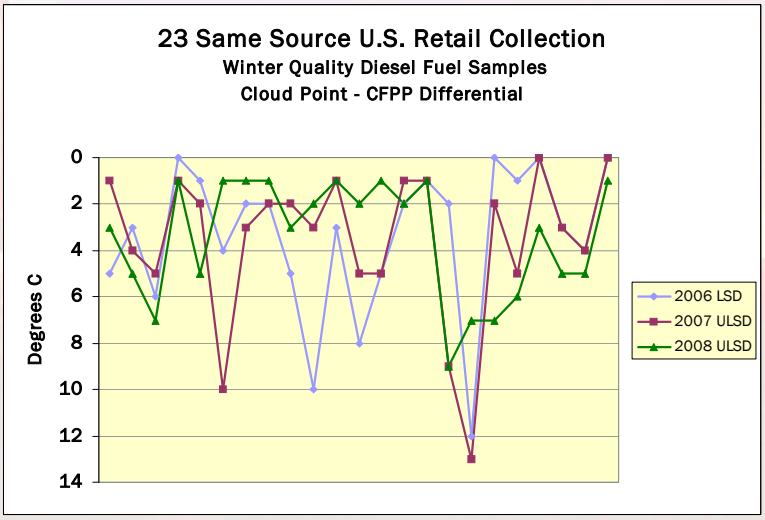


Cloud point unchanged.

ADVANCED ADDITIVES
ADVANTAGED FUELS

Infineum

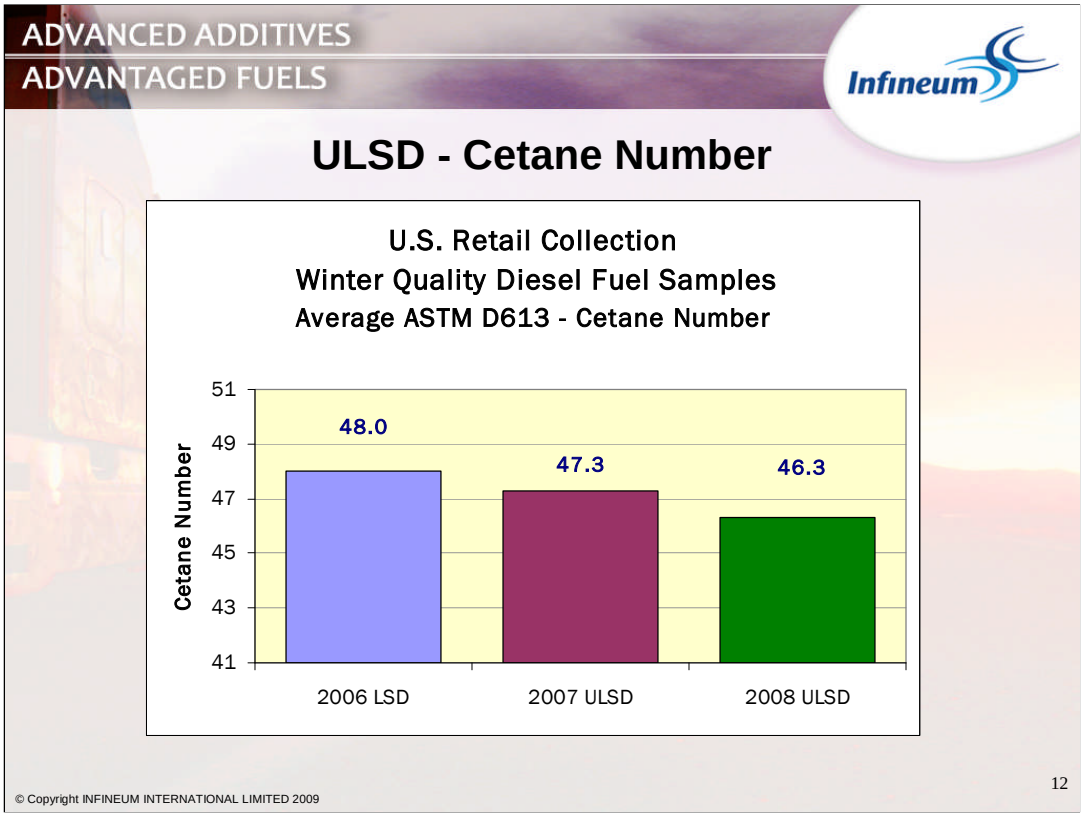
ULSD – Low Temperature Operability



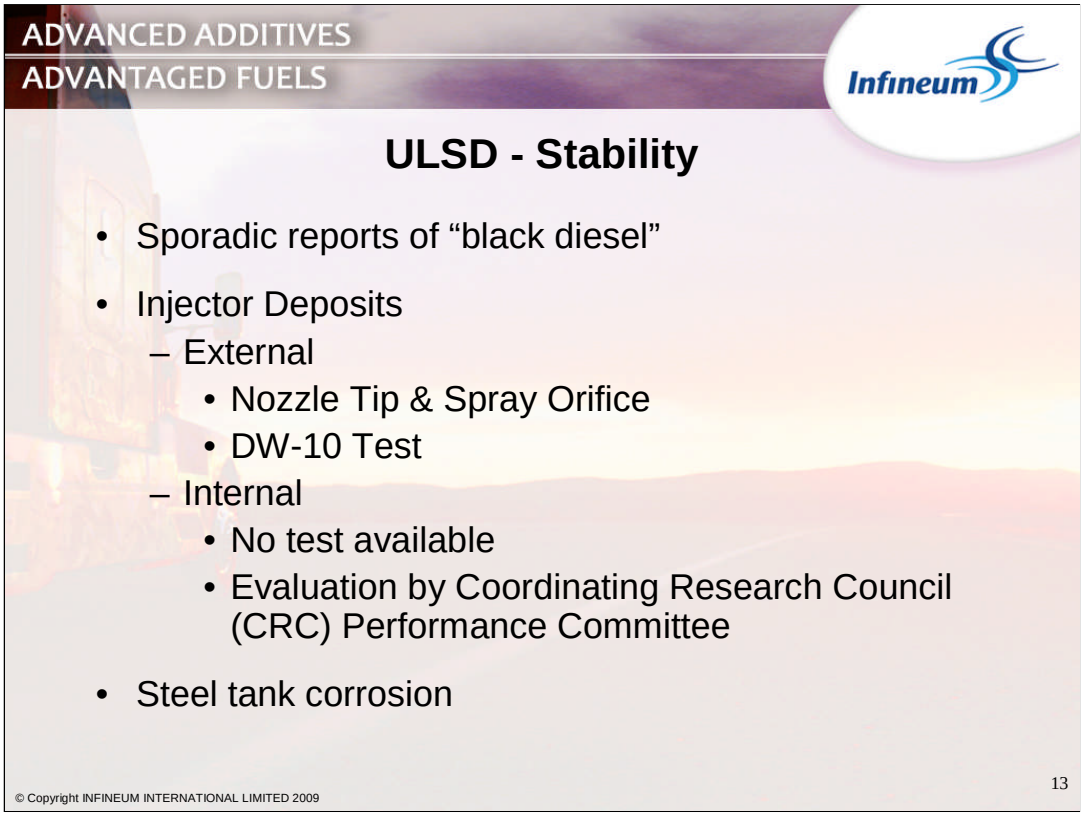
~40% of 2008 samples contain operability additives

Operability; differential between cloud point and CFPP indicates additive usage instead of kerosene blending to meet operability targets.

Data from the samples collected show an increase from ~25% to ~40% of fuels using additives to achieve operability.



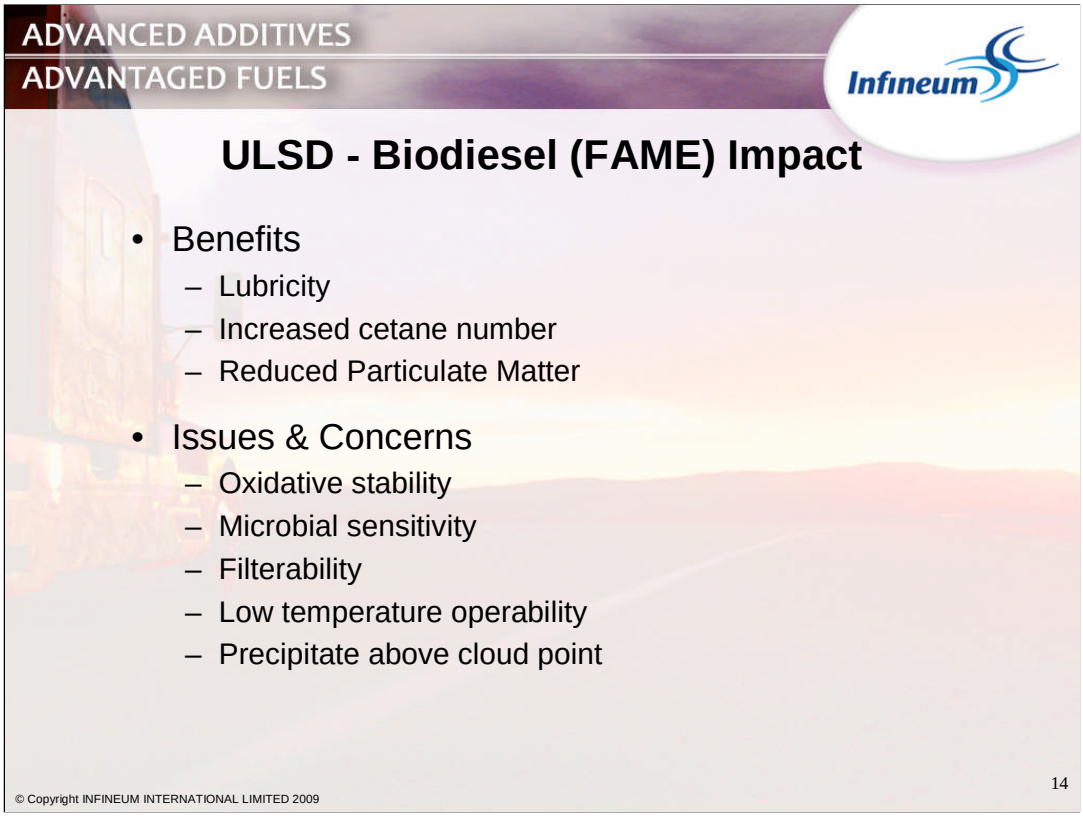
Cetane number shows little change since 2006.



Sporadic occurrences of black diesel have surfaced recently. Crude slate, refinery processing, refinery additive treatment location and timing have all been shown to be variables in the appearance of black diesel. Polarity change from LSD to ULSD and housekeeping may also be contributors. Definite cause(s) is/are still unknown, and no universal solutions are available. As in the past, we expect solutions to vary from process changes to additive solutions such as dispersants, detergents, anti-oxidants, and stabilizers.

External deposits are forming in nozzle tip and spray orifice; DW-10 may be used to identify solutions. Internal deposits are new to HPCR and ULSD, no tests are available, and CRC actively looking at the problem. Some recent evaluations have indicated that careful additive formulation is necessary. Our studies have shown that this can mitigate potential side effects leading to contribution to these deposits.

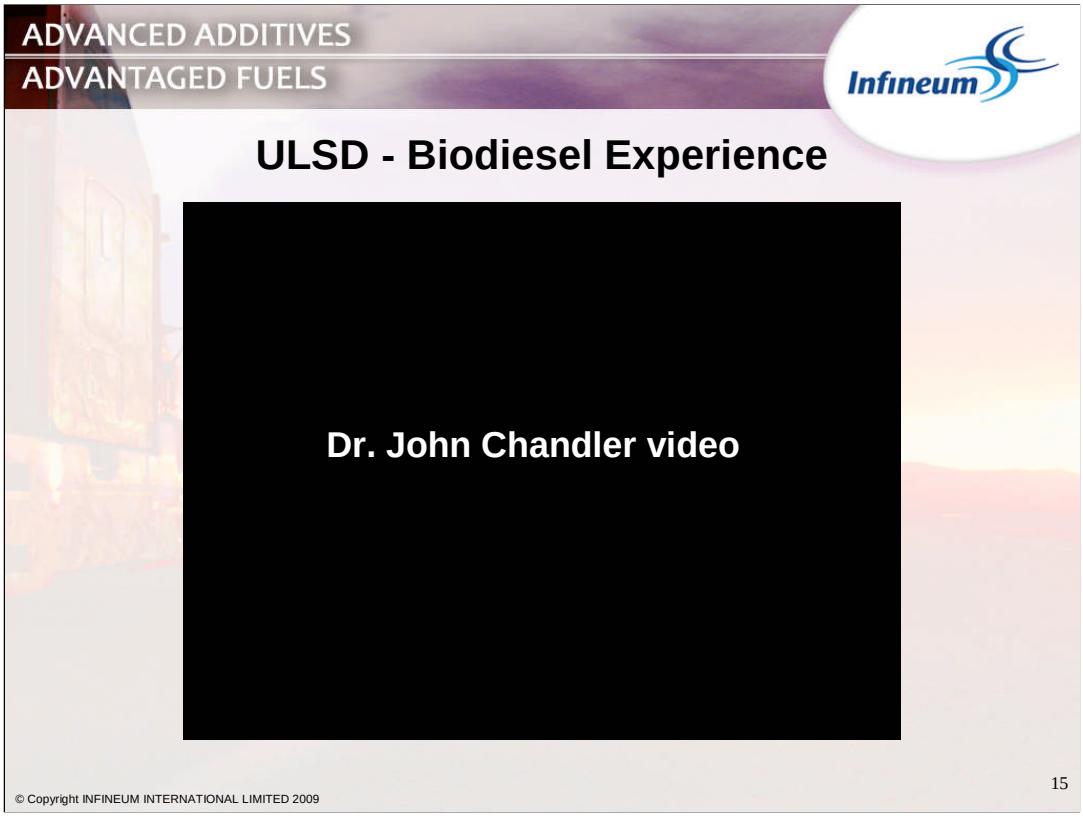
Unexpected steel tank corrosion was reported recently by Steel Tank Institute at ASTM. They are “Baffled as to cause .“



The presence of biodiesel in a blend has been shown to impact various fuel properties.

It adds lubricity, and increases cetane number and reduces PM emissions. It can reduce fuels oxidative stability and increase sensitivity to microbial degradation.

It can also decrease filterability, have a negative influence on cold operability and can cause precipitation at temperatures above the cloud point. These issues and concerns can be addressed by appropriate additive solutions.



Dr. John Chandler of Infineum, also Secretary of ASTM Sub Committee E0 on Burner, Diesel, Non-Aviation Gas Turbine, and Marine Fuels and Chair of the ASTM Diesel Cold Flow Task Force shares his views on some of these biodiesel related issues.

Dr. Chandler: We won't ever eliminate filter plugging problems. Even now ASTM has a new Task Force that's working on a filter plugging problem that dispenses filters. The belief is that impurities in biodiesel are plugging these filters. Their expectation is to come up with a specification that will minimize or eliminate this problem.

We also have alternative fuels coming along such as Gas-to-Liquid and Biomass-to-Liquid which will have to be tested for filterability issues. We don't know what the, what to expect on this so we'll have to test them as carefully as we can, but lab testing will only take you so far, eventually these will have to get into the field and be evaluated for filterability problems, as well as other issues.

Engine designs are changing. They will require tighter and tighter filtration removing smaller and smaller particles. Combine this with a colder than normal winter or an extended winter will also be a factor – we combine all these and you have a situation that's ripe for filter plugging problems.

But these are not new to the industry. They have happened before and the industry has always jumped in with both feet to solve these problems, to minimize any problems for the consumer.

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Biomass-Based Diesel

Quality varies and requires different additive solutions

	1st Generation	2nd Generation
Composition	Biodiesel/FAME	BTL, CTL, GTL
Lubricity	Benefit	Debit
Cold Flow	Debit	Neutral to Debit (Process dependant)
Cetane	Benefit	Benefit
Stability	Debit	Neutral to Benefit
NOx	Neutral to Debit	Benefit
Particulate Matter	Benefit	Neutral to Benefit

When 2nd generation biomass-based diesel is introduced in the market due to RFS-2 regulation, a different set of benefits and issues will arise. Here is comparison of some properties of different biomass-based diesels.

Now that we've looked at diesel of today, let's change gears and take a look forward. 2008 was, according the US Energy Information Administration, a watershed year for distillate and its future.

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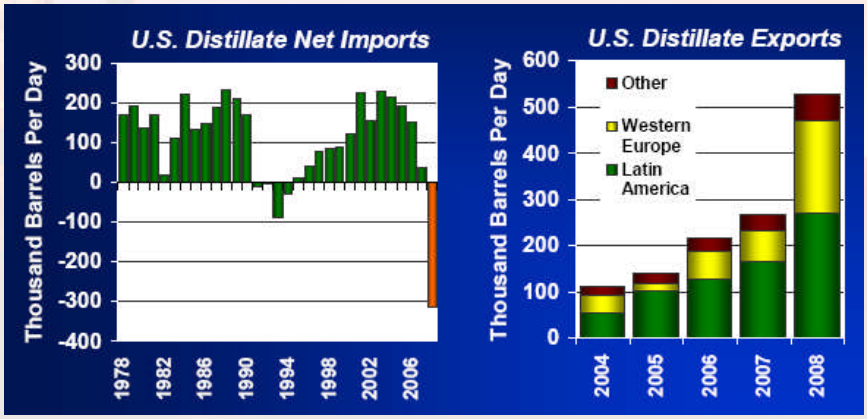
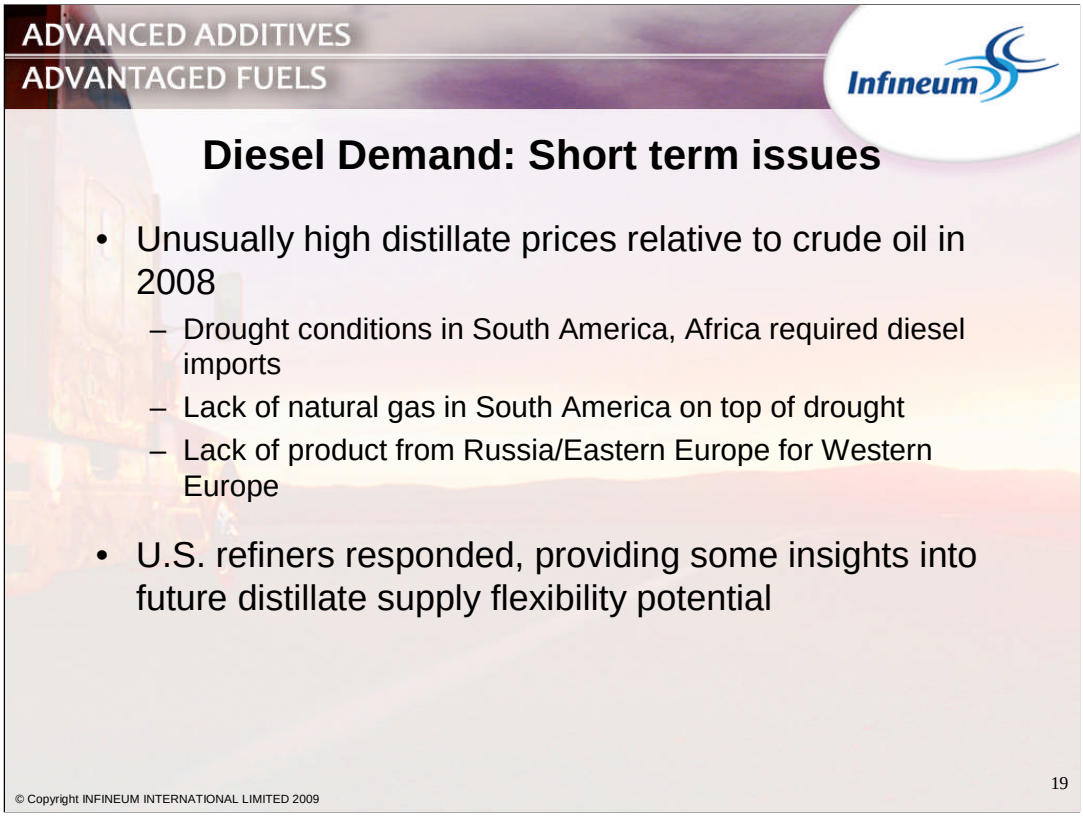
Diesel Demand

- In 2008, U.S. Shifts from Net Importer to Net Exporter of Distillate



EIA data showed 2008 to be an unusual year. US became a net exporter of distillate mainly to Latin America and Western Europe.



There were some unique conditions in 2008 that led to this increased distillate demand.

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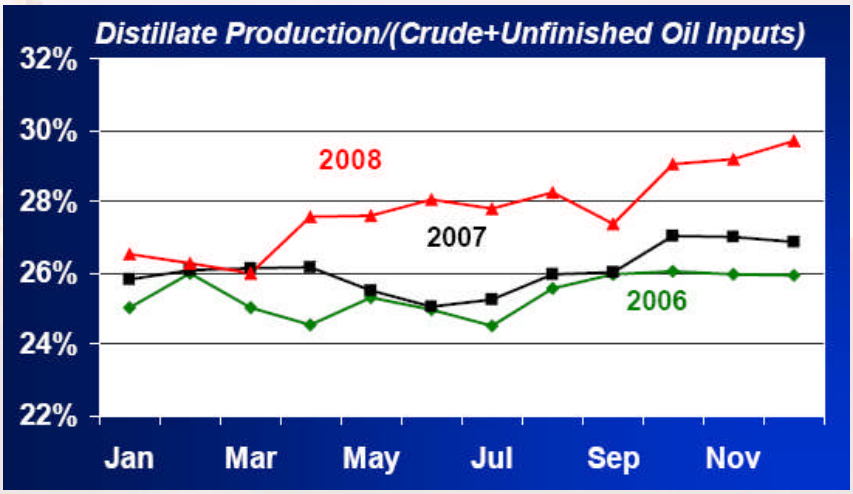
Distillate Yields Reflect Price Incentives



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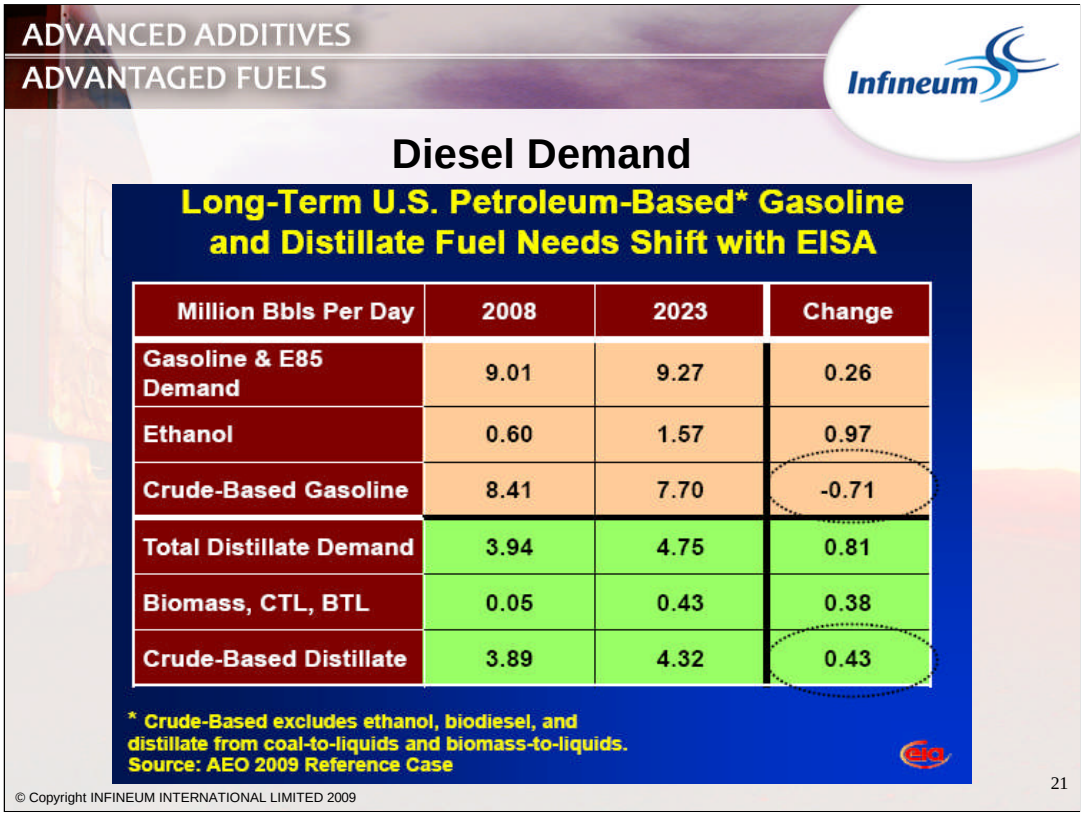
In 2008, in response to increased demand and better margins than gasoline, distillate yield increased. Since some of the 2008 short term issues in LA & EU have been addressed, 2009 US conversion has returned to historical levels.

The recession has had a larger impact on diesel demand than gasoline. EIA reported year to year Diesel demand is down 9% in 6/09 reporting while gasoline is down 1%. Thus making distillate drag on refinery margins.



The EIA's look forward expects petroleum based gasoline to decrease in the next 15 years & petroleum based diesel demand to increase in the same time frame due to US legislation. Ethanol mandates & vehicle fuel economy increases are expected to offset the increased gasoline demand due to Vehicle Miles Traveled.

This creates significant challenges for refiners to adapt to the projected changes in product mix. Increases in distillate yield relative to gasoline will be met with a number of solutions. These include refinery expansion with appropriate process units, change in utilization of current equipment, and optimization using various additive strategies.

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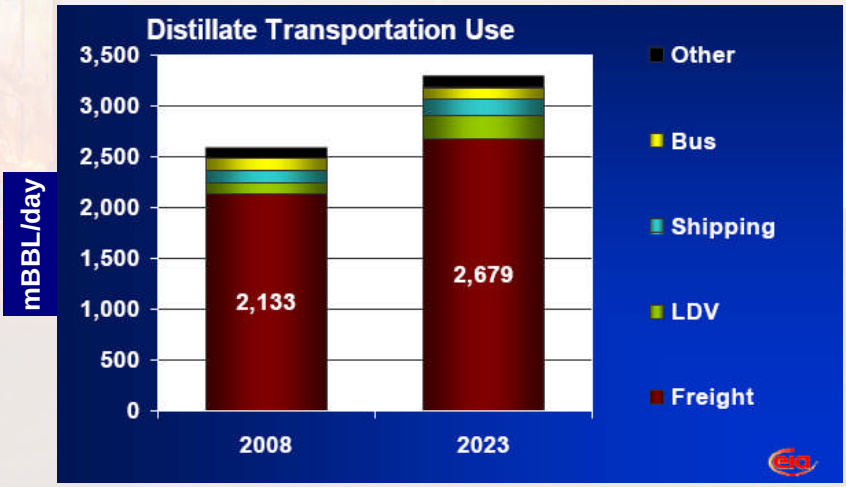
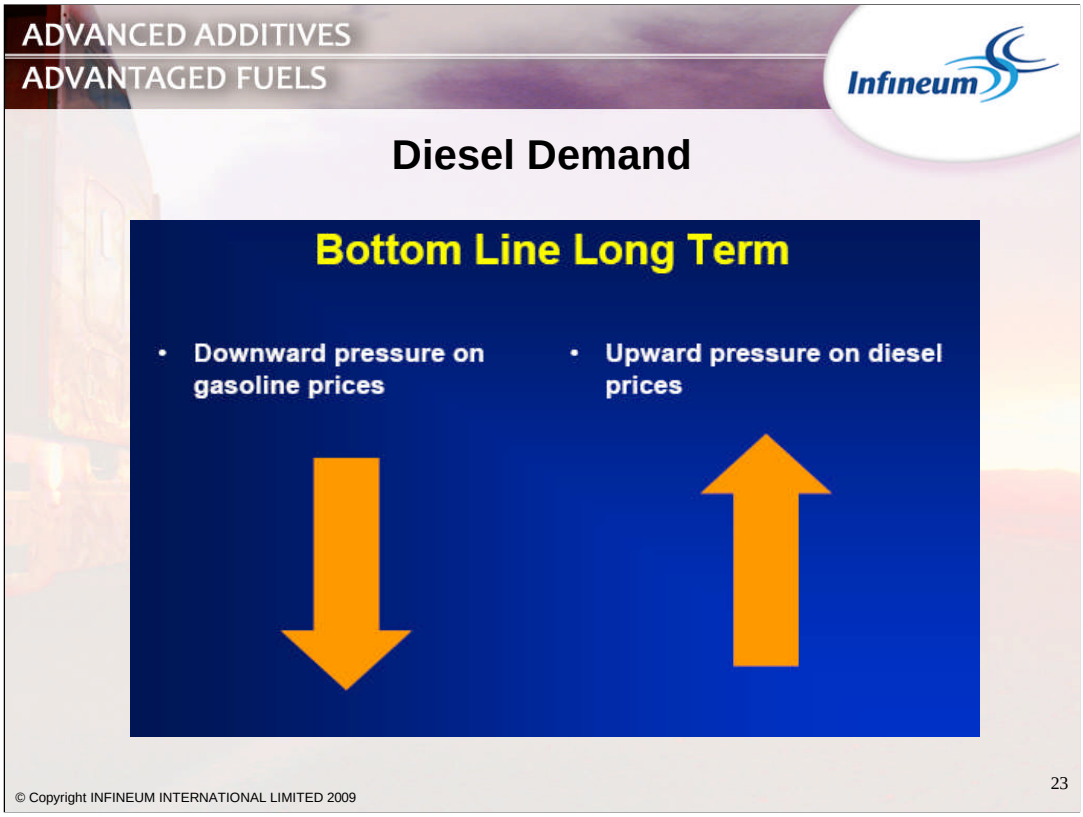
Diesel Demand

- Heavy Duty Truck Use Drives Future Diesel Demand



HDD is expected to remain the major diesel user in the future.

Some increase is expected in Light Duty Vehicle application. Volume is still relatively small. We still question when & if LDD will ever be a major driver for diesel quality requirements and specifications in the US.



Long term EIA sees World Wide downward pressure on gasoline prices and upward pressure on diesel prices.

Lets move to the world of biofuels.

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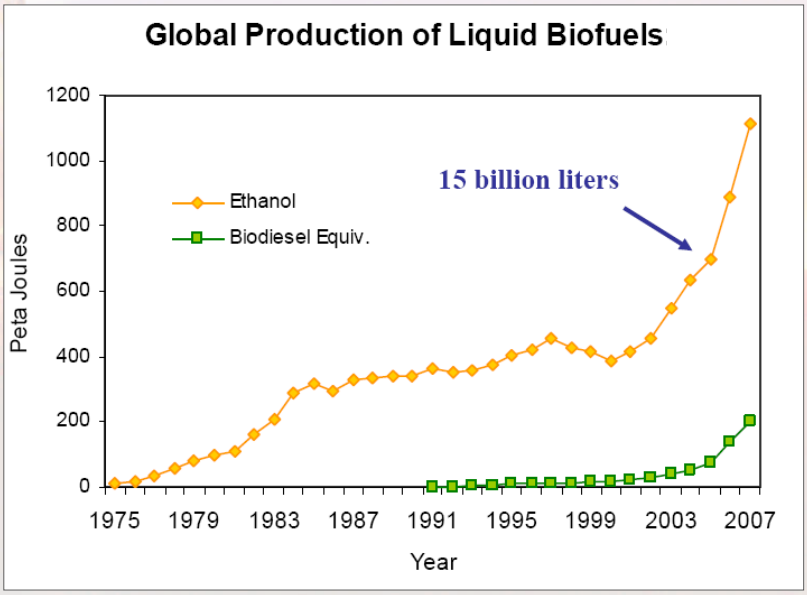
Biofuels



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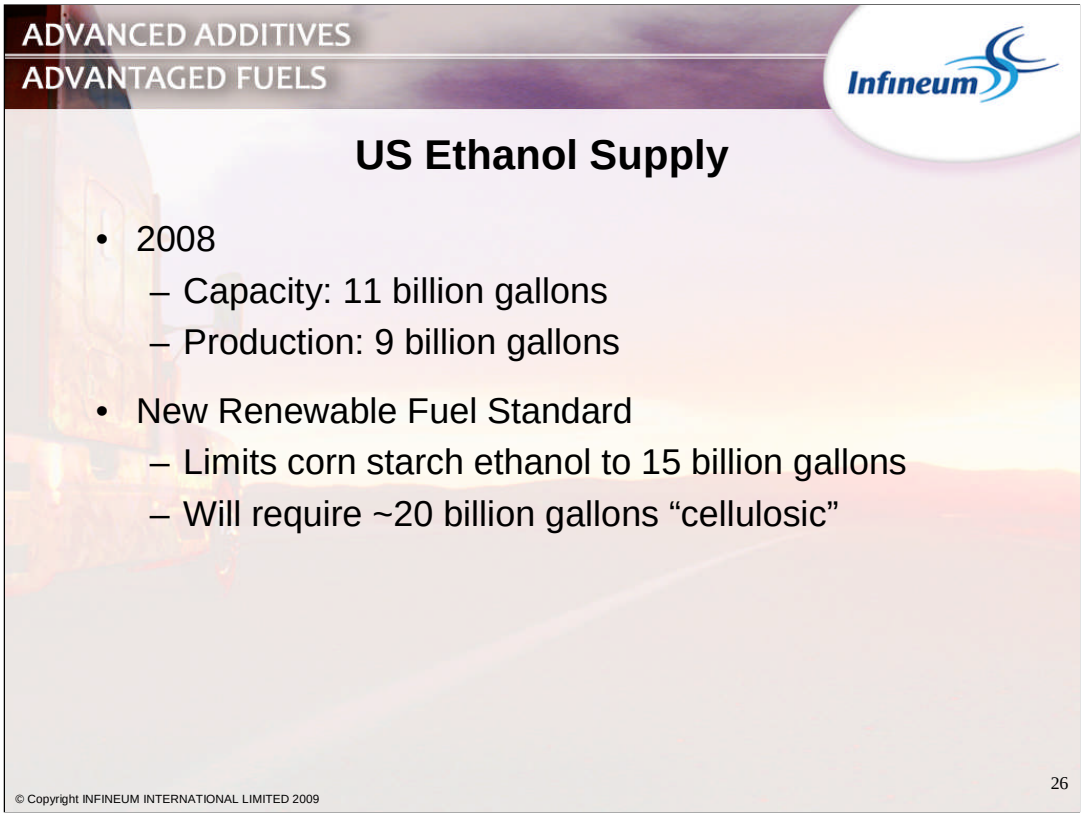
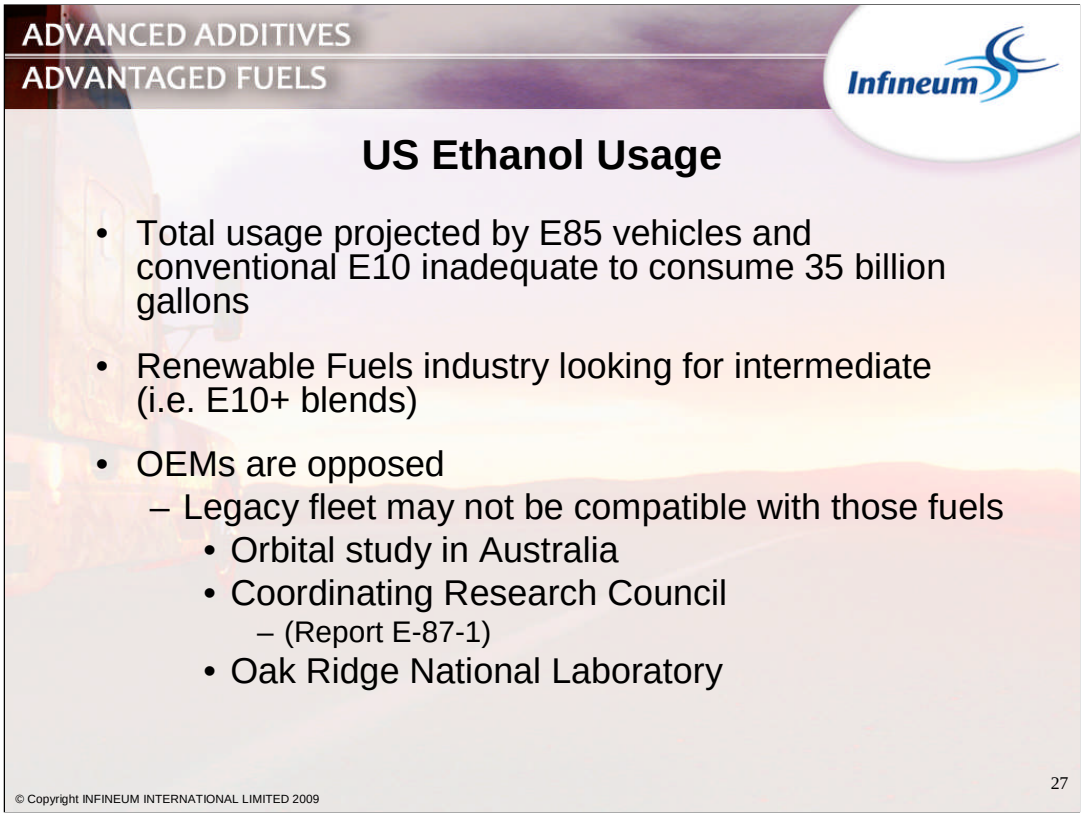
Global production of biofuels has been led by ethanol over the past 35 years. Biodiesel gained traction in the last decade.



US ethanol production was 9 billion gals in 2008 with 11 billion gals capacity.

RFS-2 limits corn starch ethanol to 15 billion gals. Although cellulosic fuel usage is expected to grow to 20 billion gallons by 2022, there is no known commercially viable cellulosic ethanol process today.



It is unknown how the increased ethanol will be consumed.

E85 and E10 vehicles will not be able to consume 35 billions gals of ethanol. Renewable Fuels Association is looking to E10+ blends, but OEMS are strongly opposed due to concerns on legacy vehicles.

CRC recently published a report (E-87-1) showing fuel enrichment in open loop control in greater than 50% of the vehicles studied indicating potential for aftertreament system damage. Those findings echo the findings of the Orbital study done for Environment Australia. ORNL is studying the issue under auspices of the Department of Energy.

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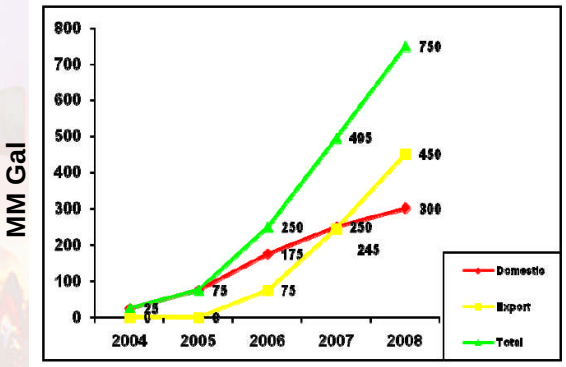
US Biodiesel Production



- National Biodiesel Board expects less in 2009
  - Cost versus petroleum diesel
  - Antidumping duty action at the European Commission reduced exports to the European Union

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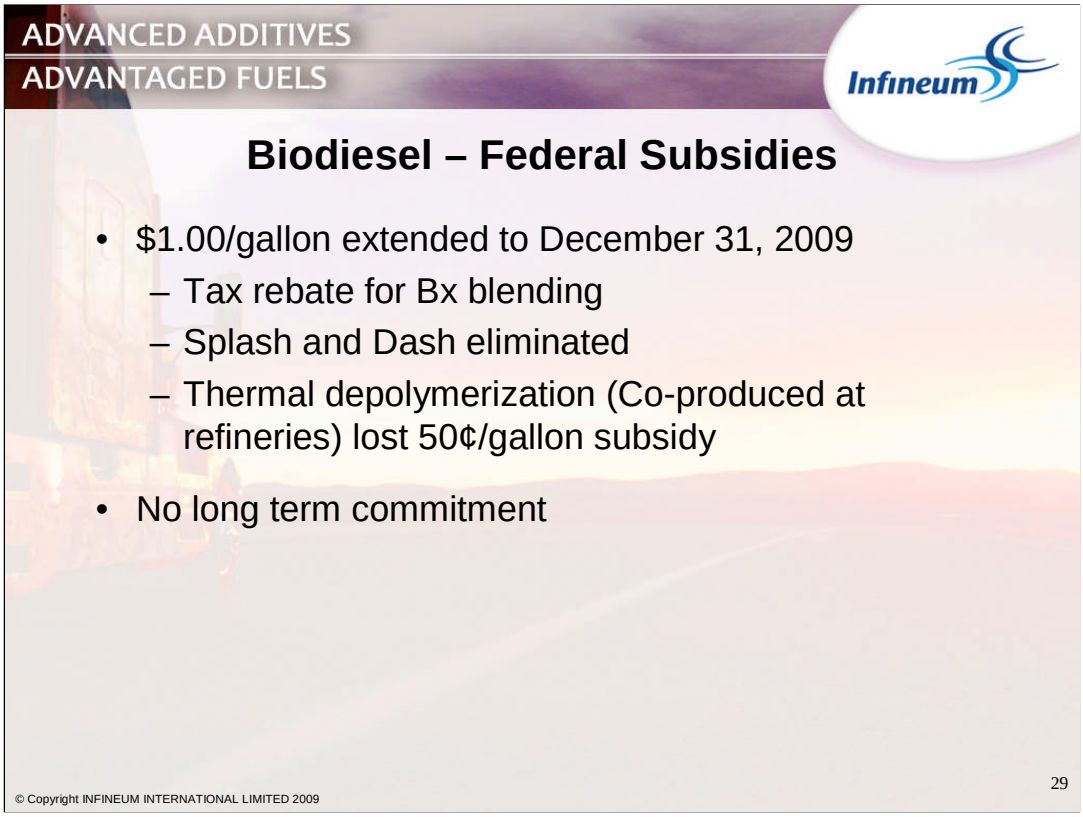
750 million gallons of biodiesel (FAME) was produced in the US in 2008 as reported by the Renewable Energy Group. More than half was exported.

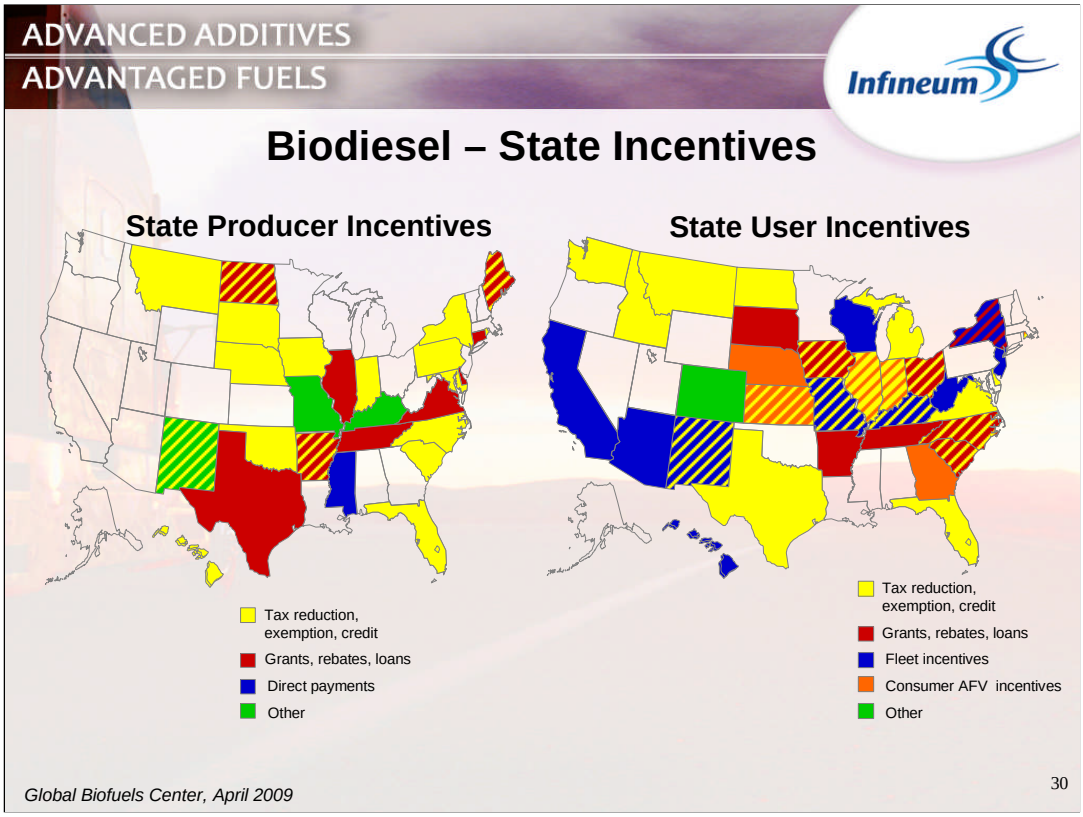
NBB expects less production in 2009 due to high costs vs. petro and EU action on subsidy. EU action on subsidy was made permanent this July to be effective for the next 5 years.



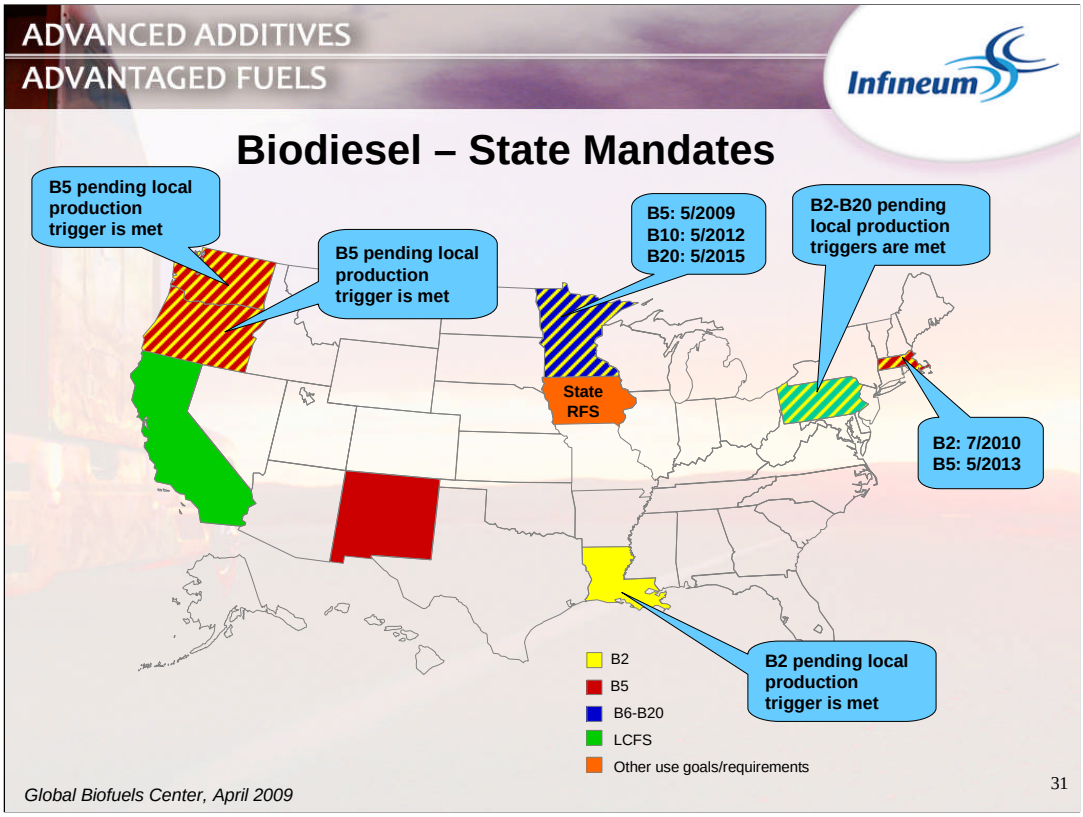
US excise tax rebate for $1.00/gal B100 in Bx blends was reauthorized in December 2008. The reauthorization removed splash and dash component and 50¢/gal TDP co-processing. Co-processing includes the inclusion of triglycerides directly into refinery processing equipment such as a crude unit or a diesel hydrogenation unit.

Congress has made no long term commitment to excise tax rebate.

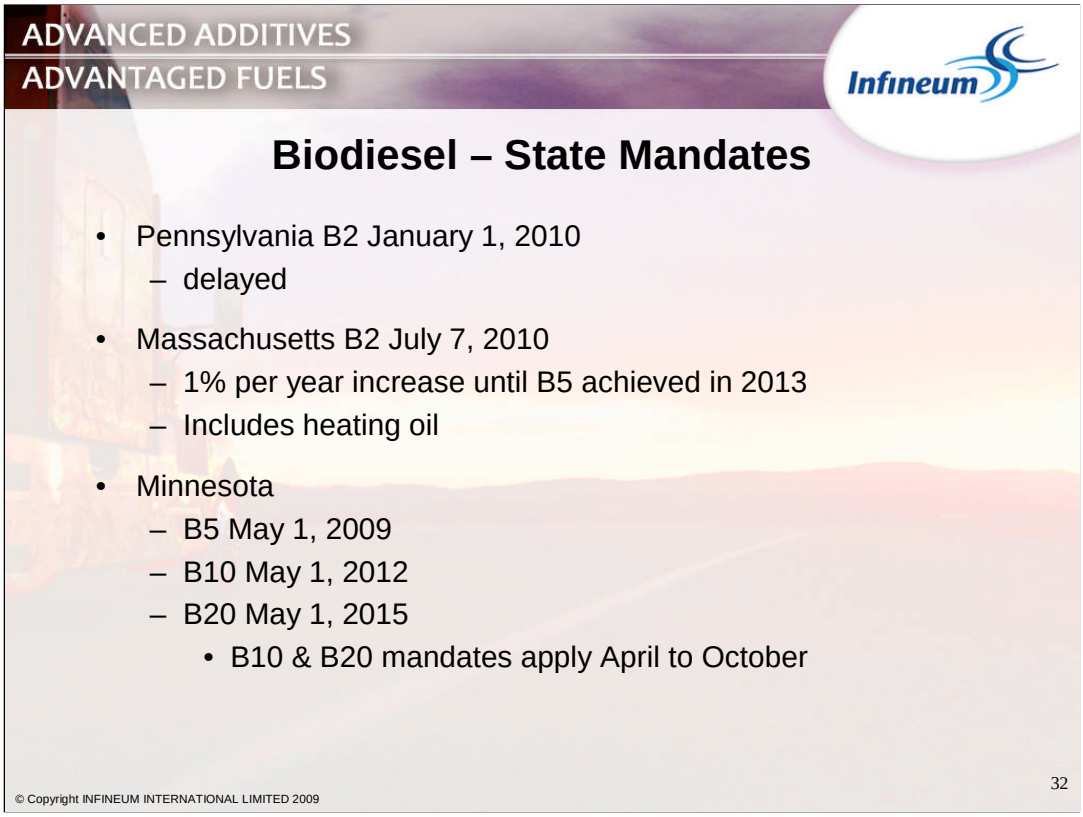
Reduced export demand and other factors including no long term federal subsidy and federal RFS-2 creates uncertainties for biodiesel market.



State governments have taken the lead on the biodiesel front. These maps show states with producer and user incentives.



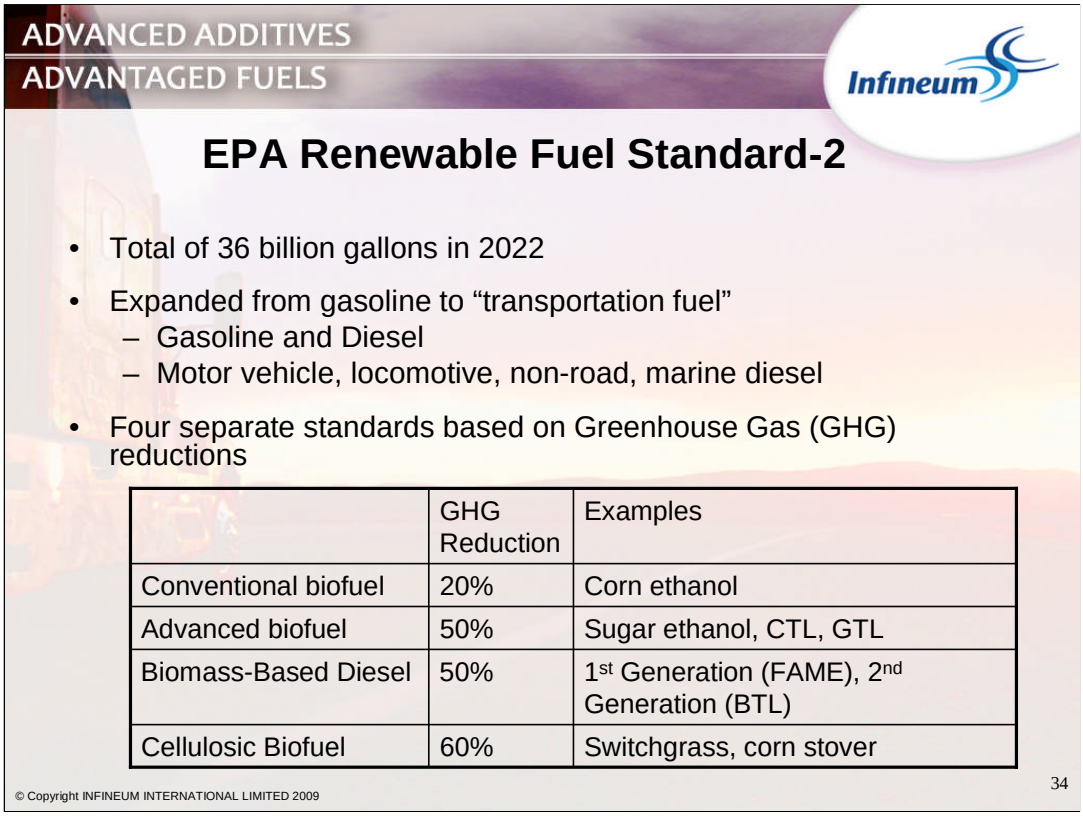
This maps shows states with mandates.



Upcoming state mandates are listed here. The PA mandate has been delayed due to lack of certification of infrastructure by state agriculture department.

MN has the lowest 10th percentile temperatures on ASTM map and the highest level of biodiesel mandated. Thus, there is some concern on operability impact this winter.

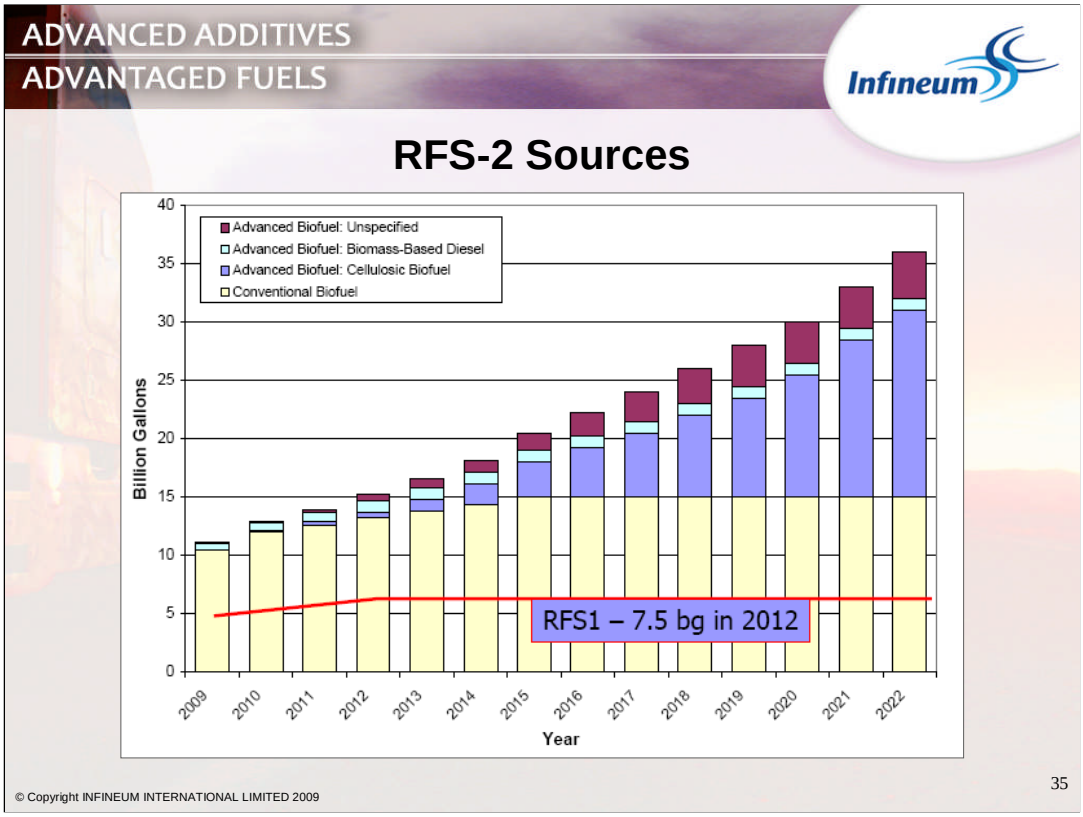
In the spring of 2009 new fuel regulations sprouted like daffodils after the first thaw.



The US EPA gave us RFS-2 regulations for EISA. RFS-2 calls 36 billion gallons of renewable fuel by 2022. It expands from gasoline only in RFS-1 to all transportation fuels.

The regulation is separated into 4 standards based on % GHG reduction from 2005 petroleum based baseline. They were developed using full Life cycle analysis including indirect land use changes.

EPA is empowered to adjust GHG reduction up to 10%. As an example, Advanced biofuel now requires 44% less GHG to accommodate sugar ethanol.



The volume expectation of the four standard is

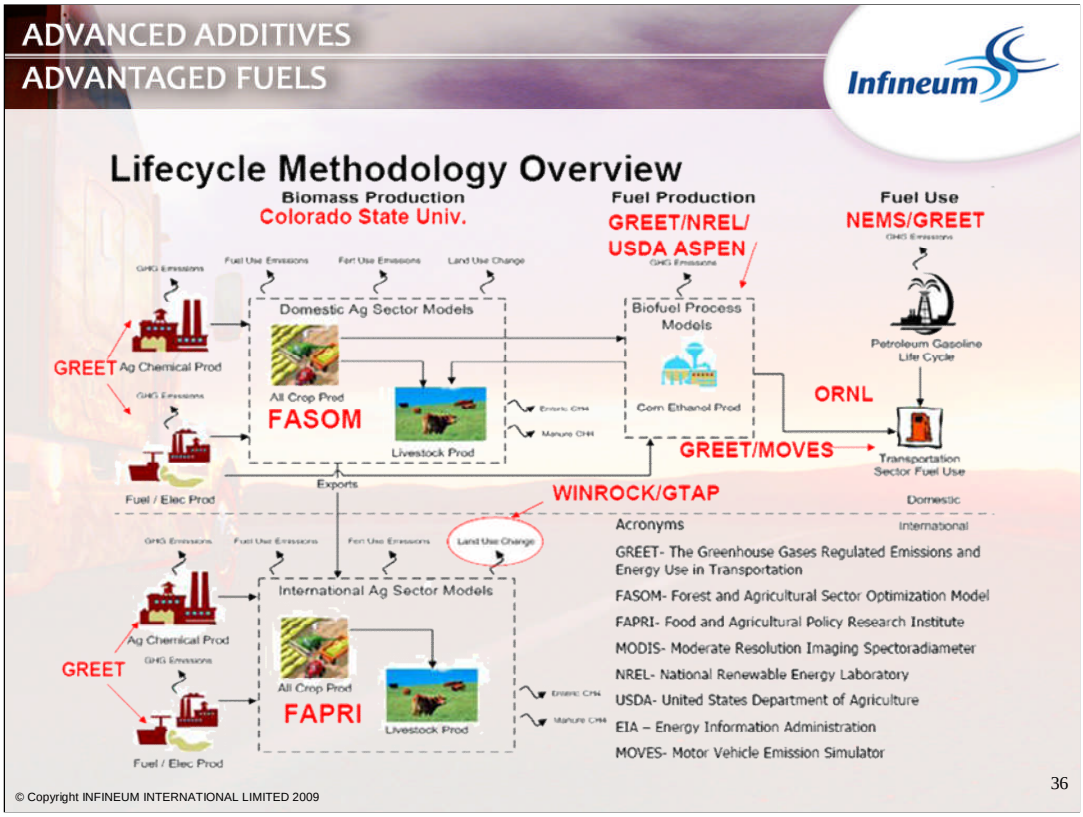
•Conventional @ 20% less GHG - 15 billion gallons by 2022

•Advanced and biomass based @ 50% less GHG – 4 billion gallons by 2022

•Biomass-based diesel includes both FAME and non-ester renewable diesel @ 50% less GHG – 1 billion gallons by 2012 with additional volume requirement at discretion of administrator

•Cellulosic @ 60% less GHG – 20 billion by 2022

Cellulosic biofuel is expected to be the biggest contributor to RFS-2 volume increases.



Lifecycle analysis compares full seed-to-wheels GHG contribution of renewable fuel vs. wells-to-wheels for petroleum.

This slide illustrates how complex Lifecycle Analysis is and how many opportunities there are to debate importance and/or inclusion of a factor in the total analysis. The EPA held a 2 day workshop on this methodology alone in June of this year.

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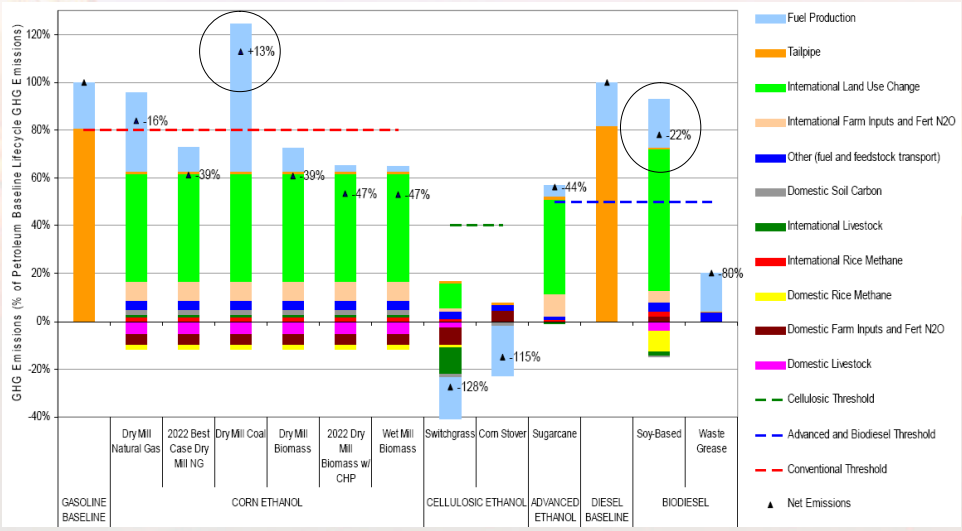
Biofuel Lifecycle GHG Results

Current renewables don't meet thresholds but will be grandfathered



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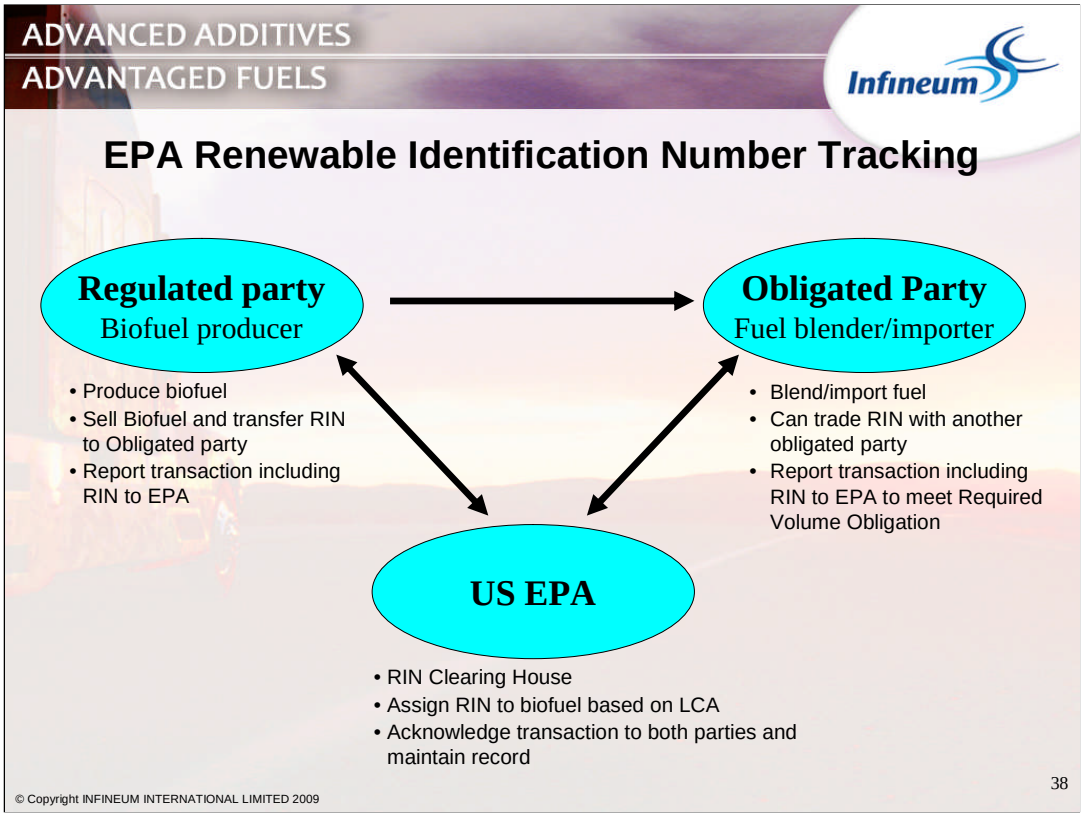
Here are the results of some LCAs.

Note corn ethanol, depending on production process, in some cases is worse than gasoline. Soy biodiesel shows reduction, but it doesn't meet the threshold required to meet the advanced biofuels standard.

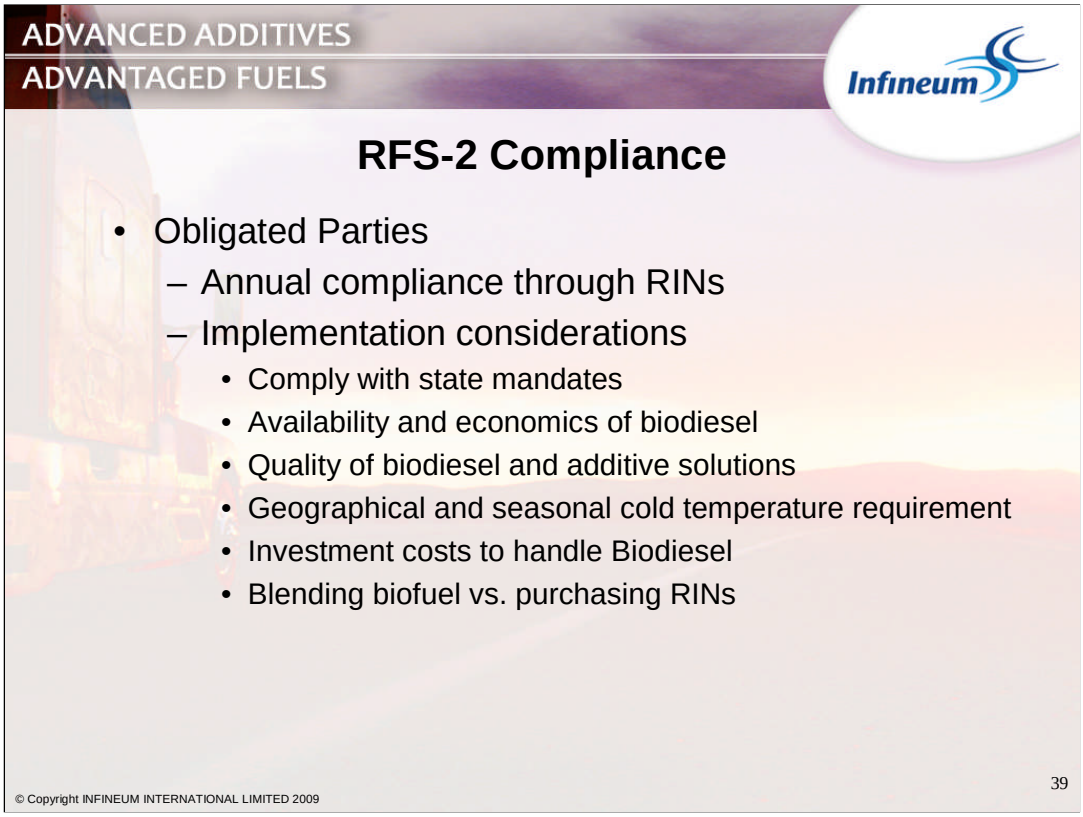
Despite the fact that some traditional biofuels don't meet the GHG reduction standards, current capacity will be grandfathered into RFS-2 volumes. The exact volumes and details of grandfathering are yet to be finalized.



Insuring compliance with the regulation is equally as complex as determining the GHG reduction associated. The US EPA has a credit system called Renewable Identification Numbers (RINs) to identify both the fuel class and volume. Under RFS-1, there was no central system for tracking and verifying RINs, and this made ensuring compliance difficult.

In RFS-2 the EPA will act as a clearinghouse for RINs. Obligated parties (i.e. Oil Companies) have the major compliance burden while regulated parties have responsibility for accurate reporting.

This slide shows EPAs plan for tracking RINs under RFS-2.



Obligated parties demonstrate annual compliance thru this RIN system. Due to extension of the comment period on the Notice of Proposed Rulemaking, we expect full compliance in 2011. However, EPA may still address 2010 compliance separately.

RFS-2 volume for Biomass-based diesel averages to be 0.71% at corporate level. This gives each obligated party flexibility for implementation and compliance. Several factors will be considered for optimal solution. We expect obligated parties to limit use of biofuel to minimum.

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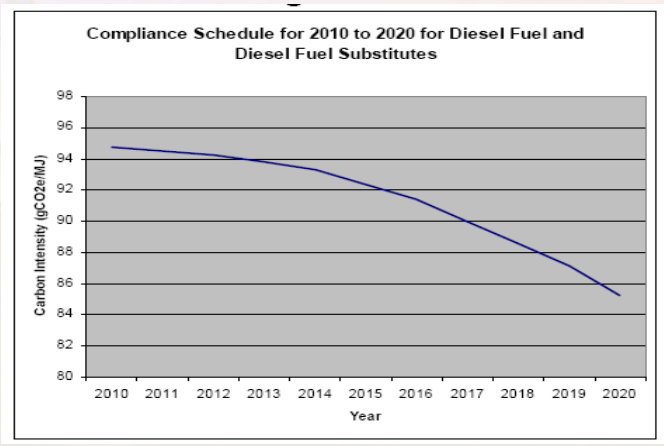
California Air Resources Board (CARB) Low Carbon Fuel Standard (LCFS)



40

Not to be out done, CARB issued its own LCFS this spring. CARB requires a carbon intensity reduction over a ten year period from its obligated parties vs. 2010 petroleum baseline. They envision compliance thru biofuels usage and carbon credit trading within CA.

Due to different methodologies used, EPA RFS-2 and CARB LCFS may result in use of different biofuel feedstocks.

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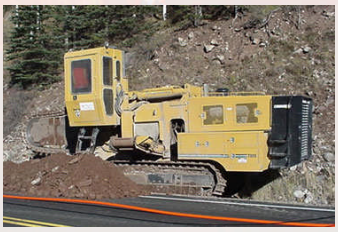
Non-Road

- Non-Road Ultra Low Sulfur Diesel (ULSD) in 2010
- Additives
  - Unlike on-road, the Clean Air Act does not currently provide statutory authority for the EPA to require additives used in non-road diesel fuel to be substantially similar.
  - Allows ash forming additives in non-road fuel.
  - Impact on exhaust aftertreatment



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Non-road diesel will have to meet 15 ppm S limit next year.

EPA has no statutory authority to control use of ash forming additives for non-road application. This has potential impact on Diesel Particulate Filter and perhaps on NOx control.

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Marine Fuel - EPA

- Emission Control Area 200 mile limit
  - 2010-2012
    - 1% S Fuel
  - 2015
    - SOx Reductions
      - 1000 ppm S fuel
      - Scrubber
  - 2016
    - NOx Reductions

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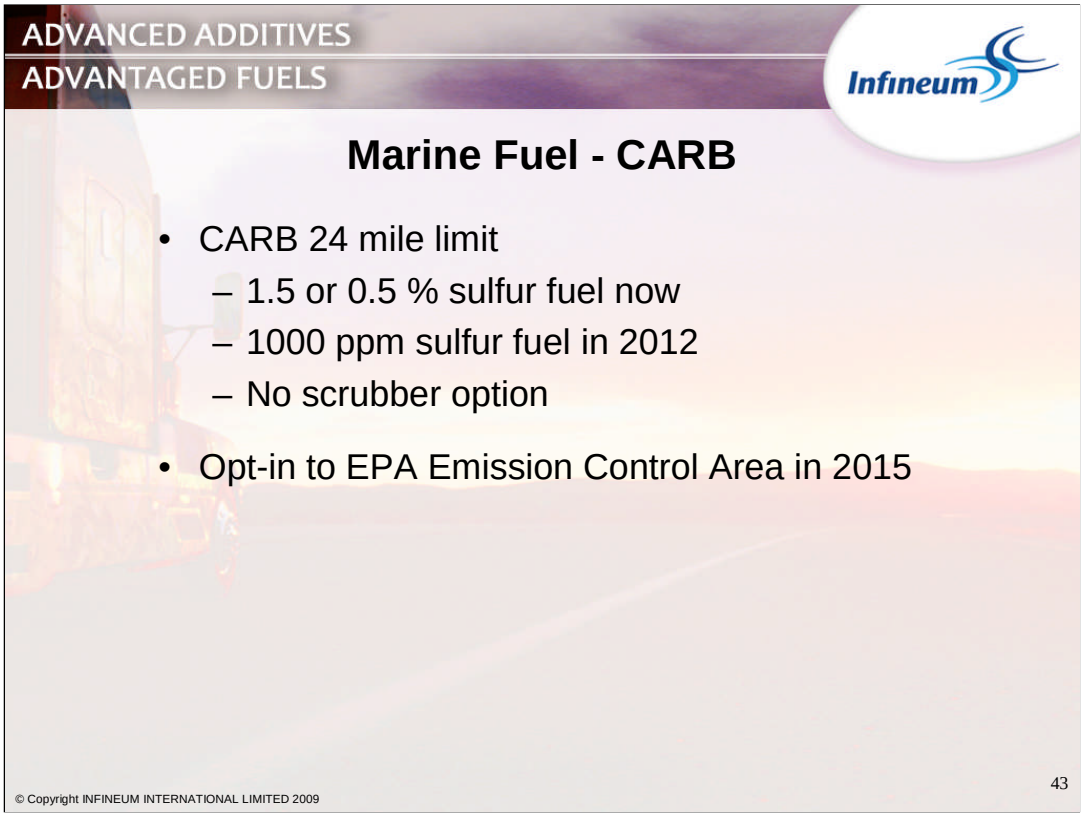
Currently marine fuel has a 4.5% S limit. This spring, the US and Canada agreed to set up a marine ECA and petitioned the International Marine Organization under MARPOL Annex VI. A 200 mile limit for SOx reduction is to be in place with following limits:

•Once an ECA petition is granted a 1% S limit is imposed on fuels. It is expected that the petition will be granted by August 2012.

•Then a 0.1% S limit will be instituted in 2015.

•NOx reductions will be required in 2016.



CARB promulgated a regulation at a 24 mile limit in spring 2009. Because scrubber is not an option, ship operators will need to install a separate fuel tank for CARB. This may have an impact on where shipments are off-loaded.

CARB may opt in to EPA ECA in 2015.

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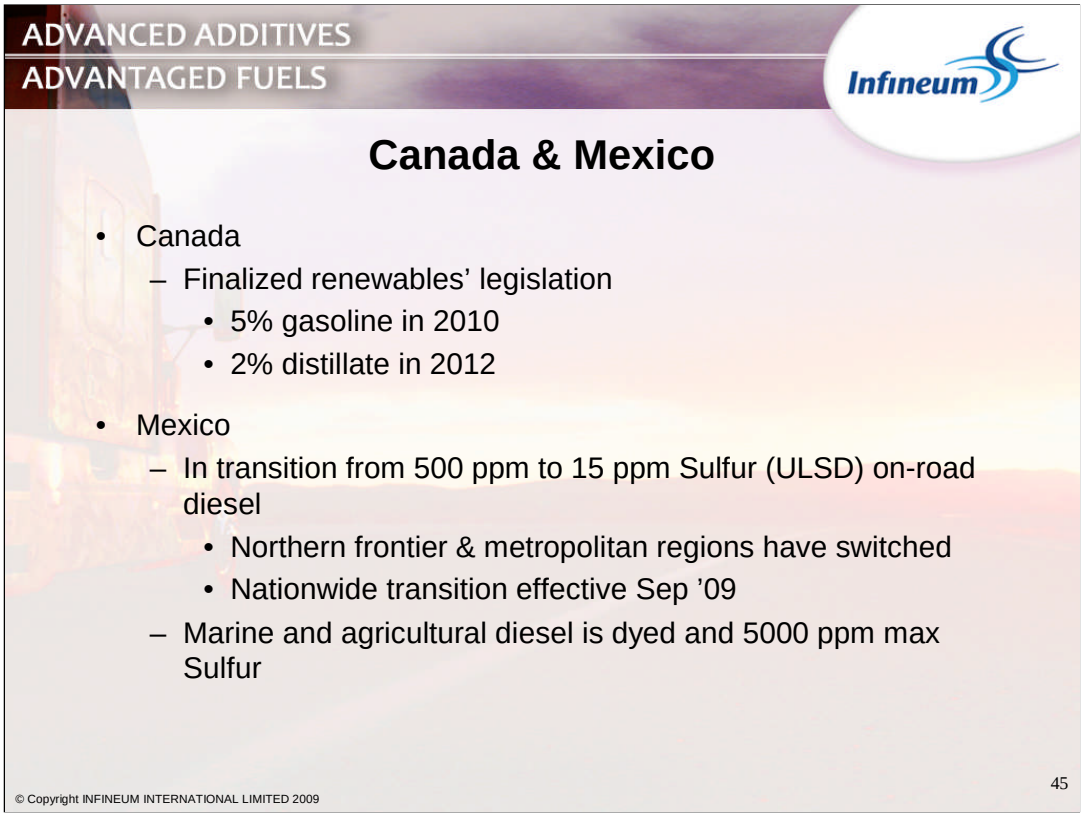
Heating Oil

- Mid-Atlantic/Northeast Visibility Union
  - Heating oil sulfur to 15 ppm in ten years

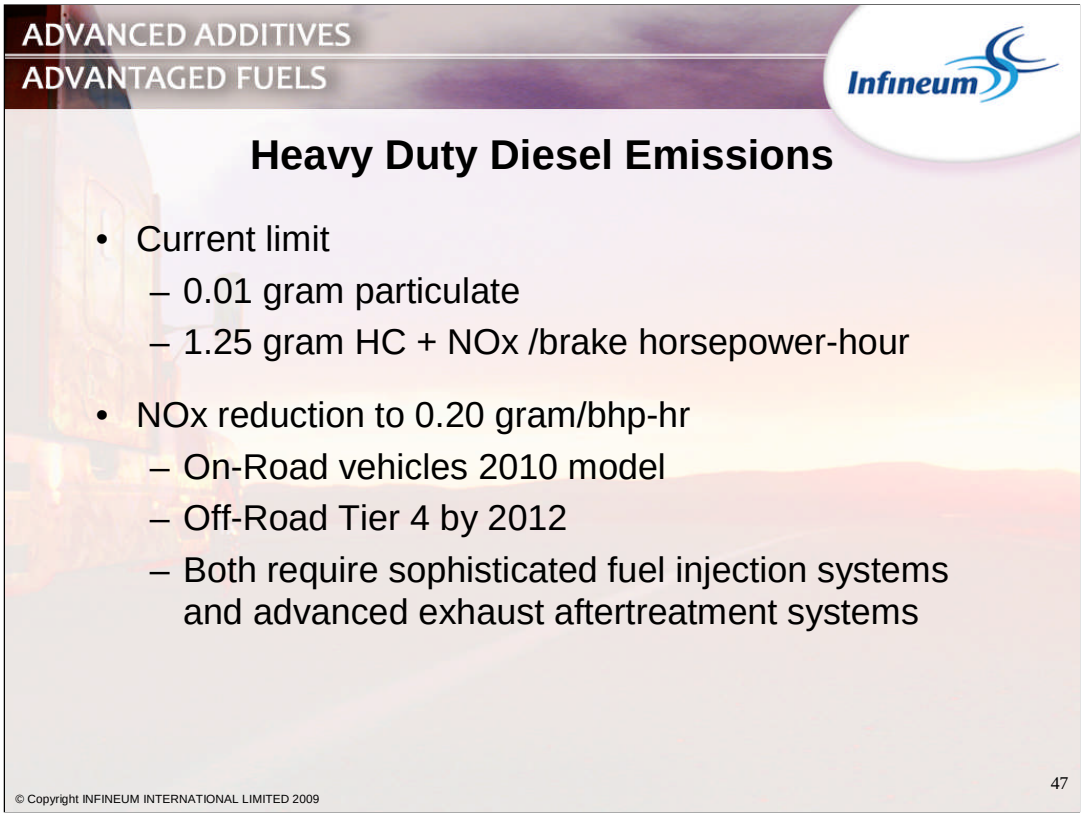
The Mid-Atlantic/NVU got producers to agree to gradual S reductions from unregulated to 15 ppm in heating oil in ten years.



Canada passed legislation for its own renewables.

Mexico has been transitioning to 15 ppm on-road ULSD over the past two years. It was implemented in the north in February 2007, metro areas in February 2009 with the rest of the country to follow in September 2009.

Now lets move on to Emissions and hardware.



HDD tailpipe emissions will be reduced to maximum 0.20 gm NOx while the current particulate matter limit is retained. This change will be required for on-road in 2010 and non-road in 2012.

To meet these emissions targets, sophisticated fuel injection and complex exhaust aftetreatment systems are needed.

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High Pressure Common Rail Injectors

- Engine out emissions control
  - Heavy duty and light duty moving to high pressure common rail injectors
    - Provides combustion control
- Reports of internal injector deposits have recently surfaced
  - Deposits are on internal actuators and control surfaces

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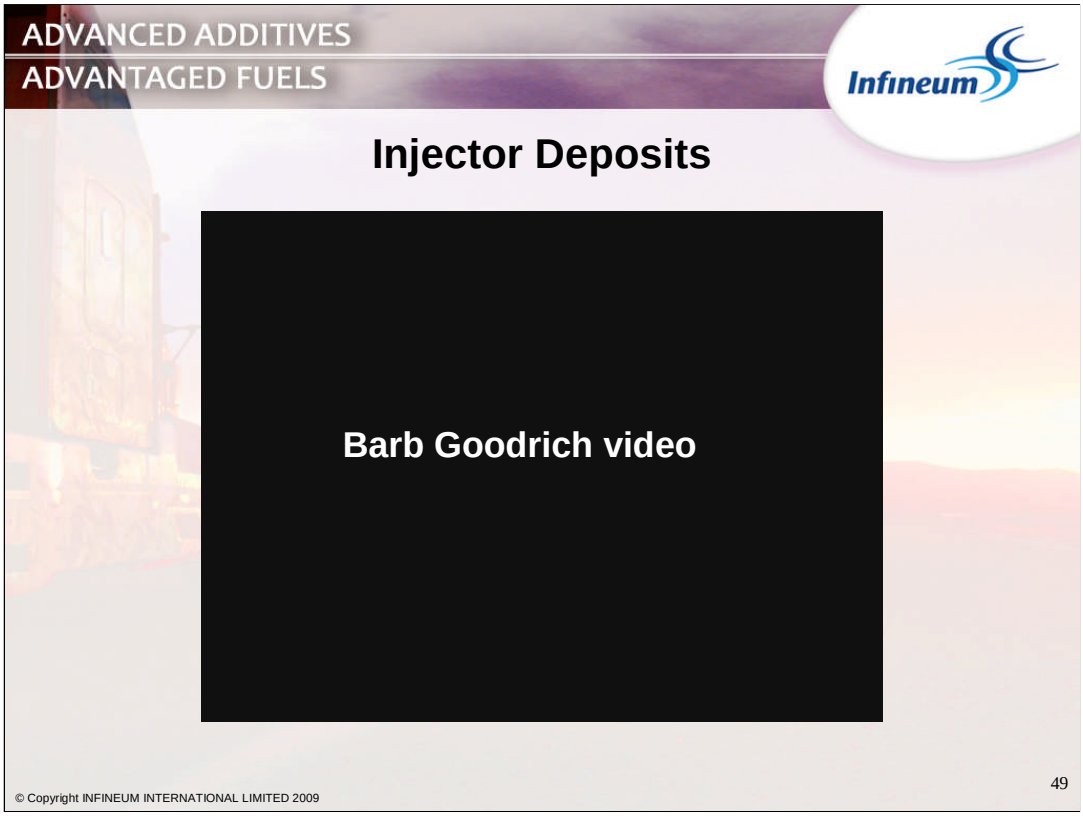
To meet the emissions requirements, HPCR systems are needed.

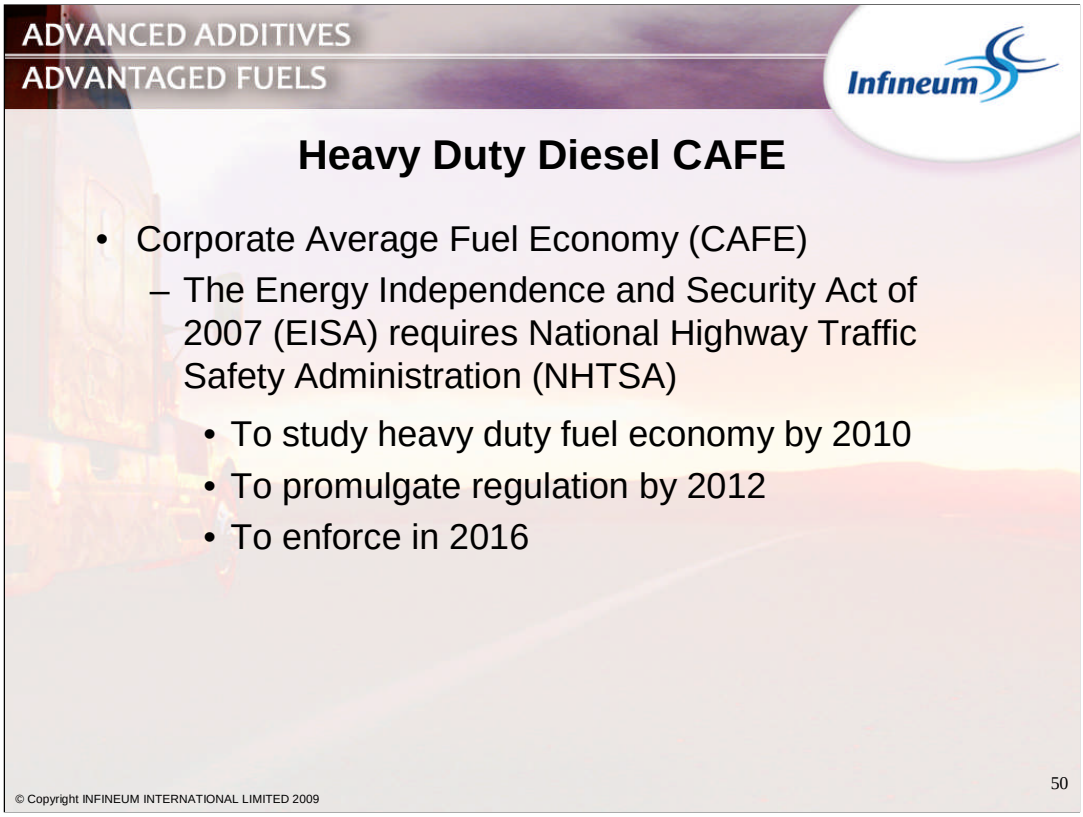
HPCR systems provide the combustion control in Compression Ignition engines to achieve maximum engine out emissions control. This precision has made the equipment more sensitive. There have been a number of recent reports of deposits on internal actuator and control surfaces. This issue is receiving wide attention throughout industry. CRC is studying the scope and potential work toward developing test methods. Additionally, we are working on specific programs with select DFIE manufacturers.

OEMs continue to raise the issue. Cummins made a presentation at the latest ASTM meeting in June 2009. Finding solution is critical as this problem will only get bigger as more new vehicles with HPCR systems enter the fleet.



Barb Goodrich of John Deere gives an OEM perspective on injector system deposit problem.

Barb Goodrich: The problem has been primarily with the high-pressure common rail systems and we're seeing injector deposits form internally, they're not easy to remove, it tends to take a really strong solvent to remove them, and a lot of the conventional detergent dispersant-type additives that might've worked great on an L10 are not necessarily working in this application for keep-clean. Many of these ultra-low sulfur diesels do not seem to be able to stand up to the injection pressures and the conditions inside the high-pressure common rail system, and they're breaking down. This is a real concern, and it's impacting all OEMs with high-pressure common rail systems with the higher injection pressures.



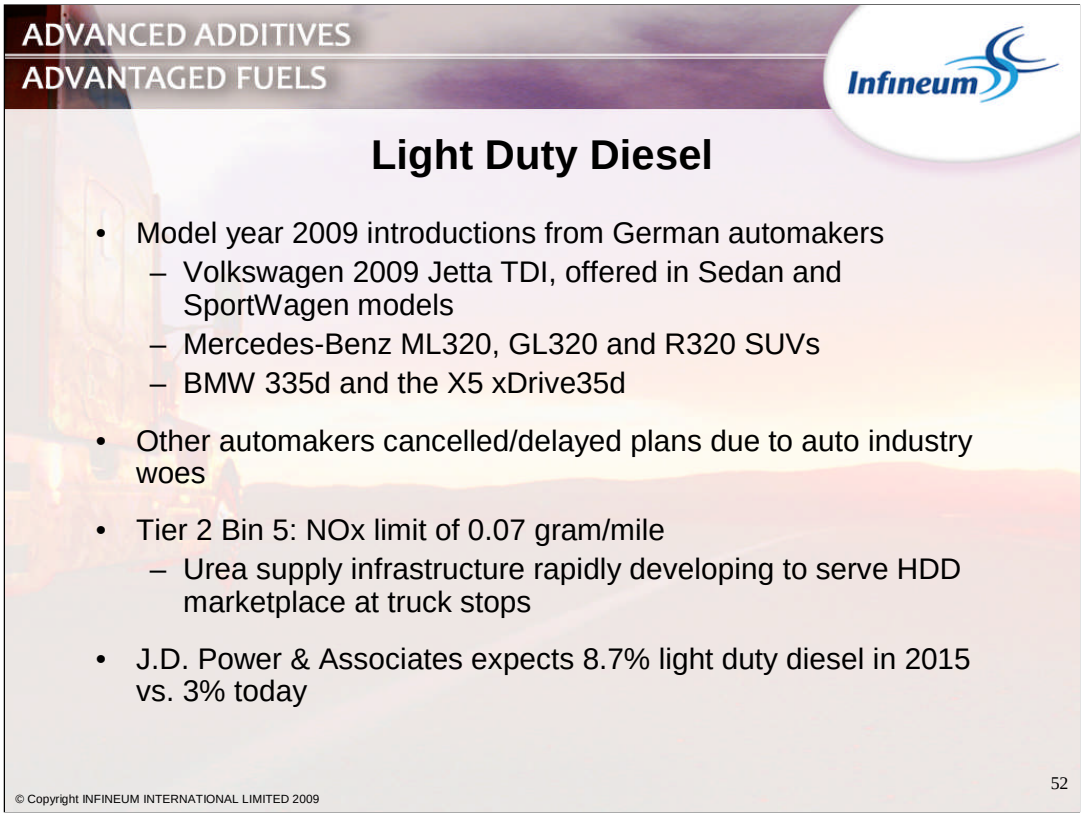
EISA requires NHTSA to promulgate CAFE regulations for HD for the first time.

NHTSA faces measurement challenges. While emission certification for LDD application is vehicle based, emission certification HDD application is system based with measuring engine system outside vehicle.

VW is very bullish on LDD. Steve Keyes of VW shares his company's view:

Steve Keyes: We've been selling diesels in the United States for over 30 years, so we feel we're the leader. We've sold about 850,000 in those 30 years, so we're the first to bring the new clean diesel technology to the United States and it is the most efficient and one of the strictest emissions standards in the world right now for diesel. It's clean, it's efficient, it's fun to drive, and on the highway will get over 40 miles to the gallon.

Steve Keyes: Well, it's interesting. If you look at some of the outside experts they're saying within a few years you could see somewhere between 12 and 15% diesel penetration, including passenger cars and trucks. We think that's a little bit conservative. In the case of our Jettas, we introduced them in August and right now about 35% of our Jetta sedans are diesel and about 60% of our Jetta sport wagons are diesel. So we're seeing a much greater interest in diesel than the independent experts are seeing or forecasting.



LD Diesel was touted in the past as a way to help meet CAFE requirements. NOx emissions were always a limiting factor. Some automakers are offering LDD while others delayed or cancelled plans due to economic woes.

Urea infrastructure is rapidly evolving to serve the 2010 Model Year HDD market. However, the expected savings over diesel fuel have yet to materialize. In fact the first major offering at TravelCenters of America has “Diesel Exhaust Fluid” costing $4.00/gal.

J.D. Powers & Associates expects 8.7% LDD sales 2015, similar to hybrids.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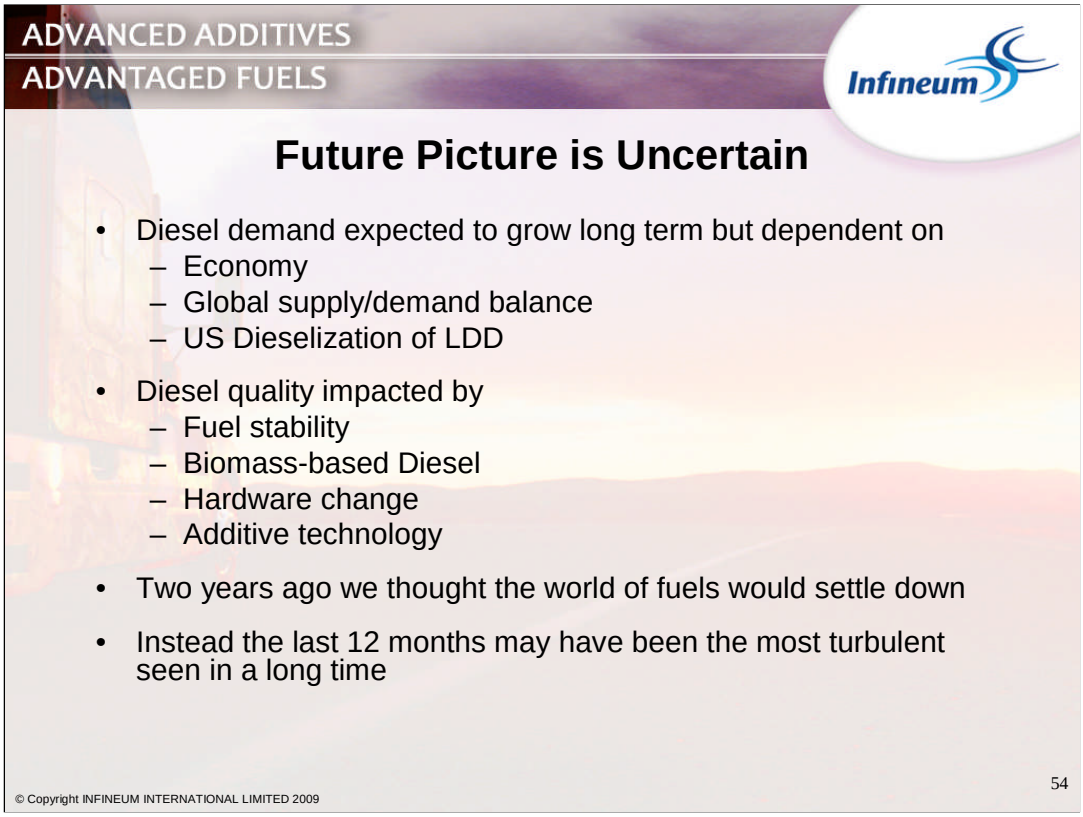
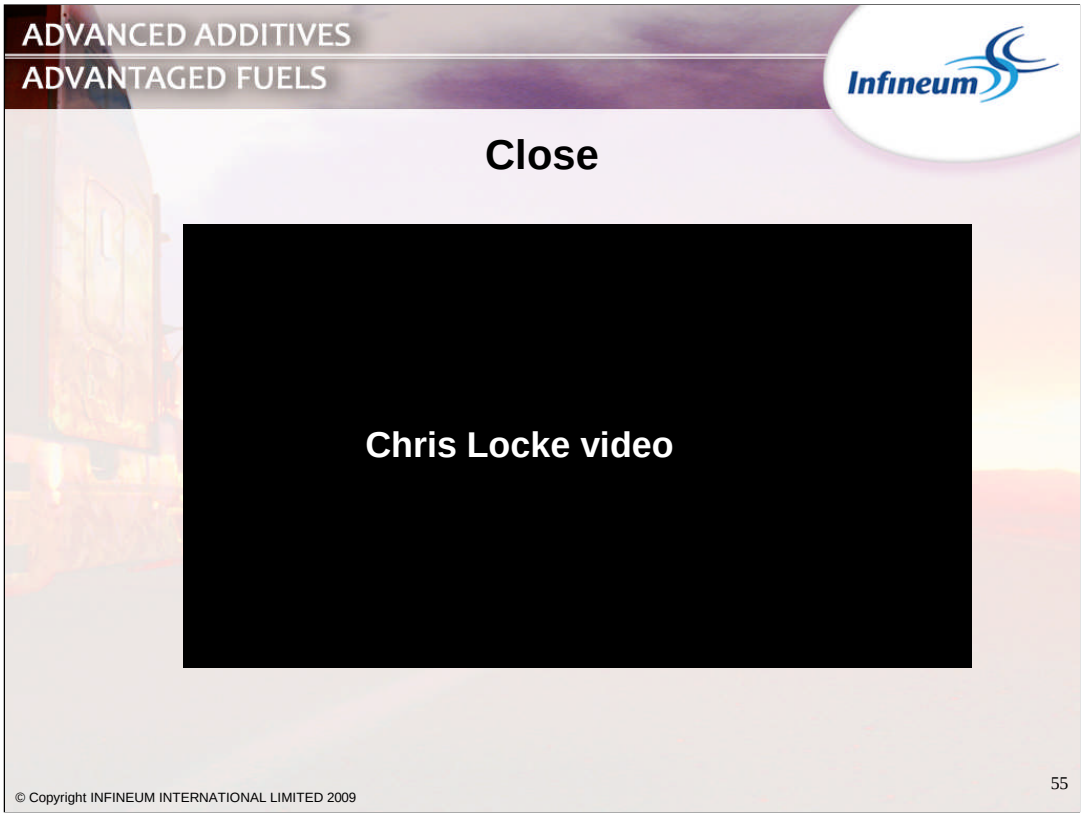


Diesel demand is expected to grow long term but there are bumps in the road…

Future diesel quality will be impacted by several factors…

The future remains uncertain and turbulent.



Chris Locke, Infineum's Global Fuels Business Manager, shares our vision of the future of diesel.

The global diesel fuel additives market today is hugely dynamic, challenging, but I also feel exciting. We are entering a period where many diverse and in some cases opposing forces are all coming to bear on our industry: environmental acceptability, energy security, emissions compliance, and enabling of new hardware, all at the time when the world chemicals industry is facing a period of unprecedented change. Biodiesel in its many forms is now a fact of life all over the world, despite ongoing questions and concerns over its long-term sustainability and indeed carbon footprint.

Enabling new hardware is also a major challenge for us, particularly the introduction of new higher-pressure and high temperature diesel injector equipment. Even the smallest amounts of deposit inside these injectors, which in many cases can be nontraditional locations, can have major impacts on the diesel spray pattern. Dealing with these deposits is going to be one of the areas of focus for the coming years.

As you have heard in the course of this presentation, there are many and diverse challenges for our fuel additives industry, but I'm convinced that with an open and collaborative mindset, we can all collectively rise together to meet those challenges. Thank you all for listening to the 2009 Infineum Fuel Additives Trends.

ADVANCED ADDITIVES
ADVANTAGED FUELS

Infineum

Thank you for attending

North American DIESEL FUEL TRENDS 2009

Questions? Comments?

EA11-003

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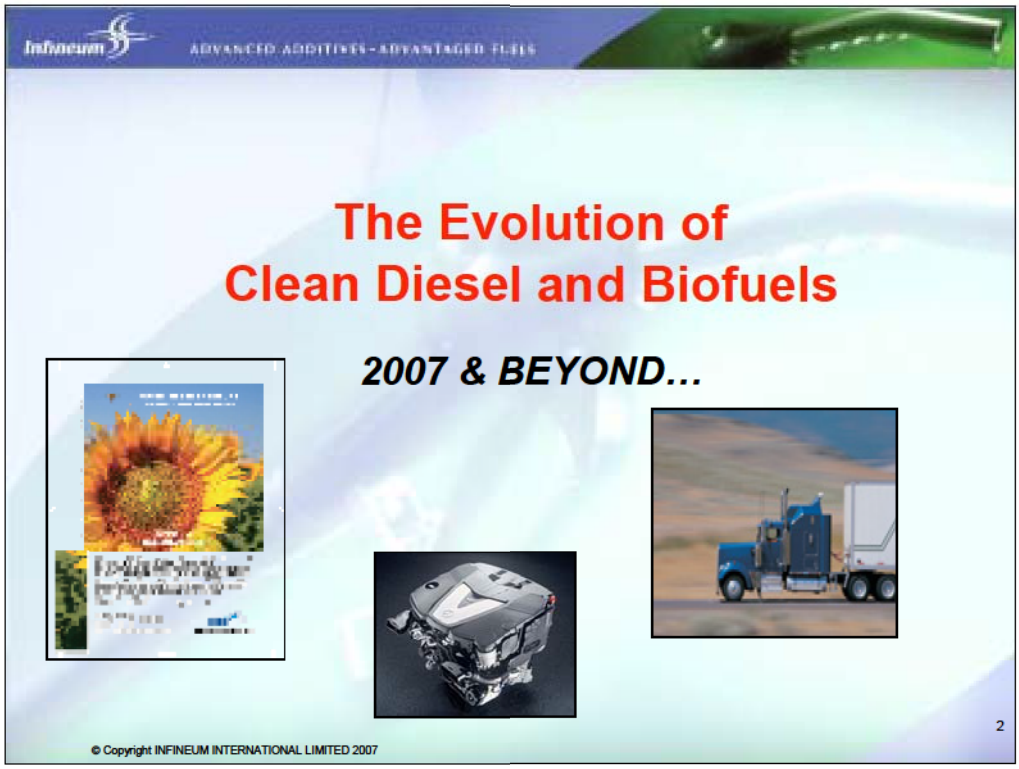
Enclosure 17

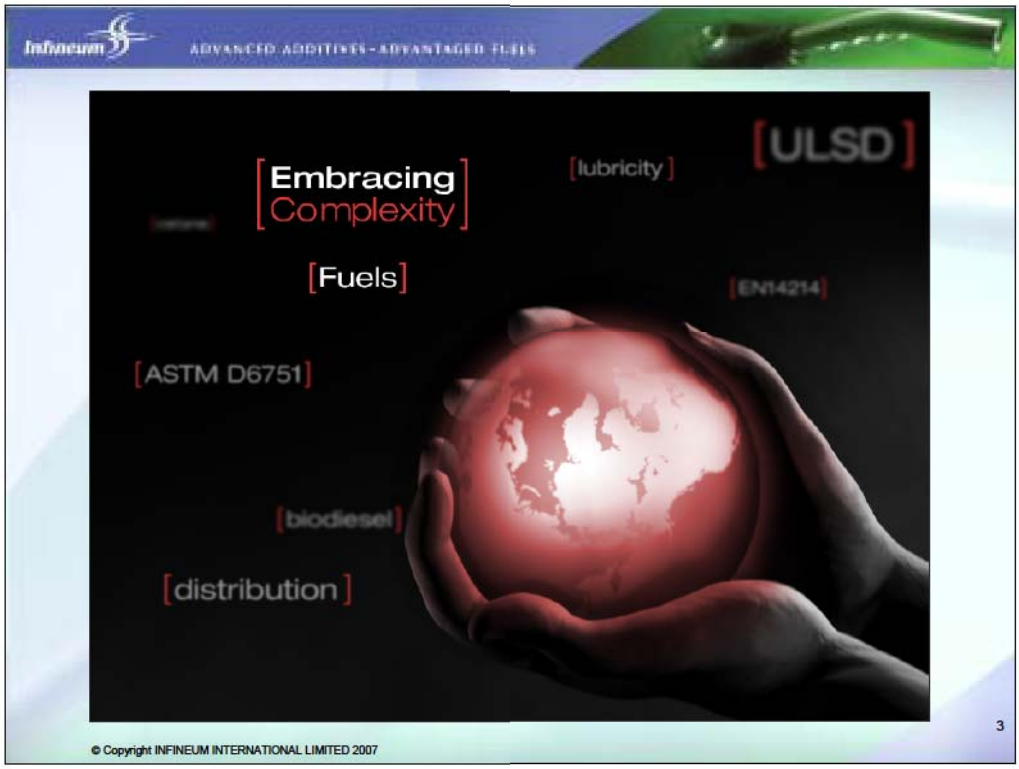
Infineum Fuel Surveys

Infineum Diesel Fuel Trends 2007

Good afternoon, and welcome to North American Diesel Fuel Trends 2007. What a dynamic year it has been! When the first edition of Infineum Diesel Fuel Trends went to press back in May 2005, the industry was mostly on the outside looking in at ultra low sulfur diesel in North America.



Today we stand before you with the benefit of some experience with ULSD as well as some insights into the rapidly evolving world of Biofuels.



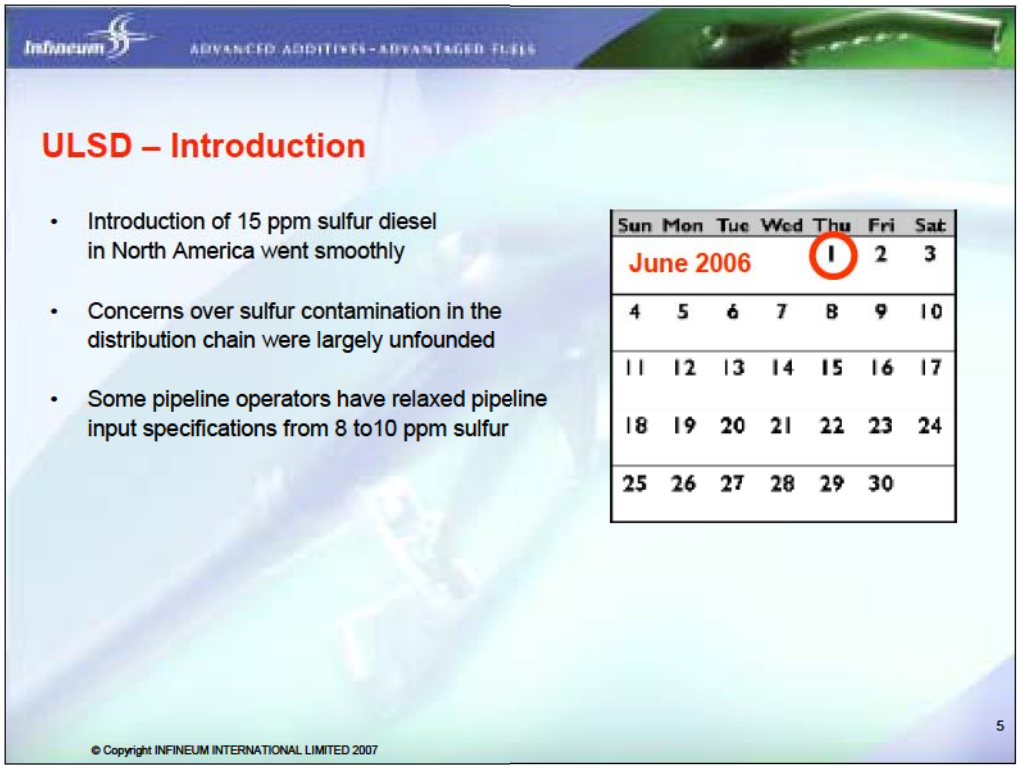
Our theme for 2007 is “Embracing Complexity” in recognition of the growing complexity of fuels, of vehicle hardware, and of specifications and regulations.

The year 2006 dawned a new era for clean diesel fuel. Ultra low sulfur diesel with 15 ppm sulfur launched with a large measure of success in markets across North America.

Ethanol and biodiesel gained new prominence with the May 2006 enactment of the Renewable Fuels Standard of the U.S. Energy Policy Act of 2005 claiming larger shares of the fuel pool.

As summarized for us recently by Hart's IFQC Biofuels Center:

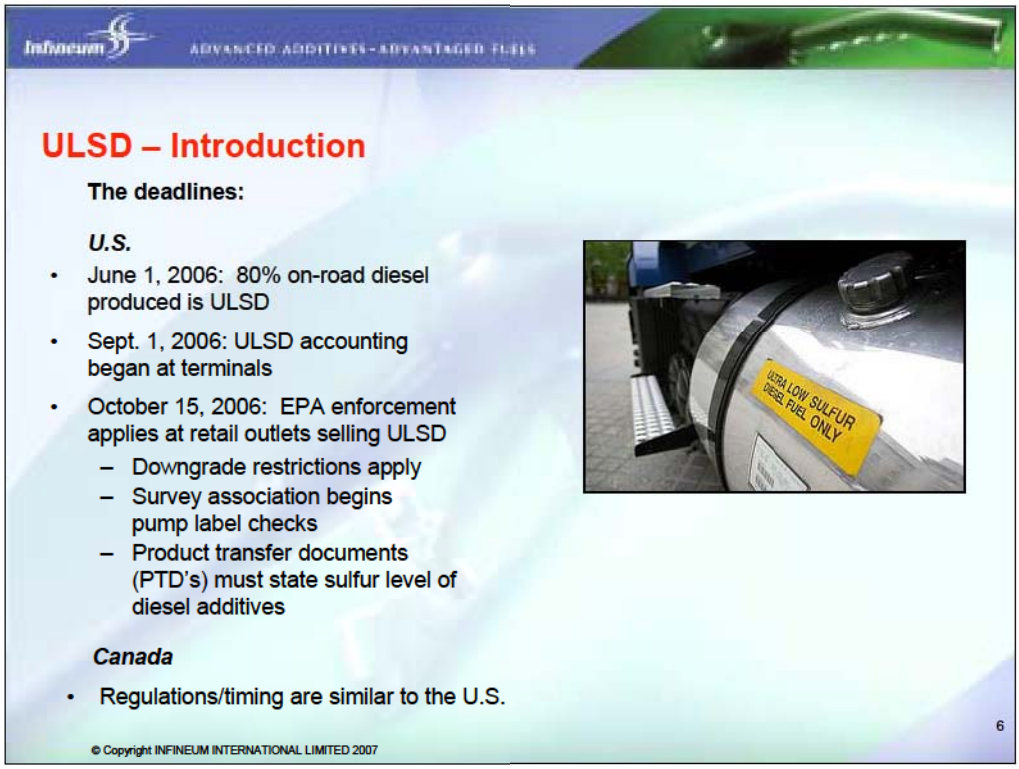
"In January 2007, the Canadian federal government issued a notice of intent to design a regulation that will require, starting in 2010, fuel producers and importers to have an average renewable fuel content of at least 5 vol% of gasoline they produce or import. The government also will require 2% renewable fuel content in diesel and heating oil 'upon successful demonstration of renewable diesel fuel use under the range of Canadian conditions." Such requirement would not be in place by 2010, but is intended to start no later than 2012."



The introduction of ULSD evoked a myriad of fears of contaminated shipments and shortages prior to its launch. Many of those concerns were allayed when most refiners opted to desulfurize their entire on-road production rather than deal with production and segregation of high and low sulfur grades.

Pipeline and terminal operators worked cooperatively to minimize potential sources of contamination.

Some pipeline operators have become confident enough in the system to relax their diesel specifications from 8 to 10 ppm sulfur which has provided some relief to the refining industry.



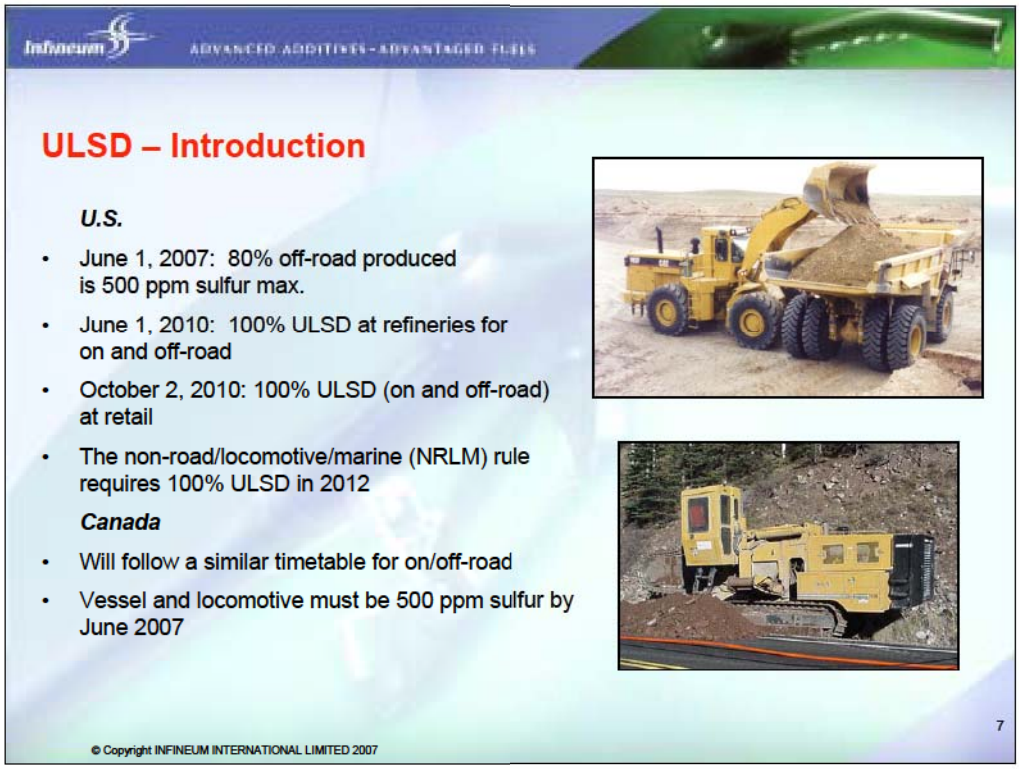
The ironclad deadlines which are forever engrained in our memories, some past, some future, include:

• June 1, 2006 when 80% of on-road diesel refinery production needed to be ULSD

• September 1, 2006 was the 15 ppm sulfur deadline at terminals followed soon after by retail outlets on October 15.

Canada's regulations and timing are similar to the U.S.

The story is far from over, however, with more deadlines on the horizon.

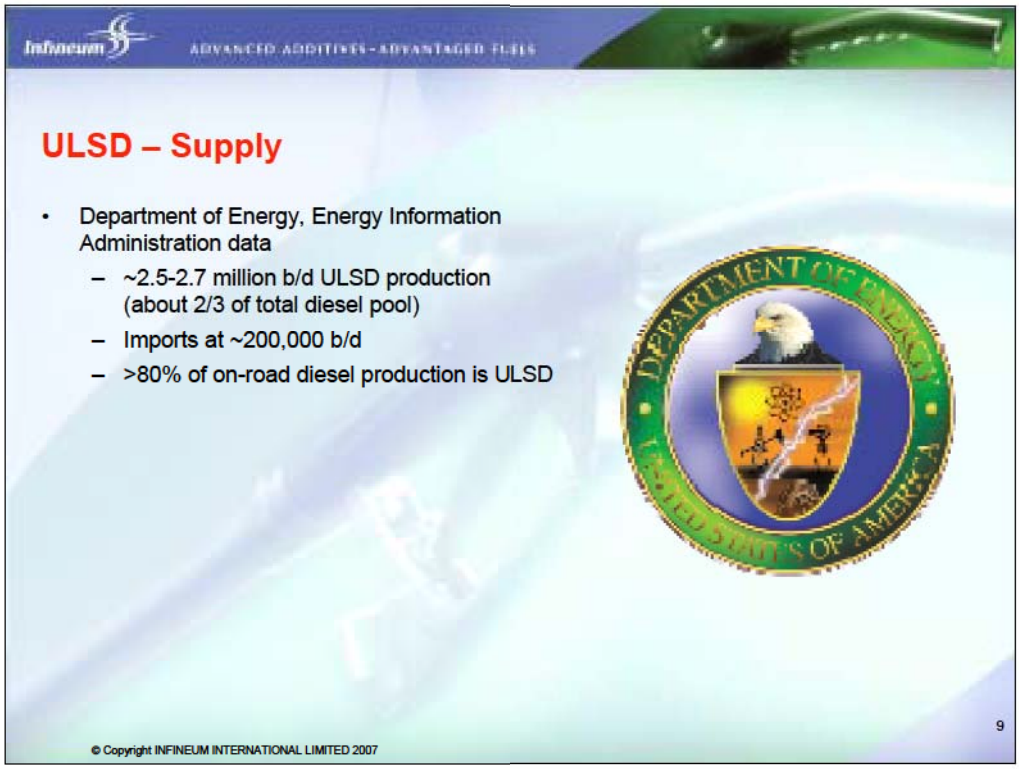


Beginning June 1, 2007, non-road production and imports are limited to 500 ppm max sulfur.

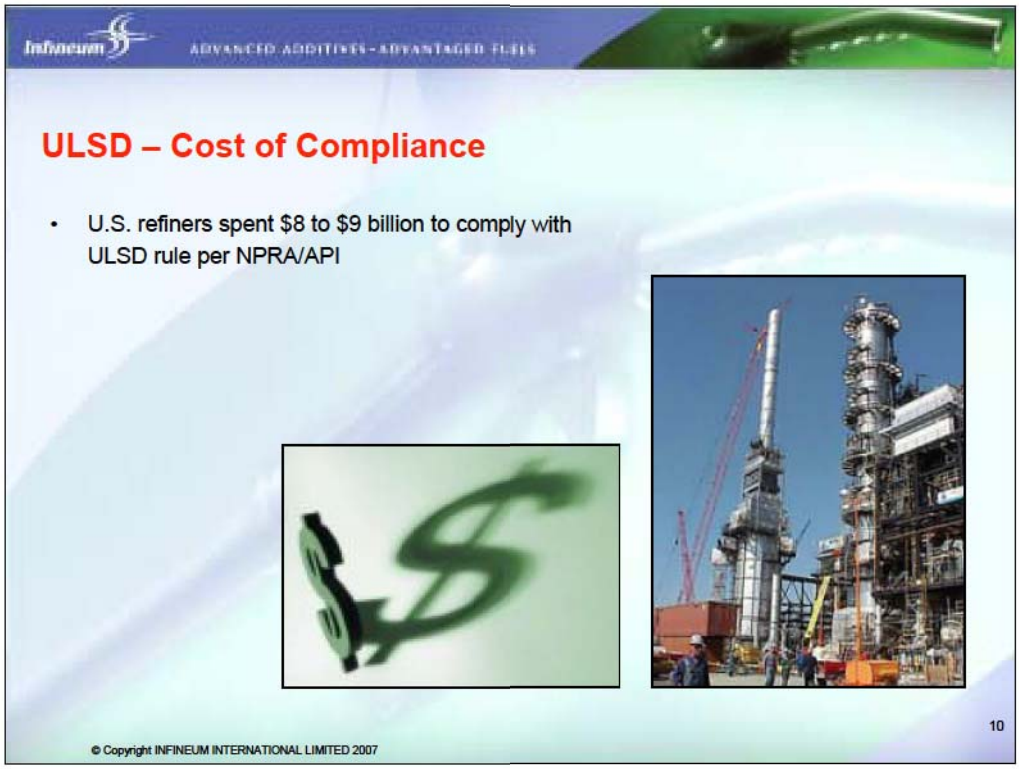
In 2010 only ULSD may be used both on and off-road. The non-road/locomotive/marine ULSD requirement is slated for 2012.

Again, Canada's regulations are similar to those of the U.S., and Canada will follow a similar timetable as outlined on this slide.

Predictions of a Y2K-like scenario were largely unfulfilled. Other than some spot outages in the Midwest and Rocky Mountain regions due to high demand and refiner allocations, government statistics indicate that ULSD supplies were plentiful in 2007, calming fears of widespread outages.

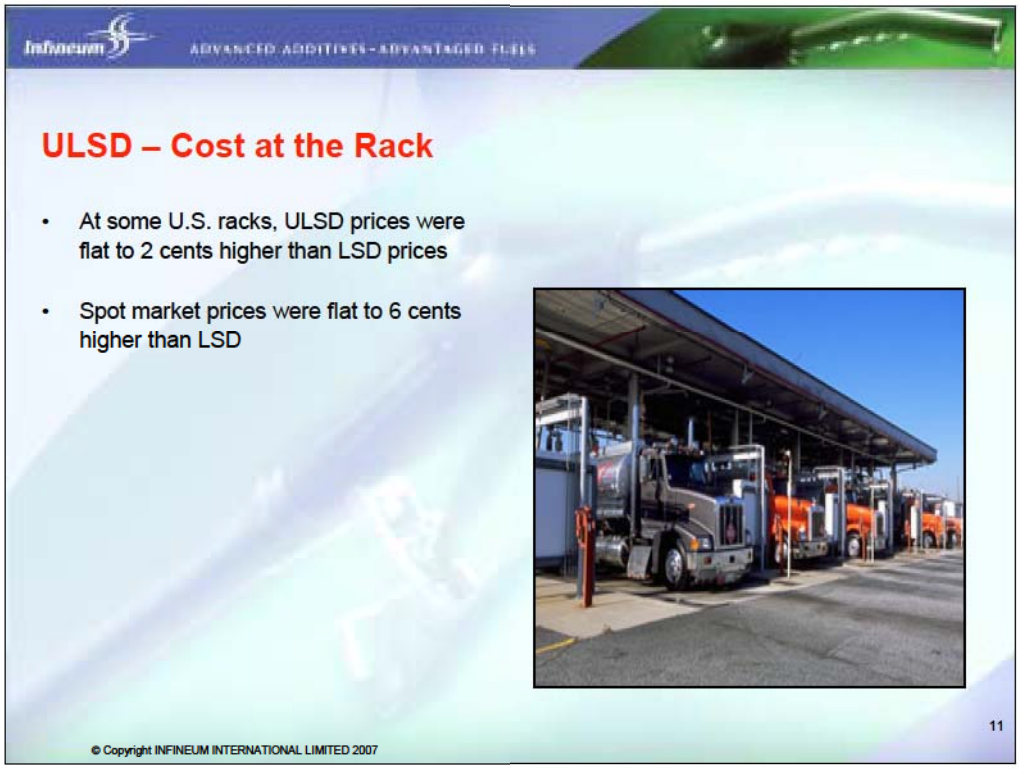


Inventory figures from the Department of Energy, Energy Information Administration show refiners making about 2.5-2.7 million barrels per day of ULSD, which represents about two-thirds of total diesel production. About 200,000 barrels per day of ULSD was imported in April 2007, and greater than 80% percent of on-road diesel production is now reported to be ULSD.



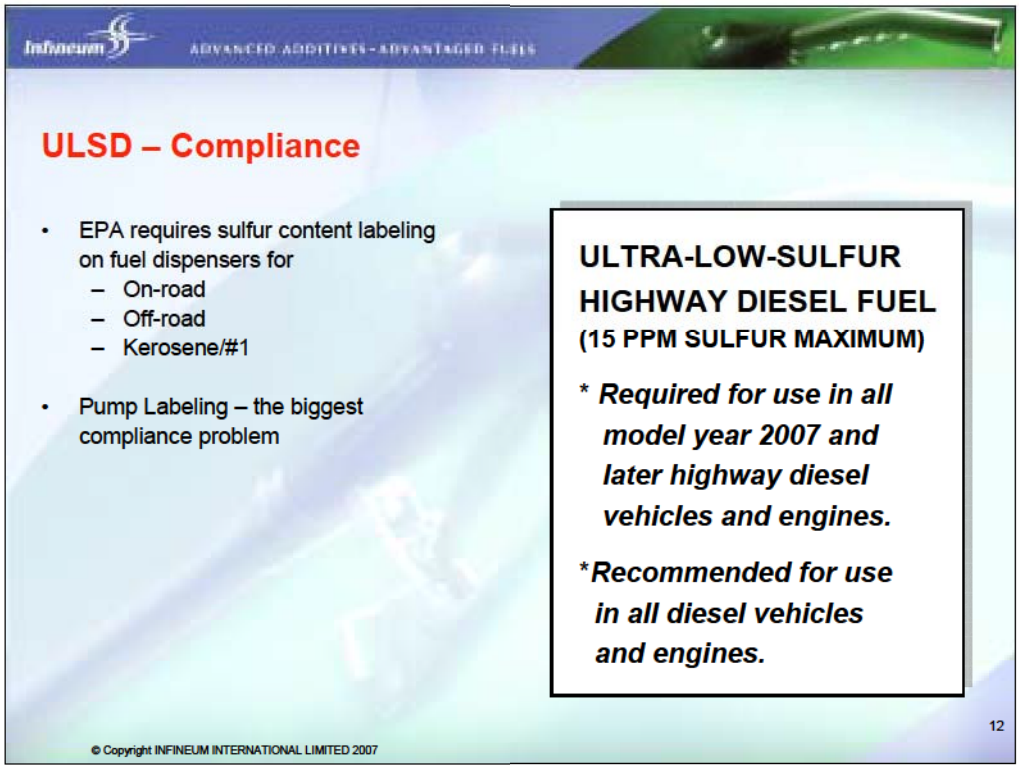
What did ULSD cost the industry? According to the latest surveys by refiner associations – American Petroleum Institute and National Petroleum Refiners Association – the oil industry spent 8-9 billion dollars to comply with the ULSD rule.

U.S. refinery capacity does not meet current demand for finished fuels. According to the EIA, ~10% of gasoline and ~6% of diesel fuel demand is satisfied by imports. This scenario has kept U.S. refining margins high alleviating concerns about returns on investment for clean fuel programs.



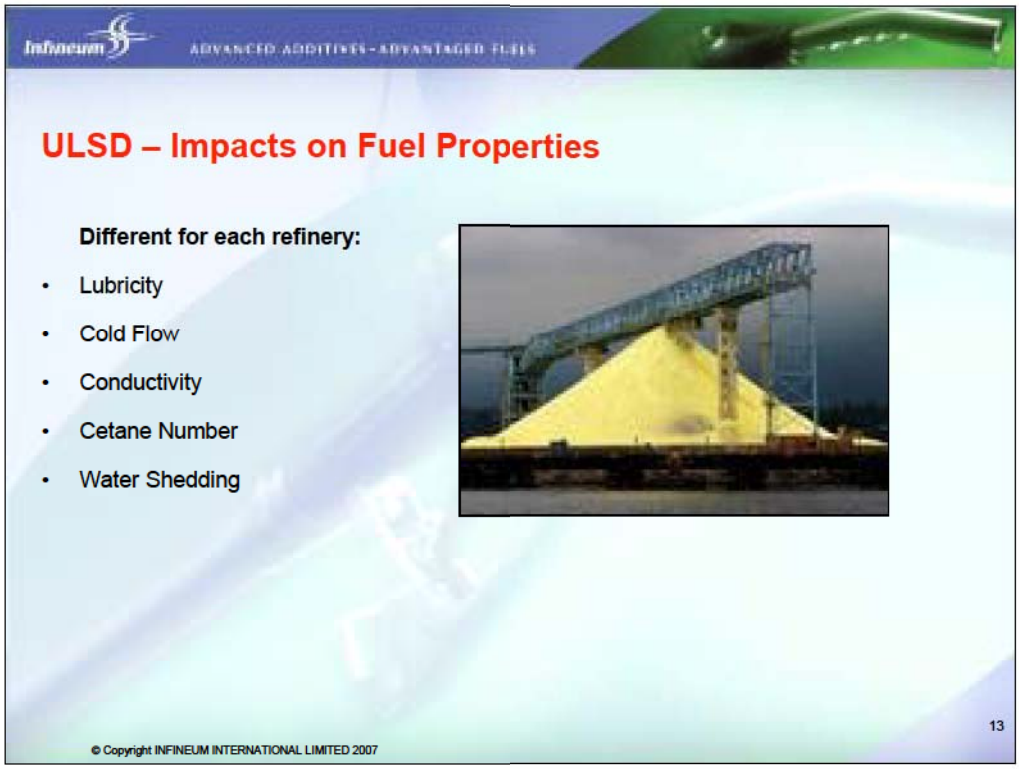
As for cost at the rack and in spot markets, at some U.S. racks, ULSD prices were flat to 2 cents higher than LSD prices.

In the cash spot markets, ULSD prices were flat to 6 cents higher than LSD prices.

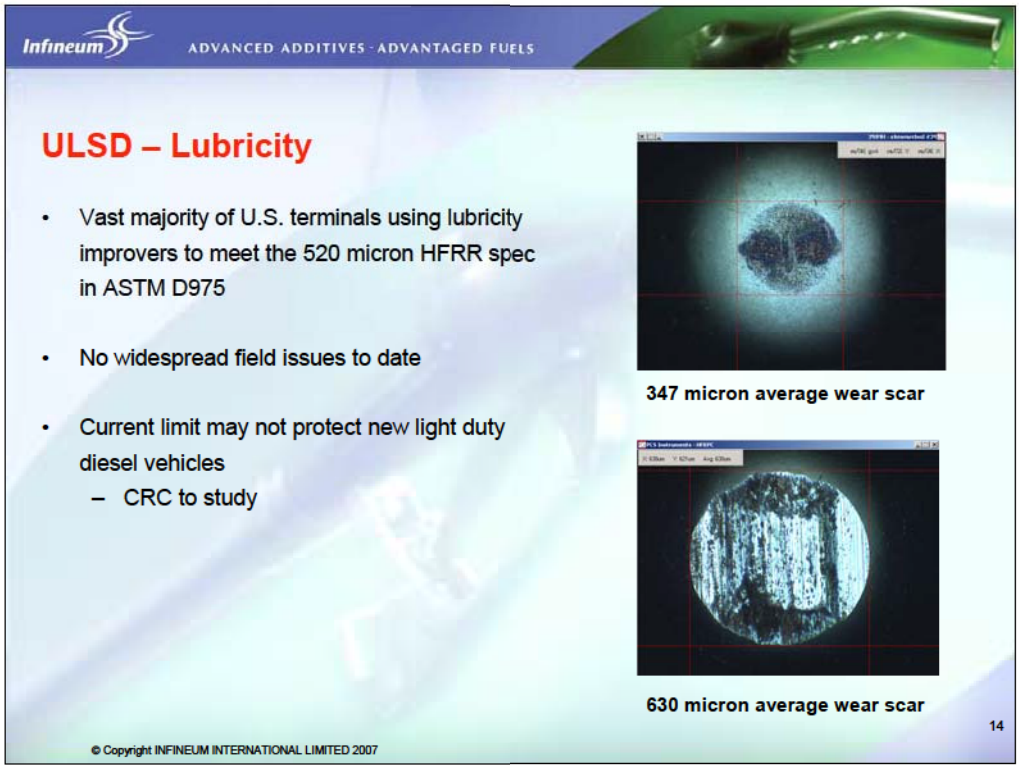


On the compliance front, EPA requires that all diesel pumps bear labels indicating sulfur levels of fuel dispensed. The rule applies to on-road and off-road diesel and kerosene. California is an exception where all diesel sold is less than 15 ppm.

The biggest compliance problem since ULSD debuted is failure by some retailers to label their pumps. EPA in December 2006 and January 2007 sent warning letters to 150 retailers. In a handful of cases, pumps that held ULSD bore LSD labels in violation of labeling laws. Cases are under investigation.



As was widely predicted in the months leading to ULSD, desulfurization did impact some critical fuel properties. The operational impact of the change to ultra low sulfur diesel has been different for each refinery or terminal, with a number of factors all having an effect.

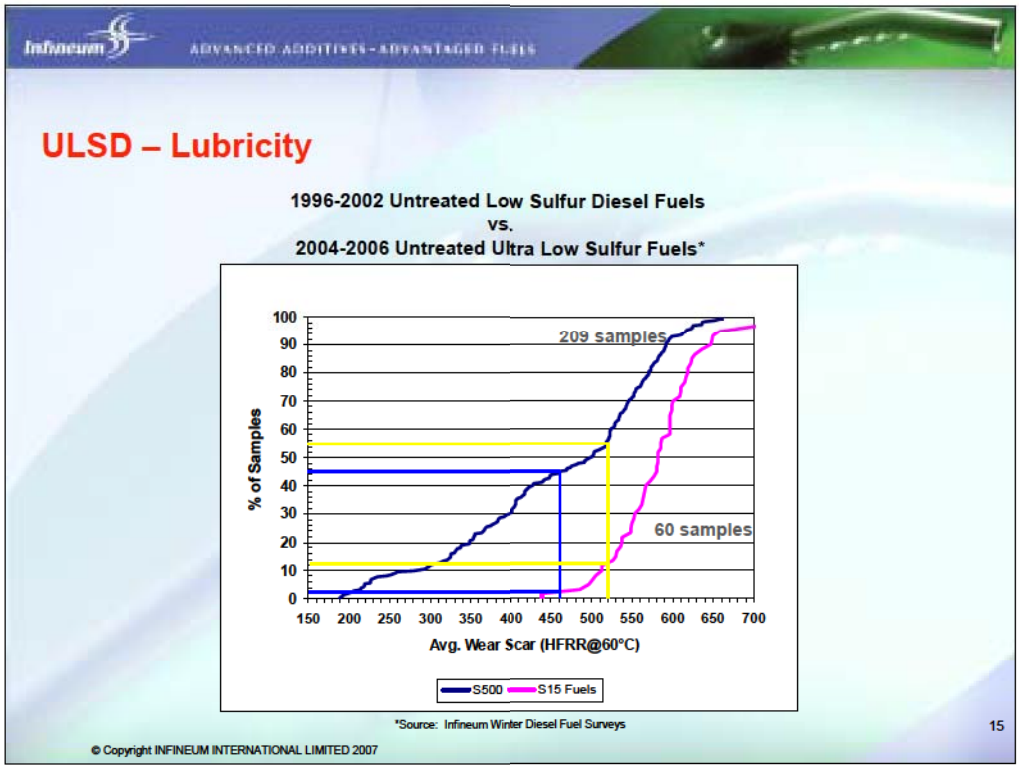


Along with the sulfur, desulfurization took with it some fuel constituents that provided natural lubricity. Winter blending with kerosene also reduces lubricity. With the challenge of installing injection facilities largely behind them, the vast majority of U.S. diesel fuel terminals are using lubricity improvers to meet the 520 maximum HFRR spec in ASTM D975.

Diesel fuels with good lubricity are essential to minimize wear in fuel injection equipment.

There have been no widespread field lubricity issues since the implementation of the lubricity specification in the U.S., although some sporadic issues have occurred.

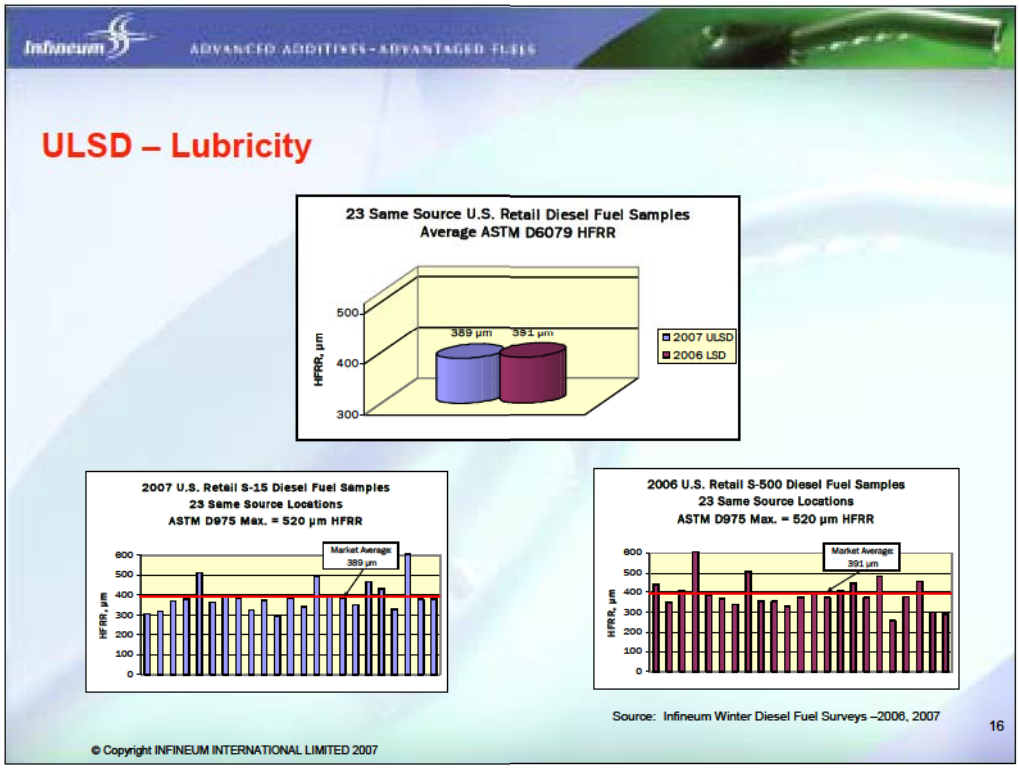
However, the Coordinating Research Council is planning to study whether the current HFRR minimum is adequate for the growing light duty diesel population in North America.



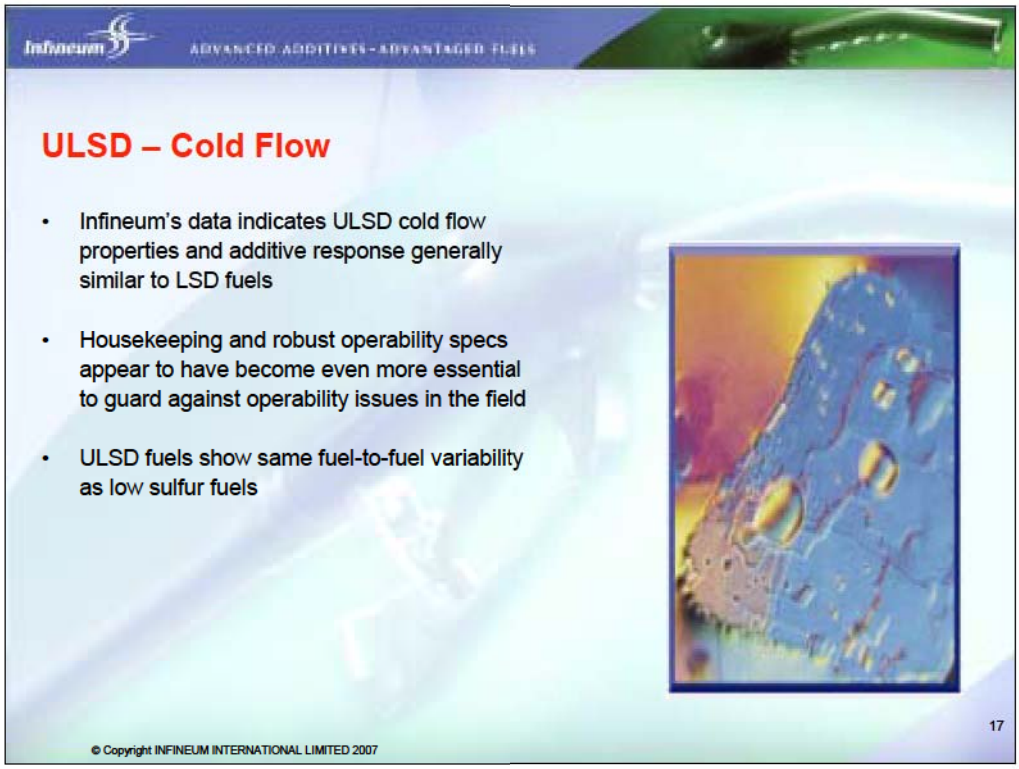
Here is a snapshot of HFRR levels in untreated 1996-2002 low sulfur diesel vs. 2004-2006 ULSD samples obtained by Infineum. Clearly there was a significant shift in the number of fuels above a 520 micron wear scar in the shift to ULSD.

This was quite evident in the market also where terminals had to significantly increase lubricity improver dosages to meet spec in these more severe fuels, some by as much as 100%.

Changes in dosage were dependent on both the fuel source and the lubricity additive chemistry employed.

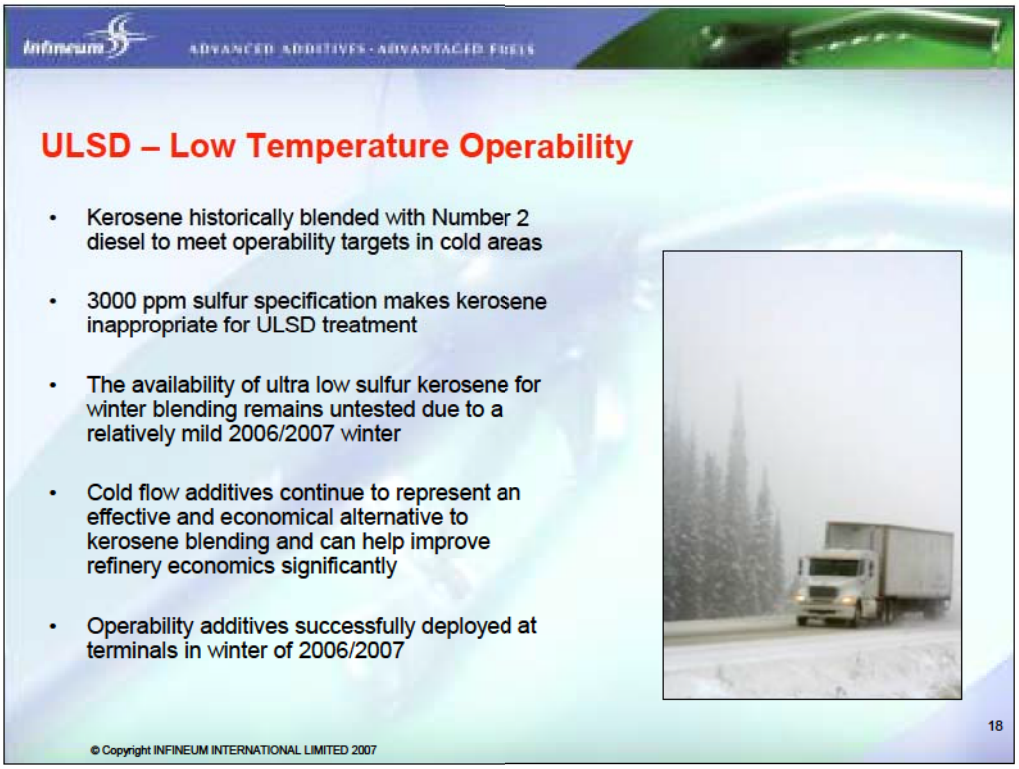


The good news is, despite the increased severity of ULSD fuels, an Infineum mini-survey of 23 winter fuels obtained at the pump in January/February 2007 shows most are well below the 520 micron minimum HFRR spec in line with samples taken at the same locations during the same period in 2006. This indicates that ULSD fuels are being treated adequately for lubricity.



Based on Infineum's experience with the first winter of ULSD, cold flow properties and additive response **on average** did not change much from LSD. The Cold Filter Plugging Point, or CFPP, of untreated ULSD is typically in the +10 to +18 Fahrenheit range in the U.S. fuels, making it a necessity to protect against fuel gelling in temperatures which in some areas can get well below 0 degrees Fahrenheit.

Although average performance did not appear to change, individual fuels did change depending on new refinery processing and blending techniques. Some required increased cold flow additive treat rates, while others saw reductions. However, in Infineum's experience, the amount of fuel-to-fuel variability appears to be no different than ULSD.

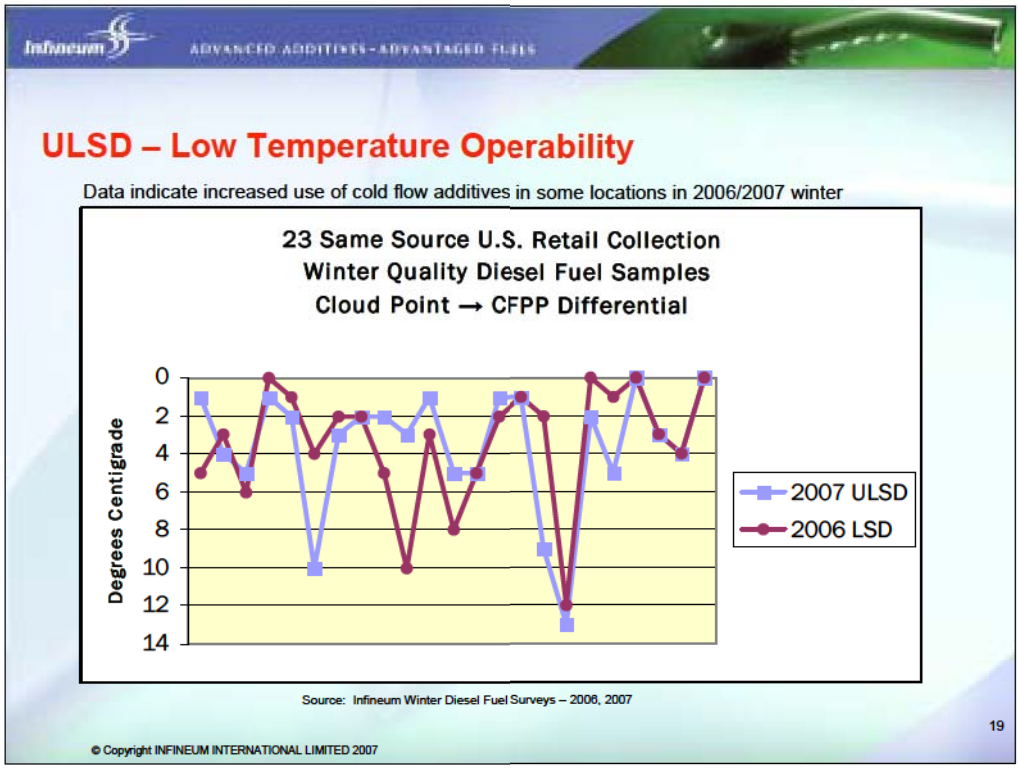


A common winter practice at terminals is to blend kerosene, or number 1 diesel, with number 2 diesel to meet operability targets in cold areas. In this ULSD era, the kerosene must also contain less than 15 ppm sulfur.

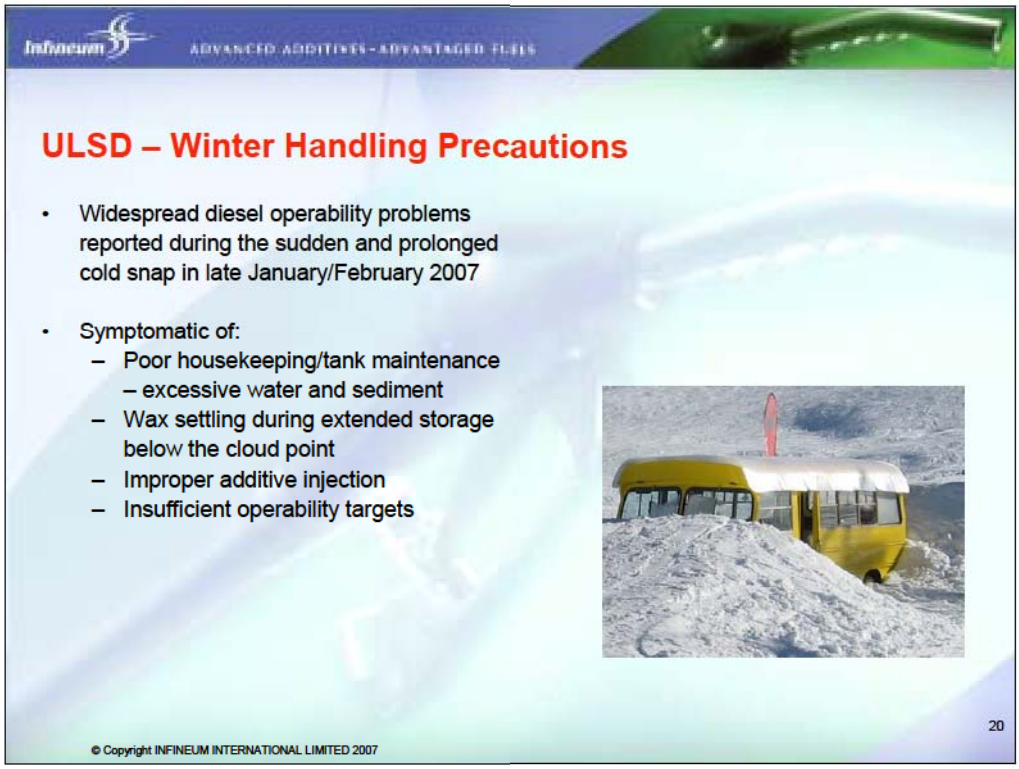
Since very few refiners planned to desulfurize their kerosene, there was widespread concern regarding the availability of ultra low sulfur kerosene for winter blending going into the first winter of ULSD. However, the comparatively mild winter in most of the country did not challenge the ULSK supply. It remains to be seen whether supplies will be sufficient in a more typical winter.

Cold flow improvers continue to be an effective and economical alternative to kerosene dilution. In the fungible U.S. pipeline system, CFPP and/or LTFT additives, both allowable alternatives for operability in ASTM D975, would generally be added at fuel terminals to meet local low temperature operability requirements.

During the winter 2006/07 season, price differentials between #1 and #2 diesel and/or concerns re availability of ULS #1, drove some fuel marketers and end-users to successfully use operability additives for the first time. This was also reflected in the results of Infineum's 2007 winter diesel fuel survey.



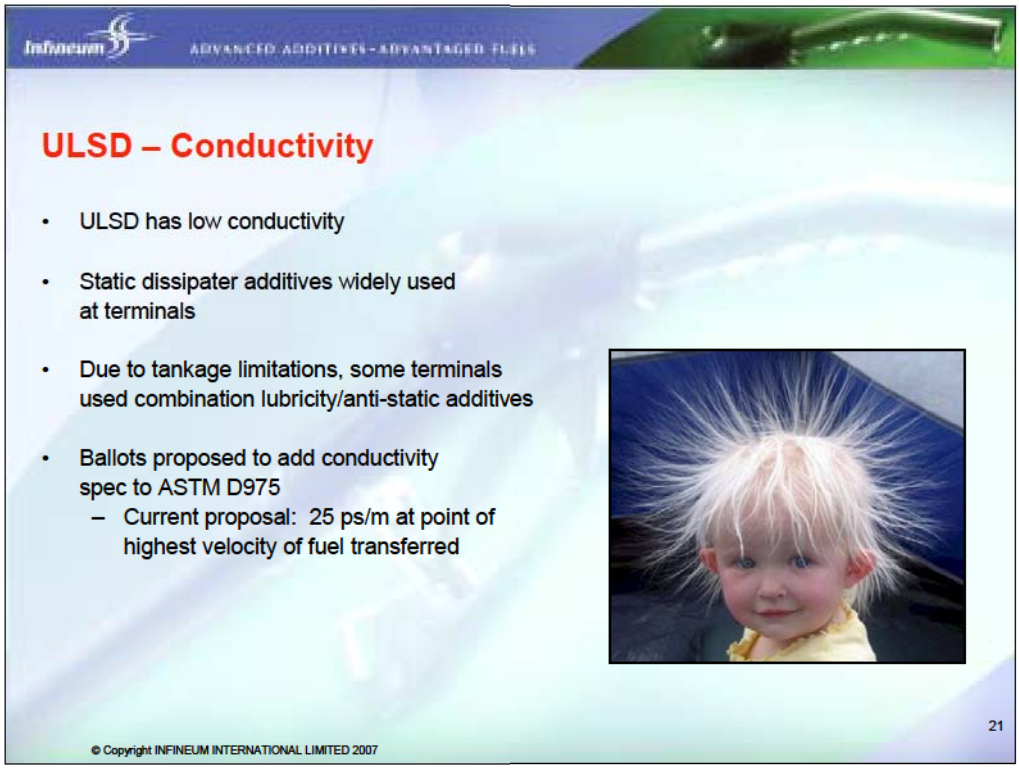
Based on Infineum's experience in the field, the differential between cloud point and cold flow filter plugging point (CFPP) is an indication of vehicle operability below the cloud point. In our survey of 2007 winter ULSD fuels vs. 2006 winter LSD fuels, there are some specific locations which showed significant differences in cloud point/CFPP differential between 2006 and 2007. This may mean that due to shortages of ultra-low sulfur kerosene, typically used to depress cloud point, more cold flow additives were used at these locations. Alternatively, these data may indicate fuel blenders targeted more robust levels of operability performance as a precaution in this first winter of ULSD.



The early part of the 2006/2007 winter was unusually mild. As referenced in the popular press and in Infineum's February 2007 letter to Hart's Diesel Fuel News, we are aware of several apparent instances of diesel vehicle operability problems brought on by the sudden and unusually prolonged cold snap in much of the U.S. in late January and throughout February.

The problems have been attributed by some to fuel gelling and subsequent filter plugging in the new ultra low sulfur diesel fuels, but actually problems of this nature are not new to winter diesel. While desulfurization has impacted some fuel properties, there are many factors which can contribute to cold weather operability problems. Among these are excessive water and sediment in storage tanks, wax settling in tanks during extended storage below the cloud point as is often the case with school buses which sit over the weekend, and improper mixing of cold flow additives

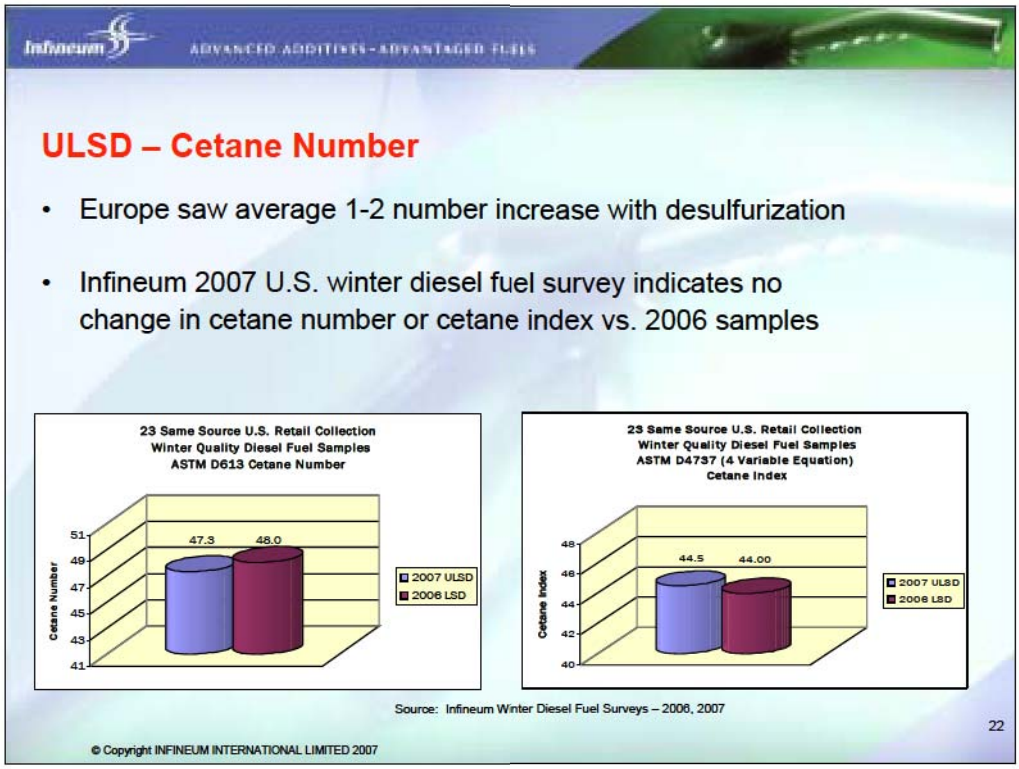
Good housekeeping in fuel storage facilities and targeting robust operability performance throughout the season to allow for sudden weather changes are essential to avoid such field issues.



ULSD's naturally low conductivity creates the possibility of a static charge build-up when diesel is pumped at fast flow rates into tanks. This is a particular concern at terminals that switchload tankers of gasoline and diesel, where enough of a static charge could cause residual fuel vapors in a tank or a truck to ignite. With the introduction of ULSD, many terminals are now using conductivity improvers as an additional safety precaution.

Due to tankage limitations, some terminals used combination lubricity/anti-stat additives. Longer term, some of these terminals may add separate tankage to optimize the lubricity and anti-stat balance.

Ballots have been proposed to add conductivity as a specification to ASTM D975. The current proposal would set the minimum at 25 pico siemens per meter at the point of highest velocity of fuel transferred.



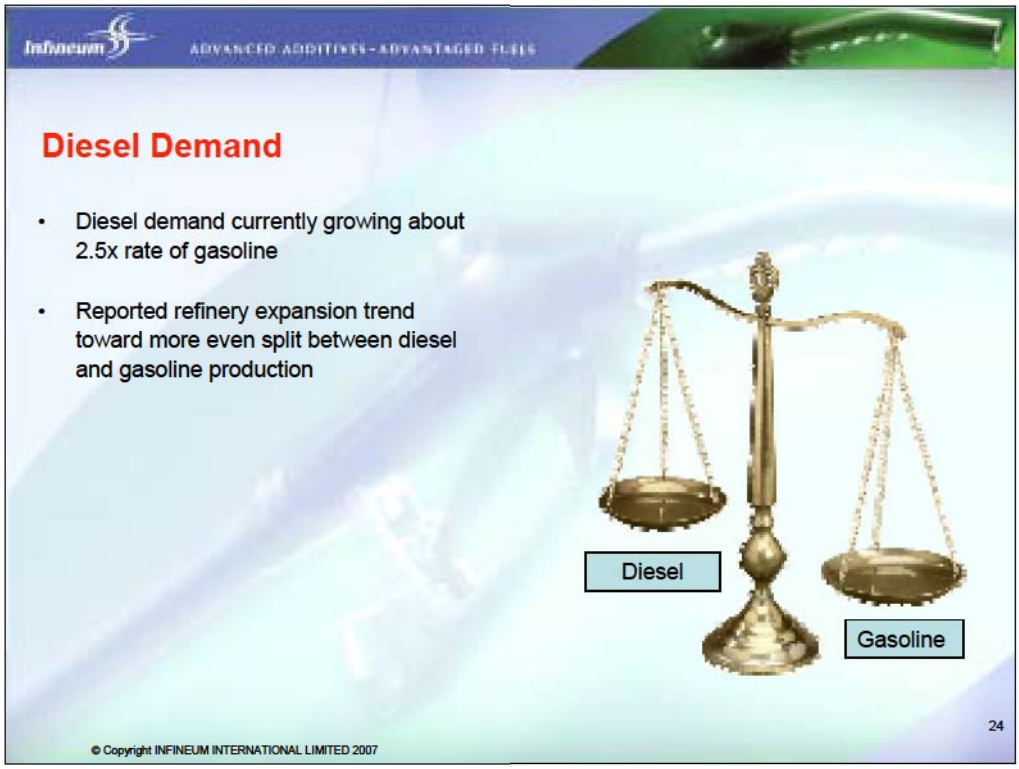
Based on Infineum's experience with the introduction of ULSD in other regions, average cetane value increases of 1 to 2 numbers were anticipated in the U.S. However, ASTM D613 data on our survey set of 23 retail samples illustrate that at the pump there has been no change in cetane number for 2007 ULSD samples versus their 2006 same source counterparts, averaging at approximately 48.

Furthermore, the ASTM D4737 cetane index calculation on the same retail samples indicates that base fuel cetane levels remained similar at a cetane index of 44.

The combination of these two sets of data also illustrates that similar levels of cetane improver are being used in ULSD as were used for LSD.

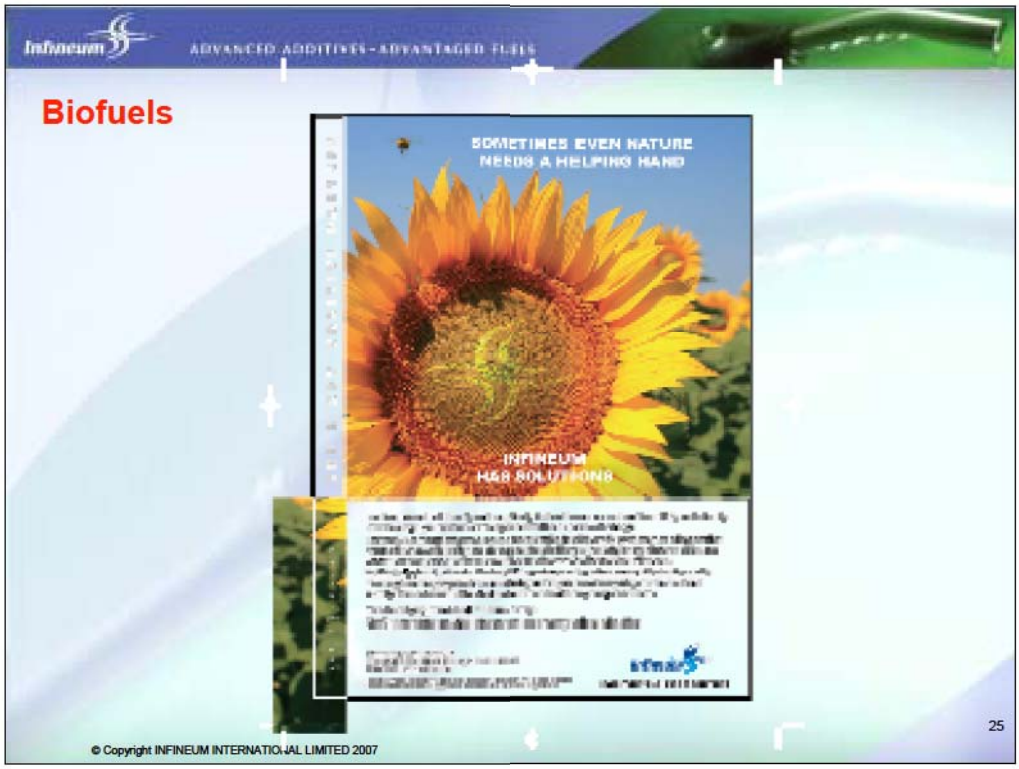
We do note, however, that based on 41 samples taken at the same retail sites in 2006 vs. 2004, there was an average 1-point increase in the cetane index and an average 2.4 number increase in the cetane number, indicating an upward shift in both parameters.

The lower polarity of ULSD results in lower water solubility in the finished fuel. Once separated from the fuel, this water will freeze at low temperatures and can block fuel filters/fuel lines and exhibit similar symptoms to those that can be caused by wax. Good housekeeping and regular tank maintenance are essential to prevent field failures.

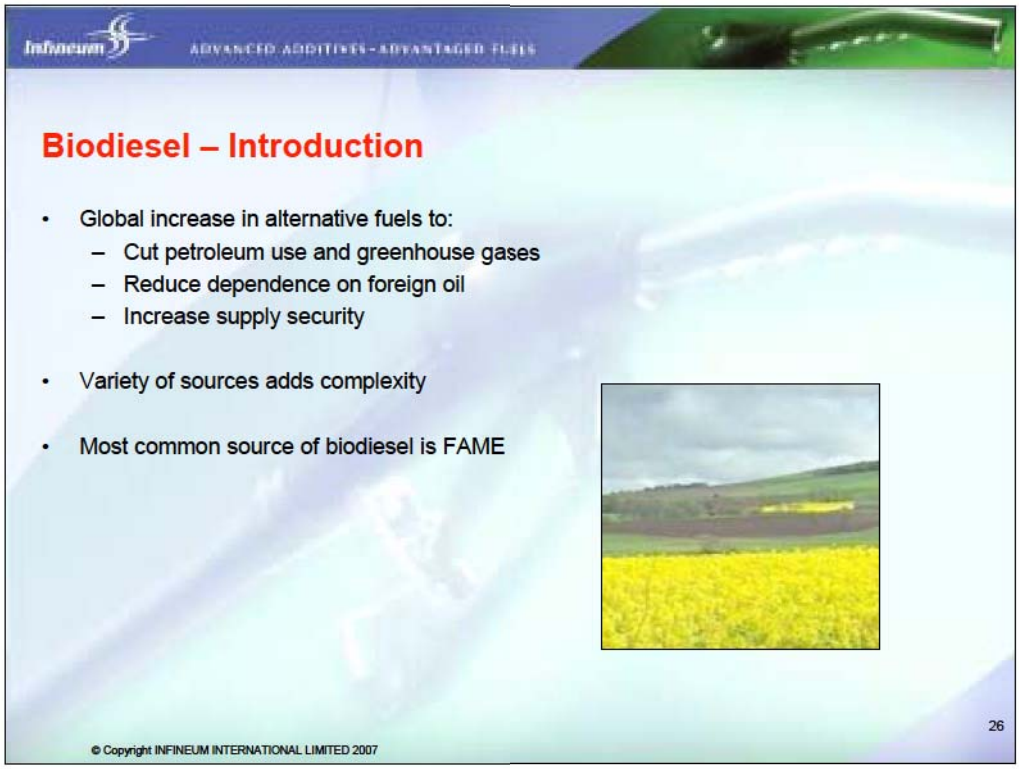


While gasoline demand in the U.S. is more than twice that of diesel, diesel demand is growing at about 2-1/2 times the rate of gasoline reflecting robust economic growth.

The ratio of gasoline to diesel output is also reportedly trending towards a more even split in planned refinery expansions.



While the emergence of ULSD was more than enough to keep us all busy in the last 24 months, the growth of biofuels was also a hot topic.



In an effort to cut petroleum use and greenhouse gases, reduce dependence on foreign oil and increase supply security, countries around the world are encouraging the use of alternative fuels.

These fuels come from a variety of sources including agricultural oils, biomass, ethanol, gas and coal, and they bring added complexity to the fuels market.

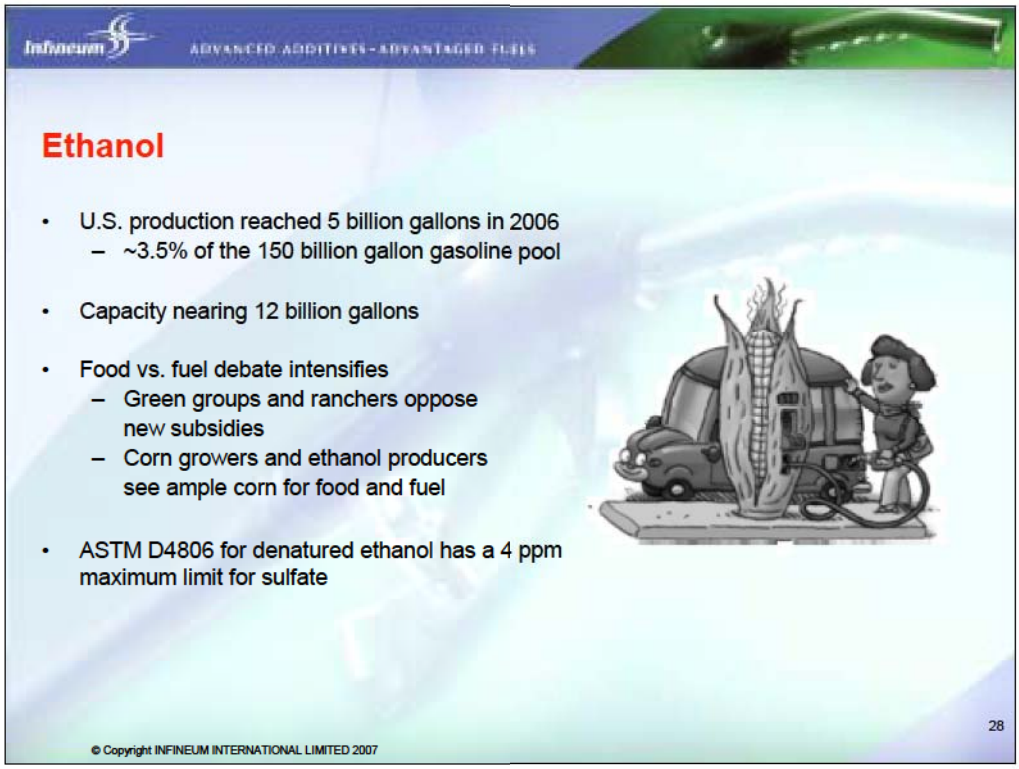
Biodiesel can be made from an array of animal and vegetable oils. The most common variety is fatty acid methyl ester or FAME.

The Energy Policy Act of 2005 included a Renewable Fuels Standard, or RFS, which set minimum use requirements for renewable fuels such as ethanol and biodiesel with a requirement of at least 7.5 billion gallons by 2012. Ethanol will account for the lion's share of the RFS; the rest will be from biodiesel.

President Bush, in his January 2007 State of the Union Address, called for expanding the scope of the RFS to an Alternative Fuels Standard to include not only corn-based and cellulosic-based ethanol and biodiesel, but also methanol, butanol, hydrogen and other alternative fuels.

Bush set a goal of reducing U.S. gasoline usage 10% by 2017. At least 15% of the reduction will be met by the AFS. The most likely technology to fulfill this requirement will be biofuels.

The AFS would contain multiple "safety valves" to protect against unforeseen increases in the prices of alternative fuels or their feedstocks.



By late 2006, U.S. ethanol production soared to 5 billion gallons, a 1 billion gallon increase since the beginning of the year. This represents about 3.5% of the total 150 billion gallon gasoline pool. Ethanol capacity is near 12 billion gallons.

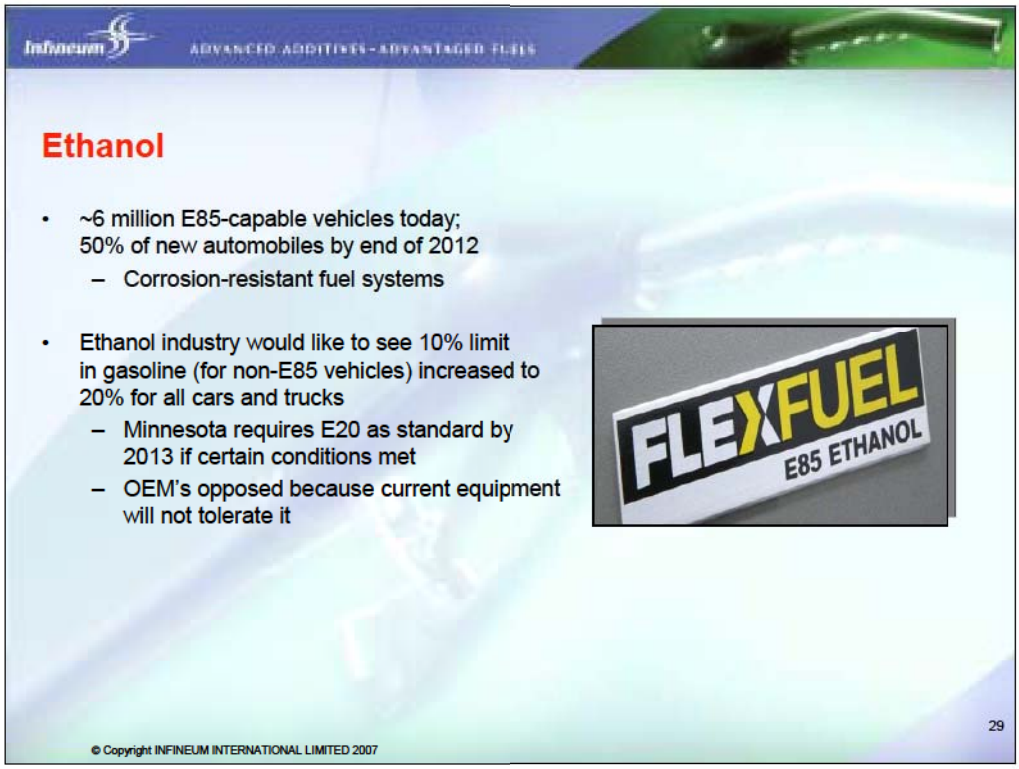
With all this talk of biofuels, the food-for-fuel debate has intensified. How much is corn for ethanol driving up food prices?

There are two school of thought:

Green groups and ranchers oppose new ethanol subsidies, mandates and plants, saying that they place upward pressure not only on corn but on feeder cattle prices. Both groups support a moratorium on licensing of new plants until the price impact on food is studied further.

Corn growers and ethanol producers maintain there is more than enough corn to feed the nation AND supply ethanol plants. Different types of corn are used for fuel and feed, sweet and field.

There is little in the way of new additives to compensate for the use of ethanol in gasoline, but a new ASTM spec for sulfates in ethanol was implemented because sulfates have been found to be precursors to fuel system deposits.

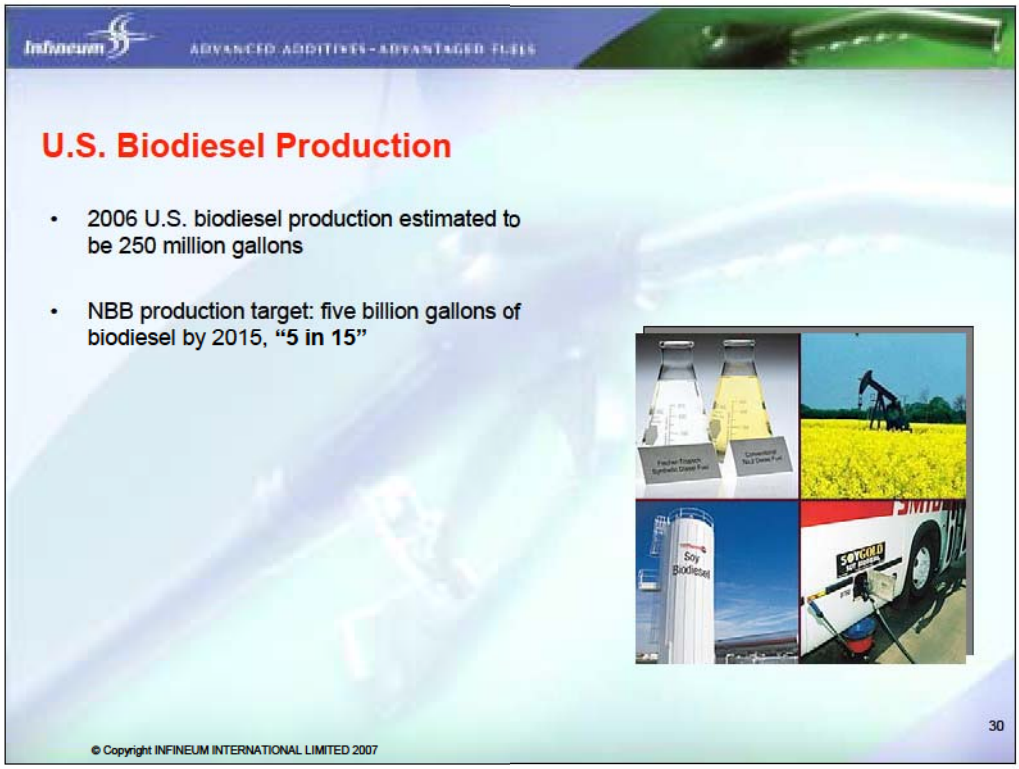


There are currently about 5 million E85-capable vehicles in the U.S. Ford, GM and Daimler Chrysler announced in late March that 50% of new U.S. automobiles will be flex-fuel or E85-capable by the end of 2012.

To bring production more in line with capacity and biofuels targets, the ethanol industry would like to see the current 10% limit in gasoline doubled to 20% for all cars and trucks.

U.S. OEM's are opposed to this because, in the words of G.M. Vice Chairman Bob Lutz, "to put E20 in the fleet that's out there is going to corrode every non-ethanol fueling system. We absolutely guarantee the destruction of the engine and the fuel injection system if we go the E20 route."

Many doubt that ethanol will ever take hold in a big way since it costs the same as gasoline but delivers only two-thirds the energy of a gallon of gasoline.



On the diesel front, the National Biodiesel Board estimates the U.S. production of biodiesel at about 250 million gallons in 2006, triple the amount produced in 2005. In order to satisfy 1% of current U.S. diesel demand, both on-and-off road, production would have to approach 600 million gallons.

The NBB has set a production target of five billion gallons of biodiesel by 2015, affectionately known as "5 in 15", although NBB admits to raw material limits at those levels.

Biodiesel is produced from a variety of sources, both vegetable oil and animal fats. Soy is the predominant source of biodiesel in the US, but as demand increases it is likely that a variety of other sources will be used.

And just when you thought you'd seen it all…

It seems we can all do our part for the growth of biodiesel. Got a few extra pounds to burn??? How about in your diesel car or truck? Capitalizing on the cosmetic surgery craze in the U.S., an entrepreneur in Miami has found a new source of biodiesel. Liposuction leftovers. Perhaps you **can** indeed have your cake and eat it, too – or should we say, "burn it" too.

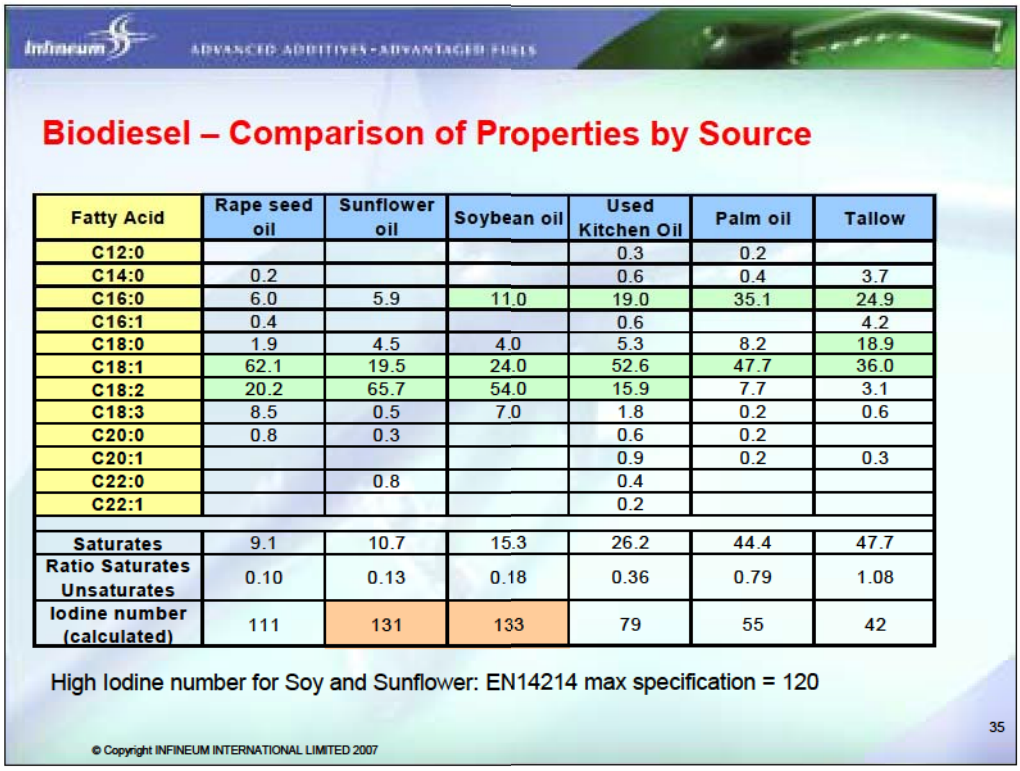
This melange of sources for biodiesel exacerbates the quality issues commonly associated with biodiesel, driving complexity. Among the concerns are:

- Oxidative stability. JAMA says U.S. and European tests are not sufficient.
- Low temperature handling and operability
- Batch-to-batch variability – continuous blending vs. small or garage blenders
- Miscibility and resistance to phase separation
- Hygroscopic nature of biodiesel
- Propensity for biological growth
- Also, additive response varies with the source as we'll show you in a minute.

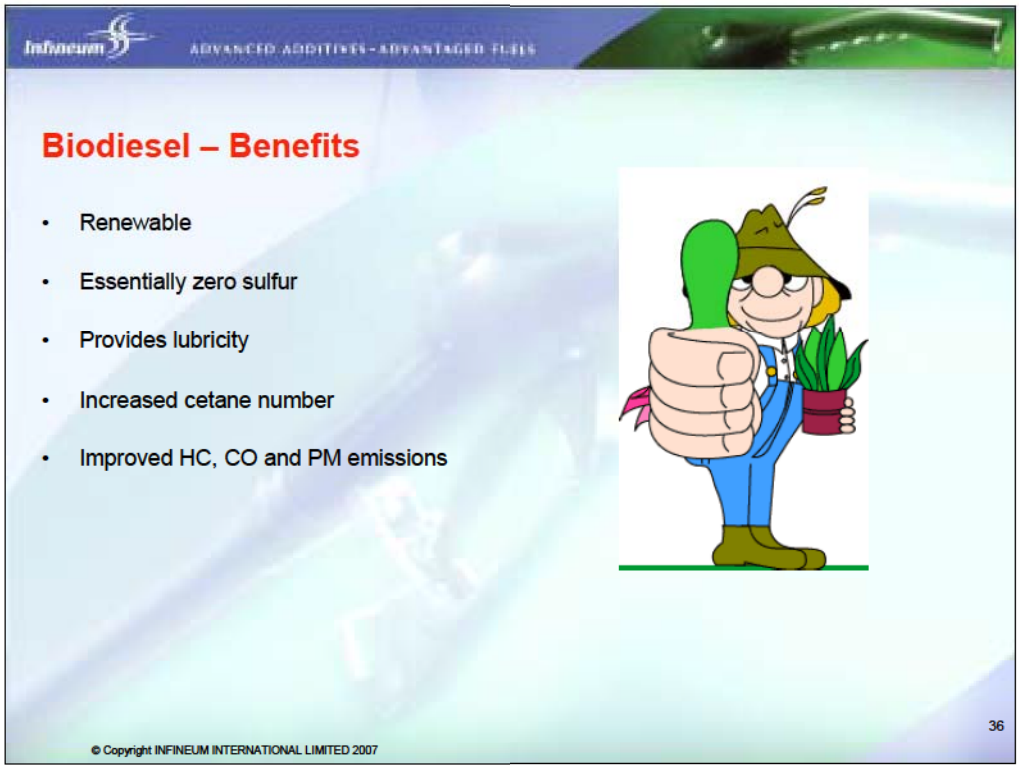
The introduction of highly saturated fatty acid methyl esters to diesel fuel will bring additional challenges to fuel producers since they contain high levels of non-paraffinic wax, raising winter operability concerns. BX blends even with very low percentages of biodiesel show some operability problems including wax precipitation in storage at temperatures above the cloud point which can lead to filter plugging.

Existing operability tests were designed for conventional diesel. Biodiesel has different characteristics to conventional diesel, and appropriate operability testing needs to be developed. In Minnesota for example, biodiesel was introduced with no prior field testing which resulted in vehicle failures during winter operation.

An ASTM operability task force was developed to evaluate tests to predict operability of Bx blends in the field. A ballot to include up to 5% biodiesel in the ASTM D975 spec for conventional diesel fuel has been passed but put on hold pending the outcome of the study.

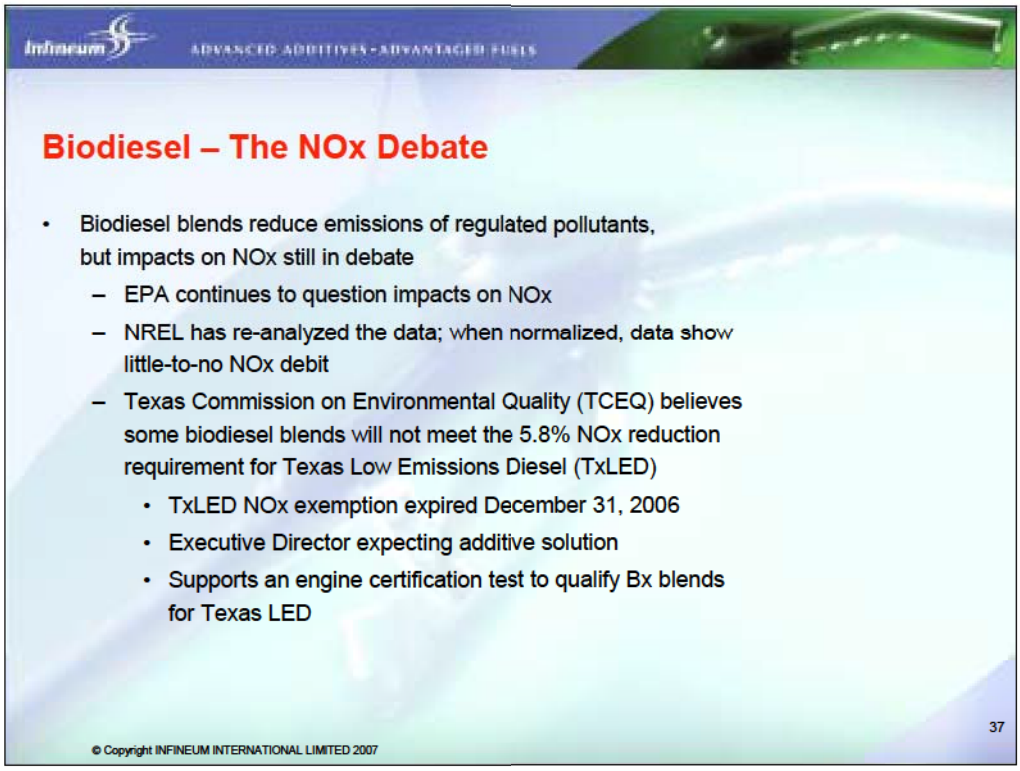


Adding to the complexity of winter operability of BX fuels are the differences in treatability among biodiesel sources. Saturates levels have the most profound impact on cold flow behavior, with tallow and palm being the most severe.



Complexity aside, biodiesel does have many beneficial properties. Biodiesel is, of course, renewable, essentially zero sulfur, provides lubricity and generally increases cetane number. Biodiesel also offers improvements in hydrocarbon, CO and PM emissions.

Although biodiesel adds lubricity, it takes at least 0.5% in the blend to give the same HFRR results as a lubricity improver at its typical treat rate. The cost of lubricity treatment is typically significantly lower than the cost of 0.5% biodiesel.



Biodiesel blends reduce emissions levels of regulated pollutants in general, but EPA continues to question whether the blends might actually increase nitrogen oxide emissions.

In Texas, the Texas Commission on Environmental Quality believes some biodiesel blends won't meet a 5.8% NOx reduction required for the Texas Low Emission diesel fuel sold in 100 Eastern Texas counties. TCEQ gave Texas refiners until Dec. 2006 to qualify blends for use in TxLED. The Executive Director expects an additive solution.

TCEQ also raises questions about test protocol with a variety of tests done with varying results for NOx emissions. TCEQ supports an engine certification test.

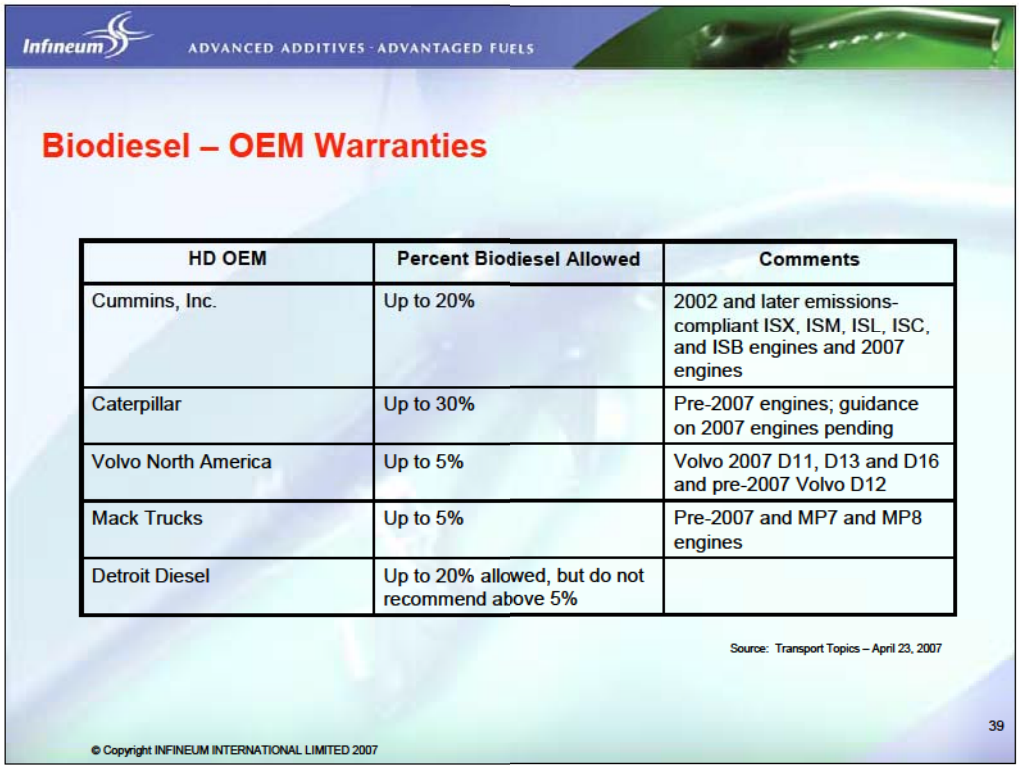
The move to increase the use of biodiesel is a natural outcome of concerns over security and sustainability of fuel supply. But, what is of prime importance to vehicle OEMs and consumers is that biodiesel does not damage their hardware or compromise performance. In an effort to meet these requirements, various standards have been introduced in Europe and the US. In Europe, all biodiesel must conform to the EN14214 spec with final fuel meeting EN 590. In the U.S., B100 must meet ASTM D6751 or EN 14214.

In Canada, the CGSB has established a specification for B1 to B5 blends, requiring that the biodiesel component meets either ASTM D6751 or EN 14214. A specification for B6 to B20 blends is being developed.

A new ASTM standard D6751-06a adds limits on sodium, calcium, and magnesium for biodiesel blends.

The National Biodiesel Accreditation Program, coordinated by the NBB, is a voluntary program for the accreditation of producers and marketers of biodiesel fuel called BQ-9000. The objective of the program is to help ensure that biodiesel fuel is produced to and maintained at the biodiesel industry standard, ASTM D 6751. The program combines the ASTM D6751 standard with a quality management program that monitors storage, sampling, testing, blending, shipping, and distribution.

One suggestion to rein in biodiesel quality is to have separate specs for the various seed sources to remove one source of variability. However, this would lead to a multitude of specs for the same fuel so not likely feasible.



Most heavy duty engine manufacturers now acknowledge the use of biodiesel blends up to 5% in their engines without voiding warranties. The biodiesel must meet the ASTM biodiesel specification, D6751, and the finished fuel must meet D975.

On March 21, Cummins announced it would raise the approved biodiesel percentage to 20% in its 2002 and later emissions-compliant ISX, ISM, ISL, ISC, and ISB engines and its 2007 models as well as several off-highway and marine engines.

Caterpillar announced on April 16 that it would permit blends of up to 30% biodiesel in it's pre-2007 engines. They expect to issue guidelines later this year for their 2007 engines. Other OEM recommendations are shown in the table on this slide.

Please note that the table on this slide is representative, not inclusive of all OEM's.

Infineum ADVANCED ADDITIVES - ADVANTAGED FUELS

Biodiesel – Joint DFIE Position

- Current European and U.S. biodiesel specifications do not provide sufficient protection
- Diesel Fuel Injection Equipment Manufacturers issued joint statement regarding biodiesel
  - Bosch
  - Delphi
  - Denso
  - Siemens VDO
  - Stanadyne
- Fully support the development of alternative fuel sources

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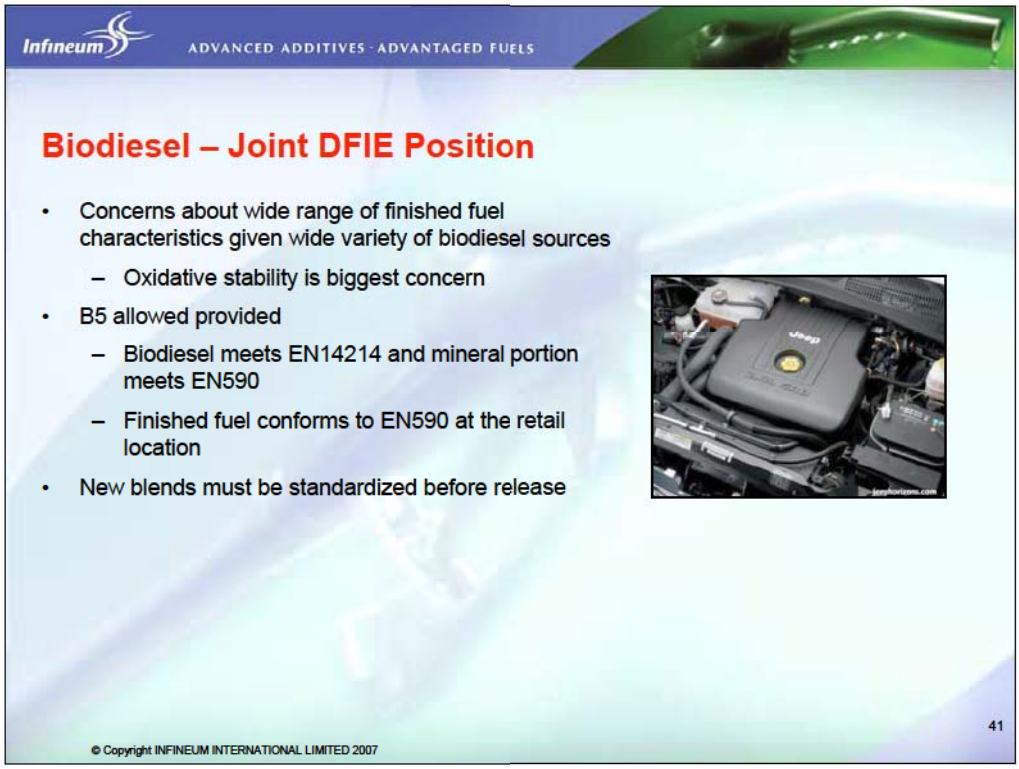
Note that vehicle OEM's may have a different view than diesel fuel injection equipment manufacturers. Preliminary findings suggest that current European and U.S. biodiesel specifications do not provide sufficient protection to advanced hardware, particularly common rail systems.

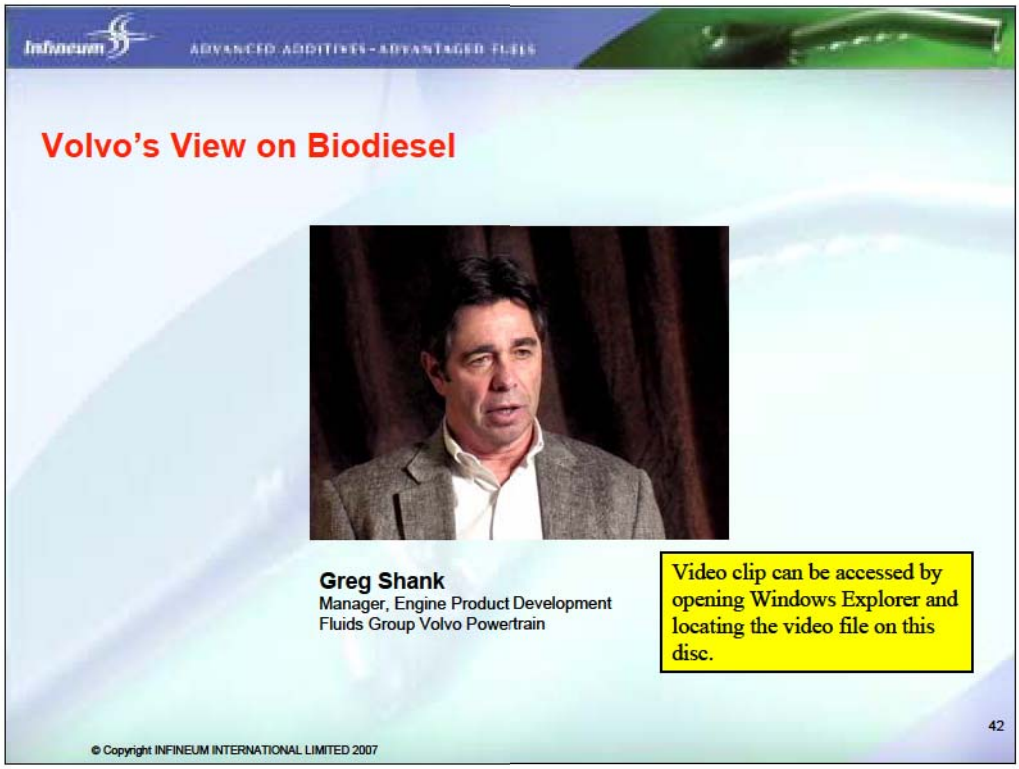
In a joint statement, the major DFIE's said that they fully support the development of alternative sources of fuel for compression ignition engines.



However, they are concerned about the impact of the wide range of FAME sources on finished fuel characteristics, most notably oxidation stability and particularly in ULSD blends. Aged or poor quality FAME contains organic acids as well as polymerization products which may attack fuel injection system components or act as precursors to deposits.

Their currently agreed position limits release of injection equipment for mixtures up to a maximum of 5% FAME meeting the EN 14214 standard with unadulterated diesel fuel meeting the EN 590 standard. The final B5 product must also comply with EN590 **at the filling station** to remove risks in the distribution system. Any new biodiesel blend has to be standardized with special emphasis on oxidation stability and validated carefully before release.

To date, although a proposal is pending, ASTM D6751 does not contain a requirement for oxidation stability

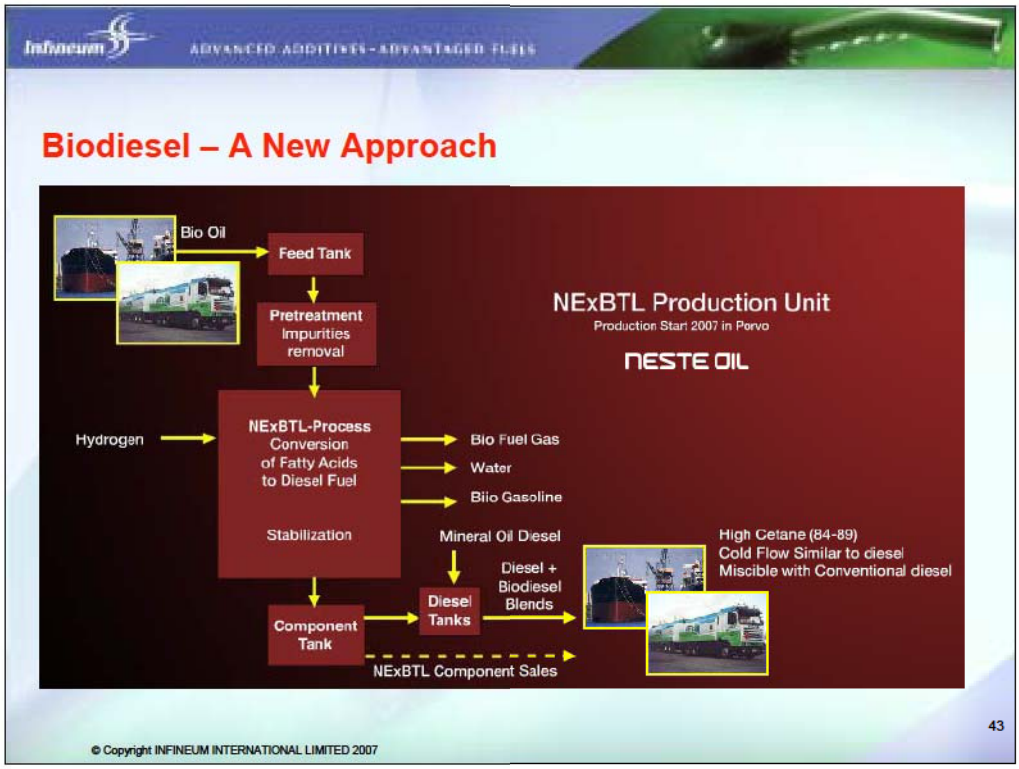


Greg Shank shares Volvo's views on biodiesel.

Video Clip

Greg Shank:

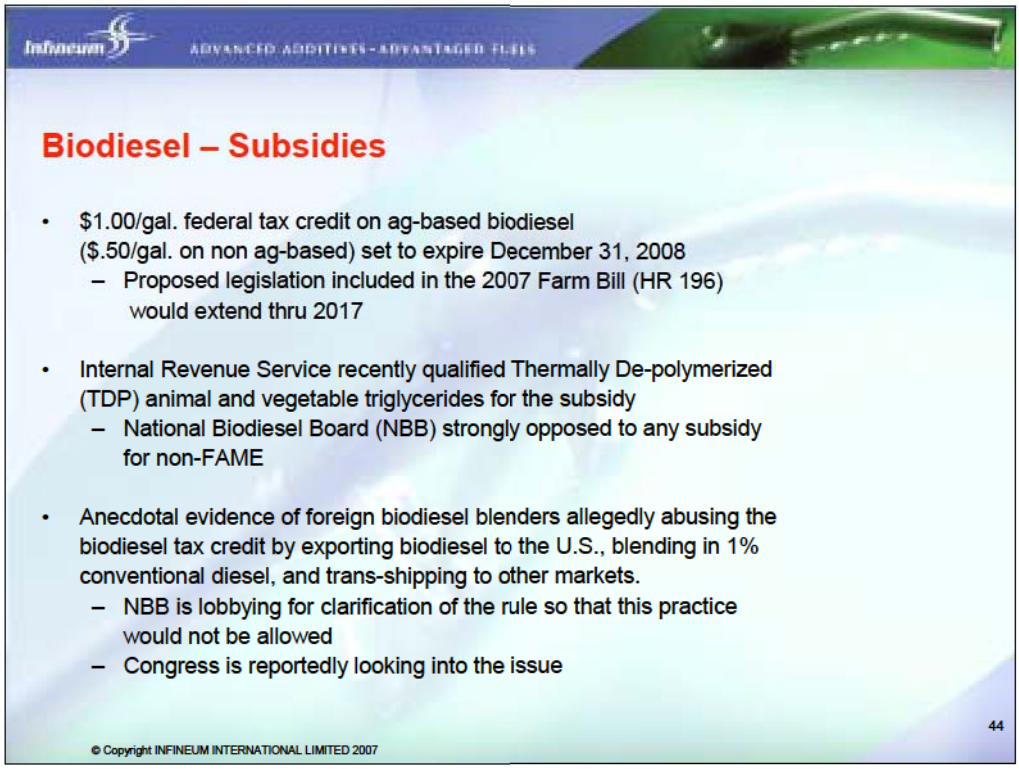
"The amount of biodiesel available isn't going to be large, but it's an issue that we need to deal with. It's not going away, and we need to work and understand oil effects of bio-diesel. Volvo Powertrain is doing a lot of work with bio-diesel and we will do a lot of work in the next 18 months to understand the effects of bio-diesel on the engine. Concern for bio-diesel on engine hardware is aimed at the fuel injection system. I mean, we're worried about corrosion of the system. That's what part of our testing will look at."



One alternative method that has been proposed for the production of fuels from seed oils is the addition of the oils directly into the refinery process. However, one of the drawbacks is that these molecules typically increase cloud point, making cold flow performance more of an issue. Neste Oil has devised a process for the conversion of seed oils to diesel blend stock that does away with this problem. The resultant product is high in cetane with cold flow properties similar to diesel and increased saturation leading to improved stability. And, unlike FAME, it is completely miscible with conventional diesel.

Some refiners add vegetable and/or animal fats directly to the hydrotreater or crude unit rather than in a separate unit as shown on this slide.

Petrobras H-Bio, UOP Green Diesel and Conoco-Phillips TDP are also 2nd generation biodiesel manufacturing methods.



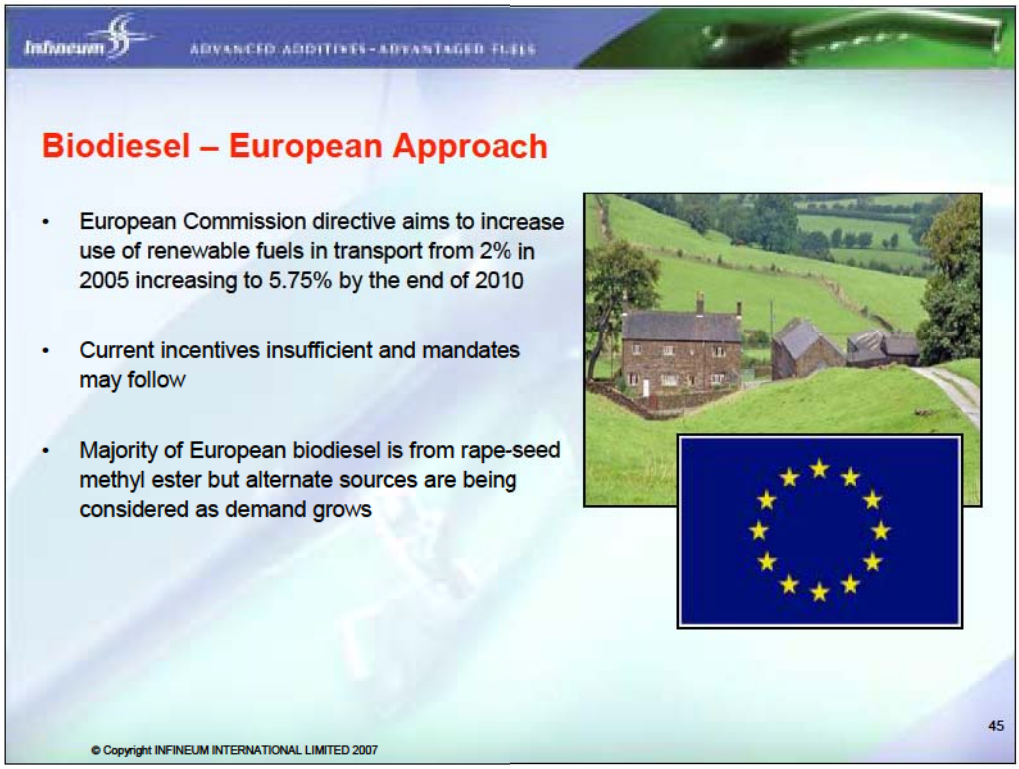
The current $1.00/gal. federal tax credit on ag-based biodiesel is set to expire on December 31, 2008. Proposed Congressional legislation in HR 196, the 2007 Farm Bill, would extend the subsidies through 2017.

The U.S. Internal Revenue Service recently expanded the $1.00/gallon tax credit, currently available to biodiesel produced via transesterification of vegetable oils, to Thermally De-polymerized (TDP) animal and vegetable oils, i.e. refinery processing of seed oils.

The NBB strongly opposes the ruling on the basis that fuel produced by this process contains no oxygen and doesn't offer the same benefits of biodiesel such as reduced particulate matter emissions and being biodegradable.

There is anecdotal evidence that foreign biodiesel blenders are abusing the biodiesel tax credit by exporting biodiesel to the U.S., blending in 1% conventional diesel, and trans-shipping to other markets.

The NBB is lobbying for clarification of the rule to stop this practice, and we understand Congress is looking into it.

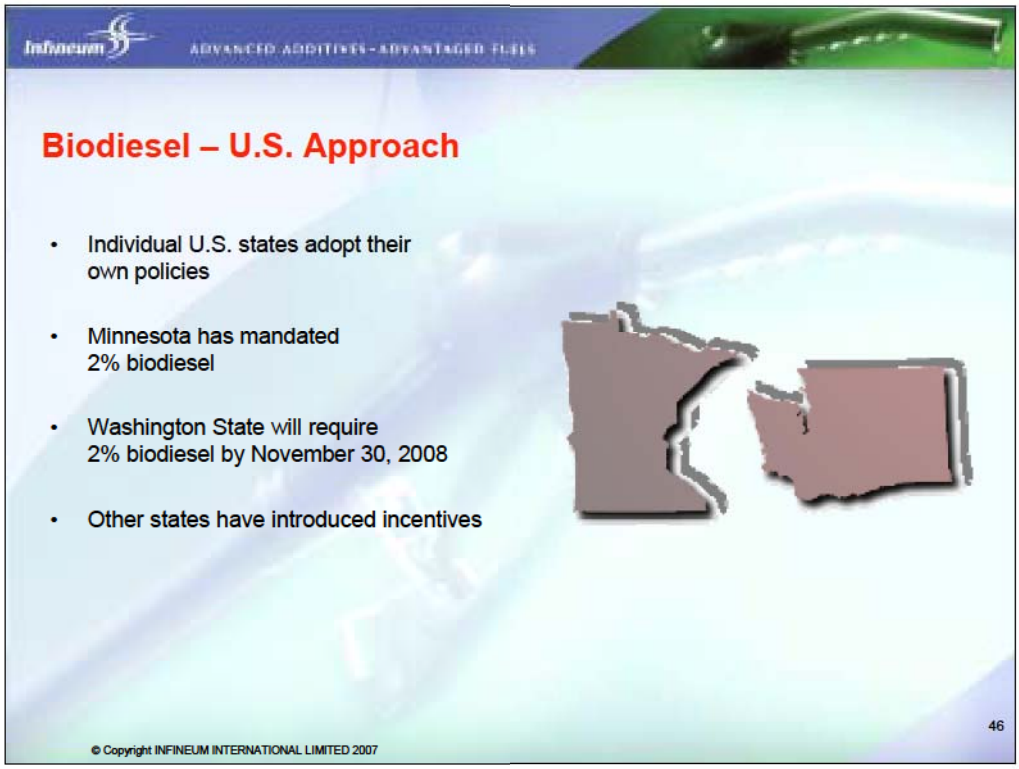


In Europe the use of biodiesel is being driven by the European Commission which introduced a directive to increase the percentage of renewable fuels for transport from a minimum of 2% in 2005 to 5.75% by the end of 2010. Several countries have implemented tax incentives in an attempt to increase biodiesel use.

But, in many cases this has not been enticing enough and mandates could follow.

The majority of biodiesel in Europe comes from rape-seed methyl ester but as demand grows, alternate sources are being considered.

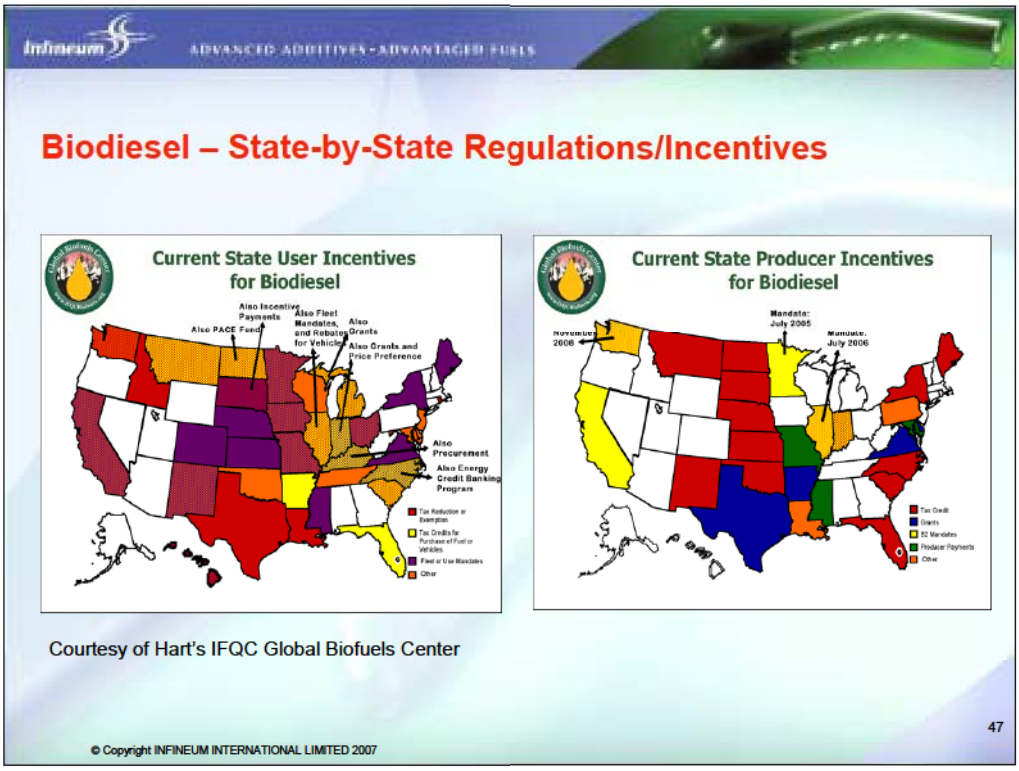
We are already seeing this happen as FAME's produced from soy and palm make their way to Europe from other parts of the world complicating issues associated with overall fuel quality.



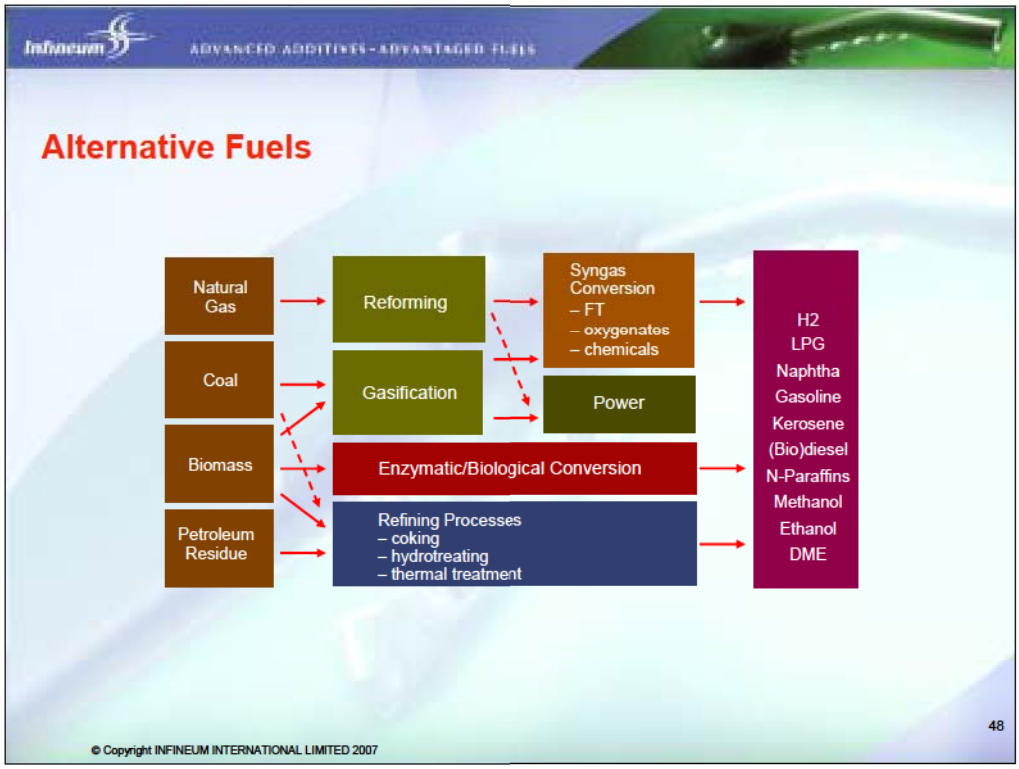
Unlike the consolidated European approach to biofuels, individual states in the U.S. can adopt their own policies.

Minnesota is the only state to have already implemented a biodiesel mandate with a ruling that 2% should be blended with conventional diesel.

Washington State has also passed a 2% law effective November 30, 2008, or when feedstock grown in the state can satisfy the requirement – whichever comes first. Many states have a similar trigger for proposed biodiesel mandates.

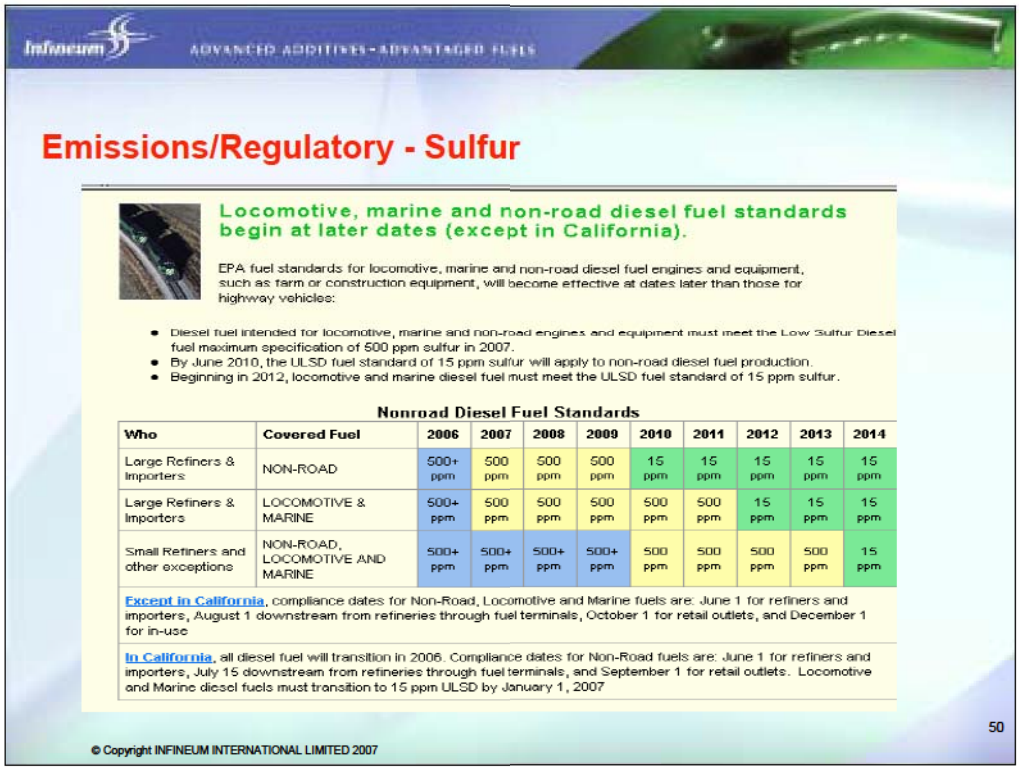


As shown in this slide, courtesy of the Hart's IFQC Global Biofuels Center, many other states have introduced tax incentives, state fleet use requirements, and other initiatives to boost renewable fuels uptake.

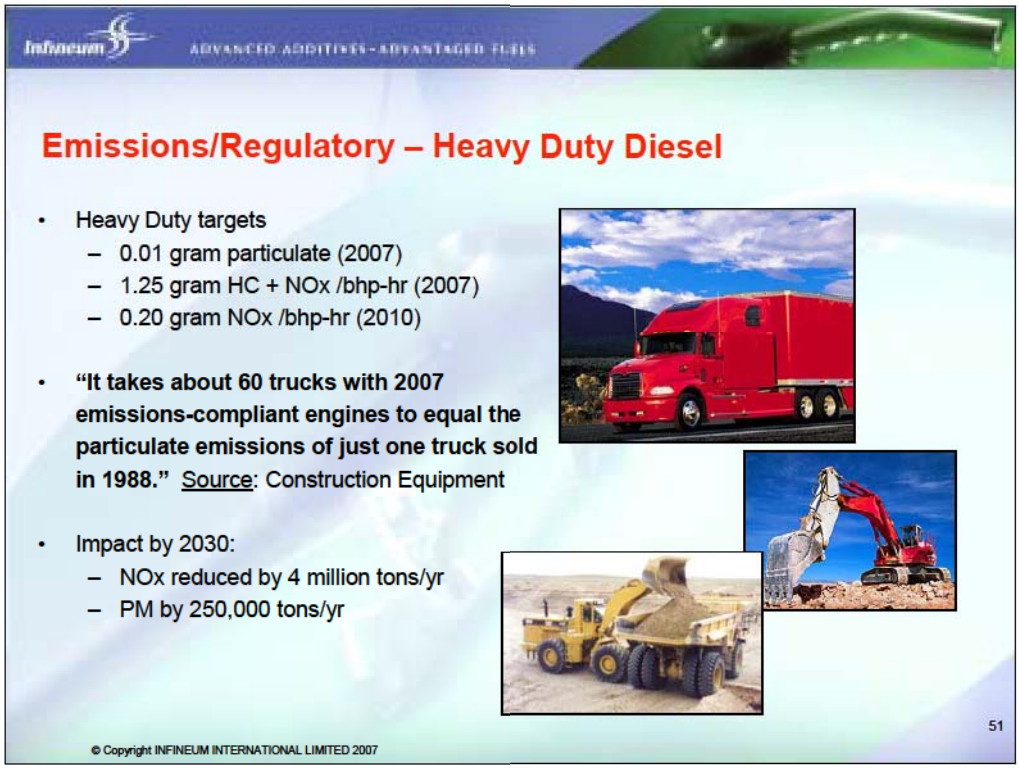


Yet another route to alternative fuels is the reduced carbon forms to liquids concept, which takes natural gas, coal, bitumen, biomass or petroleum residues and converts them via various processes into more usable, higher value liquid fuels. Currently there is significant activity in all of these areas, and it is likely that the high price of crude oil combined with technology advances in this area, will mean that fuels from these sources may become increasingly important in the next few years.

Any discussion of diesel fuel needs to include commentary on emissions and regulations that drive us toward “cleaner” fuels.



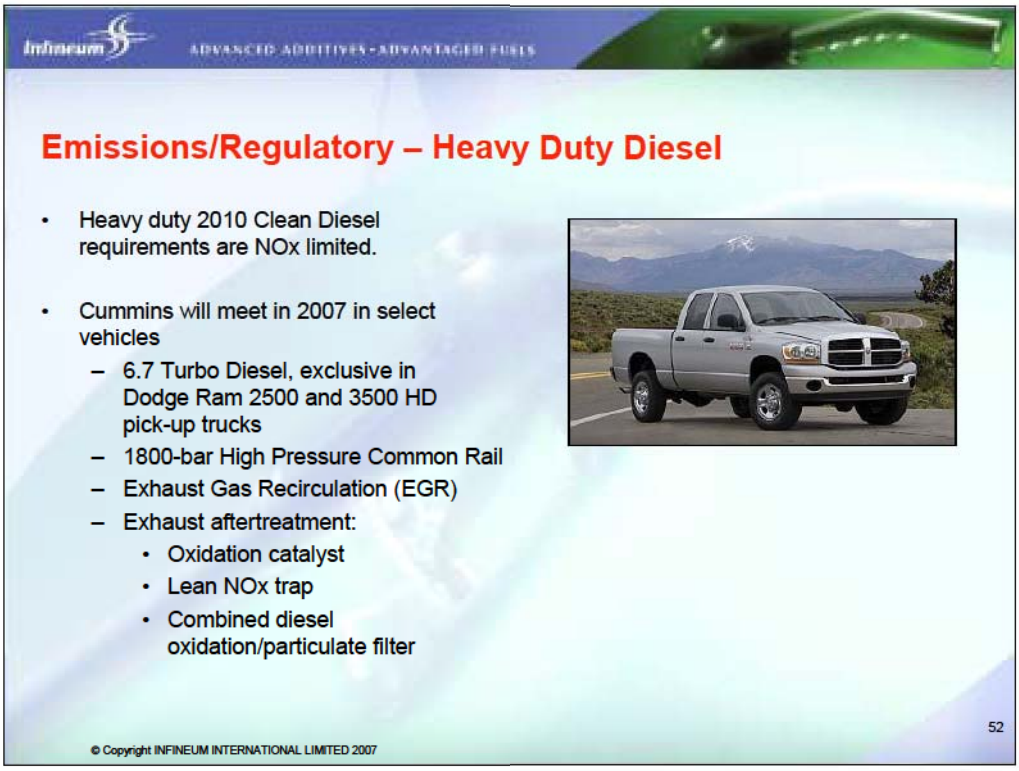
This chart shows non-road, locomotive, and marine diesel fuel sulfur standards, where they are and where they're headed. This should be old news to most of us.



Here are the heavy duty emissions targets for 2007 and beyond. In 2007, particulates must not exceed 0.01 grams, and HC plus NOx must be below 1.25 grams/brake horsepower hour.

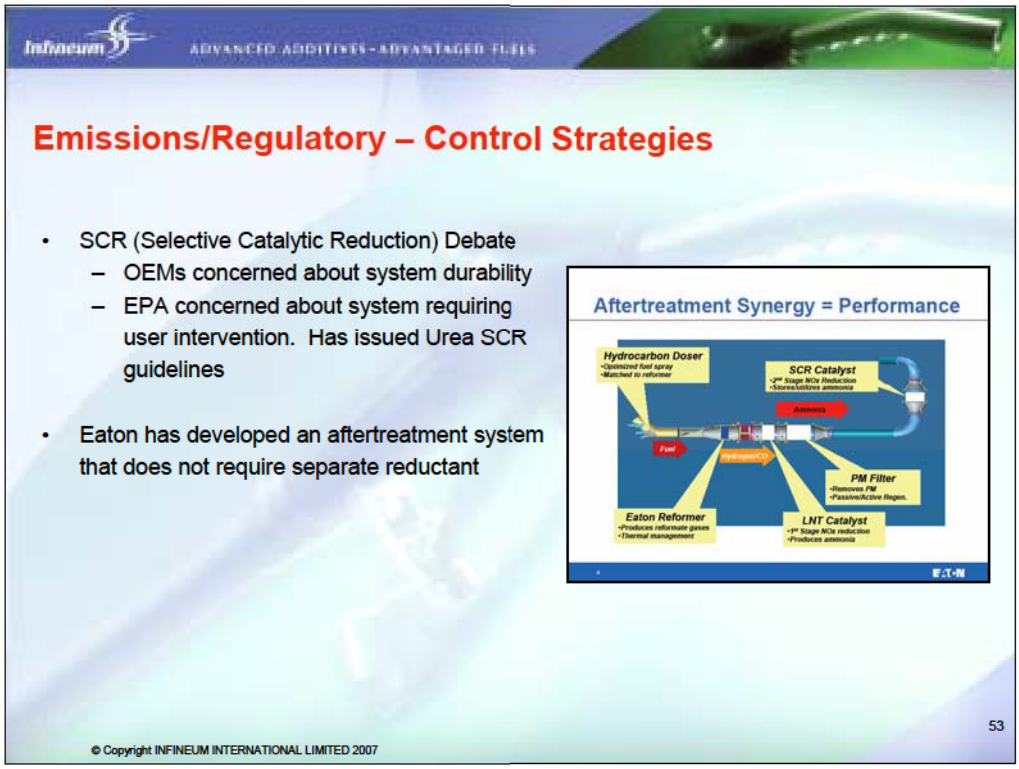
According to Construction Equipment magazine, "it takes about 60 trucks with 2007 emissions-compliant engines to equal the particulate emissions of just one truck sold in 1988".

The EPA is claiming that by 2030, these regulations will reduce NOx emissions by 4 million tons per year and PM by a quarter of a million tons per year. The reason it will take so long is that due to the inherent durability of diesel engines, diesel fleet turnover is that slow.



The heavy duty 2010 Clean Diesel requirements are NOx limited.

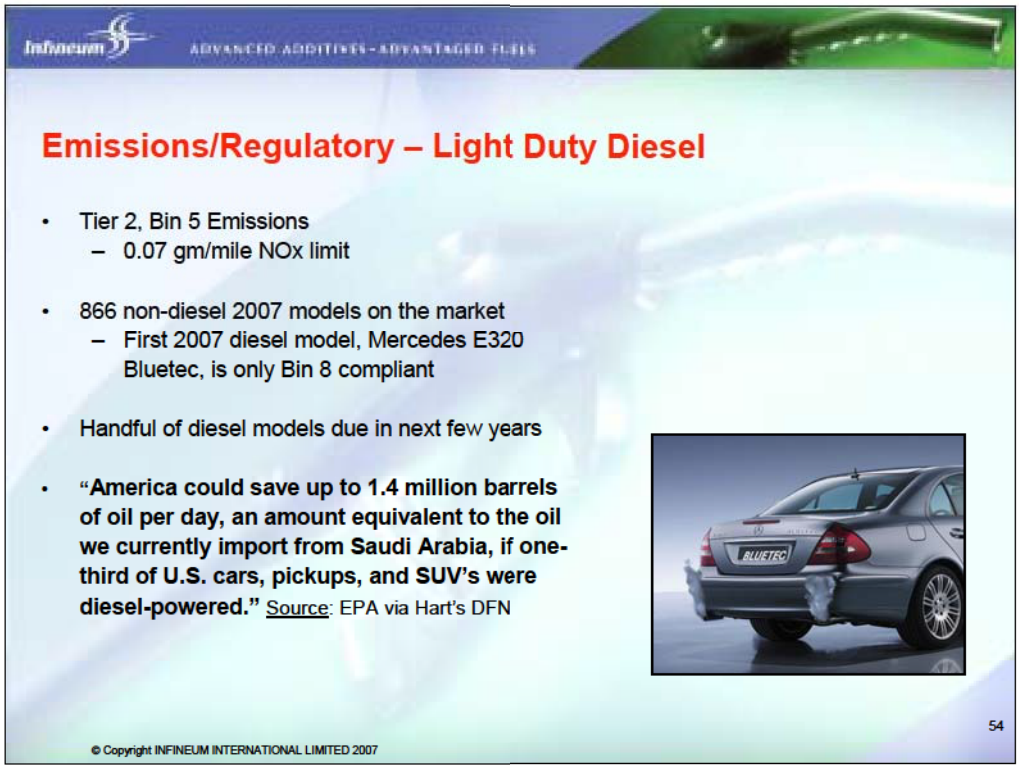
Cummins will meet the 2010 requirements in 2007 in their 6.7 liter Turbo Diesel which combines high pressure common rail, exhaust gas recirculation and aftertreatment which employs a lean NOx trap rather than SCR.



Diesel OEMs have had lingering concerns about the durability of lean NOx traps so they focused on urea SCR as their preferred control strategy. The US EPA has always had concerns where user intervention is a component of the emissions control system.

When confronted by major OEMs with urea as the only viable option, the EPA finally relented…sort of. While accepting urea SCR as a potential control system, they released “SCR guidance” late last year. The guidance document runs 10 pages.

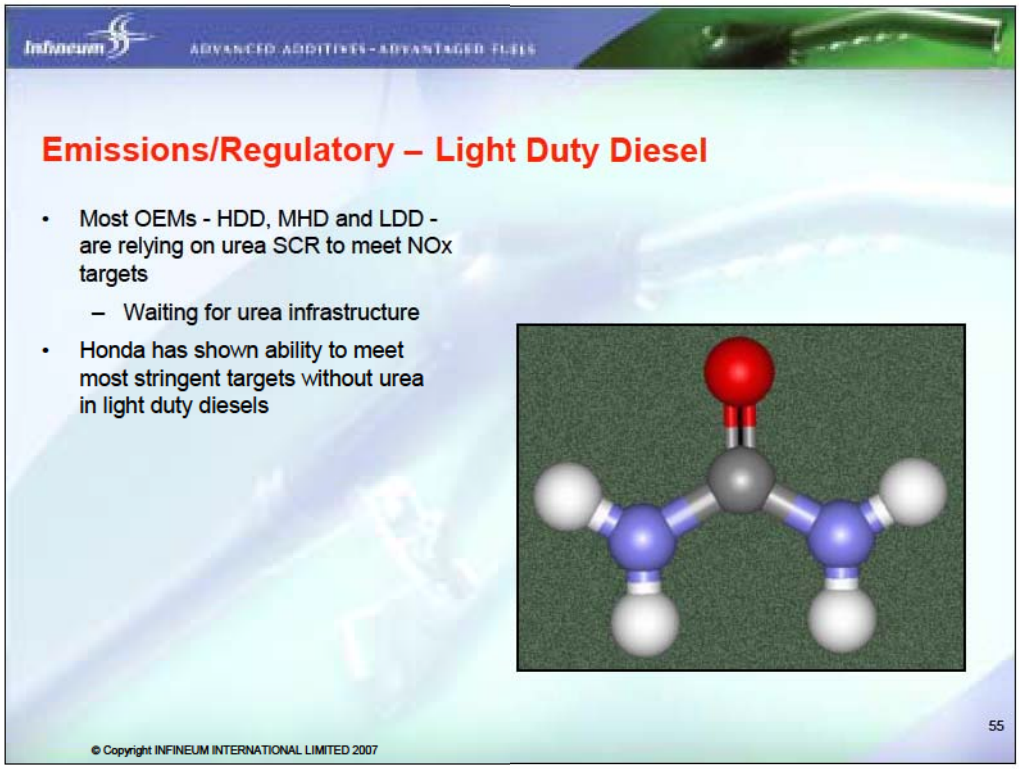
But there is a fly in this ointment. Early this year, Eaton unveiled an HD emissions control system shown here that meets 2010 targets without the use of external reductant. It will be interesting to see EPA’s reaction to this development.



Light duty vehicle emissions standards are "fuel neutral". Therefore, a compression ignition powered vehicle must meet the same standards as a spark ignition powered vehicle. Diesels meeting U.S. performance norms cannot as yet meet the target standard of Tier 2 Bin 5. VW has small engines that meet the target, but the Mercedes E320D, the closest **"normal"** vehicle only meets Tier 2, Bin 8, a less stringent level. By "normal" I mean large enough so you don't have to get out and push on an entrance ramp.

Daimler Chrysler has removed diesel Jeeps from the market because they don't meet 2007 emissions. The expectation is that large scale introduction of diesel models will not occur until a urea infrastructure is in place.

According to EPA, "America could save up to 1.4 million barrels of oil per day, an amount equivalent to the oil we currently import from Saudi Arabia, if one-third of U.S. cars, pickups, and SUV's were diesel-powered".



Many OEMs have targeted Tier 2, Bin 5 light duty diesel models for 2008/9. Most are anticipating that a sufficient urea infrastructure will be in place by 2009 driven by the heavy, heavy diesel and medium, heavy diesel markets. Light duty diesel alone is likely too small to drive the required infrastructure.

However, robust systems that do not require external reductant have been devised. Honda has shown a system that can meet Tier 2 Bin 5 **without** urea. Will Honda and Eaton systems allow EPA to force non-user intervention on urea? Stay tuned.

After almost a decade of emissions driven technology developments, heavy duty manufacturers feel that there is a respite on the horizon. Once they develop robust solutions for 2010 Clean Diesel requirements, they do not see any new emissions initiatives until 2015 or beyond. They see their business competing on other features including fuel economy, safety, emissions management and driver comfort/convenience.

But they may not be off the hook for long. For the first time, CAFE legislation for heavy duty vehicles was proposed in Congress this year.

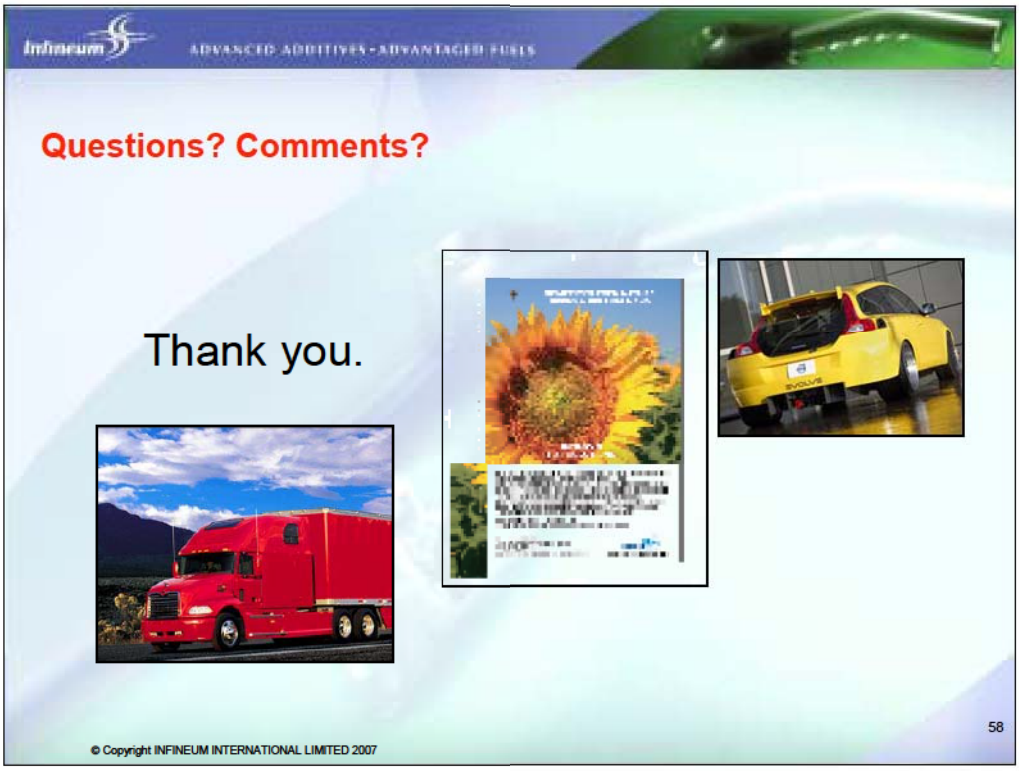
There are about 220 million light duty vehicles on the road in the U.S. In the most optimistic scenarios, 2 million of the 16-17 million new light duty vehicle sales per year will be diesel-powered. Given normal turnover rates, that means light duty diesels will not exceed more than 10% of the total passenger car pool for 10 years.

What will LDD do to demand for different quality diesel? What will drive baseline diesel fuel quality in the NA market – how big does light duty diesel have to get before all diesel fuel quality changes?

We see enhancements needed in:

- Cetane number
- Lubricity
- Low Temperature Operability
- Common rail deposit control

Some people have done cost analysis and believe light duty diesel acceptance will be based on the cost delta between gasoline and diesel. However, our vision is that light duty diesel will offer options to feed the continuing appetite for large SUV's with far better fuel economy.



Thank you for allowing us to share our views on the shape of the North American diesel fuel market, present and future. At this time, we welcome your personal take… whether or not you happen to agree with ours!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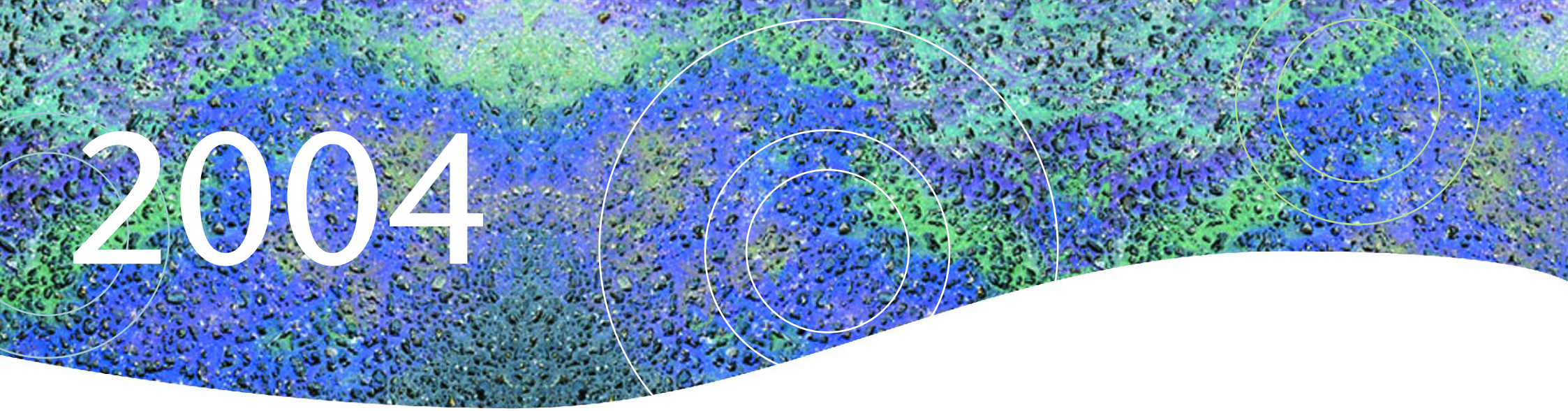
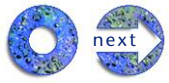


Infineum Worldwide Winter Diesel Fuel Quality Survey 2004



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Introduction

The Infineum Worldwide Winter Diesel Fuel Quality Survey aims to provide the petroleum refining and distribution industry with an overview of the quality of diesel in the marketplace, allowing international trends to be followed. To achieve its purpose, the Survey needs to cover as much of the globe as possible. For the winter 2004 survey, some 307 samples were collected in 42 countries around the world. The majority of samples were collected during January and February, deep winter months in the northern hemisphere. In southern hemisphere countries, sampling was delayed until later in the year when true winter grade samples could be obtained.

Samples need to be representative of the diesel purchased by the average consumer so they are gathered from service stations by Infineum colleagues at local area offices. As a general principle, Infineum tries to get one sample that represents the production from each refinery or region in a given country. To minimise the possibility of taking multiple samples from a single refinery, knowledge of local exchange agreements and distribution systems is used to select where each sample is collected. For the larger diesel consuming countries, this procedure results in samples that represent a reasonable average of the overall quality. However for smaller countries or specific producers, spot sampling over a short period of time will effectively only provide a snapshot of production quality, with data derived from only one or two samples. This can make it more difficult to evaluate trends with any accuracy.

Analysis

The analyses applied to each sample are those we consider will be of most interest to the diesel producers, distributors and consumers. They cover areas of national specification, exchange specification and performance parameters. A degree of standardisation has been applied to enable diesel from all countries to be compared and the data analysed as a single set. Standardisation and space restrictions however, mean that not all national specifications are reported.

Wherever possible, industry standard test methods have been applied and in house test methods avoided. This has been done so that the data published here most accurately reflect the results which could or would be generated by organisations within the petroleum industry.

When considering our data, in particular when comparing the various test results with the national specifications, it should be noted that a number of the tests have quite wide reproducibility bands and very little repeat testing has been conducted to determine compliance or otherwise with the specifications.

Test Methods

The majority of testing was carried out at quality accredited laboratories in the USA, Japan and the UK using the following test methods:

Density	ASTM D4052
Kinematic Viscosity	ASTM D445
Sulphur Content	ASTM D2622 / ASTM D4294
Cetane Number	ASTM D613
Cetane Index	ASTM D4737 / ASTM D976
Pour Point	ASTM D97 / ASTM D5950
Distillation	ASTM D86
Cloud Point	ASTM D2500 / ASTM D5772 / ASTM D5771
CFPP	IP309 / ASTM D6371
HFRR	ISO 12156-1 / ASTM D6079
Wax Content	Differential Scanning Calorimetry
LTFT	ASTM D4539

Samples collected in the Middle East were tested at a local laboratory, using the same or similar test methods.

Data on Korean and Chinese diesels were provided directly by the local authorities so information on test methods used is not available.

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The Trends

Background
This year's winter diesel fuel survey has been conducted against a backdrop of growing complexity in both the fuel and automotive manufacturing areas. Legislation aimed at reducing atmospheric pollution has driven, and continues to drive, changes to vehicle hardware and fuel composition that affect everyone from the largest fuel or vehicle producer to the general consumer.

To meet the demands of both improved engine performance and environmental legislation, vehicle manufacturers are increasingly employing more complex hardware. Common rail fuel systems, diesel particulate filters, NOx control devices, higher injection pressures, staged injection and smaller injection nozzles are the main features that come to mind. A number of these have a direct impact on fuel quality and put a demand on the fuel producers to improve fuel attributes such as stability and deposit control. However, the main influence on fuel composition probably remains sulphur reduction. This is driven partially by the direct negative impact of sulphur in the environment and partially by the need for vehicle producers to use sulphur intolerant after treatment devices. Additionally fuel composition is increasingly affected by the use of bio-diesel both as an extender to crude derived diesel, or as a fuel in itself.

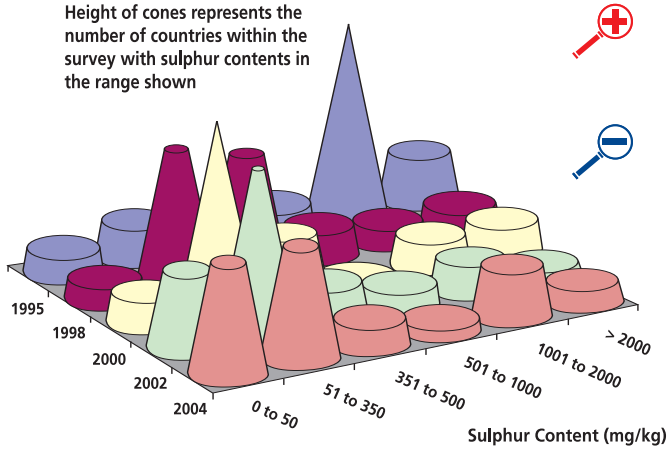
All these changes also have a direct impact on the fuel additive requirement; lubricity additive treat rates are increasing to counter the effects of more severe desulphurisation, performance packages are being rebalanced to provide the fuel stability and deposit control needed for the new hardware, and more specialised cold flow additives are being deployed to maintain the required performance in fuels of increasing severity.

Infineum diesel fuel surveys can be used to track the changes in fuel composition brought about by the factors discussed above. The 2004 survey is the most recent in a sequence extending back to 1985 and provides an up-to-date snapshot of diesel fuel quality that can be compared with those obtained in previous years to provide an insight into quality trends.

Sulphur Reduction
Sulphur reduction is a worldwide theme that is clearly visible within the survey samples collected over the past 10 years. Within Europe and North America there are consolidated programmes of sulphur reduction with the next major steps due to occur in 2005 and 2006 respectively. Specifications in other regions are less homogenous so the pace of sulphur reduction is not uniform, but similar trends are observed.

Sulphur reduction observed in this year's survey is limited to countries either from outside of Europe and North America or from within Europe that are changing ahead of the wider specifications to take advantage of tax incentives. This latter trend is clearly reflected within the chart below. Growth in the <50ppm peak as the 50 - 350ppm peak declines is predominantly driven by European tax incentives.

The chart would also appear to indicate that little change has occurred at the higher sulphur levels. However, this does not fit well with the analysis of individual countries which shows that almost all countries are reducing sulphur. This suggests that the chart trend in this area is probably a reflection of the number and mix of countries included in each survey.



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The Trends

To provide more detail: in the two year period since the previous survey was conducted we have witnessed sulphur levels reduce to; <10ppm in Austria and Germany, <50ppm in Japan and Ireland, <350ppm in Hungary and <500ppm in Australia. Additionally the Santiago area of Chile has reduced to <50ppm.

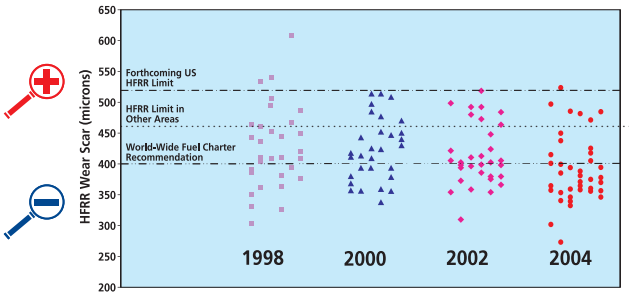
Lubricity

Lubricity additives and high frequency reciprocating rig (HFRR) specifications have been used to protect the fuel systems of light duty vehicles in Europe and the low sulphur diesel producing countries in Asia Pacific for some time. However, in the absence of a lubricity requirement in the ASTM D975 diesel fuel specification, use of lubricity additives was not widespread in the predominantly heavy duty US region at the time of this survey. In June 2004 a 520µm maximum HFRR wear scar was added to ASTM D975 for implementation from 1st January 2005, but a ballot to delay the effective date is still pending at the time of publication of this survey.

The chart below compares average HFRR wear scars on a country by country basis since 1998 and clearly shows that lubricity standards are being maintained as results are very similar to those obtained during the 2002 survey.

However, it is worth noting that the World-Wide Fuel Charter, published jointly by ACEA, Alliance, EMA and JAMA, continues to advocate a 400µm HFFR wear scar limit.

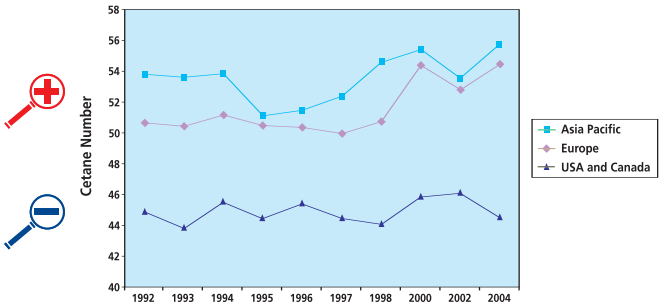
Worldwide Lubricity Performance



Cetane

Again, worldwide cetane is very similar to that measured during the 2002 survey. The chart below compares average regional cetane values for the US and Canada, Asia Pacific and Europe since 1992. South and Central America has not been included in the chart as the list of countries included in the survey tends to change from year to year causing the average data to be inconsistent.

Regional Average Cetane Number



The shift of cetane in Europe from an average around 51 to an average around 53 is now confirmed. This shift is fully expected as it coincides with the changes to the EN590 specification in 2000 when the minimum cetane number was raised from 49 to 51.

Cold Flow

The use of cold flow additives to ease diesel supply/demand issues and aid refinery economics is a long established principle. However, analysis of the diesel fuel survey samples clearly indicates that the principle is not employed by all refiners and fuel distributors. To provide an indication of worldwide cold flow additive use at a regional level, the 2004 survey data have been studied in detail.

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The Trends

It is a phenomenon of most cold flow additives used in commercial applications that addition of the additive to the fuel will have no effect on fuel cloud point, but the cold filter plugging point (CFPP) will be reduced. In principle, it is therefore possible to identify survey fuels treated with cold flow additive as the difference between cloud point and CFPP will be extended compared to an untreated fuel. In practice this is an inexact science as the natural difference between cloud point and CFPP can vary significantly and the degree of CFPP depression provided by cold flow additives can vary from fuel to fuel. In the most extreme case, fuels treated with pour point depressant additives that are not active enough to depress the CFPP will appear in the analysis as untreated. However, in an average case the difference between cloud point and CFPP in an untreated fuel will be around 4 to 8°C and in a treated fuel it will be greater.

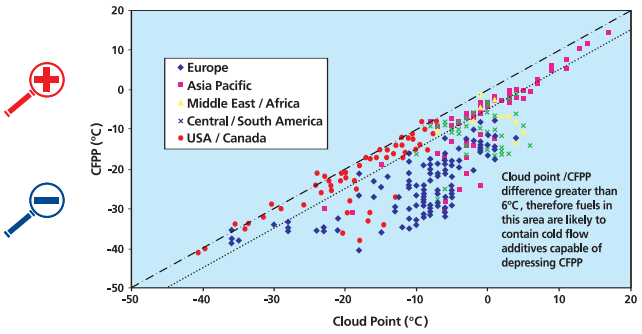
For the analysis of the survey data it has been assumed that fuels exhibiting cloud point/CFPP differences of 6°C or less are unlikely to be treated with cold flow additive, and fuels with cloud point/CFPP differences of 7°C or greater are likely to be treated.

The chart below is a plot of CFPP against cloud point covering all samples collected for the 2004 survey.

The lower diagonal line represents a cloud point/CFPP difference of 6°C. Based on the principle explained above, points occurring below this line are considered to represent fuels that have been treated with cold flow additive capable of depressing the CFPP. This provides an interesting regional breakdown:-

Region	% of Samples Containing Cold Flow Additive Capable of Depressing CFPP
Europe	90
Central / South America	48
Asia Pacific	33
USA / Canada	20

Worldwide Cold Flow Evaluation



It must be stressed that this analysis is only valid for the survey samples and may not represent a true picture within all of the regions used. Percentage figures for the Middle East Africa region are not included in the table as the number of samples tested is small. Figures obtained for Asia Pacific and Central / South America regions may also be misleading as coverage of these regions is somewhat limited. Sample coverage in the USA / Canada and Europe regions, however, is considerably better so the percentage figures here are likely to be more indicative of cold flow additive application within these regions.

Looking Forward

Shifting emphasis from analysing current trends to considering the future it is clear that a number of the themes already noted will continue in the forthcoming years. Fuel sulphur levels will continue to be reduced, biodiesel will increasingly be used as an extender to fossil fuel and the complexity of both fuel and vehicle production will increase. These changes will continue to apply pressure to refinery operations and as a consequence diesel fuel characteristics are likely to evolve. Today, the speed and direction of any evolution is a matter of speculation and is probably better dealt with as a trend in the next survey, currently planned for 2006.

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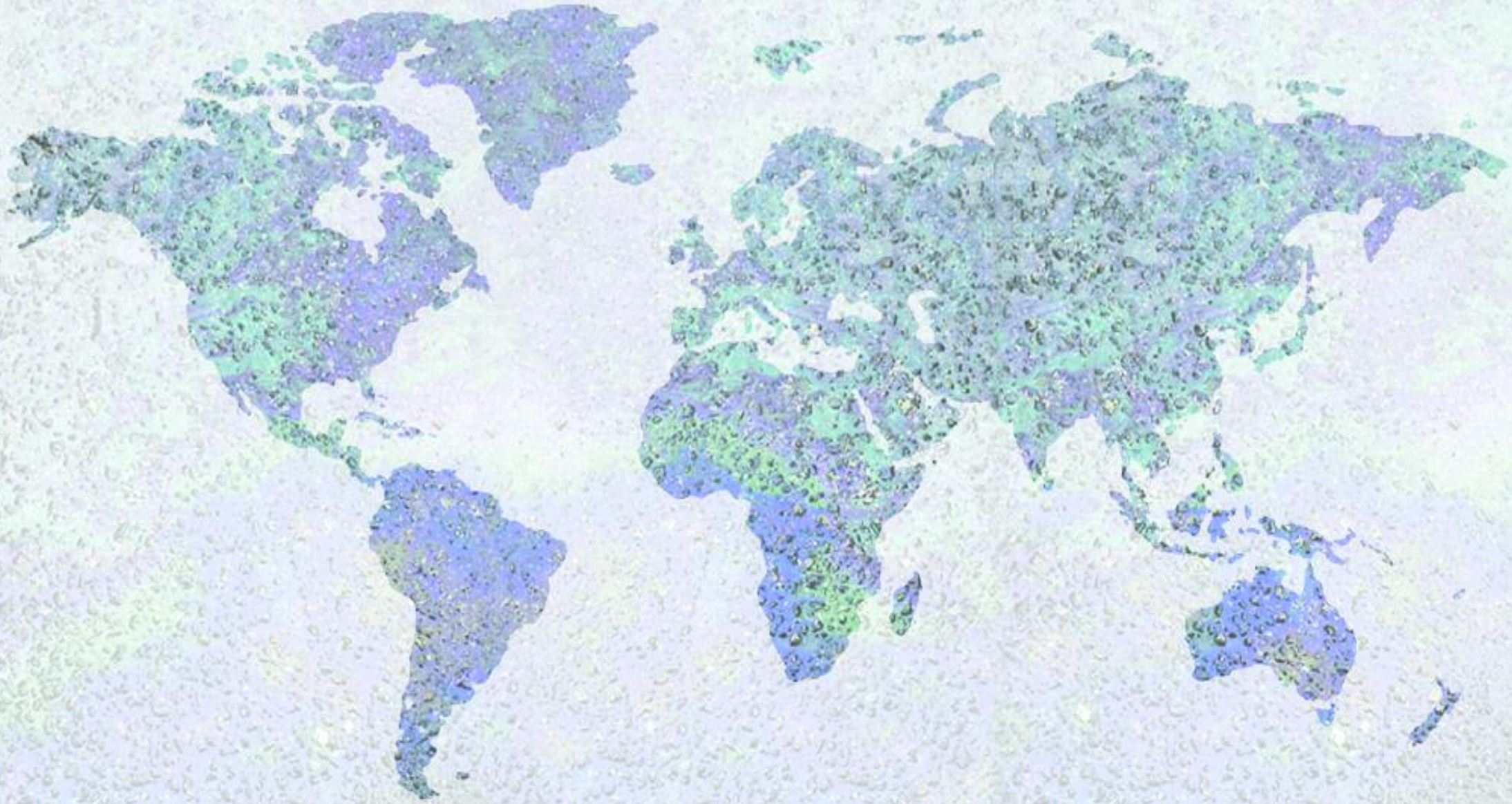
Worldwide Summary



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Worldwide Summary - 1

Mean Values

Physical inspection data

Country	Argentina	Australia	Austria	Bahrain	Benelux	Brazil	Canada	Chile	China	Colombia	Czech Republic	Denmark
No. of Samples	20	7	5	1	8	3	15			5	4	2
See page	96	69	13	61	15	100	102	105	71	106	17	19
Cloud Point, °C	-1	-1	-9	-1	-7	0	-28			3	-9	-13
CFPP, °C	-13	-5	-28	-5	-23	-10	-28			-9	-27	-27
LTFT, °C							-30					
Pour Point, °C	-19	-6	-28	-6	-34	-24	-34			-18	-31	-41
HFRR, µm	375	370	341	382	339	356	496			359	357	377
Wax Content @ 10°C Below Cloud, wt%	1.5	5.0	1.6	2.4	1.5	0.6	1.2			1.4	1.6	1.0
Sulphur, wt%	0.1183	0.0230	0.0009	0.4085	0.0041	0.144	0.029			0.1561	0.0289	0.0040
Density @ 15°C, kg/m³	846.1	837.2	827.1	853.1	833.3	854.3	844.9			839.9	838.6	841.3
Viscosity @ 20°C, cSt	4.96	4.37	3.77	4.45	3.98	5.53	3.25			4.89	4.11	4.34
Viscosity @ 30°C, cSt												
Viscosity @ 40°C, cSt	3.24	2.80	2.43	3.53	2.62	3.30	2.15			3.03	2.65	2.76
Cetane Index 2 Variable	50.1	52.0	52.5	51.5	52.3	48.1	44.2			50.4	50.6	50.4
Cetane Index 4 Variable	49.2	53.1	53.1	51.0	52.2	46.2	43.7			51.1	50.6	50.0
Cetane Number	52.5	56.5	54.8	51.6	54.7	47.7	43.5			53.8	53.3	54.7
Distillation, °C IBP	153	173	153	162	162	158	164			174	162	165
T_{10}	209	223	205	222	205	205	194			220	211	207
T_{20}	227	236	216	253	220	228	208			231	222	223
T_{50}	275	269	257	299	265	279	248			269	265	269
T_{90}	347	323	325	354	327	362	310			347	329	330
T_{95}	364	336	343	368	341	386				371	344	345
FBP	377	349	354	379	353	394	336			383	354	356

Worldwide Summary - 2

Mean Values

Physical inspection data

Country	Finland	France	Germany	Greece	Hungary	India	Ireland	Italy	Japan G2	Japan G3	Japan SG3	Korea
No. of Samples	6	12	20	3	1	2	7	15	22	1	2	5
See page	21	23	26	30	32	76	34	36	78	82	84	86
Cloud Point, °C	-26	-5	-8	-1	-9	6	-7	-2	-3	-15	-21	-4
CFPP, °C	-34	-25	-29	-10	-32	2	-19	-14	-11	-19	-31	-26
LTFT, °C												
Pour Point, °C	-37	-30	-27	-13	-27	2	-28	-21	-20.5	-20.0	-37.5	-27.5
HFRR, µm	359	273	345	410	360	401	348	364	400	486	482	418
Wax Content @ 10°C Below Cloud, wt%	1.7	1.4	1.4	2.4	1.1	2.3	1.9	1.9	1.7	2.3	1.7	
Sulphur, wt%	0.0020	0.0304	0.0008	0.0213	0.0194	0.1364	0.0034	0.0229	0.0033	0.0023	0.0026	0.022
Density @ 15°C, kg/m³	821.3	836.3	830.3	832.9	837.5	837.6	839.6	835.0	832	818	809	833.7
Viscosity @ 20°C, cSt	2.99	3.80	3.88	5.61	4.24	3.91	4.70	4.25				
Viscosity @ 30°C, cSt									3.86	2.65	1.87	
Viscosity @ 40°C, cSt	2.02	2.50	2.53	3.07	2.67	2.56	2.96	2.80				2.92
Cetane Index 2 Variable	49.3	50.3	52.3	56.3	50.9	53.1	51.8	52.8				
Cetane Index 4 Variable	50.4	49.7	52.7	58.8	51.7	50.8	52.5	52.4	57.1	54.7	48.7	55
Cetane Number	55.2	52.8	54.7	60.4	56.0	51.6	55.1	53.9	58.1	55.7	49.3	
Distillation, °C IBP	166	157	167	189	177	129	175	175	169	166	152	154
T_{10}	202	197	208	235	218	179	222	207	215	189	170	203
T_{20}	210	210	220	250	229	205	236	222	238	205	181	223
T_{50}	236	261	260	283	265	275	273	270	282	252	217	276
T_{90}	290	334	327	336	333	350	330	340	334	315	296	338
T_{95}	305	351	344	352	350	372	344	357	346	330	313	
FBP	323	361	356	364	361	381	354	368	360	349	331	367

Worldwide Summary - 3

Mean Values

Physical inspection data

Country	Kuwait	Lithuania	Malaysia	Mexico	Norway	Peru	Poland	Portugal	Saudi Arabia	Singapore	Slovakia	South Africa
No. of Samples	1	1	4	11	4	2	5	3	4	6	1	5
See page	62	39	88	108	41	111	43	45	64	90	47	66
Cloud Point, °C	2	-24	14	-5	-24	-1	-13	2	-2	6	-11	3
CFPP, °C	-7	-36	11	-9	-34	-5	-32	-16	-5	1	-35	-9
LTFT, °C												
Pour Point, °C	-9	-30	11	-10	-40	-6	-37	-21	-13	-2	-33	-18
HFRR, µm	424	439	377	414	339	332	366	404	484	386	303	359
Wax Content @ 10°C Below Cloud, wt%	1.6	1.7	3.7	1.4	1.5	2.1	1.2	1.5	1.4	2.1	1.2	1.4
Sulphur, wt%	0.5510	0.0047	0.1083	0.0414	0.0027	0.4655	0.0027	0.0280	0.9075	0.0297	0.0289	0.1561
Density @ 15°C, kg/m³	833.1	825.9	833.2	832.6	830.3	860.1	835.0	839.1	837.1	847.4	840.8	839.9
Viscosity @ 20°C, cSt	5.39	3.13	5.66	4.05	3.03	6.54	4.60	4.71	5.15	6.85	3.75	4.89
Viscosity @ 30°C, cSt												
Viscosity @ 40°C, cSt	3.22	2.07	3.48	2.62	2.04	2.63	2.96	2.96	2.91	4.01	2.45	3.03
Cetane Index 2 Variable	55.3	50.7	56.4	52.2	47.0	49.5	53.7	51.6	53.4	53.2	48.1	50.4
Cetane Index 4 Variable	57.1	51.5	58.4	52.3	47.5	46.9	54.2	51.7	53.1	55.0	48.2	51.1
Cetane Number	58.2	54.9	61.2	56.8	53.1	48.8	54.0	53.9	58.7	56.1	52.3	53.8
Distillation, °C IBP	195	171	190	165	142	150	170	163	179	195	143	174
T_{10}	226	211	232	207	197	214	218	213	211	242	207	220
T_{20}	243	219	247	222	207	254	231	225	228	259	218	231
T_{50}	280	247	284	263	240	297	274	270	276	296	258	269
T_{90}	342	288	358	336	300	348	327	343	352	359	328	347
T_{95}	358	306	381	355	315	363	340	362	368	375	344	371
FBP	373	328	388	369	327	379	352	375	379	386	349	383

Worldwide Summary - 4

Physical inspection data

Country	Spain	Sweden	Switzerland	Thailand	United Kingdom	USA East	USA Midwest	USA West
No. of Samples	11	7	5	9	19	9	23	9
See page	49	52	54	92	56	119	115	112
Cloud Point, °C	-2	-36	-12	4	-10	-13	-16	-15
CFPP, °C	-16	-37	-27	0	-20	-20	-20	-17
LTFT, °C					-18	-18	-17	
Pour Point, °C	-25	-38	-34	-3	-29	-32	-28	-26
HFRR, µm	354	394	371	386	357	395	426	523
Wax Content @ 10°C Below Cloud, wt%	1.6	3.2	1.4	2.2	2.0	2.0	1.8	1.7
Sulphur, wt%	0.0290	0.0006	0.0185	0.0283	0.0040	0.037	0.039	0.020
Density @ 15°C, kg/m³	835.1	815.2	827.6	832.0	831.4	854.0	860.8	840.8
Viscosity @ 20°C, cSt	4.08	2.79	3.38	5.02	3.84	4.03	4.36	3.49
Viscosity @ 30°C, cSt								
Viscosity @ 40°C, cSt	2.64	1.92	2.24	3.17	2.51	2.58	2.76	2.31
Cetane Index 2 Variable	51.8	50.6	50.7	56.4	53.3	45.0	43.9	45.4
Cetane Index 4 Variable	51.6	51.9	51.0	57.0	52.6	44.7	43.7	46.1
Cetane Number	54.3	54.3	53.0	57.9	55.4	44.5	43.6	47.3
Distillation, °C IBP	162	180	148	165	164	178	187	177
T_{10}	204	205	199	214	203	214	224	203
T_{20}	216	211	209	232	219	227	235	214
T_{50}	265	233	250	280	264	263	267	248
T_{90}	338	271	320	350	322	323	319	317
T_{95}	356	280	339	367	337			
FBP	365	294	348	376	350	350	346	347

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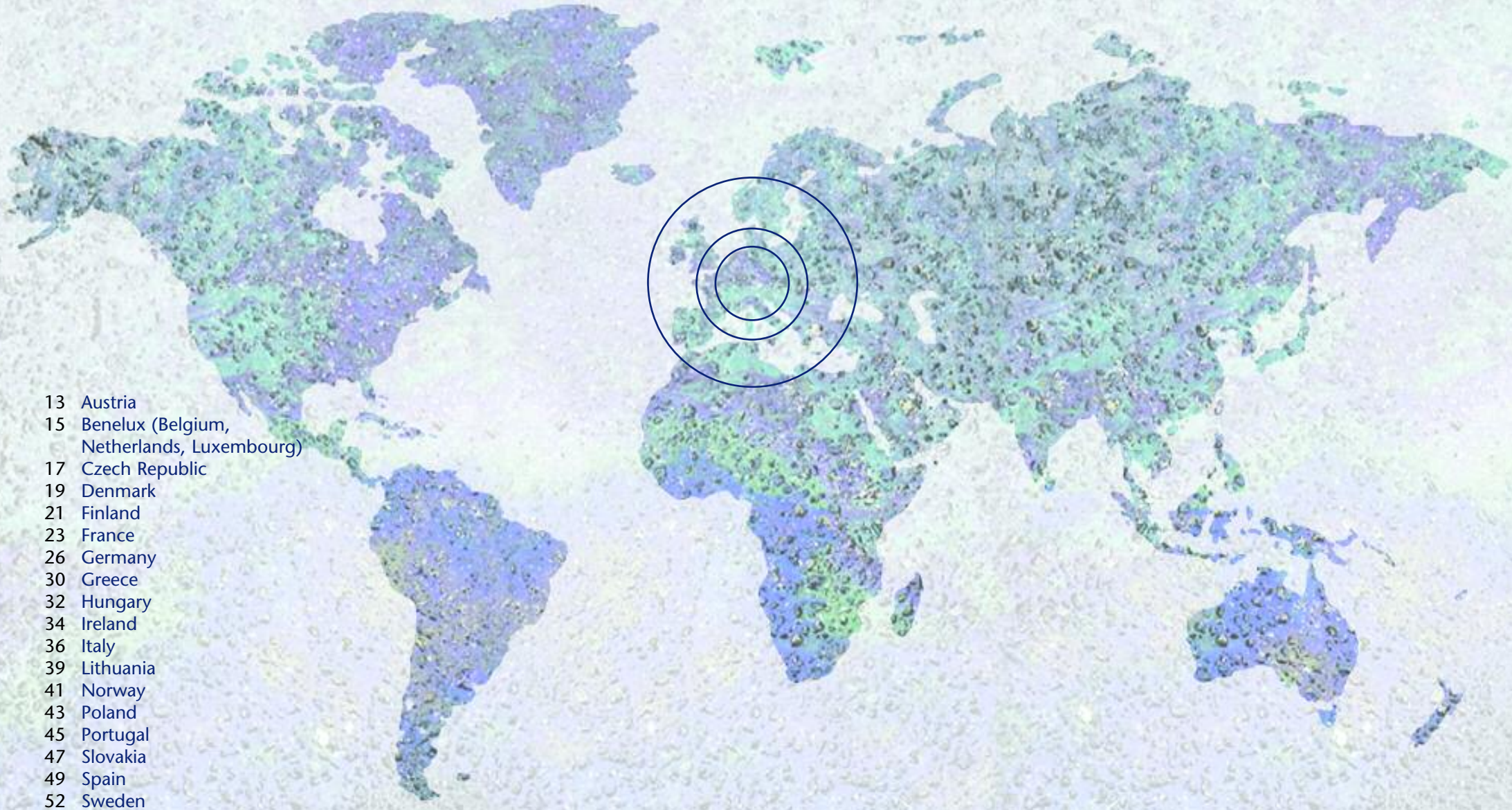
Worldwide Survey - Europe



13 Austria
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36 Italy
39 Lithuania
41 Norway
43 Poland
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49 Spain
52 Sweden
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56 United Kingdom

Austria

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400979	DIES 0400981	DIES 0400984	DIES 0400986	DIES 0400987
Cloud Point, °C		-7	-9	-10	-8	-7	-10	-9	-10
CFPP, °C	-20 (max)	-20	-28	-34	-20	-28	-33	-24	-34
Pour Point, °C		-27	-28	-33	-27	-27	-27	-27	-33
HFRR, µm	460 (max)	383	341	275	336	381	275	330	383
Wax Content @ 10°C Below Cloud, wt%		2.4	1.6	1.2	2.4	1.8	1.2	1.2	1.6
Sulphur, wt%	0.001 (max)	0.0010	0.0009	0.0007	0.0010	0.0009	0.0007	0.0007	0.0010
Density @ 15°C, kg/m³	820 - 845	832.4	827.1	821.7	830.4	825.3	825.9	821.7	832.4
Viscosity @ 20°C, cSt	2.0 - 4.5	4.65	3.77	3.37	4.65	3.37	3.41	3.49	3.92
Viscosity @ 40°C, cSt		2.88	2.43	2.21	2.88	2.21	2.22	2.31	2.51
Cetane Index 2 Variable	51 (min)	55.0	52.5	51.4	55.0	51.5	51.6	53.2	51.4
Cetane Index 4 Variable	46 (min)	55.4	53.1	51.8	55.4	51.9	51.8	54.2	52.0
Cetane Number		57.8	54.8	52.5	57.8	53.8	52.5	55.1	54.9
Distillation, °C IBP		169	153	141	141	152	145	158	169
T_{10}		212	205	198	210	199	198	205	212
T_{20}		230	216	207	230	207	208	215	221
T_{50}		272	257	250	272	250	251	251	259
T_{95}	360 (max)	358	343	336	358	341	345	336	336
FBP		368	354	347	368	351	355	350	347

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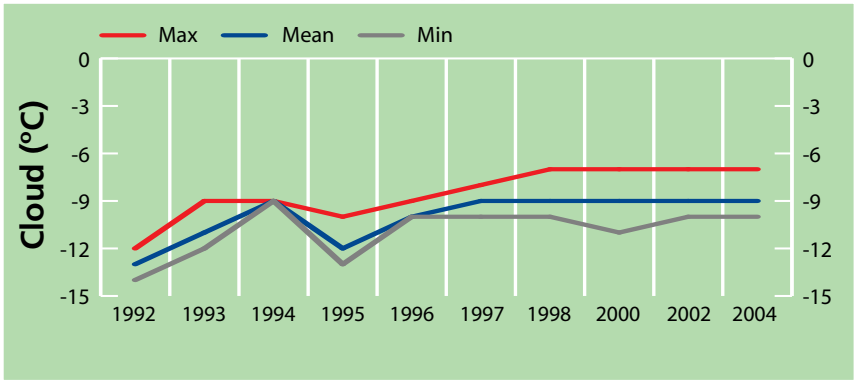
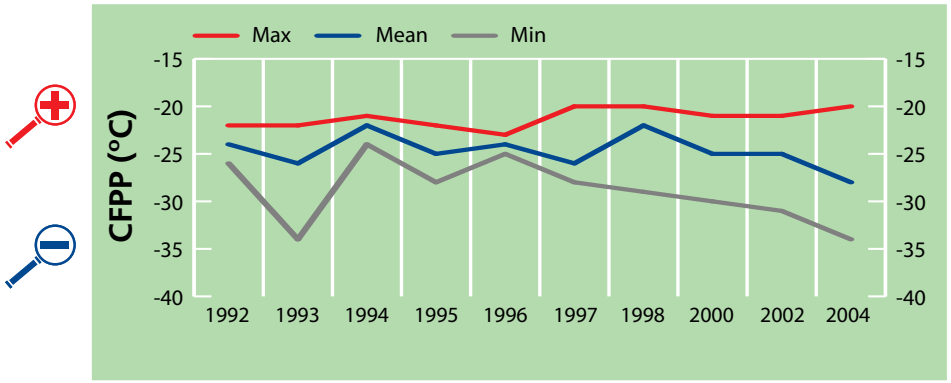
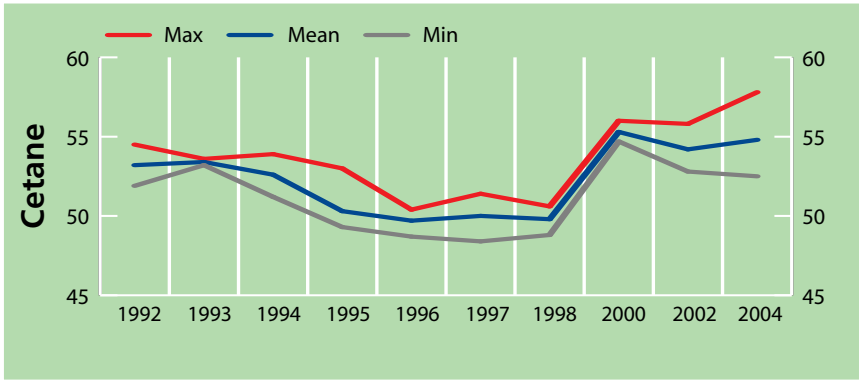
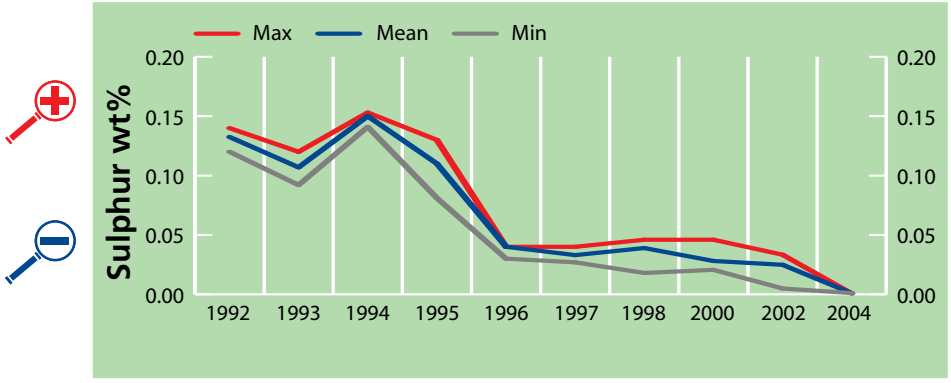
Austria - Key Trends









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Benelux

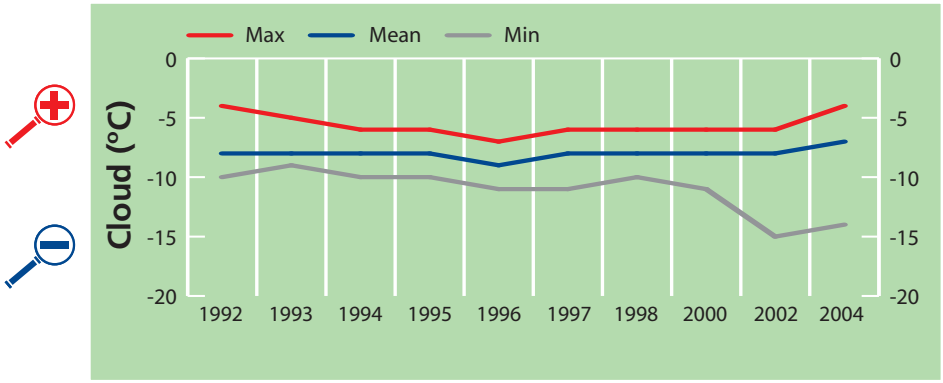
Belgium, Netherlands and Luxembourg

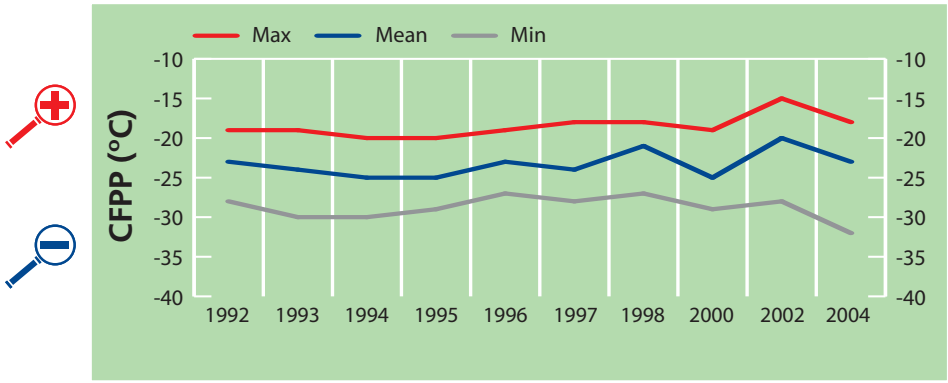
National Standards and physical inspection data

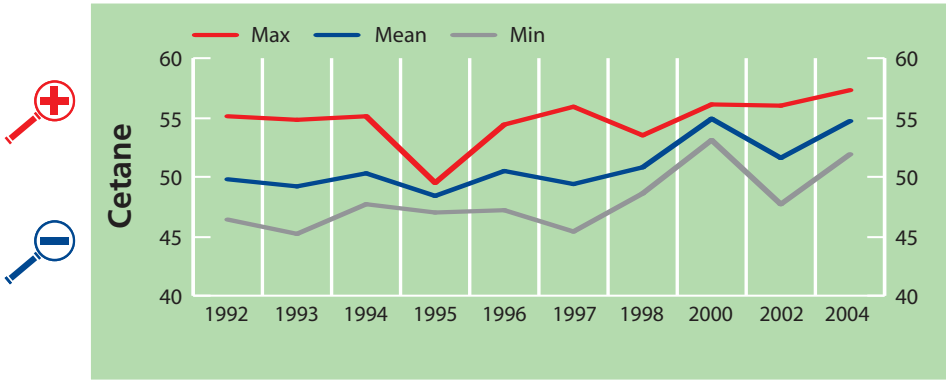
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400675	DIES 0400676	DIES 0400677	DIES 0400678	DIES 0400679	DIES 0400682	DIES 0400683	DIES 0400684
Cloud Point, °C		-4	-7	-14	-8	-7	-14	-5	-4	-5	-5	-8
CFPP, °C	-20	-18	-23	-32	-32	-21	-22	-26	-18	-18	-27	-21
Pour Point, °C		-24	-34	-48	-48	-48	-30	-33	-24	-30	-30	-27
HFRR, µm	460 (max)	382	339	265	372	360	265	353	382	365	313	303
Wax Content @ 10°C Below Cloud, wt%		2.0	1.5	1.0	1.0	1.7	1.6	1.1	2.0	1.9	1.1	1.7
Sulphur, wt%	0.005 (max)	0.0044	0.0041	0.0031	0.0043	0.0031	0.0043	0.0040	0.0041	0.0042	0.0042	0.0044
Density @ 15°C, kg/m³	820 - 845	837.7	833.3	828.8	836.6	830.9	834.3	828.8	832.4	833.1	832.6	837.7
Viscosity @ 20°C, cSt		4.34	3.98	3.43	3.77	3.43	3.80	4.19	4.30	4.34	4.18	3.86
Viscosity @ 40°C, cSt	2.0 - 4.5	2.78	2.62	2.47	2.47	2.57	2.48	2.70	2.76	2.78	2.70	2.52
Cetane Index 2 Variable		54.7	52.3	48.1	48.1	54.1	50.5	54.3	54.7	53.3	53.1	50.1
Cetane Index 4 Variable	46 (min)	55.1	52.2	48.3	48.3	53.2	51.1	55.1	54.1	52.8	53.8	49.4
Cetane Number	51 (min)	57.3	54.7	51.9	54.6	54.2	55.0	57.3	54.0	55.7	55.0	51.9
Distillation, °C IBP		172	162	153	163	153	170	172	157	158	166	158
T_{10}		215	205	194	200	194	213	213	201	203	215	201
T_{20}		229	220	208	211	208	221	228	223	224	229	219
T_{50}		274	265	252	252	269	258	266	274	269	267	261
T_{95}	360 (max)	351	341	327	351	343	327	343	347	339	346	336
FBP		362	353	336	358	351	336	362	356	350	357	350

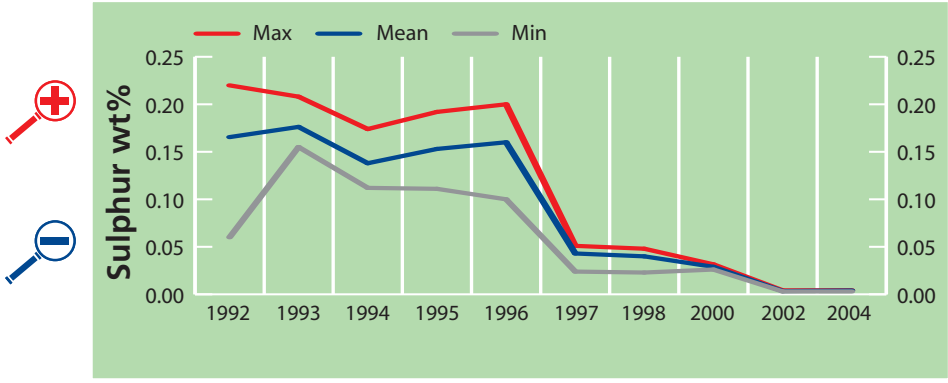
Benelux - Key Trends

Belgium, Netherlands and Luxembourg









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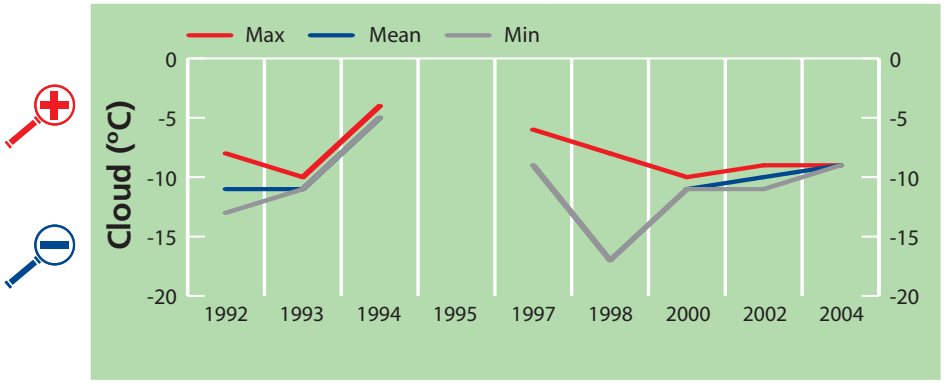
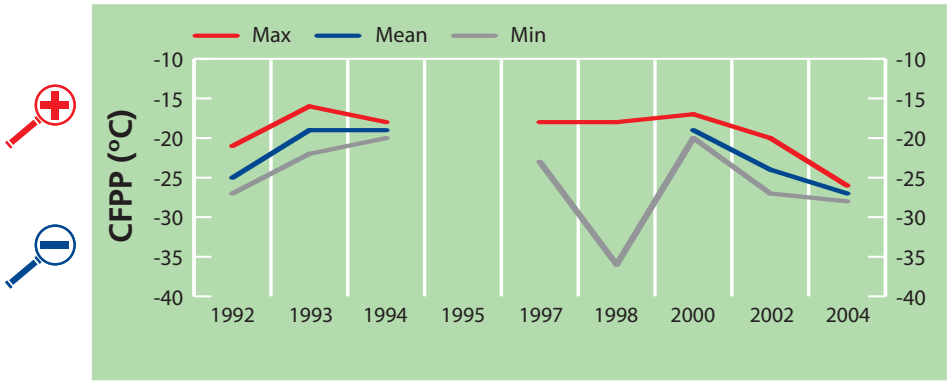
Czech Republic

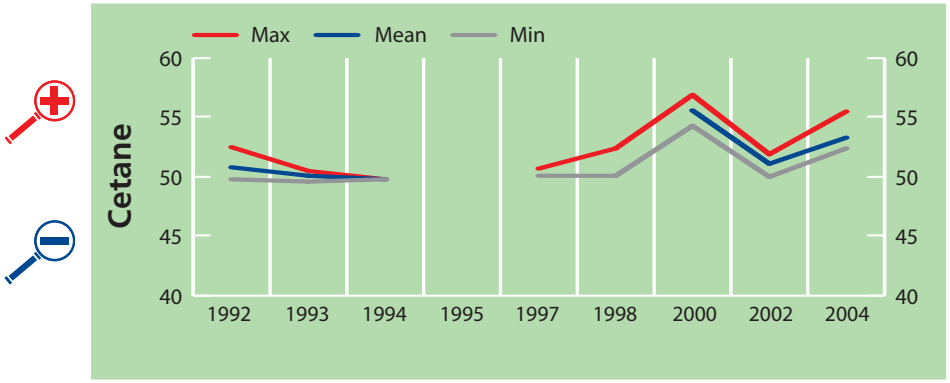
National Standards and physical inspection data

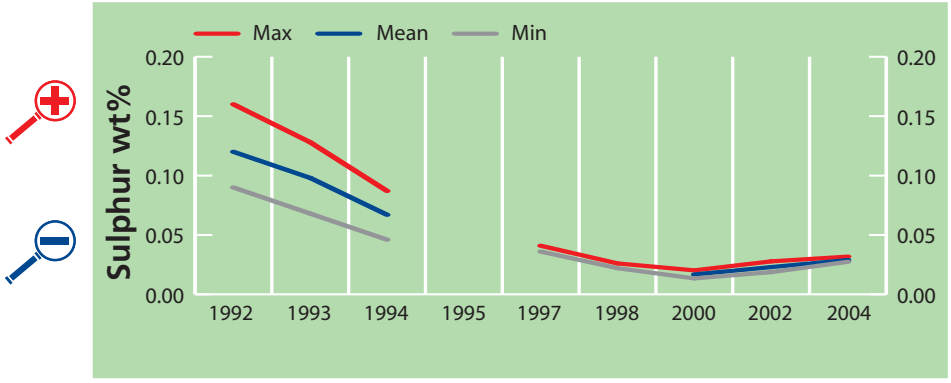
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0402029	DIES 0402028	DIES 0402027	DIES 0402026
Cloud Point, °C	-8 (max)	-9	-9	-9	-9	-9	-9	-9
CFPP, °C	-20 (max)	-26	-27	-28	-26	-28	-28	-28
Pour Point, °C		-30	-31	-33	-33	-30	-30	-30
HFRR, µm	460 (max)	367	357	342	342	357	367	362
Wax Content @ 10°C Below Cloud, wt%		1.9	1.6	1.2	1.9	1.8	1.2	1.5
Sulphur, wt%	0.035 (max)	0.0318	0.0289	0.0274	0.0318	0.0290	0.0274	0.0275
Density @ 15°C, kg/m³	820 - 845	844.1	838.6	833.0	844.1	842.4	834.9	833.0
Viscosity @ 20°C, cSt		4.37	4.11	3.72	4.37	4.31	4.04	3.72
Viscosity @ 40°C, cSt	2.0 - 4.5	2.78	2.65	2.45	2.78	2.75	2.61	2.45
Cetane Index 2 Variable		51.5	50.6	49.6	49.6	49.8	51.3	51.5
Cetane Index 4 Variable	46 (min)	51.6	50.6	49.8	49.8	49.8	51.6	51.1
Cetane Number	51 (min)	55.5	53.3	52.4	55.5	52.6	52.4	52.8
Distillation, °C IBP		185	162	147	185	152	162	147
T_{10}		220	211	199	220	213	211	199
T_{20}		232	222	211	232	226	218	211
T_{50}		269	265	260	269	268	262	260
T_{95}	360 (max)	351	344	337	337	344	351	344
FBP		360	354	347	347	353	360	356

Czech Republic - Key Trends









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Denmark

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401477	DIES 0401478
Cloud Point, °C		-9	-13	-16	-16	-9
CFPP, °C	-24 (max)	-27	-27	-27	-27	-27
Pour Point, °C		-39	-41	-42	-42	-39
HFRR, µm	460 (max)	400	377	354	400	354
Wax Content @ 10°C Below Cloud, wt%		1.6	1.0	0.4	0.4	1.6
Sulphur, wt%	0.005 (max)	0.0042	0.0040	0.0038	0.0038	0.0042
Density @ 15°C, kg/m³	820 - 845	844.6	841.3	837.9	844.6	837.9
Viscosity @ 20°C, cSt		4.82	4.34	3.86	3.86	4.82
Viscosity @ 40°C, cSt	2.0 - 4.5	3.05	2.76	2.48	2.48	3.05
Cetane Index 2 Variable		53.4	50.4	47.4	47.4	53.4
Cetane Index 4 Variable	46 (min)	53.4	50.0	46.6	46.6	53.4
Cetane Number	51 (min)	54.7	54.7	54.7	54.7	54.7
Distillation, °C IBP		169	165	162	162	169
T_{10}		215	207	198	198	215
T_{20}		234	223	212	212	234
T_{50}		278	269	260	260	278
T_{95}	360 (max)	348	345	342	348	342
FBP		361	356	352	361	352

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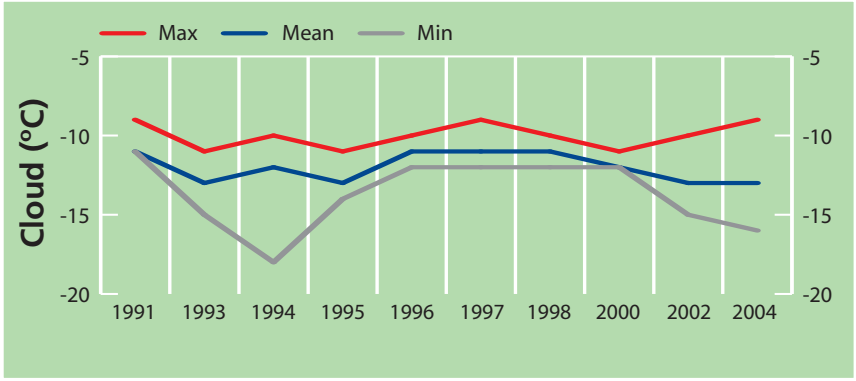
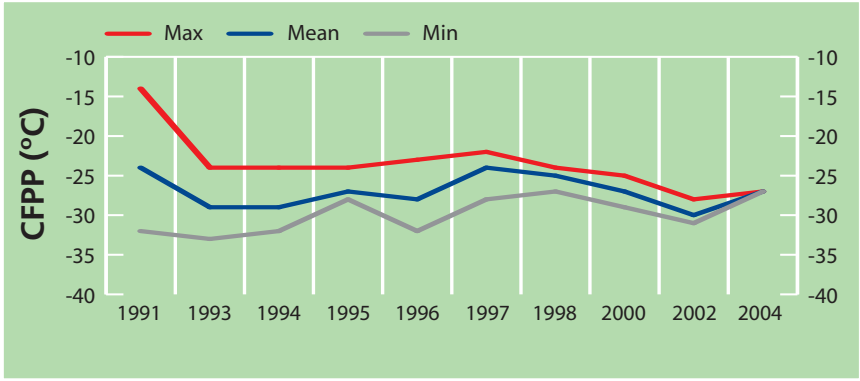
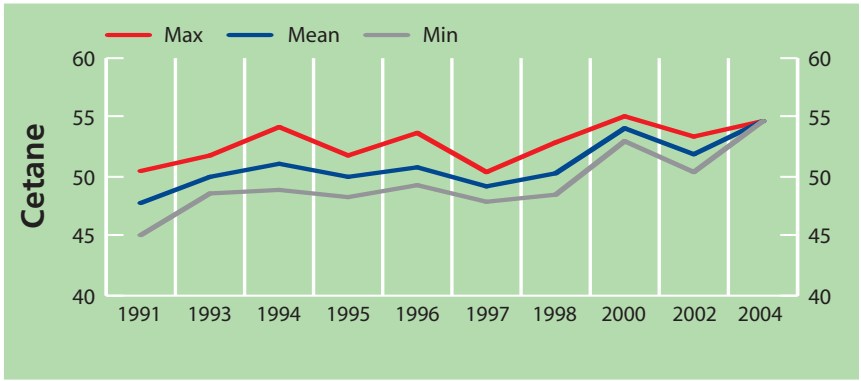
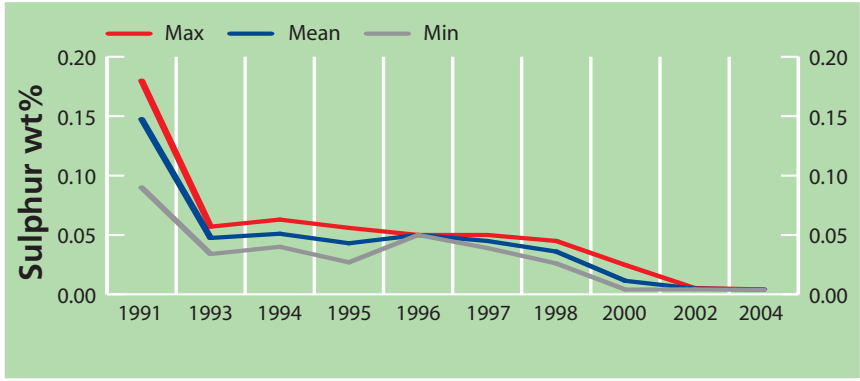
Denmark - Key Trends









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Finland

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0402214	DIES 0402215	DIES 0402216	DIES 0402217	DIES 0402218	DIES 0402219
Cloud Point, °C	-29 (max)	-23	-26	-28	-28	-28	-28	-23	-28	-23
CFPP, °C	-34 (max)	-28	-34	-36	-35	-36	-34	-28	-35	-36
Pour Point, °C		-33	-37	-39	-36	-33	-39	-39	-36	-39
HFRR, µm	460 (max)	422	359	282	378	395	357	321	422	282
Wax Content @ 10°C Below Cloud, wt%		1.9	1.7	1.3	1.8	1.8	1.8	1.3	1.9	1.3
Sulphur, wt%	0.005 (max)	0.0021	<0.0010	<0.0005	<0.0005	<0.0005	<0.0005	0.0018	<0.0005	0.0021
Density @ 15°C, kg/m³	800 - 840	822.6	821.3	820.5	821.3	821.1	822.6	820.9	821.4	820.5
Viscosity @ 20°C, cSt		3.10	2.99	2.92	2.95	2.95	3.10	2.96	3.06	2.92
Viscosity @ 40°C, cSt	1.5 - 4.0	2.03	2.02	1.99	2.02	2.02	2.03	2.02	2.01	1.99
Cetane Index 2 Variable		49.7	49.3	48.8	49.7	49.4	48.8	48.9	49.7	49.1
Cetane Index 4 Variable	46 (min)	50.9	50.4	49.8	50.9	50.5	49.8	50.0	50.8	50.4
Cetane Number	51 (min)	56.2	55.2	54.0	56.2	54.0	56.2	55.8	54.0	55.1
Distillation, °C IBP		182	166	147	182	165	167	168	168	147
T_{10}	180 (min)	204	202	200	202	203	204	200	204	201
T_{20}		212	210	207	212	211	212	207	212	208
T_{50}		238	236	235	238	236	236	235	238	235
T_{95}	340 (max)	312	305	298	305	312	298	305	304	310
FBP		328	323	317	326	323	317	323	323	328

Specification shown is Reformulated Diesel. Other specifications can also exist within Finland and may be represented within the data shown here

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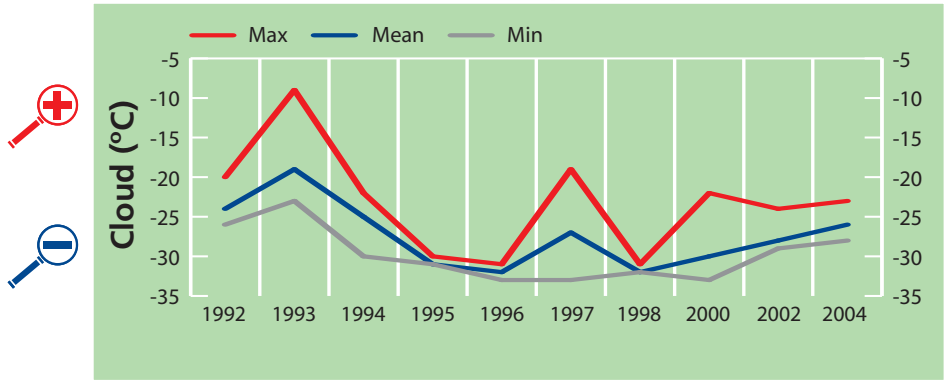
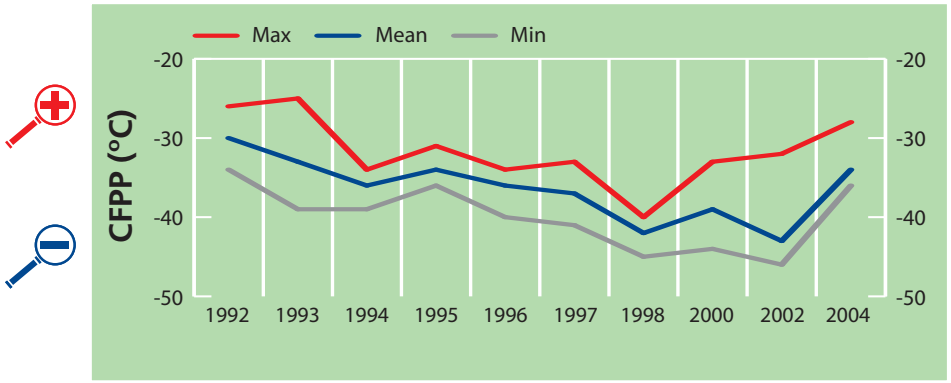
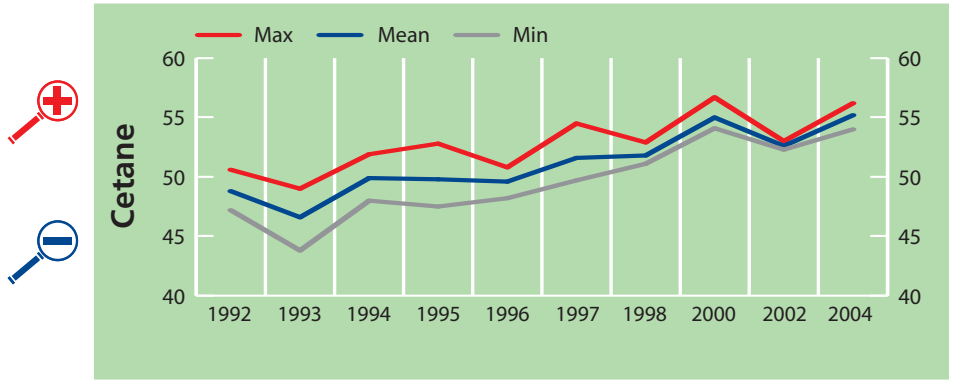
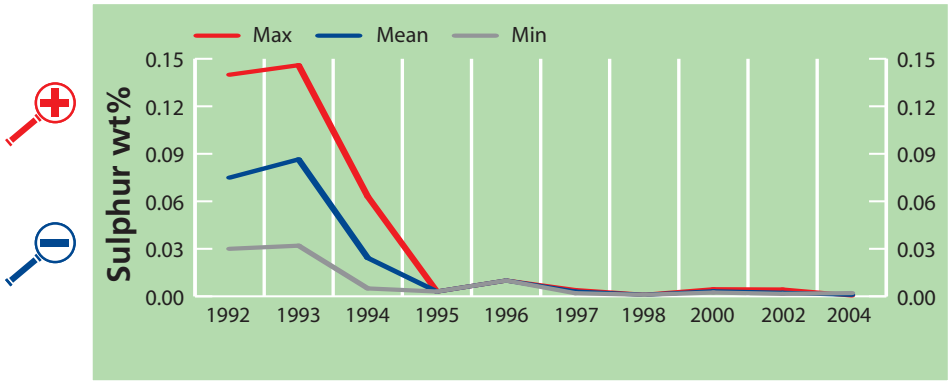
Finland - Key Trends









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National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400891	DIES 0400892	DIES 0400893	DIES 0400895	DIES 0400898	DIES 0400899	DIES 0400900	DIES 0400901
Cloud Point, °C		-4	-5	-6	-6	-6	-5	-4	-6	-6	-5	-5
CFPP, °C	-15 (max)*	-18	-25	-30	-27	-30	-26	-20	-27	-18	-24	-26
Pour Point, °C		-21	-30	-39	-24	-36	-30	-33	-39	-24	-24	-30
HFRR, µm	460 (max)	368	273	161	328	365	327	256	194	187	161	326
Wax Content @ 10°C Below Cloud, wt%		2.1	1.4	0.9	1.3	0.9	1.4	1.2	1.0	1.9	1.6	1.5
Sulphur, wt%	0.035 (max)	0.0350	0.0304	0.0222	0.0332	0.0311	0.0350	0.0222	0.0323	0.0250	0.0319	0.0295
Density @ 15°C, kg/m^3	820 - 845	843.7	836.3	830.4	830.4	831.6	840.1	834.5	843.1	835.9	836.6	840.0
Viscosity @ 20°C, cSt		4.49	3.80	3.18	3.66	3.18	4.00	3.52	3.85	3.80	3.90	4.03
Viscosity @ 40°C, cSt	2.0 - 4.5	2.86	2.50	2.18	2.40	2.18	2.64	2.33	2.56	2.49	2.54	2.61
Cetane Index 2 Variable		53.5	50.3	47.4	50.0	47.4	49.3	48.9	49.2	52.2	51.6	50.7
Cetane Index 4 Variable	46 (min)	52.3	49.7	47.5	49.7	47.5	49.3	48.6	48.1	51.1	50.6	49.5
Cetane Number	51 (min)	54.6	52.8	51.4	51.7	52.4	51.4	51.7	53.7	52.2	54.3	52.3
Distillation, °C IBP		180	157	150	159	150	168	152	154	151	154	160
T_{10}		218	197	187	191	187	209	193	198	195	196	197
T_{20}		230	210	197	204	197	219	204	212	210	211	214
T_{50}		271	261	243	251	243	261	252	265	268	266	268
T_{95}	360 (max)	356	351	346	350	356	351	355	354	350	353	350
FBP		369	361	354	360	369	361	365	362	361	358	362

* Specification for Gazole-Hiver, Grand-Froid is -20°C

France (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400902	DIES 0400903	DIES 0400904	DIES 0400905
Cloud Point, °C		-4	-5	-6	-5	-5	-5	-6
CFPP, °C	-15 (max)*	-18	-25	-30	-22	-29	-26	-21
Pour Point, °C		-21	-30	-39	-21	-27	-36	-39
HFRR, µm	460 (max)	368	273	161	368	307	253	208
Wax Content @ 10°C Below Cloud, wt%		2.1	1.4	0.9	2.1	1.1	1.4	1.3
Sulphur, wt%	0.035 (max)	0.0350	0.0304	0.0222	0.0287	0.0322	0.0341	0.0296
Density @ 15°C, kg/m³	820 - 845	843.7	836.3	830.4	834.1	832.9	843.7	832.8
Viscosity @ 20°C, cSt		4.49	3.80	3.18	4.11	3.66	4.49	3.46
Viscosity @ 40°C, cSt	2.0 - 4.5	2.86	2.50	2.18	2.66	2.41	2.86	2.30
Cetane Index 2 Variable		53.5	50.3	47.4	53.5	50.6	50.1	49.8
Cetane Index 4 Variable	46 (min)	52.3	49.7	47.5	52.3	50.1	50.3	49.4
Cetane Number	51 (min)	54.6	52.8	51.4	54.0	54.6	51.6	53.8
Distillation, °C IBP		180	157	150	150	155	180	153
T_{10}		218	197	187	193	195	218	192
T_{20}		230	210	197	213	207	230	203
T_{50}		271	261	243	271	257	271	253
T_{95}	360 (max)	356	351	346	346	351	352	350
FBP		369	361	354	354	358	360	360

* Specification for Gazole-Hiver, Grand-Froid is -20°C

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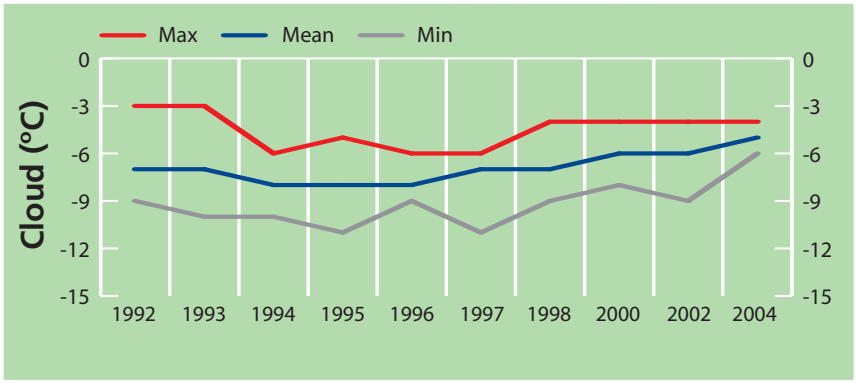
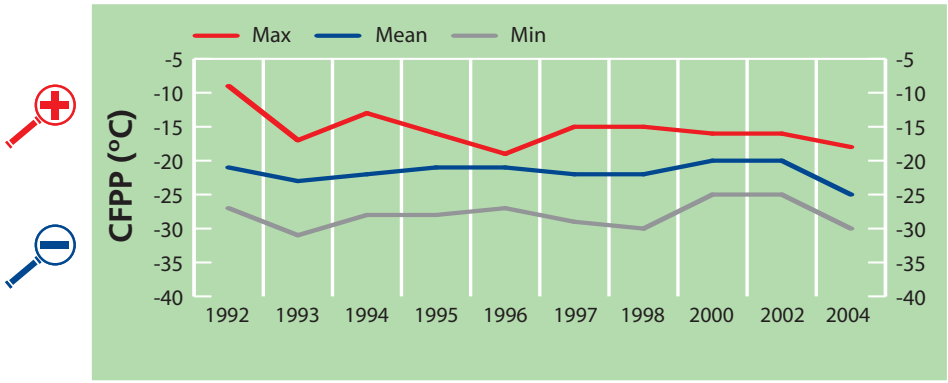
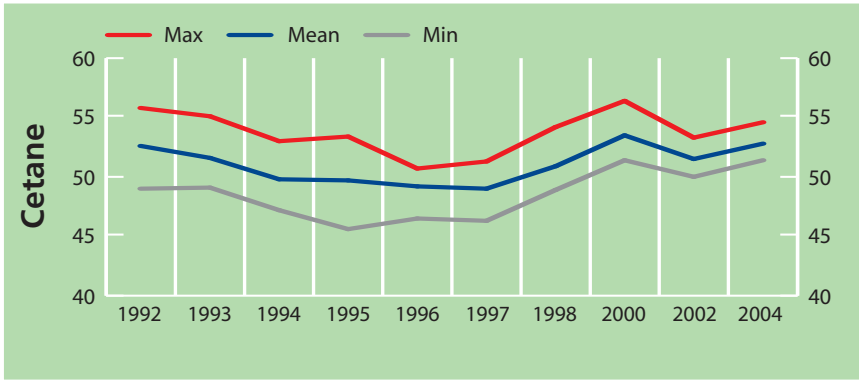
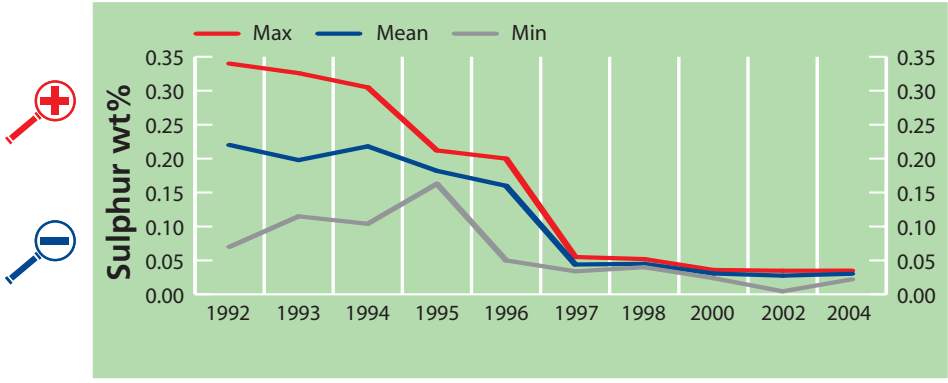
France - Key Trends









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Germany

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400938	DIES 0400939	DIES 0400940	DIES 0400941	DIES 0400945	DIES 0400947	DIES 0400948	DIES 0400949
Cloud Point, °C		-6	-8	-11	-7	-9	-8	-6	-11	-9	-8	-7
CFPP, °C	-22 (max)	-23	-29	-33	-29	-27	-29	-31	-33	-29	-32	-28
Pour Point, °C		-21	-27	-30	-30	-21	-27	-27	-27	-27	-30	-30
HFRR, µm	460 (max)	424	345	227	358	344	342	376	256	346	308	401
Wax Content @ 10°C Below Cloud, wt%		2.1	1.4	0.7	1.2	1.3	1.8	1.4	1.2	1.3	1.5	1.6
Sulphur, wt%	0.001 (max)	0.0010	0.0008	<0.0005	0.0005	0.0007	0.0008	0.0006	0.0006	0.0009	0.0006	0.0010
Density @ 15°C, kg/m³	820 - 845	840.8	830.3	822.5	828.0	840.8	828.1	833.2	822.5	828.8	828.8	824.3
Viscosity @ 20°C, cSt		4.62	3.88	3.10	3.74	4.58	4.23	3.93	3.18	3.84	4.19	3.15
Viscosity @ 40°C, cSt	2.0 - 4.5	2.92	2.53	2.10	2.46	2.88	2.72	2.54	2.13	2.51	2.74	2.16
Cetane Index 2 Variable		56.5	52.3	48.8	53.0	51.0	54.6	50.8	51.8	53.5	54.4	51.1
Cetane Index 4 Variable	46 (min)	58.2	52.7	49.2	53.2	52.0	55.6	51.2	52.3	53.3	55.1	51.3
Cetane Number	51 (min)	58.0	54.7	51.3	53.7	54.5	56.7	56.5	53.1	57.3	58.0	53.1
Distillation, °C IBP		195	167	150	162	178	168	166	150	158	176	161
T_{10}		230	208	194	203	226	214	208	196	200	212	194
T_{20}		239	220	204	214	239	227	218	206	214	225	204
T_{50}		272	260	244	259	270	267	258	247	263	267	247
T_{95}	360 (max)	350	344	334	348	342	343	346	334	348	347	344
FBP		364	356	345	358	358	354	358	350	361	358	357

Germany (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400952	DIES 0400954	DIES 0400955	DIES 0400958	DIES 0400959	DIES 0400961	DIES 0400962	DIES 0400963
Cloud Point, °C		-6	-8	-11	-8	-8	-6	-8	-7	-10	-8	-7
CFPP, °C	-22 (max)	-23	-29	-33	-32	-31	-32	-23	-26	-29	-30	-29
Pour Point, °C		-21	-27	-30	-30	-27	-27	-24	-27	-27	-27	-30
HFRR, µm	460 (max)	424	345	227	227	369	333	340	395	384	281	297
Wax Content @ 10°C Below Cloud, wt%		2.1	1.4	0.7	0.9	1.3	1.5	1.7	1.6	2.1	0.7	1.6
Sulphur, wt%	0.001 (max)	0.0010	0.0008	<0.0005	0.0010	0.0010	<0.0005	0.0008	0.0008	0.0006	0.0010	0.0007
Density @ 15°C, kg/m³	820 - 845	840.8	830.3	822.5	834.0	834.3	833.4	824.0	830.3	833.7	833.3	829.5
Viscosity @ 20°C, cSt		4.62	3.88	3.10	3.82	4.28	3.85	4.26	3.52	4.62	3.40	3.79
Viscosity @ 40°C, cSt	2.0 - 4.5	2.92	2.53	2.10	2.46	2.72	2.52	2.76	2.33	2.92	2.27	2.49
Cetane Index 2 Variable		56.5	52.3	48.8	50.6	52.9	50.6	56.5	50.8	53.8	48.8	53.5
Cetane Index 4 Variable	46 (min)	58.2	52.7	49.2	51.0	53.3	51.2	58.2	51.5	55.6	49.2	49.2
Cetane Number	51 (min)	58.0	54.7	51.3	53.0	53.1	51.3	56.9	52.7	57.5	52.5	51.9
Distillation, °C IBP		195	167	150	172	175	172	171	164	195	152	155
T_{10}		230	208	194	208	213	209	219	208	230	202	199
T_{20}		239	220	204	219	227	219	230	215	239	213	213
T_{50}		272	260	244	258	269	257	269	254	272	250	264
T_{95}	360 (max)	350	344	334	350	345	347	338	340	334	350	345
FBP		364	356	345	364	359	359	347	352	345	363	356

Germany (continued 2)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400964	DIES 0400965	DIES 0400966	DIES 0400967
Cloud Point, °C		-6	-8	-11	-6	-7	-9	-7
CFPP, °C	-22 (max)	-23	-29	-33	-31	-26	-31	-29
Pour Point, °C		-21	-27	-30	-27	-21	-27	-24
HFRR, µm	460 (max)	424	345	227	381	424	357	376
Wax Content @ 10°C Below Cloud, wt%		2.1	1.4	0.7	1.6	1.3	1.7	1.6
Sulphur, wt%	0.001 (max)	0.0010	0.0008	<0.0005	0.0006	0.0008	0.0008	0.0008
Density @ 15°C, kg/m³	820 - 845	840.8	830.3	822.5	833.2	831.9	831.8	822.5
Viscosity @ 20°C, cSt		4.62	3.88	3.10	4.00	4.01	4.12	3.10
Viscosity @ 40°C, cSt	2.0 - 4.5	2.92	2.53	2.10	2.60	2.61	2.66	2.10
Cetane Index 2 Variable		56.5	52.3	48.8	51.5	53.0	53.6	51.1
Cetane Index 4 Variable	46 (min)	58.2	52.7	49.2	52.1	53.0	54.2	51.6
Cetane Number	51 (min)	58.0	54.7	51.3	56.5	56.7	54.3	54.6
Distillation, °C IBP		195	167	150	173	162	174	161
T_{10}		230	208	194	211	207	214	196
T_{20}		239	220	204	220	219	227	204
T_{50}		272	260	244	261	265	268	244
T_{95}	360 (max)	350	344	334	347	348	341	346
FBP		364	356	345	358	359	352	354

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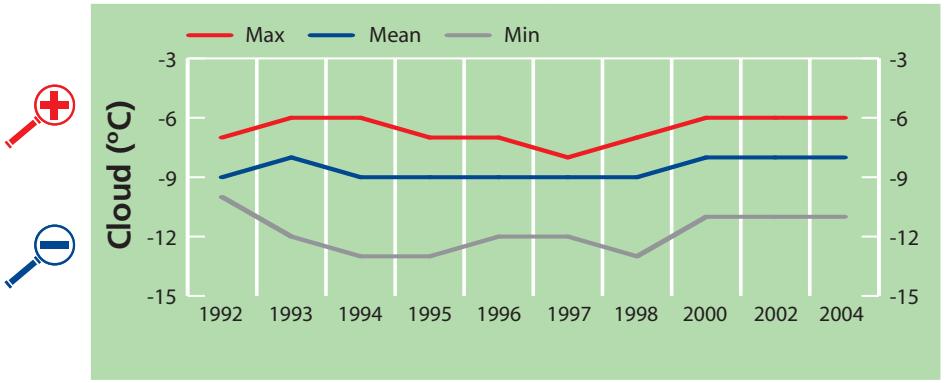
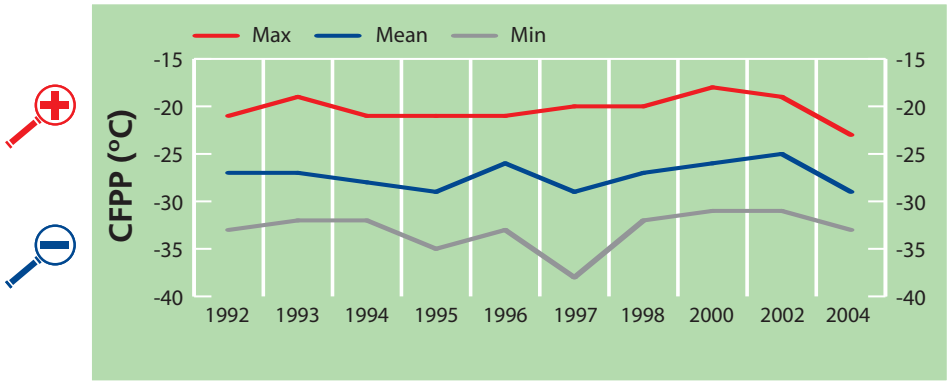
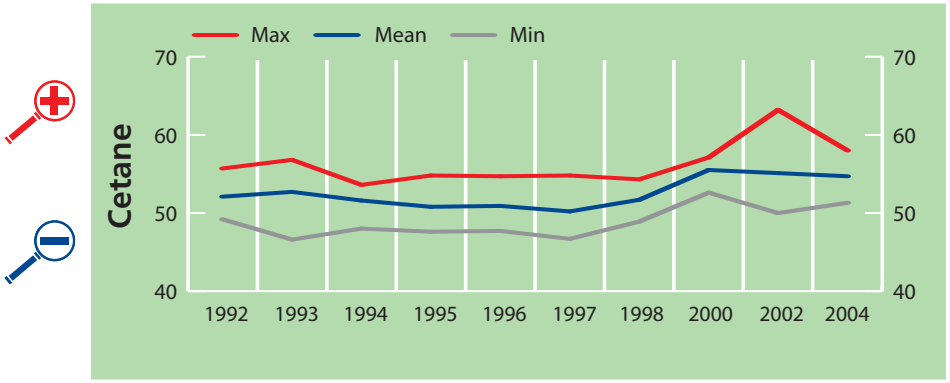
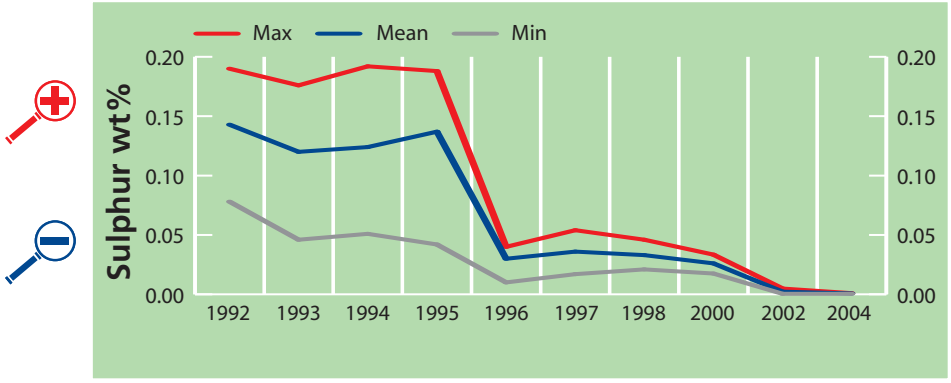
Germany - Key Trends









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Greece

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400466	DIES 30068/04	DIES 30208/04
Cloud Point, °C		1	-1	-3	-1	-3	1
CFPP, °C	-5 (max)	-8	-10	-15	-15	-8	-8
Pour Point, °C		-9	-13	-18	-18	-9	-12
HFRR, µm	460 (max)	478	410	325	325	478	429
Wax Content @ 10°C Below Cloud, wt%		2.9	2.4	1.8	1.8	2.6	2.9
Sulphur, wt%	0.035 (max)	0.0319	0.0213	0.0055	0.0319	0.0055	0.0266
Density @ 15°C, kg/m³	845 (max)	837.4	832.9	828.2	833.0	837.4	828.2
Viscosity @ 20°C, cSt		6.15	5.61	5.05	5.05	6.15	5.64
Viscosity @ 40°C, cSt	2.0 - 4.5	3.73	3.07	2.38	3.08	3.73	2.38
Cetane Index 2 Variable		58.6	56.3	55.0	55.2	55.0	58.6
Cetane Index 4 Variable	46 (min)	61.5	58.8	56.7	56.7	58.3	61.5
Cetane Number	51 (min)	62.9	60.4	59.0	59.0	59.2	62.9
Distillation, °C IBP		204	189	181	181	204	183
T_{10}		247	235	225	225	247	233
T_{20}		261	250	240	240	261	251
T_{50}		287	283	278	278	285	287
T_{95}	360 (max)	355	352	348	355	348	353
FBP		367	364	362	363	362	367

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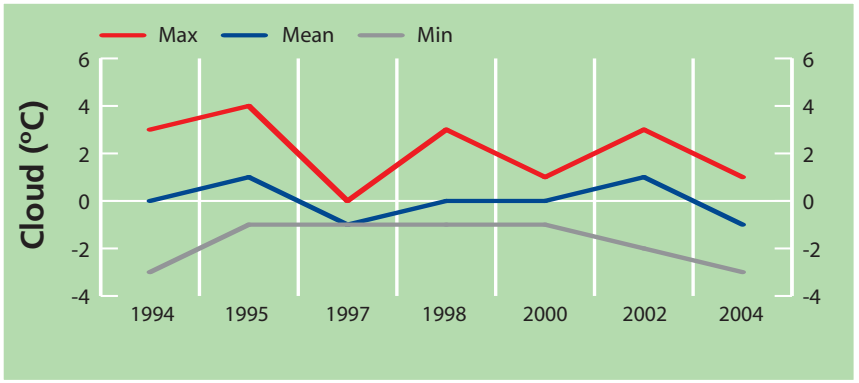
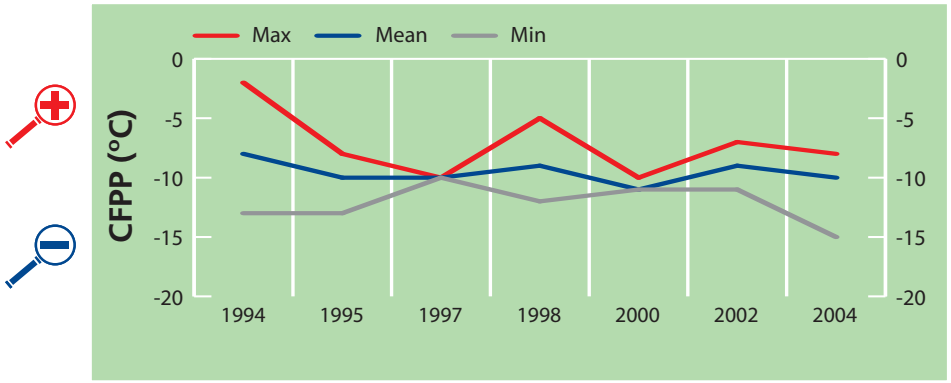
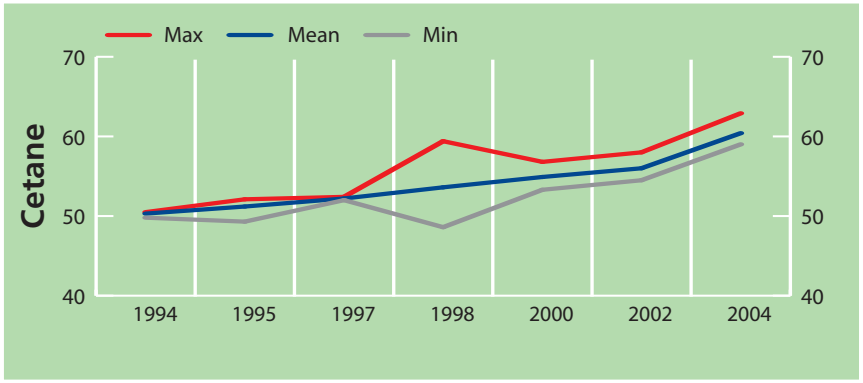
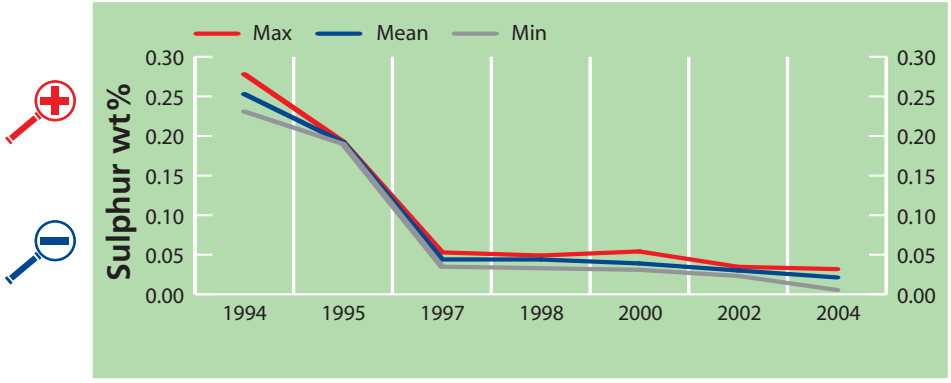
Greece - Key Trends









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Hungary

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400244
Cloud Point, °C			-9		-9
CFPP, °C	-20 (max)		-32		-32
Pour Point, °C			-27		-27
HFRR, µm	460 (max)		360		360
Wax Content @ 10°C Below Cloud, wt%			1.1		1.1
Sulphur, wt%	0.035 (max)		0.0194		0.0194
Density @ 15°C, kg/m³	820 - 845		837.5		837.5
Viscosity @ 20°C, cSt			4.24		4.24
Viscosity @ 40°C, cSt	2.0 - 4.5		2.67		2.67
Cetane Index 2 Variable			50.9		50.9
Cetane Index 4 Variable	46 (min)		51.7		51.7
Cetane Number	51 (min)		56.0		56.0
Distillation, °C IBP			177		177
T_{10}			218		218
T_{20}			229		229
T_{50}			265		265
T_{95}	360 (max)		350		350
FBP			361		361

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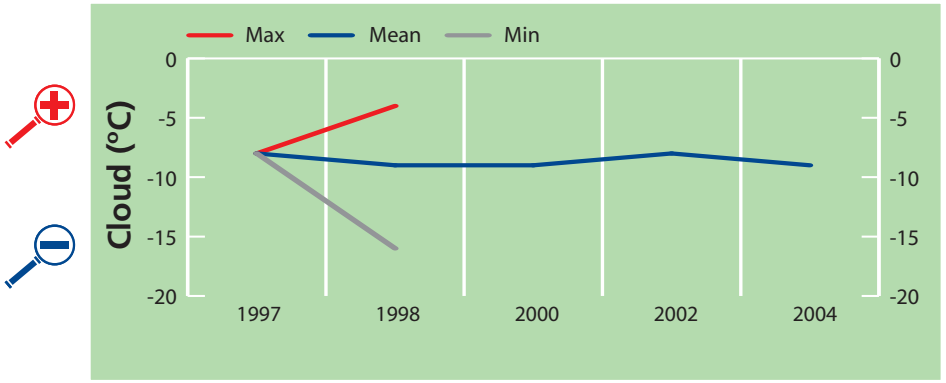
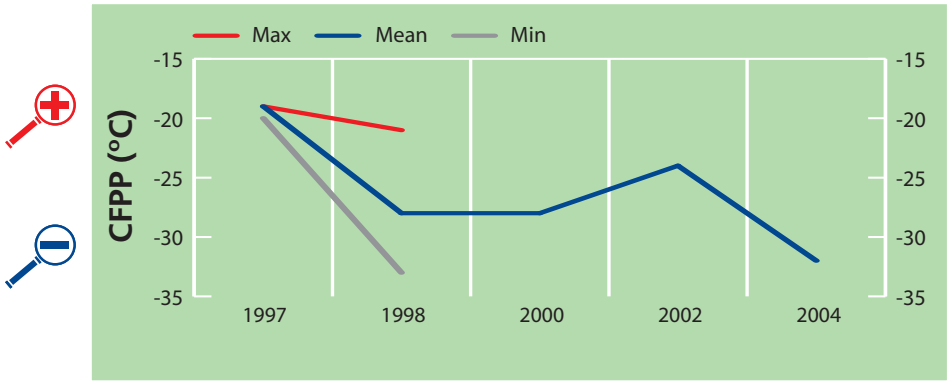
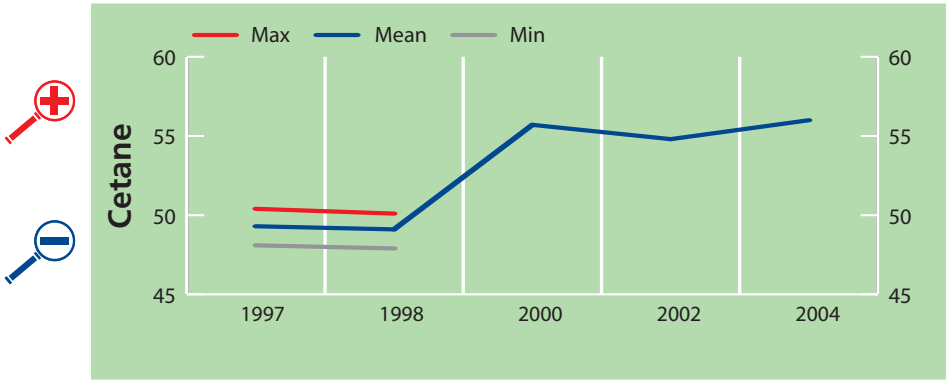
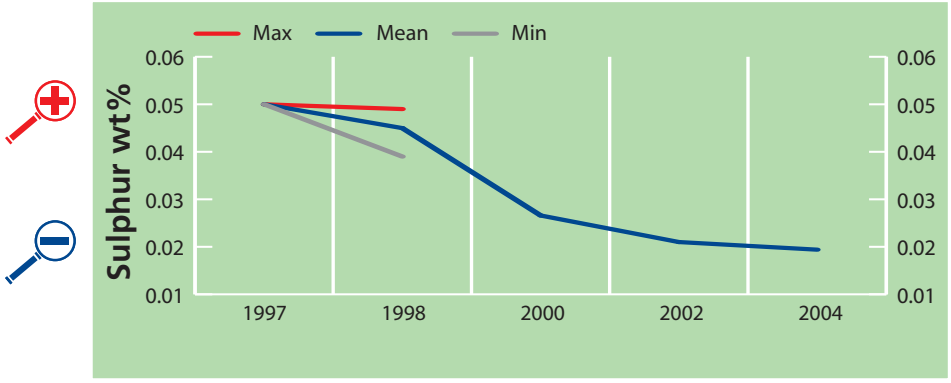
Hungary - Key Trends









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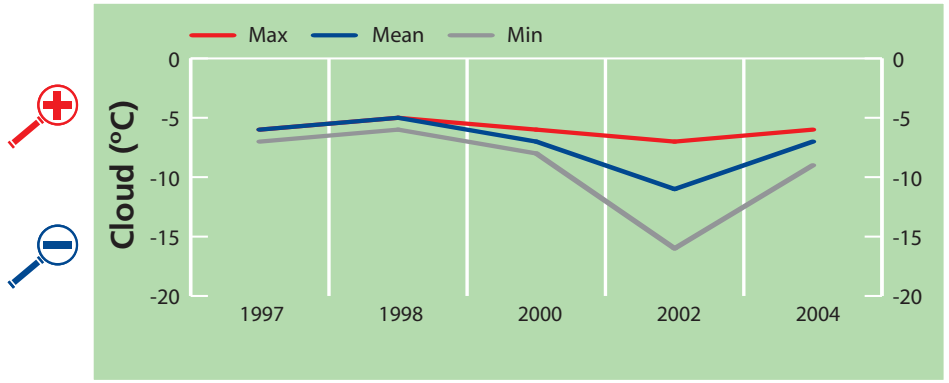
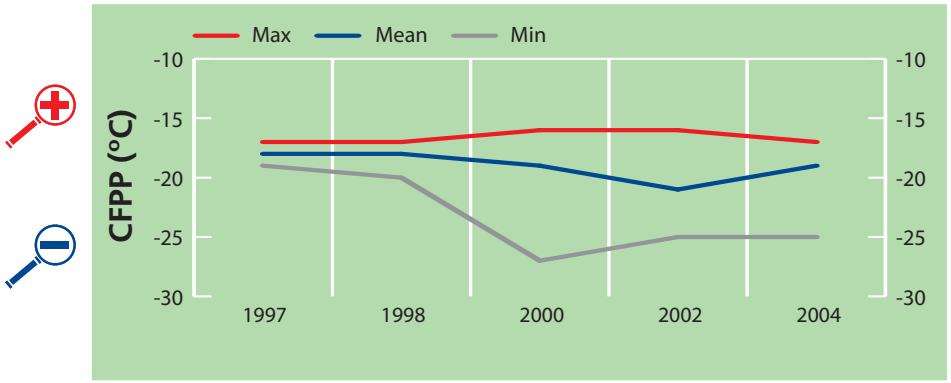
Ireland

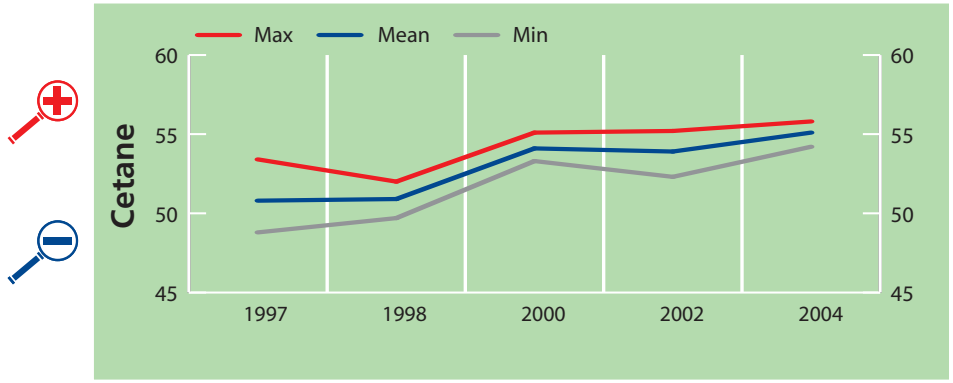
National Standards and physical inspection data

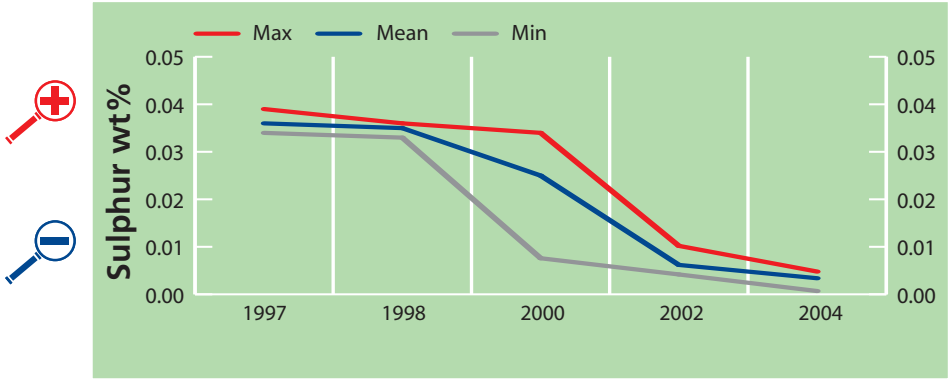
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401573	DIES 0401574	DIES 0401575	DIES 0401576	DIES 0401577	DIES 0401578	DIES 0401580
Cloud Point, °C		-6	-7	-9	-9	-6	-6	-6	-8	-8	-8
CFPP, °C	-15 (max)	-17	-19	-25	-25	-18	-18	-17	-20	-18	-19
Pour Point, °C		-27	-28	-30	-27	-27	-27	-27	-30	-30	-30
HFRR, µm	460 (max)	379	348	301	301	371	377	329	379	301	376
Wax Content @ 10°C Below Cloud, wt%		2.5	1.9	1.6	1.7	1.8	1.9	1.8	1.6	2.5	1.8
Sulphur, wt%	0.005 (max)	0.0048	0.0034	0.0007	0.0036	0.0042	0.0032	0.0027	0.0048	0.0007	0.0048
Density @ 15°C, kg/m³	820 - 845	842.4	839.6	835.2	842.4	840.5	841.5	841.6	837.9	838.0	835.2
Viscosity @ 20°C, cSt		5.08	4.70	4.23	4.97	4.76	5.01	5.08	4.39	4.44	4.23
Viscosity @ 40°C, cSt	2.0 - 4.5	3.16	2.96	2.72	3.04	3.01	3.11	3.16	2.82	2.85	2.72
Cetane Index 2 Variable		52.5	51.8	51.0	51.7	52.5	52.4	52.5	51.0	51.0	51.5
Cetane Index 4 Variable	46 (min)	53.1	52.5	51.5	51.5	52.3	52.7	52.6	52.6	52.5	53.1
Cetane Number	51 (min)	55.8	55.1	54.2	55.2	55.6	54.2	54.6	55.1	55.8	55.5
Distillation, °C IBP		181	175	169	171	174	181	180	172	176	169
T_{10}		228	222	215	217	215	222	220	228	228	226
T_{20}		240	236	233	235	233	237	237	240	240	234
T_{50}		279	273	264	277	277	279	279	266	266	264
T_{95}	360 (max)	351	344	335	343	350	348	351	341	338	335
FBP		359	354	348	353	359	358	358	351	350	348

Ireland - Key Trends









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Italy

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401695	DIES 0401697	DIES 0401698	DIES 0401699	DIES 0401700	DIES 0401701	DIES 0401702	DIES 0401703
Cloud Point, °C		1	-2	-7	0	1	-3	-2	-1	-1	0	1
CFPP, °C	-12 (max)*	-8	-14	-21	-14	-12	-13	-20	-8	-14	-11	-15
Pour Point, °C		-15	-21	-27	-21	-21	-15	-24	-18	-18	-18	-21
HFRR, µm	460 (max)	604	364	186	359	412	604	321	280	415	356	365
Wax Content @ 10°C Below Cloud, wt%		2.9	1.9	1.4	2.6	1.8	1.7	1.4	1.4	1.8	2.7	2.9
Sulphur, wt%	0.035 (max)	0.0330	0.0229	0.0031	0.0309	0.0176	0.0079	0.0292	0.0279	0.0181	0.0169	0.0330
Density @ 15°C, kg/m³	820 - 845	842.4	835.0	827.3	831.0	842.4	827.3	835.0	837.7	831.8	840.9	835.5
Viscosity @ 20°C, cSt		5.35	4.25	3.61	4.32	5.35	4.52	4.19	3.90	4.23	4.24	4.11
Viscosity @ 40°C, cSt	2.0 - 4.5	3.36	2.80	2.36	2.79	3.36	2.88	2.71	2.62	2.67	2.78	3.24
Cetane Index 2 Variable		55.8	52.8	50.6	54.9	52.1	55.8	52.0	51.1	53.6	51.3	55.0
Cetane Index 4 Variable	46 (min)	57.1	52.4	50.1	54.9	53.5	57.1	51.5	50.4	53.0	50.6	50.9
Cetane Number	51 (min)	58.2	53.9	51.1	56.5	53.2	51.1	51.4	52.6	54.1	52.1	58.2
Distillation, °C IBP		204	175	148	180	204	191	179	174	180	183	184
T_{10}		232	207	195	208	232	218	201	200	209	205	223
T_{20}		245	222	208	224	245	232	216	213	223	219	243
T_{50}		281	270	260	273	279	271	266	266	268	272	281
T_{95}	360 (max)	363	357	350	360	354	350	363	362	360	359	356
FBP		373	368	365	366	370	368	373	372	370	369	366

* Fuels are also produced to lower CFPP values for use in Alpine regions

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Italy (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401704	DIES 0401708	DIES 0401710	DIES 0401711	DIES 0401712	DIES 0401713	DIES 0401716
Cloud Point, °C		1	-2	-7	-7	-4	-3	-2	-2	-5	0
CFPP, °C	-12 (max)*	-8	-14	-21	-21	-15	-14	-10	-13	-19	-17
Pour Point, °C		-15	-21	-27	-27	-27	-18	-21	-24	-21	-18
HFRR, µm	460 (max)	604	364	186	186	319	443	442	249	316	392
Wax Content @ 10°C Below Cloud, wt%		2.9	1.9	1.4	1.5	1.6	1.9	1.6	1.6	1.6	2.1
Sulphur, wt%	0.035 (max)	0.0330	0.0229	0.0031	0.0031	0.0271	0.0306	0.0218	0.0285	0.0326	0.0186
Density @ 15°C, kg/m³	820 - 845	842.4	835.0	827.3	827.3	830.9	836.5	838.1	841.2	828.8	841.3
Viscosity @ 20°C, cSt		5.35	4.25	3.61	4.01	3.72	4.13	4.20	4.33	3.61	4.89
Viscosity @ 40°C, cSt	2.0 - 4.5	3.36	2.80	2.36	2.57	2.46	2.88	2.78	2.80	2.36	3.10
Cetane Index 2 Variable		55.8	52.8	50.6	54.7	52.1	52.7	51.7	50.6	53.5	51.4
Cetane Index 4 Variable	46 (min)	57.1	52.4	50.1	54.2	51.8	51.8	51.2	50.1	53.0	52.2
Cetane Number	51 (min)	58.2	53.9	51.1	54.0	56.4	52.9	54.1	54.3	53.5	53.7
Distillation, °C IBP		204	175	148	172	173	151	177	162	148	164
T_{10}		232	207	195	195	198	199	206	207	196	207
T_{20}		245	222	208	211	212	215	221	220	208	226
T_{50}		281	270	260	266	260	272	269	269	263	277
T_{95}	360 (max)	363	357	350	351	351	356	355	361	353	362
FBP		373	368	365	368	365	366	371	368	365	370

* Fuels are also produced to lower CFPP values for use in Alpine regions

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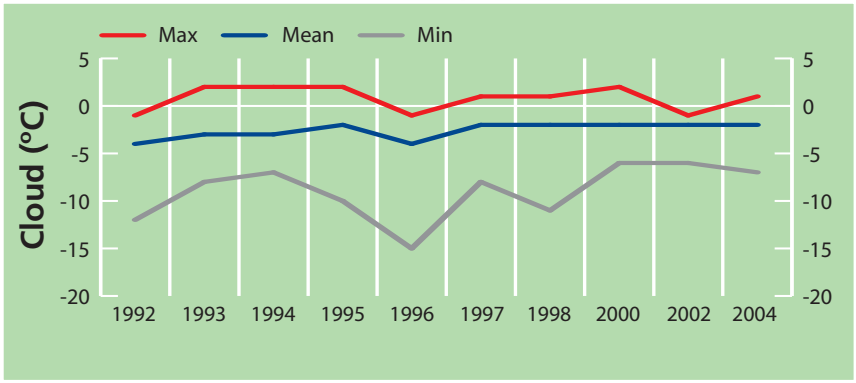
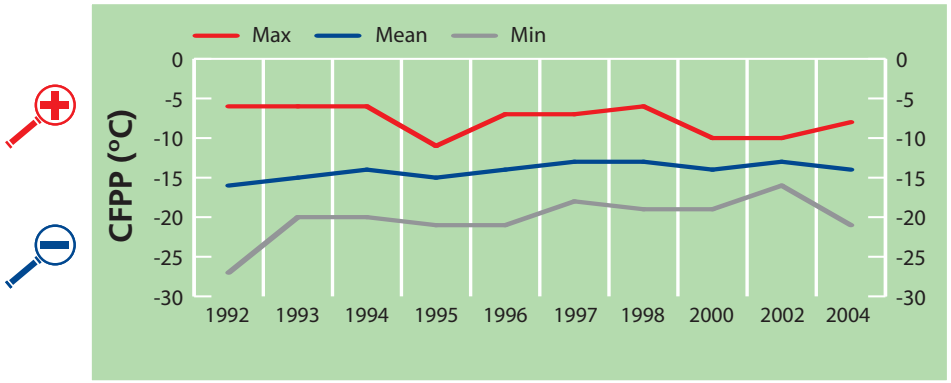
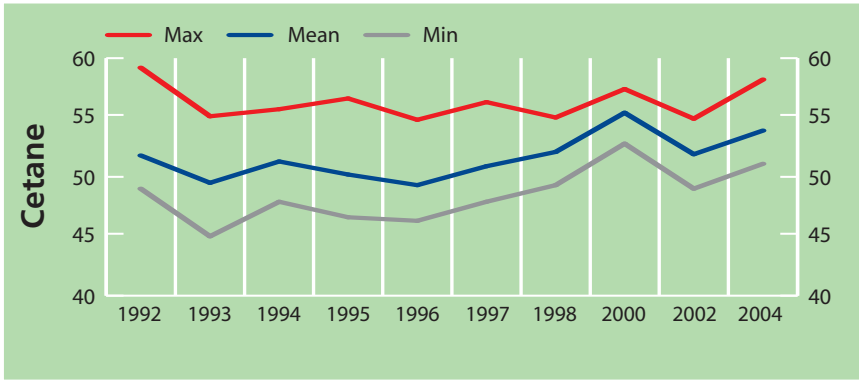
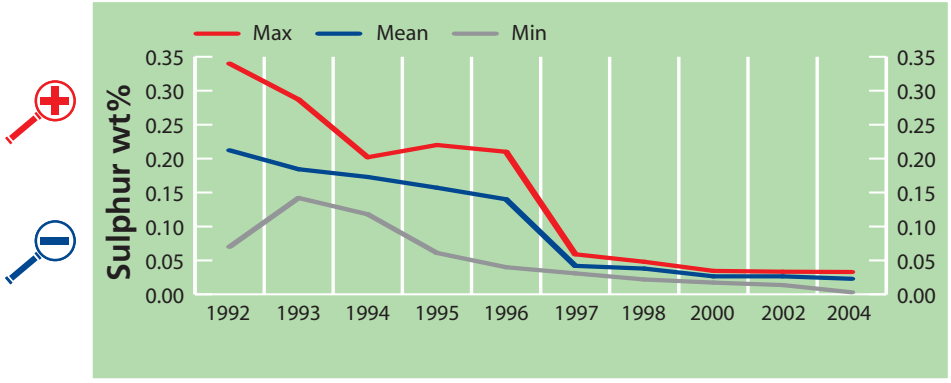
Italy - Key Trends









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Lithuania

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401479
Cloud Point, °C			-24		-24
CFPP, °C	-26 (max)		-36		-36
Pour Point, °C	-30 (max)		-30		-30
HFRR, µm			439		439
Wax Content @ 10°C Below Cloud, wt%			1.7		1.7
Sulphur, wt%	0.005 (max)		0.0047		0.0047
Density @ 15°C, kg/m³	860 (max)		825.9		825.9
Viscosity @ 20°C, cSt			3.13		3.13
Viscosity @ 40°C, cSt			2.07		2.07
Cetane Index 2 Variable			50.7		50.7
Cetane Index 4 Variable			51.5		51.5
Cetane Number	51 (min)		54.9		54.9
Distillation, °C IBP			171		171
T_{10}			211		211
T_{20}			219		219
T_{50}			247		247
T_{90}			288		288
FBP			328		328

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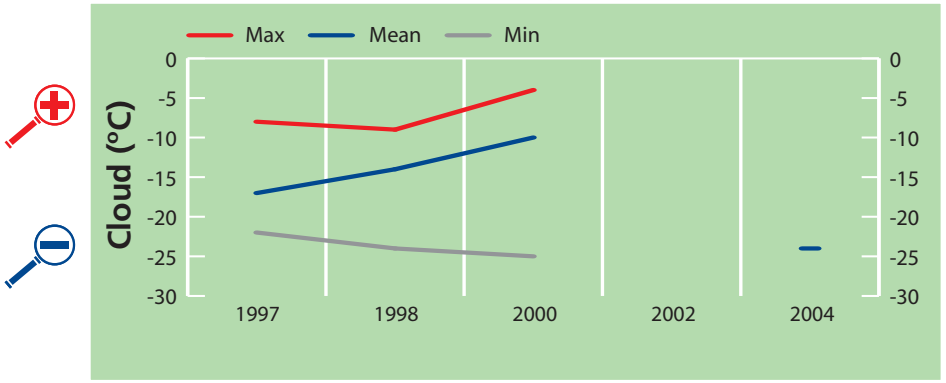
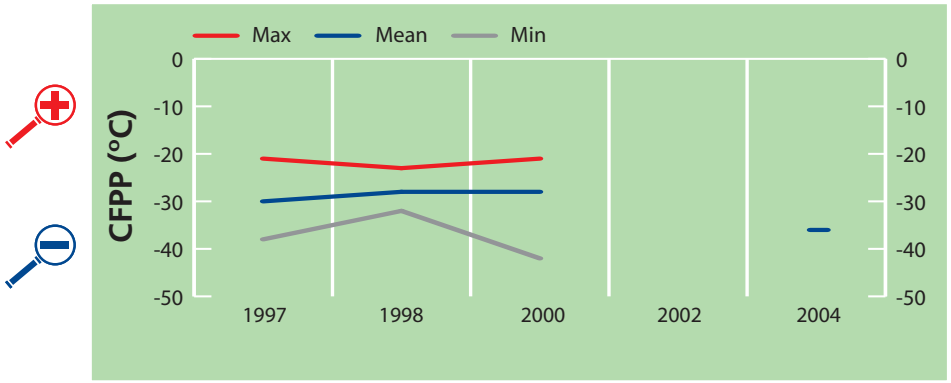
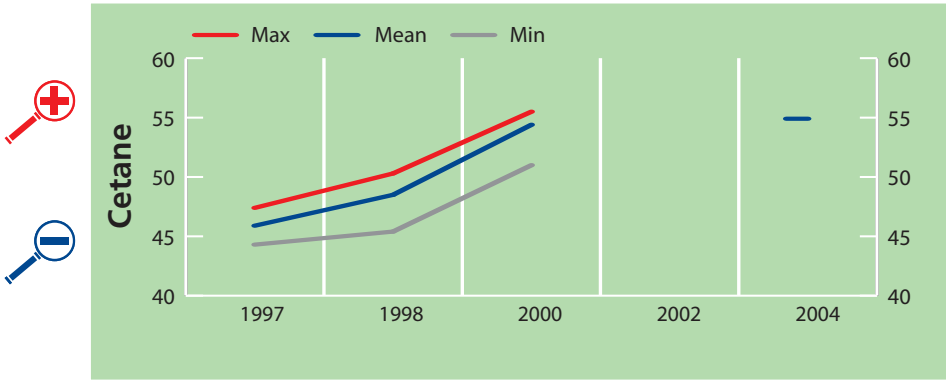
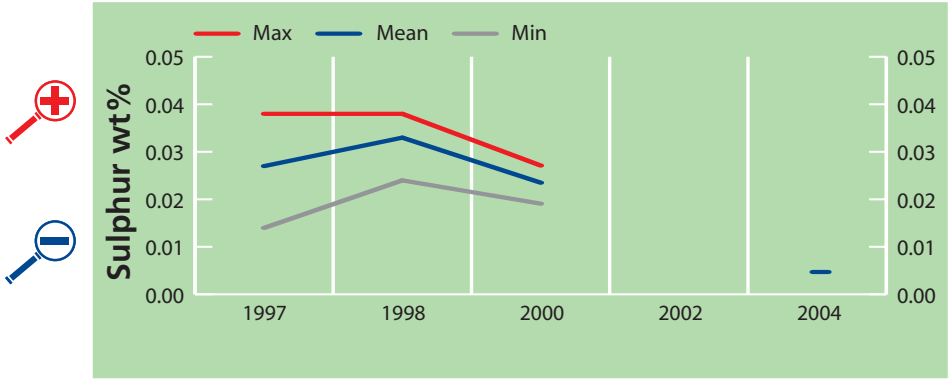
Lithuania - Key Trends









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Norway

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400868	DIES 0400371	DIES 0400871	DIES 0400872
Cloud Point, °C	-22 (max)	-21	-24	-30	-21	-23	-21	-30
CFPP, °C	-32 (max)	-33	-34	-36	-33	-35	-36	-34
Pour Point, °C		-36	-40	-42	-39	-42	-42	-36
HFRR, µm	460 (max)	422	339	220	376	422	220	341
Wax Content @ 10°C Below Cloud, wt%		2.2	1.5	1.0	1.4	1.0	1.3	2.2
Sulphur, mg/Kg	0.005 (max)	0.0037	0.0027	0.0017	0.0037	0.0017	0.0026	0.0027
Density @ 15°C, kg/m³	800 - 840	836.1	830.3	816.3	836.1	832.9	835.9	816.3
Viscosity @ 20°C, cSt		3.29	3.03	2.45	3.29	3.09	3.29	2.45
Viscosity @ 40°C, cSt	1.5 - 4.0	2.20	2.04	1.72	2.20	2.06	2.17	1.72
Cetane Index 2 Variable		48.2	47.0	45.1	48.0	45.1	46.5	48.2
Cetane Index 4 Variable	46 (min)	49.3	47.5	46.2	47.6	46.2	46.7	49.3
Cetane Number	51 (min)	55.3	53.1	52.2	52.2	52.6	52.3	55.3
Distillation, °C IBP		149	142	136	145	149	140	136
T_{10}	180 (min)	202	197	192	198	202	198	192
T_{20}		211	207	200	210	211	209	200
T_{50}		251	240	227	251	236	245	227
T_{95}	340 (max)	324	315	298	321	317	324	298
FBP		334	327	313	332	330	334	313

Specification shown is Norwgian Arctic Class 2

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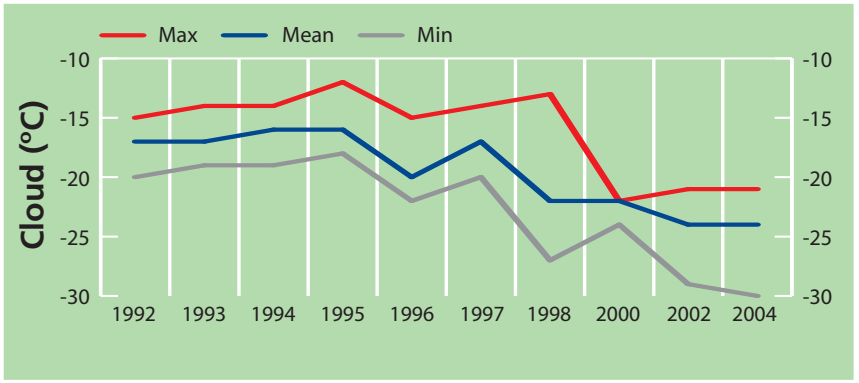
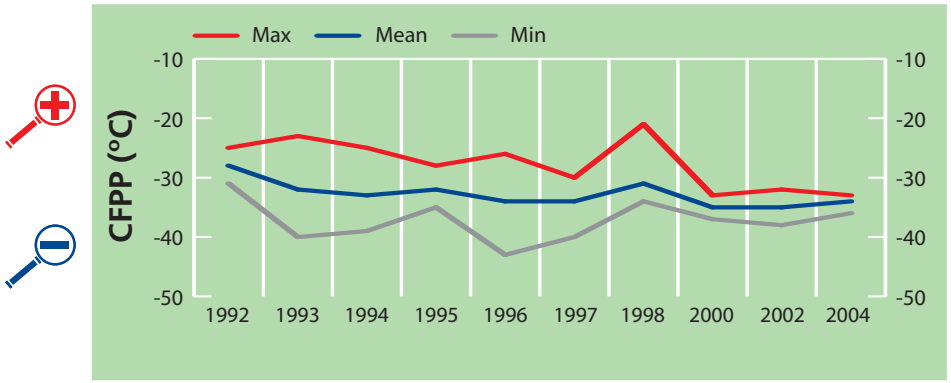
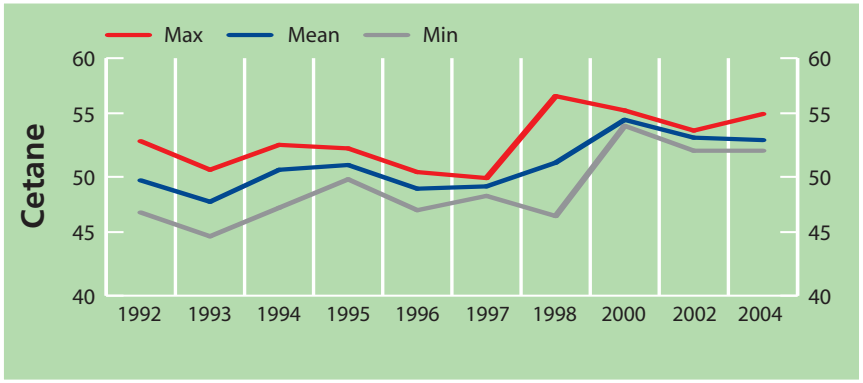
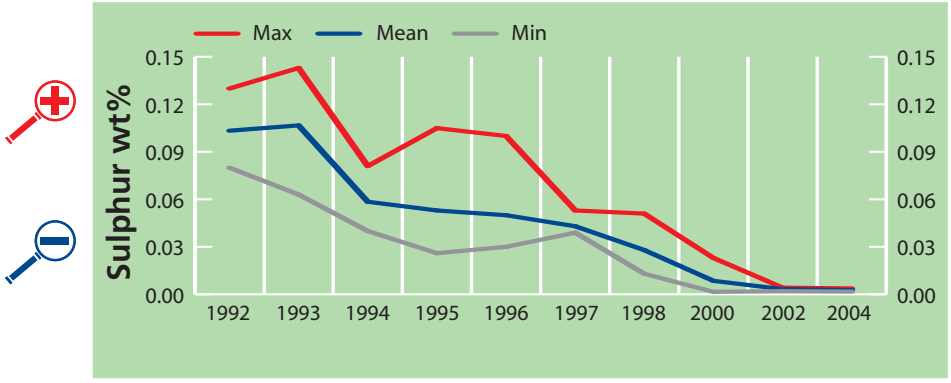
Norway - Key Trends









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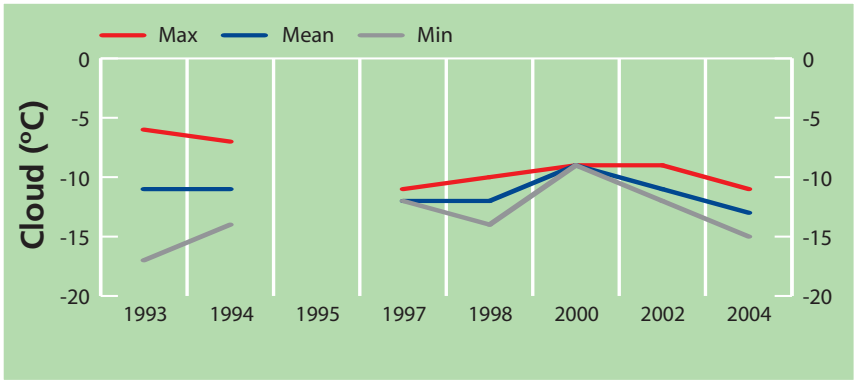
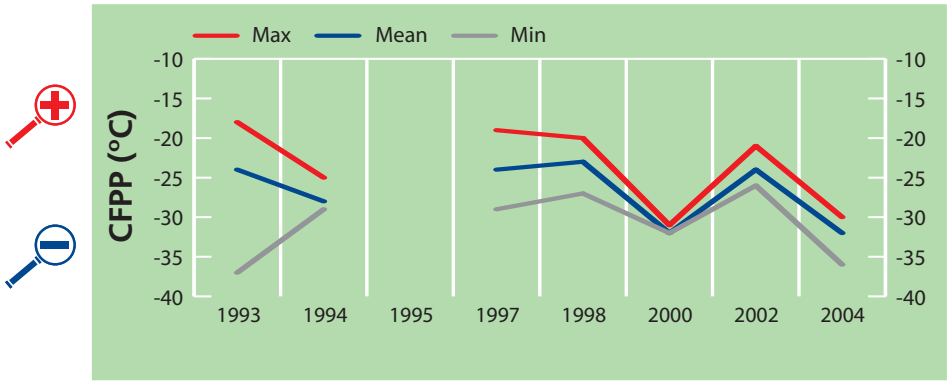
Poland

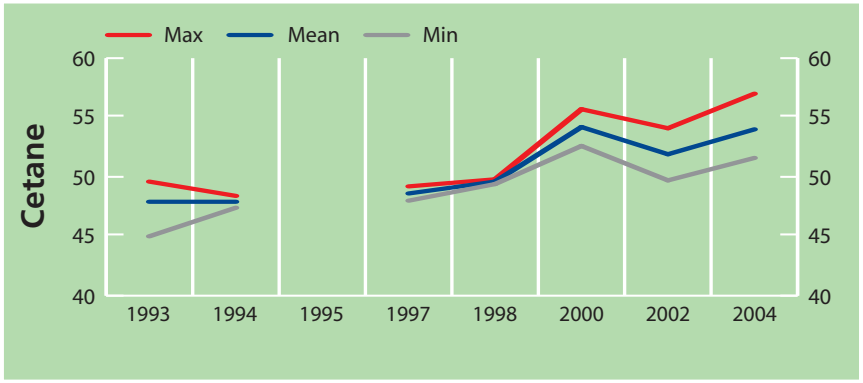
National Standards and physical inspection data

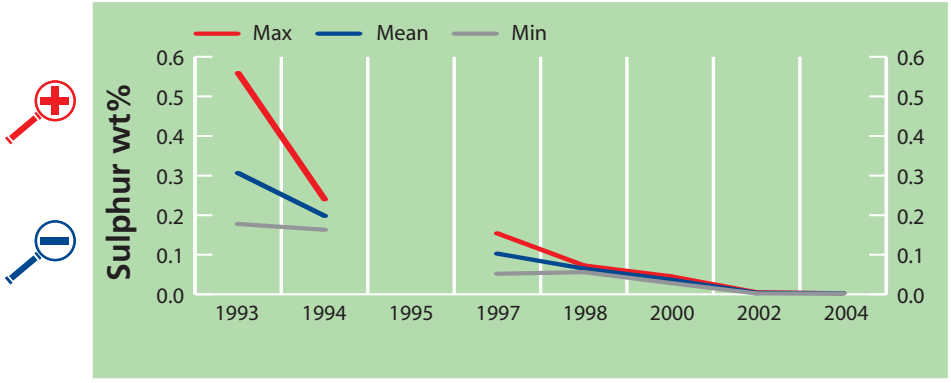
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401042	DIES 0401043	DIES 0401045	DIES 0401046	DIES 0401309
Cloud Point, °C		-11	-13	-15	-13	-12	-11	-13	-15
CFPP, °C	-20 (max)	-30	-32	-36	-30	-35	-30	-31	-36
Pour Point, °C		-27	-37	-54	-30	-36	-39	-27	-54
HFRR, µm	460 (max)	374	366	357	357	374	364	364	374
Wax Content @ 10°C Below Cloud, wt%		1.3	1.2	1.1	1.1	1.2	1.3	1.1	1.3
Sulphur, mg/Kg	0.035 (max)	0.0029	0.0027	0.0023	0.0028	0.0029	0.0023	0.0028	0.0029
Density @ 15°C, kg/m³	820 - 845	839.4	835.0	826.6	839.3	836.7	833.0	839.4	826.6
Viscosity @ 20°C, cSt		4.70	4.60	4.45	4.68	4.55	4.45	4.70	4.63
Viscosity @ 40°C, cSt	2.0 - 4.5	3.02	2.96	2.82	3.02	2.97	2.82	3.01	2.97
Cetane Index 2 Variable		56.5	53.7	52.5	52.6	52.7	54.2	52.5	56.5
Cetane Index 4 Variable	46 (min)	58.1	54.2	52.7	52.7	52.9	54.8	52.7	58.1
Cetane Number	51 (min)	57.0	54.0	51.6	52.8	53.7	54.8	51.6	57.0
Distillation, °C IBP		183	170	164	170	164	170	164	183
T_{10}		221	218	214	218	214	216	219	221
T_{20}		234	231	227	233	227	230	234	232
T_{50}		276	274	272	276	272	273	275	273
T_{95}	360 (max)	344	340	333	341	344	342	338	333
FBP		357	352	341	357	355	352	357	341

Poland - Key Trends









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Portugal

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400497	DIES 0400506	DIES 0400508
Cloud Point, °C		4	2	1	1	4	1
CFPP, °C	-10 (max)	-12	-16	-18	-18	-12	-17
Pour Point, °C		-18	-21	-24	-18	-21	-24
HFRR, µm	460 (max)	415	404	397	401	397	415
Wax Content @ 10°C Below Cloud, wt%		1.6	1.5	1.4	1.4	1.6	1.4
Sulphur, mg/Kg	0.035 (max)	0.0289	0.0280	0.0272	0.0272	0.0289	0.0278
Density @ 15°C, kg/m³	820 - 845	844.8	839.1	828.7	844.8	843.8	828.7
Viscosity @ 20°C, cSt		5.00	4.71	4.14	5.00	5.00	4.14
Viscosity @ 40°C, cSt	2.0 - 4.5	3.12	2.96	2.68	3.09	3.12	2.68
Cetane Index 2 Variable		54.2	51.6	50.2	50.2	50.4	54.2
Cetane Index 4 Variable	46 (min)	54.3	51.7	50.1	50.6	50.1	54.3
Cetane Number	51 (min)	57.9	53.9	51.7	51.7	52.2	57.9
Distillation, °C IBP		173	163	151	173	164	151
T_{10}		221	213	205	221	212	205
T_{20}		233	225	217	233	226	217
T_{50}		273	270	266	273	272	266
T_{95}	360 (max)	364	362	360	360	363	364
FBP		375	375	373	375	375	373

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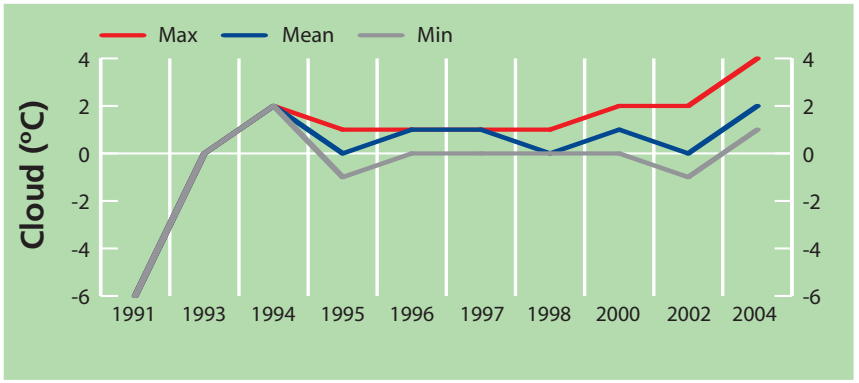
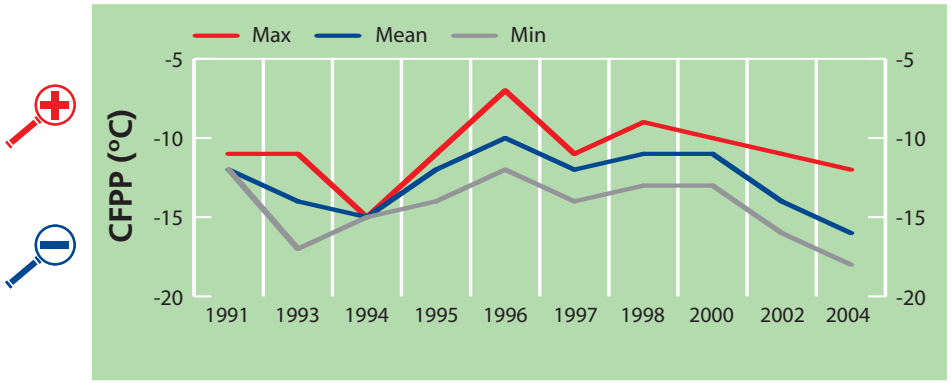
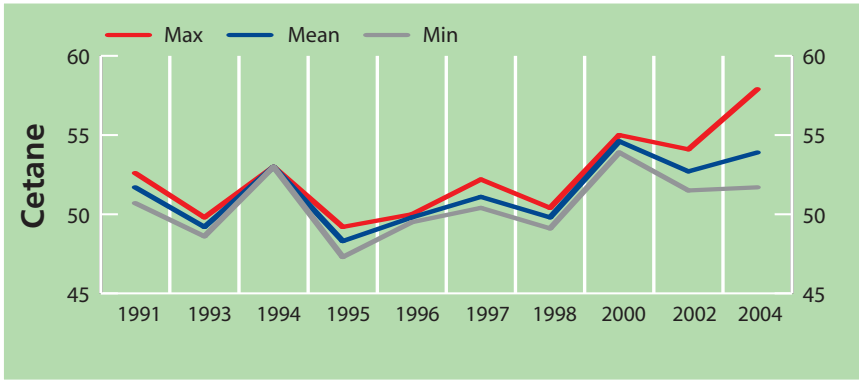
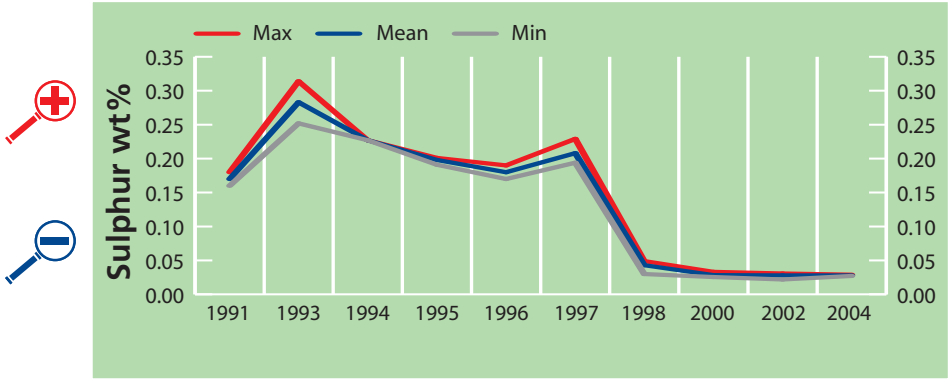
Portugal - Key Trends









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Slovakia

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0402353
Cloud Point, °C			-11		-11
CFPP, °C	-20 (max)		-35		-35
Pour Point, °C			-33		-33
HFRR, µm	460 (max)		303		303
Wax Content @ 10°C Below Cloud, wt%			1.2		1.2
Sulphur, wt%	0.035 (max)		0.0289		0.0289
Density @ 15°C, kg/m³	820 - 845		840.8		840.8
Viscosity @ 20°C, cSt			3.75		3.75
Viscosity @ 40°C, cSt	2.0 - 4.5		2.45		2.45
Cetane Index 2 Variable			48.1		48.1
Cetane Index 4 Variable	46 (min)		48.2		48.2
Cetane Number	51 (min)		52.3		52.3
Distillation, °C IBP			143		143
T_{10}			207		207
T_{20}			218		218
T_{50}			258		258
T_{95}	360 (max)		344		344
FBP			349		349

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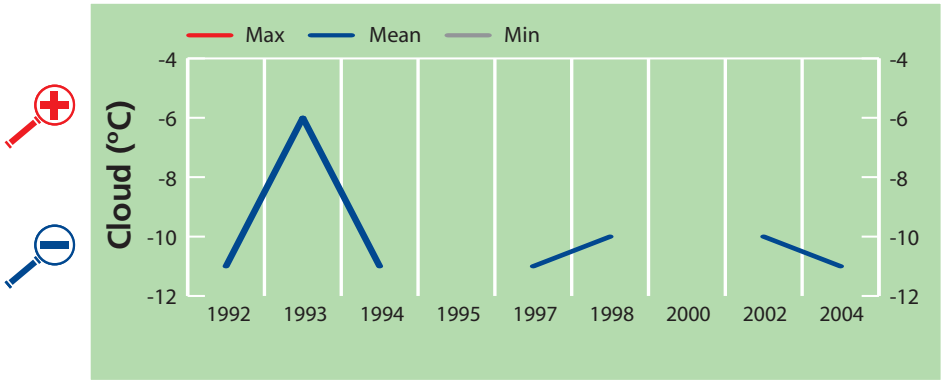
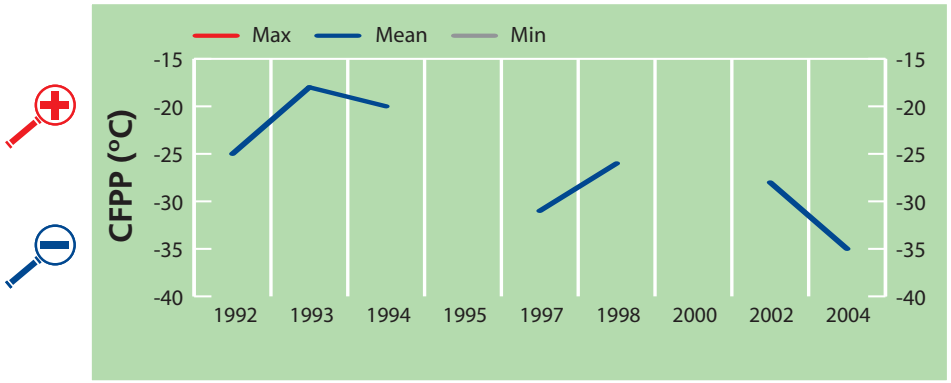
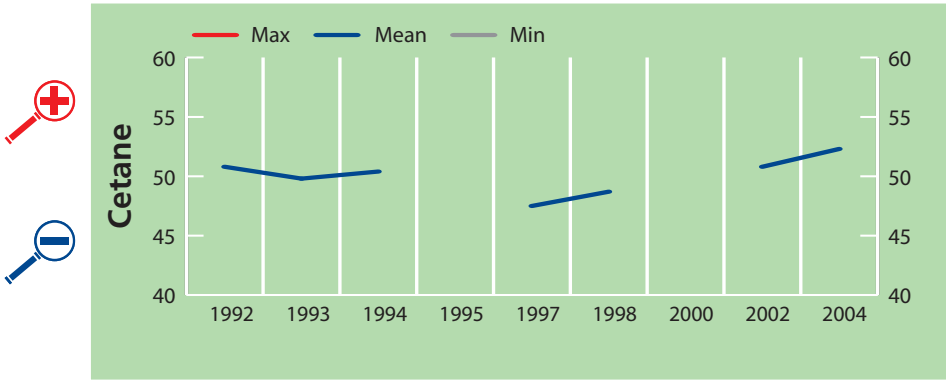
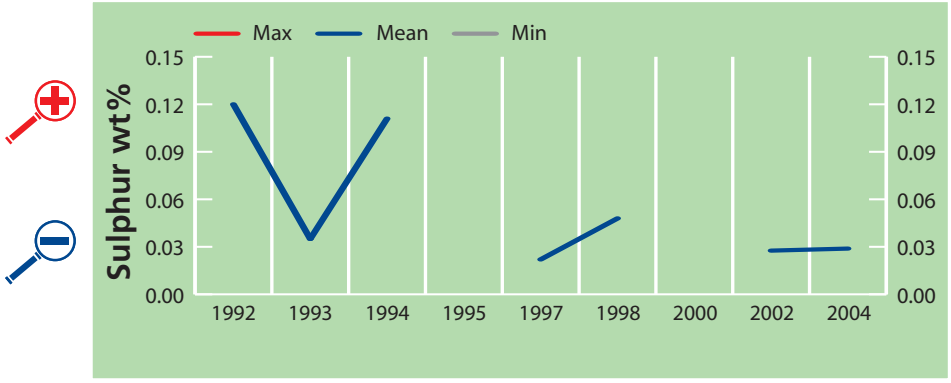
Slovakia - Key Trends









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Spain

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400493	DIES 0400499	DIES 0400504	DIES 0400510	DIES 0400513	DIES 0400518	DIES 0400520	DIES 0400524
Cloud Point, °C		1	-2	-6	-5	-1	-1	-6	1	-1	-1	-1
CFPP, °C	-10 (max)	-12	-16	-25	-25	-15	-14	-12	-15	-16	-15	-13
Pour Point, °C		-15	-25	-33	-24	-24	-33	-18	-30	-15	-21	-21
HFRR, µm	460 (max)	396	354	265	381	364	350	366	358	351	396	381
Wax Content @ 10°C Below Cloud, wt%		2.0	1.6	1.1	1.3	1.7	1.7	1.1	1.7	1.8	1.7	1.7
Sulphur, wt%	0.035 (max)	0.0338	0.0290	0.0185	0.0266	0.0304	0.0305	0.0283	0.0338	0.0329	0.0312	0.0308
Density @ 15°C, kg/m³	820 - 845	844.0	835.1	824.2	840.1	826.9	824.2	841.8	829.7	841.1	833.1	825.4
Viscosity @ 20°C, cSt		4.89	4.08	3.54	4.03	3.93	3.82	3.54	4.27	4.89	4.14	3.87
Viscosity @ 40°C, cSt	2.0 - 4.5	3.07	2.64	2.34	2.61	2.57	2.52	2.34	2.77	3.07	2.68	2.54
Cetane Index 2 Variable		55.0	51.8	47.4	49.6	54.5	55.0	47.4	54.6	52.4	52.6	54.7
Cetane Index 4 Variable	46 (min)	54.7	51.6	47.2	49.4	54.3	54.7	47.2	54.5	53.0	52.8	54.5
Cetane Number	51 (min)	58.2	54.3	48.9	51.5	57.4	56.6	48.9	57.6	52.6	55.7	58.2
Distillation, °C IBP		181	162	148	163	157	157	176	165	181	176	154
T_{10}		223	204	197	206	199	197	197	204	223	210	197
T_{20}		237	216	209	220	212	209	210	211	237	220	210
T_{50}		278	265	257	263	264	262	257	269	278	265	263
T_{95}	360 (max)	360	356	353	354	355	359	356	357	360	356	357
FBP		370	365	360	360	364	364	370	364	368	368	364

Spain (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400527	DIES 0400528	DIES 0400530
Cloud Point, °C		1	-2	-6	-6	0	-1
CFPP, °C	-10 (max)	-12	-16	-25	-20	-15	-15
Pour Point, °C		-15	-25	-33	-33	-24	-27
HFRR, µm	460 (max)	396	354	265	349	265	334
Wax Content @ 10°C Below Cloud, wt%		2.0	1.6	1.1	1.5	1.5	2.0
Sulphur, wt%	0.035 (max)	0.0338	0.0290	0.0185	0.0271	0.0293	0.0185
Density @ 15°C, kg/m³	820 - 845	844.0	835.1	824.2	836.7	843.2	844.0
Viscosity @ 20°C, cSt		4.89	4.08	3.54	3.97	3.97	4.41
Viscosity @ 40°C, cSt	2.0 - 4.5	3.07	2.64	2.34	2.58	2.57	2.81
Cetane Index 2 Variable		55.0	51.8	47.4	51.1	48.4	49.7
Cetane Index 4 Variable	46 (min)	54.7	51.6	47.2	50.4	48.1	49.0
Cetane Number	51 (min)	58.2	54.3	48.9	54.8	51.2	52.8
Distillation, °C IBP		181	162	148	150	148	158
T_{10}		223	204	197	198	206	205
T_{20}		237	216	209	212	217	220
T_{50}		278	265	257	265	262	269
T_{95}	360 (max)	360	356	353	353	354	359
FBP		370	365	360	364	366	369

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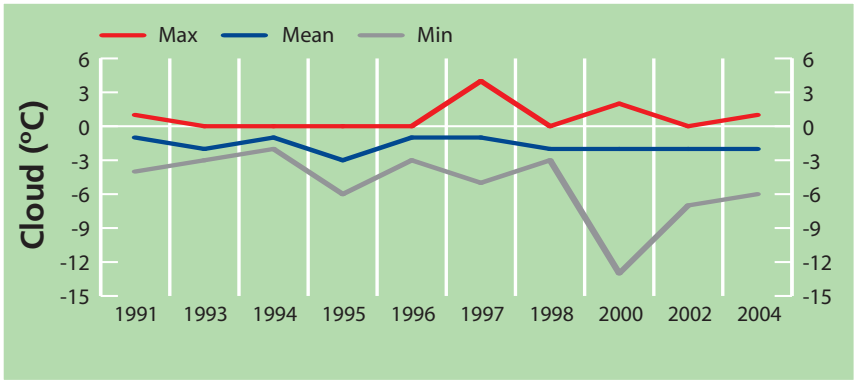
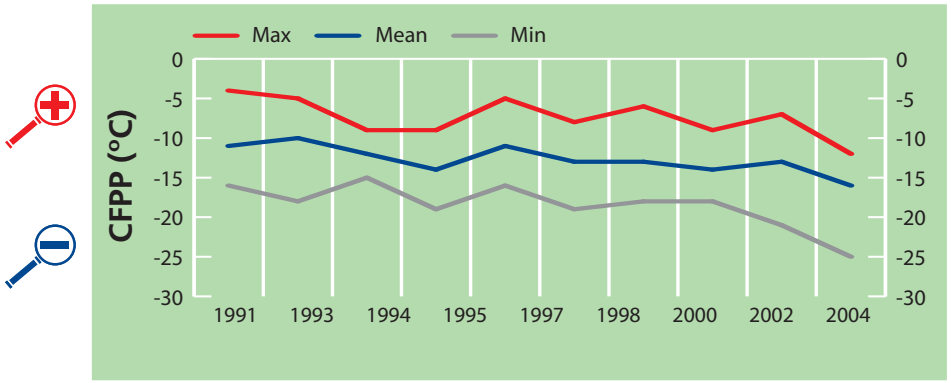
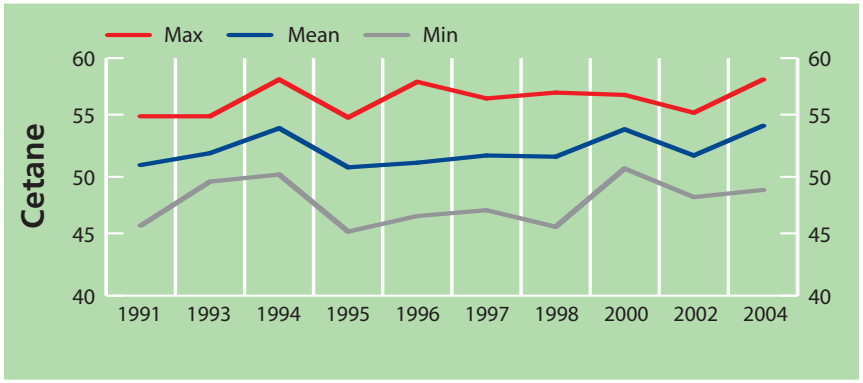
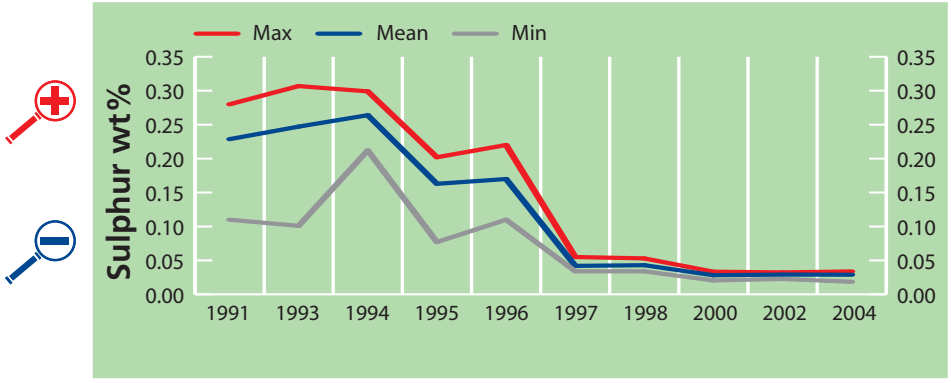
Spain - Key Trends









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Sweden

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400591	DIES 0400593	DIES 0400596	DIES 0400599	DIES 0400601	DIES 0400602	DIES 0400603
Cloud Point, °C	-16 (max)	-35	-36	-36	-35	-36	-36	-36	-36	-36	-36
CFPP, °C	-26 (max)	-35	-37	-39	-38	-38	-38	-35	-38	-38	-39
Pour Point, °C		-36	-38	-39	-36	-36	-39	-39	-39	-36	-39
HFRR, µm	460 (max)	418	394	341	396	418	410	381	341	416	397
Wax Content @ 10°C Below Cloud, wt%		3.4	3.2	3.0	3.4	3.3	3.0	3.4	3.2	3.1	3.2
Sulphur, wt%	0.001 (max)	0.0006	<0.0006	<0.0005	<0.0005	<0.0005	0.0005	0.0006	<0.0005	<0.0005	<0.0005
Density @ 15°C, kg/m³	800 - 820	816.0	815.2	814.5	814.8	814.6	815.2	816.0	814.5	815.7	815.6
Viscosity @ 20°C, cSt		2.87	2.79	2.71	2.74	2.71	2.78	2.84	2.74	2.87	2.86
Viscosity @ 40°C, cSt	1.4 - 4.0	1.99	1.92	1.87	1.89	1.88	1.90	1.95	1.87	1.97	1.99
Cetane Index 2 Variable		51.2	50.6	49.7	50.3	49.7	50.8	51.2	50.6	50.8	50.7
Cetane Index 4 Variable	50 (min)	52.3	51.9	50.9	51.5	50.9	51.9	52.3	51.9	52.3	52.2
Cetane Number	51 (min)	54.8	54.3	53.6	54.4	53.9	54.6	54.8	54.8	53.6	53.8
Distillation, °C IBP	180 (min)	185	180	176	177	176	179	182	176	185	185
T_{10}		209	205	201	203	201	203	205	203	209	208
T_{20}		215	211	208	210	208	209	211	210	215	215
T_{50}		236	233	230	232	230	234	236	232	234	234
T_{95}	285 (max)	282	280	276	279	276	280	282	281	281	280
FBP		297	294	293	293	294	293	293	293	297	297

Specification shown is Swedish Standard 15 54 35, grade EC1 winter

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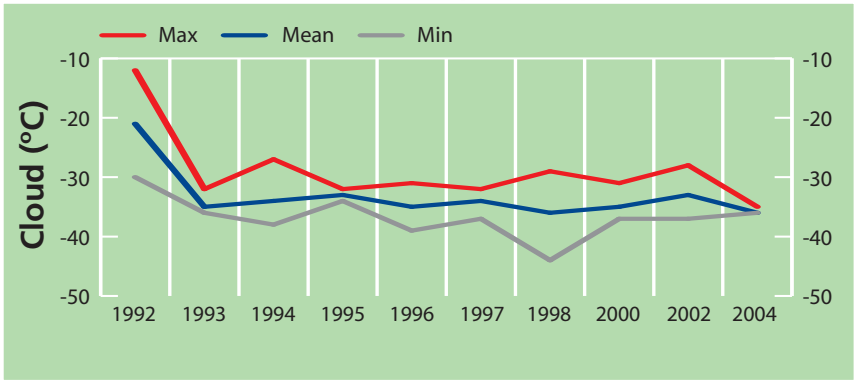
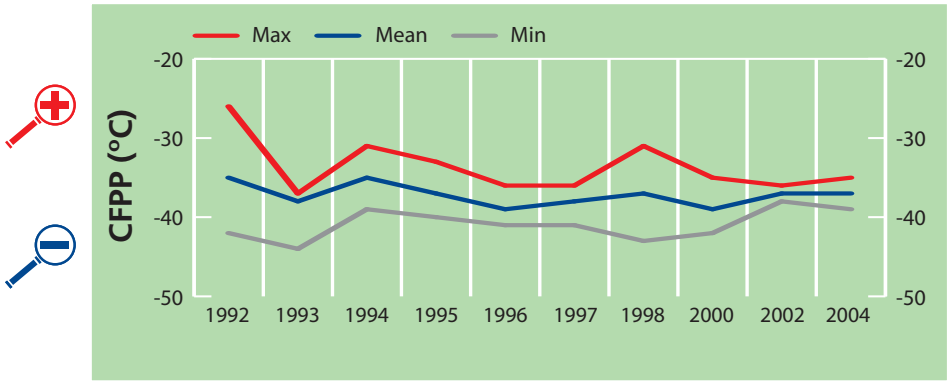
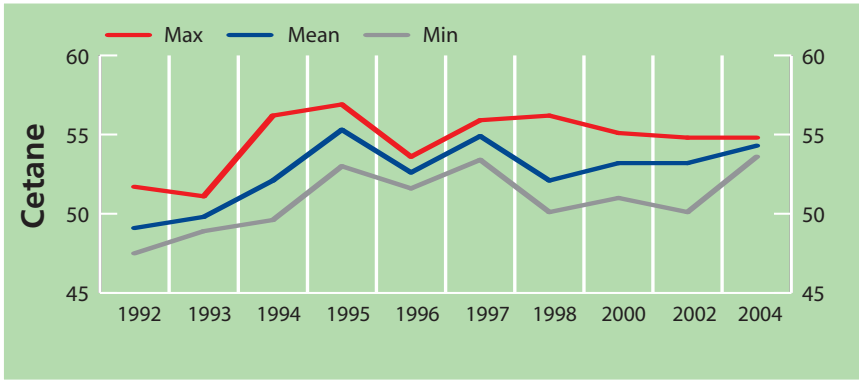
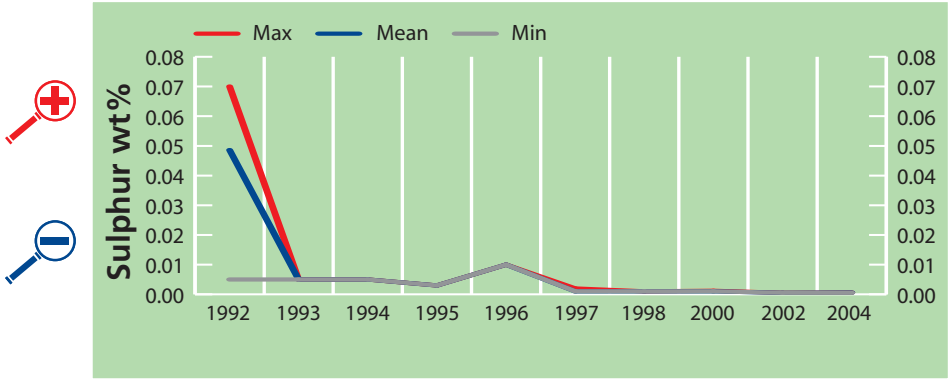
Sweden - Key Trends









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Switzerland

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400989	DIES 0400991	DIES 0400992	DIES 0400994	DIES 0400996
Cloud Point, °C	-10 (max)	-10	-12	-18	-10	-18	-11	-11	-11
CFPP, °C	-20 (max)	-21	-27	-41	-27	-41	-21	-25	-24
Pour Point, °C		-27	-34	-42	-33	-42	-36	-27	-33
HFRR, µm	460 (max)	461	371	282	375	461	422	316	282
Wax Content @ 10°C Below Cloud, wt%		2.3	1.4	0.9	1.3	0.9	2.3	1.0	1.5
Sulphur, wt%	0.035 (max)	0.0270	0.0185	<0.0005	0.0262	0.0019	0.0270	0.0189	<0.0005
Density @ 15°C, kg/m³	800 - 845	834.5	827.6	822.1	830.5	824.9	822.1	826.1	834.5
Viscosity @ 20°C, cSt		3.87	3.38	3.18	3.37	3.19	3.30	3.18	3.87
Viscosity @ 40°C, cSt	1.5 - 4.0	2.51	2.24	2.12	2.24	2.13	2.21	2.12	2.51
Cetane Index 2 Variable		53.5	50.7	48.7	49.9	48.7	53.5	49.9	51.4
Cetane Index 4 Variable	46 (min)	53.5	51.0	49.8	50.0	49.8	53.5	50.4	51.5
Cetane Number	49 (min)	57.0	53.0	49.2	51.0	49.2	57.0	52.8	54.9
Distillation, °C IBP		157	148	143	144	143	145	151	157
T_{10}	180 (min)	209	199	193	197	199	193	196	209
T_{20}		220	209	205	208	207	205	206	220
T_{50}		262	250	239	251	239	253	245	262
T_{95}	340 (max)	340	339	337	340	337	338	339	339
FBP		355	348	341	350	345	341	355	348

National standard shown is EN590 Arctic Class 0

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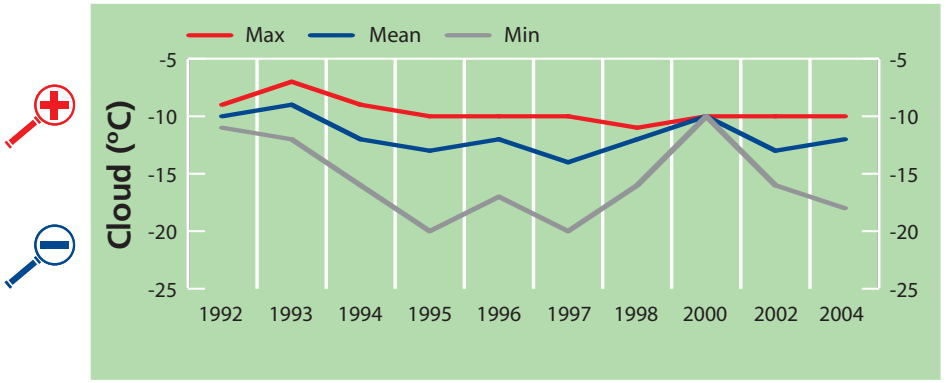
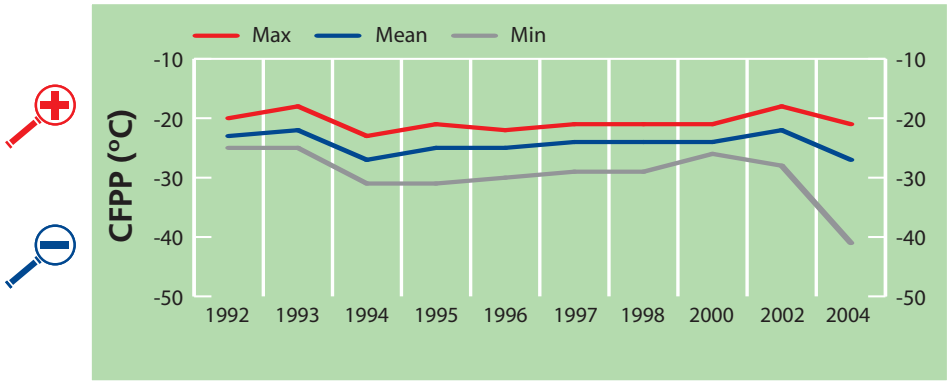
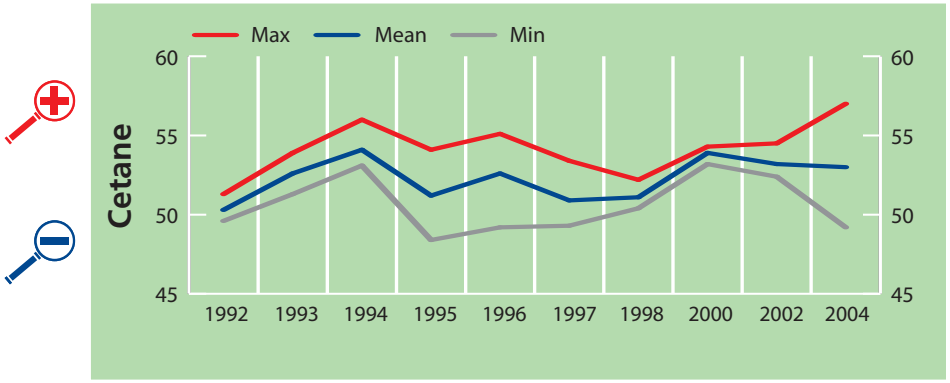
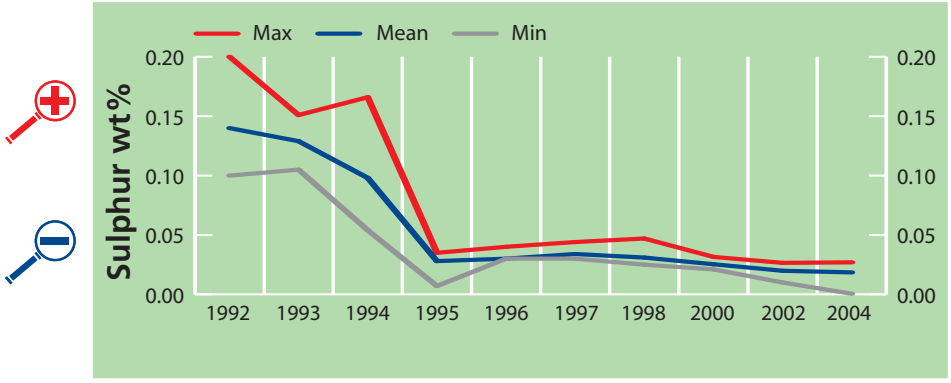
Switzerland - Key Trends









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United Kingdom

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401304	DIES 0401305	DIES 0401306	DIES 0401307	DIES 0401308	DIES 0401395	DIES 0401397	DIES 0400849
Cloud Point, °C		-5	-10	-18	-11	-5	-8	-18	-10	-7	-9	-18
CFPP, °C	-15 (max)	-16	-20	-27	-16	-19	-19	-27	-24	-19	-19	-21
Pour Point, °C		-21	-29	-48	-48	-21	-30	-24	-24	-27	-24	-24
HFRR, µm	460 (max)	506	357	221	314	306	357	328	435	380	395	392
Wax Content @ 10°C Below Cloud, wt%		2.9	2.0	1.1	2.9	1.4	2.5	2.1	1.6	1.9	1.9	1.1
Sulphur, wt%	0.005 (max)*	0.0051	0.0040	0.0026	0.0048	0.0026	0.0051	0.0036	0.0039	0.0043	0.0043	0.0033
Density @ 15°C, kg/m³	820 - 835*	834.7	831.4	825.6	833.7	832.7	830.2	830.1	831.9	829.3	829.7	834.5
Viscosity @ 20°C, cSt		4.43	3.84	3.23	4.32	3.96	4.24	3.51	3.63	3.66	3.61	3.23
Viscosity @ 40°C, cSt	2.0 - 4.5	2.86	2.51	2.17	2.73	2.57	2.70	2.32	2.39	2.37	2.35	2.17
Cetane Index 2 Variable		56.9	53.3	47.9	54.5	53.0	55.6	51.7	51.4	53.6	52.1	47.9
Cetane Index 4 Variable	46 (min)	58.2	52.6	47.5	54.8	52.5	55.6	51.7	51.1	52.0	52.0	47.5
Cetane Number	51 (min)	60.1	55.4	52.3	54.0	54.3	60.1	53.4	54.6	55.5	56.2	52.3
Distillation, °C IBP		178	164	139	169	175	159	159	159	160	157	168
T_{10}		216	203	192	215	202	206	205	201	197	200	193
T_{20}		234	219	207	234	219	226	217	215	210	212	207
T_{50}		276	264	248	276	266	275	257	258	260	258	248
T_{95}	345 (max)*	347	337	322	331	347	340	322	338	343	340	333
FBP		363	350	334	352	363	351	334	349	354	355	345

* Specifications for UK Ultra Low Sulphur Diesel expected to revert to EN590 during 2005

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United Kingdom (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400850	DIES 0400851	DIES 0400852	DIES 0400853	DIES 0400854	DIES 0401105	DIES 0401108	DIES 30229/04
Cloud Point, °C		-5	-10	-18	-6	-11	-9	-15	-16	-6	-6	-6
CFPP, °C	-15 (max)	-16	-20	-27	-17	-23	-19	-25	-23	-21	-19	-18
Pour Point, °C		-21	-29	-48	-27	-33	-27	-24	-21	-42	-45	-36
HFRR, µm	460 (max)	506	357	221	506	291	282	408	425	316	286	412
Wax Content @ 10°C Below Cloud, wt%		2.9	2.0	1.1	2.0	1.4	1.5	2.1	2.3	2.6	2.7	1.4
Sulphur, wt%	0.005 (max)*	0.0051	0.0040	0.0026	0.0045	0.0043	0.0046	0.0038	0.0033	0.0043	0.0043	0.0030
Density @ 15°C, kg/m³	820 - 835*	834.7	831.4	825.6	825.6	834.7	833.7	832.7	832.1	833.8	833.5	834.5
Viscosity @ 20°C, cSt		4.43	3.84	3.23	3.56	3.58	3.73	3.81	3.70	4.17	4.28	3.66
Viscosity @ 40°C, cSt	2.0 - 4.5	2.86	2.51	2.17	2.36	2.36	2.45	2.48	2.45	2.71	2.77	2.37
Cetane Index 2 Variable		56.9	53.3	47.9	54.2	50.9	51.7	52.0	54.4	54.4	54.5	54.4
Cetane Index 4 Variable	46 (min)	58.2	52.6	47.5	53.7	50.2	51.2	52.0	51.4	53.7	54.2	49.2
Cetane Number	51 (min)	60.1	55.4	52.3	54.5	52.5	55.1	54.9	53.5	58.7	58.4	53.5
Distillation, °C IBP		178	164	139	168	168	168	178	174	165	168	156
T_{10}		216	203	192	192	197	199	209	204	202	207	203
T_{20}		234	219	207	208	214	216	225	220	227	228	216
T_{50}		276	264	248	261	261	262	262	260	275	275	253
T_{95}	345 (max)*	347	337	322	345	338	340	325	322	346	336	335
FBP		363	350	334	355	349	352	341	337	349	349	353

* Specifications for UK Ultra Low Sulphur Diesel expected to revert to EN590 during 2005

United Kingdom (continued 2)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 30230/04	DIES 0400890	DIES 0401777
Cloud Point, °C		-5	-10	-18	-11	-6	-5
CFPP, °C	-15 (max)	-16	-20	-27	-18	-16	-19
Pour Point, °C		-21	-29	-48	-21	-27	-21
HFRR, µm	460 (max)	506	357	221	364	221	373
Wax Content @ 10°C Below Cloud, wt%		2.9	2.0	1.1	2.5	2.2	2.4
Sulphur, wt%	0.005 (max)*	0.0051	0.0040	0.0026	0.0031	0.0042	0.0045
Density @ 15°C, kg/m³	820 - 835*	834.7	831.4	825.6	829.7	828.5	826.0
Viscosity @ 20°C, cSt		4.43	3.84	3.23	4.13	3.73	4.43
Viscosity @ 40°C, cSt	2.0 - 4.5	2.86	2.51	2.17	2.68	2.55	2.86
Cetane Index 2 Variable		56.9	53.3	47.9	54.4	54.5	56.9
Cetane Index 4 Variable	46 (min)	58.2	52.6	47.5	55.0	53.9	58.2
Cetane Number	51 (min)	60.1	55.4	52.3	55.4	55.7	59.9
Distillation, °C IBP		178	164	139	157	139	177
T_{10}		216	203	192	214	196	216
T_{20}		234	219	207	230	210	234
T_{50}		276	264	248	268	267	274
T_{95}	345 (max)*	347	337	322	330	345	342
FBP		363	350	334	347	353	355

* Specifications for UK Ultra Low Sulphur Diesel expected to revert to EN590 during 2005

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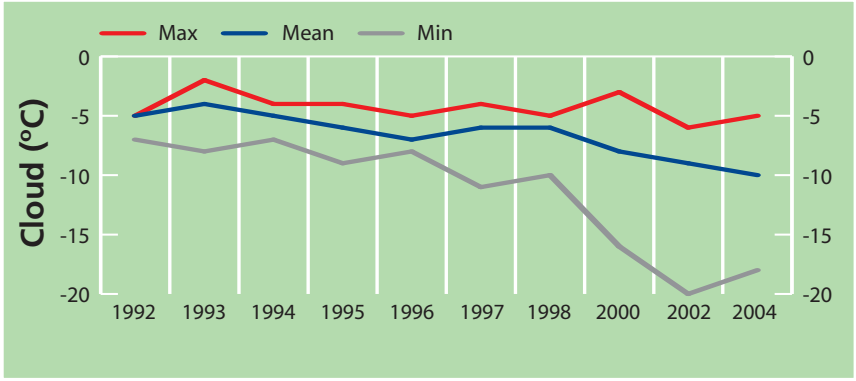
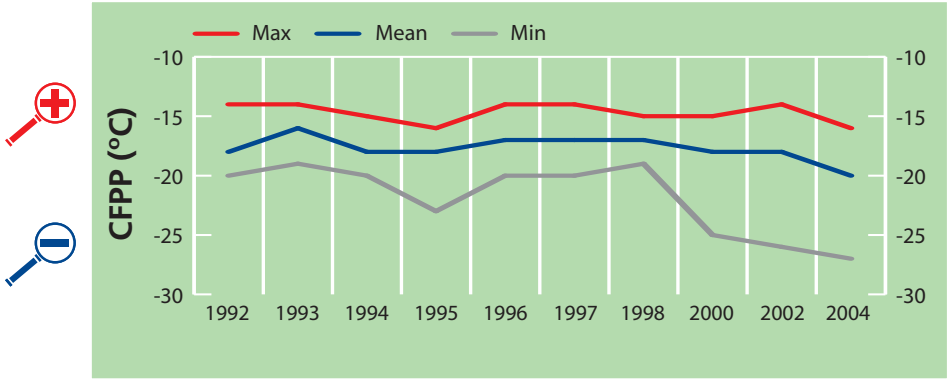
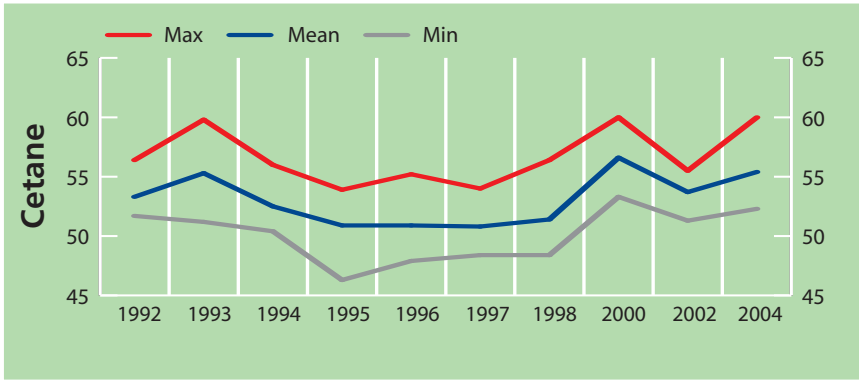
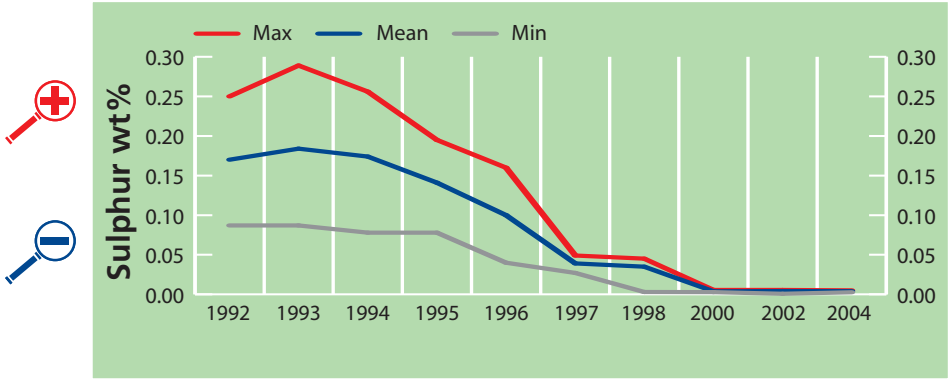
United Kingdom - Key Trends









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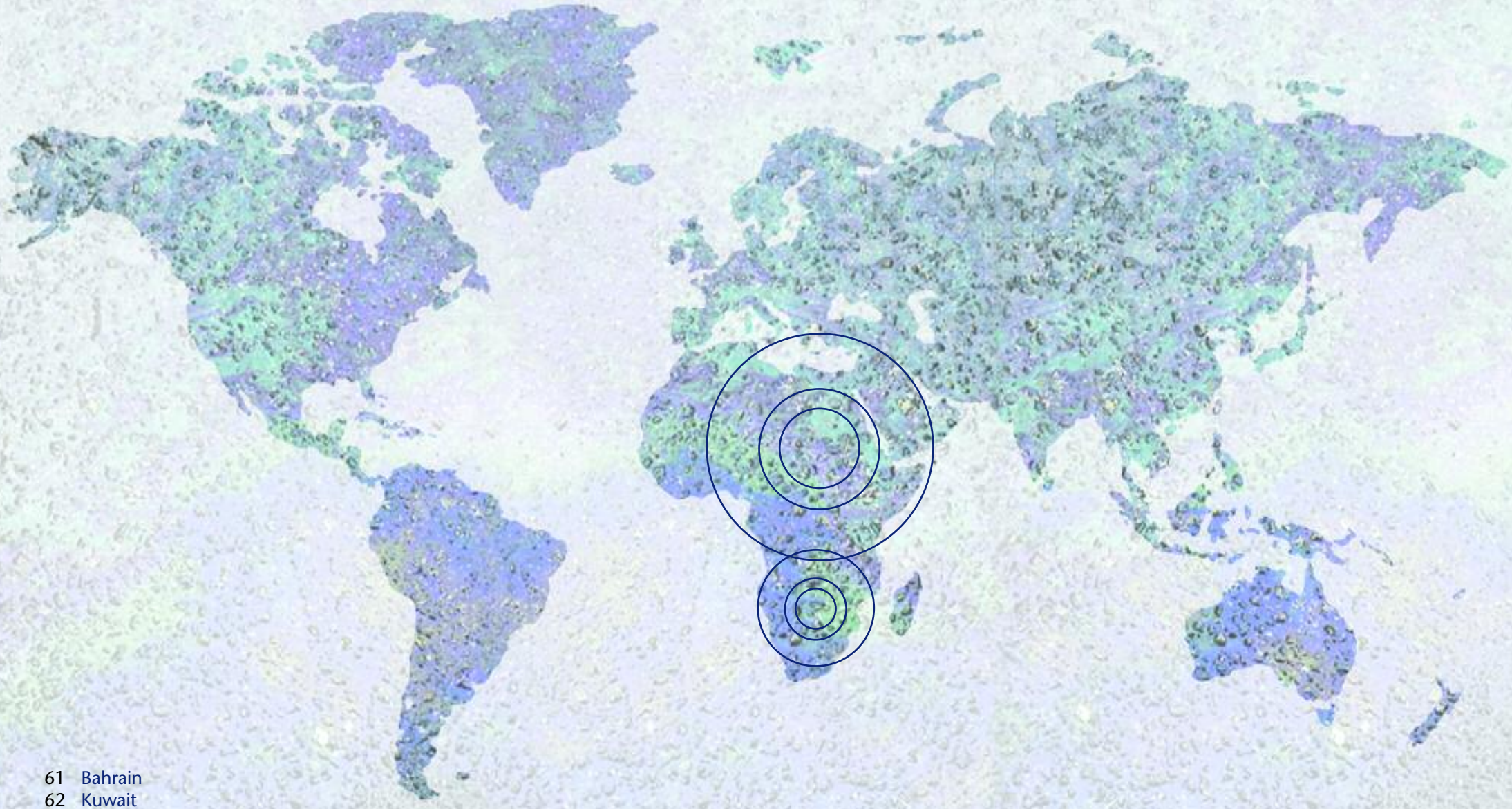
Worldwide Survey - Middle East & Africa



61 Bahrain
62 Kuwait
64 Saudi Arabia
66 South Africa

Bahrain

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401542
Cloud Point, °C			-1		-1
CFPP, °C			-5		-5
Pour Point, °C			-6		-6
HFRR, µm			382		382
Wax Content @ 10°C Below Cloud, wt%			2.4		2.4
Sulphur, mg/Kg			0.4085		0.4085
Density @ 15°C, kg/m³			853.1		853.1
Viscosity @ 20°C, cSt			4.45		4.45
Viscosity @ 40°C, cSt			3.53		3.53
Cetane Index 2 Variable			51.5		51.5
Cetane Index 4 Variable			51.0		51.0
Cetane Number			51.6		51.6
Distillation, °C IBP			162		162
T_{10}			222		222
T_{20}			253		253
T_{50}			299		299
T_{90}			354		354
FBP			379		379

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Kuwait

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401543
Cloud Point, °C			2		2
CFPP, °C			-7		-7
Pour Point, °C			-9		-9
HFRR, µm			424		424
Wax Content @ 10°C Below Cloud, wt%			1.6		1.6
Sulphur, wt%			0.5510		0.5510
Density @ 15°C, kg/m³			833.1		833.1
Viscosity @ 20°C, cSt			5.39		5.39
Viscosity @ 40°C, cSt			3.22		3.22
Cetane Index 2 Variable			55.3		55.3
Cetane Index 4 Variable			57.1		57.1
Cetane Number			58.2		58.2
Distillation, °C IBP			195		195
T_{10}			226		226
T_{20}			243		243
T_{50}			280		280
T_{90}			342		342
FBP			373		373

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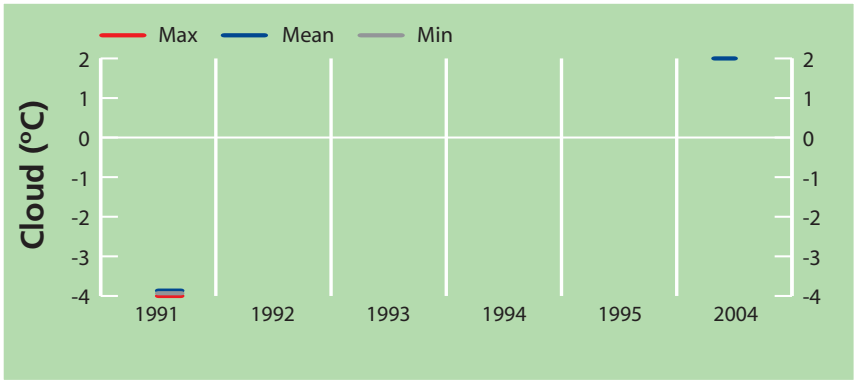
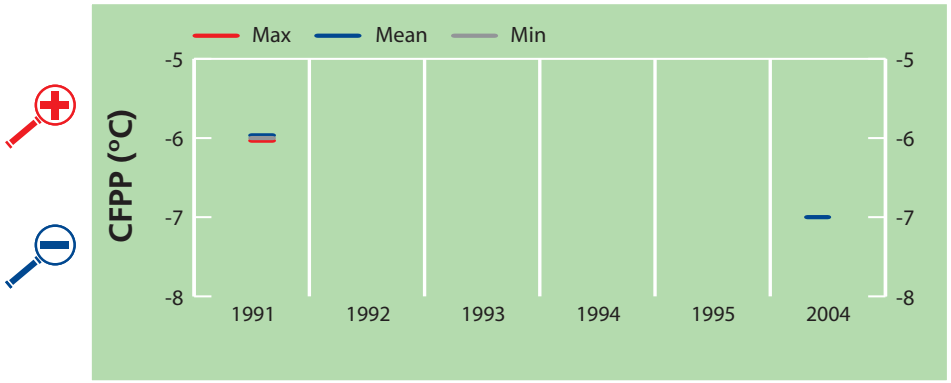
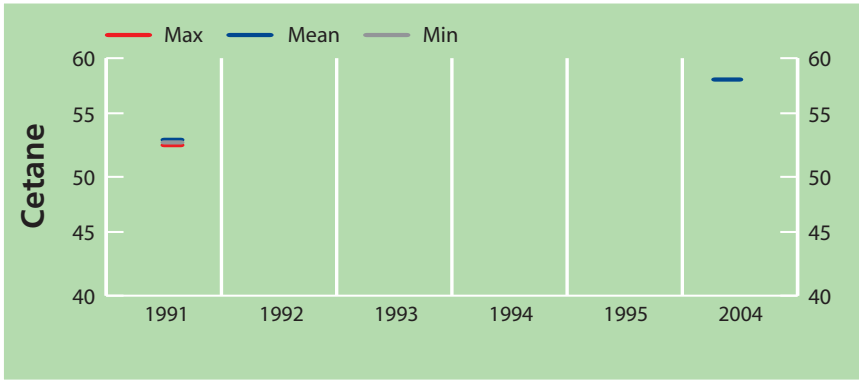
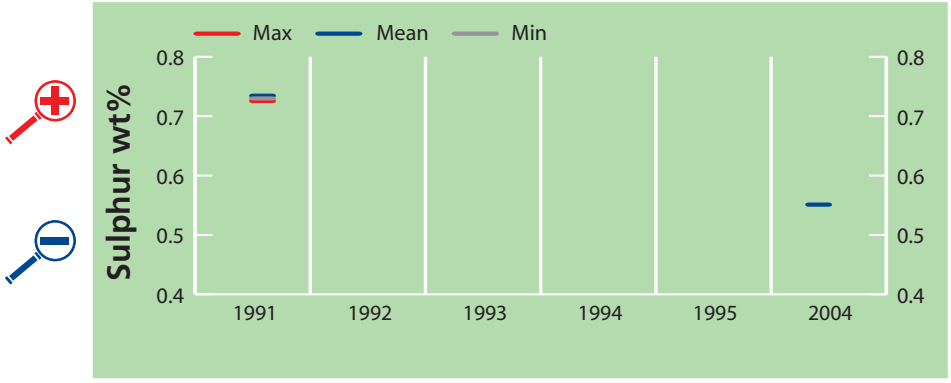
Kuwait - Key Trends









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Saudi Arabia

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401544	DIES 0401545	DIES 0401546	DIES 0401547
Cloud Point, °C	2 (max)*	1	-2	-7	-1	-1	1	-7
CFPP, °C	-4 (max)*	-1	-5	-10	-1	-6	-3	-10
Pour Point, °C		-9	-13	-15	-15	-9	-15	-12
HFRR, µm		566	484	409	457	505	409	566
Wax Content @ 10°C Below Cloud, wt%		2.1	1.4	1.0	1.5	1.0	1.1	2.1
Sulphur, wt%	1.0 (max)	1.0765	0.9075	0.7626	0.8835	0.9075	0.7626	1.0765
Density @ 15°C, kg/m³		839.8	837.1	834.3	837.9	839.8	834.3	836.3
Viscosity @ 20°C, cSt		5.92	5.15	4.59	5.13	4.94	5.92	4.59
Viscosity @ 40°C, cSt	1.9 - 4.1	3.09	2.91	2.76	3.09	2.95	2.76	2.83
Cetane Index 2 Variable	45 (min)	54.0	53.4	52.6	54.0	53.1	52.6	53.7
Cetane Index 4 Variable		54.0	53.1	52.1	53.7	52.5	52.1	54.0
Cetane Number		58.8	58.7	58.6	58.7	58.8	58.7	58.6
Distillation, °C IBP		185	179	176	179	177	176	185
T_{10}		218	211	204	212	210	204	218
T_{20}		234	228	217	230	229	217	234
T_{50}		281	276	267	281	279	267	275
T_{90}		361	352	333	361	359	355	333
FBP		384	379	369	382	384	381	369

* Cloud point and CFPP are alternative specifications.
When CFPP is used the difference between cloud point and CFPP must not exceed 10°C.
Distillation T85 @ 350°C maximum

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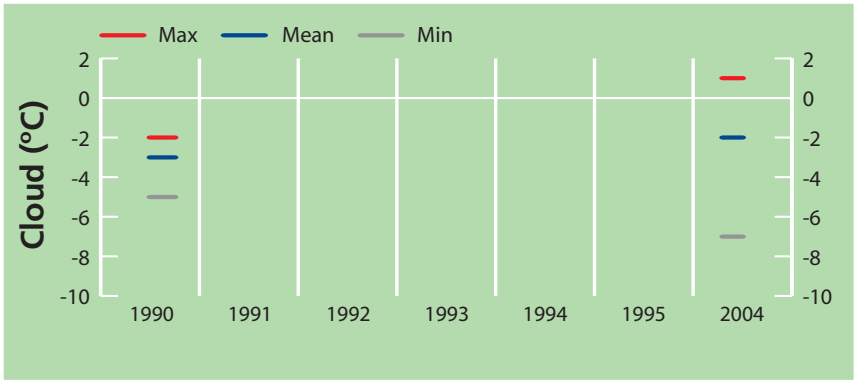
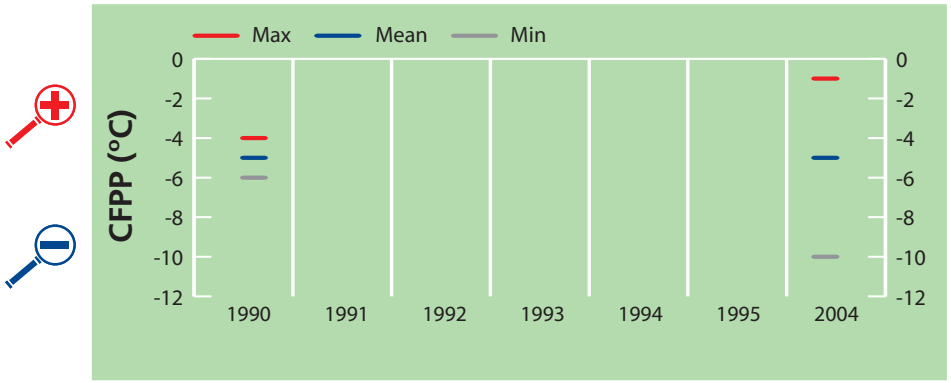
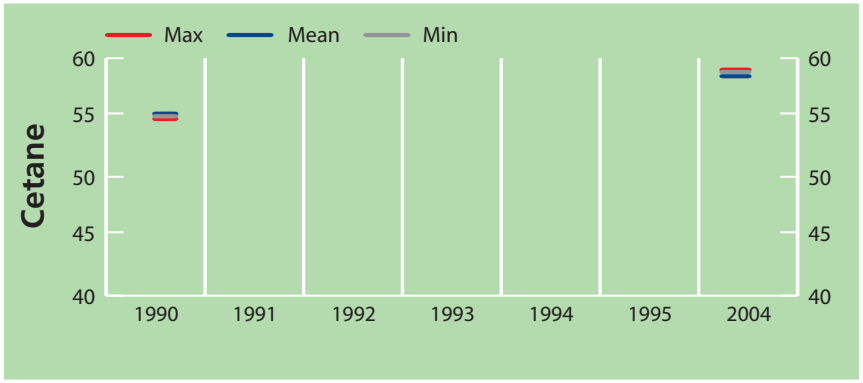
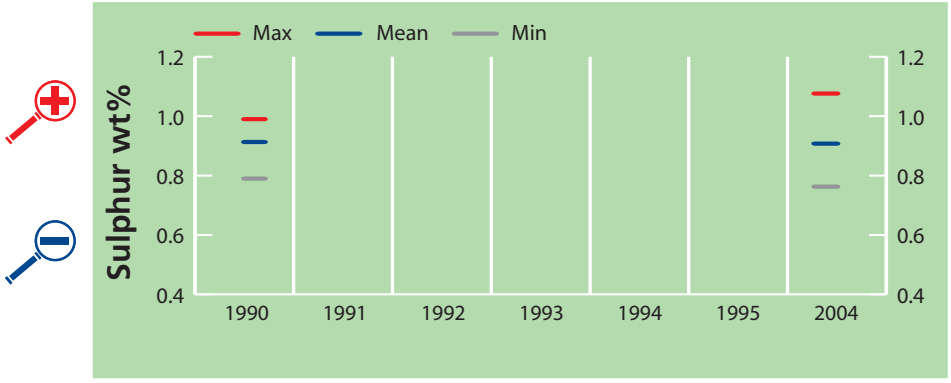
Saudi Arabia - Key Trends









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South Africa

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0404793	DIES 0404795	DIES 0404798	DIES 0404799	DIES 0404800
Cloud Point, °C		5	3	-2	5	4	3	-2	4
CFPP, °C	-4 (max)	-7	-9	-13	-11	-13	-7	-8	-8
Pour Point, °C		-15	-18	-24	-15	-15	-21	-15	-24
HFRR, µm		505	359	293	339	349	293	505	309
Wax Content @ 10°C Below Cloud, wt%		2.2	1.4	0.4	2.2	2.1	0.4	1.8	0.5
Sulphur, wt%	0.3 (max)	0.2910	0.1561	0.0005	0.2910	0.2630	0.0005	0.2250	0.0010
Density @ 15°C, kg/m³		857.7	839.9	822.9	857.7	851.0	822.9	843.9	824.0
Viscosity @ 20°C, cSt		6.76	4.89	3.30	6.76	6.31	3.50	4.61	3.30
Viscosity @ 40°C, cSt	2.2 - 5.3	3.93	3.03	2.23	3.93	3.74	2.33	2.91	2.23
Cetane Index 2 Variable		51.9	50.4	47.6	50.5	51.9	50.9	50.9	47.6
Cetane Index 4 Variable		52.1	51.1	49.3	51.1	52.1	51.7	51.3	49.3
Cetane Number	45 (min)	55.0	53.8	52.3	53.6	53.2	55.0	52.3	54.8
Distillation, °C IBP		197	174	122	197	186	185	179	122
T_{10}		242	220	203	242	231	204	221	203
T_{20}		258	231	204	258	249	213	231	204
T_{50}		298	269	234	298	294	244	275	234
T_{90}	362 (max)	357	347	336	357	355	347	342	336
FBP		389	383	377	381	381	389	377	387

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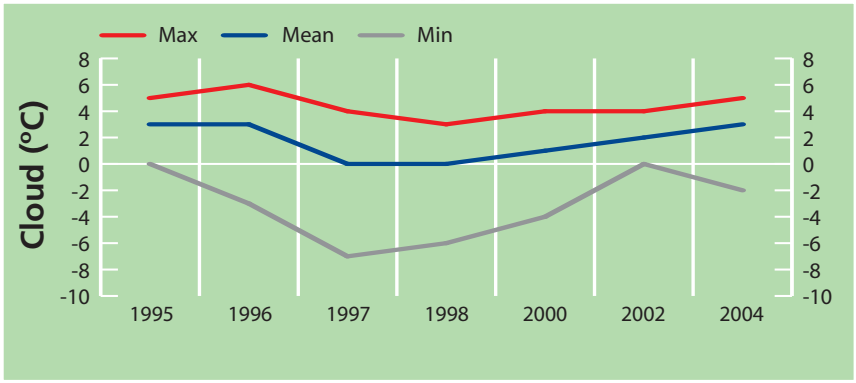
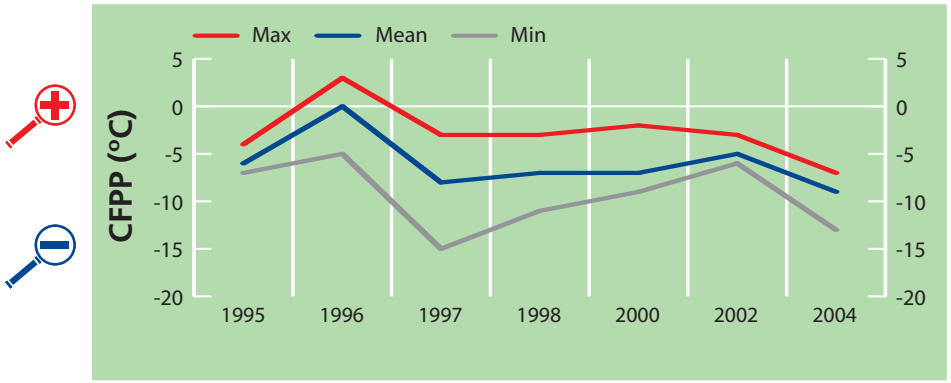
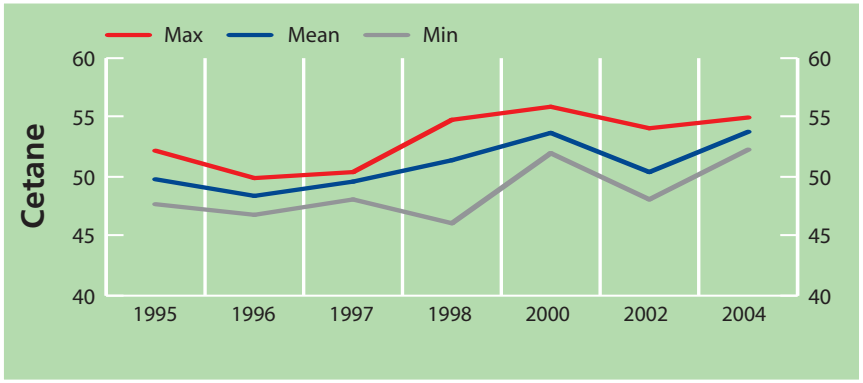
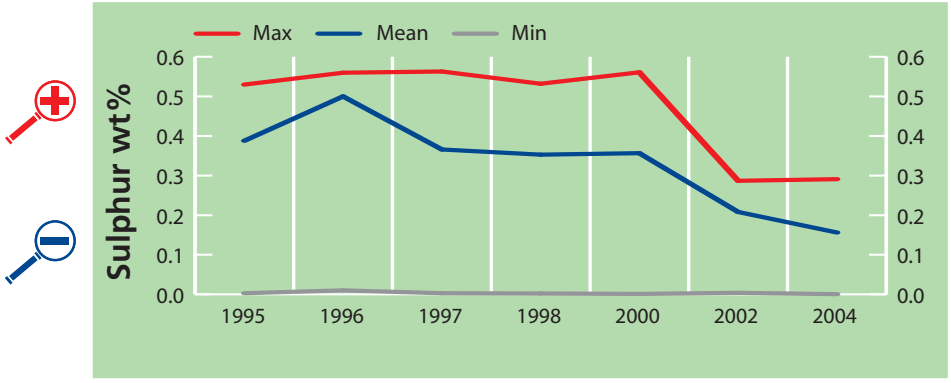
South Africa - Key Trends









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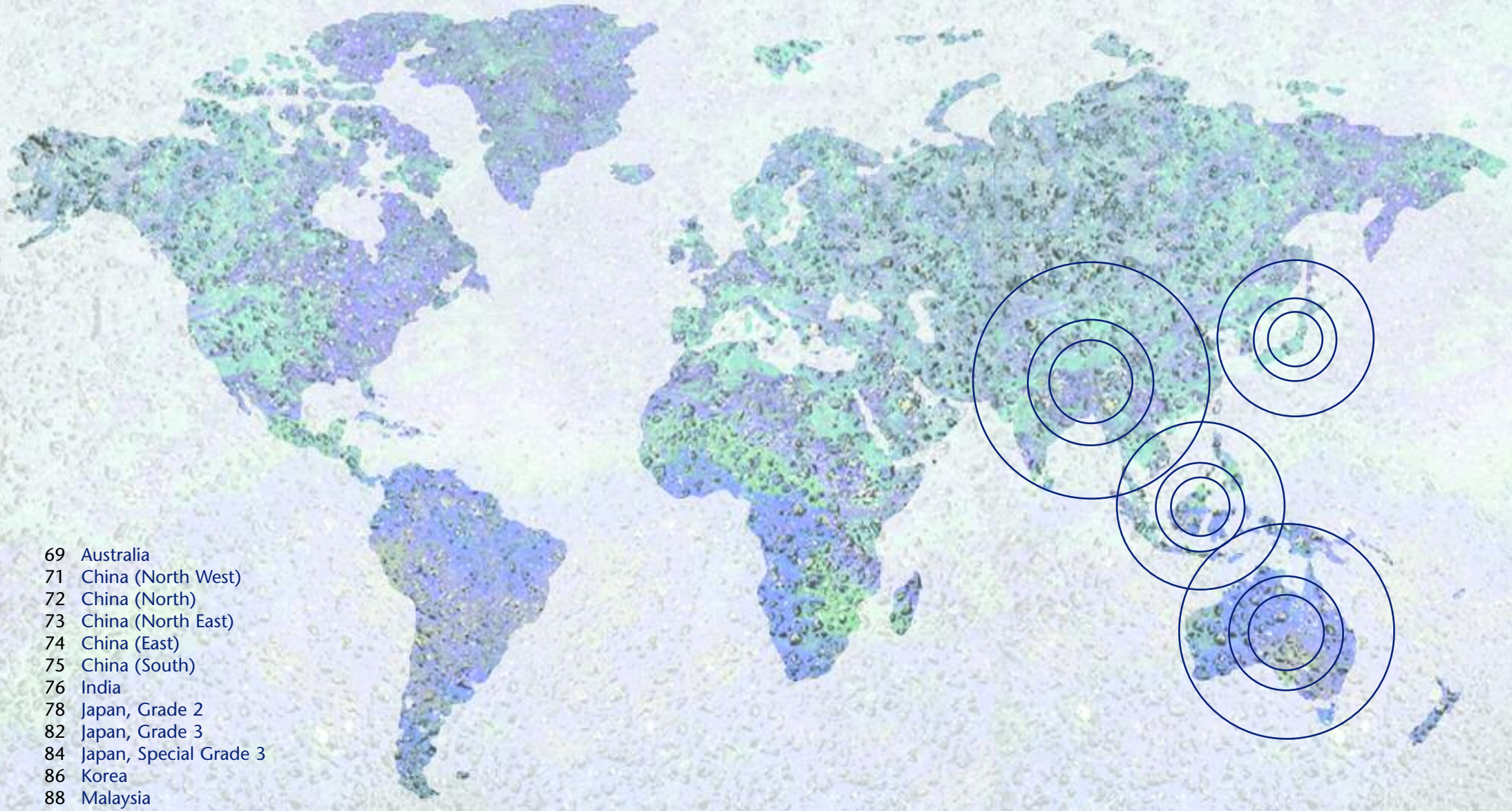
Worldwide Survey - Asia Pacific



69 Australia
71 China (North West)
72 China (North)
73 China (North East)
74 China (East)
75 China (South)
76 India
78 Japan, Grade 2
82 Japan, Grade 3
84 Japan, Special Grade 3
86 Korea
88 Malaysia
90 Singapore
92 Thailand

Australia

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0404234	DIES 0404407	DIES 0404423	DIES 0404533	DIES 0404534	DIES 0404814	DIES 0404816
Cloud Point, °C		1	-1	-5	0	-4	-5	-1	-1	0	1
CFPP, °C		-2	-5	-9	-4	-9	-7	-4	-3	-3	-2
Pour Point, °C		-6	-6	-9	-6	-6	-9	-6	-6	-6	-6
HFRR, µm	460 (max)	402	370	319	377	377	361	319	396	402	361
Wax Content @ 10°C Below Cloud, wt%		8.7	5.0	3.6	4.1	8.7	4.8	3.6	4.7	4.8	4.0
Sulphur, wt%	0.05 (max)	0.0431	0.0230	0.0030	0.0332	0.0272	0.0431	0.0030	0.0040	0.0198	0.0305
Density @ 15°C, kg/m³	820 - 860	848.5	837.2	828.4	833.3	831.9	848.5	828.4	841.8	843.4	833.0
Viscosity @ 20°C, cSt		4.89	4.37	3.91	4.46	4.73	4.89	3.97	3.93	4.69	3.91
Viscosity @ 40°C, cSt	2.0 - 4.5	3.05	2.80	2.55	2.85	2.99	3.05	2.61	2.56	2.95	2.55
Cetane Index 2 Variable		55.1	52.0	49.1	54.9	55.1	49.1	53.5	49.4	50.2	51.9
Cetane Index 4 Variable	46 (min)	58.4	53.1	49.5	55.3	58.4	50.9	54.0	49.5	51.1	52.3
Cetane Number		61.0	56.5	52.5	58.7	61.0	56.5	56.5	52.5	54.1	56.5
Distillation, °C IBP		199	173	154	165	199	198	161	154	178	157
T_{10}		243	223	209	215	243	243	209	215	228	211
T_{20}		253	236	221	233	253	253	221	227	239	224
T_{50}		277	269	262	277	275	273	262	265	271	262
T_{95}	370 (max)	343	336	328	342	328	330	343	335	338	338
FBP		354	349	341	354	341	341	352	349	352	353

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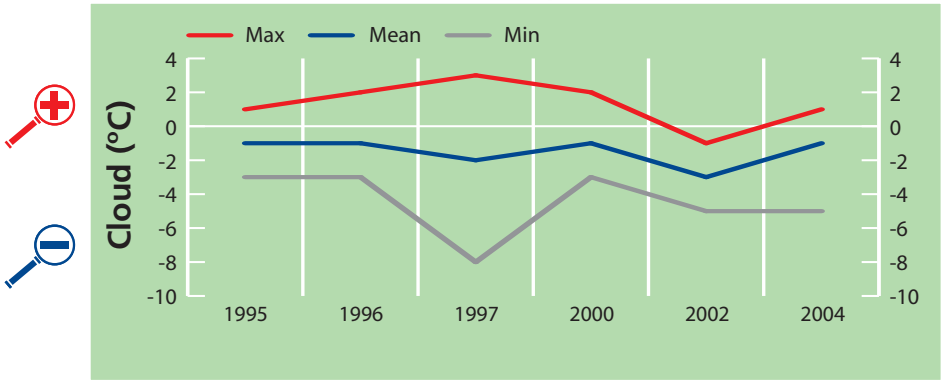
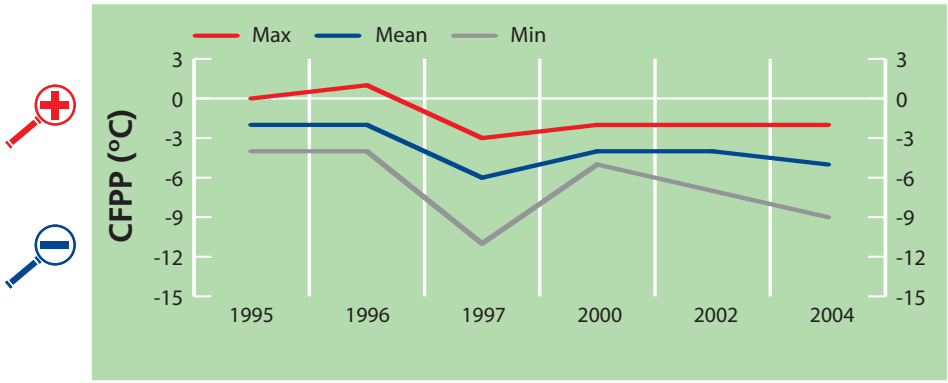
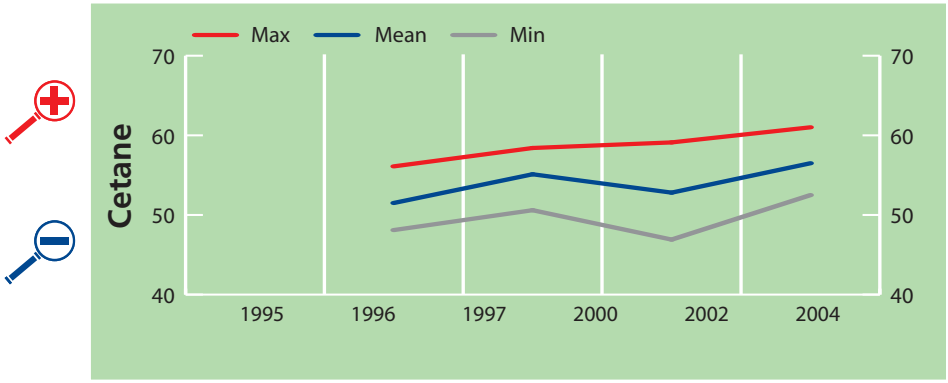
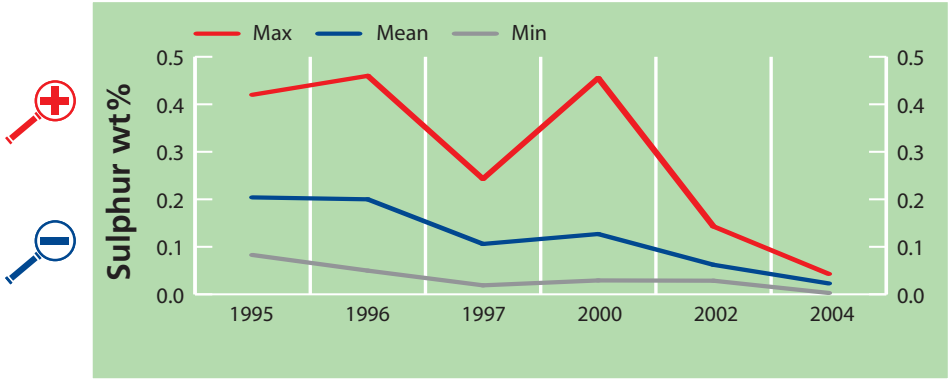
Australia - Key Trends









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China - North West

National Standards and physical inspection data

-10°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	-5 (max)	-5	-8	-11
Solid Point, °C*	-10 (max)	-12	-15	-20
Sulphur, wt%				
Density @ 20°C, kg/m³	820-860			
Cetane Number	49 (min)			
Distillation T_{95}, °C	365 (max)			

-20°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	-14 (max)	-17	-21	-29
Solid Point, °C*	-20 (max)	-20	-26	-30
Sulphur, wt%				
Density @ 20°C, kg/m³	820-860			
Cetane Number	46 (min)			
Distillation T_{95}, °C	365 (max)			

-35°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	-29 (max)	-29	-34	-44
Solid Point, °C*	-35 (max)	-35	-39	-46
Sulphur, wt%				
Density @ 20°C, kg/m³	800-840			
Cetane Number	45 (min)			
Distillation T_{95}, °C	365 (max)			

All Grades	National Standard	Maximum Observed	Mean	Minimum Observed
Sulphur, wt%		0.190	0.080	0.015
Density @ 20°C, kg/m³		826	819	815
Cetane Number		56	46	45
Distillation T_{95}, °C		321	290	256

Data supplied by Petro-China
* Solid point is 3°C lower than pour point
Specification shown is BG/T 19147-2003

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China - North

National Standards and physical inspection data

0°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	4 (max)	3	-9	-3
Solid Point, °C*	0 (max)	0	-4	-6
Sulphur, wt%				
Density @ 20°C, kg/m³	820-860			
Cetane Number	49 (min)			
Distillation T_{95}, °C	365 (max)			

-10°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	-5 (max)	-5	-10	-16
Solid Point, °C*	-10 (max)	-10	-14	-16
Sulphur, wt%				
Density @ 20°C, kg/m³	820-860			
Cetane Number	46 (min)			
Distillation T_{95}, °C	365 (max)			

-20°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	-14 (max)	-14	-20	-18
Solid Point, °C*	-20 (max)	-20	-25	-24
Sulphur, wt%				
Density @ 20°C, kg/m³	820-860			
Cetane Number	46 (min)			
Distillation T_{95}, °C	365 (max)			

All Grades	National Standard	Maximum Observed	Mean	Minimum Observed
Sulphur, wt%		0.0910	0.0304	0.0039
Density @ 20°C, kg/m³		856.2	834.0	814.8
Cetane Number		59	51	45
Distillation T_{95}, °C		363	340	305

Data supplied by SINOPEC
* Solid point is 3°C lower than pour point
Specification shown is BG/T 19147-2003

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China - North East

National Standards and physical inspection data

-10°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	-5 (max)	-6	-7	-9
Solid Point, °C*	-10 (max)	-10	-12	-13
Sulphur, wt%				
Density @ 20°C, kg/m³	820-860			
Cetane Number	49 (min)			
Distillation T_{95}, °C	365 (max)			

-20°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	-14 (max)	-14	-19	-23
Solid Point, °C*	-20 (max)	-20	-23	-27
Sulphur, wt%				
Density @ 20°C, kg/m³	820-860			
Cetane Number	46 (min)			
Distillation T_{95}, °C	365 (max)			

-35°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	-29 (max)	-29	-34	-36
Solid Point, °C*	-35 (max)	-35	-37	-43
Sulphur, wt%				
Density @ 20°C, kg/m³	800-840			
Cetane Number	45 (min)			
Distillation T_{95}, °C	365 (max)			

All Grades	National Standard	Maximum Observed	Mean	Minimum Observed
Sulphur, wt%		0.030	0.020	0.005
Density @ 20°C, kg/m³		841	835	821
Cetane Number		59	49	45
Distillation T_{95}, °C		327	302	287

Data supplied by Petro-China
* Solid point is 3°C lower than pour point
Specification shown is BG/T 19147-2003

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China - East

National Standards and physical inspection data

0°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	4 (max)	4	0	-8
Solid Point, °C*	0 (max)	0	-5	-16
Sulphur, wt%				
Density @ 20°C, kg/m³	820-860			
Cetane Number	49 (min)			
Distillation T_{95}, °C	365 (max)			

-10°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	-5 (max)	-11	-7	-5
Solid Point, °C*	-10 (max)	-10	-13	-16
Sulphur, wt%				
Density @ 20°C, kg/m³	820-860			
Cetane Number	49 (min)			
Distillation T_{95}, °C	365 (max)			

All Grades	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C				
Solid Point, °C*				
Sulphur, wt%		0.198	0.133	0.003
Density @ 20°C, kg/m³		860.4	848.8	829.3
Cetane Number		55	49	43
Distillation T_{95}, °C		365	360	350

Data supplied by Petro-China
* Solid point is 3°C lower than pour point
Specification shown is BG/T 19147-2003

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China - South

National Standards and physical inspection data

0°C Solid Point Grade	National Standard	Maximum Observed	Mean	Minimum Observed
CFPP, °C	4 (max)	-1	-3	-8
Solid Point, °C*	0 (max)	0	-7	-17
Sulphur, wt%		0.199	0.163	0.065
Density @ 20°C, kg/m³	820-860	860.8	842.2	816.0
Cetane Number	49 (min)	58	52	46
Distillation T_{95}, °C	365 (max)	364	357	347

Data supplied by SINOPEC
* Solid point is 3°C lower than pour point
Specification shown is BG/T 19147-2003

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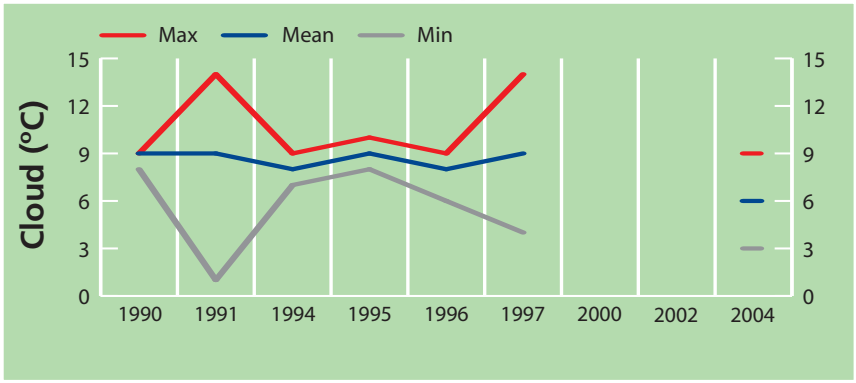
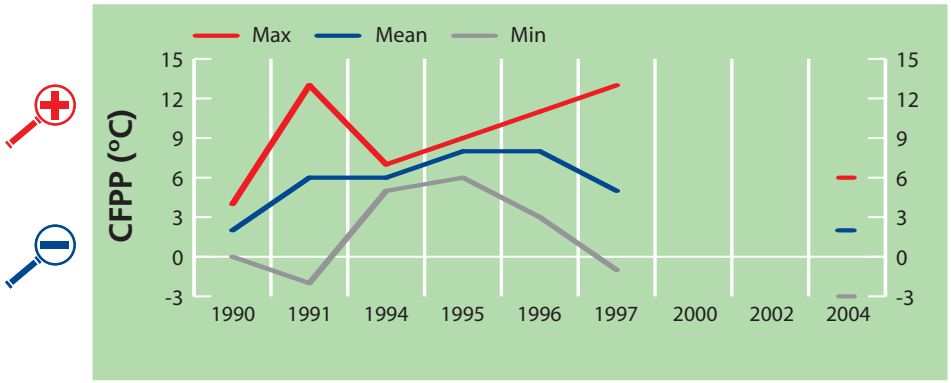
National Standards and physical inspection data

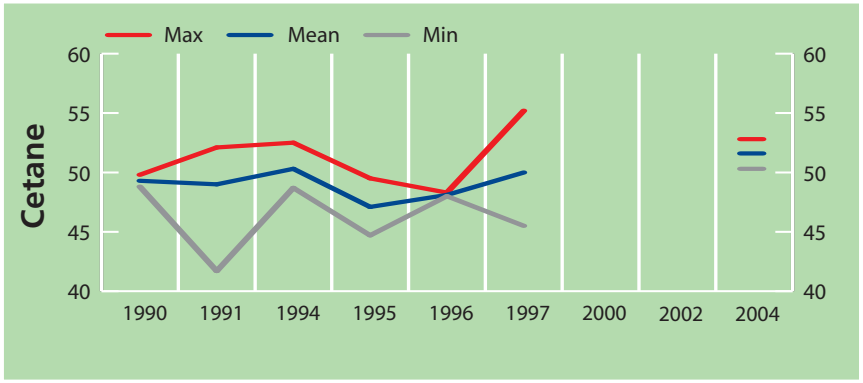
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401332	DIES 0401333
Cloud Point, °C		9	6	3	3	9
CFPP, °C	6 (max)	6	2	-3	-3	6
Pour Point, °C	3 (max)	6	2	-3	-3	6
HFRR, µm		455	401	347	455	347
Wax Content @ 10°C Below Cloud, wt%		3.2	2.3	1.3	1.3	3.2
Sulphur, wt%	0.25 (max)*	0.2060	0.1364	0.0668	0.0668	0.2060
Density @ 15°C, kg/m³	820 - 880**	838.0	837.6	837.1	838.0	837.1
Viscosity @ 20°C, cSt		3.96	3.91	3.87	3.87	3.96
Viscosity @ 40°C, cSt	2.0 - 5.0	2.58	2.56	2.55	2.55	2.58
Cetane Index 2 Variable		54.7	53.1	51.5	51.5	54.7
Cetane Index 4 Variable	46 (min)**	51.4	50.8	50.1	50.1	51.4
Cetane Number	48 (min)**	52.8	51.6	50.3	50.3	52.8
Distillation, °C IBP		140	129	118	140	118
T_{10}		192	179	167	192	167
T_{20}		214	205	195	214	195
T_{50}		282	275	268	268	282
T_{90}	366 (max)	355	350	346	346	355
FBP		383	381	379	383	379

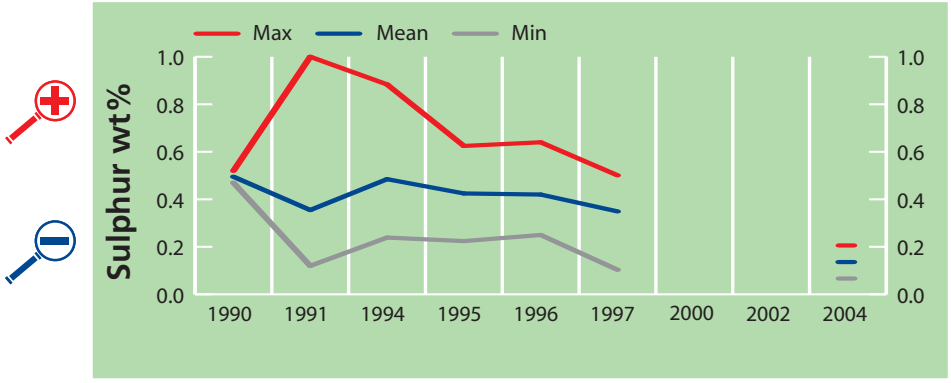
National Standard shown is Year 2000 BIS Diesel Fuel Specification. * Fuel with 500mg/kg available in Delhi and Mumbai.
** Fuel from Assam crude can have either a cetane number of 45 or a cetane index of 43, and density of 820 - 870 kg/m³.
Bharat Stage II Norms will provide more stringent standards from 1st January 2005.

India - Key Trends









Japan (Grade 2)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0402353	DIES 0402355	DIES 0402356	DIES 0402358	DIES 0402359	DIES 0402373	DIES 0402374	DIES 0402375
Cloud Point, °C		1	-3	-8	-3	-4	-5	-3	-7	-7	-5	-3
CFPP, °C	-5 (max)	-5	-11	-17	-13	-8	-13	-17	-16	-9	-9	-14
Pour Point, °C	-7.5 (max)*	-10.0	-20.5	-32.5	-22.5	-30.0	-27.5	-20.0	-20.0	-15.0	-12.5	-22.5
HFRR, µm		489	400	195	247	480	376	361	412	443	470	375
Wax Content @ 10°C Below Cloud, wt%		3.6	1.7	0.0	1.3	1.5	1.0	1.2	0.5	0.9	1.3	1.8
Sulphur, wt%	0.005 (max)	0.0046	0.0033	0.0018	0.0027	0.0035	0.0024	0.0032	0.0034	0.0027	0.0018	0.0035
Density @ 15°C, kg/m³		847	832	820	821	833	824	839	825	823	826	828
Viscosity @ 30°C, cSt	2.5 (min)	4.92	3.86	2.74	3.06	4.24	3.45	3.97	3.35	3.52	4.01	3.41
Cetane Index 4 Variable		61.5	57.1	50.7	57.2	58.3	59.2	54.3	57.4	60.1	61.5	56.3
Cetane Number	45 (min)	61.7	58.1	52.5	58.7	58.8	60.2	56.0	60.0	60.9	61.7	56.2
Distillation, °C IBP		195	169	147	162	157	170	189	178	161	175	158
T_{10}		249	215	181	187	224	201	222	211	210	225	181
T_{20}		265	238	202	208	244	226	242	231	237	246	206
T_{50}		299	282	253	270	289	279	281	271	279	285	283
T_{90}	350 (max)	342	334	321	336	336	331	335	326	325	332	339
FBP		368	360	345	364	361	360	365	355	349	356	364

* Pour point measured at 2.5°C intervals (Japanese Industry Standard)

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Japan (Grade 2) continued

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0402376	DIES 0402377	DIES 0402379	DIES 0402380	DIES 0402382	DIES 0402383	DIES 0402385	DIES 0402386
Cloud Point, °C		1	-3	-8	-1	-2	-3	-3	-2	-1	-1	-1
CFPP, °C	-5 (max)	-5	-11	-17	-6	-14	-6	-7	-7	-5	-6	-11
Pour Point, °C	-7.5 (max)*	-10.0	-20.5	-32.5	-15.0	-10.0	-25.0	-20.0	-27.5	-25.0	-22.5	-20.0
HFRR, µm		489	400	195	455	451	424	483	467	489	459	454
Wax Content @ 10°C Below Cloud, wt%		3.6	1.7	1.8	2.7	1.7	2.3	2.0	2.2	2.5	2.3	
Sulphur, wt%	0.005 (max)	0.0046	0.0033	0.0018	0.0038	0.0042	0.0028	0.0029	0.0035	0.0040	0.0019	0.0046
Density @ 15°C, kg/m³		847	832	820	839	838	834	830	830	833	826	847
Viscosity @ 30°C, cSt	2.5 (min)	4.92	3.86	2.74	4.73	4.02	4.28	3.82	3.85	3.85	3.59	4.15
Cetane Index 4 Variable		61.5	57.1	50.7	58.6	54.5	58.8	58.4	58.3	56.7	58.1	50.7
Cetane Number	45 (min)	61.7	58.1	52.5	57.6	57.2	60.6	58.3	58.4	57.7	59.8	52.5
Distillation, °C IBP		195	169	147	154	147	195	169	169	166	159	174
T_{10}		249	215	181	187	224	201	222	211	210	225	181
T_{20}		265	238	202	208	244	226	242	231	237	246	206
T_{50}		299	282	253	270	289	279	281	271	279	285	283
T_{90}	350 (max)	342	334	321	338	338	332	332	338	339	339	338
FBP		368	360	345	362	368	357	358	363	359	365	362

* Pour point measured at 2.5°C intervals (Japanese Industry Standard)

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Japan (Grade 2) continued 2

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0402388	DIES 0402389	DIES 0402390	DIES 0402391	DIES 0402392	DIES 0402393
Cloud Point, °C		1	-3	-8	-8	-6	-2	-6	0	1
CFPP, °C	-5 (max)	-5	-11	-17	-8	-17	-6	-17		-12
Pour Point, °C	-7.5 (max)*	-10.0	-20.5	-32.5	-10.0	-22.5	-32.5	-17.5	-12.5	-20.0
HFRR, µm		489	400	195	286	415	237	458	195	354
Wax Content @ 10°C Below Cloud, wt%		3.6	1.7	0.0	0.0	0.5	2.3	0.6	3.4	3.6
Sulphur, wt%	0.005 (max)	0.0046	0.0033	0.0018	0.0031	0.0036	0.0037	0.0033	0.0038	0.0044
Density @ 15°C, kg/m³		847	832	820	836	833	838	820	840	837
Viscosity @ 30°C, cSt	2.5 (min)	4.92	3.86	2.74	3.76	3.61	4.03	2.74	4.62	4.92
Cetane Index 4 Variable		61.5	57.1	50.7	55.2	55.7	56.0	54.0	57.6	60.3
Cetane Number	45 (min)	61.7	58.1	52.5	56.5	57.3	56.6	56.2	58.4	59.6
Distillation, °C IBP		195	169	147	184	180	180	163	158	169
T_{10}		249	215	181	221	219	233	187	240	239
T_{20}		265	238	202	241	239	251	202	261	265
T_{50}		299	282	253	282	277	283	253	292	299
T_{90}	350 (max)	342	334	321	321	328	332	328	340	342
FBP		368	360	345	345	356	362	358	362	367

* Pour point measured at 2.5°C intervals (Japanese Industry Standard)

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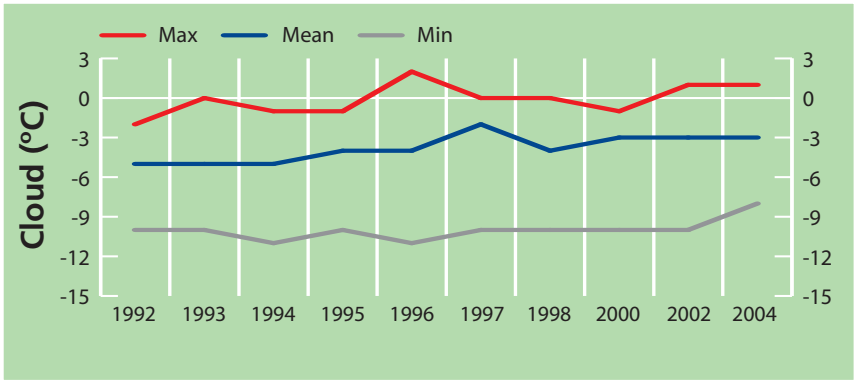
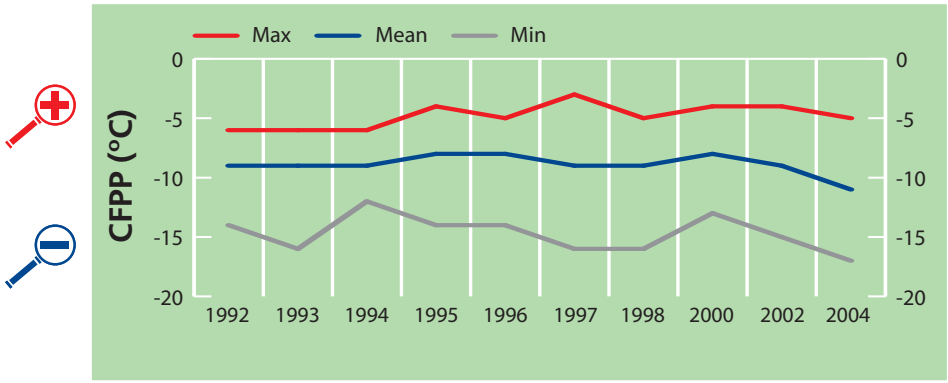
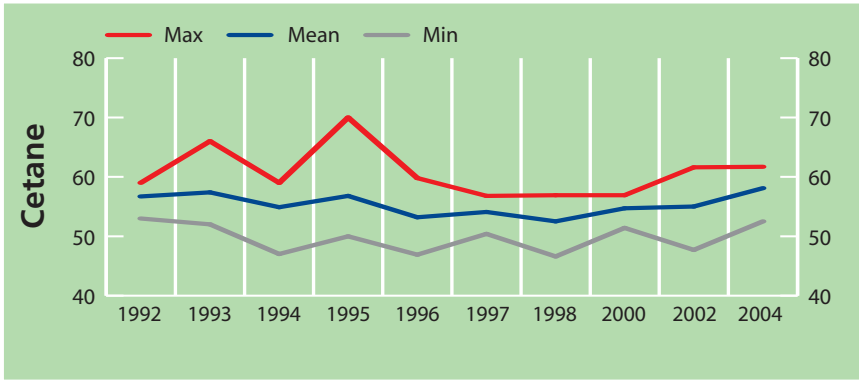
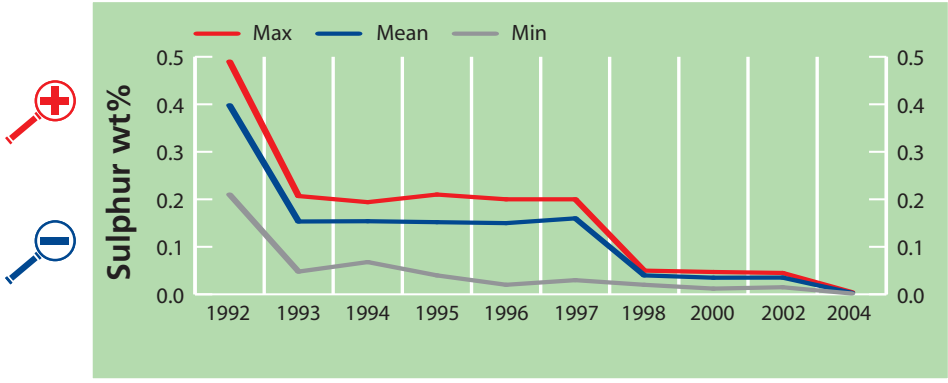
Japan (Grade 2) - Key Trends









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Japan (Grade 3)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0402352
Cloud Point, °C			-15		-15
CFPP, °C	-12 (max)		-19		-19
Pour Point, °C	-20 (max)*		-20.0		-20.0
HFRR, µm			486		486
Wax Content @ 10°C Below Cloud, wt%			2.3		2.3
Sulphur, wt%	0.005 (max)		0.0023		0.0023
Density @ 15°C, kg/m³			818		818
Viscosity @ 30°C, cSt	2.0 (max)		2.65		2.65
Cetane Index 4 Variable			54.7		54.7
Cetane Number	45 (min)		55.7		55.7
Distillation, °C IBP			166		166
T_{10}			189		189
T_{20}			205		205
T_{50}			252		252
T_{90}	330 (max)		315		315
FBP			349		349

* Pour point measured at 2.5°C intervals (Japanese Industry Standard)

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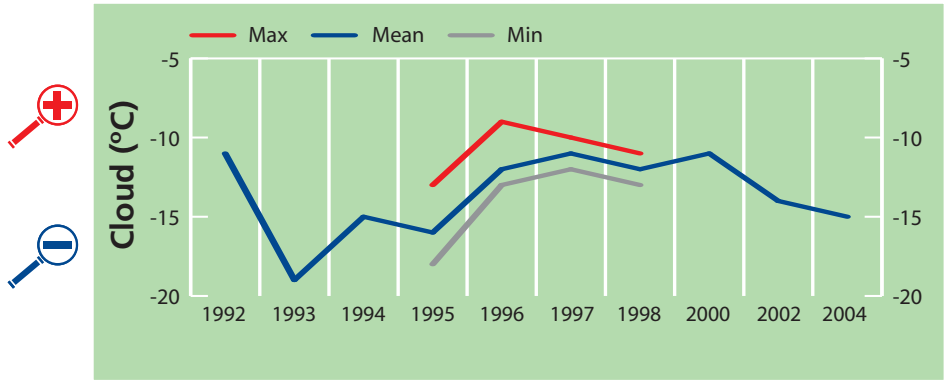
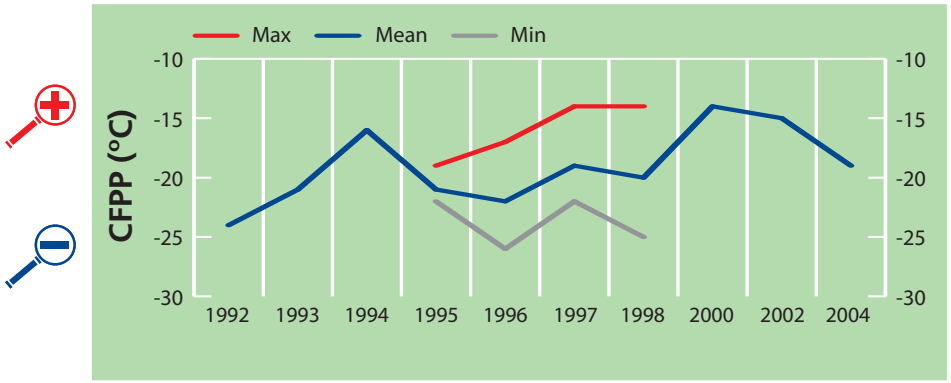
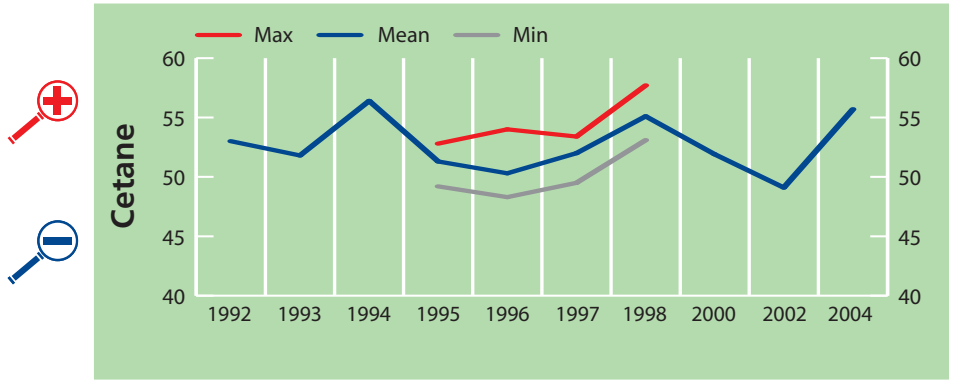
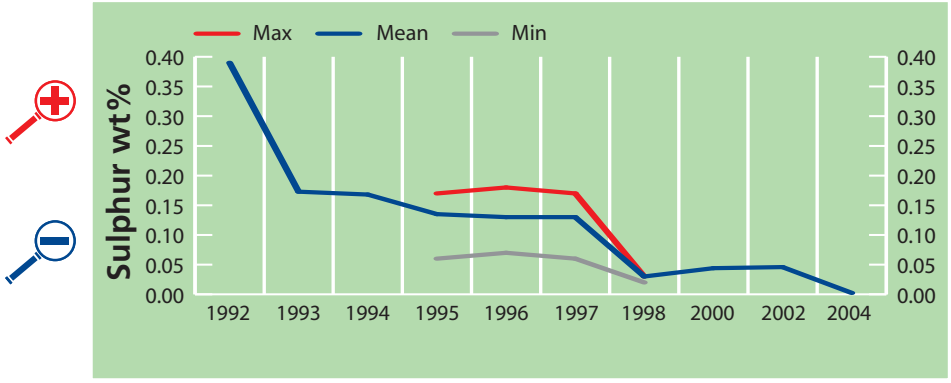
Japan (Grade 3) - Key Trends









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Japan (Special Grade 3)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0402351	DIES 0402360
Cloud Point, °C		-19	-21	-23	-23	-19
CFPP, °C	-19 (max)	-30	-31	-31	-30	-31
Pour Point, °C	-30 (max)*	-37.5	<-40.0	<-45	<-45	-37.5
HFRR, µm		505	482	458	505	458
Wax Content @ 10°C Below Cloud, wt%		1.9	1.7	1.5	1.5	1.9
Sulphur, wt%	0.005 (max)	0.0029	0.0026	0.0023	0.0023	0.0029
Density @ 15°C, kg/m³		811	809	807	807	811
Viscosity @ 30°C, cSt	1.7 (min)	1.91	1.87	1.83	1.83	1.91
Cetane Index 4 Variable		48.7	48.7	48.6	48.6	48.7
Cetane Number	45 (min)	49.3	49.3	49.2	49.3	49.2
Distillation, °C IBP		154	152	151	154	151
T_{10}		170	170	170	170	170
T_{20}		182	181	181	181	182
T_{50}		220	217	215	215	220
T_{90}	330 (max)	300	296	292	292	300
FBP		337	331	325	325	337

* Pour point measured at 2.5°C intervals (Japanese Industry Standard)

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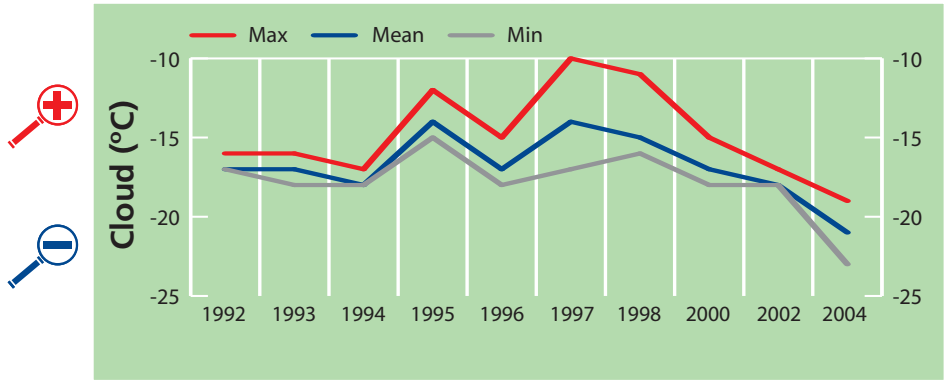
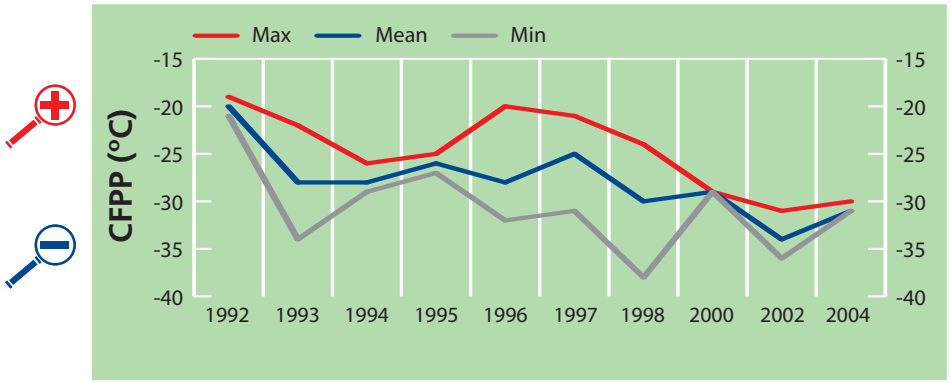
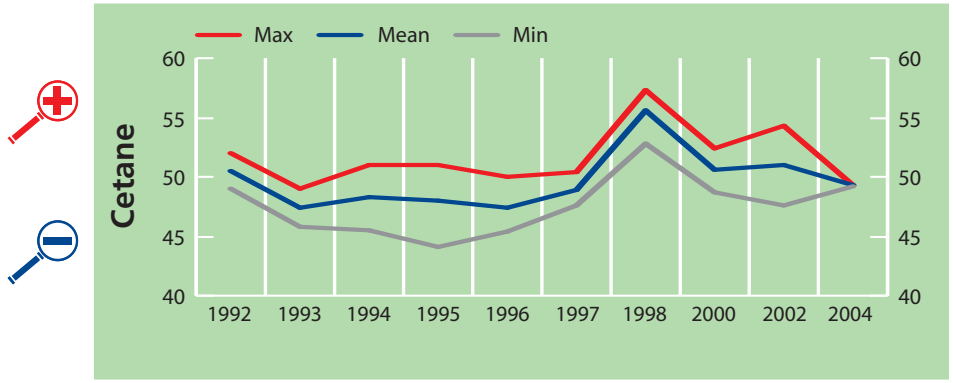
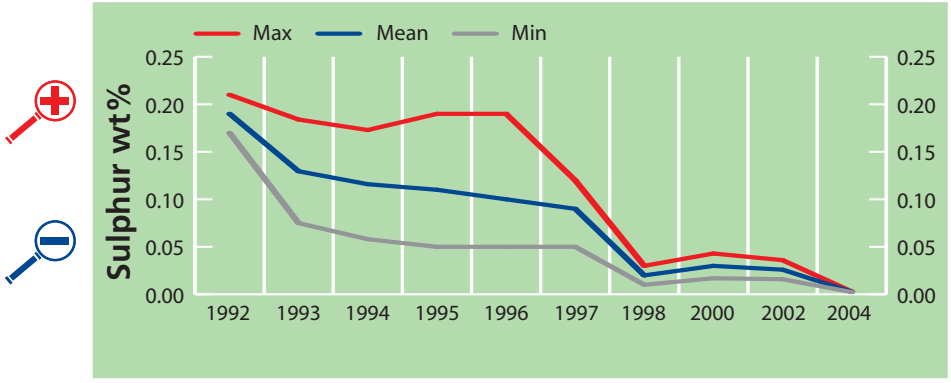
Japan (Special Grade 3) - Key Trends









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Korea

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	A	B	C	D	E
Cloud Point, °C		-1	-4	-6	-6	-3	-6	-1	-4
CFPP, °C	-16 (max)	-21	-26	-30	-30	-21	-28	-24	-25
Pour Point, °C	-17.5 (max)	-22.5	-27.5	-32.5	-32.5	-22.5	-25.0	-27.5	-30.0
HFRR, µm	460 (max)	459	418	388	418	459	388	432	391
Sulphur, wt%	0.043 (max)	0.031	0.022	0.017	0.022	0.031	0.019	0.022	0.017
Density @ 15°C, kg/m³	815 - 855	847.6	833.7	818.3	842.5	847.6	831.4	828.9	818.3
Viscosity @ 40°C, cSt	1.9 - 5.5	3.50	2.92	2.30	3.50	3.20	3.10	2.50	2.30
Cetane Index 4 Variable		58	55	52	54	53	58	52	56
Distillation, °C IBP		179	154	130	167	130	179	135	157
T_{10}		222	203	181	221	205	222	184	181
T_{20}		238	223	204	226	222	238	224	204
T_{50}		288	276	262	288	281	282	266	262
T_{90}	360 (max)	347	338	331	341	347	331	336	337
FBP		373	367	357	364	373	357	373	368

Data supplied by KPQII

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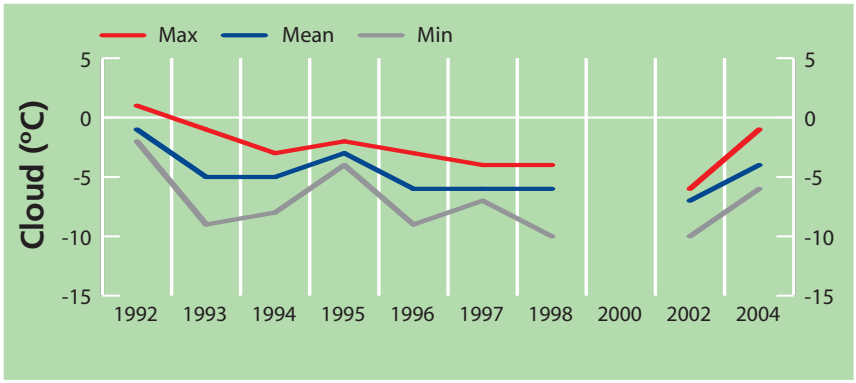
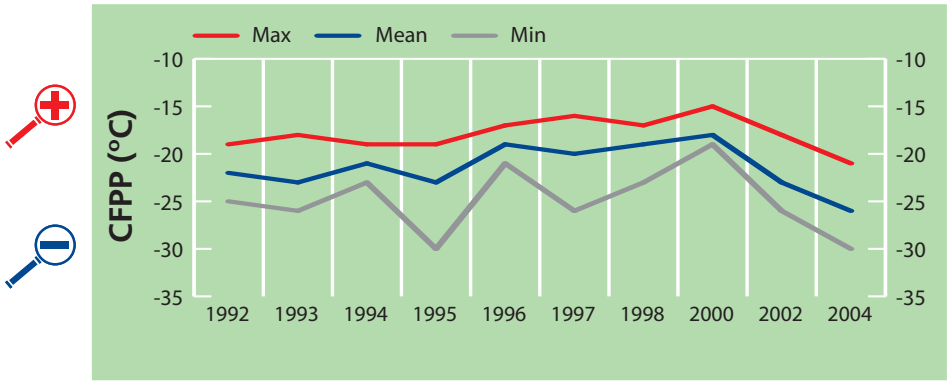
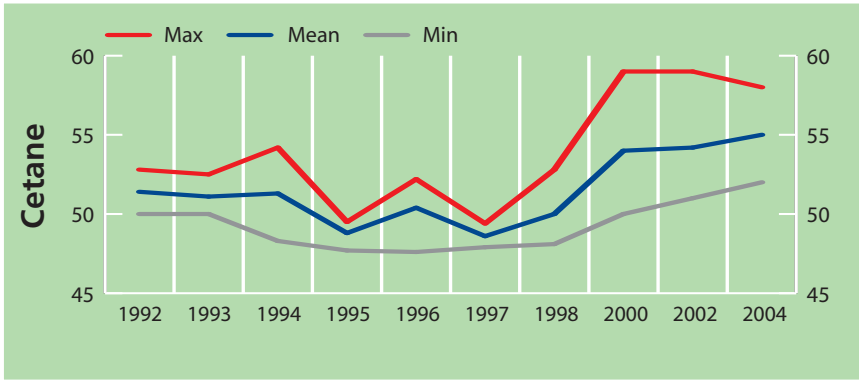
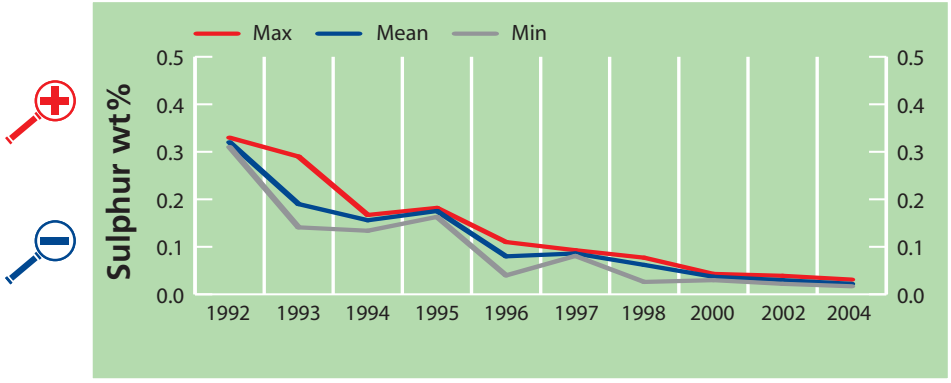
Korea - Key Trends









Malaysia

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401334	DIES 0401335	DIES 0401337	DIES 0401338
Cloud Point, °C	18 (max)	17	14	11	11	13	17	14
CFPP, °C		15	11	8	8	11	15	12
Pour Point, °C	15 (max)	12	11	9	9	12	12	9
HFRR, µm		381	377	371	377	378	381	371
Wax Content @ 10°C Below Cloud, wt%		4.7	3.7	3.2	3.2	3.3	4.7	3.5
Sulphur, wt%	0.5 (max)	0.2810	0.1083	0.0271	0.2810	0.0893	0.0357	0.0271
Density @ 15°C, kg/m³		849.2	833.2	818.0	841.0	849.2	824.5	818.0
Viscosity @ 20°C, cSt		6.40	5.66	4.57	6.40	5.96	5.71	4.57
Viscosity @ 40°C, cSt	1.5 - 5.8	3.83	3.48	2.93	3.83	3.61	3.53	2.93
Cetane Index 2 Variable		60.1	56.4	51.1	54.9	51.1	59.4	60.1
Cetane Index 4 Variable		63.1	58.4	51.7	57.2	51.7	63.1	61.6
Cetane Number	45 (min)	64.7	61.2	57.7	57.7	58.0	64.4	64.7
Distillation, °C IBP		216	190	164	192	188	216	164
T_{10}		243	232	214	241	230	243	214
T_{20}		259	247	231	259	247	252	231
T_{50}		292	284	275	292	285	284	275
T_{90}	370 (max)	364	358	350	360	361	364	350
FBP		394	388	383	385	390	394	383

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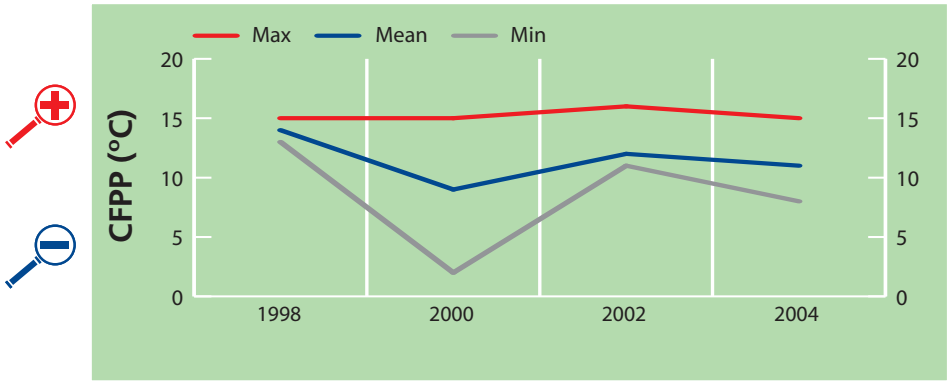
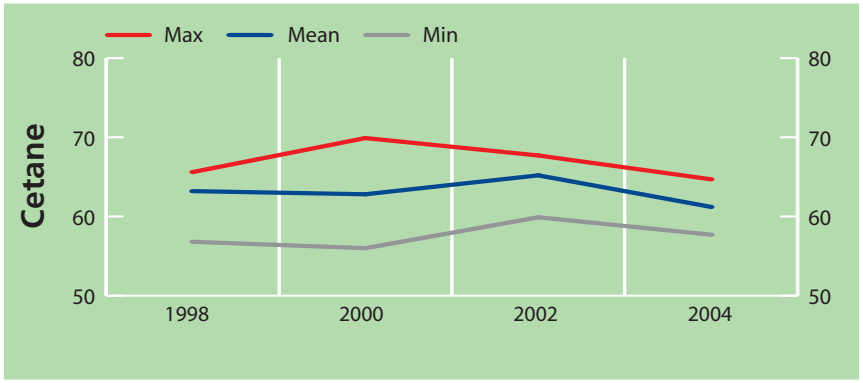
Malaysia - Key Trends





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Singapore

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0400223	DIES 0400226	DIES 0400228	DIES 0400232	DIES 0400234	DIES 0400236
Cloud Point, °C		11	6	3	6	11	5	3	4	5
CFPP, °C		5	1	-2	-1	5	0	0	0	-2
Pour Point, °C		3	-2	-6	-3	3	-6	0	0	-6
HFRR, µm		487	386	335	487	346	365	335	384	400
Wax Content @ 10°C Below Cloud, wt%		3.6	2.1	1.4	1.6	2.5	1.5	3.6	1.8	1.4
Sulphur, wt%	0.05 (max)	0.0350	0.0297	0.0222	0.0292	0.0346	0.0222	0.0350	0.0334	0.0239
Density @ 15°C, kg/m³	860 (max)	853.8	847.4	843.3	843.3	853.8	847.7	846.7	846.5	846.5
Viscosity @ 20°C, cSt		8.43	6.85	6.32	6.32	8.43	6.77	6.45	6.55	6.57
Viscosity @ 40°C, cSt		4.78	4.01	3.79	3.79	4.78	3.81	3.85	3.90	3.96
Cetane Index 2 Variable		54.9	53.2	51.9	54.9	53.2	53.1	52.8	53.3	51.9
Cetane Index 4 Variable	48 (min)	56.3	55.0	53.3	55.6	56.3	54.8	55.3	54.7	53.3
Cetane Number		56.8	56.1	55.1	55.4	56.8	56.2	56.5	55.1	56.5
Distillation, °C IBP		211	195	184	184	211	201	194	194	188
T_{10}		260	242	229	229	260	242	247	238	236
T_{20}		275	259	249	249	275	258	262	255	254
T_{50}		308	296	291	297	308	294	291	293	293
T_{90}	370 (max)	368	359	348	361	368	362	348	359	358
FBP		392	386	374	387	392	391	374	386	387

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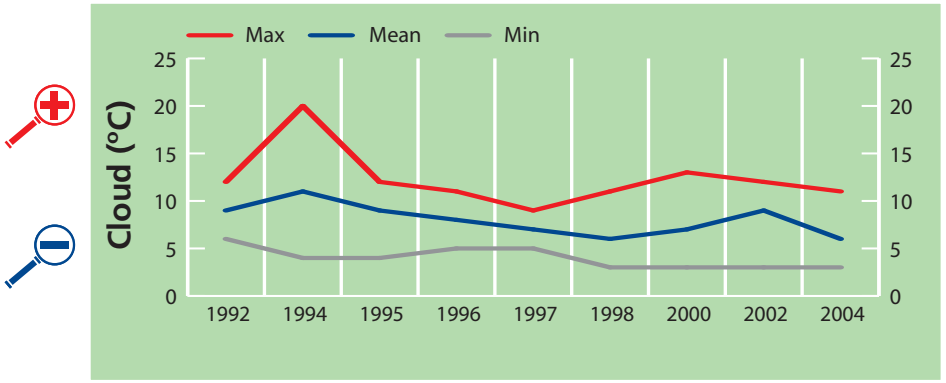
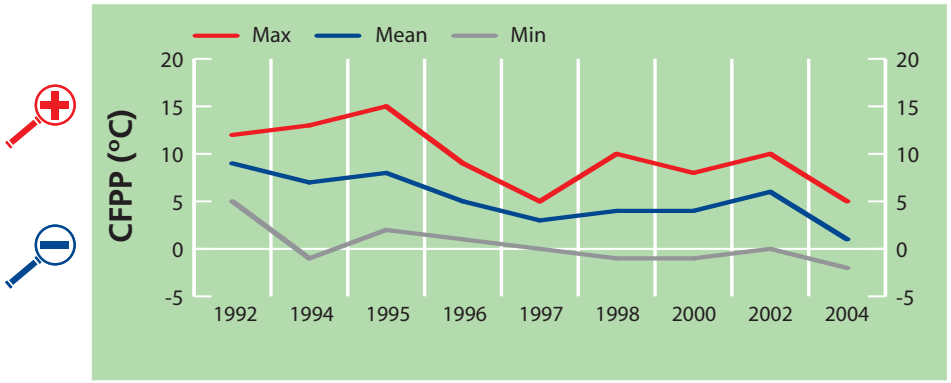
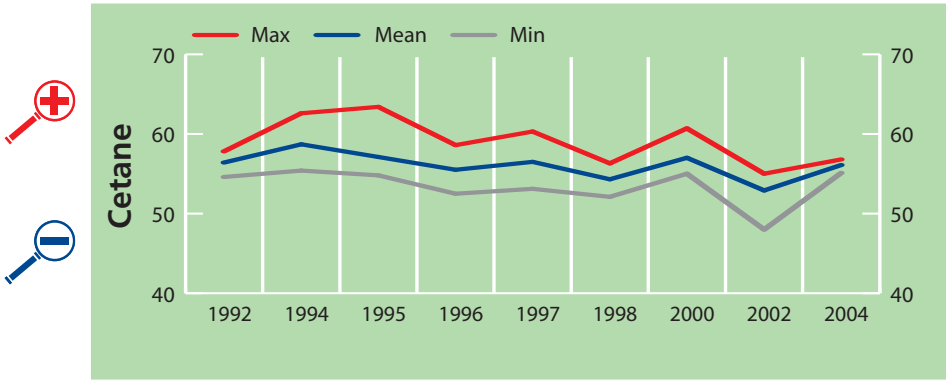
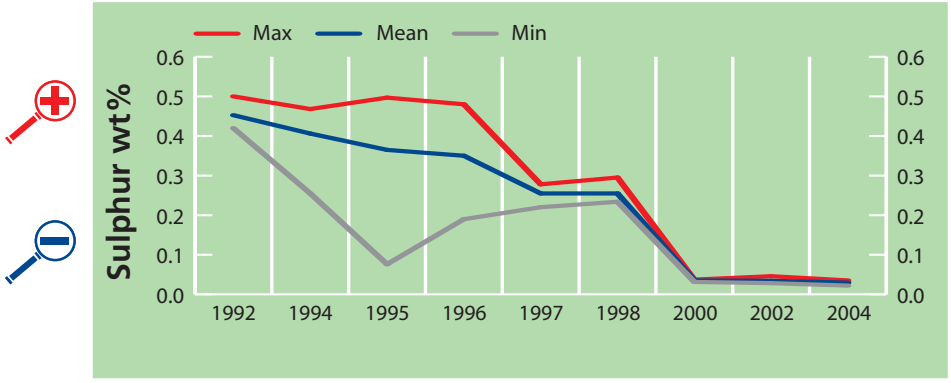
Singapore - Key Trends









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Thailand

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401626	DIES 0401627	DIES 0401629	DIES 0401630	DIES 0401632	DIES 0401633	DIES 0401634	DIES 0401635
Cloud Point, °C		9	4	0	4	2	3	7	3	9	7	3
CFPP, °C		5	0	-4	-2	-3	-1	3	-2	5	2	-1
Pour Point, °C	10	3	-3	-9	-6	-6	-6	3	-9	0	3	3
HFRR, µm	460 (max)	534	386	321	534	356	436	365	358	340	325	441
Wax Content @ 10°C Below Cloud, wt%		3.1	2.2	1.8	2.1	2.1	2.0	2.8	1.8	3.1	2.3	2.1
Sulphur, wt%	0.05 (max)	0.0329	0.0283	0.0259	0.0288	0.0329	0.0279	0.0259	0.0275	0.0286	0.0282	0.0268
Density @ 15°C, kg/m³	810 - 870	839.7	832.0	804.7	839.7	839.5	834.5	832.8	832.9	833.0	831.8	804.7
Viscosity @ 20°C, cSt		5.84	5.02	4.36	4.36	5.23	4.62	5.84	5.34	5.03	5.15	5.06
Viscosity @ 40°C, cSt	1.8 - 4.1	3.40	3.17	2.82	2.82	3.29	3.11	3.40	3.38	3.23	3.19	3.14
Cetane Index 2 Variable		65.8	56.4	52.0	57.5	53.0	55.1	56.9	56.1	55.5	55.9	65.8
Cetane Index 4 Variable	47 (min)	68.1	57.0	52.5	57.3	53.6	54.9	57.7	57.0	55.9	56.1	68.1
Cetane Number	47 (min)	59.3	57.9	54.8	58.3	55.3	54.8	59.0	59.0	59.3	59.3	56.7
Distillation, °C IBP		189	165	145	168	185	159	158	173	156	145	152
T_{10}		222	214	203	203	222	210	219	221	215	211	206
T_{20}		240	232	223	224	239	227	240	237	234	230	223
T_{50}		287	280	273	279	279	280	287	283	280	279	278
T_{90}	357 (max)	354	350	343	354	346	352	352	353	352	349	351
FBP		382	376	367	379	374	367	382	380	380	377	376

Specification shown is Type II

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Thailand (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0401637
Cloud Point, °C		9	4	0	0
CFPP, °C		5	0	-4	-4
Pour Point, °C	10	3	-3	-9	-9
HFRR, µm	460 (max)	534	386	321	321
Wax Content @ 10°C Below Cloud, wt%		3.1	2.2	1.8	1.8
Sulphur, wt%	0.05 (max)	0.0329	0.0283	0.0259	0.0280
Density @ 15°C, kg/m³	810 - 870	839.7	832.0	804.7	839.3
Viscosity @ 20°C, cSt		5.84	5.02	4.36	4.58
Viscosity @ 40°C, cSt	1.8 - 4.1	3.40	3.17	2.82	2.95
Cetane Index 2 Variable		65.8	56.4	52.0	52.0
Cetane Index 4 Variable	47 (min)	68.1	57.0	52.5	52.5
Cetane Number	47 (min)	59.3	57.9	54.8	59.3
Distillation, °C IBP		189	165	145	189
T_{10}		222	214	203	219
T_{20}		240	232	223	234
T_{50}		287	280	273	273
T_{90}	357 (max)	354	350	343	343
FBP		382	376	367	368

Specification shown is Type II

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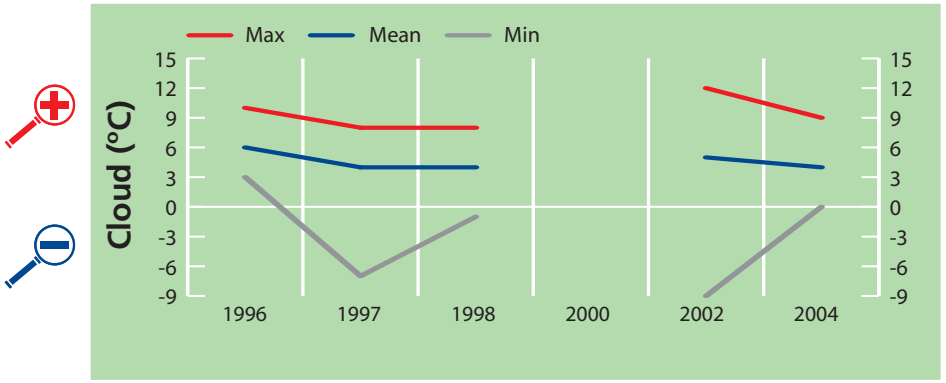
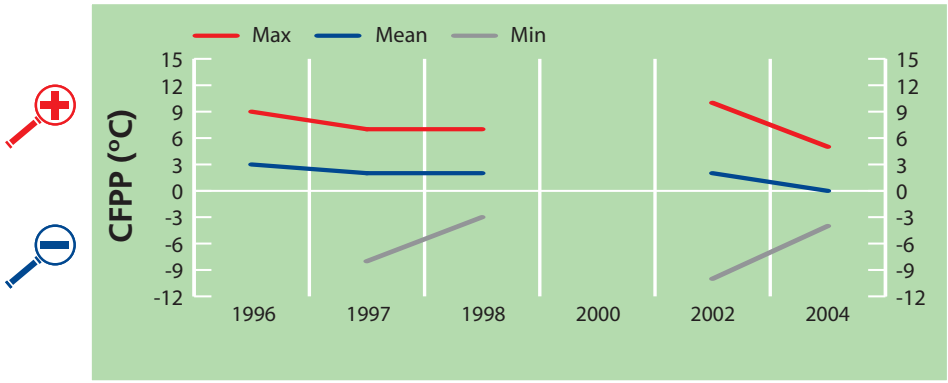
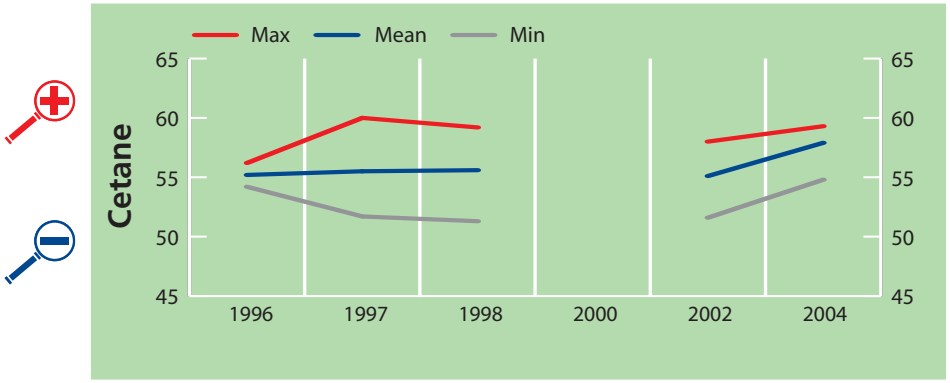
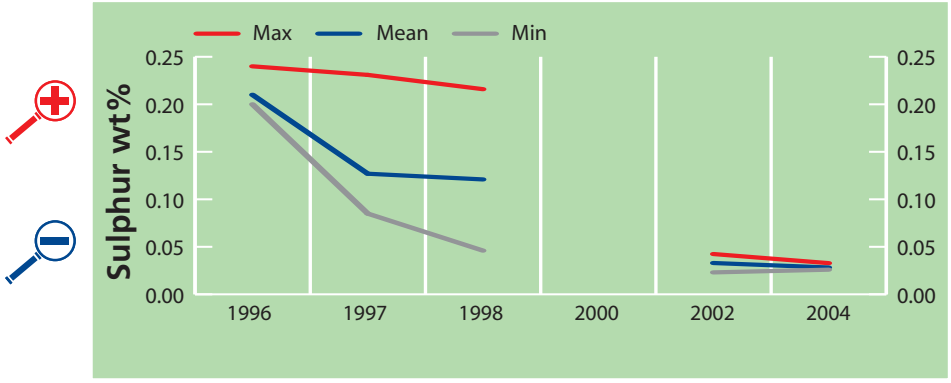
Thailand - Key Trends









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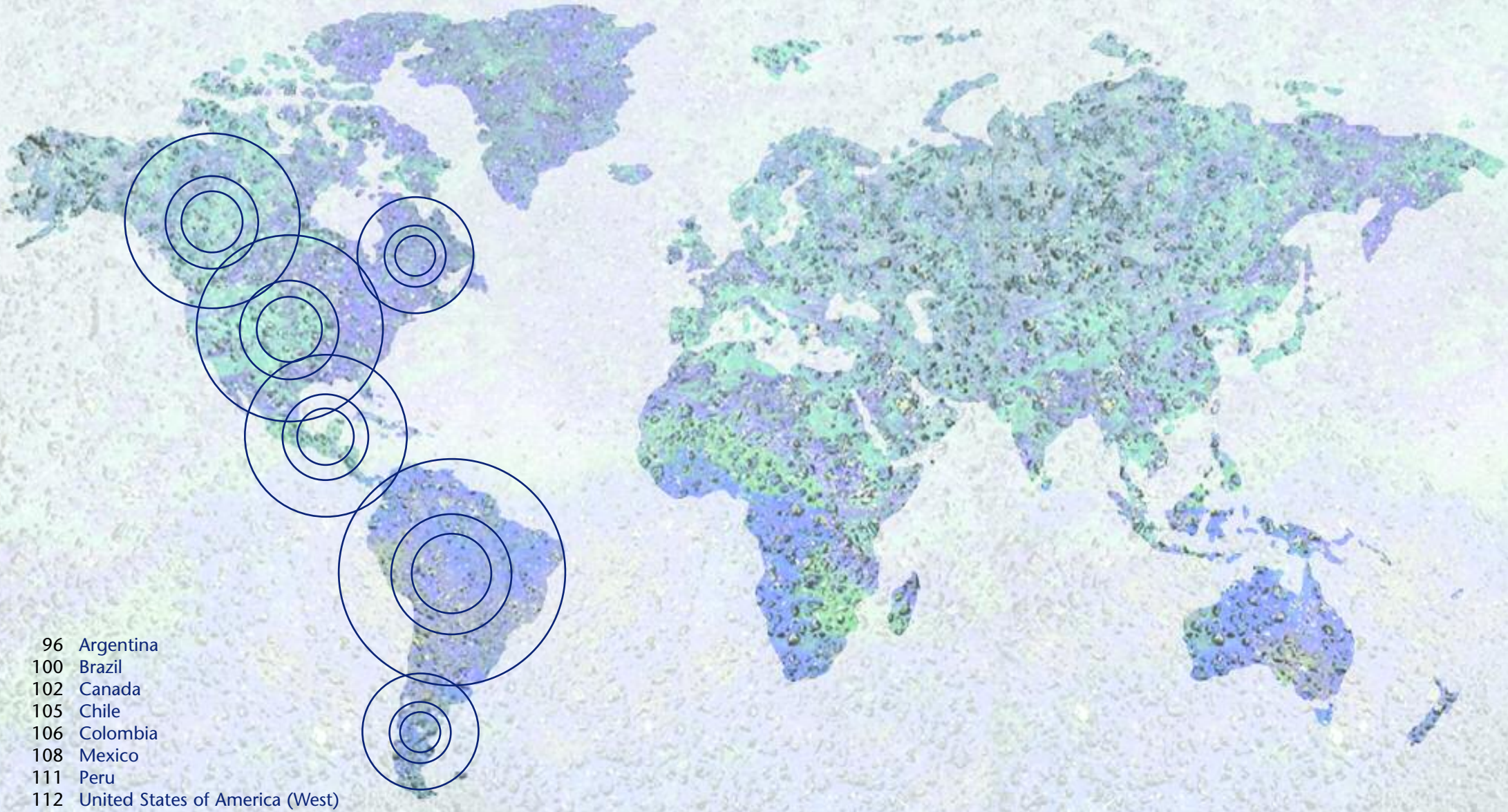
Worldwide Survey - The Americas



96 Argentina
100 Brazil
102 Canada
105 Chile
106 Colombia
108 Mexico
111 Peru
112 United States of America (West)
115 United States of America (Midwest)
119 United States of America (East)

Argentina

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0403751	DIES 0403752	DIES 0403753	DIES 0403755	DIES 0403757	DIES 0403760	DIES 0403763	DIES 0403764
Cloud Point, °C		5	-1	-10	1	-3	1	0	3	-3	1	2
CFPP, °C		-6	-13	-28	-10	-14	-17	-15	-16	-17	-7	-16
Pour Point, °C		-12	-19	-30	-12	-18	-24	-18	-21	-21	-18	-21
HFRR, µm		414	375	314	381	397	402	370	314	408	380	360
Wax Content @ 10°C Below Cloud, wt%		2.5	1.5	0.6	1.6	1.3	1.6	1.4	2.0	1.2	1.7	2.1
Sulphur, wt%	0.25 (max)*	0.2040	0.1183	0.0403	0.1170	0.0512	0.0499	0.0403	0.1420	0.0426	0.1330	0.1270
Density @ 15°C, kg/m³		861.1	846.1	830.9	848.1	833.7	846.2	837.5	861.1	833.9	853.9	858.3
Viscosity @ 20°C, cSt		6.53	4.96	3.63	5.78	3.78	4.55	4.07	6.53	3.63	6.14	6.02
Viscosity @ 40°C, cSt	2.0 - 5.5	3.99	3.24	2.46	3.66	2.46	2.91	2.63	3.95	2.47	3.78	3.76
Cetane Index 2 Variable		54.6	50.1	45.5	50.9	50.5	49.8	49.8	48.6	50.3	49.3	48.1
Cetane Index 4 Variable	48 (min)	53.7	49.2	43.6	50.6	49.6	48.0	48.3	47.5	48.9	48.8	48.0
Cetane Number	50 (min)	55.7	52.5	46.8	50.5	52.6	52.1	52.6	54.7	53.6	53.6	55.7
Distillation, °C IBP		176	153	124	173	157	157	163	162	133	164	159
T_{10}		240	209	183	219	189	194	190	240	190	222	228
T_{20}		254	227	201	239	205	212	207	254	204	242	245
T_{50}		293	275	257	282	258	273	260	293	257	284	285
T_{90}	360 (max)	358	347	333	351	342	358	342	357	339	350	353
FBP		390	377	361	377	375	385	371	379	379	375	371

*Sulphur limit 0.15% maximum in metropolitan zones

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Argentina (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0403766	DIES 0403768	DIES 0403769	DIES 0403770	DIES 0403774	DIES 0403775	DIES 0403776	DIES 0403777
Cloud Point, °C		5	-1	-10	4	-1	-1	0	-1	5	-10	2
CFPP, °C		-6	-13	-28	-6	-10	-15	-11	-6	-9	-16	-12
Pour Point, °C		-12	-19	-30	-21	-15	-15	-18	-12	-15	-18	-12
HFRR, µm		414	375	314	366	327	389	382	400	324	414	391
Wax Content @ 10°C Below Cloud, wt%		2.5	1.5	0.6	0.8	1.4	1.6	1.9	0.8	2.5	1.1	1.9
Sulphur, wt%	0.25 (max)*	0.2040	0.1183	0.0403	0.1310	0.1340	0.1370	0.1350	0.1500	0.1370	0.1690	0.1120
Density @ 15°C, kg/m³		861.1	846.1	830.9	856.5	847.8	845.9	854.4	830.9	831.0	854.8	853.9
Viscosity @ 20°C, cSt		6.53	4.96	3.63	4.57	5.21	5.12	6.13	4.13	4.21	5.04	6.03
Viscosity @ 40°C, cSt	2.0 - 5.5	3.99	3.24	2.46	2.83	3.21	3.17	3.66	2.68	2.73	3.08	3.60
Cetane Index 2 Variable		54.6	50.1	45.5	45.5	50.3	52.3	49.8	53.5	54.6	47.5	50.0
Cetane Index 4 Variable	48 (min)	53.7	49.2	43.6	43.6	50.3	52.2	49.9	52.0	53.7	45.5	49.8
Cetane Number	50 (min)	55.7	52.5	46.8	46.8	52.3	52.3	53.6	53.2	53.8	51.8	52.8
Distillation, °C IBP		176	153	124	131	166	158	171	124	128	172	155
T_{10}		240	209	183	194	222	222	230	187	197	205	228
T_{20}		254	227	201	217	237	243	247	203	215	238	247
T_{50}		293	275	257	269	278	286	288	266	271	276	288
T_{90}	360 (max)	358	347	333	342	342	350	352	353	353	333	350
FBP		390	377	361	378	374	378	380	386	382	361	380

*Sulphur limit 0.15% maximum in metropolitan zones

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Argentina (continued 2)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0403778	DIES 0403788	DIES 0404125	DIES 0404126
Cloud Point, °C		5	-1	-10	2	-3	-6	-7
CFPP, °C		-6	-13	-28	-15	-7	-25	-28
Pour Point, °C		-12	-19	-30	-18	-24	-30	-24
HFRR, µm		414	375	314	357	372	386	379
Wax Content @ 10°C Below Cloud, wt%		2.5	1.5	0.6	2.2	0.6	1.1	1.0
Sulphur, wt%	0.25 (max)*	0.2040	0.1183	0.0403	0.1200	0.2040	0.1060	0.1270
Density @ 15°C, kg/m³		861.1	846.1	830.9	859.8	836.5	833.2	844.8
Viscosity @ 20°C, cSt		6.53	4.96	3.63	6.16	4.05	3.77	4.39
Viscosity @ 40°C, cSt	2.0 - 5.5	3.99	3.24	2.46	3.86	2.60	3.99	3.69
Cetane Index 2 Variable		54.6	50.1	45.5	48.8	51.6	51.0	49.2
Cetane Index 4 Variable	48 (min)	53.7	49.2	43.6	49.2	49.7	50.1	49.2
Cetane Number	50 (min)	55.7	52.5	46.8	55.1	50.5	51.7	51.1
Distillation, °C IBP		176	153	124	176	124	136	158
T_{10}		240	209	183	240	183	193	212
T_{20}		254	227	201	254	201	208	228
T_{50}		293	275	257	291	266	262	270
T_{90}	360 (max)	358	347	333	349	357	339	337
FBP		390	377	361	372	390	375	371

*Sulphur limit 0.15% maximum in metropolitan zones

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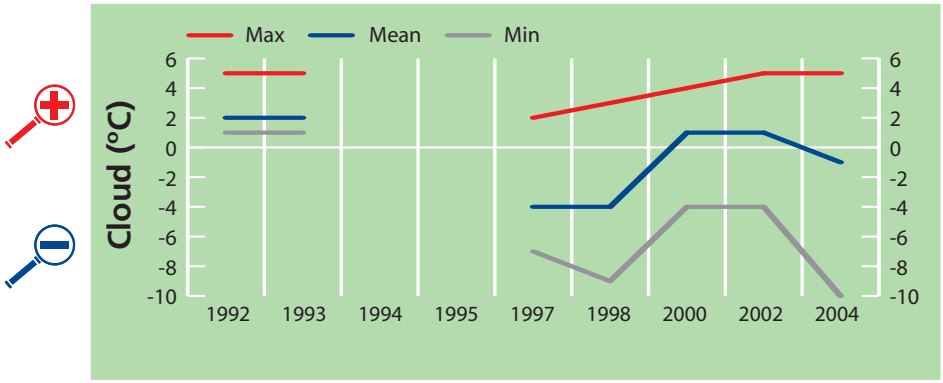
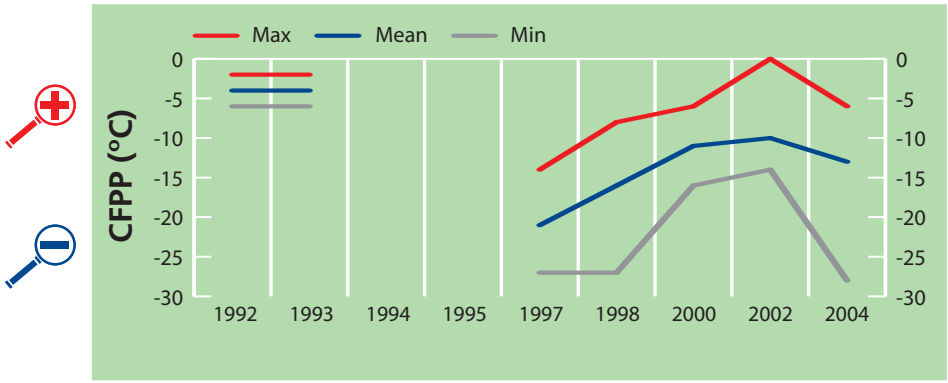
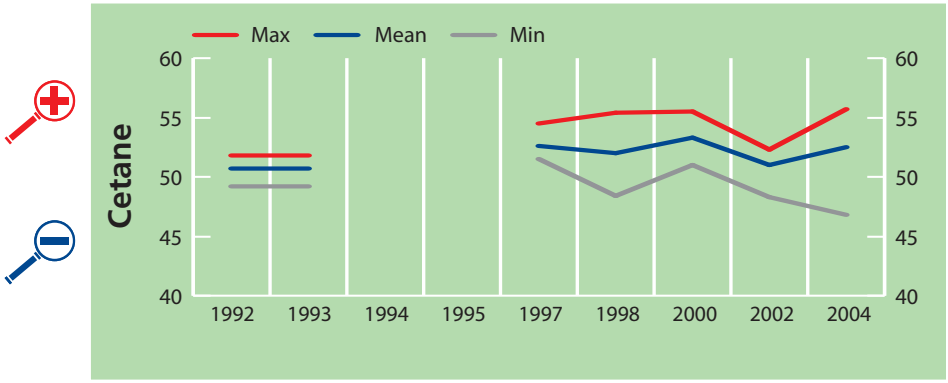
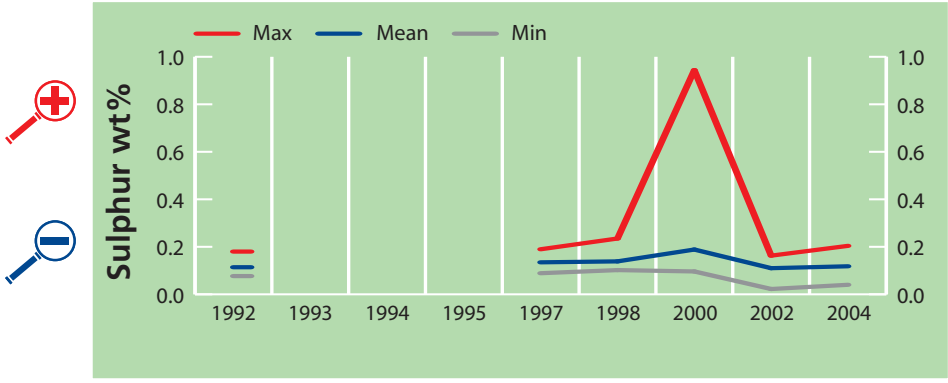
Argentina - Key Trends









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Brazil

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0405861	DIES 0405862	DIES 0405863
Cloud Point, °C		6	0	-5	-5	0	6
CFPP, °C		-6	-10	-14	-10	-6	-14
Pour Point, °C		-24	-24	-24	-24	-24	-24
HFRR, µm		391	356	296	391	381	296
Wax Content @ 10°C Below Cloud, wt%		0.7	0.6	0.6	0.6	0.6	0.7
Sulphur, wt%	0.2 (max)	0.173	0.144	0.125	0.173	0.133	0.125
Density @ 15°C, kg/m³	820 - 865	862.9	854.3	846.7	862.9	853.3	846.7
Viscosity @ 20°C, cSt		7.06	5.53	4.64	7.06	4.64	4.90
Viscosity @ 40°C, cSt	2.5 - 5.5	4.03	3.30	2.86	4.03	2.86	3.03
Cetane Index 2 Variable		49.0	48.1	47.2	48.2	47.2	49.0
Cetane Index 4 Variable	45 (min)	47.8	46.2	44.4	46.5	44.4	47.8
Cetane Number	42 (min)	51.0	47.7	44.8	47.3	44.8	51.0
Distillation, °C IBP		173	158	143	173	143	157
T_{10}		221	205	193	221	193	201
T_{20}		246	228	217	246	217	220
T_{50}	245 - 310	294	279	270	294	272	270
T_{90}		372	362	353	362	353	372
FBP		406	394	385	385	392	406

Specification shown is for metropolitan areas

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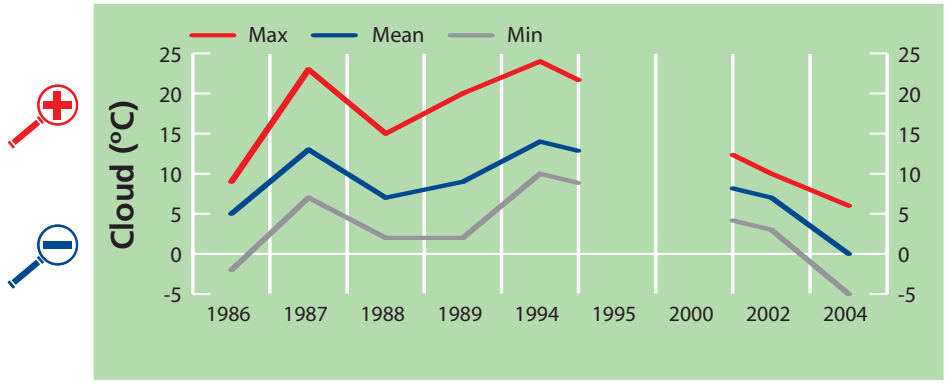
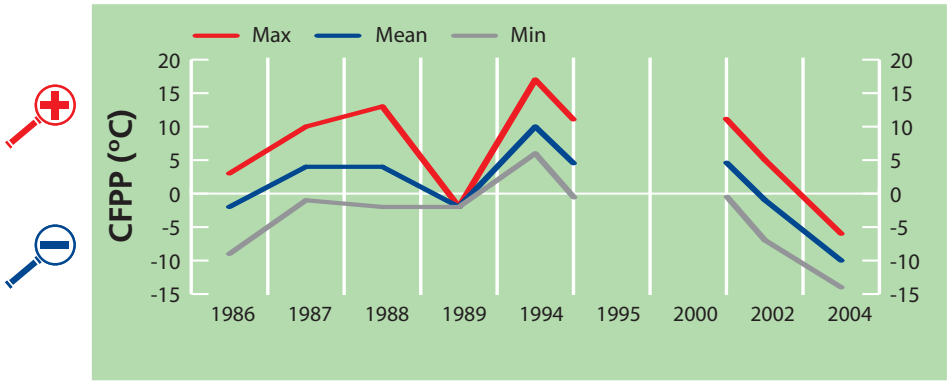
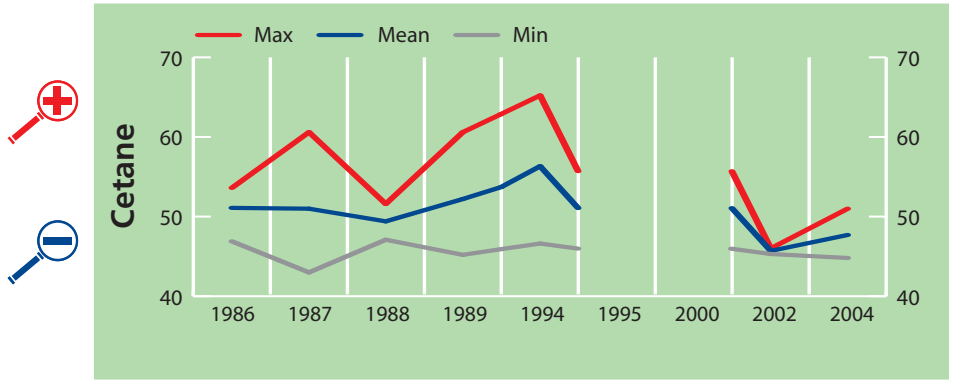
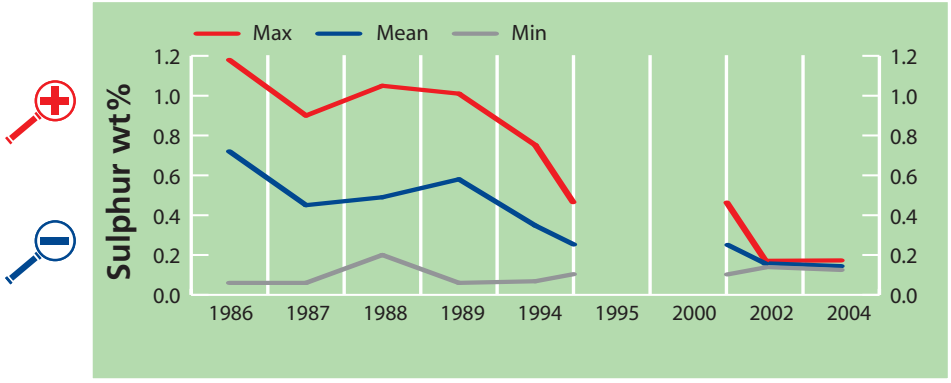
Brazil - Key Trends









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Canada

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441-108	30441-109	30441-110	30441-111	30441-112	30441-113	30441-114	30441-115
Cloud Point, °C		-18	-28	-41	-34	-22	-20	-41	-24	-30	-36	-29
CFPP, °C		-21	<-30	<-38	-34	-24	-21	<-38	-21	-29	-34	-30
LTFT, °C		-22	-30	-42	-34	-22	-22	-42	-24	-30	-36	-30
Pour Point, °C		-27	<-36	<-53	<-53	-27	-27	<-52	-30	-36	<-52	<-49
HFRR, µm	460 (max)	625	496	358	531	407	537	358	450	443	625	405
Wax Content @ 10°C Below Cloud, wt%		3.9	1.2	0.1	0.2	1.5	1.5	3.9	1.5	0.8	0.1	0.3
Sulphur, wt%		0.043	0.029	0.014	0.038	0.023	0.031	0.016	0.032	0.041	0.014	0.043
Density @ 15°C, kg/m³		857.1	844.9	829.2	853.9	842.0	843.3	855.3	833.9	829.2	838.4	848.9
Viscosity @ 20°C, cSt		3.63	3.25	2.51	3.53	3.31	3.49	3.63	2.73	2.51	2.88	3.20
Viscosity @ 40°C, cSt	1.7 - 4.1	2.37	2.15	1.72	2.25	2.17	2.24	2.37	1.86	1.72	1.99	2.17
Cetane Index 2 Variable		46.2	44.2	40.9	42.1	46.2	46.0	41.2	46.0	44.6	42.6	40.9
Cetane Index 4 Variable		46.1	43.7	40.8	41.4	45.3	46.0	40.8	45.6	44.7	43.2	42.0
Cetane Number	40 (min)	46.4	43.5	40.5	44.0	44.5	45.4	44.2	43.8	40.5	41.8	40.6
Distillation, °C IBP		178	164	149	166	169	178	172	155	149	163	160
T_{10}		214	194	173	194	195	207	214	182	173	183	195
T_{20}		225	208	185	209	208	218	225	195	185	194	206
T_{50}		263	248	231	251	252	253	249	241	231	235	241
T_{90}	360 (max)	325	310	293	317	307	309	293	306	300	311	322
FBP		349	336	313	342	330	337	313	339	335	341	349

Canada (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441-116	30441-117	30441-118	30441-119	30441-120	30441-121	30441-122
Cloud Point, °C		-18	-28	-41	-40	-22	-18	-23	-22	-34	-31
CFPP, °C		-21	<-30	<-38	<-38	-25	<-38	-26	-23	-35	-32
LTFT, °C		-22	-30	-42	-42	-22	-34	-22	-22	-34	-32
Pour Point, °C		-27	<-36	<-53	<-51	-27	-42	-27	-27	-48	-53
HFRR, µm	460 (max)	625	496	358	513	535	414	540	545	588	553
Wax Content @ 10°C Below Cloud, wt%		3.9	1.2	0.1	1.4	0.3	0.2	3.7	1.8	0.5	0.3
Sulphur, wt%		0.043	0.029	0.014	0.038	0.024	0.036	0.022	0.037	0.026	0.017
Density @ 15°C, kg/m³		857.1	844.9	829.2	857.1	847.9	835.6	845.5	848.6	853.8	840.2
Viscosity @ 20°C, cSt		3.63	3.25	2.51	3.54	3.34	3.08	3.18	3.50	3.54	3.26
Viscosity @ 40°C, cSt	1.7 - 4.1	2.37	2.15	1.72	2.34	2.22	2.07	2.12	2.30	2.32	2.16
Cetane Index 2 Variable		46.2	44.2	40.9	44.0	45.3	46.0	45.3	45.1	42.9	44.4
Cetane Index 4 Variable		46.1	43.7	40.8	41.4	44.4	46.1	44.4	44.2	42.0	44.3
Cetane Number	40 (min)	46.4	43.5	40.5	42.4	45.0	44.9	45.1	46.4	42.2	42.4
Distillation, °C IBP		178	164	149	152	172	161	174	171	158	162
T_{10}		214	194	173	183	207	191	206	204	193	184
T_{20}		225	208	185	204	222	204	220	219	209	196
T_{50}		263	248	231	263	256	243	253	256	254	243
T_{90}	360 (max)	325	310	293	325	302	314	295	309	322	322
FBP		349	336	313	349	325	349	319	330	342	347

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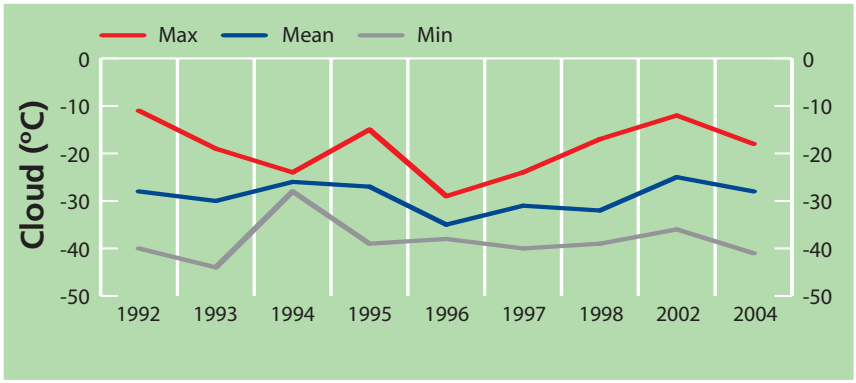
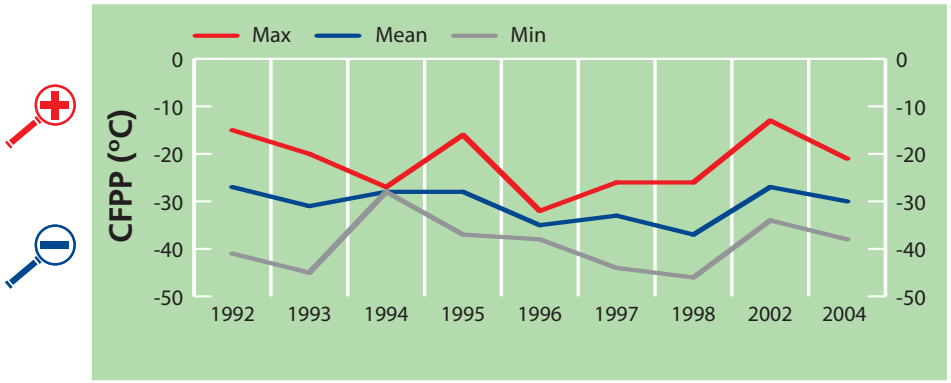
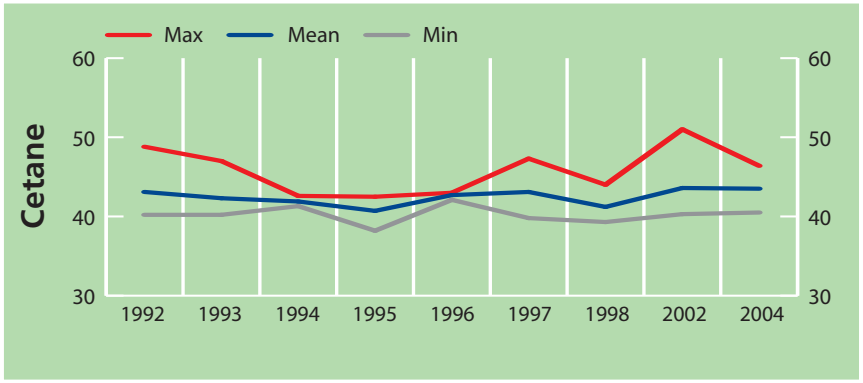
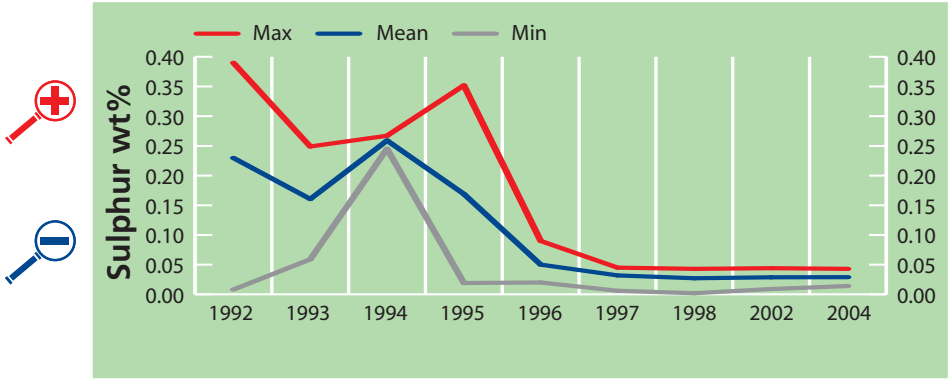
Canada - Key Trends









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Chile

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0406000	DIES 0406551
Cloud Point, °C		0		-2	-2	0
CFPP, °C		-4		-6	-6	-4
Pour Point, °C		-3		-9	-9	-3
HFRR, µm		470		377	470	377
Wax Content @ 10°C Below Cloud, wt%		2.6		2.5	2.5	2.6
Sulphur, wt%	0.3 (max)	0.0990		0.0023	0.0023	0.099
Density @ 15°C, kg/m³	830 - 870	853.9		842.6	842.6	853.9
Viscosity @ 20°C, cSt		5.59		5.37	5.37	5.59
Viscosity @ 40°C, cSt	1.9 - 5.5	3.37		3.32	3.32	3.37
Cetane Index 2 Variable		52.2		48.3	52.2	48.3
Cetane Index 4 Variable		53.6		48.7	53.6	48.7
Cetane Number	45 (min)	52.0		47.0	47.0	52.0
Distillation, °C IBP		195		181	195	181
T_{10}		233		230	233	230
T_{20}		246		245	246	245
T_{50}		278		278	278	278
T_{90}	282 - 357	341		337	337	341
FBP		371		362	362	371

Specification shown is for regional production - variations exist in some regions
Sample DIES0406000 complies with the low sulphur metropolitan specification used within Santiago
Mean values are not presented as the samples represent different grades

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Colombia

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0405740	DIES 0405741
Cloud Point, °C		3	2	0	0	3
CFPP, °C		-2	-3	-3	-3	-2
Pour Point, °C	4 (max)	-6	-6	-6	-6	-6
HFRR, µm		362	359	357	362	357
Wax Content @ 10°C Below Cloud, wt%		3.7	2.7	1.6	3.7	1.6
Sulphur, wt%	0.4 (max)	0.3070	0.1924	0.0778	0.0778	0.3070
Density @ 15°C, kg/m³		0.9	0.8	0.8	0.8	0.9
Viscosity @ 20°C, cSt		5.21	4.79	4.37	4.37	5.21
Viscosity @ 40°C, cSt	2.0 - 5.8	3.28	2.99	2.70	2.70	3.28
Cetane Index 2 Variable		50.0	49.2	48.4	50.0	48.4
Cetane Index 4 Variable		49.7	48.7	47.7	49.7	47.7
Cetane Number	51 (min)	52.6	51.6	50.6	52.6	50.6
Distillation, °C IBP		172	161	149	149	172
T_{10}		217	215	213	213	217
T_{20}		236	235	233	233	236
T_{50}	305 (max)	279	274	269	269	279
T_{90}	360 (max)	346	337	328	328	346
FBP	385 (max)	377	365	352	352	377

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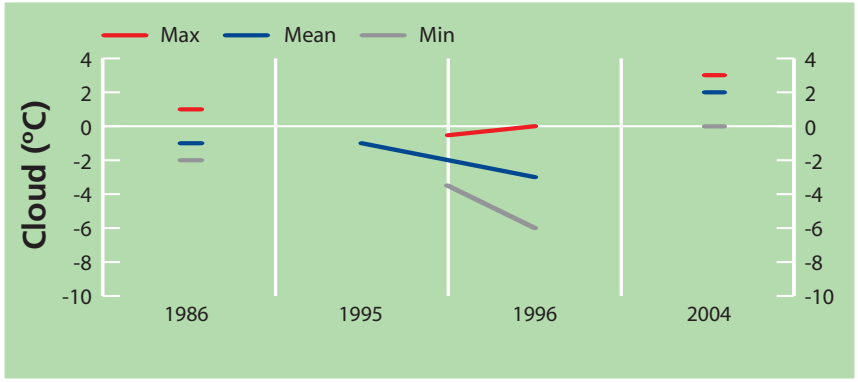
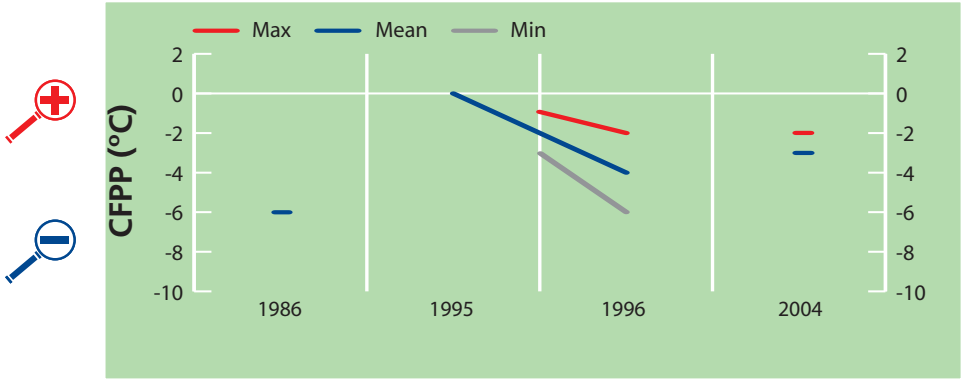
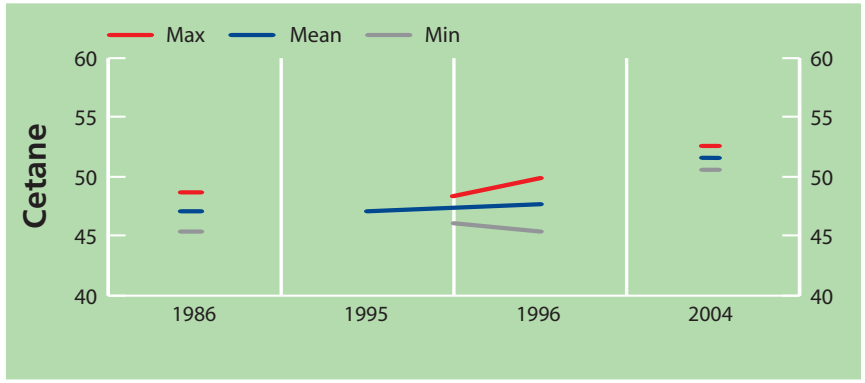
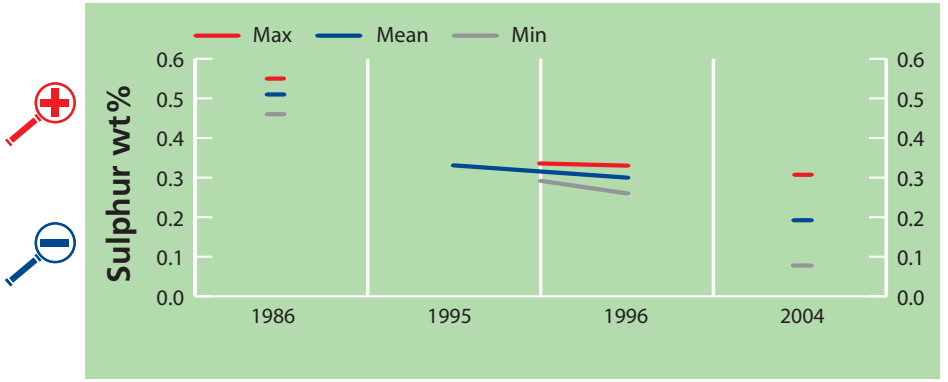
Colombia - Key Trends









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Mexico

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0403287	DIES 0403288	DIES 0403289	DIES 0403290	DIES 0403291	DIES 0403292	DIES 0403293	DIES 0403295
Cloud Point, °C		-3	-5	-8	-4	-8	-4	-4	-5	-5	-3	-7
CFPP, °C		-8	-9	-11	-10	-9	-11	-8	-11	-11	-9	-9
Pour Point, °C	-5 (max)	-6	-10	-15	-12	-12	-9	-9	-9	-12	-6	-12
HFRR, µm		551	414	290	290	367	363	417	500	551	405	429
Wax Content @ 10°C Below Cloud, wt%		2.2	1.4	0.6	1.2	2.2	1.8	1.8	0.9	0.6	1.9	1.7
Sulphur, wt%	0.05 (max)	0.0464	0.0414	0.0268	0.0418	0.0420	0.0421	0.0402	0.0457	0.0464	0.0268	0.0352
Density @ 15°C, kg/m³		841.2	832.6	825.0	841.2	840.2	832.3	832.5	826.0	825.0	840.8	838.3
Viscosity @ 20°C, cSt		5.22	4.05	3.40	4.00	4.51	4.17	4.42	3.48	3.40	5.22	4.22
Viscosity @ 40°C, cSt	1.9 - 4.1	3.17	2.62	2.27	2.60	2.85	2.68	2.81	2.31	2.27	3.17	2.67
Cetane Index 2 Variable		54.4	52.2	49.0	49.0	51.4	53.8	54.4	51.7	52.0	53.1	50.9
Cetane Index 4 Variable	48 (min)	54.3	52.3	49.2	49.2	51.8	53.8	54.0	52.0	52.0	54.3	51.1
Cetane Number	48 (min)	60.0	56.8	53.4	53.4	56.0	58.5	60.0	56.4	55.0	58.0	57.3
Distillation, °C IBP		194	165	145	187	186	160	157	150	145	194	183
T_{10}	275 (max)	230	207	195	210	219	208	204	199	195	230	212
T_{20}		246	222	208	218	230	223	225	211	208	246	240
T_{50}		281	263	251	262	271	270	273	251	251	281	266
T_{90}	345 (max)	342	336	331	342	333	337	334	333	339	341	334
FBP		379	369	356	377	361	367	371	373	379	371	359

Specification shown is for the 0.05% sulphur grade

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Mexico (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0403296	DIES 0403297	DIES 0403300
Cloud Point, °C		-3	-5	-8	-6	-6	-5
CFPP, °C		-8	-9	-11	-9	-8	-10
Pour Point, °C	-5 (max)	-6	-10	-15	-15	-9	-9
HFRR, µm		551	414	290	302	535	399
Wax Content @ 10°C Below Cloud, wt%		2.2	1.4	0.6	1.8	0.8	0.8
Sulphur, wt%	0.05 (max)	0.0464	0.0414	0.0268	0.0439	0.0455	0.0453
Density @ 15°C, kg/m³		841.2	832.6	825.0	830.4	825.7	825.8
Viscosity @ 20°C, cSt		5.22	4.05	3.40	4.01	3.49	3.64
Viscosity @ 40°C, cSt	1.9 - 4.1	3.17	2.62	2.27	2.57	2.42	2.42
Cetane Index 2 Variable		54.4	52.2	49.0	53.5	52.0	52.0
Cetane Index 4 Variable	48 (min)	54.3	52.3	49.2	53.6	51.5	52.2
Cetane Number	48 (min)	60.0	56.8	53.4	57.8	55.9	56.7
Distillation, °C IBP		194	165	145	168	146	146
T_{10}	275 (max)	230	207	195	206	198	198
T_{20}		246	222	208	222	211	211
T_{50}		281	263	251	265	252	252
T_{90}	345 (max)	342	336	331	331	335	335
FBP		379	369	356	356	372	372

Specification shown is for the 0.05% sulphur grade

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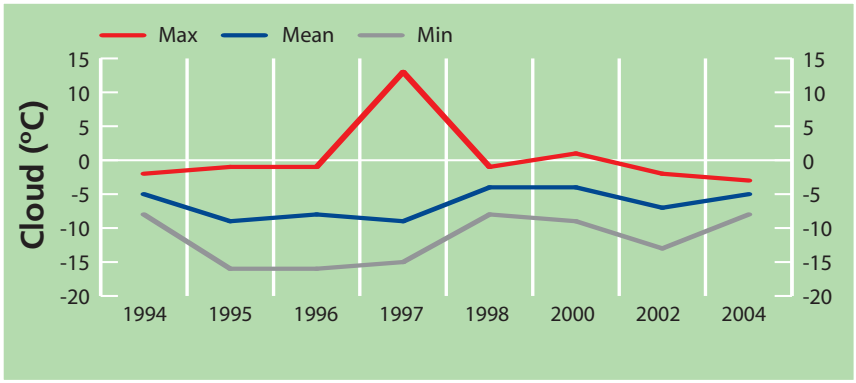
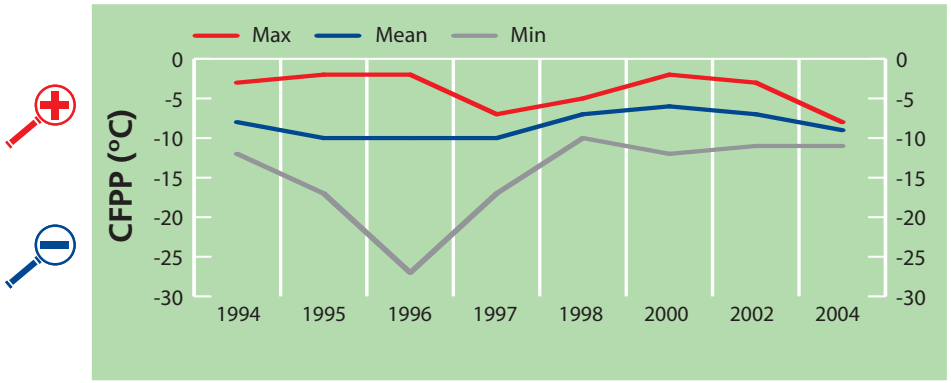
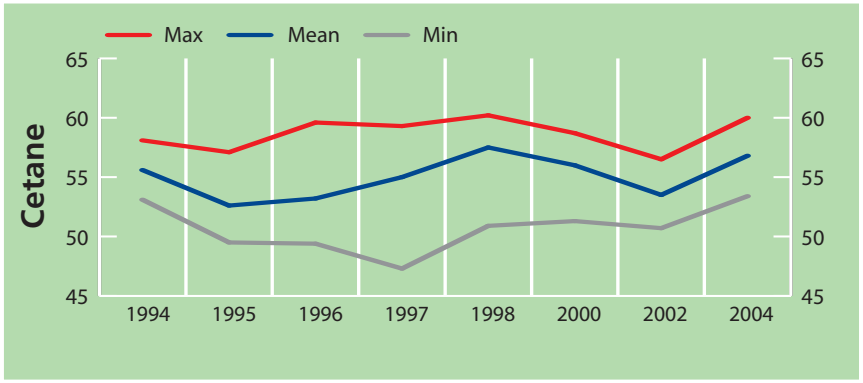
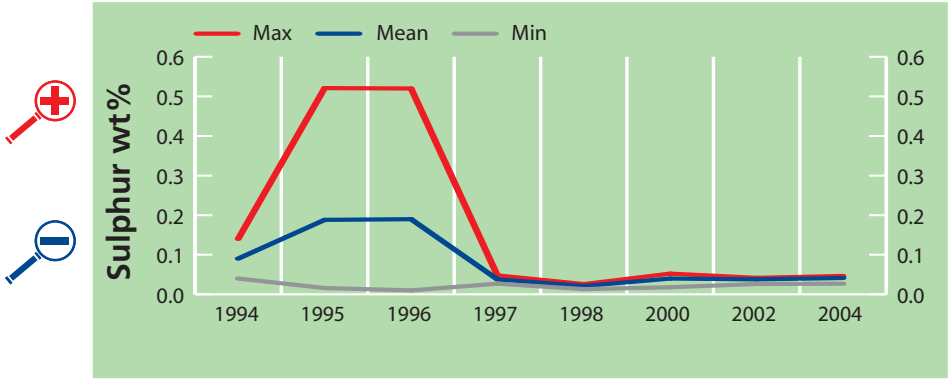
Mexico - Key Trends









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Peru

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0403432	DIES 0403434
Cloud Point, °C		4	-1	-5	4	-5
CFPP, °C		-1	-5	-10	-1	-10
Pour Point, °C	4 (max)	-3	-6	-9	-3	-9
HFRR, µm		337	332	327	337	327
Wax Content @ 10°C Below Cloud, wt%		2.3	2.1	1.9	2.3	1.9
Sulphur, wt%	1.0 (max)	0.5720	0.4655	0.3590	0.5720	0.3590
Density @ 15°C, kg/m³		865.0	860.1	855.1	865.0	855.1
Viscosity @ 30°C, cSt						
Viscosity @ 40°C, cSt	1.3 - 2.4	2.79	2.63	2.47	2.47	2.79
Cetane Index 2 Variable		50.0	49.5	49.0	49.0	50.0
Cetane Index 4 Variable		48.5	46.9	45.3	45.3	48.5
Cetane Number	45 (min)	50.0	48.8	47.6	47.6	50.0
Distillation, °C IBP		162	150	139	139	162
T_{10}		220	214	207	207	220
T_{20}		257	254	252	257	252
T_{50}		303	297	290	303	290
T_{90}	357 (max)	358	348	339	358	339
FBP		386	379	373	386	373

Specification shown is Diesel No.2

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National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441-90	30441-91	30441-92	30441-93	30441-94	30441-95	30441-96	30441-97
Cloud Point, °C		-7	-15	-26	-7	-16	-15	-26	-12	-8	-17	-13
CFPP, °C		-8	-17	-31	-8	-17	-15	-29	-14	-11	-17	-14
LTFT, °C		-8	-17	-28	-8	-18	-16	-28	-10	-8	-20	-14
Pour Point, °C		-12	-26	-48	-12	-27	-24	-36	-21	-12	-30	-24
HFRR, µm		784	523	314	314	354	784	655	397	587	571	510
Wax Content @ 10°C Below Cloud, wt%		3.5	1.7	0.7	3.5	2.2	1.2	0.7	0.9	2.4	1.6	1.7
Sulphur, wt%	0.05 (max)	0.042	<0.016	<0.001	<0.001	<0.001	0.001	0.002	0.012	0.013	0.032	0.042
Density @ 15°C, kg/m³		859.1	840.8	827.0	827.0	830.6	827.3	859.1	828.9	834.1	847.4	857.8
Viscosity @ 20°C, cSt		4.22	3.49	2.68	3.54	3.00	2.68	3.46	3.04	4.11	3.46	4.22
Viscosity @ 40°C, cSt	1.9 - 4.1	2.67	2.31	1.88	2.35	2.04	1.88	2.28	2.06	2.67	2.30	2.66
Cetane Index 2 Variable		52.9	45.4	37.3	52.9	42.6	44.1	37.3	44.5	52.2	45.3	44.8
Cetane Index 4 Variable	40 (min)	53.6	46.1	38.8	53.6	44.6	46.0	38.8	46.0	52.3	45.2	44.4
Cetane Number	40 (min)	54.6	47.3	40.7	54.6	45.0	51.1	48.4	45.4	53.5	40.7	43.7
Distillation, °C IBP		192	177	169	183	172	175	192	169	176	172	179
T_{10}		219	203	187	207	187	194	210	188	207	207	219
T_{20}		234	214	194	218	194	202	216	197	220	220	234
T_{50}		267	248	226	257	226	227	239	230	265	255	267
T_{90}	282 - 338	330	317	300	324	318	302	300	319	330	315	323
FBP		356	347	334	349	350	338	334	355	356	342	354

USA West (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441-98
Cloud Point, °C		-7	-15	-26	-20
CFPP, °C		-8	-17	-31	-31
LTFT, °C		-8	-17	-28	-28
Pour Point, °C		-12	-26	-48	-48
HFRR, µm		784	523	314	536
Wax Content @ 10°C Below Cloud, wt%		3.5	1.7	0.7	0.8
Sulphur, wt%	0.05 (max)	0.042	<0.016	<0.001	0.036
Density @ 15°C, kg/m³		859.1	840.8	827.0	855.1
Viscosity @ 20°C, cSt		4.22	3.49	2.68	3.94
Viscosity @ 40°C, cSt	1.9 - 4.1	2.67	2.31	1.88	2.54
Cetane Index 2 Variable		52.9	45.4	37.3	44.8
Cetane Index 4 Variable	40 (min)	53.6	46.1	38.8	44.0
Cetane Number	40 (min)	54.6	47.3	40.7	43.3
Distillation, °C IBP		192	177	169	174
T_{10}		219	203	187	210
T_{20}		234	214	194	224
T_{50}		267	248	226	263
T_{90}	282 - 338	330	317	300	322
FBP		356	347	334	348

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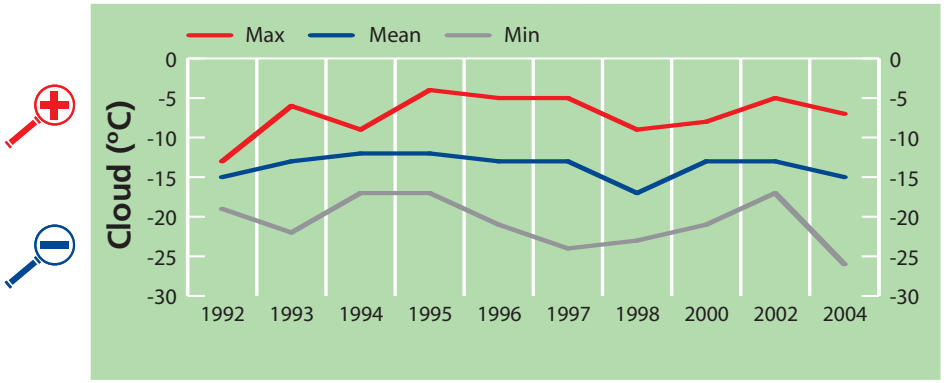
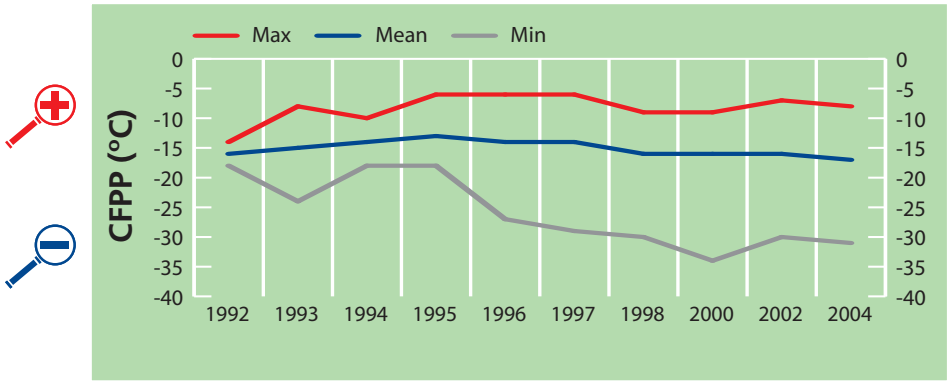
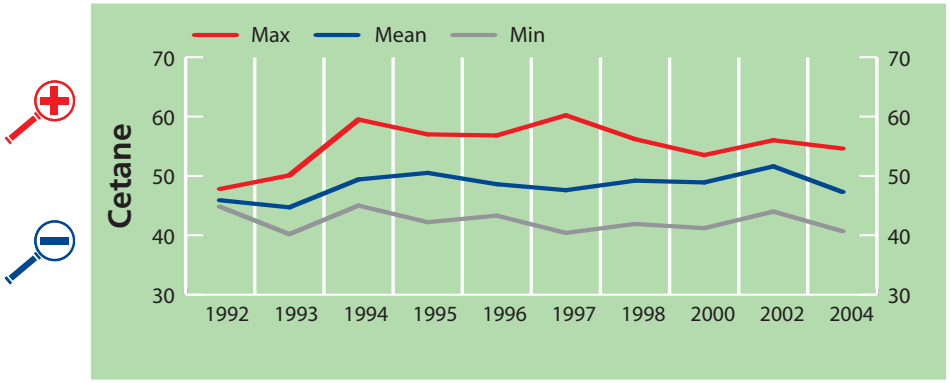
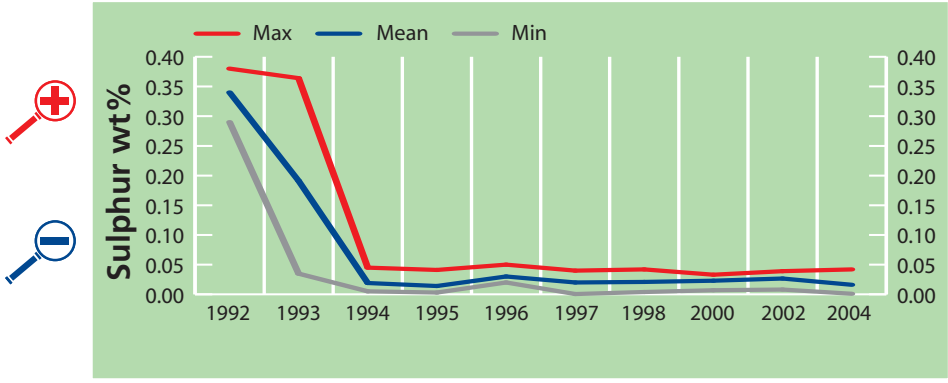
USA West - Key Trends









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USA - Midwest

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441-67	30441-68	30441-69	30441-70	30441-71	30441-72	30441-73	30441-74
Cloud Point, °C		-10	-16	-24	-24	-18	-12	-19	-20	-17	-11	-13
CFPP, °C		-11	-20	-36	-24	-19	-17	-28	-21	-17	-12	-16
LTFT, °C		-12	-18	-24	-24	-18	-14	-24	-20	-18	-12	-14
Pour Point, °C		-21	<-30	<-54	-33	-24	-36	-39	-24	-33	-21	-21
HFRR, µm		593	426	254	499	398	385	368	529	359	379	350
Wax Content @ 10°C Below Cloud, wt%		4.8	1.8	0.4	2.0	0.7	1.9	1.5	1.8	2.0	1.9	0.6
Sulphur, wt%	0.05 (max)	0.047	0.039	0.030	0.036	0.047	0.034	0.045	0.044	0.032	0.037	0.039
Density @ 15°C, kg/m³		874.0	860.8	832.6	862.0	874.0	854.2	867.5	858.8	855.4	862.7	869.6
Viscosity @ 20°C, cSt		5.16	4.36	3.59	4.22	4.63	4.27	4.16	4.14	4.04	4.28	4.95
Viscosity @ 40°C, cSt	1.9 - 4.1	3.10	2.76	2.38	2.67	2.90	2.76	2.66	2.64	2.60	2.72	3.06
Cetane Index 2 Variable		50.9	43.9	40.3	42.7	40.3	45.7	41.5	43.9	44.7	44.6	41.5
Cetane Index 4 Variable	40 (min)	51.9	43.7	40.0	42.3	40.1	45.8	41.0	43.7	44.6	43.7	41.4
Cetane Number	40 (min)	51.3	43.6	39.5	42.5	41.4	45.0	44.6	45.0	47.7	43.1	40.3
Distillation, °C IBP		201	187	170	192	191	184	187	186	185	170	192
T_{10}		234	224	210	229	225	222	225	225	221	221	222
T_{20}		246	235	221	238	235	233	235	234	232	236	233
T_{50}		275	267	256	263	268	266	265	264	263	273	268
T_{90}	282 - 338	334	319	298	305	330	321	316	313	316	328	334
FBP		367	346	323	326	364	343	343	340	340	355	367

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USA - Midwest (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441-75	30441-76	30441-82	30441-83	30441-84	30441-85	30441-86	30441-87
Cloud Point, °C		-10	-16	-24	-11	-11	-10	-14	-20	-20	-18	-20
CFPP, °C		-11	-20	-36	-12	-11	-15	-15	-22	-36	-25	-31
LTFT, °C		-12	-18	-24	-12	-12	-12	-16	-22	-24	-22	-22
Pour Point, °C		-21	<-30	<-54	-24	-21	-27	-24	-21	<-54	<-53	-51
HFRR, µm		593	426	254	420	389	532	552	593	279	254	255
Wax Content @ 10°C Below Cloud, wt%		4.8	1.8	0.4	2.1	2.1	1.4	2.6	4.6	1.4	0.4	1.7
Sulphur, wt%	0.05 (max)	0.047	0.039	0.030	0.035	0.036	0.041	0.032	0.03	0.043	0.043	0.044
Density @ 15°C, kg/m³		874.0	860.8	832.6	866.3	867.8	852.2	844.0	832.6	868.6	868.0	868.6
Viscosity @ 20°C, cSt		5.16	4.36	3.59	4.70	4.95	3.85	3.87	3.59	4.20	4.21	4.26
Viscosity @ 40°C, cSt	1.9 - 4.1	3.10	2.76	2.38	2.94	3.10	2.49	2.53	2.38	2.66	2.68	2.71
Cetane Index 2 Variable		50.9	43.9	40.3	43.7	43.3	44.8	47.9	50.9	41.2	40.5	41.4
Cetane Index 4 Variable	40 (min)	51.9	43.7	40.0	43.3	42.9	44.8	48.5	51.9	40.6	40.5	40.8
Cetane Number	40 (min)	51.3	43.6	39.5	45.0	44.9	44.1	48.8	51.3	39.5	40.9	40.0
Distillation, °C IBP		201	187	170	180	184	172	188	189	192	185	192
T_{10}		234	224	210	231	234	210	220	220	228	219	227
T_{20}		246	235	221	244	245	223	230	229	238	231	238
T_{50}		275	267	256	274	274	259	261	257	265	261	266
T_{90}	282 - 338	334	319	298	325	322	327	315	298	312	325	315
FBP		367	346	323	349	348	355	344	323	340	360	339

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USA - Midwest (continued 2)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441-88	30441-89	30441-99	30441-100	30441-101	30441-102	30441-103
Cloud Point, °C		-10	-16	-24	-21	-17	-14	-17	-10	-17	-19
CFPP, °C		-11	-20	-36	-23	-31	-17	-17	-14	-17	-23
LTFT, °C		-12	-18	-24	-22	-18	-16	-20	-12	-18	-20
Pour Point, °C		-21	<-30	<-54	-30	-36	-21	-24	-24	-24	-24
HFRR, µm		593	426	254	322	535	393	487	538	463	509
Wax Content @ 10°C Below Cloud, wt%		4.8	1.8	0.4	1.0	0.6	1.7	1.8	4.8	1.8	2.0
Sulphur, wt%	0.05 (max)	0.047	0.039	0.030	0.043	0.044	0.038	0.043	0.031	0.04	0.046
Density @ 15°C, kg/m³		874.0	860.8	832.6	860.3	873.2	852.4	862.5	849.5	862.9	864.4
Viscosity @ 20°C, cSt		5.16	4.36	3.59	3.71	4.62	3.90	4.86	4.63	5.11	5.16
Viscosity @ 40°C, cSt	1.9 - 4.1	3.10	2.76	2.38	2.42	2.86	2.50	3.01	2.90	3.08	3.10
Cetane Index 2 Variable		50.9	43.9	40.3	41.5	40.3	46.5	44.8	48.5	44.9	44.3
Cetane Index 4 Variable	40 (min)	51.9	43.7	40.0	41.3	40.0	45.5	44.0	49.4	44.6	43.8
Cetane Number	40 (min)	51.3	43.6	39.5	40.5	39.8	43.8	42.0	48.9	42.5	40.3
Distillation, °C IBP		201	187	170	183	187	170	186	201	200	200
T_{10}		234	224	210	210	224	212	227	232	234	234
T_{20}		246	235	221	221	234	229	242	243	246	245
T_{50}		275	267	256	256	267	267	274	272	275	274
T_{90}	282 - 338	334	319	298	318	328	317	320	323	319	316
FBP		367	346	323	354	358	343	345	349	342	338

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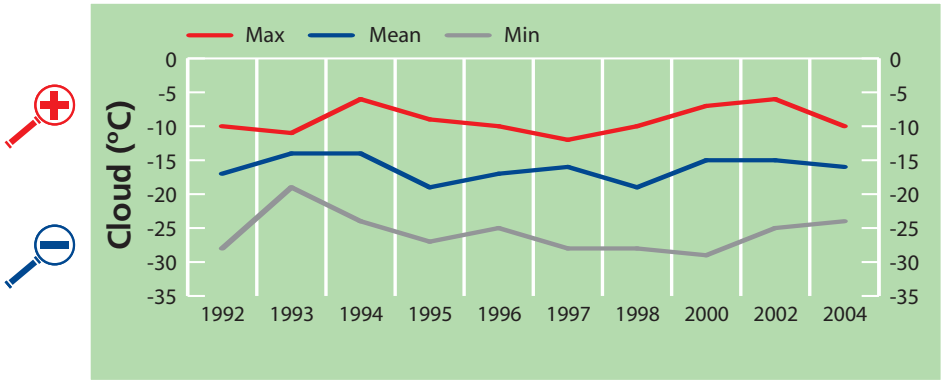
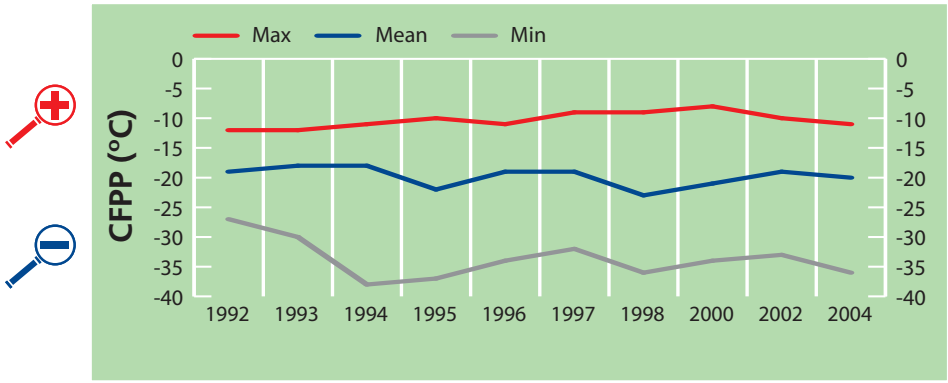
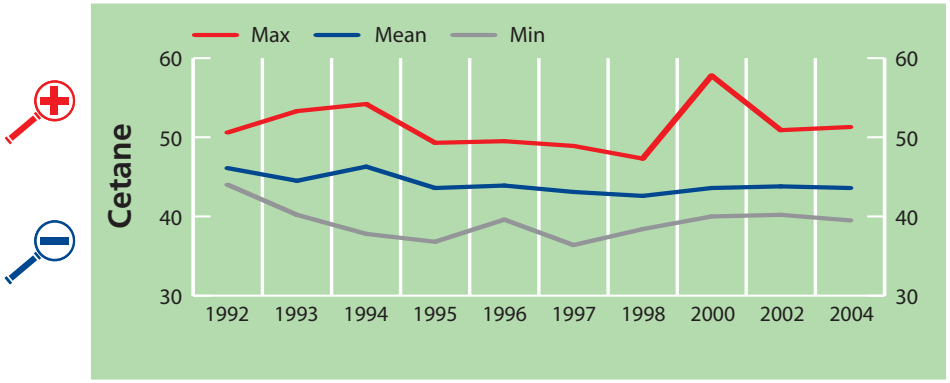
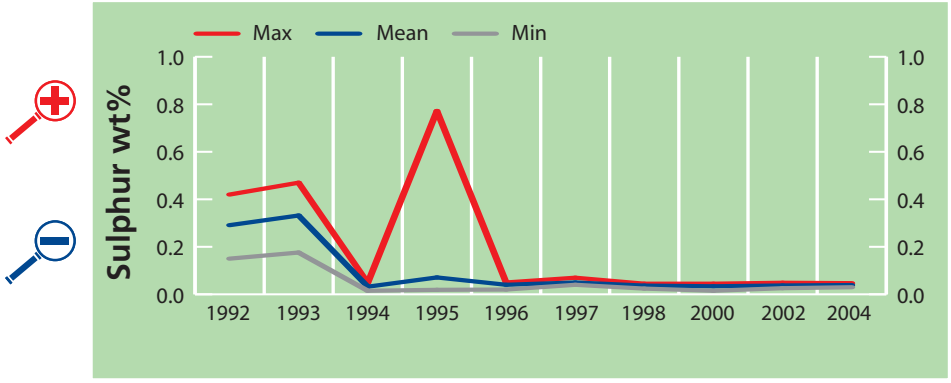
USA Midwest - Key Trends









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National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441-77	30441-78	30441-79	30441-80	30441-81	30441-104	30441-105	30441-106
Cloud Point, °C		-8	-13	-23	-12	-9	-9	-12	-8	-13	-15	-17
CFPP, °C		-8	-20	-34	-12	-8	-10	-16	-15	-27	-34	-33
LTFT, °C		-10	-18	-26	-14	-10	-10	-20	-12	-22	-26	-22
Pour Point, °C		-24	-32	-48	-24	-24	-24	-30	-27	-33	-36	-42
HFRR, µm		409	395	379	384	382	409	399	379	396	408	389
Wax Content @ 10°C Below Cloud, wt%		5.1	2.0	0.5	2.2	5.1	2.2	1.9	2.4	1.9	1.5	0.7
Sulphur, wt%	0.05 (max)	0.043	0.037	0.020	0.040	0.041	0.038	0.036	0.039	0.040	0.036	0.043
Density @ 15°C, kg/m³		863.6	854.0	842.7	852.2	860.8	863.6	860.9	862.9	854.7	845.0	842.7
Viscosity @ 20°C, cSt		4.92	4.03	3.22	4.17	4.21	4.92	4.05	4.28	4.25	3.73	3.48
Viscosity @ 40°C, cSt	1.9 - 4.1	3.05	2.58	2.11	2.67	2.70	3.05	2.61	2.74	2.68	2.39	2.27
Cetane Index 2 Variable		47.2	45.0	43.2	47.2	44.1	45.2	43.4	43.7	45.8	47.1	45.1
Cetane Index 4 Variable	40 (min)	46.9	44.7	42.7	46.9	43.5	44.4	42.7	43.0	45.1	46.8	45.8
Cetane Number	40 (min)	46.9	44.5	43.2	46.9	44.6	44.5	43.3	44.1	43.2	44.6	45.4
Distillation, °C IBP		184	178	173	178	175	173	180	177	184	176	178
T_{10}		225	214	199	219	219	225	215	220	216	205	206
T_{20}		241	227	209	233	230	241	228	233	230	219	217
T_{50}		278	263	242	270	268	278	265	269	267	259	248
T_{90}	282 - 338	331	323	316	326	325	331	322	326	324	322	317
FBP		355	350	344	350	353	355	350	352	349	348	349

USA East (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	30441-107
Cloud Point, °C		-8	-13	-23	-23
CFPP, °C		-8	-20	-34	-22
LTFT, °C		-10	-18	-26	-24
Pour Point, °C		-24	-32	-48	-48
HFRR, µm		409	395	379	405
Wax Content @ 10°C Below Cloud, wt%		5.1	2.0	0.5	0.5
Sulphur, wt%	0.05 (max)	0.043	0.037	0.020	0.020
Density @ 15°C, kg/m³		863.6	854.0	842.7	843.4
Viscosity @ 20°C, cSt		4.92	4.03	3.22	3.22
Viscosity @ 40°C, cSt	1.9 - 4.1	3.05	2.58	2.11	2.11
Cetane Index 2 Variable		47.2	45.0	43.2	43.2
Cetane Index 4 Variable	40 (min)	46.9	44.7	42.7	44.1
Cetane Number	40 (min)	46.9	44.5	43.2	43.6
Distillation, °C IBP		184	178	173	177
T_{10}		225	214	199	199
T_{20}		241	227	209	209
T_{50}		278	263	242	242
T_{90}	282 - 338	331	323	316	316
FBP		355	350	344	344

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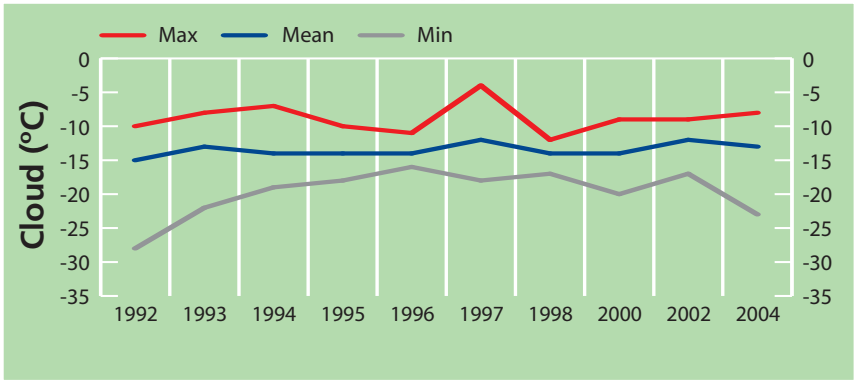
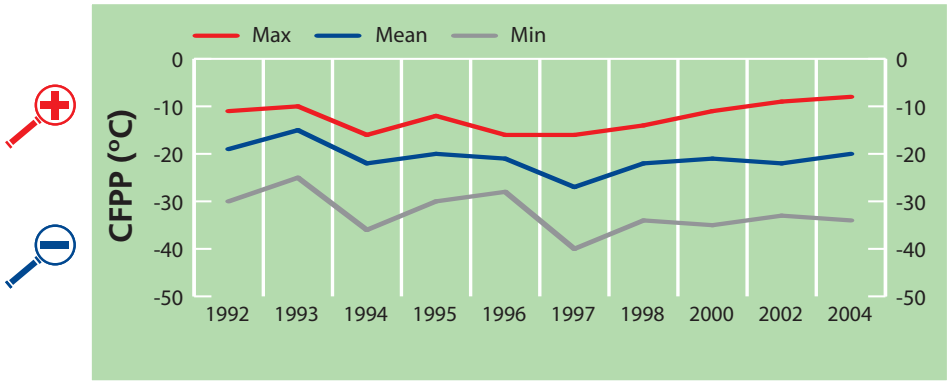
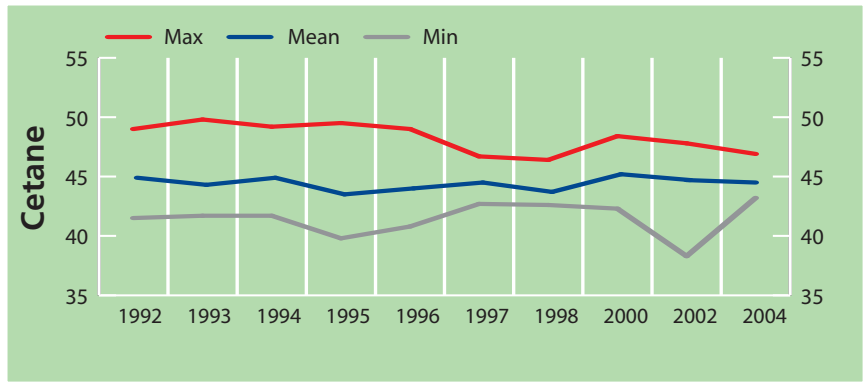
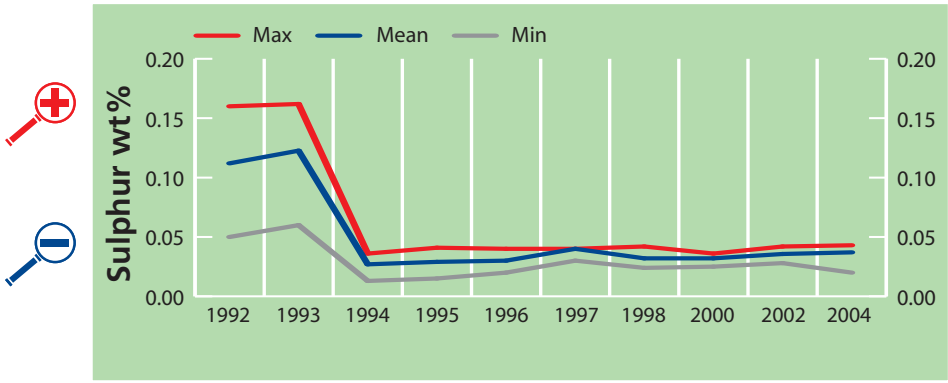
USA East - Key Trends









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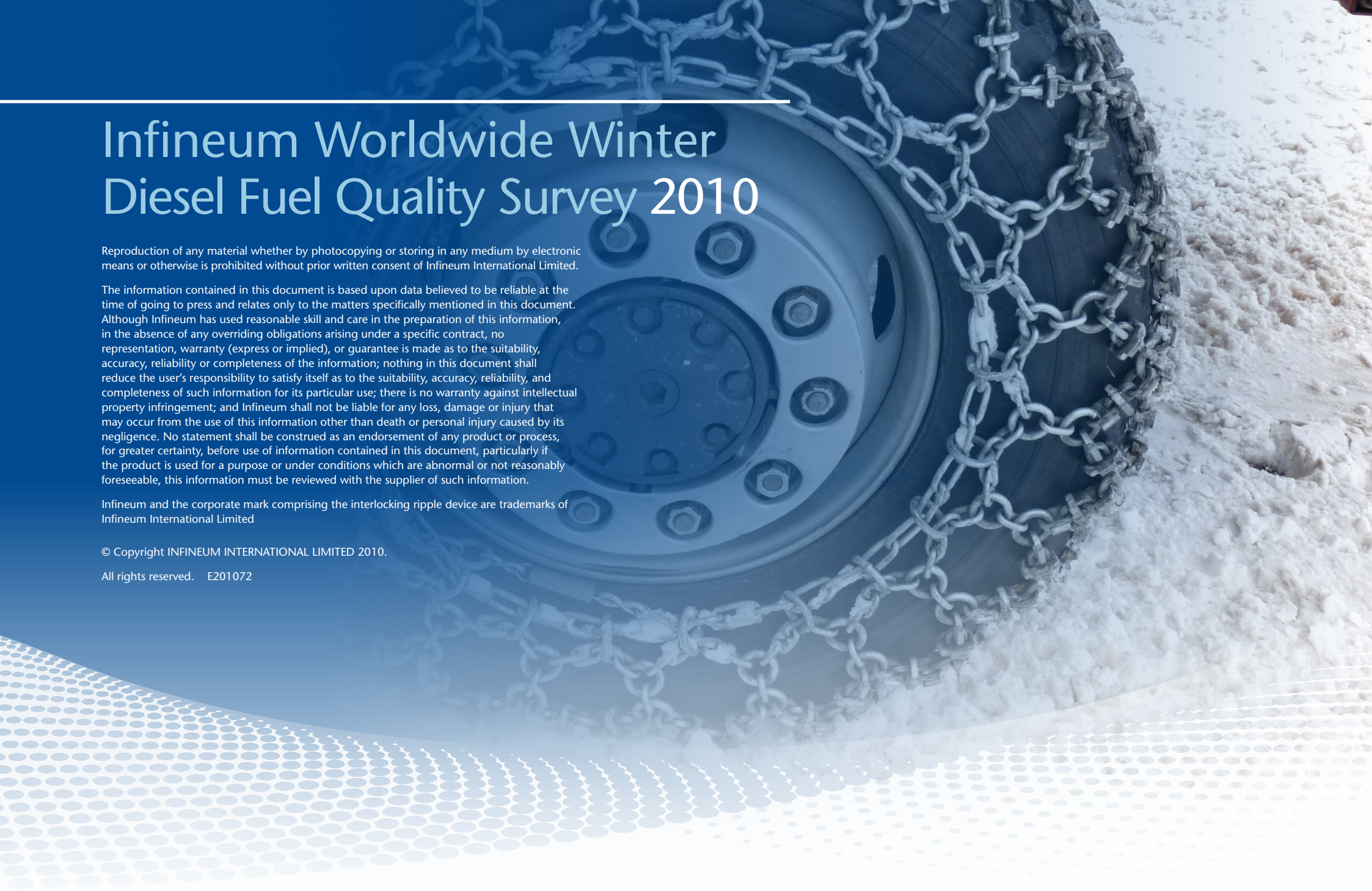
Infineum Fuel Surveys

WWWDS_Active

Infineum Worldwide Winter Diesel Fuel Quality Survey 2010



Contents

Introduction

The Infineum Worldwide Winter Diesel Fuel Quality Survey aims to provide the petroleum refining and distribution industry with an overview of the quality of automotive diesel in the marketplace, allowing tracking of international trends. To achieve this purpose, the Survey needs to cover as much of the globe as possible. For the winter 2010 survey, some 348 samples were collected in 40 countries around the world. The majority of samples were collected during January and February, deep winter months in the northern hemisphere. In southern hemisphere countries, sampling was delayed until later in the year when true winter grade samples could be obtained.

Samples need to be representative of the diesel purchased by the average consumer so they are gathered from service stations by Infineum colleagues at local area offices. As a general principle, Infineum tries to get one sample that represents the production from each refinery or region in a given country. To minimise the possibility of taking multiple samples from a single refinery, knowledge of local exchange agreements and distribution systems is used to select where each sample is collected. For the larger diesel consuming countries, this procedure results in samples that represent a reasonable average of the overall quality. However, for smaller countries or specific producers, spot sampling over a short period of time will effectively only provide a snapshot of production quality, with data derived from only one or two samples. This can make it more difficult to evaluate trends with any accuracy.

Analysis

The analyses applied to each sample are those we consider to be of most interest to the diesel producers, marketers, distributors and consumers. They cover areas of national specification, exchange specification and performance parameters. A degree of standardisation has been applied to enable diesel from all countries to be compared and the data analysed as a single set. Standardisation, however, means that not all national specifications are reported.

Wherever possible, industry standard test methods have been applied and in-house test methods avoided. This has been done so that the data published here most accurately reflect the results which could or would be generated by organisations within the petroleum industry.

When considering our data, in particular when comparing the various test results with the national specifications, it should be noted that a number of the tests have quite wide reproducibility bands, and very little repeat testing has been conducted to determine compliance or otherwise with specifications.

Test Methods

The majority of testing was carried out at quality accredited laboratories in the USA, Japan and the UK using the test methods below. Samples collected in Saudi Arabia and China were tested at local laboratories, using the same or similar test methods.

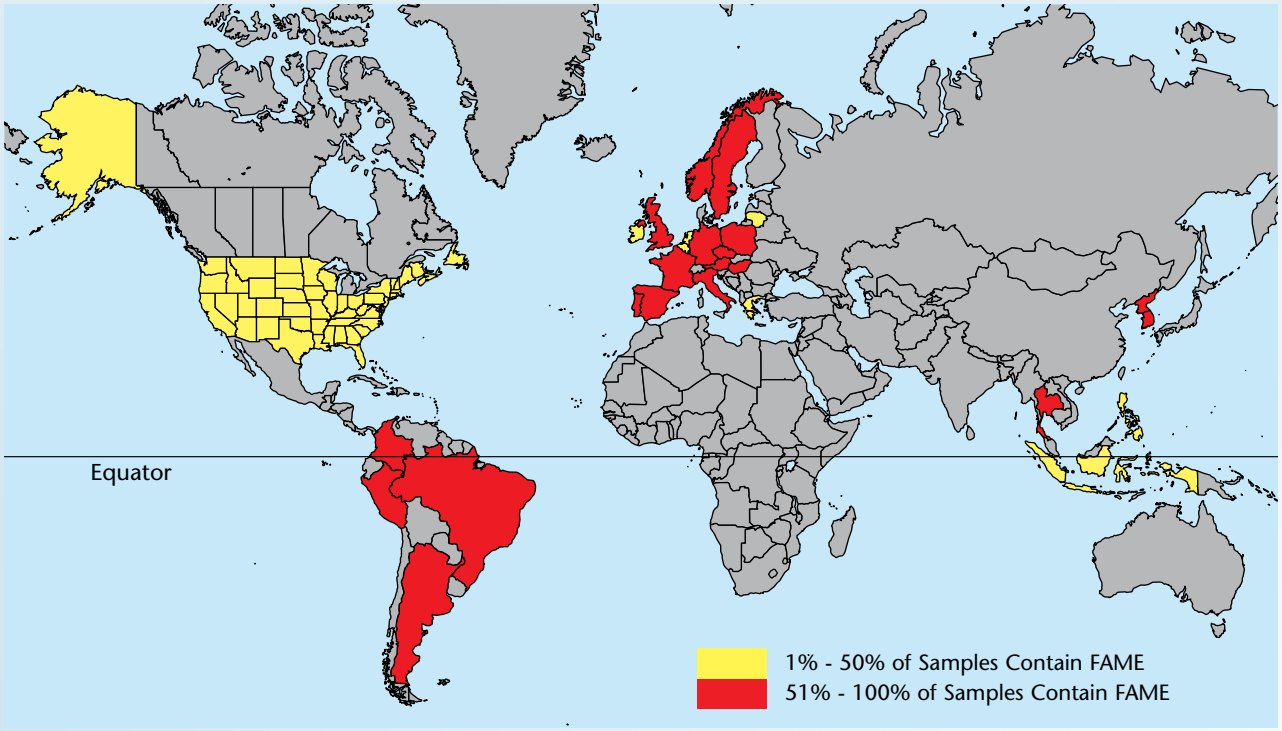
Density	ASTM D4052
Kinematic Viscosity	ASTM D445
Sulphur Content	ASTM D2622 / ASTM D4294
Cetane Number	ASTM D613 / IP365
Cetane Index	ASTM D4737 / ASTM D976
Pour Point	ASTM D97 / ASTM D5950
Distillation	ASTM D86
Cloud Point	ASTM D2500 / ASTM D5772 / ASTM D5771
CFPP	IP309 / ASTM D6371
HFRR	ISO 12156-1 / ASTM D6079
Wax Content	Differential Scanning Calorimetry
LTFT	ASTM D4539
FAME Content	EN14078
Rancimat	EN 15751 (mod)

The Trends

Since publication of the previous Infineum Worldwide Diesel Fuel Survey in 2008, world financial markets have experienced their greatest turmoil since the 'Great Depression' of the 1930s. A number of banks collapsed, others only managed to survive following enormous injections of public money, and recession became a byword as national and regional economies slipped into negative or slow growth. The adverse effects of these factors on the oil industry have been unavoidable; fuel demand has fallen taking down refinery utilisation rates and profitability, while costs have continued to rise under inflationary pressure. Yet, despite the difficult times, the current diesel survey points strongly to maintenance of quality standards and a continued drive towards meeting ever more ambitious renewable fuel requirements:

- Within Europe the Biofuels Directive, which required a 5.75% share of transportation energy to be supplied from renewable sources in 2010, has been superseded by the Renewable Energy Directive (RED) that now requires 10% of transportation energy to come from renewable sources by 2020.
- In the US the National Renewable Fuels Standard Program (RFS2) stipulates a total renewable fuels volume of 12.95 billion gallons in 2010, rising annually to 36 billion gallons in 2022.

In addition many biofuels schemes have been given an injection of credibility as lifecycle greenhouse gas emissions, fuel quality and sustainability become key elements of renewable fuel policies and supporting specifications.



Given the emphasis being placed on renewable fuels targets by many governments, it seems appropriate that our analysis of the 2010 diesel survey data concentrates on evaluating progress being made towards these targets. At present the alternatives for renewable diesel fuel are Fatty Acid Methyl Ester (FAME) and Hydrogenated Vegetable Oil (HVO). Addition of HVO introduces components to the fuel blend that are already present in the fossil diesel so it is generally difficult to detect. FAME, on the other hand, is easy to detect and is currently much more commonly used than HVO; therefore our analysis of the survey samples has concentrated on the presence of FAME.

FAME

Taking a global view initially, the map above provides a clear indication of the major FAME consumers today. Yellow shading indicates that between 1% and 50% of samples collected from these countries contain FAME, while red shading indicates that between 51% and 100% of samples collected contain FAME. Key areas of interest are thus; The European Union (EU), USA, South America, and part of Asia Pacific.

The Trends (continued)

European Union

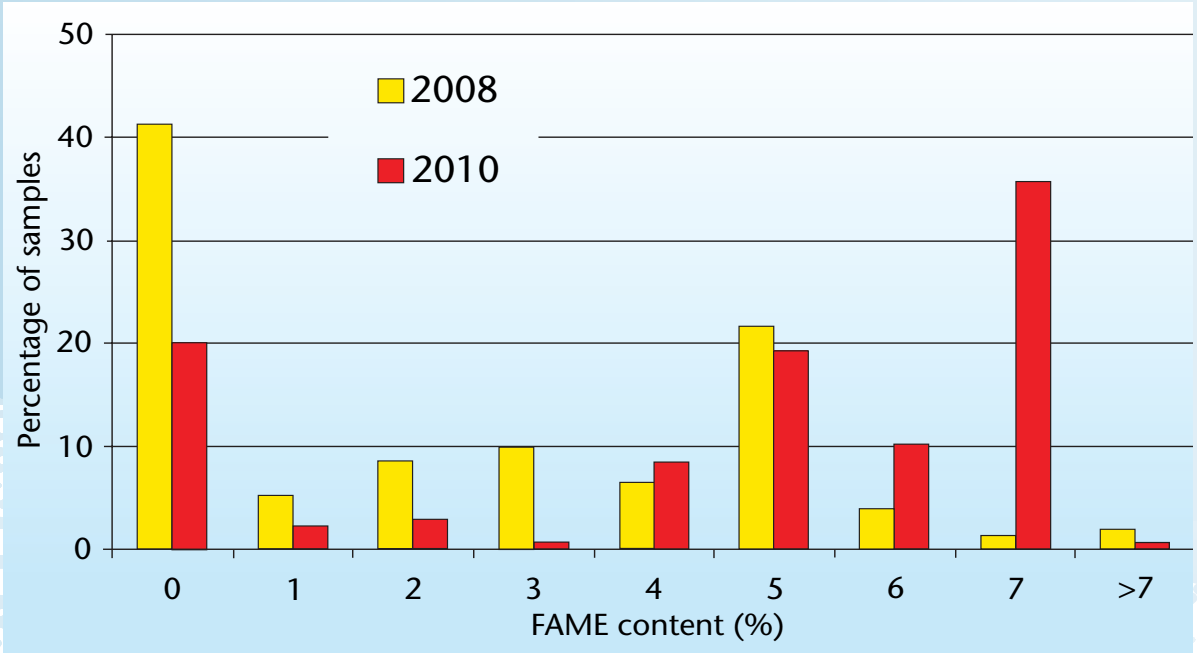
In previous surveys we have concentrated on charting the progress of FAME introduction by measuring the percentage of samples collected in each country that contained FAME in any proportion. However, this approach has become less valuable for Europe as most EU countries now use FAME in a very high proportion of diesel blends. Consequently this year we have taken the approach of estimating the percentage of FAME contained in each sample collected, and comparing results with similar data generated, but not published, during the 2008 survey (see FAME chart below).

This provides an interesting insight into FAME penetration in blends with fossil diesel (Bx) within the EU. In 2008, FAME was detected in just fewer than 60% of the samples collected with the peak concentration being the concurrent EN590 limit of 5%. Today, FAME is present in 80% of samples collected with the concentration peaking at the current EN590 limit of 7% and with over 65% of samples containing 5% or more. The renewable fuels regulatory mandate is clearly taking effect.

Given that the demographics of the survey sample collection in Europe are a close match to the demographics of EU crude oil consumption, it becomes possible to take this evaluation to a higher level; the total percentage of FAME penetration as Bx during the survey period in the region can be estimated:

- For the 2008 survey the estimated penetration of FAME as Bx is 2.2% of the diesel pool, a figure that is comfortably close to the total renewable transportation fuels value for 2007 of 2.6% published by the EU in its Renewable Energy Progress Report in April 2009.
- For 2010, the survey detects a substantial increase in the quantity of FAME being used in Bx blends. It is now estimated that 4.5% of the diesel pool is FAME, though it is difficult to tell how much of a rise in overall FAME consumption this represents as some of the rise in Bx is likely to be offset by reductions in use of B100.

Volume of FAME in EU Samples



The Trends (continued)

Alongside EU requirements to use more renewable fuels, the diesel fuel specification, EN590, has been modified to retain fuel quality in light of the higher FAME limit. One of the amendments is the inclusion of Rancimat oxidation stability (EN15751) of greater than 20 hours for any diesel blend containing more than 2% FAME on a volume basis. As such Rancimat measurements have been added to the survey for the first time this year.

Results show that some fuels fell short of EN590 requirements at the time of testing, but care should be taken not to interpret this as a failure to meet the specification at the time of production. The time elapsed between fuel production and testing is likely to have had a negative impact on the oxidation stability measured. However, the results do show that 90% of fuels surveyed are highly stable despite the increased FAME content. Investigation is underway to establish if linkages exist between the less stable fuels, but it is currently too early to make any comment. Infineum will include Rancimat measurements in future surveys to see how this evolves.

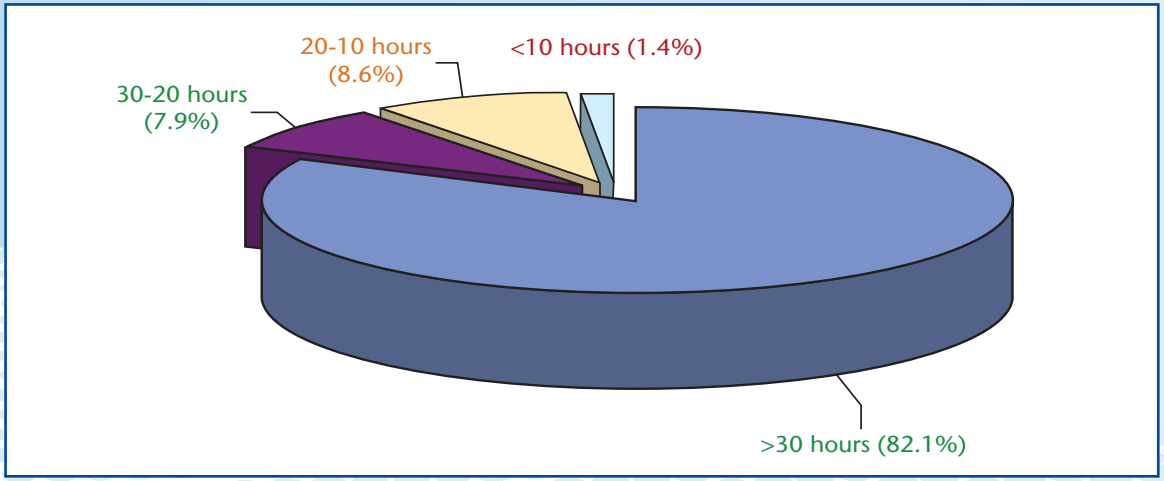
Rest of the World

South America: Biodiesel regulatory mandates that came into force in December 2009 and January 2010 in Columbia (B7-B10), Brazil (B5), Argentina (B5), and Peru (B2) are clearly visible within the survey fuels.

North America: A state regulatory mandate for biodiesel in Minnesota (B5) and a tax incentive encouraging use of biodiesel in Illinois (B10) are readily detectable in the survey samples. By contrast most other samples collected in the US were FAME free, though Washington State and Oregon, both with biodiesel regulatory mandates at the time of the survey, were not sampled. Similarly, mandates in the Canadian Provinces of Manitoba (B2) and British Columbia (B5, relaxed to B3 for 2010) are not detectable in the survey as samples were not collected in these provinces. However, it is expected that FAME detection in both the US and Canada should increase by the 2012 survey as other states and provinces introduce local mandates and the US RFS2 legislation starts to take effect.

Asia Pacific: Samples from three Asia Pacific countries; Thailand, South Korea and Indonesia were seen to contain FAME. Of particular note is Thailand. At the time the survey samples were collected Thailand had a B2 mandate, subsequently increased to B3, but all samples contained between 2% and 5% FAME, returning an overall average of 4%.

EU Rancimat Results



The Trends (continued)

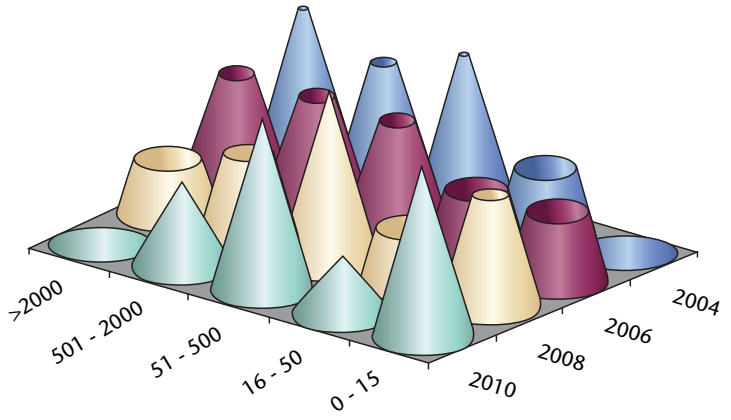
Sulphur Content and Lubricity

While renewable fuel content may be the new trend, diesel sulphur reduction and the associated lubricity performance debit is still continuing in some parts of the world. This year, rather than attempt to portray a global position, we have decided to remove the USA and European Union countries (that have already reached fuel minimum sulphur levels) in order to provide a clearer picture of what is happening in the rest of the world.

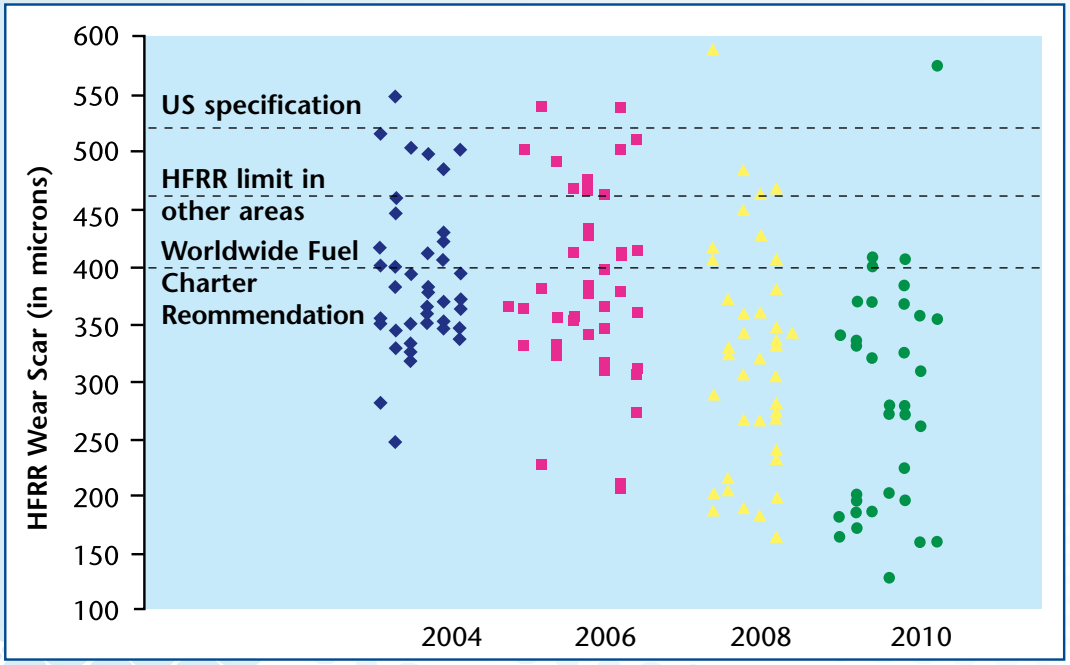
As can be seen from the chart below, removal of the US and EU countries leaves a slower rate of change of fuel sulphur content than we have become accustomed to seeing in previous surveys. As would be expected, there are some countries that have reached 10ppm sulphur but a similar number are still at 500ppm and a significant minority have yet to go below 2,000ppm. While progress is certainly being made, it may take some time before all diesel fuels can be considered as 'ultra low sulphur'.

On the other hand, a mixture of additive treatment and increasing FAME usage paint a rapidly improving picture for lubricity. Average High Frequency Reciprocating Rig (HFRR) wear scar diameters continue to fall, such that the majority of countries surveyed now have an average HFRR wear scar diameter below the Worldwide Fuel Charter recommendation of 400µm (see chart below).

Height of cones represents the percentage of countries in the survey that fall within each sulphur band (excludes Europe and US)



Sulphur Content (ppm)



The Trends (continued)

Looking Forward

As an increasing number of countries, American states and Canadian provinces introduce renewable fuel regulatory mandates it will be interesting to see if biofuel feedstock availability is able to keep pace with demand and indeed if biofuels from alternative raw materials can start to fill any shortfall. It is expected that feedstock sourcing will increasingly become an issue for the industry.

Despite biofuel feedstock prices having dropped significantly in the past 12 months, it remains to be seen what effect a continued worldwide recession will have on the fuels market in general, and in particular, on the producers of renewable fuels that typically require tax incentives and generous investment support in order to maintain a viable business model. It is expected that the dominant feedstocks of rapeseed in Europe, palm in Asia Pacific, and soy in the Americas will remain, and that the EU RED greenhouse gas saving targets will put pressure on palm and soy, while encouraging the use of biodiesel made from animal fats and other waste. In addition, new EU legislation banning the use of certain fertilizers will cut production of rapeseed based products and force the region to look at other local feedstocks or to increase imports.

Whatever happens, it is clear that renewable fuels are here to stay and that increasing legislative mandates will secure production into the future. However, care must be taken to avoid fuel versus food conflicts, ensure true sustainability, achieve the desired greenhouse gas reductions and, retain the biodiversity of our planet… And this must all be achieved without sacrificing quality.

Worldwide Summary

Worldwide Diesel Fuel Survey – 1

Country	Austria	Benelux	Czech Rep	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy
No. of Samples	7	7	3	2	5	22	23	2	1	8	15
Samples containing FAME	6	3	3	0	0	22	22	1	1	2	10
Cloud Point, °C	-8	-9	-8	-13	-30	-7	-8	0	-8	-6	-3
CFPP, °C	-28	-24	-22	-26	-41	-18	-26	-7	-28	-19	-15
LTFT, °C											
Pour Point, °C	-29	-29	-33	-41	-40	-29	-30	-19	-27	-29	-21
HFRR, µm	231	300	211	292	347	219	219	325	176	337	284
Wax Content @ 10°C Below Cloud, wt%	1.4	1.4	1.4	1.0	0.6	1.8	1.4	2.4	1.3	1.7	1.7
Rancimat, hrs	>30	>20	>30	>30	>30	>30	>20	<20	>30	>30	>20
Sulphur, wt%	0.0007	0.0008	0.0006	0.0006	0.0003	0.0007	0.0007	0.0008	0.0006	0.0009	0.0006
Density @15°C, kg/m³	836	835	830	837	818	834	838	828	840	835	835
Viscosity @ 30°C, cSt											
Viscosity @ 40°C, cSt	2.84	2.57	2.52	2.64	1.85	2.50	2.82	2.89	2.69	2.69	2.66
Cetane Index 2 Variable	53	52	54	51	48	53	53	56	52	53	52
Cetane Index 4 Variable	54	52	54	50	50	52	53	56	52	52	52
Cetane Number	57	54	53	53	56	54	56	56	54	56	55
Distillation, °C IBP	185	167	178	169	176	169	182	168	189	171	175
T_{10}	214	202	204	197	193	199	215	211	217	202	205
T_{20}	229	220	218	212	202	217	230	227	232	221	220
T_{50}	273	267	265	263	230	268	273	273	275	270	269
T_{90}	335	331	334	332	294	335	334	341	338	335	339
T_{95}	350	347	349	346	319	348	348	358	353	351	355
FBP	359	356	357	355	336	356	357	367	362	358	365
% FAME	6	1	4	0	0	7	7	1	5	1	3

Worldwide Diesel Fuel Survey – 2

Country	Lithuania	Norway	Portugal	Russia	Slovak Rep	Spain	Sweden	Switzerland	UK	Ukraine	Israel
No. of Samples	2	4	3	3	1	11	7	6	15	3	2
Samples containing FAME	1	4	3	0	1	11	7	0	14	0	0
Cloud Point, °C	-15	-26	-2	-23	-10	-3	-34	-14	-8	-14	-1
CFPP, °C	-36	-39	-13	-30	-31	-15	-37	-26	-19	-28	-9
LTFT, °C											
Pour Point, °C	-38	-47	-16	-37	-33	-17	-34	-30	-26	-33	-14
HFRR, µm	374	236	205	343	224	230	222	351	237	374	387
Wax Content @ 10°C Below Cloud, wt%	1.1	0.8	1.9	1.5	1.4	1.5	2.2	1.6	2.2	1.5	2.5
Rancimat, hrs	>20	>30	>20	>30	>30	>20	>30	>30	>20	>30	>30
Sulphur, wt%	0.0004	0.0007	0.0007	0.0279	0.0004	0.0006	<0.0003	0.0006	0.0006	0.0059	0.0016
Density @15°C, kg/m³	834	834	839	820	833	838	816	832	839	833	834
Viscosity @ 30°C, cSt											
Viscosity @ 40°C, cSt	2.53	2.11	3.05	2.12	2.89	2.81	2.02	2.33	2.73	2.62	3.16
Cetane Index 2 Variable	50	47	54	47	53	53	51	53	53	52	54
Cetane Index 4 Variable	50	47	54	49	54	52	53	54	52	53	56
Cetane Number	53	54	57	52	54	55	54	54	55	54	55
Distillation, °C IBP	179	172	186	174	178	171	189	170	177	181	195
T_{10}	207	197	218	196	213	206	208	199	212	212	232
T_{20}	220	209	236	204	227	225	216	214	231	225	247
T_{50}	256	245	281	232	269	276	237	272	275	264	281
T_{90}	312	314	340	302	332	341	291	320	330	333	341
T_{95}	329	329	355	322	345	357	312	335	344	352	358
FBP	345	336	365	331	353	365	326	345	353	359	366
% FAME	3	7	6	0	5	6	5	0	4	0	0

Worldwide Diesel Fuel Survey – 3

Country	Saudi Arabia	South Africa	Australia	China	Indonesia	Japan G2	Japan G3	Japan Sp G3	Korea	New Zealand	Singapore
No. of Samples	5	8	5	21	4	22	1	2	4	4	4
Samples containing FAME	0	0	0		2				4	0	0
Cloud Point, °C	-2	-1	-2	-9	5	-5	-16	-19	-7	-4	6
CFPP, °C	-13	-7	-4	-11	1	-10	-17	-32	-26	-12	3
LTFT, °C											
Pour Point, °C	-13	-17	-4	-24	0	-19	-23	-43	-31	-20	2
HFRR, µm	546	358	364	406	293	400	470	461	335	340	299
Wax Content @ 10°C Below Cloud, wt%	1.6	1.4	4.5		2.2				1.4	2.0	2.7
Rancimat, hrs		>30	>20		>30				>30	>20	>30
Sulphur, wt%	0.1230	0.0204	0.0008	0.0670	0.1948	0.0006	0.0006	0.0006	0.0005	0.0007	0.0033
Density @15°C, kg/m³	833	841	845	832	846	830	818	815	823	838	842
Viscosity @ 30°C, cSt						3.62	2.50	2.32			
Viscosity @ 40°C, cSt	3.36	3.11	2.90	3.99	4.22	1.5			2.43	3.36	3.38
Cetane Index 2 Variable	55	51	50	51	53	57	53	50	56	54	56
Cetane Index 4 Variable	55	52	51	52	53	57	53	50	55	56	59
Cetane Number	55	53	51	50	54	56	52	50	53	55	57
Distillation, °C IBP	177	186	189	172	178				161	185	180
T_{10}	210	222	228	206	227	207	181	172	189	230	245
T_{20}	228	238	243	221	246	231	196	186	207	246	263
T_{50}	280	273	273	260	289	277	246	232	265	282	303
T_{90}	349	345	325	323	353	330	311	312	336	337	361
T_{95}	365	366	339	338	372	342	323	326	354	351	377
FBP	377	377	350	352	380	352	333	338	365	359	385
% FAME	0	0	0		3				1	0	0

Worldwide Diesel Fuel Survey – 4

Country	Thailand	Argentina	Brazil	Canada	Colombia	Mexico	Peru	USA Mid West	USA East	USA West
No. of Samples	12	18	5	14	2	8	1	35	9	10
Samples containing FAME	12	17	5	0	2	0	1	8	0	1
Cloud Point, °C	8	-1	4	-27	-7	-8	-14	-16	-10	-13
CFPP, °C	5	-16	-4	-32	-12	-10	-16	-23	-17	-18
LTFT, °C				-29				-25	-24	-20
Pour Point, °C	3	-18	-8	-29	-12	-15	-24	-18	-13	-14
HFRR, µm	201	232	200	401	201	398	255	380	374	426
Wax Content @ 10°C Below Cloud, wt%	3.0	1.6	1.3	1.3	2.6	1.6	1.2	1.5	2.1	1.6
Rancimat, hrs	>30	>20	>20		>30	>20	>20			
Sulphur, wt%	0.0160	0.0803	0.0318	<0.001	0.0371	0.0192	0.0015	0.0009	0.0009	0.0008
Density @15°C, kg/m³	833	846	843	842	837	837	834	844	846	840
Viscosity @ 30°C, cSt										
Viscosity @ 40°C, cSt	3.27	3.14	2.91	2.38	2.61	2.78	2.32	2.48	2.49	2.60
Cetane Index 2 Variable	57	51	52	46	51	51	50	47	47	48
Cetane Index 4 Variable	58	50	50	46	51	52	50	46	46	48
Cetane Number	59	53	53	47	51	57	48	46	47	51
Distillation, °C IBP	181	170	142	169	179	190	167	174	167	175
T_{10}	223	213	189	202	206	217	196	206	204	205
T_{20}	243	232	216	217	220	230	210	221	222	219
T_{50}	288	281	278	252	266	266	255	257	261	256
T_{90}	353	349	359	304	331	330	324	315	316	320
T_{95}	371	369	385		345	347	342			
FBP	380	379	394	332	356	359	355	343	343	348
% FAME	4	5	5	0	9	0	2	2	0	0

Worldwide Survey – Europe

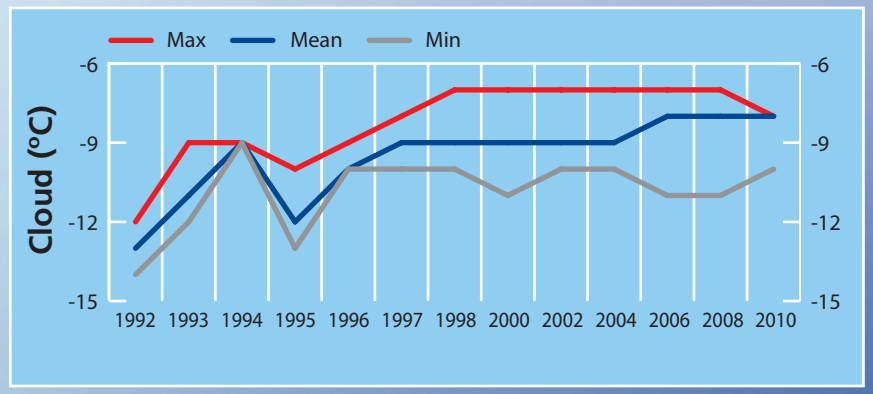
Austria

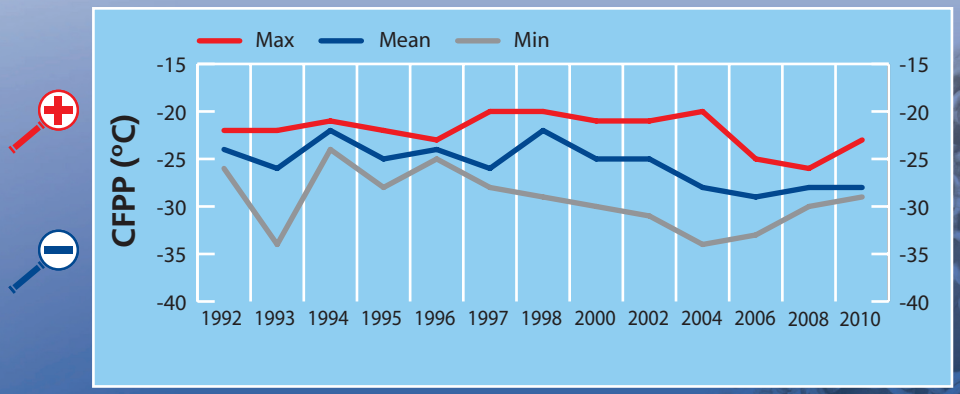
National Standards and physical inspection data

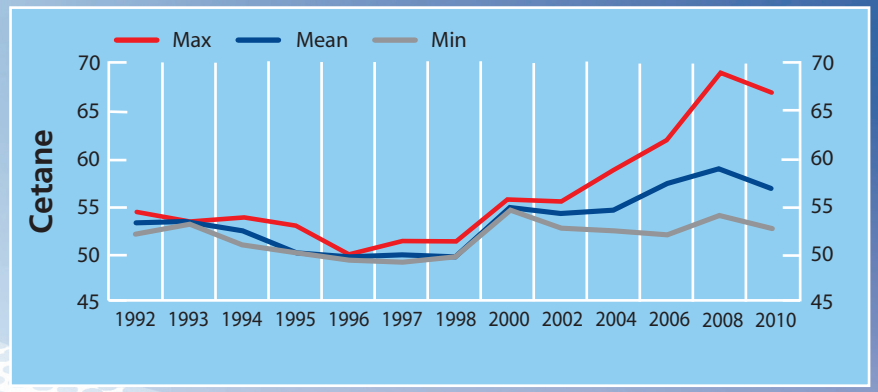
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001216	DIES 1001221	DIES 1001222	DIES 1001223	DIES 1001224	DIES 1001225	DIES 1001256
Cloud Point, °C		-8	-8	-10	-8	-8	-8	-10	-8	-8	-9
CFPP, °C	-20 (max)	-23	-28	-29	-27	-29	-29	-29	-28	-29	-23
Pour Point, °C		-27	-29	-33	-27	-27	-30	-33	-30	-27	-27
HFRR, µm	460 (max)	398	231	189	220	189	191	205	214	398	202
Wax Content @ 10°C Below Cloud, wt%		1.6	1.4	1.0	1.3	1.4	1.5	1.0	1.6	1.5	1.6
Rancimat, hrs	*	>30	>30	>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0009	0.0007	<0.0003	0.0007	0.0005	0.0008	0.0006	0.0008	<0.0003	0.0009
Density @15°C, kg/m^3	820 - 845	839	836	829	839	838	836	838	836	829	833
Viscosity @ 40°C, cSt	2.00 - 4.50	3.37	2.84	2.53	2.74	3.37	2.53	2.64	2.6	3.32	2.66
Cetane Index $_{2\ Variable}$		57	53	51	52	56	51	51	52	57	54
Cetane Index $_{4\ Variable}$	46 (min)	61	54	50	52	57	50	51	52	61	53
Cetane Number	51 (min)	67	57	53	57	59	53	55	53	67	58
Distillation, °C IBP		228	185	168	180	187	168	183	177	228	169
T_{10}		249	214	196	212	234	196	206	205	249	199
T_{20}		256	229	211	228	251	211	220	219	256	219
T_{50}		288	273	262	274	288	262	268	268	278	272
T_{90}		341	335	322	337	341	334	336	336	322	341
T_{95}	360 (max)	359	350	338	352	354	349	350	350	338	359
FBP		369	359	351	359	359	353	359	360	351	369
% FAME	7 (max)	7	6	0	7	7	7	7	7	0	7

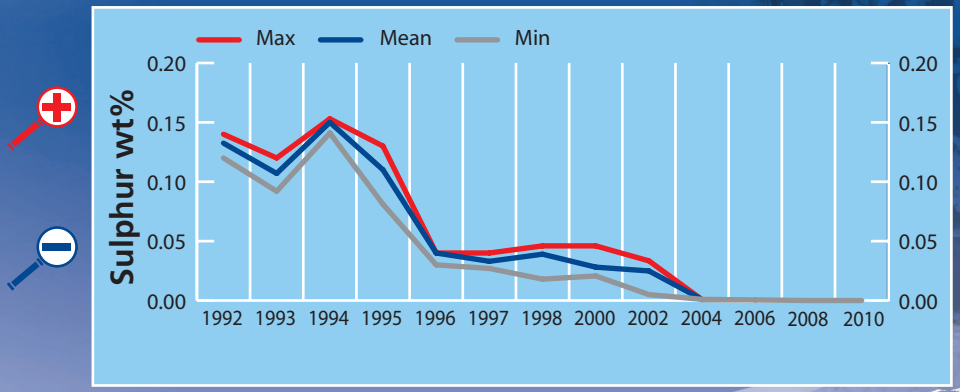
*20 hours min for diesel containing FAME above 2 % V/V

Austria


Max
Mean
Min
Cloud (°C)
-6
-9
-12
-15
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
-15
-20
-25
-30
-35
-40
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
70
65
60
55
50
45
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.20
0.15
0.10
0.05
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

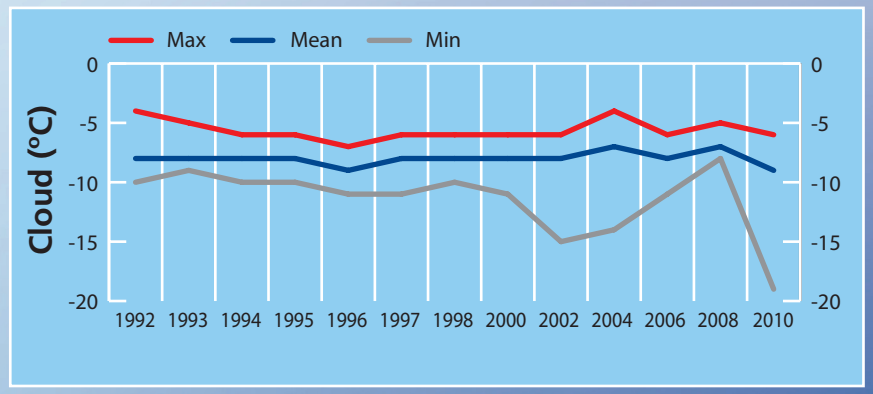
Benelux

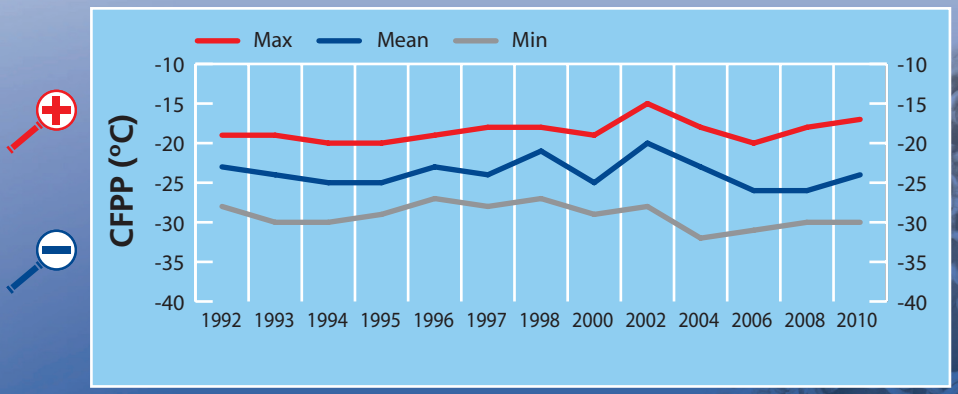
National Standards and physical inspection data

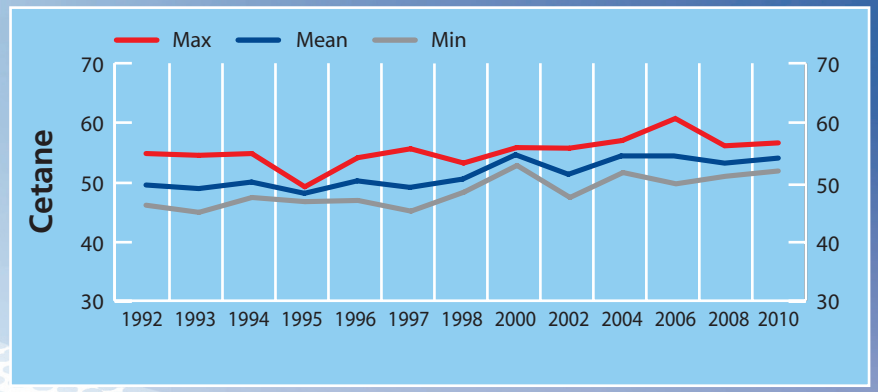
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001165	DIES 1001168	DIES 1001172	DIES 1001173	DIES 1001175	DIES 1001179	DIES 1001183
Cloud Point, °C		-6	-9	-19	-9	-8	-8	-8	-8	-19	-6
CFPP, °C	-20 (max)	-17	-24	-30	-30	-30	-20	-21	-23	-28	-17
Pour Point, °C		-21	-29	-36	-30	-30	-36	-30	-24	-21	-30
HFRR, µm	460 (max)	422	300	215	220	354	312	353	226	215	422
Wax Content @ 10°C Below Cloud, wt%		1.9	1.4	1.0	1.4	1.3	1.0	1.7	1.5	1.3	1.9
Rancimat, hrs	*	>30	>20	22	>30	>30	22	23	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0009	0.0008	0.0007	0.0009	0.0008	0.0007	0.0007	0.0008	0.0008	0.0008
Density @15°C, kg/m^3	820 - 845	842	835	828	833	835	833	838	842	838	828
Viscosity @ 40°C, cSt	2.00 - 4.50	2.76	2.57	2.44	2.54	2.71	2.58	2.44	2.76	2.47	2.47
Cetane Index $_{2\ Variable}$		54	52	51	53	53	52	51	52	51	54
Cetane Index $_{4\ Variable}$	46 (min)	53	52	50	53	53	52	50	51	50	53
Cetane Number	51 (min)	57	54	52	54	57	54	54	55	52	52
Distillation, °C IBP		172	167	161	169	172	166	163	169	171	161
T_{10}		213	202	193	206	213	202	194	204	203	193
T_{20}		231	220	210	222	231	218	214	227	220	210
T_{50}		279	267	263	266	270	263	267	279	265	263
T_{90}		339	331	322	330	327	334	331	339	322	333
T_{95}	360 (max)	354	347	339	347	344	351	348	354	339	347
FBP		364	356	348	353	355	359	356	364	348	355
% FAME	7 (max)	4	1	0	2	0	0	0	4	4	0

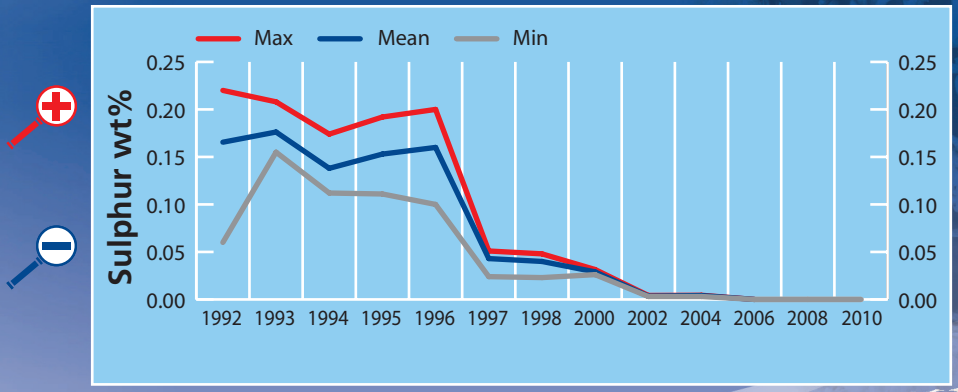
*20 hours min for diesel containing FAME above 2 % V/V

Benelux


Max
Mean
Min
Cloud (°C)
0
-5
-10
-15
-20
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
-10
-15
-20
-25
-30
-35
-40
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
70
60
50
40
30
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.25
0.20
0.15
0.10
0.05
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

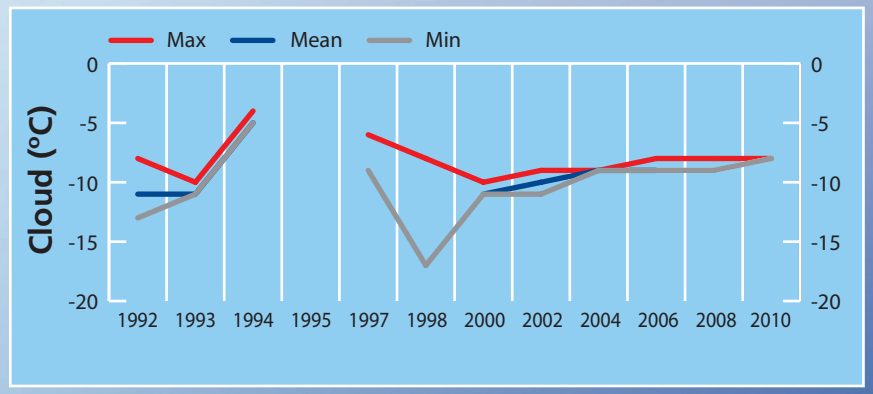
Czech Republic

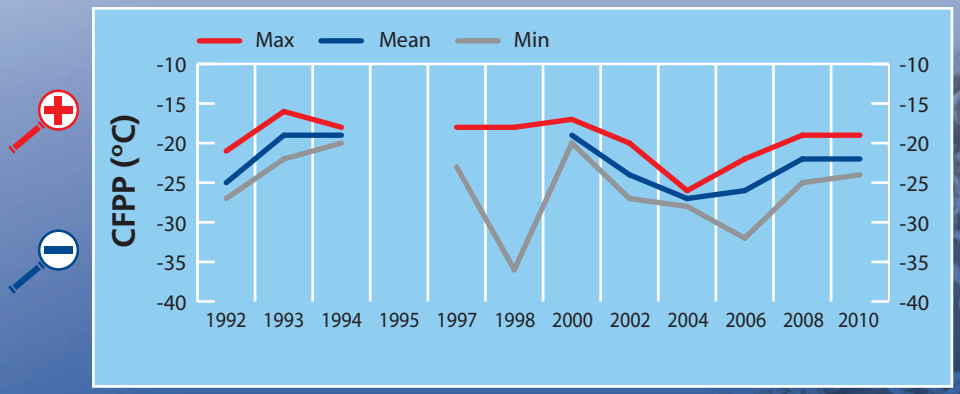
National Standards and physical inspection data

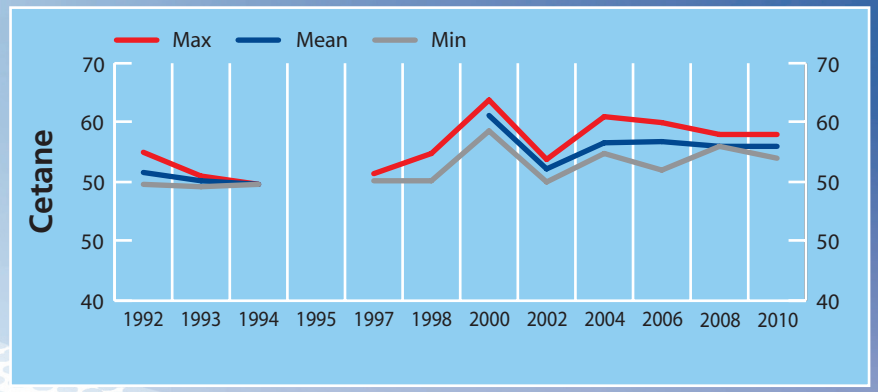
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001663	DIES 1001664	DIES 1001665
Cloud Point, °C	-8 (max)	-8	-8	-8	-8	-8	-8
CFPP, °C	-20 (max)	-19	-22	-24	-19	-24	-22
Pour Point, °C		-30	-33	-36	-36	-30	-33
HFRR, µm	460 (max)	224	211	200	224	200	210
Wax Content @ 10°C Below Cloud, wt%		2.1	1.4	0.9	2.1	0.9	1.2
Rancimat, hrs	*	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0007	0.0006	0.0006	0.0006	0.0007	0.0006
Density @15°C, kg/m^3	820 - 845	833	830	829	833	829	829
Viscosity @ 40°C, cSt	2.00 - 4.50	2.69	2.52	2.36	2.69	2.53	2.36
Cetane Index $_{2\ Variable}$		54	54	53	54	54	53
Cetane Index $_{4\ Variable}$	46 (min)	54	54	52	54	54	52
Cetane Number	51 (min)	54	53	52	52	52	54
Distillation, °C IBP		190	178	165	190	179	165
T_{10}		216	204	190	216	205	190
T_{20}		231	218	206	231	218	206
T_{50}		269	265	261	269	264	261
T_{90}		336	334	330	330	336	335
T_{95}	360 (max)	353	349	342	342	353	352
FBP		361	357	349	349	361	360
% FAME	7 (max)	5	4	4	5	4	4

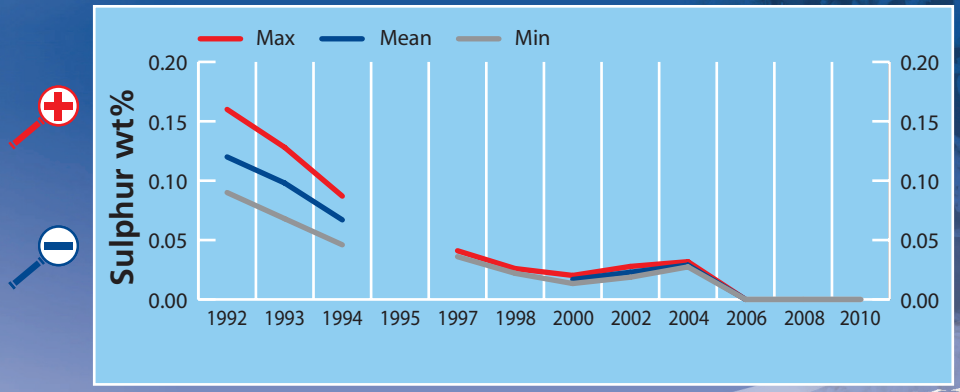
*20 hours min for diesel containing FAME above 2 % V/V

Czech Republic









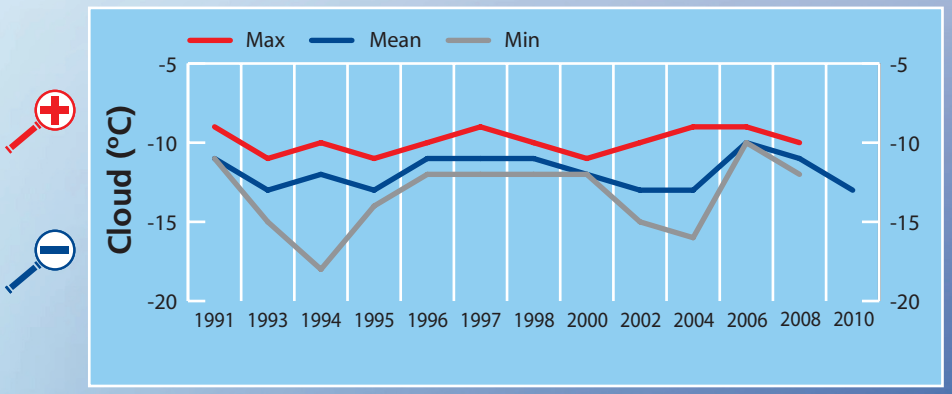
Denmark

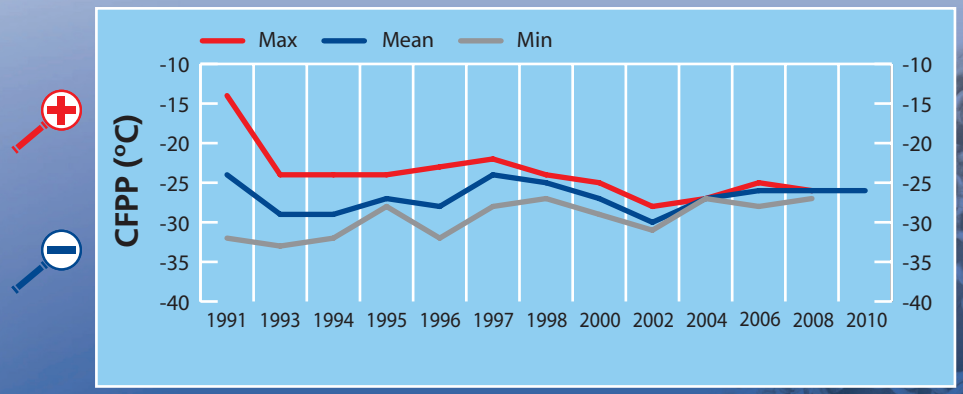
National Standards and physical inspection data

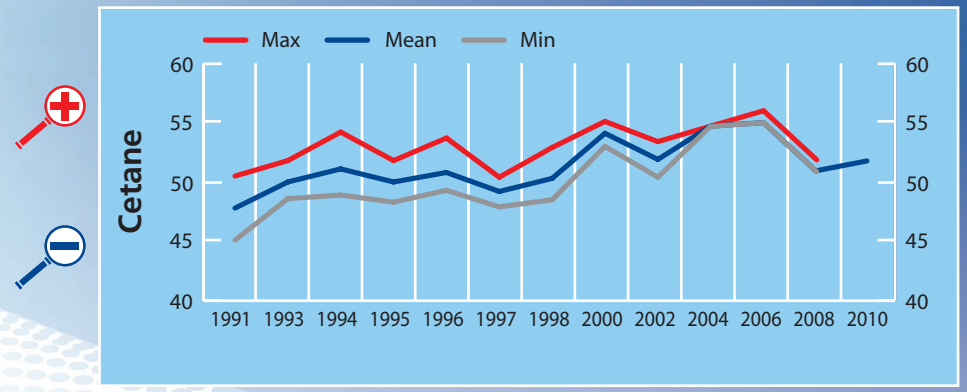
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001188	DIES 1001194
Cloud Point, °C			-13		-10	-17
CFPP, °C	-24 (max)		-26		-21	-31
Pour Point, °C			-41		-39	-42
HFRR, µm	460 (max)		292		308	277
Wax Content @ 10°C Below Cloud, wt%			1.0		1.3	0.7
Rancimat, hrs	*		>30		>30	>30
Sulphur, wt%	0.001 (max)		0.0006		0.0006	0.0006
Density @15°C, kg/m^3	820 - 845		837		837	837
Viscosity @ 40°C, cSt	2.00 - 4.50		2.64		2.72	2.57
Cetane Index $_{2\ Variable}$			51		51	50
Cetane Index $_{4\ Variable}$	46 (min)		50		51	49
Cetane Number	51 (min)		53		51	55
Distillation, °C IBP			169		168	170
T_{10}			197		200	194
T_{20}			212		215	210
T_{50}			263		267	259
T_{90}			332		334	329
T_{95}	360 (max)		346		347	345
FBP			355		356	354
% FAME	7 (max)		0		0	0

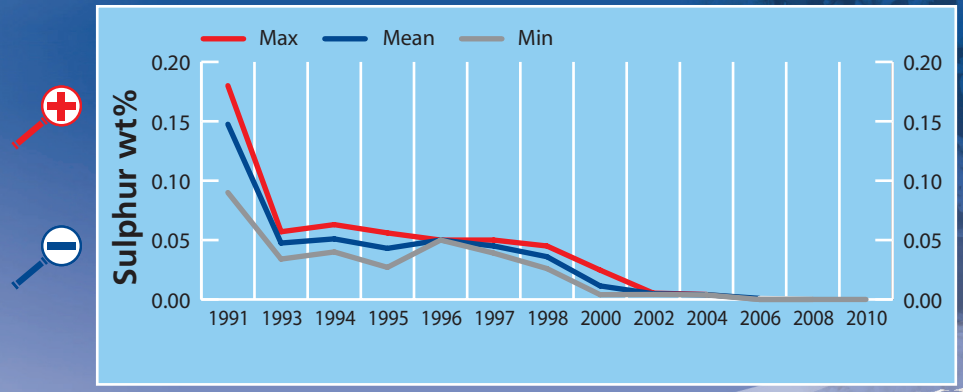
*20 hours min for diesel containing FAME above 2 % V/V

Denmark


Max
Mean
Min
Cloud (°C)
-5
-10
-15
-20
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
-10
-15
-20
-25
-30
-35
-40
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
60
55
50
45
40
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.20
0.15
0.10
0.05
0.00
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

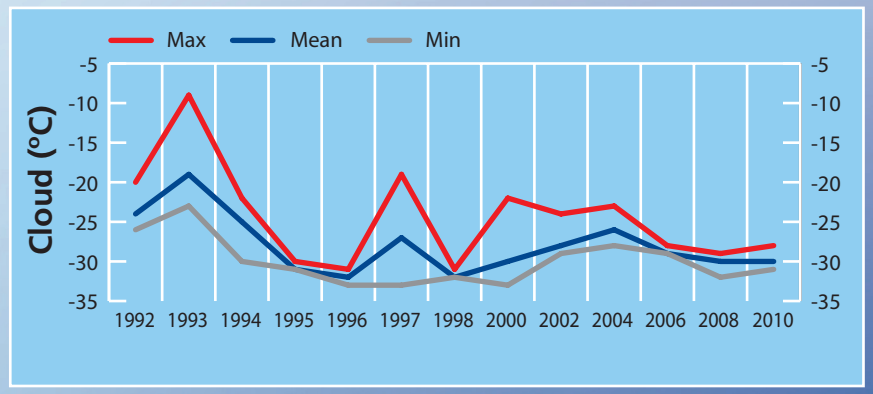
Finland

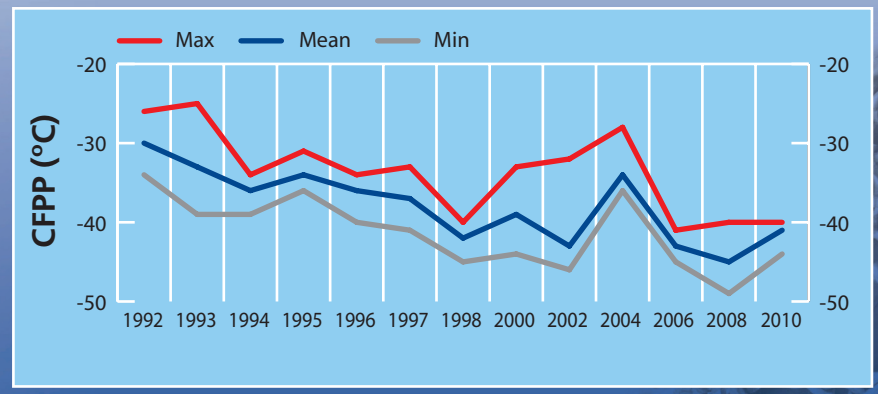
National Standards and physical inspection data

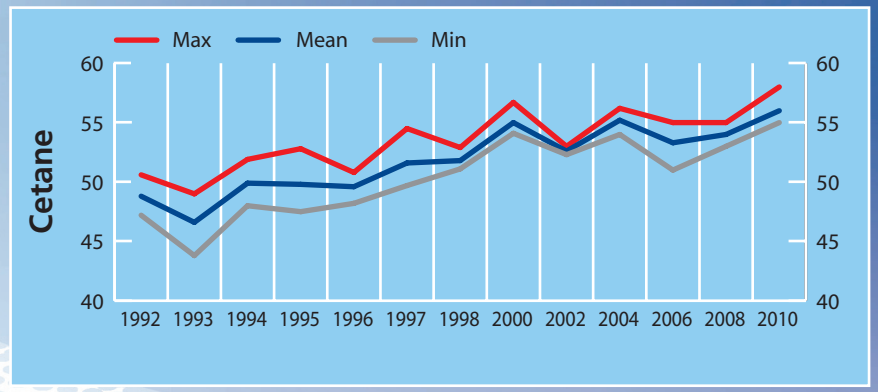
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002230	DIES 1002231	DIES 1002232	DIES 1002233	DIES 1002234
Cloud Point, °C	-29 (max)	-28	-30	-31	-31	-31	-31	-30	-28
CFPP, °C	-34 (max)	-40	-41	-44	-42	-40	-44	-41	-41
Pour Point, °C		-36	-40	-42	-36	-42	-42	-42	-39
HFRR, µm	460 (max)	380	347	328	328	354	341	380	331
Wax Content @ 10°C Below Cloud, wt%		1.1	0.6	0.4	1.1	0.5	0.5	0.5	0.4
Rancimat, hrs	*	>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0003	0.0003	<0.0003	0.0003	<0.0003	<0.0003	0.0003	0.0003
Density @15°C, kg/m^3	800 - 840	820	818	815	815	820	819	818	820
Viscosity @ 40°C, cSt	1.5 - 4.0	1.93	1.85	1.81	1.93	1.82	1.83	1.81	1.88
Cetane Index $_{2\ Variable}$		52	48	47	52	47	48	48	48
Cetane Index $_{4\ Variable}$	46 (min)	53	50	48	53	48	49	49	49
Cetane Number	51 (min)	58	56	55	58	55	56	56	56
Distillation, °C IBP		182	176	172	176	182	174	174	172
T_{10}	180 (min)	196	193	191	196	191	191	192	194
T_{20}		207	202	200	207	200	201	201	202
T_{50}		237	230	228	237	228	228	228	231
T_{90}		297	294	291	293	295	294	291	297
T_{95}	360 (max)	323	319	314	314	323	321	315	323
FBP		339	336	333	333	339	339	334	336
% FAME	7 (max)	0	0	0	0	0	0	0	0

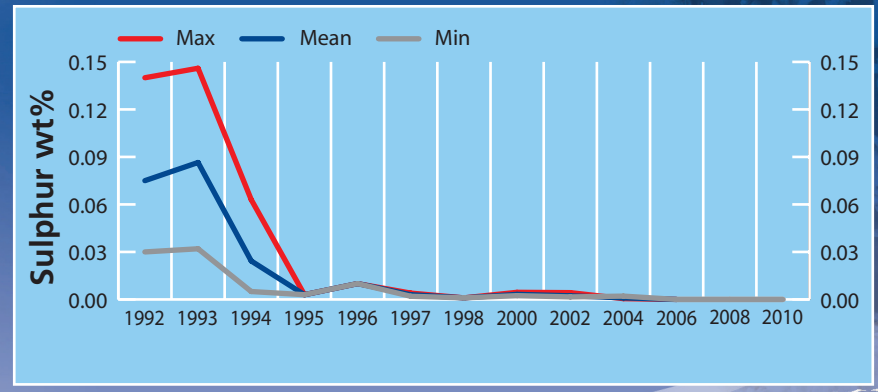
Specification shown is Reformulated Diesel. Other specifications can also exist within Finland and may be represented within the data shown here.
*20 hours min for diesel containing FAME above 2 % V/V

Finland


Max
Mean
Min
Cloud (°C)
-5
-10
-15
-20
-25
-30
-35
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
-20
-30
-40
-50
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
60
55
50
45
40
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.15
0.12
0.09
0.06
0.03
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

France

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001404	DIES 1001405	DIES 1001406	DIES 1001407	DIES 1001408	DIES 1001409	DIES 1001410
Cloud Point, °C		-5	-7	-12	-7	-7	-6	-6	-5	-5	-6
CFPP, °C	-15 (max)**	-14	-18	-26	-20	-18	-14	-14	-19	-22	-16
Pour Point, °C		-24	-29	-39	-27	-27	-30	-30	-24	-27	-39
HFRR, µm	460 (max)	276	219	194	229	228	236	226	208	218	215
Wax Content @ 10°C Below Cloud, wt%		2.7	1.8	1.3	1.4	1.5	1.8	1.7	1.3	1.3	2.7
Rancimat, hrs	*	>30	>30	>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0010	0.0007	0.0005	0.0007	0.0007	0.0008	0.0008	0.0005	0.0006	0.0009
Density @15°C, kg/m^3	820 - 845	842	834	827	835	836	833	833	829	829	827
Viscosity @ 40°C, cSt	2.00 - 4.50	2.83	2.50	2.29	2.62	2.64	2.46	2.46	2.30	2.29	2.54
Cetane Index $_{2\ Variable}$		56	53	50	53	53	54	54	53	53	55
Cetane Index $_{4\ Variable}$	46 (min)	56	52	49	53	52	52	53	52	52	56
Cetane Number	51 (min)	59	54	52	53	57	52	57	53	57	56
Distillation, °C IBP		177	169	161	171	169	162	161	164	162	167
T_{10}		212	199	188	203	202	189	190	188	189	203
T_{20}		234	217	203	222	220	209	210	204	203	220
T_{50}		280	268	259	271	271	271	272	259	259	268
T_{90}		341	335	325	335	337	336	337	338	340	330
T_{95}	360 (max)	357	348	338	347	351	348	349	355	357	341
FBP		362	356	348	357	356	355	356	362	361	348
% FAME	7 (max)	7	7	6	6	7	7	7	6	6	7

**Specification for Gazole-Hiver, Grand-Froid is -20°C
*20 hours min for diesel containing FAME above 2 % V/V

France (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001411	DIES 1001412	DIES 1001413	DIES 1001415	DIES 1001416	DIES 1001417	DIES 1001418
Cloud Point, °C		-5	-7	-12	-6	-6	-6	-8	-6	-6	-6
CFPP, °C	-15 (max)**	-14	-18	-26	-15	-15	-16	-20	-19	-17	-17
Pour Point, °C		-24	-29	-39	-33	-33	-33	-30	-30	-30	-36
HFRR, µm	460 (max)	276	219	194	201	196	194	212	217	236	209
Wax Content @ 10°C Below Cloud, wt%		2.7	1.8	1.3	2.7	2.6	2.5	1.3	1.7	1.6	1.6
Rancimat, hrs	*	>30	>30	>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0010	0.0007	0.0005	0.0010	0.0010	0.0009	0.0007	0.0007	0.0007	0.0006
Density @15°C, kg/m^3	820 - 845	842	834	827	827	827	828	839	842	842	836
Viscosity @ 40°C, cSt	2.00 - 4.50	2.83	2.50	2.29	2.52	2.53	2.51	2.44	2.68	2.62	2.4
Cetane Index $_{2\ Variable}$		56	53	50	56	56	55	50	52	51	52
Cetane Index $_{4\ Variable}$	46 (min)	56	52	49	56	56	55	49	50	50	51
Cetane Number	51 (min)	59	54	52	59	55	55	52	53	55	52
Distillation, °C IBP		177	169	161	175	174	175	169	169	161	166
T_{10}		212	199	188	203	204	203	196	199	195	195
T_{20}		234	217	203	221	220	220	213	220	216	212
T_{50}		280	268	259	269	269	267	264	278	275	267
T_{90}		341	335	325	331	330	330	337	341	341	339
T_{95}	360 (max)	357	348	338	342	342	342	350	354	355	354
FBP		362	356	348	351	349	350	359	362	361	361
% FAME	7 (max)	7	7	6	7	7	7	6	7	7	7

**Specification for Gazole-Hiver, Grand-Froid is -20°C
*20 hours min for diesel containing FAME above 2 % V/V

France (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001419	DIES 1001422	DIES 1001423	DIES 1001424	DIES 1001425	DIES 1001426	DIES 1001427
Cloud Point, °C		-5	-7	-12	-6	-9	-9	-9	-8	-9	-12
CFPP, °C	-15 (max)**	-14	-18	-26	-19	-18	-16	-20	-19	-17	-26
Pour Point, °C		-24	-29	-39	-36	-24	-24	-24	-27	-27	-24
HFRR, µm	460 (max)	276	219	194	225	228	215	209	205	222	227
Wax Content @ 10°C Below Cloud, wt%		2.7	1.8	1.3	1.4	1.8	1.5	1.8	1.8	1.7	1.6
Rancimat, hrs	*	>30	>30	>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0010	0.0007	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007
Density @15°C, kg/m^3	820 - 845	842	834	827	841	835	835	841	839	838	831
Viscosity @ 40°C, cSt	2.00 - 4.50	2.83	2.50	2.29	2.45	2.37	2.374	2.83	2.57	2.56	2.37
Cetane Index $_{2\ Variable}$		56	53	50	50	51	51	53	52	52	52
Cetane Index $_{4\ Variable}$	46 (min)	56	52	49	49	50	51	52	51	51	52
Cetane Number	51 (min)	59	54	52	54	54	57	53	52	52	56
Distillation, °C IBP		177	169	161	165	172	170	175	170	170	177
T_{10}		212	199	188	194	200	200	212	204	204	204
T_{20}		234	217	203	211	215	215	234	233	222	218
T_{50}		280	268	259	266	261	262	280	272	272	259
T_{90}		341	335	325	338	330	333	336	333	333	325
T_{95}	360 (max)	357	348	338	351	343	347	351	346	347	338
FBP		362	356	348	361	352	352	360	355	355	348
% FAME	7 (max)	7	7	6	7	7	6	7	7	7	7

**Specification for Gazole-Hiver, Grand-Froid is -20°C
*20 hours min for diesel containing FAME above 2 % V/V

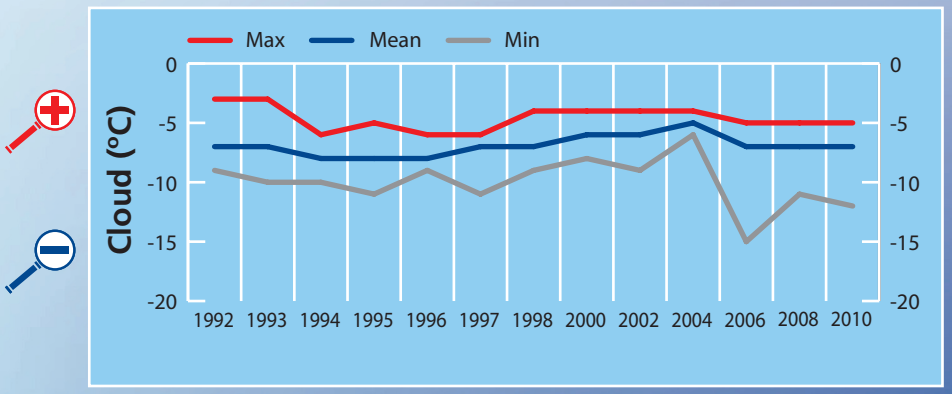
France (continued)

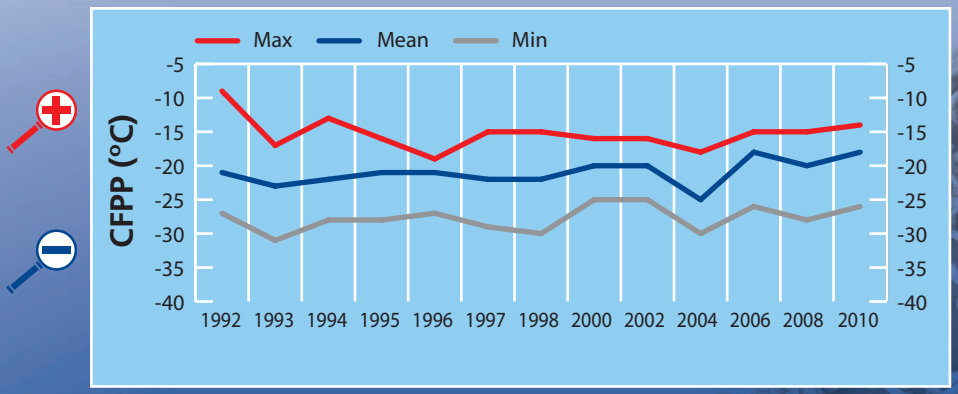
National Standards and physical inspection data

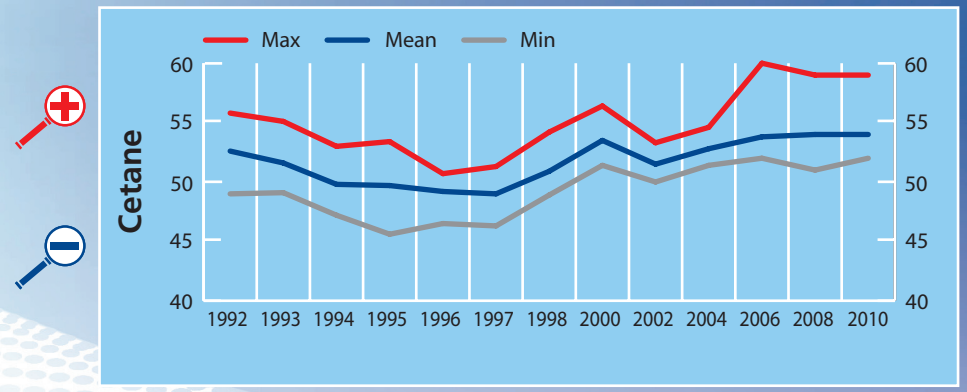
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001428
Cloud Point, °C		-5	-7	-12	-7
CFPP, °C	-15 (max)**	-14	-18	-26	-19
Pour Point, °C		-24	-29	-39	-24
HFRR, µm	460 (max)	276	219	194	276
Wax Content @ 10°C Below Cloud, wt%		2.7	1.8	1.3	1.4
Rancimat, hrs	*	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0010	0.0007	0.0005	0.0007
Density @15°C, kg/m^3	820 - 845	842	834	827	832
Viscosity @ 40°C, cSt	2.00 - 4.50	2.83	2.50	2.29	2.54
Cetane Index $_{2\ Variable}$		56	53	50	53
Cetane Index $_{4\ Variable}$	46 (min)	56	52	49	53
Cetane Number	51 (min)	59	54	52	56
Distillation, °C IBP		177	169	161	174
T_{10}		212	199	188	204
T_{20}		234	217	203	220
T_{50}		280	268	259	264
T_{90}		341	335	325	333
T_{95}	360 (max)	357	348	338	348
FBP		362	356	348	358
% FAME	7 (max)	7	7	6	6

**Specification for Gazole-Hiver, Grand-Froid is -20°C
*20 hours min for diesel containing FAME above 2 % V/V

France


Max
Mean
Min
Cloud (°C)
0
-5
-10
-15
-20
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
-5
-10
-15
-20
-25
-30
-35
-40
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010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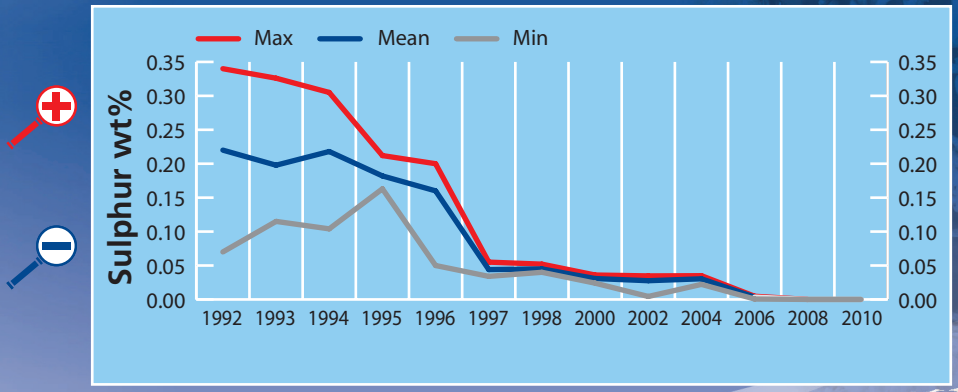
Mean
Min
Cetane
60
55
50
45
40
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
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0.30
0.25
0.20
0.15
0.10
0.05
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

Germany

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001176	DIES 1001177	DIES 1001178	DIES 1001180	DIES 1001182	DIES 1001184	DIES 1001185
Cloud Point, °C		-6	-8	-14	-7	-9	-8	-8	-8	-8	-8
CFPP, °C	-22 (max)	-19	-26	-33	-23	-26	-30	-28	-24	-27	-29
Pour Point, °C		-21	-30	-38	-24	-27	-27	-27	-27	-27	-33
HFRR, µm	460 (max)	389	219	190	199	219	243	213	228	389	228
Wax Content @ 10°C Below Cloud, wt%		1.9	1.4	0.8	1.7	1.8	1.3	1.6	1.7	1.3	1.4
Rancimat, hrs	*	>30	>20	3	>30	>30	>30	19	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0009	0.0007	<0.0003	0.0006	0.0006	0.0006	0.0007	0.0005	<0.0003	0.0009
Density @15°C, kg/m^3	820 - 845	843	838	825	841	840	835	840	843	830	838
Viscosity @ 40°C, cSt	2.00 - 4.50	3.73	2.82	2.08	3.00	2.99	2.82	2.77	3.04	3.32	2.64
Cetane Index $_{2\ Variable}$		56	53	50	53	53	54	52	51	56	52
Cetane Index $_{4\ Variable}$	46 (min)	61	53	49	54	53	55	52	52	61	51
Cetane Number	51 (min)	67	56	52	61	56	60	56	56	67	55
Distillation, °C IBP		201	182	166	191	178	189	184	200	201	174
T_{10}		249	215	191	230	224	221	214	225	249	205
T_{20}		255	230	205	244	239	232	229	237	255	220
T_{50}		287	273	250	279	279	274	273	276	278	271
T_{90}		340	334	321	333	331	336	334	333	324	335
T_{95}	360 (max)	353	348	334	348	343	350	346	347	342	347
FBP		362	357	258	356	352	356	359	354	353	358
% FAME	7 (max)	7	7	0	7	7	7	7	7	0	7

*20 hours min for diesel containing FAME above 2 % V/V

Germany (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001186	DIES 1001191	DIES 1001192	DIES 1001193	DIES 1001195	DIES 1001197	DIES 1001200
Cloud Point, °C		-6	-8	-14	-8	-7	-8	-7	-7	-7	-6
CFPP, °C	-22 (max)	-19	-26	-33	-31	-22	-30	-21	-27	-30	-19
Pour Point, °C		-21	-30	-38	-33	-27	-30	-30	-33	-33	-38
HFRR, µm	460 (max)	389	219	190	202	197	212	221	193	216	236
Wax Content @ 10°C Below Cloud, wt%		1.9	1.4	0.8	1.3	1.3	1.5	1.3	1.4	1.6	1.9
Rancimat, hrs	*	>30	>20	3	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0009	0.0007	<0.0003	0.0006	0.0007	0.0006	0.0009	0.0007	0.0008	0.0008
Density @15°C, kg/m^3	820 - 845	843	838	825	838	837	839	830	838	840	836
Viscosity @ 40°C, cSt	2.00 - 4.50	3.73	2.82	2.08	2.74	2.55	2.96	2.69	2.97	2.66	2.62
Cetane Index $_{2\ Variable}$		56	53	50	52	51	54	55	53	51	52
Cetane Index $_{4\ Variable}$	46 (min)	61	53	49	52	50	54	56	54	51	52
Cetane Number	51 (min)	67	56	52	58	54	60	61	52	52	52
Distillation, °C IBP		201	182	166	176	177	177	181	184	181	185
T_{10}		249	215	191	209	205	218	209	216	209	210
T_{20}		255	230	205	225	219	235	225	233	223	224
T_{50}		287	273	250	272	263	280	273	279	269	269
T_{90}		340	334	321	339	334	337	336	339	334	333
T_{95}	360 (max)	353	348	334	353	348	349	349	352	346	347
FBP		362	357	258	360	356	360	357	361	356	355
% FAME	7 (max)	7	7	0	7	7	7	7	7	7	7

*20 hours min for diesel containing FAME above 2 % V/V

Germany (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001202	DIES 1001205	DIES 1001206	DIES 1001208	DIES 1001215	DIES 1001226	DIES 1001227
Cloud Point, °C		-6	-8	-14	-9	-7	-8	-7	-7	-7	-6
CFPP, °C	-22 (max)	-19	-26	-33	-27	-26	-29	-28	-29	-28	-33
Pour Point, °C		-21	-30	-38	-27	-21	-33	-27	-30	-30	-33
HFRR, µm	460 (max)	389	219	190	200	234	210	192	207	202	208
Wax Content @ 10°C Below Cloud, wt%		1.9	1.4	0.8	1.4	1.3	1.4	1.5	1.0	0.8	1.2
Rancimat, hrs	*	>30	>20	3	7	>30	>30	3	15	16	15
Sulphur, wt%	0.001 (max)	0.0009	0.0007	<0.0003	0.0004	0.0009	0.0007	<0.0003	0.0009	0.0009	0.0006
Density @15°C, kg/m^3	820 - 845	843	838	825	837	840	839	838	839	842	840
Viscosity @ 40°C, cSt	2.00 - 4.50	3.73	2.82	2.08	3.28	2.76	2.93	3.73	2.59	2.58	2.51
Cetane Index $_{2\ Variable}$		56	53	50	55	53	53	55	51	50	50
Cetane Index $_{4\ Variable}$	46 (min)	61	53	49	57	52	53	57	50	49	50
Cetane Number	51 (min)	67	56	52	59	56	53	60	53	52	54
Distillation, °C IBP		201	182	166	187	180	184	184	175	181	172
T_{10}		249	215	191	235	213	215	233	203	206	206
T_{20}		255	230	205	250	230	231	249	219	221	220
T_{50}		287	273	250	286	277	277	287	268	267	267
T_{90}		340	334	321	339	338	337	340	335	335	330
T_{95}	360 (max)	353	348	334	352	353	349	351	350	349	343
FBP		362	357	258	360	359	359	357	361	362	351
% FAME	7 (max)	7	7	0	7	7	7	6	7	7	6

*20 hours min for diesel containing FAME above 2 % V/V

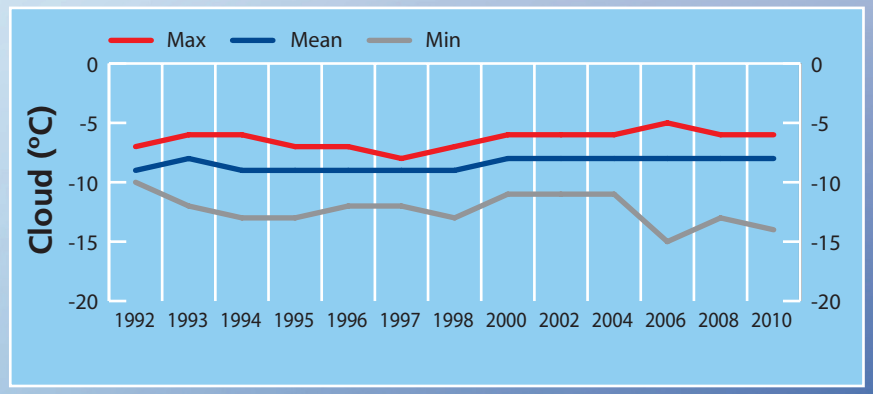
Germany (continued)

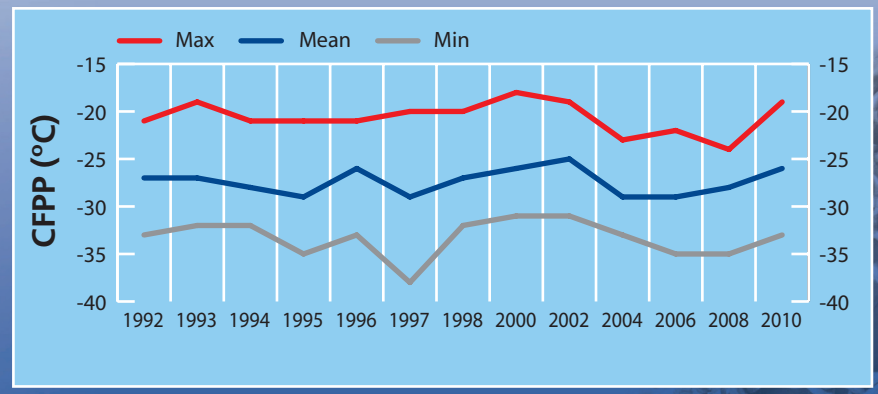
National Standards and physical inspection data

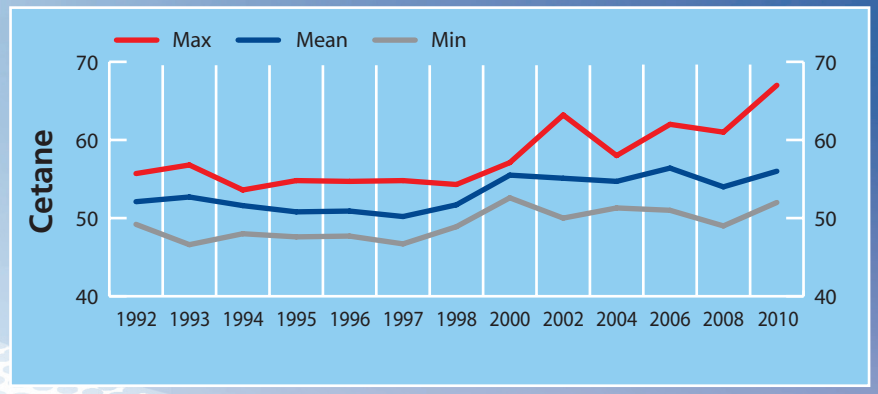
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001228	DIES 1001229
Cloud Point, °C		-6	-8	-14	-14	-7
CFPP, °C	-22 (max)	-19	-26	-33	-22	-20
Pour Point, °C		-21	-30	-38	-30	-33
HFRR, µm	460 (max)	389	219	190	190	215
Wax Content @ 10°C Below Cloud, wt%		1.9	1.4	0.8	1.9	1.4
Rancimat, hrs	*	>30	>20	3	20	17
Sulphur, wt%	0.001 (max)	0.0009	0.0007	<0.0003	0.0009	0.0009
Density @15°C, kg/m^3	820 - 845	843	838	825	825	838
Viscosity @ 40°C, cSt	2.00 - 4.50	3.73	2.82	2.08	2.08	2.57
Cetane Index $_{2\ Variable}$		56	53	50	52	51
Cetane Index $_{4\ Variable}$	46 (min)	61	53	49	52	51
Cetane Number	51 (min)	67	56	52	53	55
Distillation, °C IBP		201	182	166	166	175
T_{10}		249	215	191	191	203
T_{20}		255	230	205	205	218
T_{50}		287	273	250	250	268
T_{90}		340	334	321	321	336
T_{95}	360 (max)	353	348	334	334	348
FBP		362	357	258	344	356
% FAME	7 (max)	7	7	0	7	7

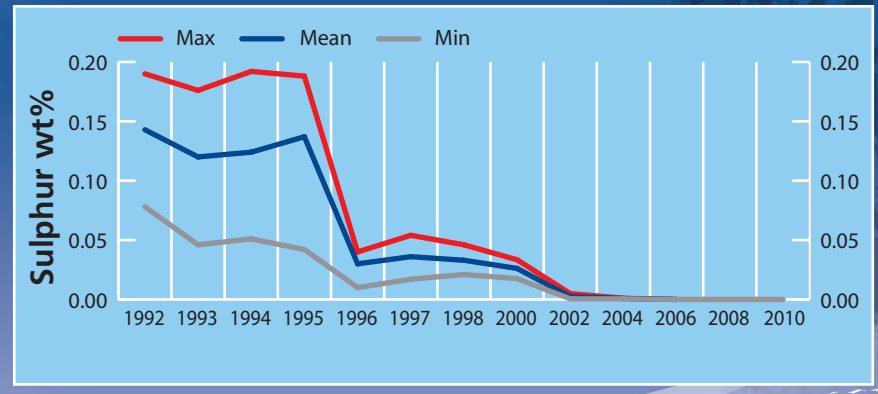
*20 hours min for diesel containing FAME above 2 % V/V

Germany


Max
Mean
Min
Cloud (°C)
0
-5
-10
-15
-20
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
-15
-20
-25
-30
-35
-40
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
70
60
50
40
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.20
0.15
0.10
0.05
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

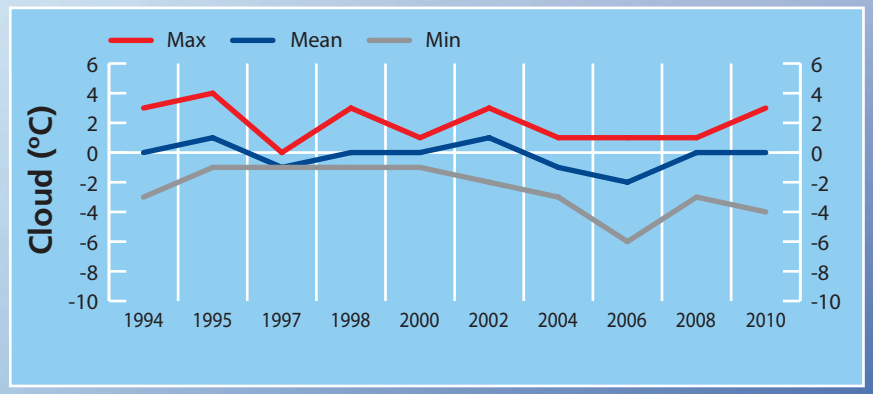
Greece

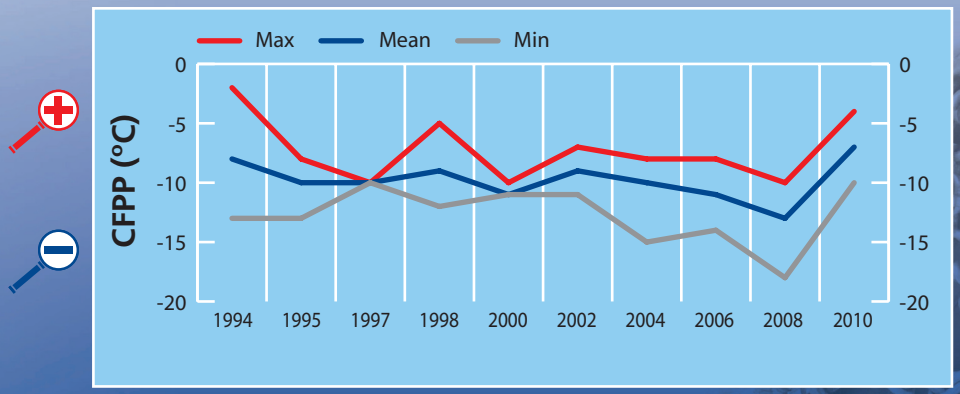
National Standards and physical inspection data

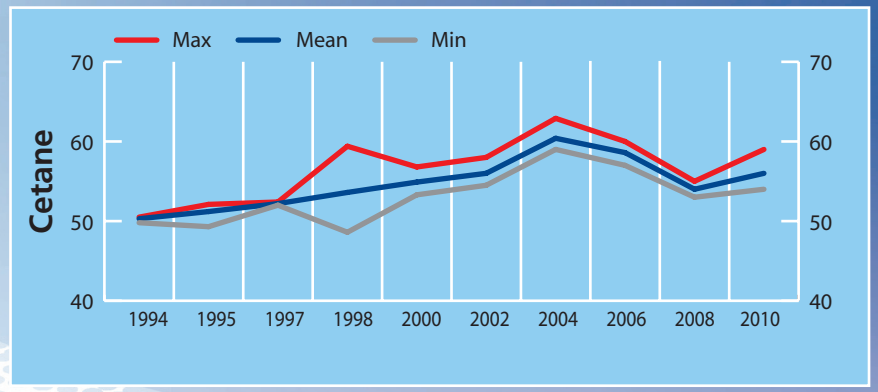
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 0909180	DIES 0909181	DIES 0909182	DIES 0909183
Cloud Point, °C		3	0	-4	3	3	-4	-1
CFPP, °C	-5 (max)	-4	-7	-10	-4	-8	-10	-7
Pour Point, °C		-9	-19	-30	-9	-12	-24	-30
HFRR, µm	460 (max)	396	325	241	241	396	347	316
Wax Content @ 10°C Below Cloud, wt%		3.1	2.4	1.6	3.1	2.7	1.6	2.2
Rancimat, hrs	*	>30	<20	13	18	>30	13	18
Sulphur, wt%	0.001 (max)	0.0010	0.0008	0.0006	0.0010	0.0008	0.0006	0.0008
Density @15°C, kg/m^3	820 - 845	833	828	823	828	823	833	830
Viscosity @ 40°C, cSt	2.00 - 4.50	3.14	2.89	2.65	3.07	2.65	2.70	3.14
Cetane Index $_{2\ Variable}$		58	56	53	58	57	53	56
Cetane Index $_{4\ Variable}$	46 (min)	59	56	53	59	57	53	57
Cetane Number	51 (min)	59	56	54	59	56	54	56
Distillation, °C IBP		176	168	165	167	165	165	176
T_{10}		223	211	200	223	202	200	218
T_{20}		241	227	217	241	219	217	233
T_{50}		281	273	267	281	269	267	276
T_{90}		343	341	340	341	341	343	340
T_{95}	360 (max)	360	358	355	359	360	359	355
FBP		369	367	364	368	369	367	364
% FAME	7 (max)	1	1	0	1	0	0	1

*20 hours min for diesel containing FAME above 2 % V/V

Greece


Max
Mean
Min
Cloud (°C)
6
4
2
0
-2
-4
-6
-8
-10
1994
1995
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
CFPP (°C)
0
-5
-10
-15
-20
1994
1995
1997
1998
2000
2002
2004
2006
2008
2010


Max
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Min
Cetane
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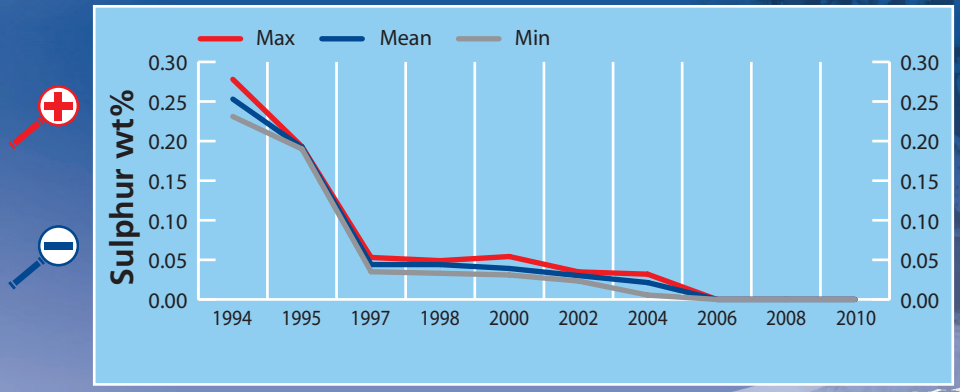
50
40
1994
1995
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Sulphur wt%
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1994
1995
1997
1998
2000
2002
2004
2006
2008
2010

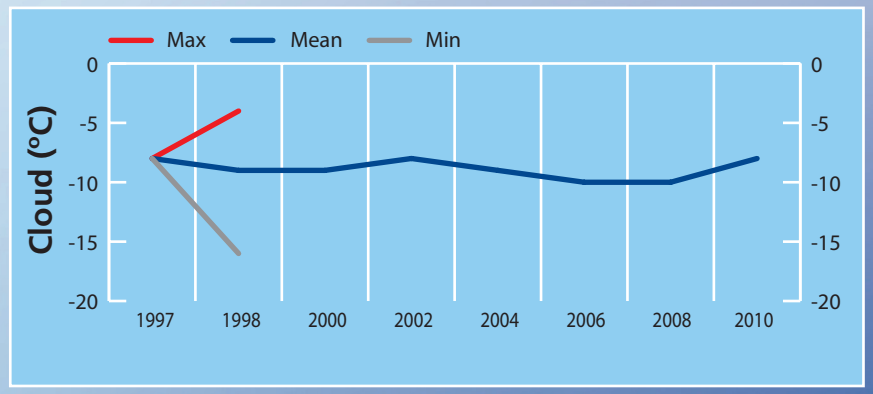
Hungary

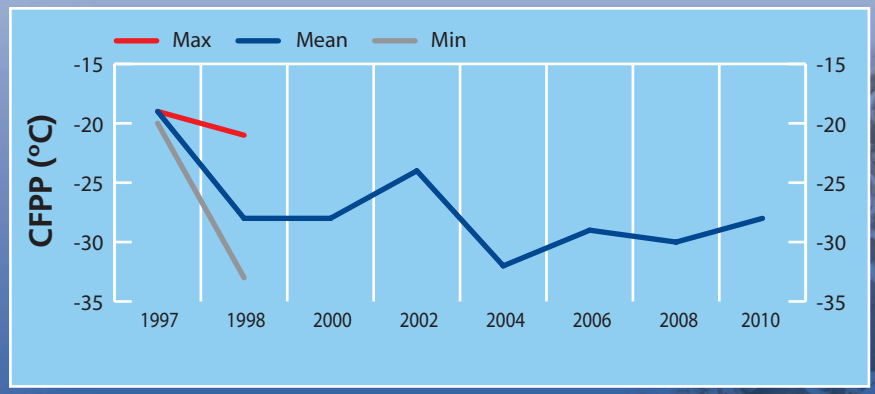
National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001668
Cloud Point, °C			-8		-8
CFPP, °C	-20 (max)		-28		-28
Pour Point, °C			-27		-27
HFRR, µm	460 (max)		176		176
Wax Content @ 10°C Below Cloud, wt%			1.3		1.3
Rancimat, hrs	*		>30		>30
Sulphur, wt%	0.001 (max)		0.0006		0.0006
Density @15°C, kg/m^3	820 - 845		840		840
Viscosity @ 40°C, cSt	2.00 - 4.50		2.69		2.69
Cetane Index $_{2\ Variable}$			52		52
Cetane Index $_{4\ Variable}$	46 (min)		52		52
Cetane Number	51 (min)		54		54
Distillation, °C IBP			189		189
T_{10}			217		217
T_{20}			232		232
T_{50}			275		275
T_{90}			338		338
T_{95}	360 (max)		353		353
FBP			362		362
% FAME	7 (max)		5		5

*20 hours min for diesel containing FAME above 2 % V/V

Hungary


Max
Mean
Min
Cloud (°C)
0
-5
-10
-15
-20
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
CFPP (°C)
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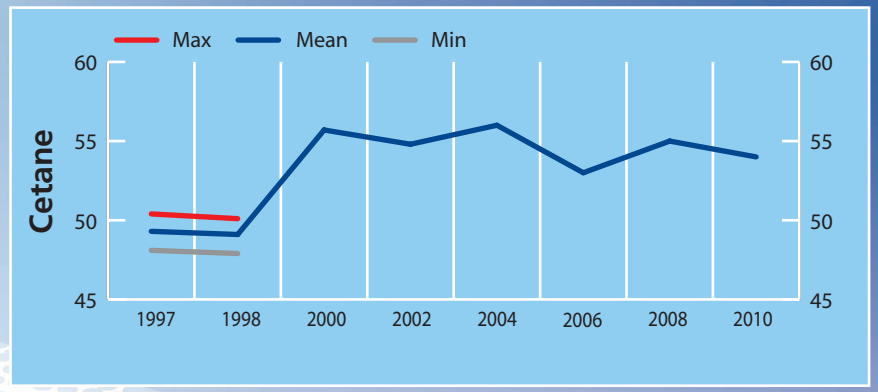
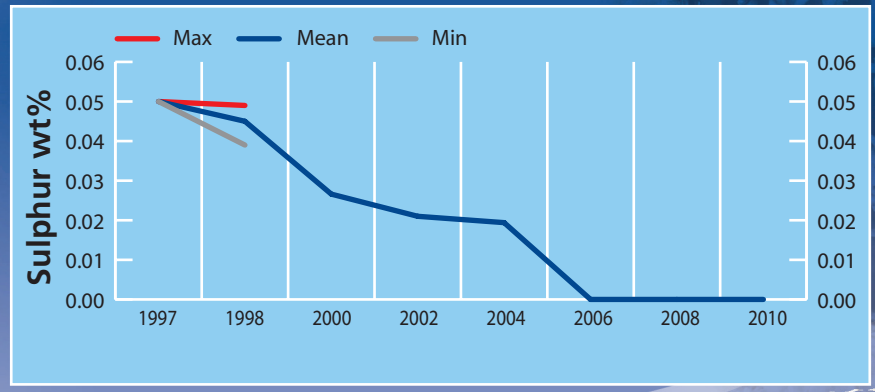
-20
-25
-30
-35
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Cetane
60
55
50
45
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Sulphur wt%
0.06
0.05
0.04
0.03
0.02
0.01
0.00
1997
1998
2000
2002
2004
2006
2008
2010

Ireland

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002242	DIES 1002243	DIES 1002245	DIES 1002246	DIES 1002247	DIES 1002249	DIES 1002250
Cloud Point, °C		-6	-6	-7	-7	-7	-7	-6	-6	-6	-7
CFPP, °C	-15 (max)	-18	-19	-21	-20	-18	-18	-18	-18	-21	-19
Pour Point, °C		-27	-29	-30	-27	-30	-30	-30	-27	-27	-30
HFRR, µm	460 (max)	426	337	241	333	367	346	337	274	377	426
Wax Content @ 10°C Below Cloud, wt%		1.8	1.7	1.5	1.6	1.7	1.8	1.7	1.6	1.5	1.8
Rancimat, hrs	*	>30	>30	>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0026	0.0009	0.0006	0.0026	0.0007	0.0006	0.0007	0.0007	0.0007	0.0006
Density @15°C, kg/m^3	820 - 845	837	835	831	837	833	831	837	836	836	832
Viscosity @ 40°C, cSt	2.00 - 4.50	2.73	2.69	2.64	2.64	2.73	2.70	2.65	2.71	2.68	2.70
Cetane Index $_{2\ Variable}$		55	53	52	52	54	55	52	52	52	55
Cetane Index $_{4\ Variable}$	46 (min)	54	52	51	51	53	54	51	52	52	54
Cetane Number	51 (min)	58	56	53	58	56	57	53	56	54	57
Distillation, °C IBP		177	171	165	169	169	165	171	174	177	167
T_{10}		207	202	198	200	200	198	202	206	207	198
T_{20}		225	221	217	218	219	217	222	224	223	219
T_{50}		272	270	267	268	271	272	268	270	267	272
T_{90}		337	335	333	335	336	337	333	335	334	337
T_{95}	360 (max)	352	351	349	351	350	352	349	352	351	351
FBP		385	358	357	358	357	357	359	359	361	357
% FAME	7 (max)	2	1	0	0	0	0	0	2	0	0

*20 hours min for diesel containing FAME above 2 % V/V

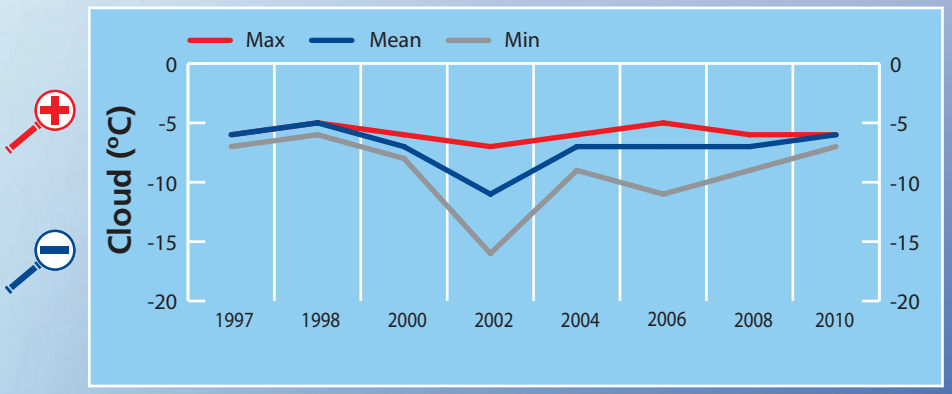
Ireland (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002251
Cloud Point, °C		-6	-6	-7	-6
CFPP, °C	-22 (max)	-18	-19	-21	-19
Pour Point, °C		-27	-29	-30	-27
HFRR, µm	460 (max)	426	337	241	241
Wax Content @ 10°C Below Cloud, wt%		1.8	1.7	1.5	1.7
Rancimat, hrs	*	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0026	0.0009	0.0006	0.0007
Density @15°C, kg/m^3	820 - 845	837	835	831	837
Viscosity @ 40°C, cSt	2.00 - 4.50	2.73	2.69	2.64	2.72
Cetane Index $_{2\ Variable}$		55	53	52	53
Cetane Index $_{4\ Variable}$	46 (min)	54	52	51	52
Cetane Number	51 (min)	58	56	53	57
Distillation, °C IBP		177	171	165	177
T_{10}		207	202	198	207
T_{20}		225	221	217	225
T_{50}		272	270	267	272
T_{90}		337	335	333	335
T_{95}	360 (max)	352	351	349	350
FBP		385	358	357	385
% FAME	7 (max)	2	1	0	2

*20 hours min for diesel containing FAME above 2 % V/V

Ireland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Mean
Min
Cloud (°C)
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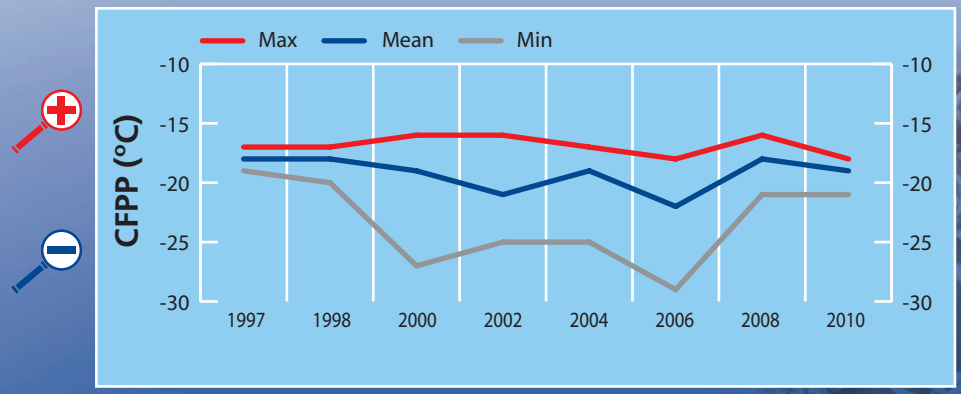
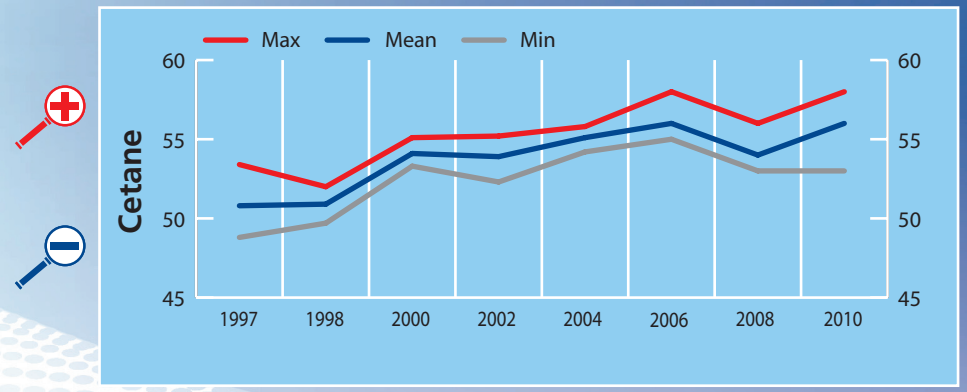
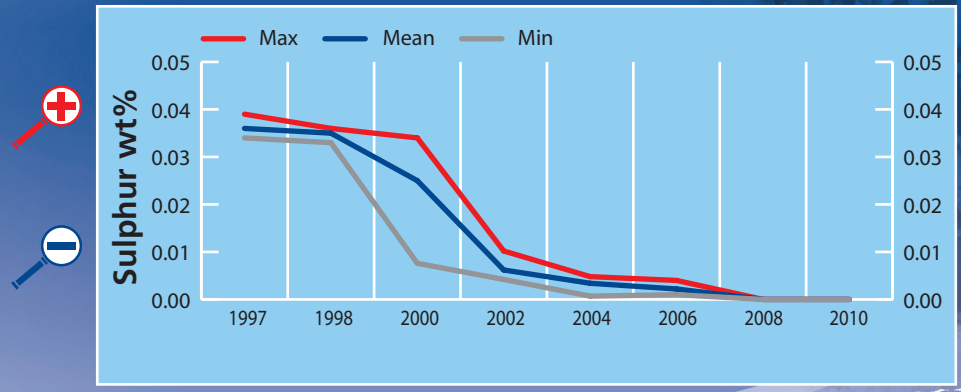
-5
-10
-15
-20
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
CFPP (°C)
-10
-15
-20
-25
-30
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Cetane
60
55
50
45
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Sulphur wt%
0.05
0.04
0.03
0.02
0.01
0.00
1997
1998
2000
2002
2004
2006
2008
2010

Italy

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002102	DIES 1002103	DIES 1002104	DIES 1002106	DIES 1002107	DIES 102108	DIES 1002109
Cloud Point, °C		-1	-3	-6	-1	-3	-4	-4	-4	-6	-2
CFPP, °C	-12 (max)**	-12	-15	-20	-12	-16	-18	-18	-16	-15	-12
Pour Point, °C		-15	-21	-36	-18	-15	-27	-18	-15	-21	-18
HFRR, µm	460 (max)	458	284	201	210	355	232	458	294	418	386
Wax Content @ 10°C Below Cloud, wt%		2.1	1.7	1.2	2.1	2.0	2.1	2.0	1.5	1.2	2.1
Rancimat, hrs	*	>30	>20	18	18	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0008	0.0006	0.0004	0.0008	0.0007	0.0006	0.0006	0.0006	0.0006	0.0005
Density @15°C, kg/m^3	820 - 845	843	835	831	834	834	838	837	832	835	835
Viscosity @ 40°C, cSt	2.00 - 4.50	3.26	2.66	2.33	2.79	3.25	3.07	2.37	2.53	2.33	2.57
Cetane Index $_{2\ Variable}$		55	52	49	54	55	54	49	53	49	52
Cetane Index $_{4\ Variable}$	46 (min)	57	52	49	54	57	56	49	53	49	52
Cetane Number	51 (min)	57	55	53	57	57	54	54	55	55	55
Distillation, °C IBP		208	175	161	183	208	199	176	181	180	172
T_{10}		235	205	184	211	235	232	201	209	202	199
T_{20}		255	220	198	225	247	255	215	223	214	215
T_{50}		285	269	254	275	278	283	254	264	254	267
T_{90}		347	339	330	340	338	338	330	333	330	342
T_{95}	360 (max)	364	355	349	352	356	352	350	351	350	359
FBP		374	365	358	363	364	360	364	365	363	368
% FAME	7 (max)	7	3	0	7	0	6	0	0	0	0

**-16 /-18 CFPP is used for Northern areas called 'ALPINE'
*20 hours min for diesel containing FAME above 2 % V/V

Italy (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002110	DIES 1002111	DIES 1002112	DIES 1002113	DIES 1002114	DIES 1002115	DIES 1002116
Cloud Point, °C		-1	-3	-6	-3	-2	-5	-1	-1	-4	-6
CFPP, °C	-12 (max)**	-12	-15	-20	-13	-12	-16	-14	-13	-18	-17
Pour Point, °C		-15	-21	-36	-24	-27	-18	-18	-21	-36	-15
HFRR, µm	460 (max)	458	284	201	235	242	201	229	234	330	201
Wax Content @ 10°C Below Cloud, wt%		2.1	1.7	1.2	1.7	1.5	1.2	1.5	1.7	1.7	1.6
Rancimat, hrs	*	>30	>20	18	21	>30	29	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0008	0.0006	0.0004	0.0007	0.0006	0.0004	0.0005	0.0006	0.0008	0.0006
Density @15°C, kg/m^3	820 - 845	843	835	831	834	832	839	831	835	836	833
Viscosity @ 40°C, cSt	2.00 - 4.50	3.26	2.66	2.33	2.39	2.33	3.26	2.52	2.88	2.45	2.43
Cetane Index $_{2\ Variable}$		55	52	49	52	51	55	53	54	50	53
Cetane Index $_{4\ Variable}$	46 (min)	57	52	49	51	50	55	53	54	50	52
Cetane Number	51 (min)	57	55	53	56	55	55	53	53	56	57
Distillation, °C IBP		208	175	161	161	161	184	171	163	162	164
T_{10}		235	205	184	188	184	218	200	205	195	194
T_{20}		255	220	198	202	198	236	215	222	211	212
T_{50}		285	269	254	263	259	285	266	276	260	267
T_{90}		347	339	330	344	345	347	342	347	335	333
T_{95}	360 (max)	364	355	349	357	359	364	359	361	351	349
FBP		374	365	358	367	367	374	367	367	360	358
% FAME	7 (max)	7	3	0	4	3	6	5	2	1	6

**-16 /-18 CFPP is used for Northern areas called 'ALPINE'
*20 hours min for diesel containing FAME above 2 % V/V

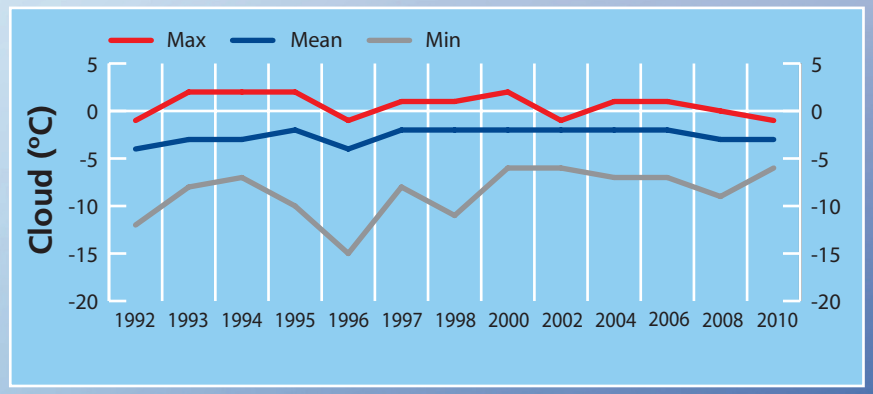
Italy (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002117
Cloud Point, °C		-1	-3	-6	-4
CFPP, °C	-12 (max)**	-12	-15	-20	-20
Pour Point, °C		-15	-21	-36	-21
HFRR, µm	460 (max)	458	284	201	237
Wax Content @ 10°C Below Cloud, wt%		2.1	1.7	1.2	1.5
Rancimat, hrs	*	>30	>20	18	>30
Sulphur, wt%	0.001 (max)	0.0008	0.0006	0.0004	0.0008
Density @15°C, kg/m^3	820 - 845	843	835	831	843
Viscosity @ 40°C, cSt	2.00 - 4.50	3.26	2.66	2.33	2.78
Cetane Index $_{2\ Variable}$		55	52	49	52
Cetane Index $_{4\ Variable}$	46 (min)	57	52	49	50
Cetane Number	51 (min)	57	55	53	54
Distillation, °C IBP		208	175	161	161
T_{10}		235	205	184	195
T_{20}		255	220	198	218
T_{50}		285	269	254	278
T_{90}		347	339	330	340
T_{95}	360 (max)	364	355	349	355
FBP		374	365	358	363
% FAME	7 (max)	7	3	0	6

**-16 /-18 CFPP is used for Northern areas called 'ALPINE'
*20 hours min for diesel containing FAME above 2 % V/V

Italy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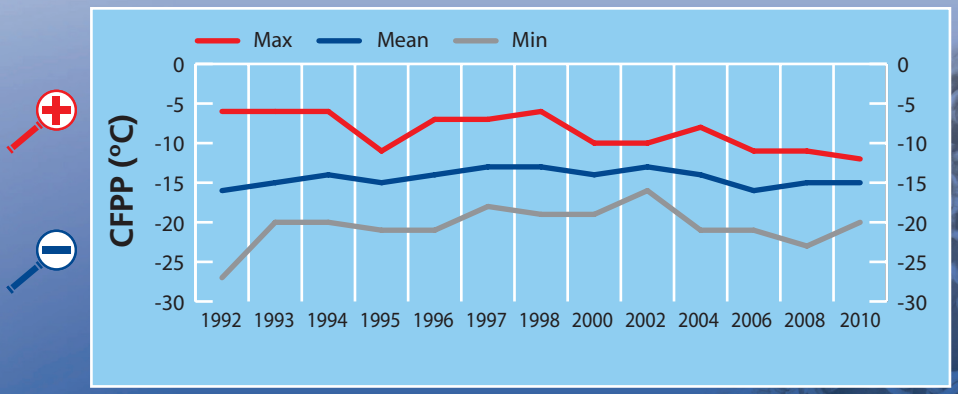
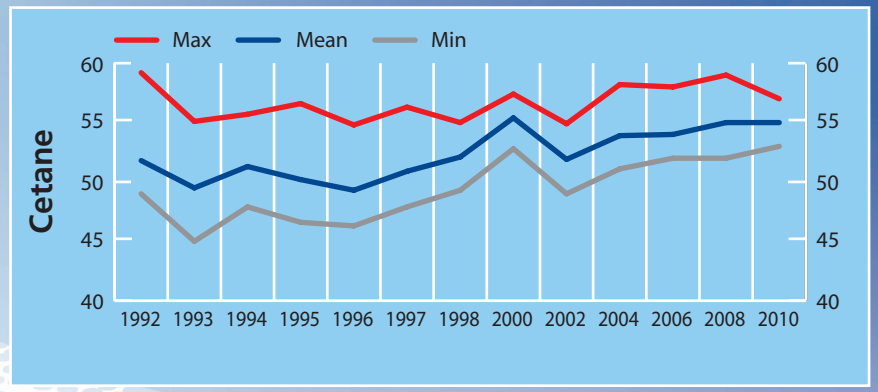
Mean
Min
Cloud (°C)
5
0
-5
-10
-15
-20
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
0
-5
-10
-15
-20
-25
-30
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
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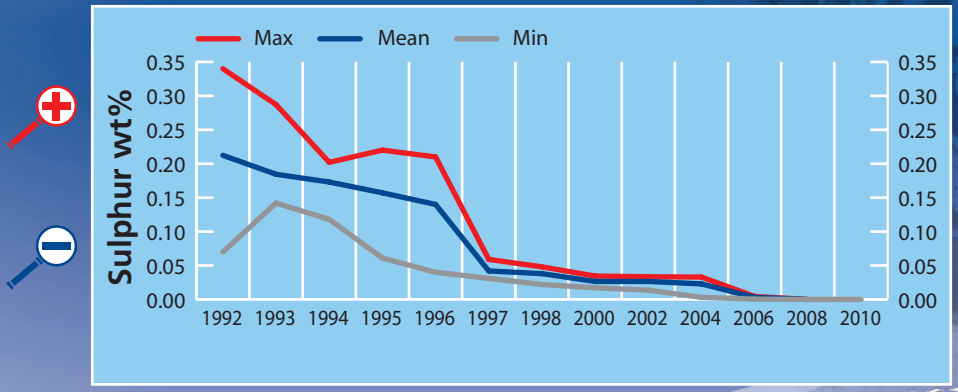
55
50
45
40
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

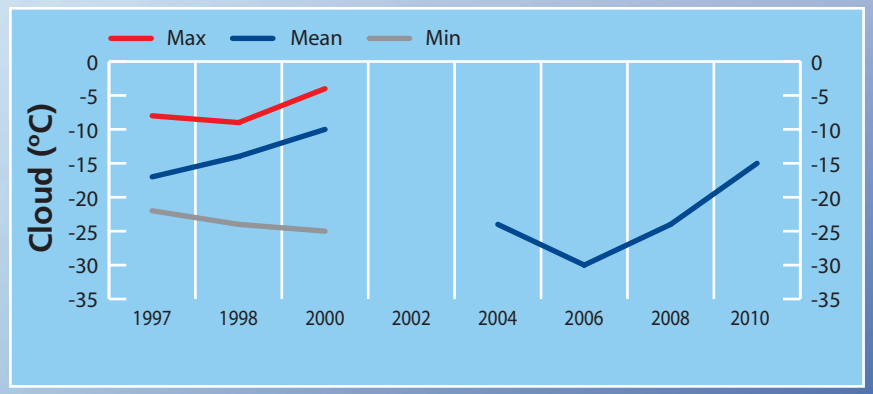
Lithuania

National Standards and physical inspection data

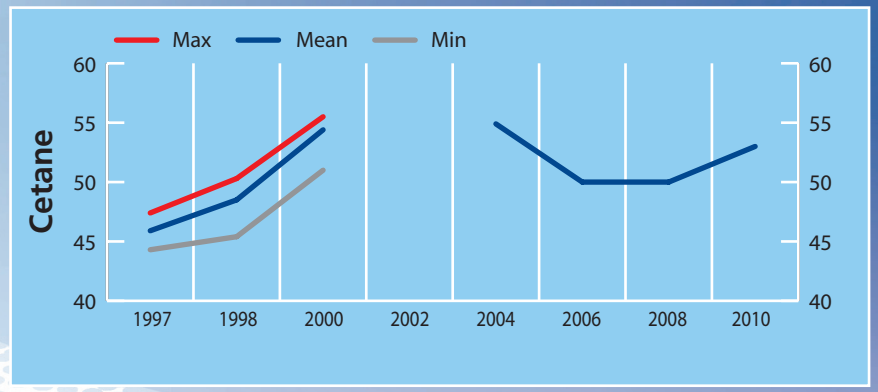
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001198	DIES 1001204
Cloud Point, °C	-22 (max)		-15		-24	-7
CFPP, °C	-32 (max)		-36		-42	-31
Pour Point, °C			-38		-39	-36
HFRR, µm	460 (max)		374		411	337
Wax Content @ 10°C Below Cloud, wt%			1.1		0.5	1.6
Rancimat, hrs	*		>20		21	>30
Sulphur, wt%	0.001 (max)		0.0004		<0.0003	0.0005
Density @15°C, kg/m^3	840 (max)		834		826	841
Viscosity @ 40°C, cSt			2.53		2.00	3.07
Cetane Index $_{2\ Variable}$			50		47	52
Cetane Index $_{4\ Variable}$			50		48	52
Cetane Number	48 (min)		53		53	53
Distillation, °C IBP			179		174	184
T_{10}			207		201	214
T_{20}			220		211	229
T_{50}			256		234	279
T_{90}			312		287	336
T_{95}	360 (max)		329		308	351
FBP			345		330	360
% FAME	7 (max)		3		0	6

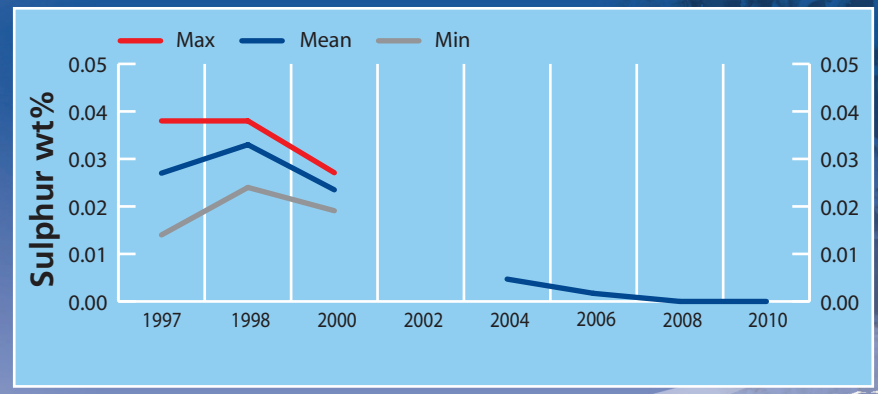
*20 hours min for diesel containing FAME above 2 % V/V

Lithuania


Max
Mean
Min
Cloud (°C)
0
-5
-10
-15
-20
-25
-30
-35
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
CFPP (°C)
-10
-20
-30
-40
-50
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Cetane
60
55
50
45
40
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Sulphur wt%
0.05
0.04
0.03
0.02
0.01
0.00
1997
1998
2000
2002
2004
2006
2008
2010

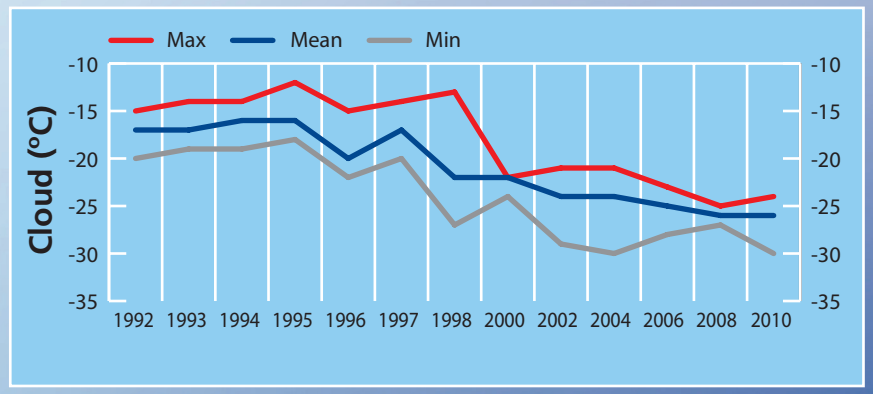
Norway

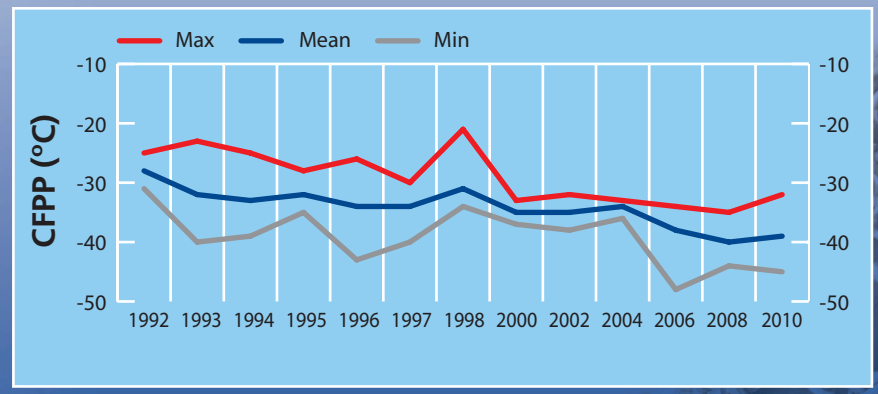
National Standards and physical inspection data

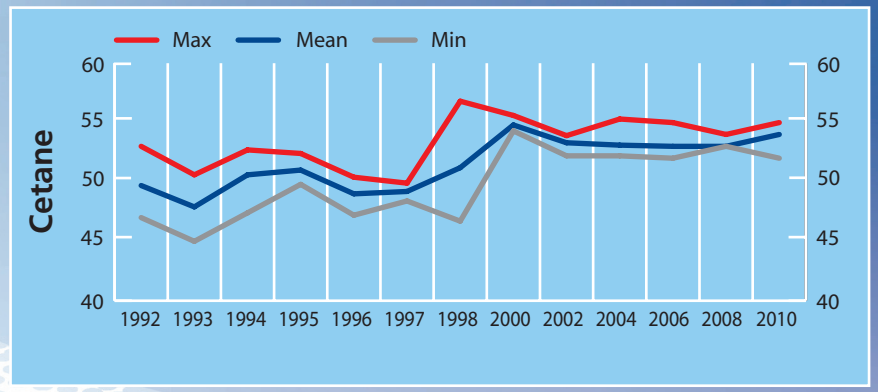
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002235	DIES 1002237	DIES 1002238	DIES 1002239
Cloud Point, °C	-22 (max)	-24	-26	-30	-24	-30	-25	-25
CFPP, °C	-32 (max)	-32	-39	-45	-44	-45	-35	-32
Pour Point, °C		-45	-47	-54	-54	-45	-45	-45
HFRR, µm	460 (max)	245	236	227	243	227	245	228
Wax Content @ 10°C Below Cloud, wt%		1.2	0.8	0.4	1.0	0.4	0.6	1.2
Rancimat, hrs	*	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0008	0.0007	0.0005	0.0008	0.0005	0.0008	0.0006
Density @15°C, kg/m^3	800 - 840	838	834	825	836	825	838	838
Viscosity @ 40°C, cSt	1.5 - 4.0	2.20	2.11	1.88	2.20	1.88	2.19	2.19
Cetane Index $_{2\ Variable}$		48	47	46	46	46	48	48
Cetane Index $_{4\ Variable}$	46 (min)	48	47	47	47	48	47	47
Cetane Number	51 (min)	55	54	52	52	54	54	55
Distillation, °C IBP		183	172	167	183	172	167	167
T_{10}	180 (min)	203	197	193	203	193	194	196
T_{20}		213	209	203	213	203	209	210
T_{50}		252	245	231	244	231	252	252
T_{90}		316	314	312	315	312	315	316
T_{95}	360 (max)	330	329	328	329	330	328	330
FBP		340	336	334	334	340	336	336
% FAME	7 (max)	7	7	7	7	7	7	7

Specification shown is Norwgian Arctic Class II
*20 hours min for diesel containing FAME above 2 % V/V

Norway


Max
Mean
Min
Cloud (°C)
-10
-15
-20
-25
-30
-35
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
-10
-20
-30
-40
-50
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
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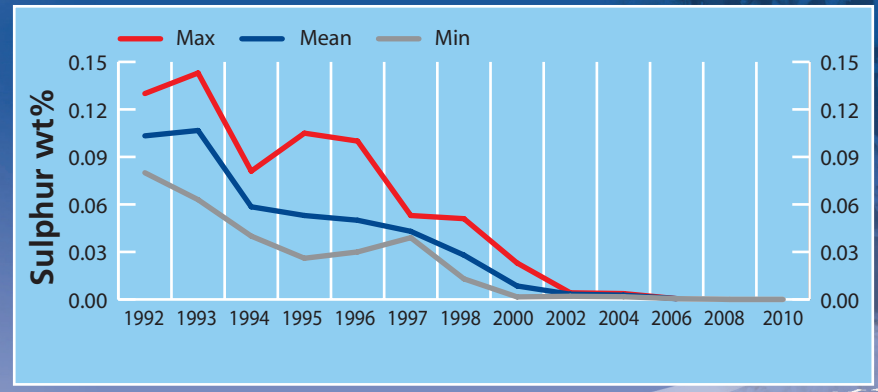
55
50
45
40
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.15
0.12
0.09
0.06
0.03
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

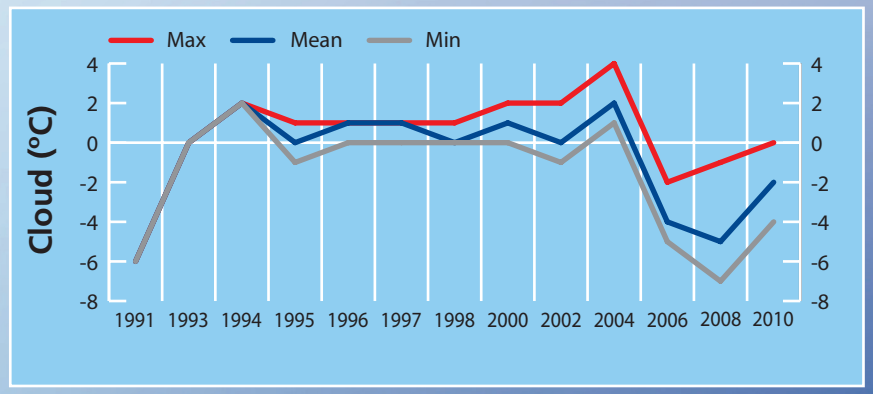
Portugal

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001356	DIES 1001357	DIES 1001358
Cloud Point, °C		-1	-2	-4	-1	-4	-2
CFPP, °C	-10 (max)**	-11	-13	-16	-11	-16	-14
Pour Point, °C		-15	-16	-18	-15	-18	-15
HFRR, µm	460 (max)	208	205	203	203	208	205
Wax Content @ 10°C Below Cloud, wt%		2.1	1.9	1.7	1.9	2.1	1.7
Rancimat, hrs	*	>30	>20	28	>30	28	>30
Sulphur, wt%	0.001 (max)	0.0008	0.0007	0.0006	0.0008	0.0006	0.0007
Density @15°C, kg/m^3	820 - 845	845	839	827	844	827	845
Viscosity @ 40°C, cSt	2.00 - 4.50	3.40	3.05	2.56	3.20	2.56	3.40
Cetane Index $_{2\ Variable}$		56	54	52	52	56	53
Cetane Index $_{4\ Variable}$	46 (min)	56	54	52	52	56	54
Cetane Number	51 (min)	59	57	57	57	59	57
Distillation, °C IBP		193	186	177	188	177	193
T_{10}		229	218	203	222	203	229
T_{20}		247	236	220	240	220	247
T_{50}		290	281	270	283	270	290
T_{90}		344	340	336	342	336	344
T_{95}	360 (max)	358	355	351	357	351	358
FBP		368	365	360	368	360	366
% FAME	7 (max)	7	6	6	6	7	7

**-5 (max) CFPP used from 1st to 31st Mar and from 15th Oct to 30th Nov
*20 hours min for diesel containing FAME above 2 % V/V

Portugal


Max
Mean
Min
Cloud (°C)
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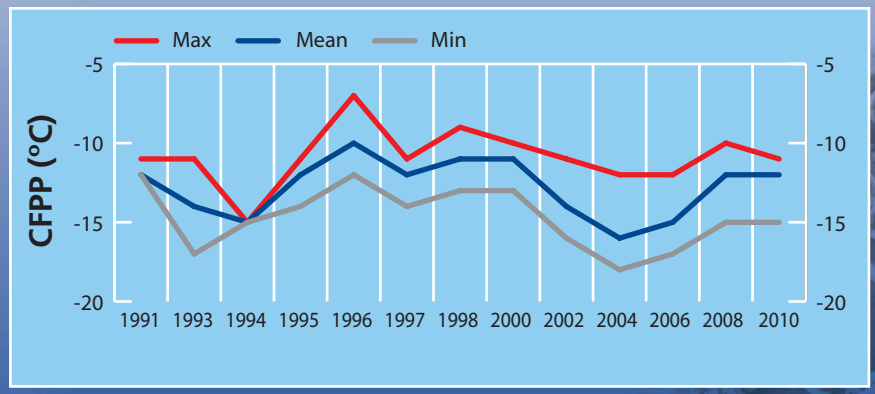
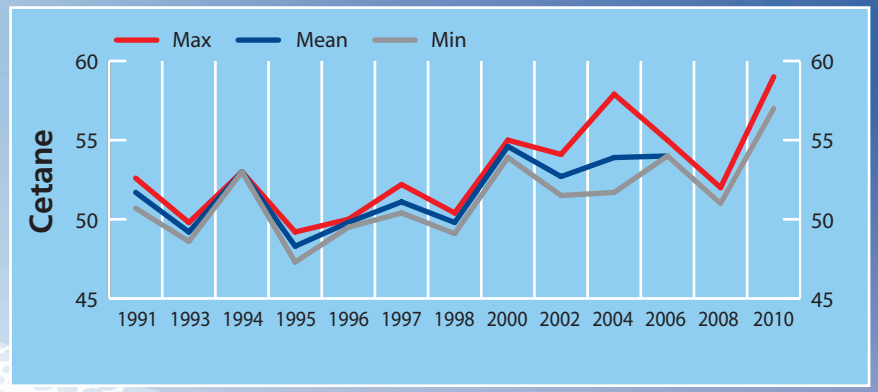
2
0
-2
-4
-6
-8
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
-5
-10
-15
-20
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
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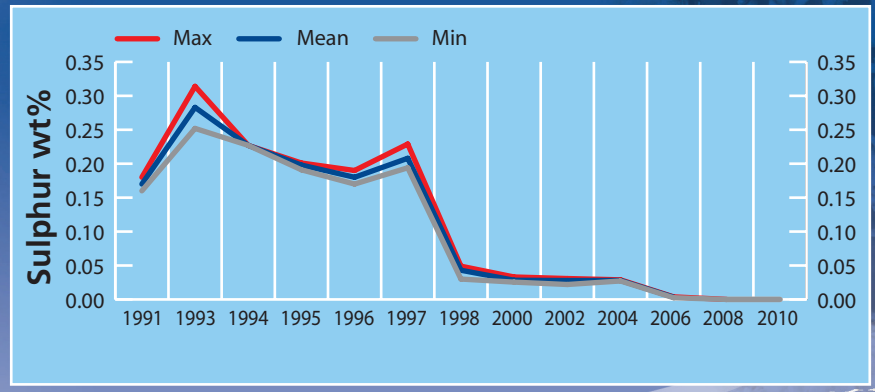
55
50
45
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010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Min
Sulphur wt%
0.35
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0.25
0.20
0.15
0.10
0.05
0.00
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

Russia

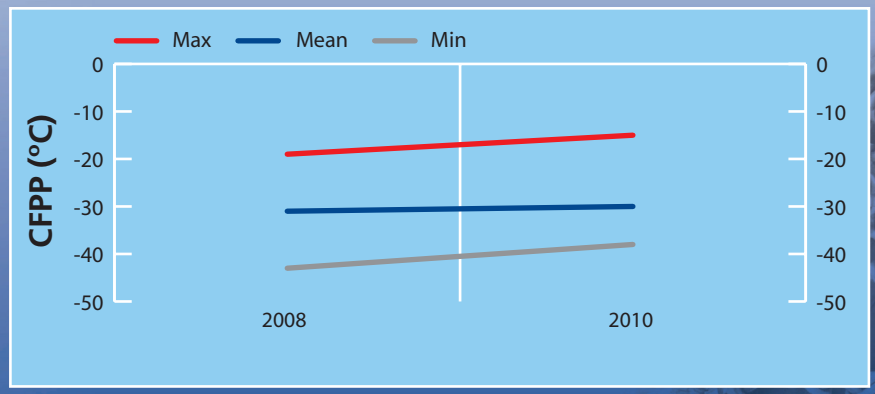
National Standards and physical inspection data

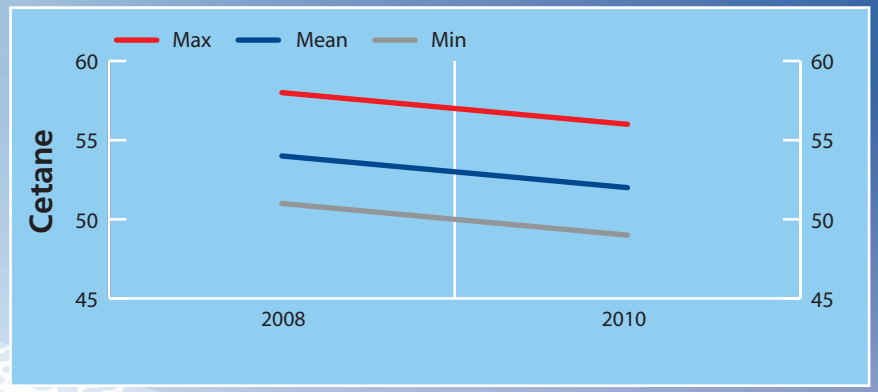
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002361	DIES 1002362	DIES 1002363
Cloud Point, °C		-6	-23	-41	-6	-41	-22
CFPP, °C	-20 (max)	-15	-30	-38	-15	-38	-37
Pour Point, °C		-24	-37	-48	-24	-39	-48
HFRR, µm	460 (max)	367	343	317	345	317	367
Wax Content @ 10°C Below Cloud, wt%		2.2	1.5	0.4	2.2	1.8	0.4
Rancimat, hrs		>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.035 (max)	0.0313	0.0279	0.0241	0.0241	0.0313	0.0283
Density @15°C, kg/m^3		841	820	805	841	805	812
Viscosity @ 40°C, cSt		3.32	2.12	1.49	3.32	1.49	1.55
Cetane Index $_{2\ Variable}$		53	47	41	53	47	41
Cetane Index $_{4\ Variable}$		55	49	44	55	49	44
Cetane Number	51 (min)*	56	52	49	56	49	51
Distillation, °C IBP		201	174	159	201	163	159
T_{10}		239	196	169	239	181	169
T_{20}		251	204	174	251	188	174
T_{50}		280	232	204	280	211	204
T_{90}		332	302	267	332	267	305
T_{95}		347	322	286	347	286	332
FBP		356	331	292	356	292	345
% FAME		0	0	0	0	0	0

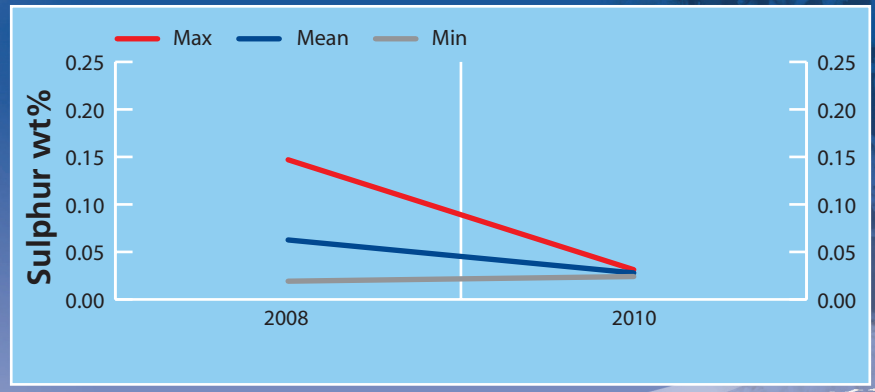
Specification shown is for Class 3 diesel
*for cold/arctic climates a cetane number of 47 is permitted

Russia


Max
Mean
Min
Cloud (°C)
0
-10
-20
-30
-40
-50
2008
2010


Max
Mean
Min
CFPP (°C)
0
-10
-20
-30
-40
-50
2008
2010


Max
Mean
Min
Cetane
60
55
50
45
2008
2010


Max
Mean
Min
Sulphur wt%
0.25
0.20
0.15
0.10
0.05
0.00
2008
2010

Slovak Republic

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001666
Cloud Point, °C			-10		-10
CFPP, °C	-10 (max)		-31		-31
Pour Point, °C			-33		-33
HFRR, µm	460 (max)		224		224
Wax Content @ 10°C Below Cloud, wt%			1.4		1.4
Rancimat, hrs	*		>30		>30
Sulphur, wt%	0.001 (max)		0.0004		0.0004
Density @15°C, kg/m^3	820 - 845		833		833
Viscosity @ 40°C, cSt	2.00 - 4.50		2.89		2.89
Cetane Index $_{2\ Variable}$			53		53
Cetane Index $_{4\ Variable}$	46 (min)		54		54
Cetane Number	51 (min)		54		54
Distillation, °C IBP			178		178
T_{10}			213		213
T_{20}			227		227
T_{50}			269		269
T_{90}			332		332
T_{95}	360 (max)		345		345
FBP			353		353
% FAME	7 (max)		5		5

*20 hours min for diesel containing FAME above 2 % V/V

Spain

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001359	DIES 1001360	DIES 1001361	DIES 1001362	DIES 1001363	DIES 1001364	DIES 1001365
Cloud Point, °C		0	-3	-7	-7	0	-2	-4	-2	-1	-7
CFPP, °C	-10 (max)	-8	-15	-25	-25	-11	-14	-13	-12	-8	-18
Pour Point, °C		-9	-17	-24	-24	-15	-15	-18	-12	-9	-18
HFRR, µm	460 (max)	261	230	207	239	213	217	207	239	217	258
Wax Content @ 10°C Below Cloud, wt%		2.1	1.5	1.0	1.5	1.8	1.7	1.0	1.4	2.1	1.2
Rancimat, hrs	*	>30	>20	19	>30	>30	>30	25	>30	>30	28
Sulphur, wt%	0.001 (max)	0.0009	0.0006	0.0004	0.0004	0.0008	0.0006	0.0005	0.0004	0.0006	0.0005
Density @15°C, kg/m^3	820 - 845	845	838	831	842	840	837	834	831	843	838
Viscosity @ 40°C, cSt	2.00 - 4.50	3.01	2.81	2.50	2.85	2.96	2.76	2.50	2.74	2.98	2.63
Cetane Index $_{2\ Variable}$		55	53	51	53	53	53	53	55	52	51
Cetane Index $_{4\ Variable}$	46 (min)	55	52	50	51	52	53	52	55	53	50
Cetane Number	51 (min)	57	55	53	56	57	56	56	56	54	55
Distillation, °C IBP		177	171	165	170	172	176	167	170	177	176
T_{10}		223	206	196	201	208	208	196	202	223	205
T_{20}		240	225	213	225	228	226	213	223	240	220
T_{50}		293	276	265	282	279	275	266	275	280	265
T_{90}		349	341	333	338	349	341	341	339	341	333
T_{95}	360 (max)	364	357	348	352	364	357	360	355	358	348
FBP		370	365	359	361	370	367	366	366	365	359
% FAME	7 (max)	20	6	4	5	5	5	5	4	5	4

*20 hours min for diesel containing FAME above 2 % V/V

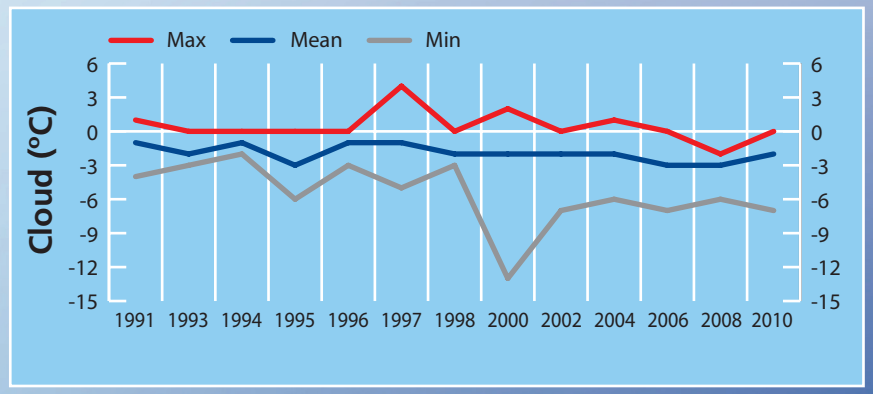
Spain (continued)

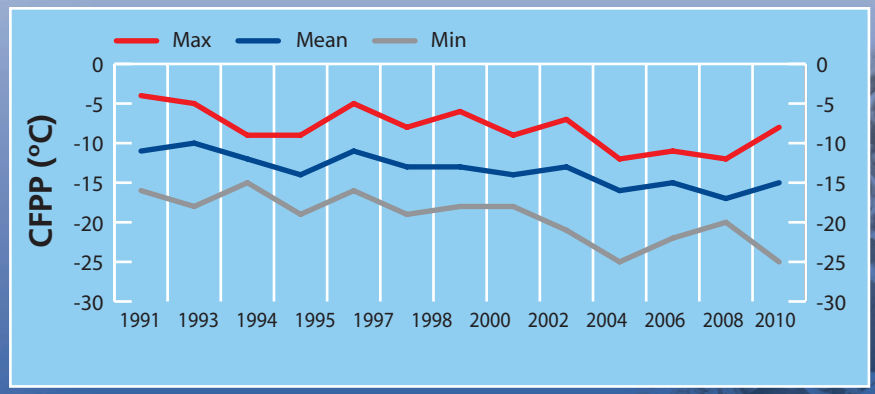
National Standards and physical inspection data

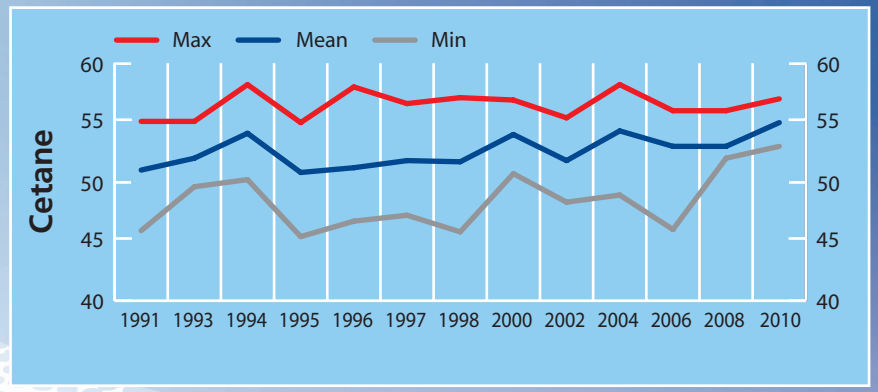
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001366	DIES 1001367	DIES 1001368	DIES 1001371
Cloud Point, °C		0	-3	-7	1	-2	-2	-2
CFPP, °C	-10 (max)	-8	-15	-25	-11	-16	-16	-18
Pour Point, °C		-9	-17	-24	-15	-18	-21	-24
HFRR, µm	460 (max)	261	230	207	261	219	235	225
Wax Content @ 10°C Below Cloud, wt%		2.1	1.5	1.0	1.4	1.5	1.4	1.3
Rancimat, hrs	*	>30	>20	19	>30	26	>30	19
Sulphur, wt%	0.001 (max)	0.0009	0.0006	0.0004	0.0008	0.0007	0.0007	0.0009
Density @15°C, kg/m^3	820 - 845	845	838	831	836	837	839	845
Viscosity @ 40°C, cSt	2.00 - 4.50	3.01	2.81	2.50	2.70	2.86	2.92	3.01
Cetane Index $_{2\ Variable}$		55	53	51	52	54	53	54
Cetane Index $_{4\ Variable}$	46 (min)	55	52	50	52	53	53	52
Cetane Number	51 (min)	57	55	53	53	53	53	53
Distillation, °C IBP		177	171	165	171	167	170	165
T_{10}		223	206	196	203	207	210	206
T_{20}		240	225	213	219	226	230	228
T_{50}		293	276	265	268	278	280	293
T_{90}		349	341	333	342	342	343	343
T_{95}	360 (max)	364	357	348	359	358	358	355
FBP		370	365	359	363	366	369	363
% FAME	7 (max)	20	6	4	5	4	4	20

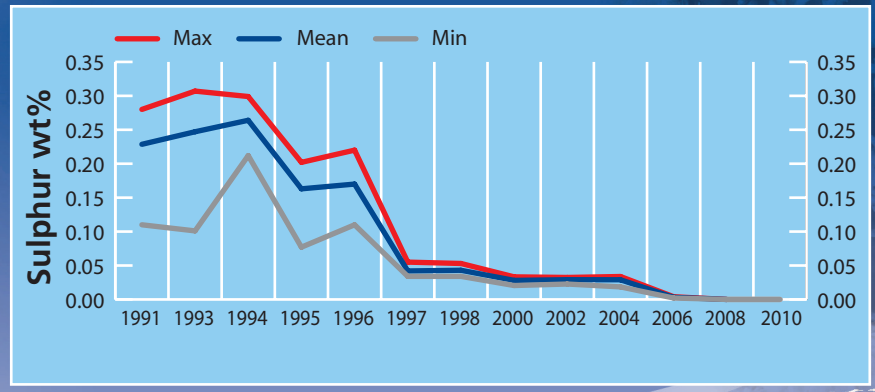
*20 hours min for diesel containing FAME above 2 % V/V

Spain


Max
Mean
Min
Cloud (°C)
6
3
0
-3
-6
-9
-12
-15
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
0
-5
-10
-15
-20
-25
-30
1991 1993 1994 1995 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
60
55
50
45
40
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1991 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

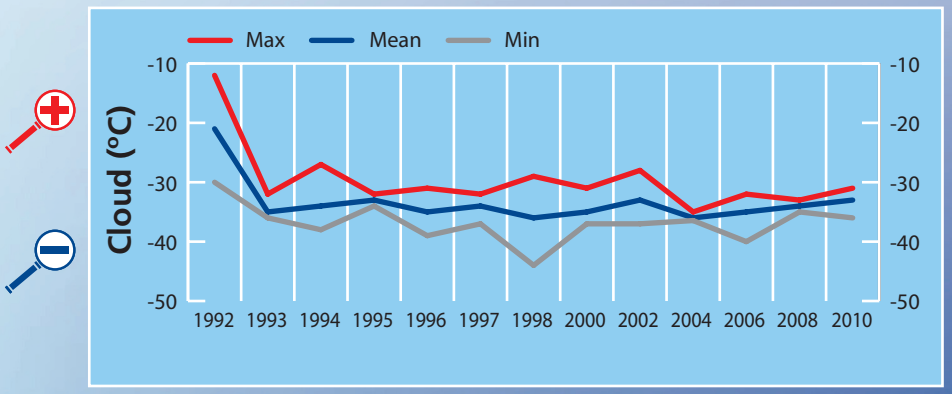
Sweden

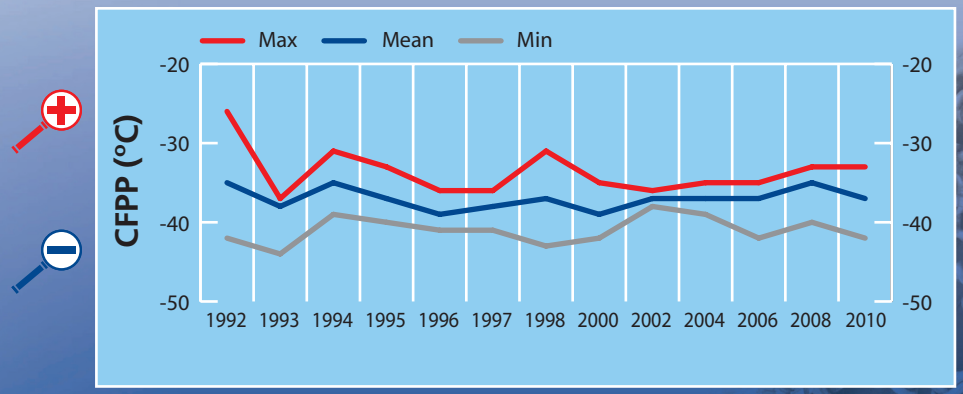
National Standards and physical inspection data

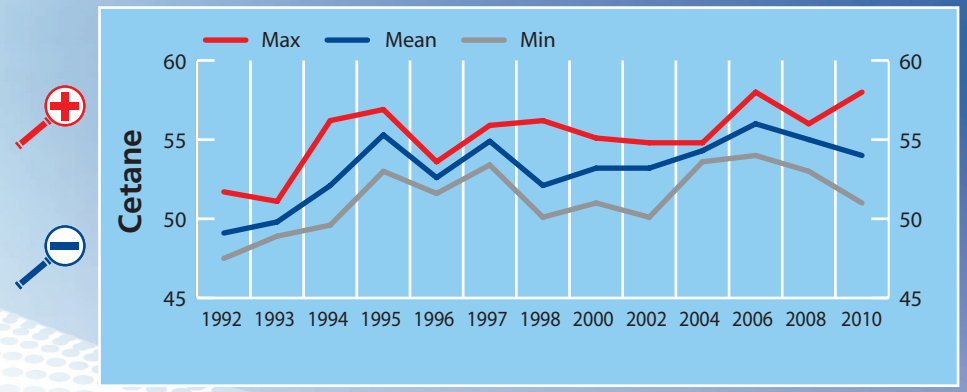
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002223	DIES 1002224	DIES 1002225	DIES 1002226	DIES 1002227	DIES 1002228	DIES 1002229
Cloud Point, °C	-22 (max)	-32	-34	-37	-34	-34	-32	-37	-35	-32	-32
CFPP, °C	-35 (max)**	-33	-37	-42	-35	-36	-42	-36	-33	-37	-40
Pour Point, °C		-33	-34	-36	-33	-36	-33	-36	-36	-33	-33
HFRR, µm	460 (max)	245	222	196	214	218	196	245	232	238	213
Wax Content @ 10°C Below Cloud, wt%		2.8	2.2	0.9	2.3	2.4	1.9	2.7	2.8	2.5	0.9
Rancimat, hrs	*	>30	>30	>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.0005 (max)	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Density @15°C, kg/m^3	800 - 820	819	816	814	814	814	816	819	816	817	817
Viscosity @ 40°C, cSt	1.7 - 4.0	2.07	2.02	1.99	1.99	1.99	2.06	2.02	2.00	2.02	2.07
Cetane Index $_{2\ Variable}$		52	51	50	52	52	52	50	51	51	52
Cetane Index $_{4\ Variable}$	50 (min)	54	53	52	54	54	54	52	53	53	54
Cetane Number	51 (min)	58	54	51	53	58	55	51	57	53	54
Distillation, °C IBP	180 (min)	192	189	184	190	191	189	191	192	184	189
T_{10}		210	208	205	207	208	209	209	210	205	209
T_{20}		218	216	214	216	216	218	215	217	214	218
T_{50}		239	237	236	236	236	239	236	236	237	239
T_{90}		297	291	283	289	288	295	283	286	297	296
T_{95}	360 (max)	320	312	302	311	310	318	302	307	318	320
FBP		331	326	320	323	323	329	320	323	330	331
% FAME	7 (max)	7	5	5	5	5	5	5	5	7	5

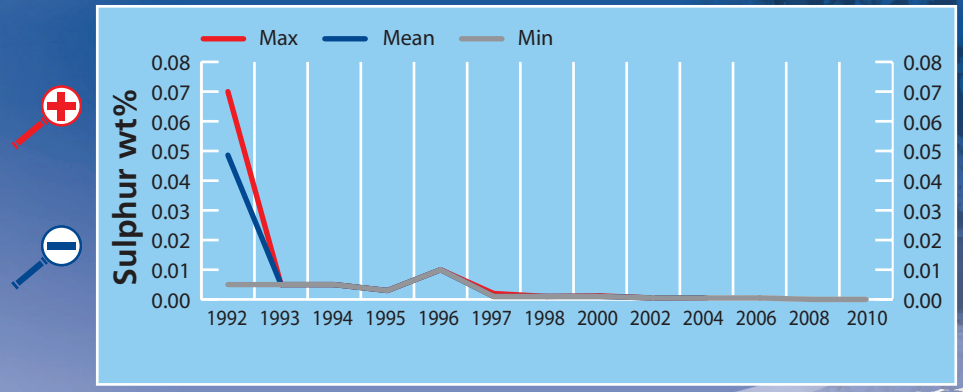
*20 hours min for diesel containing FAME above 2 % V/V
** specification of -32°C for B5 fuels

Sweden


Max
Mean
Min
Cloud (°C)
-10
-20
-30
-40
-50
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
-20
-30
-40
-50
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
60
55
50
45
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

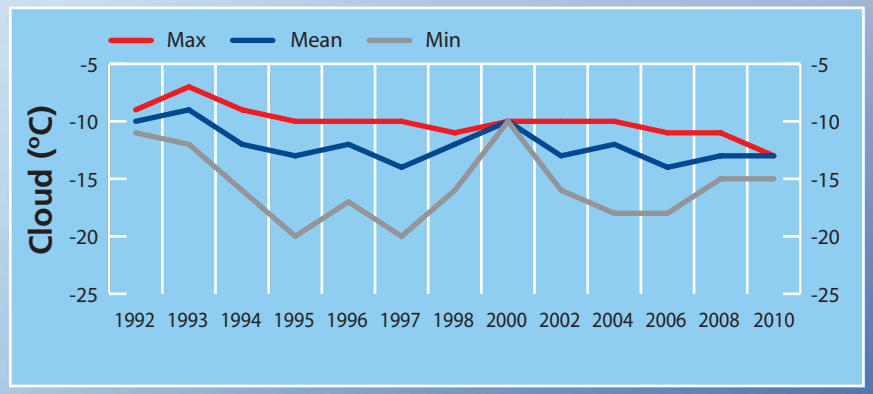
Switzerland

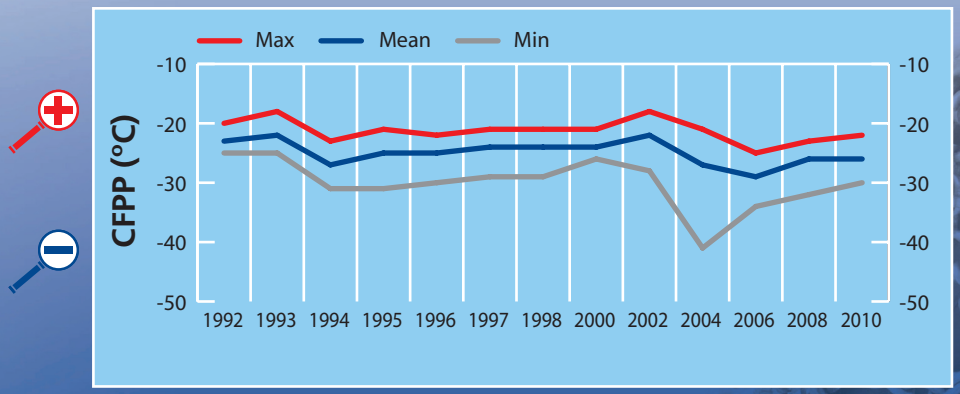
National Standards and physical inspection data

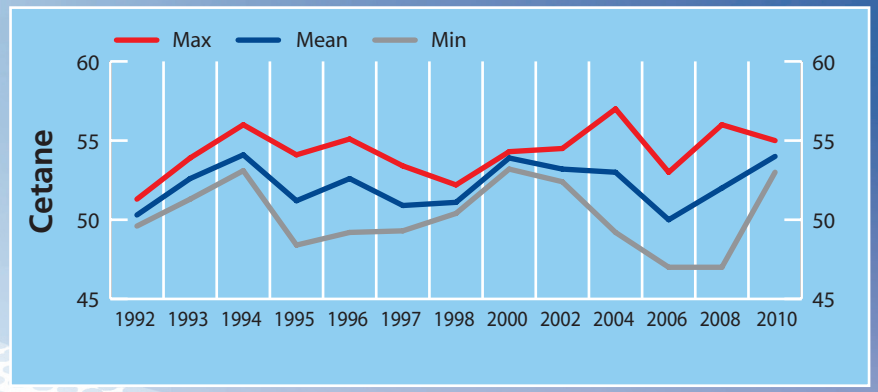
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001230	DIES 1001232	DIES 1001234	DIES 1001236	DIES 1001238	DIES 1001257
Cloud Point, °C		-13	-14	-16	-13	-14	-14	-14	-16	-13
CFPP, °C		-22	-26	-30	-29	-25	-22	-30	-28	-23
Pour Point, °C		-27	-30	-36	-27	-36	-27	-27	-27	-36
HFRR, µm	460 (max)	374	351	332	374	373	349	332	337	341
Wax Content @ 10°C Below Cloud, wt%		1.8	1.6	1.4	1.6	1.4	1.8	1.4	1.8	1.5
Rancimat, hrs		>30	>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0007	0.0006	0.0005	0.0006	0.0005	0.0005	0.0007	0.0007	0.0005
Density @15°C, kg/m^3	845 (max)	835	832	822	835	834	822	835	831	835
Viscosity @ 40°C, cSt		2.56	2.33	2.13	2.56	2.20	2.13	2.50	2.37	2.20
Cetane Index $_{2\ Variable}$		64	53	48	64	49	52	51	52	48
Cetane Index $_{4\ Variable}$		69	54	48	69	49	52	51	52	48
Cetane Number	51 (min)	55	54	53	55	54	53	53	55	54
Distillation, °C IBP		177	170	163	173	163	166	177	176	164
T_{10}		206	199	191	204	195	191	206	205	196
T_{20}		223	214	204	222	209	204	223	219	210
T_{50}		362	272	249	362	252	249	262	260	250
T_{90}		326	320	316	316	326	319	319	316	321
T_{95}	360 (max)	340	335	330	330	340	337	336	332	336
FBP		348	345	342	342	347	348	346	343	346
% FAME	7 (max)	0	0	0	0	0	0	0	0	0

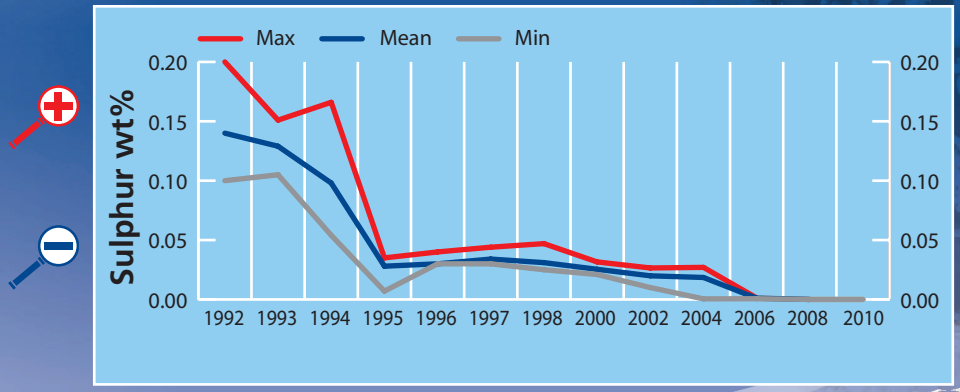
National standard shown is EN590 Arctic Class 0

Switzerland









UK

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001657	DIES 1001658	DIES 1001659	DIES 1001660	DIES 1002210	DIES 1002211	DIES 1002212
Cloud Point, °C		-6	-8	-22	-6	-7	-12	-10	-8	-6	-8
CFPP, °C	-15 (max)	-16	-19	-28	-18	-18	-26	-20	-16	-17	-26
Pour Point, °C		-15	-26	-48	-24	-27	-21	-21	-24	-21	-24
HFRR, µm	460 (max)	331	237	192	194	192	217	260	263	238	231
Wax Content @ 10°C Below Cloud, wt%		3.4	2.2	1.3	1.9	1.8	1.6	1.6	1.3	2.6	1.7
Rancimat, hrs	*	>30	>20	24	>30	>30	>30	>30	24	>30	>30
Sulphur, wt%	0.001 (max)	0.0011	0.0006	0.0002	0.0004	0.0004	0.0004	0.0007	0.0006	0.0006	0.0005
Density @15°C, kg/m^3	820 - 835	844	839	832	842	842	838	840	840	843	844
Viscosity @ 40°C, cSt	2.00 - 4.50	3.26	2.73	2.23	2.91	2.85	2.53	2.52	2.78	3.26	2.70
Cetane Index $_{2\ Variable}$		55	53	51	53	52	51	51	52	54	51
Cetane Index $_{4\ Variable}$	46 (min)	55	52	50	52	52	51	50	52	55	50
Cetane Number	51 (min)	60	55	52	53	53	55	54	53	53	52
Distillation, °C IBP		191	177	165	176	177	173	171	181	186	182
T_{10}		232	212	200	216	212	209	206	216	232	212
T_{20}		252	231	220	237	233	226	224	233	252	229
T_{50}		289	275	257	280	279	268	268	272	289	276
T_{90}		336	330	306	335	334	325	326	333	336	335
T_{95}	360 (max)	352	344	321	350	347	341	341	350	350	352
FBP		359	353	333	357	359	349	352	358	357	359
% FAME	7 (max)	5	4	0	5	5	5	5	4	5	5

*20 hours min for diesel containing FAME above 2 % V/V

UK (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002213	DIES 1002214	DIES 1002215	DIES 1002216	DIES 1002217	DIES 1002321	DIES 1002322
Cloud Point, °C		-6	-8	-22	-6	-8	-7	-6	-6	-7	-9
CFPP, °C	-15 (max)	-16	-19	-28	-17	-18	-16	-17	-17	-18	-17
Pour Point, °C		-15	-26	-48	-30	-27	-30	-15	-18	-36	-48
HFRR, µm	460 (max)	331	237	192	230	233	255	230	237	331	224
Wax Content @ 10°C Below Cloud, wt%		3.4	2.2	1.3	1.7	2.1	3.0	2.4	2.1	2.3	3.2
Rancimat, hrs	*	>30	>20	24	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0011	0.0006	0.0002	0.0006	0.0005	0.0008	0.0002	0.0004	0.0007	0.0011
Density @15°C, kg/m^3	820 - 835	844	839	832	842	838	832	839	838	837	837
Viscosity @ 40°C, cSt	2.00 - 4.50	3.26	2.73	2.23	2.74	2.76	2.56	2.95	2.87	2.68	2.60
Cetane Index $_{2\ Variable}$		55	53	51	51	54	55	53	54	54	54
Cetane Index $_{4\ Variable}$	46 (min)	55	52	50	51	53	54	54	54	53	53
Cetane Number	51 (min)	60	55	52	53	54	60	57	60	57	52
Distillation, °C IBP		191	177	165	170	176	168	191	191	171	165
T_{10}		232	212	200	209	207	203	225	221	200	202
T_{20}		252	231	220	230	226	224	243	239	220	227
T_{50}		289	275	257	275	279	273	279	278	277	279
T_{90}		336	330	306	336	332	328	328	328	334	329
T_{95}	360 (max)	352	344	321	350	343	342	343	344	348	341
FBP		359	353	333	359	353	351	354	353	357	349
% FAME	7 (max)	5	4	0	4	5	4	5	5	0	5

*20 hours min for diesel containing FAME above 2 % V/V

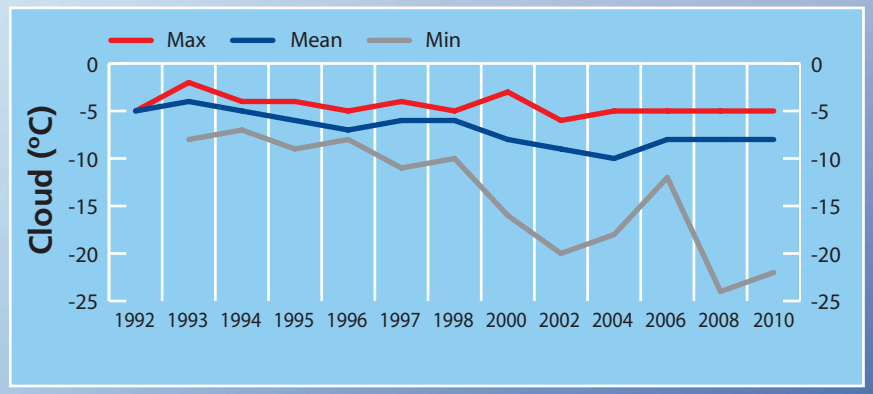
UK (continued)

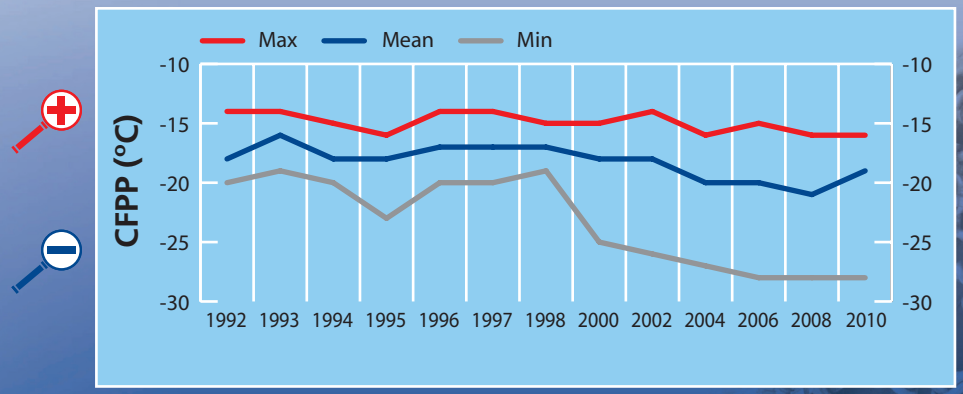
National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002323
Cloud Point, °C		-6	-8	-22	-22
CFPP, °C	-15 (max)	-16	-19	-28	-28
Pour Point, °C		-15	-26	-48	-24
HFRR, µm	460 (max)	331	237	192	220
Wax Content @ 10°C Below Cloud, wt%		3.4	2.2	1.3	3.4
Rancimat, hrs	*	>30	>20	24	>30
Sulphur, wt%	0.001 (max)	0.0011	0.0006	0.0002	0.0010
Density @15°C, kg/m^3	820 - 835	844	839	832	833
Viscosity @ 40°C, cSt	2.00 - 4.50	3.26	2.73	2.23	2.23
Cetane Index $_{2\ Variable}$		55	53	51	51
Cetane Index $_{4\ Variable}$	46 (min)	55	52	50	51
Cetane Number	51 (min)	60	55	52	55
Distillation, °C IBP		191	177	165	175
T_{10}		232	212	200	208
T_{20}		252	231	220	222
T_{50}		289	275	257	257
T_{90}		336	330	306	306
T_{95}	360 (max)	352	344	321	321
FBP		359	353	333	333
% FAME	7 (max)	5	4	0	5

*20 hours min for diesel containing FAME above 2 % V/V

UK


Max
Mean
Min
Cloud (°C)
0
-5
-10
-15
-20
-25
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010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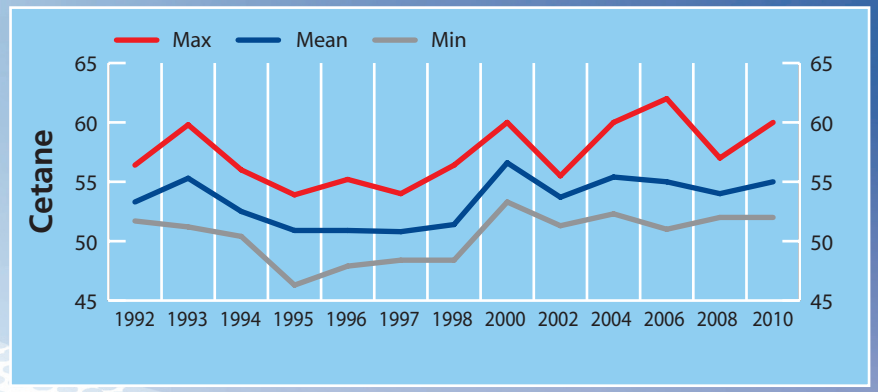
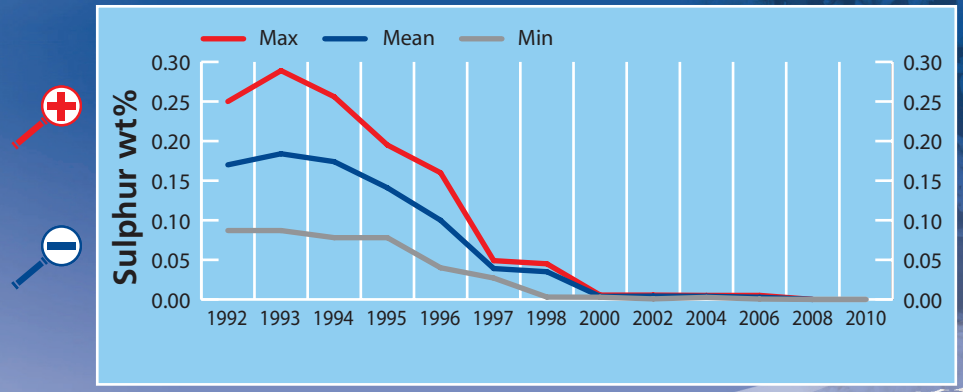
Mean
Min
CFPP (°C)
-10
-15
-20
-25
-30
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
65
60
55
50
45
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

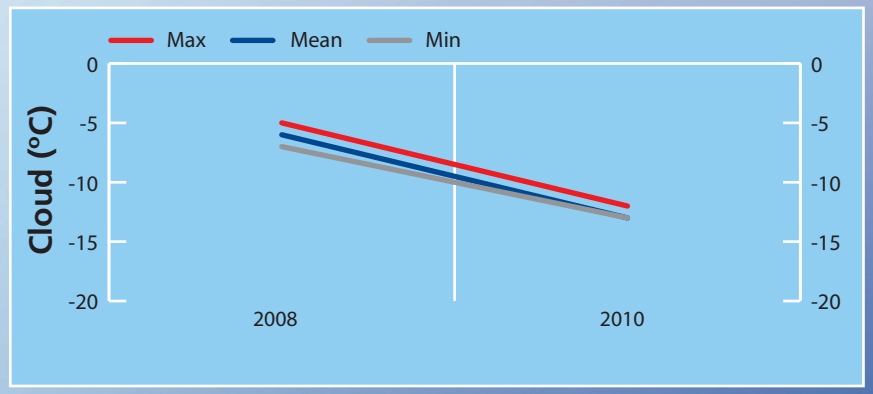
Ukraine

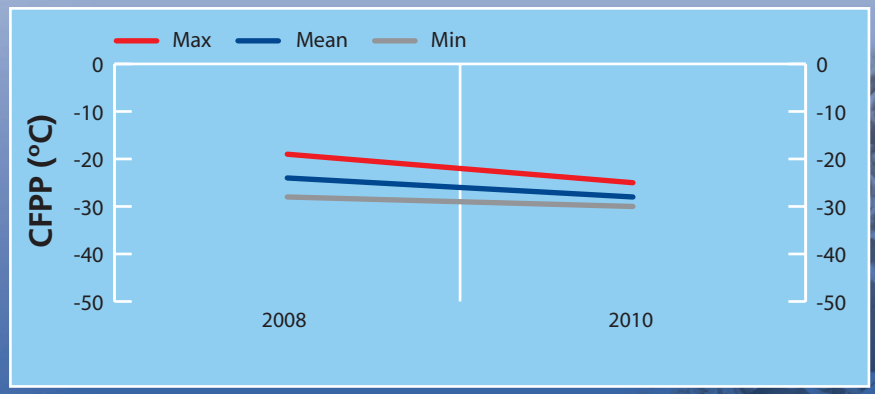
National Standards and physical inspection data

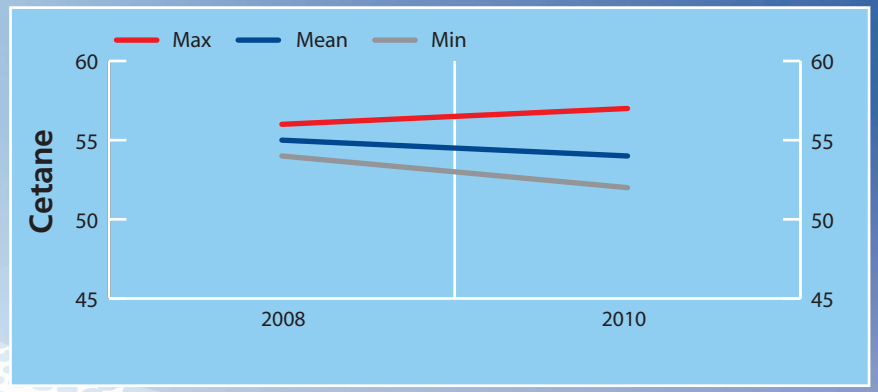
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002119	DIES 1002120	DIES 1002120
Cloud Point, °C	-10 (max)	-13	-14	-14	-14	-13	-14
CFPP, °C		-25	-28	-30	-29	-25	-30
Pour Point, °C		-33	-33	-33	-33	-33	-33
HFRR, µm	460 (max)	393	374	353	353	377	393
Wax Content @ 10°C Below Cloud, wt%		1.8	1.5	1.0	1.6	1.8	1.0
Rancimat, hrs		>30	>30	>30	>30	>30	>30
Sulphur, wt%	*	0.0101	0.0059	0.0035	0.0041	0.0101	0.0035
Density @15°C, kg/m^3	800 - 845	834	833	831	831	833	834
Viscosity @ 40°C, cSt	1.5 - 4.0	2.71	2.62	2.47	2.66	2.47	2.71
Cetane Index $_{2\ Variable}$		53	52	51	53	51	53
Cetane Index $_{4\ Variable}$	51 (min)	54	53	52	54	52	53
Cetane Number	46 (min)	57	54	52	54	57	52
Distillation, °C IBP		183	181	179	179	182	183
T_{10}		216	212	208	213	216	208
T_{20}		226	225	224	226	225	224
T_{50}		269	264	261	264	261	269
T_{90}		343	333	322	333	322	343
T_{95}	360 (max)	364	352	338	353	338	364
FBP		371	359	346	361	346	371
% FAME	5 (max)	0	0	0	0	0	0

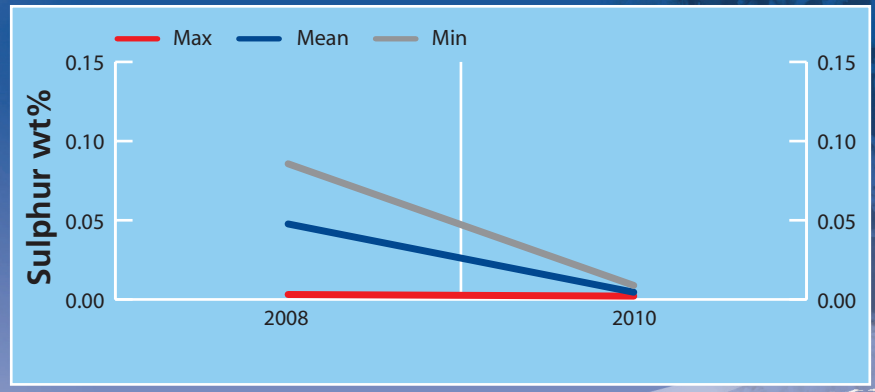
*Up to 2000ppm sulphur is allowed in Ukraine but incentives are in place to encourage 50 and 150ppm production

Ukraine


Max
Mean
Min
Cloud (°C)
0
-5
-10
-15
-20
2008
2010


Max
Mean
Min
CFPP (°C)
0
-10
-20
-30
-40
-50
2008
2010


Max
Mean
Min
Cetane
60
55
50
45
2008
2010


Max
Mean
Min
Sulphur wt%
0.15
0.10
0.05
0.00
2008
2010

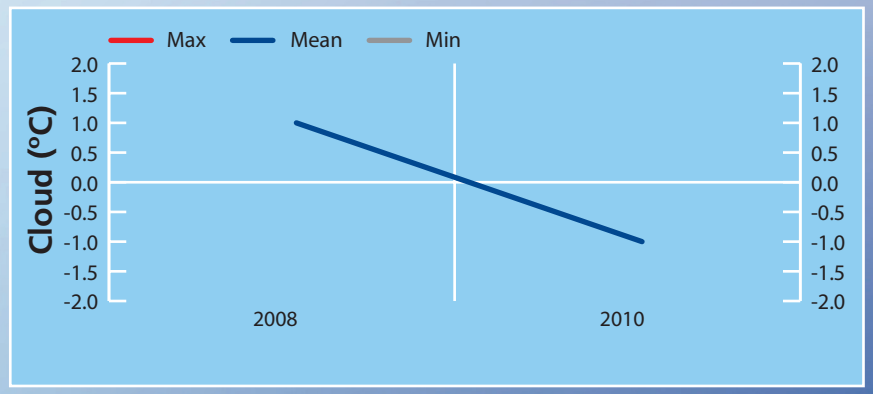
Worldwide Survey – Middle East & Africa

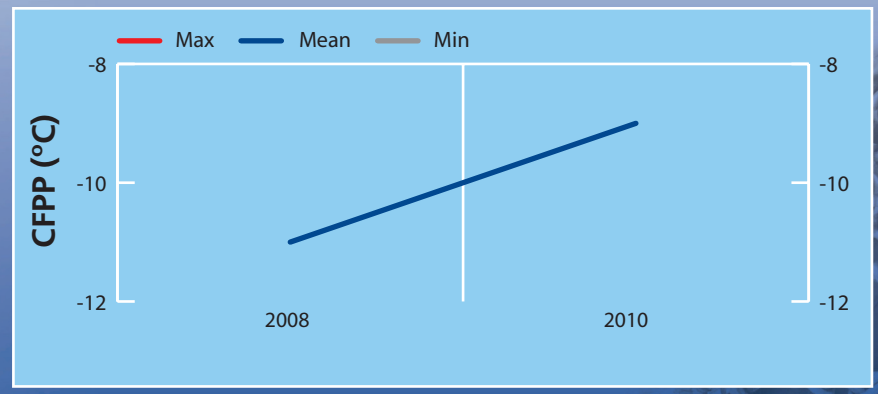
Israel

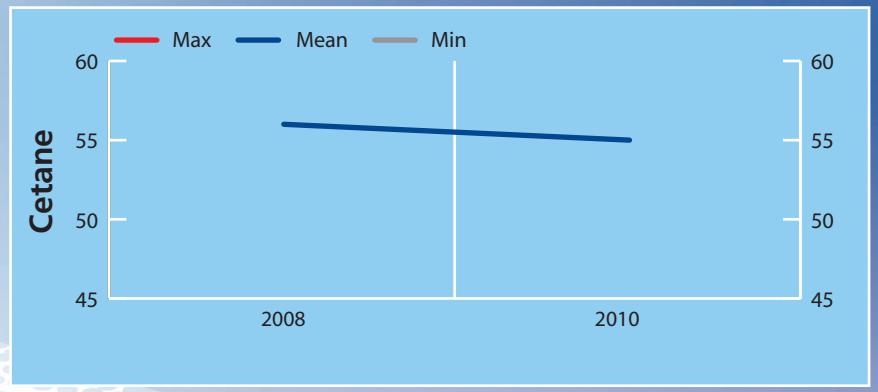
National Standards and physical inspection data

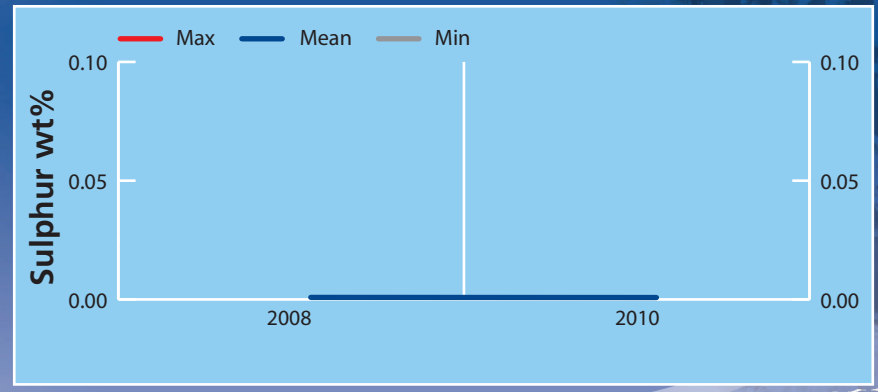
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002324	DIES 1002326
Cloud Point, °C			-1		-2	0
CFPP, °C			-9		-7	-11
Pour Point, °C			-14		-12	-15
HFRR, µm			387		387	387
Wax Content @ 10°C Below Cloud, wt%			2.5		2.4	2.5
Rancimat, hrs			>30		>30	>30
Sulphur, wt%	0.001 (max)		0.0016		0.0022	0.0010
Density @15°C, kg/m^3	820 - 845		834		834	840
Viscosity @ 40°C, cSt	2.0 - 4.5		3.16		3.16	3.32
Cetane Index $_{2\ Variable}$			54		55	54
Cetane Index $_{4\ Variable}$	46 (min)		56		57	56
Cetane Number	51 (min)		55		55	54
Distillation, °C IBP			195		189	202
T_{10}			232		224	239
T_{20}			247		242	252
T_{50}			281		280	283
T_{90}			341		340	342
T_{95}	360 (max)		358		357	359
FBP			366		364	368
% FAME			0		0	0

Israel


Max
Mean
Min
Cloud (°C)
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
2008
2010


Max
Mean
Min
CFPP (°C)
-8
-10
-12
2008
2010


Max
Mean
Min
Cetane
60
55
50
45
2008
2010


Max
Mean
Min
Sulphur wt%
0.10
0.05
0.00
2008
2010

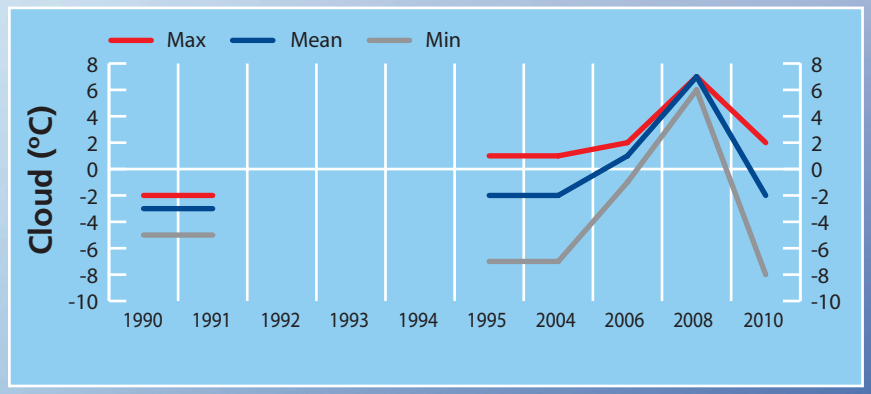
Saudi Arabia

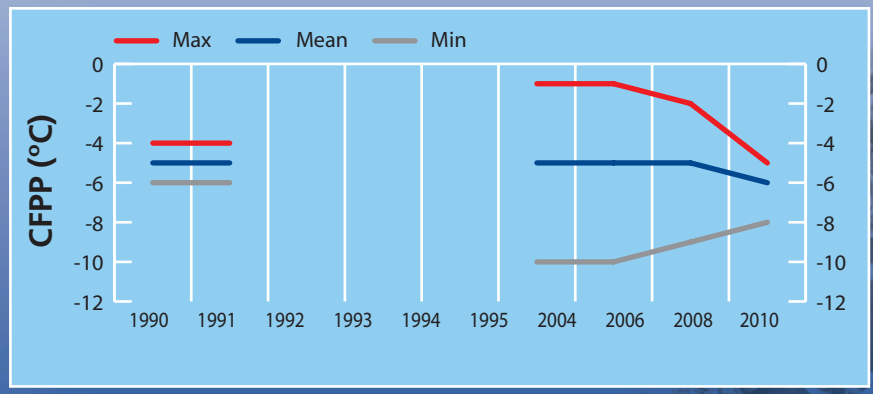
National Standards and physical inspection data

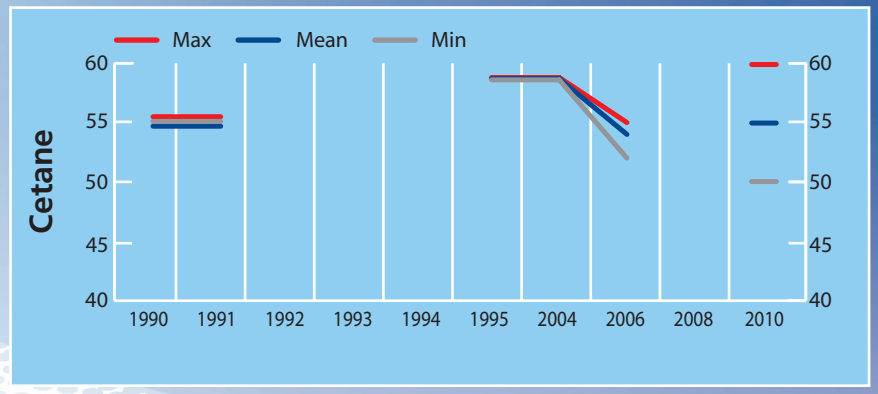
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002535	DIES 1002536	DIES 1002537	DIES 1002538	DIES 1002539
Cloud Point, °C	2 (max)*	2	-2	-8	2	-3	-8	1	-1
CFPP, °C	-4 (max)*	-6	-13	-17	-13	-17	-14	-16	-6
Pour Point, °C		-3	-13	-21	-9	-3	-21	-15	-15
HFRR, µm		601	546	448	567	594	601	448	520
Wax Content @ 10°C Below Cloud, wt%		2.9	1.6	0.8	0.8	1.3	2.9	1.0	2.2
Rancimat, hrs									
Sulphur, wt%	0.5 (max)	0.3070	0.1230	0.0638	0.0684	0.0657	0.0638	0.3070	0.1100
Density @15°C, kg/m^3		847	833	826	826	830	836	847	828
Viscosity @ 40°C, cSt	1.9 - 4.1	6.33	3.36	2.39	2.73	2.65	2.39	6.33	2.70
Cetane Index $_{2\ Variable}$	45 (min)	58	55	51	55	54	51	58	56
Cetane Index $_{4\ Variable}$		58	55	50	55	55	50	58	56
Cetane Number		60	55	50	55	54	50	60	58
Distillation, °C IBP		184	177	171	174	182	173	184	171
T_{10}		227	210	202	205	213	202	227	202
T_{20}		250	228	219	220	228	219	250	221
T_{50}		329	280	263	267	269	263	329	272
T_{90}		390	349	321	361	335	321	390	338
T_{95}		393	365	332	388	359	332	393	353
FBP		397	377	347	392	378	347	397	369
% FAME		0	0	0	0	0	0	0	0

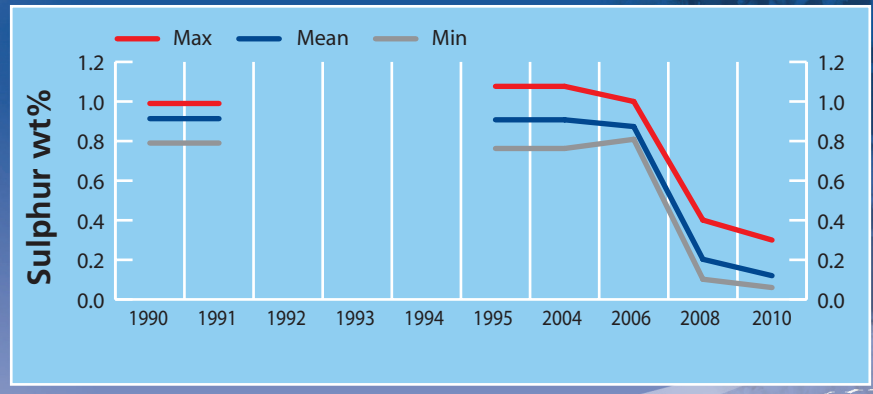
Specification shown for 0.5% Sulphur grade. *Cloud point and CFPP are alternative specifications. When CFPP is used the difference between cloud point and CFPP must not exceed 10°C

Saudi Arabia









South Africa

National Standards and physical inspection data

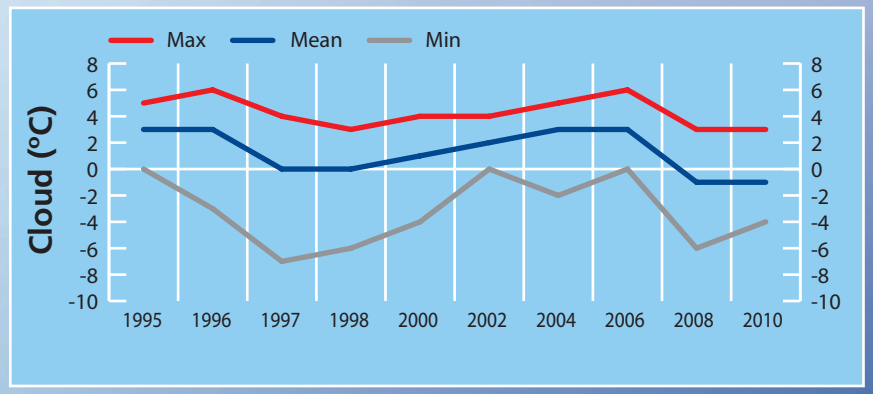
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1003466	DIES 1003467	DIES 1003468	DIES 1003469	DIES 1003470	DIES 1003471	DIES 1003472
Cloud Point, °C		2	-1	-5	-4	0	-4	1	0	2	-5
CFPP, °C	-4 (max)	-4	-7	-13	-10	-13	-10	-4	-9	-4	-7
Pour Point, °C		-12	-17	-21	-15	-18	-15	-18	-12	-18	-21
HFRR, µm		402	358	267	345	319	400	396	353	383	402
Wax Content @ 10°C Below Cloud, wt%		2.5	1.4	0.4	2.4	1.7	1.0	0.5	1.7	0.4	1.3
Rancimat, hrs		>30	>30	>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.05 (max)	0.0431	0.0204	<0.0003	0.0013	0.0351	0.0235	<0.0003	0.0370	<0.0003	0.0223
Density @15°C, kg/m^3		855	841	830	838	855	834	830	839	833	851
Viscosity @ 40°C, cSt	1.6 - 5.3	3.94	3.11	2.33	3.05	3.54	3.00	2.33	3.31	2.33	3.40
Cetane Index $_{2\ Variable}$		55	51	47	54	49	54	48	55	47	49
Cetane Index $_{4\ Variable}$		55	52	48	54	50	55	49	55	48	49
Cetane Number	45 (min)	60	53	50	60	55	54	51	52	50	50
Distillation, °C IBP		200	186	177	177	197	186	184	177	184	183
T_{10}		245	222	205	222	235	223	205	216	207	226
T_{20}		262	238	213	240	260	236	213	238	214	241
T_{50}		297	273	242	279	286	270	242	286	242	279
T_{90}	362 (max)	352	345	336	336	350	341	343	349	343	344
T_{95}		377	366	352	352	367	359	377	368	377	361
FBP		393	377	363	363	375	372	393	376	392	372
% FAME		0	0	0	0	0	0	0	0	0	0

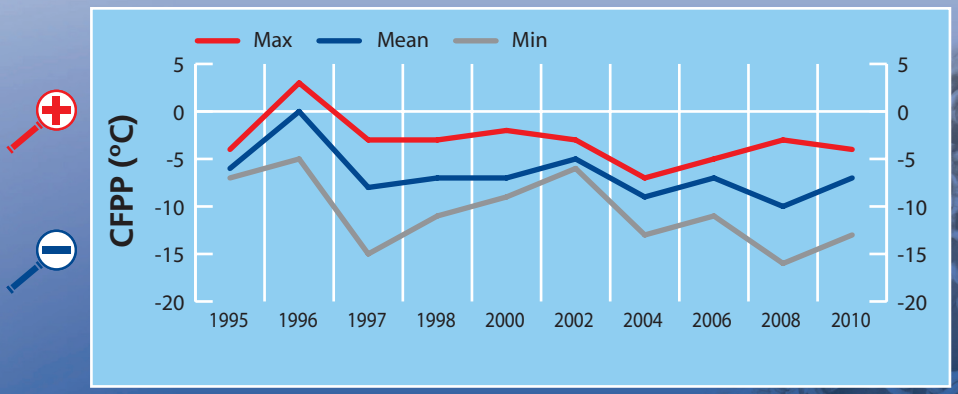
South Africa (continued)

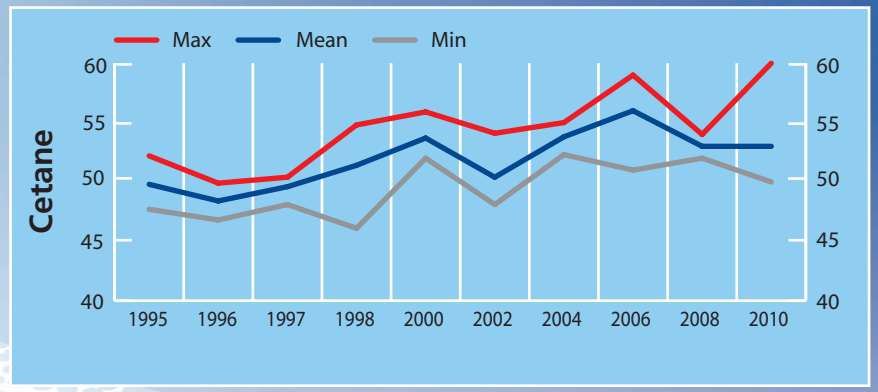
National Standards and physical inspection data

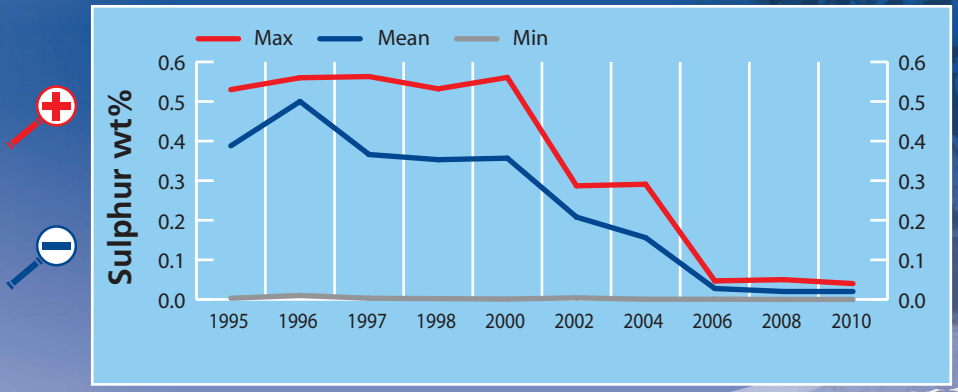
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1003473
Cloud Point, °C		2	-1	-5	2
CFPP, °C	-4 (max)	-4	-7	-13	-4
Pour Point, °C		-12	-17	-21	-18
HFRR, µm		402	358	267	267
Wax Content @ 10°C Below Cloud, wt%		2.5	1.4	0.4	2.5
Rancimat, hrs		>30	>30	>30	>30
Sulphur, wt%	0.05 (max)	0.0431	0.0204	<0.0003	0.0431
Density @15°C, kg/m^3		855	841	830	851
Viscosity @ 40°C, cSt	1.6 - 5.3	3.94	3.11	2.33	3.94
Cetane Index $_{2\ Variable}$		55	51	47	52
Cetane Index $_{4\ Variable}$		55	52	48	54
Cetane Number	45 (min)	60	53	50	53
Distillation, °C IBP		200	186	177	200
T_{10}		245	222	205	245
T_{20}		262	238	213	262
T_{50}		297	273	242	297
T_{90}	362 (max)	352	345	336	352
T_{95}		377	366	352	366
FBP		393	377	363	375
% FAME		0	0	0	0

South Africa









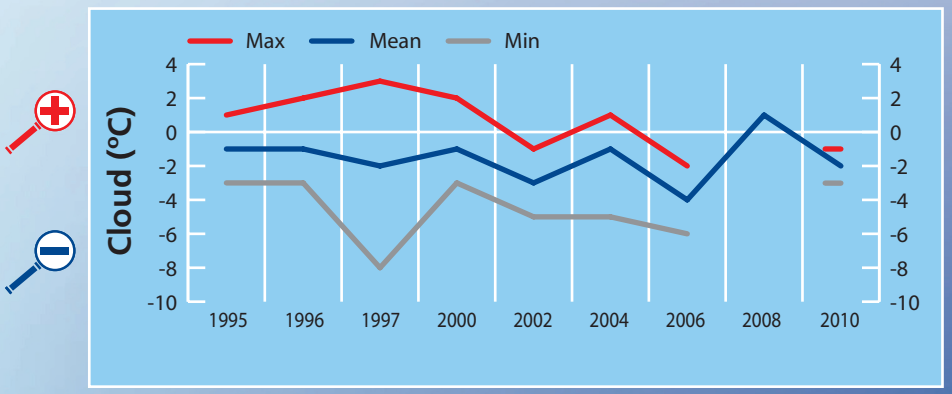
Worldwide Survey – Asia Pacific

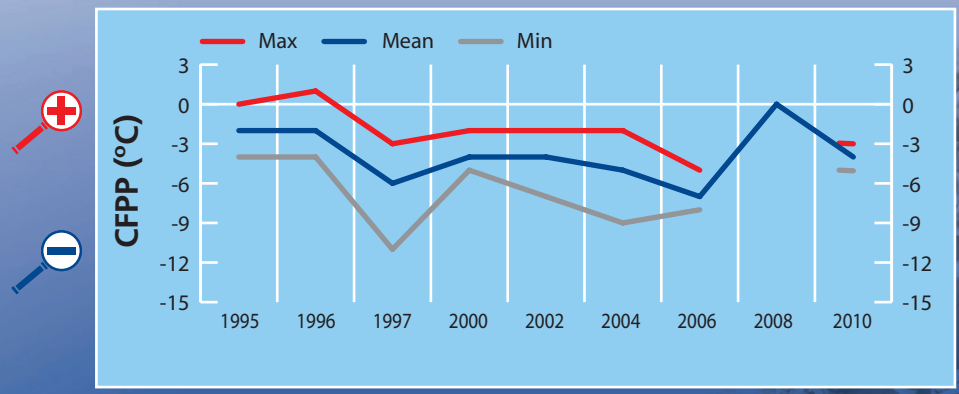
Australia

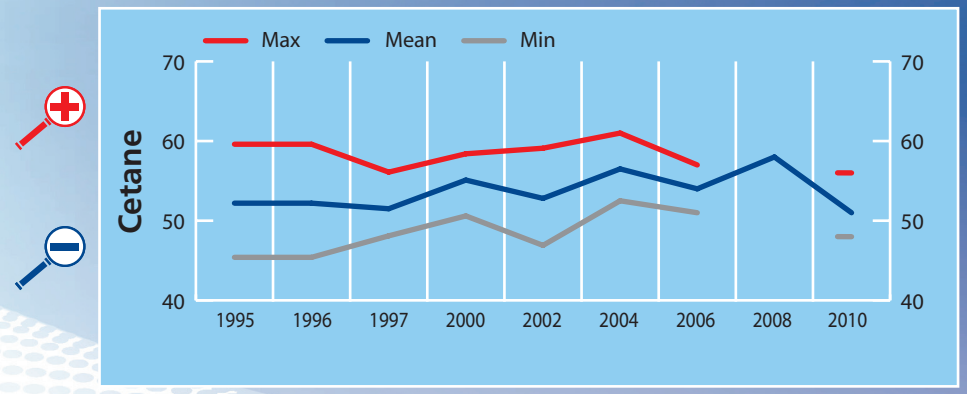
National Standards and physical inspection data

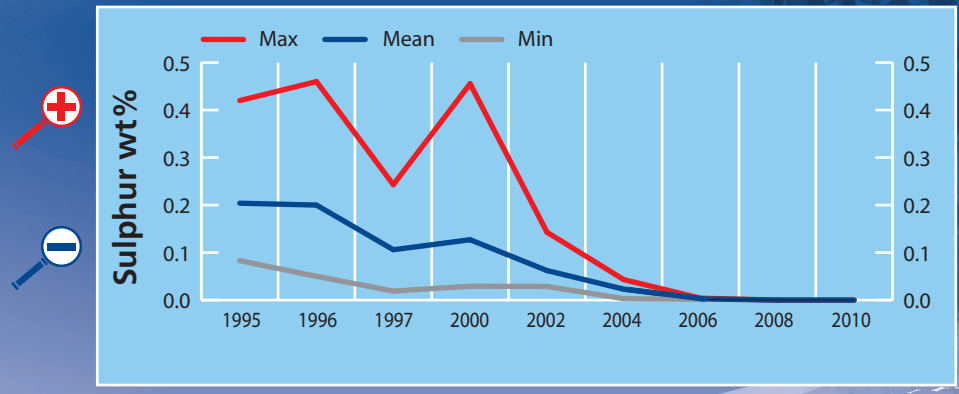
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1005698	DIES 1005752	DIES 1005861	DIES 1005862	DIES 1005863
Cloud Point, °C		-1	-2	-3	-2	-2	-1	-2	-3
CFPP, °C		-3	-4	-5	-4	-4	-4	-3	-5
Pour Point, °C		-3	-4	-6	-6	-3	-3	-3	-6
HFRR, µm	460 (max)	401	364	339	401	375	340	339	366
Wax Content @ 10°C Below Cloud, wt%		6.3	4.5	2.6	2.6	3.8	6.3	6.3	3.4
Rancimat, hrs		>30	>20	17	>30	>30	20	18	17
Sulphur, wt%	0.001 (max)	0.0009	0.0008	0.0006	0.0008	0.0006	0.0008	0.0009	0.0007
Density @15°C, kg/m^3	820 - 850	850	845	835	850	835	847	846	847
Viscosity @ 40°C, cSt	2.0 - 4.5	3.30	2.90	2.65	2.84	3.30	2.88	2.83	2.65
Cetane Index $_{2\ Variable}$		54	50	48	49	54	50	50	48
Cetane Index $_{4\ Variable}$	46 (min)	56	51	48	48	56	51	51	48
Cetane Number	51 (min)	56	51	48	49	56	51	51	48
Distillation, °C IBP		197	189	172	172	196	197	191	188
T_{10}		236	228	218	221	231	236	234	218
T_{20}		249	243	232	237	247	249	247	232
T_{50}		278	273	264	273	278	275	273	264
T_{90}		331	325	321	329	331	322	321	324
T_{95}	360 (max)	344	339	332	344	344	334	332	340
FBP		358	350	345	358	352	345	345	352
% FAME	5 (max)	0	0	0	0	0	0	0	0

Australia


Max
Mean
Min
Cloud (°C)
4
2
0
-2
-4
-6
-8
-10
1995
1996
1997
2000
2002
2004
2006
2008
2010


Max
Mean
Min
CFPP (°C)
3
0
-3
-6
-9
-12
-15
1995
1996
1997
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Cetane
70
60
50
40
1995
1996
1997
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Sulphur wt%
0.5
0.4
0.3
0.2
0.1
0.0
1995
1996
1997
2000
2002
2004
2006
2008
2010

Peoples Republic of China

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	SW1	SW2	S1	S2	E1	E2	E3
Cloud Point, °C	**	1	-9	-38	-1	0	1	-7	-5	-4	0
CFPP, °C		0	-11	-38	0	-1	-2	-8	-6	-4	-2
Solid Point, °C	**	-3	-24	-56	-13	-11	-3	-18	-10	-8	-6
HFRR, µm	460 (max)	612	406	236	390	394	437	331	428	414	345
Wax Content @ 10°C Below Cloud, wt%											
Rancimat, hrs											
Sulphur, wt%	0.2 (max)	0.1690	0.0670	0.0030	0.1170	0.0940	0.0184	0.0057	0.0030	0.0030	0.0822
Density @15°C, kg/m^3	810 - 850	858	832	807	833	832	832	830	820	827	833
Viscosity @ 20°C, cSt	3.0-8.0***	5.99	3.99	2.24	4.01	4.16	5.45	4.65	5.00	4.21	4.22
Cetane Index $_{2\ Variable}$	46 (min)*	58	51	45	54	53	57	54	58	58	53
Cetane Index $_{4\ Variable}$		60	52	45	53	53	59	55	59	60	52
Cetane Number	49 (min)*	62	50	43	53	53	57	52	62	52	51
Distillation, °C IBP		204	172	151	169	170	180	183	167	184	164
T_{10}		240	206	183	201	201	234	216	213	224	199
T_{20}		255	221	189	221	220	252	231	232	243	217
T_{50}	300 (max)	287	260	209	271	267	283	266	267	279	265
T_{90}	355 (max)	343	323	272	337	333	338	337	335	337	333
T_{95}	365 (max)	355	338	285	350	346	350	354	352	351	345
FBP		370	352	300	364	359	361	365	370	365	362

* Cetane number for parafinic crude has a min of 45
*** 2.5 - 8 for -20˚C grade and 1.8 - 7 for -35˚C grade

**Solid Point and CFPP spec depend on grade, see table below

Grade	10˚C	5˚C	0˚C	-10˚C	-20˚C	-35˚C	-50˚C
Solid Point ˚C max	10	5	0	-10	-20	-35	-50
CFPP ˚C max	12	8	4	-5	-14	-29	-44

Peoples Republic of China (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E4	NW1	NW2	NE1	NE2	NE3	NE4
Cloud Point, °C	**	1	-9	-38	1	-15	-2	-25	-21	-6	-38
CFPP, °C		0	-11	-38	-2	-20	-4	-36	-20	-9	-38
Solid Point, °C	**	-3	-24	-56	-5	-44	-40	-56	-24	-40	-42
HFRR, µm	460 (max)	612	406	236	355	444	295	612	492	409	510
Wax Content @ 10°C Below Cloud, wt%											
Rancimat, hrs											
Sulphur, wt%	0.2 (max)	0.1690	0.0670	0.0030	0.0924	0.0737	0.0573	0.0041	0.1680	0.0220	0.0864
Density @15°C, kg/m³	810 - 850	858	832	807	849	822	838	807	824	849	810
Viscosity @ 20°C, cSt	3.0-8.0***	5.99	3.99	2.24	5.99	3.08	4.83	2.24	3.75	4.02	2.25
Cetane Index 2 Variable	46 (min)*	58	51	45	52	51	54	45	56	46	48
Cetane Index 4 Variable		60	52	45	53	51	53	48	56	46	50
Cetane Number	49 (min)*	62	50	43	51	50	49	50	53	47	49
Distillation, °C IBP		204	172	151	204	170	167	162	176	179	166
T_{10}		240	206	183	240	193	198	183	203	212	187
T_{20}		255	221	189	255	207	221	189	220	226	194
T_{50}	300 (max)	287	260	209	287	244	281	209	264	261	221
T_{90}	355 (max)	343	323	272	340	308	343	286	313	321	272
T_{95}	365 (max)	355	338	285	352	322	355	314	324	335	285
FBP		370	352	300	368	333	367	330	334	350	300

* Cetane number for parafinic crude has a min of 45
*** 2.5 - 8 for -20˚C grade and 1.8 - 7 for -35˚C grade

**Solid Point and CFPP spec depend on grade, see table below

Grade	10˚C	5˚C	0˚C	-10˚C	-20˚C	-35˚C	-50˚C
Solid Point ˚C max	10	5	0	-10	-20	-35	-50
CFPP ˚C max	12	8	4	-5	-14	-29	-44

Peoples Republic of China (continued)

National Standards and physical inspection data

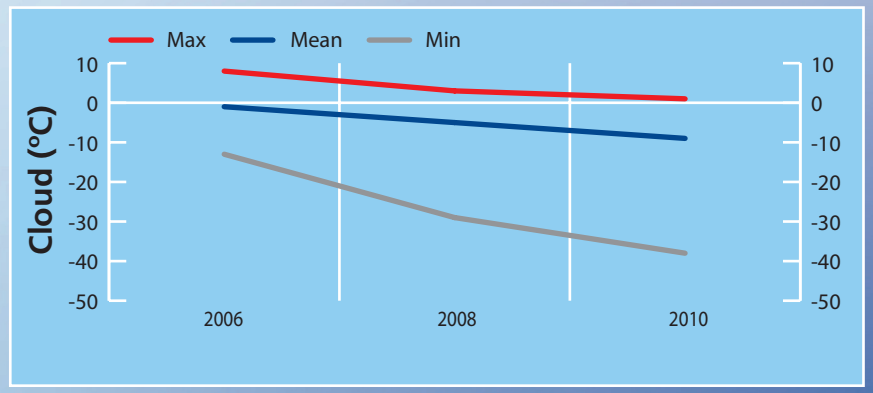
	National Standard	Maximum Observed	Mean	Minimum Observed	N1	N2	N3	N4	N5	N6	N7
Cloud Point, °C	**	1	-9	-38	-7	-2	-9	-6	-7	-24	-4
CFPP, °C		0	-11	-38	-12	-10	-14	-9	-9	-24	-11
Solid Point, °C	**	-3	-24	-56	-16	-40	-20	-19	-15	-34	-33
HFRR, µm	460 (max)	612	406	236	379	236	405	391	398	461	393
Wax Content @ 10°C Below Cloud, wt%											
Rancimat, hrs											
Sulphur, wt%	0.2 (max)	0.1690	0.0670	0.0030	0.0056	0.0934	0.0638	0.0816	0.1410	0.0254	0.1690
Density @15°C, kg/m^3	810 - 850	858	832	807	824	851	831	840	853	814	858
Viscosity @ 20°C, cSt	3.0-8.0***	5.99	3.99	2.24	3.84	3.88	3.61	3.64	3.94	2.37	4.64
Cetane Index $_{2\ Variable}$	46 (min)*	58	51	45	55	46	51	49	45	46	46
Cetane Index $_{4\ Variable}$		60	52	45	56	45	51	48	45	48	45
Cetane Number	49 (min)*	62	50	43	55	44	47	47	43	48	44
Distillation, °C IBP		204	172	151	172	158	180	169	151	172	168
T_{10}		240	206	183	214	192	202	201	206	190	209
T_{20}		255	221	189	230	211	217	217	224	195	230
T_{50}	300 (max)	287	260	209	261	265	255	259	263	219	275
T_{90}	355 (max)	343	323	272	311	337	318	324	329	295	338
T_{95}	365 (max)	355	338	285	327	350	336	339	346	313	352
FBP		370	352	300	343	364	353	353	361	328	365

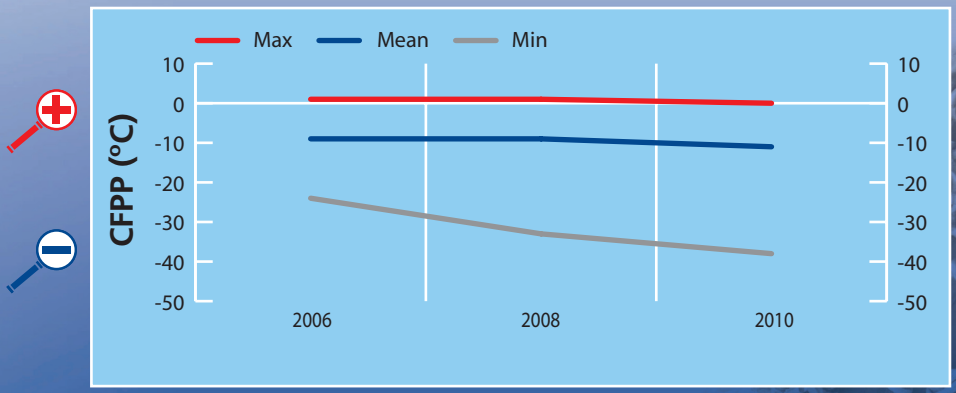
* Cetane number for parafinic crude has a min of 45
*** 2.5 - 8 for -20˚C grade and 1.8 - 7 for -35˚C grade

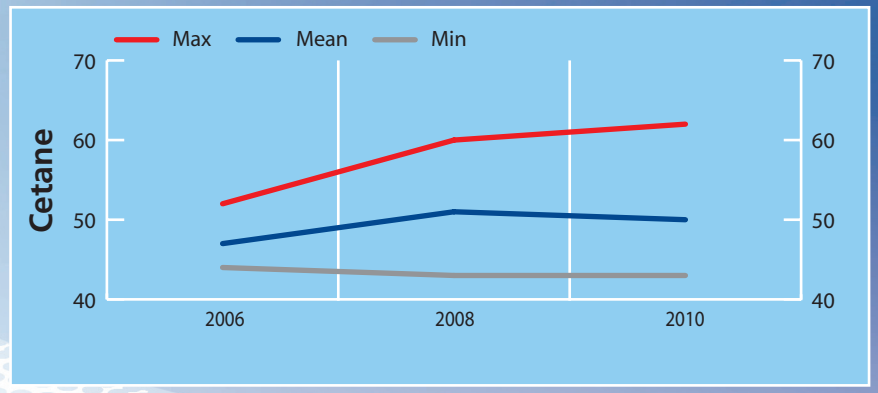
**Solid Point and CFPP spec depend on grade, see table below

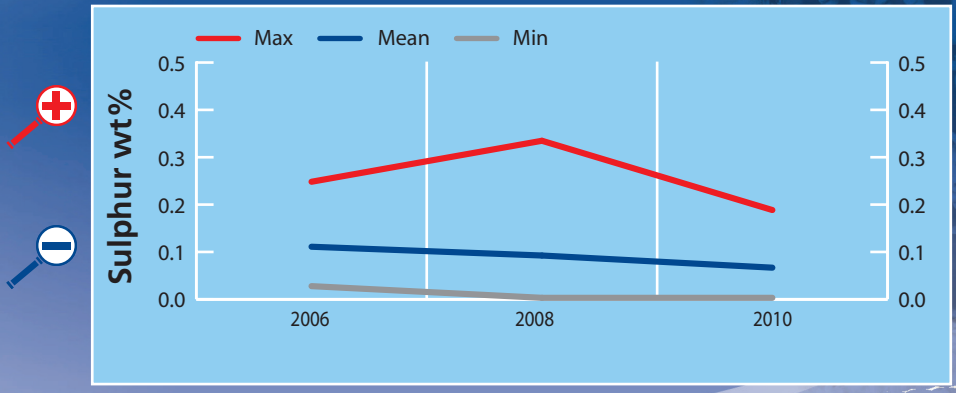
Grade	10˚C	5˚C	0˚C	-10˚C	-20˚C	-35˚C	-50˚C
Solid Point ˚C max	10	5	0	-10	-20	-35	-50
CFPP ˚C max	12	8	4	-5	-14	-29	-44

Peoples Republic of China









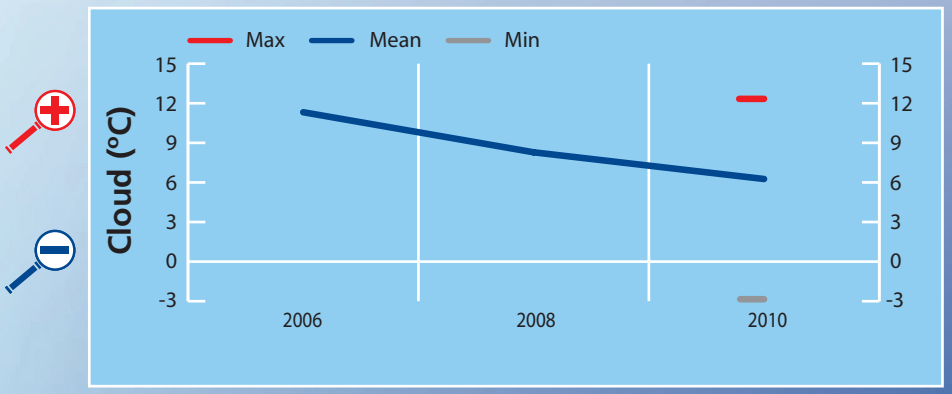
Indonesia

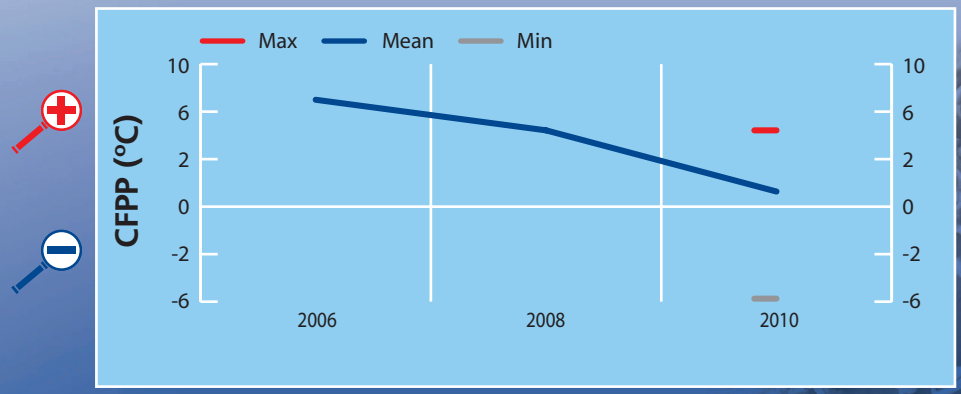
National Standards and physical inspection data

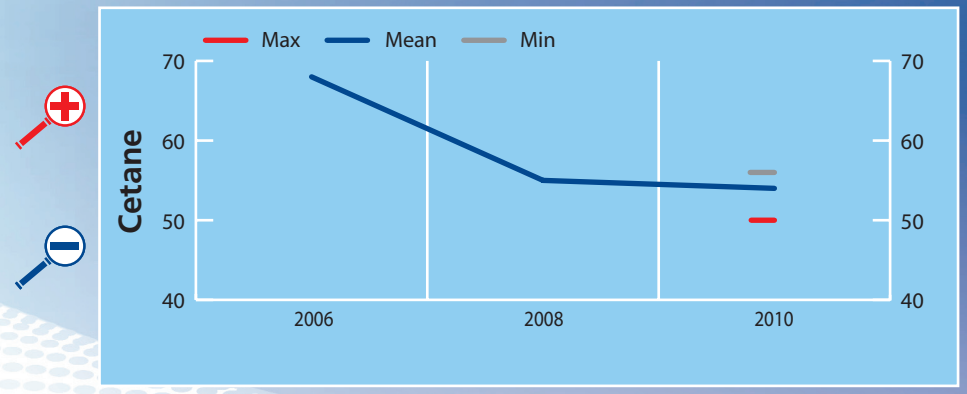
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002853	DIES 1002854	DIES 1002855	DIES 1002856
Cloud Point, °C		10	5	-5	6	10	-5	8
CFPP, °C		5	1	-6	0	4	-6	5
Pour Point, °C	18 (max)	6	0	-9	0	3	-9	6
HFRR, µm		361	293	231	232	231	350	361
Wax Content @ 10°C Below Cloud, wt%		4.2	2.2	1.3	1.3	1.4	1.9	4.2
Rancimat, hrs		>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.35 (max)	0.2990	0.1948	0.0882	0.1490	0.0882	0.2990	0.2430
Density @15°C, kg/m^3	815 - 870	851	846	842	848	843	851	842
Viscosity @ 40°C, cSt	2.0 - 5.0	4.97	4.22	3.35	3.35	4.97	3.68	4.86
Cetane Index $_{2\ Variable}$		55	53	50	53	54	50	55
Cetane Index $_{4\ Variable}$	45 (min)	55	53	50	54	54	50	55
Cetane Number	48 (min)	56	54	50	54	55	50	56
Distillation, °C IBP		181	178	174	181	177	174	180
T_{10}		237	227	219	237	223	229	219
T_{20}		256	246	240	256	244	244	240
T_{50}		295	289	280	295	289	280	294
T_{90}	370 (max)	357	353	341	357	357	341	355
T_{95}		380	372	358	378	380	358	371
FBP		391	380	367	384	391	367	378
% FAME	10 (max)	6	3	0	6	5	0	0

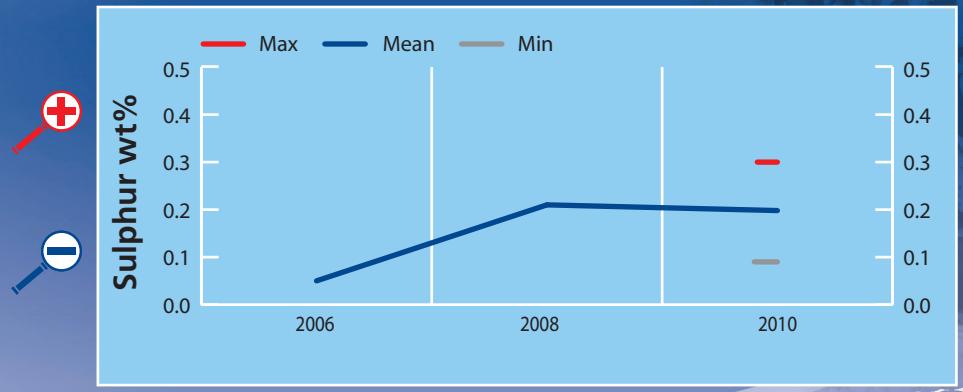
Specification shown for PSO graded fuels

Indonesia


Max
Mean
Min
Cloud (°C)
15
12
9
6
3
0
-3
2006
2008
2010


Max
Mean
Min
CFPP (°C)
10
6
2
0
-2
-6
2006
2008
2010


Max
Mean
Min
Cetane
70
60
50
40
2006
2008
2010


Max
Mean
Min
Sulphur wt%
0.5
0.4
0.3
0.2
0.1
0.0
2006
2008
2010

Japan, Grade 2

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001876	DIES 1001877	DIES 1001879	DIES 1001880	DIES 1001881	DIES 1001883	DIES 1001886
Cloud Point, °C	-5	-1	-5	-12	-5	-5	-8	-7	-5	-3	-3
CFPP, °C		-5	-10	-17	-12	-12	-17	-17	-15	-7	-5
Pour Point, °C	-7.5*	-10	-19	-33	-23	-13	-20	-23	-20	-10	-18
HFRR, µm		486	400	230	230	323	397	359	362	461	410
Wax Content @ -10°C wt%	**	2.7	1.5	0.0	0.9	1.6	0.4	0.5	1.1	2.3	2.4
Rancimat, hrs											
Sulphur, wt%	0.001 (max)	0.0009	0.0006	0.0004	0.0005	0.0007	0.0005	0.0005	0.0007	0.0006	0.0007
Density @15°C, kg/m^3		843	830	821	825	830	826	837	825	828	830
Viscosity @ 30°C, cSt		4.19	3.62	3.15	3.63	3.98	3.15	3.61	3.40	3.44	3.85
Cetane Index $_{2\ Variable}$		60	57	52	58	57	60	58	56	57	57
Cetane Index $_{4\ Variable}$	45 (min)	64	57	50	58	57	64	58	56	56	58
Cetane Number	45 (min)	59	56	50	58	58	54	52	55	57	58
Distillation, °C IBP											
T_{10}		232	207	184	199	210	196	207	198	197	207
T_{20}		251	231	209	228	239	215	230	220	223	236
T_{50}		293	277	263	279	282	263	274	269	276	284
T_{90}	350 (max)	347	330	314	329	333	325	329	331	332	333
T_{95}		360	342	326	341	345	340	343	345	345	344
FBP		369	352	334	350	356	350	355	355	354	353

*Pour point measured at 2.5°C intervals (Japanese Industry Standard) **Wax content measured at -10°C for Grade 2

Japan, Grade 2 (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001887	DIES 1001888	DIES 1001889	DIES 1001891	DIES 1001892	DIES 1001893	DIES 1001894
Cloud Point, °C	-5	-1	-5	-12	-5	-7	-5	-4	-1	-1	-1
CFPP, °C		-5	-10	-17	-14	-10	-7	-8	-14	-9	-10
Pour Point, °C	-7.5*	-10	-19	-33	-13	-15	-15	-28	-23	-33	-18
HFRR, µm		486	400	230	440	434	429	486	290	472	398
Wax Content @ -10°C wt%	**	2.7	1.5	0.0	1.8	0.9	1.9	2.3	2.4	2.6	2.6
Rancimat, hrs											
Sulphur, wt%	0.001 (max)	0.0009	0.0006	0.0004	0.0007	0.0006	0.0006	0.0006	0.0007	0.0006	0.0006
Density @15°C, kg/m^3		843	830	821	827	828	835	824	828	822	821
Viscosity @ 30°C, cSt		4.19	3.62	3.15	3.61	3.24	4.19	3.38	3.99	3.43	3.33
Cetane Index $_{2\ Variable}$		60	57	52	57	55	56	59	60	59	59
Cetane Index $_{4\ Variable}$	45 (min)	64	57	50	57	55	57	58	61	59	59
Cetane Number	45 (min)	59	56	50	58	53	50	57	59	58	58
Distillation, °C IBP											
T_{10}		232	207	184	201	195	232	193	212	188	184
T_{20}		251	231	209	230	216	249	222	245	213	209
T_{50}		293	277	263	278	270	284	279	293	277	276
T_{90}	350 (max)	347	330	314	329	328	329	330	347	336	336
T_{95}		360	342	326	342	342	339	341	360	347	350
FBP		369	352	334	355	353	351	353	369	356	358

*Pour point measured at 2.5°C intervals (Japanese Industry Standard) **Wax content measured at -10°C for Grade 2

Japan, Grade 2 (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001895	DIES 1001896	DIES 1001897	DIES 1001898	DIES 1001899	DIES 1001900	DIES 1001901
Cloud Point, °C	-5	-1	-5	-12	-4	-12	-12	-10	-6	-5	-3
CFPP, °C		-5	-10	-17	-7	-11	-10	-11	-10	-9	-6
Pour Point, °C	-7.5*	-10	-19	-33	-23	-13	-25	-23	-13	-18	-13
HFRR, µm		486	400	230	480	313	395	439	442	471	386
Wax Content @ -10°C wt%	**	2.7	1.5	0.0	2.4	0.0	0.0	0.0	0.7	1.6	2.7
Rancimat, hrs											
Sulphur, wt%	0.001 (max)	0.0009	0.0006	0.0004	0.0007	0.0009	0.0004	0.0006	0.0007	0.0006	0.0006
Density @15°C, kg/m^3		843	830	821	833	831	825	827	843	839	836
Viscosity @ 30°C, cSt		4.19	3.62	3.15	3.74	3.51	3.42	3.32	3.85	3.70	4.135
Cetane Index $_{2\ Variable}$		60	57	52	56	54	56	55	52	53	55
Cetane Index $_{4\ Variable}$	45 (min)	64	57	50	56	56	58	56	50	53	57
Cetane Number	45 (min)	59	56	50	56	53	56	55	56	52	56
Distillation, °C IBP											
T_{10}		232	207	184	208	227	226	216	206	212	229
T_{20}		251	231	209	235	241	239	234	236	235	251
T_{50}		293	277	263	283	270	268	268	277	278	284
T_{90}	350 (max)	347	330	314	335	315	314	317	331	329	333
T_{95}		360	342	326	347	327	326	328	345	342	345
FBP		369	352	334	356	334	334	336	356	352	356

*Pour point measured at 2.5°C intervals (Japanese Industry Standard) **Wax content measured at -10°C for Grade 2

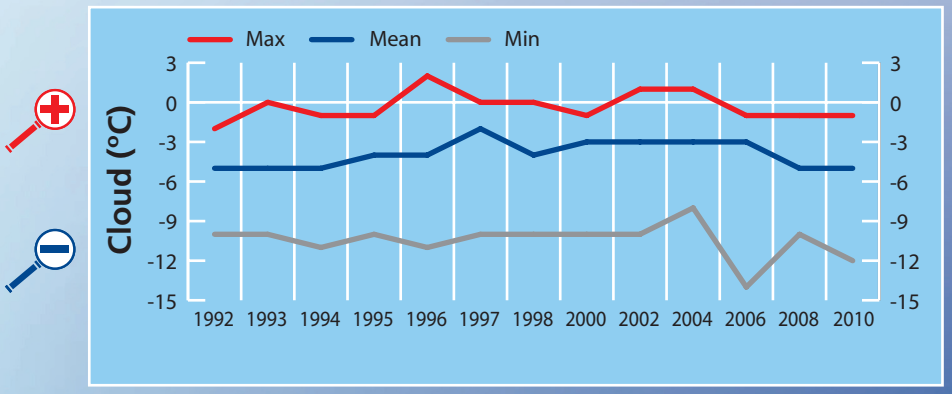
Japan, Grade 2 (continued)

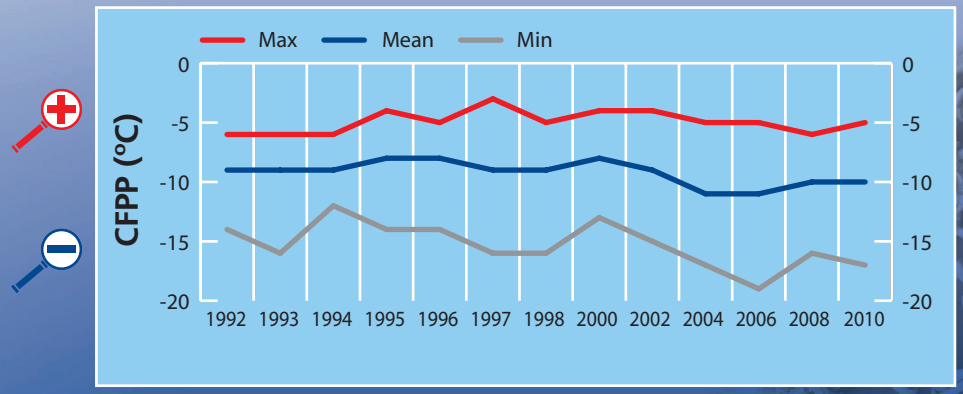
National Standards and physical inspection data

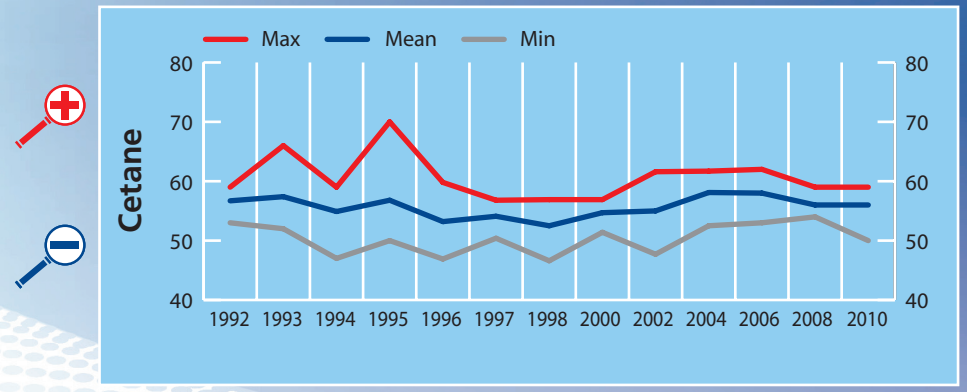
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001902
Cloud Point, °C	-5	-1	-5	-12	-2
CFPP, °C		-5	-10	-17	-5
Pour Point, °C	-7.5*	-10	-19	-33	-20
HFRR, µm		486	400	230	376
Wax Content @ -10°C wt%	**	2.7	1.5	0.0	2.7
Rancimat, hrs					
Sulphur, wt%	0.001 (max)	0.0009	0.0006	0.0004	0.0006
Density @15°C, kg/m^3		843	830	821	833
Viscosity @ 30°C, cSt		4.19	3.62	3.15	3.75
Cetane Index $_{2\ Variable}$		60	57	52	56
Cetane Index $_{4\ Variable}$	45 (min)	64	57	50	56
Cetane Number	45 (min)	59	56	50	56
Distillation, °C IBP					
T_{10}		232	207	184	212
T_{20}		251	231	209	238
T_{50}		293	277	263	282
T_{90}	350 (max)	347	330	314	332
T_{95}		360	342	326	343
FBP		369	352	334	352

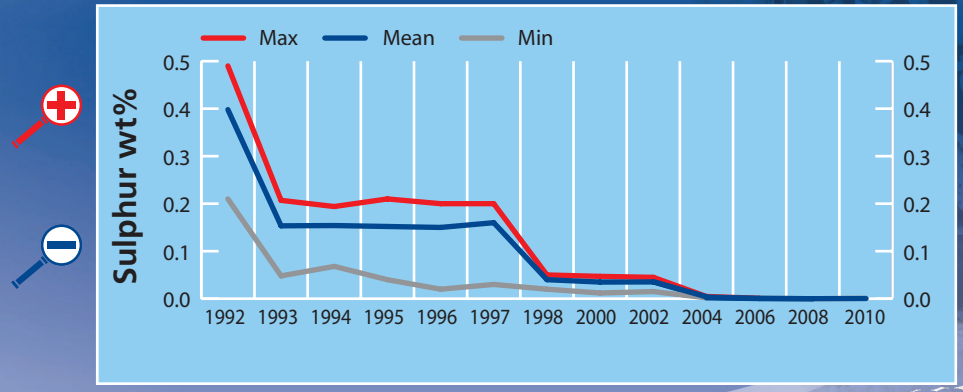
*Pour point measured at 2.5°C intervals (Japanese Industry Standard) **Wax content measured at -10°C for Grade 2

Japan, Grade 2









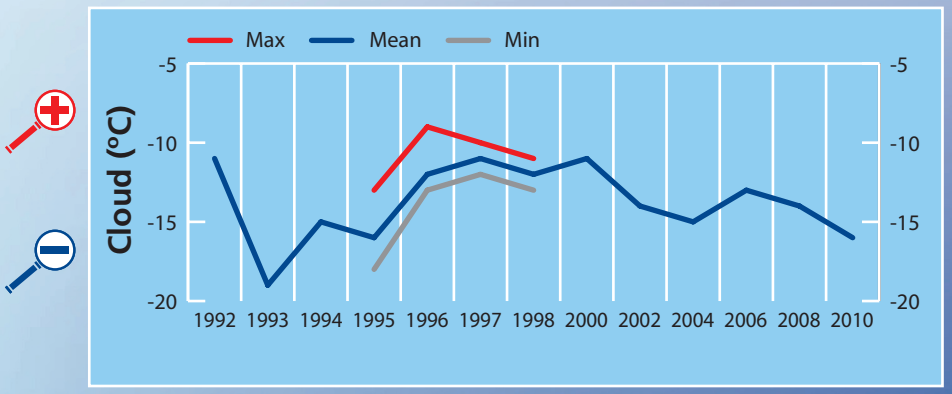
Japan, Grade 3

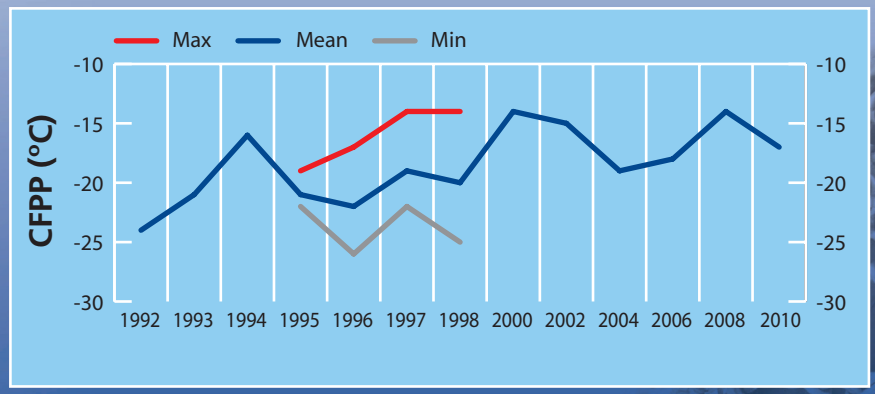
National Standards and physical inspection data

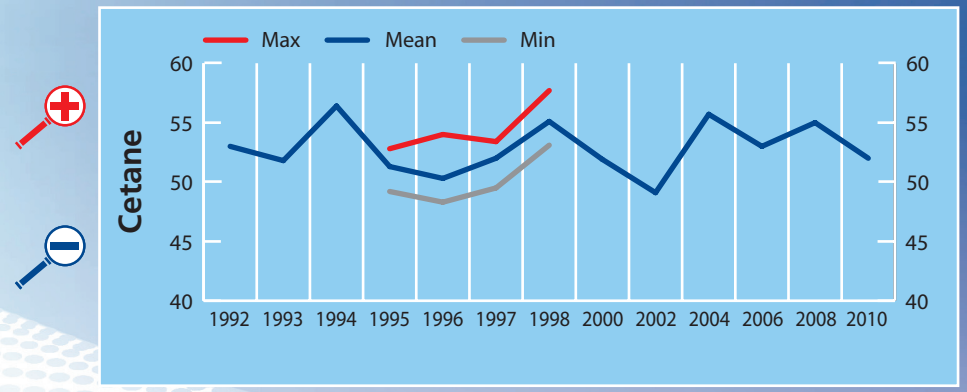
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001875
Cloud Point, °C	-12		-16		-16
CFPP, °C			-17		-17
Pour Point, °C	-20*		-23		-23
HFRR, µm			470		470
Wax Content @ -20°C wt%			1.7		1.7
Rancimat, hrs					
Sulphur, wt%	0.001 (max)		0.0006		0.0006
Density @15°C, kg/m^3			818		818
Viscosity @ 30°C, cSt			2.50		2.50
Cetane Index $_{2\ Variable}$			53		53
Cetane Index $_{4\ Variable}$	45 (min)		53		53
Cetane Number	45 (min)		52		52
Distillation, °C IBP					
T_{10}			181		181
T_{20}			196		196
T_{50}			246		246
T_{90}	330 (max)		311		311
T_{95}			323		323
FBP			333		333

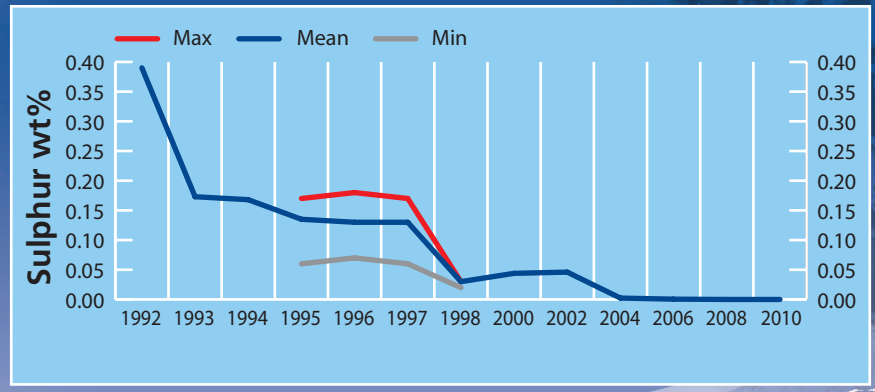
*Pour point measured at 2.5°C intervals (Japanese Industry Standard)

Japan, Grade 3









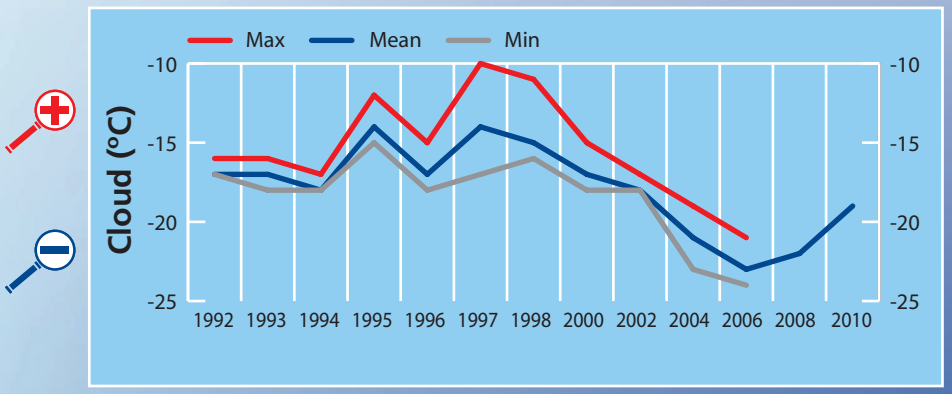
Japan, Special Grade 3

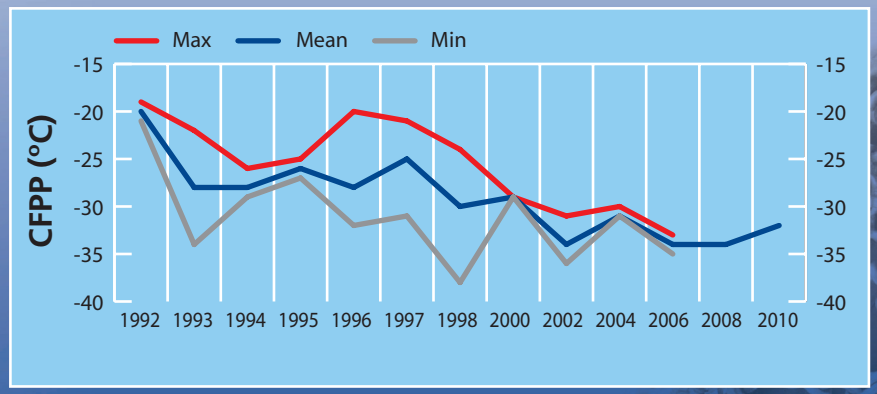
National Standards and physical inspection data

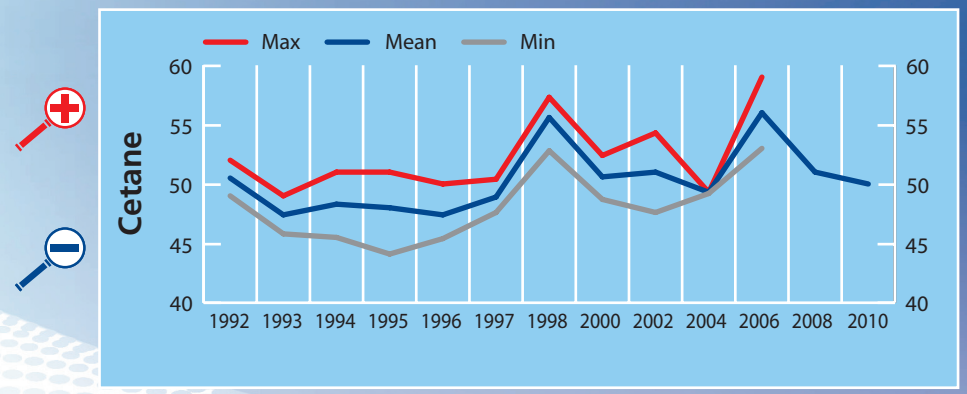
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1001874	DIES 1001882
Cloud Point, °C	-19		-19		-19	-18
CFPP, °C			-32		-29	-35
Pour Point, °C	-30*		-43		<-45	-43
HFRR, µm			461		470	451
Wax Content @ -30°C wt%			2.1		1.98	2.2
Rancimat, hrs						
Sulphur, wt%	0.001 (max)		0.0006		0.0007	0.0004
Density @15°C, kg/m^3			815		809	820
Viscosity @ 30°C, cSt			2.32		2.07	2.56
Cetane Index $_{2\ Variable}$			50		48	53
Cetane Index $_{4\ Variable}$	45 (min)		50		49	52
Cetane Number	45 (min)		50		49	51
Distillation, °C IBP						
T_{10}			172		170	174
T_{20}			186		180	191
T_{50}			232		217	247
T_{90}	330 (max)		312		297	326
T_{95}			326		311	340
FBP			338		324	351

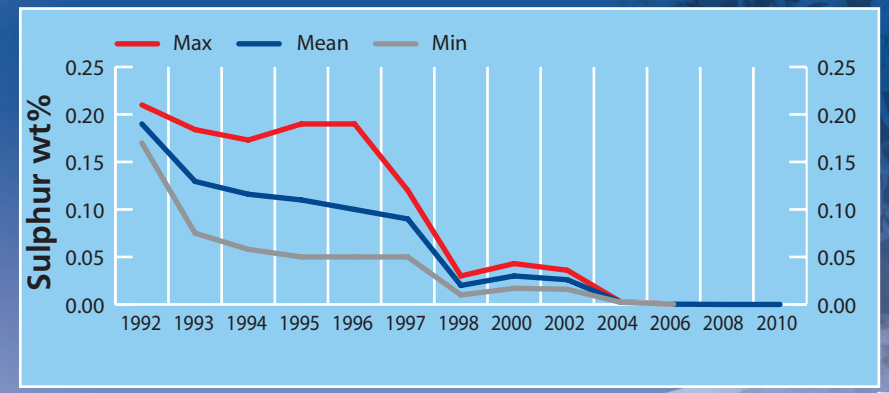
*Pour point measured at 2.5°C intervals (Japanese Industry Standard)

Japan, Special Grade 3







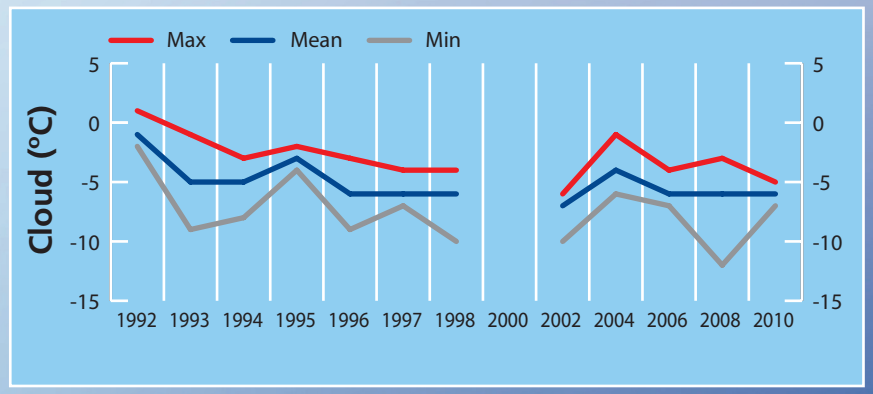


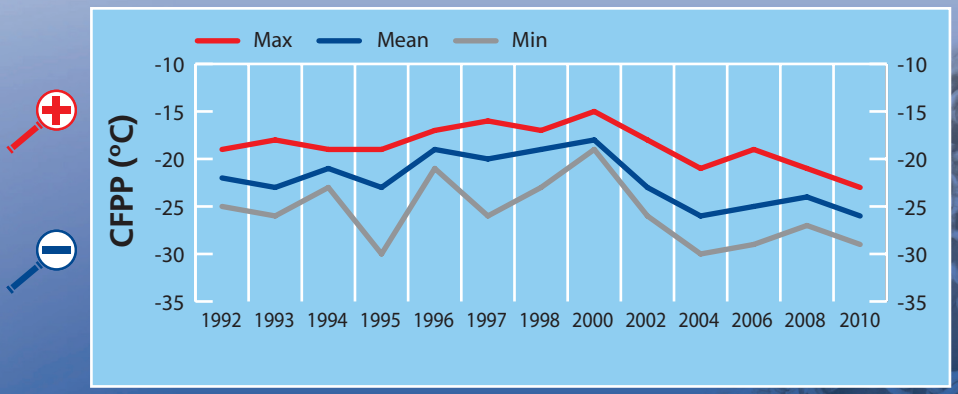
Korea

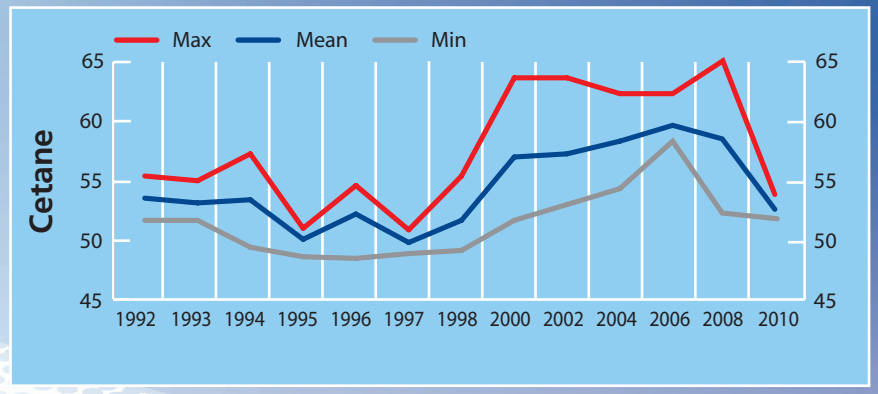
National Standards and physical inspection data

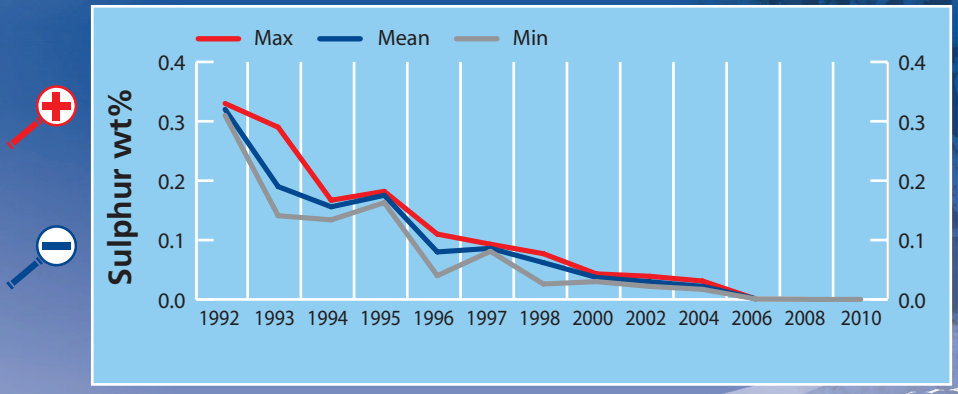
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1000367	DIES 1000368	DIES 1000369	DIES 1000371
Cloud Point, °C		-6	-7	-8	-7	-7	-6	-8
CFPP, °C	-16 (max)	-23	-26	-29	-25	-29	-23	-28
Pour Point, °C		-27	-31	-36	-27	-27	-36	-33
HFRR, µm	400 (max)	372	335	291	327	291	372	351
Wax Content @ 10°C Below Cloud, wt%		2.0	1.4	0.9	1.4	0.9	1.4	2.0
Rancimat, hrs		>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.001 (max)	0.0006	0.0005	0.0005	0.0005	0.0005	0.0006	0.0005
Density @15°C, kg/m^3	815 - 835	825	823	823	825	824	823	823
Viscosity @ 40°C, cSt	1.9 - 4.5	2.54	2.44	2.31	2.54	2.31	2.40	2.48
Cetane Index $_{2\ Variable}$		56	56	55	56	55	56	56
Cetane Index $_{4\ Variable}$	52 (min)	57	55	53	56	53	56	57
Cetane Number	52 (min)	54	53	52	53	52	53	54
Distillation, °C IBP		175	161	152	164	152	152	175
T_{10}		199	189	178	192	178	185	199
T_{20}		216	207	194	211	194	205	216
T_{50}		269	265	260	269	260	266	267
T_{90}	360 (max)	339	336	333	336	339	338	333
T_{95}		356	354	350	352	356	356	350
FBP		370	365	360	365	370	364	360
% FAME	5 (max)	2	1	1	2	1	1	1

Korea


Max
Mean
Min
Cloud (°C)
5
0
-5
-10
-15
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
-10
-15
-20
-25
-30
-35
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
65
60
55
50
45
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.4
0.3
0.2
0.1
0.0
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

New Zealand

National Standards and physical inspection data

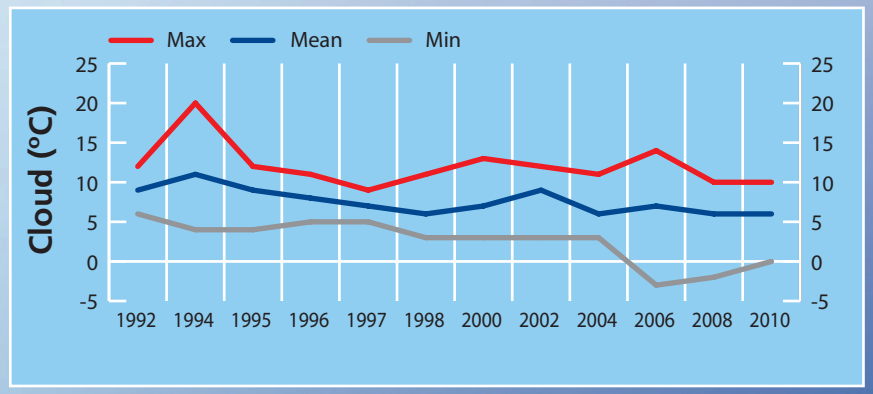
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1005488	DIES 1005489	DIES 1005528	DIES 1005529
Cloud Point, °C	2 (max)	-3	-4	-6	-4	-3	-4	-6
CFPP, °C	-6 (max)	-8	-12	-17	-8	-16	-8	-17
Pour Point, °C		-15	-20	-27	-15	-15	-24	-27
HFRR, µm	460 (max)	455	340	275	455	275	339	292
Wax Content @ 10°C Below Cloud, wt%		2.3	2.0	1.8	1.8	2.3	2.1	1.8
Rancimat, hrs		>30	>20	16	>30	>30	27	16
Sulphur, wt%	0.001 (max)	0.0008	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008
Density @15°C, kg/m^3	820 - 850	842	838	830	842	830	842	837
Viscosity @ 40°C, cSt	2.0 - 4.5	3.70	3.36	2.91	3.69	2.91	3.61	3.22
Cetane Index $_{2\ Variable}$		57	54	53	53	57	54	54
Cetane Index $_{4\ Variable}$	51 (min)	58	56	55	56	58	55	55
Cetane Number	47 (min)	57	55	53	54	57	56	53
Distillation, °C IBP		198	185	169	198	177	195	169
T_{10}		241	230	216	241	216	236	228
T_{20}		254	246	237	254	237	253	242
T_{50}		287	282	277	285	279	287	277
T_{90}	360 (max)	341	337	334	341	336	338	334
T_{95}		353	351	348	353	353	352	348
FBP		361	359	355	360	361	358	355
% FAME	5 (max)	0	0	0	0	0	0	0

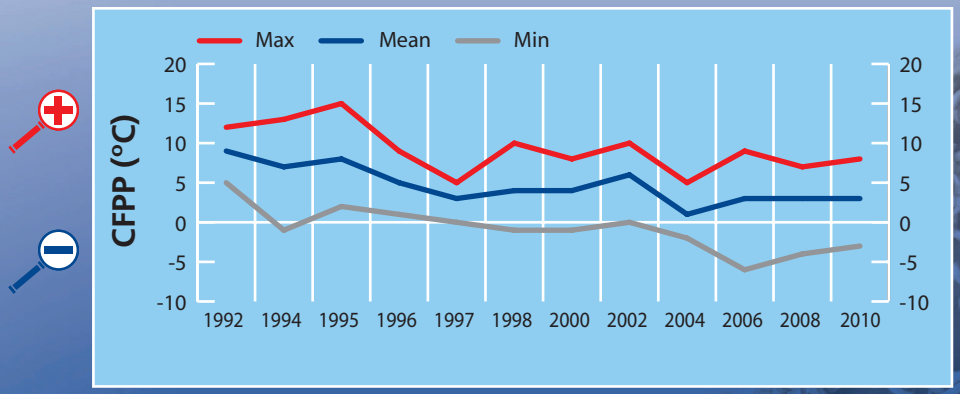
Singapore

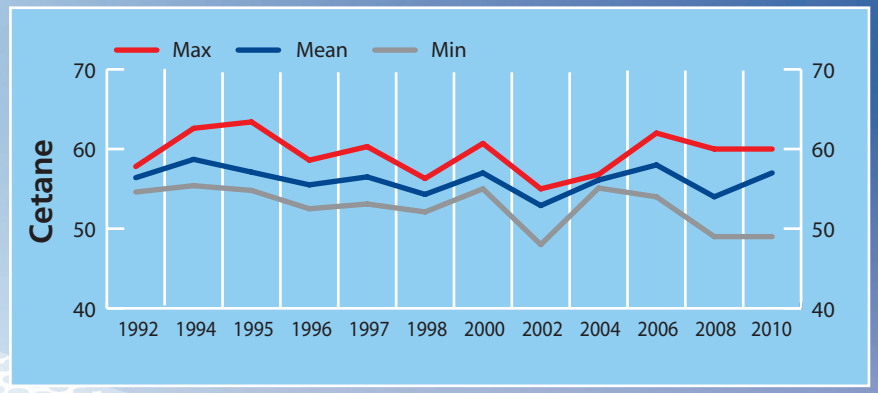
National Standards and physical inspection data

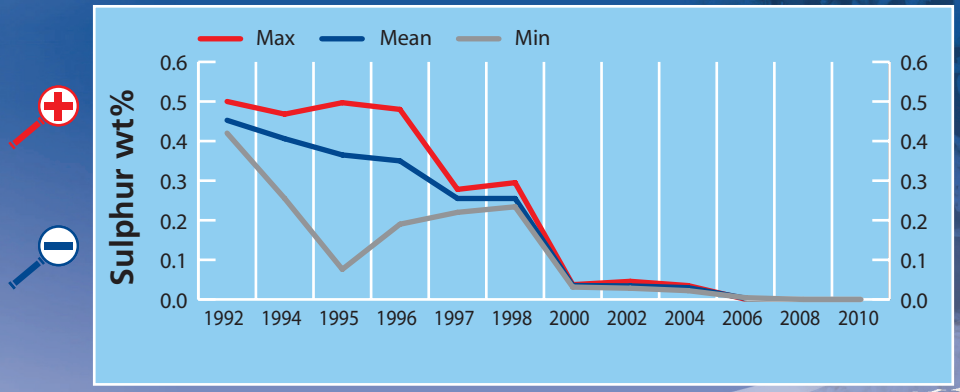
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002857	DIES 1002858	DIES 1002859	DIES 1002860
Cloud Point, °C		9	6	0	9	6	9	0
CFPP, °C		8	3	-3	8	2	6	-3
Pour Point, °C		6	2	-3	6	0	6	-3
HFRR, µm		353	299	232	232	316	296	353
Wax Content @ 10°C Below Cloud, wt%		3.3	2.7	1.2	3.1	1.2	3.3	3.0
Rancimat, hrs		>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.5 (max)	0.0041	0.0033	0.0016	0.0037	0.0041	0.0038	0.0016
Density @15°C, kg/m^3		856	842	829	841	856	842	829
Viscosity @ 40°C, cSt		3.67	3.38	3.15	3.28	3.15	3.45	3.67
Cetane Index $_{2\ Variable}$		58	56	50	58	50	58	58
Cetane Index $_{4\ Variable}$		64	59	49	64	49	63	61
Cetane Number		60	57	49	60	49	60	58
Distillation, °C IBP		189	180	168	185	179	168	189
T_{10}		262	245	219	262	219	262	237
T_{20}		280	263	239	279	239	280	255
T_{50}		316	303	287	316	293	316	287
T_{90}		369	361	339	369	369	368	339
T_{95}		386	377	357	383	386	381	357
FBP		394	385	369	390	394	388	369
% FAME		0	0	0	0	0	0	0

Singapore


Max
Mean
Min
Cloud (°C)
25
20
15
10
5
0
-5
1992 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
20
15
10
5
0
-5
-10
1992 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
70
60
50
40
1992 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1992 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

Thailand

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002861	DIES 1002862	DIES 1002863	DIES 1002864	DIES 1002865	DIES 1002867	DIES 1002868
Cloud Point, °C		12	8	1	8	10	6	8	8	9	12
CFPP, °C		9	5	-2	7	8	3	3	1	3	9
Pour Point, °C	10 (max)	9	3	-6	3	6	0	3	3	0	9
HFRR, µm	460 (max)	243	201	166	196	198	166	243	204	204	215
Wax Content @ 10°C Below Cloud, wt%		4.4	3.0	2.3	3.1	3.3	3.0	2.4	2.4	2.3	4.3
Rancimat, hrs		>30	>30	>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.035 (max)	0.0290	0.0160	0.0026	0.0035	0.0078	0.0153	0.0230	0.0229	0.0264	0.0038
Density @15°C, kg/m^3	810 - 870	838	833	820	832	824	833	835	837	837	835
Viscosity @ 40°C, cSt	1.8 - 4.1	3.65	3.27	2.85	3.34	3.40	3.22	3.12	3.18	3.12	3.65
Cetane Index $_{2\ Variable}$		61	57	54	58	60	58	55	56	54	57
Cetane Index $_{4\ Variable}$	47 (min)*	63	58	55	59	63	58	56	57	55	59
Cetane Number	47 (min)*	63	59	56	59	59	58	56	57	56	61
Distillation, °C IBP		199	181	165	178	180	176	177	181	179	196
T_{10}		239	223	203	224	227	220	218	221	218	238
T_{20}		255	243	227	247	247	242	238	242	236	255
T_{50}		291	288	282	290	289	290	283	288	282	291
T_{90}		357	353	348	351	355	351	355	354	354	354
T_{95}		376	371	367	368	373	368	375	373	376	370
FBP		386	380	374	377	381	376	386	384	385	379
% FAME		5	4	2	5	2	5	2	5	2	5

Specification shown is HSD grade
*Cetane number or cetane index may be used

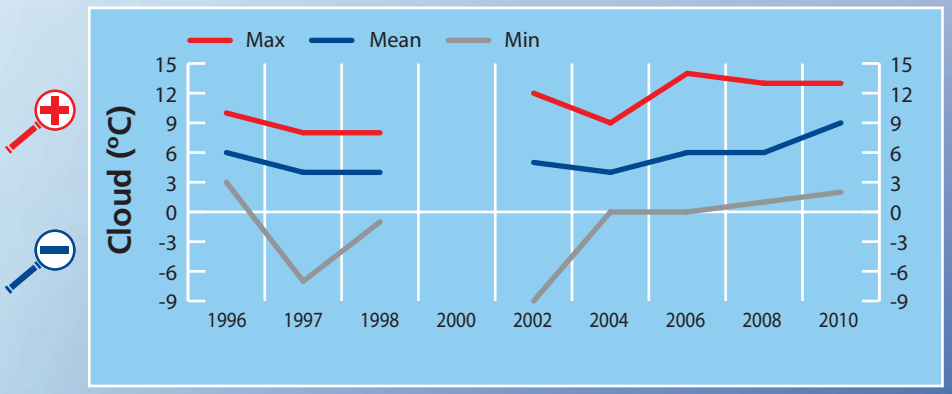
Thailand (continued)

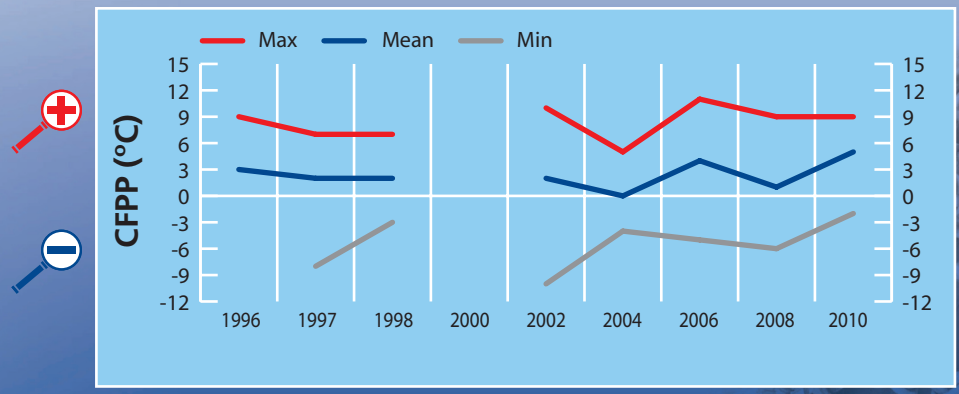
National Standards and physical inspection data

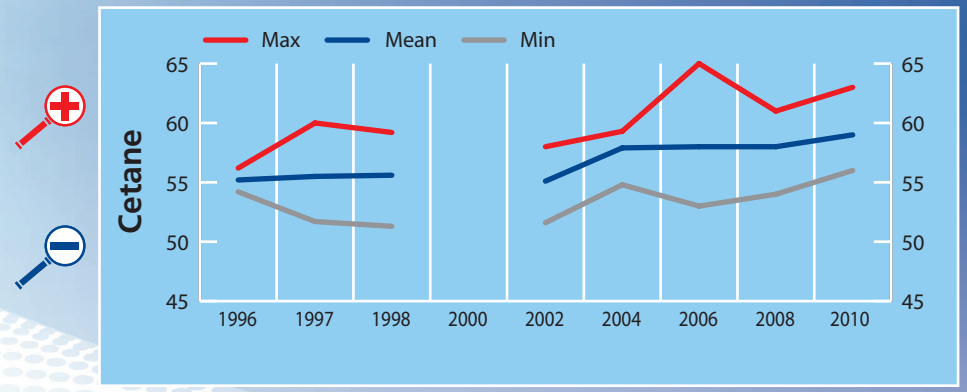
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1002869	DIES 1002870	DIES 1002871	DIES 1002872	DIES 1002873
Cloud Point, °C		12	8	1	12	6	1	8	9
CFPP, °C		9	5	-2	9	5	-2	3	8
Pour Point, °C	10 (max)	9	3	-6	9	0	-6	0	3
HFRR, µm	460 (max)	243	201	166	172	174	214	195	230
Wax Content @ 10°C Below Cloud, wt%		4.4	3.0	2.3	4.4	2.5	2.4	2.8	3.2
Rancimat, hrs		>30	>30	>30	>30	>30	>30	>30	>30
Sulphur, wt%	0.035 (max)	0.0290	0.0160	0.0026	0.0039	0.0265	0.0026	0.0277	0.0290
Density @15°C, kg/m^3	810 - 870	838	833	820	833	832	820	837	838
Viscosity @ 40°C, cSt	1.8 - 4.1	3.65	3.27	2.85	3.65	3.33	2.85	3.16	3.24
Cetane Index $_{2\ Variable}$		61	57	54	57	58	61	55	55
Cetane Index $_{4\ Variable}$	47 (min)*	63	58	55	60	59	62	55	55
Cetane Number	47 (min)*	63	59	56	61	59	60	57	63
Distillation, °C IBP		199	181	165	199	183	165	181	173
T_{10}		239	223	203	239	226	203	220	221
T_{20}		255	243	227	255	243	227	240	243
T_{50}		291	288	282	290	290	285	285	287
T_{90}		357	353	348	354	354	348	352	357
T_{95}		376	371	367	371	370	367	372	375
FBP		386	380	374	377	377	374	380	380
% FAME		5	4	2	2	4	4	4	2

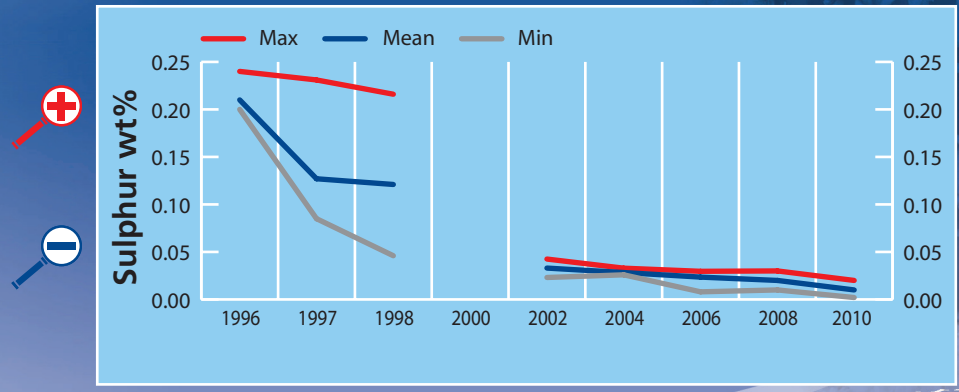
Specification shown is HSD grade
*Cetane number or cetane index may be used

Thailand


Max
Mean
Min
Cloud (°C)
15
12
9
6
3
0
-3
-6
-9
1996
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
CFPP (°C)
15
12
9
6
3
0
-3
-6
-9
-12
1996
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Cetane
65
60
55
50
45
1996
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Sulphur wt%
0.25
0.20
0.15
0.10
0.05
0.00
1996
1997
1998
2000
2002
2004
2006
2008
2010

Worldwide Survey – The Americas

Argentina

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1004235	DIES 1004236	DIES 1004237	DIES 1004238	DIES 1004239	DIES 1004240	DIES 1004241
Cloud Point, °C		3	-1	-11	1	1	1	0	3	-5	-11
CFPP, °C		-10	-16	-24	-14	-14	-15	-22	-13	-16	-24
Pour Point, °C		-9	-18	-27	-15	-18	-15	-27	-12	-21	-24
HFRR, µm		355	232	196	228	220	243	215	248	248	229
Wax Content @ 10°C Below Cloud, wt%		3.5	1.6	0.7	1.8	3.5	1.8	1.6	1.5	1.7	1.6
Rancimat, hrs		>30	>20	1	>30	>30	>30	>30	>30	>30	25
Sulphur, wt%	0.20 (max)	0.1290	0.0803	0.0007	0.1290	0.0780	0.1060	0.0027	0.1010	0.1150	0.0007
Density @15°C, kg/m^3		862	846	831	839	849	855	848	862	846	834
Viscosity @ 40°C, cSt	2.0 - 4.5	3.71	3.14	2.47	2.67	3.51	3.37	3.36	3.71	2.82	2.56
Cetane Index $_{2\ Variable}$		54	51	48	52	52	50	52	48	50	52
Cetane Index $_{4\ Variable}$	46 (min)	53	50	48	50	52	49	52	48	49	52
Cetane Number	49 (min)	58	53	48	52	53	53	58	54	52	52
Distillation, °C IBP		184	170	146	146	175	169	178	184	170	181
T_{10}		233	213	192	193	223	215	222	233	204	210
T_{20}		250	232	211	217	244	243	244	248	223	222
T_{50}	310 (max)	296	281	261	272	293	291	289	293	276	262
T_{90}	360 (max)	359	349	329	344	356	352	348	359	340	329
T_{95}		382	369	343	362	375	372	370	382	356	343
FBP		392	379	352	375	384	381	379	391	366	352
% FAME	5 (min)	6	5	0	5	5	5	5	5	5	5

Specification shown for Grade 2 fuels (in cities with more than 50,000 inhabitants sulphur level is 0.015wt%)

Argentina (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1004242	DIES 1004294	DIES 1004296	DIES 1004297	DIES 1004298	DIES 1004377	DIES 1004379
Cloud Point, °C		3	-1	-11	2	0	2	2	2	-4	3
CFPP, °C		-10	-16	-24	-16	-20	-14	-16	-14	-18	-15
Pour Point, °C		-9	-18	-27	-18	-21	-15	-18	-12	-24	-18
HFRR, µm		355	232	196	252	201	229	196	234	229	201
Wax Content @ 10°C Below Cloud, wt%		3.5	1.6	0.7	1.1	1.7	2.1	1.6	1.7	1.6	1.7
Rancimat, hrs		>30	>20	1	>30	>30	>30	>30	>30	1	1
Sulphur, wt%	0.20 (max)	0.1290	0.0803	0.0007	0.1180	0.0027	0.1290	0.1030	0.0961	0.0894	0.1050
Density @15°C, kg/m^3		862	846	831	835	848	839	850	861	849	849
Viscosity @ 40°C, cSt	2.0 - 4.5	3.71	3.14	2.47	2.74	3.42	3.32	3.45	3.60	2.76	3.66
Cetane Index $_{2\ Variable}$		54	51	48	54	52	53	52	49	49	53
Cetane Index $_{4\ Variable}$	46 (min)	53	50	48	53	52	52	51	48	48	52
Cetane Number	49 (min)	58	53	48	53	58	51	51	48	51	53
Distillation, °C IBP		184	170	146	161	179	146	169	184	167	174
T_{10}		233	213	192	192	228	200	216	232	201	224
T_{20}		250	232	211	211	249	224	239	250	218	247
T_{50}	310 (max)	296	281	261	277	290	276	293	293	274	296
T_{90}	360 (max)	359	349	329	357	347	346	359	358	344	359
T_{95}		382	369	343	382	365	364	378	379	363	379
FBP		392	379	352	391	377	375	386	390	373	387
% FAME	5 (min)	6	5	0	6	5	5	5	5	5	5

Specification shown for Grade 2 fuels (in cities with more than 50,000 inhabitants sulphur level is 0.015wt%)

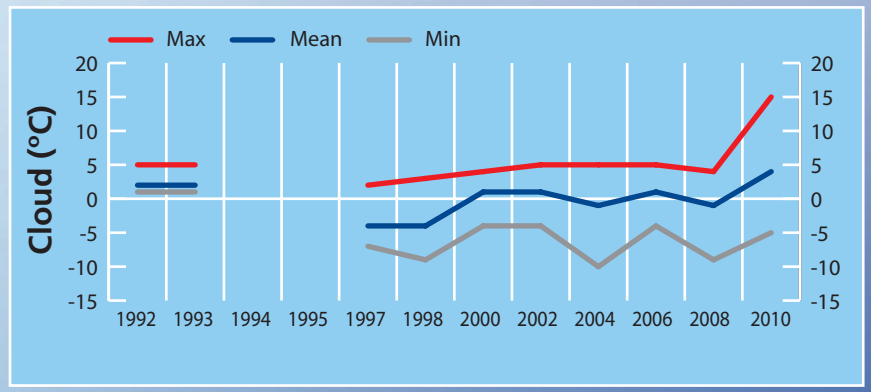
Argentina (continued)

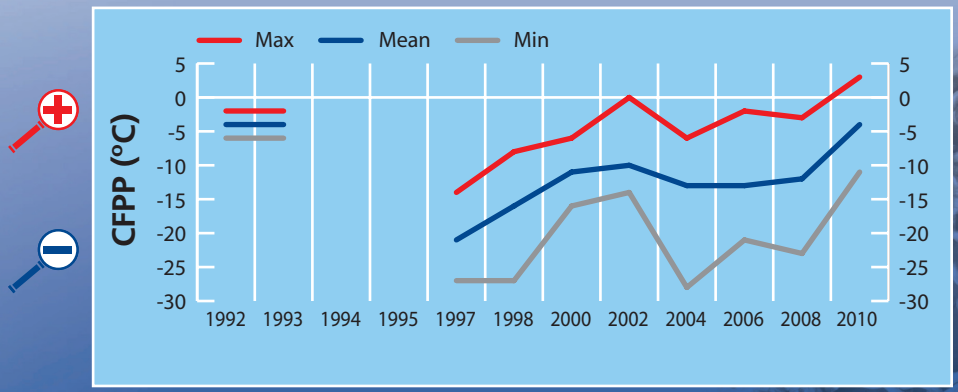
National Standards and physical inspection data

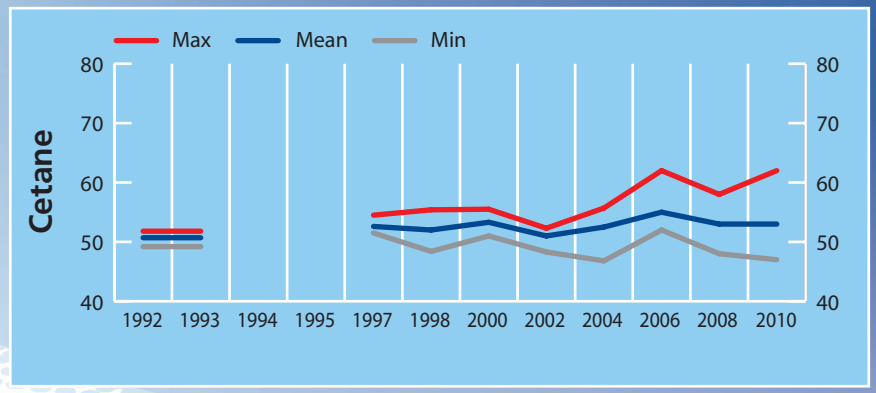
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1004462	DIES 1004463	DIES 1004464	DIES 1004465
Cloud Point, °C		3	-1	-11	-7	-5	1	0
CFPP, °C		-10	-16	-24	-20	-13	-15	-10
Pour Point, °C		-9	-18	-27	-18	-21	-18	-9
HFRR, µm		355	232	196	225	206	355	221
Wax Content @ 10°C Below Cloud, wt%		3.5	1.6	0.7	0.9	0.7	1.2	1.8
Rancimat, hrs		>30	>20	1	>30	>30	>30	>30
Sulphur, wt%	0.20 (max)	0.1290	0.0803	0.0007	0.0261	0.0313	0.1070	0.1060
Density @15°C, kg/m^3		862	846	831	834	831	852	856
Viscosity @ 40°C, cSt	2.0 - 4.5	3.71	3.14	2.47	2.56	2.47	3.12	3.34
Cetane Index $_{2\ Variable}$		54	51	48	52	52	48	50
Cetane Index $_{4\ Variable}$	46 (min)	53	50	48	52	52	48	49
Cetane Number	49 (min)	58	53	48	57	57	48	51
Distillation, °C IBP		184	170	146	171	169	177	166
T_{10}		233	213	192	203	198	215	220
T_{20}		250	232	211	217	212	232	245
T_{50}	310 (max)	296	281	261	264	261	275	293
T_{90}	360 (max)	359	349	329	336	339	356	353
T_{95}		382	369	343	355	358	382	371
FBP		392	379	352	367	370	392	380
% FAME	5 (min)	6	5	0	6	0	5	6

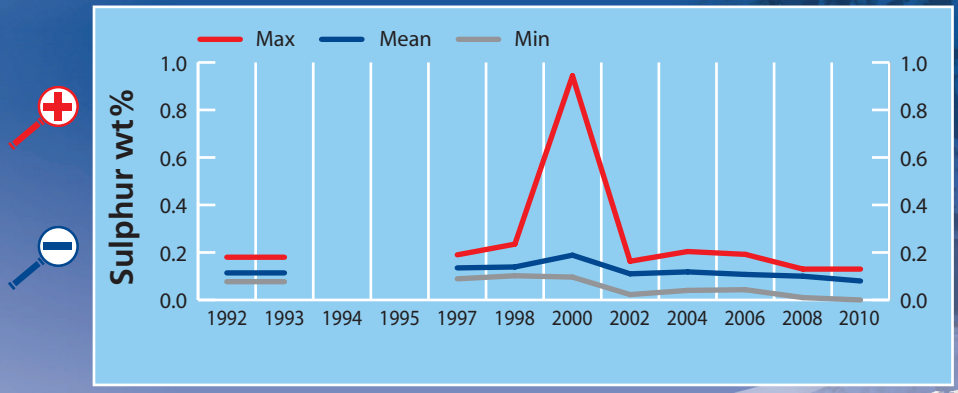
Specification shown for Grade 2 fuels (in cities with more than 50,000 inhabitants sulphur level is 0.015wt%)

Argentina


Max
Mean
Min
Cloud (°C)
20
15
10
5
0
-5
-10
-15
1992 1993 1994 1995 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
5
0
-5
-10
-15
-20
-25
-30
1992 1993 1994 1995 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
80
70
60
50
40
1992 1993 1994 1995 1997 1998 2000 2002 2004 2006 2008 2010

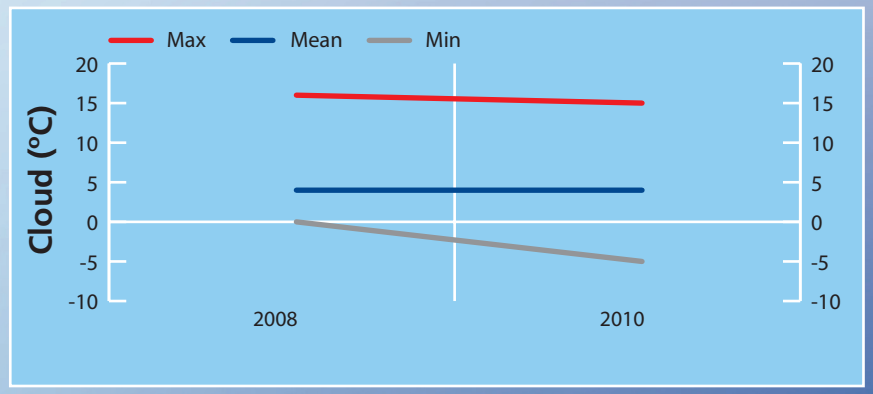

Max
Mean
Min
Sulphur wt%
1.0
0.8
0.6
0.4
0.2
0.0
1992 1993 1994 1995 1997 1998 2000 2002 2004 2006 2008 2010

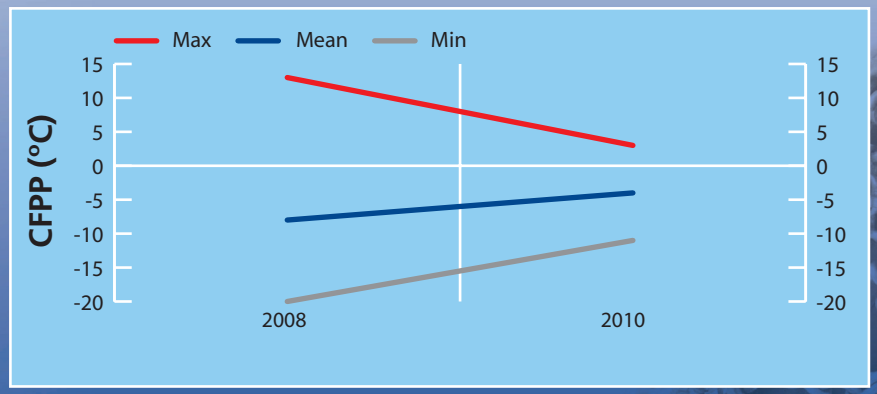
Brazil

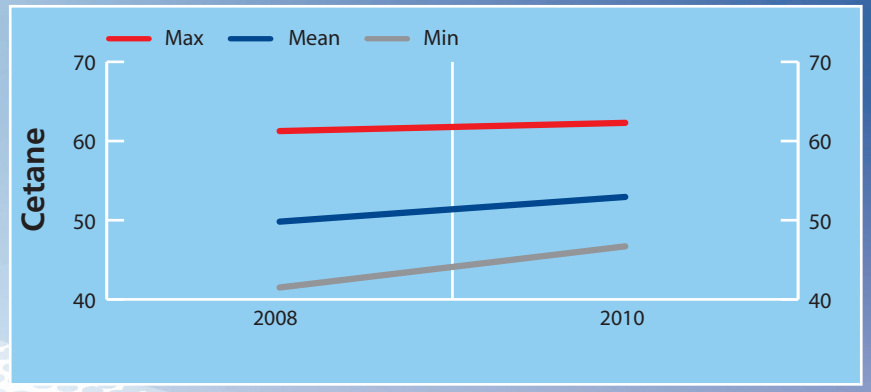
National Standards and physical inspection data

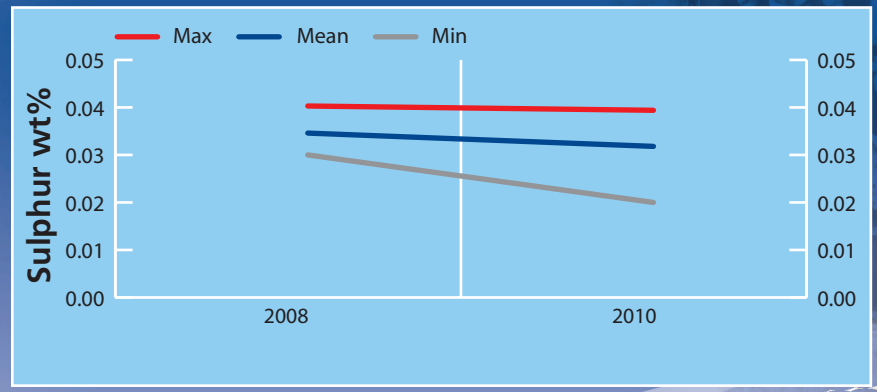
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1003666	DIES 1003667	DIES 1003670	DIES 1003671	DIES 1003672
Cloud Point, °C		15	4	-6	1	2	5	15	-6
CFPP, °C		3	-4	-11	-4	-2	-8	3	-11
Pour Point, °C		12	-8	-24	-6	-12	-24	12	-12
HFRR, µm		216	200	191	191	200	216	195	193
Wax Content @ 10°C Below Cloud, wt%		2.9	1.3	0.3	1.3	0.3	0.7	2.9	1.1
Rancimat, hrs		>30	>20	20	26	>30	>30	20	>30
Sulphur, wt%	0.05 (max)	0.0394	0.0318	0.0213	0.0333	0.0367	0.0285	0.0213	0.0394
Density @15°C, kg/m^3		851	843	833	841	851	850	833	842
Viscosity @ 40°C, cSt	2.0 - 5.0	3.28	2.91	2.56	3.27	2.75	2.58	3.28	2.71
Cetane Index $_{2\ Variable}$		58	52	47	54	48	47	58	50
Cetane Index $_{4\ Variable}$	46 (min)	56	50	45	54	45	45	56	49
Cetane Number	46 (min)	62	53	47	55	47	48	62	51
Distillation, °C IBP		158	142	131	145	139	138	131	158
T_{10}		214	189	171	214	176	171	187	199
T_{20}		240	216	190	240	200	190	229	220
T_{50}		293	278	268	288	273	268	293	269
T_{90}	360 (max)	373	359	338	354	366	373	362	338
T_{95}		405	385	361	374	398	405	386	361
FBP		411	394	374	385	406	411	393	374
% FAME	5 (min)	5	5	5	5	5	5	5	5

Brazil


Max
Mean
Min
Cloud (°C)
20
15
10
5
0
-5
-10
2008
2010


Max
Mean
Min
CFPP (°C)
15
10
5
0
-5
-10
-15
-20
2008
2010


Max
Mean
Min
Cetane
70
60
50
40
2008
2010


Max
Mean
Min
Sulphur wt%
0.05
0.04
0.03
0.02
0.01
0.00
2008
2010

Canada

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-56	E00232-109-57	E00232-109-58	E00232-109-59	E00232-109-60	E00232-109-61	E00232-109-62
Cloud Point, °C		-3	-27	-39	-21	-28	-37	-25	-39	-3	-24.
CFPP, °C		-8	-32	-47	-24	-29	-41	-30	-47	-8	-29
Pour Point, °C		-12	-29	<-45	-27	-36	<-44	-30	<-44	-12	-30
LTFT, °C		-5	-29	-41	-22	-26	-39	-27	-41	-5	-26
HFRR, µm	460 (max)	493	401	318	331	392	441	318	433	493	471
Wax Content @ 10°C Below Cloud, wt%		2.8	1.3	0.4	2.8	1.1	0.6	1.6	0.6	1.3	2.6
Rancimat, hrs											
Sulphur, wt%	0.0015 (max)	<0.001	<0.001	<0.001	0.0011	0.0006	0.0009	0.0008	0.0003	0.0012	0.0006
Density @15°C, kg/m^3		867	842	814	834	814	851	841	848	867	832
Viscosity @ 40°C, cSt	2.0 - 4.1*	3.94	2.38	1.61	2.39	1.61	2.23	2.37	2.37	3.94	2.13
Cetane Index $_{2\ Variable}$		52	46	41	51	48	41	47	44	46	49
Cetane Index $_{4\ Variable}$		52	46	41	50	48	41	47	43	45	489
Cetane Number	40 (min)	52	47	41	49	46	44	50	44	46	48
Distillation, °C IBP		194	169	153	162	156	178	166	181	194	165
T_{10}		237	202	175	207	175	204	203	201	237	202
T_{20}		252	217	186	226	186	216	218	214	252	216
T_{50}		286	252	222	257	222	243	254	249	286	249
T_{90}	360 (max)	339	304	287	299	287	292	309	300	339	290
FBP		365	332	314	320	320	320	339	327	365	314
% FAME		0	0	0	0	0	0	0	0	0	0

*for operating temperatures of below -20°C the minimum KV is 1.3cSt

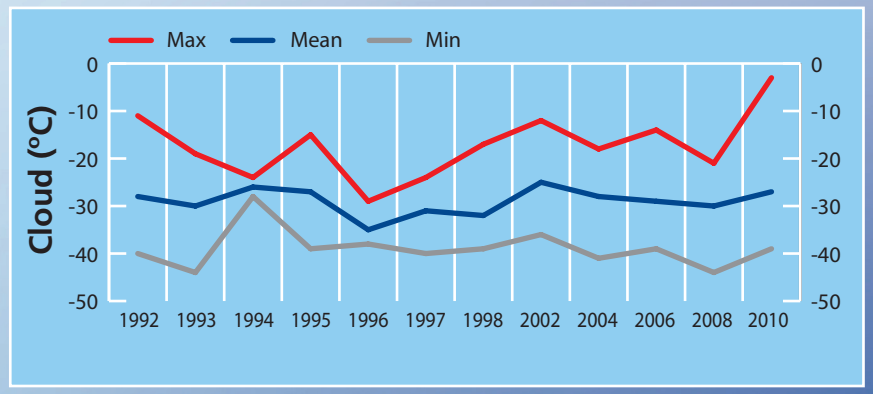
Canada (continued)

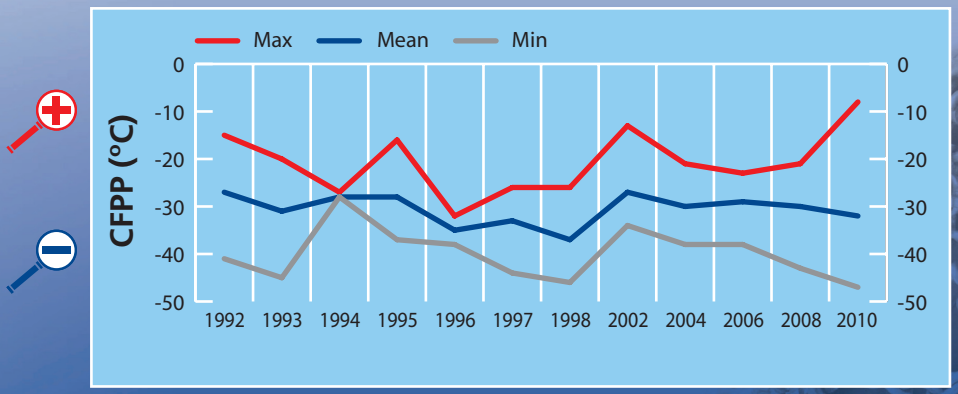
National Standards and physical inspection data

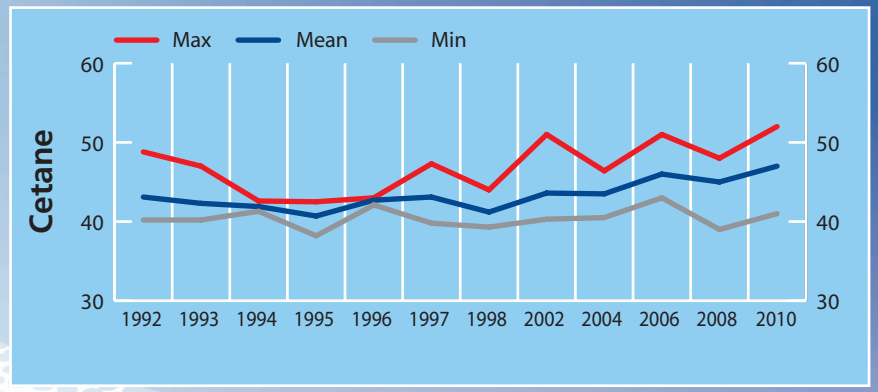
	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-63	E00232-109-64	E00232-109-65	E00232-109-66	E00232-109-67	E00232-109-68	E00232-109-69
Cloud Point, °C		-3	-27	-39	-24	-22	-38	-28	-25	-33	-33
CFPP, °C		-8	-32	-47	-29	-25	-46	-34	-29	-35	-36
Pour Point, °C		-12	-29	<-45	-30	-27	<-44	-33	-33	-36	<-45
LTFT, °C		-5	-29	-41	-25	-24	-40	-29	-26	-36	-34
HFRR, µm	460 (max)	493	401	318	336	362	441	487	357	342	411
Wax Content @ 10°C Below Cloud, wt%		2.8	1.3	0.4	1.2	1.7	0.5	1.3	1.3	1.7	0.4
Rancimat, hrs											
Sulphur, wt%	0.0015 (max)	<0.001	<0.001	<0.001	0.0009	0.0005	0.0004	0.0007	0.0008	0.0006	0.0007
Density @15°C, kg/m^3		867	842	814	842	826	851	835	846	849	853
Viscosity @ 40°C, cSt	2.0 - 4.1*	3.94	2.38	1.61	2.18	2.31	2.50	2.06	2.53	2.17	2.49
Cetane Index $_{2\ Variable}$		52	46	41	45	52	43	46	47	43	45
Cetane Index $_{4\ Variable}$		52	46	41	44	52	42	46	46	42	43
Cetane Number	40 (min)	52	47	41	49	52	44	49	49	44	41
Distillation, °C IBP		194	169	153	163	161	180	164	163	173	153
T_{10}		237	202	175	199	194	204	196	208	210	185
T_{20}		252	217	186	213	212	218	208	224	222	208
T_{50}		286	252	222	246	254	252	241	259	249	262
T_{90}	360 (max)	339	304	287	299	315	302	297	312	290	321
FBP		365	332	314	334	350	328	333	341	315	343
% FAME		0	0	0	0	0	0	0	0	0	0

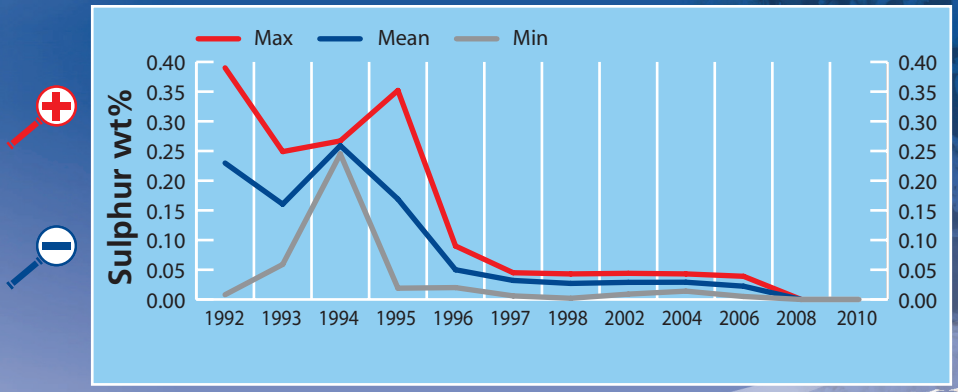
*for operating temperatures of below -20°C the minimum KV is 1.3cSt

Canada


Max
Mean
Min
Cloud (°C)
0
-10
-20
-30
-40
-50
1992 1993 1994 1995 1996 1997 1998 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
0
-10
-20
-30
-40
-50
1992 1993 1994 1995 1996 1997 1998 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
60
50
40
30
1992 1993 1994 1995 1996 1997 1998 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1992 1993 1994 1995 1996 1997 1998 2002 2004 2006 2008 2010

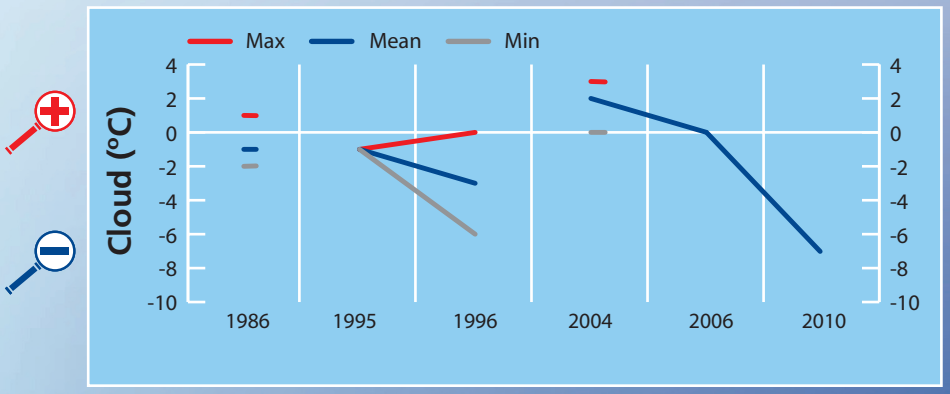
Colombia

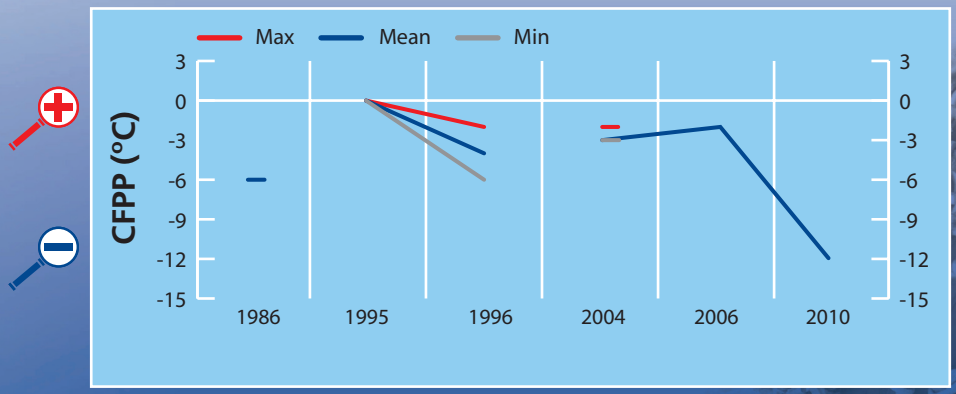
National Standards and physical inspection data

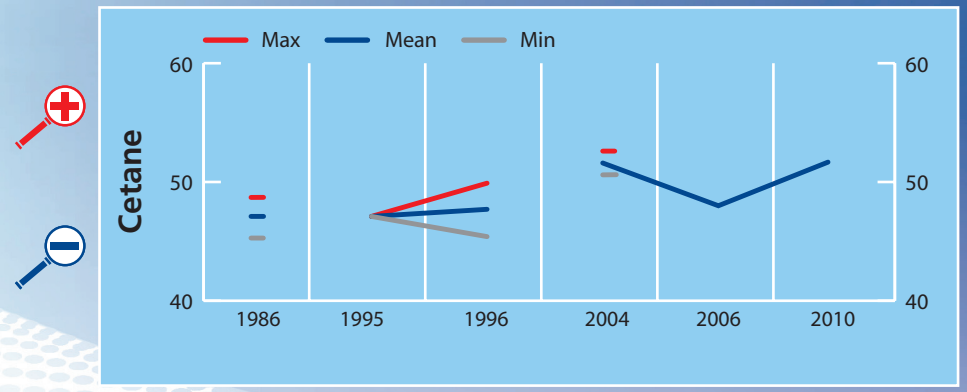
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1003251	DIES 1003252
Cloud Point, °C			-7		-7	-7
CFPP, °C			-12		-12	-12
Pour Point, °C			-12		-12	-12
HFRR, µm			201		220	181
Wax Content @ 10°C Below Cloud, wt%			2.6		2.6	2.6
Rancimat, hrs			>30		>30	>30
Sulphur, wt%	0.05 (max)		0.0371		0.0374	0.0367
Density @15°C, kg/m^3			837		837	837
Viscosity @ 40°C, cSt	1.9 - 5.0		2.61		2.57	2.65
Cetane Index $_{2\ Variable}$			51		51	51
Cetane Index $_{4\ Variable}$	45 (min)		51		51	51
Cetane Number	43 (min)		51		52	51
Distillation, °C IBP			179		178	180
T_{10}			206		206	206
T_{20}			220		219	221
T_{50}			266		266	266
T_{90}			331		331	331
T_{95}	360 (max)		345		345	345
FBP	390 (max)		356		357	356
% FAME	4.5 -5.5		9		9	9

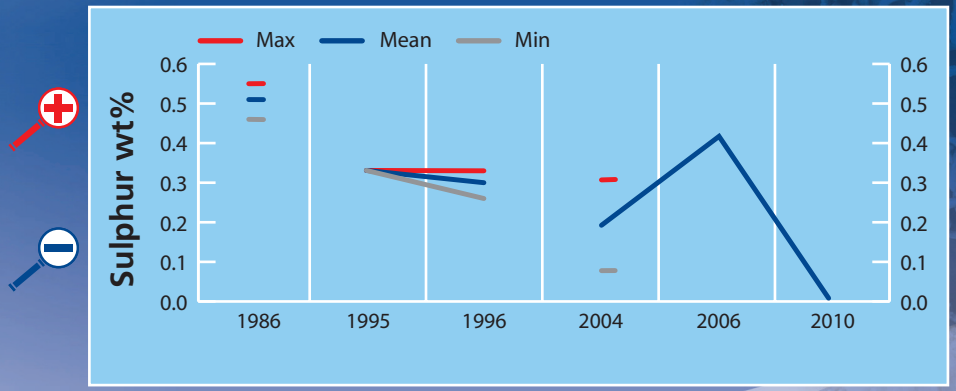
Specification shown is for standard grade diesel

Colombia


Max
Mean
Min
Cloud (°C)
4
2
0
-2
-4
-6
-8
-10
1986
1995
1996
2004
2006
2010


Max
Mean
Min
CFPP (°C)
3
0
-3
-6
-9
-12
-15
1986
1995
1996
2004
2006
2010


Max
Mean
Min
Cetane
60
50
40
1986
1995
1996
2004
2006
2010


Max
Mean
Min
Sulphur wt%
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1986
1995
1996
2004
2006
2010

Mexico

National Standards and physical inspection data

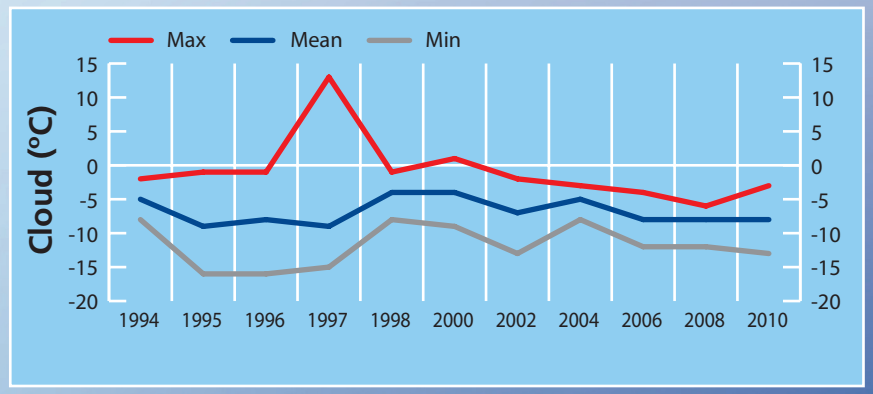
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1006709	DIES 1006710	DIES 1006712	DIES 1006713	DIES 1006714	DIES 1006715	DIES 1006716
Cloud Point, °C		-3	-8	-13	-10	-7	-9	-3	-10	-13	-8
CFPP, °C		-6	-10	-13	-12	-8	-11	-6	-12	-13	-10
Pour Point, °C	-5 (max)	-6	-15	-21	-15	-12	-15	-6	-21	-18	-15
HFRR, µm	520 (max)	538	398	354	538	386	382	372	371	401	354
Wax Content @ 10°C Below Cloud, wt%		2.1	1.6	1.1	1.2	1.9	1.4	1.5	1.5	1.9	1.1
Rancimat, hrs		>30	>20	9	>30	11	9	>30	14	>30	>30
Sulphur, wt%	0.0015 (max)	0.0423	0.0192	0.0009	0.0267	0.0009	0.0011	0.0013	0.0021	0.0423	0.0404
Density @15°C, kg/m^3		848	837	830	840	835	848	837	841	837	832
Viscosity @ 20°C, cSt	1.9 - 4.1	3.59	2.78	2.23	2.890	2.92	2.55	3.59	3.02	2.45	2.23
Cetane Index $_{2\ Variable}$	48 (min)	55	51	47	50	53	47	55	52	50	50
Cetane Index $_{4\ Variable}$	48 (min)	59	52	47	50	55	47	59	52	50	49
Cetane Number		65	57	51	54	60	51	65	57	53	53
Distillation, °C IBP		221	190	168	183	210	189	221	182	184	168
T_{10}	275 (max)	248	217	192	210	232	213	248	219	208	192
T_{20}		258	230	205	223	240	226	258	236	222	205
T_{50}		284	266	251	262	268	262	284	275	260	251
T_{90}	345 (max)	339	330	322	328	329	327	339	329	322	332
T_{95}		355	347	339	345	345	346	355	347	339	352
FBP		366	359	351	359	360	360	366	359	351	364
% FAME		0	0	0	0	0	0	0	0	0	0

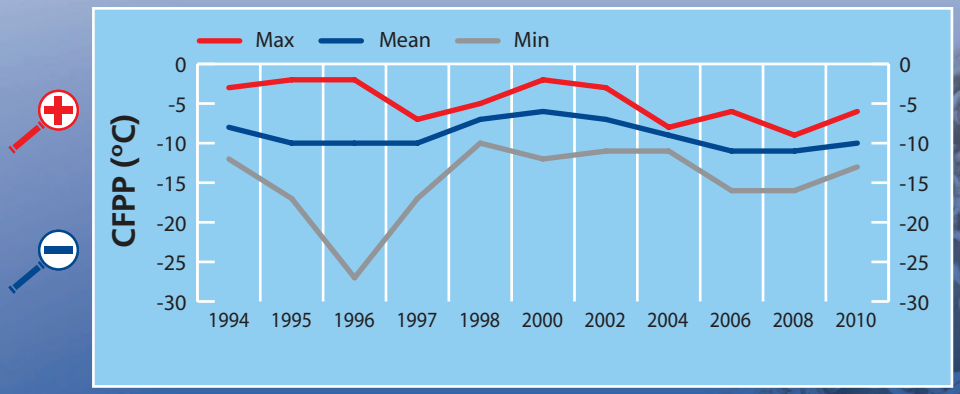
Mexico (continued)

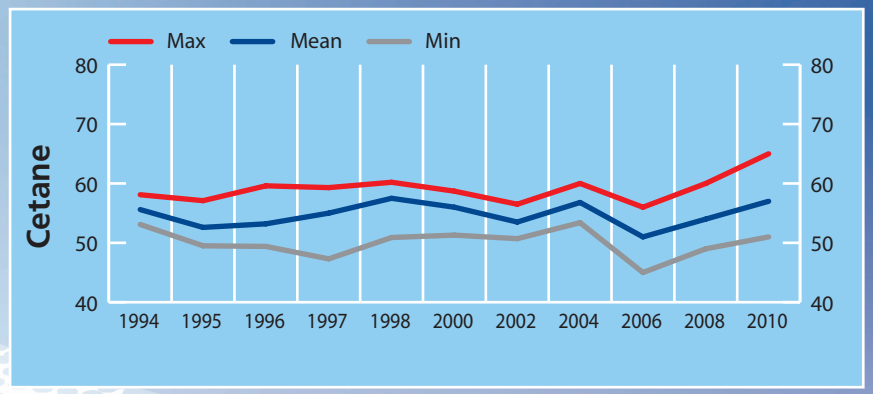
National Standards and physical inspection data

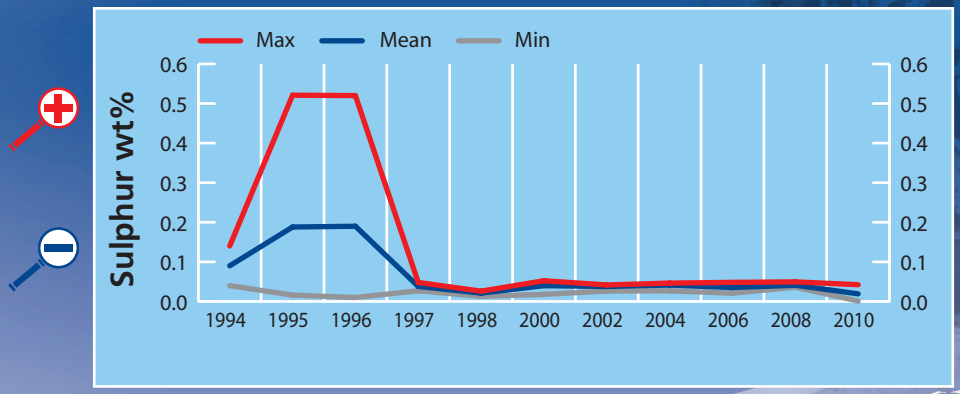
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1006717
Cloud Point, °C		-3	-8	-13	-8
CFPP, °C		-6	-10	-13	-10
Pour Point, °C	-5 (max)	-6	-15	-21	-15
HFRR, µm	520 (max)	538	398	354	379
Wax Content @ 10°C Below Cloud, wt%		2.1	1.6	1.1	2.1
Rancimat, hrs		>30	>20	9	>30
Sulphur, wt%	0.0015 (max)	0.0423	0.0192	0.0009	0.0384
Density @15°C, kg/m^3		848	837	830	830
Viscosity @ 20°C, cSt	1.9 - 4.1	3.59	2.78	2.23	2.61
Cetane Index $_{2\ Variable}$	48 (min)	55	51	47	54
Cetane Index $_{4\ Variable}$	48 (min)	59	52	47	55
Cetane Number		65	57	51	62
Distillation, °C IBP		221	190	168	185
T_{10}	275 (max)	248	217	192	214
T_{20}		258	230	205	228
T_{50}		284	266	251	267
T_{90}	345 (max)	339	330	322	329
T_{95}		355	347	339	345
FBP		366	359	351	355
% FAME		0	0	0	0

Mexico


Max
Mean
Min
Cloud (°C)
15
10
5
0
-5
-10
-15
-20
1994
1995
1996
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
CFPP (°C)
0
-5
-10
-15
-20
-25
-30
1994
1995
1996
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Cetane
80
70
60
50
40
1994
1995
1996
1997
1998
2000
2002
2004
2006
2008
2010


Max
Mean
Min
Sulphur wt%
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1994
1995
1996
1997
1998
2000
2002
2004
2006
2008
2010

Peru

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1003465
Cloud Point, °C			-14		-14
CFPP, °C	-8 (max)		-16		-16
Pour Point, °C	4 (max)		-24		-24
HFRR, µm	520 (max)		255		255
Wax Content @ 10°C Below Cloud, wt%			1.2		1.2
Rancimat, hrs			>20		23
Sulphur, wt%	0.005 (max)		0.0015		0.0015
Density @15°C, kg/m^3			834		834
Viscosity @ 40°C, cSt	1.90 - 4.10		2.32		2.32
Cetane Index $_{2\ Variable}$			50		50
Cetane Index $_{4\ Variable}$	45 (min)		50		50
Cetane Number	45 (min)		48		48
Distillation, °C IBP			167		167
T_{10}			196		196
T_{20}			210		210
T_{50}			255		255
T_{90}	282 -360		324		324
T_{95}			342		342
FBP			355		355
% FAME	2 (max)		2		2

Specification shown for B2 S-50 grade diesel

USA - Mid West

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-1	E00232-109-2	E00232-109-3	E00232-109-4	E00232-109-5	E00232-109-6	E00232-109-7
Cloud Point, °C		-4	-16	-27	-13	-8	-12	-12	-10	-14	-15
CFPP, °C		-11	-23	-41	-15	-11	-13	-15	-16	-17	-18
Pour Point, °C		18	-25	<-46	-21	-21	-21	-24	-27	-21	-21
LTFT, °C		-6	-18	-32	-13	-10	-14	-14	-14	-17	-17
HFRR, µm	520 (max)	651	380	197	394	413	323	471	383	411	596
Wax Content @ 10°C Below Cloud, wt%		3.0	1.5	0.8	2.1	1.1	1.2	1.3	2.5	1.7	1.9
Rancimat, hrs											
Sulphur, wt%	0.0015 (max)	0.0015	0.0009	0.0005	0.0008	0.0010	0.0006	0.0008	0.0010	0.0007	0.0009
Density @15°C, kg/m³		862	844	819	835	862	855	848	841	831	841
Viscosity @ 40°C, cSt	1.9 - 4.1	3.24	2.48	2.00	2.47	3.24	3.01	2.60	2.49	2.06	2.58
Cetane Index 2 Variable		53	47	42	51	45	46	46	49	49	49
Cetane Index 4 Variable	40 (min)	54	46	42	51	44	46	46	48	49	48
Cetane Number	40 (min)	54	46	41	50	52	46	44	48	47	50
Distillation, °C IBP		183	174	159	167	168	183	169	170	159	168
T_{10}		219	206	187	203	219	219	203	202	187	208
T_{20}		237	221	200	219	237	234	221	221	204	223
T_{50}		274	257	231	260	274	269	260	262	248	261
T_{90}	282 - 338	333	315	288	319	333	328	319	319	308	317
FBP		360	343	311	346	358	353	349	343	337	344
% FAME		11	2	0	0	0	0	0	0	0	0

USA - Mid West (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-8	E00232-109-9	E00232-109-10	E00232-109-11	E00232-109-12	E00232-109-13	E00232-109-14
Cloud Point, °C		-4	-16	-27	-13	-16	-9	-14	-15	-12	-20
CFPP, °C		-11	-23	-41	-32	-18	-22	-31	-24	-21	-36
Pour Point, °C		18	-25	<-46	-30	-27	-30	<-45	-39	-30	<-43
LTFT, °C		-6	-18	-32	-21	-16	-12	-20	-18	-14	-24
HFRR, µm	520 (max)	651	380	197	282	580	417	269	197	222	333
Wax Content @ 10°C Below Cloud, wt%		3.0	1.5	0.8	1.1	0.9	1.1	1.4	1.3	1.7	0.8
Rancimat, hrs											
Sulphur, wt%	0.0015 (max)	0.0015	0.0009	0.0005	0.0012	0.0007	0.0008	0.0011	0.0013	0.0009	0.0014
Density @15°C, kg/m³		862	844	819	843	819	854	859	860	860	858
Viscosity @ 40°C, cSt	1.9 - 4.1	3.24	2.48	2.00	2.55	2.00	2.40	2.63	2.71	2.71	2.60
Cetane Index 2 Variable		53	47	42	48	48	43	45	44	45	43
Cetane Index 4 Variable	40 (min)	54	46	42	48	50	42	43	43	44	42
Cetane Number	40 (min)	54	46	41	47	49	48	46	43	44	41
Distillation, °C IBP		183	174	159	182	176	175	173	173	176	177
T_{10}		219	206	187	212	192	197	204	213	209	211
T_{20}		237	221	200	226	200	211	224	229	229	225
T_{50}		274	257	231	257	231	252	271	269	273	259
T_{90}	282 - 338	333	315	288	314	314	326	329	329	331	319
FBP		360	343	311	349	346	353	352	350	353	348
% FAME		11	2	0	0	0	0	10	10	10	0

USA - Mid West (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-17	E00232-109-18	E00232-109-19	E00232-109-20	E00232-109-26	E00232-109-28	E00232-109-31
Cloud Point, °C		-4	-16	-27	-12	-20	-23	-4	-15	-27	-15
CFPP, °C		-11	-23	-41	-15	-23	-26	-13	-35	-41	-21
Pour Point, °C		18	-25	<-46	18	-33	-27	-18	<-43	<-46	-39
LTFT, °C		-6	-18	-32	-14	-22	-23	-6	-22	-32	-23
HFRR, µm	520 (max)	651	380	197	381	353	466	332	338	284	305
Wax Content @ 10°C Below Cloud, wt%		3.0	1.5	0.8	1.4	1.0	3.0	1.8	1.3	0.9	1.3
Rancimat, hrs											
Sulphur, wt%	0.0015 (max)	0.0015	0.0009	0.0005	0.0009	0.0012	0.0006	0.0009	0.0010	0.0010	0.0012
Density @15°C, kg/m³		862	844	819	841	852	824	844	857	833	857
Viscosity @ 40°C, cSt	1.9 - 4.1	3.24	2.48	2.00	2.41	2.42	2.00	2.91	2.49	2.16	2.53
Cetane Index 2 Variable		53	47	42	48	44	50	50	44	47	44
Cetane Index 4 Variable	40 (min)	54	46	42	48	44	50	50	42	48	42
Cetane Number	40 (min)	54	46	41	47	42	49	49	42	48	42
Distillation, °C IBP		183	174	159	169	169	174	168	166	181	167
T_{10}		219	206	187	203	208	200	211	204	203	203
T_{20}		237	221	200	219	221	211	231	221	213	221
T_{50}		274	257	231	259	256	242	271	261	243	261
T_{90}	282 - 338	333	315	288	316	316	288	331	317	309	319
FBP		360	343	311	347	344	311	360	348	334	352
% FAME		11	2	0	0	0	0	0	0	4	0

USA - Mid West (continued)

National Standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-32	E00232-109-33	E00232-109-34	E00232-109-35	E00232-109-42	E00232-109-44	E00232-109-45
Cloud Point, °C		-4	-16	-27	-9	-18	-14	-18	-19	-22	-11
CFPP, °C		-11	-23	-41	-12	-24	-17	-23	-24	-25	-18
Pour Point, °C		18	-25	<-46	-18	-27	-21	-27	-27	-27	-24
LTFT, °C		-6	-18	-32	-9	-18	-14	-17	-20	-22	-10
HFRR, µm	520 (max)	651	380	197	582	353	543	651	296	513	198
Wax Content @ 10°C Below Cloud, wt%		3.0	1.5	0.8	1.4	1.0	1.8	1.2	0.9	3.0	2.3
Rancimat, hrs											
Sulphur, wt%	0.0015 (max)	0.0015	0.0009	0.0005	0.0008	0.0009	0.0008	0.0008	0.0007	0.0005	0.0007
Density @15°C, kg/m³		862	844	819	839	836	825	837	850	826	839
Viscosity @ 40°C, cSt	1.9 - 4.1	3.24	2.48	2.00	2.58	2.01	2.45	2.08	2.67	2.04	2.56
Cetane Index 2 Variable		53	47	42	50	43	53	44	45	50	51
Cetane Index 4 Variable	40 (min)	54	46	42	49	45	54	45	44	50	50
Cetane Number	40 (min)	54	46	41	47	46	52	46	44	49	51
Distillation, °C IBP		183	174	159	169	180	177	178	182	174	176
T_{10}		219	206	187	202	206	211	204	212	200	204
T_{20}		237	221	200	216	212	222	212	223	212	221
T_{50}		274	257	231	260	233	253	236	256	243	267
T_{90}	282 - 338	333	315	288	326	296	317	298	309	291	327
FBP		360	343	311	353	331	342	332	340	314	344
% FAME		11	2	0	0	0	0	0	0	0	11

USA - Mid West (continued)

National Standards and physical inspection data

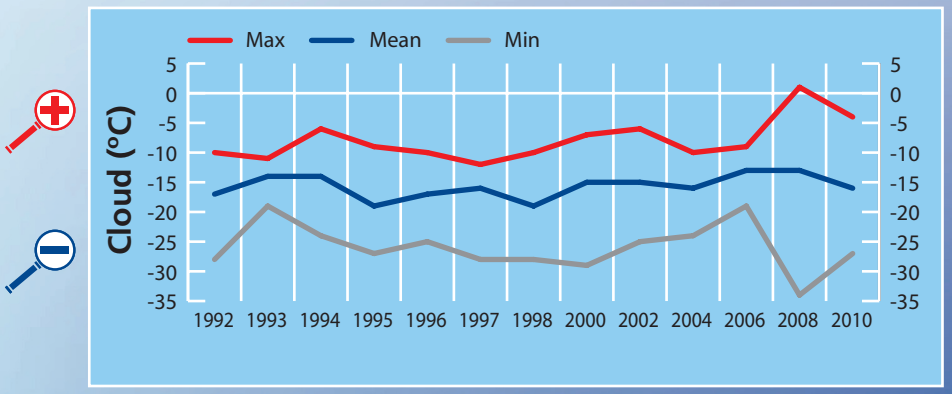
	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-32	E00232-109-33	E00232-109-34	E00232-109-35	E00232-109-42	E00232-109-44	E00232-109-45
Cloud Point, °C		-4	-16	-27	-9	-18	-14	-18	-19	-22	-11
CFPP, °C		-11	-23	-41	-12	-24	-17	-23	-24	-25	-18
Pour Point, °C		18	-25	<-46	-18	-27	-21	-27	-27	-27	-24
LTFT, °C		-6	-18	-32	-9	-18	-14	-17	-20	-22	-10
HFRR, µm	520 (max)	651	380	197	582	353	543	651	296	513	198
Wax Content @ 10°C Below Cloud, wt%		3.0	1.5	0.8	1.4	1.0	1.8	1.2	0.9	3.0	2.3
Rancimat, hrs											
Sulphur, wt%	0.0015 (max)	0.0015	0.0009	0.0005	0.0008	0.0009	0.0008	0.0008	0.0007	0.0005	0.0007
Density @15°C, kg/m³		862	844	819	839	836	825	837	850	826	839
Viscosity @ 40°C, cSt	1.9 - 4.1	3.24	2.48	2.00	2.58	2.01	2.45	2.08	2.67	2.04	2.56
Cetane Index 2 Variable		53	47	42	50	43	53	44	45	50	51
Cetane Index 4 Variable	40 (min)	54	46	42	49	45	54	45	44	50	50
Cetane Number	40 (min)	54	46	41	47	46	52	46	44	49	51
Distillation, °C IBP		183	174	159	169	180	177	178	182	174	176
T_{10}		219	206	187	202	206	211	204	212	200	204
T_{20}		237	221	200	216	212	222	212	223	212	221
T_{50}		274	257	231	260	233	253	236	256	243	267
T_{90}	282 - 338	333	315	288	326	296	317	298	309	291	327
FBP		360	343	311	353	331	342	332	340	314	344
% FAME		11	2	0	0	0	0	0	0	0	11

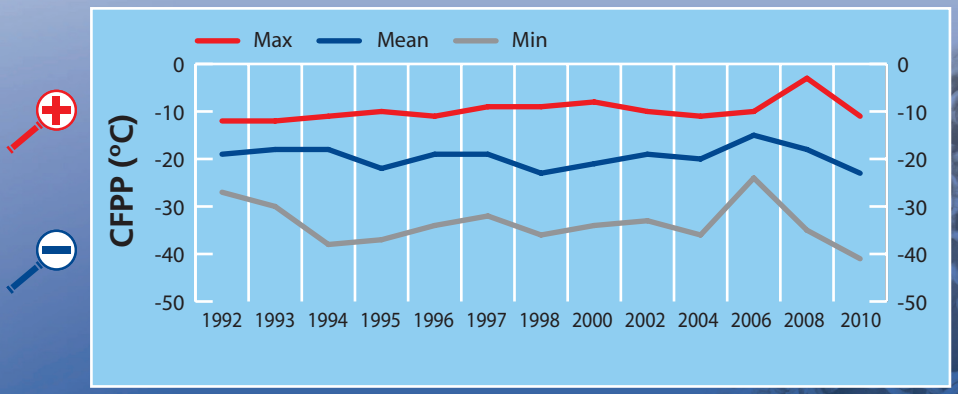
USA - Mid West (continued)

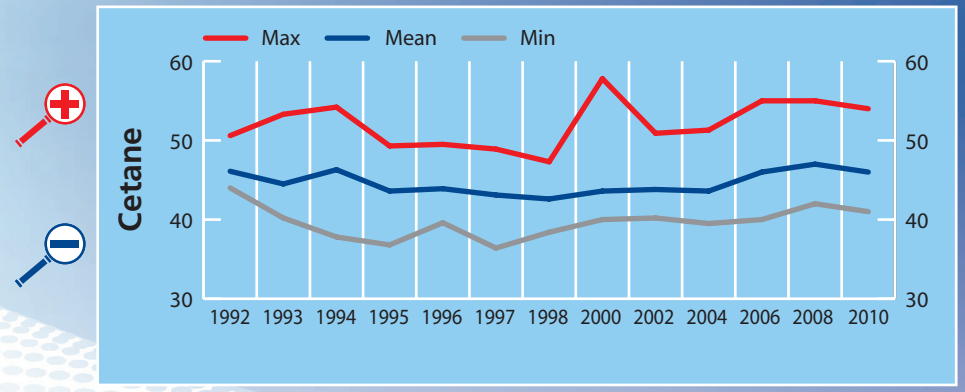
National Standards and physical inspection data

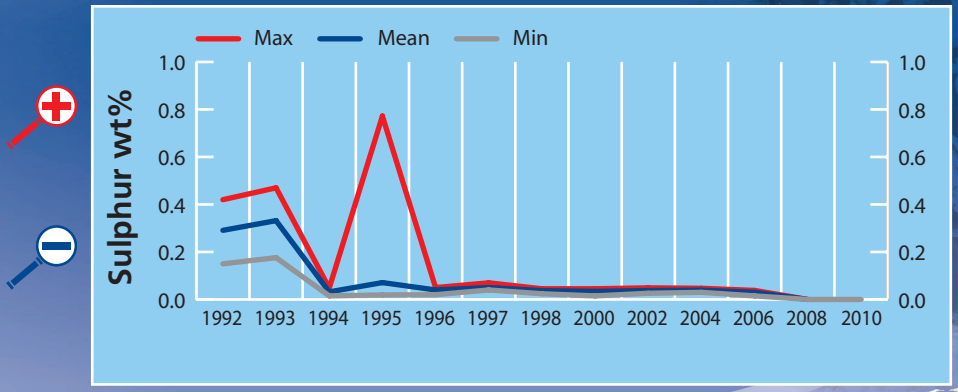
	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-47	E00232-109-48	E00232-109-49	E00232-109-50	E00232-109-52	E00232-109-53	E00232-109-54
Cloud Point, °C		-4	-16	-27	-17	-23	-20	-27	-15	-20	-18
CFPP, °C		-11	-23	-41	-36	-30	-26	-29	-31	-30	-27
Pour Point, °C		18	-25	<-46	<-44	<-44	-33	-33	<-44	-30	-27
LTFT, °C		-6	-18	-32	-19	-28	-23	-28	-18	-23	-22
HFRR, µm	520 (max)	651	380	197	332	320	366	456	420	244	266
Wax Content @ 10°C Below Cloud, wt%		3.0	1.5	0.8	1.0	0.9	1.8	1.9	1.4	1.2	1.2
Rancimat, hrs											
Sulphur, wt%	0.0015 (max)	0.0015	0.0009	0.0005	0.0013	0.0012	0.0010	0.0015	0.0006	0.0012	0.0011
Density @15°C, kg/m³		862	844	819	859	850	848	843	835	842	843
Viscosity @ 40°C, cSt	1.9 - 4.1	3.24	2.48	2.00	2.71	2.46	2.44	2.25	2.28	2.61	2.64
Cetane Index 2 Variable		53	47	42	43	44	45	45	48	49	49
Cetane Index 4 Variable	40 (min)	54	46	42	42	44	45	45	48	48	48
Cetane Number	40 (min)	54	46	41	41	42	42	42	54	47	46
Distillation, °C IBP		183	174	159	172	181	183	180	167	181	177
T_{10}		219	206	187	211	211	211	209	201	211	209
T_{20}		237	221	200	227	224	224	222	214	224	225
T_{50}		274	257	231	262	254	256	249	249	262	263
T_{90}	282 - 338	333	315	288	321	307	306	292	312	318	321
FBP		360	343	311	350	338	336	320	338	341	343
% FAME		11	2	0	0	0	0	0	2	5	5

USA - Mid West


Max
Mean
Min
Cloud (°C)
5
0
-5
-10
-15
-20
-25
-30
-35
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
0
-10
-20
-30
-40
-50
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
60
50
40
30
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
1.0
0.8
0.6
0.4
0.2
0.0
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

USA - East

National Standards and physical inspection data

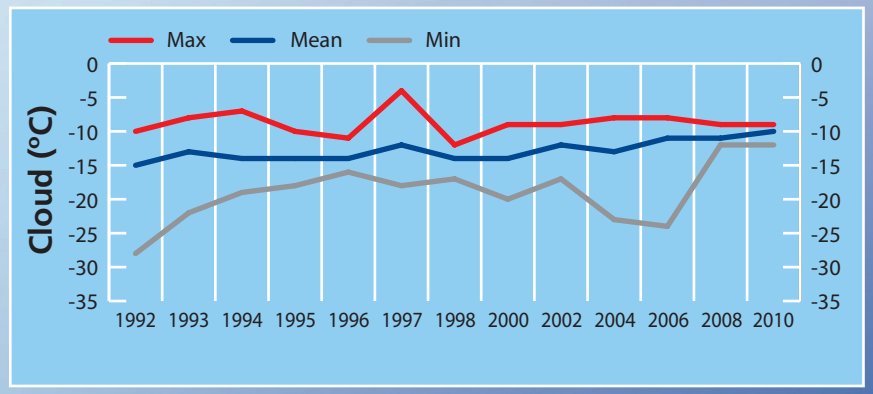
	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-15	E00232-109-16	E00232-109-21	E00232-109-22	E00232-109-23	E00232-109-24	E00232-109-27
Cloud Point, °C		-9	-10	-12	-12	-9	-9	-10	-10	-10	-11
CFPP, °C		-14	-17	-27	-14	-15	-15	-17	-15	-14	-27
Pour Point, °C		-18	-24	<-43	-24	-24	-18	<-43	-24	-18	-30
LTFT, °C		-11	-13	-15	-12	-11	-13	-14	-12	-12	-15
HFRR, µm	520 (max)	477	374	283	477	378	364	283	395	380	375
Wax Content @ 10°C Below Cloud, wt%		2.7	2.1	0.8	0.8	2.7	2.3	2.2	2.5	2.5	1.7
Rancimat, hrs											
Sulphur, wt%	0.0015 (max)	0.0011	0.0009	0.0008	0.0008	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010
Density @15°C, kg/m³		859	846	841	859	841	849	844	842	846	843
Viscosity @ 40°C, cSt	1.9 - 4.1	2.87	2.49	2.30	2.87	2.48	2.46	2.31	2.37	2.30	2.50
Cetane Index $_{2\ Variable}$		49	47	44	44	49	47	47.	48	47	48
Cetane Index $_{4\ Variable}$	40 (min)	49	46	43	43	49	46	46	47	45	48
Cetane Number	40 (min)	49	47	45	45	48	48	47	49	47	47
Distillation, °C IBP		176	167	159	176	169	164	159	168	163	167
T_{10}		211	204	199	211	208	206	199	199	199	204
T_{20}		228	222	217	228	226	223	218	218	217	222
T_{50}		265	261	258	265	262	263	258	258	258	261
T_{90}	282 - 338	326	316	311	326	313	317	311	312	313	317
FBP		354	343	337	354	338	345	337	338	339	344
% FAME		0	0	0	0	0	0	0	0	0	0

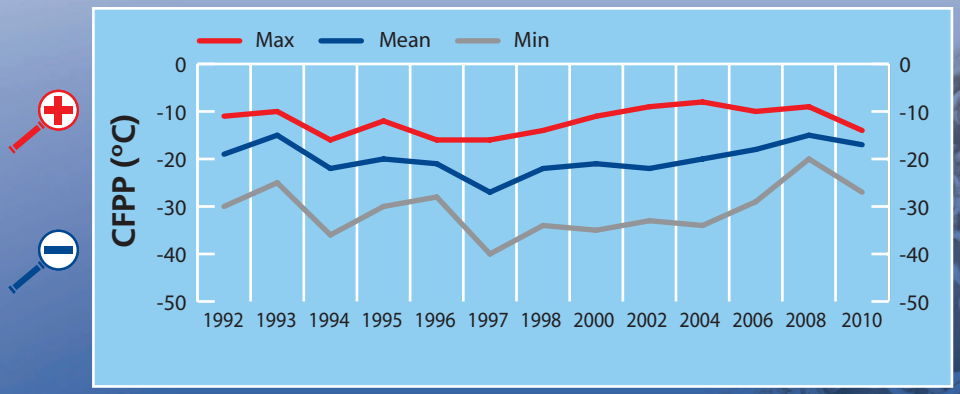
USA - East (continued)

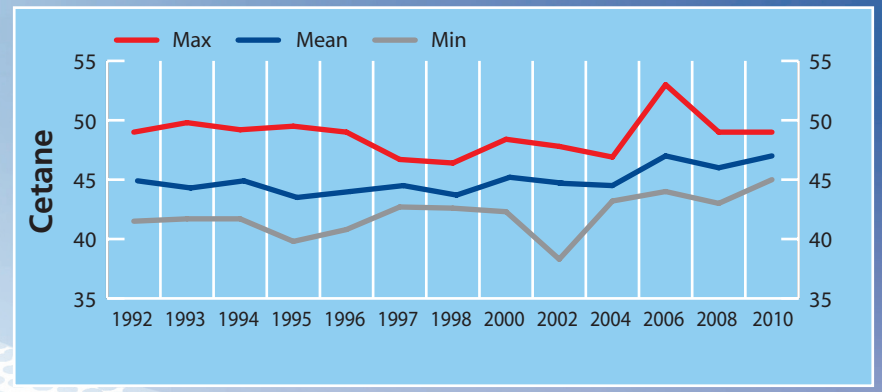
National Standards and physical inspection data

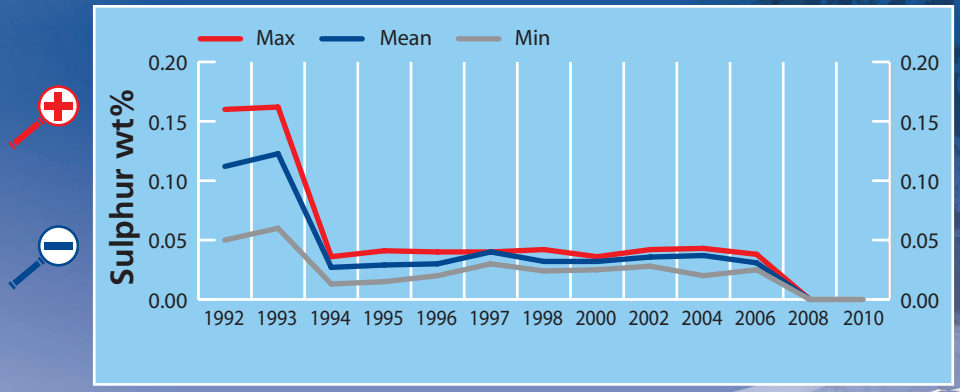
	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-30	E00232-109-43
Cloud Point, °C		-9	-10	-12	-10	-9
CFPP, °C		-14	-17	-27	-18	-16
Pour Point, °C		-18	-24	<-43	-30	-27
LTFT, °C		-11	-13	-15	-14	-12
HFRR, µm	520 (max)	477	374	283	290	422
Wax Content @ 10°C Below Cloud, wt%		2.7	2.1	0.8	2.2	1.9
Rancimat, hrs						
Sulphur, wt%	0.0015 (max)	0.0011	0.0009	0.0008	0.0010	0.0011
Density @15°C, kg/m^3		859	846	841	842	847
Viscosity @ 40°C, cSt	1.9 - 4.1	2.87	2.49	2.30	2.52	2.56
Cetane Index $_{2\ Variable}$		49	47	44	49	47
Cetane Index $_{4\ Variable}$	40 (min)	49	46	43	48	46
Cetane Number	40 (min)	49	47	45	49	46
Distillation, °C IBP		176	167	159	176	164
T_{10}		211	204	199	206	207
T_{20}		228	222	217	223	224
T_{50}		265	261	258	262	262
T_{90}	282 - 338	326	316	311	315	320
FBP		354	343	337	341	348
% FAME		0	0	0	0	0

USA - East


Max
Mean
Min
Cloud (°C)
0
-5
-10
-15
-20
-25
-30
-35
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
0
-10
-20
-30
-40
-50
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
55
50
45
40
35
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.20
0.15
0.10
0.05
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010

USA - West

National Standards and physical inspection data

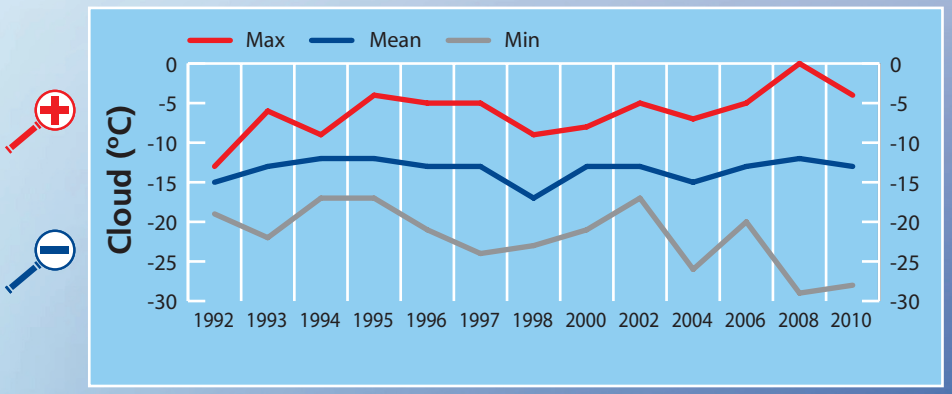
	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-25	E00232-109-29	E00232-109-36	E00232-109-37	E00232-109-38	E00232-109-39	E00232-109-40
Cloud Point, °C		-4	-13	-28	-14	-28	-4	-16	-8	-14	-10
CFPP, °C		-9	-18	-32	-19	-32	-9	-18	-13	-31	-13
Pour Point, °C		-9	-20	<-48	-24	<-48	-9	-27	-15	-30	-18
LTFT, °C		-6	-14	-30	-16	-30	-6	-16	-9	-16	-9
HFRR, µm	520 (max)	571	426	230	230	528	312	339	571	409	544
Wax Content @ 10°C Below Cloud, wt%		3.7	1.6	0.5	1.1	0.6	3.7	0.5	1.7	1.5	1.3
Rancimat, hrs											
Sulphur, wt%	0.0015 (max)	0.0011	0.0008	0.0003	0.0007	0.0009	0.0009	0.0006	0.0008	0.0007	0.0008
Density @15°C, kg/m³		866	840	829	854	866	838	832	833	832	839
Viscosity @ 40°C, cSt	1.9 - 4.1	3.62	2.60	2.16	2.27	2.59	3.62	2.16	2.74	2.41	2.57
Cetane Index $_{2\ Variable}$		56	48	37	40	38	56	43	52	51	49
Cetane Index $_{4\ Variable}$	40 (min)	58	48	38	41	38	58	45	52	50	48
Cetane Number	40 (min)	57	51	48	52	49	54	49	57	53	48
Distillation, °C IBP		182	175	166	177	182	166	168	175	173	176
T_{10}		239	205	191	197	214	239	191	204	197	198
T_{20}		259	219	199	207	225	259	199	219	212	214
T_{50}		292	256	229	243	248	292	229	262	256	258
T_{90}	282 - 338	331	320	307	322	307	331	312	327	317	327
FBP		354	348	337	349	337	352	351	354	344	353
% FAME		5	0	0	5	0	0	0	0	0	0

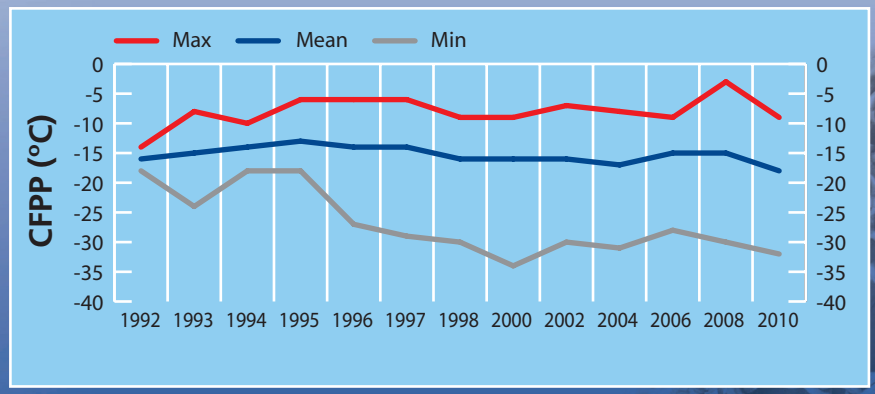
USA - West (continued)

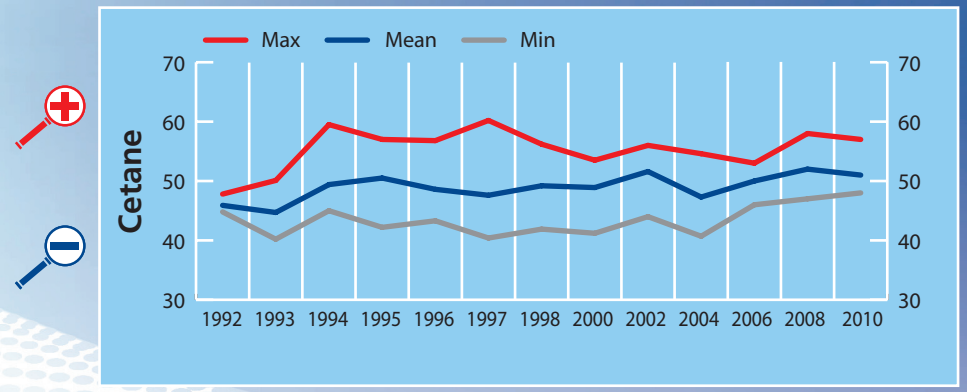
National Standards and physical inspection data

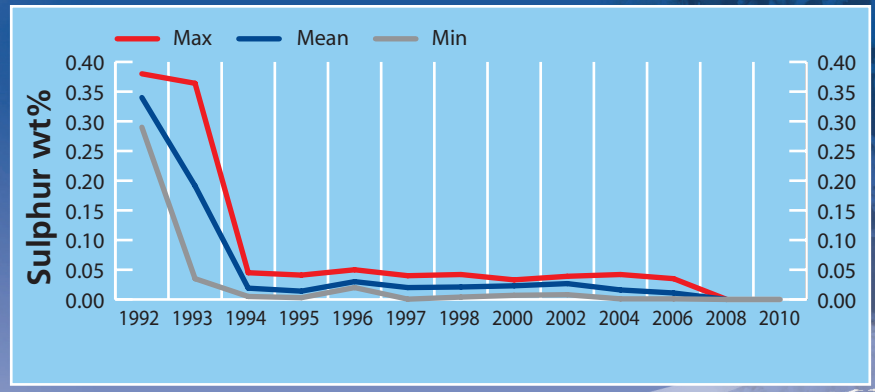
	National Standard	Maximum Observed	Mean	Minimum Observed	E00232-109-41	E00232-109-46	E00232-109-51
Cloud Point, °C		-4	-13	-28	-13	-8	-12
CFPP, °C		-9	-18	-32	-20	-10	-13
Pour Point, °C		-9	-20	<-48	-24	-15	-21
LTFT, °C		-6	-14	-30	-17	-8	-13
HFRR, µm	520 (max)	571	426	230	565	402	360
Wax Content @ 10°C Below Cloud, wt%		3.7	1.6	0.5	1.4	2.1	1.9
Rancimat, hrs							
Sulphur, wt%	0.0015 (max)	0.0011	0.0008	0.0003	0.0003	0.0011	0.0011
Density @15°C, kg/m^3		866	840	829	835	829	841
Viscosity @ 40°C, cSt	1.9 - 4.1	3.62	2.60	2.16	2.33	2.36	2.98
Cetane Index $_{2\ Variable}$		56	48	37	49	51	51
Cetane Index $_{4\ Variable}$	40 (min)	58	48	38	49	51	50
Cetane Number	40 (min)	57	51	48	49	53	50
Distillation, °C IBP		182	175	166	177	179	176
T_{10}		239	205	191	200	203	207
T_{20}		259	219	199	213	216	226
T_{50}		292	256	229	252	252	271
T_{90}	282 - 338	331	320	307	315	320	325
FBP		354	348	337	346	353	343
% FAME		5	0	0	0	0	0

USA - West


Max
Mean
Min
Cloud (°C)
0
-5
-10
-15
-20
-25
-30
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
CFPP (°C)
0
-5
-10
-15
-20
-25
-30
-35
-40
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Cetane
70
60
50
40
30
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010


Max
Mean
Min
Sulphur wt%
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1992 1993 1994 1995 1996 1997 1998 2000 2002 2004 2006 2008 2010