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Worldwide Winter Diesel Fuel Quality Survey 2018

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Infineum Worldwide Winter Diesel Fuel Quality Survey 2018

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Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 - Contents

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 - Introduction

Introduction

The Infineum Worldwide Winter Diesel Fuel Quality Survey provides the petroleum refining and distribution industries with a comprehensive view of the quality of automotive diesel fuel in the marketplace. To allow international trends to be tracked, 355 fuel samples were collected from 53 countries for the winter 2018 survey. In the northern hemisphere samples were collected during the deep winter months of January and February. However, in the southern hemisphere sampling was undertaken in mid-2017, when true winter-grade samples were available.

Infineum local knowledge

To be representative of the diesel purchased by consumers, the samples were collected from retail service stations. As a general principle, one sample is obtained to cover the production from each refinery or region in a given country. Infineum uses its knowledge of local exchange agreements and distribution systems to select appropriate sample collection points, which minimises the possibility of taking multiple samples from a single refinery. 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 can 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.

Sample analysis

The analyses applied to each sample are those Infineum considers to be of most interest to diesel producers, marketers, distributors and consumers. They cover areas including national specifications, exchange specifications and performance parameters. A degree of standardisation has been applied so that diesel from all the countries sampled can be compared and the data analysed as a single set. However, this standardisation means that not all national specifications are reported.

Wherever possible, industry standard test methods have been used and in-house test methods avoided. This means that the data published accurately reflect the results that could, or would, be generated by organisations within the petroleum industry. When considering this 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. In addition, very little repeat testing has been conducted to determine compliance or otherwise with specifications.

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 - Introduction

Test methods

The majority of testing was carried out at quality accredited laboratories in the UK, Japan and China using the test methods below.

Cetane Number	IP498
Cetane Index	Calculated
CFPP	IP309
Cloud Point	ASTM D2500
Density	IP365
Distillation	ASTM D86
FAME Content	EN14078
Final Boiling Point	Part of Distillation - ASTM D86
HFRR	ISO 12156-1 / JPI-5S-50-98
Kinematic Viscosity	ASTM D445
LTFT	ASTM D4539
Pour Point	ASTM D5950
Rancimat	EN 15751 (mod)
Sulphur Content	ASTM D2622
Wax Content	Differential Scanning Calorimetry – RD88-17

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – Key facts

The 2018 Infineum Winter Diesel Fuel Quality Survey (WDFQS) provides a snapshot of the quality of diesel fuel collected from retail stations from around the world in the deep winter months.

53 Countries

355 Samples collected

66 Parameters measured

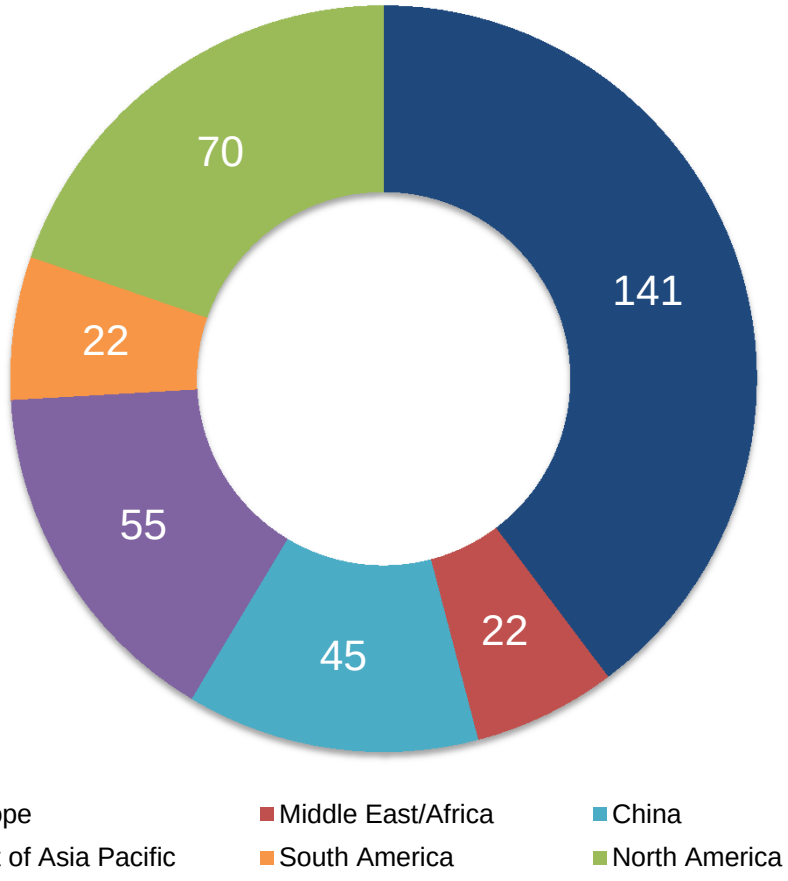
9,803 data points analysed

Infineum Fuels Technologists have been tracking the trends in diesel fuel quality in this biennial Survey since 1985*, providing the industry with a comprehensive picture of the global changes. Today, producing fit for purpose fuels in the most cost-efficient way remains the main challenge for refiners. By sharing the data from the Survey we can help to identify and monitor trends that most influence diesel fuel quality including fuel specifications, emissions legislation, trade flows and the evolution in crude slates.

* Prior to 1999, work was undertaken by Paramins (the additives division of Exxon Chemical Company), which together with Shell Additives (a division of The Shell Petroleum Company Ltd and Shell Oil Company) formed the Infineum joint venture.

Sample collection

2018 sample collection in most regions remains consistent with 2016. However, there has been an increase in the number of samples collected from China this year (45 in 2018 vs. 26 in 2016) to enable the Survey to explore the different diesel fuel qualities available across the country, for example in cities and in more rural areas.



Additional samples were collected from China in 2018

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – Key findings

Sulphur continues to fall

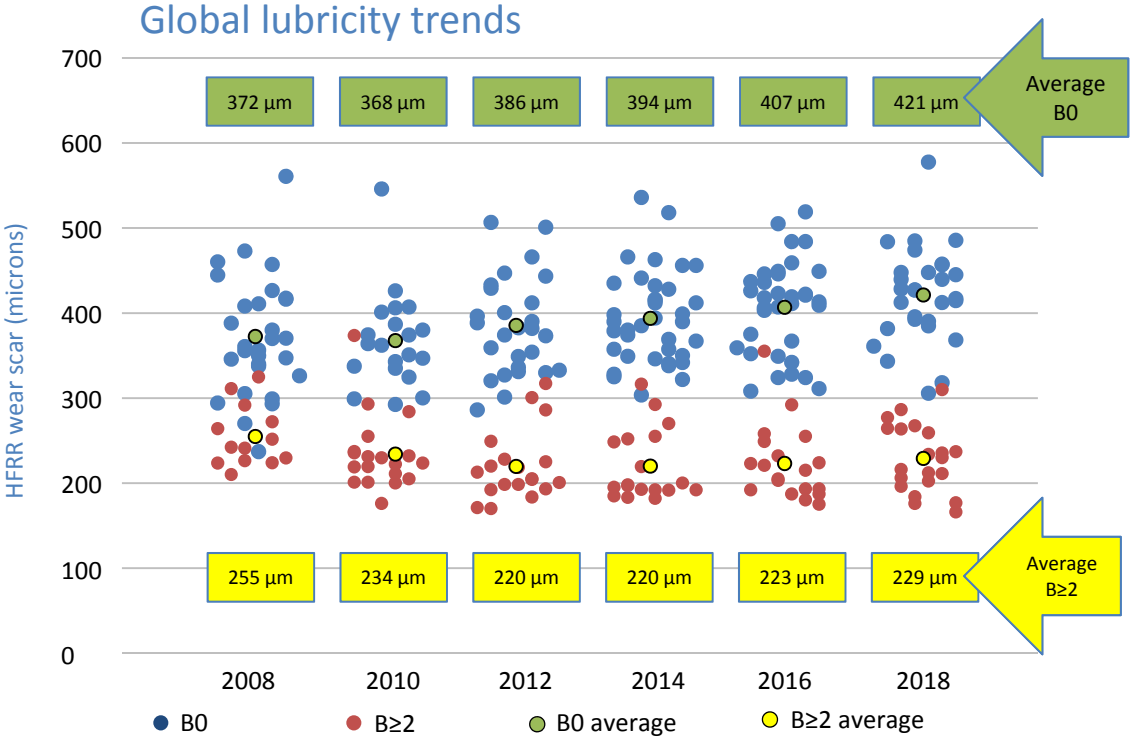
The global downward trend in sulphur levels continues, with only eight countries having sulphur levels higher than 100 ppm, compared to 12 countries in the last Survey. However, two of the 51 countries sampled still had retail diesel fuels containing more than 1,000 ppm sulphur.

Countries where fuel samples contained more than 100 ppm sulphur		
Country	**Max S level (ppm)**	**Average S level (ppm)**
Indonesia	1,550	528
Kuwait	1,220	1,029
China	638	46
Saudi Arabia	431	381
Qatar	406	221
Malaysia	363	278
Oman	288	205
Argentina	228	32

All of the 211 samples collected in Europe and North America contained less than 10 ppm sulphur.

Lubricity trends

The slight increase in global average wear scar diameter, reported in the last three Surveys appears to have levelled off. However, since 2008, the global average wear scar for B0 diesel fuels has increased by nearly 50 microns (µm) and appears to be continuing to increase.

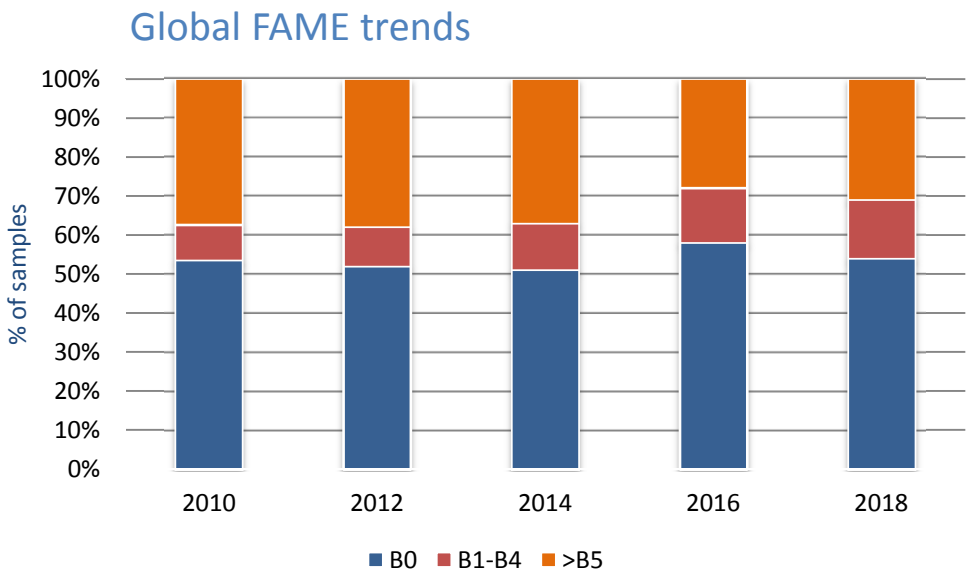


The upward trend in global average wear scar diameter has levelled off, while the average for B0 fuels continues to rise

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – Key findings

Rising global FAME use

On a global level, the percentage of samples containing no fatty acid methyl ester (FAME) – or B0 – is slightly lower than in 2016. In addition, where FAME is used, there is a continued increase in the number of samples with FAME levels between B1–B4.



A higher percentage of samples contained FAME in 2018

However, as has been noted in previous Surveys, the trends in the use of FAME vary widely on a regional and country basis.

HVO use continues to grow

In 2016 we reported the first definite signs of hydrogenated vegetable *oil* (*HVO*)* used as a renewable diesel fuel in Europe and also in the US. In 2018, this trend continues to grow. Spain had the highest number of HVO containing samples and HVO was also detected in samples from France, Peru and Thailand.

* Only co -processed (non isomerised) HVO is detected, which means samples from counties using isomerised HVO are not reported.

Read on for the Infineum interpretation of the 2018 Winter Diesel Fuel Quality Survey.

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

Introduction

In the global fuels market, growth in the demand for middle distillate fuels is forecast to increase significantly in the coming years, with road diesel expected to account for some 60% of demand. This demand growth is being driven by a variety of factors, which means we can expect to see real differences in regional trends.

The decline in demand for diesel fuel in North America is likely to continue. However, this will be more than offset by the rising demand in other regions – most notably in Asia. Unexpectedly, despite a drop in diesel car sales, Europe was one of the strongest sources of diesel demand growth for 2017 - with demand in all uses growing by 2.4% in the first 10 months compared to 2016. In addition, the relatively urgent need for low sulphur fuels in the marine bunker sector to meet tightening emissions regulations, which come into force in January 2020, will drive demand for low sulphur distillate fuels for use in ships.

At the global level, forecasters estimate road diesel demand may rise from some 17 million barrels per day (mb/d) today to reach approximately 22 mb/d by 2035.

In response to this demand growth, we can expect to see considerable investment in new capacity. While the greatest number of projects and biggest additions come from Asia, projects are also lined up in the Middle East and Africa. The US refining industry also remains in a good position to meet this rising demand for middle distillates – and here we have seen exports more than double in the past seven years. The majority of these exports are destined for South America – most notably Brazil and Mexico, although more than 200,000 b/d is exported to Europe annually.

In some markets, refiners are looking for cost effective ways to maximise distillate production without increasing costs or investing in capital projects. Another growing trend is the increasing use of unconventional crudes, such as shale, oil sands and heavy crudes, which brings additional complexity to the market.

As the industry works to meet changing demand patterns diesel trade flows will change and there will be an increase in the global movement of diesel fuel. One thing that is clear here is that refiners will need a good understanding of the global market to ensure their export products are fit for use in their final destination.

In our view, as exports rise, refiners will need to overcome a number of challenges:

- Identifying the most attractive markets to target.
- Cost effectively maximising the production of on-specification diesel.
- Producing the right fuels for their target markets.
- Meeting the national standards, which vary the world over for almost every parameter including: sulphur, FAME %, cold filter plugging point (CFPP), cetane, aromatics and lubricity.
- Understanding specifications, pipeline restrictions, off taker requirements, exchange agreements and tax incentives of the final destination market.

The 2018 WDFQS highlights the variation in fuel quality that can be found from country to country and, in some cases, from filling station to filling station within the same country. In addition, it gives a broad picture of how refiners are managing to address some of the key industry challenges. However, the increase in the global movement of fuels means it is becoming harder to identify the source of the fuel and therefore draw firm conclusions from the data.

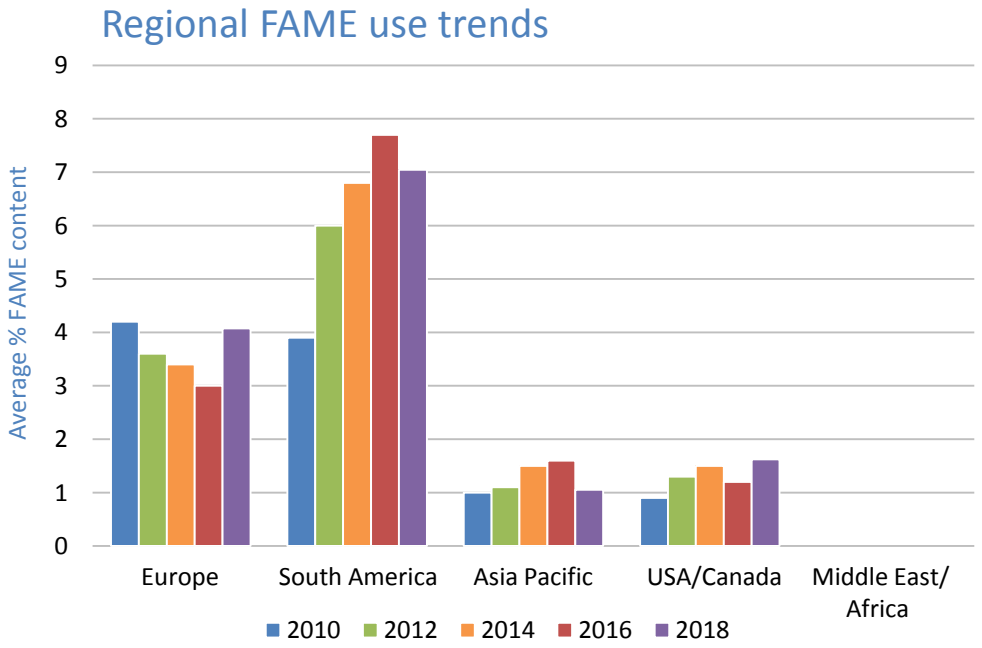
Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

FAME use – a mixed regional picture

While there is an increase in diesel fuel FAME use on a global level, there continues to be a very mixed picture in the different regions:

- Increase in Europe
- Slight increase in North America
- Decrease in South America
- Slight decrease in Asia Pacific
- No FAME in Middle East or Africa

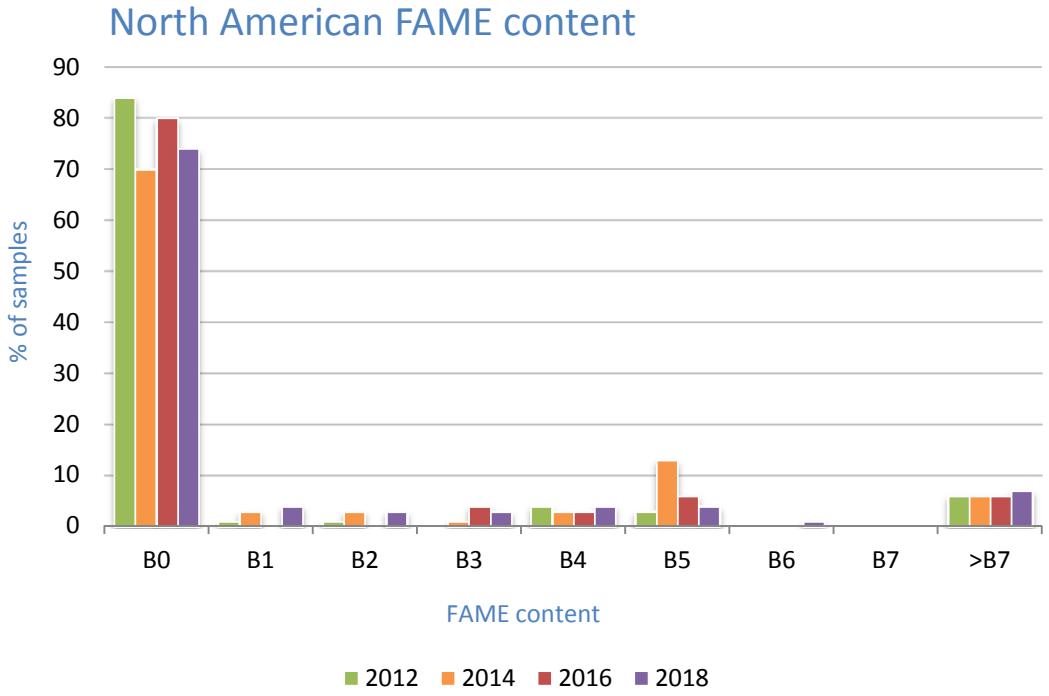
Regional variations are driven by a number of factors including cost, availability of alternative renewables, presence of explicit mandates and incentives. It is also possible that the acceptance of no harms in Europe and the US may be driving these markets towards FAME use.



Refiners select the most cost competitive solutions to meet legislation requirements in renewable fuels, creating a mixed picture of FAME use.

FAME in North America

In a reversal of observations made in the 2016 Survey, a higher percentage of samples collected in North America in 2018 contained FAME – 27% compared to 20% in 2016. Over this period, the percentage of samples containing B1-B5 rose from 14% to 19% and the percentage of >B7 samples increased from 6% to 7%. At 1.65%, the average FAME percentage is now at the highest level seen over the past five Surveys.



A higher percentage of samples collected in North America in 2018 contained FAME

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

FAME in North America (continued)

In the US, the total volume of renewable fuels that must be used to replace or reduce the quantity of petroleum-based transportation fuel, heating oil or jet fuel is regulated on a national basis under the Renewable Fuels Standard Program (RFS). The US Environmental Protection Agency (EPA) has steadily increased renewable fuel volume requirements across all types of biofuels and targets have been proposed that increase the biomass-based biodiesel volume requirement through to 2020.

Since FAME use is a mandated annual required volume obligation (RVO) it is possible to meet mandates by increasing FAME use in summer and reducing, or even excluding, FAME use in winter. This practice may be evident in the Survey data, but cannot be confirmed, as summer samples are not collected.

Some samples had well above the mandated levels, with four samples from Illinois containing over B10, and with one sample from Indiana at B21.

Canadian Renewable Fuels Regulations require fuel producers and importers to have an average renewable fuel content of at least 2% based on the volume of diesel fuel and heating distillate oil that they produce or import into Canada. However, biodiesel is not blended during the deep winter months so, as expected, none of the 13 samples collected contained FAME.

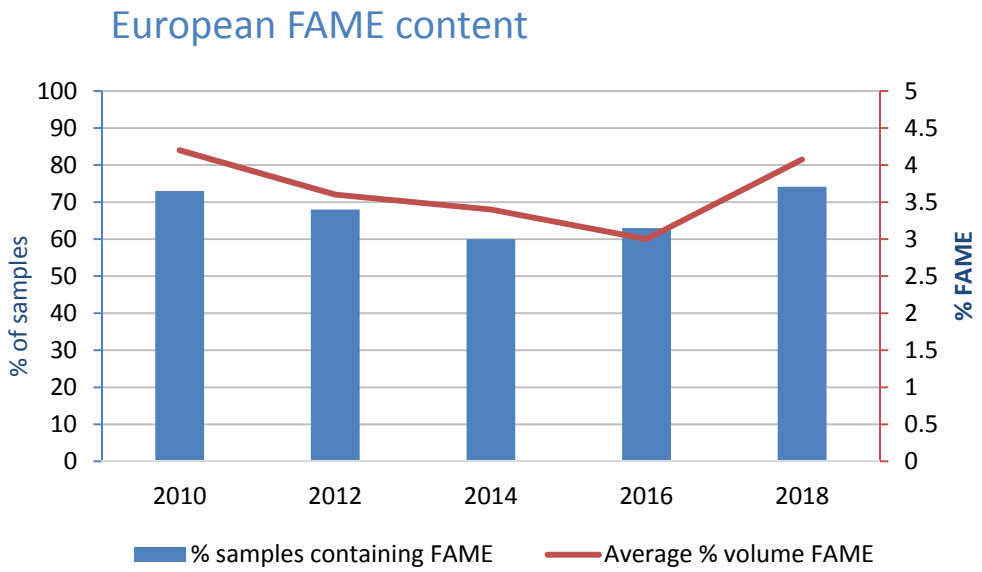
Current US FAME mandates and average content measured in US states sampled in 2018

State sampled	Biodiesel mandate	Range of biodiesel present	Average FAME content
Indiana	2% in state vehicles	21%	21%
Illinois	5% in state vehicles	0 – 12 %	8%
Minnesota	5% in winter	4%	4%
Massachusetts	5%	0 – 6%	3%
California	None	0 – 5%	2%
Texas	None	0 – 5%	1%
Kansas	2% in state vehicles	0%	0%
Louisiana	2% once production >10 million gallons	0%	0%
Colorado	B20 in state vehicles	0%	0%
Michigan	None	0%	0%
Iowa	None	0%	0%
New Jersey	None	0%	0%
Ohio	None	0%	0%
Tennessee	None	0%	0%
South Dakota	None	0%	0%
North Dakota	None	0%	0%

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

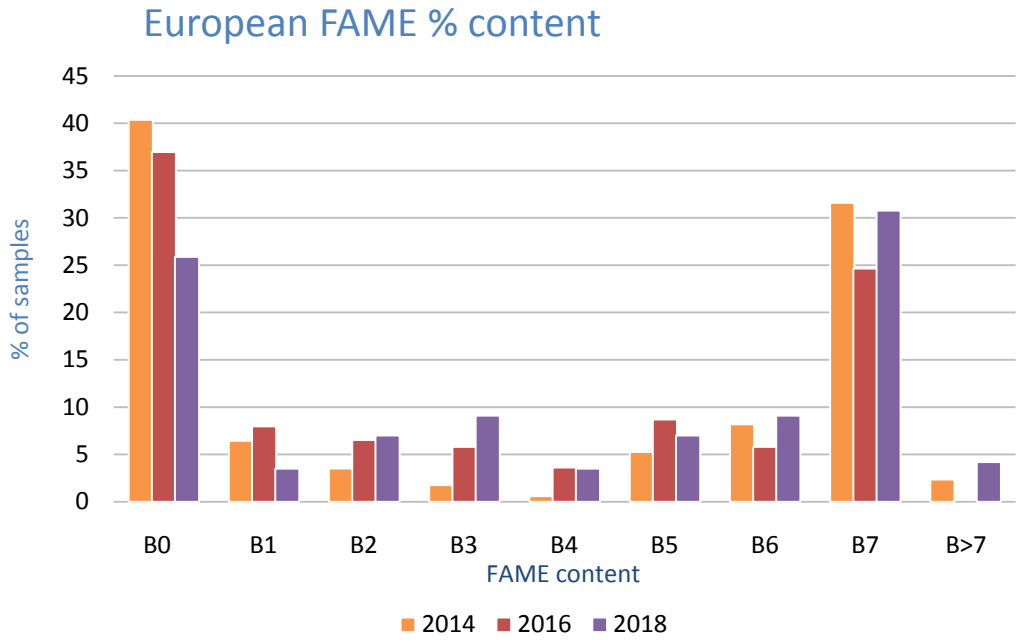
FAME in Europe

Since 2010, we had seen a steady decline in the percentage volume of FAME in European samples – a trend that has not continued. In 2018, an increase in the total percentage of samples containing FAME has been observed – from 63% of samples in 2016, to 74% of samples today. Compared to 2016, the average % volume of FAME used has also increased from 3% to 4% - a trend that could be an indication of the need to meet renewables targets in Europe.



The downward trend for the % volume of FAME in Europe did not continue in 2018

In the EMEA region, none of the samples from Belarus, Croatia, Lithuania, Russia, Turkey and Ukraine and no samples from Africa or the Middle East contained FAME. However, a lower percentage of samples contained B0 than in the previous two Surveys. Over the entire region there is a very mixed picture for FAME use.



In Europe there is a reduction in B0 samples and a shift towards higher FAME levels

The general trend in this region is a shift towards higher FAME blending levels. All of the samples collected from 11 of the 24 EMEA countries contained FAME – with increased use seen in Benelux, Ireland, Spain, Poland and Denmark and a first detection of FAME in samples from Switzerland.

While the European Fuel Quality Directive limits the content of FAME in European diesel to a maximum of 7% by volume (B7), some of the samples in the 2018 Survey from France, Germany, Spain and Greece contained 8% FAME (B8).

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

FAME in Europe (continued)

The rising FAME levels in Europe have prompted action from the European Automobile Manufacturers Association (ACEA). The organisation states that diesel vehicles and engines offered by ACEA companies (including all new models and all existing vehicles in the EU fleet) are compatible with the use of B7 diesel fuel. However, flexibility in the EU Fuel Quality Directive, means countries can decide to permit the sale of >B7 diesel fuel as they work to meet their 2020 target for renewable energy use in transport.

ACEA reports, France, for example, has decided to permit the sale of B10 diesel fuel in its territory and the French national fuel law has been changed to permit the sale of diesel fuel containing maximum 10% vol FAME (B10). At the same time, ACEA says France has made sensible changes to address concerns that higher FAME diesel fuel will result in vehicle operational concerns, especially in colder conditions.

Since the use of B10 diesel can present issues of compatibility, particularly in modern vehicles using sophisticated emission control equipment, ACEA has issued a B10 compatibility list. This outlines the vehicles and engines that manufacturers have declared to be compatible with the use of B10 diesel fuel and those that are not and that should therefore continue to use normal B7 diesel fuel.

A requirement of the Fuel Quality Directive is that a filling station must clearly label diesel grades with different FAME content, ACEA says the guide will mean customers facing a choice at diesel pumps can make the right decision on which fuel to select.

It will be interesting to see in the 2020 Survey if other European countries increase FAME blending levels above B7. In our view, since vehicle operability is influenced by a number of variables, close collaboration between OEMs, fuel producers and additive companies is essential to ensure future field issues when using high FAME content fuels in cold conditions are avoided.

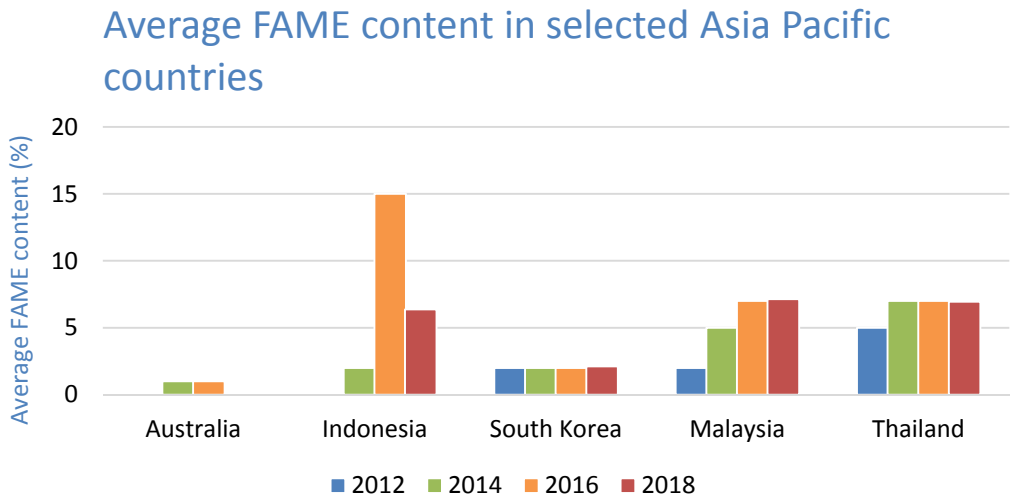
FAME in Asia Pacific

Biodiesel was detected in samples from Indonesia, Malaysia, South Korea and Thailand – all of which have various levels of biodiesel mandate in place. Unlike in the previous two Surveys, no FAME was detected in Australia in 2018. In addition, no FAME was detected in samples from Singapore, New Zealand, or Japan.

In the 2016 Survey, we suggested future samples from India and China might contain FAME as both countries were expected to introduce voluntary 20% blending targets for biodiesel. However, no samples from either country contained FAME in 2018.

In the last Survey a big rise was reported in FAME use in Indonesia - possibly related to the introduction of a B20 mandate in January 2016, up from B10. In the 2018 Survey, samples ranged from 0% to 18% FAME, a range that could be indicative of the use of some imported fuels.

For the first time, hydrogenated vegetable oil (HVO) has been detected in a sample from Thailand.



There is a mixed picture for FAME use in Asia Pacific

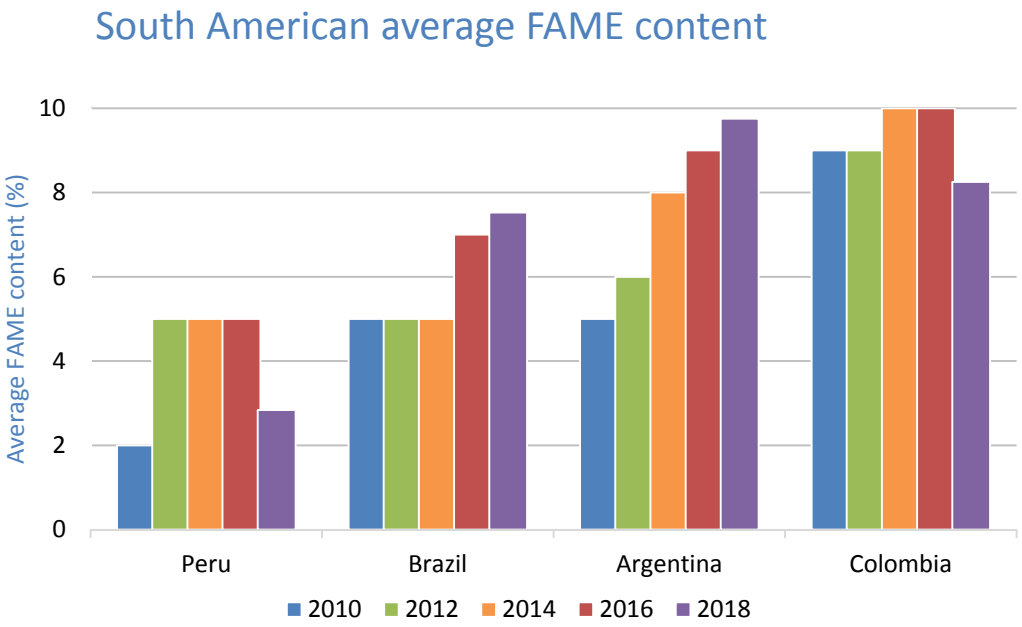
Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

FAME in South America

FAME use in South America is primarily driven by local mandates, which vary considerably from country to country. Chile, with no mandate is in place, was the only country where samples did not contain FAME. Throughout the other countries sampled, Argentina, Brazil, Peru and Colombia, FAME levels ranged from 3% to 12%.

While FAME use is still growing in Argentina and Brazil, use was down in Peru and Colombia - the first time since 2010 that any decrease in FAME use in the southern hemisphere has been observed. The use of second generation biofuel has also been identified, in the form of HVO, in a sample from Peru, which could help to explain the fall in FAME use that was seen here this year.

Looking ahead, we can expect FAME levels in South America to rise again. Argentina is expected to push its FAME content requirements up to B15 in the next couple of years. Brazil is also increasing its FAME content by about 1% each year, with B9 being adopted in 2018 and B10 in 2019.



This is the first time any decrease in FAME use has been detected in samples from this region over the past five Surveys

Biodiesel use across the globe is driven by mandates and/or subsidies and refiners select the most cost competitive solution to meet necessary blend targets.

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

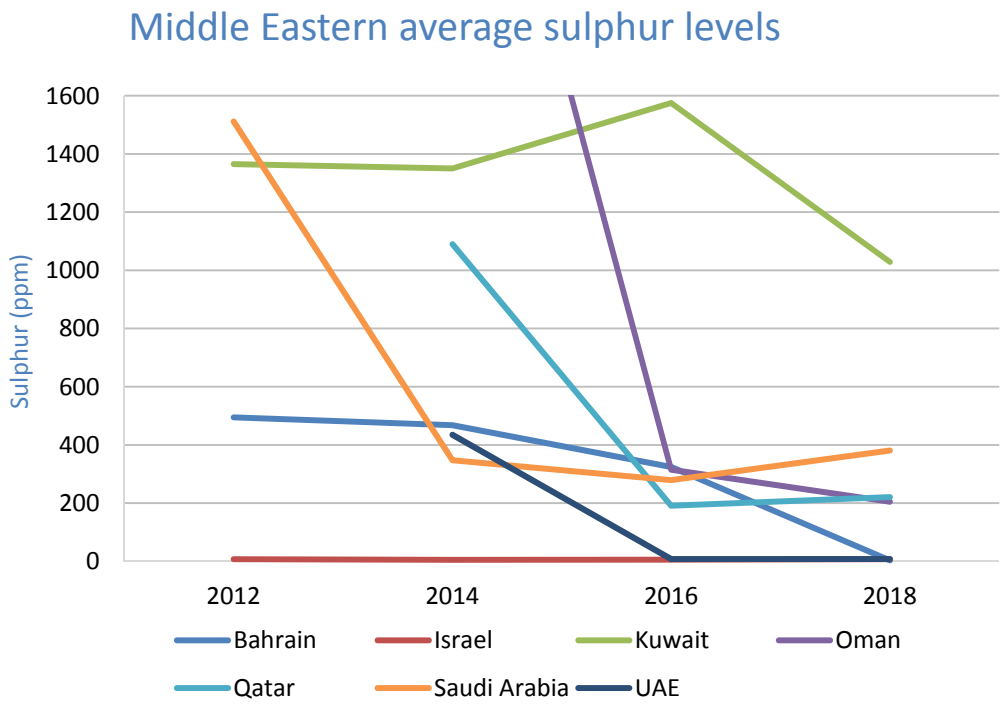
Sulphur

In Europe and North America very low sulphur limits for diesel fuels have been in place for some years. In the samples collected from these regions in 2018 sulphur levels ranged from 3 ppm to 10 ppm.

The main area of interest in the Survey is the data from those countries that are still working towards the 'ultra low sulphur diesel' benchmark of <10 ppm.

Sulphur in the Middle East

Sulphur in the Middle East shows some variability, however the general overall downward trend is continuing as some refiners look to export diesel fuels to meet growing global demand.



Middle Eastern sulphur levels are still amongst the highest in the world

In recent years new capacity has been added through refinery expansion and modernisation programs and more is on the way in 2019 and 2020. These new projects are largely focused on the production of low and ultra-low sulphur diesel fuels. All this activity means that by 2025 the Middle East could become the world's largest exporter of diesel, with most of the additional capacity destined for the European, African, South American and Asian markets.

To meet growing domestic and global demand for low sulphur fuels, refiners will need to maximise production of on-specification diesel. The use of proven cold flow and lubricity improver additives not only ensures the production of fit for purpose products, but also can help to improve refinery profitability.

Rising exports means refiners will need to ensure their fuels meet the specification requirements of their final destination markets.

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

Sulphur in Asia Pacific

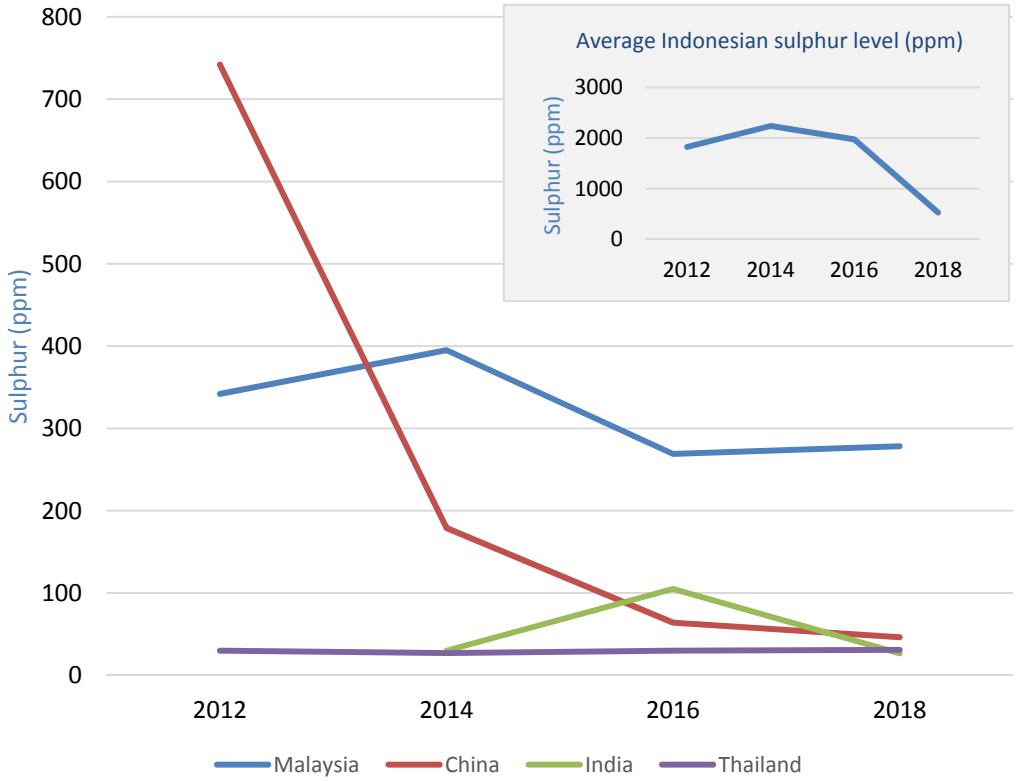
While samples from Australia, South Korea, Japan and New Zealand have been at <10 ppm sulphur throughout the past 10 years, in other countries in the Asia Pacific region, where levels have remained high, there have, in the main, been continued sulphur reductions.

Indonesia for example, showed a dramatic fall in sulphur level this year from an average of 1,973 ppm in 2016 to 528 ppm in 2018. However, as noted in the FAME analysis, two of the three fuels sampled had a similar profile to European fuels, and are indicative of imports, while the third fuel had a sulphur level of 1,550 ppm.

In India there has been a marked drop in sulphur levels from 2016, with the average falling to below 30 ppm – driven by the introduction of Bharat IV in April 2017, which specified fuel sulphur at <50 ppm. We expect to see further reductions in the coming years as India transitions to Bharat stage VI. This mandates fuel sulphur at 10 ppm - with Delhi an early adopter in April 2018 and the rest of the country set to follow suit on April 1 2020.

In the main, countries working towards the low sulphur benchmark have shown continued sulphur reductions.

Asia Pacific average sulphur levels



Progress to the ultra low sulphur benchmark continue in Asia Pacific

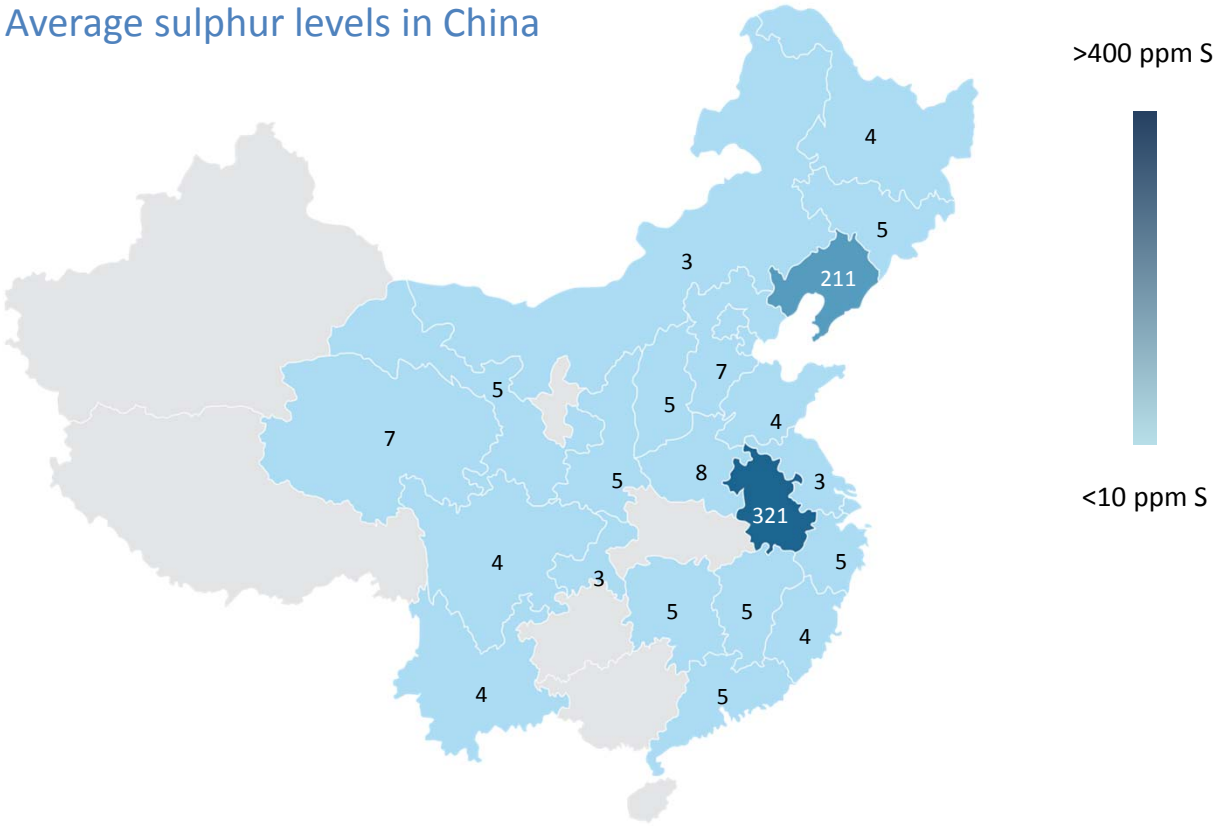
Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

Sulphur in Asia Pacific (continued)

In China, where the population of modern passenger cars is growing, the high and variable fuel sulphur levels have been a cause for concern. To curb pollution, China tightened emissions regulations in January 2017, with China V targets equivalent to Euro V applying nationwide. This means advanced aftertreatment technologies are required, with their effectiveness dependent on the broad availability of diesel fuel with 10 ppm sulphur.

In previous Surveys sampling has centred near China's major refineries. This year, so that the sulphur results give a figure more representative of the entire country, the samples were collected from across China. However, despite this change in sampling, the average sulphur level continued to fall, with more than 91% of samples containing less than 10 ppm sulphur, and none exceeding 1,000 ppm.

Average sulphur levels in China



More than 91% of samples from China contained less than 10 ppm sulphur

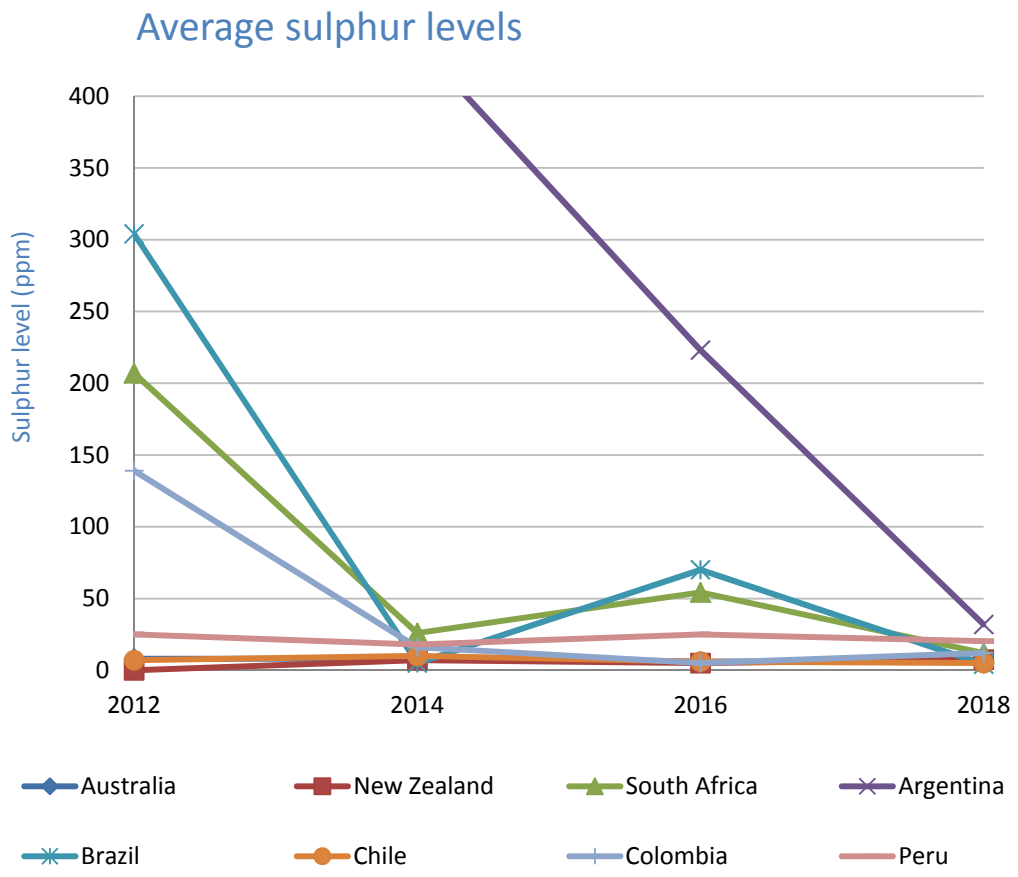
Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

Sulphur in the Southern hemisphere

In the past two Surveys we have reported significant reductions in average sulphur levels in the southern hemisphere – a trend that continues in 2018.

The largest improvement came from Argentina where all but one of the 2018 samples, (Grade 2), contained less than 10 ppm sulphur. In our 2016 Survey, the mean sulphur level was 223 ppm, with data points ranging from 5 to 431 ppm. It is unclear if this picture is a result of new specifications that were introduced in June 2016, or if it is owing to increased imports of low sulphur diesel fuel from North America.

Care must be taken in assuming that in all cases this is representative of the countries' entire diesel pool, because city diesel tends to be lower in sulphur than rural diesel, and sampling location may have a significant influence.



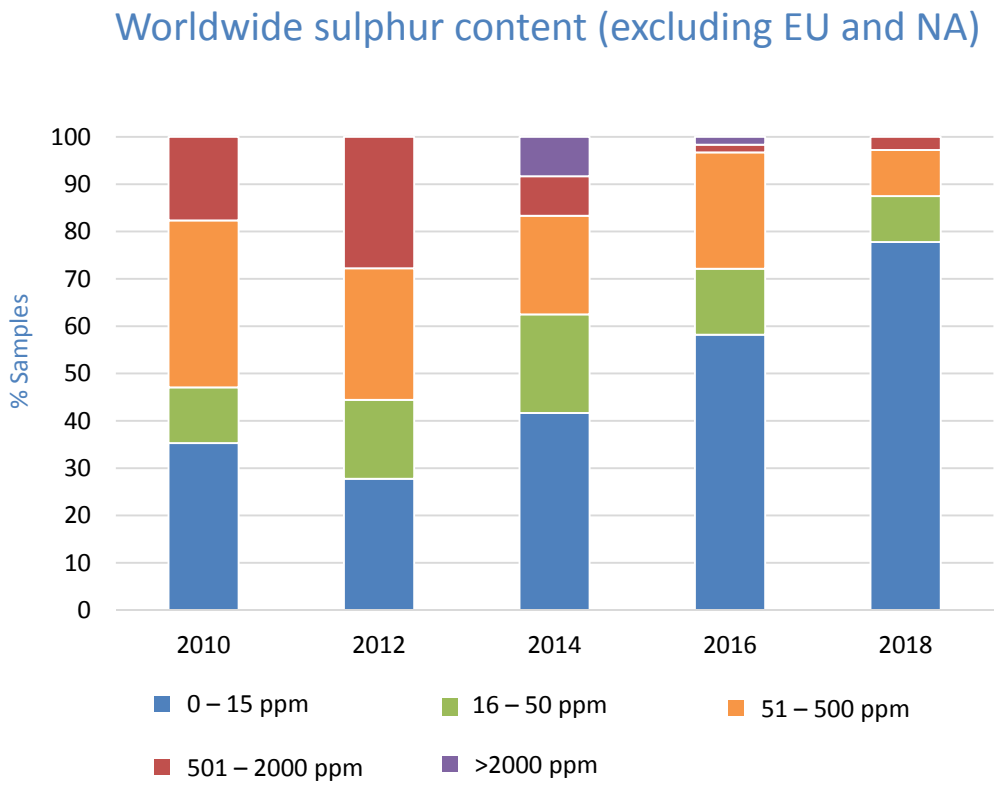
The reduction in sulphur levels continues in southern hemisphere samples

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

Global sulphur

At the global level, despite the continued sulphur reduction, the chart below shows that fuels containing high sulphur levels are still present in some countries – with Kuwait and Indonesia still selling diesel fuels with well over 1,000 ppm sulphur. However, significant progress has been made, with fewer samples containing over 500 ppm and more samples than in the previous Surveys containing 0-15 ppm sulphur.

As emissions legislation drives the use of more advanced vehicle technology in all regions of the world, diesel fuel sulphur levels should continue to fall. In our view, proven lubricity additives will be required to ensure that vehicle performance is not adversely affected.



Worldwide sulphur levels continue to fall

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

Lubricity

Previous issues of the WDFQS have examined the trends in global average diesel fuel lubricity and a worsening picture has been reported, which could have been attributed to a combination of the backing off from FAME use, the tough economic climate and variations in sampling.

In 2014, one third of the high frequency reciprocating rig (HFRR) results were above the Worldwide Fuel Charter (WWFC) recommendation of 400 µm (which applies to the top two diesel grades). In 2016 that number increased to 42%, but in 2018 the percentage of results above 400 µm has decreased slightly to 36%.

On examining the trends for samples meeting the WWFC 460 µm level the picture is slightly worse with 89% of samples being below this limit in 2018, compared to almost 94% in 2016. However, half of these are from countries where the legislation sets higher limits or no legislation exists.

In the Middle East, wear scar results are deteriorating in countries where there is no lubricity specification. Countries where a 460 µm limit is in place met the specification.

In Asia Pacific, the average HFRR values have stayed consistent throughout the previous five Surveys. However, samples in more recent Surveys are now largely meeting the 460 µm limit.

Average Middle East HFFR wear scar results (µm)				
Country	**2014 average**	**2016 average**	**2018 average**	**Specification**
Bahrain	441	449	428	460 (max)
Israel	412	437	427	460 (max)
Kuwait	456	484	484	-
Oman	367	446	412	460 (max)
Qatar	518	411	485	-
Saudi Arabia	536	519	578	-
UAE	416	423	440	460 (max)

Additives may increasingly be required to ensure that vehicle performance is not adversely affected if lubricity deteriorates further.

Infineum Worldwide Winter Diesel Fuel Quality Survey 2018 – The trends

Cold flow

The samples in the northern hemisphere show that the cloud point (CP) and cold filter plugging point (CFPP) situation is mostly stable, which means that cold flow performance has been maintained. In Europe, the CP/CFPP delta suggests that cold flow additives are being used by almost all the region's refineries and in the US the data suggest an increase in treated fuel. However, for the fourth consecutive Survey, fuels from Canada show no signs of cold flow additive treatment.

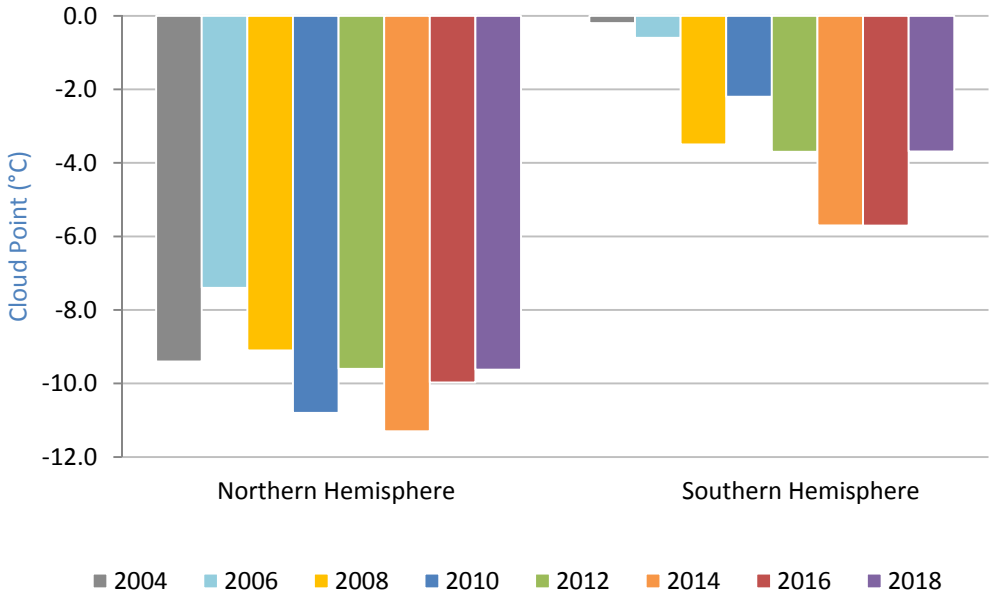
In previous Surveys we had identified a steady decrease in the cloud point of samples from Asia Pacific, a trend that has continued. However, a notable increase in cloud point has been detected in South Korea in 2018. This could be a result of refiners upgrading bunker fuels into diesel, resulting in a heavier finished product, or may be because they are slowing down their dewaxing operations.

In the southern hemisphere, a gradual decrease/lowering of cloud point has been observed since 2004. In this Survey there is a spike (increase) in cloud point for this region, but the data is being skewed by large increases seen in South Africa, Colombia and Peru.

Regardless of the cause of these changes, refiners have managed to maintain consistent fuel quality, with all fuels remaining on-specification.

The use of additives extends the cold flow performance across the spectrum of middle distillate fuels and ensures that diesel fuels not only meet specifications, but also are fit for purpose.

Average cloud point in the north and south hemispheres



There is a spike in cloud point in the samples from the southern hemisphere

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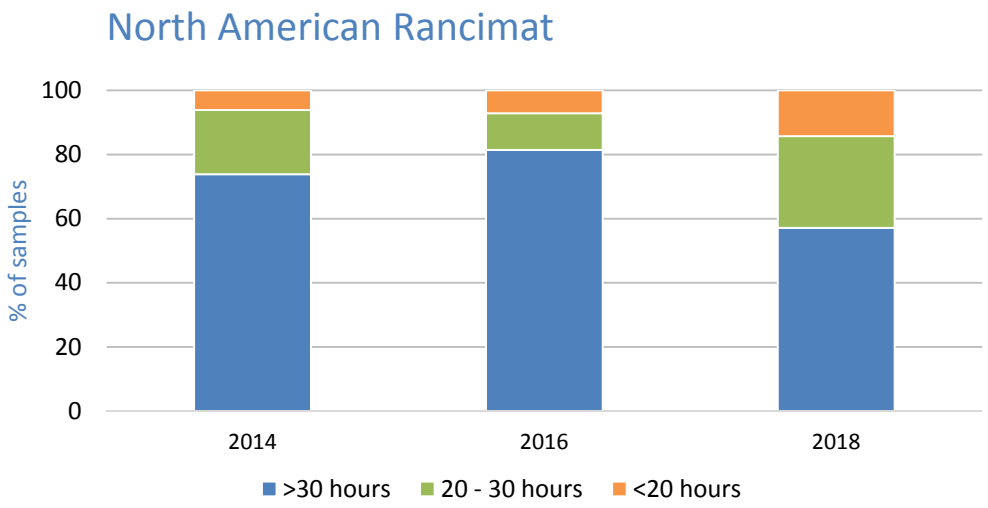
Oxidation

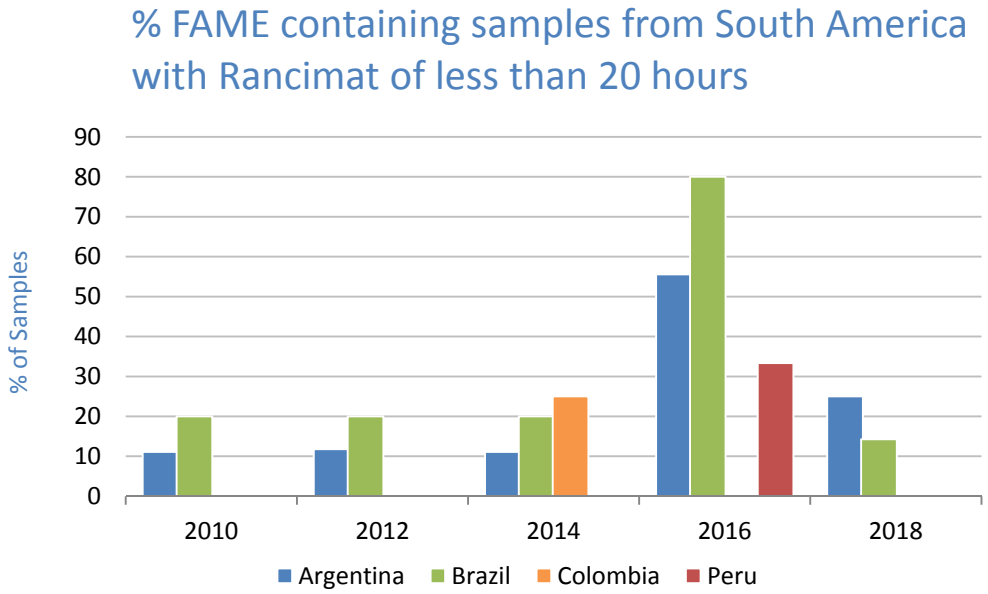
The oxidation performance of samples collected from Europe has remained at a stable level in the past three Surveys, with only 4% of samples found to have a Rancimat of <20 hours.

Using 20 hours as a break-point, in North America, when compared to the 2014 and 2016 surveys, 2018 fuel samples are trending to shorter Rancimat induction periods. However, all 2018 fuel samples met applicable Rancimat national specifications. Increasing FAME use is seen as a contributing factor.



In North America, comparing BX to B0, there is a trend towards shorter Rancimat time results

In South America, 2018 data is directionally showing an improvement in oxidation over 2016, with no samples from Peru and only a very small proportion of those from Argentina and Brazil found to have a Rancimat of < 20 hours.



There has been an improvement in oxidation in South America vs. 2016

The cause of this trend in South America is unclear, although it could be attributed to improved FAME quality. Whatever the reason, the improvement is good news since in certain circumstances poor oxidation stability can lead to higher levels of particulate matter in fuels. This has the potential to reduce vehicle filter longevity and to cause filterability performance issues, which may result in fuel starvation and engine operating difficulties.

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Looking to the future

The demand for diesel fuel continues to grow in many regions – most notably in Asia Pacific. While globally there is an inevitable move away from diesel engines in new passenger cars in the wake of 'dieselgate', the impact on diesel fuel sales will take a long time to filter through. Freight can also be expected to drive demand for diesel since the uptake of alternative powertrain technologies, such as batteries and fuel cells, will be slower here than in lighter-duty vehicle applications. At the same time, there is an urgent demand for low sulphur fuel from the marine market as it works to meet the 2020 International Maritime Organization emissions regulations that will cap bunker fuels at 0.5% sulphur.

This increased demand is expected to spur capacity additions and drive refiners to find cost effective ways to maximise diesel fuel output. The global movement of diesel fuel will continue to increase as refiners look for the most lucrative markets for their products. However, with each market having different quality requirements, as the diesel fuel product flows increase, it will be more and more challenging to produce on-specification fuels for each destination while still remaining profitable. In our view, it will be increasingly important for fuel traders to build in flexibility so that their cargos can go to multiple destinations.

In addition, the changing crude slate, with the increased use of more unconventional crudes such as shale oil sands and heavy crudes, adds value at the refinery, but also increases complexity in upstream, midstream and downstream markets. In the US, for example, production of shale and oil sands crudes has surged in 2018 – a trend that looks set to continue. Additives will be increasingly required here to help address the challenges these crudes present by improving crude logistics and optimising refinery production.

As OEMs work to reduce emissions to meet ever-tightening regulations, we will see a broader introduction of advanced aftertreatment technologies, which means the wide availability of low sulphur diesel fuel is essential. At the same time, OEMs need to be confident that the fuels used in their vehicles around the world can deliver optimum vehicle operability – even in the harshest conditions.

All of these trends mean expert advice on cost effective ways to meet the latest specification requirements around the world is increasingly important. As the technology leader in cold flow and lubricity, two of the most relevant parameters used to determine quality in diesel fuels, Infineum is well placed to help fuel producers address the growing list of challenges they are facing.

Industry leading trends are driving continued technical challenges, which fuel additives can help to address.

Worldwide summary

Mean data

Country	Austria	Belarus	Benelux	Croatia	Czech Rep.	Denmark	Finland	France
No. of Samples	7	2	13	1	3	2	3	8
Samples containing FAME	6	0	12	0	3	2	1	8
Cloud Point, °C	-8	-13	-5	-3	-6	-8	-29	-7
LTFT, °C	-	-	-	-	-	-	-	-
CFPP, °C	-31	-37	-27	-19	-26	-28	-44	-22
Pour Point, °C	-35	-39	-30	-24	-28	-42	-43	-26
HFRR, µm	235	428	234	415	211	216	368	184
Wax Content @ 10°C Below Cloud, wt%	2.0	1.5	2.0	1.9	2.0	2.4	0.5	2.1
Rancimat, hrs	>25	>30	>25	>30	>30	>30	>30	>30
Sulphur, ppm	7	8	6	6	7	7	<3	7
Density @15°C, kg/m³	835	833	835	832	837	838	806	836
Viscosity @ 40°C, cSt	-	-	-	-	-	-	-	-
Cetane Index 2 Variable	54	53	52	54	50	53	58	52
Cetane Index 4 Variable	53	54	53	54	49	52	60	51
Cetane Number	57	53	55	54	51	54	58	52
Distillation, °C IBP	172	183	165	167	171	169	180	163
T_{10}	207	216	212	206	199	202	205	196
T_{20}	224	229	229	224	213	220	216	215
T_{50}	273	268	268	270	260	273	247	269
T_{90}	336	332	335	342	332	334	297	337
T_{95}	352	348	352	360	346	350	311	356
FBP	361	357	361	371	356	355	326	361
% FAME	4	0	4	0	7	7	0	7

Mean data

Country	Germany	Greece	Hungary	Ireland	Italy	Lithuania	Norway	Poland
No. of Samples	24	2	1	1	14	2	2	4
Samples containing FAME	20	2	1	1	14	0	2	3
Cloud Point, °C	-7	0	-11	-5	-4	-17	-25	-12
LTFT, °C	-	-	-	-	-	-	-	-
CFPP, °C	-28	-10	-29	-16	-16	-32	-39	-33
Pour Point, °C	-30	-17	-27	-21	-22	-29	-47	-33
HFRR, µm	264	176	277	206	259	474	310	286
Wax Content @ 10°C Below Cloud, wt%	2.0	3.2	2.3	2.8	2.5	1.9	1.5	1.3
Rancimat, hrs	>25	23	>30	>30	>25	>20	>30	>25
Sulphur, ppm	7	6	7	5	7	7	7	6
Density @15°C, kg/m³	835	832	838	833	832	830	832	827
Viscosity @ 40°C, cSt	-	-	-	-	-	-	-	-
Cetane Index 2 Variable	52	53	52	53	53	49	49	54
Cetane Index 4 Variable	52	53	52	53	53	49	49	54
Cetane Number	54	53	54	54	54	52	53	54
Distillation, °C IBP	174	171	172	166	169	173	169	168
T_{10}	207	199	207	197	200	197	200	199
T_{20}	223	214	225	216	217	209	214	216
T_{50}	267	266	273	270	268	245	251	263
T_{90}	333	336	338	335	340	306	310	327
T_{95}	349	350	355	346	358	328	327	344
FBP	358	360	364	356	365	338	335	355
% FAME	4	8	3	6	5	0	4	4

Mean data

Country	Portugal	Romania	Russia	Slovak Rep.	Spain	Sweden	Switzerland	Turkey
No. of Samples	3	4	4	1	11	4	7	2
Samples containing FAME	3	3	0	1	11	4	6	0
Cloud Point, °C	-2	-10	-14	-9	-4	-25	-8	-5
LTFT, °C	-	-	-	-	-	-	-	-
CFPP, °C	-14	-30	-35	-31	-17	-34	-30	-20
Pour Point, °C	-13	-32	-33	-39	-17	-35	-28	-24
HFRR, µm	267	382	417	196	264	212	230	427
Wax Content @ 10°C Below Cloud, wt%	1.9	2.3	1.7	1.7	2.5	N/A	1.7	2.3
Rancimat, hrs	>30	>30	>30	>30	>25	>25	>30	>30
Sulphur, ppm	7	4	7	6	2	<3	7	4
Density @15°C, kg/m³	837	839	824	837	837	816	838	830
Viscosity @ 40°C, cSt	-	-	-	-	-	-	-	-
Cetane Index 2 Variable	53	50	52	52	53	55	50	57
Cetane Index 4 Variable	54	49	52	52	52	57	50	57
Cetane Number	54	54	50	54	55	56	52	57
Distillation, °C IBP	180	168	162	177	165	187	168	165
T_{10}	219	205	196	208	200	213	202	209
T_{20}	236	220	211	223	220	223	219	233
T_{50}	276	261	251	271	274	251	263	281
T_{90}	344	322	314	339	340	299	326	344
T_{95}	364	338	332	353	357	315	343	363
FBP	375	350	344	364	367	327	354	368
% FAME	4	2	0	7	6	6	5	0

Mean data

Country	UK	Ukraine	China	India	Indonesia	Japan	Malaysia	Singapore
No. of Samples	15	1	45	3	3	24	3	4
Samples containing FAME	10	0	0	0	2	0	3	0
Cloud Point, °C	-7	-24	-10	1	-5	-13	10	-4
LTFT, °C	-	-	-	-	-	-	-	-
CFPP, °C	-21	-34	-13	-7	-13	-20	7	-7
Pour Point, °C	-24	-30	-18	-10	-11	-28	6	-8
HFRR, µm	318	458	384	445	347	422	237	361
Wax Content @ 10°C Below Cloud, wt%	2.1	1.7	2.2	2.4	5.0	1.3	5.2	4.0
Rancimat, hrs	>25	>30	>20	>30	>30	-	>30	>30
Sulphur, ppm	7	3	46	27	528	7	278	6
Density @15°C, kg/m³	836	835	828	833	835	823	844	833
Viscosity @ 40°C, cSt	-	-	-	2.47	2.87	2.32	3.41	3.26
Cetane Index 2 Variable	52	52	53	53	53	53	53	57
Cetane Index 4 Variable	52	53	54	51	54	53	54	58
Cetane Number	52	52	52	55	55	50	59	58
Distillation, °C IBP	170	169	172	142	182	161	188	184
T_{10}	205	220	212	187	218	193	234	229
T_{20}	223	234	225	210	233	210	250	247
T_{50}	268	268	260	266	273	254	286	285
T_{90}	333	332	321	336	332	319	348	340
T_{95}	354	357	338	357	349	335	367	357
FBP	361	367	348	369	360	351	377	361
% FAME	1	0	0	0	6	0	7	0

Mean data

Country	South Korea	Thailand	Canada	USA-East	USA-Mid West	USA-West	Bahrain	Israel
No. of Samples	5	7	13	10	37	10	1	2
Samples containing FAME	5	7	0	4	12	3	0	0
Cloud Point, °C	-5	8	-31	-13	-17	-13	-3	-5
LTFT, °C	-	-	-29	-	-	-	-	-
CFPP, °C	-30	3	-32	-24	-24	-18	-5	-7
Pour Point, °C	-35	2	-42	-30	-32	-23	-9	-9
HFRR, µm	306	202	457	385	390	448	428	427
Wax Content @ 10°C Below Cloud, wt%	1.7	3.6	1.0	2.1	1.9	2.4	3.9	3.7
Rancimat, hrs	>30	>30	22	>25	>25	>25	>30	>30
Sulphur, ppm	6	31	5	7	6	4	<3	8
Density @15°C, kg/m³	832	833	841	844	843	828	833	842
Viscosity @ 40°C, cSt	2.31	3.26	2.18	2.45	2.58	2.49	3.48	3.09
Cetane Index 2 Variable	53	57	45	48	48	53	58	52
Cetane Index 4 Variable	51	58	45	47	48	55	61	53
Cetane Number	53	60	44	47	48	53	55	55
Distillation, °C IBP	142	180	161	164	171	172	162	187
T_{10}	176	223	195	201	209	211	240	227
T_{20}	196	243	209	218	224	223	259	243
T_{50}	263	287	248	263	261	258	293	279
T_{90}	340	349	309	324	323	321	345	335
T_{95}	360	368	326	341	340	337	360	353
FBP	370	378	341	353	352	350	361	366
% FAME	2	7	0	1	2	1	0	0

Mean data

Country	Kuwait	Oman	Qatar	Saudi Arabia	UAE	Argentina	Australia	Brazil
No. of Samples	2	2	2	4	3	8	4	7
Samples containing FAME	0	0	0	0	0	8	0	7
Cloud Point, °C	-1	-7	-2	-4	1	-4	-2	-4
LTFT, °C	-	-	-	-	-	-	-	-
CFPP, °C	-4	-11	-6	-11	-2	-16	-7	-10
Pour Point, °C	-6	-15	-6	-13	-2	-21	-8	-16
HFRR, µm	484	412	485	578	440	166	343	177
Wax Content @ 10°C Below Cloud, wt%	3.0	2.4	3.9	3.2	6.0	3.3	4.7	2.3
Rancimat, hrs	>30	>30	>30	>30	>30	23	>30	25
Sulphur, ppm	1029	205	221	381	8	32	7	4
Density @15°C, kg/m³	845	840	831	835	828	840	840	838
Viscosity @ 40°C, cSt	3.50	3.04	3.51	2.81	3.53	2.92	2.96	2.75
Cetane Index 2 Variable	53	52	57	53	59	53	52	52
Cetane Index 4 Variable	54	53	60	54	63	53	53	52
Cetane Number	51	51	58	53	62	54	53	52
Distillation, °C IBP	193	184	204	187	198	178	185	169
T_{10}	231	218	245	219	243	218	226	210
T_{20}	249	234	256	232	260	236	241	228
T_{50}	290	275	282	271	291	281	274	272
T_{90}	350	336	343	338	343	337	330	337
T_{95}	368	353	368	356	359	354	347	356
FBP	378	364	375	367	367	358	357	366
% FAME	0	0	0	0	0	10	0	8

Mean data

Country	Chile	Colombia	New Zealand	Peru	South Africa
No. of Samples	2	2	2	3	6
Samples containing FAME	0	2	0	3	0
Cloud Point, °C	-7	-1	-4	-8	-2
LTFT, °C	-	-	-	-	-
CFPP, °C	-17	-9	-14	-13	-7
Pour Point, °C	-21	-11	-18	-18	-9
HFRR, µm	440	197	413	265	393
Wax Content @ 10°C Below Cloud, wt%	1.9	3.4	3.3	2.2	2.6
Rancimat, hrs	>30	>30	>30	>30	>30
Sulphur, ppm	5	12	8	20	12
Density @15°C, kg/m³	833	865	841	837	835
Viscosity @ 40°C, cSt	2.48	2.48	3.68	2.62	2.93
Cetane Index 2 Variable	51	49	54	52	53
Cetane Index 4 Variable	51	48	57	51	54
Cetane Number	53	48	54	51	54
Distillation, °C IBP	170	136	201	168	180
T_{10}	201	243	244	203	219
T_{20}	216	263	258	220	234
T_{50}	258	305	287	268	271
T_{90}	329	345	339	334	342
T_{95}	349	359	355	351	363
FBP	361	367	363	362	373
% FAME	0	8	0	3	0

Worldwide Survey - Europe

33 Austria
35 Belarus
37 Benelux (Belgium, Netherlands, Luxembourg)
40 Croatia
42 Czech Republic
44 Denmark
46 Finland
48 France
51 Germany
56 Greece
58 Hungary
60 Ireland
62 Italy
65 Lithuania
67 Norway
69 Poland
71 Portugal
73 Romania
75 Russia
77 Slovak Republic
79 Spain
82 Sweden
84 Switzerland
86 Turkey
88 United Kingdom
91 Ukraine

Austria

National standards and physical inspection data

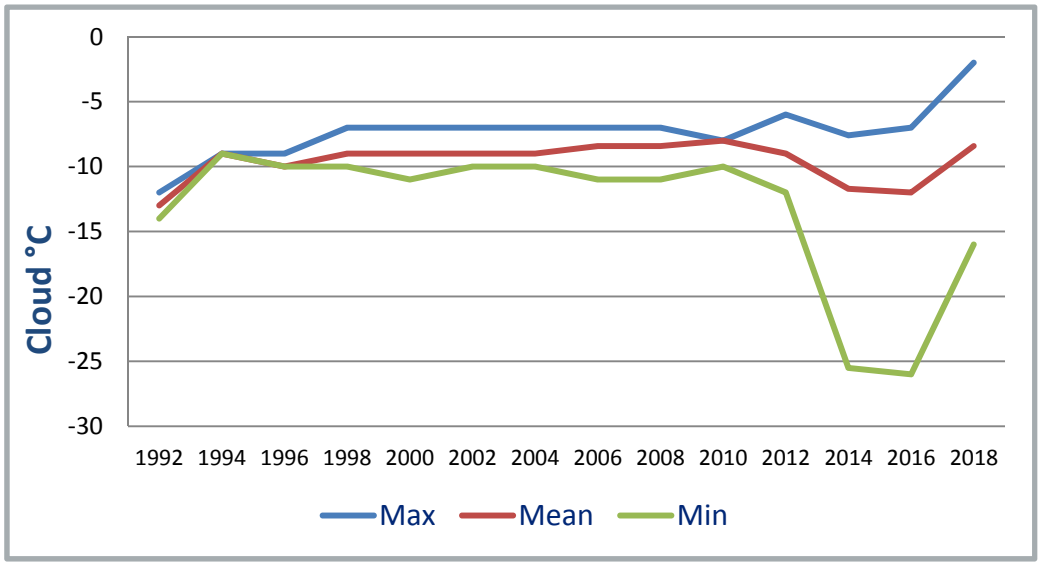
Europe

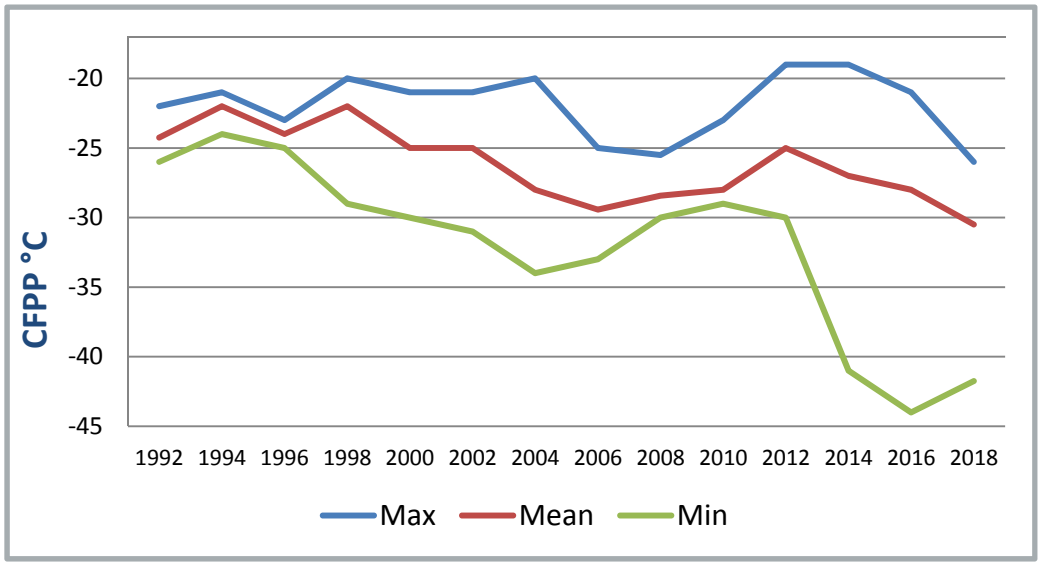
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1710486	DIES 1710487	DIES 1710488	DIES 1710489	DIES 1710490	DIES 1710491	DIES 1710492
Cloud Point, °C		**-2**	**-8**	**-16**	-7	-16	-2	-5	-9	-6	-14
CFPP, °C	-20 (max)	**-26**	**-31**	**-42**	-26	-42	-28	-28	-30	-31	-30
Pour Point, °C		**-27**	**-35**	**-51**	-30	-39	-27	-36	-30	-30	-51
HFRR, µm	460 (max)	**325**	**235**	**193**	208	325	194	212	193	194	323
Wax Content @ 10°C Below Cloud, wt%		**2.8**	**2.0**	**0.9**	2.8	0.9	2.0	2.6	2.1	2.1	1.8
Rancimat, hrs	*	**>30**	**>25**	**11**	>30	>30	>30	11	>30	>30	>30
Sulphur, ppm	10 (max)	**9**	**7**	**<3**	9	7	7	6	8	9	<3
Density @15°C, kg/m^3	820 - 845	**840**	**835**	**829**	837	831	829	840	834	834	836
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**56**	**54**	**53**	53	53	55	54	53	53	56
Cetane Index $_{4\ Variable}$	46 (min)	**58**	**53**	**52**	52	53	54	53	52	52	58
Cetane Number	51 (min)	**61**	**57**	**53**	54	59	55	59	54	53	61
Distillation, °C IBP		**196**	**172**	**164**	166	164	171	174	168	166	196
T_{10}		**240**	**207**	**198**	198	200	201	209	199	200	240
T_{20}		**254**	**224**	**216**	218	218	218	229	216	216	254
T_{50}		**286**	**273**	**266**	272	266	268	282	268	267	286
T_{90}		**339**	**336**	**328**	339	335	337	338	338	336	328
T_{95}	360 (max)	**359**	**352**	**340**	359	359	352	350	356	350	340
FBP		**372**	**361**	**347**	372	371	359	358	361	359	347
% FAME	7 (max)	**7**	**4**	**0**	7	0	7	3	7	7	0

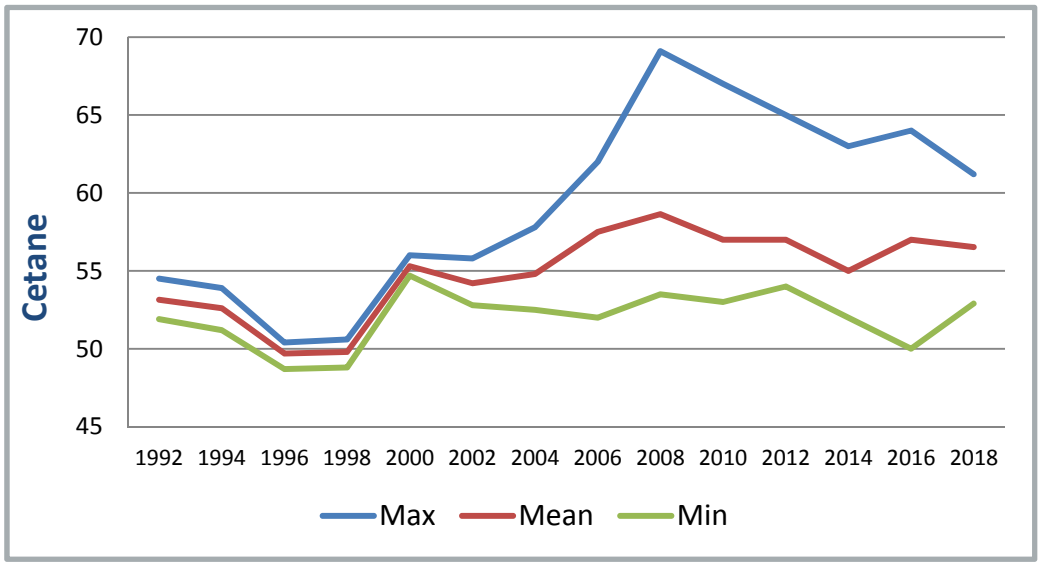
*20 hours min for diesel containing FAME above 2 % V/V

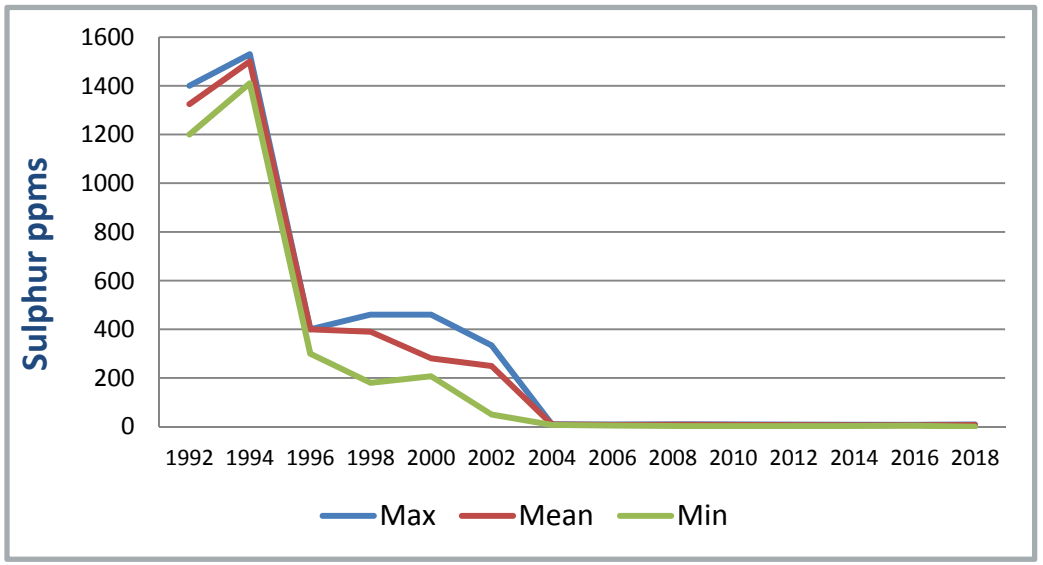
Austria

Europe









Belarus

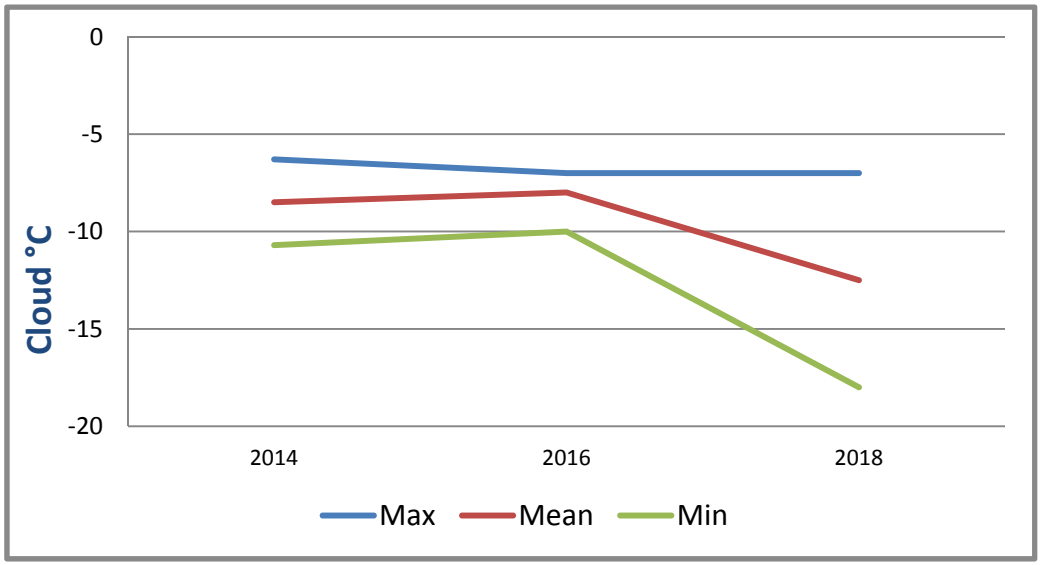
Europe

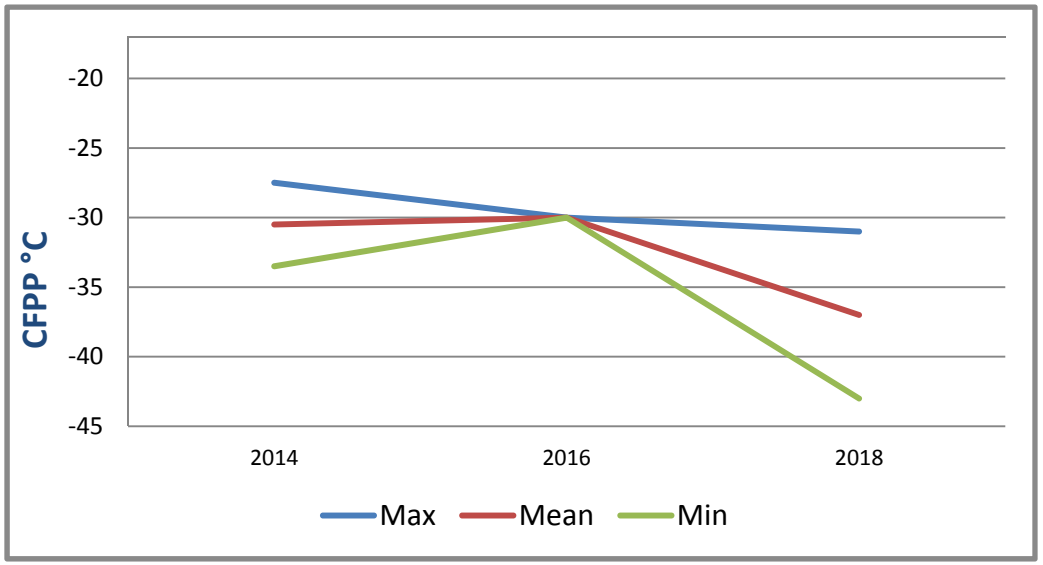
National standards and physical inspection data

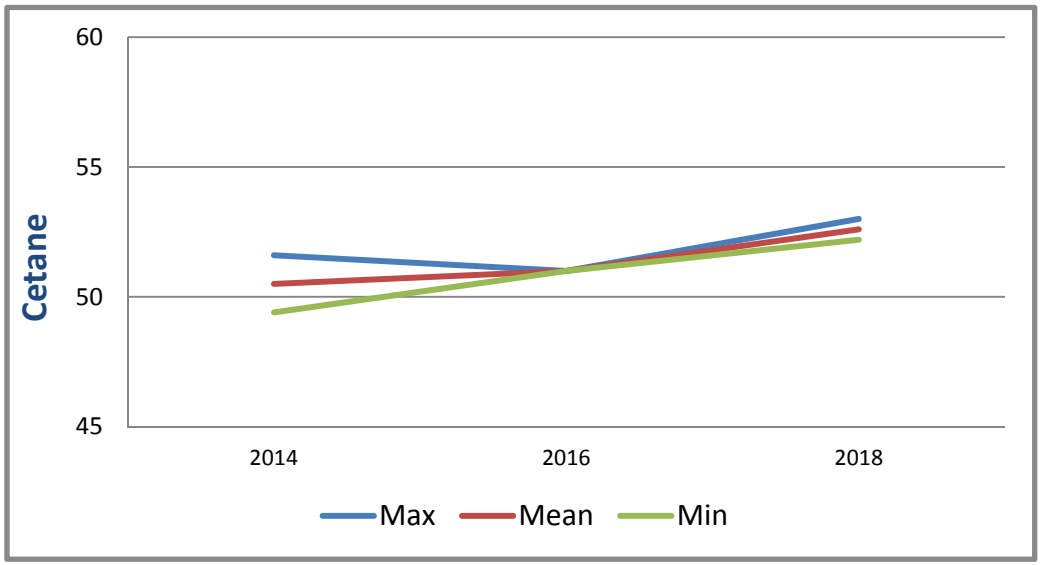
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1710494	DIES 1710495
Cloud Point, °C		**-7**	**-13**	**-18**	-7	-18
CFPP, °C	-20 (max)	**-31**	**-37**	**-43**	-31	-43
Pour Point, °C		**-36**	**-39**	**-42**	-36	-42
HFRR, µm	460 (max)	**450**	**428**	**407**	407	450
Wax Content @ 10°C Below Cloud, wt%		**2.2**	**1.5**	**0.7**	2.2	0.7
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	10 (max)	**9**	**8**	**6**	9	6
Density @15°C, kg/m^3		**837**	**833**	**829**	837	829
Viscosity @ 40°C, cSt		**-**	**-**	**-**	-	-
Cetane Index $_{2\ Variable}$		**53**	**53**	**53**	53	53
Cetane Index $_{4\ Variable}$		**54**	**54**	**53**	54	53
Cetane Number	51 (min)	**53**	**53**	**52**	52	53
Distillation, °C IBP		**186**	**183**	**180**	186	180
T_{10}		**223**	**216**	**209**	223	209
T_{20}		**236**	**229**	**222**	236	222
T_{50}		**276**	**268**	**260**	276	260
T_{90}		**336**	**332**	**328**	336	328
T_{95}	360 (max)	**350**	**348**	**347**	350	347
FBP	7 (max)	**357**	**357**	**357**	357	357
% FAME		**0**	**0**	**0**	0	0

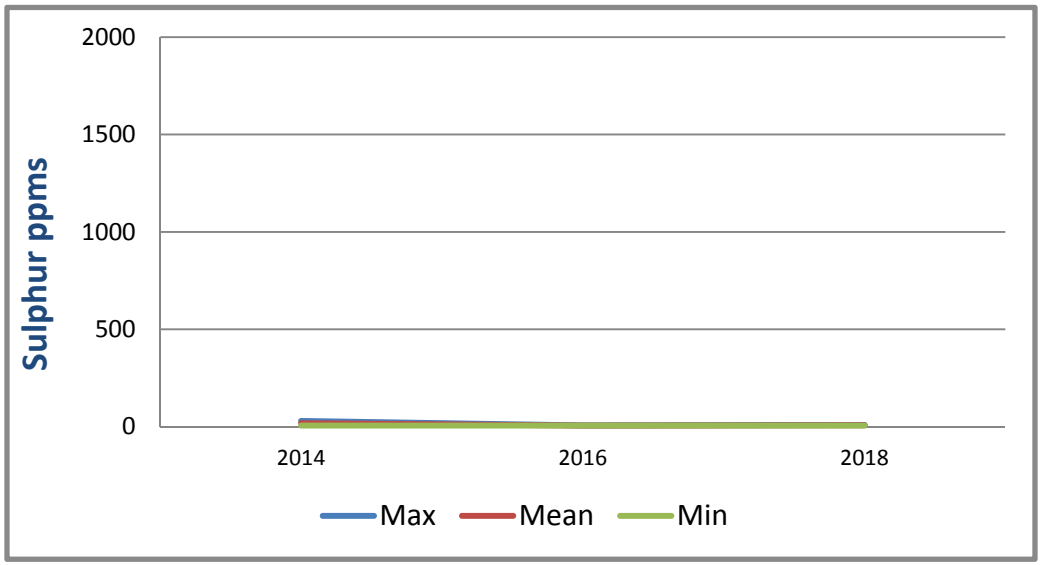
Belarus

Europe









Benelux

National standards and physical inspection data

Europe

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1710517	DIES 1710518	DIES 1710519	DIES 1710520	DIES 1710522	DIES 1710521	DIES 1710523
Cloud Point, °C		**3**	**-5**	**-8**	-7	-7	3	-7	-8	-4	-4
CFPP, °C	-15 (max)	**-18**	**-27**	**-33**	-28	-28	-25	-31	-33	-18	-30
Pour Point, °C		**-21**	**-30**	**-39**	-27	-39	-27	-36	-30	-21	-27
HFRR, µm	460 (max)	**303**	**234**	**187**	193	242	187	303	198	281	233
Wax Content @ 10°C Below Cloud, wt%		**3.3**	**2.0**	**1.3**	2.3	1.3	3.3	1.4	1.6	2	2.3
Rancimat, hrs	*	**>30**	**>25**	**19**	>30	>30	27	>30	>30	19	>30
Sulphur, ppm	10 (max)	**7**	**6**	**4**	7	5	7	6	4	6	7
Density @15°C, kg/m^3	820 - 845	**842**	**835**	**831**	832	836	842	834	833	838	831
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**55**	**52**	**49**	55	49	53	51	53	52	55
Cetane Index $_{4\ Variable}$	46 (min)	**57**	**53**	**49**	57	49	51	51	53	52	56
Cetane Number	51 (min)	**59**	**55**	**53**	55	54	53	54	55	54	59
Distillation, °C IBP		**185**	**165**	**101**	185	170	166	171	176	101	184
T_{10}		**223**	**212**	**204**	223	205	204	207	211	210	222
T_{20}		**239**	**229**	**219**	239	219	231	223	225	227	239
T_{50}		**281**	**268**	**252**	275	252	281	259	268	269	274
T_{90}		**341**	**335**	**333**	333	336	333	334	335	341	333
T_{95}	360 (max)	**361**	**352**	**346**	348	357	346	353	351	361	348
FBP		**368**	**361**	**355**	356	365	355	363	361	368	358
% FAME	7 (max)	**7**	**4**	**0**	5	0	7	1	6	2	5

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

Benelux (continued)

Europe

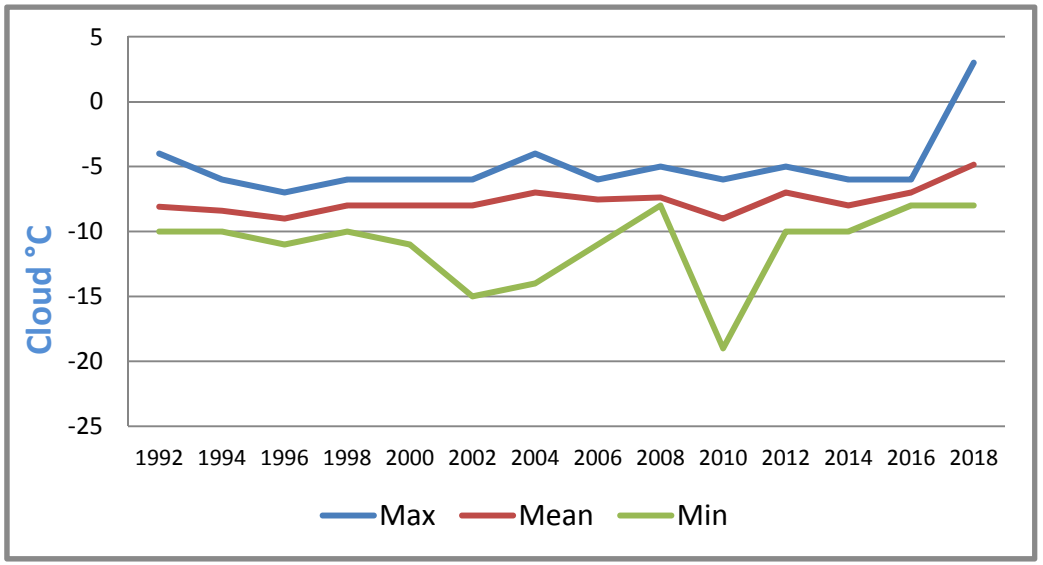
National standards and physical inspection data

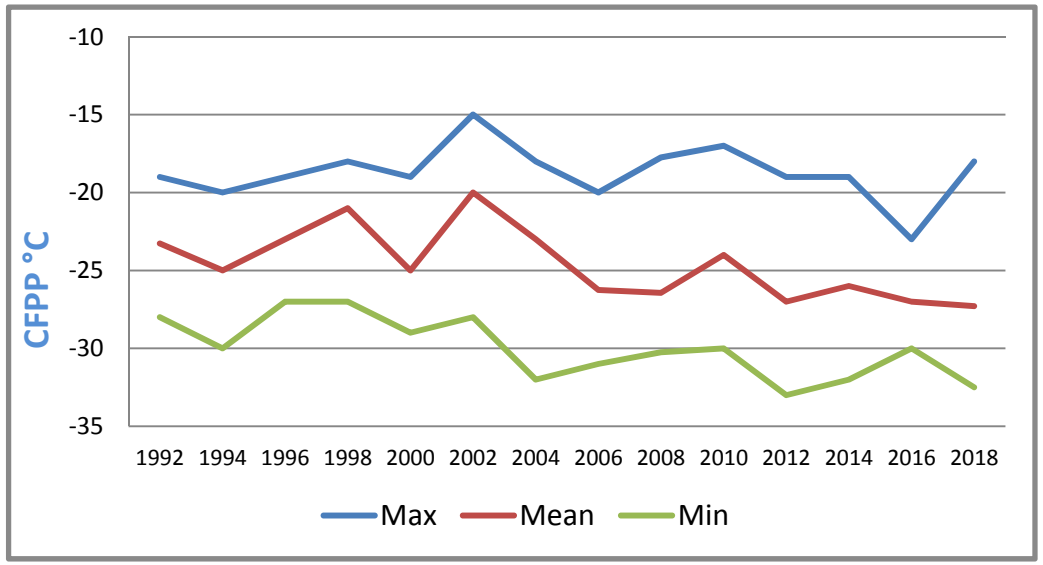
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1710524	DIES 1710526	DIES 1710527	DIES 1710528	DIES 1710530	DIES 1710525
Cloud Point, °C		**3**	**-5**	**-8**	-7	-6	-7	-4	-6	-7
CFPP, °C	-15 (max)	**-18**	**-27**	**-33**	-30	-28	-23.5	-33	-27	-27
Pour Point, °C		**-21**	**-30**	**-39**	-33	-30	-27	-39	-24	-27
HFRR, µm	460 (max)	**303**	**234**	**187**	353	222	252	216	191	291
Wax Content @ 10°C Below Cloud, wt%		**3.3**	**2.0**	**1.3**	1.5	2.6	3.3	1.2	2.1	2.3
Rancimat, hrs	*	**>30**	**>25**	**19**	>30	26	30	>30	>30	20
Sulphur, ppm	10 (max)	**7**	**6**	**4**	7	7	7	3	5	8
Density @15°C, kg/m^3	820 - 845	**842**	**835**	**831**	833	840	842	834	839	830
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**55**	**52**	**49**	51	52	53	50	52	54
Cetane Index $_{4\ Variable}$	46 (min)	**57**	**53**	**49**	52	51	51	50	50	54
Cetane Number	51 (min)	**59**	**55**	**53**	54	53	53	54	54	55
Distillation, °C IBP		**185**	**165**	**101**	171	164	163	171	156	169
T_{10}		**223**	**212**	**204**	207	203	205	197	189	202
T_{20}		**239**	**229**	**219**	223	226	232	210	209	219
T_{50}		**281**	**268**	**252**	261	275	281	254	271	266
T_{90}		**341**	**335**	**333**	333	335	333	337	338	334
T_{95}	360 (max)	**361**	**352**	**346**	352	351	348	355	355	350
FBP		**368**	**361**	**355**	362	358	354	365	362	359
% FAME	7 (max)	**7**	**4**	**0**	1	5	7	7	7	3

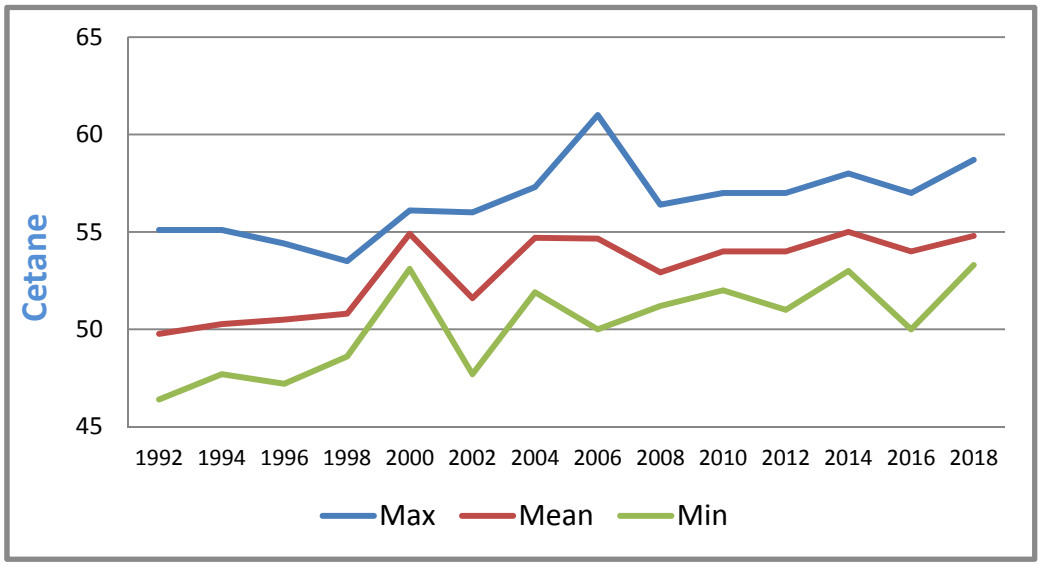
*20 hours min for diesel containing FAME above 2 % V/V

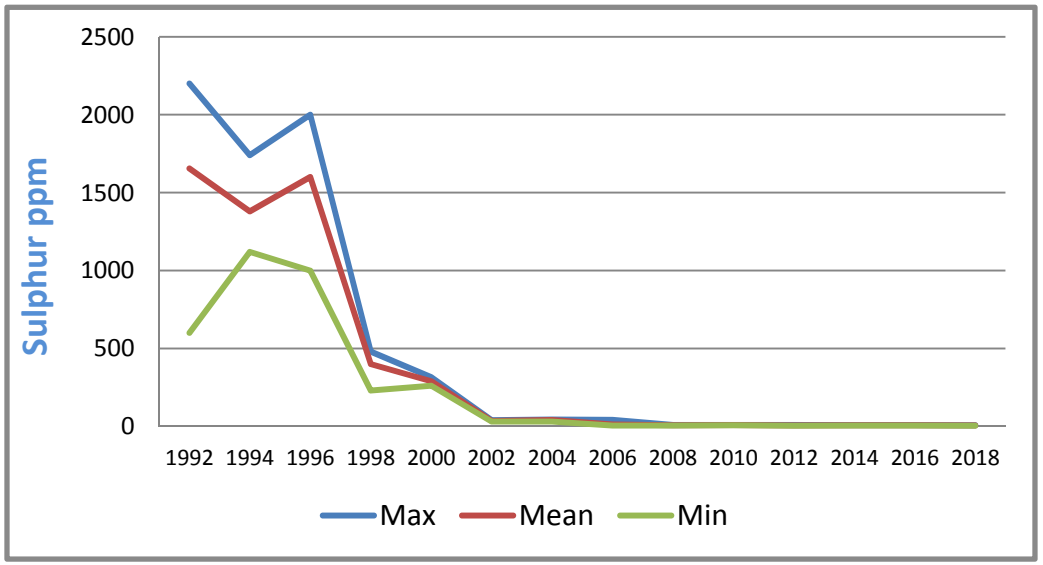
Benelux

Europe









Croatia

Europe

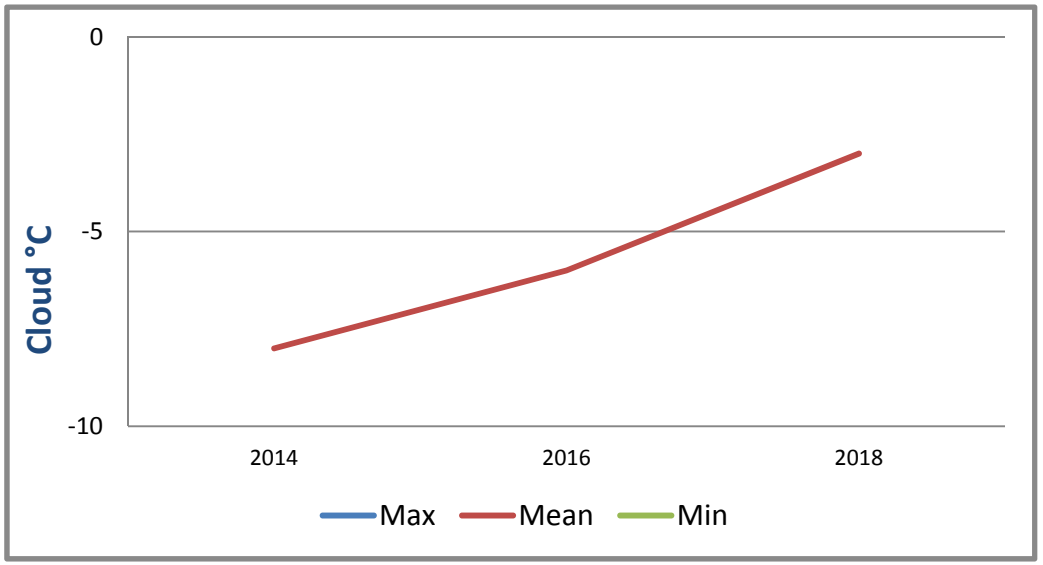
National standards and physical inspection data

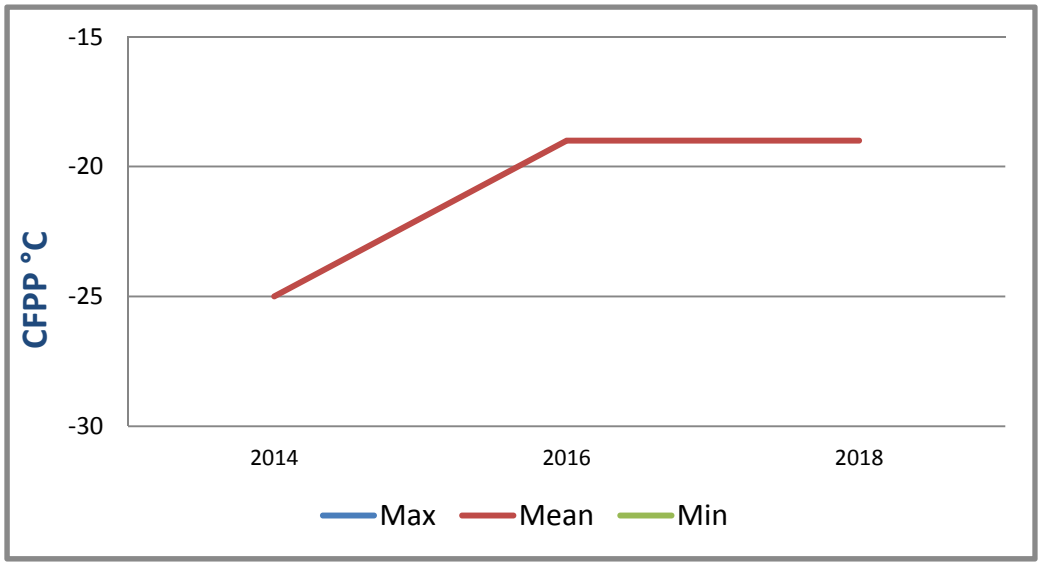
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800004
Cloud Point, °C			**-3**		-3
CFPP, °C	-15 (max)		**-19**		-19
Pour Point, °C			**-24**		-24
HFRR, µm	460 (max)		**415**		415
Wax Content @ 10°C Below Cloud, wt%			**1.9**		1.9
Rancimat, hrs	*		**>30**		>30
Sulphur, ppm	10 (max)		**6**		6
Density @15°C, kg/m^3	820 - 845		**832**		832
Viscosity @ 40°C, cSt	2.0 - 4.5		**-**		-
Cetane Index $_{2\ Variable}$			**54**		54
Cetane Index $_{4\ Variable}$	46 (min)		**54**		54
Cetane Number	51 (min)		**54**		54
Distillation, °C IBP			**167**		167
T_{10}			**206**		206
T_{20}			**224**		224
T_{50}			**270**		270
T_{90}			**342**		342
T_{95}	360 (max)		**360**		360
FBP			**371**		371
% FAME	7 (max)		**0**		0

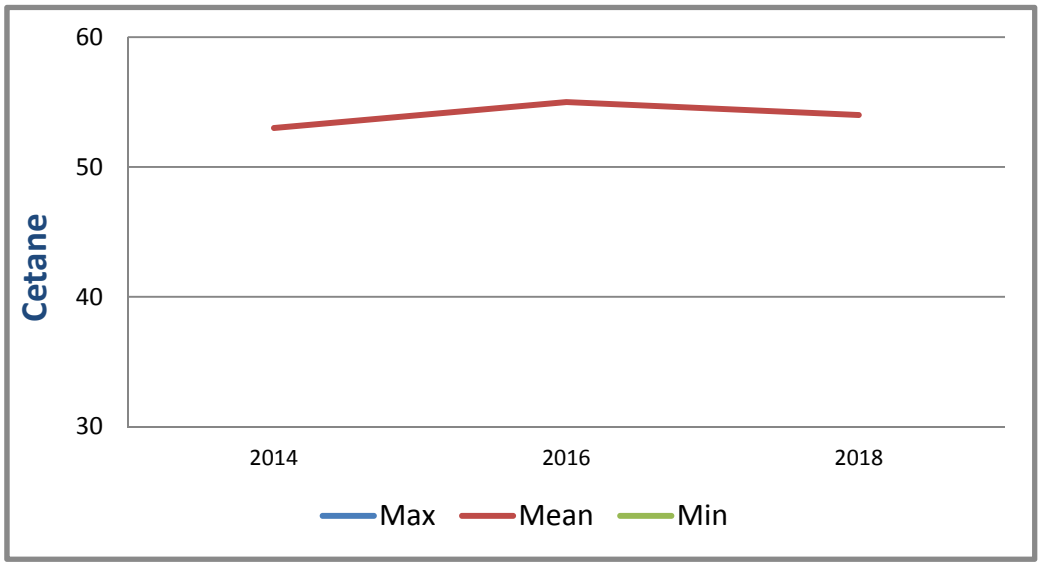
*20 hours min for diesel containing FAME above 2 % V/V

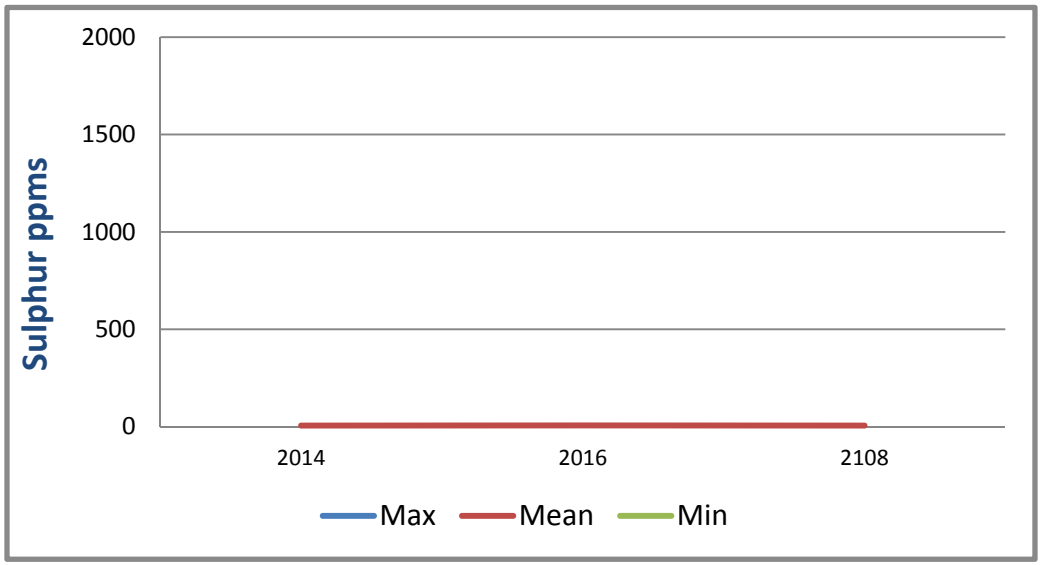
Croatia

Europe









Czech Republic

Europe

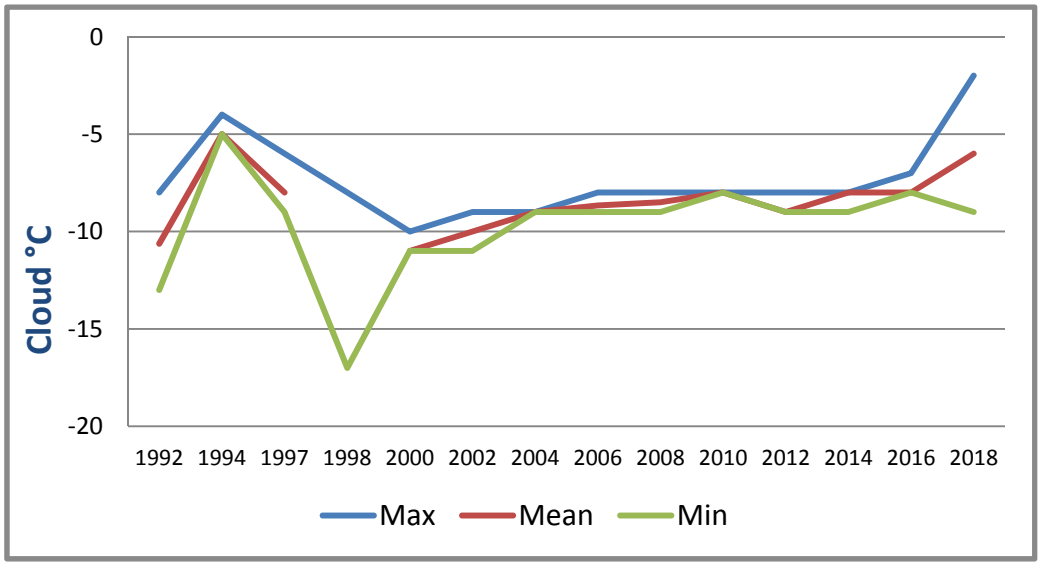
National standards and physical inspection data

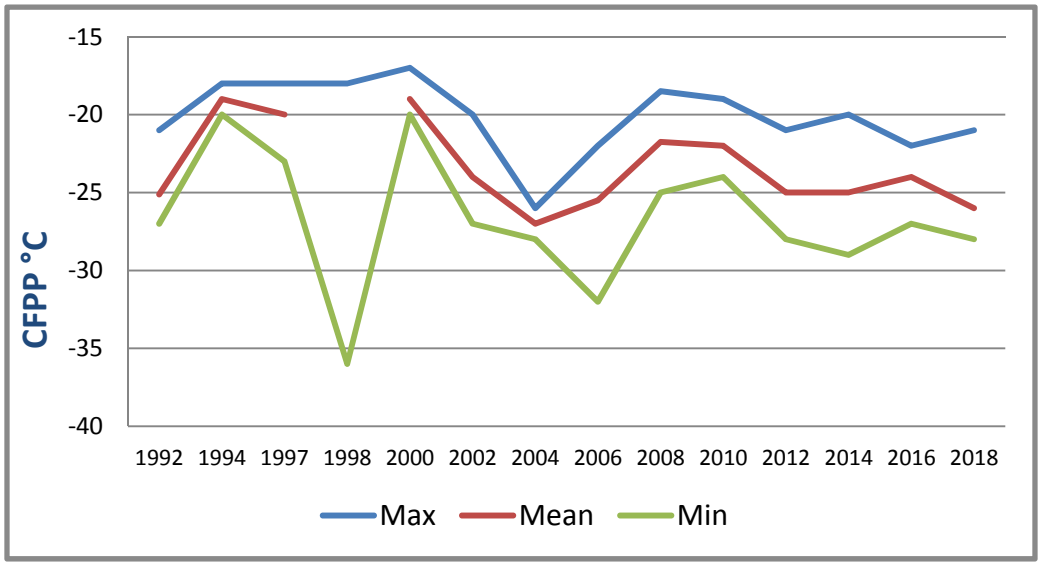
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800005	DIES 1800006	DIES 1800007
Cloud Point, °C		**-2**	**-6**	**-9**	-9	-8	-2
CFPP, °C	-20 (max)	**-21**	**-26**	**-28**	-28	-28	-21
Pour Point, °C		**-27**	**-28**	**-30**	-27	-30	-27
HFRR, µm	460 (max)	**245**	**211**	**193**	245	197	193
Wax Content @ 10°C Below Cloud, wt%		**2.1**	**2.0**	**1.9**	2.1	2.1	1.9
Rancimat, hrs	*	**>30**	**>30**	**>30**	>30	>30	>30
Sulphur, ppm	10 (max)	**7**	**7**	**7**	7	7	7
Density @15°C, kg/m^3	820 - 845	**841**	**837**	**830**	841	841	830
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-
Cetane Index $_{2\ Variable}$		**53**	**50**	**48**	48	48	53
Cetane Index $_{4\ Variable}$	46 (min)	**53**	**49**	**48**	48	48	53
Cetane Number	51 (min)	**54**	**51**	**50**	50	50	54
Distillation, °C IBP		**175**	**171**	**169**	169	170	175
T_{10}		**204**	**199**	**197**	198	197	204
T_{20}		**218**	**213**	**211**	212	211	218
T_{50}		**262**	**260**	**259**	259	259	262
T_{90}		**334**	**332**	**331**	331	331	334
T_{95}	360 (max)	**350**	**346**	**344**	345	344	350
FBP		**359**	**356**	**354**	354	354	359
% FAME	7 (max)	**7**	**7**	**7**	7	7	7

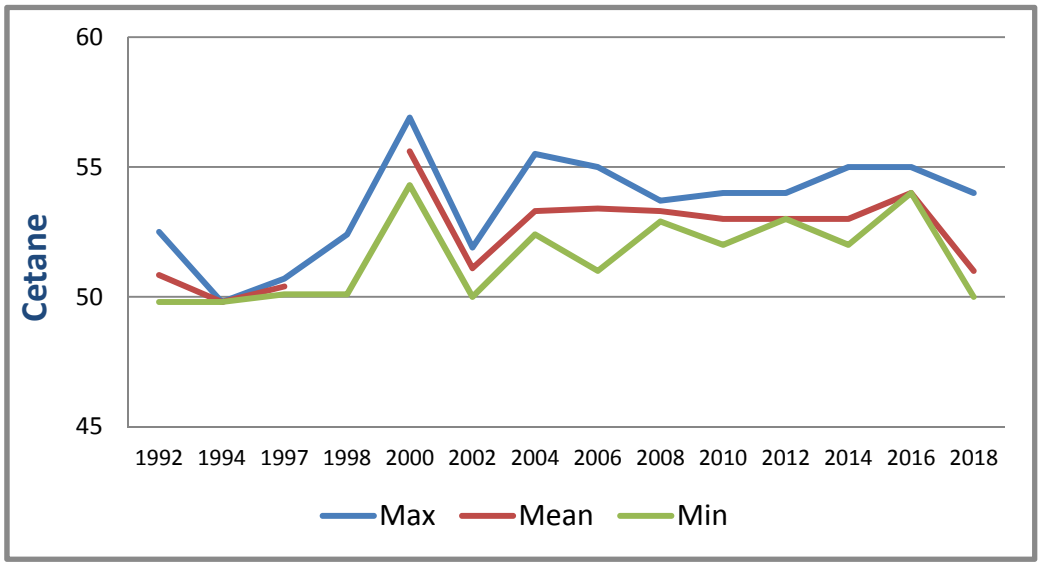
*20 hours min for diesel containing FAME above 2 % V/V

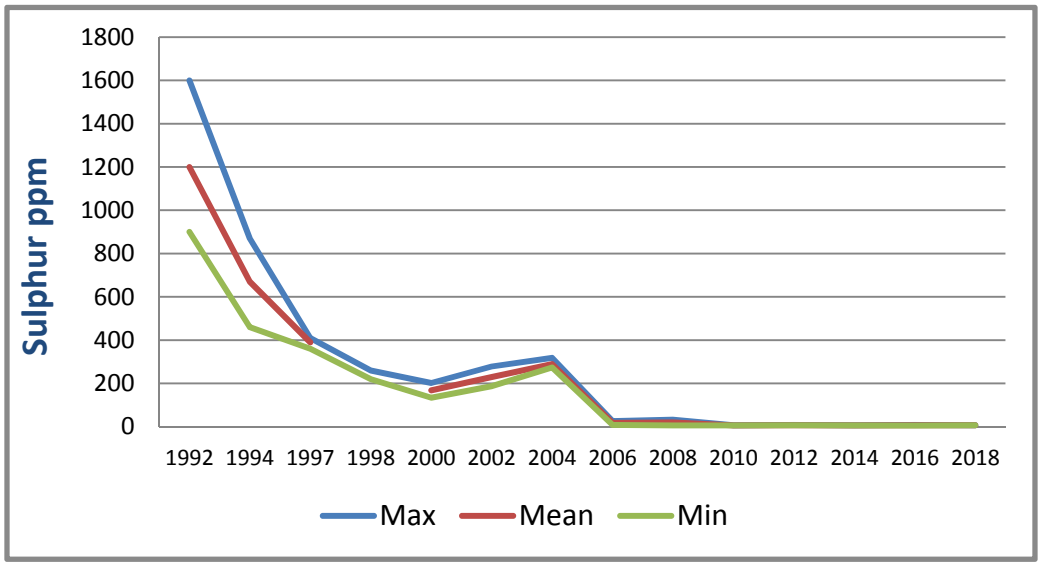
Czech Republic

Europe









Denmark

National standards and physical inspection data

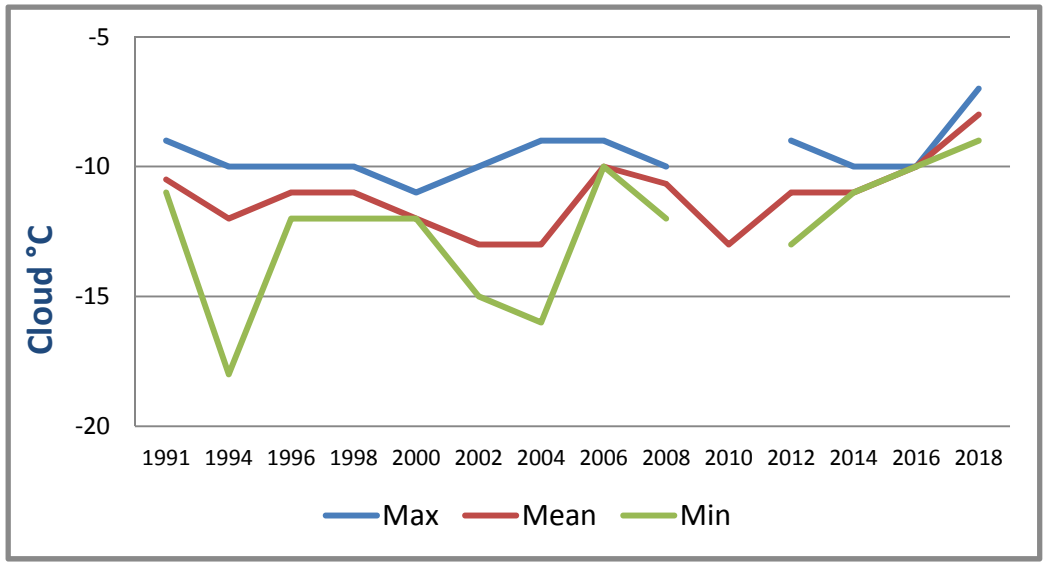
Europe

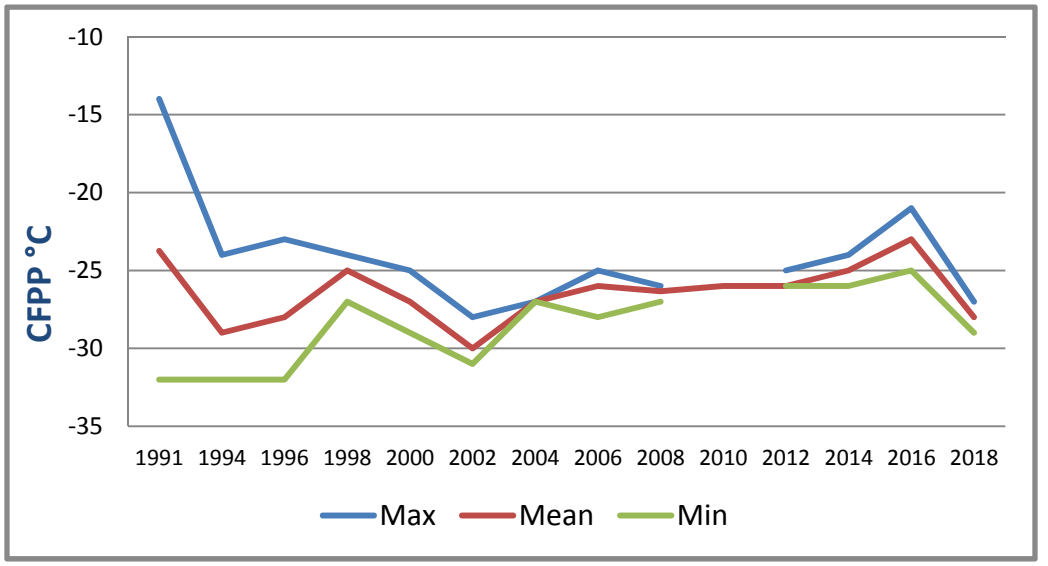
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800008	DIES 1800009
Cloud Point, °C		**-7**	**-8**	**-9**	-9	-7
CFPP, °C	-20 (max)	**-27**	**-28**	**-29**	-29	-27
Pour Point, °C		**-36**	**-42**	**-48**	-36	-48
HFRR, µm	460 (max)	**237**	**216**	**196**	196	237
Wax Content @ 10°C Below Cloud, wt%		**2.9**	**2.4**	**1.9**	1.9	2.9
Rancimat, hrs	*	**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	10 (max)	**7**	**7**	**6**	6	7
Density @15°C, kg/m^3	820 - 845	**838**	**838**	**837**	838	837
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-
Cetane Index $_{2\ Variable}$		**53**	**53**	**53**	53	53
Cetane Index $_{4\ Variable}$	46 (min)	**52**	**52**	**51**	52	51
Cetane Number	51 (min)	**54**	**54**	**53**	53	54
Distillation, °C IBP		**174**	**169**	**164**	174	164
T_{10}		**207**	**202**	**197**	207	197
T_{20}		**224**	**220**	**215**	224	215
T_{50}		**274**	**273**	**273**	274	273
T_{90}		**337**	**334**	**332**	337	332
T_{95}	360 (max)	**354**	**350**	**346**	354	346
FBP		**360**	**355**	**351**	360	351
% FAME	7 (max)	**7**	**7**	**7**	7	7

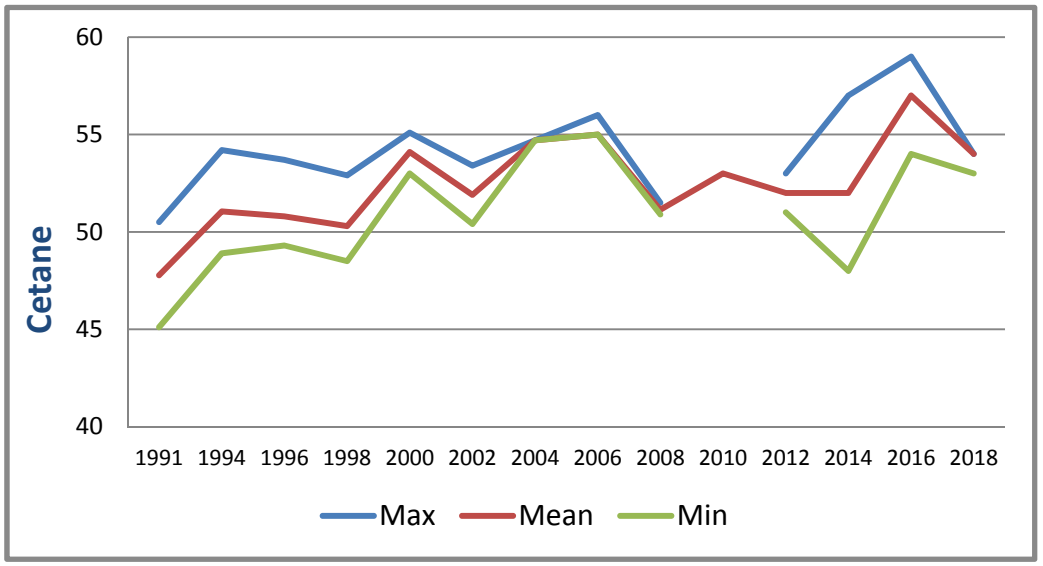
*20 hours min for diesel containing FAME above 2 % V/V

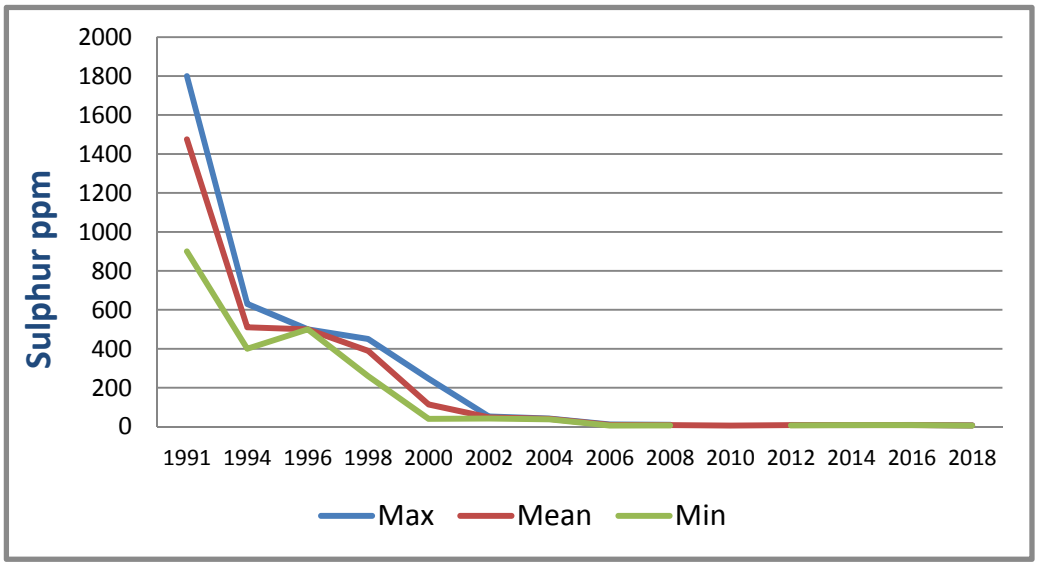
Denmark

Europe









Finland

National standards and physical inspection data

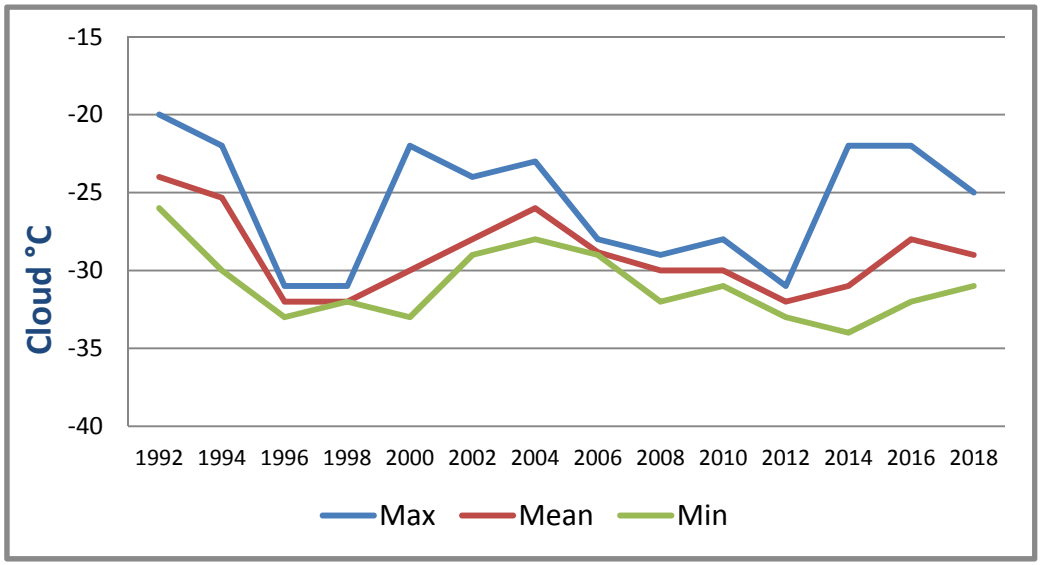
Europe

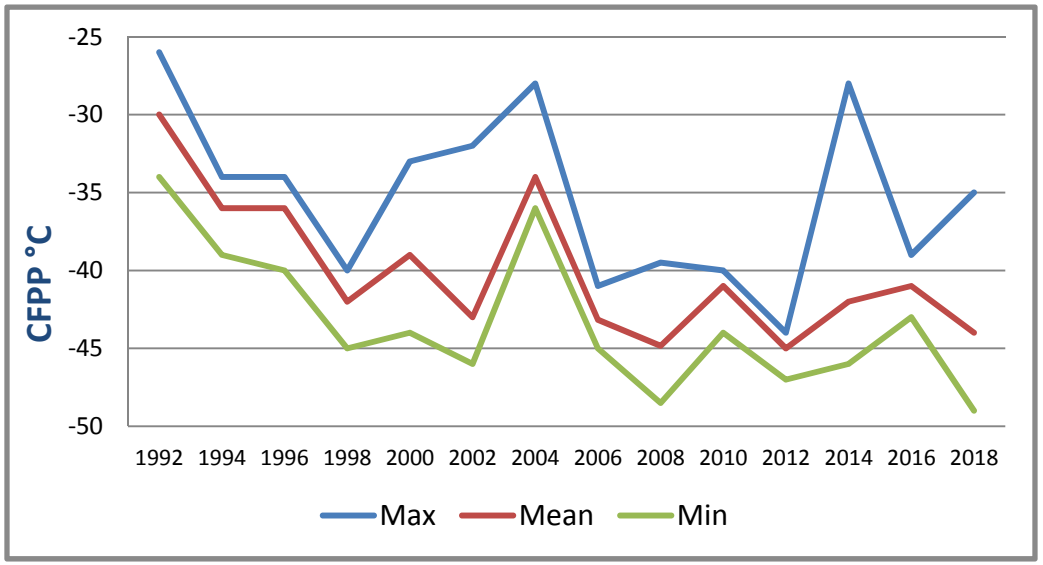
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800010	DIES 1800012	DIES 1800013
Cloud Point, °C	-16 (max)	**-25**	**-29**	**-31**	-31	-25	-31
CFPP, °C	-26 (max)	**-35**	**-44**	**-49**	-49	-35	-49
Pour Point, °C		**-39**	**-43**	**-45**	-45	-39	-45
HFRR, µm	460 (max)	**389**	**368**	**349**	367	389	349
Wax Content @ 10°C Below Cloud, wt%		**1.6**	**0.5**	**0.0**	0	1.6	0
Rancimat, hrs	*	**>30**	**>30**	**>30**	>30	>30	>30
Sulphur, ppm	10 (max)	**<3**	**<3**	**<3**	<3	<3	<3
Density @15°C, kg/m^3	800 - 845	**809**	**806**	**801**	807	801	809
Viscosity @ 40°C, cSt	1.5 - 4.0	**-**	**-**	**-**	-	-	-
Cetane Index $_{2\ Variable}$		**65**	**58**	**54**	56	65	54
Cetane Index $_{4\ Variable}$	46 (min)	**68**	**60**	**55**	58	68	55
Cetane Number	59 (min)	**62**	**58**	**54**	57	62	54
Distillation, °C IBP		**182**	**180**	**177**	182	177	182
T_{10}	180 (min)	**211**	**205**	**201**	204	211	201
T_{20}		**227**	**216**	**208**	212	227	208
T_{50}		**265**	**247**	**236**	239	265	236
T_{90}		**310**	**297**	**290**	290	310	291
T_{95}	360 (max)	**325**	**311**	**303**	303	325	306
FBP		**337**	**326**	**320**	320	337	321
% FAME	7 (max)	**1**	**0**	**0**	0	1	0

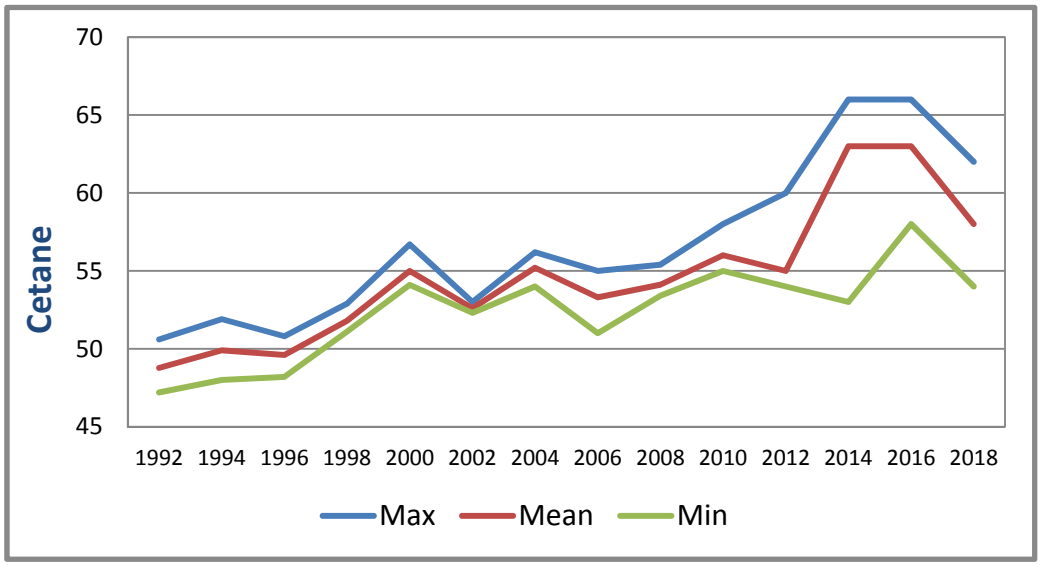
*20 hours min for diesel containing FAME above 2 % V/V
Specification shown is EN590 Arctic grade I

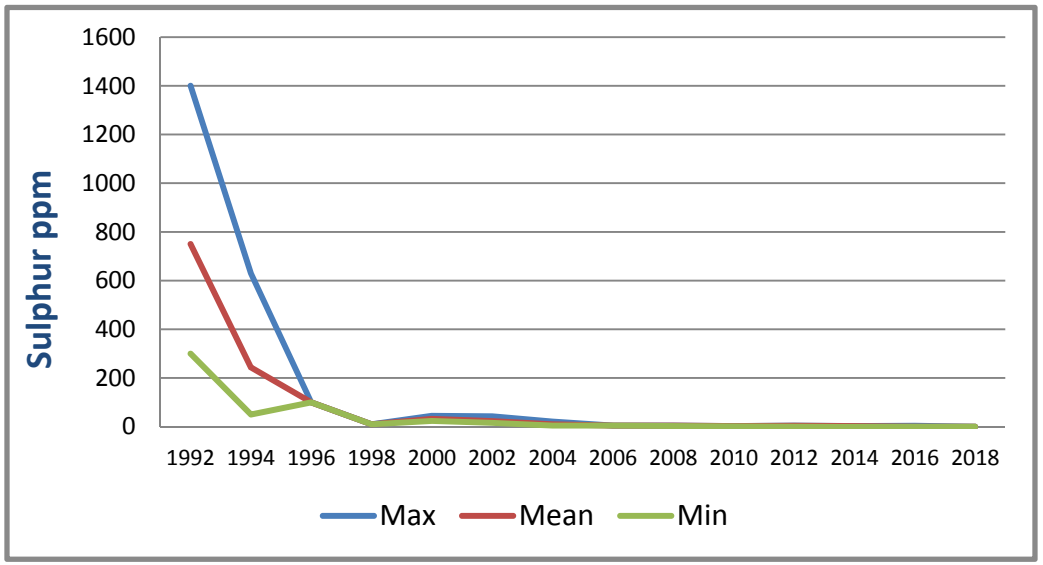
Finland

Europe









France

National standards and physical inspection data

Europe

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800017	DIES 1800019	DIES 1800021	DIES 1800025	DIES 1800027	DIES 1800028	DIES 1800029
Cloud Point, °C	-5 (max)	**-5**	**-7**	**-8**	-5	-8	-5	-5	-8	-7	-8
CFPP, °C	-15 (max)	**-17**	**-22**	**-26**	-17	-24	-21	-22	-26	-26	-25
Pour Point, °C		**-21**	**-26**	**-33**	-24	-21	-30	-33	-21	-27	-24
HFRR, µm	460 (max)	**203**	**184**	**170**	201	203	184	179	185	175	170
Wax Content @ 10°C Below Cloud, wt%		**3.1**	**2.1**	**1.4**	2.8	2.5	1.5	1.4	1.9	1.8	1.8
Rancimat, hrs	*	**>30**	**>30**	**>30**	>30	>30	>30	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**8**	**7**	**7**	7	7	7	8	7	7	7
Density @15°C, kg/m^3	820 - 845	**843**	**836**	**827**	833	827	830	834	843	837	843
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**56**	**52**	**50**	55	56	53	52	50	51	50
Cetane Index $_{4\ Variable}$	46 (min)	**56**	**51**	**48**	54	56	52	51	48	49	48
Cetane Number	51 (min)	**55**	**52**	**49**	52	55	53	51	49	51	50
Distillation, °C IBP		**171**	**163**	**159**	161	171	162	159	163	160	167
T_{10}		**203**	**196**	**191**	195	203	192	191	196	191	199
T_{20}		**224**	**215**	**208**	219	220	209	208	215	209	217
T_{50}		**279**	**269**	**262**	279	271	263	262	270	264	269
T_{90}		**340**	**337**	**334**	340	337	338	339	335	338	334
T_{95}	360 (max)	**361**	**356**	**352**	358	355	359	361	352	357	353
FBP		**364**	**361**	**359**	361	360	364	364	359	362	359
% FAME	8 (max)	**8**	**7**	**7**	7	8	7	7	7	7	7

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

France (continued)

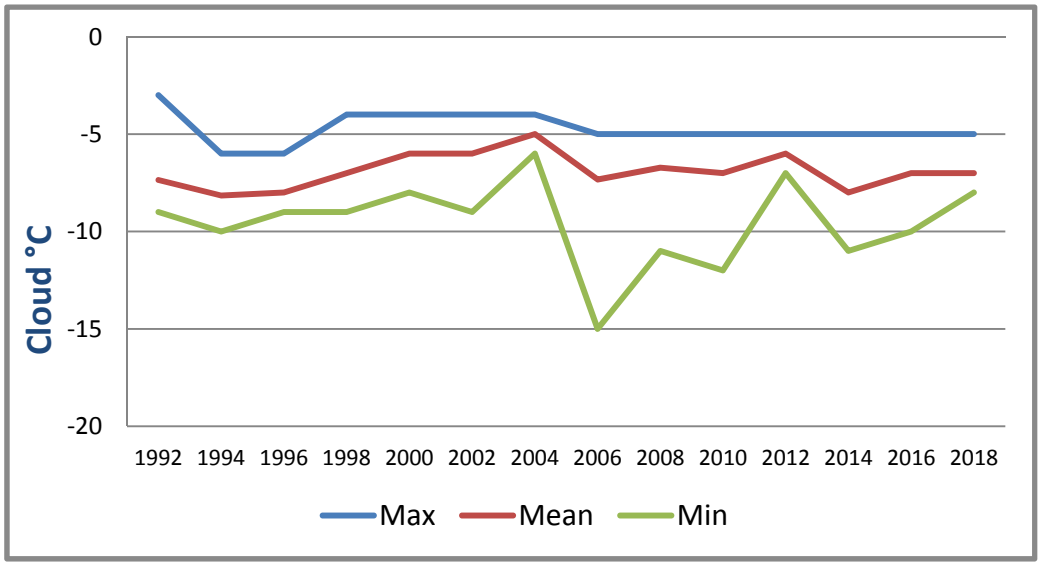
National standards and physical inspection data

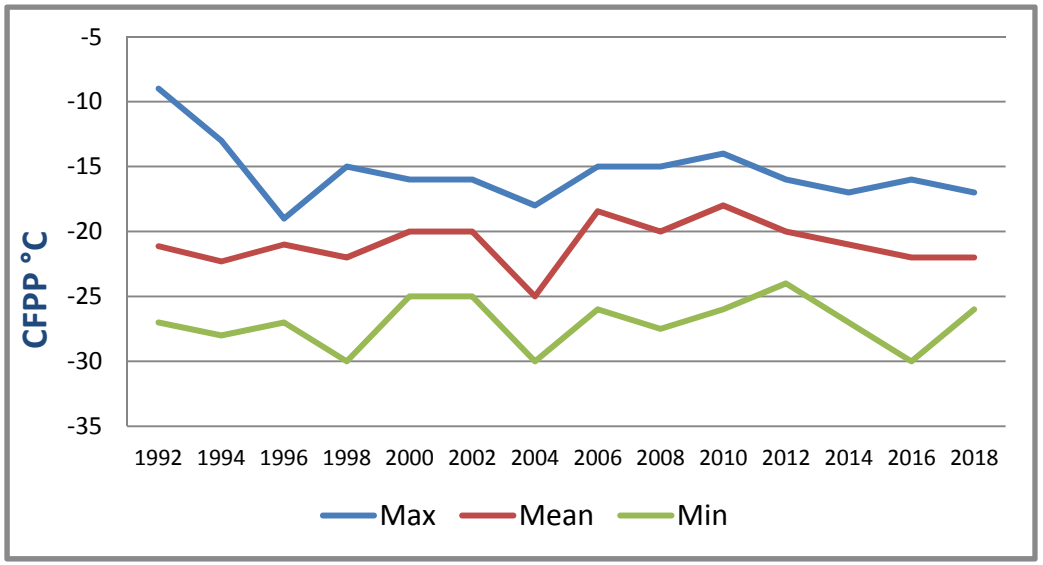
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800030
Cloud Point, °C	-5 (max)	**-5**	**-7**	**-8**	-6
CFPP, °C	-15 (max)	**-17**	**-22**	**-26**	-18
Pour Point, °C		**-21**	**-26**	**-33**	-24
HFRR, µm	460 (max)	**203**	**184**	**170**	176
Wax Content @ 10°C Below Cloud, wt%		**3.1**	**2.1**	**1.4**	3.1
Rancimat, hrs	*	**>30**	**>30**	**>30**	>30
Sulphur, ppm	10 (max)	**8**	**7**	**7**	7
Density @15°C, kg/m^3	820 - 845	**843**	**836**	**827**	841
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-
Cetane Index $_{2\ Variable}$		**56**	**52**	**50**	52
Cetane Index $_{4\ Variable}$	46 (min)	**56**	**51**	**48**	51
Cetane Number	51 (min)	**55**	**52**	**49**	51
Distillation, °C IBP		**171**	**163**	**159**	160
T_{10}		**203**	**196**	**191**	201
T_{20}		**224**	**215**	**208**	224
T_{50}		**279**	**269**	**262**	277
T_{90}		**340**	**337**	**334**	336
T_{95}	360 (max)	**361**	**356**	**352**	354
FBP		**364**	**361**	**359**	359
% FAME	8 (max)	**8**	**7**	**7**	7

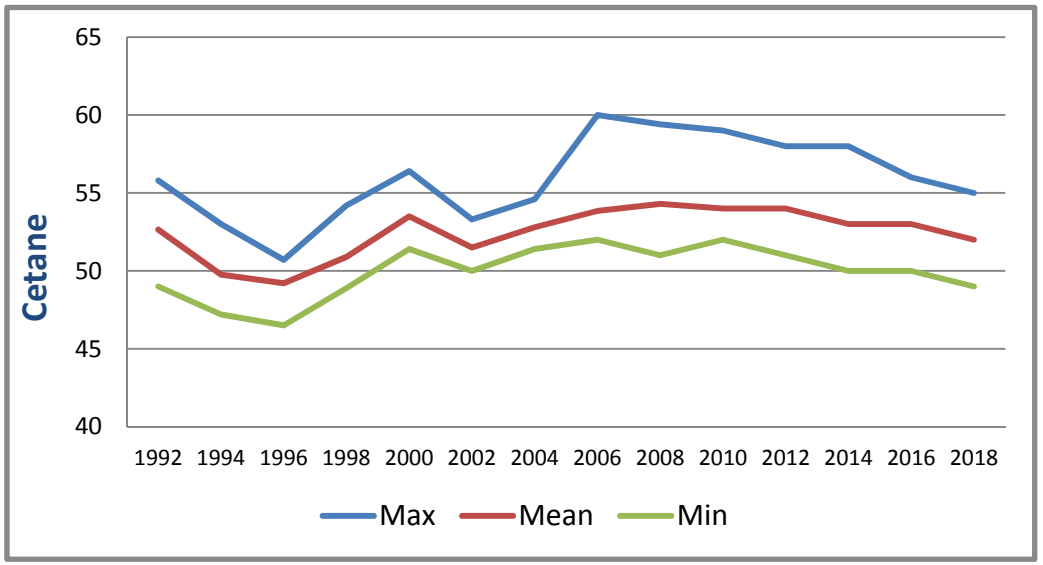
*20 hours min for diesel containing FAME above 2 % V/V

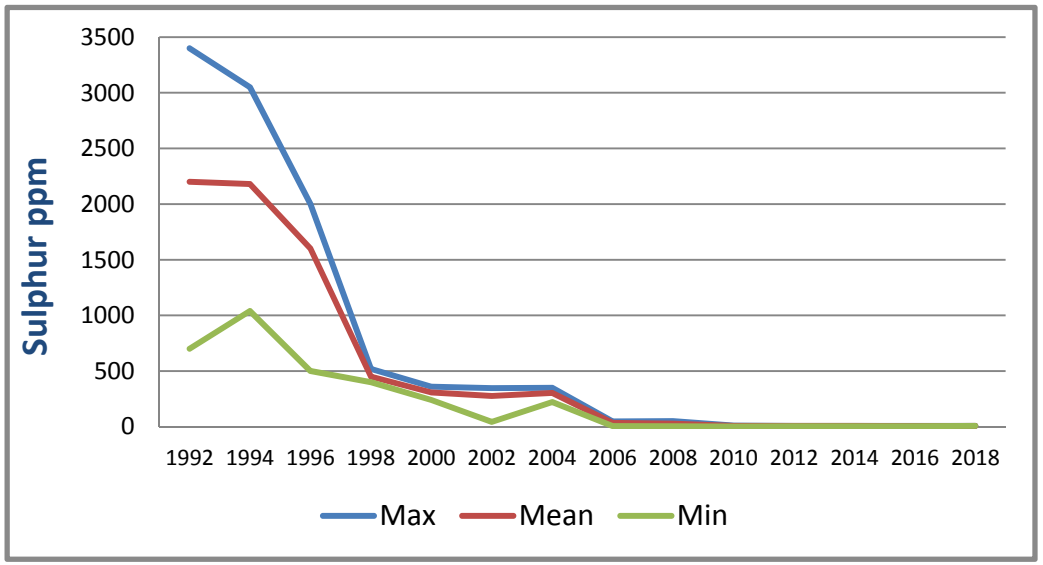
France

Europe









Germany

National standards and physical inspection data

Europe

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800032	DIES 1800033	DIES 1800034	DIES 1800036	DIES 1800037	DIES 1800038	DIES 1800039
Cloud Point, °C		**-3**	**-7**	**-13**	-6	-3	-9	-6	-7	-13	-13
CFPP, °C	-20 (max)	**-20**	**-28**	**-33**	-30	-30	-30	-30	-31	-29	-33
Pour Point, °C		**-24**	**-30**	**-51**	-27	-33	-30	-30	-27	-27	-51
HFRR, µm	460 (max)	**472**	**264**	**183**	349	472	226	200	215	204	390
Wax Content @ 10°C Below Cloud, wt%		**2.8**	**2.0**	**1.5**	2.0	2.2	2.6	1.9	1.8	2.6	1.8
Rancimat, hrs	*	**>30**	**>25**	**10**	>30	>30	>30	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**9**	**7**	**<3**	6	7	6	8	7	6	<3
Density @15°C, kg/m^3	820 - 845	**840**	**835**	**825**	838	840	838	830	836	840	835
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**56**	**52**	**50**	51	52	52	53	51	50	56
Cetane Index $_{4\ Variable}$	46 (min)	**59**	**52**	**50**	51	52	52	53	51	50	59
Cetane Number	51 (min)	**62**	**54**	**51**	53	59	54	54	53	53	62
Distillation, °C IBP		**197**	**174**	**166**	170	175	182	173	169	188	197
T_{10}		**241**	**207**	**193**	212	215	215	198	209	213	241
T_{20}		**255**	**223**	**207**	229	234	230	213	226	227	255
T_{50}		**285**	**267**	**255**	267	274	271	264	265	264	285
T_{90}		**338**	**333**	**321**	332	336	326	337	331	323	327
T_{95}	360 (max)	**355**	**349**	**336**	350	352	340	352	348	336	340
FBP		**364**	**358**	**346**	358	358	352	360	358	347	346
% FAME	7 (max)	**8**	**4**	**0**	2	0	3	7	2	7	0

*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 1800040	DIES 1800041	DIES 1800042	DIES 1800043	DIES 1800045	DIES 1800044	DIES 1800046
Cloud Point, °C		**-3**	**-7**	**-13**	-8	-8	-7	-7	-7	-8	-6
CFPP, °C	-20 (max)	**-20**	**-28**	**-33**	-29	-27	-25	-28	-30	-25	-20
Pour Point, °C		**-24**	**-30**	**-51**	-24	-30	-30	-24	-33	-30	-24
HFRR, µm	460 (max)	**472**	**264**	**183**	188	427	221	190	456	196	200
Wax Content @ 10°C Below Cloud, wt%		**2.8**	**2.0**	**1.5**	2.8	1.7	1.7	1.8	2.1	2.5	2.3
Rancimat, hrs	*	**>30**	**>25**	**10**	>30	>30	>30	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**9**	**7**	**<3**	6	5	5	8	6	7	8
Density @15°C, kg/m^3	820 - 845	**840**	**835**	**825**	834	825	838	836	837	833	831
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**56**	**52**	**50**	55	55	50	52	53	53	51
Cetane Index $_{4\ Variable}$	46 (min)	**59**	**52**	**50**	55	55	50	52	53	53	51
Cetane Number	51 (min)	**62**	**54**	**51**	57	57	54	52	60	54	52
Distillation, °C IBP		**197**	**174**	**166**	167	170	170	170	173	179	173
T_{10}		**241**	**207**	**193**	209	201	203	203	211	208	199
T_{20}		**255**	**223**	**207**	231	216	218	220	229	221	212
T_{50}		**285**	**267**	**255**	281	262	262	270	273	267	256
T_{90}		**338**	**333**	**321**	337	338	332	334	336	334	331
T_{95}	360 (max)	**355**	**349**	**336**	351	355	348	350	352	347	347
FBP		**364**	**358**	**346**	358	364	358	360	359	356	356
% FAME	7 (max)	**8**	**4**	**0**	7	1	8	7	0	7	5

*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 1800047	DIES 1800048	DIES 1800051	DIES 1800049	DIES 1800050	DIES 1800052	DIES 1800053
Cloud Point, °C		**-3**	**-7**	**-13**	-7	-5	-6	-6	-11	-6	-4
CFPP, °C	-20 (max)	**-20**	**-28**	**-33**	-26	-27	-30	-28	-32	-29	-20
Pour Point, °C		**-24**	**-30**	**-51**	-30	-30	-33	-27	-30	-30	-30
HFRR, µm	460 (max)	**472**	**264**	**183**	201	196	346	190	227	449	197
Wax Content @ 10°C Below Cloud, wt%		**2.8**	**2.0**	**1.5**	2.1	2.4	1.5	1.7	1.5	2.1	1.9
Rancimat, hrs	*	**>30**	**>25**	**10**	>30	>30	>30	10	>30	>30	>30
Sulphur, ppm	10 (max)	**9**	**7**	**<3**	7	7	6	7	5	6	9
Density @15°C, kg/m^3	820 - 845	**840**	**835**	**825**	840	836	830	840	834	832	831
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**56**	**52**	**50**	52	53	51	52	52	54	51
Cetane Index $_{4\ Variable}$	46 (min)	**59**	**52**	**50**	51	53	52	51	52	54	50
Cetane Number	51 (min)	**62**	**54**	**51**	52	54	54	54	56	55	52
Distillation, °C IBP		**197**	**174**	**166**	173	181	173	175	172	173	166
T_{10}		**241**	**207**	**193**	206	213	204	204	206	209	193
T_{20}		**255**	**223**	**207**	223	226	218	221	223	227	207
T_{50}		**285**	**267**	**255**	271	269	255	271	264	269	255
T_{90}		**338**	**333**	**321**	336	333	333	338	321	333	337
T_{95}	360 (max)	**355**	**349**	**336**	351	348	353	355	341	349	353
FBP		**364**	**358**	**346**	361	357	364	364	356	359	362
% FAME	7 (max)	**8**	**4**	**0**	3	6	0	3	2	0	7

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

Germany (continued)

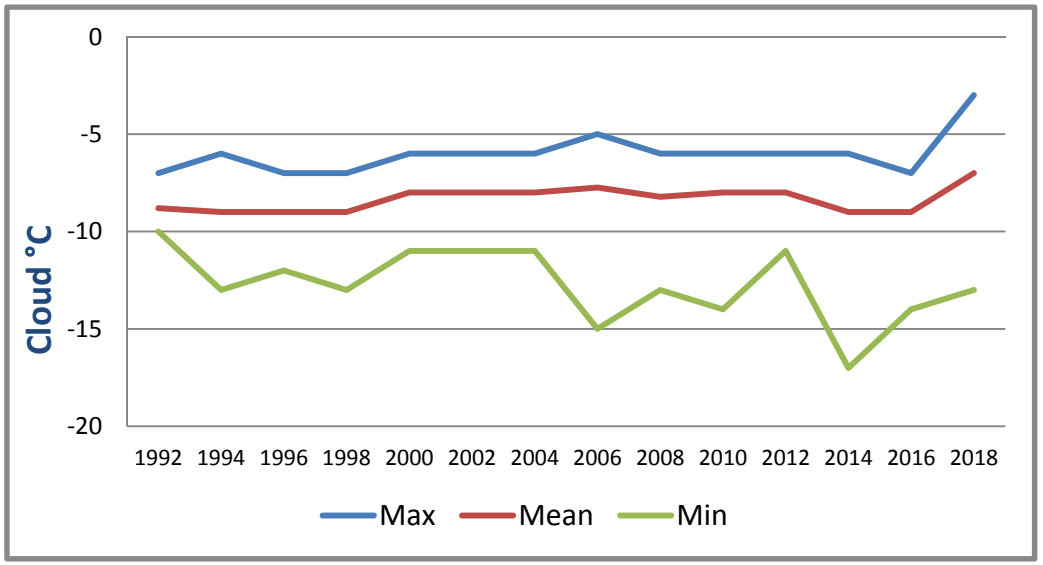
National standards and physical inspection data

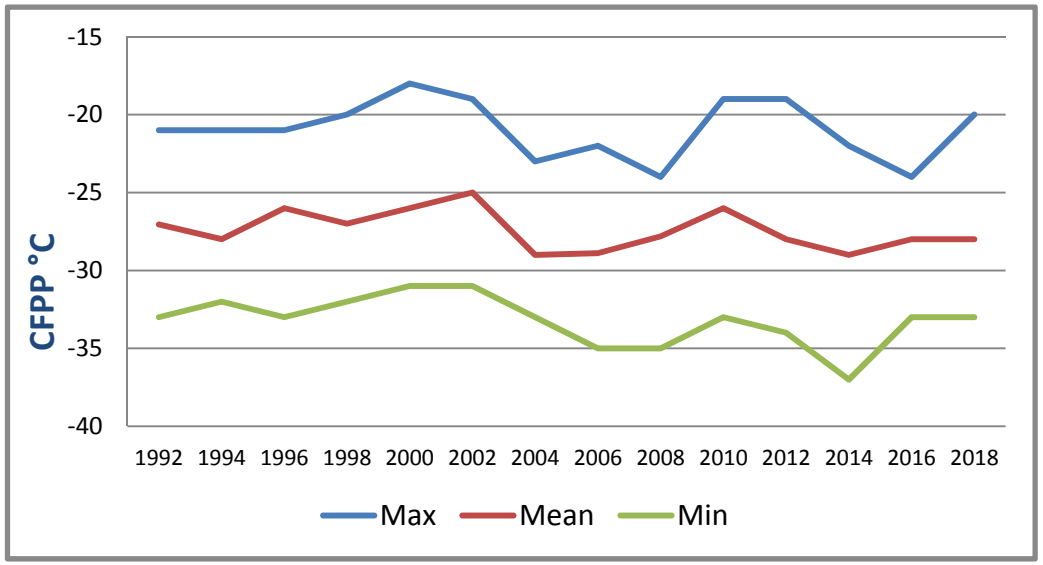
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800064	DIES 1800065	DIES 1800066
Cloud Point, °C		**-3**	**-7**	**-13**	-7	-7	-6
CFPP, °C	-20 (max)	**-20**	**-28**	**-33**	-31	-30	-32
Pour Point, °C		**-24**	**-30**	**-51**	-33	-30	-33
HFRR, µm	460 (max)	**472**	**264**	**183**	183	211	203
Wax Content @ 10°C Below Cloud, wt%		**2.8**	**2.0**	**1.5**	1.9	1.7	2.0
Rancimat, hrs	*	**>30**	**>25**	**10**	>30	>30	>30
Sulphur, ppm	10 (max)	**9**	**7**	**<3**	8	7	8
Density @15°C, kg/m^3	820 - 845	**840**	**835**	**825**	834	833	831
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-
Cetane Index $_{2\ Variable}$		**56**	**52**	**50**	52	53	52
Cetane Index $_{4\ Variable}$	46 (min)	**59**	**52**	**50**	52	52	52
Cetane Number	51 (min)	**62**	**54**	**51**	51	55	52
Distillation, °C IBP		**197**	**174**	**166**	169	173	168
T_{10}		**241**	**207**	**193**	200	200	198
T_{20}		**255**	**223**	**207**	216	215	213
T_{50}		**285**	**267**	**255**	267	267	261
T_{90}		**338**	**333**	**321**	338	338	335
T_{95}	360 (max)	**355**	**349**	**336**	351	353	349
FBP		**364**	**358**	**346**	359	364	358
% FAME	7 (max)	**8**	**4**	**0**	7	7	7

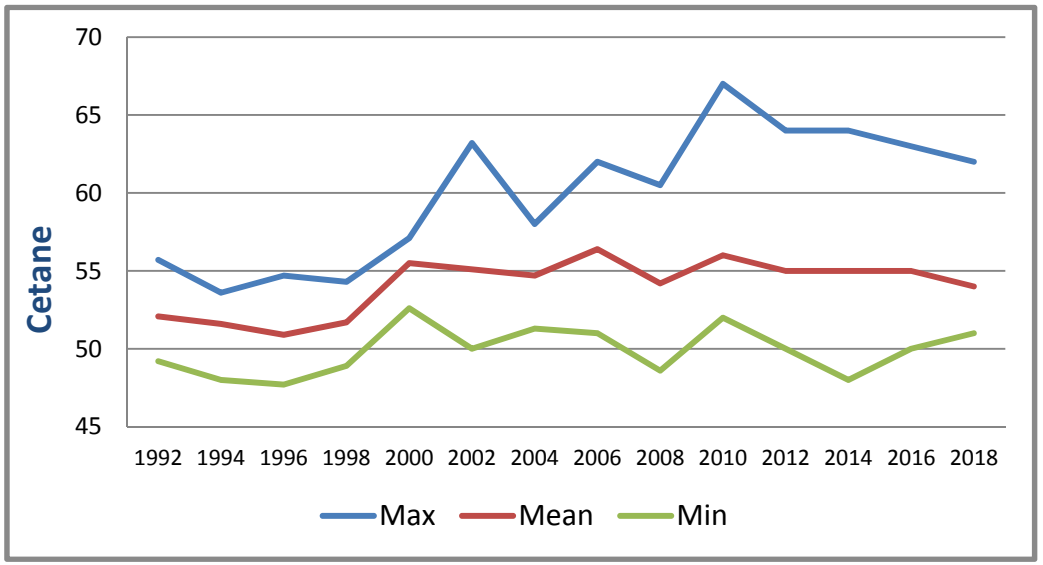
*20 hours min for diesel containing FAME above 2 % V/V

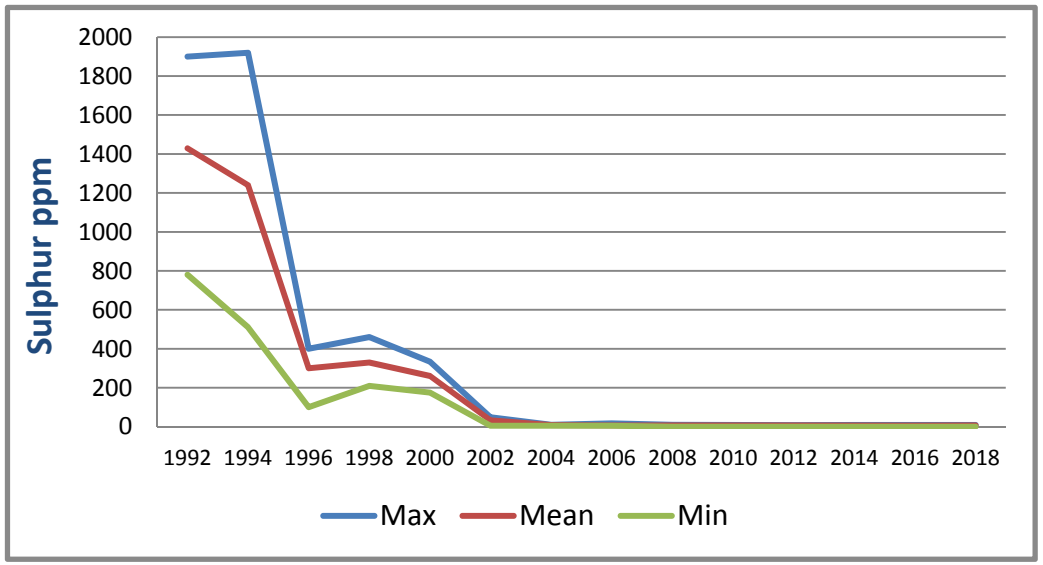
Germany

Europe









Greece

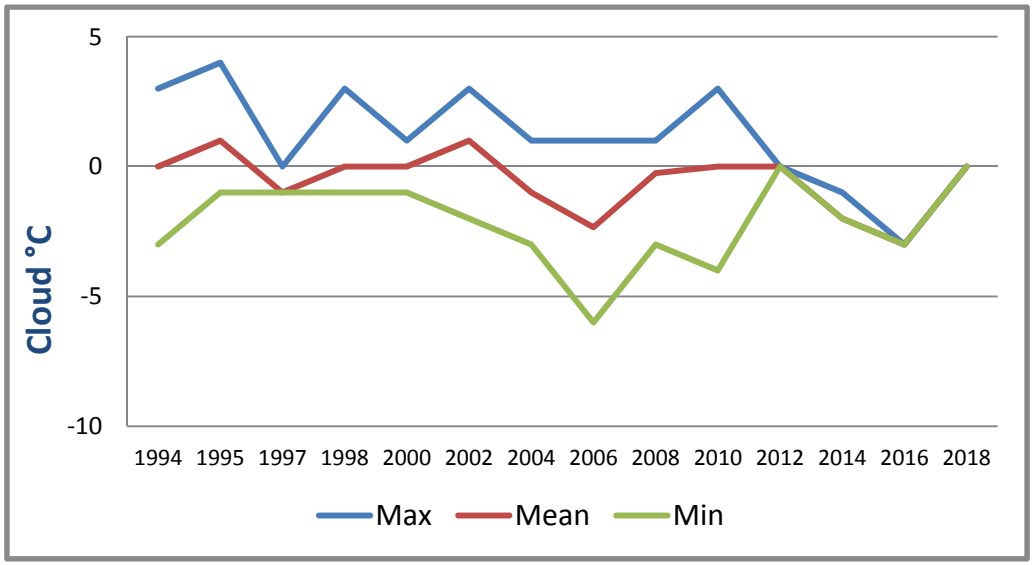
National standards and physical inspection data

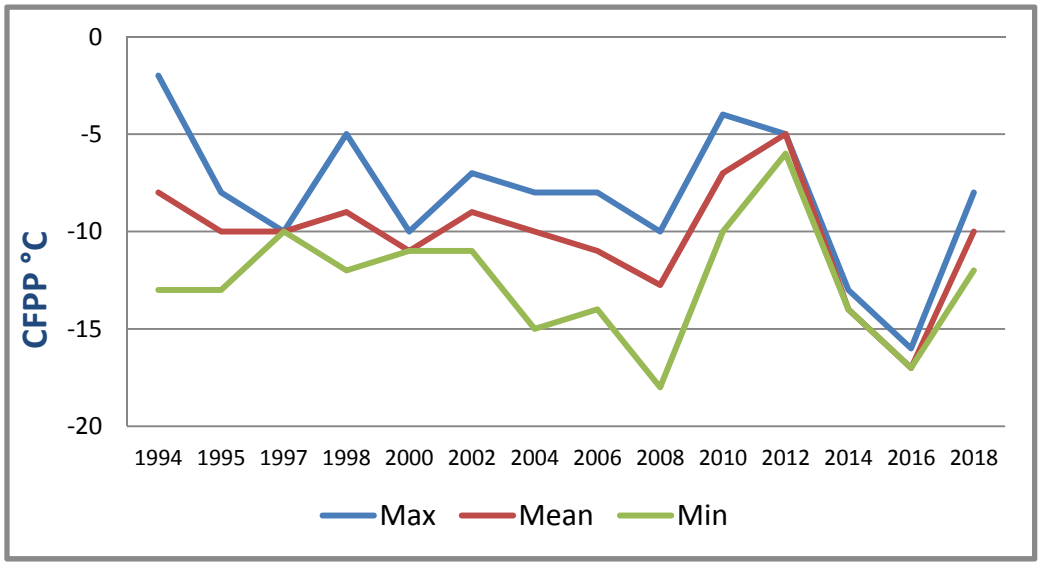
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800067	DIES 1800125
Cloud Point, °C		**0**	**0**	**0**	0	0
CFPP, °C	-5 (max)	**-8**	**-10**	**-12**	-8	-12
Pour Point, °C		**-15**	**-17**	**-18**	-18	-15
HFRR, µm	460 (max)	**177**	**176**	**175**	175	177
Wax Content @ 10°C Below Cloud, wt%		**3.2**	**3.2**	**3.2**	3.2	3.2
Rancimat, hrs	*	**28**	**23**	**19**	19	28
Sulphur, ppm	10 (max)	**6**	**6**	**6**	6	6
Density @15°C, kg/m^3	820 - 845	**833**	**832**	**832**	832	833
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-
Cetane Index $_{2\ Variable}$		**53**	**53**	**53**	53	53
Cetane Index $_{4\ Variable}$	46 (min)	**53**	**53**	**52**	53	52
Cetane Number	51 (min)	**54**	**53**	**52**	52	54
Distillation, °C IBP		**172**	**171**	**170**	170	172
T_{10}		**200**	**199**	**199**	199	200
T_{20}		**215**	**214**	**214**	214	215
T_{50}		**267**	**266**	**265**	265	267
T_{90}		**336**	**336**	**335**	335	336
T_{95}	360 (max)	**351**	**350**	**349**	349	351
FBP		**361**	**360**	**359**	361	359
% FAME	7 (max)	**8**	**8**	**7**	8	7

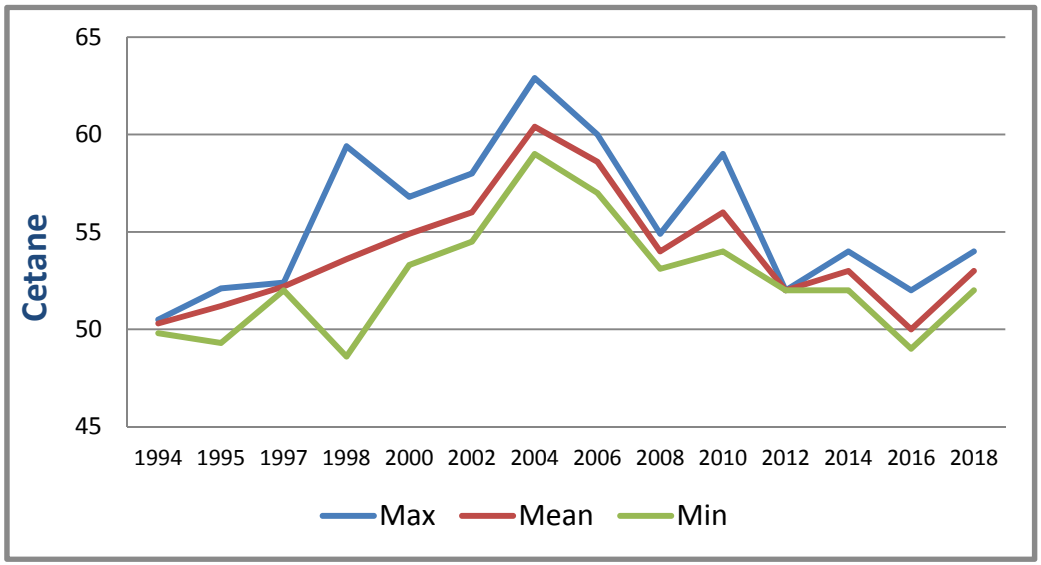
*20 hours min for diesel containing FAME above 2 % V/V

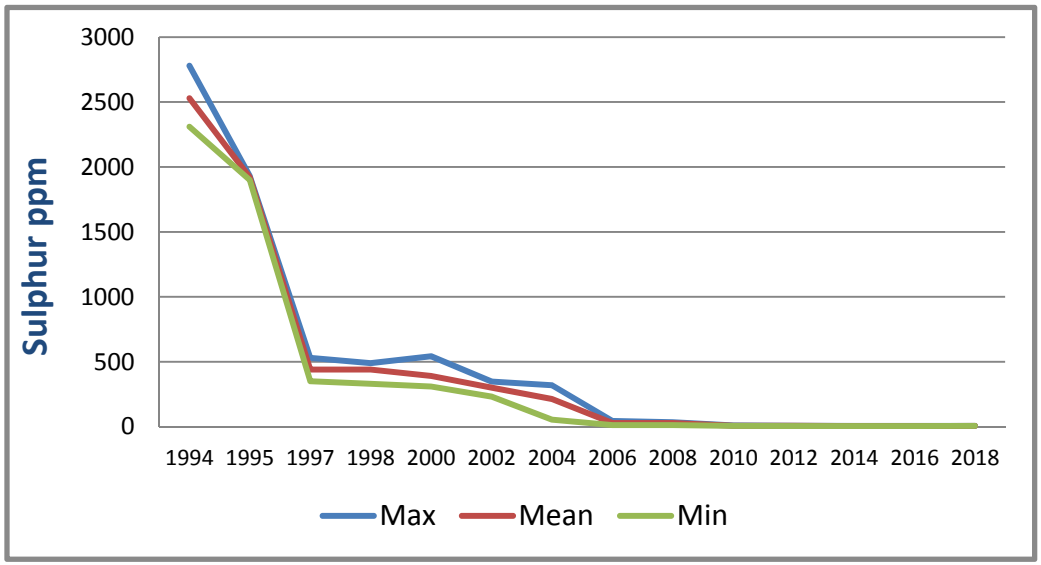
Greece

Europe









Hungary

Europe

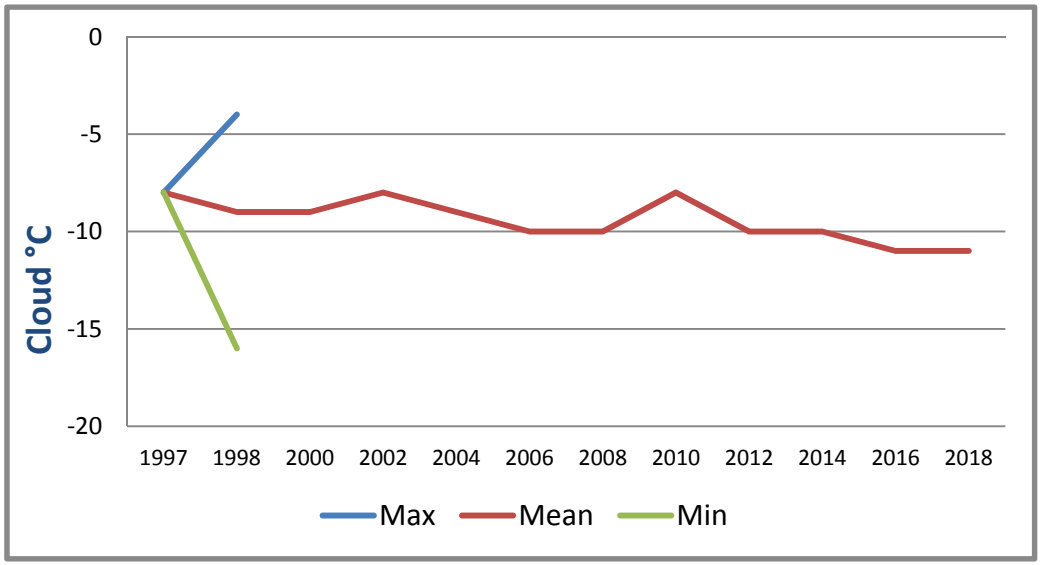
National standards and physical inspection data

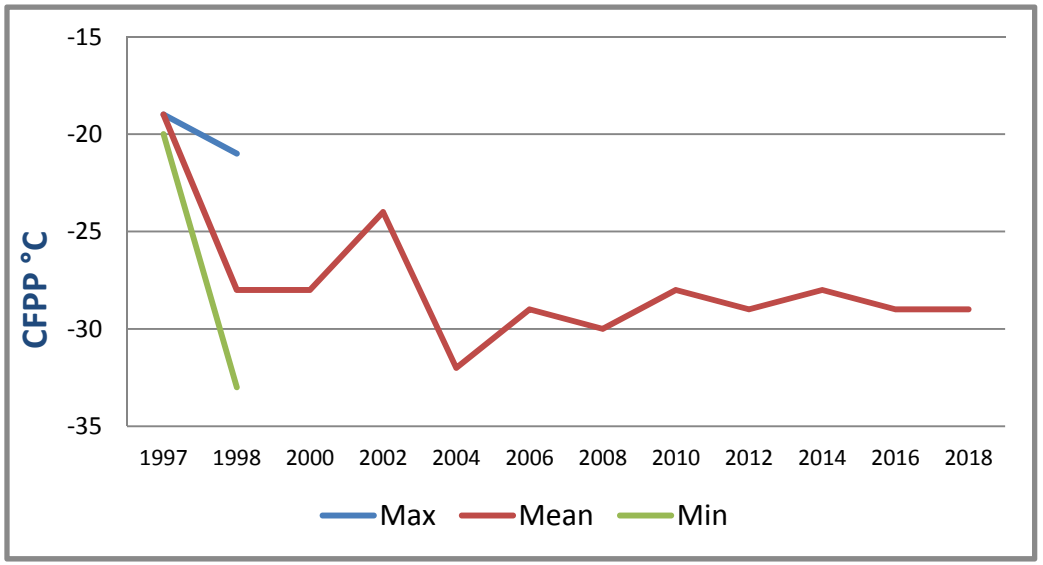
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800127
Cloud Point, °C			-11		-11
CFPP, °C	-20 (max)		-29		-29
Pour Point, °C			-27		-27
HFRR, µm	460 (max)		277		277
Wax Content @ 10°C Below Cloud, wt%			2.3		2.3
Rancimat, hrs	*		>30		>30
Sulphur, ppm	10 (max)		7		7
Density @15°C, kg/m^3	820 - 845		838		838
Viscosity @ 40°C, cSt	2.0 - 4.5		-		-
Cetane Index $_{2\ Variable}$			52		52
Cetane Index $_{4\ Variable}$	46 (min)		52		52
Cetane Number	51 (min)		54		54
Distillation, °C IBP			172		172
T_{10}			207		207
T_{20}			225		225
T_{50}			273		273
T_{90}			338		338
T_{95}	360 (max)		355		355
FBP			364		364
% FAME	7 (max)		3		3

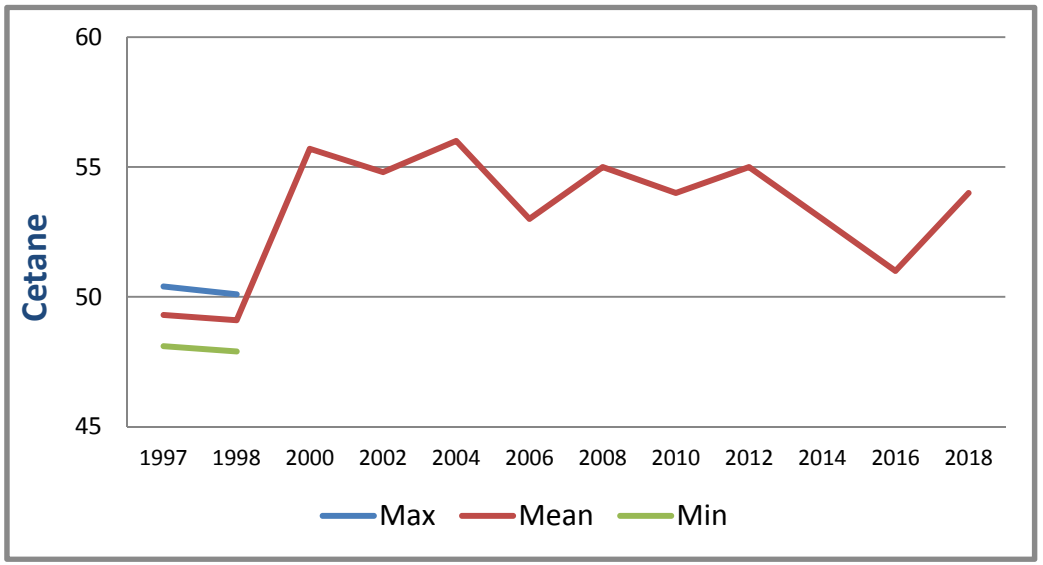
*20 hours min for diesel containing FAME above 2 % V/V

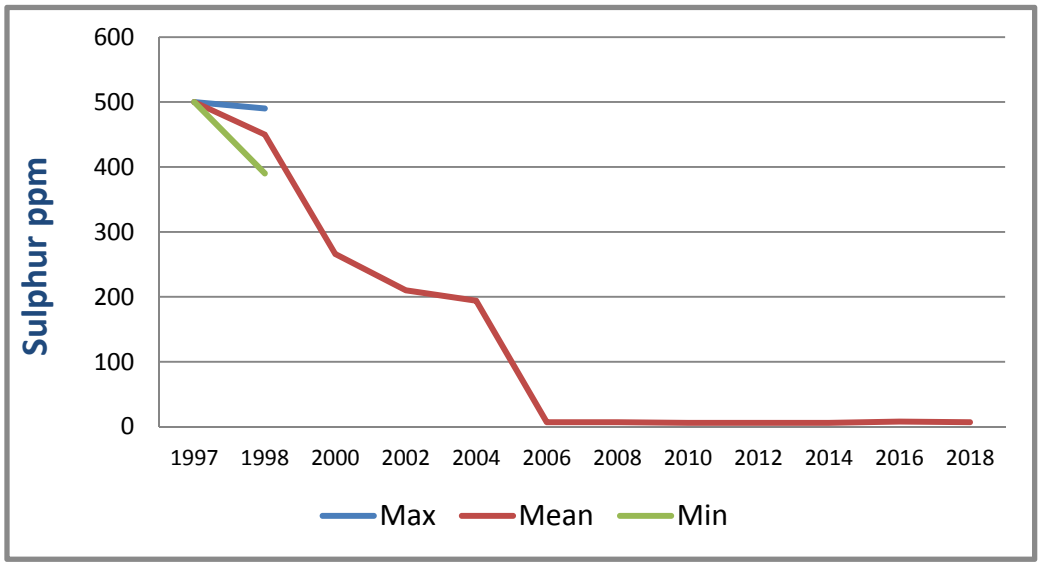
Hungary

Europe









Ireland

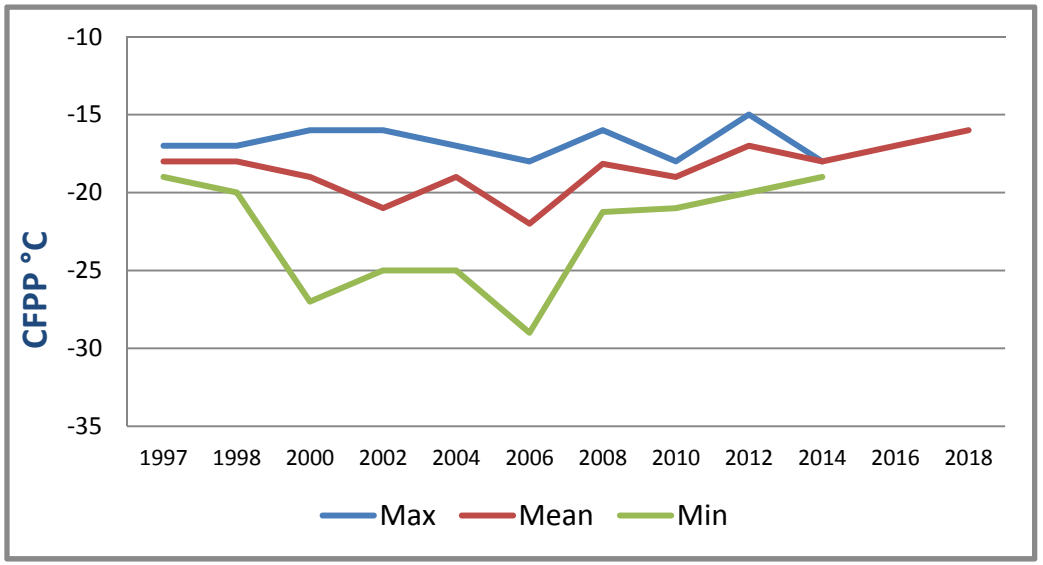
National standards and physical inspection data

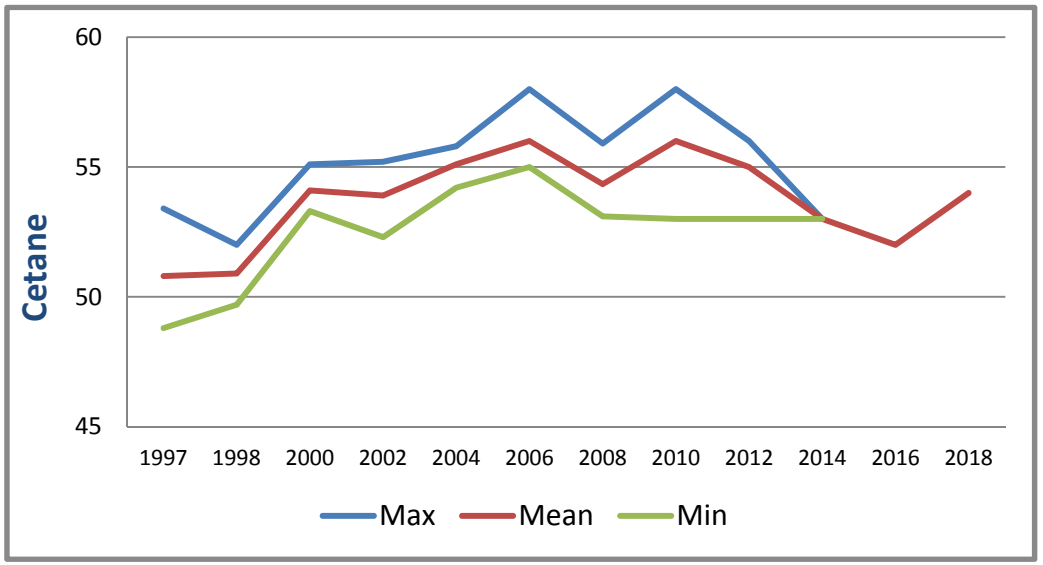
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800130
Cloud Point, °C			-5		-5
CFPP, °C	-15 (max)		-16		-16
Pour Point, °C			-21		-21
HFRR, µm	460 (max)		206		206
Wax Content @ 10°C Below Cloud, wt%			2.8		2.8
Rancimat, hrs	*		>30		>30
Sulphur, ppm	10 (max)		5		5
Density @15°C, kg/m^3	820 - 845		833		833
Viscosity @ 40°C, cSt	2.0 - 4.5		-		-
Cetane Index $_{2\ Variable}$			53		53
Cetane Index $_{4\ Variable}$	46 (min)		53		53
Cetane Number	51 (min)		54		54
Distillation, °C IBP			166		166
T_{10}			197		197
T_{20}			216		216
T_{50}			270		270
T_{90}			335		335
T_{95}	360 (max)		346		346
FBP			356		356
% FAME	7 (max)		6		6

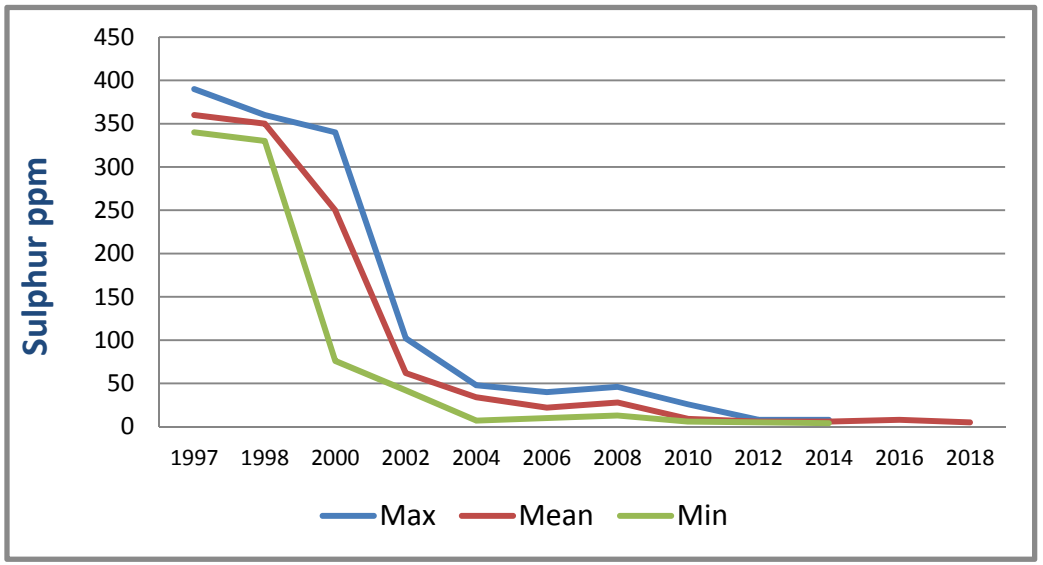
*20 hours min for diesel containing FAME above 2 % V/V

Ireland

Europe







Italy

National standards and physical inspection data

Europe

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800131	DIES 1800132	DIES 1800133	DIES 1800134	DIES 1800135	DIES 1800136	DIES 1800137
Cloud Point, °C		**-2**	**-4**	**-7**	-4	-3	-2	-4	-4	-2	-7
CFPP, °C	-10 (max)	**-10**	**-16**	**-20**	-18	-16	-14	-17	-19	-16	-15
Pour Point, °C		**-15**	**-22**	**-39**	-21	-15	-15	-24	-39	-30	-18
HFRR, µm	460 (max)	**396**	**259**	**206**	256	229	280	207	241	221	226
Wax Content @ 10°C Below Cloud, wt%		**3.3**	**2.5**	**1.9**	2.6	2.6	3.3	2.1	2	2.4	2
Rancimat, hrs	*	**>30**	**>25**	**26**	>30	>30	>30	26	>30	>30	>30
Sulphur, ppm	10 (max)	**8**	**7**	**5**	7	6	7	6	7	6	5
Density @15°C, kg/m^3	820 - 845	**841**	**832**	**826**	835	841	830	832	839	829	827
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**57**	**53**	**50**	53	53	57	52	50	55	54
Cetane Index $_{4\ Variable}$	46 (min)	**59**	**53**	**49**	52	54	59	51	49	54	54
Cetane Number	51 (min)	**58**	**54**	**52**	53	54	58	54	52	55	53
Distillation, °C IBP		**198**	**169**	**155**	167	198	188	169	161	161	171
T_{10}		**229**	**200**	**188**	201	229	226	196	188	193	201
T_{20}		**242**	**217**	**203**	218	242	241	210	203	213	216
T_{50}		**281**	**268**	**252**	270	279	281	258	264	270	264
T_{90}		**346**	**340**	**336**	340	340	340	340	346	343	339
T_{95}	360 (max)	**362**	**358**	**354**	360	358	354	360	361	358	358
FBP		**368**	**365**	**362**	366	368	363	365	367	366	368
% FAME	7 (max)	**7**	**5**	**2**	6	4	4	5	3	4	6

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

Italy (continued)

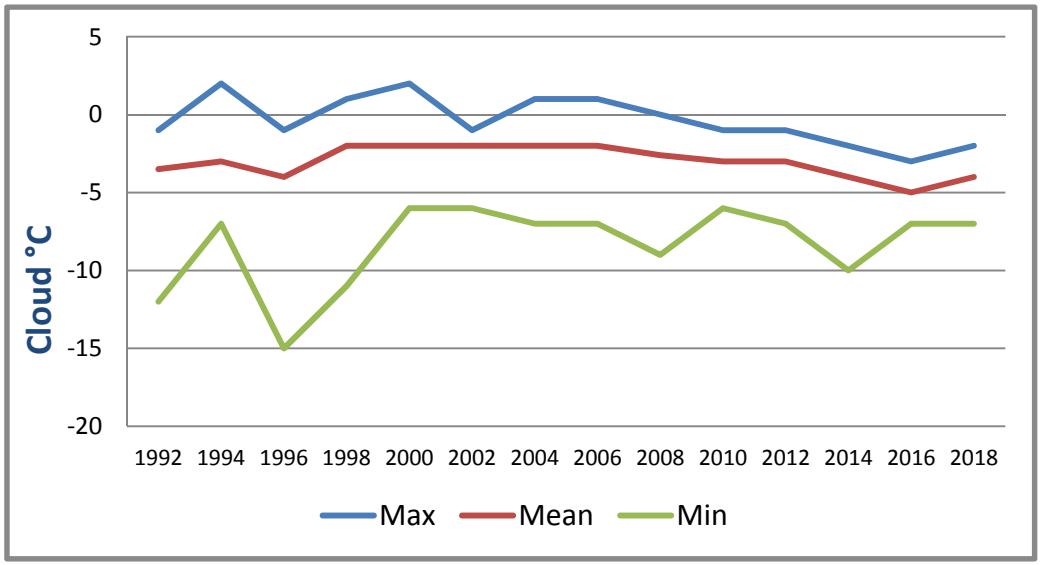
National standards and physical inspection data

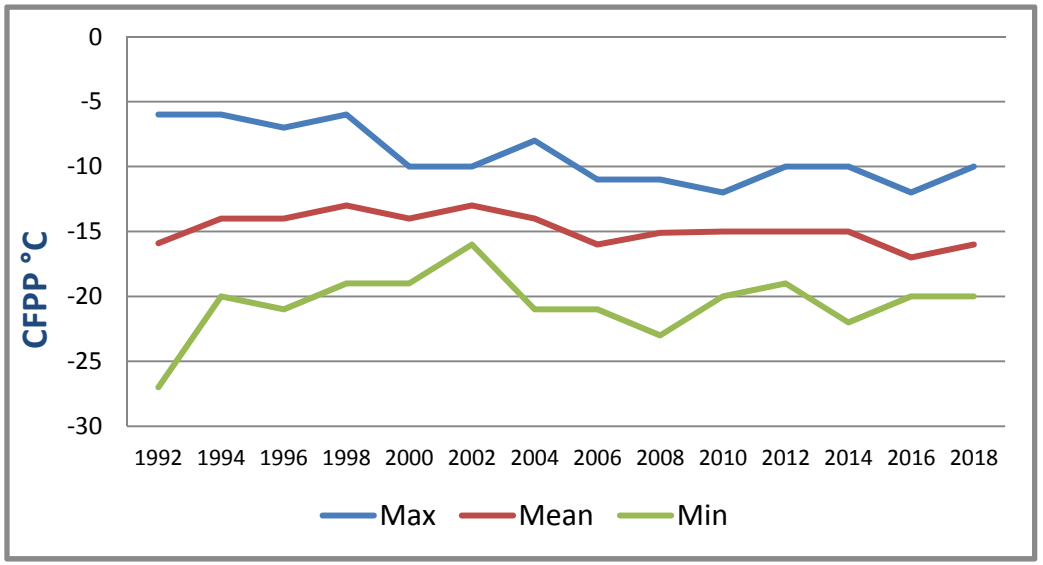
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800138	DIES 1800139	DIES 1800155	DIES 1800156	DIES 1800157	DIES 1800158	DIES 1800159
Cloud Point, °C		**-2**	**-4**	**-7**	-6	-5	-6	-5	-3	-4	-5
CFPP, °C	-10 (max)	**-10**	**-16**	**-20**	-19	-10	-20	-16	-15	-16	-17
Pour Point, °C		**-15**	**-22**	**-39**	-24	-21	-24	-21	-18	-21	-18
HFRR, µm	460 (max)	**396**	**259**	**206**	396	216	385	273	206	263	231
Wax Content @ 10°C Below Cloud, wt%		**3.3**	**2.5**	**1.9**	2	2.3	1.9	3.2	3.3	2.9	2.9
Rancimat, hrs	*	**>30**	**>25**	**26**	>30	>30	>30	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**8**	**7**	**5**	7	6	6	7	7	6	8
Density @15°C, kg/m^3	820 - 845	**841**	**832**	**826**	832	835	831	833	832	833	826
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**57**	**53**	**50**	51	52	50	54	55	52	57
Cetane Index $_{4\ Variable}$	46 (min)	**59**	**53**	**49**	50	52	50	53	53	52	57
Cetane Number	51 (min)	**58**	**54**	**52**	53	53	53	57	58	54	57
Distillation, °C IBP		**198**	**169**	**155**	167	173	166	155	156	169	168
T_{10}		**229**	**200**	**188**	196	203	196	188	191	198	202
T_{20}		**242**	**217**	**203**	209	217	207	210	214	211	221
T_{50}		**281**	**268**	**252**	255	267	252	273	274	264	275
T_{90}		**346**	**340**	**336**	336	342	336	340	340	338	339
T_{95}	360 (max)	**362**	**358**	**354**	357	362	359	358	358	357	354
FBP		**368**	**365**	**362**	364	367	365	363	362	364	362
% FAME	7 (max)	**7**	**5**	**2**	2	5	2	6	6	7	6

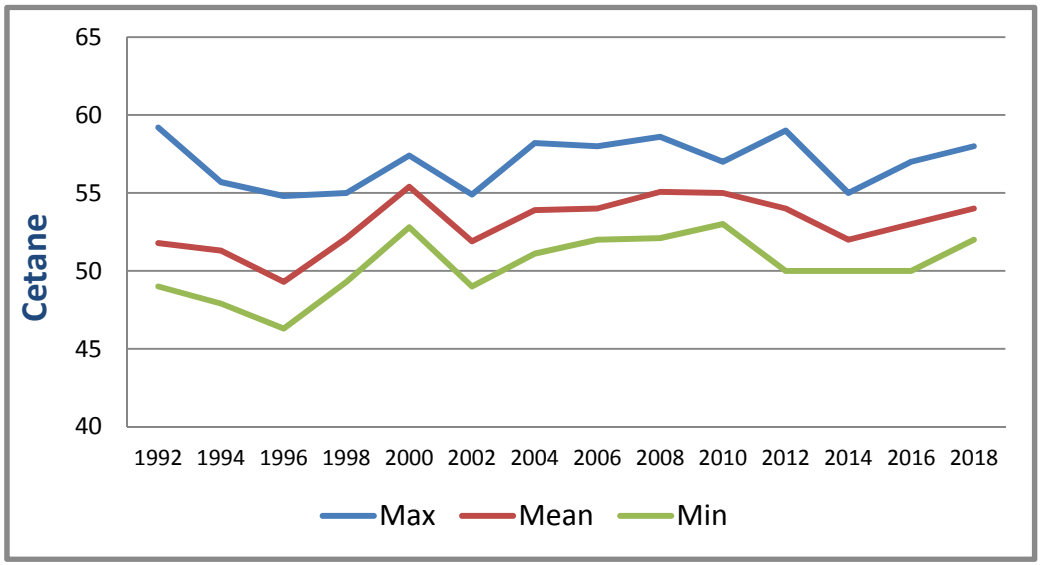
*20 hours min for diesel containing FAME above 2 % V/V

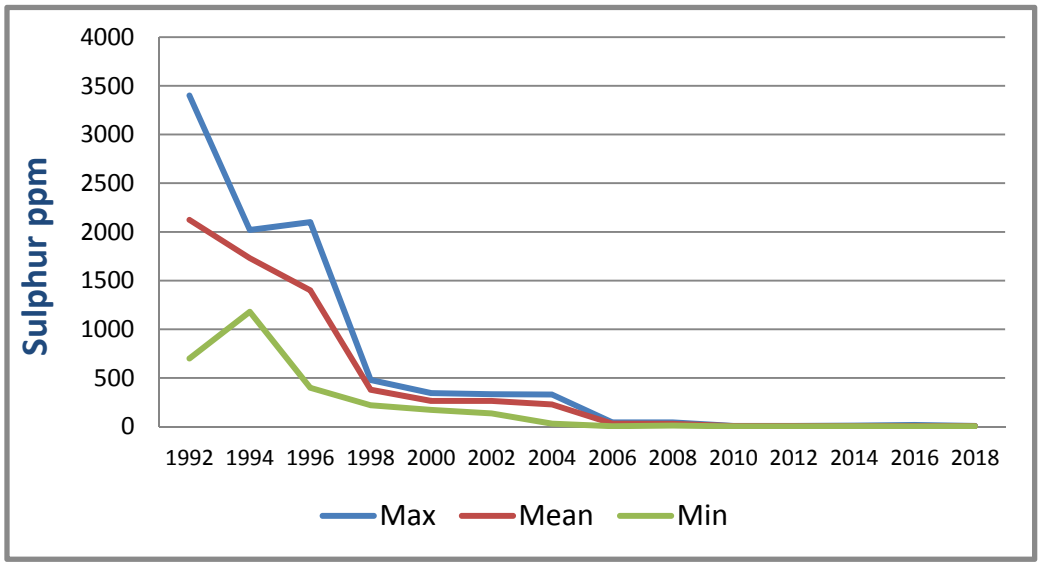
Italy

Europe









Lithuania

Europe

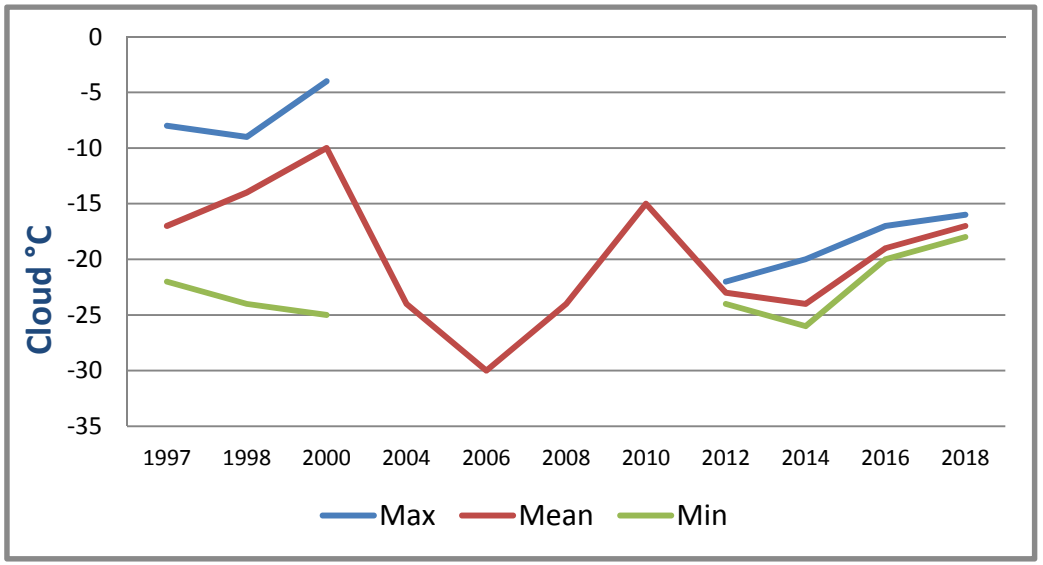
National standards and physical inspection data

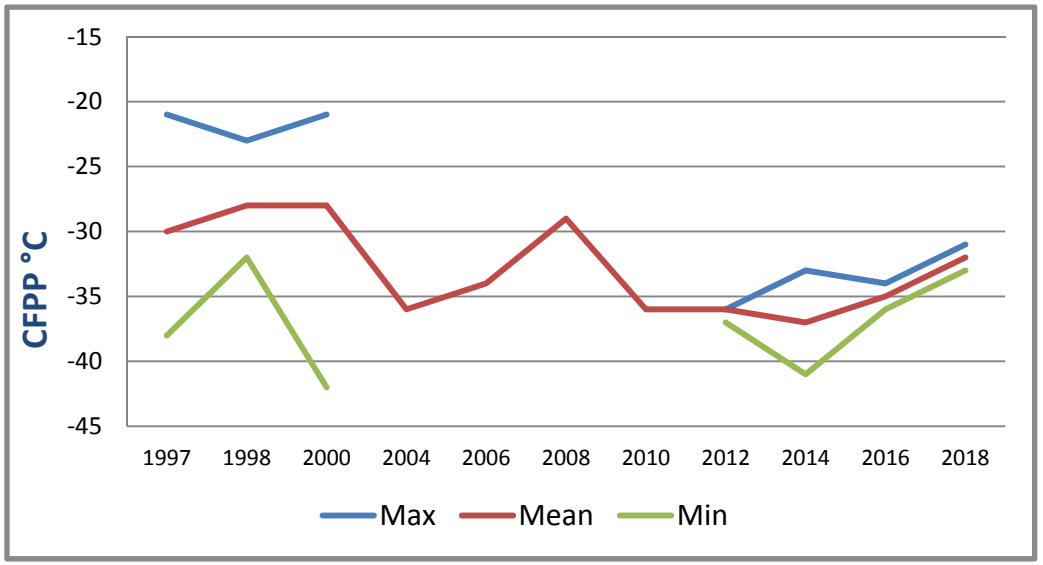
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800162	DIES 1800163
Cloud Point, °C	-22 (max)	**-16**	**-17**	**-18**	-18	-16
CFPP, °C	-32 (max)	**-31**	**-32**	**-33**	-33	-31
Pour Point, °C		**-27**	**-29**	**-30**	-27	-30
HFRR, µm	460 (max)	**477**	**474**	**472**	477	472
Wax Content @ 10°C Below Cloud, wt%		**1.9**	**1.9**	**1.8**	1.9	1.8
Rancimat, hrs	*	**>30**	**>20**	**15**	15	>30
Sulphur, ppm	10 (max)	**7**	**7**	**7**	7	7
Density @15°C, kg/m^3	800 - 840	**831**	**830**	**829**	829	831
Viscosity @ 40°C, cSt	1.5 - 4.0	**-**	**-**	**-**	-	-
Cetane Index $_{2\ Variable}$		**49**	**49**	**49**	49	49
Cetane Index $_{4\ Variable}$	46 (min)	**49**	**49**	**49**	49	49
Cetane Number	48 (min)	**52**	**52**	**51**	51	52
Distillation, °C IBP		**174**	**173**	**173**	174	173
T_{10}		**197**	**197**	**196**	196	197
T_{20}		**210**	**209**	**208**	208	210
T_{50}		**247**	**245**	**244**	244	247
T_{90}		**306**	**306**	**306**	306	306
T_{95}	360 (max)	**329**	**328**	**328**	328	329
FBP		**339**	**338**	**337**	339	337
% FAME	7 (max)	**0**	**0**	**0**	0	0

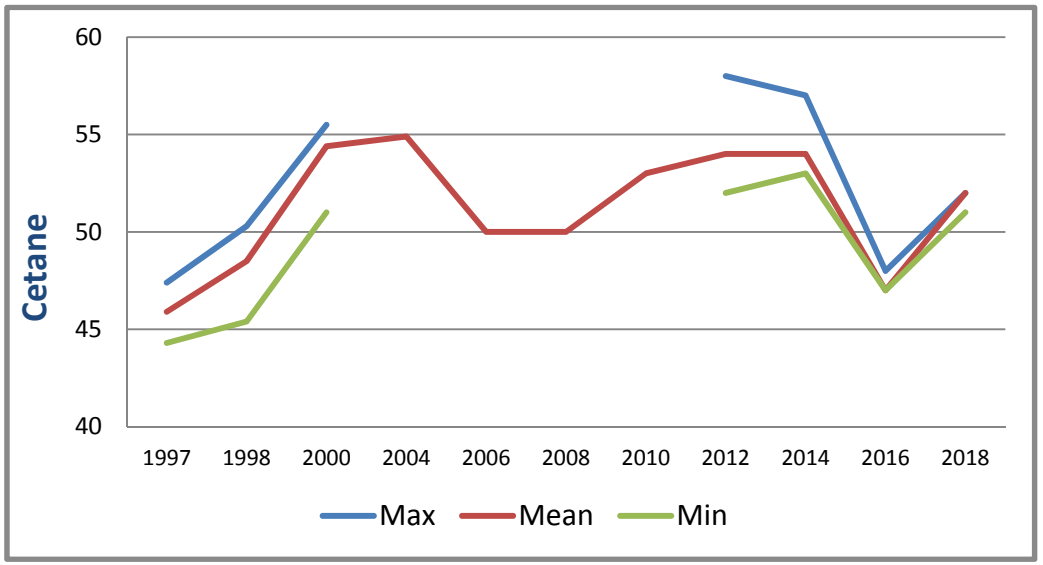
*20 hours min for diesel containing FAME above 2 % V/V
Specification shown is EN590 Arctic grade II

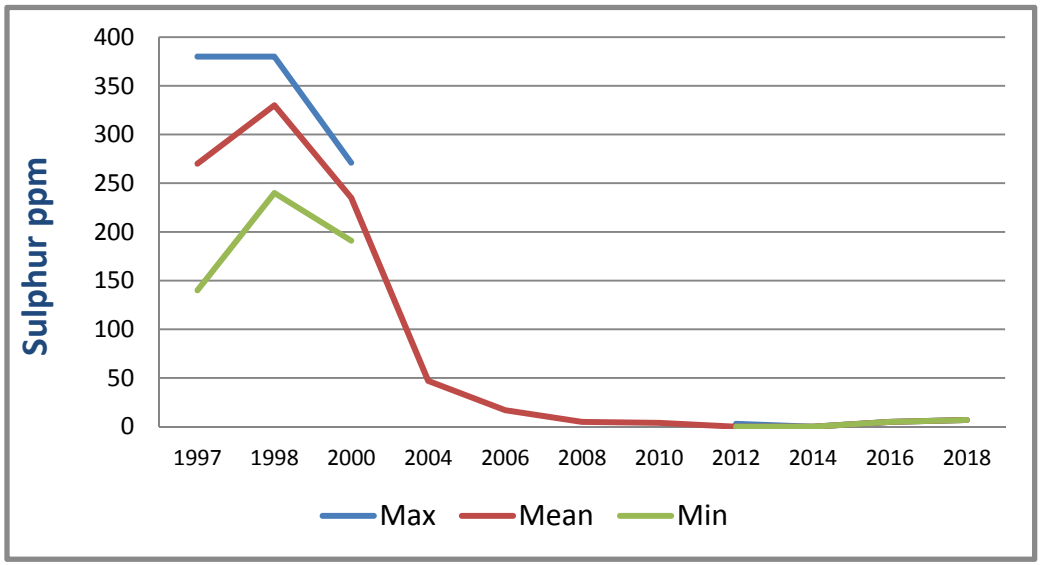
Lithuania

Europe









Norway

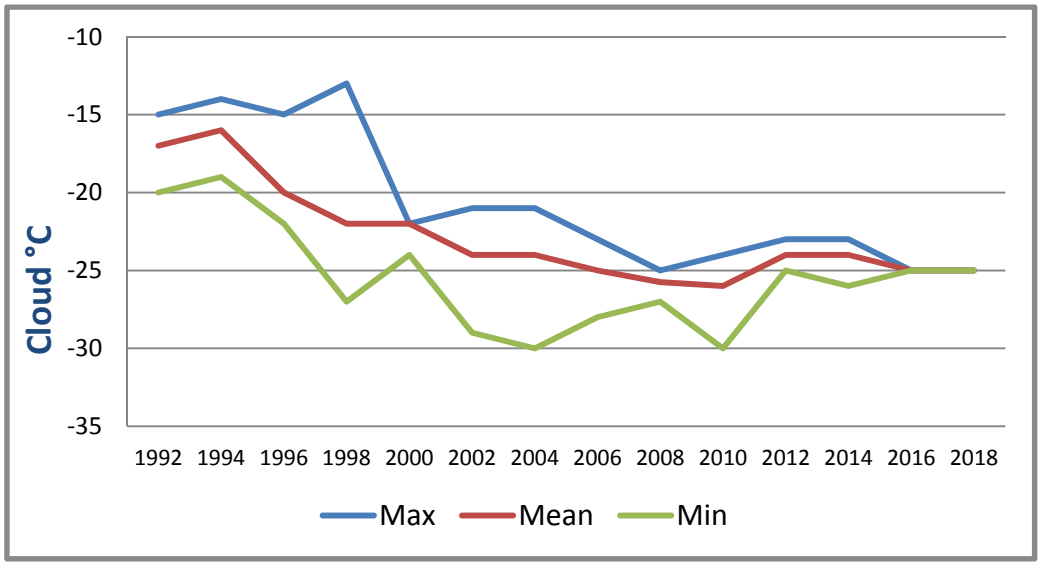
National standards and physical inspection data

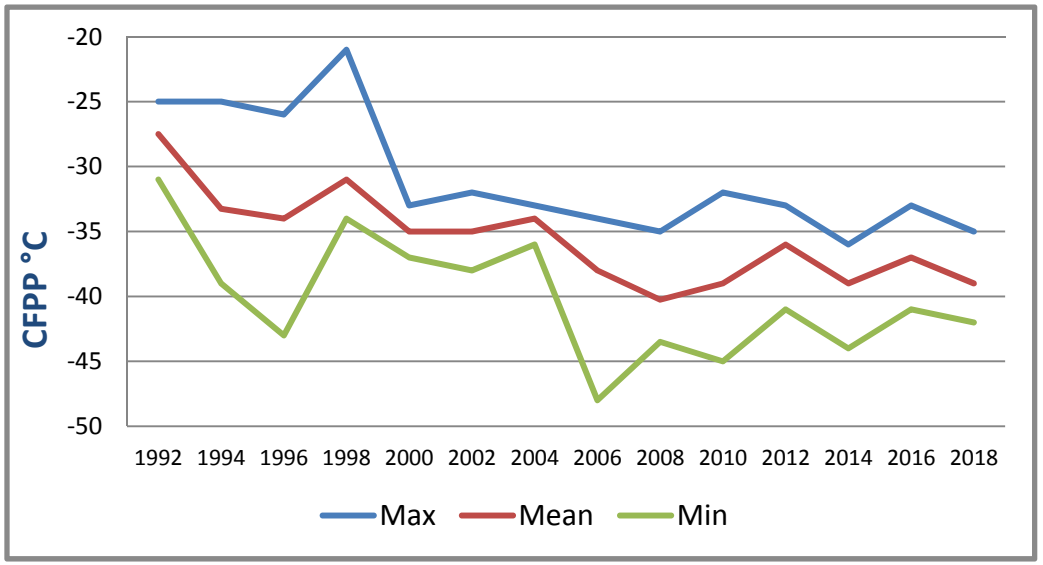
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800165	DIES 1800169
Cloud Point, °C	-22 (max)	**-25**	**-25**	**-25**	-25	-25
CFPP, °C	-32 (max)	**-35**	**-39**	**-42**	-42	-35
Pour Point, °C		**-42**	**-47**	**-51**	-42	-51
HFRR, µm	460 (max)	**406**	**310**	**214**	406	214
Wax Content @ 10°C Below Cloud, wt%		**1.8**	**1.5**	**1.1**	1.1	1.8
Rancimat, hrs	*	**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	10 (max)	**7**	**7**	**7**	7	7
Density @15°C, kg/m^3	800 - 845	**835**	**832**	**829**	829	835
Viscosity @ 40°C, cSt	1.5 - 4.0	**-**	**-**	**-**	-	-
Cetane Index $_{2\ Variable}$		**51**	**49**	**48**	48	51
Cetane Index $_{4\ Variable}$	46 (min)	**50**	**49**	**48**	48	50
Cetane Number	48 (min)	**53**	**53**	**52**	53	52
Distillation, °C IBP		**171**	**169**	**167**	171	167
T_{10}	180 (min)	**201**	**200**	**198**	198	201
T_{20}		**217**	**214**	**210**	210	217
T_{50}		**260**	**251**	**241**	241	260
T_{90}		**313**	**310**	**307**	307	313
T_{95}	360 (max)	**328**	**327**	**327**	328	327
FBP		**337**	**335**	**333**	337	333
% FAME	7 (max)	**7**	**4**	**2**	2	7

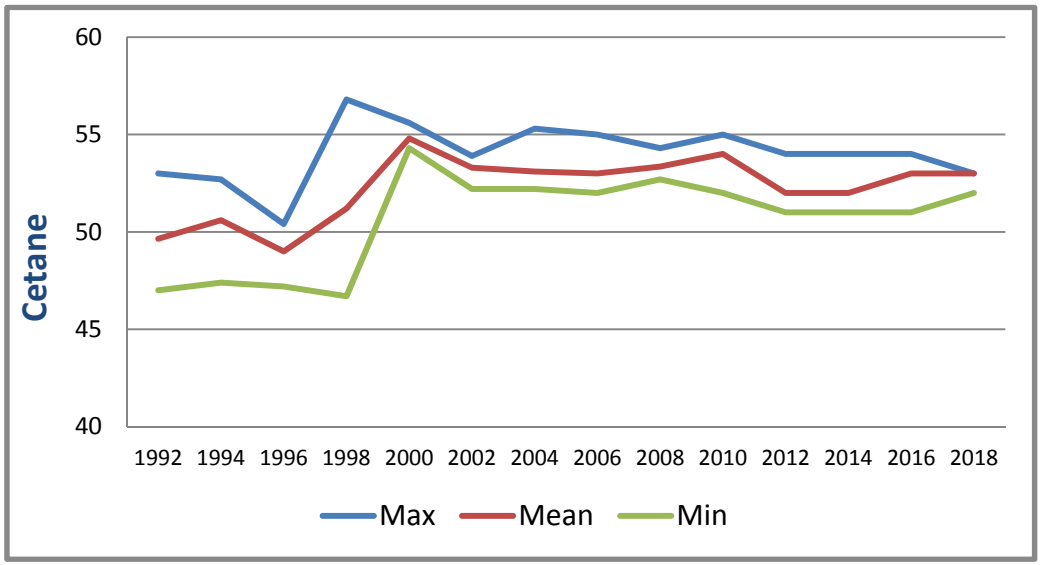
*20 hours min for diesel containing FAME above 2 % V/V
Specification shown is EN590 Arctic grade II

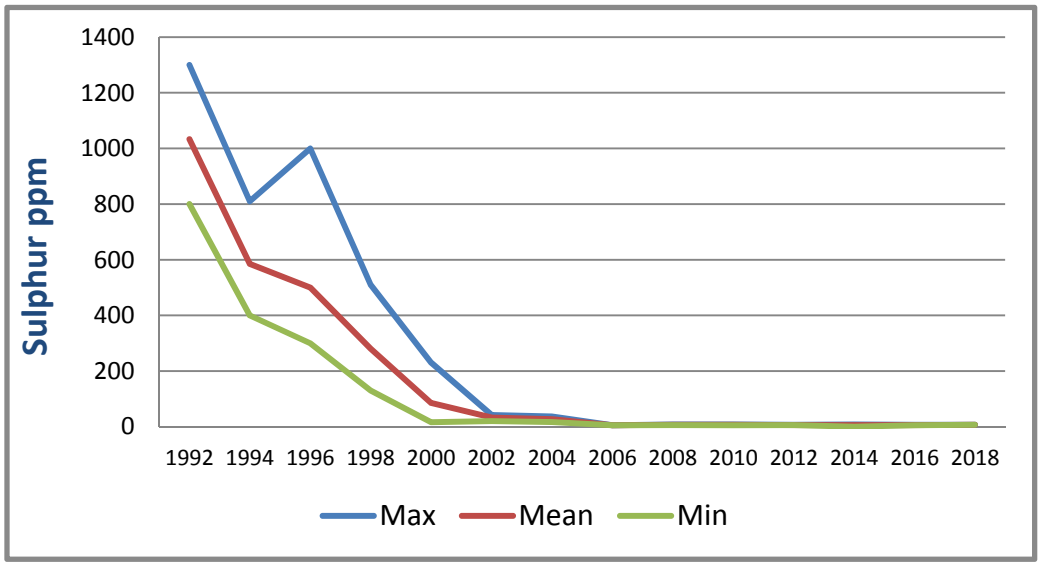
Norway

Europe









Poland

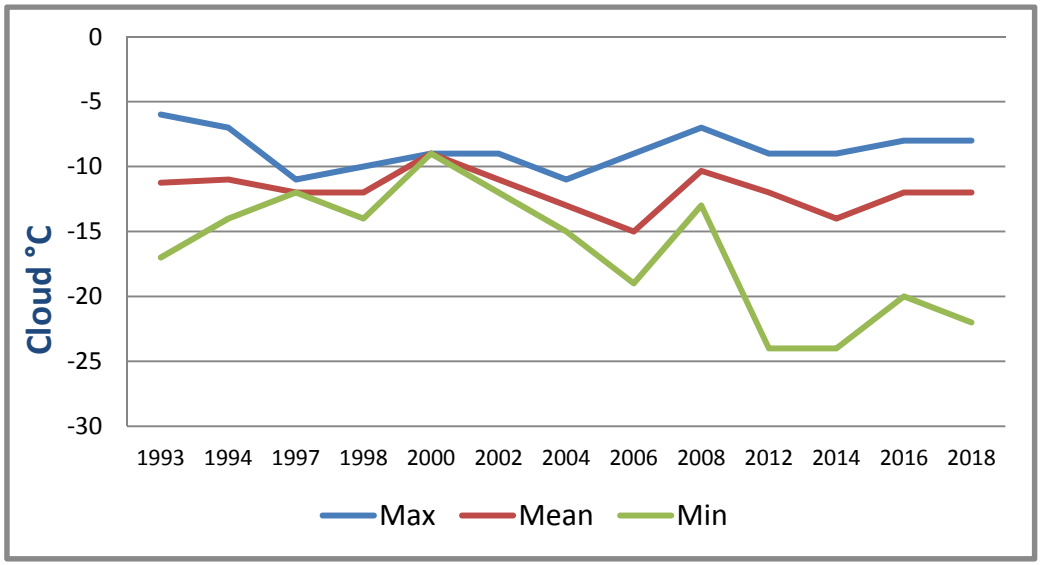
National standards and physical inspection data

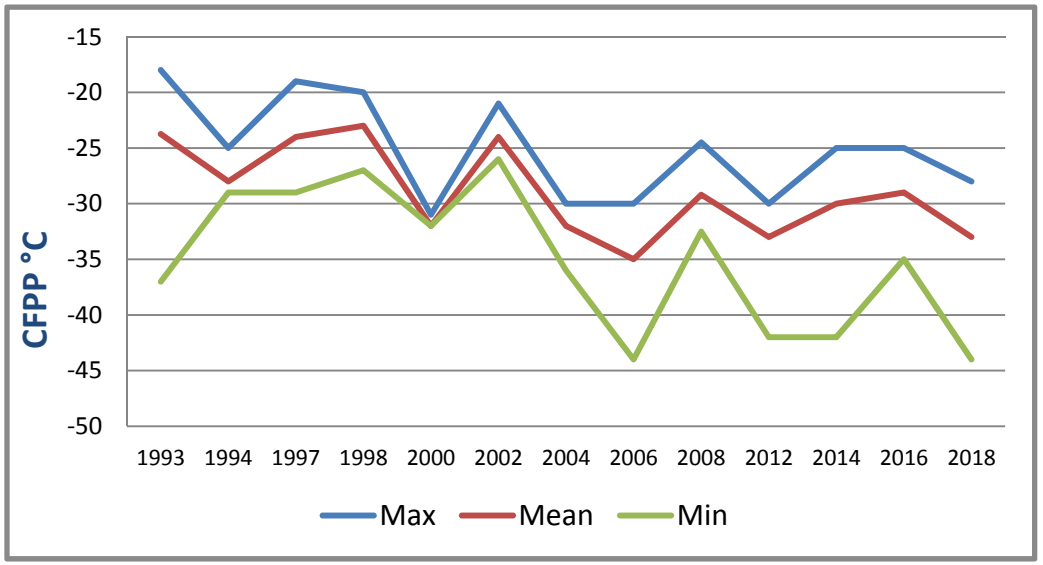
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800170	DIES 1800171	DIES 1800172	DIES 1800173
Cloud Point, °C		**-8**	**-12**	**-22**	-8	-22	-8	-8
CFPP, °C	-20 (max)	**-28**	**-33**	**-44**	-28	-44	-31	-29
Pour Point, °C		**-30**	**-33**	**-39**	-33	-39	-30	-30
HFRR, µm	460 (max)	**475**	**286**	**202**	202	475	204	266
Wax Content @ 10°C Below Cloud, wt%		**1.6**	**1.3**	**0.3**	1.6	0.3	1.6	1.5
Rancimat, hrs	*	**>30**	**>25**	**14**	>30	14	>30	>30
Sulphur, ppm	10 (max)	**8**	**6**	**3**	3	5	8	7
Density @15°C, kg/m^3	820 - 845	**834**	**827**	**814**	828	814	833	834
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-
Cetane Index $_{2\ Variable}$		**57**	**54**	**50**	57	50	53	53
Cetane Index $_{4\ Variable}$	46 (min)	**57**	**54**	**51**	57	51	53	53
Cetane Number	51 (min)	**57**	**54**	**52**	55	53	52	57
Distillation, °C IBP		**172**	**168**	**163**	163	168	171	172
T_{10}		**206**	**199**	**192**	194	192	206	205
T_{20}		**223**	**216**	**202**	217	202	223	223
T_{50}		**281**	**263**	**230**	281	230	269	270
T_{90}		**344**	**327**	**286**	344	286	337	339
T_{95}	360 (max)	**358**	**344**	**311**	358	311	352	355
FBP		**365**	**355**	**330**	365	330	363	364
% FAME	7 (max)	**7**	**4**	**0**	7	0	6	5

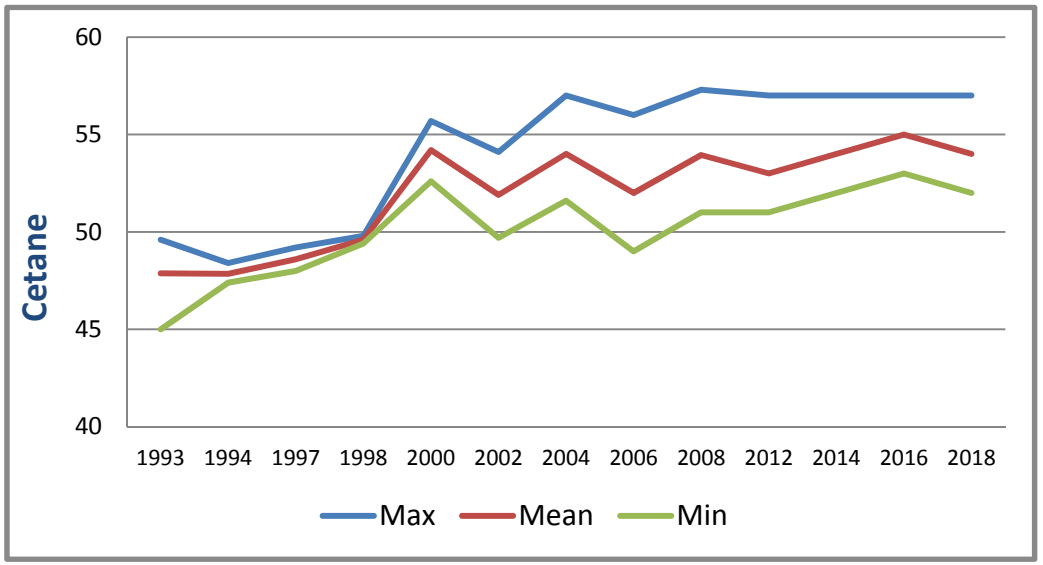
*20 hours min for diesel containing FAME above 2 % V/V

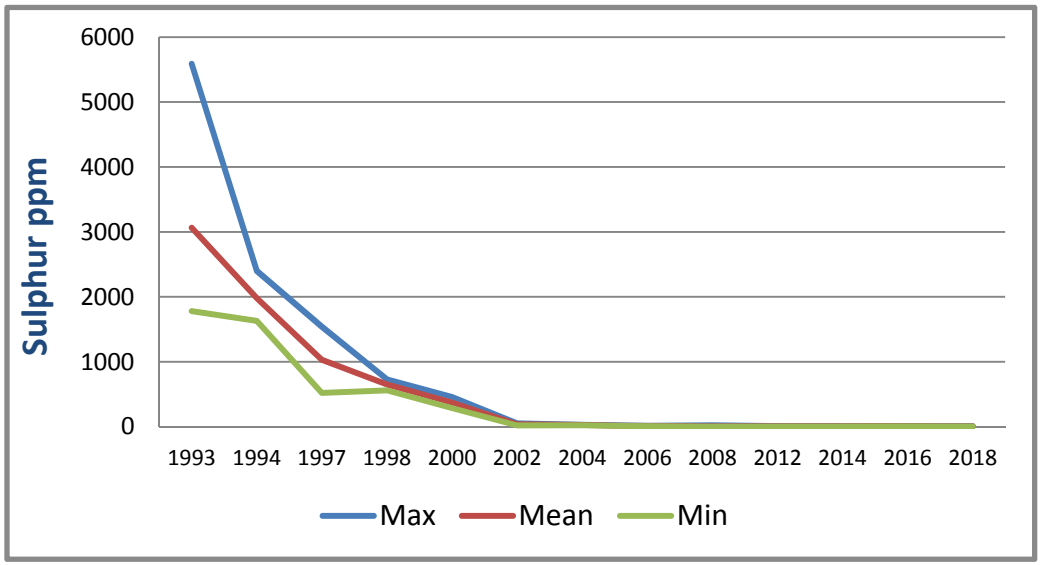
Poland

Europe









Portugal

Europe

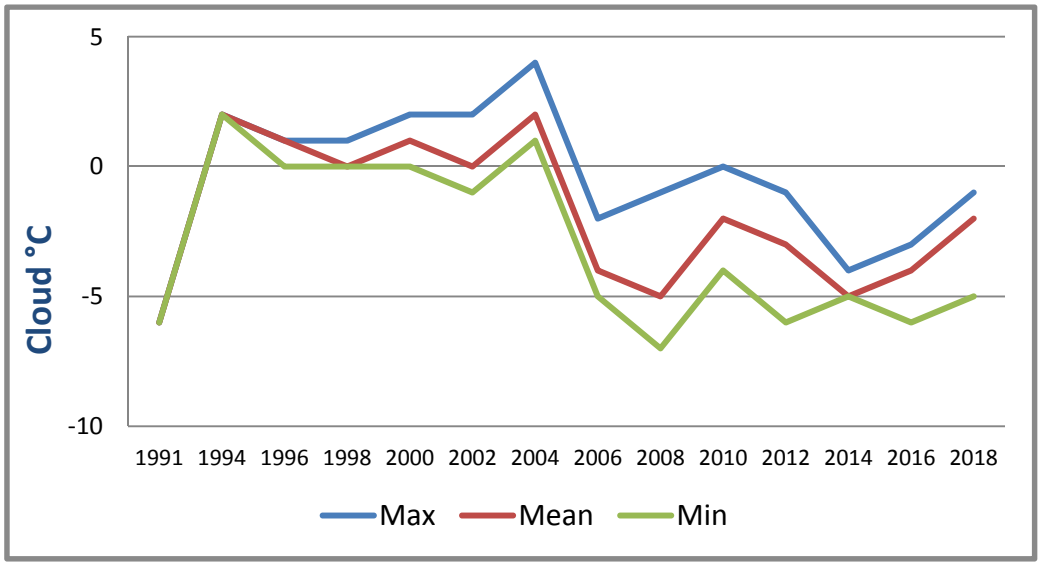
National standards and physical inspection data

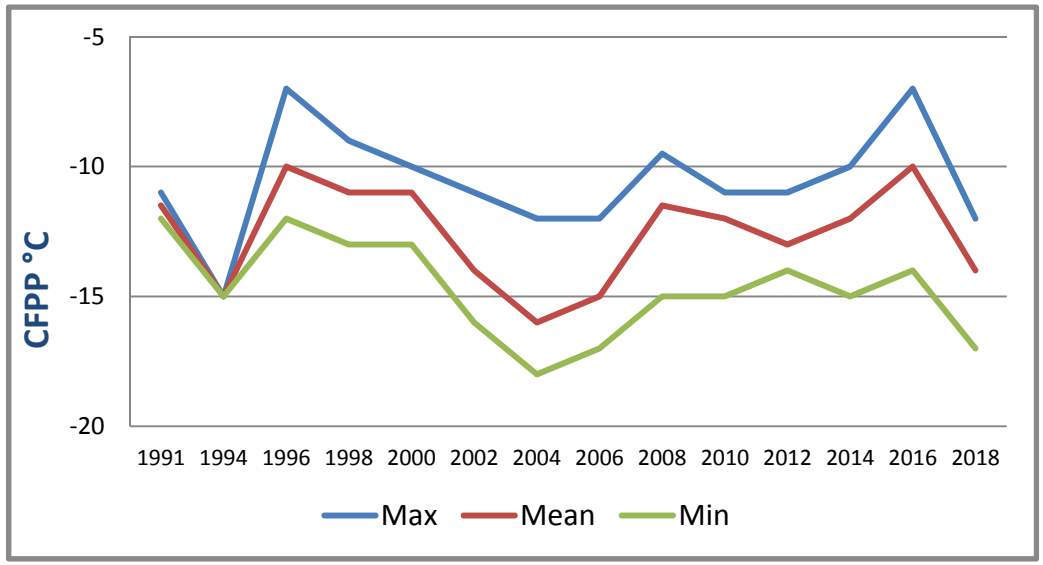
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800175	DIES 1800177	DIES 1800178
Cloud Point, °C		**-1**	**-2**	**-5**	-1	-5	-1
CFPP, °C	-20 (max)	**-12**	**-14**	**-17**	-12	-12	-17
Pour Point, °C		**-12**	**-13**	**-15**	-12	-12	-15
HFRR, µm	460 (max)	**343**	**267**	**222**	343	238	222
Wax Content @ 10°C Below Cloud, wt%		**2.0**	**1.9**	**1.8**	2	1.8	1.9
Rancimat, hrs	*	**>30**	**>30**	**>30**	>30	>30	>30
Sulphur, ppm	10 (max)	**8**	**7**	**6**	8	6	6
Density @15°C, kg/m^3	820 - 845	**843**	**837**	**834**	834	843	836
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-
Cetane Index $_{2\ Variable}$		**55**	**53**	**51**	55	51	54
Cetane Index $_{4\ Variable}$	46 (min)	**56**	**54**	**50**	56	50	56
Cetane Number	51 (min)	**56**	**54**	**52**	56	52	55
Distillation, °C IBP		**187**	**180**	**172**	180	172	187
T_{10}		**227**	**219**	**205**	224	205	227
T_{20}		**243**	**236**	**224**	241	224	243
T_{50}		**278**	**276**	**274**	276	274	278
T_{90}		**345**	**344**	**343**	343	345	343
T_{95}	360 (max)	**365**	**364**	**363**	365	364	363
FBP		**376**	**375**	**374**	376	374	374
% FAME	7 (max)	**5**	**4**	**3**	3	4	5

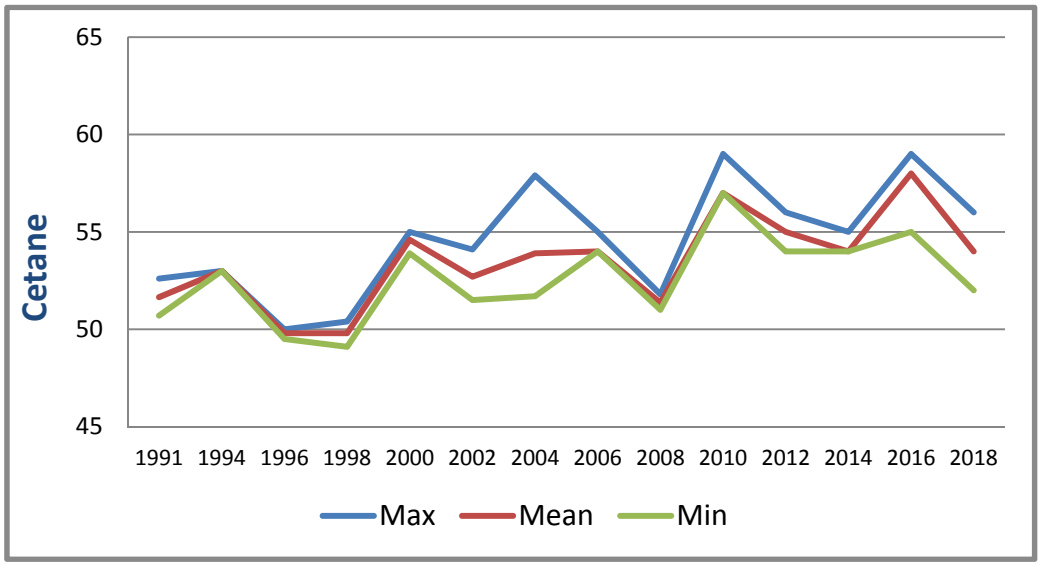
*20 hours min for diesel containing FAME above 2 % V/V

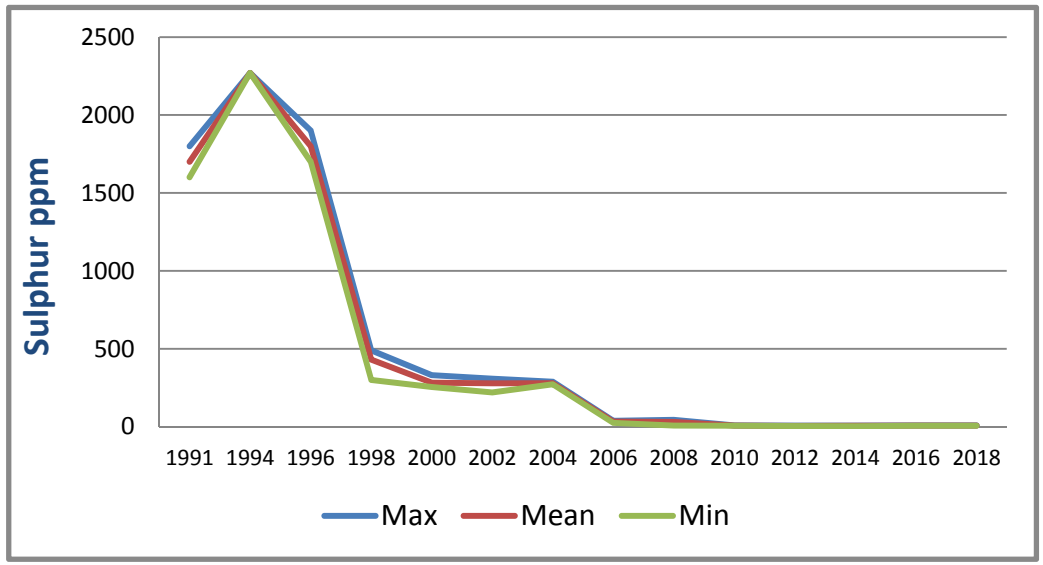
Portugal

Europe









Romania

National standards and physical inspection data

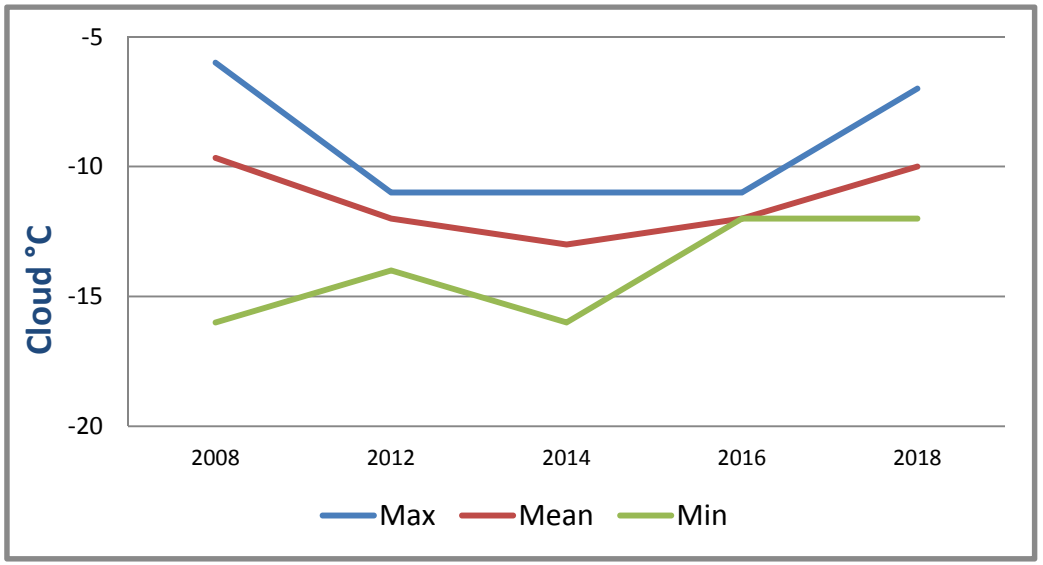
Europe

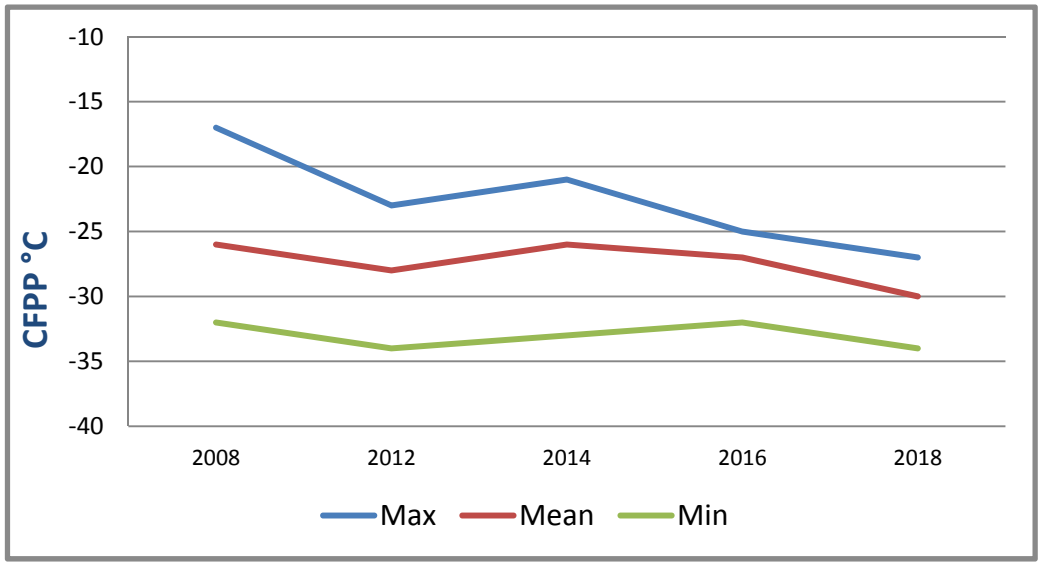
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800188	DIES 1800190	DIES 1800192	DIES 1800193
Cloud Point, °C		**-7**	**-10**	**-12**	-7	-7	-12	-12
CFPP, °C	-15 (max)	**-27**	**-30**	**-34**	-29	-29	-34	-27
Pour Point, °C		**-24**	**-32**	**-39**	-30	-33	-39	-24
HFRR, µm	460 (max)	**461**	**382**	**209**	443	414	209	461
Wax Content @ 10°C Below Cloud, wt%		**2.8**	**2.3**	**2.0**	2.1	2.8	2.4	2
Rancimat, hrs	*	**>30**	**>30**	**>30**	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**5**	**4**	**<3**	4	5	5	<3
Density @15°C, kg/m^3	820 - 845	**844**	**839**	**835**	842	835	836	844
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-
Cetane Index $_{2\ Variable}$		**51**	**50**	**48**	48	51	51	48
Cetane Index $_{4\ Variable}$	46 (min)	**51**	**49**	**47**	48	51	51	47
Cetane Number	51 (min)	**58**	**54**	**52**	52	53	58	53
Distillation, °C IBP		**170**	**168**	**167**	168	168	167	170
T_{10}		**210**	**205**	**203**	210	203	204	206
T_{20}		**224**	**220**	**219**	224	219	219	220
T_{50}		**264**	**261**	**260**	260	262	264	260
T_{90}		**326**	**322**	**319**	322	319	326	323
T_{95}	360 (max)	**341**	**338**	**333**	340	333	338	341
FBP		**357**	**350**	**345**	352	345	347	357
% FAME	7 (max)	**6**	**2**	**0**	0	0	6	0

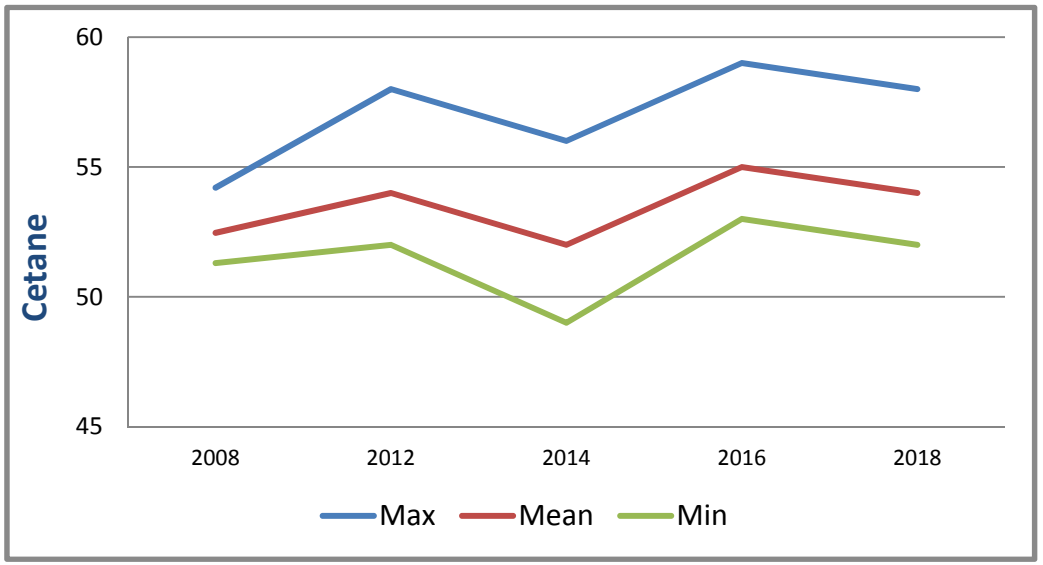
*20 hours min for diesel containing FAME above 2 % V/V

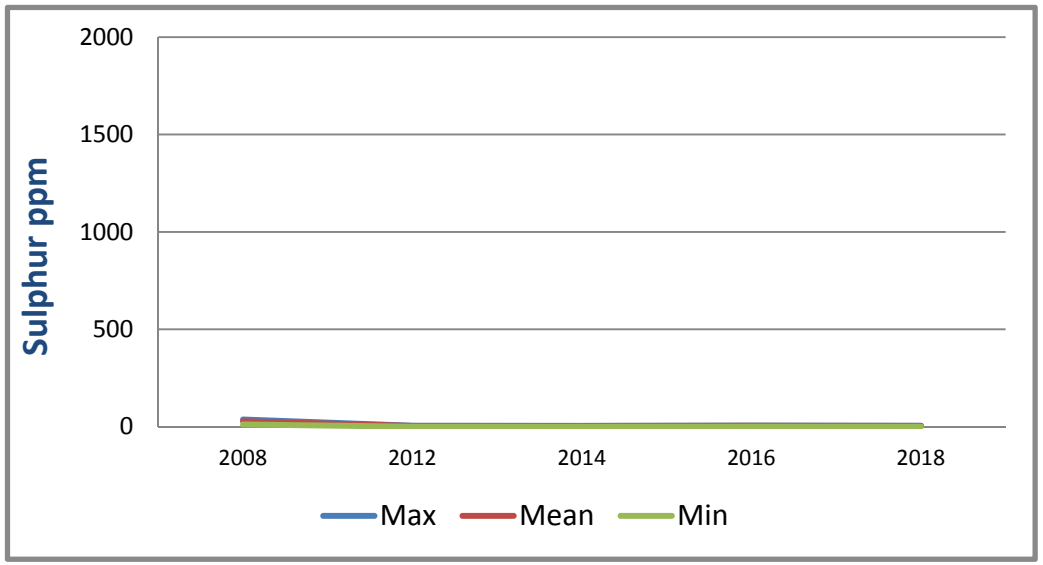
Romania

Europe









Russia

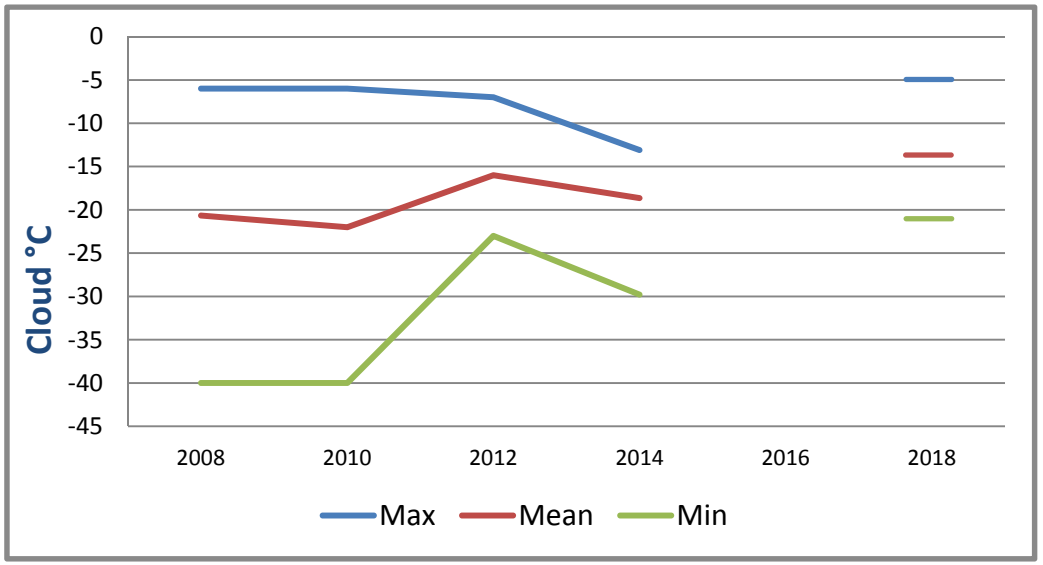
National standards and physical inspection data

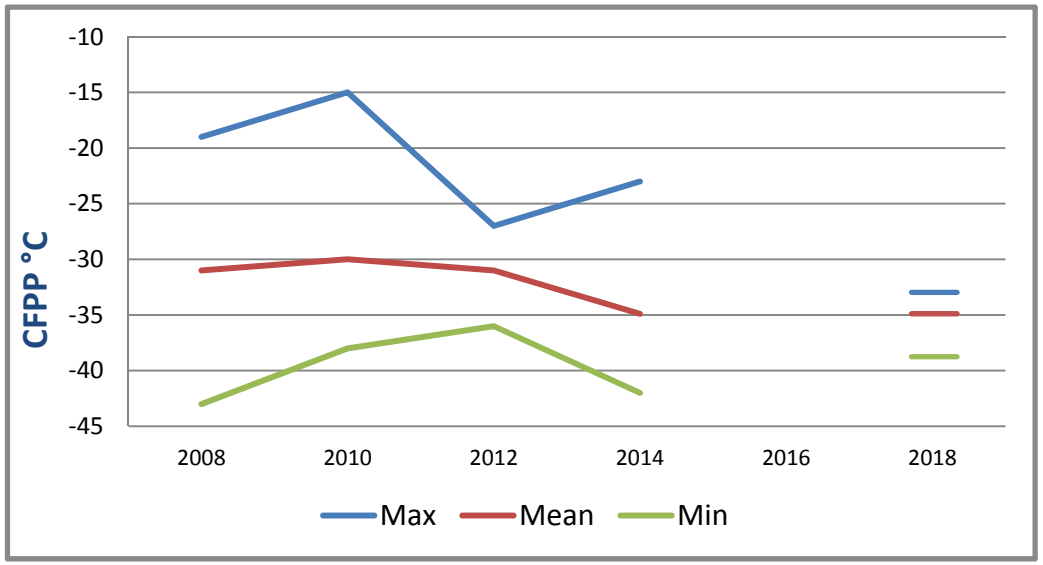
Europe

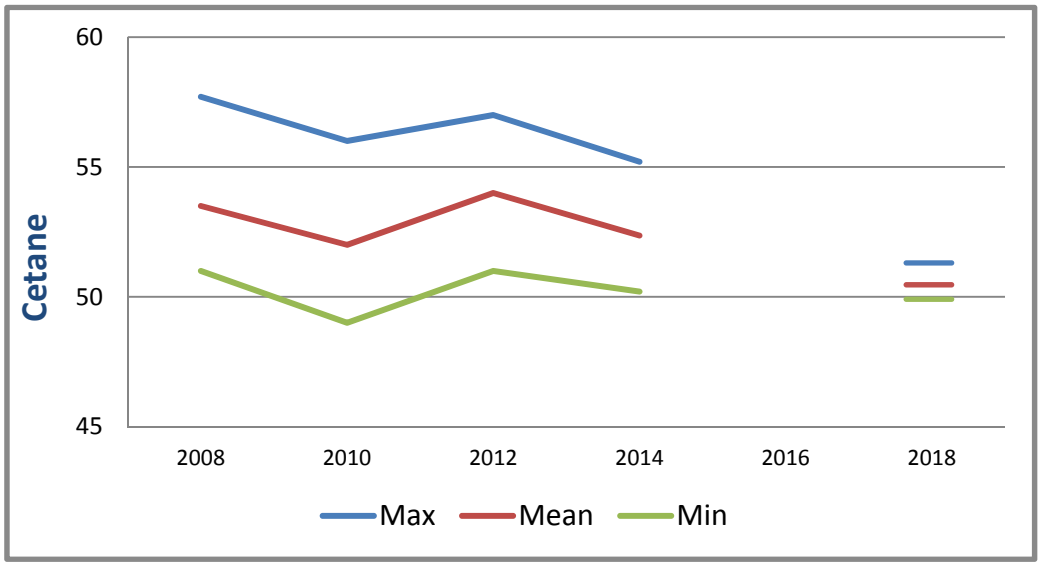
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800194	DIES 1800195	DIES 1800201	DIES 1800202
Cloud Point, °C		**-5**	**-14**	**-21**	-13	-16	-21	-5
CFPP, °C	-20 (max)	**-33**	**-35**	**-39**	-33	-33	-39	-35
Pour Point, °C		**-33**	**-35**	**-39**	-33	-39	-33	-33
HFRR, µm	460 (max)	**457**	**417**	**385**	457	427	385	400
Wax Content @ 10°C Below Cloud, wt%		**2.1**	**1.7**	**1.5**	1.6	2.1	1.6	1.5
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**8**	**7**	**5**	5	8	7	6
Density @15°C, kg/m^3		**829**	**824**	**818**	818	829	825	825
Viscosity @ 40°C, cSt		**-**	**-**	**-**	-	-	-	-
Cetane Index $_{2\ Variable}$		**54**	**52**	**50**	51	50	54	54
Cetane Index $_{4\ Variable}$		**54**	**52**	**50**	51	50	54	54
Cetane Number	51 (min)	**51**	**50**	**50**	51	50	50	51
Distillation, °C IBP		**168**	**162**	**157**	157	168	159	162
T_{10}		**204**	**196**	**184**	184	196	200	204
T_{20}		**220**	**211**	**197**	197	210	218	220
T_{50}		**258**	**251**	**238**	238	250	257	258
T_{90}		**316**	**314**	**312**	314	312	314	316
T_{95}	360 (max)	**335**	**332**	**329**	333	329	333	335
FBP		**346**	**344**	**339**	346	339	346	345
% FAME	7 (max)	**0**	**0**	**0**	0	0	0	0

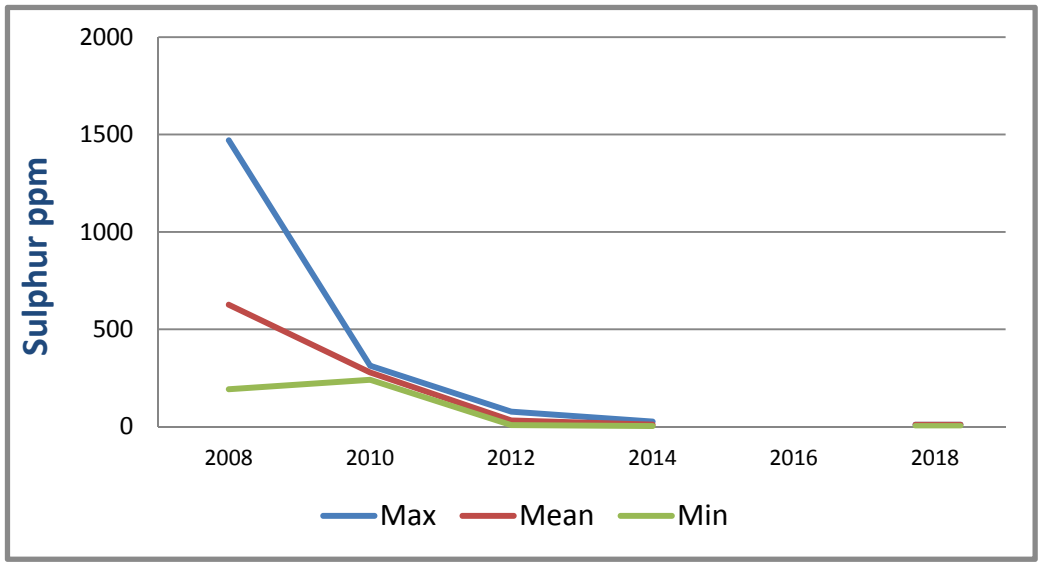
Russia

Europe









Slovak Republic

Europe

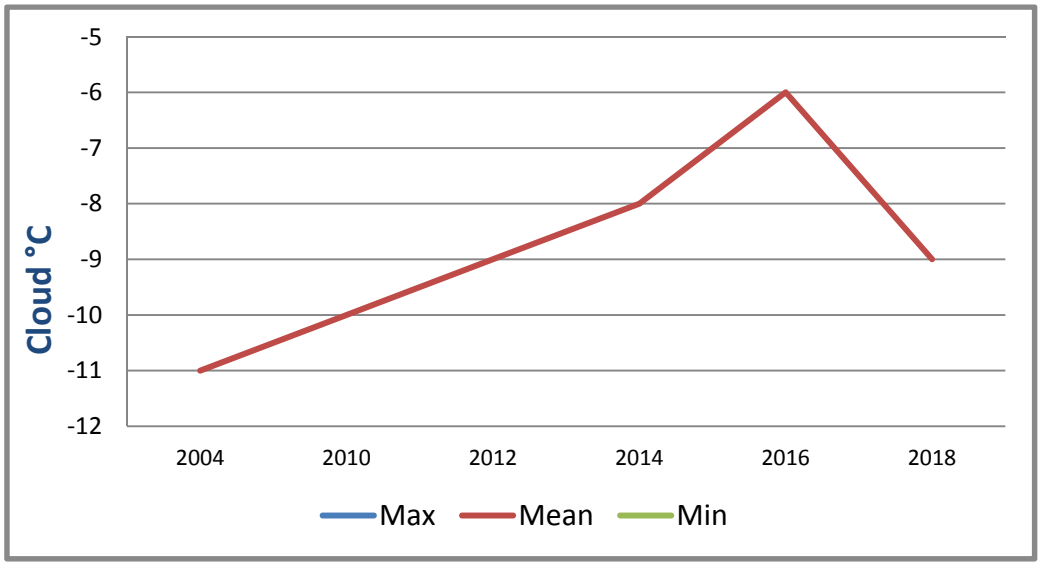
National standards and physical inspection data

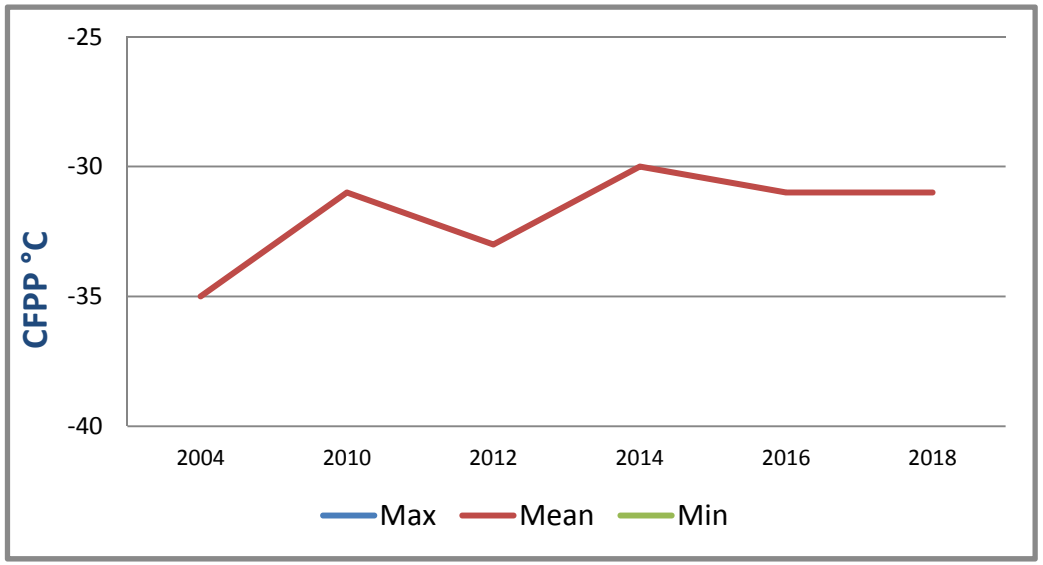
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800204
Cloud Point, °C			**-9**		-9
CFPP, °C	-20 (max)		**-31**		-31
Pour Point, °C			**-39**		-39
HFRR, µm	460 (max)		**196**		196
Wax Content @ 10°C Below Cloud, wt%			**1.7**		1.7
Rancimat, hrs	*		**>30**		>30
Sulphur, ppm	10 (max)		**6**		6
Density @15°C, kg/m^3	820 - 845		**837**		837
Viscosity @ 40°C, cSt	2.0 - 4.5		**-**		-
Cetane Index $_{2\ Variable}$			**52**		52
Cetane Index $_{4\ Variable}$	46 (min)		**52**		52
Cetane Number	51 (min)		**54**		54
Distillation, °C IBP			**177**		177
T_{10}			**208**		208
T_{20}			**223**		223
T_{50}			**271**		271
T_{90}			**339**		339
T_{95}	360 (max)		**353**		353
FBP			**364**		364
% FAME	7 (max)		**7**		7

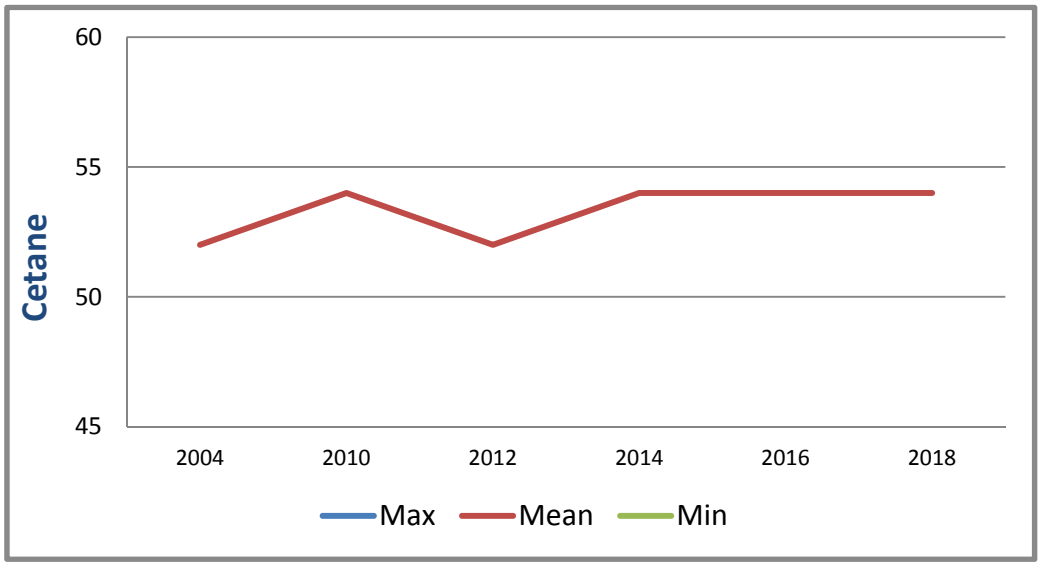
*20 hours min for diesel containing FAME above 2 % V/V

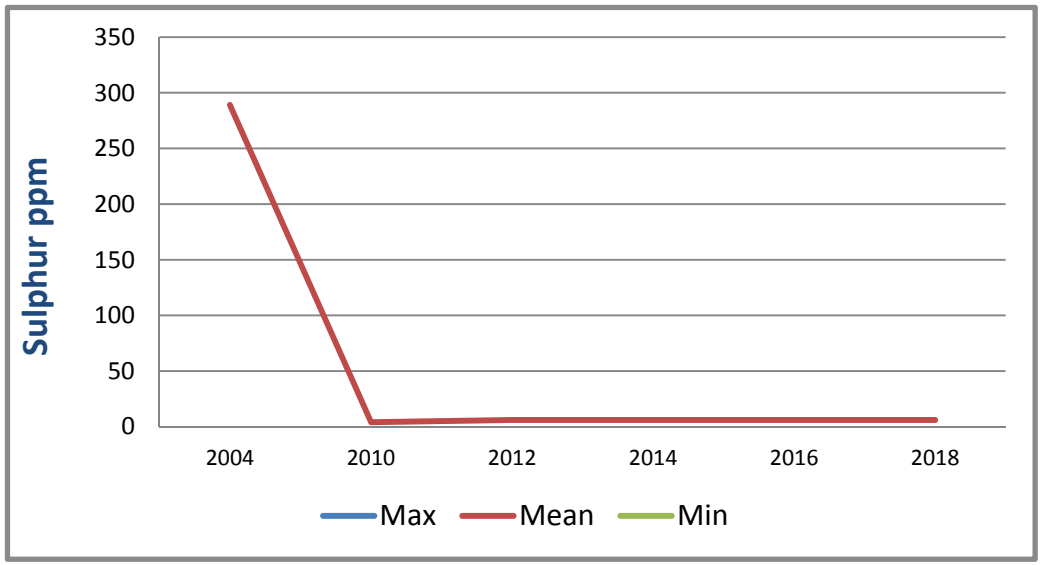
Slovak Republic

Europe









Spain

National standards and physical inspection data

Europe

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800205	DIES 1800206	DIES 1800207	DIES 1800208	DIES 1800209	DIES 1800210	DIES 1800211
Cloud Point, °C	0 (max)	**-2**	**-4**	**-8**	-3	-8	-4	-2	-3	-4	-4
CFPP, °C	-20 (max)	**-15**	**-17**	**-21**	-18	-15	-17	-15	-18	-15	-17
Pour Point, °C		**-12**	**-17**	**-21**	-18	-15	-15	-12	-18	-12	-21
HFRR, µm	460 (max)	**372**	**264**	**196**	196	244	211	281	276	216	206
Wax Content @ 10°C Below Cloud, wt%		**3.6**	**2.5**	**2.0**	2.2	2.6	2.3	2.6	2	3.6	2.1
Rancimat, hrs	*	**>30**	**>25**	**11**	>30	>30	>30	>30	>30	>30	11
Sulphur, ppm	10 (max)	**4**	**2**	**2**	2	3	2	3	2	4	2
Density @15°C, kg/m^3	820 - 845	**842**	**837**	**826**	838	837	834	826	838	834	842
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**55**	**53**	**50**	50	54	55	55	52	53	52
Cetane Index $_{4\ Variable}$	46 (min)	**55**	**52**	**49**	49	53	55	54	52	54	51
Cetane Number	51 (min)	**59**	**55**	**53**	53	55	59	57	56	57	55
Distillation, °C IBP		**180**	**165**	**157**	165	166	165	163	165	180	157
T_{10}		**216**	**200**	**191**	191	205	202	192	202	216	195
T_{20}		**229**	**220**	**206**	206	229	224	207	222	228	220
T_{50}		**281**	**274**	**263**	264	281	281	263	274	269	280
T_{90}		**345**	**340**	**336**	338	341	342	337	341	336	345
T_{95}	360 (max)	**360**	**357**	**352**	356	357	360	355	359	352	360
FBP		**370**	**367**	**364**	365	369	370	369	369	364	368
% FAME	7 (max)	**8**	**6**	**3**	8	6	6	7	8	8	7

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

Spain (continued)

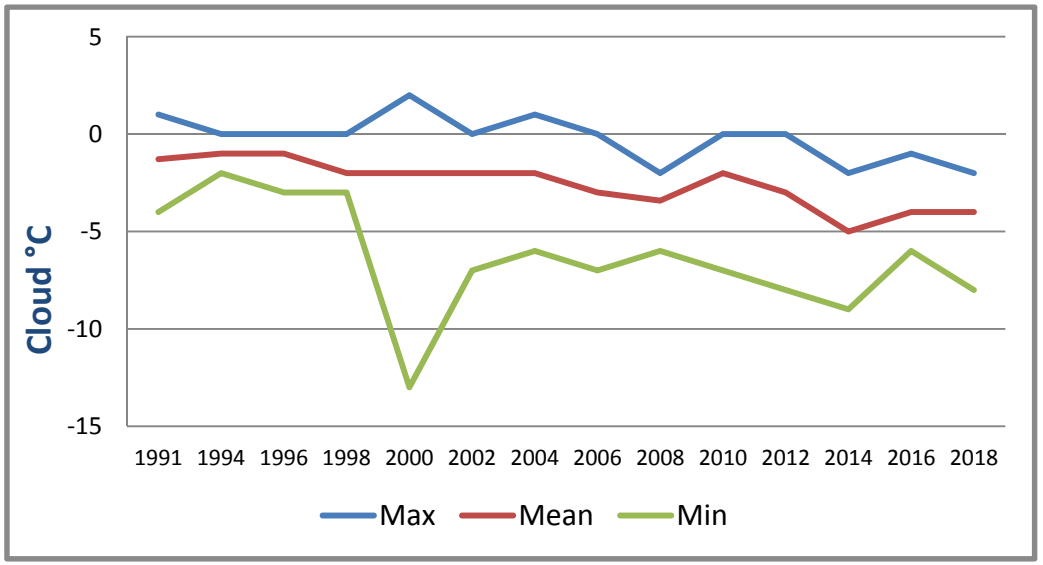
National standards and physical inspection data

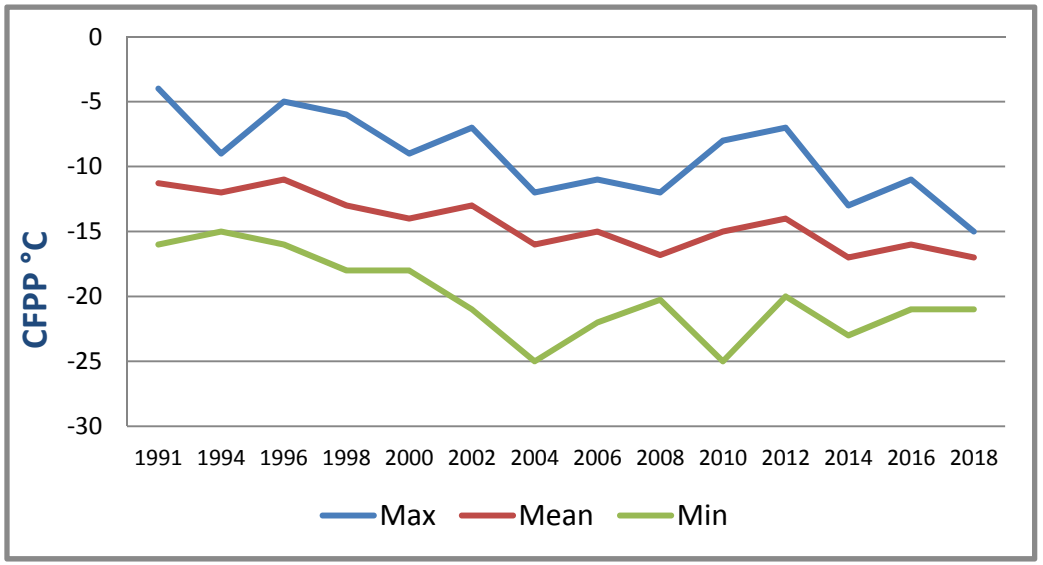
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800212	DIES 1800213	DIES 1800214	DIES 1800215
Cloud Point, °C	0 (max)	**-2**	**-4**	**-8**	-3	-4	-3	-4
CFPP, °C	-20 (max)	**-15**	**-17**	**-21**	-18	-21	-19	-18
Pour Point, °C		**-12**	**-17**	**-21**	-15	-21	-18	-18
HFRR, µm	460 (max)	**372**	**264**	**196**	216	341	372	350
Wax Content @ 10°C Below Cloud, wt%		**3.6**	**2.5**	**2.0**	2.5	2.3	2.4	2.5
Rancimat, hrs	*	**>30**	**>25**	**11**	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**4**	**2**	**2**	3	2	2	3
Density @15°C, kg/m^3	820 - 845	**842**	**837**	**826**	837	838	838	839
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-
Cetane Index $_{2\ Variable}$		**55**	**53**	**50**	52	54	53	53
Cetane Index $_{4\ Variable}$	46 (min)	**55**	**52**	**49**	51	52	52	52
Cetane Number	51 (min)	**59**	**55**	**53**	54	54	55	55
Distillation, °C IBP		**180**	**165**	**157**	164	162	162	160
T_{10}		**216**	**200**	**191**	196	200	203	205
T_{20}		**229**	**220**	**206**	214	223	225	225
T_{50}		**281**	**274**	**263**	269	278	276	276
T_{90}		**345**	**340**	**336**	338	340	340	340
T_{95}	360 (max)	**360**	**357**	**352**	355	356	357	356
FBP		**370**	**367**	**364**	366	367	368	365
% FAME	7 (max)	**8**	**6**	**3**	7	4	3	3

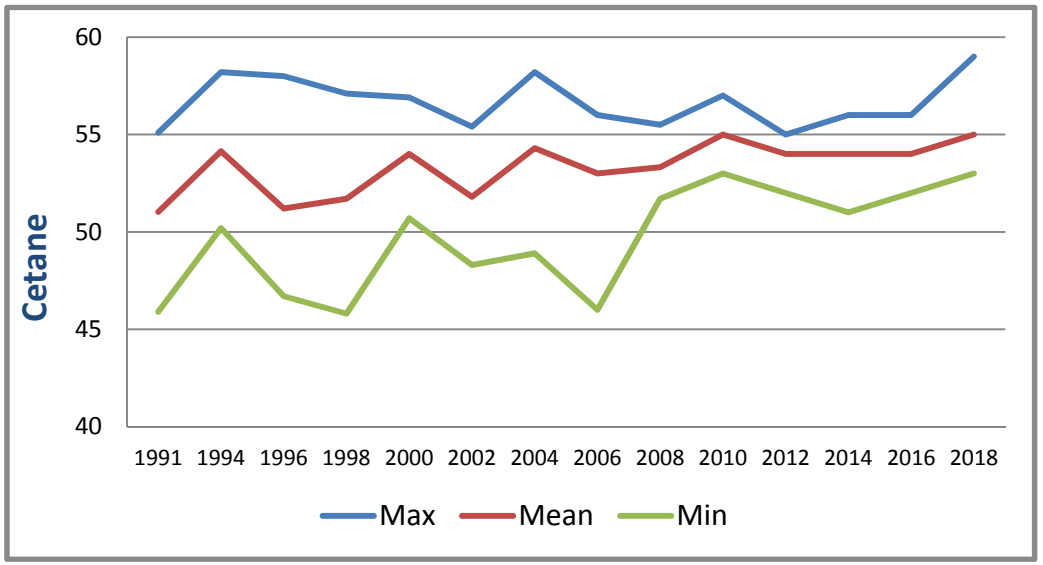
*20 hours min for diesel containing FAME above 2 % V/V

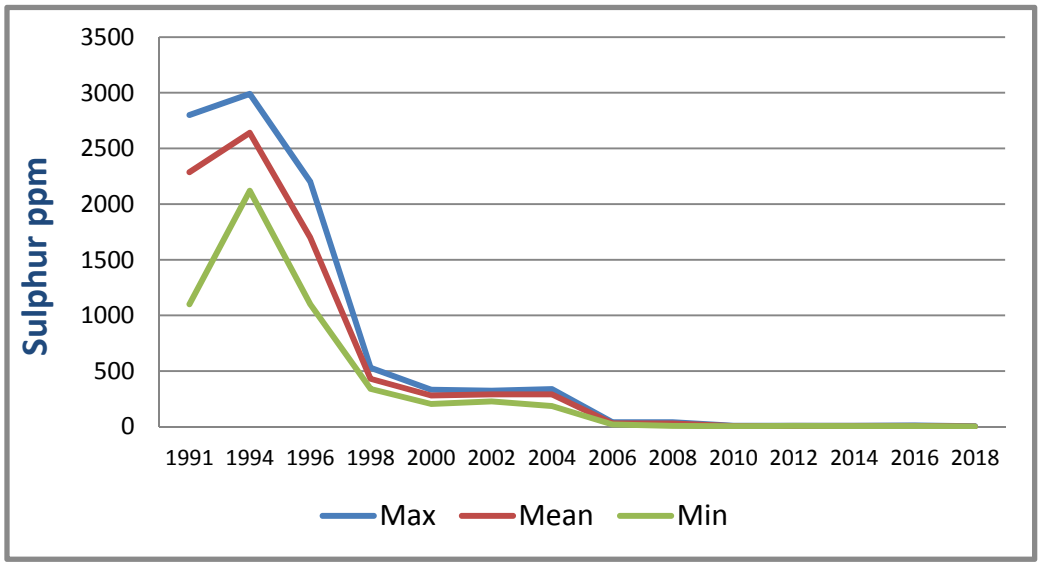
Spain

Europe









Sweden

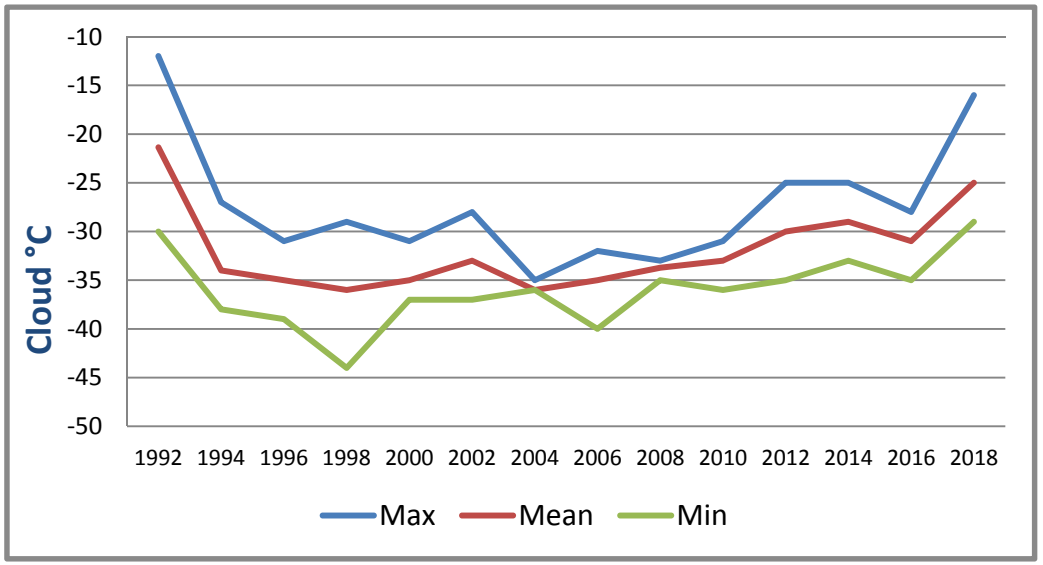
National standards and physical inspection data

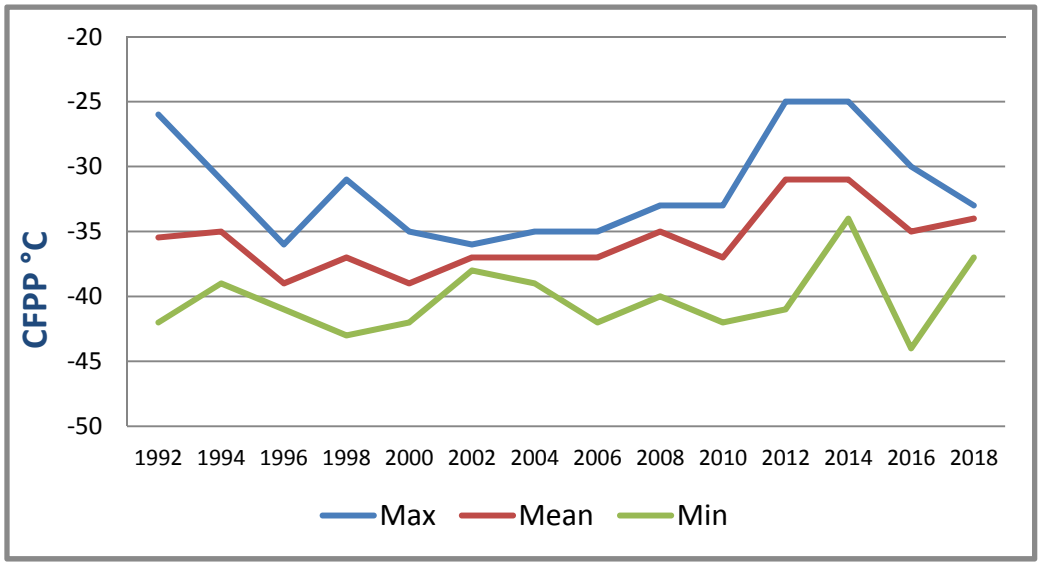
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800216	DIES 1800218	DIES 1800220	DIES 1800221
Cloud Point, °C	-22 (max)	**-16**	**-25**	**-29**	-29	-27	-28	-16
CFPP, °C	-32 (max)	**-33**	**-34**	**-37**	-33	-37	-34	-33
Pour Point, °C		**-33**	**-35**	**-36**	-33	-36	-36	-33
HFRR, µm	460 (max)	**247**	**212**	**192**	192	247	217	193
Wax Content @ 10°C Below Cloud, wt%		**N/A**	**N/A**	**N/A**	N/A	N/A	N/A	N/A
Rancimat, hrs	*	**>30**	**>25**	**22**	23	>30	>30	22
Sulphur, ppm	10 (max)	**<3**	**<3**	**<3**	<3	<3	<3	<3
Density @15°C, kg/m^3	800 - 830	**822**	**816**	**803**	822	819	803	822
Viscosity @ 40°C, cSt	1.5 - 4.0	**-**	**-**	**-**	-	-	-	-
Cetane Index $_{2\ Variable}$		**64**	**55**	**50**	53	50	64	53
Cetane Index $_{4\ Variable}$	46 (min)	**69**	**57**	**52**	54	52	69	55
Cetane Number	48 (min)	**62**	**56**	**53**	55	53	62	55
Distillation, °C IBP	180 (min)	**188**	**187**	**185**	185	188	187	188
T_{10}		**221**	**213**	**209**	211	209	221	212
T_{20}		**235**	**223**	**216**	220	216	235	222
T_{50}		**267**	**251**	**237**	249	237	267	250
T_{90}		**305**	**299**	**287**	305	287	299	305
T_{95}	360 (max)	**320**	**315**	**308**	320	308	312	319
FBP		**332**	**327**	**323**	329	323	325	332
% FAME	7 (max)	**7**	**6**	**5**	7	5	7	7

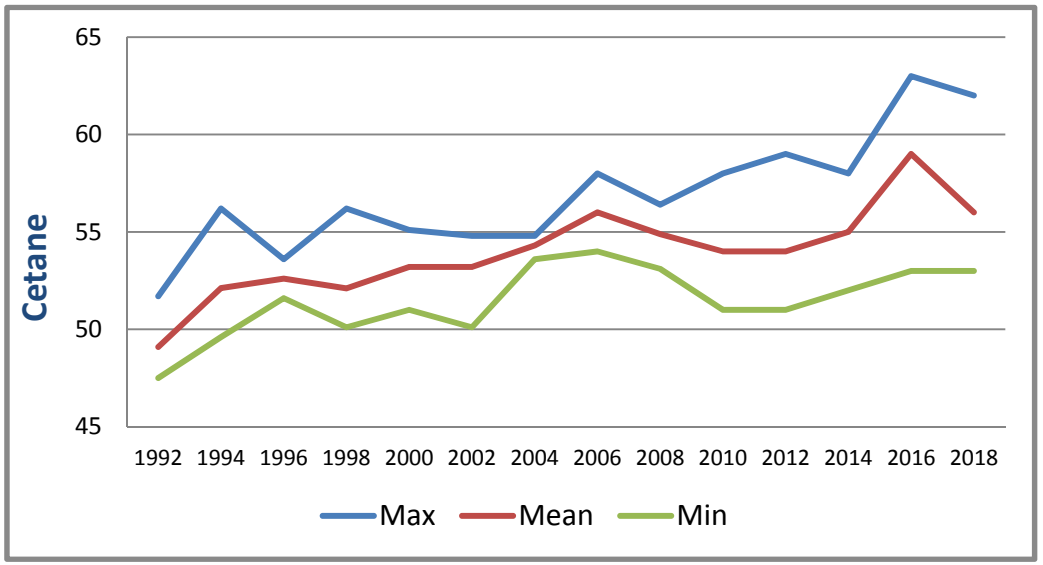
*20 hours min for diesel containing FAME above 2 % V/V
Specification shown is EN590 Arctic grade II

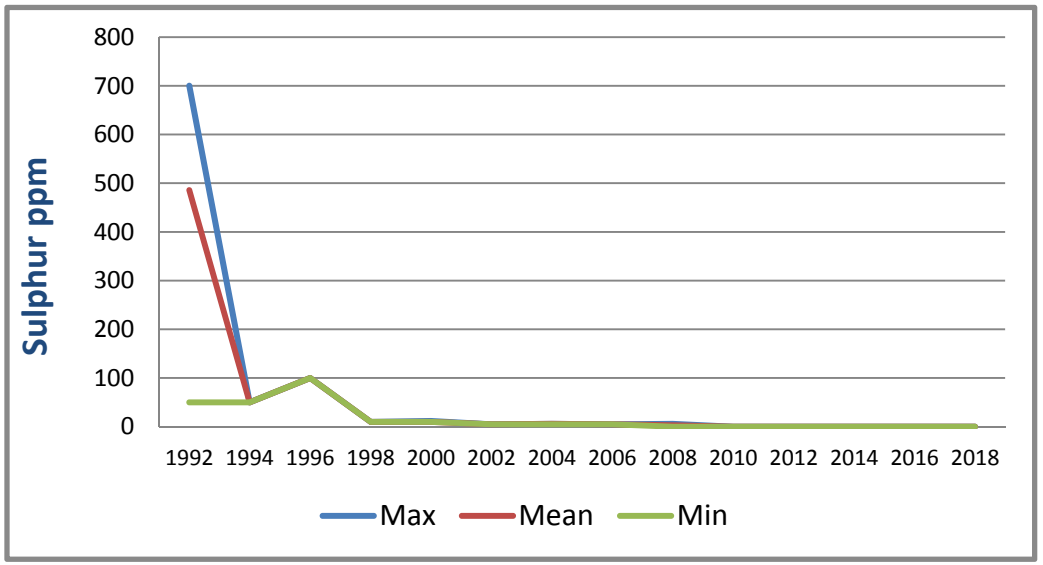
Sweden

Europe









Switzerland

National standards and physical inspection data

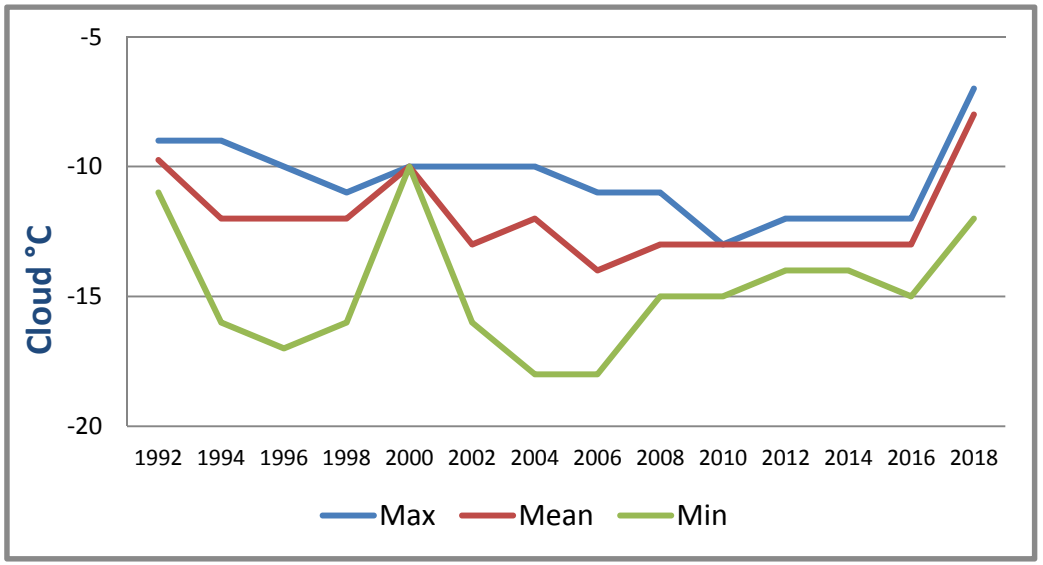
Europe

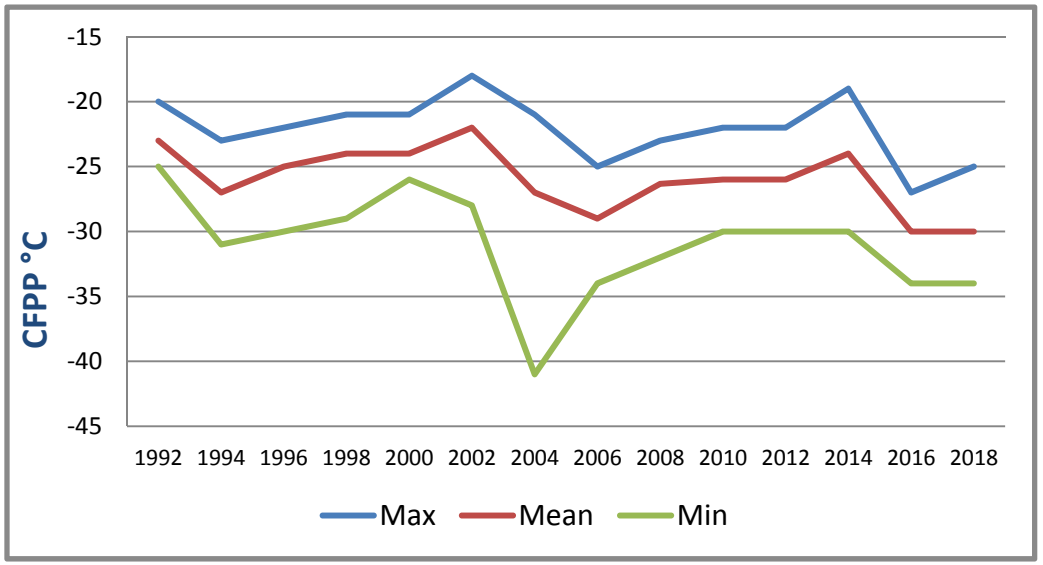
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800369	DIES 1800370	DIES 1800371	DIES 1800372	DIES 1800373	DIES 1800374	DIES 1800368
Cloud Point, °C	-10 (max)	**-7**	**-8**	**-12**	-7	-8	-9	-7	-8	-8	-12
CFPP, °C	-20 (max)	**-25**	**-30**	**-34**	-34	-25	-28	-31	-32	-33	-29
Pour Point, °C		**-24**	**-28**	**-33**	-30	-24	-30	-24	-33	-30	-24
HFRR, µm	460 (max)	**385**	**230**	**189**	195	213	189	206	208	385	216
Wax Content @ 10°C Below Cloud, wt%		**1.9**	**1.7**	**1.6**	1.8	1.7	1.6	1.6	1.9	1.7	1.8
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**8**	**7**	**6**	7	8	7	8	6	6	8
Density @15°C, kg/m^3	845 (max)	**843**	**838**	**833**	837	843	840	839	838	833	838
Viscosity @ 40°C, cSt	1.5 - 4.0	**-**	**-**		-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**52**	**50**	**49**	50	49	50	49	52	52	50
Cetane Index $_{4\ Variable}$	46 (min)	**52**	**50**	**48**	50	48	49	48	51	52	49
Cetane Number	51 (min)	**56**	**52**	**50**	52	50	50	50	54	56	51
Distillation, °C IBP		**170**	**168**	**163**	169	170	170	163	169	168	165
T_{10}	180 (min)	**210**	**202**	**196**	201	204	199	197	209	210	196
T_{20}		**225**	**219**	**214**	219	220	216	214	225	224	214
T_{50}		**269**	**263**	**259**	262	263	263	259	269	261	261
T_{90}		**331**	**326**	**319**	325	326	330	324	331	319	328
T_{95}	360 (max)	**346**	**343**	**340**	342	342	346	341	344	340	345
FBP		**356**	**354**	**350**	353	355	356	352	354	350	356
% FAME	7 (max)	**7**	**5**	**0**	6	7	7	5	7	0	7

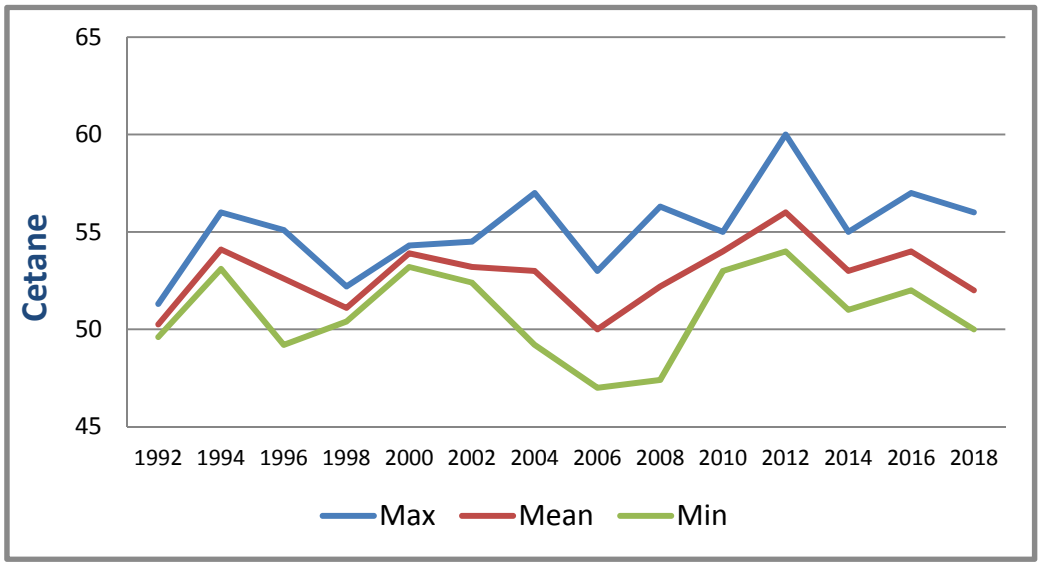
*20 hours min for diesel containing FAME above 2 % V/V
National standard shown is EN590 Arctic Class 0

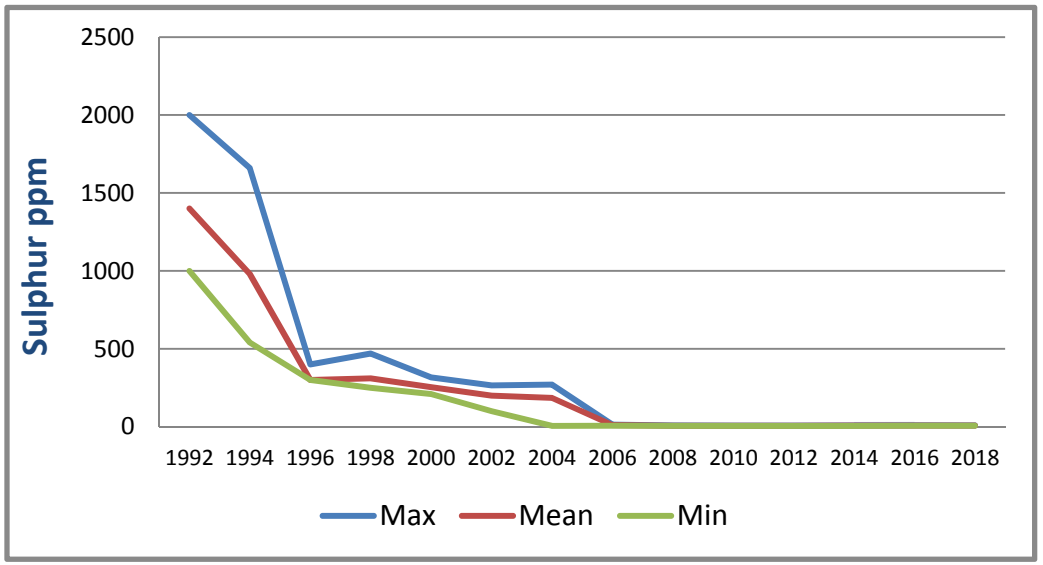
Switzerland

Europe









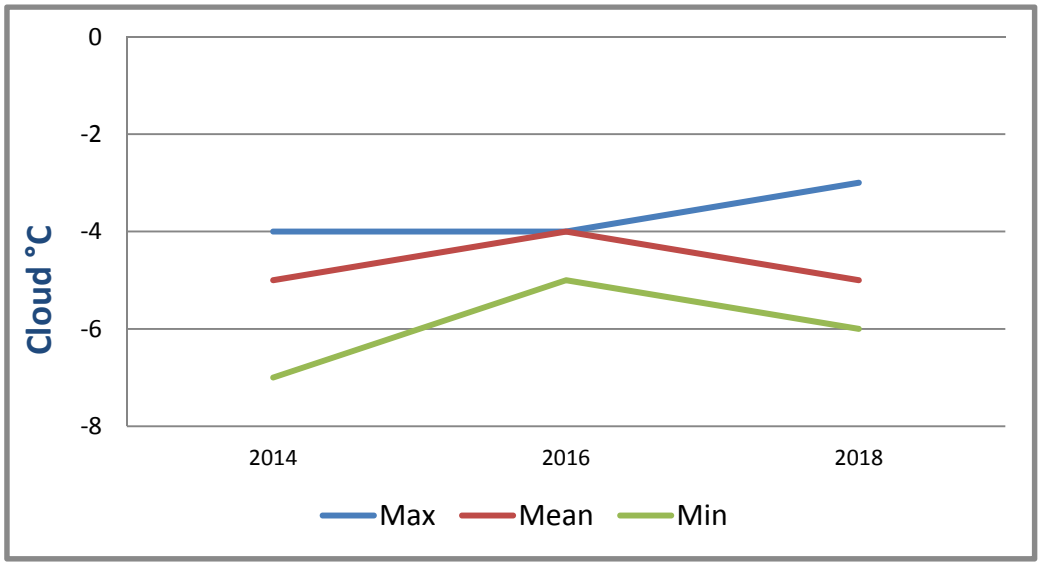
Turkey

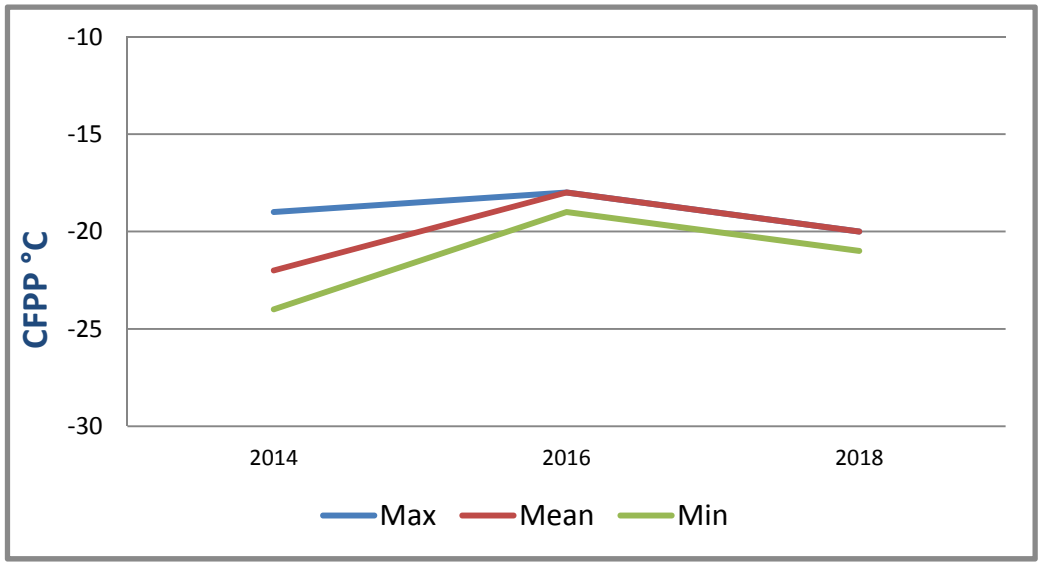
National standards and physical inspection data

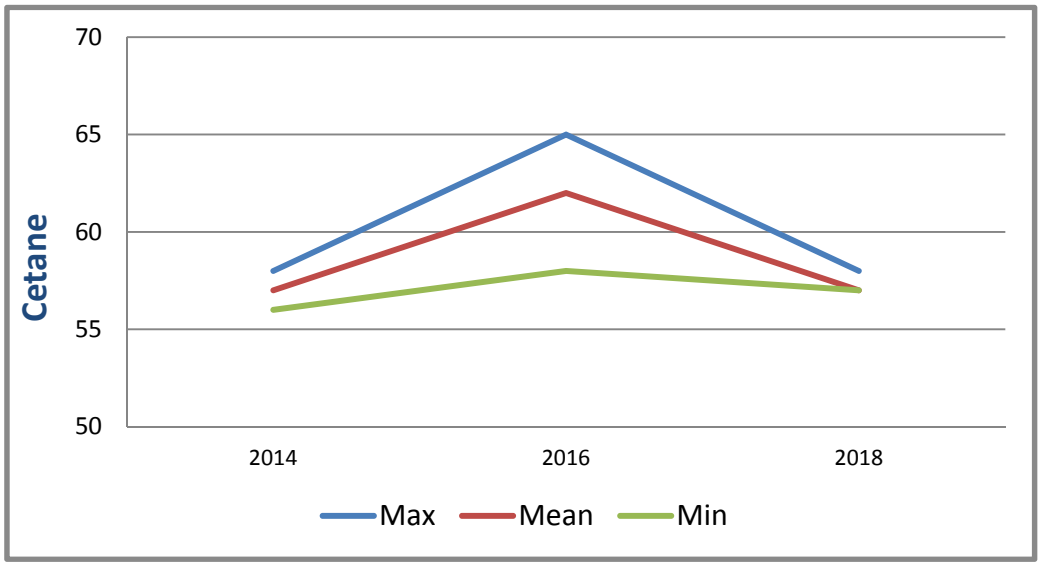
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800375	DIES 1800376
Cloud Point, °C		**-3**	**-5**	**-6**	-6	-3
CFPP, °C	-10 (max)	**-20**	**-20**	**-21**	-21	-20
Pour Point, °C		**-24**	**-24**	**-24**	-24	-24
HFRR, µm	460 (max)	**433**	**427**	**422**	433	422
Wax Content @ 10°C Below Cloud, wt%		**2.3**	**2.3**	**2.2**	2.2	2.3
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	10 (max)	**4**	**4**	**<3**	4	<3
Density @15°C, kg/m^3	820 - 845	**831**	**830**	**829**	831	829
Viscosity @ 40°C, cSt	2 - 4.5	**-**	**-**	**-**	-	-
Cetane Index $_{2\ Variable}$		**58**	**57**	**56**	58	56
Cetane Index $_{4\ Variable}$	46 (min)	**58**	**57**	**57**	58	57
Cetane Number	51 (min)	**58**	**57**	**57**	58	57
Distillation, °C IBP		**167**	**165**	**163**	163	167
T_{10}		**211**	**209**	**208**	211	208
T_{20}		**238**	**233**	**229**	238	229
T_{50}		**286**	**281**	**276**	286	276
T_{90}		**346**	**344**	**342**	346	342
T_{95}	360 (max)	**364**	**363**	**363**	363	364
FBP		**371**	**368**	**366**	366	371
% FAME	7 (max)	**0**	**0**	**0**	0	0

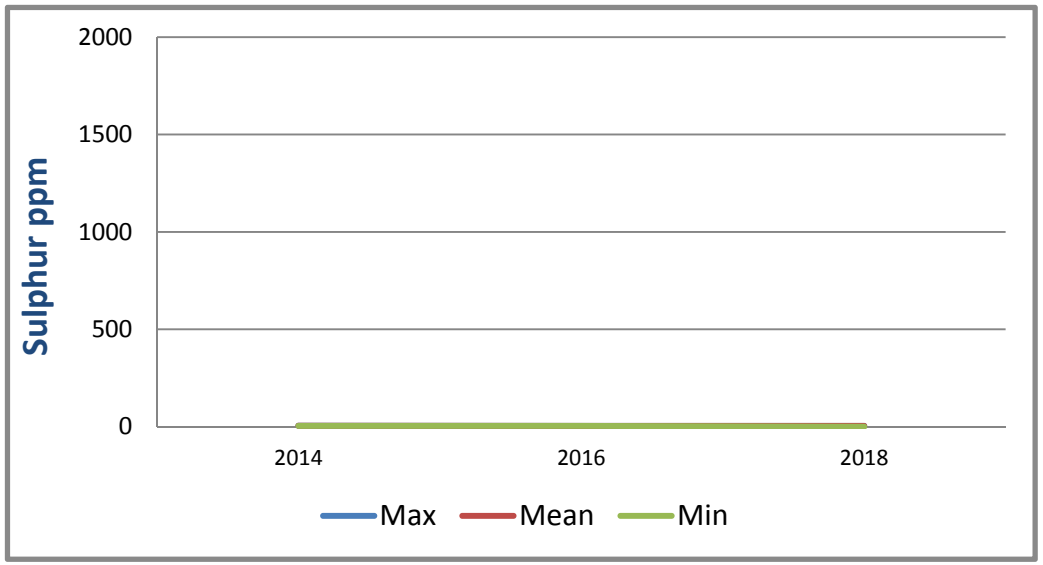
Turkey

Europe









United Kingdom

National standards and physical inspection data

Europe

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1710499	DIES 1710501	DIES 1710502	DIES 1710503	DIES 1710504	DIES 1710505	DIES 1710506
Cloud Point, °C		**-3**	**-7**	**-14**	-5	-12	-14	-5	-7	-7	-8
CFPP, °C	-15 (max)	**-15**	**-21**	**-29**	-20	-26	-29	-25	-20	-21	-22
Pour Point, °C		**-18**	**-24**	**-33**	-24	-27	-27	-24	-18	-18	-24
HFRR, µm	460 (max)	**439**	**318**	**197**	294	345	423	200	197	217	329
Wax Content @ 10°C Below Cloud, wt%		**2.9**	**2.1**	**1.4**	2.2	1.4	1.7	2.5	1.4	1.7	2.1
Rancimat, hrs	*	**>30**	**>25**	**25**	>30	>30	>30	25	>30	>30	>30
Sulphur, ppm	10 (max)	**10**	**7**	**4**	6	9	9	6	7	8	4
Density @15°C, kg/m^3	820 - 845	**841**	**836**	**829**	841	840	838	837	835	836	831
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-	-	-	-	-	-	-
Cetane Index $_{2\ Variable}$		**56**	**52**	**49**	52	49	49	55	50	50	55
Cetane Index $_{4\ Variable}$	46 (min)	**57**	**52**	**48**	51	48	49	54	49	50	55
Cetane Number	51 (min)	**56**	**52**	**50**	51	51	52	54	51	50	54
Distillation, °C IBP		**186**	**170**	**161**	171	165	161	170	166	169	175
T_{10}		**220**	**205**	**195**	206	201	195	206	197	199	213
T_{20}		**240**	**223**	**211**	225	215	211	227	213	215	230
T_{50}		**283**	**268**	**256**	274	259	258	281	256	259	271
T_{90}		**341**	**333**	**321**	337	325	324	339	330	334	341
T_{95}	360 (max)	**364**	**354**	**343**	353	350	348	352	351	357	364
FBP		**368**	**361**	**355**	362	357	356	360	361	364	368
% FAME	7 (max)	**6**	**1**	**0**	3	2	2	6	0	0	1

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

United Kingdom (continued)

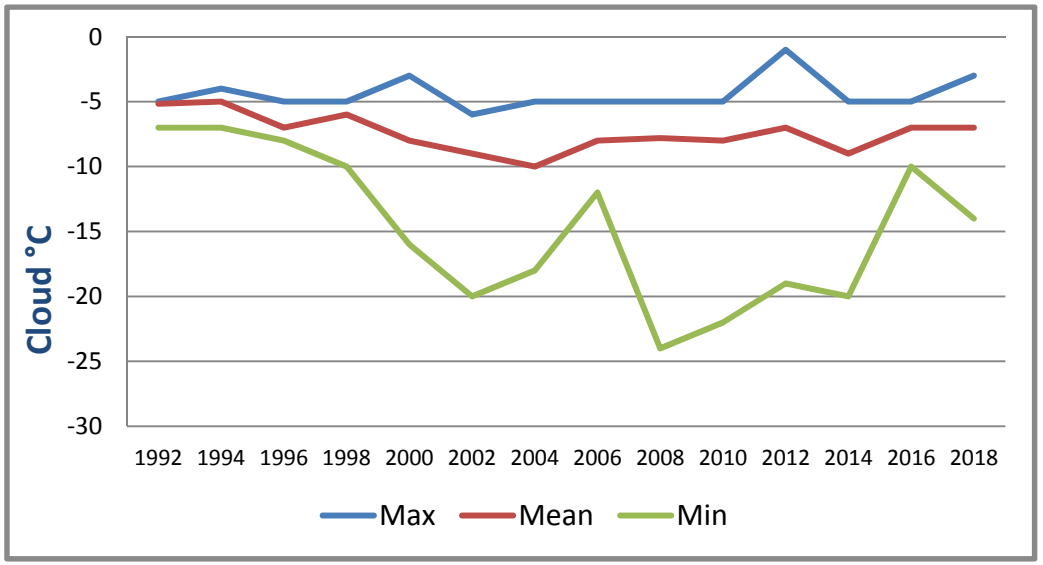
National standards and physical inspection data

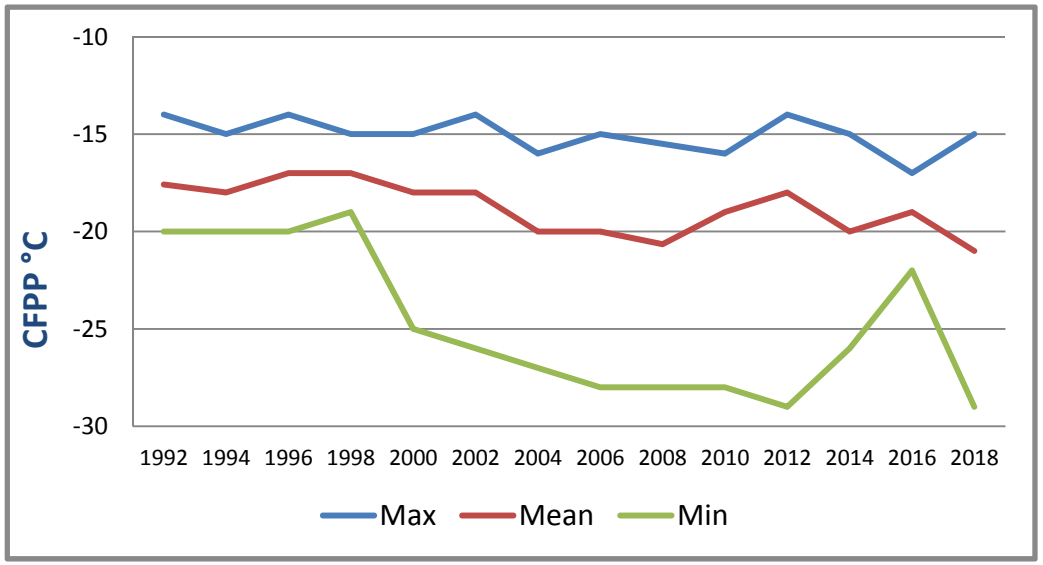
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1710516
Cloud Point, °C		**-3**	**-7**	**-14**	-8
CFPP, °C	-15 (max)	**-15**	**-21**	**-29**	-28
Pour Point, °C		**-18**	**-24**	**-33**	-33
HFRR, µm	460 (max)	**439**	**318**	**197**	420
Wax Content @ 10°C Below Cloud, wt%		**2.9**	**2.1**	**1.4**	1.5
Rancimat, hrs	*	**>30**	**>25**	**25**	>30
Sulphur, ppm	10 (max)	**10**	**7**	**4**	5
Density @15°C, kg/m^3	820 - 845	**841**	**836**	**829**	830
Viscosity @ 40°C, cSt	2.0 - 4.5	**-**	**-**	**-**	-
Cetane Index $_{2\ Variable}$		**56**	**52**	**49**	54
Cetane Index $_{4\ Variable}$	46 (min)	**57**	**52**	**48**	54
Cetane Number	51 (min)	**56**	**52**	**50**	51
Distillation, °C IBP		**186**	**170**	**161**	166
T_{10}		**220**	**205**	**195**	204
T_{20}		**240**	**223**	**211**	219
T_{50}		**283**	**268**	**256**	265
T_{90}		**341**	**333**	**321**	340
T_{95}	360 (max)	**364**	**354**	**343**	361
FBP		**368**	**361**	**355**	365
% FAME	7 (max)	**6**	**1**	**0**	0

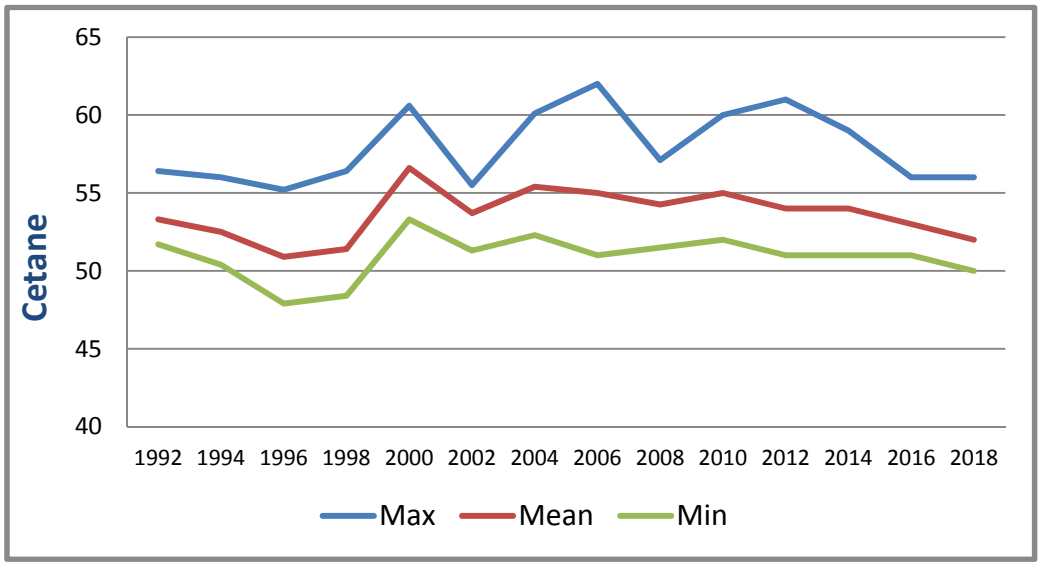
*20 hours min for diesel containing FAME above 2 % V/V

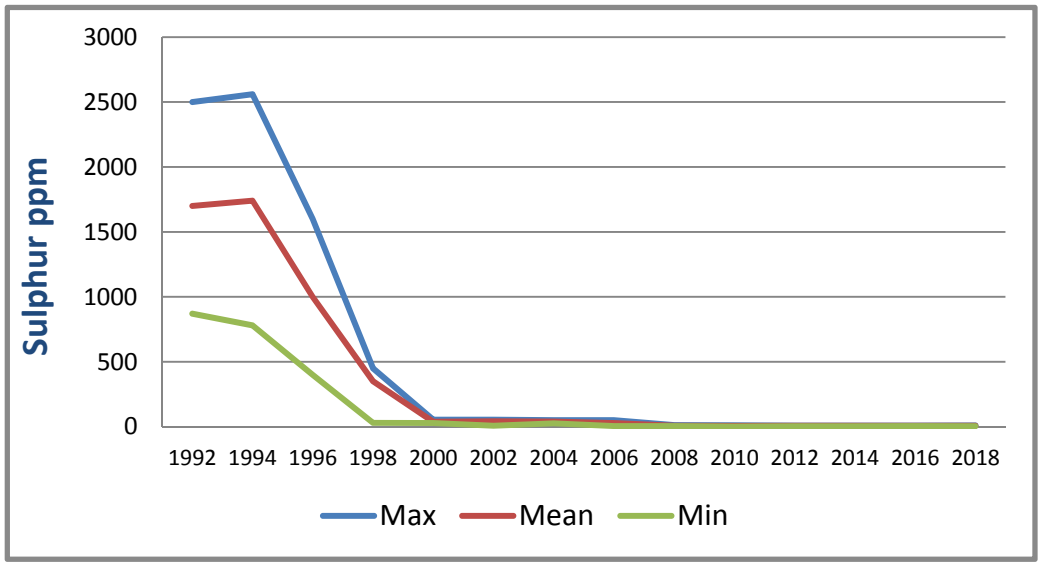
United Kingdom

Europe









Ukraine

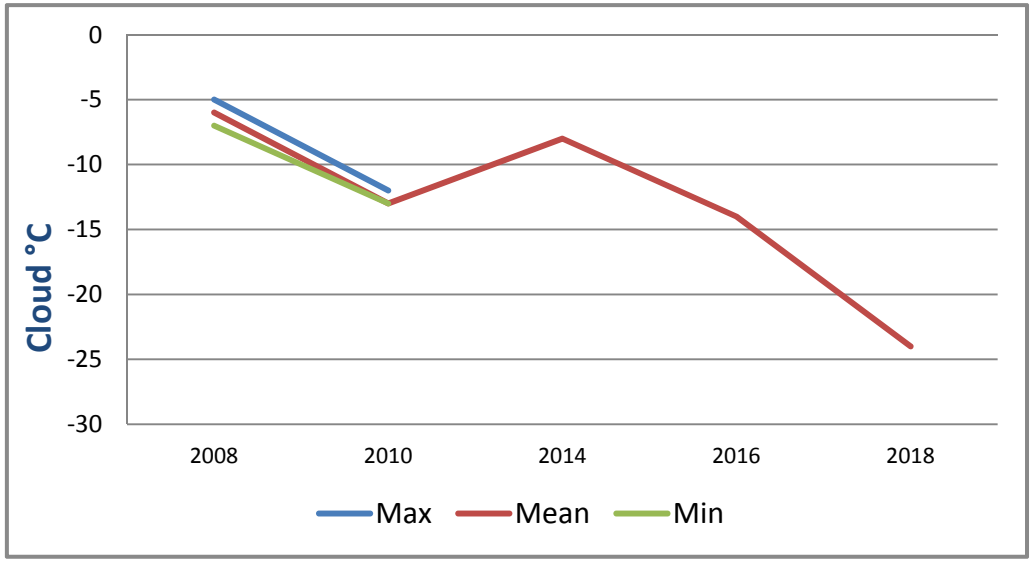
National standards and physical inspection data

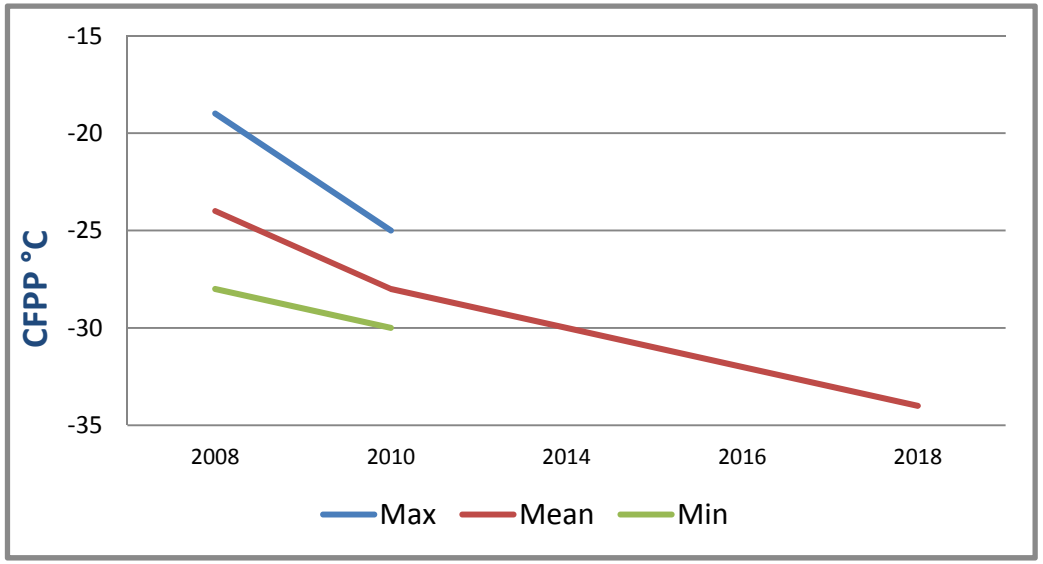
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800391
Cloud Point, °C			**-24**		-24
CFPP, °C	-20 (max)		**-34**		-34
Pour Point, °C			**-30**		-30
HFRR, µm	460 (max)		**458**		458
Wax Content @ 10°C Below Cloud, wt%			**1.7**		1.7
Rancimat, hrs			**>30**		>30
Sulphur, ppm	10 (max)		**3**		3
Density @15°C, kg/m^3			**835**		835
Viscosity @ 40°C, cSt			**-**		-
Cetane Index $_{2\ Variable}$			**52**		52
Cetane Index $_{4\ Variable}$			**53**		53
Cetane Number	49 (min)		**52**		52
Distillation, °C IBP			**169**		169
T_{10}			**220**		220
T_{20}			**234**		234
T_{50}			**268**		268
T_{90}			**332**		332
T_{95}	360 (max)		**357**		357
FBP			**367**		367
% FAME	7 (max)*		**0**		0

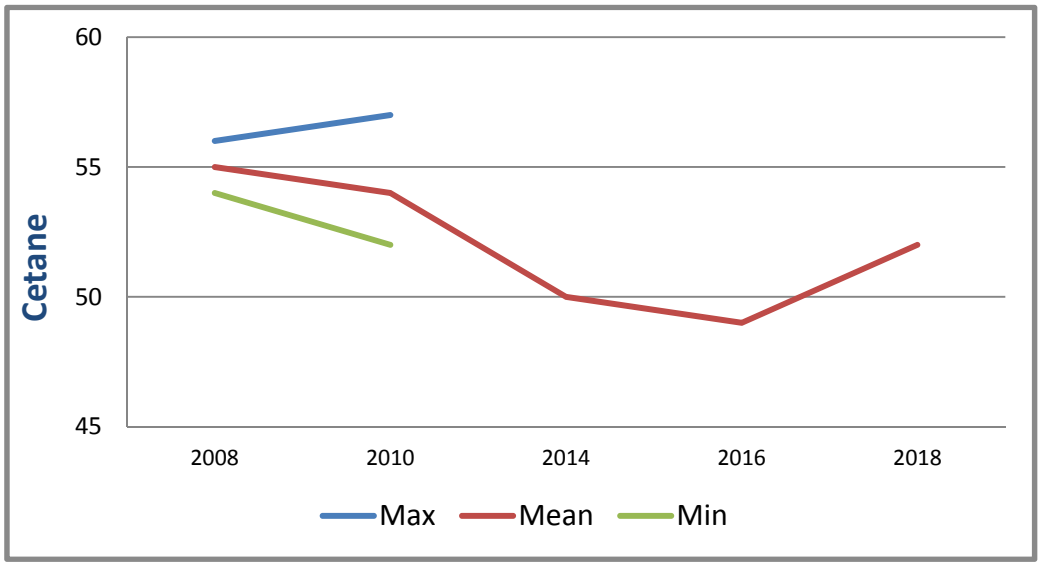
*For ambient temperatures below -20°C, using biodiesel is not recommended. Two grades are allowed on the market.

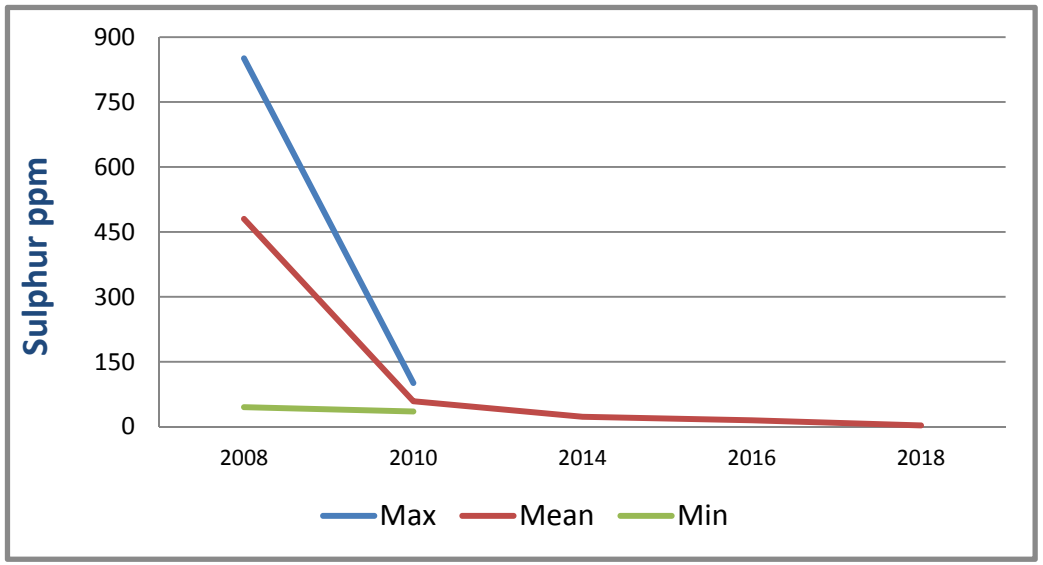
Ukraine

Europe









Worldwide Survey – Asia Pacific

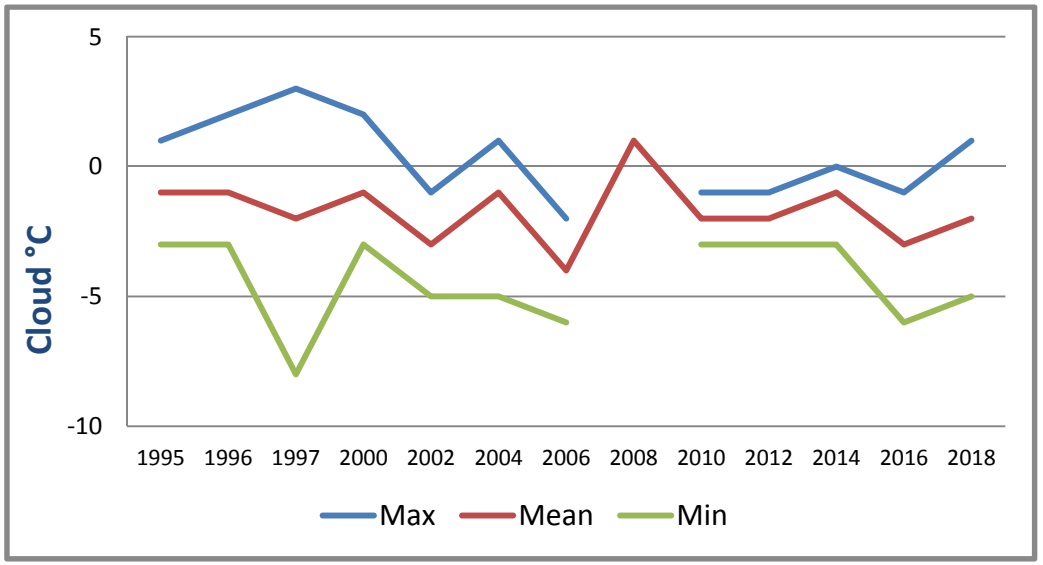
Australia

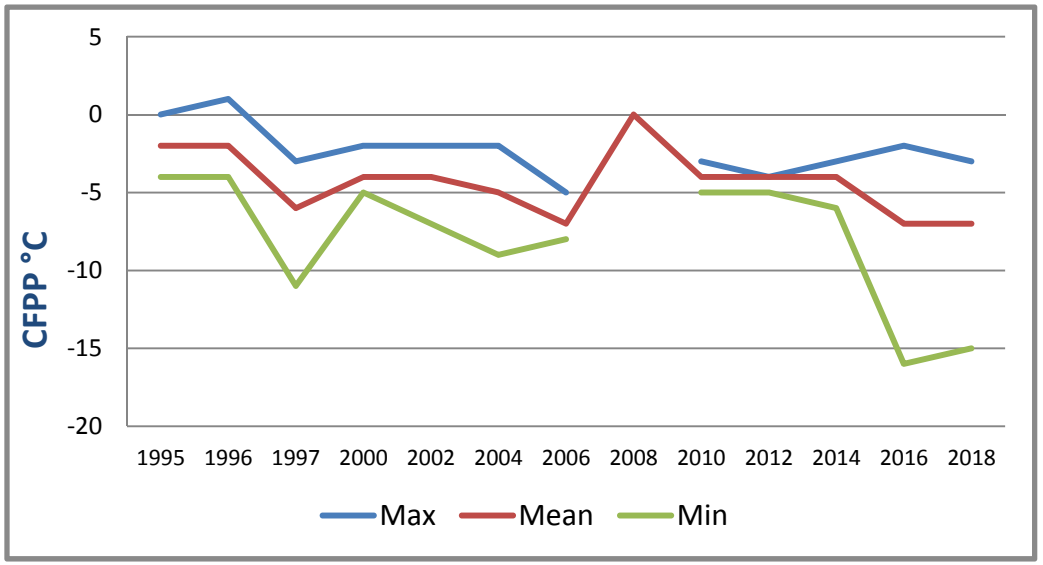
National standards and physical inspection data

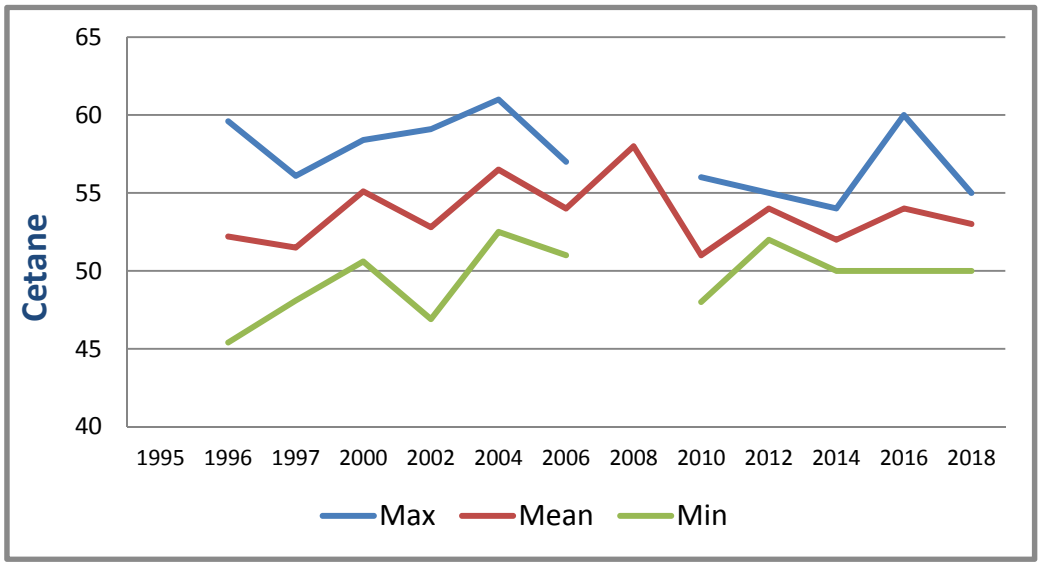
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1705989	DIES 1705990	DIES 1705991	DIES 1705992
Cloud Point, °C		**1**	**-2**	**-5**	1	-2	-1	-5
CFPP, °C		**-3**	**-7**	**-15**	-3	-6	-4	-15
Pour Point, °C		**-6**	**-8**	**-12**	-6	-6	-6	-12
HFRR, µm	460 (max)	**397**	**343**	**284**	397	362	284	330
Wax Content @ 10°C Below Cloud, wt%		**5.9**	**4.7**	**2.6**	5.3	5.9	5	2.6
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**7**	**7**	**5**	7	7	7	5
Density @15°C, kg/m^3	820 - 850	**846**	**840**	**836**	843	846	837	836
Viscosity @ 40°C, cSt	2.0 - 4.5	**3.40**	**2.96**	**2.70**	2.93	2.70	3.40	2.81
Cetane Index $_{2\ Variable}$		**55**	**52**	**48**	51	48	55	53
Cetane Index $_{4\ Variable}$	46 (min)	**58**	**53**	**49**	52	49	58	53
Cetane Number	51 (min)	**55**	**53**	**50**	52	50	55	54
Distillation, °C IBP		**198**	**185**	**178**	181	181	198	178
T_{10}		**242**	**226**	**215**	225	223	242	215
T_{20}		**255**	**241**	**231**	240	237	255	231
T_{50}		**284**	**274**	**266**	274	266	284	272
T_{90}		**338**	**330**	**320**	333	320	331	338
T_{95}	360 (max)	**358**	**347**	**336**	351	336	344	358
FBP		**364**	**357**	**348**	361	348	356	364
% FAME	5 (max)	**0**	**0**	**0**	0	0	0	0

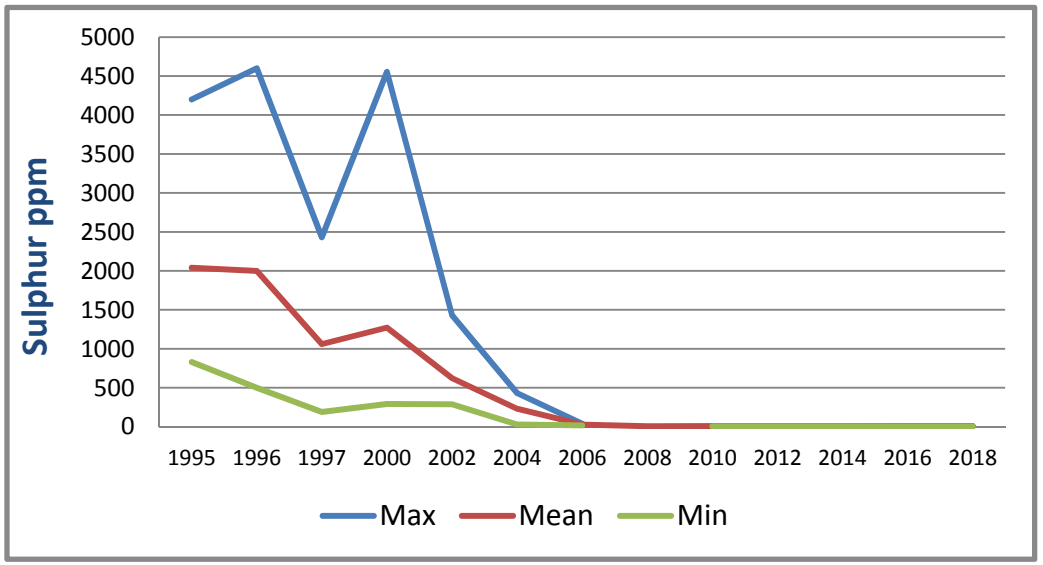
Australia

Asia Pacific









Peoples Republic of China

National standards and physical inspection data

Asia Pacific

	National Standard	Maximum Observed	Mean	Minimum Observed	E01157-103-001	E01157-103-002	E01157-103-003	E01157-103-004	E01157-103-005	E01157-103-006	E01157-103-007
Cloud Point, °C		**3**	**-10**	**-34**	-9	-12	-34	-5	-1	-3	-11
CFPP, °C	*	**1**	**-13**	**-50**	-10	-12	-38	-5	-4	-6	-10
Pour Point, °C	*	**-3**	**-18**	**-45**	-15	-15	-40	-8	-13	-13	-18
HFRR, µm	460 (max)	**474**	**384**	**178**	455	363	379	393	400	399	413
Wax Content @ 10°C Below Cloud, wt%		**4.6**	**2.2**	**0.0**	2.0	4.2	0.0	2.5	2.9	2.3	2.0
Rancimat, hrs		**>30**	**>20**	**11**	>30	22	20	18	19	15	23
Sulphur, ppm	10 (max)	**638**	**46**	**2**	638	5	4	5	4	3	4
Density @15°C, kg/m^3		**844**	**828**	**803**	825	832	803	837	831	832	827
Viscosity @ 40°C, cSt	*	**6.44**	**4.14**	**2.17**	3.66	4.92	2.17	4.82	4.75	4.32	5.11
Cetane Index $_{2\ Variable}$	*	**59**	**53**	**45**	53	55	48	53	55	53	57
Cetane Index $_{4\ Variable}$		**64**	**54**	**45**	53	58	50	54	56	53	59
Cetane Number	*	**60**	**52**	**45**	51	56	48	52	52	52	56
Distillation, °C IBP		**211**	**172**	**138**	166	198	145	175	175	176	176
T_{10}		**251**	**212**	**181**	196	239	181	222	217	212	225
T_{20}		**261**	**225**	**188**	209	251	188	238	233	226	241
T_{50}	300 (max)	**290**	**260**	**212**	254	276	212	273	271	264	278
T_{90}	355 (max)	**345**	**321**	**269**	330	316	273	333	341	334	335
T_{95}	365 (max)	**360**	**338**	**286**	349	328	291	351	358	353	352
FBP		**366**	**348**	**301**	360	337	304	361	364	362	359
% FAME	1 (max)	**0**	**0**	**0**	0	0	0	0	0	0	0

* Various spec depend on grade, see tables.

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Solid Point °C Max.	5	0	-10	-20	-35	-50
CFPP °C Max.	8	4	-5	-14	-29	-44
Cetane Number Min.	51	51	51	49	47	47

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Cetane Index Min.	46	46	46	46	43	43
Density @ 20°C, kg/m^3	810-850	810-850	810-850	790-840	790-840	790-840
Viscosity @ 20°C, cSt	3-8	3-8	2.5-8	2.5-8	1.8-7	1.8-7

Peoples Republic of China (continued)

Asia Pacific

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E01157-103-008	E01157-103-009	E01157-103-010	E01157-103-011	E01157-103-012	E01157-103-013	E01157-103-014
Cloud Point, °C		**3**	**-10**	**-34**	-34	-9	-17	-5	-34	-6	-7
CFPP, °C	*	**1**	**-13**	**-50**	-34	-36	-17	-3	-34	-7	-7
Pour Point, °C	*	**-3**	**-18**	**-45**	-40	-45	-20	-10	-40	-8	-13
HFRR, µm	460 (max)	**474**	**384**	**178**	474	369	403	425	411	303	434
Wax Content @ 10°C Below Cloud, wt%		**4.6**	**2.2**	**0.0**	0.0	0.0	3.4	2.2	0.0	3.6	2.1
Rancimat, hrs		**>30**	**>20**	**11**	15	22	>30	>30	17	13	22
Sulphur, ppm	10 (max)	**638**	**46**	**2**	5	7	3	7	4	6	5
Density @15°C, kg/m^3		**844**	**828**	**803**	804	804	829	837	804	833	833
Viscosity @ 40°C, cSt	*	**6.44**	**4.14**	**2.17**	2.24	2.21	5.02	5.44	2.24	5.03	4.39
Cetane Index $_{2\ Variable}$	*	**59**	**53**	**45**	49	49	53	54	49	55	52
Cetane Index $_{4\ Variable}$		**64**	**54**	**45**	51	51	55	56	51	57	53
Cetane Number	*	**60**	**52**	**45**	51	47	52	53	51	56	52
Distillation, °C IBP		**211**	**172**	**138**	161	168	183	183	160	177	177
T_{10}		**251**	**212**	**181**	188	187	227	232	189	230	220
T_{20}		**261**	**225**	**188**	196	193	236	247	195	245	232
T_{50}	300 (max)	**290**	**260**	**212**	217	215	260	282	217	278	265
T_{90}	355 (max)	**345**	**321**	**269**	270	269	302	342	269	331	328
T_{95}	365 (max)	**360**	**338**	**286**	290	286	315	357	289	348	346
FBP		**366**	**348**	**301**	306	301	325	364	306	357	357
% FAME	1 (max)	**0**	**0**	**0**	0	0	0	0	0	0	0

* Various spec depend on grade, see tables.

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Solid Point ºC Max.	5	0	-10	-20	-35	-50
CFPP ºC Max.	8	4	-5	-14	-29	-44
Cetane Number Min.	51	51	51	49	47	47

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Cetane Index Min.	46	46	46	46	43	43
Density @ 20°C, kg/m^3	810-850	810-850	810-850	790-840	790-840	790-840
Viscosity @ 20°C, cSt	3-8	3-8	2.5-8	2.5-8	1.8-7	1.8-7

Peoples Republic of China (continued)

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E01157-103-015	E01157-103-016	E01157-103-017	E01157-103-018	E01157-103-019	E01157-103-020	E01157-103-021
Cloud Point, °C		**3**	**-10**	**-34**	-9	-6	-28	-28	-7	-7	-4
CFPP, °C	*	**1**	**-13**	**-50**	-12	-17	-50	-35	-14	-17	-5
Pour Point, °C	*	**-3**	**-18**	**-45**	-13	-25	<-55	-35	-13	-15	-13
HFRR, µm	460 (max)	**474**	**384**	**178**	362	384	400	404	349	403	194
Wax Content @ 10°C Below Cloud, wt%		**4.6**	**2.2**	**0.0**	2.6	1.8	0.0	1.3	2.3	2.1	3.5
Rancimat, hrs		**>30**	**>20**	**11**	21	>30	11	24	23	26	21
Sulphur, ppm	10 (max)	**638**	**46**	**2**	3	412	3	6	4	4	8
Density @15°C, kg/m^3		**844**	**828**	**803**	835	842	817	816	830	833	843
Viscosity @ 40°C, cSt	*	**6.44**	**4.14**	**2.17**	4.78	3.97	2.80	2.32	4.57	4.75	5.20
Cetane Index $_{2\ Variable}$	*	**59**	**53**	**45**	53	49	48	47	54	54	53
Cetane Index $_{4\ Variable}$		**64**	**54**	**45**	55	48	50	47	56	56	53
Cetane Number	*	**60**	**52**	**45**	52	46	48	46	54	55	53
Distillation, °C IBP		**211**	**172**	**138**	202	164	139	138	192	198	172
T_{10}		**251**	**212**	**181**	231	202	192	181	224	227	231
T_{20}		**261**	**225**	**188**	243	217	199	190	236	240	248
T_{50}	300 (max)	**290**	**260**	**212**	272	261	229	222	268	271	282
T_{90}	355 (max)	**345**	**321**	**269**	324	335	301	280	329	329	334
T_{95}	365 (max)	**360**	**338**	**286**	341	353	315	296	347	349	347
FBP		**366**	**348**	**301**	350	359	324	313	357	359	354
% FAME	1 (max)	**0**	**0**	**0**	0	0	0	0	0	0	0

* Various spec depend on grade, see tables.

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Solid Point °C Max.	5	0	-10	-20	-35	-50
CFPP °C Max.	8	4	-5	-14	-29	-44
Cetane Number Min.	51	51	51	49	47	47

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Cetane Index Min.	46	46	46	46	43	43
Density @ 20°C, kg/m^3	810-850	810-850	810-850	790-840	790-840	790-840
Viscosity @ 20°C, cSt	3-8	3-8	2.5-8	2.5-8	1.8-7	1.8-7

Peoples Republic of China (continued)

Asia Pacific

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E01157-103-022	E01157-103-023	E01157-103-024	E01157-103-025	E01157-103-026	E01157-103-027	E01157-103-028
Cloud Point, °C		**3**	**-10**	**-34**	-6	-5	3	-7	-15	-5	-5
CFPP, °C	*	**1**	**-13**	**-50**	-17	-6	1	-6	-14	-6	-4
Pour Point, °C	*	**-3**	**-18**	**-45**	-25	-13	-25	-10	-18	-5	-8
HFRR, µm	460 (max)	**474**	**384**	**178**	178	384	459	366	440	387	377
Wax Content @ 10°C Below Cloud, wt%		**4.6**	**2.2**	**0.0**	1.9	1.9	4.2	3.0	0.0	3.3	2.5
Rancimat, hrs		**>30**	**>20**	**11**	>30	21	>30	17	14	19	23
Sulphur, ppm	10 (max)	**638**	**46**	**2**	412	4	5	4	5	3	4
Density @15°C, kg/m^3		**844**	**828**	**803**	841	844	839	833	830	829	829
Viscosity @ 40°C, cSt	*	**6.44**	**4.14**	**2.17**	3.97	6.44	5.40	4.62	3.92	4.77	4.64
Cetane Index $_{2\ Variable}$	*	**59**	**53**	**45**	48	51	54	54	52	59	56
Cetane Index $_{4\ Variable}$		**64**	**54**	**45**	48	51	54	55	53	64	57
Cetane Number	*	**60**	**52**	**45**	47	55	52	53	52	60	55
Distillation, °C IBP		**211**	**172**	**138**	160	168	180	184	176	211	173
T_{10}		**251**	**212**	**181**	199	223	223	223	213	251	212
T_{20}		**261**	**225**	**188**	216	239	239	238	225	261	230
T_{50}	300 (max)	**290**	**260**	**212**	259	274	282	270	258	290	274
T_{90}	355 (max)	**345**	**321**	**269**	332	337	345	327	316	338	334
T_{95}	365 (max)	**360**	**338**	**286**	348	354	360	345	330	354	350
FBP		**366**	**348**	**301**	358	362	365	353	341	364	358
% FAME	1 (max)	**0**	**0**	**0**	0	0	0	0	0	0	0

* Various spec depend on grade, see tables.

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Solid Point ºC Max.	5	0	-10	-20	-35	-50
CFPP ºC Max.	8	4	-5	-14	-29	-44
Cetane Number Min.	51	51	51	49	47	47

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Cetane Index Min.	46	46	46	46	43	43
Density @ 20°C, kg/m^3	810-850	810-850	810-850	790-840	790-840	790-840
Viscosity @ 20°C, cSt	3-8	3-8	2.5-8	2.5-8	1.8-7	1.8-7

Peoples Republic of China (continued)

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E01157-103-029	E01157-103-030	E01157-103-031	E01157-103-032	E01157-103-033	E01157-103-034	E01157-103-035
Cloud Point, °C		**3**	**-10**	**-34**	-6	-5	-6	-4	-30	-7	-7
CFPP, °C	*	**1**	**-13**	**-50**	-16	-8	-6	-4	-39	-8	-6
Pour Point, °C	*	**-3**	**-18**	**-45**	-25	-23	-13	-5	-45	-15	-13
HFRR, µm	460 (max)	**474**	**384**	**178**	390	389	356	358	444	424	378
Wax Content @ 10°C Below Cloud, wt%		**4.6**	**2.2**	**0.0**	1.8	2.8	2.3	3.0	0.0	1.6	2.4
Rancimat, hrs		**>30**	**>20**	**11**	>30	>30	19	16	14	>30	20
Sulphur, ppm	10 (max)	**638**	**46**	**2**	421	4	2	7	8	7	6
Density @15°C, kg/m^3		**844**	**828**	**803**	841	832	828	833	805	844	834
Viscosity @ 40°C, cSt	*	**6.44**	**4.14**	**2.17**	3.97	4.29	4.19	5.12	2.29	3.27	4.73
Cetane Index $_{2\ Variable}$	*	**59**	**53**	**45**	48	54	54	56	49	45	53
Cetane Index $_{4\ Variable}$		**64**	**54**	**45**	48	53	54	57	51	45	54
Cetane Number	*	**60**	**52**	**45**	46	52	52	55	51	45	52
Distillation, °C IBP		**211**	**172**	**138**	162	166	168	172	157	140	176
T_{10}		**251**	**212**	**181**	200	203	200	220	190	186	222
T_{20}		**261**	**225**	**188**	214	222	215	241	197	201	236
T_{50}	300 (max)	**290**	**260**	**212**	258	269	266	283	218	250	270
T_{90}	355 (max)	**345**	**321**	**269**	331	333	337	335	269	335	332
T_{95}	365 (max)	**360**	**338**	**286**	348	348	353	350	287	353	349
FBP		**366**	**348**	**301**	358	356	361	357	301	366	359
% FAME	1 (max)	**0**	**0**	**0**	0	0	0	0	0	0	0

* Various spec depend on grade, see tables.

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Solid Point ºC Max.	5	0	-10	-20	-35	-50
CFPP ºC Max.	8	4	-5	-14	-29	-44
Cetane Number Min.	51	51	51	49	47	47

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Cetane Index Min.	46	46	46	46	43	43
Density @ 20°C, kg/m^3	810-850	810-850	810-850	790-840	790-840	790-840
Viscosity @ 20°C, cSt	3-8	3-8	2.5-8	2.5-8	1.8-7	1.8-7

Peoples Republic of China (continued)

Asia Pacific

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E01157-103-036	E01157-103-037	E01157-103-038	E01157-103-039	E01157-103-040	E01157-103-041	E01157-103-042
Cloud Point, °C		**3**	**-10**	**-34**	-7	-20	-15	2	2	-12	-8
CFPP, °C	*	**1**	**-13**	**-50**	-8	-28	-14	1	1	-11	-8
Pour Point, °C	*	**-3**	**-18**	**-45**	-13	-25	-18	-3	-10	-18	-13
HFRR, µm	460 (max)	**474**	**384**	**178**	373	384	388	369	379	362	369
Wax Content @ 10°C Below Cloud, wt%		**4.6**	**2.2**	**0.0**	2.0	0.0	0.0	4.5	4.4	1.6	2.0
Rancimat, hrs		**>30**	**>20**	**11**	19	15	24	16	>30	16	15
Sulphur, ppm	10 (max)	**638**	**46**	**2**	5	2	5	5	7	5	5
Density @15°C, kg/m^3		**844**	**828**	**803**	831	819	824	825	824	827	827
Viscosity @ 40°C, cSt	*	**6.44**	**4.14**	**2.17**	4.42	2.85	3.74	3.93	4.60	3.74	3.73
Cetane Index $_{2\ Variable}$	*	**59**	**53**	**45**	54	48	55	58	58	52	52
Cetane Index $_{4\ Variable}$		**64**	**54**	**45**	55	50	56	60	59	52	52
Cetane Number	*	**60**	**52**	**45**	53	50	52	57	56	52	51
Distillation, °C IBP		**211**	**172**	**138**	169	171	174	173	173	177	177
T_{10}		**251**	**212**	**181**	214	205	212	226	215	203	201
T_{20}		**261**	**225**	**188**	230	211	226	242	232	213	212
T_{50}	300 (max)	**290**	**260**	**212**	268	231	260	278	275	254	253
T_{90}	355 (max)	**345**	**321**	**269**	330	299	312	340	340	320	320
T_{95}	365 (max)	**360**	**338**	**286**	346	318	326	355	355	339	338
FBP		**366**	**348**	**301**	358	333	336	362	361	350	349
% FAME	1 (max)	**0**	**0**	**0**	0	0	0	0	0	0	0

* Various spec depend on grade, see tables.

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Solid Point ºC Max.	5	0	-10	-20	-35	-50
CFPP ºC Max.	8	4	-5	-14	-29	-44
Cetane Number Min.	51	51	51	49	47	47

Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Cetane Index Min.	46	46	46	46	43	43
Density @ 20°C, kg/m^3	810-850	810-850	810-850	790-840	790-840	790-840
Viscosity @ 20°C, cSt	3-8	3-8	2.5-8	2.5-8	1.8-7	1.8-7

Peoples Republic of China (continued)

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E01157-103-043	E01157-103-044	E01157-103-045
Cloud Point, °C		**3**	**-10**	**-34**	-1	-6	-8
CFPP, °C	*	**1**	**-13**	**-50**	-2	-5	-8
Pour Point, °C	*	**-3**	**-18**	**-45**	-13	-8	-10
HFRR, µm	460 (max)	**474**	**384**	**178**	363	447	425
Wax Content @ 10°C Below Cloud, wt%		**4.6**	**2.2**	**0.0**	4.6	3.4	3.4
Rancimat, hrs		**>30**	**>20**	**11**	19	>30	20
Sulphur, ppm	10 (max)	**638**	**46**	**2**	8	7	2
Density @15°C, kg/m^3		**844**	**828**	**803**	834	837	823
Viscosity @ 40°C, cSt	*	**6.44**	**4.14**	**2.17**	4.73	4.66	3.55
Cetane Index $_{2\ Variable}$	*	**59**	**53**	**45**	53	53	53
Cetane Index $_{4\ Variable}$		**64**	**54**	**45**	54	54	53
Cetane Number	*	**60**	**52**	**45**	52	53	55
Distillation, °C IBP		**211**	**172**	**138**	186	173	165
T_{10}		**251**	**212**	**181**	224	228	200
T_{20}		**261**	**225**	**188**	237	242	212
T_{50}	300 (max)	**290**	**260**	**212**	270	272	250
T_{90}	355 (max)	**345**	**321**	**269**	340	329	318
T_{95}	365 (max)	**360**	**338**	**286**	359	344	333
FBP		**366**	**348**	**301**	364	352	342
% FAME	1 (max)	**0**	**0**	**0**	0	0	0

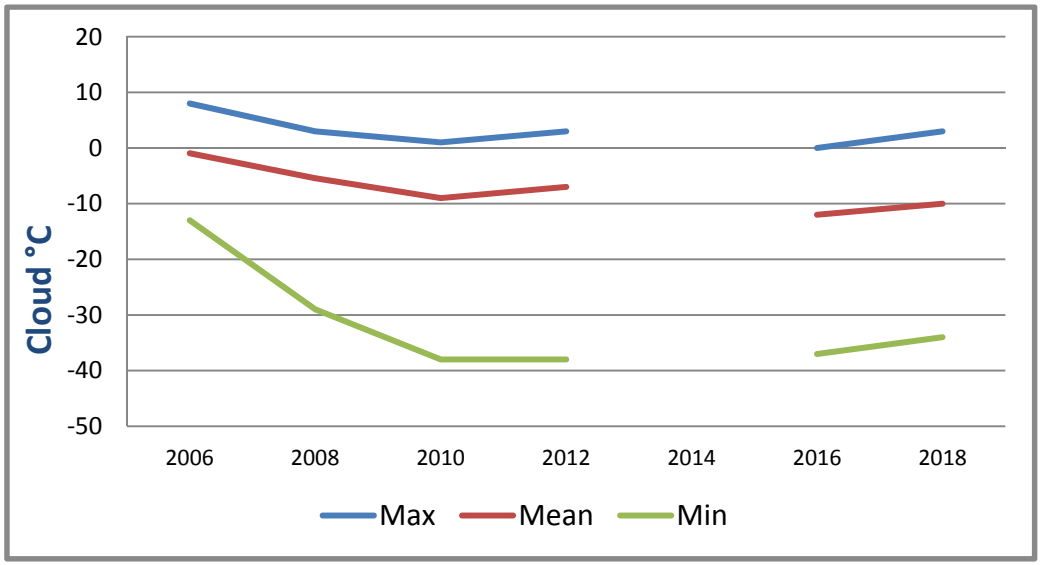
* Various spec depend on grade, see tables.

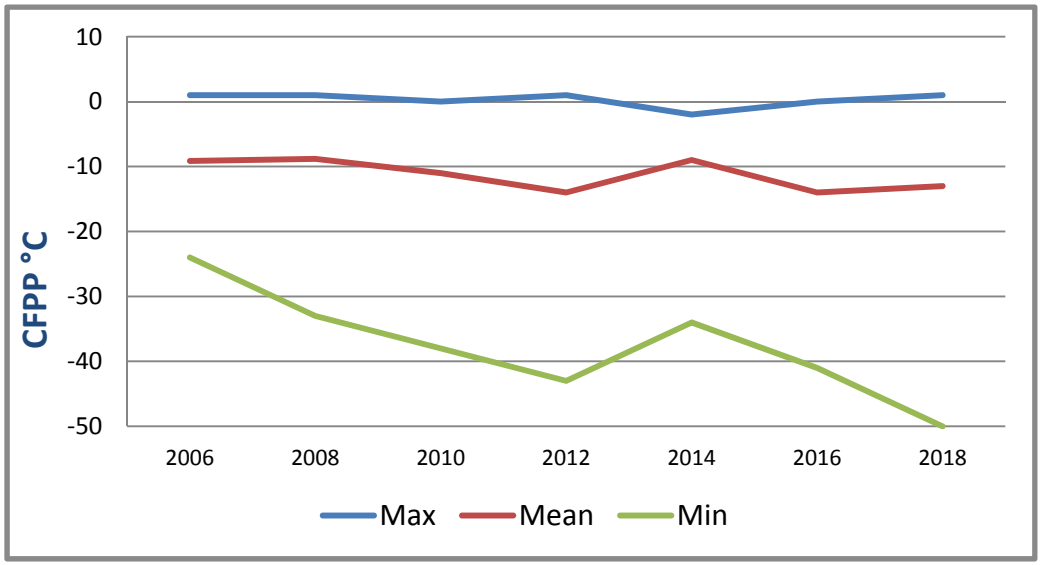
Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Solid Point °C Max.	5	0	-10	-20	-35	-50
CFPP °C Max.	8	4	-5	-14	-29	-44
Cetane Number Min.	51	51	51	49	47	47

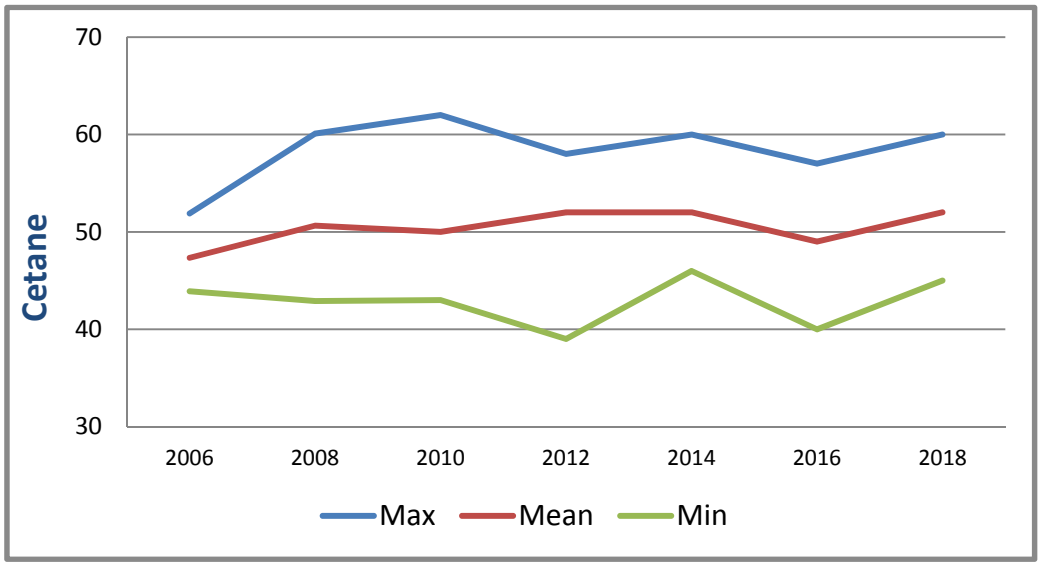
Grade	5°C	0°C	-10°C	-20°C	-35°C	-50°C
Cetane Index Min.	46	46	46	46	43	43
Density @ 20°C, kg/m^3	810-850	810-850	810-850	790-840	790-840	790-840
Viscosity @ 20°C, cSt	3-8	3-8	2.5-8	2.5-8	1.8-7	1.8-7

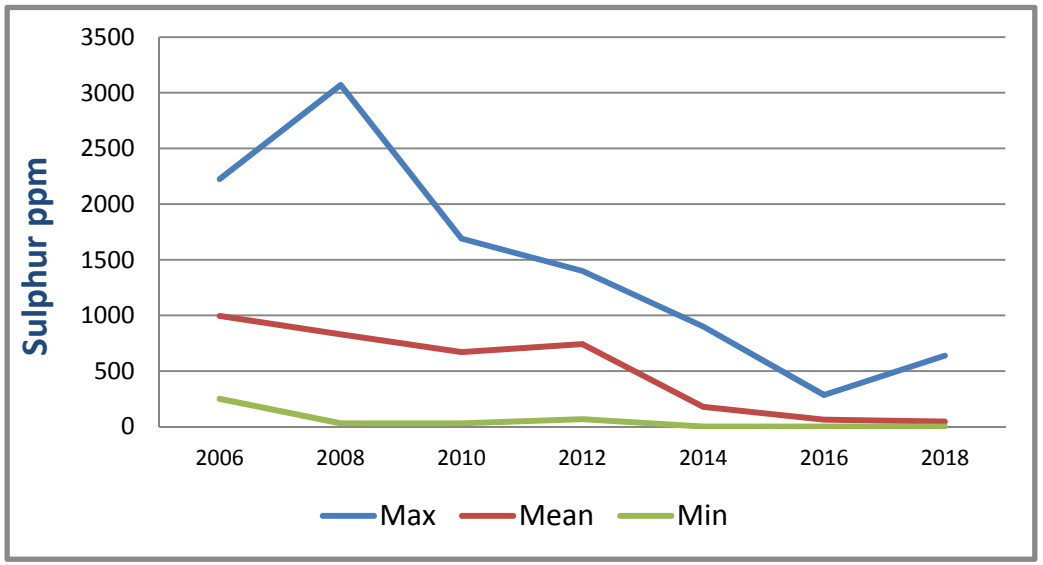
Peoples Republic of China

Asia Pacific









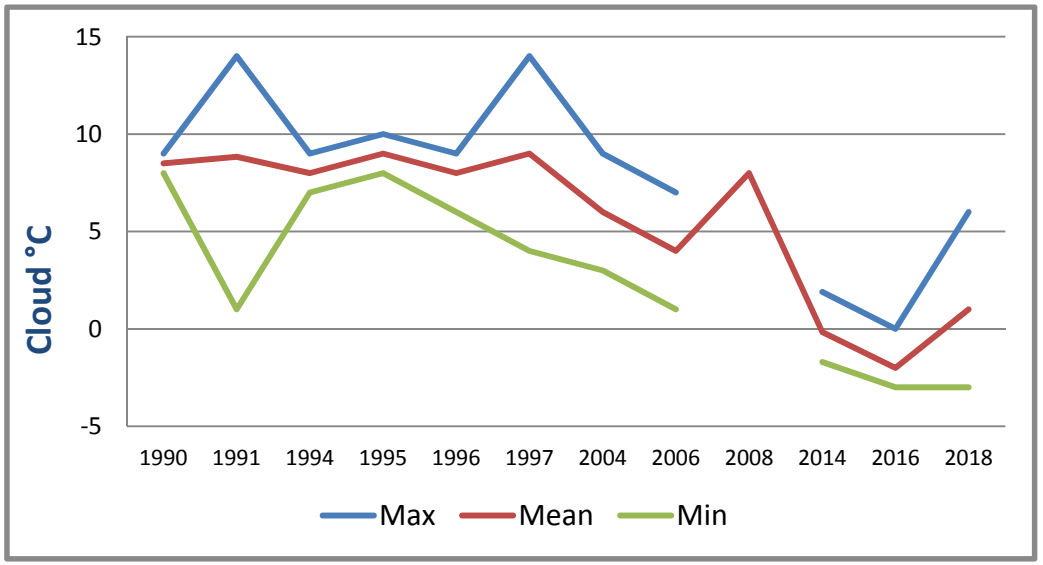
India

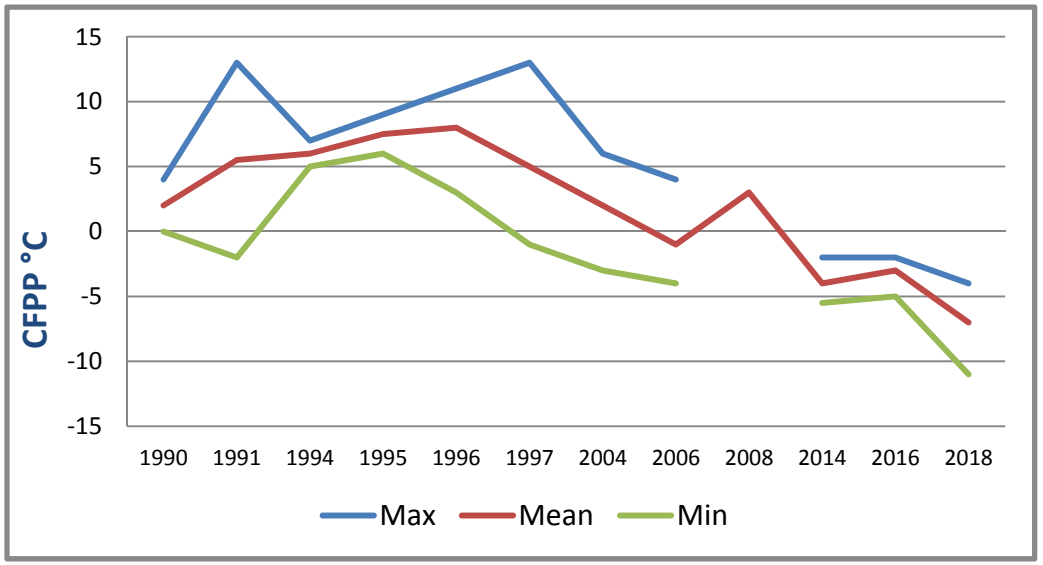
National standards and physical inspection data

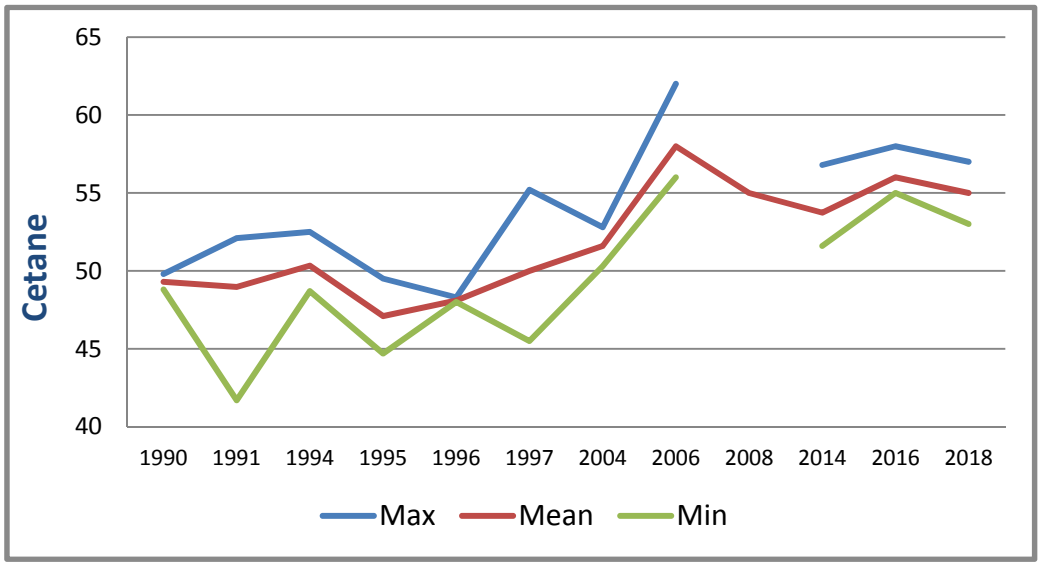
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800405	DIES 1800406	DIES 1800407
Cloud Point, °C		**6**	**1**	**-3**	-1	-3	6
CFPP, °C	6 (max)	**-4**	**-7**	**-11**	-6	-11	-4
Pour Point, °C	3 (max)	**-3**	**-10**	**-18**	-9	-18	-3
HFRR, µm	460 (max)	**460**	**445**	**417**	417	459	460
Wax Content @ 10°C Below Cloud, wt%		**3.4**	**2.4**	**1.4**	3.4	2.4	1.4
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30
Sulphur, ppm	50 (max)	**31**	**27**	**19**	31	19	30
Density @15°C, kg/m^3	820 - 845	**836**	**833**	**831**	836	832	831
Viscosity @ 40°C, cSt	2.0 - 4.5	**2.84**	**2.47**	**2.09**	2.84	2.09	2.49
Cetane Index $_{2\ Variable}$		**54**	**53**	**50**	54	54	50
Cetane Index $_{4\ Variable}$	46 (min)	**54**	**51**	**49**	54	52	49
Cetane Number	51 (min)	**57**	**55**	**53**	57	53	54
Distillation, °C IBP		**152**	**142**	**132**	152	132	143
T_{10}		**205**	**187**	**173**	205	181	173
T_{20}		**230**	**210**	**191**	230	210	191
T_{50}		**278**	**266**	**252**	278	267	252
T_{90}		**339**	**336**	**334**	336	339	334
T_{95}	360 (max)	**362**	**357**	**353**	353	362	356
FBP		**374**	**369**	**365**	365	374	366
% FAME	7 (max)	**0**	**0**	**0**	0	0	0

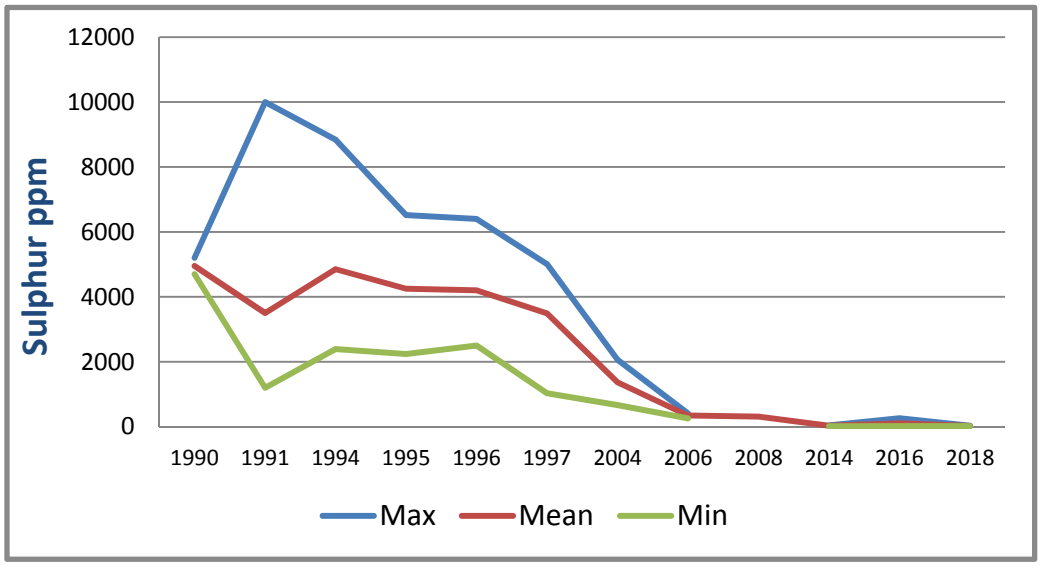
India

Asia Pacific









Indonesia

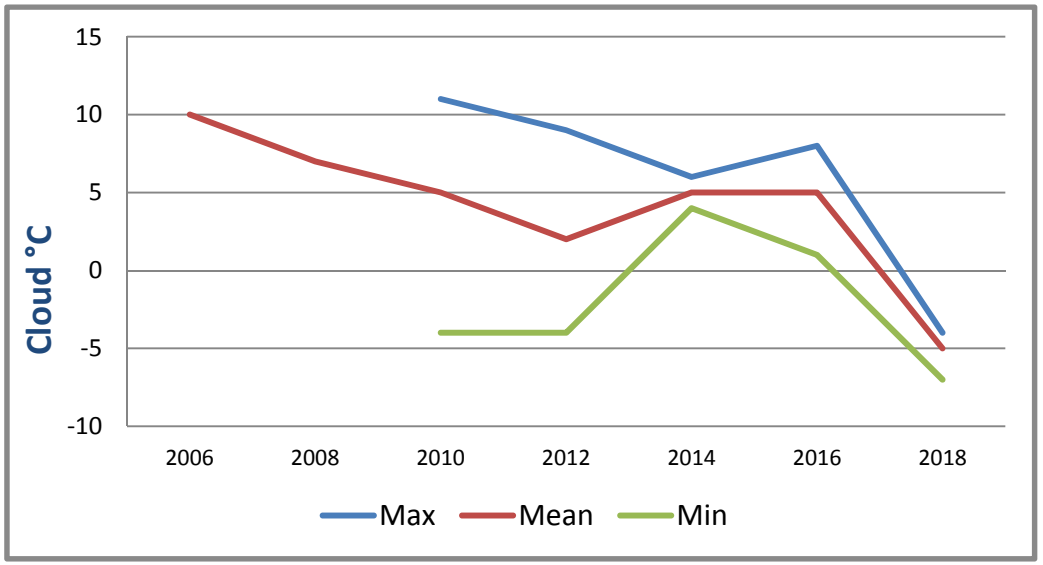
National standards and physical inspection data

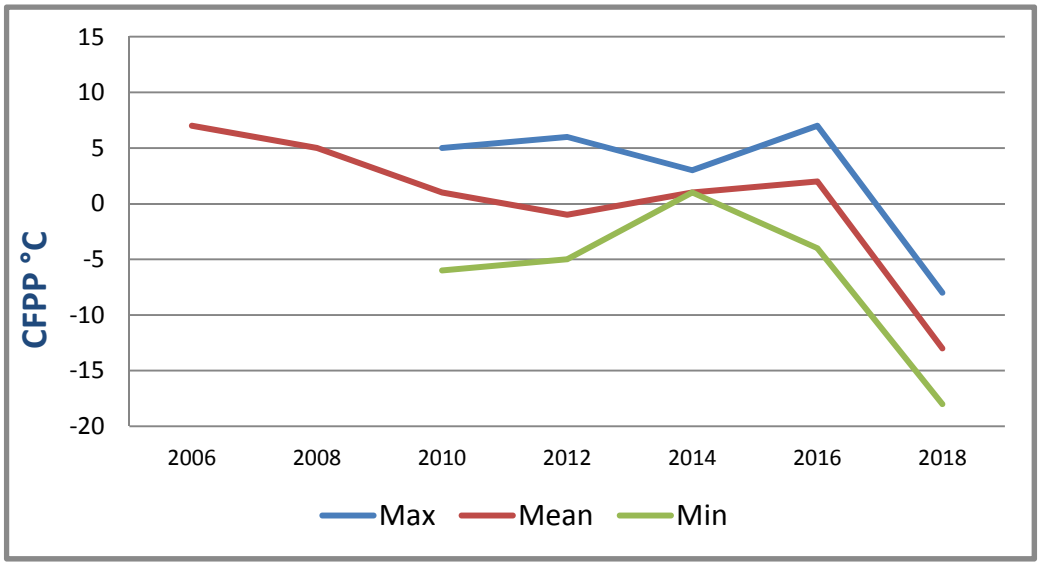
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800408	DIES 1800409	DIES 1800421
Cloud Point, °C		**-4**	**-5**	**-7**	-4	-5	-7
CFPP, °C		**-8**	**-13**	**-18**	not suitable for CFPP	-8	-18
Pour Point, °C	18 (max)	**-3**	**-11**	**-15**	-3	-15	-15
HFRR, µm	460 (max)*	**444**	**347**	**230**	230	444	369
Wax Content @ 10°C Below Cloud, wt%		**10.5**	**5.0**	**2.0**	10.5	2	2.5
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30
Sulphur, ppm	2500 (max)	**1550**	**528**	**3**	3	1550	30
Density @15°C, kg/m^3	815 - 860	**839**	**835**	**829**	839	829	837
Viscosity @ 40°C, cSt	2.0 - 4.5	**3.35**	**2.87**	**2.50**	3.35	2.50	2.76
Cetane Index 2 Variable		**55**	**53**	**52**	55	53	52
Cetane Index 4 Variable	45 (min)	**58**	**54**	**52**	58	52	52
Cetane Number	48 (min)	**61**	**55**	**52**	61	52	53
Distillation, °C IBP		**194**	**182**	**174**	194	174	177
T_{10}		**243**	**218**	**199**	243	199	212
T_{20}		**259**	**233**	**212**	259	212	228
T_{50}		**290**	**273**	**260**	290	260	268
T_{90}	370 (max)	**337**	**332**	**327**	327	337	333
T_{95}		**360**	**349**	**337**	337	360	350
FBP		**371**	**360**	**344**	344	371	363
% FAME	20	**18**	**6**	**0**	18	0	1

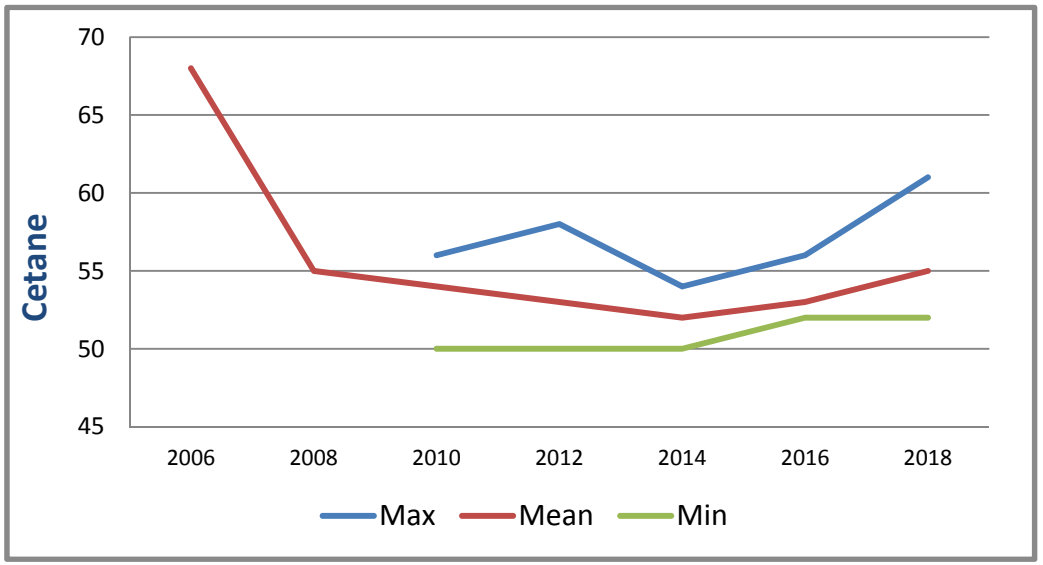
*Applies to diesel with actual sluphur levels of 500 ppm or below

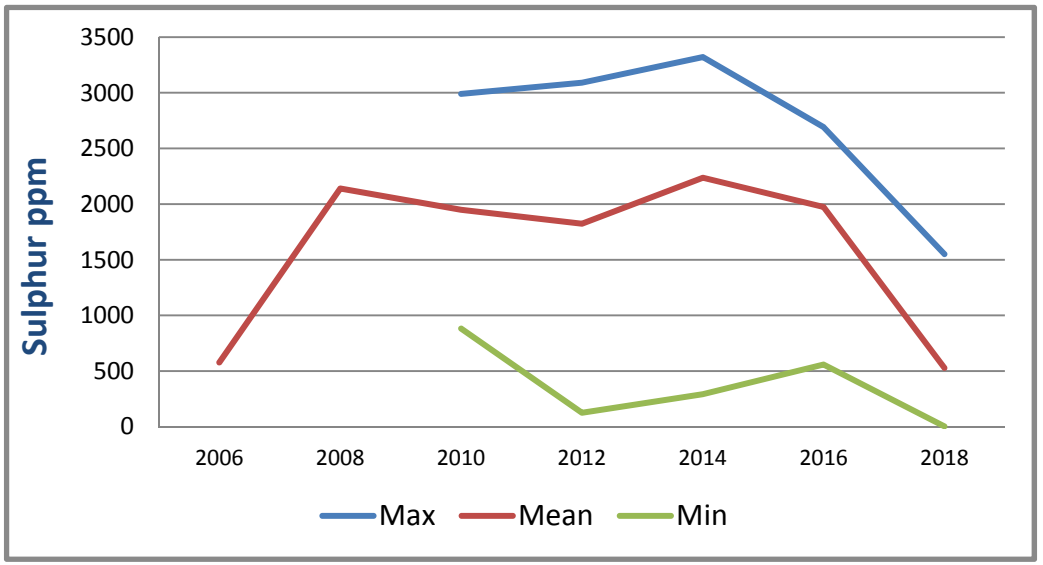
Indonesia

Asia Pacific









Japan – Grade 2

National standards and physical inspection data

Asia Pacific

	National Standard	Maximum Observed	Mean	Minimum Observed	E01106-104-10	E01106-104-11	E01106-104-12	E01106-104-13	E01106-104-15	E01106-104-16	E01106-104-17
Cloud Point, °C		**-1**	**-6**	**-12**	-5	-5	-8	-7	-3	-3	-5
CFPP, °C	-5 (max)	**-7**	**-12**	**-19**	-9	-13	-16	-10	-12	-12	-14
Pour Point, °C	-7.5 (max)	**-13**	**-20**	**-30**	-18	-18	-20	-20	-15	-15	-15
HFRR, µm		**469**	**391**	**284**	299	291	401	355	415	425	456
Wax Content @ 10°C Below Cloud, wt%		**2.4**	**1.0**	**0.0**	1.2	1.1	0.1	0.3	1.7	2.0	1.0
Rancimat, hrs		**-**	**-**	**-**	-	-	-	-	-	-	-
Sulphur, ppm	10 (max)	**9**	**8**	**6**	9	7	8	8	6	7	7
Density @15°C, kg/m^3	860 (max)	**847**	**832**	**821**	825	830	836	821	836	822	840
Viscosity @ 40°C, cSt	2.5 (min)	**3.84**	**2.93**	**2.29**	2.92	2.92	2.73	2.46	2.90	2.73	3.13
Cetane Index $_{2\ Variable}$		**59**	**55**	**53**	58	56	53	56	55	59	53
Cetane Index $_{4\ Variable}$	45 (min)	**59**	**56**	**53**	58	57	53	57	56	59	54
Cetane Number	45 (min)	**56**	**53**	**50**	55	53	50	54	53	56	51
Distillation, °C IBP		**195**	**172**	**154**	171	176	171	167	169	154	158
T_{10}		**248**	**215**	**188**	209	212	212	197	224	196	221
T_{20}		**262**	**236**	**206**	232	233	232	216	247	224	243
T_{50}		**290**	**277**	**258**	276	278	272	264	283	279	281
T_{90}	350 (max)	**342**	**330**	**314**	332	335	324	327	333	332	337
T_{95}		**357**	**344**	**327**	347	349	340	346	347	345	355
FBP		**370**	**358**	**340**	361	363	357	365	361	356	370
% FAME		**0**	**0**	**0**	0	0	0	0	0	0	0

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

Japan – Grade 2 (continued)

Asia Pacific

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	E01106-104-18	E01106-104-19	E01106-104-20	E01106-104-21	E01106-104-22	E01106-104-23	E01106-104-24
Cloud Point, °C		**-1**	**-6**	**-12**	-4	-5	-5	-2	-1	-2	-12
CFPP, °C	-5 (max)	**-7**	**-12**	**-19**	-15	-7	-8	-8	-13	-13	-10
Pour Point, °C	-7.5 (max)	**-13**	**-20**	**-30**	-20	-13	-20	-28	-18	-18	-15
HFRR, µm		**469**	**391**	**284**	371	388	424	463	418	430	469
Wax Content @ 10°C Below Cloud, wt%		**2.4**	**1.0**	**0.0**	1.0	1.8	1.1	2.1	2.4	1.6	0.0
Rancimat, hrs		**-**	**-**	**-**	-	-	-	-	-	-	-
Sulphur, ppm	10 (max)	**9**	**8**	**6**	6	8	6	7	7	6	6
Density @15°C, kg/m^3	860 (max)	**847**	**832**	**821**	840	831	830	827	829	838	824
Viscosity @ 40°C, cSt	2.5 (min)	**3.84**	**2.93**	**2.29**	3.17	3.21	2.80	2.90	3.20	3.29	2.66
Cetane Index $_{2\ Variable}$		**59**	**55**	**53**	53	57	55	58	58	54	55
Cetane Index $_{4\ Variable}$	45 (min)	**59**	**56**	**53**	54	59	55	58	58	54	57
Cetane Number	45 (min)	**56**	**53**	**50**	51	56	53	56	56	52	54
Distillation, °C IBP		**195**	**172**	**154**	167	166	167	157	157	172	181
T_{10}		**248**	**215**	**188**	222	228	204	197	205	218	221
T_{20}		**262**	**236**	**206**	244	251	226	227	233	241	236
T_{50}		**290**	**277**	**258**	281	286	273	284	286	283	262
T_{90}	350 (max)	**342**	**330**	**314**	337	332	332	333	341	342	314
T_{95}		**357**	**344**	**327**	354	345	347	346	356	357	327
FBP		**370**	**358**	**340**	370	358	359	359	367	369	340
% FAME		**0**	**0**	**0**	0	0	0	0	0	0	0

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

Japan – Grade 2 (continued)

Asia Pacific

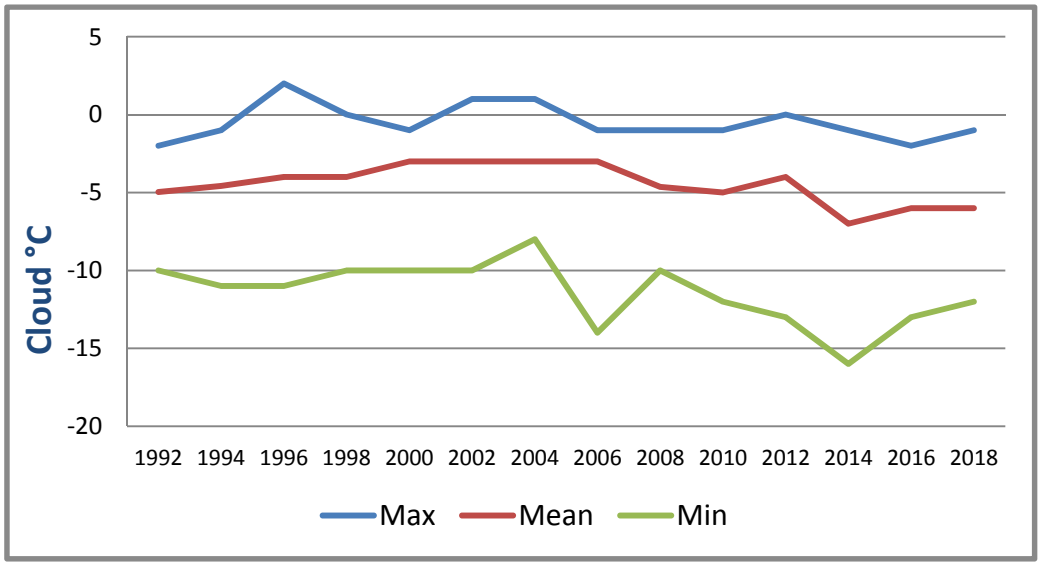
National standards and physical inspection data

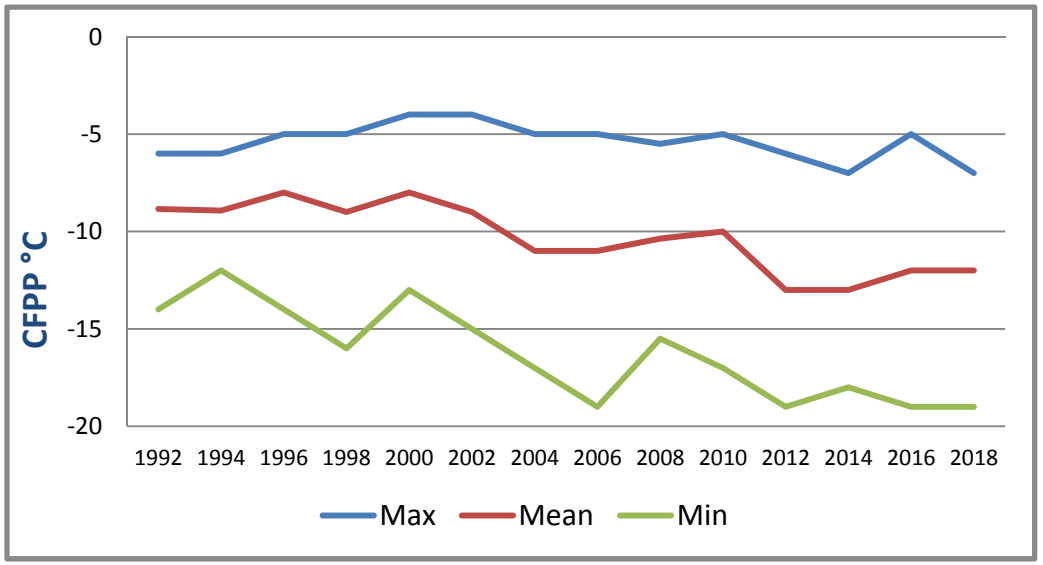
	National Standard	Maximum Observed	Mean	Minimum Observed	E01106-104-3	E01106-104-4	E01106-104-5	E01106-104-6	E01106-104-7	E01106-104-8	E01106-104-9
Cloud Point, °C		**-1**	**-6**	**-12**	-5	-6	-12	-6	-8	-11	-11
CFPP, °C	-5 (max)	**-7**	**-12**	**-19**	-16	-9	-11	-16	-19	-10	-11
Pour Point, °C	-7.5 (max)	**-13**	**-20**	**-30**	-30	-25	-13	-25	-20	-30	-28
HFRR, µm		**469**	**391**	**284**	437	357	284	339	390	379	426
Wax Content @ 10°C Below Cloud, wt%		**2.4**	**1.0**	**0.0**	1.2	1.3	0.0	1.2	0.1	0.0	0.0
Rancimat, hrs		**-**	**-**	**-**	-	-	-	-	-	-	-
Sulphur, ppm	10 (max)	**9**	**8**	**6**	7	9	9	9	8	9	9
Density @15°C, kg/m^3	860 (max)	**847**	**832**	**821**	847	836	835	824	825	834	832
Viscosity @ 40°C, cSt	2.5 (min)	**3.84**	**2.93**	**2.29**	3.84	2.85	3.07	2.69	2.29	2.96	2.92
Cetane Index $_{2\ Variable}$		**59**	**55**	**53**	53	55	53	59	54	54	55
Cetane Index $_{4\ Variable}$	45 (min)	**59**	**56**	**53**	55	56	53	59	53	56	57
Cetane Number	45 (min)	**56**	**53**	**50**	52	55	54	51	51	53	54
Distillation, °C IBP		**195**	**172**	**154**	195	181	185	167	161	192	190
T_{10}		**248**	**215**	**188**	248	226	220	203	188	235	232
T_{20}		**262**	**236**	**206**	262	245	235	229	206	248	246
T_{50}		**290**	**277**	**258**	290	281	269	281	258	275	274
T_{90}	350 (max)	**342**	**330**	**314**	336	330	316	332	326	318	319
T_{95}		**357**	**344**	**327**	349	343	328	346	344	329	331
FBP		**370**	**358**	**340**	362	358	345	356	363	340	344
% FAME		**0**	**0**	**0**	0	0	0	0	0	0	0

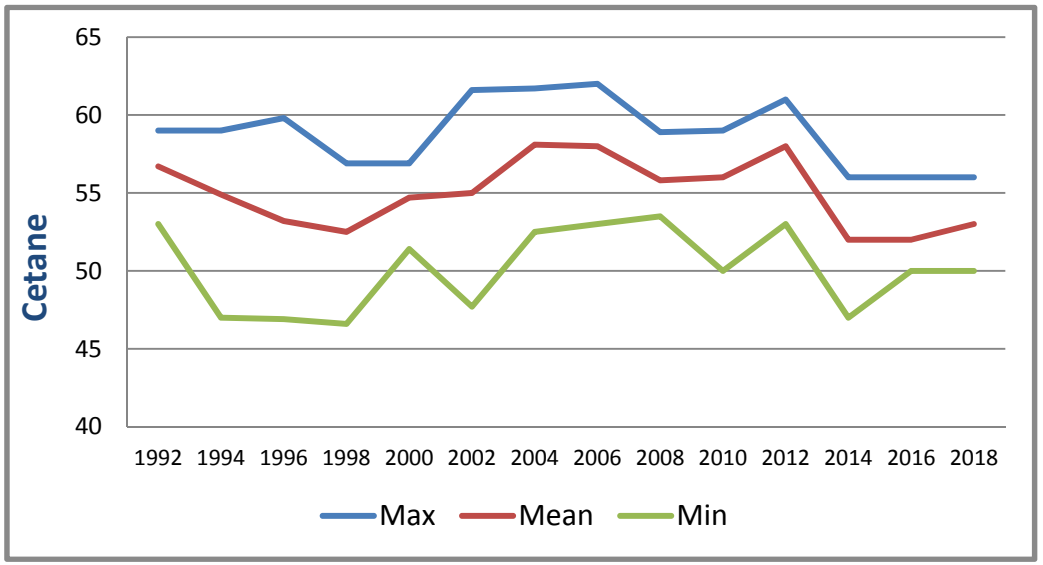
*Pour point measured at 2.5°C intervals (Japanese Industry Standard).

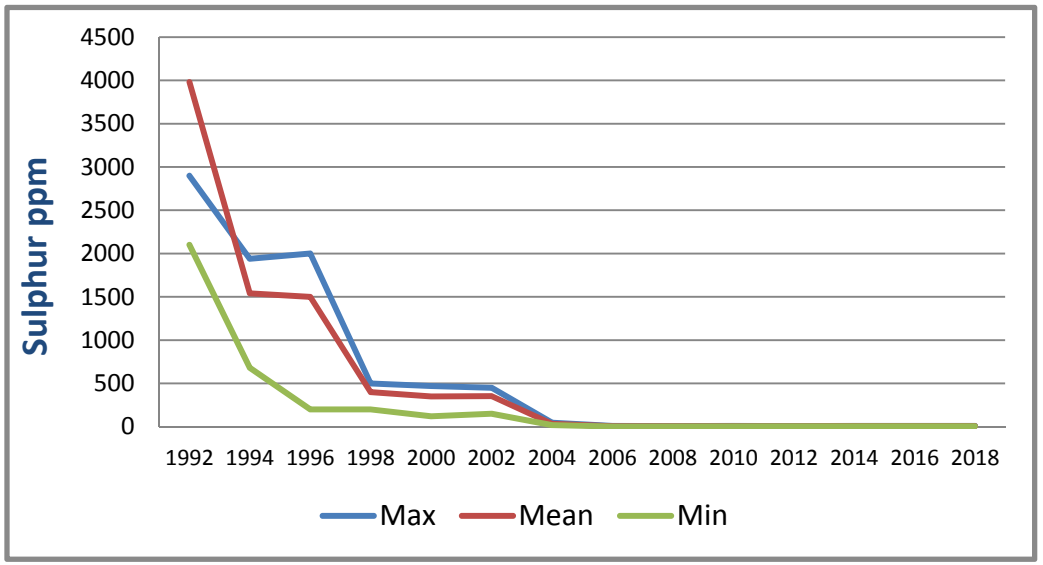
Japan – Grade 2

Asia Pacific









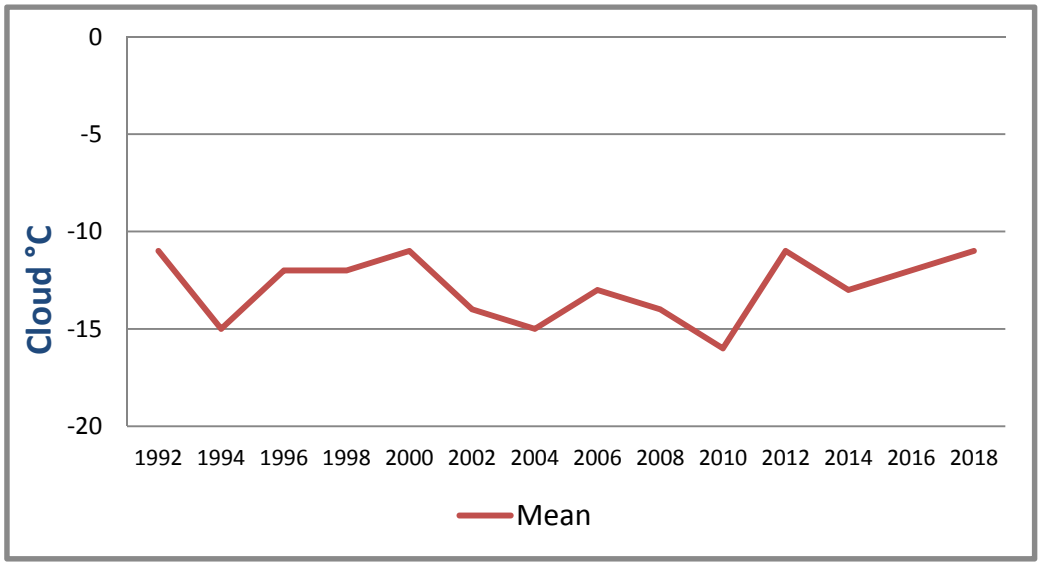
Japan – Grade 3

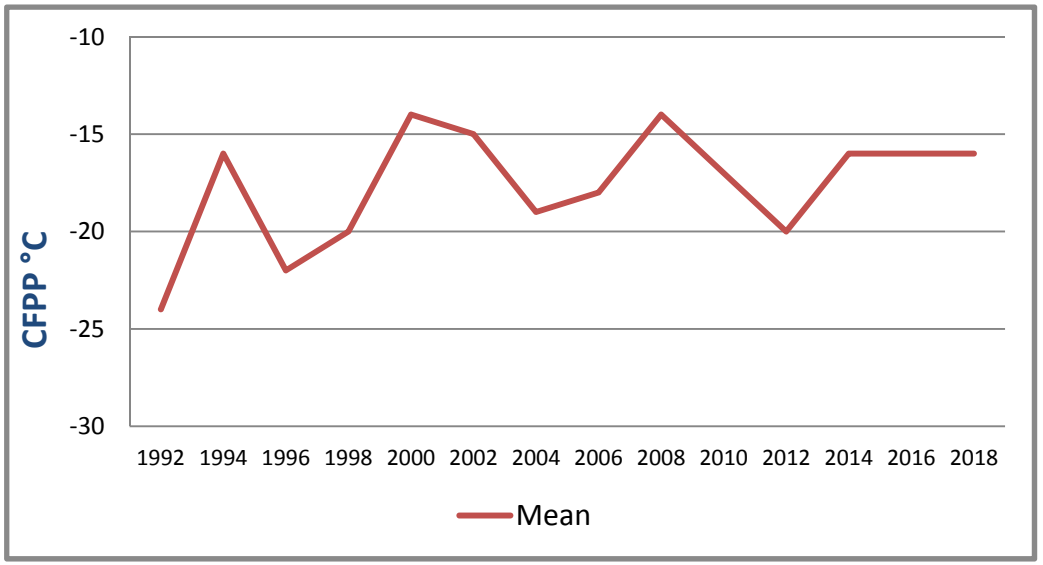
National standards and physical inspection data

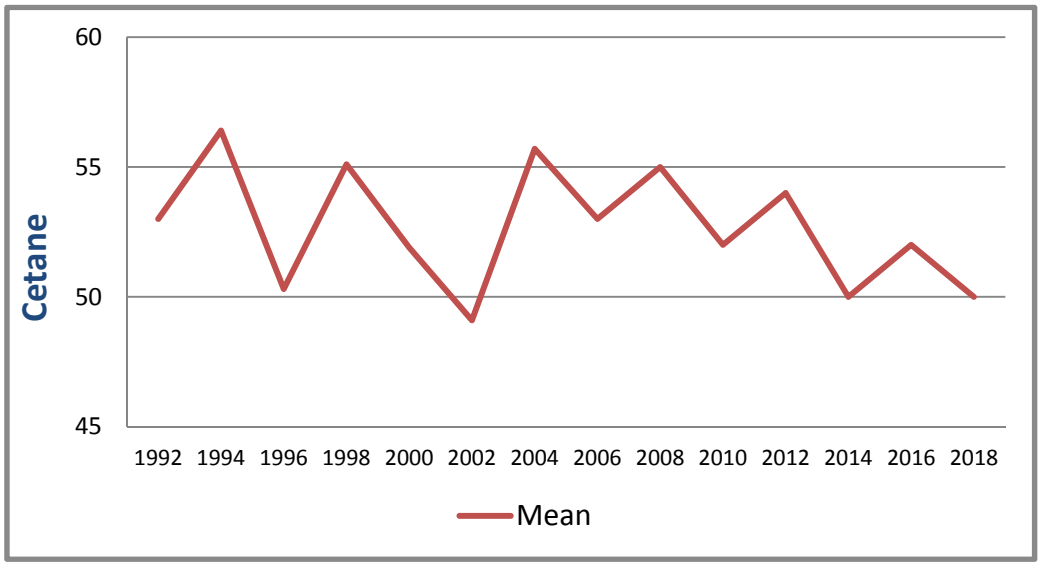
	National Standard	Maximum Observed	Mean	Minimum Observed	E01106-104-2
Cloud Point, °C			**-11**		-11
CFPP, °C	-12 (max)		**-16**		-16
Pour Point, °C	-20 (max)		**-25**		-25
HFRR, µm			**469**		469
Wax Content @ 10°C Below Cloud, wt%			**1.9**		1.9
Rancimat, hrs			**-**		-
Sulphur, ppm	10 (max)		**7**		7
Density @15°C, kg/m^3	860 (max)		**827**		827
Viscosity @ 40°C, cSt	2 (min)		**2.30**		2.30
Cetane Index $_{2\ Variable}$			**53**		53
Cetane Index $_{4\ Variable}$	45 (min)		**52**		52
Cetane Number	45 (min)		**50**		50
Distillation, °C IBP			**157**		157
T_{10}			**189**		189
T_{20}			**207**		207
T_{50}			**259**		259
T_{90}	330 (max)		**320**		320
T_{95}			**334**		334
FBP			**351**		351
% FAME			**0**		0

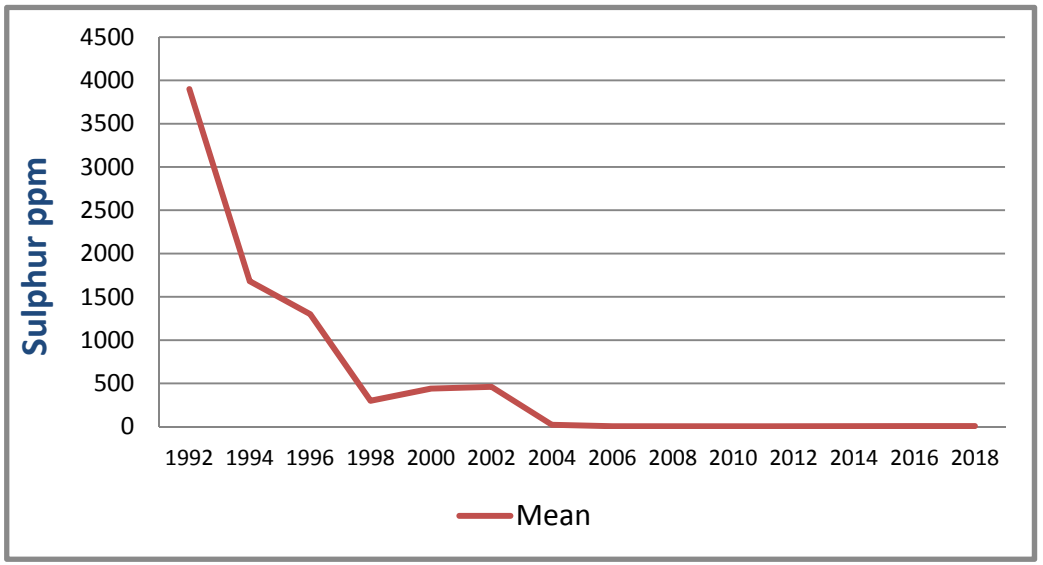
Japan – Grade 3

Asia Pacific









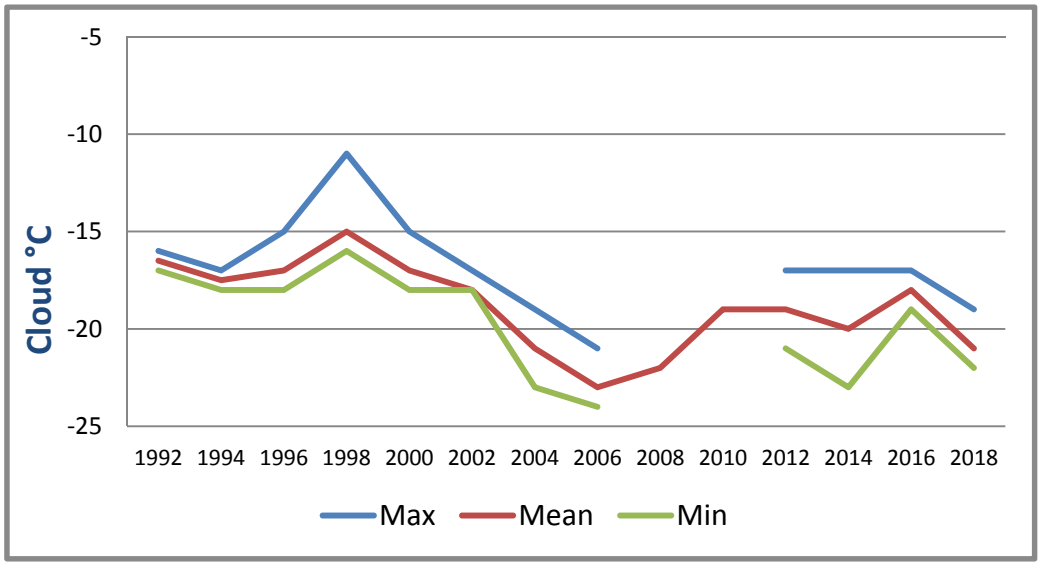
Japan – Special Grade 3

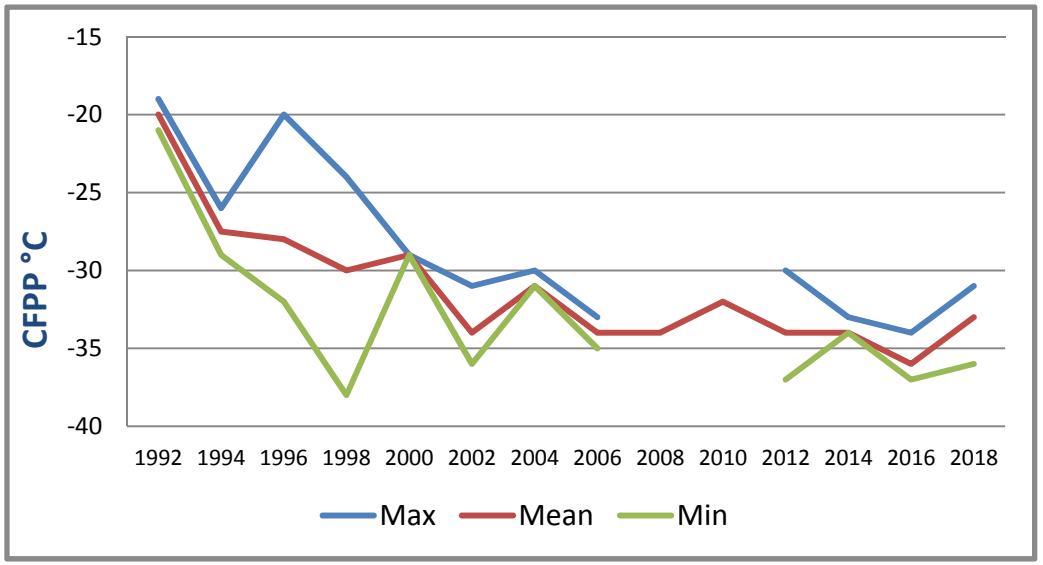
National standards and physical inspection data

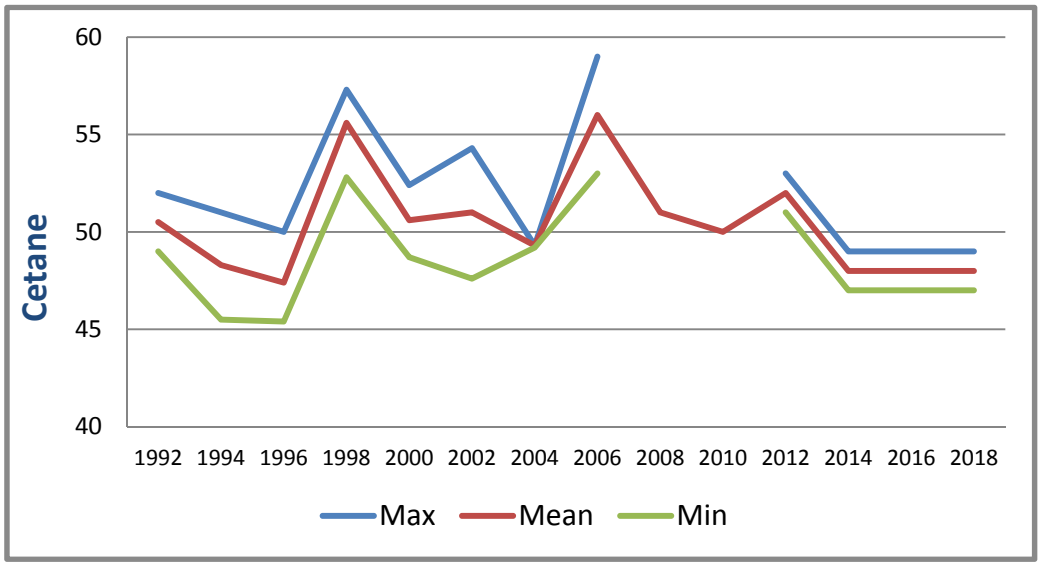
	National Standard	Maximum Observed	Mean	Minimum Observed	E01106-104-1	E01106-104-14
Cloud Point, °C		**-19**	**-21**	**-22**	-22	-19
CFPP, °C	-19 (max)	**-31**	**-33**	**-36**	-31	-36
Pour Point, °C	-30 (max)	**-38**	**-40**	**-43**	-38	-43
HFRR, µm		**424**	**406**	**388**	388	424
Wax Content @ 10°C Below Cloud, wt%		**1.1**	**1.0**	**0.8**	0.8	1.1
Rancimat, hrs		**-**	**-**	**-**	-	-
Sulphur, ppm	10 (max)	**8**	**7**	**6**	8	6
Density @15°C, kg/m^3	860 (max)	**814**	**811**	**808**	808	814
Viscosity @ 40°C, cSt	1.7 (min)	**1.90**	**1.74**	**1.58**	1.58	1.90
Cetane Index $_{2\ Variable}$		**52**	**50**	**48**	48	52
Cetane Index $_{4\ Variable}$	45 (min)	**51**	**50**	**49**	49	51
Cetane Number	45 (min)	**49**	**48**	**47**	47	49
Distillation, °C IBP		**156**	**155**	**153**	153	156
T_{10}		**176**	**176**	**175**	175	176
T_{20}		**189**	**187**	**185**	185	189
T_{50}		**235**	**226**	**218**	218	235
T_{90}	330 (max)	**323**	**308**	**293**	293	323
T_{95}		**341**	**328**	**316**	316	341
FBP		**356**	**346**	**337**	337	356
% FAME		**0**	**0**	**0**	0	0

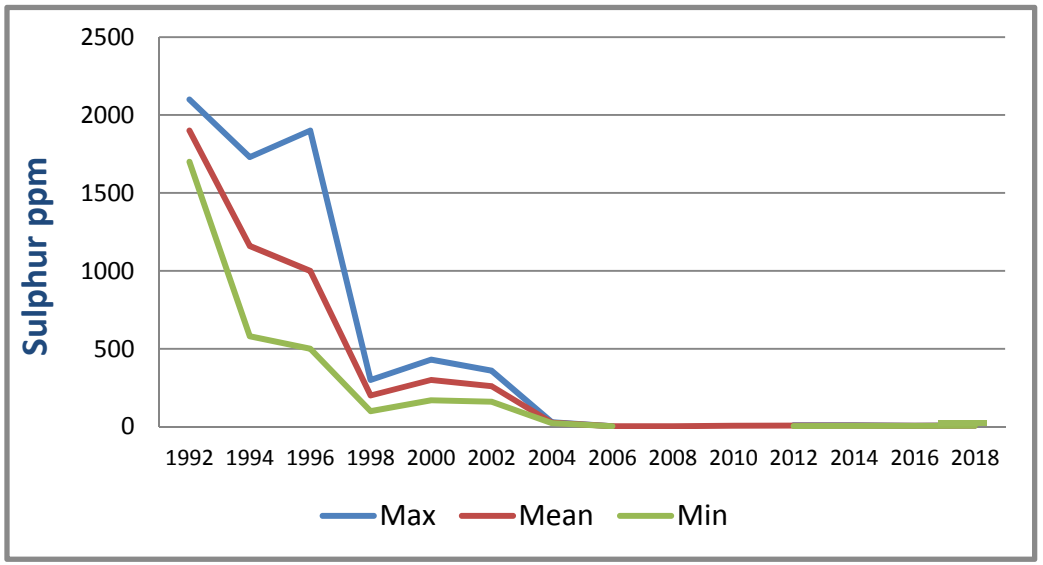
Japan – Special Grade 3

Asia Pacific









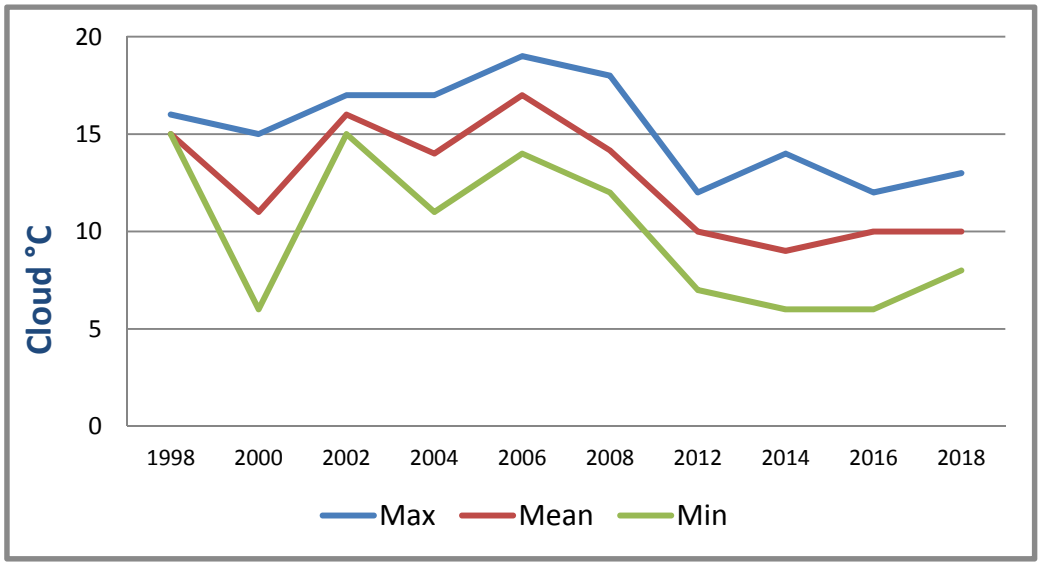
Malaysia

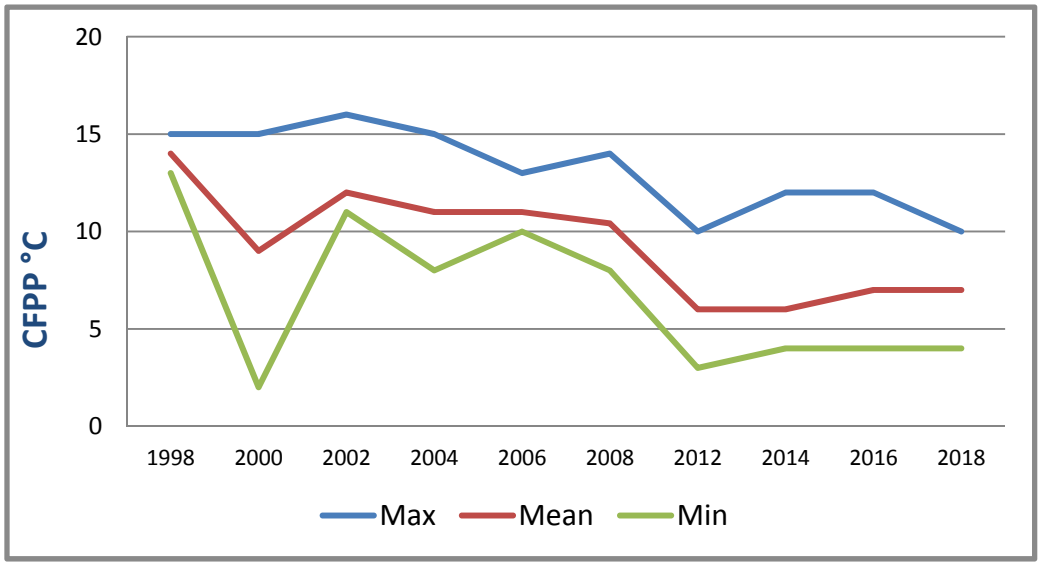
National standards and physical inspection data

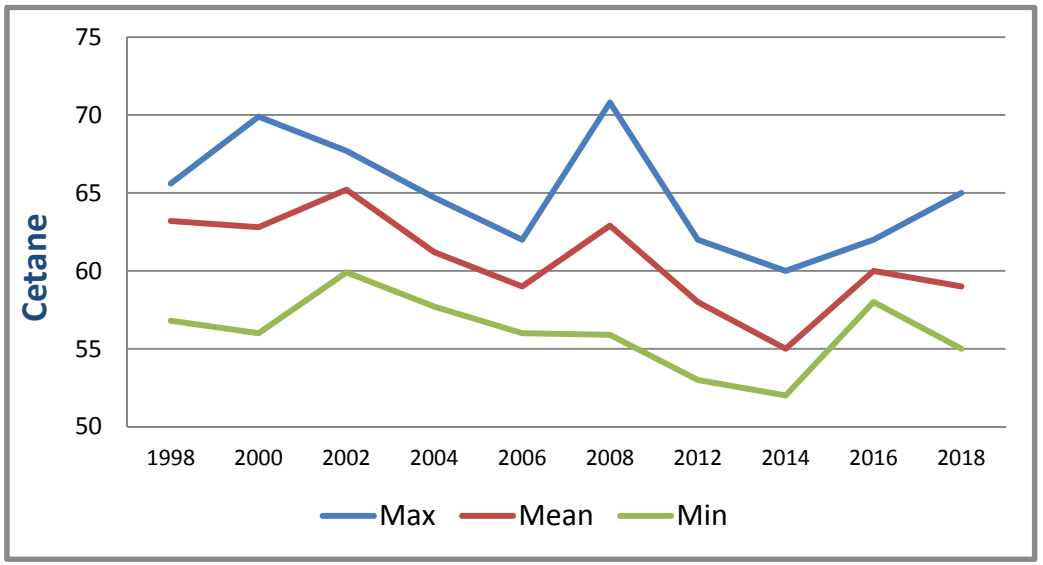
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800511	DIES 1800513	DIES 1800516
Cloud Point, °C	19 (max)	**13**	**10**	**8**	13	8	10
CFPP, °C		**10**	**7**	**4**	10	4	7
Pour Point, °C		**9**	**6**	**3**	9	3	6
HFRR, µm	460 (max)	**244**	**237**	**229**	244	229	238
Wax Content @ 10°C Below Cloud, wt%		**6.7**	**5.2**	**4.0**	6.7	4.9	4
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30
Sulphur, ppm	500 (max)	**363**	**278**	**185**	287	363	185
Density @15°C, kg/m^3	810 - 870	**854**	**844**	**828**	828	854	850
Viscosity @ 40°C, cSt	1.5 - 5.8	**3.81**	**3.41**	**3.12**	3.12	3.81	3.29
Cetane Index $_{2\ Variable}$		**58**	**53**	**50**	58	51	50
Cetane Index $_{4\ Variable}$	49 (min)	**60**	**54**	**50**	60	53	50
Cetane Number	49 (min)	**65**	**59**	**55**	65	58	55
Distillation, °C IBP		**195**	**188**	**181**	189	195	181
T_{10}		**249**	**234**	**225**	228	249	225
T_{20}		**264**	**250**	**242**	245	264	242
T_{50}		**293**	**286**	**282**	283	293	282
T_{90}		**350**	**348**	**346**	348	346	350
T_{95}	370 (max)	**371**	**367**	**363**	367	363	371
FBP		**381**	**377**	**372**	378	372	381
% FAME	6.8 - 7	**7**	**7**	**7**	7	7	7

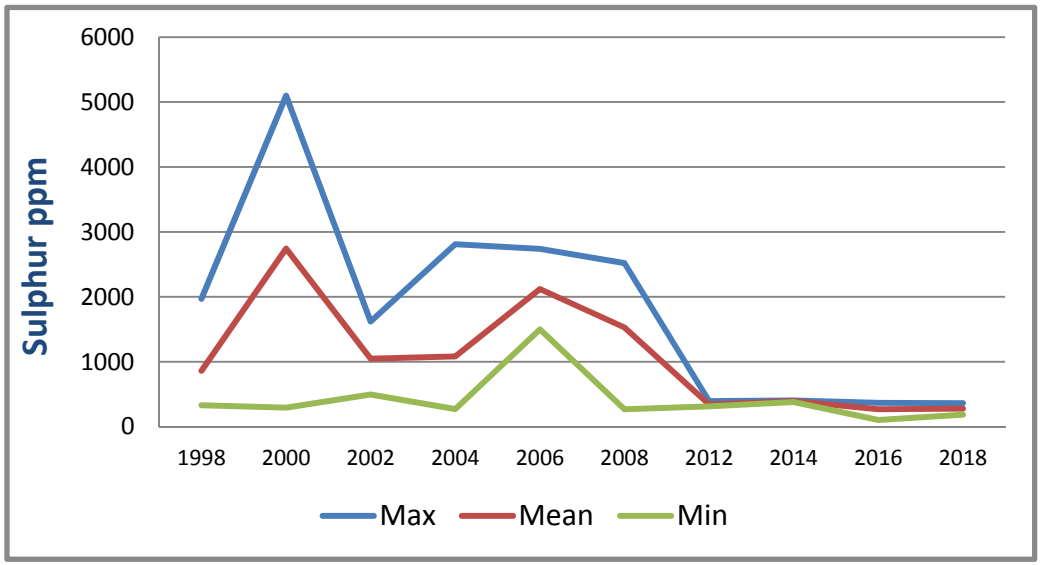
Malaysia

Asia Pacific









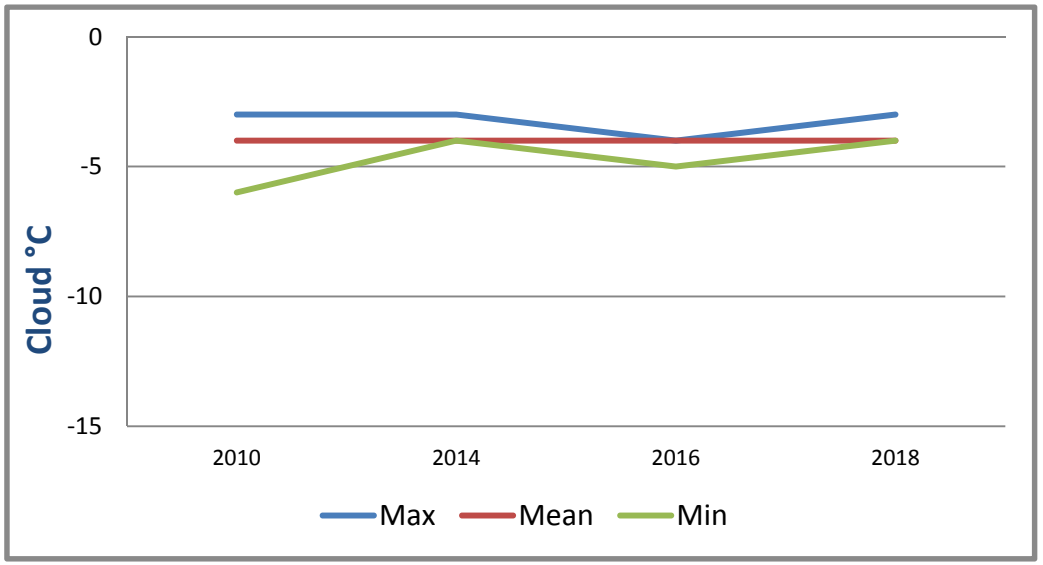
New Zealand

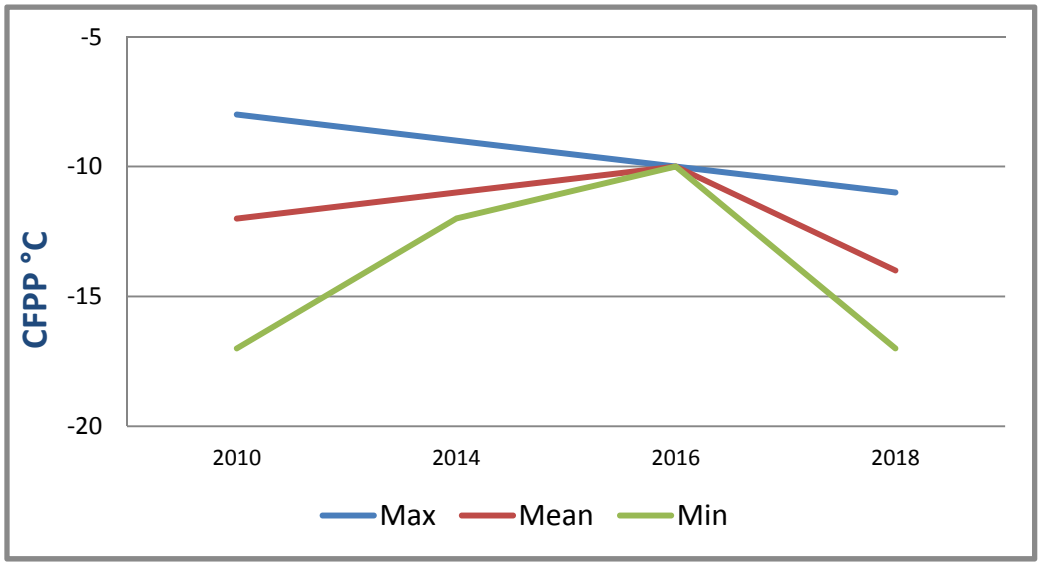
National standards and physical inspection data

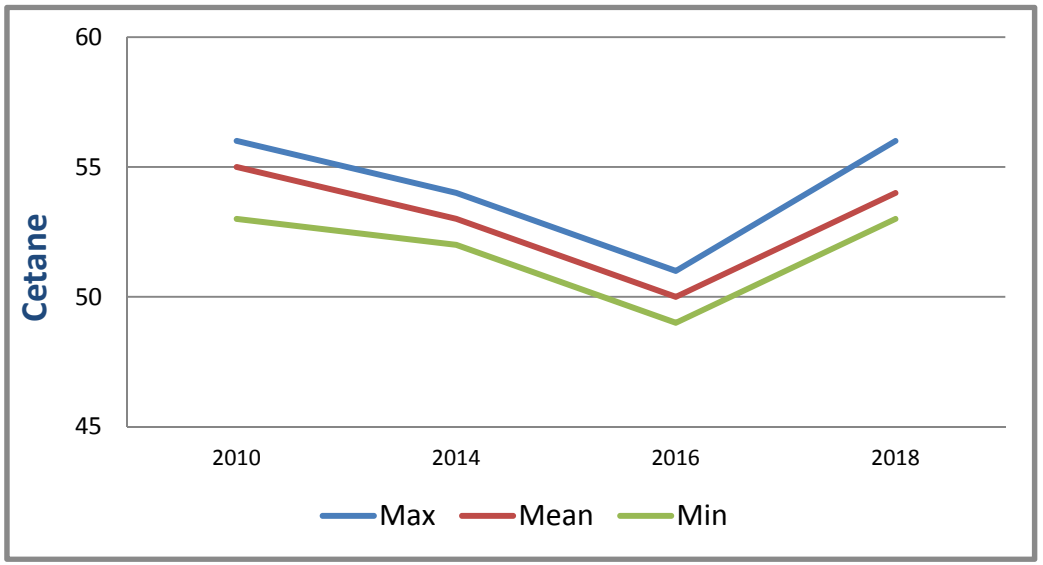
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1706016	DIES 1706017
Cloud Point, °C	2 (max)	**-3**	**-4**	**-4**	-4	-3
CFPP, °C		**-11**	**-14**	**-17**	-11	-17
Pour Point, °C		**-12**	**-18**	**-24**	-12	-24
HFRR, µm	460 (max)	**463**	**413**	**362**	463	362
Wax Content @ 10°C Below Cloud, wt%		**3.7**	**3.3**	**2.8**	2.8	3.7
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	10 (max)	**8**	**8**	**7**	8	7
Density @15°C, kg/m^3	820 - 850	**843**	**841**	**838**	843	838
Viscosity @ 40°C, cSt	2.0 - 4.5	**3.76**	**3.68**	**3.61**	3.76	3.61
Cetane Index $_{2\ Variable}$		**55**	**54**	**53**	53	55
Cetane Index $_{4\ Variable}$	47 (min)	**58**	**57**	**56**	56	58
Cetane Number	51 (min)	**56**	**54**	**53**	53	56
Distillation, °C IBP		**204**	**201**	**198**	198	204
T_{10}		**245**	**244**	**243**	243	245
T_{20}		**258**	**258**	**257**	257	258
T_{50}		**287**	**287**	**286**	287	286
T_{90}		**342**	**339**	**337**	342	337
T_{95}	360 (max)	**358**	**355**	**353**	358	353
FBP		**366**	**363**	**359**	366	359
% FAME	7 (max)	**0**	**0**	**0**	0	0

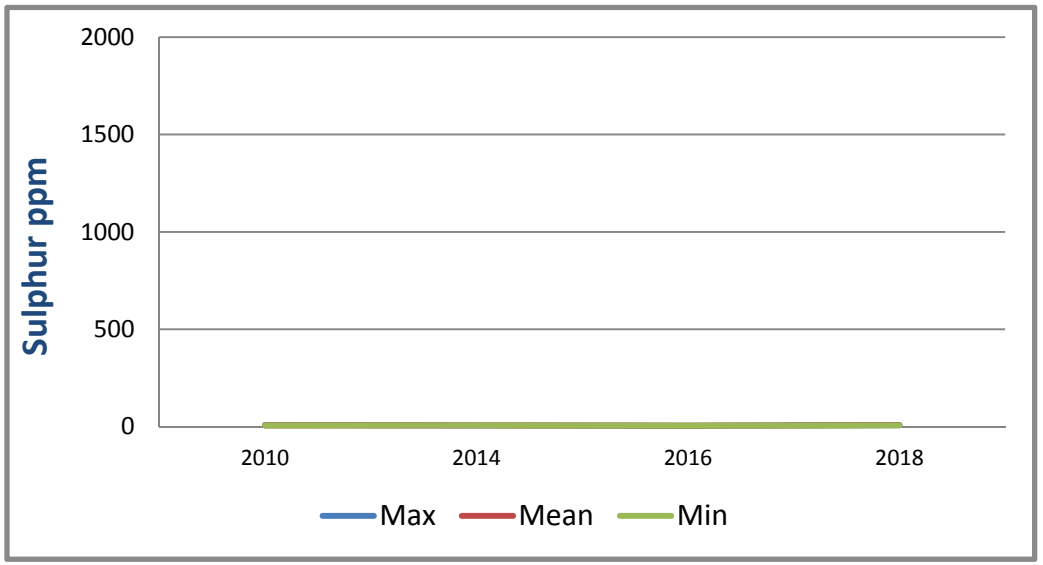
New Zealand

Asia Pacific









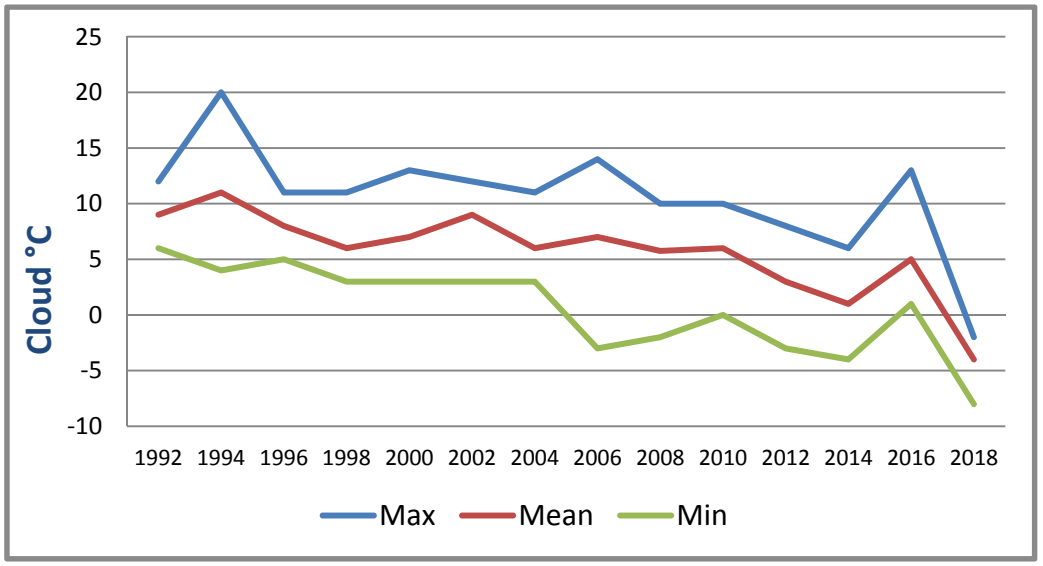
Singapore

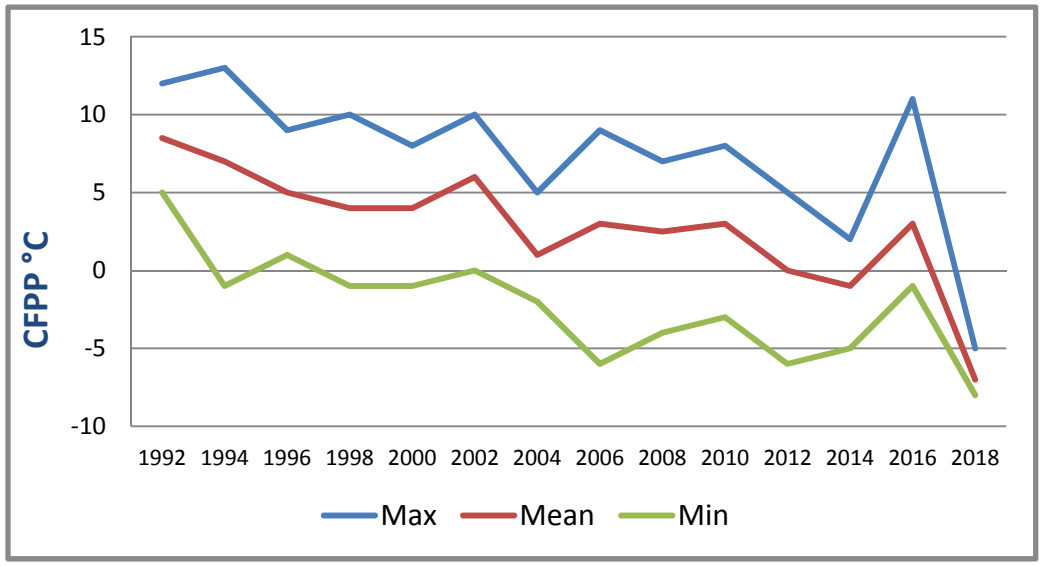
National standards and physical inspection data

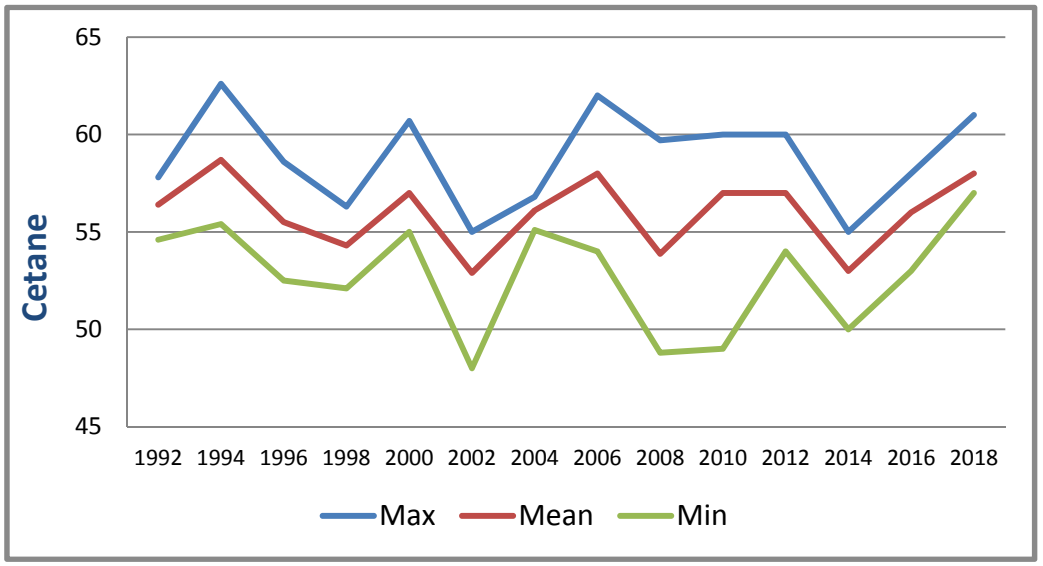
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800433	DIES 1800435	DIES 1800437	DIES 1800438
Cloud Point, °C		**-2**	**-4**	**-8**	-3	-2	-2	-8
CFPP, °C		**-5**	**-7**	**-8**	-5	-6	-8	-8
Pour Point, °C		**-6**	**-8**	**-9**	-9	-9	-6	-9
HFRR, µm		**404**	**361**	**308**	404	308	356	375
Wax Content @ 10°C Below Cloud, wt%		**5.8**	**4.0**	**3.2**	3.2	3.8	3.2	5.8
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**7**	**6**	**4**	4	7	5	6
Density @15°C, kg/m^3	845 (max)	**838**	**833**	**831**	831	838	832	831
Viscosity @ 40°C, cSt		**3.52**	**3.26**	**3.10**	3.23	3.52	3.21	3.10
Cetane Index $_{2\ Variable}$		**58**	**57**	**55**	58	55	57	56
Cetane Index $_{4\ Variable}$		**59**	**58**	**58**	59	58	58	58
Cetane Number	51.0	**61**	**58**	**57**	58	57	57	61
Distillation, °C IBP		**195**	**184**	**178**	178	195	178	185
T_{10}		**238**	**229**	**224**	224	238	224	231
T_{20}		**254**	**247**	**243**	244	254	243	248
T_{50}		**289**	**285**	**280**	287	289	285	280
T_{90}		**347**	**340**	**326**	347	343	345	326
T_{95}	361 (max)	**362**	**357**	**343**	362	360	361	343
FBP		**367**	**361**	**347**	367	364	365	347
% FAME		**0**	**0**	**0**	0	0	0	0

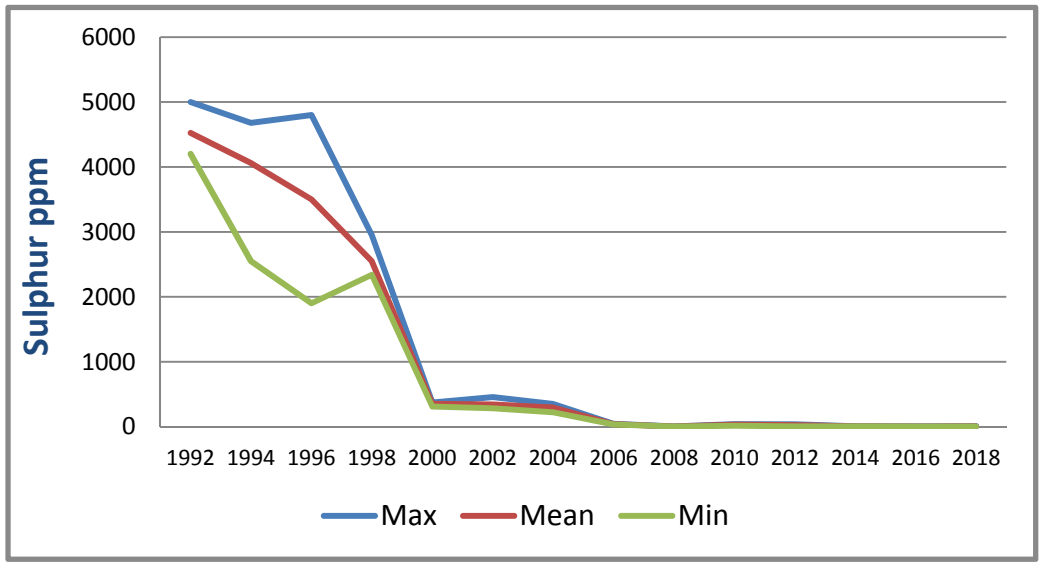
Singapore

Asia Pacific









South Korea

Asia Pacific

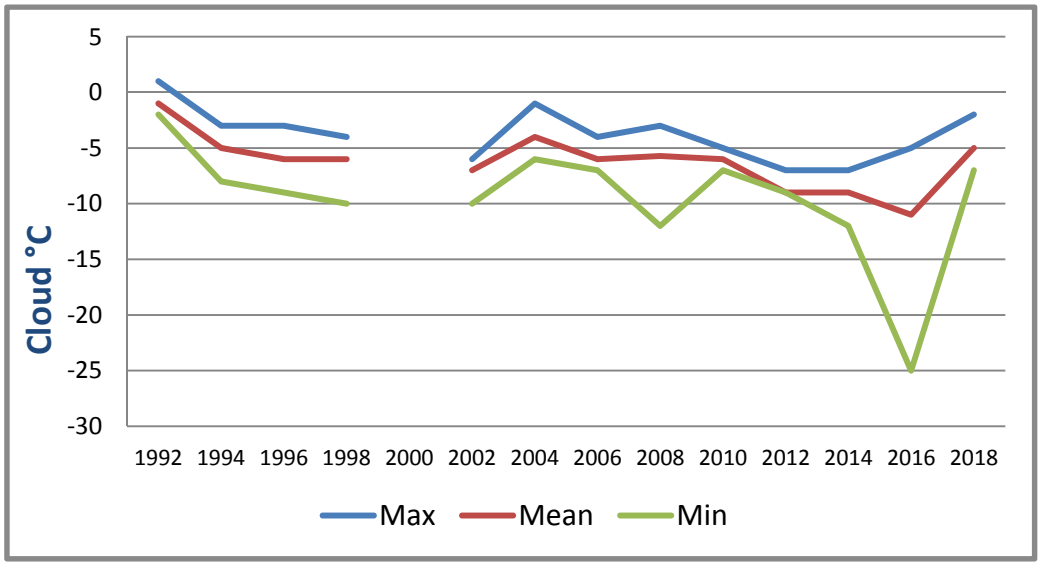
National standards and physical inspection data

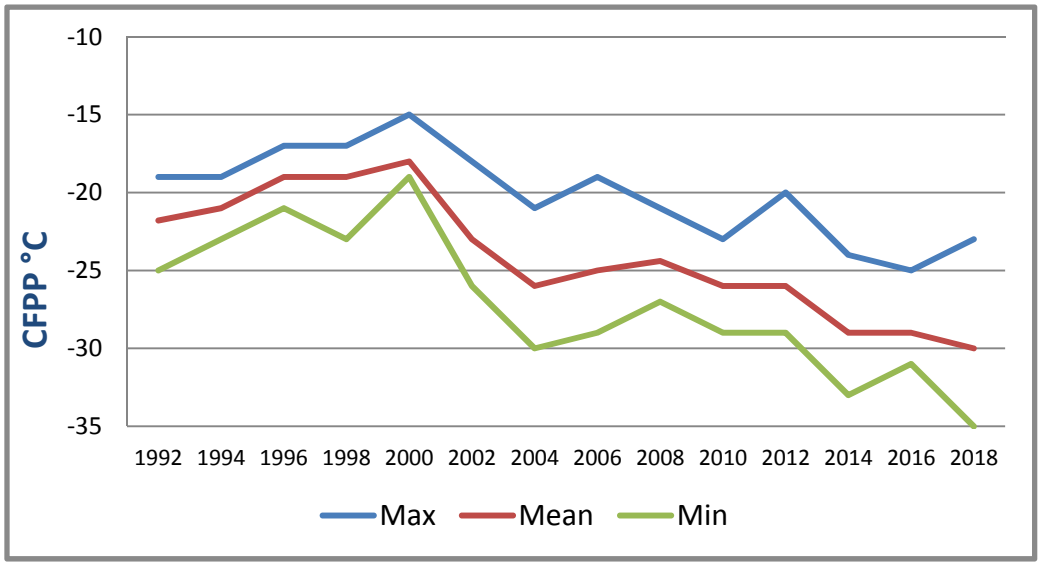
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800425	DIES 1800426	DIES 1800428	DIES 1800429	DIES 1800432
Cloud Point, °C		**-2**	**-5**	**-7**	-2	-4	-4	-6	-7
CFPP, °C		**-23**	**-30**	**-35**	-31	-23	-31	-35	-30
Pour Point, °C	-23 (max)*	**-30**	**-35**	**-45**	-30	-36	-33	-45	-30
HFRR, µm	400 (max)	**387**	**306**	**256**	256	287	334	387	264
Wax Content @ 10°C Below Cloud, wt%		**2.3**	**1.7**	**1.0**	1.4	2.3	1	2	1.9
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30	>30	>30
Sulphur, ppm	10 (max)	**11**	**6**	**<3**	<3	11	5	5	5
Density @15°C, kg/m^3	815 - 835	**862**	**832**	**820**	862	822	820	830	825
Viscosity @ 40°C, cSt	1.9 - 5.5	**2.47**	**2.31**	**2.14**	2.39	2.47	2.14	2.25	2.29
Cetane Index $_{2\ Variable}$		**58**	**53**	**44**	44	58	54	52	55
Cetane Index $_{4\ Variable}$		**57**	**51**	**41**	41	57	53	51	53
Cetane Number	48 (min)	**57**	**53**	**50**	52	57	52	50	54
Distillation, °C IBP		**147**	**142**	**136**	147	137	147	145	136
T_{10}		**179**	**176**	**172**	172	175	174	179	179
T_{20}		**203**	**196**	**190**	191	199	190	199	203
T_{50}		**274**	**263**	**252**	270	274	252	259	262
T_{90}	360 (max)	**347**	**340**	**327**	346	347	343	327	337
T_{95}		**367**	**360**	**345**	367	363	367	345	356
FBP		**378**	**370**	**356**	376	372	378	356	368
% FAME	2 - 5	**3**	**2**	**2**	2	3	2	2	2

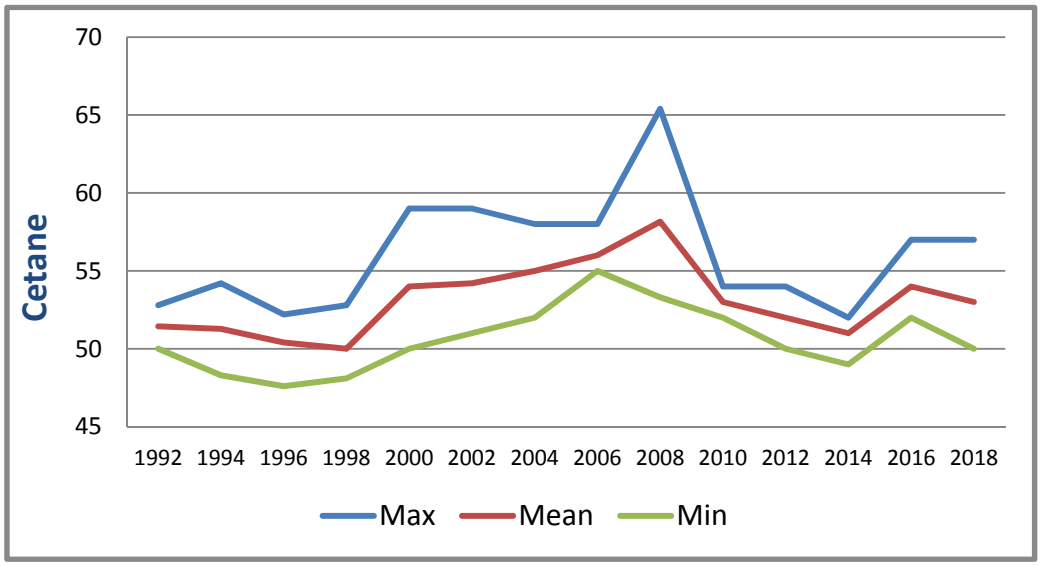
*December to February, November -15 °C

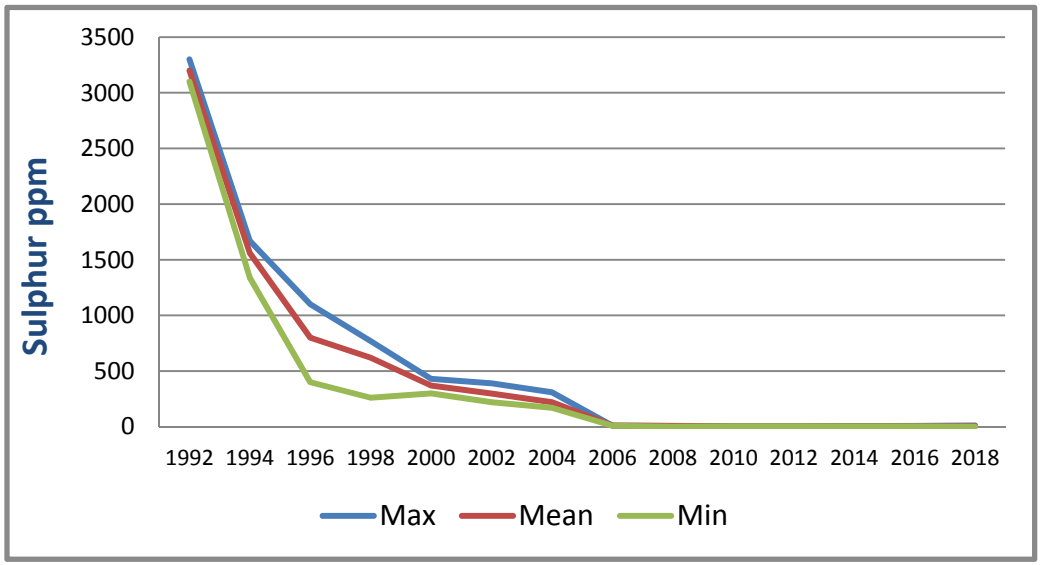
South Korea

Asia Pacific









Thailand

National standards and physical inspection data

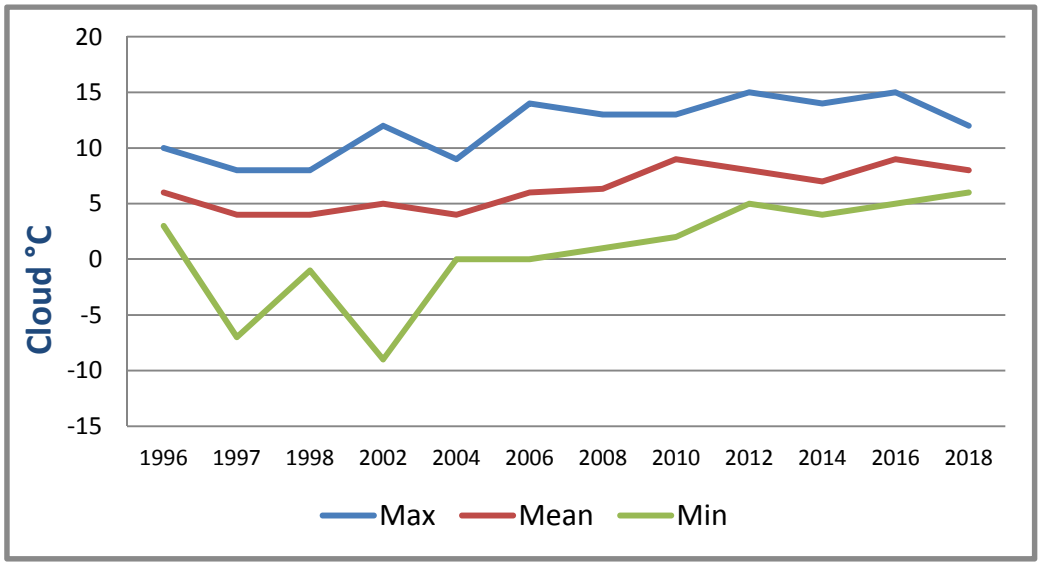
Asia Pacific

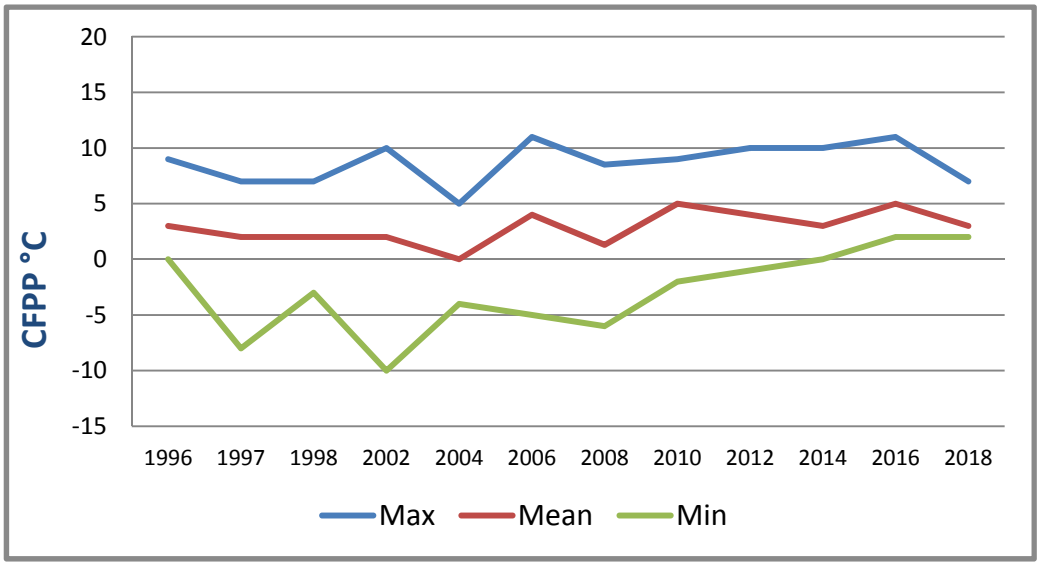
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800504	DIES 1800505	DIES 1800506	DIES 1800507	DIES 1800508	DIES 1800509	DIES 1800510
Cloud Point, °C		**12**	**8**	**6**	6	12	9	8	6	9	6
CFPP, °C		**7**	**3**	**2**	2	7	4	2	2	3	3
Pour Point, °C	10 (max)	**9**	**2**	**0**	0	9	3	0	0	0	0
HFRR, µm	460 (max)	**222**	**202**	**175**	206	205	217	175	180	213	222
Wax Content @ 10°C Below Cloud, wt%		**6.4**	**3.6**	**2.4**	4.2	6.4	3.5	2.8	3.1	2.6	2.4
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30	>30	>30	>30	>30
Sulphur, ppm	50 (max)	**38**	**31**	**27**	27	36	38	31	31	27	27
Density @15°C, kg/m^3	810 - 870	**840**	**833**	**818**	829	828	839	818	840	838	837
Viscosity @ 40°C, cSt	1.8 - 4.1	**3.39**	**3.26**	**3.07**	3.07	3.17	3.31	3.35	3.39	3.28	3.26
Cetane Index $_{2\ Variable}$		**62**	**57**	**55**	58	59	55	62	55	55	55
Cetane Index $_{4\ Variable}$	50 (min)*	**66**	**58**	**56**	59	60	56	66	56	56	56
Cetane Number	50 (min)*	**66**	**60**	**57**	61	66	59	58	58	57	58
Distillation, °C IBP		**189**	**180**	**170**	170	172	175	182	182	189	186
T_{10}		**230**	**223**	**215**	215	217	221	227	230	227	224
T_{20}		**248**	**243**	**239**	239	242	243	244	248	242	241
T_{50}		**290**	**287**	**284**	287	289	289	288	290	284	284
T_{90}	357 (max)	**353**	**349**	**346**	346	347	353	350	350	350	350
T_{95}		**373**	**368**	**363**	364	363	373	369	371	370	370
FBP		**382**	**378**	**373**	373	373	382	379	378	380	377
% FAME	6.5 - 7.0	**8**	**7**	**7**	7	8	7	7	7	7	7

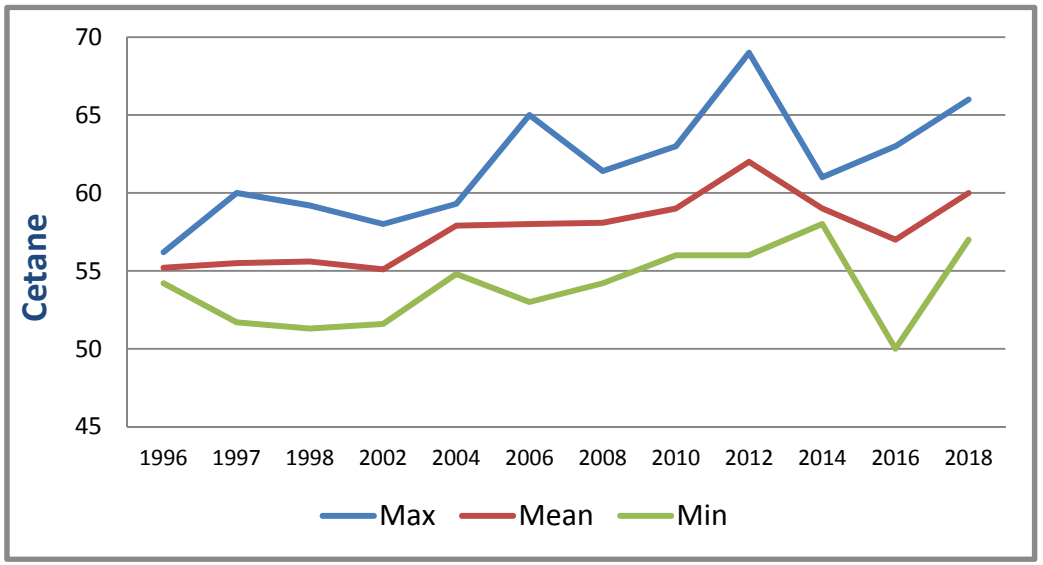
*Cetane number or cetane index may be used

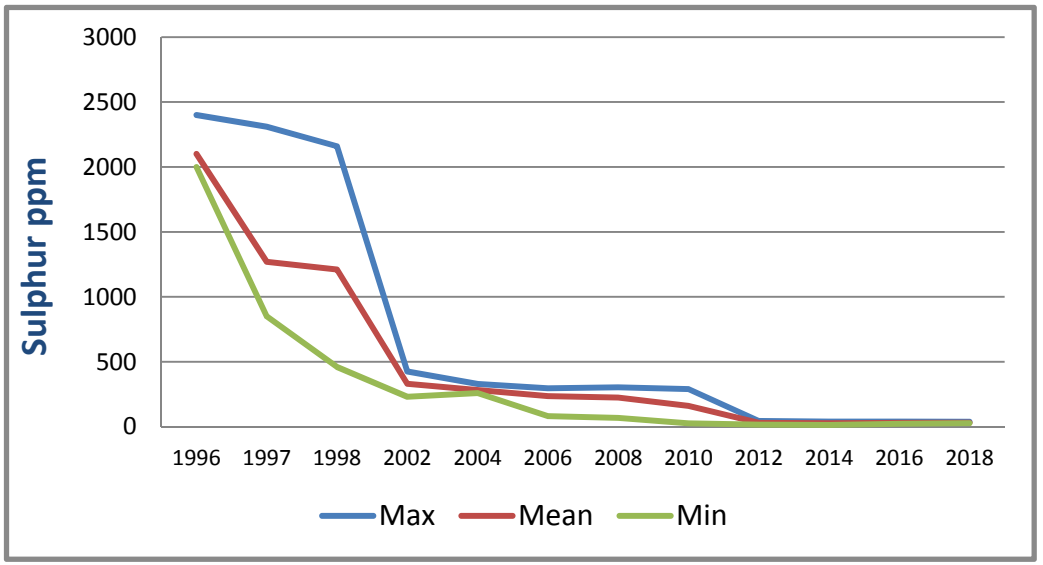
Thailand

Asia Pacific









Worldwide Survey – The Americas

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Argentina

National standards and physical inspection data

The Americas

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1705993	DIES 1705994	DIES 1705995	DIES 1705996	DIES 1705997	DIES 1705998	DIES 1705999
Cloud Point, °C		**3**	**-4**	**-11**	-2	-11	-7	-7	-7	3	3
CFPP, °C		**-11**	**-16**	**-23**	-16	-20	-14	-15	-23	-12	-11
Pour Point, °C		**-15**	**-21**	**-27**	-18	-18	-15	-18	-24	-27	-27
HFRR, µm	460 (max)	**181**	**166**	**158**	181	165	165	160	170	163	167
Wax Content @ 10°C Below Cloud, wt%		**4.4**	**3.3**	**2.0**	3.5	2.7	3.1	3	2	4.3	4.4
Rancimat, hrs		**>30**	**23**	**11**	20	>30	>30	29	16	>30	11
Sulphur, ppm	10 (max)	**228**	**32**	**3**	228	4	3	3	5	4	4
Density @15°C, kg/m^3	800 - 870	**848**	**840**	**833**	848	840	842	841	833	838	839
Viscosity @ 40°C, cSt	2.0 - 4.5	**3.24**	**2.92**	**2.51**	3.11	2.58	2.90	3.04	2.51	3.24	3.23
Cetane Index $_{2\ Variable}$		**55**	**53**	**52**	52	52	53	54	53	55	55
Cetane Index $_{4\ Variable}$	48 (min)	**57**	**53**	**51**	51	51	53	54	53	57	56
Cetane Number	51 (min)	**58**	**54**	**49**	49	52	56	51	55	58	57
Distillation, °C IBP		**195**	**178**	**168**	184	169	176	176	168	195	185
T_{10}		**232**	**218**	**203**	220	207	217	221	203	232	228
T_{20}		**248**	**236**	**220**	239	226	236	240	220	248	247
T_{50}	310 (max)	**288**	**281**	**267**	286	272	281	286	267	287	288
T_{90}	360 (max)	**341**	**337**	**333**	341	333	337	338	336	339	340
T_{95}		**359**	**354**	**348**	358	350	355	354	352	355	359
FBP		**364**	**358**	**354**	364	354	357	356	357	361	361
% FAME	10 (min)	**12**	**10**	**7**	10	8	10	11	7	10	12

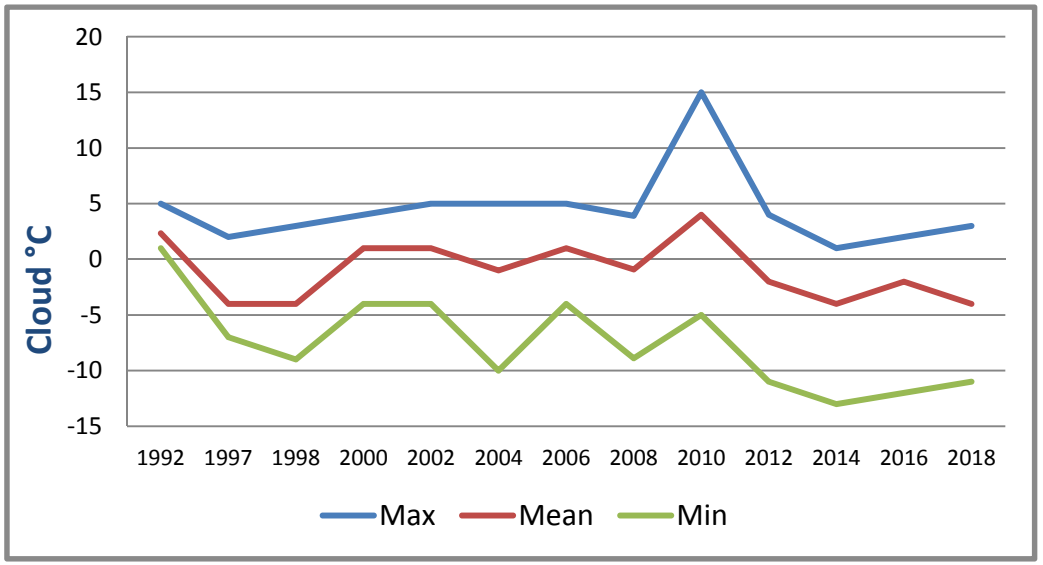
Argentina (continued)

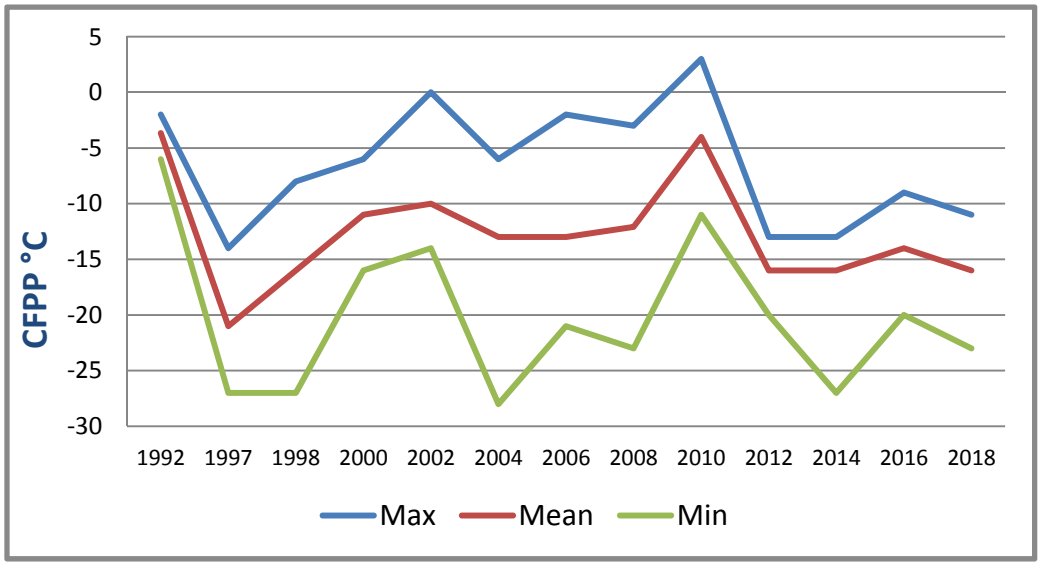
National standards and physical inspection data

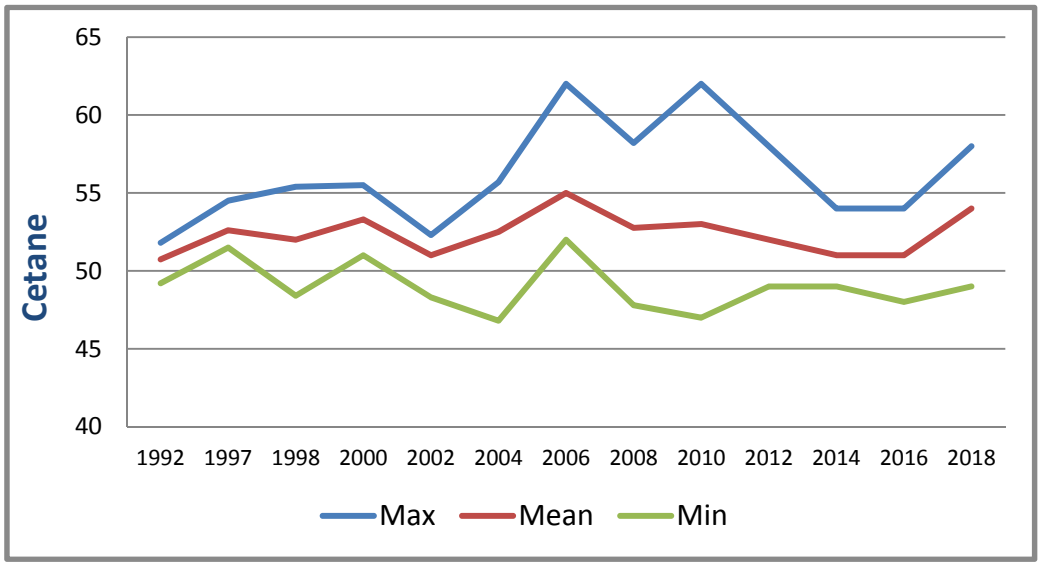
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1706000
Cloud Point, °C		**3**	**-4**	**-11**	-7
CFPP, °C		**-11**	**-16**	**-23**	-19
Pour Point, °C		**-15**	**-21**	**-27**	-21
HFRR, µm	460 (max)	**181**	**166**	**158**	158
Wax Content @ 10°C Below Cloud, wt%		**4.4**	**3.3**	**2.0**	3.3
Rancimat, hrs		**>30**	**23**	**11**	20
Sulphur, ppm	10 (max)	**228**	**32**	**3**	4
Density @15°C, kg/m^3	800 - 870	**848**	**840**	**833**	840
Viscosity @ 40°C, cSt	2.0 - 4.5	**3.24**	**2.92**	**2.51**	2.77
Cetane Index $_{2\ Variable}$		**55**	**53**	**52**	53
Cetane Index $_{4\ Variable}$	48 (min)	**57**	**53**	**51**	52
Cetane Number	51 (min)	**58**	**54**	**49**	54
Distillation, °C IBP		**195**	**178**	**168**	172
T_{10}		**232**	**218**	**203**	214
T_{20}		**248**	**236**	**220**	232
T_{50}	310 (max)	**288**	**281**	**267**	277
T_{90}	360 (max)	**341**	**337**	**333**	334
T_{95}		**359**	**354**	**348**	348
FBP		**364**	**358**	**354**	355
% FAME	10 (min)	**12**	**10**	**7**	10

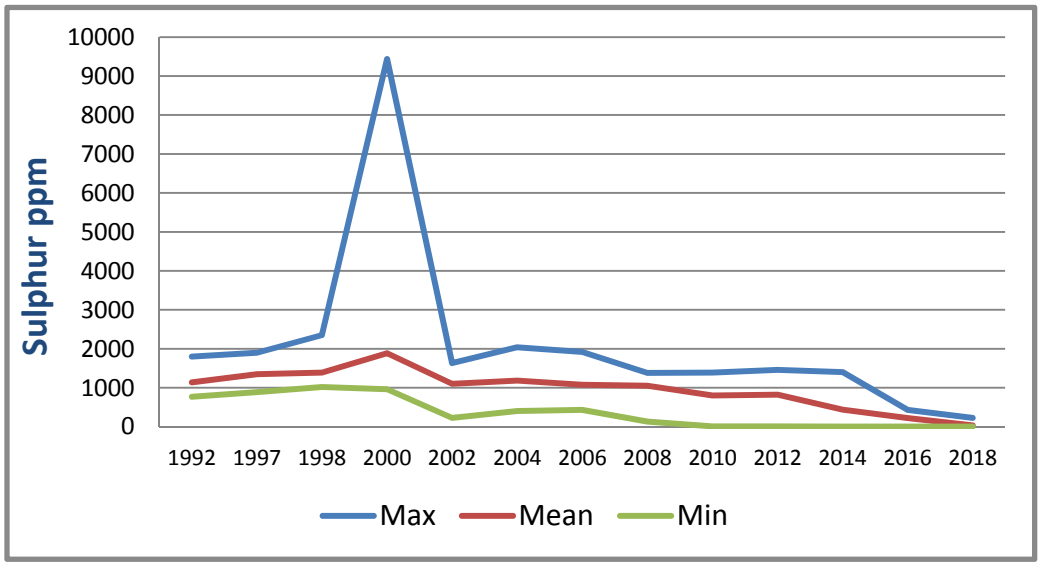
* Sulphur limit of 10ppm for Diesel Ultra grade

Argentina









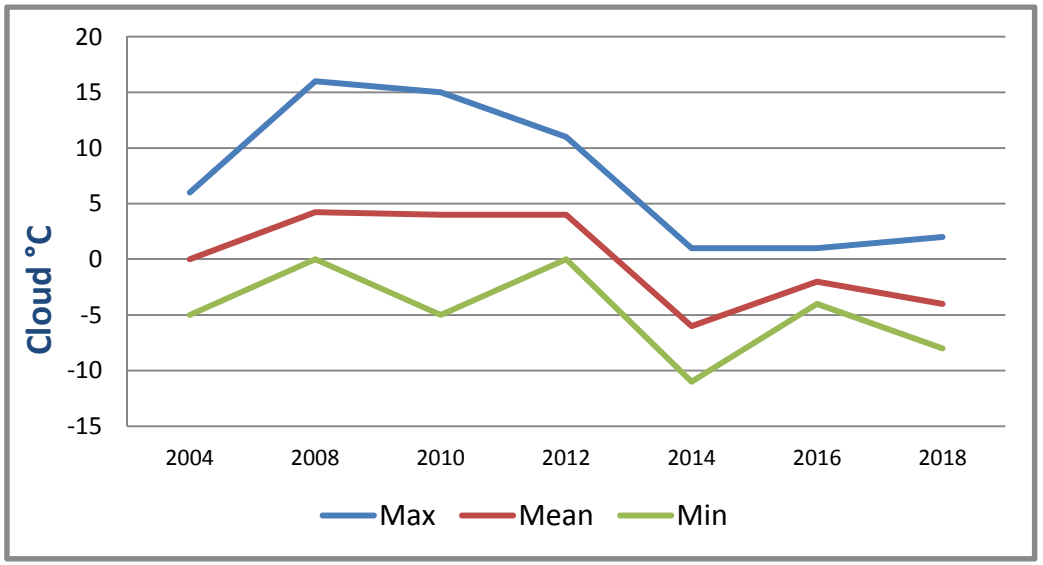
Brazil

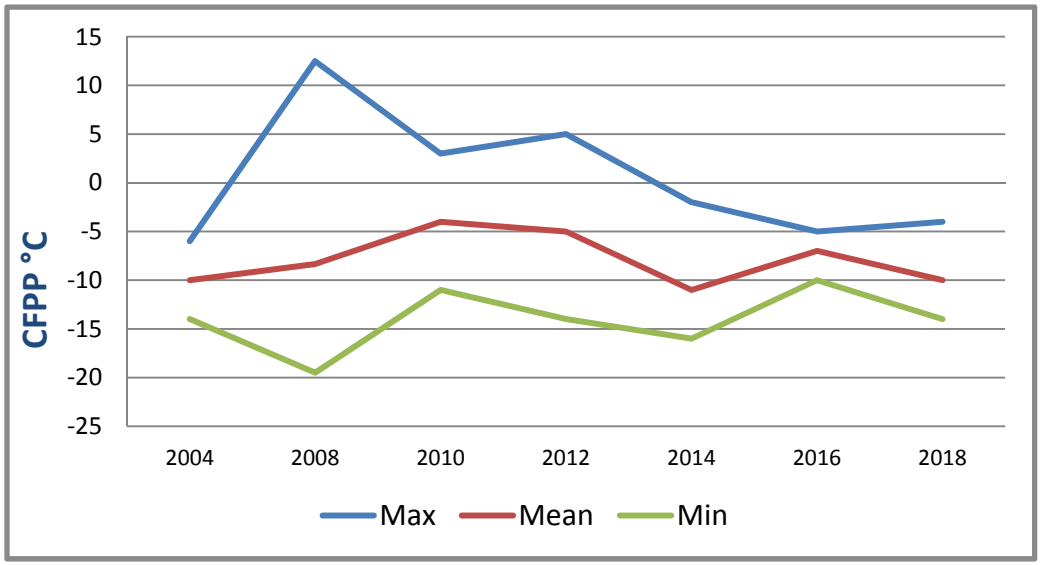
National standards and physical inspection data

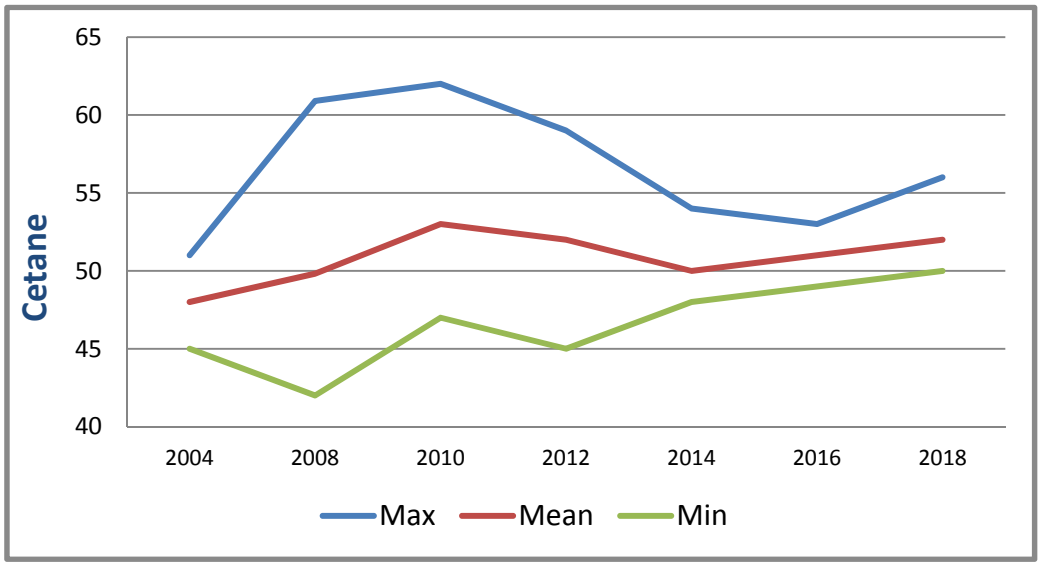
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1706001	DIES 1706002	DIES 1706003	DIES 1706004	DIES 1706005	DIES 1706006	DIES 1706008
Cloud Point, °C		**2**	**-4**	**-8**	-4	-8	-1	2	-7	-2	-5
CFPP, °C		**-4**	**-10**	**-14**	-12	-14	-8	-4	-12	-9	-11
Pour Point, °C		**-9**	**-16**	**-24**	-18	-18	-18	-9	-18	-24	-9
HFRR, µm	460 (max)	**189**	**177**	**166**	189	166	183	186	173	175	166
Wax Content @ 10°C Below Cloud, wt%		**4.3**	**2.3**	**0.8**	2.2	2.8	0.8	2.2	2.4	1.7	4.3
Rancimat, hrs		**>30**	**25**	**2**	2	>30	23	>30	>30	27	>30
Sulphur, ppm	10 (max)	**5**	**4**	**<3**	3	4	<3	<3	5	4	5
Density @15°C, kg/m^3		**847**	**838**	**826**	842	837	847	839	836	839	826
Viscosity @ 40°C, cSt	2.0 - 4.5	**2.98**	**2.75**	**2.54**	2.98	2.54	2.91	2.75	2.55	2.71	2.80
Cetane Index $_{2\ Variable}$		**58**	**52**	**48**	52	52	48	52	52	52	58
Cetane Index $_{4\ Variable}$		**59**	**52**	**48**	52	51	48	51	52	51	59
Cetane Number	48 (min)	**56**	**52**	**50**	55	50	51	51	50	51	56
Distillation, °C IBP		**184**	**169**	**157**	178	172	184	168	167	160	157
T_{10}		**222**	**210**	**201**	217	207	218	205	203	201	222
T_{20}		**241**	**228**	**221**	233	223	233	224	221	222	241
T_{50}	245 - 295	**278**	**272**	**267**	277	268	267	271	269	274	278
T_{90}		**340**	**337**	**332**	340	333	337	339	334	340	332
T_{95}	370 (max)	**363**	**356**	**349**	363	350	360	363	349	360	349
FBP		**376**	**366**	**357**	368	357	375	376	359	370	359
% FAME	8 (min)	**9**	**8**	**3**	8	9	8	8	3	8	8

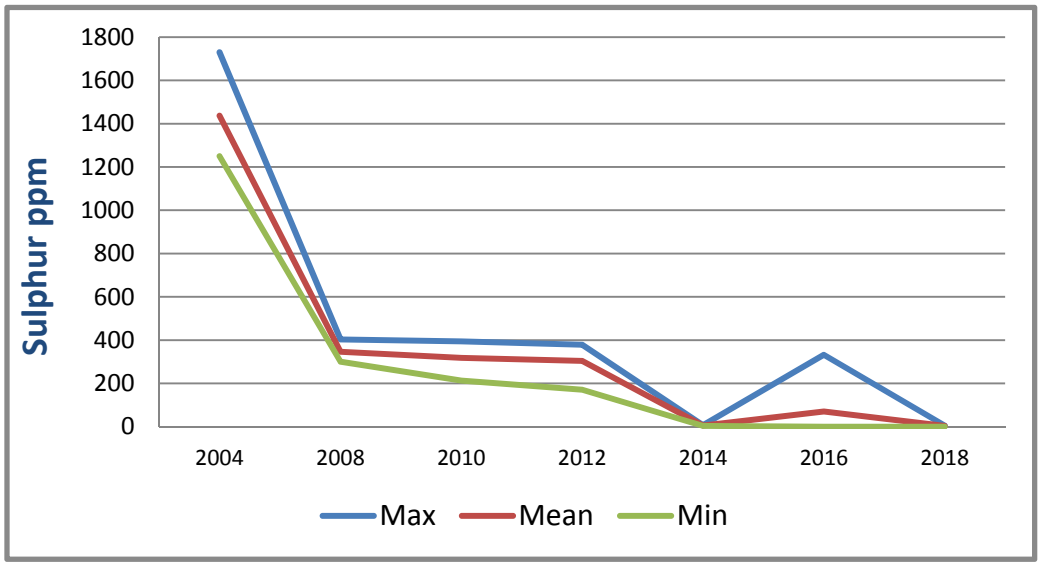
Specification shown for S10 grade

Brazil









Canada

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1801391	DIES 1801392	DIES 1801393	DIES 1801394	DIES 1801396	DIES 1801397	DIES 1801399
Cloud Point, °C		**-24**	**-31**	**-38**	-33	-32	-38	-25	-24	-26	-31
LTFT, °C		**-22**	**-29**	**-36**	-31	-29	-36	-22	-22	-24	N/A
CFPP, °C		**-25**	**-32**	**-42**	-34	-32	-42	-29	-25	-28	-30
Pour Point, °C		**-27**	**-44**	**-69**	-51	-69	-51	-27	-33	-33	-36
HFRR, µm	460 (max)	**574**	**457**	**401**	401	574	474	475	451	466	403
Wax Content @ 10°C Below Cloud, wt%		**1.4**	**1.0**	**0.6**	N/A	N/A	N/A	1.4	0.6	N/A	N/A
Rancimat, hrs		**25**	**22**	**20**	>30	>30	>30	>30	25	20	>30
Sulphur, ppm	15 (max)	**8**	**5**	**3**	7	4	3	8	7	5	6
Density @15°C, kg/m^3		**857**	**841**	**821**	857	835	850	832	832	848	852
Viscosity @ 40°C, cSt	1.7 - 4.1*	**2.67**	**2.18**	**1.64**	2.37	2.01	2.45	2.08	2.00	2.67	2.18
Cetane Index $_{2\ Variable}$		**50**	**45**	**41**	43	44	45	48	48	47	43
Cetane Index $_{4\ Variable}$		**50**	**45**	**41**	42	45	43	48	47	47	42
Cetane Number	40 (min)	**47**	**44**	**42**	42	42	42	46	44	47	45
Distillation, °C IBP		**180**	**161**	**150**	153	159	169	163	153	160	168
T_{10}		**213**	**195**	**174**	195	183	201	196	181	212	205
T_{20}		**227**	**209**	**185**	212	195	217	211	197	227	217
T_{50}		**265**	**248**	**223**	259	236	256	246	245	265	252
T_{90}	360 (max)	**320**	**309**	**294**	320	315	307	301	313	319	301
T_{95}		**337**	**326**	**312**	337	333	323	321	331	335	315
FBP		**350**	**341**	**325**	350	346	339	339	344	346	330
% 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)

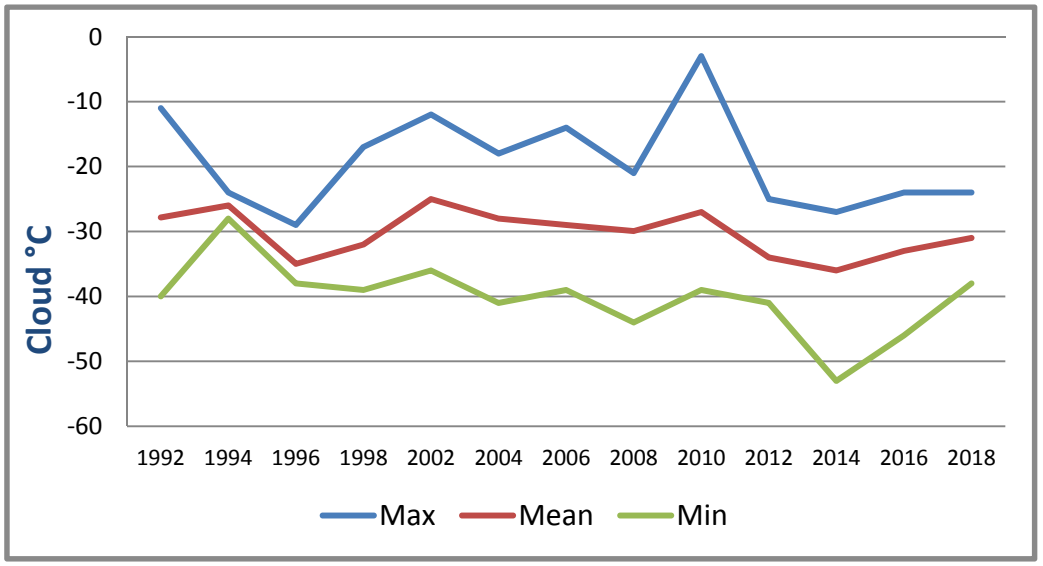
National standards and physical inspection data

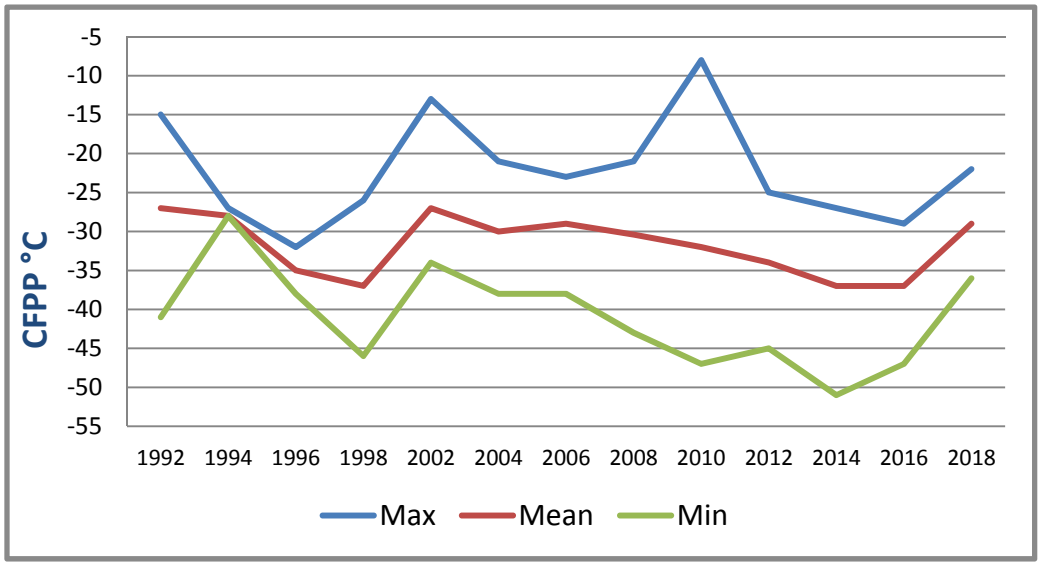
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1801400	DIES 1801402	DIES 1801404	DIES 1801405	DIES 1801425	DIES 1801426
Cloud Point, °C		**-24**	**-31**	**-38**	-31	-29	-34	-29	-34	-37
LTFT, °C		**-22**	**-29**	**-36**	-30	-26	-32	-26	-33	-36
CFPP, °C		**-25**	**-32**	**-42**	-32	-29	-33	-29	-37	-39
Pour Point, °C		**-27**	**-44**	**-69**	-42	-42	-45	-36	-54	-48
HFRR, µm	460 (max)	**574**	**457**	**401**	498	459	466	458	410	407
Wax Content @ 10°C Below Cloud, wt%		**1.4**	**1.0**	**0.6**	N/A	N/A	N/A	N/A	N/A	N/A
Rancimat, hrs		**25**	**22**	**20**	>30	>30	>30	>30	21	23
Sulphur, ppm	15 (max)	**8**	**5**	**3**	4	4	6	3	8	4
Density @15°C, kg/m^3		**857**	**841**	**821**	841	825	821	831	855	857
Viscosity @ 40°C, cSt	1.7 - 4.1*	**2.67**	**2.18**	**1.64**	2.14	1.92	1.64	2.28	2.26	2.31
Cetane Index $_{2\ Variable}$		**50**	**45**	**41**	46	47	45	50	43	41
Cetane Index $_{4\ Variable}$		**50**	**45**	**41**	45	48	46	50	41	41
Cetane Number	40 (min)	**47**	**44**	**42**	46	46	45	47	42	44
Distillation, °C IBP		**180**	**161**	**150**	164	160	150	163	152	180
T_{10}		**213**	**195**	**174**	197	186	174	198	191	213
T_{20}		**227**	**209**	**185**	211	197	185	212	208	225
T_{50}		**265**	**248**	**223**	249	235	223	252	255	250
T_{90}	360 (max)	**320**	**309**	**294**	307	310	294	317	318	298
T_{95}		**337**	**326**	**312**	324	328	314	336	334	312
FBP		**350**	**341**	**325**	340	344	332	348	349	325
% FAME		**0**	**0**	**0**	0	0	0	0	0	0

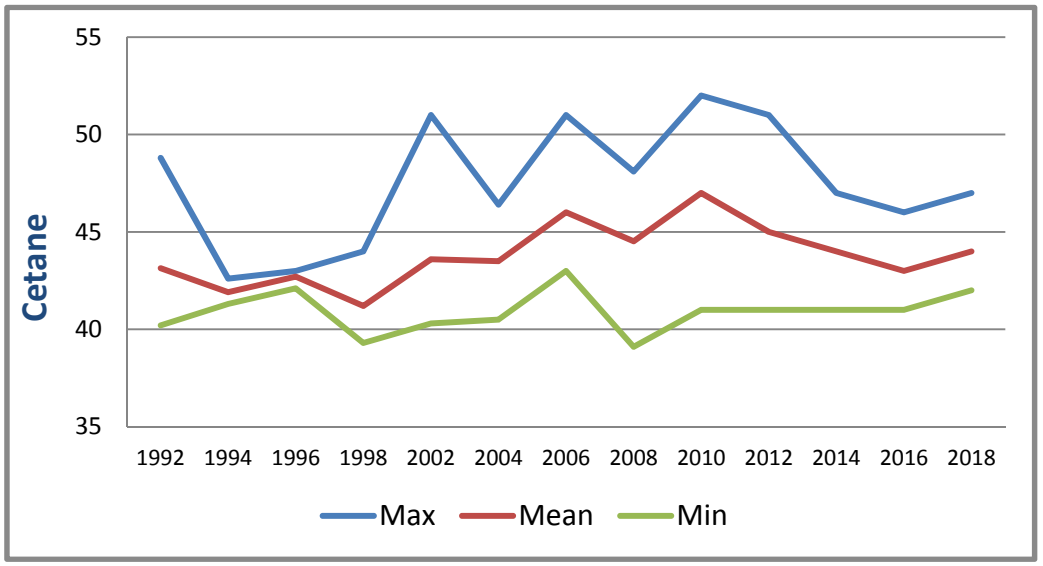
*For operating temperatures of below -20°C the minimum KV is 1.3cSt

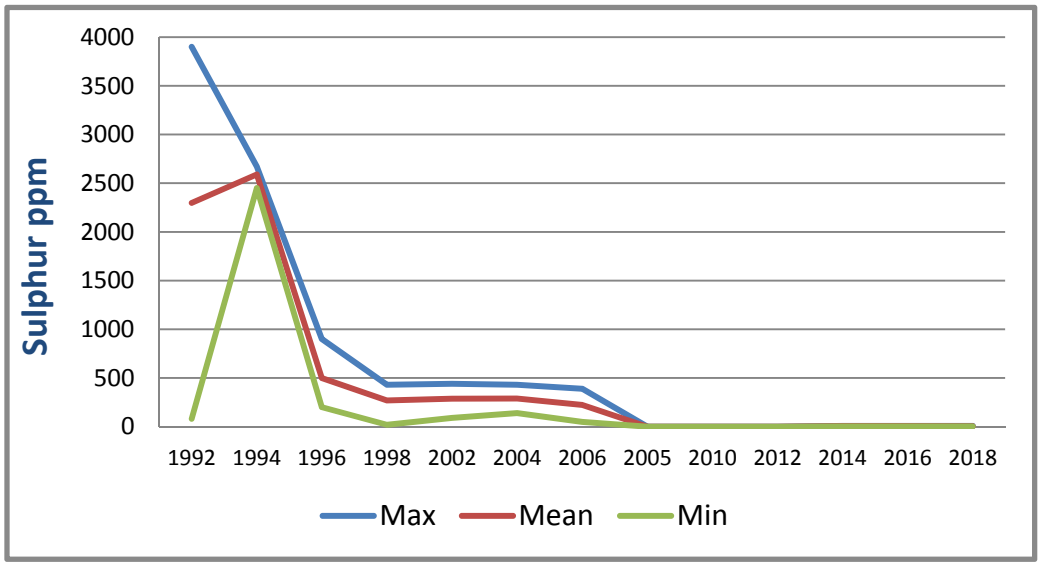
Canada

The Americas







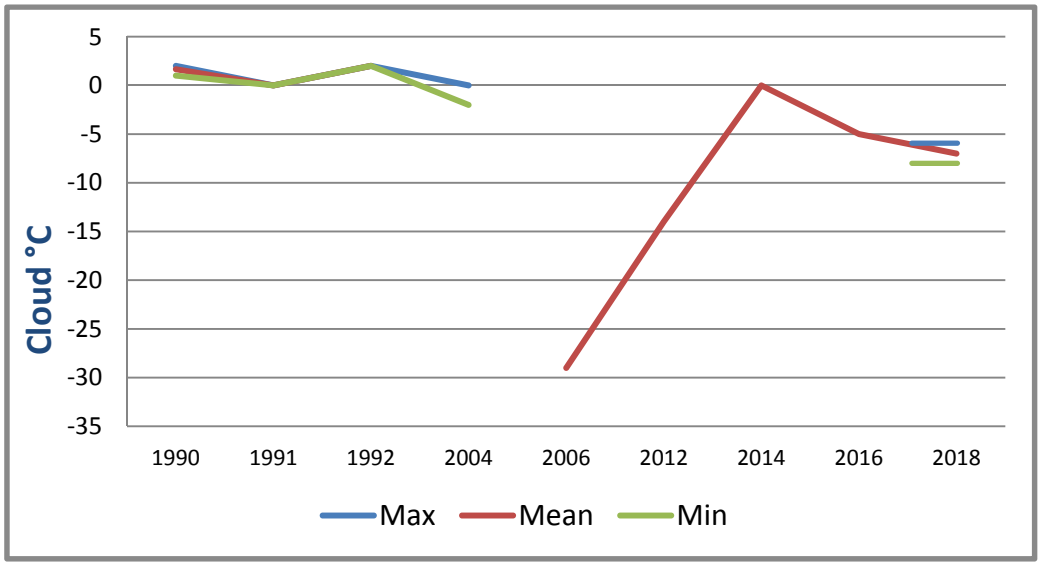


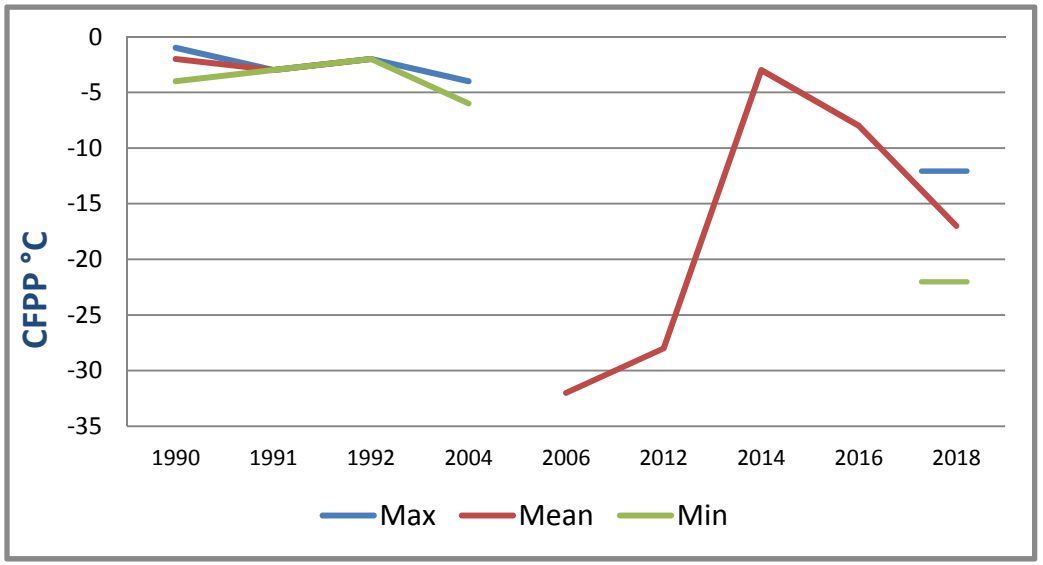
Chile

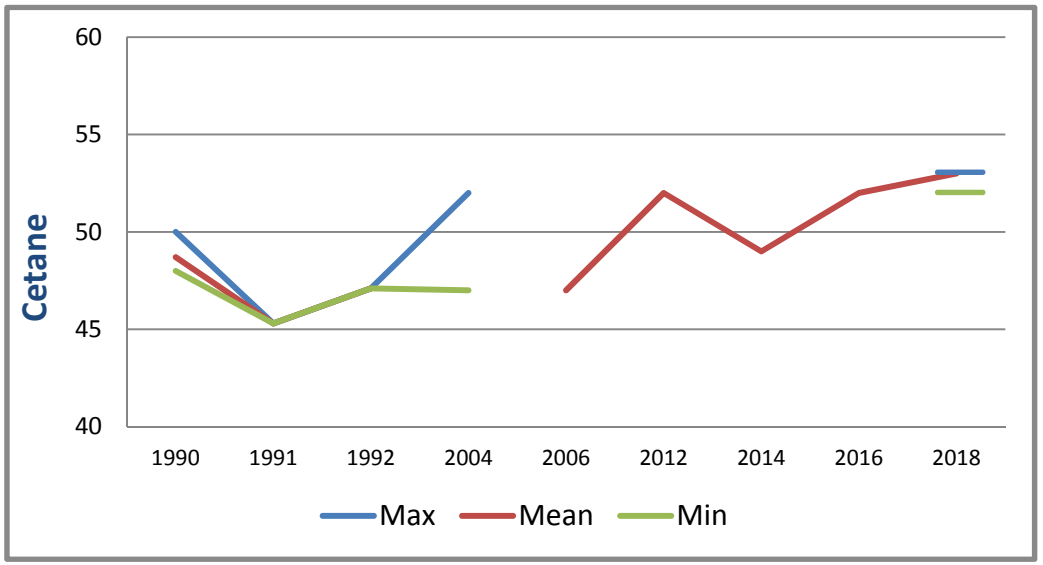
National standards and physical inspection data

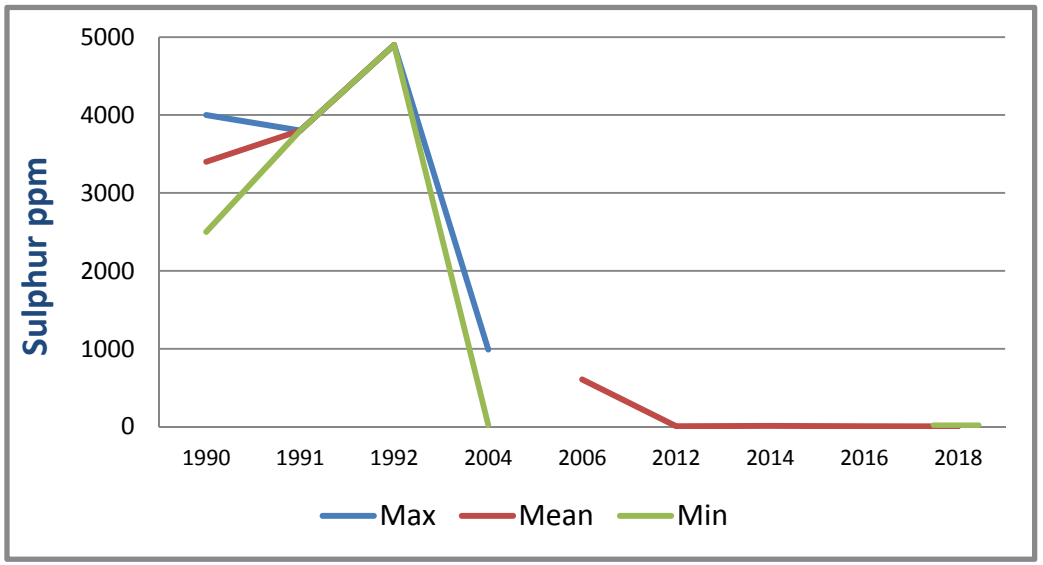
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1705977	DIES 1705979
Cloud Point, °C		**-6**	**-7**	**-8**	-6	-8
CFPP, °C		**-12**	**-17**	**-22**	-22	-12
Pour Point, °C	-1 (max)	**-18**	**-21**	**-24**	-24	-18
HFRR, µm	460 (max)	**461**	**440**	**418**	461	418
Wax Content @ 10°C Below Cloud, wt%		**2.1**	**1.9**	**1.7**	1.7	2.1
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	15 (max)	**5**	**5**	**5**	5	5
Density @15°C, kg/m^3	820 - 850	**834**	**833**	**833**	834	833
Viscosity @ 40°C, cSt	1.9 - 4.1	**2.49**	**2.48**	**2.46**	2.46	2.49
Cetane Index $_{2\ Variable}$		**51**	**51**	**51**	51	51
Cetane Index $_{4\ Variable}$		**51**	**51**	**51**	51	51
Cetane Number	50 (min)	**53**	**53**	**52**	52	53
Distillation, °C IBP		**170**	**170**	**170**	170	170
T_{10}		**202**	**201**	**201**	202	201
T_{20}		**217**	**216**	**216**	217	216
T_{50}		**259**	**258**	**258**	259	258
T_{90}	282 - 350	**330**	**329**	**328**	330	328
T_{95}		**350**	**349**	**347**	350	347
FBP		**362**	**361**	**359**	362	359
% FAME		**0**	**0**	**0**	0	0

Chile









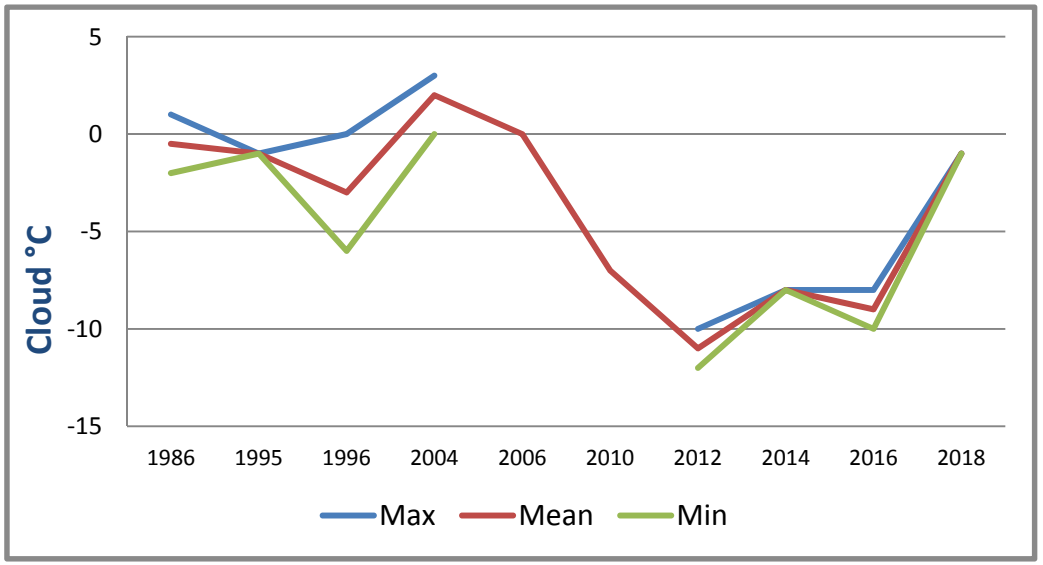
Colombia

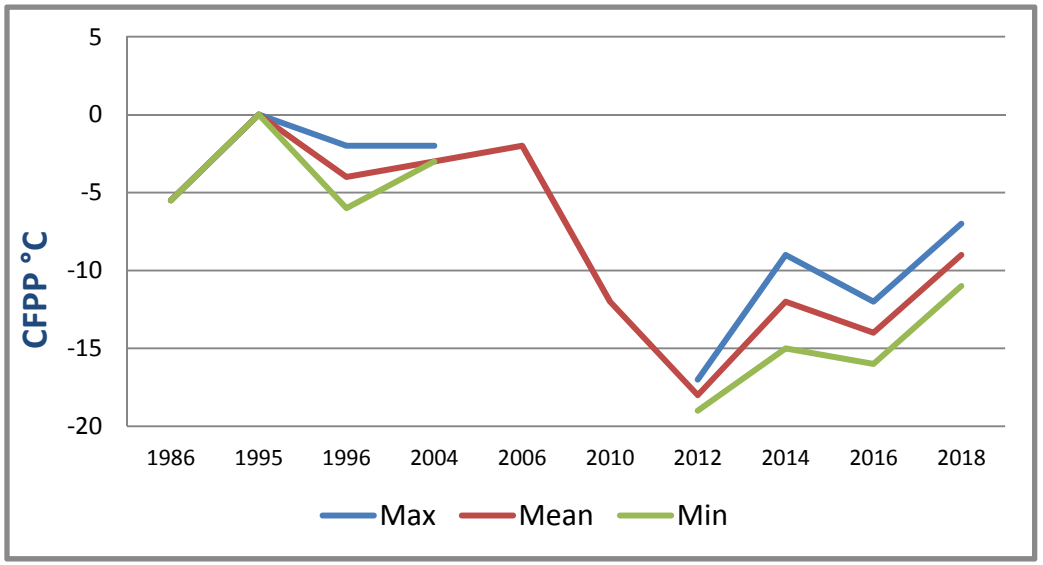
The Americas

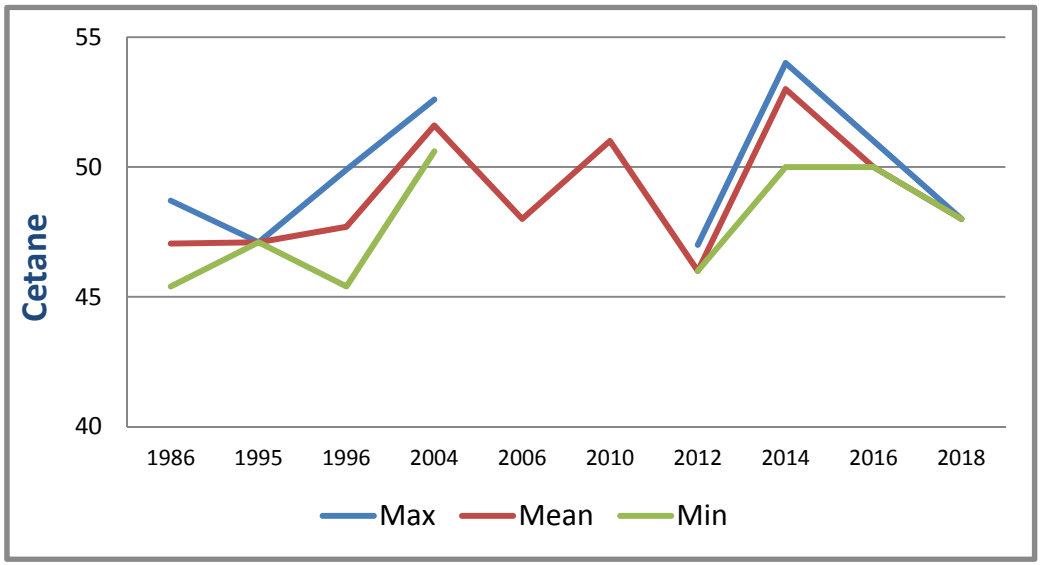
National standards and physical inspection data

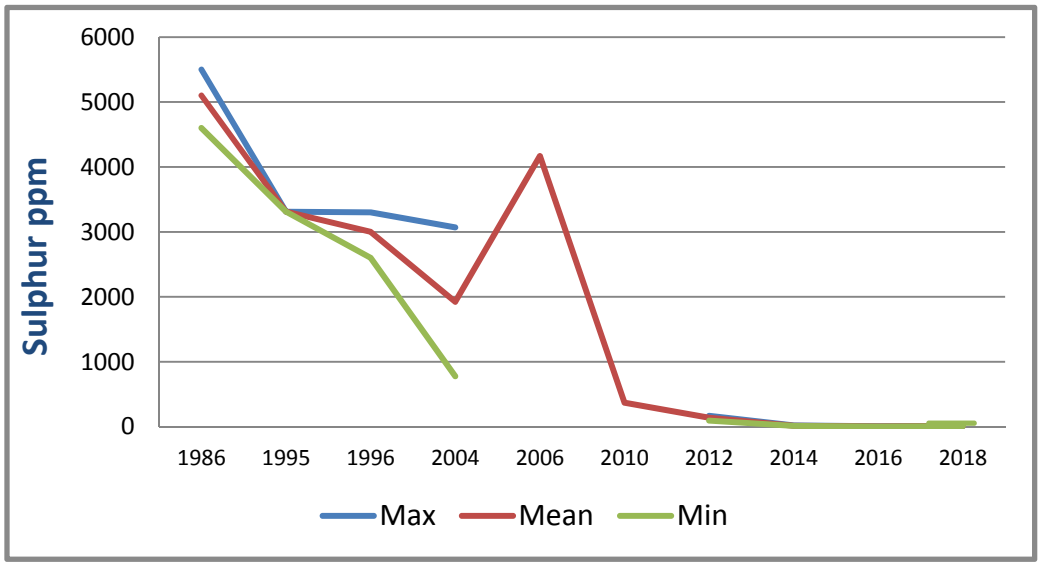
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1705980	DIES 1705981
Cloud Point, °C		**-1**	**-1**	**-1**	-1	-1
CFPP, °C		**-7**	**-9**	**-11**	-11	-7
Pour Point, °C	3 (max)	**-9**	**-11**	**-12**	-9	-12
HFRR, µm	450 (min)	**199**	**197**	**195**	199	195
Wax Content @ 10°C Below Cloud, wt%		**3.5**	**3.4**	**3.2**	3.5	3.2
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	50 (max)	**13**	**12**	**11**	13	11
Density @15°C, kg/m^3		**867**	**865**	**864**	864	867
Viscosity @ 40°C, cSt	1.9 - 5.0	**2.49**	**2.48**	**2.46**	2.46	2.49
Cetane Index $_{2\ Variable}$		**50**	**49**	**49**	50	49
Cetane Index $_{4\ Variable}$	45 (min)	**49**	**48**	**48**	49	48
Cetane Number	45 (min)	**48**	**48**	**48**	48	48
Distillation, °C IBP		**190**	**136**	**83**	83	190
T_{10}		**248**	**243**	**238**	238	248
T_{20}		**268**	**263**	**259**	259	268
T_{50}		**306**	**305**	**305**	305	306
T_{90}		**345**	**345**	**345**	345	345
T_{95}	282 - 360	**360**	**359**	**359**	359	360
FBP		**367**	**367**	**367**	367	367
% FAME	10	**8**	**8**	**8**	8	8

Colombia









Peru

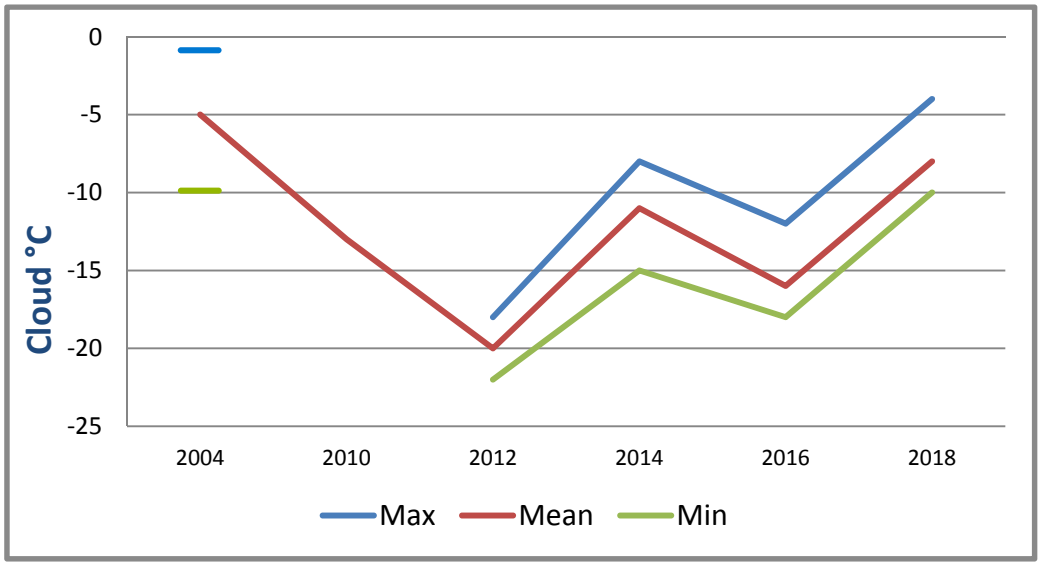
The Americas

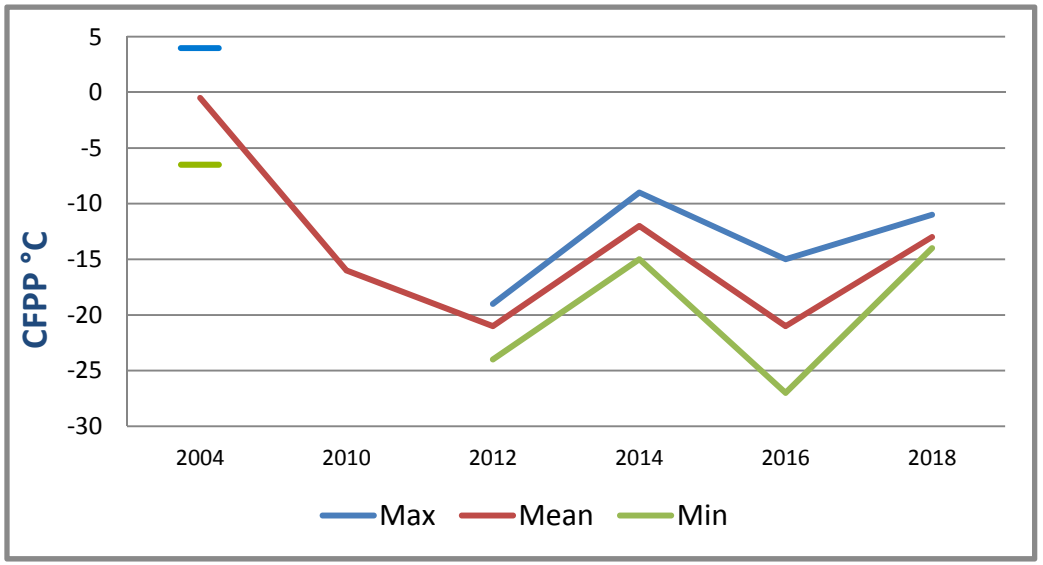
National standards and physical inspection data

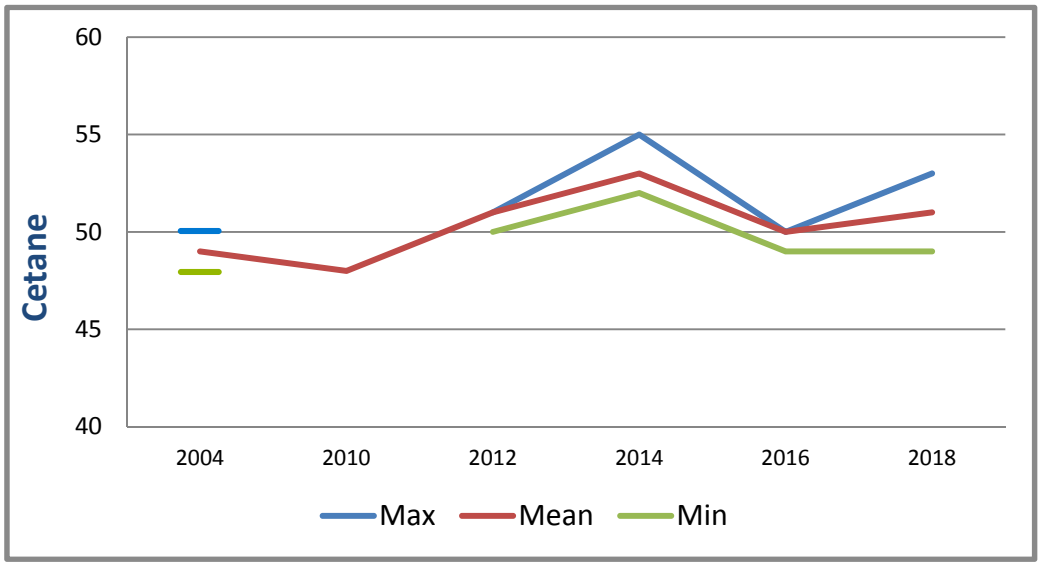
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1705983	DIES 1705985	DIES 1705988
Cloud Point, °C		**-4**	**-8**	**-10**	-4	-10	-10
CFPP, °C	-8 (max)	**-11**	**-13**	**-14**	-11	-14	-14
Pour Point, °C	4 (max)	**-18**	**-18**	**-18**	-18	-18	-18
HFRR, µm	520 (max)	**358**	**265**	**185**	185	252	358
Wax Content @ 10°C Below Cloud, wt%		**2.9**	**2.2**	**1.4**	1.4	2.4	2.9
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30
Sulphur, ppm	50 (max)	**39**	**20**	**8**	39	14	8
Density @15°C, kg/m^3		**845**	**837**	**830**	830	837	845
Viscosity @ 40°C, cSt	1.9 - 4.1	**2.97**	**2.62**	**2.40**	2.49	2.40	2.97
Cetane Index $_{2\ Variable}$		**53**	**52**	**50**	53	50	52
Cetane Index $_{4\ Variable}$	40 (min)	**52**	**51**	**50**	52	50	51
Cetane Number	45 (min)	**53**	**51**	**49**	53	49	51
Distillation, °C IBP		**172**	**168**	**163**	163	172	168
T_{10}		**213**	**203**	**191**	191	203	213
T_{20}		**233**	**220**	**209**	209	217	233
T_{50}		**280**	**268**	**260**	264	260	280
T_{90}	282 - 360	**340**	**334**	**328**	340	328	334
T_{95}		**360**	**351**	**345**	360	345	348
FBP		**370**	**362**	**356**	370	356	359
% FAME	5 (max)	**3**	**3**	**3**	3	3	3

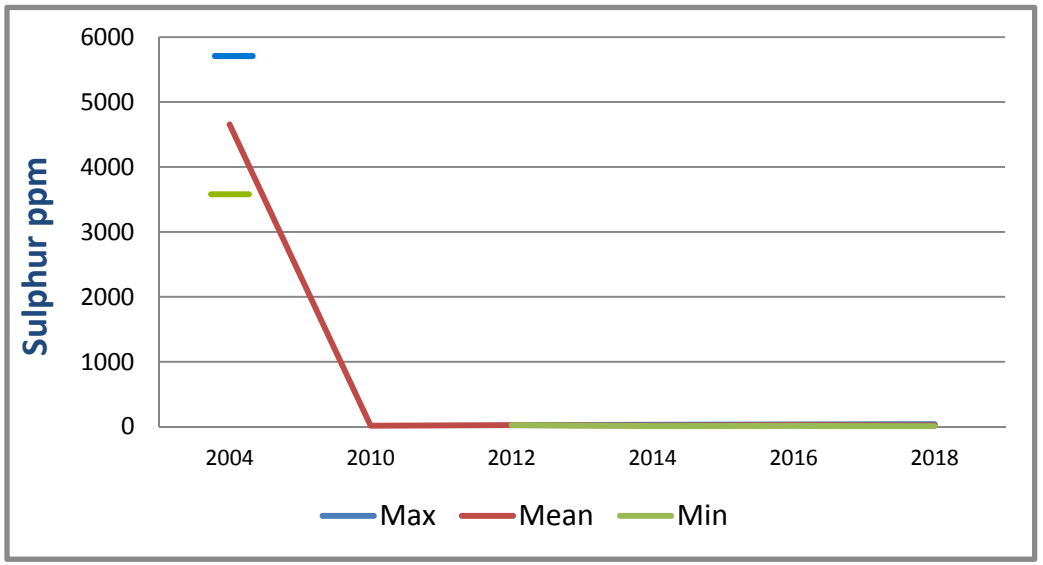
Peru

The Americas









USA – East Coast

National standards and physical inspection data

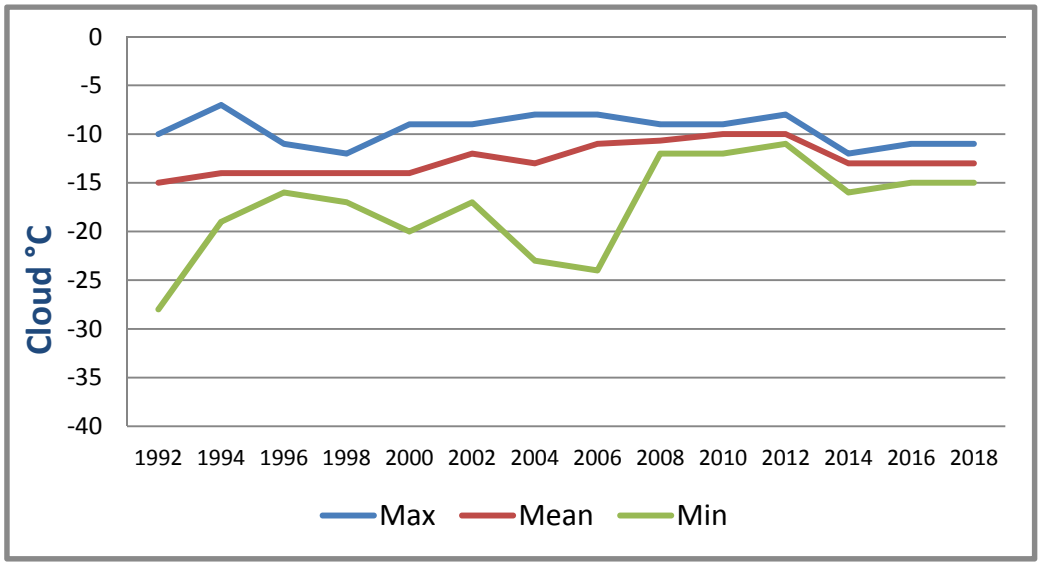
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1801567	DIES 1802015	DIES 1802018	DIES 1802019	DIES 1802020	DIES 1802030	DIES 1802031
Cloud Point, °C		**-11**	**-13**	**-15**	-13	-12	-11	-12	-11	-14	-12
CFPP, °C		**-13**	**-24**	**-34**	-31	-34	-28	-29	-33	-15	-13
Pour Point, °C		**-21**	**-30**	**-39**	-30	-33	-36	-33	-33	-21	-24
HFRR, µm	520 (max)	**506**	**385**	**219**	365	337	219	375	421	316	449
Wax Content @ 10°C Below Cloud, wt%		**2.5**	**2.1**	**1.8**	2.1	1.8	1.9	2.2	1.9	2.3	2.5
Rancimat, hrs		**>30**	**>25**	**8**	27	27	21	>30	>30	>30	>30
Sulphur, ppm	15 (max)	**8**	**7**	**6**	8	8	6	7	8	6	7
Density @15°C, kg/m^3		**857**	**844**	**834**	835	836	835	834	835	855	850
Viscosity @ 40°C, cSt	1.9 - 4.1	**2.62**	**2.45**	**2.14**	2.14	2.49	2.62	2.58	2.50	2.41	2.47
Cetane Index $_{2\ Variable}$		**53**	**48**	**44**	49	51	53	52	51	45	46
Cetane Index $_{4\ Variable}$	40 (min)	**52**	**47**	**42**	48	51	52	52	51	43	45
Cetane Number	40 (min)	**52**	**47**	**43**	48	50	51	52	50	43	46
Distillation, °C IBP		**168**	**164**	**159**	164	166	168	168	162	166	161
T_{10}		**205**	**201**	**193**	193	202	204	205	200	201	200
T_{20}		**222**	**218**	**208**	208	219	221	222	217	218	218
T_{50}		**270**	**263**	**252**	252	265	270	266	262	263	263
T_{90}	282 - 338	**333**	**324**	**317**	319	333	331	327	330	319	324
T_{95}		**351**	**341**	**332**	337	351	345	345	349	335	342
FBP		**358**	**353**	**345**	349	358	356	356	357	349	355
% FAME	5 (max)	**6**	**1**	**0**	0	3	6	1	0	1	0

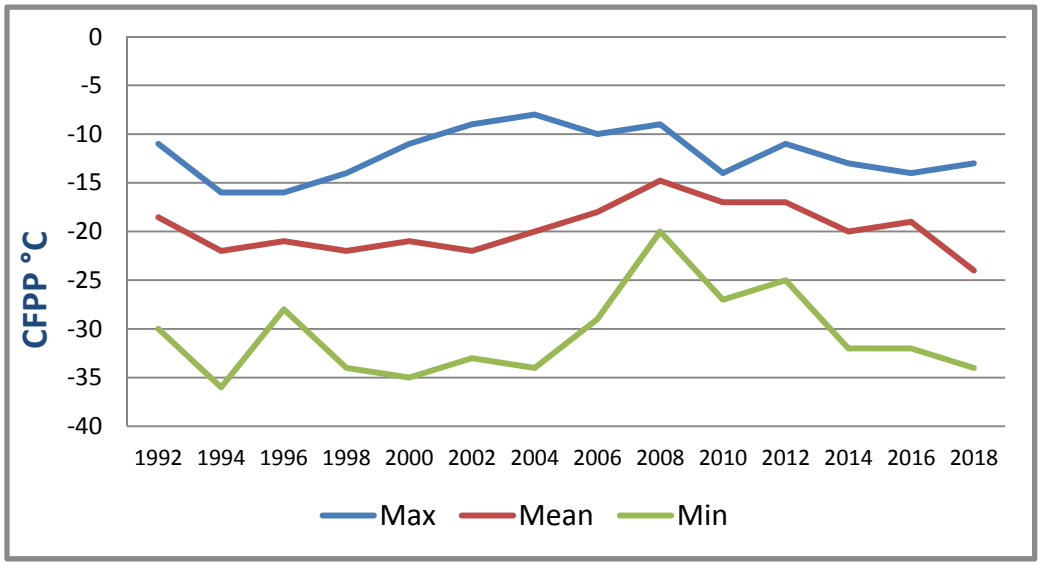
USA – East Coast

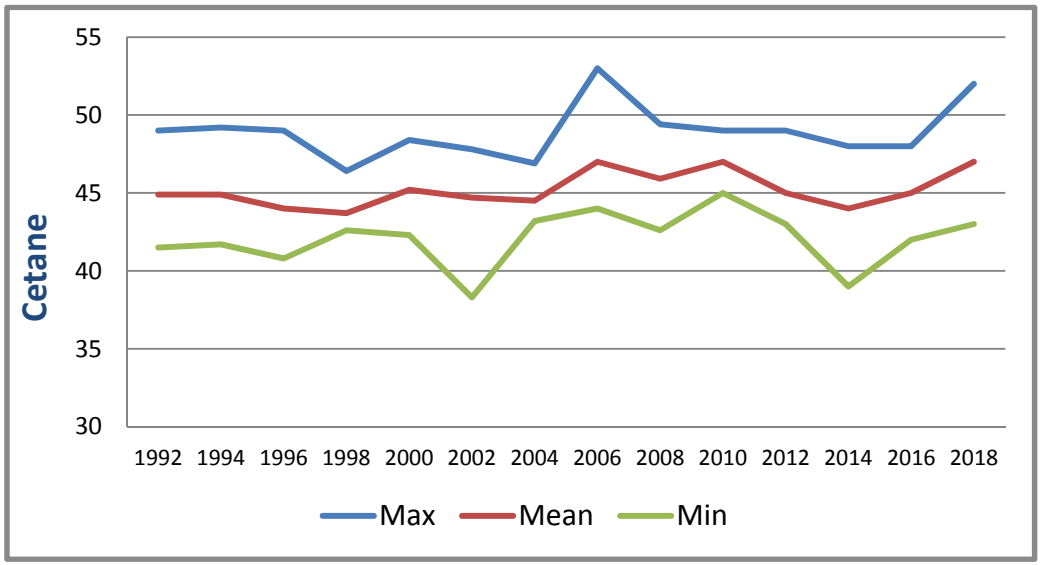
National standards and physical inspection data

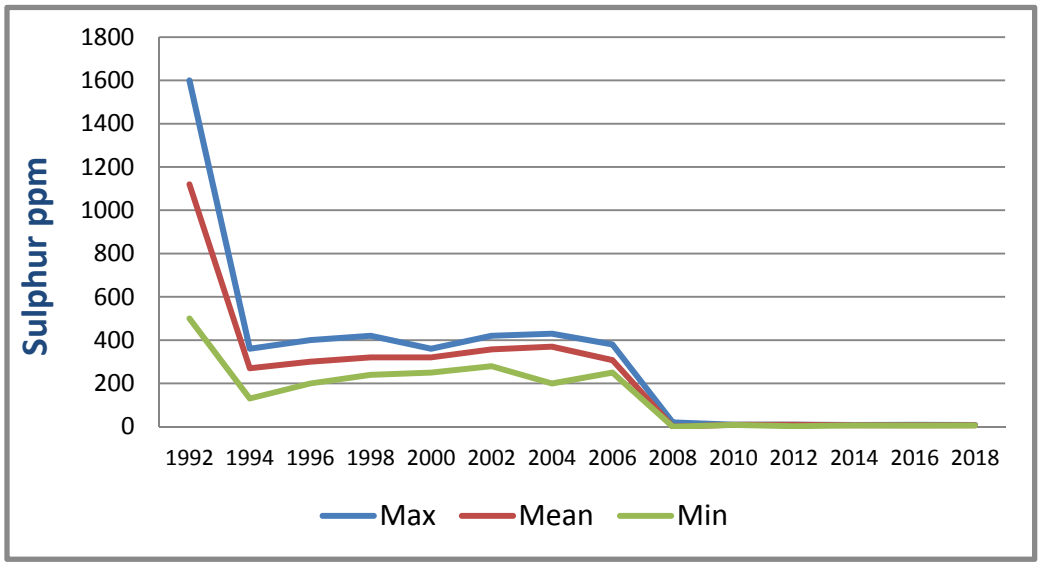
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1802032	DIES 1802033	DIES 1802034
Cloud Point, °C		**-11**	**-13**	**-15**	-13	-15	-14
CFPP, °C		**-13**	**-24**	**-34**	-15	-32	-15
Pour Point, °C		**-21**	**-30**	**-39**	-27	-39	-21
HFRR, µm	520 (max)	**506**	**385**	**219**	506	421	441
Wax Content @ 10°C Below Cloud, wt%		**2.5**	**2.1**	**1.8**	2.1	2.1	2.3
Rancimat, hrs		**>30**	**>25**	**8**	>30	8	>30
Sulphur, ppm	15 (max)	**8**	**7**	**6**	7	6	6
Density @15°C, kg/m^3		**857**	**844**	**834**	844	857	856
Viscosity @ 40°C, cSt	1.9 - 4.1	**2.62**	**2.45**	**2.14**	2.56	2.38	2.37
Cetane Index $_{2\ Variable}$		**53**	**48**	**44**	48	44	44
Cetane Index $_{4\ Variable}$	40 (min)	**52**	**47**	**42**	48	42	43
Cetane Number	40 (min)	**52**	**47**	**43**	48	43	43
Distillation, °C IBP		**168**	**164**	**159**	167	163	159
T_{10}		**205**	**201**	**193**	205	200	199
T_{20}		**222**	**218**	**208**	222	217	217
T_{50}		**270**	**263**	**252**	263	262	263
T_{90}	282 - 338	**333**	**324**	**317**	326	317	319
T_{95}		**351**	**341**	**332**	343	332	335
FBP		**358**	**353**	**345**	356	345	348
% FAME	5 (max)	**6**	**1**	**0**	0	0	0

USA – East Coast









USA – Midwest

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1801563	DIES 1801564	DIES 1801565	DIES 1801566	DIES 1801569	DIES 1801925	DIES 1801926
Cloud Point, °C		**-7**	**-17**	**-55**	-9	-9	-16	-55	-19	-19	-15
CFPP, °C		**-9**	**-24**	**-55**	-9	-10	-37	-55	-24	-23	-34
Pour Point, °C		**-15**	**-32**	**-54**	-15	-15	-39	-51	-30	-54	-33
HFRR, µm	520 (max)	**526**	**390**	**198**	460	442	378	452	443	491	217
Wax Content @ 10°C Below Cloud, wt%		**3.8**	**1.9**	**0.6**	3.2	3.1	1	N/A	1.7	0.8	1.8
Rancimat, hrs		**>30**	**>25**	**6**	>30	>30	>30	>30	17	>30	21
Sulphur, ppm	15 (max)	**10**	**6**	**3**	3	3	8	10	4	8	4
Density @15°C, kg/m^3		**862**	**843**	**807**	820	821	846	807	831	843	861
Viscosity @ 40°C, cSt	1.9 - 4.1	**3.51**	**2.58**	**1.40**	2.51	2.49	2.21	1.40	2.18	2.36	3.06
Cetane Index $_{2\ Variable}$		**58**	**48**	**44**	56	56	45	45	48	45	46
Cetane Index $_{4\ Variable}$	40 (min)	**61**	**48**	**43**	57	57	45	47	49	45	45
Cetane Number	40 (min)	**60**	**48**	**42**	55	55	42	44	49	46	44
Distillation, °C IBP		**204**	**171**	**151**	176	173	152	160	175	168	186
T_{10}		**239**	**209**	**178**	209	207	194	178	202	201	224
T_{20}		**250**	**224**	**185**	221	221	208	185	213	213	240
T_{50}		**282**	**261**	**209**	261	261	251	209	246	249	277
T_{90}	282 - 338	**336**	**323**	**255**	325	325	332	255	316	324	334
T_{95}		**358**	**340**	**270**	343	344	356	270	335	346	347
FBP		**367**	**352**	**290**	355	354	367	290	351	359	354
% FAME	5 (max)	**21**	**2**	**0**	0	0	0	0	0	0	11

USA – Midwest

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1801928	DIES 1801930	DIES 1801932	DIES 1801934	DIES 1801961	DIES 1801963	DIES 1801964
Cloud Point, °C		**-7**	**-17**	**-55**	-16	-13	-19	-14	-17	-16	-15
CFPP, °C		**-9**	**-24**	**-55**	-28	-18	-33	-18	-17	-33	-35
Pour Point, °C		**-15**	**-32**	**-54**	-27	-33	-33	-39	-27	-30	-42
HFRR, µm	520 (max)	**526**	**390**	**198**	220	497	230	205	458	207	456
Wax Content @ 10°C Below Cloud, wt%		**3.8**	**1.9**	**0.6**	2.1	2.2	1.8	3.8	1.3	1.8	1.7
Rancimat, hrs		**>30**	**>25**	**6**	21	>30	20	26	>30	22	>30
Sulphur, ppm	15 (max)	**10**	**6**	**3**	6	6	6	10	5	5	4
Density @15°C, kg/m^3		**862**	**843**	**807**	862	844	861	844	855	862	815
Viscosity @ 40°C, cSt	1.9 - 4.1	**3.51**	**2.58**	**1.40**	2.98	3.02	2.82	2.62	2.85	3.04	2.07
Cetane Index $_{2\ Variable}$		**58**	**48**	**44**	45	51	44	51	45	46	52
Cetane Index $_{4\ Variable}$	40 (min)	**61**	**48**	**43**	45	51	44	50	45	45	53
Cetane Number	40 (min)	**60**	**48**	**42**	44	49	43	51	44	44	54
Distillation, °C IBP		**204**	**171**	**151**	184	181	185	172	179	181	169
T_{10}		**239**	**209**	**178**	223	223	221	210	217	225	191
T_{20}		**250**	**224**	**185**	237	238	234	226	232	239	202
T_{50}		**282**	**261**	**209**	276	276	270	276	266	277	239
T_{90}	282 - 338	**336**	**323**	**255**	332	328	331	332	327	333	323
T_{95}		**358**	**340**	**270**	346	342	344	339	345	346	343
FBP		**367**	**352**	**290**	355	351	351	348	357	357	347
% FAME	5 (max)	**21**	**2**	**0**	12	0	11	21	0	11	0

USA – Midwest

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1802010	DIES 1802011	DIES 1802012	DIES 1802013	DIES 1802014	DIES 1802021	DIES 1802022
Cloud Point, °C		**-7**	**-17**	**-55**	-11	-16	-16	-13	-17	-22	-22
CFPP, °C		**-9**	**-24**	**-55**	-23	-17	-17	-18	-17	-25	-26
Pour Point, °C		**-15**	**-32**	**-54**	-36	-21	-21	-18	-21	-36	-33
HFRR, µm	520 (max)	**526**	**390**	**198**	413	456	454	484	445	488	452
Wax Content @ 10°C Below Cloud, wt%		**3.8**	**1.9**	**0.6**	2.4	2.6	2.4	3.6	2.6	0.7	0.7
Rancimat, hrs		**>30**	**>25**	**6**	>30	16	26	>30	16	20	13
Sulphur, ppm	15 (max)	**10**	**6**	**3**	8	7	5	7	6	3	3
Density @15°C, kg/m^3		**862**	**843**	**807**	851	850	846	821	851	849	844
Viscosity @ 40°C, cSt	1.9 - 4.1	**3.51**	**2.58**	**1.40**	3.51	2.66	2.55	2.83	2.62	2.46	2.34
Cetane Index $_{2\ Variable}$		**58**	**48**	**44**	50	47	48	58	46	45	46
Cetane Index $_{4\ Variable}$	40 (min)	**61**	**48**	**43**	51	46	47	61	46	44	46
Cetane Number	40 (min)	**60**	**48**	**42**	50	46	48	60	45	44	48
Distillation, °C IBP		**204**	**171**	**151**	204	171	159	165	167	161	168
T_{10}		**239**	**209**	**178**	239	215	209	224	215	201	205
T_{20}		**250**	**224**	**185**	250	233	225	241	231	219	219
T_{50}		**282**	**261**	**209**	282	265	263	271	264	257	252
T_{90}	282 - 338	**336**	**323**	**255**	335	318	323	319	318	316	312
T_{95}		**358**	**340**	**270**	347	336	343	335	335	334	331
FBP		**367**	**352**	**290**	353	348	356	346	348	347	345
% FAME	5 (max)	**21**	**2**	**0**	0	0	0	0	0	0	0

USA – Midwest

National standards and physical inspection data

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1802023	DIES 1802024	DIES 1802025	DIES 1802026	DIES 1802027	DIES 1802028	DIES 1802029
Cloud Point, °C		**-7**	**-17**	**-55**	-20	-21	-20	-21	-22	-17	-22
CFPP, °C		**-9**	**-24**	**-55**	-41	-24	-27	-21	-45	-38	-45
Pour Point, °C		**-15**	**-32**	**-54**	-48	-33	-39	-39	-54	-50	-44
HFRR, µm	520 (max)	**526**	**390**	**198**	402	495	486	484	252	303	302
Wax Content @ 10°C Below Cloud, wt%		**3.8**	**1.9**	**0.6**	1.5	0.6	1.8	1.7	0.8	0.9	1
Rancimat, hrs		**>30**	**>25**	**6**	25	24	>30	>30	>30	23	>30
Sulphur, ppm	15 (max)	**10**	**6**	**3**	9	3	8	9	8	3	8
Density @15°C, kg/m^3		**862**	**843**	**807**	856	847	859	859	852	847	841
Viscosity @ 40°C, cSt	1.9 - 4.1	**3.51**	**2.58**	**1.40**	2.70	2.45	2.82	2.76	2.44	2.49	2.11
Cetane Index $_{2\ Variable}$		**58**	**48**	**44**	45	46	45	44	44	46	45
Cetane Index $_{4\ Variable}$	40 (min)	**61**	**48**	**43**	44	45	44	43	44	46	45
Cetane Number	40 (min)	**60**	**48**	**42**	44	44	44	44	45	45	44
Distillation, °C IBP		**204**	**171**	**151**	175	160	174	175	169	171	161
T_{10}		**239**	**209**	**178**	213	203	215	217	200	204	191
T_{20}		**250**	**224**	**185**	229	219	234	233	216	218	204
T_{50}		**282**	**261**	**209**	265	256	269	268	258	256	245
T_{90}	282 - 338	**336**	**323**	**255**	321	317	320	319	328	329	320
T_{95}		**358**	**340**	**270**	338	335	337	336	344	347	338
FBP		**367**	**352**	**290**	351	351	351	350	354	359	354
% FAME	5 (max)	**21**	**2**	**0**	0	0	0	0	4	4	4

USA – Midwest

National standards and physical inspection data

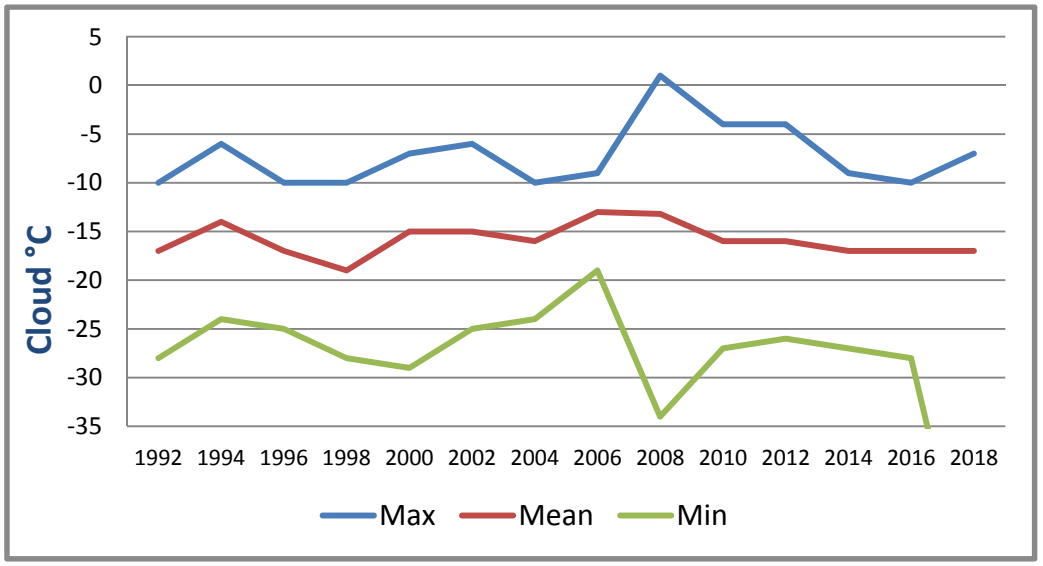
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1802036	DIES 1802037	DIES 1802038	DIES 1802039	DIES 1802040	DIES 1802041	DIES 1802042
Cloud Point, °C		**-7**	**-17**	**-55**	-7	-13	-14	-10	-15	-14	-13
CFPP, °C		**-9**	**-24**	**-55**	-24	-13	-15	-13	-15	-18	-18
Pour Point, °C		**-15**	**-32**	**-54**	-39	-24	-27	-18	-18	-21	-21
HFRR, µm	520 (max)	**526**	**390**	**198**	445	353	526	472	426	198	221
Wax Content @ 10°C Below Cloud, wt%		**3.8**	**1.9**	**0.6**	1.9	2.1	2.1	2.4	3.8	2.1	2
Rancimat, hrs		**>30**	**>25**	**6**	>30	>30	>30	>30	23	26	6
Sulphur, ppm	15 (max)	**10**	**6**	**3**	8	5	8	3	6	4	5
Density @15°C, kg/m^3		**862**	**843**	**807**	829	841	835	833	827	849	846
Viscosity @ 40°C, cSt	1.9 - 4.1	**3.51**	**2.58**	**1.40**	2.39	2.52	2.41	2.70	2.36	2.84	2.69
Cetane Index $_{2\ Variable}$		**58**	**48**	**44**	53	49	50	52	53	48	48
Cetane Index $_{4\ Variable}$	40 (min)	**61**	**48**	**43**	52	48	49	53	54	48	48
Cetane Number	40 (min)	**60**	**48**	**42**	53	48	50	52	52	50	48
Distillation, °C IBP		**204**	**171**	**151**	161	167	168	172	167	181	170
T_{10}		**239**	**209**	**178**	193	204	201	208	205	220	211
T_{20}		**250**	**224**	**185**	210	220	216	224	220	234	227
T_{50}		**282**	**261**	**209**	260	260	256	265	258	269	266
T_{90}	282 - 338	**336**	**323**	**255**	336	327	324	330	314	329	328
T_{95}		**358**	**340**	**270**	358	345	344	350	329	343	345
FBP		**367**	**352**	**290**	366	356	356	363	342	353	355
% FAME	5 (max)	**21**	**2**	**0**	0	0	0	0	1	5	2

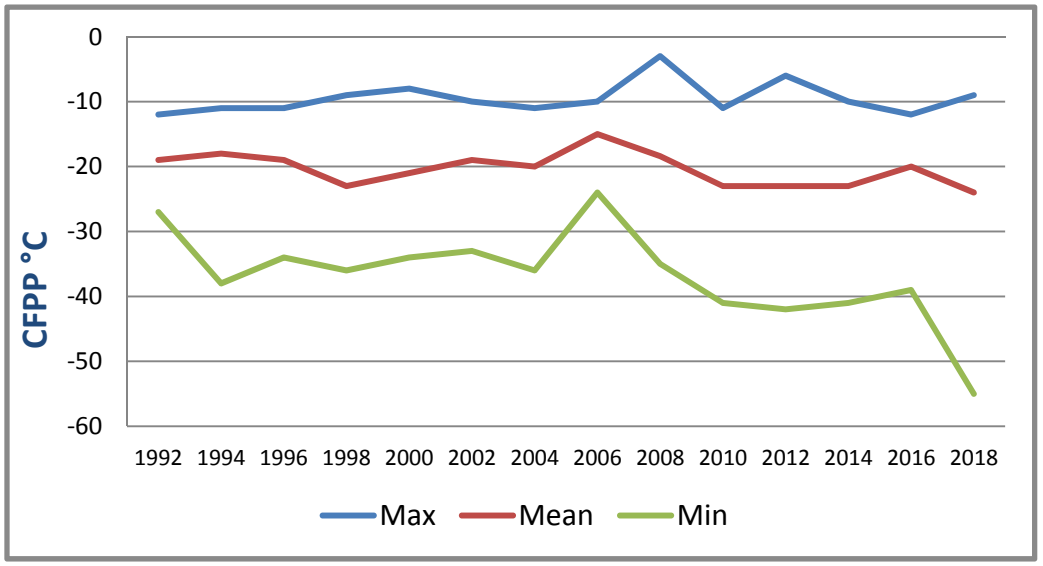
USA – Midwest

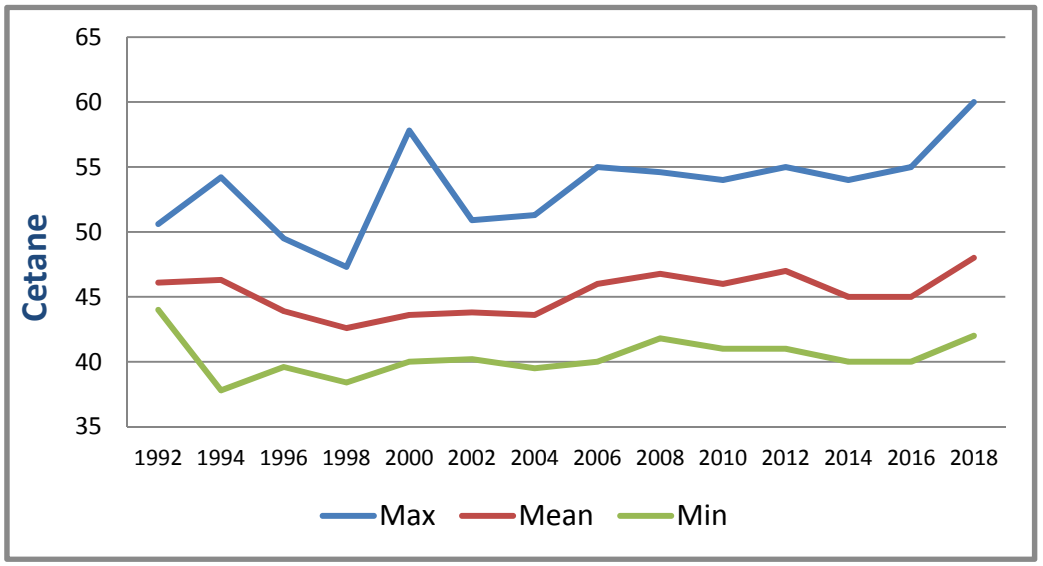
National standards and physical inspection data

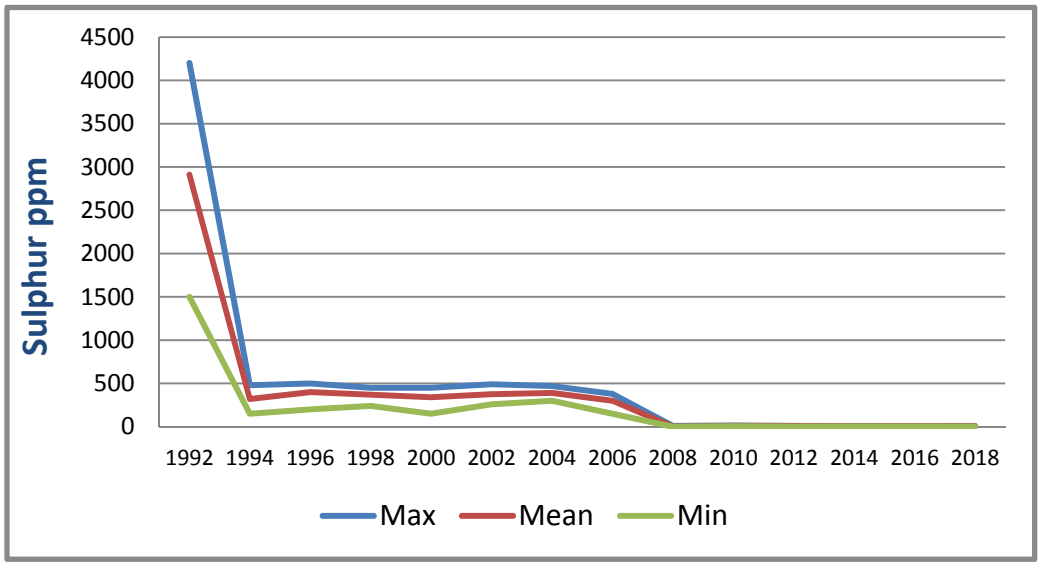
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1802043	DIES 1802044
Cloud Point, °C		**-7**	**-17**	**-55**	-11	-12
CFPP, °C		**-9**	**-24**	**-55**	-13	-13
Pour Point, °C		**-15**	**-32**	**-54**	-21	-21
HFRR, µm	520 (max)	**526**	**390**	**198**	417	317
Wax Content @ 10°C Below Cloud, wt%		**3.8**	**1.9**	**0.6**	2	1.9
Rancimat, hrs		**>30**	**>25**	**6**	>30	30
Sulphur, ppm	15 (max)	**10**	**6**	**3**	6	7
Density @15°C, kg/m^3		**862**	**843**	**807**	845	846
Viscosity @ 40°C, cSt	1.9 - 4.1	**3.51**	**2.58**	**1.40**	2.60	2.59
Cetane Index $_{2\ Variable}$		**58**	**48**	**44**	49	48
Cetane Index $_{4\ Variable}$	40 (min)	**61**	**48**	**43**	48	47
Cetane Number	40 (min)	**60**	**48**	**42**	47	47
Distillation, °C IBP		**204**	**171**	**151**	158	151
T_{10}		**239**	**209**	**178**	205	203
T_{20}		**250**	**224**	**185**	221	221
T_{50}		**282**	**261**	**209**	265	265
T_{90}	282 - 338	**336**	**323**	**255**	331	332
T_{95}		**358**	**340**	**270**	350	351
FBP		**367**	**352**	**290**	363	363
% FAME	5 (max)	**21**	**2**	**0**	0	2

USA – Midwest









USA – West Coast

National standards and physical inspection data

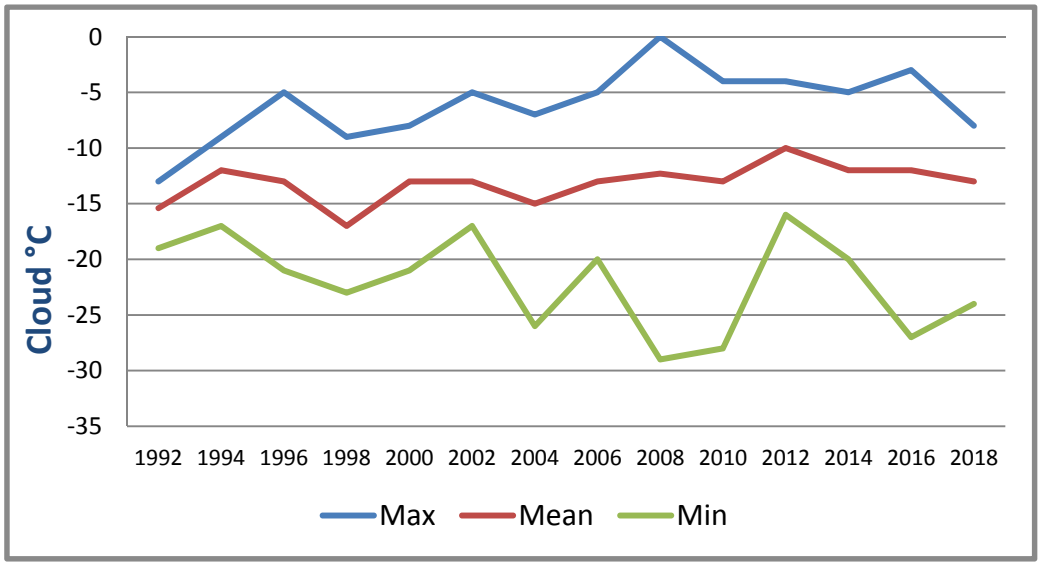
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1801570	DIES 1801571	DIES 1801572	DIES 1801573	DIES 1801915	DIES 1801917	DIES 1801919
Cloud Point, °C		**-8**	**-13**	**-24**	-9	-8	-24	-11	-9	-8	-10
CFPP, °C		**-10**	**-18**	**-35**	-11	-10	-23	-16	-13	-13	-11
Pour Point, °C		**-12**	**-23**	**-42**	-12	-15	-36	-18	-15	-15	-12
HFRR, µm	520 (max)	**526**	**448**	**289**	326	289	477	506	516	503	363
Wax Content @ 10°C Below Cloud, wt%		**3.5**	**2.4**	**1.3**	3	2.4	3.5	1.3	2.2	1.8	3
Rancimat, hrs		**>30**	**>25**	**4**	20	4	>30	>30	26	>30	23
Sulphur, ppm	15 (max)	**7**	**4**	**3**	3	3	3	3	5	4	3
Density @15°C, kg/m^3		**844**	**828**	**780**	830	833	780	831	830	829	830
Viscosity @ 40°C, cSt	1.9 - 4.1	**2.96**	**2.49**	**2.16**	2.24	2.76	2.96	2.33	2.60	2.52	2.17
Cetane Index $_{2\ Variable}$		**77**	**53**	**48**	49	53	77	49	53	52	49
Cetane Index $_{4\ Variable}$	40 (min)	**94**	**55**	**47**	50	53	94	50	53	52	50
Cetane Number	40 (min)	**78**	**53**	**46**	52	54	78	50	52	52	52
Distillation, °C IBP		**181**	**172**	**159**	178	178	159	170	168	170	181
T_{10}		**262**	**211**	**197**	208	216	262	197	199	201	208
T_{20}		**271**	**223**	**210**	217	230	271	210	215	215	217
T_{50}		**282**	**258**	**245**	248	265	282	249	263	257	245
T_{90}	282 - 338	**333**	**321**	**294**	324	330	294	322	333	333	321
T_{95}		**354**	**337**	**299**	341	347	299	349	349	354	339
FBP		**366**	**350**	**315**	354	359	315	366	362	365	352
% FAME	5 (max)	**5**	**1**	**0**	5	3	0	0	0	0	5

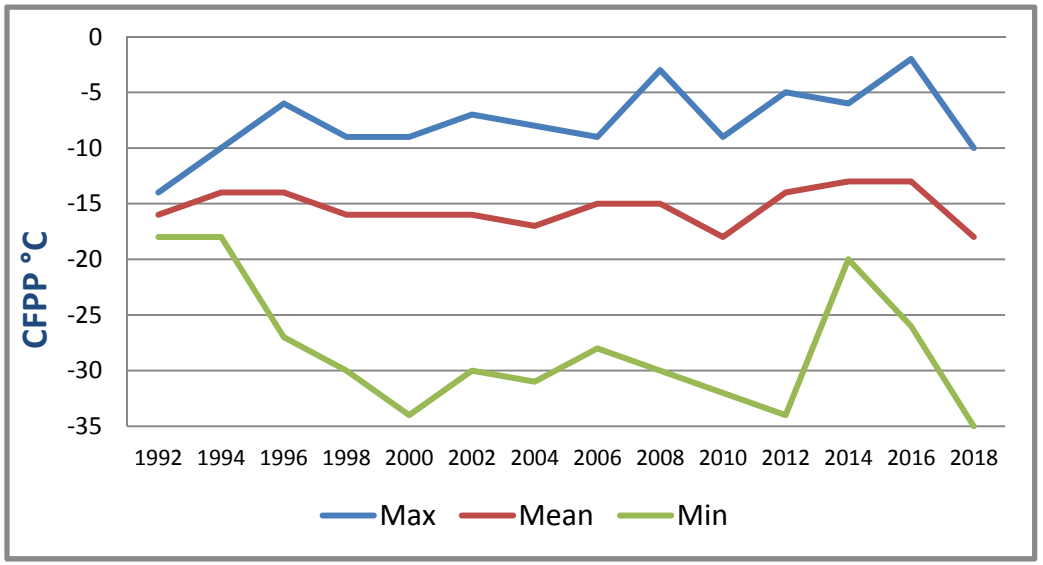
USA – West Coast

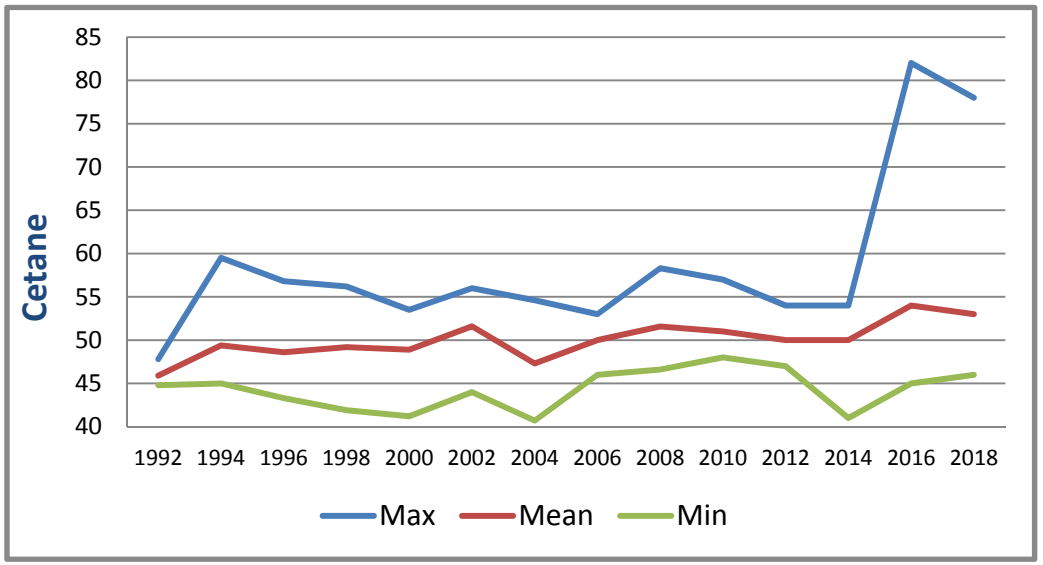
National standards and physical inspection data

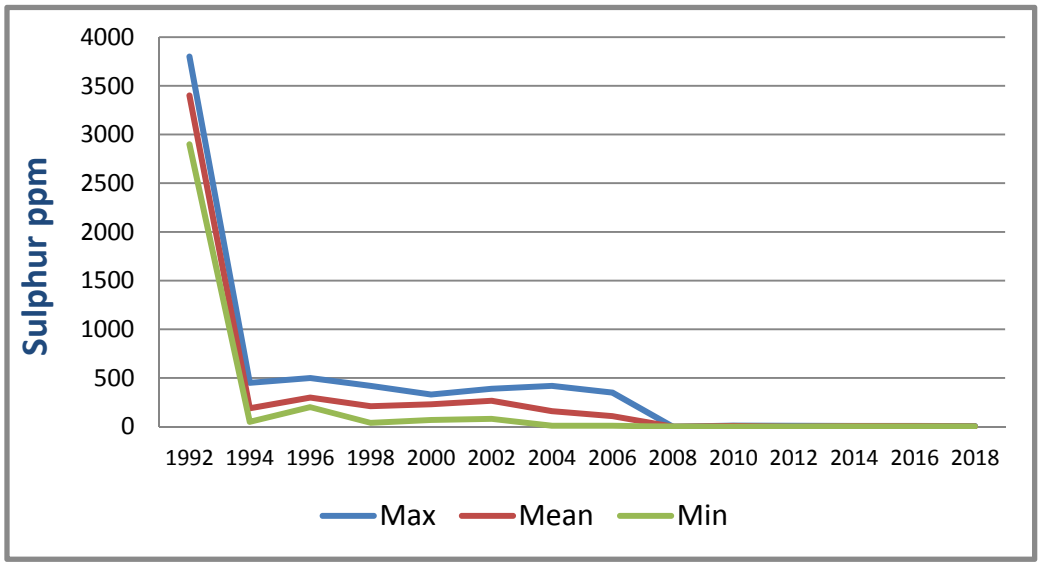
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1801920	DIES 1801923	DIES 1802035
Cloud Point, °C		**-8**	**-13**	**-24**	-18	-21	-15
CFPP, °C		**-10**	**-18**	**-35**	-35	-21	-32
Pour Point, °C		**-12**	**-23**	**-42**	-42	-24	-36
HFRR, µm	520 (max)	**526**	**448**	**289**	518	526	455
Wax Content @ 10°C Below Cloud, wt%		**3.5**	**2.4**	**1.3**	1.6	3.4	2.2
Rancimat, hrs		**>30**	**>25**	**4**	>30	>30	>30
Sulphur, ppm	15 (max)	**7**	**4**	**3**	7	6	6
Density @15°C, kg/m^3		**844**	**828**	**780**	842	827	844
Viscosity @ 40°C, cSt	1.9 - 4.1	**2.96**	**2.49**	**2.16**	2.48	2.16	2.68
Cetane Index $_{2\ Variable}$		**77**	**53**	**48**	48	51	49
Cetane Index $_{4\ Variable}$	40 (min)	**94**	**55**	**47**	47	51	49
Cetane Number	40 (min)	**78**	**53**	**46**	46	48	48
Distillation, °C IBP		**181**	**172**	**159**	171	170	172
T_{10}		**262**	**211**	**197**	203	203	211
T_{20}		**271**	**223**	**210**	218	215	226
T_{50}		**282**	**258**	**245**	258	249	266
T_{90}	282 - 338	**333**	**321**	**294**	323	303	325
T_{95}		**354**	**337**	**299**	338	317	340
FBP		**366**	**350**	**315**	350	329	350
% FAME	5 (max)	**5**	**1**	**0**	0	0	0

USA – West Coast









Worldwide Survey – Middle East and Africa

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Bahrain

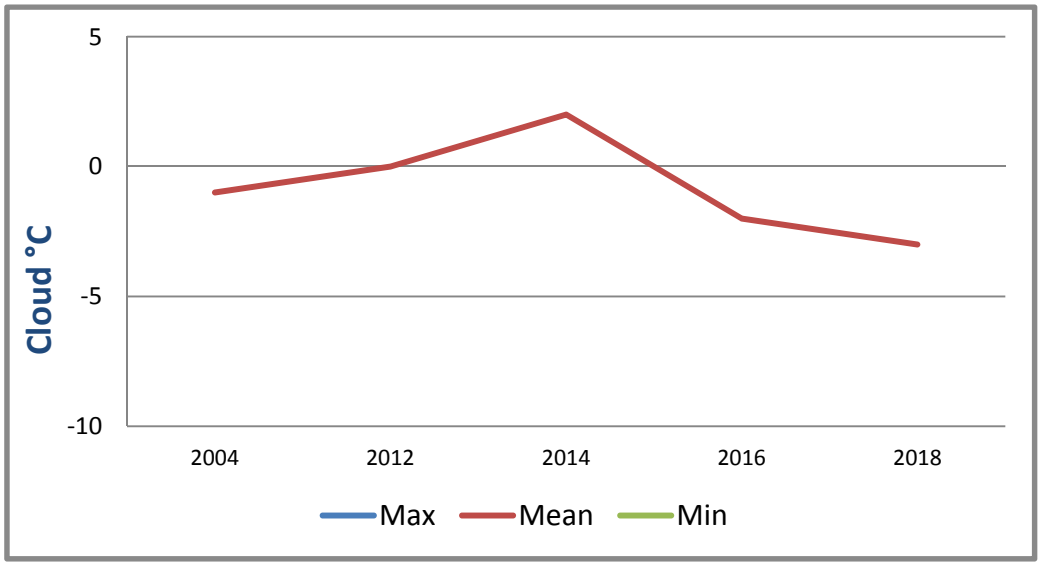
Middle East and Africa

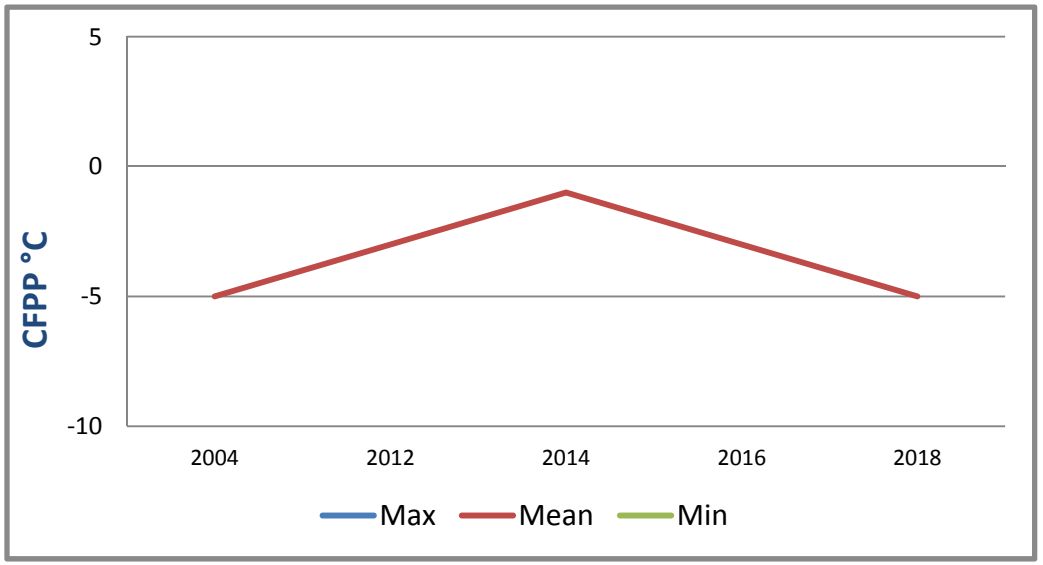
National standards and physical inspection data

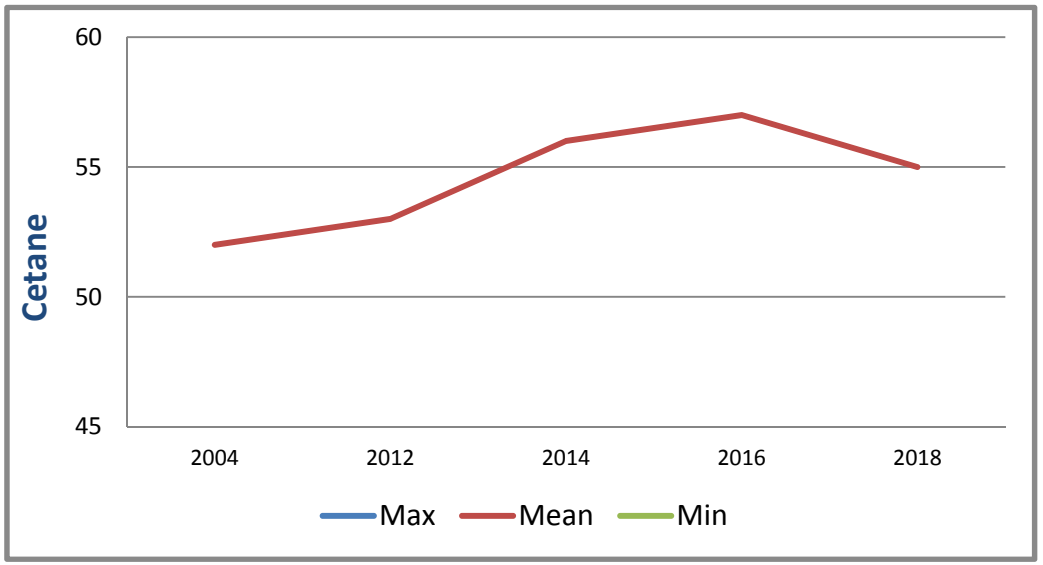
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800392
Cloud Point, °C			**-3**		-3
CFPP, °C	0 (max)		**-5**		-5
Pour Point, °C			**-9**		-9
HFRR, µm	460 (max)		**428**		428
Wax Content @ 10°C Below Cloud, wt%			**3.9**		3.9
Rancimat, hrs			**>30**		>30
Sulphur, ppm	500 (max)		**<3**		<3
Density @15°C, kg/m^3	820 - 845		**833**		833
Viscosity @ 40°C, cSt	2.0 - 4.5		**3.48**		3.48
Cetane Index $_{2\ Variable}$			**58**		58
Cetane Index $_{4\ Variable}$	46 (min)		**61**		61
Cetane Number			**55**		55
Distillation, °C IBP			**162**		162
T_{10}			**240**		240
T_{20}			**259**		259
T_{50}			**293**		293
T_{90}	357 (max)		**345**		345
T_{95}			**360**		360
FBP			**361**		361
% FAME			**0**		0

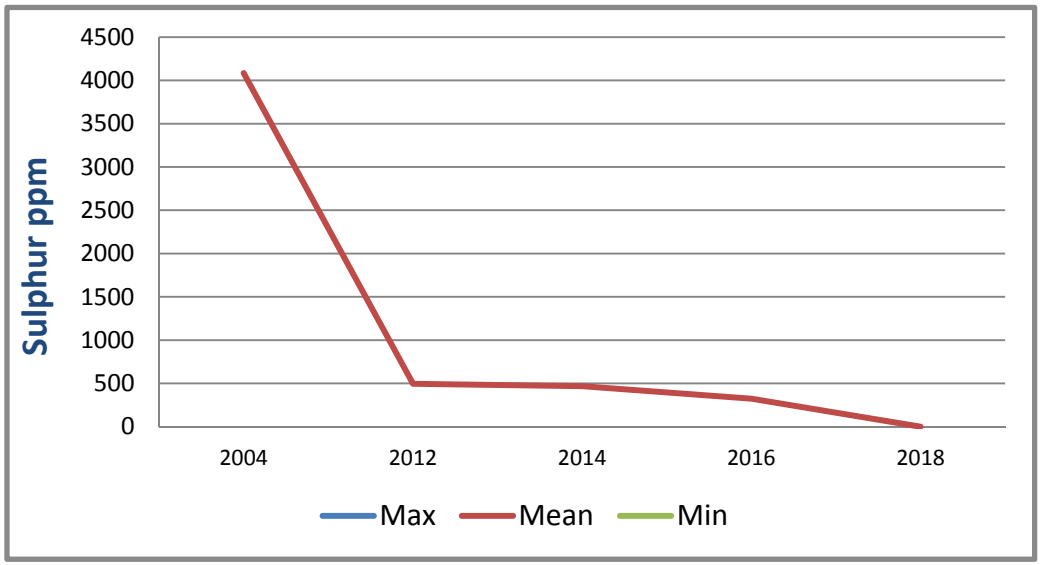
Bahrain

Middle East and Africa









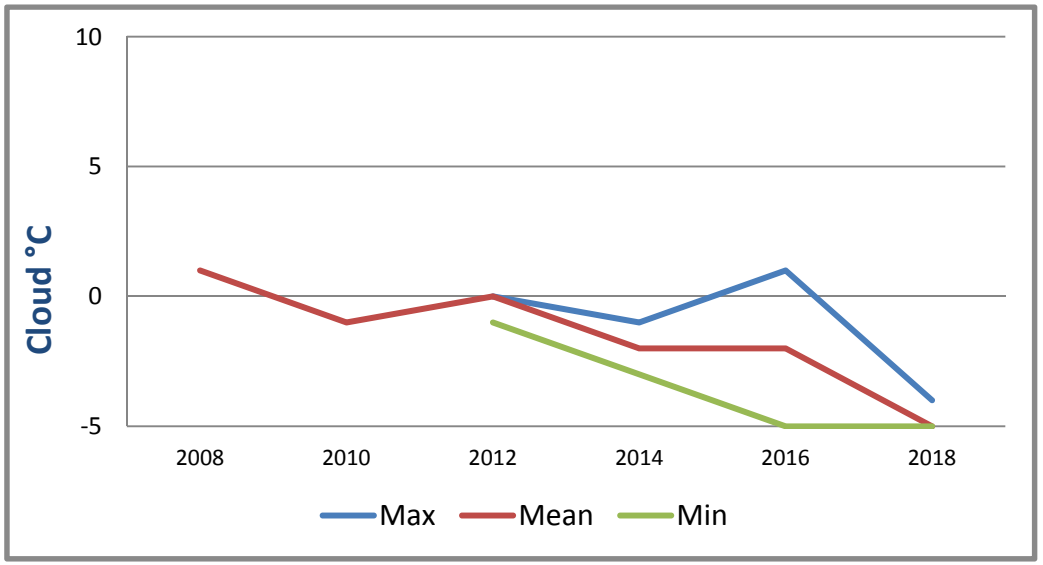
Israel

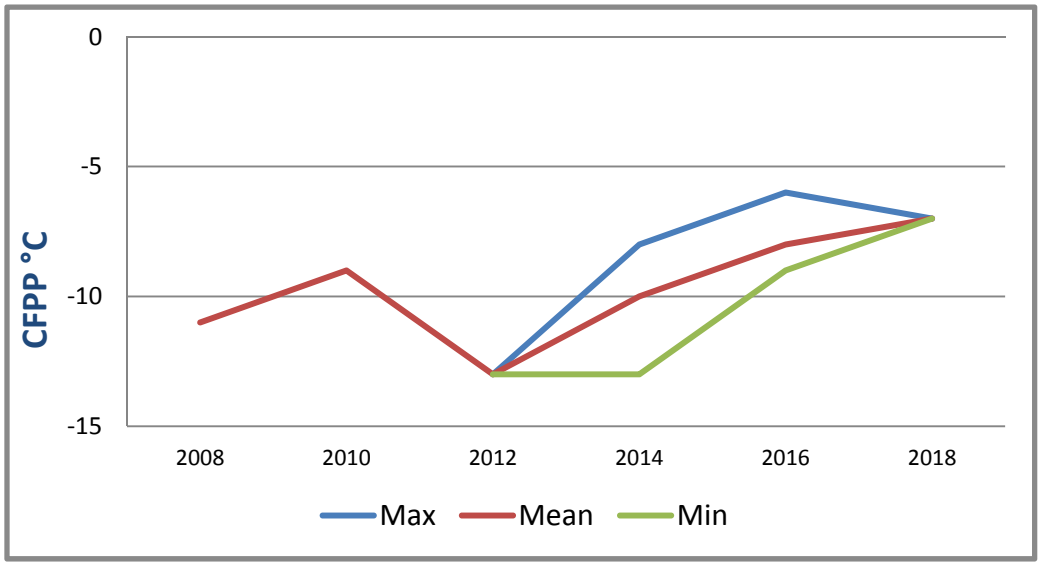
National standards and physical inspection data

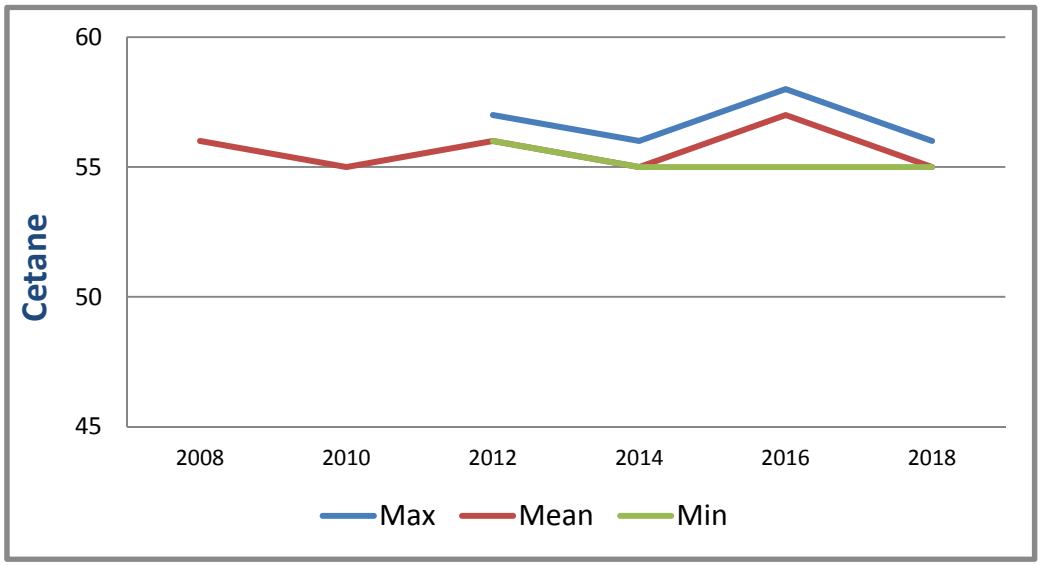
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800393	DIES 1800394
Cloud Point, °C		**-4**	**-5**	**-5**	-4	-5
CFPP, °C	-5 (max)	**-7**	**-7**	**-7**	-7	-7
Pour Point, °C		**-6**	**-9**	**-12**	-6	-12
HFRR, µm	460 (max)	**445**	**427**	**410**	410	445
Wax Content @ 10°C Below Cloud, wt%		**3.7**	**3.7**	**3.7**	3.7	3.7
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	50 (max)	**8**	**8**	**7**	8	7
Density @15°C, kg/m^3	820 - 845	**842**	**842**	**842**	842	842
Viscosity @ 40°C, cSt	2.0 - 4.5	**3.10**	**3.09**	**3.08**	3.10	3.08
Cetane Index $_{2\ Variable}$		**52**	**52**	**52**	52	52
Cetane Index $_{4\ Variable}$	46 (min)	**53**	**53**	**53**	53	53
Cetane Number	51 (min)	**56**	**55**	**55**	56	55
Distillation, °C IBP		**188**	**187**	**187**	187	188
T_{10}		**228**	**227**	**227**	227	228
T_{20}		**243**	**243**	**242**	242	243
T_{50}		**279**	**279**	**278**	278	279
T_{90}		**336**	**335**	**335**	335	336
T_{95}	360 (max)	**354**	**353**	**352**	352	354
FBP		**367**	**366**	**365**	365	367
% FAME	7 (max)	**0**	**0**	**0**	0	0

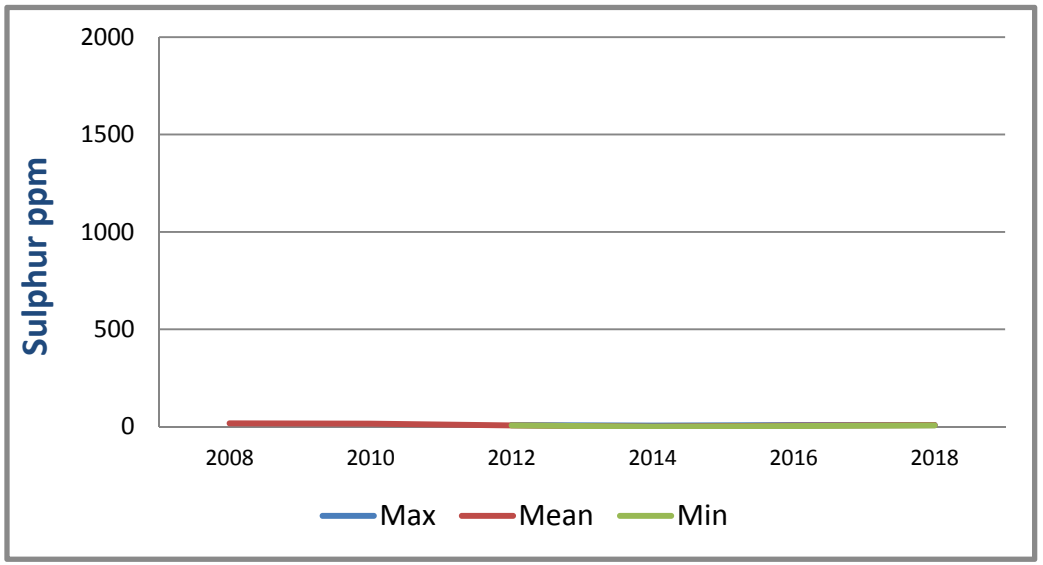
Israel

Middle East and Africa









Kuwait

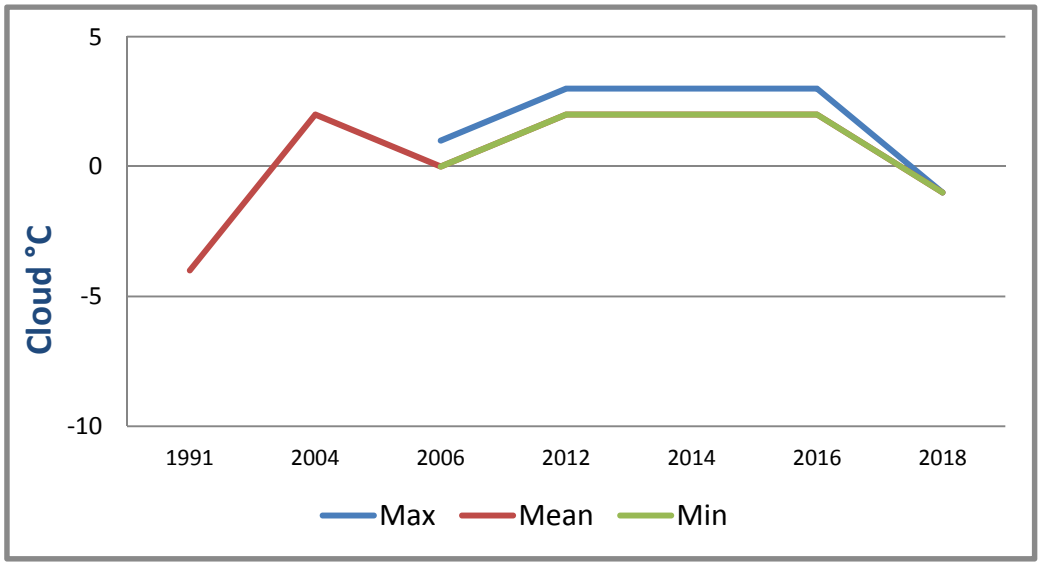
Middle East and Africa

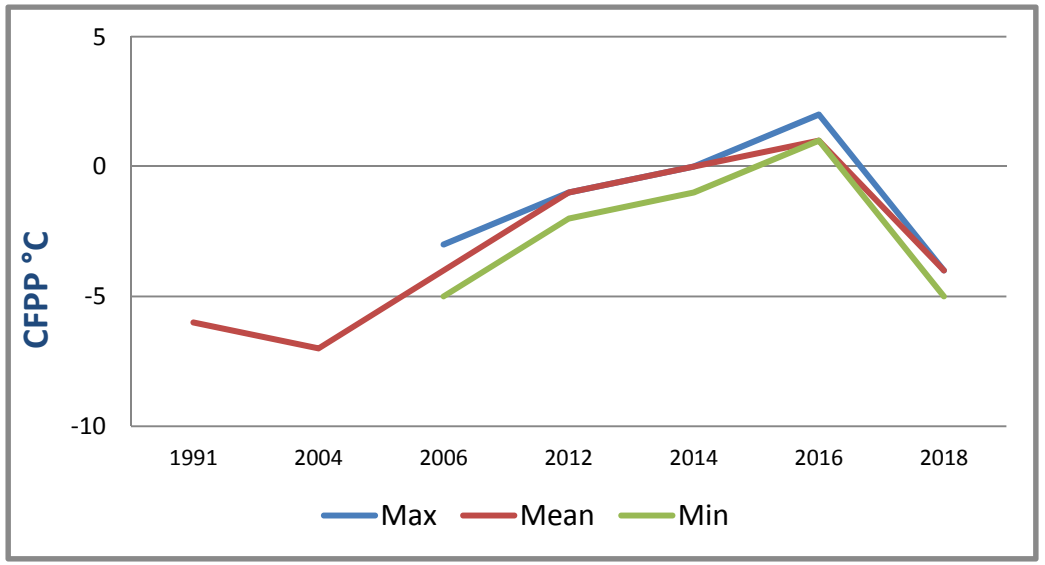
National standards and physical inspection data

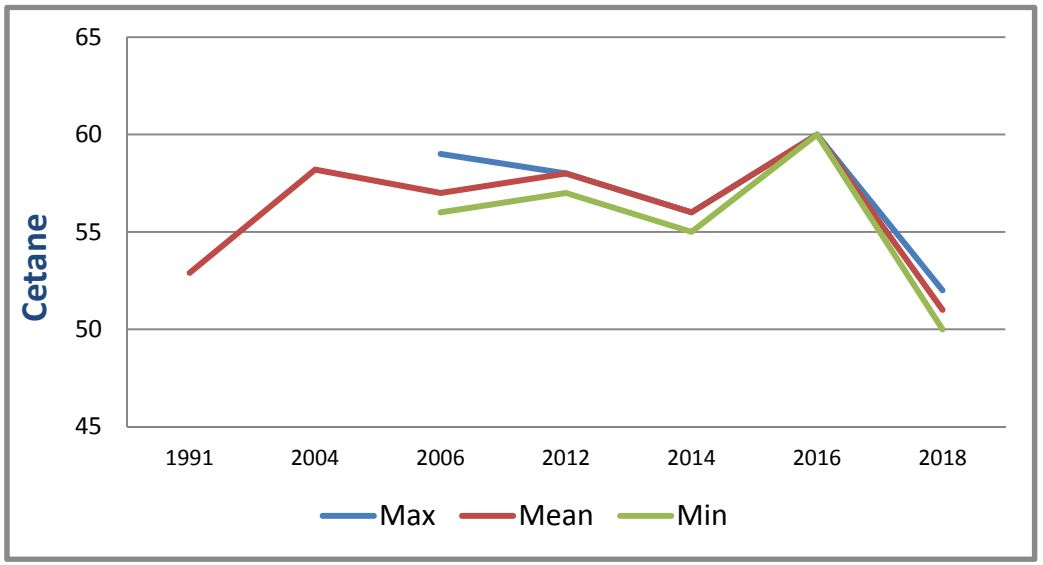
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800395	DIES 1800396
Cloud Point, °C	4 (max)	**-1**	**-1**	**-1**	-1	-1
CFPP, °C		**-4**	**-4**	**-5**	-4	-5
Pour Point, °C	0 (max)	**-6**	**-6**	**-6**	-6	-6
HFRR, µm		**490**	**484**	**478**	478	490
Wax Content @ 10°C Below Cloud, wt%		**3.0**	**3.0**	**2.9**	2.9	3
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	2000 (max)	**1220**	**1029**	**837**	1220	837
Density @15°C, kg/m^3	820 - 870	**849**	**845**	**842**	849	842
Viscosity @ 40°C, cSt	1.6 - 5.5	**3.58**	**3.50**	**3.43**	3.58	3.43
Cetane Index $_{2\ Variable}$		**54**	**53**	**52**	52	54
Cetane Index $_{4\ Variable}$	48 (min)	**55**	**54**	**53**	53	55
Cetane Number		**52**	**51**	**50**	50	52
Distillation, °C IBP		**195**	**193**	**192**	195	192
T_{10}		**231**	**231**	**231**	231	231
T_{20}		**249**	**249**	**248**	249	248
T_{50}		**292**	**290**	**288**	292	288
T_{90}	357 (max)	**351**	**350**	**350**	351	350
T_{95}		**369**	**368**	**367**	369	367
FBP		**378**	**378**	**377**	378	377
% FAME		**0**	**0**	**0**	0	0

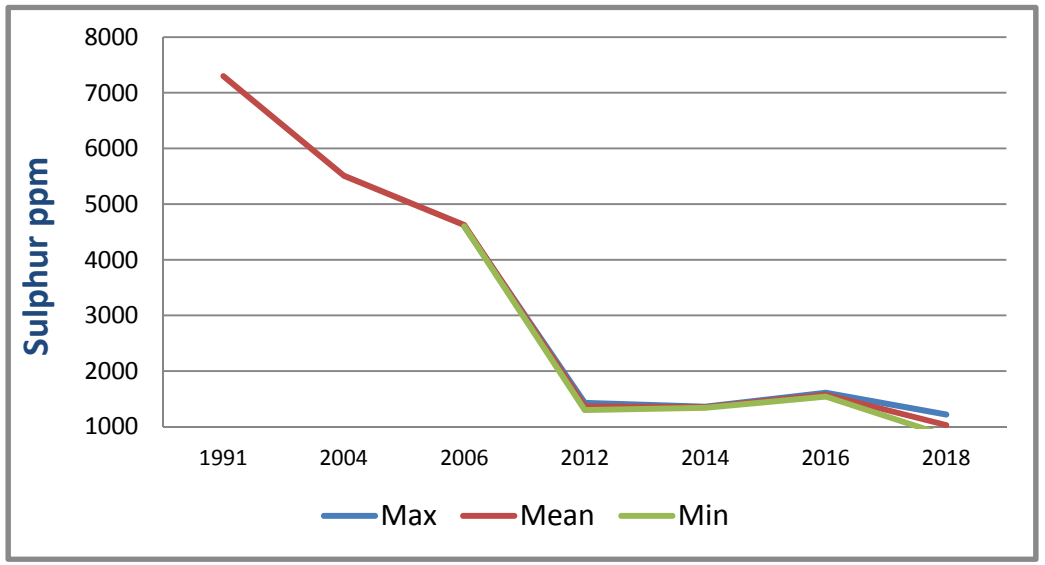
Kuwait

Middle East and Africa









Oman

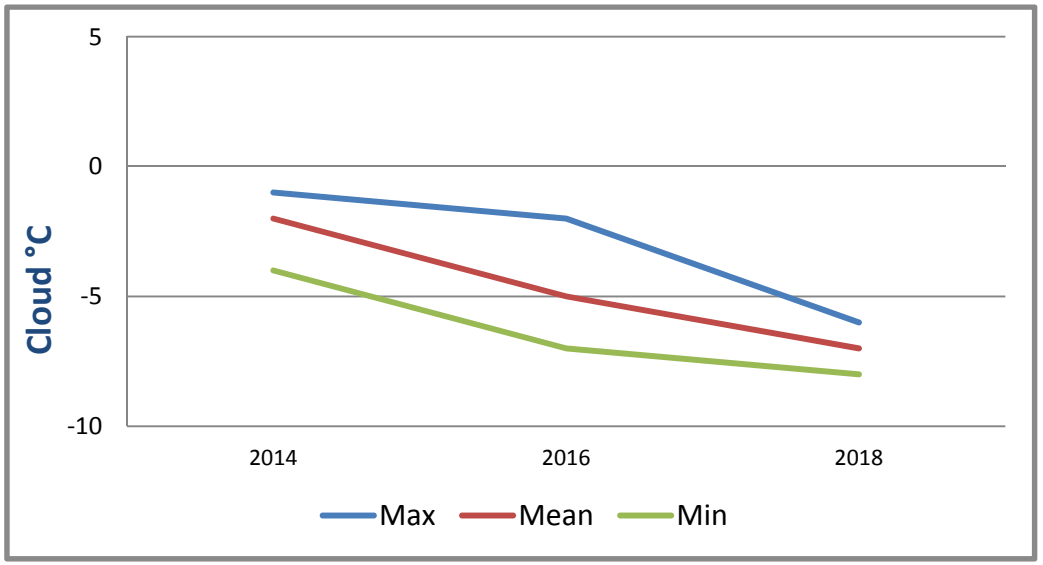
Middle East and Africa

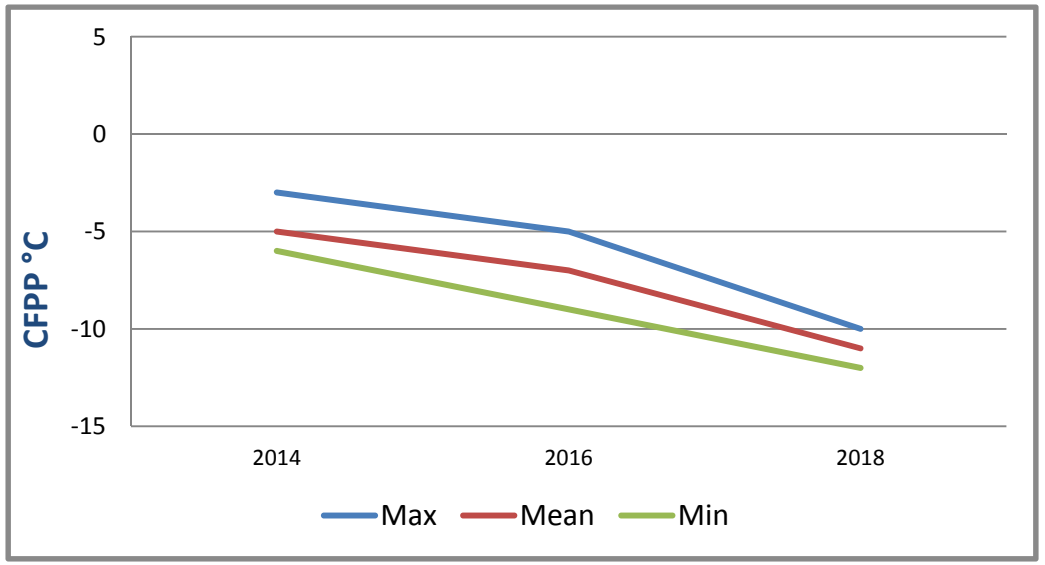
National standards and physical inspection data

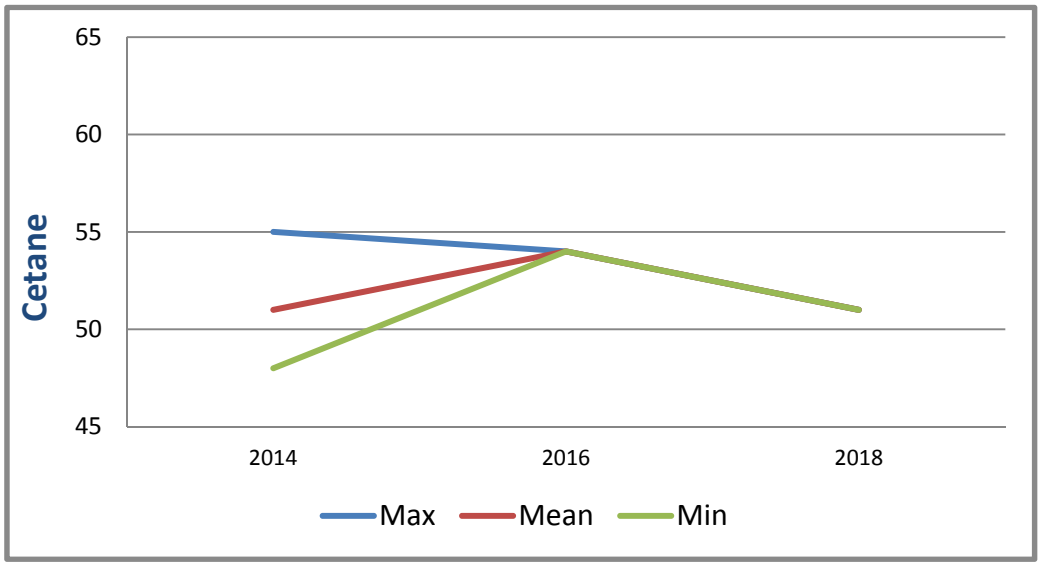
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800403	DIES 1800404
Cloud Point, °C		**-6**	**-7**	**-8**	-8	-6
CFPP, °C		**-10**	**-11**	**-12**	-12	-10
Pour Point, °C	0 (max)	**-15**	**-15**	**-15**	-15	-15
HFRR, µm	460 (max)	**428**	**412**	**397**	397	428
Wax Content @ 10°C Below Cloud, wt%		**2.7**	**2.4**	**2.1**	2.1	2.7
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	500 (max)	**288**	**205**	**122**	288	122
Density @15°C, kg/m^3	820 - 870	**844**	**840**	**835**	835	844
Viscosity @ 40°C, cSt	1.6 - 5.3	**3.34**	**3.04**	**2.75**	2.75	3.34
Cetane Index $_{2\ Variable}$		**52**	**52**	**52**	52	52
Cetane Index $_{4\ Variable}$	47 (min)	**53**	**53**	**52**	52	53
Cetane Number		**51**	**51**	**51**	51	51
Distillation, °C IBP		**191**	**184**	**177**	177	191
T_{10}		**227**	**218**	**210**	210	227
T_{20}		**243**	**234**	**225**	225	243
T_{50}		**282**	**275**	**268**	268	282
T_{90}		**339**	**336**	**332**	332	339
T_{95}		**355**	**353**	**351**	351	355
FBP		**364**	**364**	**363**	363	364
% FAME		**0**	**0**	**0**	0	0

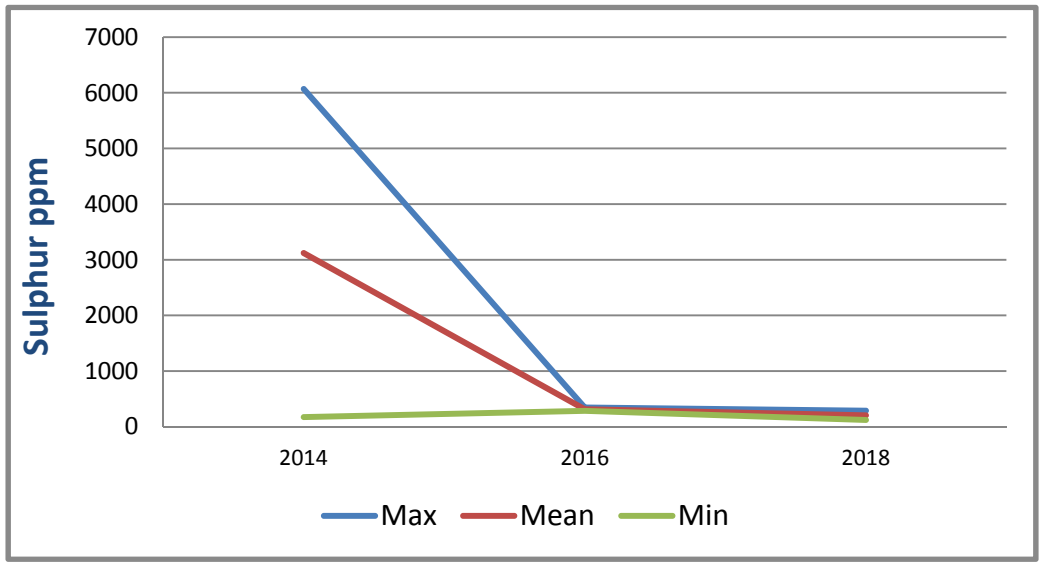
Oman

Middle East and Africa









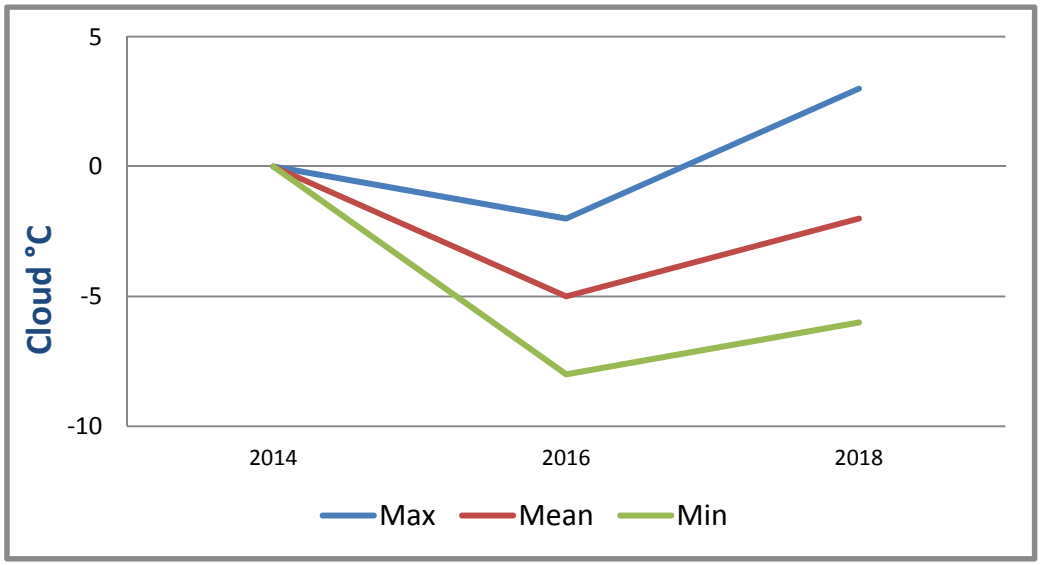
Qatar

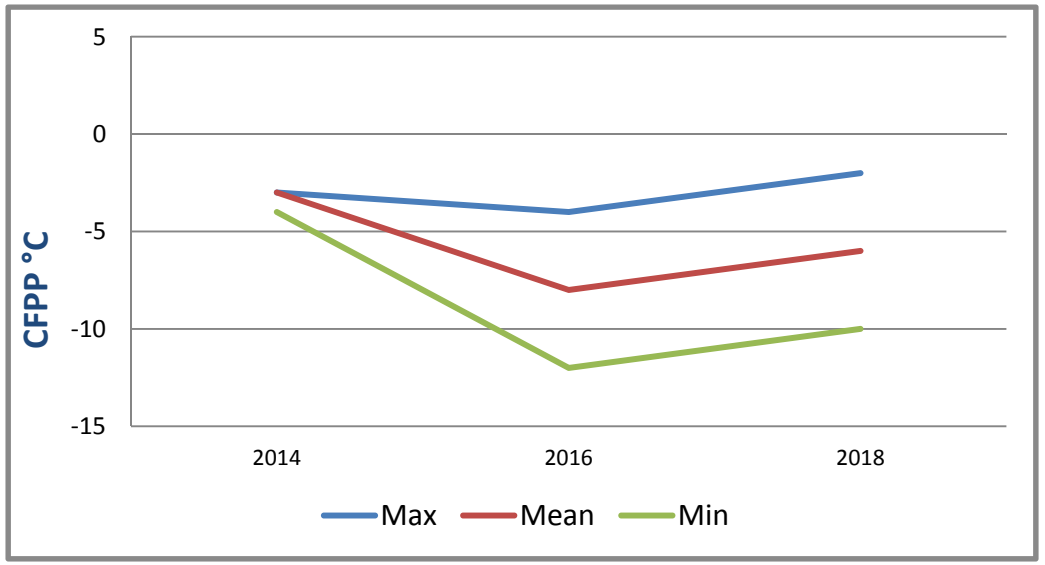
National standards and physical inspection data

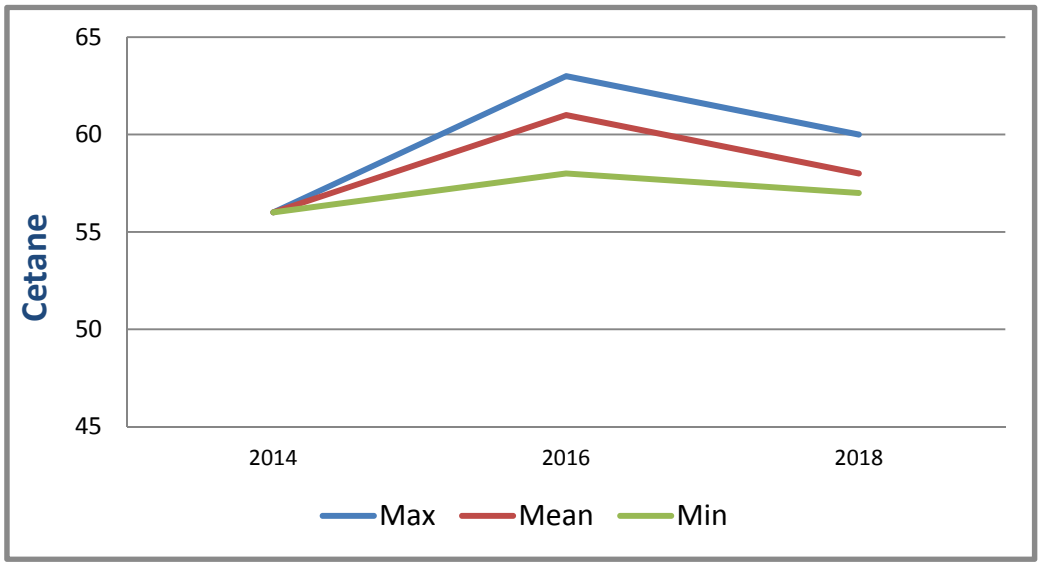
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800400	DIES 1800401
Cloud Point, °C		**3**	**-2**	**-6**	-6	3
CFPP, °C		**-2**	**-6**	**-10**	-10	-2
Pour Point, °C		**-3**	**-6**	**-9**	-9	-3
HFRR, µm		**558**	**485**	**412**	412	558
Wax Content @ 10°C Below Cloud, wt%		**5.2**	**3.9**	**2.6**	5.2	2.6
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30
Sulphur, ppm	2000 (max)	**406**	**221**	**36**	36	406
Density @15°C, kg/m^3	820 - 850	**837**	**831**	**826**	826	837
Viscosity @ 40°C, cSt	1.6 - 6	**3.52**	**3.51**	**3.50**	3.52	3.50
Cetane Index $_{2\ Variable}$		**59**	**57**	**55**	59	55
Cetane Index $_{4\ Variable}$	47 (min)	**63**	**60**	**57**	63	57
Cetane Number		**60**	**58**	**57**	60	57
Distillation, °C IBP		**217**	**204**	**191**	217	191
T_{10}		**248**	**245**	**242**	248	242
T_{20}		**258**	**256**	**254**	258	254
T_{50}		**282**	**282**	**282**	282	282
T_{90}	365 (max)	**356**	**343**	**331**	331	356
T_{95}		**382**	**368**	**354**	354	382
FBP		**387**	**375**	**362**	362	387
% FAME		**0**	**0**	**0**	0	0

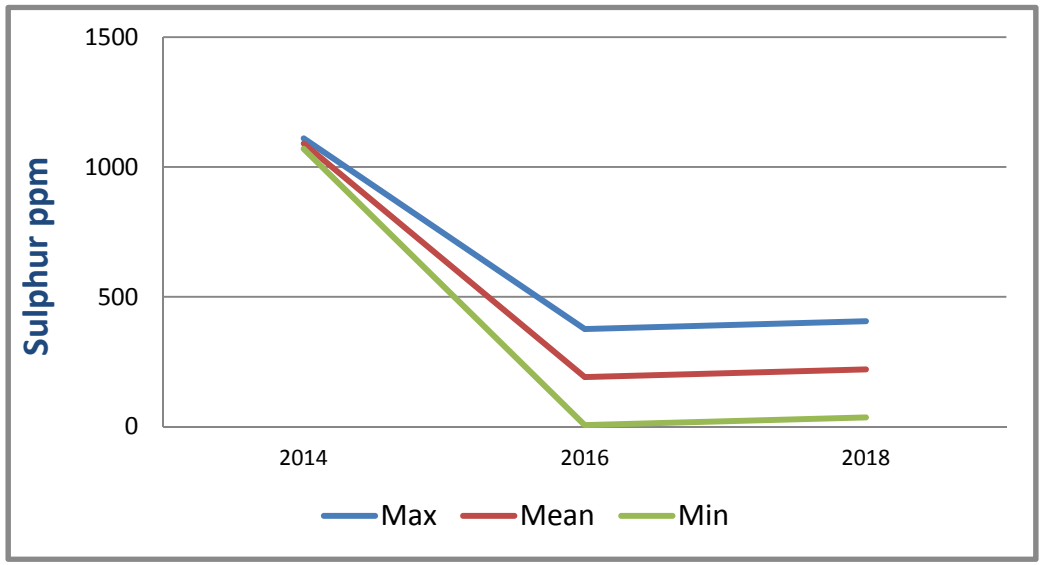
Qatar

Middle East and Africa









Saudi Arabia

Middle East and Africa

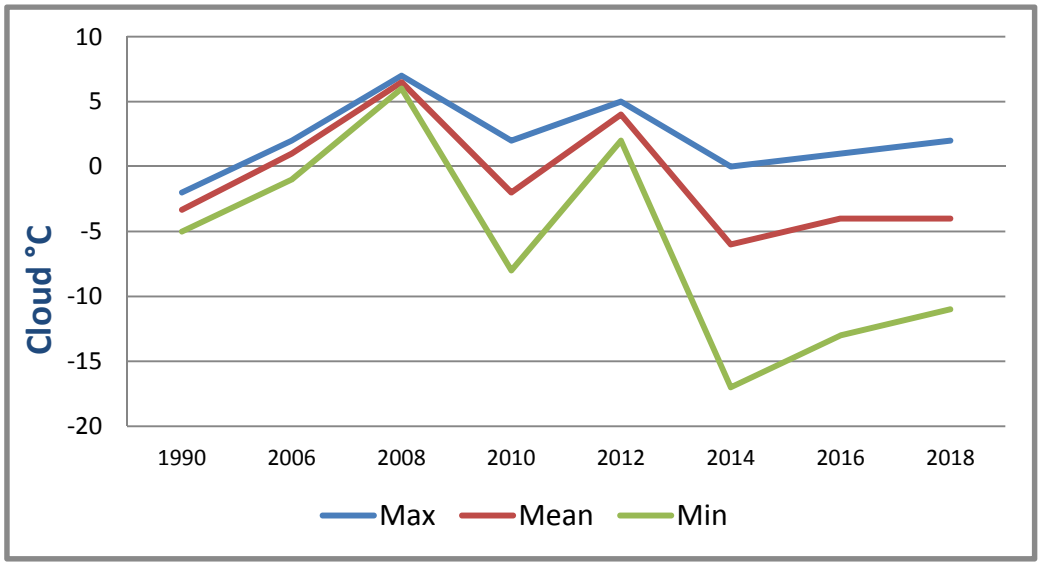
National standards and physical inspection data

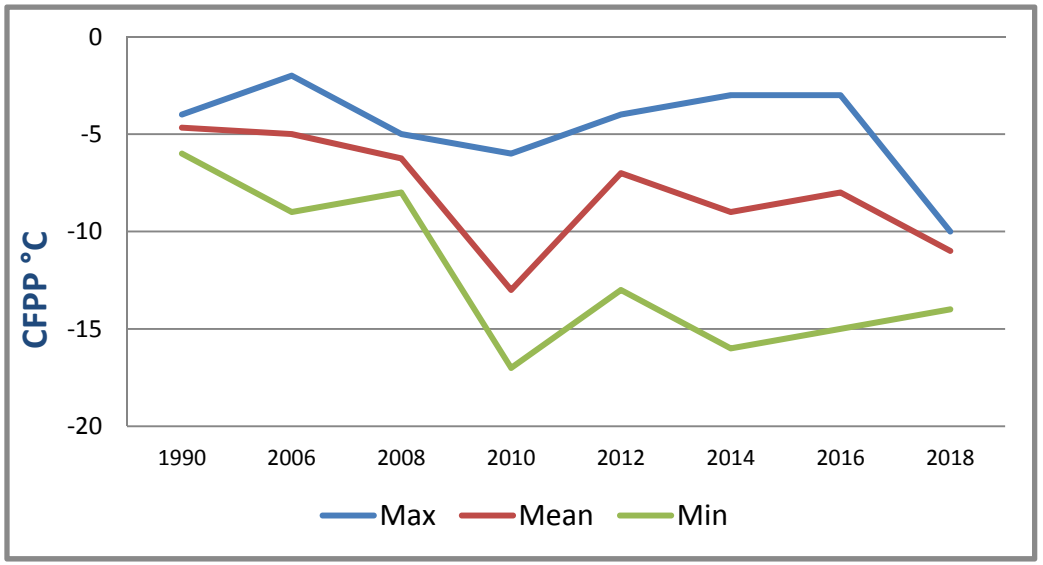
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800526	DIES 1800527	DIES 1800528	DIES 1801065
Cloud Point, °C	2 (max) *	**2**	**-4**	**-11**	2	-8	2	-11
CFPP, °C	-4 (max) *	**-10**	**-11**	**-14**	-11	-11	-10	-14
Pour Point, °C		**-12**	**-13**	**-15**	-12	-12	-12	-15
HFRR, µm		**630**	**578**	**538**	630	538	594	550
Wax Content @ 10°C Below Cloud, wt%		**4.8**	**3.2**	**1.9**	1.9	4.1	1.9	4.8
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30	>30
Sulphur, ppm	500 (max)	**431**	**381**	**328**	431	340	425	328
Density @15°C, kg/m^3		**846**	**835**	**826**	826	846	826	845
Viscosity @ 40°C, cSt	1.9 - 4.1	**2.97**	**2.81**	**2.71**	2.71	2.97	2.75	2.82
Cetane Index $_{2\ Variable}$		**56**	**53**	**50**	56	51	56	50
Cetane Index $_{4\ Variable}$	45 (min)	**56**	**54**	**51**	56	51	56	51
Cetane Number		**57**	**53**	**49**	57	51	57	49
Distillation, °C IBP		**199**	**187**	**176**	176	199	176	199
T_{10}		**233**	**219**	**207**	208	233	207	230
T_{20}		**245**	**232**	**221**	221	245	221	243
T_{50}		**277**	**271**	**268**	268	277	268	273
T_{90}		**354**	**338**	**318**	354	328	354	318
T_{95}		**376**	**356**	**331**	376	343	375	331
FBP		**384**	**367**	**343**	384	356	384	343
% FAME		**0**	**0**	**0**	0	0	0	0

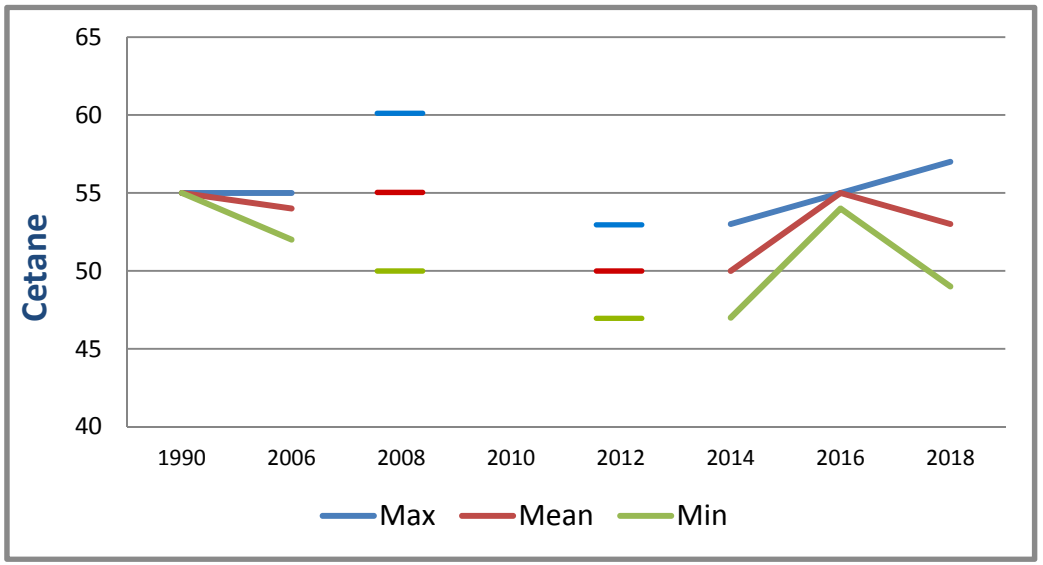
When CFPP is used the difference between cloud point and CFPP must not exceed 10°C.

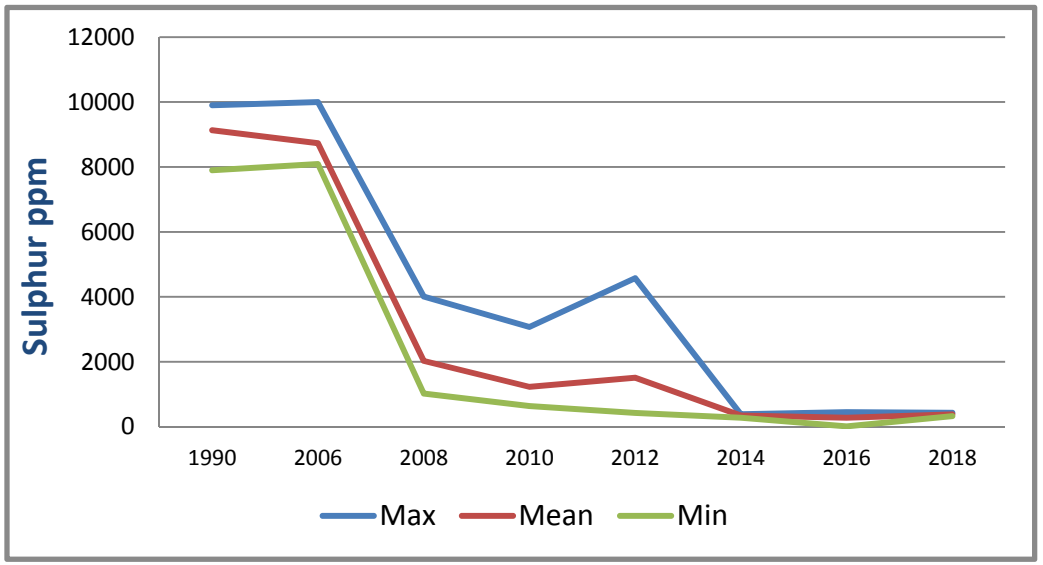
Saudi Arabia

Middle East and Africa









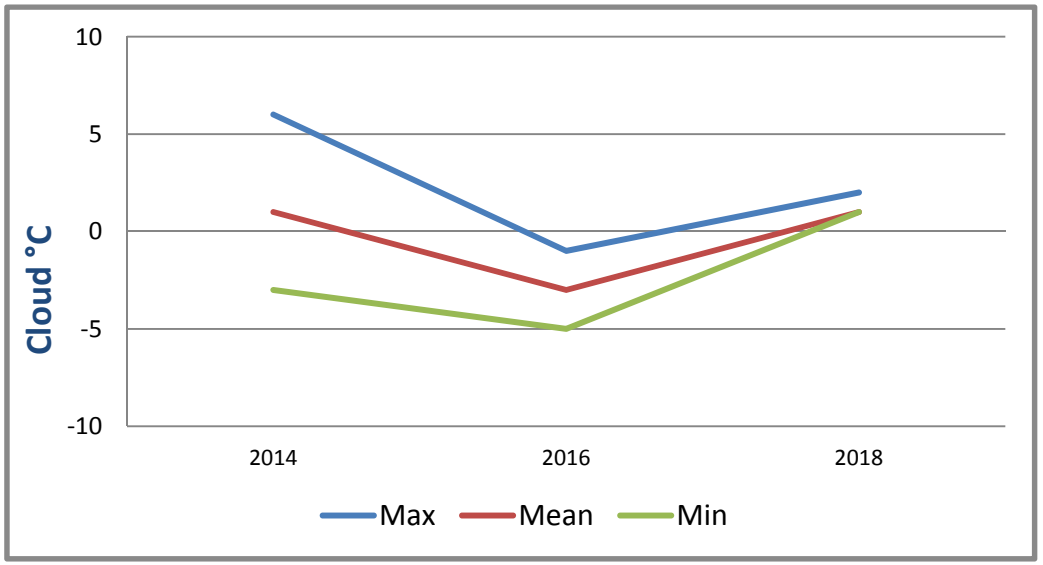
United Arab Emirates

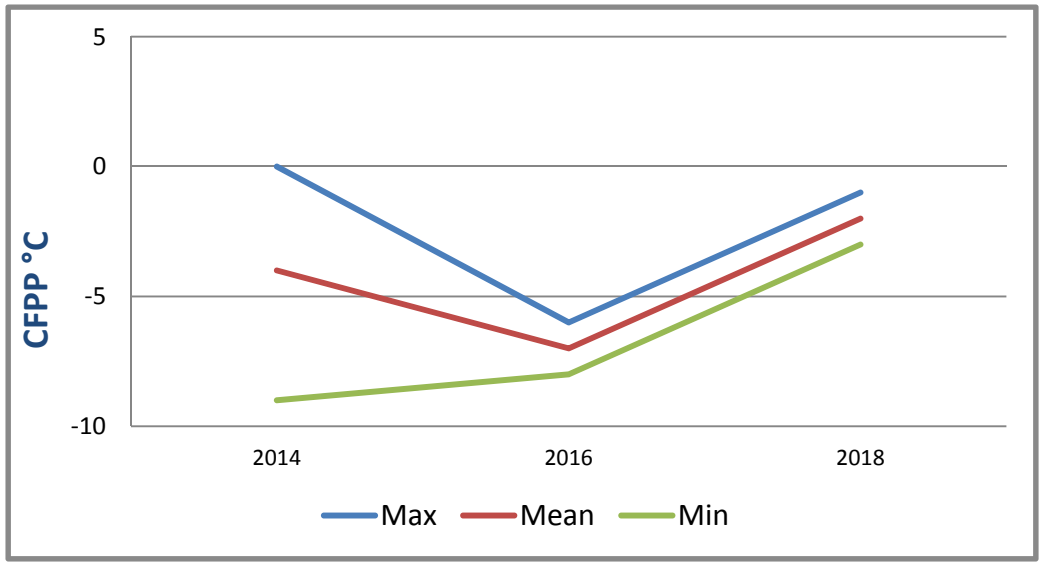
National standards and physical inspection data

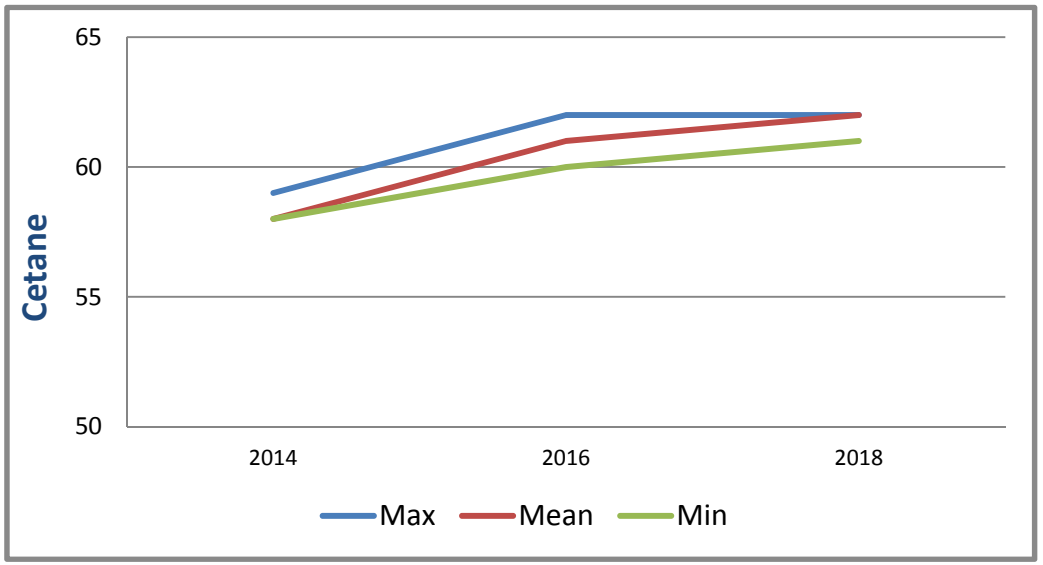
	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1800397	DIES 1800398	DIES 1800399
Cloud Point, °C		**2**	**1**	**1**	1	1	2
CFPP, °C	5 (max)	**-1**	**-2**	**-3**	-2	-3	-1
Pour Point, °C		**0**	**-2**	**-3**	-3	-3	0
HFRR, µm	460 (max)	**458**	**440**	**425**	436	425	458
Wax Content @ 10°C Below Cloud, wt%		**6.5**	**6.0**	**5.5**	5.9	5.5	6.5
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30
Sulphur, ppm	10 (max)	**8**	**8**	**8**	8	8	8
Density @15°C, kg/m^3	820 - 845	**831**	**828**	**825**	828	825	831
Viscosity @ 40°C, cSt	2 - 4.5	**3.70**	**3.53**	**3.45**	3.45	3.45	3.70
Cetane Index $_{2\ Variable}$		**60**	**59**	**58**	59	60	58
Cetane Index $_{4\ Variable}$	52 (min)	**64**	**63**	**63**	63	64	63
Cetane Number		**62**	**62**	**61**	62	61	62
Distillation, °C IBP		**213**	**198**	**185**	196	185	213
T_{10}		**254**	**243**	**236**	239	236	254
T_{20}		**267**	**260**	**256**	257	256	267
T_{50}		**292**	**291**	**289**	289	290	292
T_{90}	357 (max)	**344**	**343**	**343**	343	344	343
T_{95}		**360**	**359**	**358**	358	360	359
FBP		**368**	**367**	**366**	366	366	368
% FAME		**0**	**0**	**0**	0	0	0

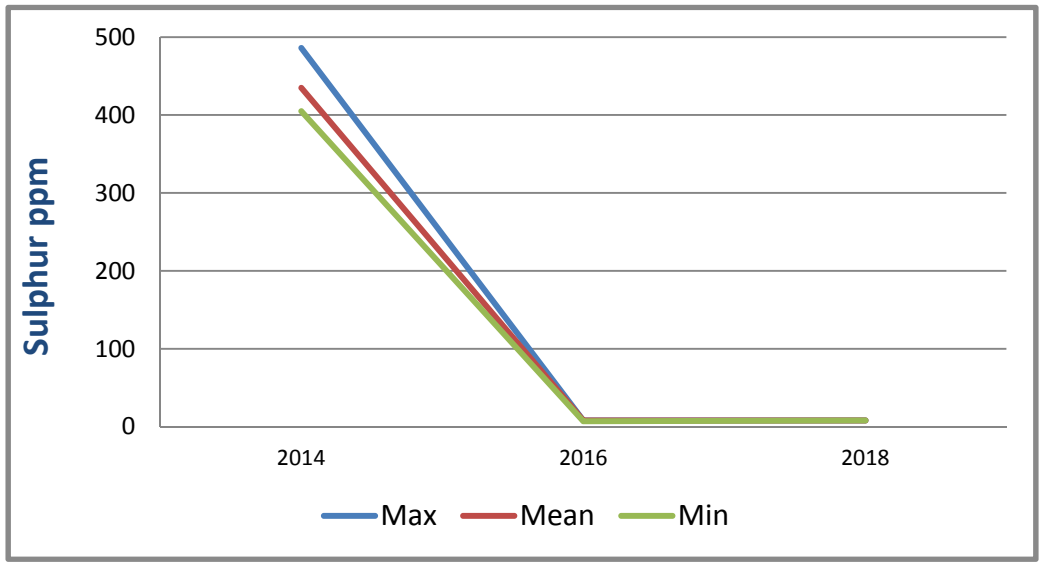
United Arab Emirates

Middle East and Africa









South Africa

National standards and physical inspection data

Middle East and Africa

	National Standard	Maximum Observed	Mean	Minimum Observed	DIES 1706009	DIES 1706011	DIES 1706012	DIES 1706013	DIES 1706014	DIES 1706015
Cloud Point, °C		**6**	**-2**	**-7**	-7	-3	6	-3	-2	-2
CFPP, °C	-4 (max)	**3**	**-7**	**-15**	-15	-10	3	-10	-6	-7
Pour Point, °C		**3**	**-9**	**-15**	-15	-12	3	-12	-6	-9
HFRR, µm	460 (max)	**441**	**393**	**317**	371	417	317	441	405	405
Wax Content @ 10°C Below Cloud, wt%		**4.6**	**2.6**	**0.9**	1.8	2.5	2.3	3.3	4.6	0.9
Rancimat, hrs		**>30**	**>30**	**>30**	>30	>30	>30	>30	>30	>30
Sulphur, ppm	50 (max)	**41**	**12**	**<3**	5	9	41	9	7	<3
Density @15°C, kg/m^3		**853**	**835**	**827**	837	833	853	835	827	827
Viscosity @ 40°C, cSt	2.2 - 5.3	**3.72**	**2.93**	**2.17**	2.67	2.79	3.72	3.03	3.20	2.17
Cetane Index $_{2\ Variable}$		**59**	**53**	**49**	51	53	50	55	59	49
Cetane Index $_{4\ Variable}$		**62**	**54**	**50**	51	54	51	56	62	50
Cetane Number	45 (min)	**59**	**54**	**51**	51	55	51	56	59	51
Distillation, °C IBP		**190**	**180**	**176**	178	176	190	179	180	178
T_{10}		**236**	**219**	**200**	211	214	236	221	231	200
T_{20}		**251**	**234**	**209**	224	229	251	239	249	209
T_{50}		**286**	**271**	**242**	262	270	286	279	285	242
T_{90}	362 (max)	**354**	**342**	**336**	336	339	354	341	338	342
T_{95}		**379**	**363**	**353**	356	358	378	356	353	379
FBP		**392**	**373**	**359**	368	369	388	363	359	392
% FAME	5 (max)	**0**	**0**	**0**	0	0	0	0	0	0

South Africa

Middle East and Africa