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review

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Cover photograph: Lukoil refinery, Odessa, Ukraine

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Forewords

Alain Heilbrunn

When I joined CONCAWE in late 2004, I took the helm of an organisation which had already proved its value to the oil industry through more than 40 years of technical contributions, and whose credibility and professionalism was acknowledged both within the industry and beyond. Following the sound principle that one does not change a winning formula, I considered that my role was not to revolutionise CONCAWE, but to guide it into the future. I had the privilege of becoming part of an organisation staffed with individuals of great creativity and professionalism. While there have been many changes in the technical staff during my time here, one thing has remained constant—the very high quality of the Secretariat staff and of the company experts who contribute to the work of our task forces and working groups.

From what I have observed, I believe that three qualities are essential to contribute successfully to CONCAWE's work. Surprisingly, perhaps, the first is modesty. Without modesty, one can become too preoccupied by one's own perspective on a problem, making it difficult to present data in an accurate and dispassionate manner. The culture of modesty is well-established in CONCAWE.

The second quality is expertise, because only the real expert can understand and interpret facts, and grasp and describe the right relationships. CONCAWE is only in a position to do this because our members provide us with the right experts and with relevant data. Without these essential day-to-day contributions, we could not exist.

The third key quality is timely delivery, which implies a capacity to anticipate developments. If one doesn't anticipate, results will come too late to make an impact and will be of only documentary value. There are many examples where CONCAWE's work has been instrumental in guiding the legislative debate, working in close coordination with our sister association, EUROPIA. Anticipation is more than just acting in due time. It is also the capacity to put the right facts on the table in such a way that they contribute effectively. This is a bit like fly fishing—if you don't put the right fly in the right place at the right time, you catch nothing.

This *Review* provides several examples of the work that we are conducting at CONCAWE. The Workshop on Environment and Health that CONCAWE hosted in Brussels in January 2009 demonstrated our strong involvement in the health field, which is likely to be the main driver for new environmental legislation. Scientifically robust data are not currently available and will be needed to guide future decisions related to health and environment.

Our refinery modelling work on Marine Fuel Quality highlights the challenge that new bunker fuel specifications present for European refineries already confronted with very high demand for distillate fuels.

Finally, our contributions to the IPPC revision and to the SIEF (Substance Information Exchange Forum) for petroleum substances, demonstrate our day-to-day involvement in stakeholder dialogue.

CONCAWE's expertise and credibility are its main assets. We cannot protect these by staying in the shadows. We need to bring forward the right contributions where and when they are needed. Fulfilling the major tasks required for REACH will be a big challenge, but we will deliver on time, because we have the right experts and a strong organisation supported by our members.

Observing and managing the work of all these people has been a great pleasure. Now the time has come for me to hand over the helm to Michael Lane, who has the best possible credentials to lead CONCAWE into a bright future. I thank all present and past CONCAWE staff, as well as the numerous company experts who have supported me over the past five years, and I wish the new team all the best for the coming years!

Michael Lane,
Secretary General,
CONCAWE

CONCAWE is a great organisation with an enviable reputation for providing outstanding technical reports for use by the refining and distribution industry in Europe. Its work is respected by many Institutions and is often the technical reference source for important decisions affecting our industry. I am proud and privileged to have been appointed as its next Secretary General. Alain Heilbrunn has built on the long-standing reputation of CONCAWE and I am pleased to take over from him the strong organisation he has nurtured for the past five years.

I have more than 30 years' experience in the oil and petrochemical industry, and for the past five years I have been the global downstream environment and health manager for a major oil company. I believe this experience will enable me to build on the strengths of CONCAWE and take it forward to help address the important environmental, health and economic issues facing the industry and society in Europe over the coming years.

As I look to the future, my initial focus will be upon:

- Getting to know the staff and the many people from member companies who provide the considerable expertise that enables CONCAWE to successfully fulfil its mission.
- Ensuring that the limited resources are focused on the top priorities for our industry, Institutions and research partners.
- Providing high quality, transparent and credible technical output to help the industry and the regulators in Europe achieve the shared goals of cost-effective legislation that meet the needs of protecting the environment, human and ecosystem health, while at the same time ensuring that our industry can continue to be competitive.

Current priorities include: providing the required information for the REACH regulation, especially the Registration Dossiers for late 2010; developing a sound basis for allocating CO_2 allowances for the third period of the European Emissions Trading Scheme; and improving the understanding of the health effects of air quality, to guide future emissions legislation and to assist the Commission, the automotive and refining industries in designing the optimum fuels and engine combinations to cost-effectively improve further the impact of transport on energy demand and air quality.

There are many important and complex challenges that lie ahead. I am excited to be able to play a small part in ensuring that our industry prospers and can fulfil its important role in reliably providing the energy and transport needs of European citizens while, at the same time, continuing to make vital progress on reducing the environmental impacts of both our own operations and the use of our products.

The footprint of petroleum fuels

How much energy and GHG emissions are associated with fossil fuels?

There are various circumstances, in particular in the context of life cycle analyses (LCA) where it may be desirable to establish the footprint of fossil fuels in terms of cost, energy or greenhouse gas (GHG) emissions. This legitimate expectation raises a specific problem in the case of petroleum products. Indeed oil refining, through which they are produced, is a co-production process whereby a number of different products are obtained simultaneously through a complex combination of inter-related physical and chemical processes.

While the total resources required to run an oil refinery in terms of feedstocks, costs, energy and the resulting emissions can be established in a straightforward manner, there is no scientifically sound way of apportioning any of these between the different products of the refinery. Several attempts have been made to devise pseudo-scientific methods to allocate the resources used by each individual process unit to a particular final product on the basis of the destination of the main product of that unit. Simpler methods distribute the resources according to some arbitrary key such as mass, energy content, economic value, etc. All these methods are fundamentally flawed as they have no rational basis or justification. This is illustrated in the examples below.

Energy content is a popular allocation key; there is, however, no physical reason why a product with higher energy content should systematically attract more production energy. Another example is provided by naphtha reforming, a ubiquitous refinery process that dehydrogenates virgin naphthas into a high octane gasoline component. A superficial analysis would call for allocating most of the energy requirement of this process to gasoline production. However the bulk of that energy is chemical energy resulting from the simultaneous production of hydrogen which, in turn, is used for the desulphurisation of diesel components.

Such simplistic allocation methods ignore the complex interactions, constraints and synergies within a refinery and, where the scope is wider, also between the different refineries in a certain region. Importantly, they also make the implicit assumption that the refining system under scrutiny is static and cannot or will not evolve and change.

This inescapable fact is part of the everyday life of refinery economists who are regularly asked to pass judgement on the profitability of processing certain feedstocks or manufacturing certain products. These analysts have learnt that a refinery product does not have a single economic value but a range of values depending on circumstances, and that each tonne of product made by the refinery may well have a different value. The tool that allows a glimpse into this complex reality is usually called marginal or differential analysis. Its fundamental principle is to compare a base or 'business-as-usual' case with an alternative case where the production of a certain product is changed, all other parameters being kept the same. The changes in cost, energy, emissions, etc. between the base and alternative case can then justifiably be 'charged' to the amount of the specific product that was changed.

Differential analysis is a heavy tool, usually requiring complex models such as the linear programming models routinely used by refiners. It also has the drawback of yielding a different result every time something is changed in the base case or even between the base and the alternative. For instance it is not unusual to discover 'tiers' in the value of refinery products, i.e. step changes in the value of the marginal tonne depending on the quantity at stake. Changing the production of two products may not lead to effects that are the sum of those obtained when considering the same changes to each product separately.

Focusing on LCAs, there can be two broad reasons why the footprint of petroleum fuels needs to be quantified. Most life cycle chains involve the use of petroleum fuels at some stage, e.g. for transport of goods, heating, etc. In such cases the fuels are not the main products under scrutiny and play a secondary role in the total chain. Hence, a simplified approach involving allocation can be justifiable, particularly as the total energy/GHG footprint of petroleum fuels is dominated by their own energy content, the additional energy required to make them being typically only about 15% of the total. Because the amounts of fuel under consideration are small in relation to their total demand, it is also reasonable to assume that the refining system would not be significantly affected by such incremental or decremental demand, thus justifying the use of a generic and 'static' figure.

The second type of situation is when the petroleum fuel takes centre stage, i.e. when it is itself the target of some form of change or is being substituted. In such cases, one cannot consider that the refining system that is implied in the base case will still be valid after the change has occurred. Indeed the changes under consideration, which can involve volumes, quality or a combination of both, are likely to trigger possibly fundamental modifications in the way the refineries function and therefore to affect their global footprint. In such cases it is imperative to use the differential analysis method mentioned above in order to obtain a realistic answer.

This can be illustrated by two examples taken from our analysis of various actual and potential changes affecting European refineries.

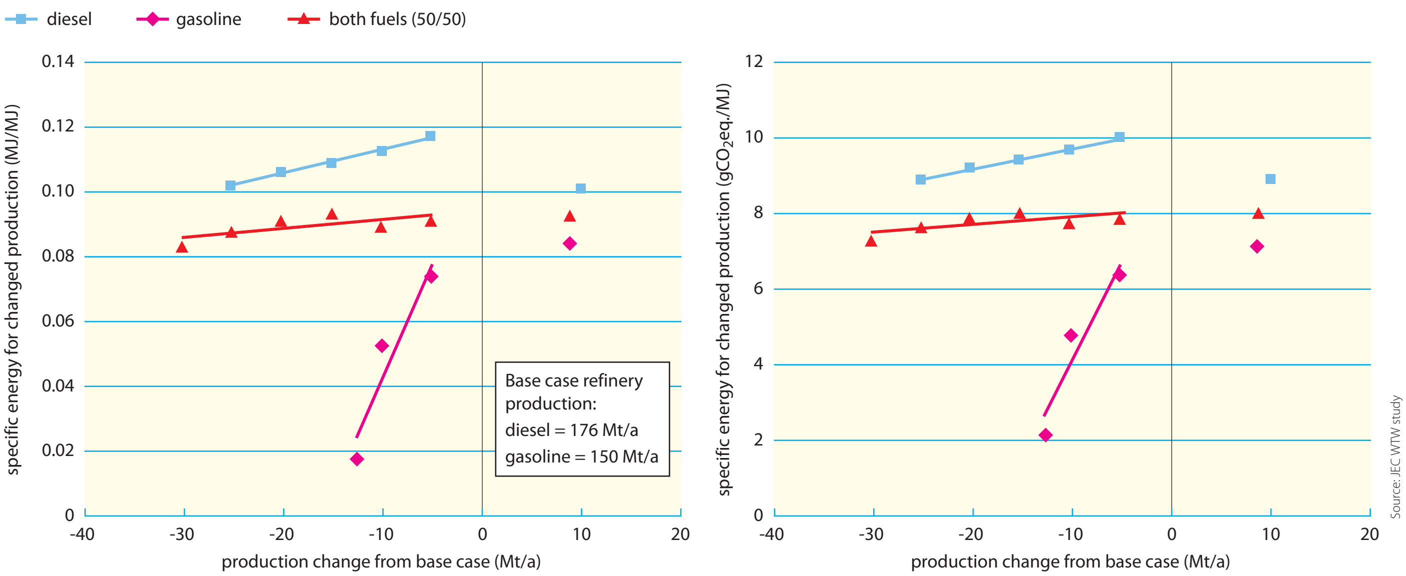
Marginal road fuel production

European refineries consume on average roughly 6.5 to 7% of their intake as energy and emit about 5 g of CO_2 per MJ of product. A typical allocation by energy content would more or less attribute that same number to all refinery products inasmuch as the calorific value of the materials involved do not differ by more than about 10%.

Figure 1 shows the result of the marginal analysis of the energy footprint of European road fuels starting from a future (2010) demand scenario. The first observation is that most points are well above the global energy and CO_2 emission figures showing that producing the marginal tonnes of road fuels is more energy intensive than the average. The second observation is that the marginal figures are not the same when either decreasing or increasing production and they also change when the decrement becomes larger. A special feature of the European situation is the high level of imbalance between diesel and gasoline demand which

Below: The refining footprint of marginal EU road fuels is higher than the average for all refined products and changes according to the scenario considered.

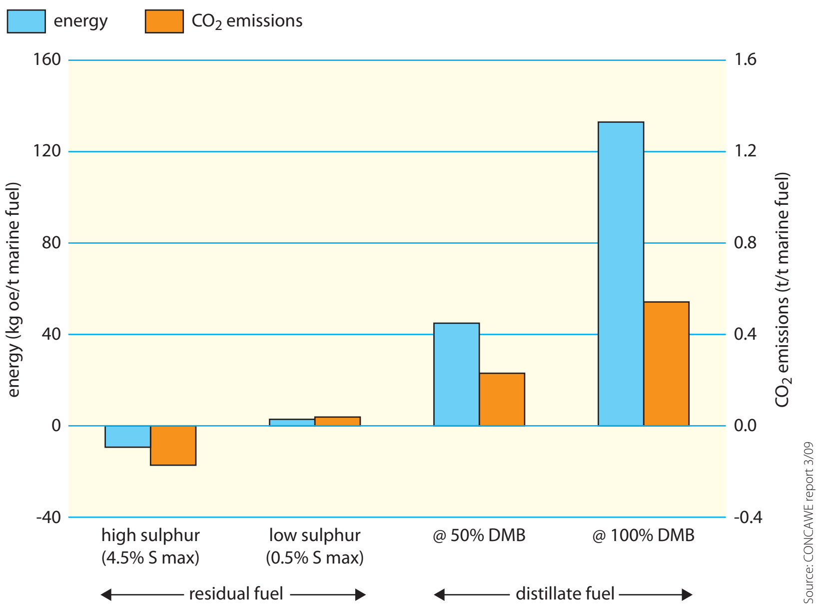
Figure 1 The refining energy and GHG footprint of marginal EU road fuels



The footprint of petroleum fuels

How much energy and GHG emissions are associated with fossil fuels?

Figure 2 Energy and CO_2 emissions associated with marine fuel production



Above: Refinery energy consumption and CO_2 emissions associated with marine fuel production are highly dependent on the quality of the fuel.

causes the energy footprint of the marginal gasoline to tumble when demand is reduced (i.e. one saves less and less energy by making less and less gasoline).

Marine fuel production

The second example relates to marine fuels and more specifically to the shift from high sulphur residual to low sulphur residual fuels and possibly to distillate fuels. Based on allocation by energy content, all fuel grades would receive similar footprints. Figure 2 reveals a very different reality. The starting point was a series of scenarios consistent with demand for the 2020 time horizon and each representing a different end point in terms of marine fuel quality. For each scenario the marine fuel demand was changed by + and – 10% and the impact on the total energy consumption and GHG emissions of EU refineries was recorded. The figures shown are the averages.

It may seem odd to find a negative number for high sulphur marine fuel but, on further analysis, this is perfectly logical. If a market is available for such a product, there is no need to spend a large amount of energy to upgrade it to lighter grades and, consequently, increasing the demand actually reduces the total energy consumption of the refineries. Quite apart from other considerations such as pollutant emissions, there is no doubt that burning high sulphur residual fuel oil in ships is a very efficient way of using energy, particularly so as marine engines have excellent efficiencies even when using such heavy fuels.

As sulphur content is reduced more energy is consumed for processing and the footprint becomes slightly positive. Switching to distillates further increases the footprint dramatically, as much more sophisticated processing is required, including deep residue conversion.

The CO_2 footprint follows the same pattern. The particularly large increase in the case of distillates is related to the large increase in hydrogen requirement.

In the above examples, the analyses covered the total EU refining sector, ensuring that demands for all other products are satisfied in all cases. A similar exercise for individual refineries would lead to different results depending on the particular circumstances of each installation, particularly in terms of their complexity. In practice though, individual refineries would be unlikely to maintain the same production for all other products. Any change in the demand of a particular product would be rebalanced at the level of a large enough supply envelope, and it is only at that level that this type of analysis makes sense.

These two examples demonstrate the importance of using appropriate analytical tools and the relevant scale when looking at the impact of changes in the production or quality of refined products. Simplistic methods will invariably lead to unrealistic and misleading figures that will not capture the complex interactions between different plants and products within a refinery, and between refineries inside a common supply envelope.

Impact of marine fuels quality legislation on EU refineries at the 2020 horizon

Momentous changes are afoot in the marine fuels world

Background

Over the years the oil refining system in the EU has developed and adapted to meet the evolving demand, in both qualitative and quantitative terms, while coping with an ever-changing supply of crude oils. The combination of changes in demand and crude supply requires constant adaptation of the refining tool, taking all factors into account, including the availability of dependable import and export opportunities to 'balance the books' under acceptable economic terms. Supported by a sophisticated linear programming model representing the entire European refining industry, CONCAWE regularly endeavours to quantify the changes that might be required in terms of new/modified process units, resulting refining costs, energy consumption and CO_2 emissions.

In recent years there has been increased focus on the quality of marine fuels, culminating in the adoption by the International Maritime Organization (IMO), in October 2008, of a timetable for the progressive but drastic reduction of sulphur oxides emissions from ships. This article presents the main findings of a recent CONCAWE report (3/09) which considers the potential impact of these measures on the EU refining industry.

Momentous changes to the world's marine fuels quality

Emissions from international shipping are regulated by the IMO, established in 1948 under a United Nations Convention. Air emissions measures are covered in Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). This Annex entered into force in May 2005, and more specifically its Regulation 14, which aims to limit SO_x emissions by limiting the sulphur content of any fuel oil used on board ships to 4.5% m/m. The regulation also allows the creation of so-called Sulphur Oxide Emission Control Areas (SECAs), where SO_x emissions have to be consistent with a maximum fuel sulphur content of 1.5%, by using either such a fuel or emission abatement equipment to reduce flue gas SO_x concentration.

The Baltic Sea became the world's first SECA in May 2006, followed by the North Sea and the English Channel in November 2007. No further SECAs have been established since, but very recently the USA and Canada submitted an application for Emission Control Areas on their East and West Coasts.

Following intense debates at the IMO, a revision to Annex VI was adopted in October 2008 and will enter into force on 1 July 2010. This will trigger momentous changes to marine fuels specifications in the next decade and beyond. Firstly, the sulphur level in SECAs will be reduced to 1.0% as of July 2010 and to 0.1% as of January 2015. Secondly the global sulphur cap will be reduced to 3.5% as of January 2012 and to 0.5% as of January 2020, subject to a 2018 review of fuel availability, on the basis of which the deadline could be postponed to January 2025. In all cases, approved emission abatement equipment may be used to achieve equivalent emissions.

In addition to the IMO regulations, the European Union has established its own requirements in a revision of the Sulphur in Liquids Fuels Directive (2005/33/EC) which imposes the use of 1.5% sulphur fuel by all ferries calling at European ports when sailing in territorial seas, exclusive economic zones and pollution control zones as of August 2006. From January 2010 marine fuels for inland waterway vessels and for all ships at berth may not contain more than 0.1% sulphur. In line with the IMO convention, emission abatement technology may be used by ships to achieve equivalent emissions, subject to authorisation. A revision of this Directive by the EU Commission, originally due in 2008, has been postponed pending the completion of the IMO deliberations.

Impact of marine fuels quality legislation on EU refineries at the 2020 horizon

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Consequences for EU refineries

These effective and potential changes to the quality of marine fuels have to be seen in the context of numerous other changes affecting refineries in Europe both in terms of quality and of supply/demand. The analysis of the compounded impacts of these various constraints was developed in CONCAWE report 8/08.

Using the framework established in that work in terms of supply/demand forecast and product quality changes, CONCAWE has recently completed a separate report (3/09) focusing specifically on the impact of marine fuels quality changes on EU refineries at the 2020 horizon. The analysis assumes that all SO_x emission reductions will be achieved through fuel desulphurisation (rather than on-board abatement equipment) and that EU refineries continue to satisfy the total EU demand for all products in terms of quantity and quality without changes in the current level of import/export.

Although this is not included in the measures adopted by IMO, there have also been calls for a wholesale migration of marine fuels from residual to (low sulphur) distillate fuels, and this case has been included in the analysis.

A number of cases were considered, all based on a common reference 2020 scenario and in order of increasing severity (see Table 1). The starting point assumes no changes to the historical 4.5% sulphur cap.

The increasing level of desulphurisation requires significant changes in the refinery toolkit. The total capacity required in Europe for the most relevant process units is shown in Figure 1.

Up to the current situation (3.5% global cap) and 1.5% in SECAs, the existing configuration can essentially cope, i.e. the new limits can be met by extra segregation of existing low sulphur material[1] (the investments of nearly 50 G$ shown in Figure 2 for this case are required to meet other changes occurring between today and 2020). Beyond this, a large increase in residue desulphurisation capacity is required, partly compensated for by a small decrease in distillate hydrocracking utilisation (because residue desulphurisation provides a measure of conversion). The hydrogen requirement also increases. It should be noted that these cases rely heavily on deep desulphurisation of residual streams and produce fuels of a very different composition compared to traditional ones. Whether this will turn out to be feasible in terms of the quality of the final fuels remains to be confirmed, and it could well be that the distillate route is a more realistic option.

In the distillate fuel (DMB) case both distillate hydrocracking and residue desulphurisation increase further with a large increase in hydrogen demand, mostly on account of the already very tight middle distillate supply situation in Europe.

The increased capacity requirements translate into new plants and corresponding investments, as well as additional energy consumption and CO_2 emissions, the latter caused in no small part by the increased hydrogen consumption. This is illustrated in Figure 2.

Table 1 Analysis of potential changes to marine fuels quality

Residual fuel cases	
Cap 4.5%	Reference case. Global sulphur cap at 4.5%, no SECAs. *Representative of pre-2006 legislation.*
Cap 3.5% S+F 1.5%	Global sulphur cap at 3.5%. SECAs sulphur limit at 1.5% (North and Baltic seas, as per MARPOL Annex VI), same limit applicable to 'passenger ships on regular service to or from an EU port' (i.e. 'Ferries', as per Directive 2005/33/EC). *Representative of current situation, based on typical sulphur levels of residual fuels.*
Cap 0.5% SECA 0.1%	Global sulphur cap at 0.5%. SECAs sulphur limit at 0.1% (North and Baltic seas, as per MARPOL Annex VI). No specific limit for Ferries. *Representative of situation in 2020 under IMO proposal.*
Cap 0.5% S+F 0.1%	As previous with Ferries subject to SECA sulphur limit. *Not formally proposed.*
Distillate fuel (DMB) case	
100% DMB 0.1/0.5%	Substitution of 100% of each residual marine fuel grade by distillate (DMB grade) at 0.5% sulphur (0.1% in SECAs and for Ferries).[a]

[a] This was simulated as a single distillate grade with specifications as per DMB and 0.3% sulphur content

[1] *Note that our model tends to over-optimise by assuming perfect liquidity in each broad region, so that this outcome may be somewhat over-optimistic.*

Impact of marine fuels quality legislation on EU refineries at the 2020 horizon

Momentous changes are afoot in the marine fuels world

The EU refining sector is already facing potential investments of nearly 50 G$ to meet other demand and quality changes in the same time period. The new sulphur limits imposed by the IMO will increase this by at least another 10 G$. Actual investments may well be significantly higher should the distillate route be preferred over residue desulphurisation. A complete switch to distillate fuel would be much more onerous, up to some 65 G$ additional investment. Refinery CO_2 emissions follow a similar pattern with an increase of about 15 Mt/a (approximately 10%) to meet IMO specifications, reaching over 40 Mt/a in the case of a switch to distillate fuel.

The necessary investments would require a massive effort from the industry, especially when seen in the context of other calls for new installations in order to meet quality specifications of other products, adapt to changes in supply/demand and comply with other regulatory constraints such as implementation of the IPPC and Large Combustion Plant Directive. Beyond the all-important financial and economic aspects, the ability of the industry to mobilise sufficient material and human resources for such massive investment must be considered.

Faced with the need to desulphurise residual streams, refiners could choose instead to stop production of residual marine fuels and convert the residues into higher value products, primarily diesel and motor gasoline. The investments required for conversion of residual streams are indeed higher than for desulphurisation but the reward in terms of product value is also much higher. Indeed for the 2007 price set that we have used the model confirmed that the conversion alternative is economically attractive. We were also able to confirm previous findings (see CONCAWE report 2/06) according to which economics would favour conversion unless the price of low sulphur residual fuels approached that of gas oils. This suggests that the real-life impact of imposing very low sulphur marine fuels may be higher than what could be anticipated purely on the basis of the desulphurisation needs. It also highlights the fact that there is likely to be a cost trade-off for ship operators between using low sulphur fuel and installing on-board flue gas scrubbing facilities.

CONCAWE report 3/09 also considers the contribution of marine fuels to the total energy consumption and CO_2 emissions of refineries, showing it to be a strong function of their required quality and of the relative demand for the different grades. For Europe, decreasing marine fuel demand can either decrease or increase energy consumption and CO_2 emissions, depending whether the required grades are high sulphur residual fuels or low sulphur distillate fuel. These findings are further discussed in the previous article, which considers the more general issue of evaluating the carbon footprint of fossil fuels.

Figures 1 and 2: Increased capacity requirements translate into new plants and corresponding investments, as well as additional energy consumption and CO_2 emissions, the latter caused in no small part by the increased hydrogen consumption.

Figure 1 Extreme marine fuel specifications require major changes in the refining toolkit

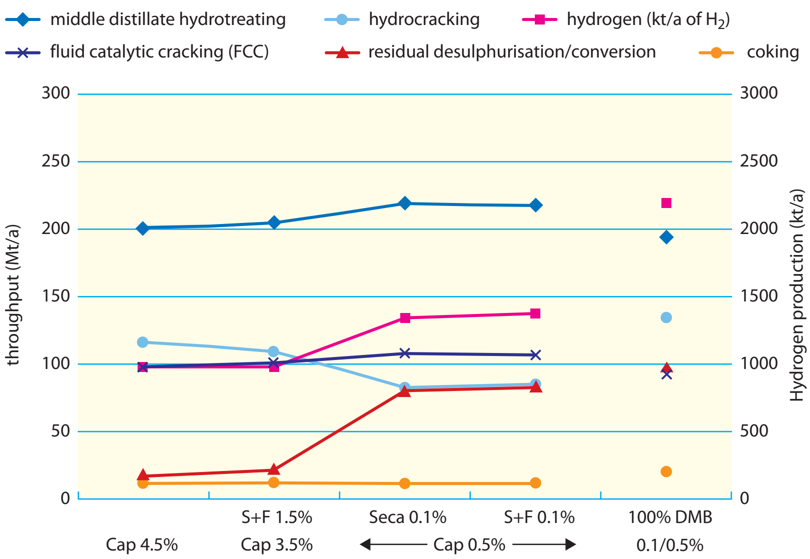
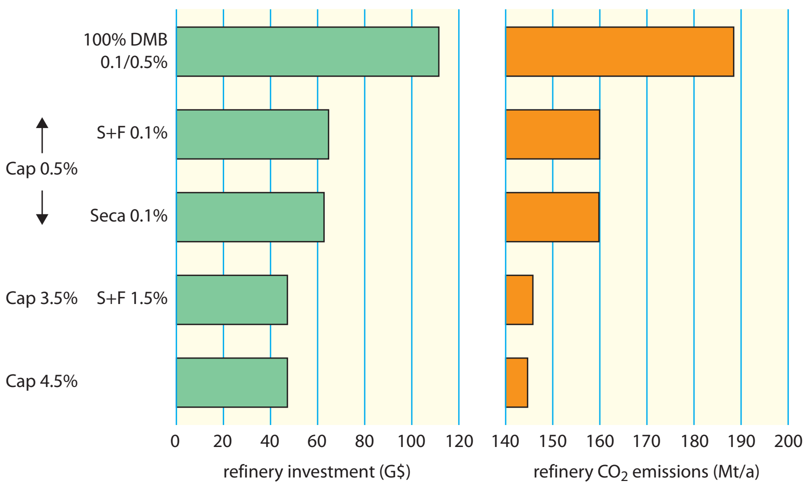


Figure 2 Such changes trigger new investments and additional CO_2 emissions



Best Available Techniques (BAT) for the mineral oil and gas refineries

Revision of the refinery BAT reference document is now under way

Industrial sites in Europe are required to have an operating permit issued under the national implementation of the IPPC Directive. The permit conditions require that the emissions to air and to water should be consistent with the application of Best Available Techniques. These are recognised technologies or non-technical measures (such as the application of energy efficiency, good housekeeping, etc.) that can be applied, where practical and cost-effective, to minimise an installation's environmental impact.

To provide guidance on BAT, reference documentation has been developed under the direction of the IPPC Bureau in Seville. This now comprises some 33 documents covering different sectors (vertical BREFs) and generic topics (horizontal BREFs).

Under current legislation the BREF documents are guidance documents only. However, the proposal by the European Commission to considerably strengthen the requirements of the IPPC Directive may result, explicitly or implicitly, in these guidance documents having a more legal status.

This promises to be problematic if the BREF documents do not fully reflect all the different situations that may occur across the entire industry. This is especially true for industries, such as refining, where existing plants are often retrofitted with abatement technology and the number of permutations of design, operational conditions, constraints, etc. is very large.

The current revision of the refinery BREF started in September 2008 and is due for completion in 2010. CONCAWE is represented on the technical working group (TWG) that is overseeing the redrafting using recent industry data. As a contribution to the revision CONCAWE has prepared a report, 4/09, *Refining BREF Review—Air Emissions*, that addresses:

- NO_x emissions from combustion;
- emissions from FCC (fluid catalytic cracking) plants;
- amine treatment;
- effectiveness of sulphur recovery plants; and
- effectiveness of vapour recovery units.

The report provides updated information on the possible emission ranges from these units and how these depend on operating environment. It was not feasible to cover all possible installations, so the emission ranges do not necessarily reflect the minimum or maximum emissions possible.

In this article we look at the work done by a CONCAWE task force when preparing information for the review of the refinery Best Available Techniques (BAT) reference document (BREF). The article focuses on two aspects: NO_x from combustion systems and the effectiveness of sulphur recovery plants.

NO_x emissions from combustion systems

The most used technique for controlling combustion NO_x in refineries is the low NO_x burner (LNB). It is a retrofitted or existing heater application and may be able to fire both oil and gas (dual fired) or gas only. There are different types of burner design and the unique characteristic of refinery applications is that, because internally generated fuels are used, the fuel composition may vary considerably over time. Similarly, operating conditions may be different from unit to unit. Such differences can have a strong effect on NO_x, as can measures to improve overall energy efficiency, such as preheating the combustion air.

These sensitivities raise the question of what is an appropriate range of NO_x emissions for a low NO_x burner, as the permit authorities need to judge emission performance relative to 'typical values' for the technology expressed as a range of BAT AELVs.

Figure 1 NO_x for staged-air LNB firing refinery fuel gas

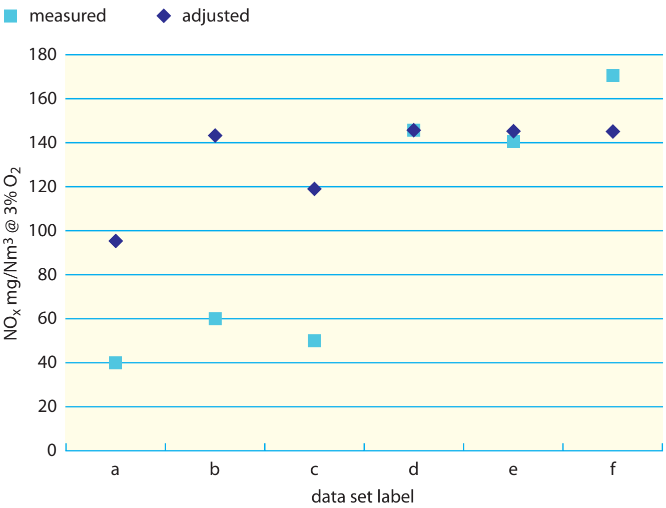
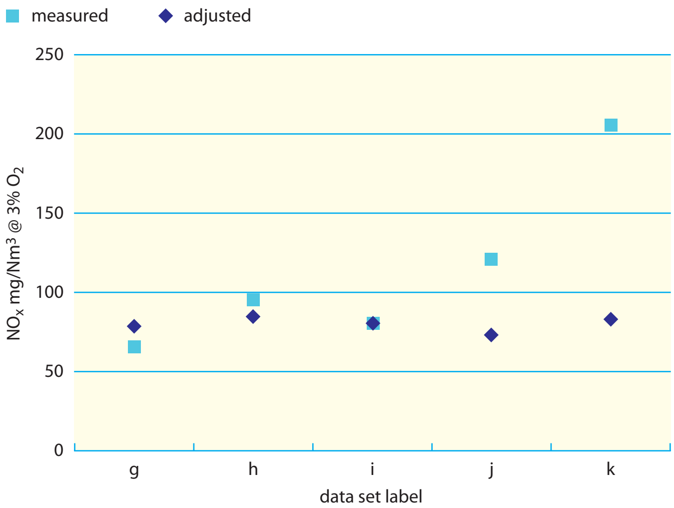


Figure 2 NO_x for staged-fuel LNB firing refinery fuel gas



Figures 1 and 2 show NO_x emissions from a total of 11 installations, each having different operating conditions. The installations in Figure 1 use 'Staged-Air Low NO_x Burner' technology; those in Figure 2 use 'Staged-Fuel Low NO_x Burner' technology.

The squares show the measured NO_x concentration. The diamonds indicate the 'intrinsic' performance of each technology for CONCAWE's standardised conditions. The difference between the diamonds and the squares is the variation in NO_x due to the operating conditions.

The CONCAWE report compares several sets of real plant data, taking examples across a wide number of different applications. The variability in NO_x across these applications is examined using correlations from the Dutch regulations[1] to see if this enables the underlying 'technology' contribution to NO_x emissions to be discerned.

Figures 1 and 2 show the effect of operating conditions on NO_x emissions calculated for two burner types burning refinery fuel gases. The first is a staged-air low NO_x burner; the second is a staged-fuel low NO_x burner. The squares are the measured data. The diamonds show the data converted to a single standard set of standardised operating conditions. The main corrections are for fuel hydrogen content, air preheat temperature and firebox temperature.

It can be seen that, although measurements on individual installations appear very different, these differences are consistent with the specific local conditions. The underlying control technology, 'the low NO_x burner', has essentially the same standardised emission in each of the cases considered—noting of course that there are different types of low NO_x burner.

Although the figures only show results for gas firing using staged-air and staged-fuel burners, CONCAWE report 4/09 also includes results for dual fired burners and ultra-low NO_x burner types.

Having established that the low NO_x burner may have different emissions according to operational needs, the report suggests how associated emission ranges might be derived that fairly describe the local application. Important considerations are, for example, the use of air preheat to increase efficiency, which is highly desirable to reduce CO_2 emissions but has a penalty on NO_x. A change in fuel hydrogen content might occur during normal operation, and this also has implications for NO_x.

Sulphur recovery efficiency

Sulphur recovery is a very important part of refining operations and key to overall control of sulphur emissions. For the purpose of providing data for the BREF

[1] *Ministerie van VROM (1987) Besluit emissie-eisen stookinstallaties milieubeheer A (Bees A). Staatsblad van het Koninkrijk der Nederlanden Stb. 164, 1987.*

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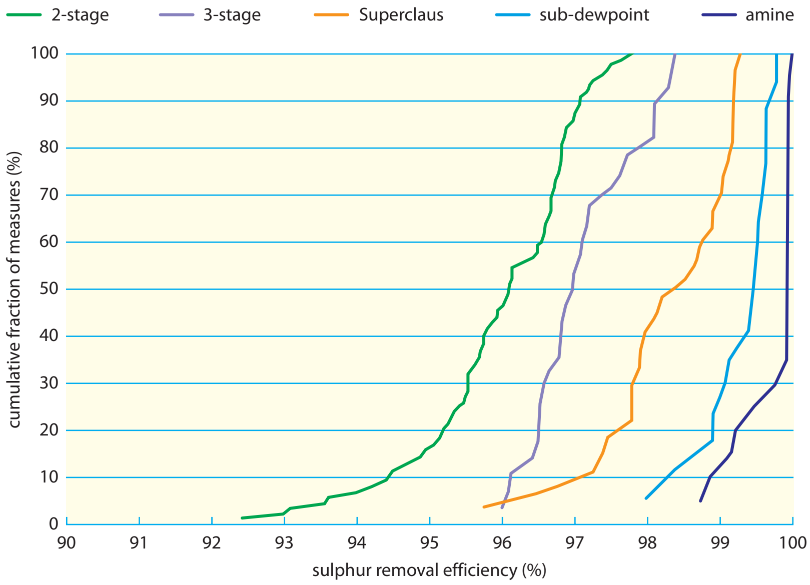
Figure 3 Sulphur removal efficiency



Overall sulphur efficiency for the stages in a sulphur recovery process. Generally, units comprise a 2- or 3-stage Claus unit followed by a Superclaus process or a sub-dewpoint process, or an amine treatment process.

review CONCAWE contracted a consultancy firm, Sulphur Experts, to produce a review of European sulphur recovery units' (SRU) efficiency. The results are derived from a database of measurements made by Sulphur Experts as part of their work in advising refineries on their SRU operations. The database includes both refineries and gas plant applications, but only European refinery data is described here.

The inspection of SRU performance includes measurements on each stage of the process. The database therefore allows the recovery efficiency of the individual stages of the sulphur recovery process to be assessed. The assessment excludes any proportion of sulphur that passes to the final stage incinerator either directly in supplemental fuel or from degassing of the sulphur product, so real-life sulphur capture may be less than the technology indicates is possible by a small amount.

Table 1 Daily average performance data (from current BREF)

	Process	Expected daily average sulphur yield (%)
Claus unit	Claus 2-stage	94–96
	Claus 3-stage	97–98
Tail gas clean-up units	Superclaus	98.66
	Sulfreen	99.42
	Beavon	99–99.9
	CBA	99–99.50
	Clauspol	99.5–99.9
	Clauspol II	99.60
	SO_2 abatement	99.9
	Hydrosulfreen	99.67
	Doxosulfreen	99.98
	RAR	99.94
	LO-CAT II	99.99
	SCOT	99.5–99.99

A sulphur recovery unit typically comprises a 2- or 3-stage Claus unit followed by a tail gas unit. There are a number of different tail gas processes based on different technologies. Figure 3 shows the cumulative distribution of measurements of sulphur capture efficiency taken after each stage in the recovery process.

The categories were 2-stage Claus unit, 3-stage Claus unit followed by tail gas treatments: oxidative (Superclaus), sub-dewpoint (variants not distinguished) and amine treatment.

The overall efficiency at the treatment stage is shown so, for example, the Superclaus curve comprises measures made on units having a 2- or 3-stage Claus unit followed by the Superclaus treatment.

As illustrated in Figure 3, there is a distribution of observed efficiencies across the measurements taken. The 100% percentile corresponds well to the manufacturers maximum efficiency for the technique. The median efficiency observed for the 2-stage Claus was 96.1% increasing to 97% for the 3-stage and 98.5% for the Superclaus. Sub-dewpoint technology tail gas units increase this to 99.5% and amine scrubbing is the only technology that achieves efficiencies above 99.9%. The information in the current BREF relating to daily average performance is shown in Table 1.

In terms of BAT choices this is very important, as setting capture efficiency targets above 99.7% essentially requires the installation of amine treatment.

These results on the different components can be compared with a crude estimate of recovery efficiency obtained from the regular CONCAWE survey of refinery sulphur emissions. These efficiencies are derived from the annual sulphur balance using the amount of recovered sulphur and the estimated sulphur feed to the SRU. The data may include periods of non-ideal operation.

Figure 4 shows the distribution of sulphur recovered in years 1998 and 2006, overlaid upon Figure 3. Year 2002 is not shown due to the limited data set, although we can comment that the top quartile results (distribution with recovery > 99%) were similar.

The Sulphur Experts database reported 127 investigations on 2- and 3-stage Claus units and 62 on tail gas units of which 26 were Superclaus, 17 were sub-dewpoint and 19 were amine treatment plants. If one were to assume no duplicate measurements and that measurements were always made across all installed units, then this would give 51% without tail-gas units, 20% with Superclaus units, 13% using sub-dewpoint technologies and 15% with amine treatment.

This split is not inconsistent with the 2006 survey results which would indicate perhaps up to 30%, rather than 20% usage of Superclaus technology, 10% using sub-dewpoint technologies and 10% using amine treatment.

The trend with time suggests a definite improvement in sulphur recovery efficiency. The largest change occurs for those reporting capture efficiencies between 97% and 99% and would be consistent with improved operation of (or investment in) 3-stage Claus plant and investment in Superclaus technology. Median recovery efficiency increased from ~97.4 to ~98.3%.

This picture suggests that the choice of recovery efficiency accorded to BAT could have major implications for European refining. Any recent investment in Superclaus (or Euroclaus) technology could be insufficient if capture efficiencies of 98% were to be excluded from the BAT AEL ranges. CONCAWE therefore proposes that the BAT AEL range for existing plant should be 98–99.9% and for new facilities 99–99.9%.

Taking the NO_x and sulphur recovery results together illustrates some fundamental facts:

Figure 4 Sulphur removal efficiency (from the CONCAWE sulphur surveys)

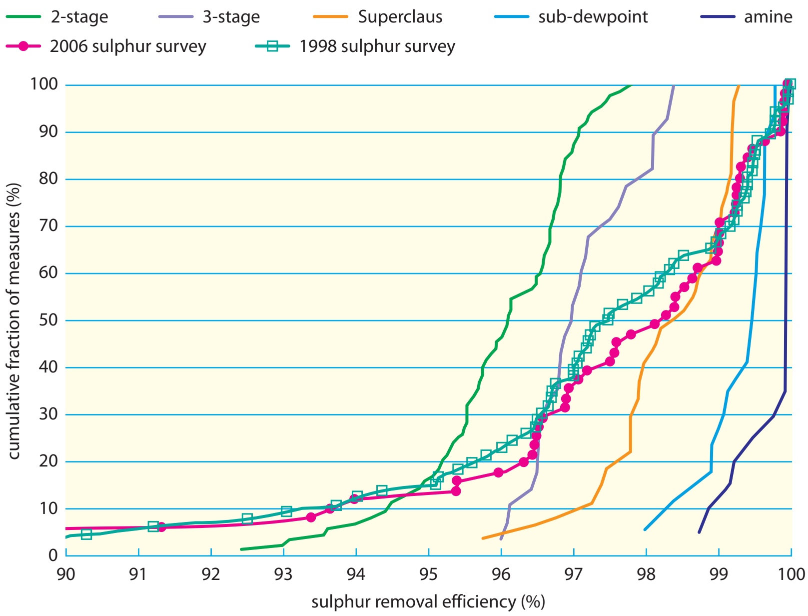


Figure 4 Estimated annual sulphur capture efficiencies from the CONCAWE 1998 and 2006 sulphur surveys overlaid on the Sulphur Experts unit-specific data.

- The industry is very diverse with many different types of installation within any broad category such as low NO_x burner or sulphur recovery plant.
- Operational data is needed to establish the realistic performance range and how this varies between installations, taking full account of retrofit possibilities and constraints.
- The effect of operating variables and co-effects needs to be recognised. For example, air preheat to increase efficiency will raise NO_x.

CONCAWE will continue to inform the debate with factual data contributed by its members.

Air quality regulatory debate, 2010–2013

CONCAWE's contribution to the development of basic health data and analyses

It is important for our industry to understand the impact of air quality on human health. Building on CONCAWE's key principles of sound science, transparency and cost-effectiveness, CONCAWE's Health Management Group (HMG) is building a long-term, forward-looking portfolio of research activities that will provide robust technical information on the impact of air quality on human health. This is evidenced by our programme on potential health effects of air pollution due to emissions to air from combustion of petroleum substances.

Air quality regulations and related actions that are intended to improve public health can impact upon our industry's products and operations. Such regulations can be complicated to implement and are often costly for both industry and the public. The CONCAWE health programme supports the development of data and approaches to inform policy decisions that aim to generate specific improvements in health. Health improvements should be quantified by reductions in morbidity, acute mortality and by increased life expectancy. Clinically/biologically relevant human health outcomes that are caused by air pollution and lead to morbidity and mortality should also be identified and quantified.

When regulatory measures are taken to reduce air pollution with the intent to yield human health improvements, these measures should be revisited to determine whether health improvement actually occurred. These 'accountability' health research approaches need to be developed to evaluate changes in health outcomes after regulatory intervention.

Communications and coordination

2007 CONCAWE Workshop

A key focus of CONCAWE's Health Management Group is to help make available technical information that will inform the review of the Air Quality Directive in 2013. To support this work, CONCAWE sponsored an Environment and Health Workshop in 2007. One of the key objectives of the workshop was to provide a forum for participants to discuss gaps in knowledge and future research needs, particularly focused on identifying research calls under the Seventh Framework Programme of Research and Technological Development of the European Union (FP7). The workshop provided scientific updates for a number of key disciplines including epidemiology, toxicology and exposure assessment, and presentations were made by representatives of several European bodies which evaluate and use the scientific data for policy advice. The Commission's DG Research supported the programme and participated in the workshop. CONCAWE documented the output of the 2007 workshop in its report No 5/07.

At their request, the workshop report was submitted to DG Research. One of the key priorities identified during the workshop was the need for a large human health (epidemiology) study in Europe, since the main air quality regulations with links to health are currently based on historic studies conducted in North America. Following the CONCAWE workshop, DG Research funded a European epidemiological study—ESCAPE[1]—to investigate long-term effects on human health of exposure to air pollution in Europe. ESCAPE is a 5M Euro project with coordination of 25 research institutions to be conducted over the period of 2008–2012. DG Research acknowledged that ESCAPE was selected to be funded, at least in part, because of the recommendations from the stakeholders at the 2007 CONCAWE workshop. ESCAPE has since commenced and CONCAWE has been nominated to the ESCAPE Advisory Panel.

Key recommendations from the 2007 Workshop indicated that industry has an important role to play, particularly in helping with coordination, communication and

[1] *European Study of Cohorts for Air Pollution Effects, www.escapeproject.eu/structure.php*

ESCAPE objectives

- Develop a flexible methodology for assessment of long-term population exposure to air pollution focused primarily on fine particles, particle composition, and nitrogen oxides.
- Apply the exposure assessment methodology on existing cohort studies of mortality and chronic disease in Europe that have been selected based on their potential to quantify relationships between long-term exposure and health response precisely.
- Specifically, investigate exposure-response relationships and thresholds for: (a) adverse perinatal health outcomes, and development of diseases such as asthma in children; (b) respiratory disease endpoints in adults; (c) cardiovascular disease endpoints in adults; and (d) all-cause and cause-specific mortality, and cancer incidence.
- Develop a database for quantitative estimates of the health impacts of long-term exposure to air pollution for all of these health endpoints for the European population.

2009 CONCAWE Workshop participants work together to address the task headline, 'How to develop relevant health-effects data to inform the policy decision-making process.'

synthesis of key data to best inform key decisions in a timely manner. These recommendations were incorporated into CONCAWE's current research portfolio on health-related problems.

2009 CONCAWE Workshop

Encouraged by the success of the 2007 Workshop, CONCAWE sponsored a second Environment and Health Workshop in 2009. This year's Workshop brought together some 100 researchers, industrial scientists, and other experts from 18 countries representing industry, academia, advisory and regulatory functions plus funding organisations. The main focus of the 2009 Workshop was to identify a stepwise approach for addressing additional key research needs and timelines.

Importantly, the workshop successfully translated a variety of priorities, emerging challenges and opportunities into policy-relevant research suggestions regarding air quality health effects. This included identifying specific projects that can be started and completed in an appropriate timeframe to be able to inform key decisions in Europe. The detailed outcomes and recommendations from the 2009 Workshop will be documented in a CONCAWE report this year that will include input from the workshop's speakers and Chairs. The report will also be submitted to DG Research, at their request, to inform their own assessment of key health-related research projects that will be considered for funding under FP7. Several of the key recommendations from the 2007 and 2009 workshops, and CONCAWE's response to these recommendations, are summarised below.

2009 CONCAWE Workshop objectives

- Identify, discuss and debate key policy-relevant research needs and opportunities;
- Prioritise the research needs and identify reasonable timelines for delivery;
- Propose a roadmap for establishing research actions to be taken to meet the regulatory timelines, in particular the review of Air Quality Directive in 2013.

Understanding how pollutants cause effects

A key recommendation noted during the workshops was the need for enhanced research coordination and communication, and the opportunity for industry engagement in this area. To contribute to research coordination, CONCAWE coordinated and sponsored a session on air quality and cardiovascular effects at the international Toxicology Forum's annual European meeting held in Brussels in October 2007. Population studies on health effects of air pollution have suggested that the largest burden of disease by specific cause is due to cardiovascular effects, in particular from long-term exposures. A set of priority projects was recommended by the participants involved, including development of an approach to screen the potential health effects associated with use of new fuels (see CONCAWE Report 5/08).

Air quality regulatory debate, 2010–2013

CONCAWE's contribution to the development of basic health data and analyses

Strategic programme and priority projects

Human health study

It was recommended to build on the ESCAPE project to the extent possible. ESCAPE has been designed to address key scientific issues specific to EU populations prior to the 2013 Air Quality Directive review. However, there are additional opportunities that exist to further enhance the ability of researchers to assess the output of ESCAPE. CONCAWE has identified a parallel project for personal exposure monitoring and assessment. This project, which is now being developed with the ESCAPE investigators and other research organisations, will complement the output of ESCAPE and will help, in particular, the assessment of the exposure-response data. The objective is to have this parallel study completed by 2012.

Understanding health impact of fuel combustion

Additionally, CONCAWE is leveraging activities with other partners interested in developing an approach to screen the potential health effects associated with combustion of fuels and/or engines utilising new technologies. The Health Effects Institute (HEI) has recently released a review of the health impacts of traffic-related air pollution this summer. They have been involved in efforts to characterise the emissions and assess the potential health impact of new advanced engine systems and fuels (e.g. the Advanced Collaborative Emissions Study, ACES). They have created an expert group to assess, at an international level, future engine technologies and fuels to help formulate hypotheses on possible health impacts to consider. HEI are specifically considering more focused work on assessing potential health impacts of biofuels. CONCAWE is also sponsoring work at NERC, a research programme at the US Lovelace Respiratory Research Institute focused on identifying biological impacts of exposure to environmentally relevant complex, multipollutant mixtures (e.g. diesel engine emissions). The refining industry (via API and CONCAWE) is in discussions with Lovelace regarding a potential study of the health impact of emissions from ships. Additionally, by order of its Ministry of Housing, Spatial Planning and the Environment (VROM), the Dutch National Institute for Public Health and the Environment (RIVM) will carry out a project to establish whether a validated and standardised approach can be adopted to screen potential health impacts of proposed technologies and fuels. CONCAWE will actively contribute our industry's perspective and experience to the RIVM project.

Demonstration of actual health improvements

Finally, there is a need to develop approaches and methods to track impacts of implemented policy measures. Through so-called 'accountability programmes' scientists endeavour to demonstrate that the regulatory measures put in place do indeed reduce pollution, thereby reducing human exposures and health effects. While the concept of accountability research in this area is not new, no focused effort or standardised and validated methods for accountability research exist in relation to health studies and implementation of regulations. The HEI is a leader in developing approaches for, and conducting, such studies. It is a highly credible, independent organisation (funded by industry and government), that promotes and delivers balanced, policy-relevant studies to European, Asian, Latin American and North American regulatory institutions. CONCAWE has recently partnered with the HEI not only to help identify potential opportunities for accountability work relevant to the European situation, but also to provide a European refining industry perspective to their policy-relevant health research programme which focuses on air toxics, traffic emissions and particulate matter (PM) research.

CONCAWE's HMG has been building highly leveraged collaborations, contributing to coordination and communication amongst researchers. This has also enabled the identification of key research priorities and opportunities to help provide information on important milestones in a timely manner, particularly in discussions leading up to and including the revision of the Air Quality Directive in 2013. CONCAWE's HMG intends to publish regular *Review* articles on the progress and key outcomes of the projects with ESCAPE, NERC and HEI to keep its readership informed.

Substance Information Exchange Fora (SIEFs) for petroleum substances

Collaboration amongst REACH registrants has commenced

Introduction

Like all other chemical substances that are manufactured in, or imported into, the European Economic Area (EEA), either as such or in preparations or, under certain circumstances, in articles, petroleum substances will have to be registered with the European Chemical Agency (ECHA) under the REACH Regulation[1]. While registration is an obligation for each ***individual*** legal entity that manufactures or imports a substance in or into the EEA, REACH makes ***collaboration mandatory*** between all registrants during the preparation of registration dossiers as well as during registration.

The legislation foresees that this mandatory collaboration will be initiated through Substance Information Exchange Fora (SIEFs). Guidance issued by the European Chemical Agency (ECHA) suggests that one of the pre-registrants volunteers as SIEF Formation Facilitator (SFF) during pre-registration.

CONCAWE acting as SIEF Formation Facilitator

CONCAWE has volunteered to act as the SIEF Formation Facilitator for practically all petroleum products and for sulphur, and this has been formally recorded in the ECHA's REACH-IT system. This concerns a total of 572 substances. CONCAWE, however, has developed a category approach that will allow 571 substances to be consolidated into 20 categories of petroleum products with similar characteristics. Sulphur will be dealt with as a single substance.

[1] *Corrigendum to Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93 and Commission Regulation (EC) No. 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (OJ L 396, 30.12.2006), OJ L136,volume 50, 29 May 2007.*

The number of pre-registrations has exceeded all expectations

Both pre-registration itself and the subsequent downloading of SIEF information suffered from performance problems with the REACH-IT system that ECHA had put in place. ECHA explained that the difficulties were due to the unexpectedly large number of pre-registrations and pre-registered substances (Table 1).

Table 1 Numbers of pre-registrations

	Expected	Actual
Pre-registered substances	30,000	>100,000
Pre-registrations	150,000	>2.7 million

By the end of January 2009 CONCAWE had downloaded the information from the REACH-IT system and established the identity of the SIEF participants for all petroleum substances and sulphur. The basic statistics are shown in Table 2.

Table 2 Composition of the SIEFs for all petroleum substances and sulphur (REACH-IT data)

	CONCAWE members	Non-members	Total
Pre-registered substances	320	572 (i.e. all)	572 (i.e. all)
Active pre-registrations	8,502	48,471	56,973
Legal entities	223	7,982	8,205
E-mail contacts for one or more pre-registrants	40	5,196	

It should be noted that these figures are not final. Pre-registrants may decide to deactivate or even withdraw pre-registrations, thus reducing the numbers. On the other hand, there is also a possibility for manufacturers and importers to carry out a 'late pre-registration', thus increasing the numbers.

CONCAWE's SIEF facilitation team will have to download the information for all 571 petroleum substances and for

Substance Information Exchange Fora (SIEFs) for petroleum substances

Collaboration amongst REACH registrants has commenced

sulphur at regular intervals to ensure that the list of SIEF participants is kept up to date and that all SIEF participants are being contacted. This will represent a significant workload.

Initial communication to pre-registrants

In March 2009 the SIEF facilitation team issued an initial communication to all participants in petroleum substances SIEFs. This communication had the following main messages:

1. CONCAWE will combine the SIEFs for substances belonging to the same substance category (using a common 'template' data set) into so-called Super-SIEFs.
2. In addition to the legal obligations as SIEF Formation Facilitator, CONCAWE will offer registration dossiers to all SIEF participants, not just its own member companies, under licence agreements. These registration dossiers will have to be complemented by a minimum of legal entity/registrant-specific information.
3. The number of non-member pre-registrations exceeds CONCAWE's expectation by a factor of 10.

   There are indications that many pre-registrations have been made 'to be on the safe side' or because, according to guidance from the ECHA, in certain circumstances a pre-registration was required without any need to subsequently register the pre-registered substance. More than 1,000 pre-registrations have been made with the additional comment that the pre-registrant has no intention to register.

   The ECHA and industry associations, for example Cefic, have commented that as many as 80 to 90% of the pre-registrations will not be followed up by a registration.

   CONCAWE has therefore asked pre-registrants to advise whether they intend to register the substances they had pre-registered, and if so, in which volume band[2].
4. SIEF participants who have confirmed their intention to pre-register will receive, together with a SIEF collaboration agreement, an invoice for EUR 200 as their share of the SIEF facilitation costs. In turn they will be provided with access to a web-based SIEF communication tool.

   CONCAWE performs its role as SIEF Formation Facilitator as a non-commercial activity and has no intention to make any profit from this activity, but simply to cover the additional costs that it generates. The cost of SIEF facilitation will be shared equally among both members and non-members.

Responses from pre-registrants

Because the rate of response to the initial communication was low, the SIEF facilitation team sent a reminder at the end of April 2009. The current picture for petroleum substances (excluding sulphur), which already includes the effect of the reminder, is shown in Table 3.

Unfortunately almost 50% of the initial responses had no, or only partial, information regarding the volume band. Such respondents have also received the reminder.

Table 3 Current level of responses for petroleum substances (excluding sulphur)

	Number of responses
Pre-registrations covered	12,492
Responses from focal points	1,025
Intention to register confirmed by volume band:	
≥1000 t/a	1,605
<1000 t/a to ≥100 t/a	412
<100 t/a to ≥1 t/a	1,674
Intention not to register confirmed	4,851

[2] *The volume bands are: 1000 t/a, <1000 t/a to ≥ 100 t/a, <100 t/a to ≥ 1 t/a*
The volume bands determine the registration deadline and the information requirements in the registration dossiers. 30 November 2010 is the registration deadline for substances in the volume band ≥1000 t/a plus substances classified as carcinogenic, mutagenic or toxic to reproduction, category 1 or 2, which are manufactured or imported in quantities of ≥1 t/a, plus substances classified as very toxic to aquatic organisms, which may cause long-term adverse effects in the aquatic environment (R50/53) and which are manufactured or imported in quantities of ≥100t/a.

In line with the opinion of the ECHA, the SIEF facilitation team will regard pre-registrants who have neither responded to the initial communication nor to the reminder as 'dormant', i.e. currently without the intention to follow up their pre-registrations with registrations.

This will also apply to those pre-registrants who wish to keep their options open until shortly before their respective registration deadlines.

However, strictly speaking each pre-registrant remains a SIEF participant until the respective registration deadline for his volume band has passed. Hence the SIEF activities will have to make allowance for pre-registrants changing their mind at a later stage.

Knowing who will register and when is not only essential information for CONCAWE in its role as the SIEF Formation Facilitator, but this information is also needed in order to determine the licence fee for registrants.

SIEF facilitation

It cannot be over-emphasised that, initially, the SIEFs have no formal legal structure, no communication system and no leadership. On 1 January 2009, the SIEF was just a set of legal entities with a common interest in manufacturing or importing a particular substance in or into the EEA. The SIEF Formation Facilitator is expected to initiate the creation of an operating structure and the provision of an intra-SIEF communication tool.

As mentioned above, CONCAWE intends to enter into a 'SIEF collaboration agreement' with all pre-registrants who have confirmed now (or will confirm later) their intention to register. This SIEF collaboration agreement will be separate from the licence agreement for the registration dossier, the scope of which is described above.

Licence fee for the registration dossiers

Before the end of June 2009, CONCAWE will communicate to pre-registrants of petroleum products the cost of a licence per substance. This cost will be based on an assumption of the final number of registrations.

Gases, petroleum coke and sulphur—special cases

There are a number of substances in which other industries also have an interest. Discussions have been initiated with their respective associations and, where appropriate, specific arrangements are being made. Whatever form these arrangements finally take, CONCAWE will continue the preparation of the REACH registration dossiers for petroleum substances and sulphur, pending further clarification. Some specific cases are described below.

For petroleum gases, the registration dossier will be prepared by the contractor of the Lower Olefins/Aromatics consortium (LOA) on behalf of both CONCAWE and LOA, and for a category that includes both gases from refinery operations and from steamcracker operations (except the pure steamcracker gases ethylene, propylene and butadiene). LOA will take over the SIEF Formation Facilitator role for petroleum gases, but CONCAWE will represent all of its members in these SIEFs, so that CONCAWE members will not need to join this SIEF individually.

There is still the possibility that one or more of the three types of petroleum coke will be exempt from registration under Annex V of REACH. However, clarity will only be provided by the ECHA at a later date, perhaps as late as the end of this year. In the meantime CONCAWE continues preparing the registration dossier. CONCAWE's SIEF facilitation team has informed pre-registrants of petroleum coke that they will not be charged a share of SIEF facilitation costs until the ECHA has clarified the status of petroleum coke under REACH. Should all three types eventually be exempt, then the Super-SIEF for this category and the three SIEFs will be disbanded.

Unlike for petroleum substances, most existing substance data for sulphur that is not in the public domain is held by companies which are not CONCAWE members. Moreover, sulphur is not produced exclusively in refineries, but also by desulphurisation of natural gas, as a by-product of making coke from coal and by mining. Although committed to its role as SIEF

Substance Information Exchange Fora (SIEFs) for petroleum substances

Collaboration amongst REACH registrants has commenced

Formation Facilitator, CONCAWE was prepared to leave the management of the preparation of a joint registration dossier for sulphur to a non-member company, provided this company held substance data. However, the companies holding data for sulphur have turned down this offer. CONCAWE will therefore prepare the joint registration dossier for sulphur and share it with all registrants under a licence agreement.

Path forward

Since 2002 CONCAWE has worked voluntarily on an ambitious and comprehensive risk assessment programme for all petroleum substances. This programme has become the basis for the preparation of REACH-compliant registration dossiers for the benefit of its member companies.

CONCAWE is working on registration dossiers, which it intends to offer to all non-member company registrants under a licence agreement. In addition, CONCAWE has volunteered to facilitate all SIEFs for petroleum substances. This task has turned out to be more complex than expected, but it is hoped that it will become simpler once contact has been established with those companies that intend to register and when communication among these SIEF participants becomes routine. Nonetheless, there is considerable work ahead. CONCAWE's main focus, however, remains the preparation of the dossiers for petroleum products in time for the registration deadline of 30 November 2010.

Abbreviations and terms used in this CONCAWE *Review*

ACES	Advanced Collaborative Emissions Study
AEL	Associated Emissions Level
AELV	Associated Emission Limit Value
API	American Petroleum Institute
BAT	Best Available Techniques
BREF	BAT Reference document: Full title: 'Reference Document on Best Available Techniques for …' (A series of documents produced by the European Integration Pollution Prevention and Control Bureau (EIPPCB) to assist in the selection of BATs for each activity area listed in Annex 1 of Directive 96/61/EC)
DMB	Marine diesel oil, also called MDO. A marine fuel grade produced by mixing of heavy oil fractions obtained by atmospheric distillation with fractions from secondary crude oil processing
ECHA	European Chemical Agency
EEA	European Economic Area
ESCAPE	European Study of Cohorts for Air Pollution Effects
FCC	Fluid Catalytic Cracker
FP7	European Union's Seventh Framework Research Programme
HEI	Health Effects Institute
HMG	CONCAWE's Health Management Group
IMO	International Maritime Organization
IPPC	Integrated Pollution Prevention and Control (EU Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control)
LCA	Life Cycle Analysis
LNB	Low NO_x Burners
LOA	Lower Olefins/Aromatics consortium
MARPOL	International Convention for the Prevention of Pollution from Ships
NERC	US National Environmental Respiratory Center
NO_X	Nitrogen Oxides
REACH	Registration, Evaluation and Authorisation of Chemicals
RIVM	Rijksinstituut voor Volksgezondheid en Milieu (National Institute for Public Health and the Environment)
SECA	Sulphur Oxide (SO_x) Emission Control Area
SIEF	Substance Information Exchange Forum
SRU	Sulphur Recovery Unit
TWG	Technical Working Group
VROM	Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer Dutch ministry of Housing, Spatial Planning and the Environment

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Michael Lane has joined us from ExxonMobil as Secretary General, replacing Alain Heilbrunn who is taking retirement.

CONCAWE publications

Reports published by CONCAWE from 2008 to date

2008	
1/08	Impact on the EU of SO_x, NO_x and primary $PM_{2.5}$ emissions from shipping in the Mediterranean Sea: Summary of the findings of the Euro Delta Project
2/08	European downstream oil industry safety performance. Statistical summary of reported incidents—2006
3/08	Guidelines for blending and handling motor gasoline containing up to 10% v/v ethanol
4/08	Advanced combustion for low emissions and high efficiency: a literature review of HCCI combustion concepts
5/08	Report of a toxicology forum symposium on air quality and cardiovascular health effects: what's the impact—October 24, 2007
6/08	Optical methods for remote measurement of diffuse VOCs: their role in the quantification of annual refinery emissions
7/08	Performance of European cross-country oil pipelines—Statistical summary of reported spillages in 2006 and since 1971
8/08	Impact of product quality and demand evolution on EU refineries at the 2020 horizon—CO_2 emissions trend and mitigation options
2009	
1/09	Air pollutant emission estimation methods for E-PRTR reporting by refineries—2009 edition
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