

BUNKERSPOT

INDEPENDENT INTELLIGENCE FOR THE GLOBAL BUNKER INDUSTRY

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Volume 7 Number 6 December 2010 / January 2011

Inside:

- Environmental Issues
- Mass Flow Metering
- Fleet Management Systems
- Maritime Security
- People and Places
- News and Events



LNG bunkering:
A bright future beyond black oil?



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NEWS

Bunker Overview	4
Europe	8
Asia Pacific	12
Americas	16
Africa and Mideast	19

SPOTLIGHT ON LNG

Jürgen Harperscheidt discusses LNG fuel systems for ships other than gas carriers	20
The Port of Gothenburg is playing a key role in a project which aims to create an operational infrastructure for ship-to-ship LNG bunkering	23
Gasnor's Aksel Skjervheim and Stig Kallestad argue that LNG does work as a marine fuel	25

FLEET MANAGEMENT SYSTEMS

Rich Brown of Applied Weather Technology unveils the latest enhancements to GlobalView, which is the first maritime fleet management system to use Google Earth	26
---	----

BUNKERSPOT WORLD MAP

Global prices at a glance	28
---------------------------	----

MASS FLOW METERING

Søren Christian Meyer reflects on OW Bunker's five years' experience of using mass flow meters	30
--	----

ENVIRONMENTAL ISSUES

Simon Burnay of BMT asks if retro-fit devices are the way forward for reducing fuel bills and achieving environmental compliance	32
John Aitken of SEAA-T argues that the bunker industry has a strong interest in the carbon emissions debate	34

COMMERCIAL ISSUES

Chris Thorpe of HCEnergy follows the trends in the crude oil market	36
---	----

MARKET OUTLOOK

Stefka Ilieva of Poten & Partners Inc. looks at how China's predicted appetite for fuel oil will drive tanker trade over the coming years	38
---	----

MARITIME SECURITY

Piracy in the Gulf of Aden has made a big impact on shipping and maritime-related industries such as bunkering. The Government Accountability Office, the US Congress's watchdog, evaluates the US Action Plan to combat piracy and finds it wanting	42
--	----

AIS TECHNOLOGY

Dean Rosenberg of PortVision looks at how the bunker industry can benefit from using AIS-based services	46
---	----

EVENTS

Llewellyn Bankes-Hughes looks at the variety of conferences now competing to attract audiences	50
--	----

NETWORKING

Bunker people on the move	54
---------------------------	----

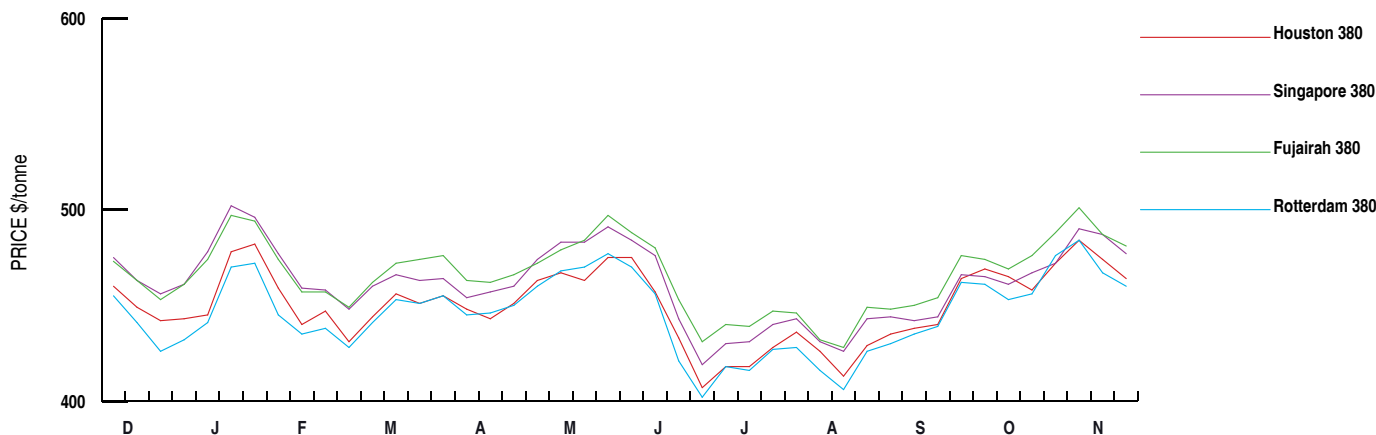
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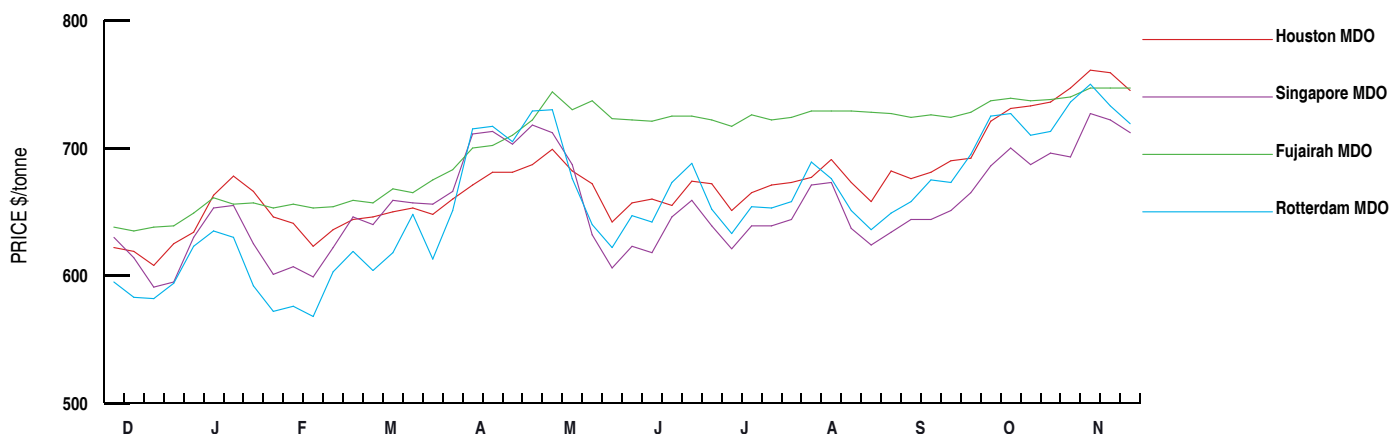
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12 month rolling price charts

380 CST Fuel Oil



Marine Diesel Oil



Green light for LNG as a viable marine fuel?

Global warming was not much in evidence at Petrosport House as this issue of *Bunkerspot* went to press. Parts of the United Kingdom were shivering under a blanket of snow and whipped by Arctic winds. In the Mexican holiday resort of Cancun, however, where thousands of delegates, lobbyists and media people attending the sixteenth *Conference of the Parties (COP) of the United Nations (UN) Framework Convention on Climate Change* were basking in 28°C sunshine, the warnings over climate change must have seemed more plausible.

If you believe the official line, COP 16 is expected to come up with solutions for climate change adaption, financing, technology transfer and measures against deforestation in developing countries – and prepare the way for a binding agreement that will be hammered out at COP 17 next year. You could say that COP 16 is tasked with tackling all the things that COP 15 in Copenhagen failed to do – which would make for a very full agenda.

The cacophony from the Cancun

Cassandras may seem a world away from the harsh reality of making a bunker delivery on a freezing St Petersburg day, but climate change does affect us all. As Jean-Pascal van Ypersele, vice chairman of the **Intergovernmental Panel on Climate Change (IPCC)**, reminded everyone on the eve of COP 16: 'We only have one inhabitable planet in the solar system, some seem to forget that.'

On page 34 of this issue, John Aitken of **SEAA** makes the point that 'there is a curious split between those in the bunker industry who take an interest in the climate change debate, and those who see the entire saga as a storm that will pass like any other'.

Bunkerspot is definitely in the first camp, and we believe that the vast majority of the industry is too. In this issue of the magazine, therefore, we are not only featuring Aitken's article on emissions trading schemes (ETs), but Simon Burnay of **BMT** looks at how shipowners can reduce their fuel consumption and achieve environmental compliance by

using retro-fit devices. Most importantly, we are spotlighting how Liquefied Natural Gas (LNG) could be used as a marine fuel, with contributions from Jurgen Harperscheidt of **TGE Marine Gas Engineering** (on page 20), the **Port of Gothenburg** (page 23) and **Gasnor's** Aksel Skjervheim and Stig Kallestad (page 25). The bunkering potential of LNG is now being discussed regularly at industry events. As *Bunkerspot* was going to press **Lloyd's Maritime Academy (LMA)** was gearing up to include sessions on LNG in its *Fuel Management, Ship Performance & Energy Efficiency* and *Future Fuels for Shipping* seminars (both taking place in London in December, see page 52 for details). In February, LMA will be devoting a full conference to the topic, *LNG: Fuel for Shipping*.

Encouragingly, the shipping industry does seem to be switching on to the benefits of LNG. Speaking to *Bloomberg* in November, Jaakko Eskola, **Wärtsilä's** head of ship power, confidently hailed LNG as 'the future

Bunker Overview

for shipping'. Furthermore, he predicted that between 800 and 1,000 vessels may be running on LNG by 2015, up from about 100 today. Clearly, this would still only be a small proportion of the world fleet, but it is a prodigious growth rate nonetheless.

Demand for LNG will take off when a supply infrastructure is in place and the gas can be offered at a price that is competitive to, or cheaper than, traditional fuels. As Gasnor's Skjervheim and Kallestad point out: 'Building up a new market which needs a new infrastructure is a challenge, but not a show stopper.'

While the world economy continues to ride the recession/recovery/resurgence helter-skelter, oil prices will continue to oscillate up and down but – as crude oil is a finite resource – the long-term trend must be upwards. The shipping world, just like any other industry, must look to alternative sources of energy. It is not just a question of meeting environmental objectives, it is a practical necessity. LNG seems to be out in front at the moment, but there are other runners. The LMA's *Future Fuels for Shipping* conference, for example, will also be showcasing fuel cell technologies, biofuels, wind power, solar power and nuclear propulsion. Some may be surprised to see nuclear power championed as a 'green energy' but the concerns over emissions would melt away if the shipping industry did join the nuclear club. The problem with nuclear energy, of course, is that if things do go wrong, they can go very wrong indeed. Nevertheless, it is clear that there are many experts who are prepared to take the idea of nuclear propulsion for commercial shipping very seriously. In October, the **Institute of Marine Engineering, Science & Technology (IMarEST)** devoted a full day of its *Ship Powering Alternatives Conference* to nuclear propulsion, with presentations on the insurance and legal implications, radioactive waste management policy and – perhaps most importantly – health and safety.

As 2011 looms, we expect the shipping industry to continue exploring its fuelling alternatives – with lots of options on the table.



Bunkerspot prices are compiled from the reports of the four brokers whose market reports have consistently proved the most reliable and accurate: **Cockett Marine Oil Limited, LQM, Glander International Inc., and KPI Bridge Oil**. *Bunkerspot* welcomes market reports from other sources for inclusion on its website www.bunkerspot.com

380 IFO		October					November			
		27-01	04-08	11-15	18-22	25-29	01-05	08-12	15-19	22-26
Rotterdam	d	439	462	461	453	456	476	484	467	460
Gibraltar	d	447	480	482	470	469	487	495	476	465
Piraeus	d	448	480	484	470	467	483	499	476	459
Suez	d	477	488	484	487	500	509	518	514	507
Fujairah	d	454	476	474	469	476	488	501	487	481
Durban	w	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tokyo	d	483	498	505	512	523	520	534	532	518
Busan	d	478	495	487	483	485	504	522	501	501
Hong Kong	d	452	479	478	472	478	488	501	494	495
Singapore	d	444	466	465	461	467	472	490	487	477
Los Angeles	w	445	462	473	463	472	483	491	483	494
Houston	w	440	464	469	465	458	472	484	474	464
New York	w	455	475	476	471	471	483	497	480	473
Panama	w	459	485	490	485	497	509	513	504	490
Santos	d	470	484	488	479	475	489	499	480	477
Buenos Aires	d	463	468	474	483	495	485	490	492	486

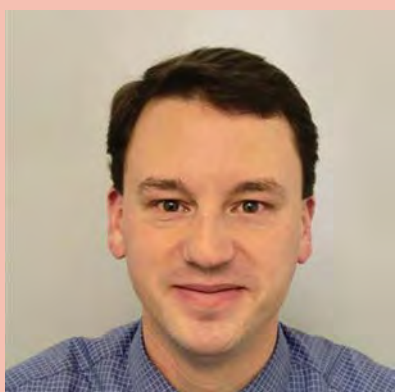
180 IFO		October					November			
		27-01	04-08	11-15	18-22	25-29	01-05	08-12	15-19	22-26
Rotterdam	d	457	481	481	470	472	496	504	484	479
Gibraltar	d	464	500	501	491	491	506	520	499	487
Piraeus	d	471	505	509	495	490	507	523	501	484
Suez	d	491	519	511	510	519	527	537	530	521
Fujairah	d	474	493	492	490	497	508	520	514	514
Durban	w	458	485	492	492	496	515	531	523	514
Tokyo	d	489	506	512	520	528	526	541	541	526
Busan	d	494	509	499	493	496	512	535	513	513
Hong Kong	d	460	488	487	482	489	498	515	505	504
Singapore	d	455	476	476	470	478	483	501	499	485
Los Angeles	w	465	483	495	484	492	503	513	508	515
Houston	w	462	483	492	485	477	489	501	490	486
New York	w	480	498	499	489	493	507	520	507	495
Panama	w	492	512	519	514	525	543	548	538	526
Santos	d	492	506	509	501	497	511	521	510	514
Buenos Aires	d	493	495	506	510	511	514	517	520	511

MDO		October					November			
		27-01	04-08	11-15	18-22	25-29	01-05	08-12	15-19	22-26
Rotterdam	d	695	725	727	710	713	736	750	733	719
Gibraltar	d	702	742	742	735	737	756	785	753	737
Piraeus	d	698	739	735	724	723	739	762	745	714
Suez	d	768	783	778	779	792	796	816	823	817
Fujairah	d	728	737	739	737	738	740	747	747	747
Durban	w	716	752	748	758	756	770	776	780	752
Tokyo	d	761	787	790	773	775	784	820	805	789
Busan	d	703	721	720	724	724	734	755	743	748
Hong Kong	d	676	712	711	706	713	712	745	748	745
Singapore	d	665	686	700	687	696	693	727	722	712
Los Angeles	w	719	733	741	740	745	764	788	781	783
Houston	w	692	721	731	733	736	747	761	759	745
New York	w	712	733	743	742	745	748	764	753	738
Panama	w	630	768	768	768	773	792	799	794	790
Santos	d	731	770	768	759	750	764	796	800	782
Buenos Aires	d	757	760	778	792	811	852	867	841	859

KEY: d – delivered • w – ex-wharf • n/a – not available • mdo – marine diesel oil

Step on the gas

Jürgen Harperscheidt discusses LNG fuel systems for ships other than gas carriers



Jürgen Harperscheidt, from TGE Marine Gas Engineering, will be speaking at Lloyd's Maritime Academy's second *LNG: Fuel for Shipping* seminar, which will take place on 15-16 February at the Sheraton Park Lane Hotel in London.

For more information on the Fuel for Shipping seminar, contact:

Lloyd's Maritime Academy
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Web: www.lloydsmaritimeacademy.com/
LNGBS

Today there is no doubt that improvement of ship's emissions is urgently required. There are different ways to cut nitrogen oxide (NO_x), sulphur oxide (SO_x), particulate matter (PM) and carbon dioxide (CO₂) emissions, but only one solution provides an 'all in one' reduction of all these emissions. Liquefied natural gas (LNG) as a ship's fuel will reduce NO_x to clearly below Tier III level, SO_x to zero, particulate matter (PM) to about zero and CO₂ by 20%- 30% without any after treatment of combustion gases.

Using LNG as a fuel has been a common technology for decades on LNG carriers. There is an excellent safety record for loading/unloading of those vessels as well as for operation of propulsion systems based on burning boil-off gas. Further there is about 10 years' worth of experience mainly in Norway on small ships with LNG propulsion, e. g. ferries and offshore supply vessels.

The current market situation with rather low LNG prices provides an additional driver for the development of LNG as ship's fuel. Commercial calculations from different sources result in pay-back times of two to eight years for the additional capital expenditure (CAPEX) on the LNG equipment for ships mainly operating in sulphur emission control areas (SECAs) and emission control areas (ECAs). The main 'uncertainty' of all those calculations is the price of LNG at the bunker flange compared with the traditional and low sulphur oil fuels.

Containment systems

One basic disadvantage of LNG is its low density: For the same energy content, LNG takes roughly twice the volume of liquid fuels. There are several types of containment systems for LNG available, but some are not feasible for the given conditions on ships using LNG as fuel following current designs. Membrane tanks as used on the very large LNG carriers are sensitive to sloshing and could therefore not carry partial loads – thus any use as a fuel tank is not possible. Type A (self supporting tanks designed like ship structures) and type B (self supporting prismatic or spherical) tanks are generally feasible for fuel gas tanks, but their requirement for pressure maintenance and secondary barriers raises difficult problems that have not yet been solved in a technically and commercially sound way. This will be a future solution for ships carrying large amounts of LNG as fuel.

So type C tanks (pressure vessels) turn out to be the preferred solution for today.

'Commercial calculations from different sources result in pay-back times of two to eight years for the additional CAPEX on the LNG equipment for ships mainly operating in SECAs/ECAs. The main 'uncertainty' of all those calculations is the price of LNG at the bunker flange compared with the traditional and low sulphur oil fuels'

These tanks are very safe and reliable, their high design pressures allow for high loading rates and pressure increase due to boil-off and finally they are easy to fabricate and install. The major disadvantage is the space consumption of this tank type that is restricted to cylindrical, conical and bilobe shape. These tank shapes add a factor for poor space usage to the above given density factor, with the result that three to four times the oil bunker tank volume is required to carry the same energy in LNG.

Tank insulation may be done by vacuum (for small cylindrical tanks) or foam insulation, depending on the operational and tank shape requirements. Vacuum tanks have an excellent insulation performance, but they are restricted to cylindrical shape. Foam insulated single shell type 'C' tanks are feasible in conical or bilobe shape in order to better fit to the available space, but have more heat ingress.

Process systems

Basically, the process system is intended to bring the LNG to the pressure and temperature required by the engines. Pressurising may be either done by small vaporisers keeping the entire tank on high operation pressure, by pumps serving the vaporizers, or by compressors. All versions are feasible, the plant capacities and operational requirements will dictate the right solution tailor-made for each situation.

Safety systems

With the use of gas on ships a number of hazards have to be controlled (e. g. fire, explosion, cold brittleness). **International Maritime Organization (IMO)** interim

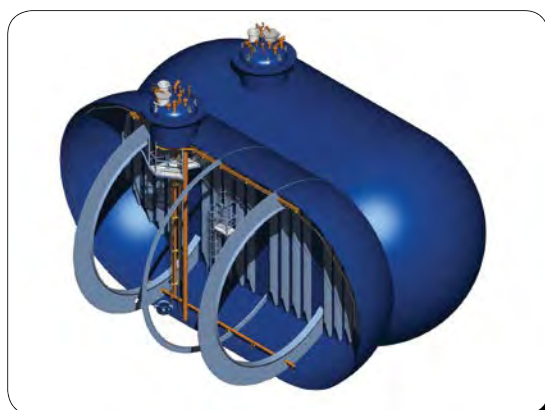
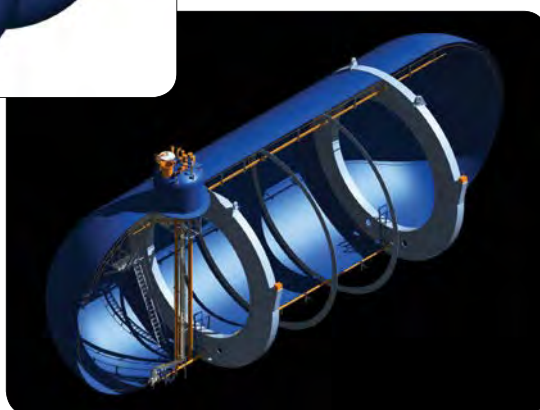


Figure 1: Principal view of IMO type 'C' bilobe and cylinder tank (Courtesy of TGE).



guideline MSC 285(86) as a preliminary version of IGF-Code and the Rules for LNG fuelled ships that have been published by all major classification societies are based on several decades of experience with LNG operations.

Double barriers for gas equipment, gas detection, emergency shutdown (ESD) systems and appropriately classed equipment are mandatory. Spill detection and stainless steel drip trays are located wherever LNG might escape and harm the ship structures by cold brittleness. Piping sections not in use are inerted with nitrogen, e. g. bunkering line after bunkering is finished.

LNG bunkering

LNG bunkering will have to be as close as

possible to the traditional bunkering if it is going to be accepted by the majority of the shipping industry. However, there are few details in place about how to bunker large amounts of LNG to a ship while it is alongside at the terminal for cargo operations. Bunker volumes and required rates exceed by far the current Norwegian practice, and bunker vessels or barges will be required to cover

‘LNG bunkering will have to be as close as possible to the traditional bunkering if it is going to be accepted by the majority of the shipping industry’

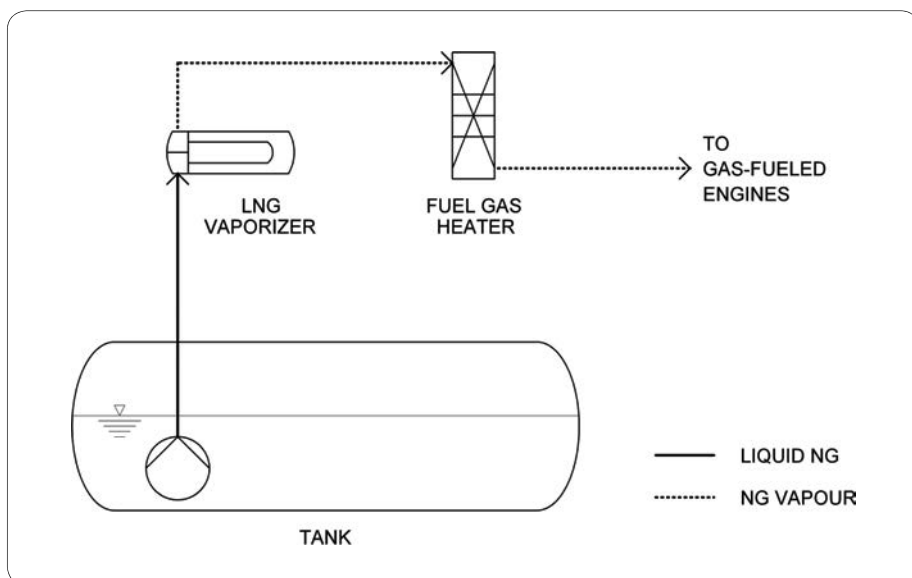


Figure 2: Schematic diagram of basic fuel gas system (Courtesy of TGE)

the needs. Technical solutions are not the major issue, as ship-to-ship transfer of large amounts is current practice in LNG business. The main challenges are the procedures and the global and local regulations that still need to be developed.

Conclusion

Technical solutions for safe operation of LNG as fuel are available. Emission control and rather low LNG prices should be the main drivers to develop LNG as bunker fuel. The shortage of related infrastructure currently is the main challenge that needs to be addressed soon in order to make LNG a reliable option for the shipowners in their decision about future ships. With the relevant dates for ECA legislation coming closer, the pressure will rise for everybody to find a solution to cover the challenges resulting from it.

'The main challenges to LNG bunkering are the procedures and the global and local regulations that still need to be developed'

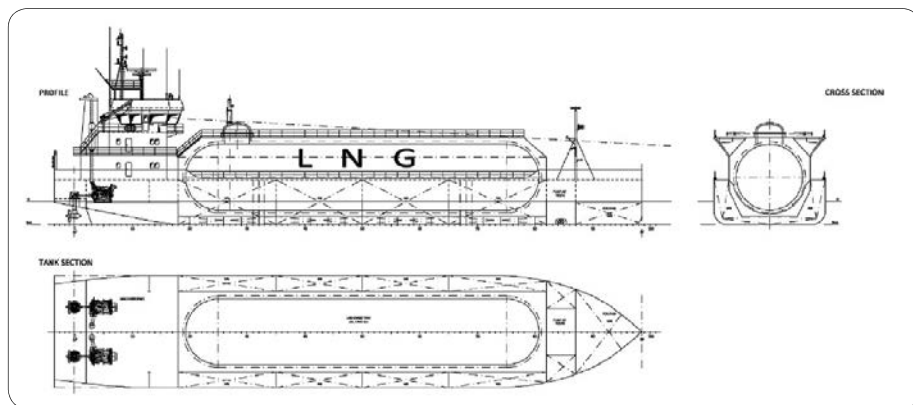
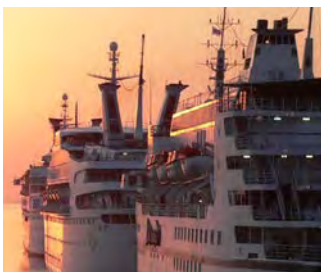


Figure 3: Design example for a 2,000 cubic metre (m³) LNG bunker vessel (Courtesy of TGE)



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Natural selection

The Port of Gothenburg is playing a key role in a project which aims to create an operational infrastructure for ship-to-ship LNG bunkering

For many years the Port of Gothenburg has been a high profile advocate for a cleaner maritime environment. Some 10 years ago, the port was the first to offer high voltage on-shore power supply, and today 30% of all calls in Gothenburg use this power source whilst at berth. Now the port is taking a leading role in promoting the use of liquefied natural gas (LNG) as a marine fuel.

'The target is to bunker a ship with LNG at 13.00 pm, on 13 June, 2013. If we are successful we will be amongst the first ports, perhaps even the first major port in the world, that can offer ship-to-ship bunkering with LNG,' said Jill Söderwall, head of energy at the port.

Stringent restrictions

Over the next decade, the shipping industry will have to comply with increasingly stringent environmental restrictions. Emissions will have to be reduced significantly and there will be an imperative to find an alternative fuel for shipping.

As Jill Söderwall explains: 'Many shipping companies are currently reviewing how to operate their vessels in 2015 when new and more restrictive emission standards for sulphur take effect in Emission Control Areas (ECAs) in the North and Baltic seas. We think that LNG could be an excellent alternative for the shipping industry.'

LNG is a natural gas that has been cooled to -163°C. At this temperature, LNG condenses into a liquid. When in liquid form, it occupies up to 600 times less space than in its gaseous state. LNG is odourless, colourless, non-corrosive and non-toxic.

It is a clean fuel in comparison with more traditional marine fuels; its use will cut nitrogen oxide (NO_x) emissions by 85%-90%, carbon dioxide (CO₂) by 10%-25% and sulphur oxide (SO_x) by 100%.

Apart from achieving significant reductions in air and sea emissions, LNG also offers a cleaner and quieter working environment for a ship's crew.

Chicken and egg

Until now, making the switch to LNG has been somewhat of a chicken and egg situation with ship operators using the

'The Port of Gothenburg has decided that it must take the initiative and create the operational infrastructure that will encourage an uptake of LNG as a marine fuel'

lack of available LNG as an excuse not to consider its adoption and gas and bunkers suppliers citing a lack of potential customers as an excuse not to develop a service. The Port of Gothenburg has therefore decided that it must take the initiative and create the operational infrastructure that will encourage an uptake of LNG as a marine fuel.

There are many reserves of LNG around the world, including Norway, Algeria, Indonesia, Nigeria, Russia and Australia. To date, there has not been a well-developed LNG infrastructure in Europe, but work is now underway to develop a number of LNG terminals.

'Another issue is the belief that the gas is dangerous,' said Jill Söderwall. 'We are working to change this picture. The truth is LNG is a very easily transported gas, lighter than air and not easy to ignite.'

The LNG-GOT project at the Port of Gothenburg is a joint venture between the port authority, Western Sweden's leading energy supplier, **Göteborg Energi**, and the Norwegian gas company **GasNor**, which has established an LNG network across northern Europe.

The project will involve the construction of gas storage tanks within the port's energy terminal, as well the development of a capability to supply fuel using a bunker barge. Göteborg Energy has already tendered for design submissions for a purpose-built LNG bunker vessel for use at the port.

'LNG-GOT's objective is to construct a terminal covering 10,000 cubic metres (m³) which will be able to receive deliveries of LNG for further delivery to bunker boats which will supply the vessels,' said Jill Söderwall.

However, bringing such a project to fruition is not without its problems for the port, she admits. 'Our biggest challenge is the

'To date, there has not been a well-developed LNG infrastructure in Europe, but work is now underway to develop a number of LNG terminals'

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'Our biggest challenge is the uncertainty over which rules and laws apply, and how we will be able to handle LNG within the harbour area'

uncertainty over which rules and laws apply, and how we will be able to handle LNG within the harbour area.

'We are pioneers in this field and are determined to establish which rules apply. To a degree, we must also be involved in the process of formulating the legislation because at present there are no major ports in the world which offer ship-to-ship bunkering with LNG.'

In order for a project such as this to be successful, shipping lines must also be prepared to invest in LNG, and **Wallenius Wilhelmssen** has already stepped up to the mark and declared its intention to invest in the technology.

Currently, between 25-30 LNG-powered vessels are in service or under construction, and some of the major LNG tanker vessels also run on LNG.

'We anticipate that the number of LNG-powered ships will continue to grow in the

coming years and that more ports in Sweden and in Europe will follow our example,' comments Jill Söderwall.

Of course, in an ideal world only renewable fuels would be used to power ships.

Göteborg Energi is already actively working on the production of biofuel that can be cooled down in the same way as LNG, and the Port of Gothenburg is hoping to offer a mixture of LNG and biofuels 'in the near future'.

Jill Söderwall believes that an investment today in LNG technology will reap future benefits for the shipping sector: 'LNG is a fossil fuel, but with significantly less environmental impact compared to other fuels.'

'I believe that LNG can bridge the gap to other renewable gases in the future. So the infrastructure that we are investing in now can also be used in the future when renewable gas is more widely used than today.'



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LNG works

Gasnor's Aksel Skjervheim and Stig Kallestad argue that LNG does work as a marine fuel

Liquefied natural gas (LNG) is a cold liquid but a hot topic in the shipping industry nowadays – because of new and stricter environmental regulations, because many shipowners and charterers expect increasing oil prices and because it offers the opportunity for more simplified operations. Emission Control Areas (ECAs) are already established in the Baltic Sea and the North Sea to regulate emissions from ships. Similar restrictions are on their way along the coasts of North America, as well as in parts of Japan and possibly other waters too. The shipping industry must now focus on how it can adapt to the new rules – and one option is to use natural gas. Most of the ships using gas today are new buildings, but there are also ships that are being retrofitted for the purpose. We expect a lot of relatively new ships to be converted to LNG propulsion.

Ships that do not operate in fixed routes might prefer to use dual-fuel engines that can switch to diesel when they cannot access LNG. This is a good solution, especially until the infrastructure for LNG is developed further.

Apart from the large tankers, LNG is already being used as fuel in quite a few ships. Most of them are ferries, but there are also some supply vessels, coastguard ships and small LNG tankers. Norway has been a market leader in this area, mainly because the concept of small-scale LNG was already put to use for industrial supplies. With its high mountains and deep fjords, the country is not well suited for long pipelines, so in order to supply the industry along the coast with natural gas the best solution was to build small LNG terminals close to the various industries.

Starting point

The ferries were a natural starting point since they go back and forth to the same places. Bunkering terminals or other solutions could then be fitted for the sole purpose of supplying ferries. As the technology seemed to be working well, several more users have also opened their eyes to LNG as fuel. The shipowner **Eidesvik** took it one step further and installed an auxiliary engine which drives a fuel cell from the natural gas. Eidesvik was so pleased with the result that it has started to develop a full scale project.

So far, most of the LNG supplied to the ships in Norway has been produced in small LNG plants on the west coast. To connect with the global LNG market, **Gasnor** is

'Most of the ships using gas today are new buildings, but there are also ships that are being retrofitted for the purpose. We expect a lot of relatively new ships to be converted to LNG propulsion'

now looking to the large import terminals to create a link between the small scale and the large scale LNG sectors. This has been done with success in both Belgium and Spain several times. In Europe alone there are close to 20 LNG import terminals from which the gas can be retrieved. Not all have been tested for it, but theoretically it should be possible.

Building up a new market which needs a new infrastructure is a challenge, but not a show stopper. As high sulphur heavy fuel oil (HFO) will no longer be an option within the ECAs, LNG is a very good alternative. The goal is to be able to provide LNG at a price that is lower than marine diesel oil (MDO) and fuel oil (once you taking into account the cost of scrubbing).

Comparing the emissions from natural gas and diesel engines shows a large difference, especially for those that affect the local environment.

Depending on the engine, nitrogen oxide (NO_x) can be reduced by 90%, sulphur oxide (SO_x) is absent (except from the lubricants) and particulate matter (PM) is also absent. There is potential for reducing the carbon dioxide (CO₂) emissions by around 25%, but this depends on the engine's ability to secure emissions of unburned methane.

The **International Maritime Organization's (IMO)** emissions regulations will continue to get tighter for years to come, but the limits will not go lower than what can be achieved by using LNG. In fact, the only way to go 'cleaner' is to use some sort of biogas; and since biogas and natural gas are chemically the same, they can be used in the same engines.

The great boom of ships using LNG as fuel has not come yet, but there is already a boom of interest all over Europe. Some engine manufacturers have a long history of LNG-fuelled propulsion – and they are now being joined by others who are testing gas engines for marine use. In addition, there is also a strong support from the classification companies, which share the belief that LNG is the fuel for the future.

Aksel Skjervheim is the Head of Fuel Markets at Gasnor AS, and Stig Kallestad is the Sales Manager Fuel Markets.

Gasnor has three liquefied natural gas (LNG) plants with a total production capacity of 120,000 metric tonnes (mt) of LNG. The company, which has supply contracts with European LNG terminals, has two LNG carriers – the 1,100 cubic metre (m³) *Pioneer Knutsen* and the 7,500 m³ *Coral Methane* – and 16 semitrailers for LNG transport.

Aksel Skjervheim is speaking at Lloyd's Maritime Academy's *Practical Guide to Fuel Management, Ship Performance and Energy Efficiency and Future Fuels for Shipping* seminars, which take place in London on 7-8 December 2010 and 9-10 December 2010 respectively.

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Earth story

Rich Brown of Applied Weather Technology unveils the latest enhancements to GlobalView, which is now the first maritime fleet management system to utilise Google Earth

Fleet managers are being inundated by massive amounts of data from disparate sources. Somewhere in this data resides the information fleet managers need to enhance ships' safety, reduce fuel consumption, fuel costs and carbon emissions. But it's getting to the information – quickly and easily, how and when fleet managers need it – that's the problem.

Historically there hasn't been a way for fleet managers to quickly see the locations of their vessels around the globe along with important information – such as which ships are encountering or approaching adverse weather and wave conditions, which ships are burning excessive fuel, which ships could save fuel by adjusting courses, which ships are running behind or ahead of schedule, or which ships are entering territory known for pirate attacks. *GlobalView*, **Applied Weather Technology's (AWT)** new fleet management system combines AWT's ship routing services and software with *Google Earth* technology to address these issues. It gives fleet managers a more visual, easy-to-use and powerful system for enhancing the safety of ships and crew, reducing fuel consumption and curbing carbon emissions.

What makes *GlobalView* unique is that it was developed with Google's *Application Programmable Interface (API)* technology, which adds a layer on top of *Google Earth* that makes it easy to consolidate and process information. *GlobalView* literally gives fleet managers a 'global view' of the locations of their companies' vessels and makes it easy to access important weather and ship-routing data about their current voyages. Fleet managers can see in an instant, all in one place, information that could have otherwise taken hours to gather from many sources. Vessels appear on the globe as colour-coded icons that can be customised to provide fleet managers with alerts regarding ship performance, fuel consumption/carbon emissions, weather conditions, estimated times of arrival (ETAs) or other factors. A click on the vessel icon gives a summary of the current voyage and sea state.

GlobalView makes it easy for fleet managers to see where severe weather and ocean conditions are occurring relative to vessels' locations. While many competitors take raw forecast data from governmental agencies and repackage it for customers, AWT continuously enhances the wind and wave forecast around tropical cyclones, monsoon areas, and other high-risk areas where conventional model data performs poorly. Then AWT runs a proprietary

WaveWatch III wave model to provide the best short- and medium-range forecasts available. When these features are combined with long-range vessel simulation from AWT's proprietary *Climatological Ship Resistance* model, ETA projections improve by approximately 8% compared to using conventional climatological weather.

With *GlobalView's* customisable fleet summary report, the status of the entire fleet is literally one click away. This summary can be tailored to include the parameters that are most relevant and alert fleet managers when thresholds are exceeded, for example heavy weather, speed under performance, fuel over-consumption, or early, on-time or late laycan status. From this report, fleet managers can click on the 'F' next to the vessel's name and *GlobalView* will 'fly' to the vessel's location so they can review the voyage in more detail. They can also click on the 'D' next to the vessel's name and a 'detailed performance analysis' will pop up for their review.

GlobalView gives fleet managers easy access to information about pirate activity. *GlobalView* shows details about actual and attempted pirate attacks, as well as reports of suspicious vessels, with time and location details. Fleet managers can filter the data by time and attack types and are provided colour-coded icons to easily identify the type and location where these attacks have occurred. Click on the icon and the attack details including a brief summary will pop up. The data empowers fleet managers to work together with ships' captains and AWT to help ships avoid these regions or at least be more aware so they can be properly prepared if an attack should occur.

GlobalView includes an option to view and evaluate alternative tracks. This gives the fleet manager the opportunity to get involved in the real-time management of the vessel's route, safety and fuel efficiency. While in the past the dialogue was mainly between the captain and AWT, we see this as an opportunity to create a stronger team effort between the captain, AWT and the fleet managers. By having the capability to evaluate the recommended route from AWT and the captain's intended route they can proactively get involved to ensure that the optimum route is sailed.

There is a need for shore-side weather routing assistance from AWT along with involvement from the fleet managers. We see that many captains tactically route their vessels using short-range forecasts for making their routing decisions, which can be beneficial in situations such as avoiding an individual low-pressure system, but using short-range

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forecasts without considering long-range ones and historical climate data could easily put vessels in locations where they might be exposed to prolonged adverse conditions on the remainder of their voyages.

Ships in such situations are often delayed for days at sea, causing excessive, unexpected and unnecessary fuel consumption and carbon emissions. These problems can often be avoided with strategic weather routing.

Strategic weather routing uses short- and long-range forecasts, detailed current data along with climatological data to evaluate the best route to minimise time en route, fuel consumption and exposure to prolonged adverse conditions that could lead to safety issues, damage and delays.

AWT uses the latest technology in ocean currents – the *Naval Coastal Ocean Model (NCOM)* combined with tidal currents at three-hourly time steps. NCOM is the operational model of the **US Naval Oceanographic Office** and uses input from the *Navy Layered Ocean Model (NLOM)* and the *Modular Ocean Data Assimilation System (MODAS)*. The model is used to support search and rescue operations and the Navy's optimum track ship routing as well as other military needs.

Using this real-time, high-resolution data

now gives AWT the capability to precisely determine the direction and intensity of the current globally. This enables AWT to more effectively optimise each voyage.

The combination of AWT's detailed current data with the 16-day forecasts and Climatological Ship Resistance Model provides the tools to strategically determine the optimum time or fuel route.

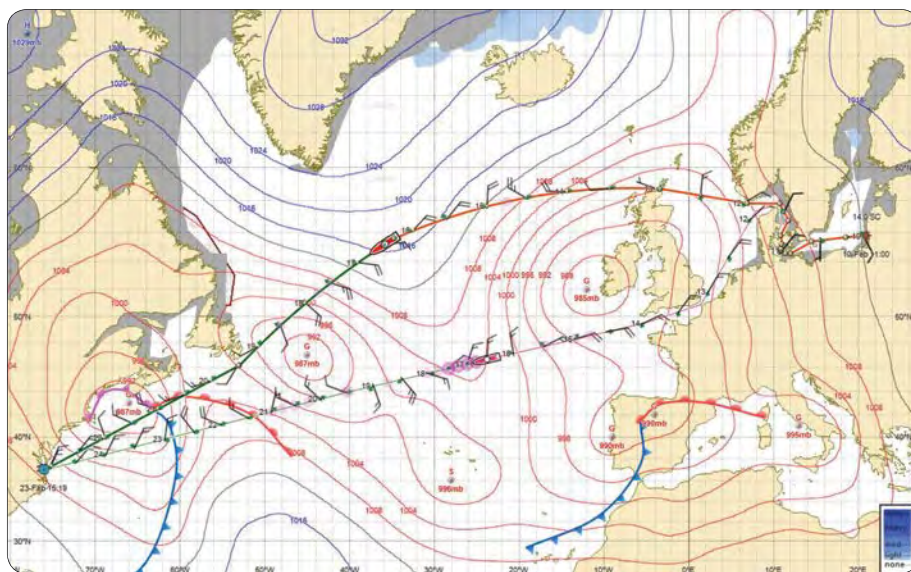
Although the exact location of a specific gale or storm may not verify beyond 10 days, the real key is determining the storm track. By understanding the intensity and where the systems are developing and moving, AWT's Route Analyst can strategically determine the best route.

Then once a vessel is within three to five days of a specific gale or storm, the route can be tactically adjusted to safely and efficiently clear that individual system.

Figure 1 shows an example where AWT's strategic weather routing saved 1.9 days, 54 metric tonnes (mt) of intermediate fuel oil (IFO) and 172 mt of carbon dioxide (CO₂) emissions.

Globalview is taking the shipping industry by storm, with leading edge technology, easy to use consolidation of information, visual alerts and the capability to proactively manage the safety and efficiency of their fleets.

'Strategic weather routing uses short- and long-range forecasts, detailed current data along with climatological data to evaluate the best route to minimise time en route, fuel consumption and exposure to prolonged adverse conditions that could lead to safety issues, damage and delays'



	En-route Time (days)	Avg Daily IFO consumption (MT)	Overall IFO consumption (MT)	Overall CO ₂ (MT)
AWT (north)	13.2	28.17	372	1184
Masters (south)	15.1	28.17	426	1356
Savings	1.9	0	54	172

Figure 1

Work experience

Søren Christian Meyer reflects on OW Bunker's five years' experience of using mass flow meters

Measuring the amount of fuel that is delivered during bunkering operations is a complex process. What is more, improving the accuracy of this exercise is a longstanding challenge to the industry that has provoked much debate over the years.

Manual tank gauging and sounding has been the dominant practice in bunkering and is still used by many suppliers. However, there are limitations, which have caused consternation from the perspective of both the supplier and the customer. Aside from quality and competitive pricing, the accuracy of the quantity of fuel oil that is delivered is a key component of customer service, and central to a positive ongoing relationship. If accuracy is compromised, delays are caused, which as well as incurring direct costs, impacts the efficiencies of a customer's entire operation. In the midst of tough economic times – particularly for shipping – and when cost pressures on all parties are higher than ever, coupled with rising customer expectations, this simply isn't good enough.

So, does mass flow metering represent the answer? It has certainly enjoyed a lot of publicity in the industry in recent months. In October, Joshua Low Chin Chuan, regional head of **Maersk Oil Trading**, reiterated Maersk's support for mass flow metering, highlighting the transparency, efficiency and relative simplicity of use, which he likened to the process of filling up a car at a petrol station. Maersk's data reports a discrepancy of just 0.15% between the invoiced quantity of fuel and the flow meter reading.

At the *Singapore International Bunkering Conference (SIBCON)* in October, a separate study on mass flow metering undertaken by enterprise development agency **Spring Singapore** announced flow meter error rates as low as -0.32% to +0.39% in some trials. This led the **Maritime and Port Authority of Singapore (MPA)** to announce that it would invest a further \$1million in researching the technology.

It may be a hot topic for the industry at the moment, but **OW Bunker** first adopted mass flow meters when it installed the technology on vessels in its global fleet five years ago. Our experience of mass flow meters over these years gives us a practical perspective and real insight on the use of the technology under different operational conditions, its commercial merits and its future role in the industry.

Mass flow meters have been heralded as a possible 'silver bullet' in guaranteeing fuel quantity and setting new standards for professionalism. Based on our experience so

'Our experience of mass flow meters over these five years gives us a practical perspective and real insight on the use of the technology under different operational conditions, its commercial merits and its future role in the industry'

far, the results are very encouraging. Mass flow meters appear to provide the most sophisticated, quick and accurate method of measuring fuel deliveries. They also supersede positive displacement flow meters, particularly when it comes to price and the actual ease of installation.

Operationally, mass flow meters are also particularly beneficial when conducting high seas and offshore bunkering, where swells or rough waves make sounding difficult. There has been a significant upsurge in shipowners and operators utilising high seas and offshore bunkering as a means of increasing efficiencies by not deviating from their course, and saving on the costs associated with bunkering in ports. Being able to ensure the quantity of product that is delivered will further increase the attraction of this service, an offering where OW Bunker has significant expertise.

Mass flow meters seem to make good sense on every level. They make life easier for the crews of both the bunker barge and the receiving vessel. And most importantly, the customer benefits from a full service solution that ensures the quantity of fuel oil delivered, creating a smoother and faster bunkering service. Ultimately this increases efficiencies within customers' operations, which should be a priority for all bunker suppliers.

Mass flow meters also represent an essential element in further professionalising the fuel supply industry and continuing to build trust with shipowners and operators. The most progressive bunker suppliers should champion the use of modern technology as a means of improving customer service and mass flow meters can play a big part in driving up service standards.

While mass flow metering technology clearly has the potential to become an 'industry standard', there is still a way to go. The process of widespread adoption and installation will take time. And if it is to become the convention, it will require regulatory approval, and to be formally

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mandated under the European Union's (EU) *Measuring Instruments Directive (MID)*.

At OW Bunker, we are happy with the results achieved over the past five years, predominantly led by positive feedback from customers. However, no one would claim that the technology has yet been perfected and further modifications need to be made. In particular, the meters are very sensitive towards external stress, vacuum and pressure pulsations, as well as pulsations in the fuel oil that come from gear pumps or engines that are nearby. This is something that needs to be pioneered by the manufacturers, but in close consultation with the industry. The insights that can be provided from fuel suppliers that use mass flow meters – not only from an operational perspective but also from a fundamental understanding of what ship owners and operators want in terms of customer service excellence – will be critical to the research and development

'Mass flow meters appear to provide the most sophisticated, quick and accurate method of measuring fuel deliveries. They also supersede positive displacement flow meters, particularly when it comes to price and the actual ease of installation'

(R&D) process, and serve as the foundation for evolving the technology so that it meets its full potential.

What is clear is that these challenges are not insurmountable and mass flow meters still represent the most accurate method

of calculation in what is a highly complex process. For progressive operators in the bunker market, mass flow metering provides a more accurate, reliable and cost-effective fuel measurement option that will deliver greater speed, certainty and efficiency. It also makes a significant contribution towards driving up service standards and professionalism within our industry.

Ultimately, this is the critical point. Every fuel supplier must continually ask himself what he can do, and what efforts he can make to improve every possible element of customer service. Where can further efficiencies be gained? How can customers' profitability be improved? Achieving this will create longer lasting, and more financially rewarding customer relationships.

Technology plays a critical role in delivering this, and while change is often hard to accept, embracing it is the sure road to continued success.

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Retro charm

Simon Burnay of BMT asks if retro-fit devices are the way forward for reducing fuel bills and achieving environmental compliance



Simon Burnay, M.Eng, MRINA, MSNAME, is Director - Marine Consultancy with BMT. Leading BMT Group's 'Energy Efficient Shipping' team, Burnay is responsible for the development of advanced fuel efficiency, energy efficiency and emissions tools and services. He is a member of the Society of Naval Architects and Marine Engineers (SNAME) H-10 Ship Controllability Panel and has been a technical advisor to non-governmental organisations (NGOs) at the International Maritime Organization (IMO) Marine Environment Protection Committee (MEPC) meetings on greenhouse gas (GHG) emissions from ships. He has specialist expertise in ship performance, speed-power trials, vessel dynamics, forensic engineering and incident investigations.

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Although the diverse economic and environmental drivers currently impacting the shipping industry come from very different sources, the fundamental result is a need to reduce the energy consumption of the world fleet. One area that has been identified as a significant opportunity is enhancing the hull form and machinery of existing vessels to make them more energy efficient.

Shipowners and operators have been hit with the double whammy of economic downturn and environmental pressure over the last five years. The commercial realities of the former and legislation driven by the latter have created a situation where energy efficiency and the appropriate implementation of a comprehensive energy management strategy are required to significantly reduce fuel consumption and emissions. A key element of an energy management strategy is to ensure the energy efficiency of both new ships coming off the slipway and existing ships in service. The **International Maritime Organization's (IMO) Energy Efficiency Design Index (EEDI)** will hopefully drive improved energy efficiency for new vessels, but this will only apply to new vessels which are a comparatively small percentage of the world fleet. In the next 20 to 30 years, the majority of greenhouse gas (GHG) reductions and therefore energy efficiency improvements will need to come from existing vessels and there are a wide variety of measures with the potential to assist in achieving this.

Potential retro-fit improvements to the hull-form include a wide range of 'bolt-on' devices, such as improvements to bow-thruster tunnels, wake equalising ducts, stator fins, twisted leading-edge rudders, appendages to improve propeller/rudder interaction and advanced propeller designs. There are also more substantive changes to hull hydrodynamics that may be achieved by modifying bulbous bows or stern shapes (including duck-tails and similar).

As well as the underwater efficiency, the basic consumption of energy required to propel the ship and service its power consumers provides opportunities to make propulsion and auxiliary machinery more efficient and consume less fuel. Here a wide range of options are available from the simple (such as use of low energy light bulbs), better use and tuning of operational equipment (e.g. auto-pilots, usage profile of generators) through to main engine modifications for improved efficiency.

BMT has been working in this area providing independent advice to major

'BMT's data, including in-service trials, shows that a device providing a 4% fuel saving in the loaded condition can provide a pay-back period of a little less than one year'

shipowners and charterers for a number of years. The results of its studies, including computational fluid dynamics (CFD), practical engineering analysis, model tests and also in-service trials, demonstrate that there is no 'off-the-shelf' product or solution that can be installed on any ship with a guarantee of success. What works for one ship design doesn't necessarily work for another and it is important to take a holistic view of each vessel, considering its operating envelope and the relevant cost-benefit criteria. As part of this process, it is also important to identify how efficient the vessel is in its current configuration as this will impact on the potential for improvement. A well designed ship that is already operating close to its optimum efficiency will have far less scope for improvement than a similar vessel that may be afflicted by a number of remedial issues.

In considering the suitability of any of these devices or modifications, it is vital to include all the relevant factors in calculating the cost benefit. Ultimately, the decision to install such devices (possibly involving a dry-dock) will be driven by economic factors and must therefore deliver an appropriate return on investment over a suitably short period to make it viable.

Correctly selected and deployed, retro-fit devices have the potential to deliver a significant reduction in power requirements. For example, BMT's data, including in-service trials, shows that a device providing a 4% fuel saving in the loaded condition can provide a pay-back period of a little less than one year, depending on the fuel price and utilisation of the vessel. The selection of devices or measures should consider a package of measures tailored specifically to an individual vessel, while taking into account its speed and operating profile. One has to strike a balance between the operating conditions of the vessel, because what provides a saving when fully loaded may not do so in the ballast condition. Any changes to the operating profile could negate the

benefits, so a considered approach will pay dividends in the long term.

To establish the saving that the selected devices or measures will provide (and hence the cost benefit), it is very important to know what the baseline performance of the vessel is against which changes can be measured. To quote the eminent physicist and engineer Lord Kelvin: 'To measure is to know.' Therefore a good performance monitoring system needs to be in place or the savings that may be realised can be lost in the scatter of data. Solutions such as BMT's *SMARTPOWER* automatically record and collate real-time performance data, providing much improved performance data over the standard manual 'noon' reporting process. By measuring, recording and analysing good quality data, it is possible to examine the overall performance of individual components (engine, propeller, hull performance), remove external effects, identify where efficiency losses are being

introduced into the system and implement solutions accordingly.

Looking to the future, BMT believes that there is significant scope to improve vessel efficiency through improvements in hydrodynamic efficiency, propulsion systems and ancillary machinery. The gains that might be achieved are dependent on the industry's willingness to invest now, based on the potential cost benefit. But there is the danger of an impasse as the industry is cautious about investing in what is seen as unproven technology during difficult economic times. The risk/reward ratio is often perceived as biased towards the shipowner's risk and the payback period is often seen as too long. A catalyst is needed to start the process and this could be achieved by using some of the proceeds from emissions trading or bunker levies to subsidise investment in energy saving technology, reducing commercial exposure and starting the iterative process of

usage and feedback that can only help refine and improve the technology.

The use of retro-fit devices and improvements to operational systems should not be seen as a 'one-size-fits-all' solution to vessel efficiency. It requires careful ship-specific analysis of the current performance, suitability of the devices and measures and practical analysis of the cost benefit, backed up by good monitoring of the achieved performance.

To achieve the reductions in GHGs that regulators will demand, there will need to be a willingness to invest in the available technology and hence proactive measures may be required to help minimise the perceived risk this presents. Further mitigation of that risk can be achieved for the shipowner or charterer by engaging the support and advice of companies which can provide the reasoned and independent assessment of the benefits possible.

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Change in the air

John Aitken of SEAA T argues that the bunker industry has a strong interest in the carbon emissions debate

There is a curious split between those in the bunker industry who take an interest in the climate change debate, and those who see the entire saga as a storm that will pass like any other.

It's easy to understand why some people think it will blow over. The theory goes that the role of bunkers won't change so long as oil companies produce fuels and ships consume them. Prices will spike, bounce and collapse like they always have done, whether there are sulphur regulations or emissions trading systems (ETS), indeed whatever the **International Maritime Organization (IMO)** or European Union (EU) throws at them. Ships need energy to move, and the world needs ships to trade. For the fast-moving bunker industry, following regulatory developments can seem to some like watching paint dry.

Perhaps some in the shipping industry see things the same way. Compare the sector's approach to that of aviation's in the **United Nation's (UN)** climate change talks. After Copenhagen in 2009, negotiations are set to resume in Cancun at the start of December, with the drum beating once again over whether shipping and aviation will be used as funding sources – for billions of dollars – to finance climate change adaptation in developing countries.

Shortly before the talks began, the **International Civil Aviation Organization (ICAO)**, aviation's equivalent of the IMO, achieved consensus among its 190 member states on a detailed plan to improve aircraft efficiency and commit to carbon-neutral growth from 2020.

The ICAO did well to act when it did. A UN report recently forecast that up to \$12 billion could be raised from aviation with some form of carbon-based revenues. The EU is already bringing aviation into its ETS, and repeatedly threatens to do the same with shipping.

In contrast to ICAO, the IMO has been unable to broker any kind of agreement on how to reduce shipping emissions. The fault cannot be laid at the door of the IMO itself, but rather with political pressures. Nonetheless, it is striking that efficiency measures such as the Energy Efficiency Design Index (EEDI), Energy Efficiency Operational Index (EEOI) and Ship Energy Efficiency Management Plan (SEEMP) have not progressed, and there has been nothing close to aviation's commitment to zero-carbon growth. For aviation, this is no more than a backstop, but a worthy one at that. Emissions will have to fall, however, rather than stabilise, to achieve

'It is striking that efficiency measures such as the EEDI, EEOI and SEEMP have not progressed, and there has been nothing close to aviation's commitment to zero-carbon growth'

the reductions required to rebalance the earth's climate system.

There are admittedly major differences between the two industries: aviation is much closer to the consumer (and the democratic vote) than shipping. Airline passengers are a clearly defined segment of the electorate (and of newspaper readers) meaning both industry and governments feel under greater pressure to change. By comparison, the cruise and ferry industries are but small sub-sectors in comparison.

There is also the argument that whatever efforts an industry makes to improve efficiency, there will be no concerted drive towards emissions reduction without clear targets, and proper incentives for market participants to change behaviour. Furthermore, there are still many important questions which do not yet have answers: what amount of greenhouse gases (GHG) should shipping be allowed to emit each year, and how should these allowances be allocated?

Such debates and the issue of common but differentiated responsibility (CBDR) appear to be particularly intractable. Different countries have very different needs in terms of their use of carbon-emitting fuels or carbon-offsetting forests. While these discussions continue, it is unlikely, as seen in the recent UN report on Climate Change Financing, that there will be a clear move in favour of choosing the method of emissions reduction – even if this is perhaps the most important policy decision.

We are currently seeing with sulphur standards how divisive it is to bring in a regulation that has not undergone what many would deem sufficiently rigorous scrutiny. The requirements of universally low sulphur fuel carry with them major question marks over economic and logistical viability.

With GHG emissions, the key policy divide is between an ETS and an offsetting scheme (GHG Contribution). Both concepts aim to encourage companies to reduce their emissions, but take very different approaches. With an ETS, companies pay for the amount

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of carbon they emit, and with a GHG Contribution scheme, they pay for how much fuel they consume.

It is clear that the burning of hydrocarbons is one of the most important sources of carbon and GHGs, and therefore it is thought that simply increasing the cost of fuel (with some offsetting) will encourage greater efficiency. Driving efficiency gains has been the approach of European policy on automotive transport for decades. This has certainly resulted in the lowest emission fleet, and a high level of innovation among auto companies. However, the net result has been that emissions from European motor transport grew 28% between 1990 and 2007. Simply put – efficiency is good, but without a cap emissions will continue to rise.

An ETS is not only the most effective means of tackling shipping emissions, since it employs a cap, but also the fairest, since it supports all companies' efforts to reduce

their carbon footprints, in whichever way they choose to do so. Companies can either cut fuel consumption, or use new technology to remove carbon at the end of the exhaust pipe. This encourages not only innovation in energy efficiency technologies, but also exhaust cleaning systems.

It is the solution that the EU chose for aviation. Indeed, it is the system that was chosen by the United States to tackle local air pollution from sulphur oxides (SO_x), in the *Clean Air Act 1990*, something which the shipping industry would be well advised to take note of.

What does this mean then for the apparently unengaged bunker fuel business? Wouldn't its role remain precisely as it always has done? Oil companies produce fuels, ships consume them, prices spike, bounce and collapse...

In fact, the bunker industry has a very strong interest in carbon emissions policy. If

the GHG Contribution concept is adopted, as the Danish government would like, the bunker industry will have to set up new systems to capture the 'levy' from bunker sales, and transfer these to the IMO. With an ETS, either the ship operators or charterers would have to acquire carbon credits reflecting their bunker fuel consumption. Bunker fuel traders and suppliers could supply carbon credits in parallel to supplying fuel, using their existing trading infrastructure to secure the best carbon prices.

An ETS is not only the best for the overall shipping business, since carbon prices will reflect demand for carbon emissions, and therefore rise and fall in tandem with the economic cycles, but also offers one of the few revenue-generating opportunities the industry will see from climate change regulation. Which is why companies, associations and governments with an interest in this market should back an ETS.

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Crude dollar trade

Chris Thorpe of HCEnergy follows the trends in the crude oil market



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The crude oil price rebound over the last 18 months has been truly remarkable given a mostly feeble global economic recovery. It was only May of this year when we tested the \$70-a-barrel level only to refute it and quickly resume a path higher to well over \$80 a barrel. The fact remains that demand growth has only partially recovered and has been supported by government stimulus worldwide. Even the emerging markets' growth rates are not back to their pre-meltdown levels. So why has the market supported a return to \$80 crude? Should transportation companies worry that fuel prices may go higher from here? The answer lies in both the US dollar, which is at risk of further devaluation, and in the crude oil supply picture, where growth does not have the potential to meet a robust recovery without the risk of higher prices.

The global demand picture is becoming clearer with recent third quarter (Q3) 2010 reports suggesting that the UK grew by an annualised 3% and the European Union (EU) as whole was not far behind. Other developed economies are also reporting positive growth with improving consumer spending whilst developing countries indicate high single-digit growth. Although exact growth figures are difficult to pinpoint in emerging markets, they continue to feature plenty of available capital for new projects and investment. The low cost of borrowing across the G7 has helped provide that capital and has fuelled a global rebound that has had a direct impact on markets and pricing including upward pressure on petroleum prices.

Inelastic demand

Perhaps due to the inelastic demand nature of some consumer goods in the United States, we have seen price increases (modest inflation) – most notably in energy and food. Indeed, the market for housing still exhibits the symptoms of a post-binge hangover and may limit consumer spending growth. But for now what's interesting is that a prevailing negative investor sentiment has been overcome by improving consumer spending. This has trickled down to energy demand for transportation of goods. Thus despite a hobbling economy, demand is actually improving for energy consumption.

With this in mind, commodity prices may creep higher despite what may appear to be zero or negative inflation, all else being equal. The spectre of deflation has placed the **United States Federal Reserve** in a position where it will employ novel methods

'Should transportation companies worry that fuel prices may go higher from here? The answer lies in both the US dollar, which is at risk of further devaluation, and in the crude oil supply picture, where growth does not have the potential to meet a robust recovery without the risk of higher prices'

to fend off the risk of deflation and prolonged unemployment. Longer term quantitative easing (now known as 'QEII') is unfolding as expected with the Federal Reserve announced purchase plan of \$600 billion of US Treasuries. By purchasing large amounts of longer-duration US Treasuries, it will decrease long-term US dollar interest rates, and likely weaken the US dollar versus other major currencies. A weak dollar generally results in higher crude oil prices in US dollar terms.

Low cost of borrowing

The low cost of borrowing in the United States and elsewhere not only makes leveraged investment attractive but also may promote investment in financial assets and physical assets such as commodities as a way to hedge against US dollar depreciation and inflation in the future. With few exceptions, commodities have rallied in the last quarter, potentially pricing in an expectation of a weaker dollar. To hedge against further weakening of the dollar, those exposed to crude oil prices using a benchmark denominated in US dollars will need to hedge dollar depreciation or against crude oil price appreciation. Most major energy benchmarks are denominated in dollars, which creates a secondary risk for hedgers if they do not at least calculate the currency risk implied by their energy exposure. This macro economic risk is hard to evaluate, but we can at least identify it and prepare for various outcomes.

If currency risk wasn't hard enough to pin down, there is a greater risk of crude oil going higher due to other key issues. As demand growth seems to be finding some stable rate of improvement, the pressure on prices to increase will come from the

supply side which might not meet current demand growth. Recall the theories of Dr M. King Hubbert, known for his peak oil theory which describes that production will peak at a certain point then decline until depleted; the increase in production may not meet demand at the most modest levels of expected growth. I will explain why.

New sources of crude oil

The world is very dependent on traditional sources of excess supply capacity in crude oil. The most prominent supplier is the **Organization of the Petroleum Exporting Countries (OPEC)**, which has historically been able to call on an available surplus capacity at short notice. Yet this important buffer in supply has dwindled and OPEC producers' ability to add more barrels in the short term is increasingly limited. The other key geographic sources have been the North Sea, Mexico and Russia which are not subject to OPEC production quotas. Those areas currently produce at capacity and have diminishing potential to add new supply. North Sea and Mexican outputs of crude oil are rapidly being depleted and Russia has returned its production levels to those seen prior to the currency crises in 1998 with no expectation for new supply growth. If traditional sources become less significant, can the newer sources and non-OPEC supplies be trusted to provide the necessary volumes when they are needed? The answer to this question will challenge Dr Hubbert's theory that a peak of supply will be reached globally, and then enter an inevitable period of depletion when demand growth outstrips supply growth.

We are left with a few supply wild cards or higher cost alternatives. Non-conventional supplies, including Canadian

'A prevailing negative investor sentiment has been overcome by improving consumer spending. This has trickled down to energy demand for transportation of goods. Thus despite a hobbling economy, demand is actually improving for energy consumption'

oil sands, on-shore shale rock formations wells and liquefied petroleum gas (LPG) from conventional wells, may provide important sources of crude and petroleum liquids at various costs. The Canadian oil sands alone are an important source of new supply but have development limitations due to the high cost of extraction and conversion of the heavy asphalt-like product to liquid crude product that can move through a pipeline primarily to the American market. The smaller volume shale rock land exploration is lower cost but provides smaller potential volume of crude and petroleum liquids versus natural gas. And alternative fuels such as natural gas and LPG play a part of supply growth, yet not enough to bridge the gap.

Even with new projects, non-OPEC suppliers cannot impact supply growth significantly. Though Canada, the US, Brazil and the former Soviet Union (FSU) are increasing production and alternative fuels are making progress, the level of annual supply growth is only between 200,000 barrels a day (b/d) and 300,000 b/d. This is quickly offset by growth declines in Mexico and the North Sea that are dropping annually by a combined 500,000 b/d, according to the **PIRA Energy Group**.

There are other less quantifiable bottlenecks for new supply growth. As a result of the **BP Macondo** oil spill, off-shore drilling in the United States and other countries may be delayed or restricted due to political agendas or environmental limitations. Even if projects do continue, weather and other safety factors may limit output potential in the near term. Looking beyond the Gulf of Mexico, even investments in the deepwater fields near Brazil's coast may get delayed following the Brazilian government's announcement of its intention to nationalise some of the oil revenues. Therefore, the time lag to supply growth remains in question.

Timing is everything

With economists gaining confidence that the worst is over in the credit markets, the risk of a severe downturn has diminished. If global demand improves as we are currently seeing, supply growth has to exceed expectations and avoid typical and periodic disruptions. With political issues, weather, investment climate, and technology all key inputs in the equation, the likelihood of a higher oil price should be considered, especially when coupled with a weaker US dollar in a long period of economic recovery and loose money.

'Most major energy benchmarks are denominated in dollars, which creates a secondary risk for hedgers if they do not at least calculate the currency risk implied by their energy exposure'

Growth factors

Stefka Ilieva of Poten & Partners Inc. looks at how China's predicted appetite for fuel oil will drive tanker trade over the coming years

Over the past decades, China has evolved into an integral growth engine for the global economy. China's rapid economic expansion is expected to continue unabated over the medium term, further driving worldwide commodities and shipping markets.

In 2009, the Chinese economy experienced its slowest growth rate over the previous eight years at only 8.7%, following 9.6% in 2008 and a booming 13% in 2007. The **World Bank** is projecting growth at 9.5% for 2010 and 8.5% in 2011.

Respectable pace

In the medium term, China's growth trend is on a course of gradual decline but still at a respectable pace of 8% per year. The focus will be on rebalancing the economy and structural reforms.

Longer term, between 2016 and 2020, the consensus outlook is for China's annual economic growth rate to stabilise to an average of 7% per year. This outlook is consistent with the level the government has set as a target for sustainable growth.

In line with the robust economic expansion China has experienced over the past two decades, crude oil demand has grown from just over 2 million barrels per day (b/d) (100 million metric tonnes (mt)) in 1990 to close to 8 million b/d (400 million mt) in 2009. Crude oil demand is projected to continue this relentless climb, albeit at a lower rate. From 2010 to 2015, the demand for crude oil is expected to increase by 4%-5% per year, driven by continued economic

'Given the high absolute level of fuel oil prices, the Chinese government is also taking measures to curb the growth of energy intensive industries'

expansion. This, of course, leads to an ever increasing level of required crude oil imports to satisfy demand against a relatively flat crude oil production profile. China's required level of crude oil imports to meet demand is expected to grow to over 6 million b/d (300 million mt) by 2015.

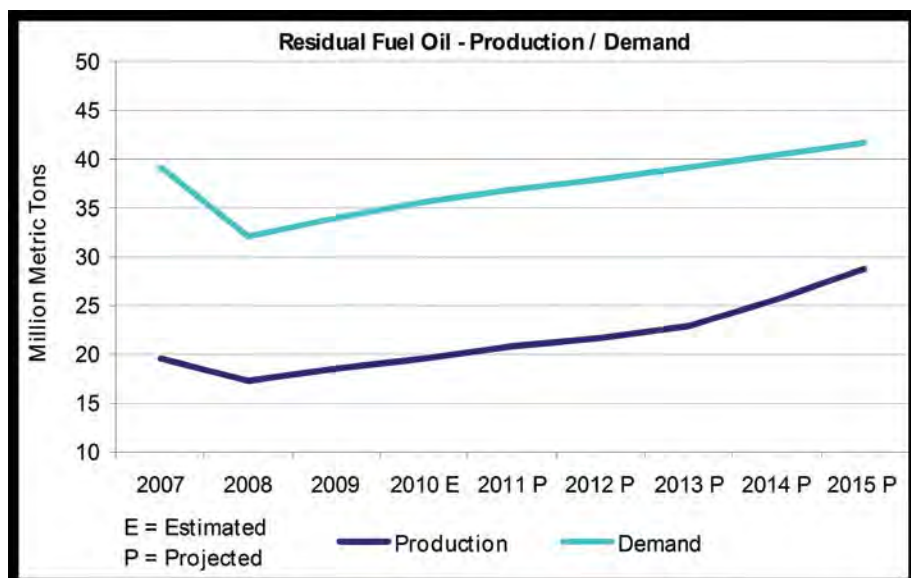
Reliant on imports

China remains structurally short of residual fuel oil and is reliant on imports to meet demand. As shown in the chart below, fuel oil consumption was off sharply in 2008, reflecting weakness in both inland and marine bunkering demand. Rationalisation of teapot refineries also reduced residual demand as a refinery feedstock.

It is expected that the strong growth in overall Chinese oil consumption will continue, but fuel oil demand is forecast to grow at a slower pace.

Fuel oil demand in the outlook period should grow with increasing demand for electricity, but the growth rate will likely be less than in prior years due to penetration of natural gas.

Given the high absolute level of fuel



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‘Increasing long-haul import volumes from Atlantic basin suppliers such as Venezuela will add significantly to tanker tonne/mile demand’

oil prices, the Chinese government is also taking measures to curb the growth of energy intensive industries. International and domestic marine bunker demand is projected to grow at 4%-5% per year in line with higher shipping activity driven by overall growth in China and global economic activity. Residual fuel oil production is shown to increase consistent with refining capacity additions.

In 2009, China imported approximately 24 million mt of fuel oil. This level was about 4 million mt higher than in 2008, reflecting the rebound in domestic demand. Venezuela was the top supplier at 4.2 million mt, registering a gain of one million mt over 2008, to once again outpace Singapore. Residual fuel oil exports in 2009 totalled 8.6 million mt.

China (excluding Hong Kong) sold 9.6 million mt of residual bunker fuel in 2009. By comparison, Hong Kong sold over five million mt. Containerships are the main bunker fuel customers in Hong Kong. This Asian hub was the busiest containership terminal in China through 2007; Shanghai is now the leading container port.

Doubling container ship traffic

The country’s major container ports (except Hong Kong) more than doubled their container ship traffic between 2003 and 2008. Hong Kong’s container traffic increased only 19%, by comparison. China’s overall traffic volume, measured in twenty-foot equivalent units (TEUs), decreased slightly from 2008 to

2009 due to the global economic slowdown. However, it is expected to bounce back this year and steadily increase through 2015. More containership traffic typically spells more bunker fuel sales. However, that does not seem to be the case for China’s eastern and northeastern containership ports.

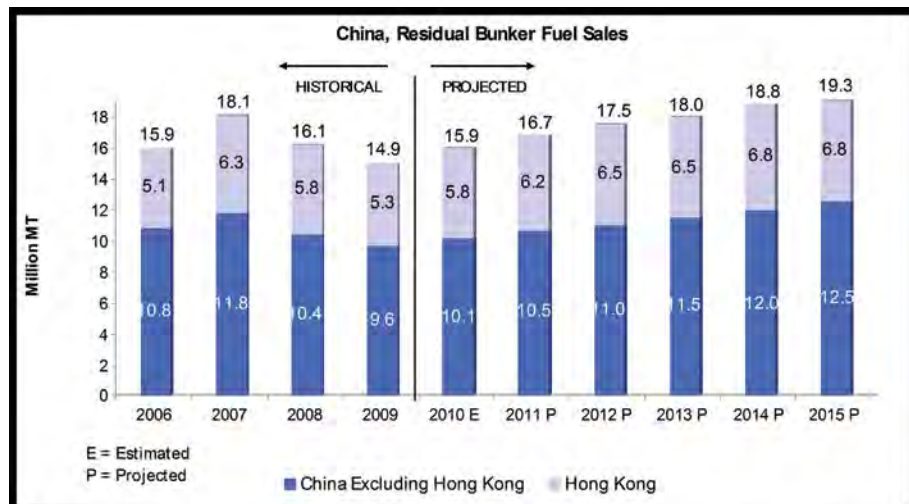
Increased petroleum consumption

The majority of new vessel demand created by increased Chinese consumption of petroleum is expected to be created for the large crude carriers, predominantly very large crude carriers (VLCCs). Total dirty import volumes from the Mideast Gulf are expected to increase over 60% from 2009 levels, reaching over 140 million mt by 2015 equating to over 200 additional VLCC cargo liftings.

Freight rate recovery

Increasing long-haul import volumes from Atlantic basin suppliers such as Venezuela will add significantly to tanker tonne/mile demand. It is anticipated that VLCCs will carry this crude oil and fuel oil, even from traditional Suezmax markets such as West Africa. Export volumes to China from West African suppliers are projected to increase over 50% by 2015, rising from the approximately 36 million mt exported in 2009 to reach 55 million mt by 2015. This increased activity is expected to support a recovery in VLCC freight rates in the medium term.

‘It is expected that the strong growth in overall Chinese oil consumption will continue, but fuel oil demand is forecast to grow at a slower pace’



Action stations

Piracy in the Gulf of Aden has made a big impact on shipping and maritime-related industries such as bunkering. The Government Accountability Office, the US Congress's watchdog, evaluates the US Action Plan to combat piracy and finds it wanting

Piracy off the Horn of Africa has been growing in frequency and severity over the past several years and threatens one of the world's busiest shipping lanes near key energy corridors and the route through the Suez Canal.

Since 2007, more than 450 ships have reported pirate attacks in this area, and Somali pirates have taken nearly 2,400 hostages and received over \$100 million in ransom payments. Pirates have attacked or attempted attacks on chemical and oil tankers, freighters, cruise ships, fishing vessels, and even warships. In addition to jeopardising the lives and welfare of the seafarers of many nations, piracy contributes to regional instability and creates challenges for shipping and freedom of navigation. With Somalia's lack of a functioning government, this illicit but profitable activity has raised concerns that piracy ransom proceeds may undermine regional security and contribute to other threats including terrorism.

Piracy is a particular menace to the oil and gas tankers that developed nations are so dependent upon for their energy needs. Transporting these often hazardous commodities by sea involves a global supply chain with tankers owned by many different companies, as well as routes across international waters that no government controls. There are more than 3,000 registered crude oil tankers and more than 200 gas tankers. These tankers are vulnerable because they travel on direct routes that are known in advance and, for part of their journey, they may have to travel through chokepoints (such as the Horn of Africa) where they have less leeway to manoeuvre away from possible attacks. Pirates have successfully targeted tankers to include the high visibility hijackings of the *Sirius Star* and *Longchamp* near Somalia. According to a recent article in *Foreign Policy*, from 2005 to 2009, pirates attacked 31 oil and gas tankers and more than 200 other types of tankers.

US action plan for countering piracy

Recognising that vibrant maritime commerce underpins global economic security and is a vital national security issue, the US has developed policies and plans to collaborate with its international and industry partners to address piracy off the Horn of Africa. In December 2008, the US published the *Countering Piracy off the Horn of Africa: Partnership and Action Plan*. The Action Plan establishes three main lines of action to repress piracy: (1) prevent pirate attacks by reducing the vulnerability of the maritime domain to piracy; (2) disrupt acts of piracy consistent with international law and the

'Piracy is a particular menace to the oil and gas tankers that developed nations are so dependent upon for their energy needs'

rights and responsibilities of coastal and flag states; and (3) ensure that those who commit acts of piracy are held accountable for their actions by facilitating the prosecution of suspected pirates by flag, victim, and coastal states.

Plan emphasises partnerships

Consistent with the US policy to continue to lead and support international efforts to repress piracy and to urge other states to take decisive action both individually and through international efforts, the *Action Plan* seeks to partner with all nations, international organisations, industry, and other entities with an interest in maritime security to take steps to repress piracy off the Horn of Africa.

Figure 1 shows how such partners fit into the three main lines of action in the *Action Plan*.

The international community, shipping industry, and international military forces also have been involved in taking steps to prevent and disrupt acts of piracy off the Horn of Africa, and facilitate prosecutions of suspected pirates. The **United Nations (UN)** adopted a number of **Security Council** resolutions related to countering piracy in the Horn of Africa region, including resolutions that authorise states to enter the territorial waters of Somalia with authorisation from and in coordination with the Somali Transitional Federal Government, and to use all necessary and appropriate means to repress acts of piracy within Somali territorial waters. In January 2009, the **Contact Group on Piracy off the Coast of Somalia** was formed under the auspices of *Security Council Resolution 1851*, and facilitates discussion and coordination of actions among states and organisations to suppress piracy. In addition, in February 2009 organisations representing the interests of shipowners, seafarers, and marine insurance companies worked to publish the first version of voluntary commercial vessel self-protection measures to avoid and respond to pirate attacks, referred to as best management practices (BMPs). Later in 2009, 10 countries signed the *New York Declaration*, and committed to (a) promulgate the internationally recognised best management practices for self-protection for their vessels

Stephen L. Caldwell and John H. Pendleton are directors at the US Government Accountability Office (GAO), a research and investigation agency of the Congress.

In their respective positions evaluating homeland security and defence programmes, they jointly completed a comprehensive report on US efforts to counter piracy.

The authors would like to recognise their staff on the report, including Patricia Lentini, Dawn Hoff, Suzanne Wren, Leslie Sarapu, Brandon L. Hunt, Farhanaz Kermalli, and Tobin McMurdie.

For the complete report, see *Maritime Security: Actions Needed to Assess and Update Plan and Enhance Collaboration among Partners Involved in Countering Piracy off the Horn of Africa* at www.gao.gov/cgi-bin/getrpt?GAO-10-856.

For more information on maritime issues, including piracy, see www.cargosecurityinternational.com.

and (b) ensure that their vessels have adopted and documented appropriate self-protection measures in their ship security plans.

Mixed progress

The **Government Accountability Office (GAO)** found that the US has made progress implementing the *Action Plan*, but the effort faces several implementation challenges, as discussed further below. The US has made the most progress on working with partners to implement efforts to prevent attacks, such as by encouraging the shipping industry to transit in areas patrolled by international navies. However, the US has had less success in other areas. For example, the US has not

disrupted pirate bases on shore, and the international community has made only limited progress to disrupt pirates' revenue and prosecute suspected pirates. Of the 14 total tasks established within the three lines of action, substantial progress has been made in implementing four tasks, the majority of which are related to preventing piracy. The US has made some progress toward implementing eight other tasks, including all of the tasks involved in facilitating the prosecution of suspected pirates. Little or no progress has been made with regard to one task that relates to disrupting acts of piracy, and GAO did not assess one task because the US decided it would duplicate the efforts

of international partners and should not be implemented. Figure 2 assesses the results of GAO's assessment.

Pirate activities still increasing

Since the publication of the *Action Plan*, pirates have increased their attacks and expanded their area of operations. Many stakeholders anecdotally credit international, industry, and US efforts with preventing and disrupting piracy, and the rate of successful attacks decreased from around 40% in 2008 to 22% in 2009. In addition, in the first six months of 2010, reports of total attacks declined to about 100 attacks, as compared with 149 attacks during the first half of 2009. However, other data show that piracy remains a persistent problem. For example, the number of hostages captured by Somali pirates from 2007 to 2009 more than quintupled. Furthermore, in the first half of 2010, pirates took 529 hostages compared to 510 in the first half of 2009. In addition, US and international officials have expressed concern that international support networks may be providing pirate groups with financing, supplies, and intelligence in return for shares of ransom payments. Figure 3 shows that from 2007 to 2009 the estimated amount of total ransom payments paid to pirates by the shipping industry increased from about \$3 million to \$74 million, with the average amount of ransoms paid per vessel increasing from \$300,000 to more than \$2 million.

In addition, pirates have expanded their area of operations with an increasing number of attacks occurring in the Indian Ocean, an area much larger and harder to patrol than the Gulf of Aden. At the end of 2008, when the US issued its *Action Plan*, approximately 83% of the 111 reported pirate attacks off the Horn of Africa that year took place in the Gulf of Aden, an area just over 100,000 square miles, with the remainder off the coast of Somalia. However, just a year later in 2009, only 53% of the 218 total attacks occurred in the Gulf of Aden as Somali pirates expanded their area of operations to the broader Indian Ocean. Pirates now threaten an area of nearly two million square nautical miles (nm²) in the Somali Basin, Gulf of Aden, and Northern Arabian Sea.

Finer details still unclear

The *Action Plan*'s objective is to repress piracy as effectively as possible, but the effectiveness of US resources applied to counterpiracy is unclear. The US is not systematically tracking the costs of its counterpiracy activities to determine the extent of its investment in

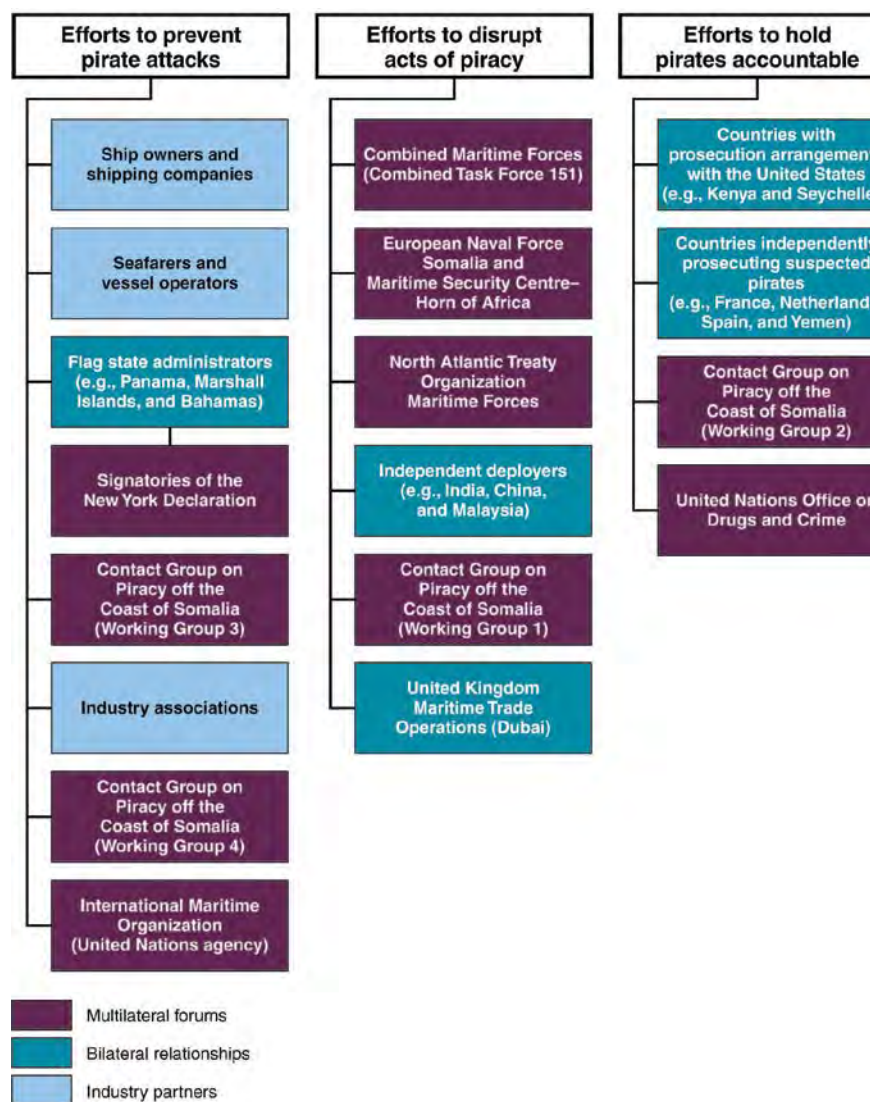


Figure 1

solving the piracy problem. The US is also not evaluating the benefits of counterpiracy efforts to US interests. While the *Action Plan* discusses US national security interest in maintaining freedom of navigation of the seas in order to facilitate vibrant maritime commerce, the extent to which counterpiracy benefits US interests, with relatively few US-flagged ships transiting these waters, has not been evaluated.

The *Action Plan* also establishes broad objectives related to repressing piracy and reducing incidents of piracy. But it does not define specific measures of effectiveness that can be used to evaluate progress, or assess the relative benefits or effectiveness of specific

tasks to prevent, disrupt, and prosecute acts of piracy.

Without information on the magnitude of US resources devoted to counterpiracy operations, or the benefits or effectiveness of its actions, the US is limited in its ability to weigh its investment of resources to counter piracy off the Horn of Africa against its other interests in the region. The lack of systematic evaluation of costs, benefits, and effectiveness also makes it difficult for agencies to target and prioritise their activities to achieve the greatest benefits.

Moreover, despite the expansion of pirate attacks over a vastly larger geographic area, increased ransom demands and payments,

and better organised pirate activities since the *Action Plan* was written, the US has no plans to reassess the plan to determine whether it should be revised. Currently, the *Action Plan* does not specifically address how to counter pirates in the broader Indian Ocean or what methods to use to meet its objective of apprehending leaders of pirate organisations and their financiers.

Conclusions

The US *Action Plan* provides a roadmap to follow in implementing collaborative efforts to counter piracy. However, given the challenges of repressing piracy off ungoverned Somalia, only limited progress

Tasks	GAO assessment*	Status
Prevent pirate attacks by reducing the vulnerability of the maritime domain to piracy		
Establish and maintain a Contact Group		U.S. government helped establish in January 2009; Coast Guard and Maritime Administration lead working group on industry self-protection.
Strengthen and encourage the use of the Maritime Security Patrol Area		U.S. government has made progress working with international and industry partners, but has limited influence on commercial vessels that are not flagged with the United States.
Updating ships' security plans		Coast Guard has approved piracy annexes to ship security plans for 100 percent of U.S.-flagged vessels identified as transiting high-risk waters, including those in the Horn of Africa.
Strategic communication		U.S. government has issued counterpiracy statements and supported international efforts; however, governmentwide plan not finalized and lack of U.S. presence on land in Somalia inhibits full implementation.
Disrupt acts of piracy consistent with international law and the rights and responsibilities of coastal and flag states		
Support a regionally based Counter-Piracy Coordination Center (CPCC)	Not applicable ^b	U.S. government has no plans to support the establishment of a CPCC since it would duplicate the reporting and monitoring functions performed by other organizations.
Seize and destroy pirate vessels and related equipment, and deliver suspected pirates to prosecuting states		U.S. and international forces have seized nearly 100 pirate vessels and their related equipment but released 57 percent of captured suspects for reasons including difficulties in meeting evidence standards and/or securing prosecution venues. ^c
Provide interdiction-capable presence		U.S. Navy and Coast Guard contribute assets and leadership to coalition forces patrolling off the Horn of Africa with an average of 4-5 ships in the region each day.
Support shiprider programs and other agreements		The United States has supported an arrangement to bolster regional capabilities to counter piracy, but U.S. agencies have not established shiprider programs because they question the benefits to facilitating prosecutions.
Disrupt and dismantle pirate bases ashore		Action not authorized by the President at this time; lack of U.S. presence in Somalia hinders implementation.
Disrupt pirate revenue		In April 2010, President Obama signed an executive order that blocks assets of certain designated individuals, including two suspected pirates. ^d But, U.S. efforts to track financial assets or transactions are hampered by a lack of government and financial institutions in Somalia.
Facilitate the prosecution of suspected pirates by flag, victim, and coastal states, and, in appropriate cases, the United States to ensure that those who commit acts of piracy are held accountable for their actions		
Conclude prosecution agreements		U.S. government concluded arrangements with Kenya and the Seychelles and is attempting to conclude others; but faces challenges in finding additional regional partners that are willing and able to prosecute.
Support the exercise of jurisdiction under the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation		The United States exercised jurisdiction under the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation to prosecute one pirate in the United States.
Support the use of other applicable international conventions and laws		United States is using other laws to exercise jurisdiction and prosecute 11 suspected pirates for attacks on the USS <i>Nicholas</i> and USS <i>Ashland</i> .
Enhance regional states' capacity to prosecute		U.S. agencies provide assistance to countries in the region for law enforcement and judicial capacity building and reform, the focus of which includes, but is not limited to, piracy. Naval Criminal Investigative Service special agents have testified in Kenyan courts, and provided training and operational support to officials in the Seychelles.

Substantial progress Some progress Little or no progress Source: GAO.

Figure 2

has been made in implementing the plan. In addition, the US is not tracking the costs, benefits, or effectiveness of its counterpiracy activities and thus lacks information needed to weigh resource investments.

Without a systematic evaluation of efforts to compare the relative effectiveness of various *Action Plan* tasks, key stakeholders lack a clear picture of what effect, if any, its efforts have had. Establishing performance measures or other mechanisms to judge progress and evaluating performance information could provide the US with more specific information to update the *Action Plan* and better direct the course of US plans and activities to repress piracy. Without updating US plans and efforts to reflect performance information and the dynamic nature of piracy, the US is limited in its ability to ensure that efforts and resources are being targeted toward the areas of greatest national interest.

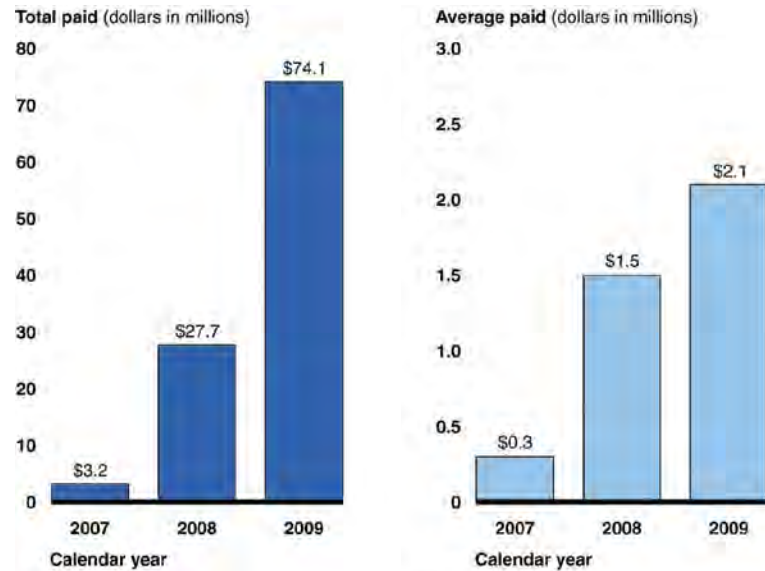


Figure 3. Source: GAO analysis of Office of Naval Intelligence data.

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Bottomline data fo

Dean Rosenberg of PortVision looks at how the bunker industry can benefit from using AIS-based services



Dean Rosenberg, the Co-Founder/President and Chief Executive Officer of PortVision, has more than 20 years of strategic management and technical experience focused on leveraging the Internet for business and organisational improvement, especially in supply chain and transportation applications.

He was previously Executive Vice President for Abaris Technologies LLC, which delivered enterprise software for commercial and government clients, and was also Co-founder and Chief Technology Officer of SupplyPro Inc., which offers Internet-based supply chain solutions to Fortune 100 companies.

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The bunkering industry is under growing economic, competitive and environmental pressures. Success depends on acquiring and serving customers as efficiently as possible. To better serve customers and maximise revenue, marine service providers have begun to take advantage of Automatic Identification System (AIS)-based services that provide detailed information about vessel movements, including dock arrival/departure as well as offshore lightering and bunkering activities. In particular, enterprises engaged in fuel sales and bunkering have gained significant value from such services, since they provide not only information about a company's own customers, but also bring light to activities that occur at other docks, locations, and vessels along the waterway.

AIS refers to the collision-avoidance transponder that is now required on most large commercial vessels. While originally mandated in 2005 by the **International Maritime Organization (IMO)** to enhance safety at sea, AIS is now being used by shore-side operators to enhance market intelligence and drive operational efficiencies. This level of understanding is now enabling maritime professionals to cut costs, expand revenue opportunities and enhance operations across a wide range of business functions.

A recent high-profile application of AIS vessel tracking technology was its deployment during the response and restoration operations following April's *Deepwater Horizon* incident. **BP** used the integrated AIS ship tracking service from Houston-based **PortVision** together with the *PV-OnBoard* battery-operated satellite trackers to gain greater visibility into what was occurring in the field. The PortVision service leverages AIS real-time and historical tracking data to provide detailed visibility into commercial vessel activity, from port arrivals and departures to ship movements on the open sea. The service enabled BP to assess progress and more effectively allocate the more than 30,800 personnel, 5,050 vessels and dozens of aircraft that were engaged in the response effort.

Of more interest to bunker suppliers and the customers they serve is what AIS data can tell them about day-to-day ship traffic, area bunkering service performance, and market opportunities. Especially in today's difficult economic environment, success depends on the ability to anticipate trends and act accordingly, which is significantly easier with access to both real-time and

'Of more interest to bunker suppliers and the customers they serve is what AIS data can tell them about day-to-day ship traffic, area bunkering service performance, and market opportunities'

historical information about every targeted ship, its arrivals, departures, how quickly it was serviced, and other pertinent data.

Virtually every commercial vessel must comply with AIS transmission requirements, including commercial self-propelled ships of 65 feet or longer and 300 gross tonnage (GT) or more for international voyages. Also subject to compliance are selected other vessels and those 65 feet or longer, regardless of tonnage, that enter major, designated navigational areas. Today, AIS transmits more than 50 million vessel location reports daily, worldwide, from tens of thousands of merchant ships that carry AIS Class 'A' equipment.

During the past five years, the industry has realised that AIS data also can be used beyond collision-avoidance purposes for a number of other business-intelligence applications, by organisations ranging from vessel traffic service (VTS) operators to major oil companies and port and marine terminal management. AIS broadcasts a wealth of valuable data on a fixed schedule, ranging from every two seconds to every six minutes.

The data includes static data such as the ship's name and call sign, its unique IMO or maritime mobile service identity (MMSI) number, its length and beam, the ship type and its antenna location. AIS also broadcasts voyage-related data including the ship's draft, cargo information and destination, plus estimated time of arrival. Finally, AIS also broadcasts dynamic data including the time and the ship's current position, course and speed over ground, gyro heading and rate of turn, and navigational status.

This data is especially useful to bunker operators, who work right at the frontline of the industry. They must have a deep knowledge and understanding of the market so they can spot and anticipate trends that will enable them to add customer value and build closer, strong partnerships. While AIS data can give them this market understanding

or bunkering

and knowledge, it is not very useful if it's only available as 'points on a map'. Today's integrated AIS services make it possible to view, synthesise, analyse and make decisions based on both real-time and historical AIS data.

For instance, most bunker suppliers establish goals related to the number of passing vessels. A successful bunkers-only port might pursue a bunkering rate of, say, 8% of passing vessels, and another bunker supplier might have a goal of 1 million metric tonnes (mt) per annum, equivalent to 1% of passing vessels taking an average stem of 700 tonnes. These organisations can use an integrated AIS service to monitor ship traffic in each targeted area, including each individual ship they are interested in. They can track which bunker services the ships use, how often they are used, and the length of each service call, enabling them to identify and then capture the maximum percentage of a location's full potential. Through the use of AIS, bunkering enterprises can monitor all bunkering activities, including activities that occur at competing fuel docks and with competing vessels.

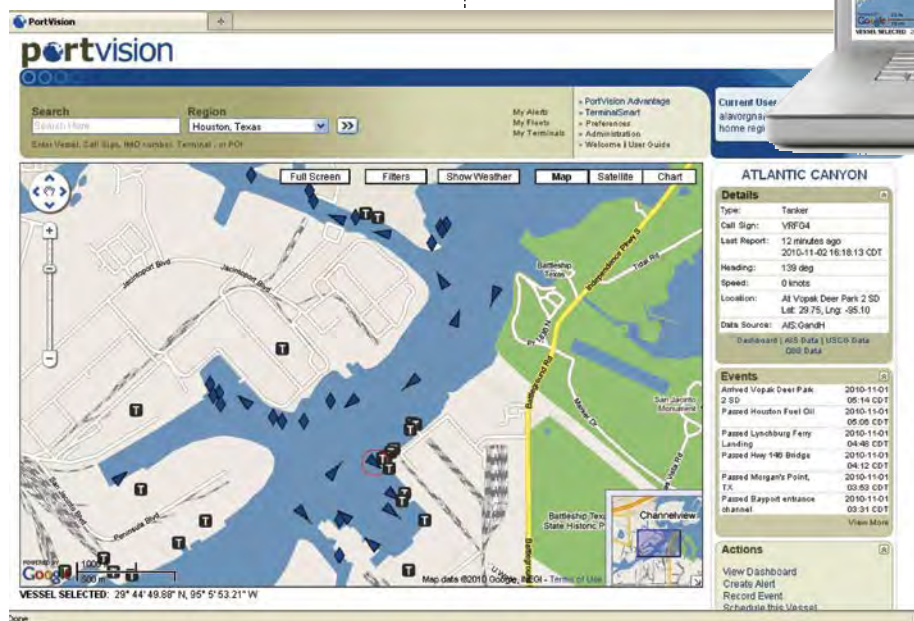
Some bunker suppliers represent excellent contingency options when there are delays at larger or better-located competitive operations. Suppliers can track these dynamics using an integrated AIS service, and capture significant incremental business opportunities. The latest integrated AIS services also provide full, web-based access to real-time weather, plus voyage distance calculations and vessel

arrival estimations. Also, when new ports or competitive operations open, integrated AIS services enable suppliers to monitor traffic and associated demand dynamics, assess the impact on their business, and plan accordingly.

As an example of these various capabilities, the PortVision service enables users to define customised fleets of chartered vessels, workboats, tugs and barges that they wish to monitor, and to receive and share e-mail and text-message alerts about fleet movements. It also automatically timestamps and captures data about arrivals, departures and other vessel events, and enables users to add their own documents and information about dock-side events for each vessel call, and to reference historical data and animated playback for any selected vessels and events. With this kind of data, a bunker supplier could monitor area activities and comparative bunker supplier performance, and also could identify ship traffic dynamics that might dictate a change in procedures or identify new, unserved market opportunities.

Once a bunker supplier acquires a customer, the next job is to keep the customer happy. Today's major shipping organisations want to work with bunker suppliers who can provide a global fuel procurement solution while helping them to increase efficiencies and maximise profitability. Bunker suppliers can quantify and

'Through the use of AIS, bunkering enterprises can monitor all bunkering activities, including activities that occur at competing fuel docks and with competing vessels'



merchandise their value for these customers by using integrated AIS services to assess their performance and report on their ongoing progress to continuously improve customer service.

For those bunker suppliers who are expanding organically or through acquisition, integrated AIS services enable them to thoroughly understand vessel patterns in targeted areas of interest.

This enables them to project demand scenarios, whether in a well-understood area near a major shipping route or in an

emerging or strategically important inland or coastal waterway.

Suppliers also can access competitive offerings and identify unserved needs in both established and new markets, and evaluate acquisition candidates based on area vessel patterns that provide indicators of service volume and performance.

Finally, integrated AIS services also enable bunker suppliers to document their activities so that they can validate or dispute claims in the case of litigation related to accidents or other incidents. They also can use AIS data

to verify operating fees and service charges as part of day-to-day operations.

AIS has come a long way since its original purpose as a collision-avoidance tool for large ships. Today, it provides a wealth of information for a variety of maritime business purposes. Bunker suppliers have the opportunity to leverage AIS data across a wide range of operations, from business acquisition and revenue generation to enhancing customer value, streamlining costs and anticipating trends and their impact on the business.

'For those bunker suppliers who are expanding organically or through acquisition, integrated AIS services enable them to thoroughly understand vessel patterns in targeted areas of interest. This enables them to project demand scenarios, whether in a well-understood area near a major shipping route or in an emerging or strategically important inland or coastal waterway'



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Little and large

Llewellyn Bankes-Hughes looks at the variety of conferences now competing to attract audiences

The last quarter of 2010 has seen an unparalleled number of conferences, seminars and courses aimed at the bunker industry, ranging from the enormous all-encompassing mega event that is now the *Singapore International Bunker Conference (SIBCON)* to the highly focused *Bunkering Symposium* in Antwerp, and from Curoil's bespoke specialist celebratory event in Curaçao to Bunkerworld's niche *Business Exchange* in London. All of them have their part to play and all are attracting audiences, albeit of very different sizes.

Worldscale occasion

October's *SIBCON* is said to have attracted as many as 1,200 participants, although by the end of the second day, the numbers in attendance had clearly fallen to well below one quarter of the number of delegates and dignitaries who showed up for the fanfare grand opening. *SIBCON* has always been a government-run advertisement for the Singapore bunker industry and a very useful forum in which the **Maritime & Port Authority (MPA)** can make important announcements, such as the development of new standards, but it has also become a worldscale occasion. It is no longer something to drop in on if your travel schedule allows for a brief visit to Singapore, but is now a must-go-to, imperative event, especially for any company – big or small – with any pretensions of being a global player or any ambitions of trading in Asia. And this does not only apply to bunker suppliers and traders, but also testing agencies, storage companies, equipment manufacturers, software developers and every other bunker-related company, including publishing houses like **Petrospot**.

Meaningful exchanges

However, while the sheer numbers involved initially are bound to excite anyone with a mission to exchange a briefcase full of business cards for a suitcase full of other peoples' cards, the reality is that few people ever get the chance to have any meaningful exchanges with more than a fraction of the total. All too often, delegates peel off for pre-arranged private meetings, often a lengthy taxi ride from the conference, some never to return other than to find directions to one of the many evening receptions taking place. Having so many people in one place at one time is both a blessing and a curse.

It is partly in response to the lack of quality 'customer' time available to delegates

'All too often, *SIBCON* delegates peel off for pre-arranged private meetings, often a lengthy taxi ride from the conference, some never to return other than to find directions to one of the many evening receptions taking place. Having so many people in one place at one time is both a blessing and a curse'

at an event the size of *SIBCON* that some of the smaller, niche events remain so popular. This year's *Bunkering Symposium*, for the third year running held in Antwerp, attracted fewer delegates than in 2009 – partly because of the sheer volume of bunker-related events taking place at or about the same time – but delegate feedback based on the programme content, social activities and opportunities to meet the people delegates set out to meet, once again is very positive.

Premium price

Bunkerworld has taken the 'meet the customer' concept further with its *Business Exchange*, held in London in late November. Here, suppliers are charged a premium price to arrange private meetings with bunker buyers. However, this idea does not suit everyone and delegate numbers tend to be low.

Social networking

Social networking is probably the main reason most people go to bunker conferences, and some events – such as the *Bunkering Symposium* in Antwerp or *Maritime Week Americas*, which moves to Cartagena, Colombia in May 2011 – are renowned for their exciting integrated parties. Other events offer very few social activities, so allowing bunker suppliers and traders to throw their own parties, as at *SIBCON*.

A few days after *SIBCON*, on the other side of the world, in Curaçao, local oil company **Curoil N.V.** celebrated its 25th anniversary by presenting an international conference to bring together many of its domestic and foreign customers and provide a new take on the various energy markets in which the company operates.

For further details on these and other industry events, please see page 52 or visit the web page www.petrospot.com/events

Contact:
Llewellyn Bankes-Hughes
Managing Director
Petrospot Limited
Tel: +44 1295 814455
Email: lbh@petrospot.com

New topics

While bunker and aviation fuels are the mainstay of Curoil's activities, utility fuels, electricity, water and even wind power were brought into this unique conference programme.

The Curoil event succeeded in a way that other events rarely do, by introducing new topics to delegates who may not have known much about them beforehand. For example, the bunker-related delegates appreciated hearing about the aviation industry, while the aviation delegates appreciated hearing about bunkering, refining and the other subjects covered.

Underlining Curoil's prominent position within Curaçao, the event was opened by Prime Minister Gerrit Schotte and attended by some 150 bunker and aviation executives from 18 different countries, as well as leading politicians, bankers and industrialists from the region, including the Prime Minister of

Aruba and the Governor of Bonaire.

While the Curaçao event was offered free of charge by way of a celebration for Curoil, there is always a market for well-planned, focused events. In the first half of 2011, all manner of bunker-related conferences are already planned, including amongst others, *Panama Maritime X* in Panama in February, *FUJCON* in the United Arab Emirates in March, *Singapore Maritime Week* and Scandinavia's *International Bunker Conference* in Copenhagen in April, *Maritime Week Americas* in Cartagena, Colombia in May, the **Turkish Bunker Association's** Istanbul conference in June and *Oil & Shipping Africa* in Ghana in July.

In addition to these conferences, numerous seminars and training events, such as the *Piraeus Bunker Course* in Greece in March and the *Oxford Bunker Course* in the UK in May, will also be on offer, competing once more to attract attention.

'While the Curaçao event was offered free of charge by way of a celebration for Curoil, there is always a market for well-planned, focused events'



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Web: www.quinnoil.com

Events Diary

2010

DECEMBER

UNITED KINGDOM: Fuel Management, Ship Performance & Energy Efficiency

7-8 December, London

Contact: Lloyd's Maritime Academy
Tel: +44 20 7017 5510
Fax: +44 20 7017 4745
Email: maritimecustserv@informa.com
Web: www.informaglobalevents.com/
KS0249BSWB

UNITED KINGDOM: Future Fuels for Shipping

9-10 December, London

Contact: Lloyd's Maritime Academy
Tel: +44 20 7017 5510
Fax: +44 20 7017 4745
Email: maritimecustserv@informa.com
Web: www.informaglobalevents.com/
KS0251BSWB

2011

FEBRUARY

UNITED KINGDOM: Managing and Avoiding Bunker Claims & Disputes

9-10 February, London

Contact: Lloyd's Maritime Academy
Tel: +44 20 7017 5510
Fax: +44 20 7017 4745
Email: maritimecustserv@informa.com
Web: www.lloydsmaritimeacademy.com/
KS0264BSWL

PANAMA: Panama Maritime X

13-16 February, Panama

Billed as the biggest shipping event in South America, the *Panama Maritime X Conference and Exhibition* takes place at the Hotel Riu Panama Plaza. Petrosport has been appointed the event's International Promoter.

Contact: Nicholas Leader
Tel: +44 1295 814455
Email: events@petrosport.com
Web: www.panamamaritimeconference.com

UNITED KINGDOM: LNG: Fuel for Shipping

15-16 February, London

Contact: Lloyd's Maritime Academy
Tel: +44 20 7017 5510
Fax: +44 20 7017 4745
Email: maritimecustserv@informa.com
Web: www.lloydsmaritimeacademy.com/
ks0220BSPOTWB

MARCH

GREECE: The Piraeus Bunker Course

2-3 March, Piraeus

Petrosport returns to Greece with a highly practical training programme covering the technical, operational, commercial and legal aspects of bunkering. This two-day, information-packed training event focuses on bunker quality, delivery procedures, ship and barge operations

and credit issues. It includes an onboard site visit to Piraeus harbour.

Contact: Osei Mitchell
Tel: +44 1295 814455
Email: events@petrosport.com
Web: www.petrosport.com/piraeus

UNITED ARAB EMIRATES: The International Fujairah Bunkering & Fuel Oil Forum

22-24 March, Fujairah

Contact: Conference Connection
Tel: +65 6338 0064
Fax: +65 6338 4090
Email: info@cconnection.org
Web: www.cconnection.org

UNITED ARAB EMIRATES: World Ports & Trade Summit

28-30 March, Abu Dhabi

Contact: Turret Media FZ LLC
Tel: +971 2 401 2777
Fax: +971 2 401 1760
Email: info@WorldPortsAndTrade.com
Web: www.WorldPortsAndTrade.com

APRIL

SINGAPORE: Petrosport Seminars

11-15 April, Singapore

Petrosport will be offering a range of topical seminars and courses on maritime security and bunker fuels during *Singapore Maritime Week 2011*.

Contact: Osei Mitchell
Tel: +44 1295 814455
Email: events@petrosport.com
Web: www.petrosport.com/events

SINGAPORE: Sea Asia 2011

12-14 April, Singapore

To be held at the Marina Bay Sands Hotel.

Contact: Seatrade
Web: www.sea-asia.com

MAY

UNITED KINGDOM: The Oxford Bunker Course

9-13 May, Oxford

The *Oxford Bunker Course* is a highly intensive five-day residential training course covering technical, operational, commercial, financial and legal aspects of bunkering. Designed for newcomers to the business and for those who may already have some experience, it is widely acknowledged as the best bunker course in the world.

Contact: Osei Mitchell
Tel: +44 1295 814455
Fax: +44 1295 814466
Email: events@petrosport.com
Web: www.petrosport.com/oxford

NETHERLANDS: BunkerExperience 2011

9-13 May, Rotterdam-Vlaardingen

All inclusive, intensive bunker course, with a mix of theory in the morning and real practice in the afternoon.

Contact: Goris Vermeulen
Tel: +32 484 168 780
Email: info@bunkerexperience.com

COLOMBIA: Maritime Week Americas 2011

23-27 May, Cartagena de Indias

The most popular bunkering event in the Americas is coming to South America! Organised by Petrosport, *Maritime Week Americas* takes place at the Hotel Hilton Cartagena.

Contact: Louise McKee
Tel: +44 1295 814455
Fax: +44 1295 814466
Email: events@petrosport.com
Web: www.maritimeweekamericas.com

JUNE

TURKEY: Istanbul Bunker Conference

1-3 June, Istanbul

Contact: The Turkish Bunker Association
Web: www.istanbulbunkerconference.com

JULY

GHANA: Oil & Shipping Africa 2011

July, Accra, Ghana

After two highly successful forays into West Africa, Petrosport returns to Accra, Ghana in July 2011 for the third annual *Oil & Shipping Africa*. The conference and training course programmes now attract many local Ghanaian, Nigerian and other West African delegates, in addition to a growing number of foreign companies eager to learn about bunkering opportunities in this part of the world.

Contact: Osei Mitchell
Tel: +44 1295 814455
Fax: +44 1295 814466
Email: events@petrosport.com

SEPTEMBER

NETHERLANDS: ARACON 2011

September, Rotterdam

ARACON 2011 is the one bunkering event serving the Amsterdam-Rotterdam-Antwerp region that serious maritime professionals should not miss!

Contact: Osei Mitchell
Tel: +44 1295 814455
Fax: +44 1295 814466
Email: events@petrosport.com

UNITED KINGDOM: The Oxford Bunker Course

12-16 September, Oxford

The *Oxford Bunker Course* is a highly intensive five-day residential training course covering technical, operational, commercial, financial and legal aspects of bunkering. Designed for newcomers to the business and for those who may already have some experience, it is widely acknowledged as the best bunker course in the world.

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Email: events@petrosport.com
Web: www.petrosport.com/oxford

On the move...

Europe

James Dean, previously Sales Director at Lloyd's List Intelligence, has joined Oxford-based Infospectrum Ltd. Tel: +44 1865 420 400; Fax: +44 1865 420 401; Email: james@infospectrum.net.

Rune Kongstein, previously with Norwegian Oil Trading, has been appointed General Manager of Marketing for Chemoil's European operations in Rotterdam. Tel: +31 10 2929 933; Mob: +47 99 445 585; Email: rune.kongstein@chemoil.com.

Patrick Villadsen Hoé and Rasmus Scheel Nielsen of A/S Dan-Bunkering Ltd have new contact details. (Hoé): Direct: +45 6421 5415; Mob: +45 2071 0498; Email: pvh@dan-bunkering.dk. (Nielsen): Direct: +45 6421 5422; Mob: +45 2818 5899; Email: rsn@dan-bunkering.dk.

Ingrid Terhoeve, previously of StarSupply and Azur, has joined Marine Bunkering (Rotterdam) B.V. as a bunker broker. Tel: +31 10 227 0399; Fax: +31 10 451 2933; Email: ingrid@marinebunkering.nl.

US-based Merlin Petroleum Company Inc. has opened an office in Switzerland. Partner, Greg Dann, previously of Armada (Switzerland) S.A., Fal Energy, Mutual Marine Shipping in Korea and Stewart Chartering and Elders IXL Chartering in London, is joined by Mathias Girard, also ex-Armada. Contact: Merlin Petroleum SARL, Grand-Rue 13, 1630 Bulle, Switzerland. Tel: +41 26 301 6100; Mob (Dann): +41 79 322 8057; Mob (Girard): +41 76 330 3798; Fax: +41 26 301 6104; Email: bunkers.swiss@merlinpetroleum.com.

Jost Bergmann has been appointed as container ship business director for Det Norske

Veritas (DNV).

Erik van der Noordaa has been appointed Chairman of the classification society Germanischer Lloyd (GL), taking over from Dr Hermann Klein who continues to act as a consultant GL and will join its Supervisory Board next year.

Mideast and Africa

Pakistan's Faisal Marine Oil Services has appointed Cristy Malik as a bunker trader. Tel: +92 21 111 901 901; Email: cristy.malik@faisaloils.com.pk.

International Bunkering (Middle East) DMCC has appointed Dowell Lin, Capt. Virendra N. Mishra and Martin Ringsdal Andreasen in Dubai. Tel: +971 4 437 1700; Fax: +971 4 428 1560. Direct contacts (Lin): Mob: +971 55 983 8758; Email: dol@ibmeast.com. (Mishra): Mob: +971 55 983 8757; Email: vnm@ibmeast.com. (Andreasen): Mob: +971 55 983 8759; Email: mra@ibmeast.com.

Cockett Marine Oil's South African office has been relocated to Suite 605 Buitenklouf Studios, 8 Kloof Street, Gardens, Cape Town 8001. Adam Lutzno, previously with World Fuel Services in Singapore and Dubai, has recently joined the team. Tel: +27 21 422 1111; Email: enquiries@cockett.co.za.

Asia

Deepak Dharwal has joined bunker supplier Chemoil Adani Pvt Ltd in Ahmedabad, India. Tel: +91 79 2555 5723; Mob: +91 90 9993 8546; Email: Deepak.dharwal@chemoiladani.com.

Daniel Filho has been appointed bunker business manager at Petrobras Singapore, taking over from Andre Maximo who is moving to the company's Rotterdam office. Tel: +65 65 505 380; Email: danielfilho@petrobras.com.br.

Jason Lim, previously the Analyst Team Leader of Lloyd's List Intelligence's Singapore office, has joined Chemoil as Senior Credit Analyst. Tel: +65 515 259; Email: jason.lim@chemoil.com.

Amy Choo and Carmen Poh have joined KPI Bridge Oil in Singapore as bunker traders. Tel: +65 6220 8655; Email: amy.choo@kpibridgeoil.com; carmen.poh@kpibridgeoil.com.

Kuan Hua Koh has joined A/S Dan-Bunkering Ltd's Shanghai office as a Marketing Executive. Tel: +86 21 6135 2700; Direct: +86 21 6135 2705; Mob: +86 136 6199 7305; Fax: +86 21 6135 2701; Email: khk@dan-bunkering.com.cn.

Americas

Paul Pappaceno, formerly of Asamar Inc., has joined Bunkers International as Vice President of Business Development and Strategic Initiatives.

Chemoil has appointed Peter Meade as the Board's Lead Independent Director, and Steven Simpson as an Independent Director and Chairman of its Audit Committee. The appointments follow the resignation of the Board's current Lead Independent Director and Audit Committee Chairman, Michael Lim Choo San. Meade is also Chairman and Independent Director of OceanConnect Holdings Inc. but previously was Vice President and CFO of Fuel and Marine Marketing LLC.

John L Manley, formerly of Deloitte & Touche, has joined the board of World Fuel Services.

Peter Pilon has been appointed Chief Executive Officer of Kittiwake Developments' US operations.

To list details of new appointments,
email: editorial@petrospot.com



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