

FOCUS

ISSUE 2 | 2009

saving the world's wetlands

robotic fish
clean up ports
scenario planning
cutting carbon



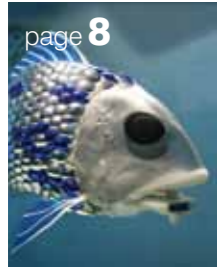
"Where will our knowledge take you?"



page 4

BMT in brief

Fresh faces at BMT and our latest award successes. Hong Kong is set to get its first offshore windfarm. Plus all the news from across the group.



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robotic fish

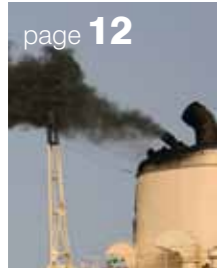
Robotic fish are being developed in the UK to find the source of potentially hazardous pollutants in a BMT co-ordinated project.



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saving wetlands

They are among the world's most productive environments and are areas of biological diversity. Find out how BMT is helping to save them.



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cutting carbon

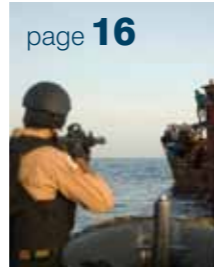
In an interview with Professor Chris Field, we look at how the shipping industry will have to respond in light of climate change.



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over the horizon

Our recent scenario planning seminar looked at the world in the year 2030 and considered the challenges of the future.



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future imperfect

As part of the scenario planning exercise we look at the future of port development, security and cargo in more detail.



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sustainable procurement

Mark Hedges of BMT Isis is helping the UK Ministry of Defence progress towards ambitious Government sustainability targets within its procurement activities.



“...the shipping and aviation industries are likely to come under increased pressure to deliver strategies to reduce carbon emissions.”

Welcome to our latest issue of Focus which brings you the news of BMT's activity worldwide.

In these uncertain times, we have been reviewing the future of the markets in which we operate with a view to understanding the challenges and opportunities that a new economic landscape is likely to bring. Recently a number of experts from across the BMT group came together to participate in a scenario planning exercise, designed to present possible scenarios of the shipping world in 2030. The outcomes from the day provided interesting food for thought and I would like to share some of these with you in this magazine.

One topic from the scenario planning that is of particular interest to BMT, and to our customers, is carbon emission reduction. With a United Nations Framework Convention on Climate Change meeting taking place at the end of this year in Copenhagen, the shipping and aviation industries are likely to come under increased pressure to deliver strategies to reduce carbon emissions.

Professor Chris Field from the Carnegie Institute in the US shared his thoughts with us on the emerging challenges and the possible solutions. As a leading scientist, Professor Field has briefed US Congressional committees on climate change impacts and was part of an Intergovernmental Panel on Climate Change (IPCC) team that won a Nobel prize for work in this area. I am therefore very grateful to him for taking time out of his extremely busy schedule to talk to us.

In parallel, we are looking at the increasing need for improved environmental performance and the part that future technology will play. At BMT, our research and development teams are working on a variety of EU funded projects to help reduce the environmental impact of maritime activity. For instance, our scientists have been working with the University of Essex to develop robotic fish to detect pollution in ports and I am delighted to share the details of this project with you.

As always, I thank you for your continued interest in BMT and welcome your feedback on any of the stories featured in this publication.

FOCUS is published by:
BMT Group Ltd, Goodrich House,
1 Waldegrave Road,
Teddington, Middlesex, TW11 8LZ, UK

T: +44 (0)20 8943 5544
F: +44 (0)20 8943 5347
E: enquiries@bmtmail.com
W: www.bmt.org

For further information on BMT products or services, please contact us at the above address.

Edited by Jenni Williamson
(jwilliamson@bmtmail.com)

Designed by Mooka Creative
(www.mookatown.com)

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help us be green

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Peter French, Chief Executive



movers...



Eleanor Hadland, an experienced port sector consultant has been appointed as Managing Director for BMT Transport Solutions GmbH, incorporating BMT Baxter Eadie Ltd.

Eleanor has a strong track record of both business and team development and has previously worked as Head of Maritime

Consultancy for Moffatt & Nichol in London, where she acted as lead consultant on major due diligence assignments for equity investors and lenders. Prior to this, she worked as Head of Ports at Drewry Shipping Consultants, having started her career at Associated British Ports.



Dr Ralph Rayner joins BMT as one of three new Sector Directors and has been appointed as a member of the group's Executive Management Board. He will focus on the energy and environment market sector and will direct and facilitate group-wide collaboration on strategic initiatives and multi-company bids and projects.

He has been a non-executive Director of BMT Scientific Marine Services Inc since 2006 and currently provides industry outreach advisory services through his role with the US Consortium for Ocean Leadership.

He is an Industrial Fellow at the London School of Economics. In addition, he was previously Managing Director of several businesses of the Fugro Group and has worked extensively with the offshore oil and gas industry in the renewable sector.

& shakers...

e-Maritime presentation wins award

Jerzy Graff, Director of Environmental Systems at BMT Group Ltd received an award for best presentation at the TRANSNV 2009 symposium for his keynote paper "e-Maritime: An enabling framework for knowledge transfer and innovative information services development across the waterborne transport sector." The conference is held bi-annually in Gdynia, Poland and is a leading scientific forum for the international maritime navigation community.



RINA prize for BMT naval architect

In May this year, a senior naval architect from BMT Defence Services Ltd, based in Bath, UK, received the '2008 David Goodrich Prize' from the Royal Institution of Naval Architects (RINA). Simon Binns was awarded the prize for "Meeting the current challenge of designing high capability SSKs", a technical paper he presented at the annual RINA Warships conference in 2008.



Simon's paper is based on research and concept options development work he led at BMT, culminating in the promotion of BMT Vidar® - 36, a concept design for a large, 3600 tonne submerged displacement, ocean-going, conventionally powered submarine (SSK).

On receipt of his award Simon said "I feel truly honoured to receive this prestigious award. I think it recognises all the members of my team for the work we did to develop the BMT Vidar® - 36 design. RINA provides an important channel for us in reporting our technical results so it's nice to have the hard work we put into preparing our papers recognised."

"We continue to evolve the BMT Vidar® SSK concept; it's very useful as a platform for exploring new options and innovative ideas in a whole boat design environment. The prize, which was presented to Simon by Trevor Blakeley, chief executive of RINA, is awarded in memory of the late David Goodrich, former President of RINA and Chairman of BMT.

For further information contact: Simon Binns, BMT Defence Services, sbinns@bmtdsl.co.uk

Kiel Canal Pilots Association installs PC Rembrandt at its headquarters

BMT's PC Rembrandt ship simulation system has been successfully installed at the headquarters of the Kiel Canal Pilots Association in Brunsbuttel, Northern Germany, allowing flexible, cost effective training for the canal's new pilots.

Current training of Kiel Canal's 123 pilots takes place at the full bridge simulator of the Maritime Academy of Bremen. However, with up to 140 vessel movements a day and growing, it is becoming increasingly difficult for pilots to be removed from the Association's watch rotation plan. As a result, a more flexible option was sought and BMT SeaTech Ltd was approached to supply a PC Rembrandt solution.

Captain Michael Hartmann, Chairman of the Kiel-Canal-Pilots Lotsenbrüderschaft NOK I said: **"The system exceeds our expectations in many aspects. It is a reliable tool to train basic and enhanced ship handling, giving us more time for final high level and multiple emergency training sessions using cost intensive full bridge simulators."**

For further information contact: James Norwood, BMT SeaTech, james.norwood@bmtseatech.co.uk



headlines...

BMT wins \$20 million contract with US Navy

BMT Designers & Planners Inc, has won a five-year contract to support the US Navy. The cost plus fixed fee contract will run over a five year period and is worth up to \$20 million. Awarded by the Naval Surface Warfare Center, Indian Head Division, BMT expects to work on between 40 – 50 projects that will provide environmental programme support to the Chief of Naval Operations Environmental Readiness Division.

Areas to be covered will include the development of information systems, annual programme plan development, environmental audits, review of emerging regulations, training plans, development of media plans and instructions, annual budget process reviews and environmental project reviews.

For further information contact: Mike Hicks, BMT Designers & Planners, mhicks@dandp.com

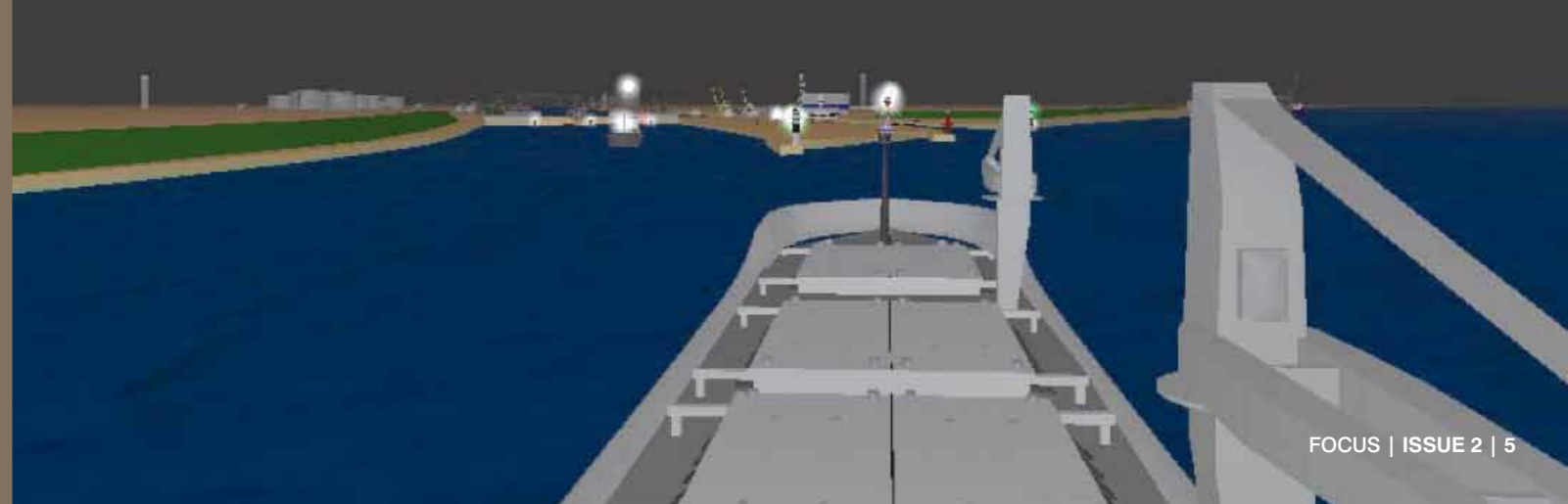
A standard in sustainable procurement

Mark Hedges, Senior Environmental Sustainability Consultant at BMT Isis Ltd has been invited to sit on a newly formed Technical Committee at the British Standards Institute (BSI), the membership of which will assist BMT with remaining at the forefront of sustainability policy.

The committee is developing the content of a new standard in sustainable procurement which will align an identification and analysis process with the traditional 'continual improvement' and reviewing philosophy of management systems. However, it is widely acknowledged that applying these principles to sustainability presents many challenges.

The invitation to sit on the committee came via several peer recommendations and demonstrates BMT's leading position in providing policy and tactical level guidance for public and private sector initiatives.

For further information contact: Mark Hedges, BMT Isis, mark.hedges@bmt-isis.com



Hong Kong's first offshore wind farm – a step closer to reality

The introduction of Hong Kong's first offshore wind farm has taken a step closer to reality with the successful completion of an Environmental Impact Assessment (EIA) and Marine Navigation Safety Risk Assessment.

The work, commissioned by Wind Prospect, a leading independent renewable energy provider, was carried out by BMT Asia Pacific Ltd.

The 16km², 200 megawatt wind farm, which will house up to 67 turbines, is expected to provide enough energy to power 80,000 homes, offsetting around 350,000 tonnes of CO₂ per year.

BMT's assessment of the site concluded that a wind farm set in the open ocean of the South China Sea, 10km east of Hong Kong, would not have a negative impact on marine or bird life, or the busy marine traffic activity in the area. It also identified that the wind farm's innovative use of suction caisson foundations would avoid the need for dredging or marine piling, thereby minimising the risk of hazardous offshore works, water pollution and ecological disturbance.

The EIA has gone to public consultation and will also be under consideration by the Government's Advisory Council on the Environment before the Environmental Protection Department reviews the assessment reports and public comments. Details of the project are available on the Stakeholder Consultation site www.hongkongoffshorewind.com, which features extensive use of 3D mapping to illustrate the project and the results of surveys and analyses undertaken.

Alex Tancook, General Manager of Wind Prospect (Hong Kong), said: **"BMT has been with the project since its inception and the completion of the marine studies and presentation of the EIA for public consultation marks a major milestone in its development."** It demonstrates that the local government and its community are committed to sustainability and a low carbon future."

For further information contact: Richard Colwill, BMT Asia Pacific, rdc@bmtasia.com.hk

BMT manages sustainable US military conference

A bi-annual conference which brings together members of the US Department of Defence (DoD) and various stakeholders with a vested interest in sustaining military readiness is being managed by BMT Designers & Planners Inc, based in Virginia, US.

The '2009 Sustaining Military Readiness Conference: Building Partnerships to Sustain Our Future', which runs from 10 – 15 August 2009 in Phoenix Arizona, US, is expected to attract in the region of 900 visitors from the DoD, federal agencies, local and state governments, NGOs, and legislative specialists. The purpose of the event is to: facilitate the sharing of results of sustainability programmes and projects; provide training opportunities; and to exchange lessons learned between the public and private sectors.

Training workshops will cover a breadth of topics including the National Environmental Protection Act, Migratory Bird Treaty Act, unmanned aircraft systems, cultural realism in the training environment, crisis management, and emerging contaminants.

Military and civilian leaders will discuss the effects of climate change, energy and other challenges on military readiness in the future during the plenary sessions followed by an international panel on cultural property protection during armed conflict.

After formal meetings, attendees are invited to attend field tours to Palo Verde Nuclear Site, the Biosphere, Luke Air Force Base and other critical missions which are building partnerships to sustain the future.

For further information contact: Mary Gabriel, BMT Designers & Planners, mgabriel@dandp.com

“ The 16km², 200 megawatt wind farm, which will house up to 67 turbines, is expected to provide enough energy to power 80,000 homes ”

BMT leads Pose²idon consortium in electric shipping study

A €23 million European Union (EU) funded project, which will investigate the commercially effective application of electric ship technology, is to be headed by BMT Defence Services Ltd.

The Power Optimised Ship for Environment with Electric Innovative Designs ON board (Pose²idon) project aims to provide a working guide on how to improve efficiency and reduce the environmental impact of the combined European commercial shipping fleet.

BMT will co-ordinate the activity of the 30 company consortium, with the objective of enhancing the electric ship concept so that it can be applied to a wider range of vessels than is currently the case. The principal barrier to adoption of the electric ship concept in smaller merchant ships is the size of the generating equipment and propulsion motor.

The consortium will focus on achieving size reduction through the development of new technologies across all aspects of marine electrical engineering. A key element of this will be the application of state of the art high temperature superconductivity (HTS) technology that will allow for smaller principal electrical components and an increase in efficiency.

Professor Chris Hodge, Chief Electrical Engineer of BMT Defence Services said: "Through our combined knowledge and expertise we are confident that we will provide the most up to date and appropriate recommendations to reduce the environmental impact of the European commercial shipping fleet."

For further information contact: Professor Chris Hodge, BMT Defence Services, chodge@bmtdsl.co.uk

Robotic fish to search out water pollution

Robotic fish, equipped with tiny chemical sensors, are being developed in the UK to find the source of potentially hazardous pollutants in water. Funded by the European Commission, the three year research project is being co-ordinated by BMT Group Ltd.

Rory Doyle, senior research scientist at BMT Group, described the project as a "world first", adding that scientists involved in designing the fish were using "cutting-edge" methods to detect and reduce water pollution.

The fish will be able to transmit the information to the port's control centre, enabling the authorities to map in real time the scale of the pollution.

Unlike previous robotic fish that work with remote controls, these will have autonomous navigation capabilities, enabling them to swim independently around the port without any human

interaction. This will also enable them to return automatically to their hub to be recharged when battery life is low.

The five fish are being built by Professor Huosheng Hu and his robotics team at the School of Computer Science and Electronic Engineering, University of Essex. The team hopes to release them into the Port of Gijon in Spain by the end of 2010. BMT is developing the artificial intelligence of the fish and will also be working with Thales in France to create the underwater communication and Tyndall in Ireland for the chemical sensors.

The fish, which cost around £20,000 to make, will measure 1.5 metres (5 feet) in length (roughly the size of a seal) and swim at a maximum speed of about one metre (3 feet) per second.

For further information contact: Luke Speller, BMT Group, lsPELLER@bmtmail.com



Conserving the world's wetlands

In spite of important progress made in recent decades, wetlands continue to be among the world's most threatened ecosystems, owing mainly to drainage, conversion, pollution and over-exploitation of their resources. So why is it so important to save them. . .

PROFILE

They occur everywhere from the tundra to the tropics. A global estimate of their size is given at somewhere in the region of 6% of the Earth's land surface or 570 million hectares, with some reports suggesting it could be considerably more.

They are among the world's most productive environments and are areas of biological diversity, providing the water and primary productivity upon which countless species of plants and animals depend for survival. They support high concentrations of birds, mammals, reptiles and amphibians and are also important in the production of plant genetic material such as rice, a staple diet of more than half of humanity. As well as this they provide tremendous economic benefits: water supply; fisheries (over two-thirds of the world's fish harvest are linked to the health of wetland areas); agriculture; timber production; energy resources, wildlife resources; transport; and recreation and tourism opportunities.

With the world's population likely to increase by 70 million every year for the next 20 years, the race is on to manage an accelerating water crisis and the effects of climate change. The ability of wetlands to adapt to changing conditions will be crucial to human communities and wildlife everywhere as the full impact on our ecosystem lifelines is felt.

In Australia, scientists from BMT WBM Pty Ltd have been working with the Federal Government and State and Territory Governments to assess and maintain the ecological character of the country's most notable Ramsar wetlands. The Ramsar Convention is an international treaty dedicated to the conservation and sustainable use of wetlands and the International Ramsar Convention Bureau maintains a list of 1,838 sites across the world in 159 countries.

In the past 18 months, BMT's involvement in ecological character studies has ranged from wetlands adjacent to the Great Barrier Reef to the iconic Kakadu National Park in the Northern Territory to the Currawinya Lakes in the arid zone of Central Australia and Corner Inlet along the country's southern coastline.

With work in hand in these wetland assessment projects continuing into 2010, BMT's success in this sector has been based on building effective partnerships with government agencies and the ability to approach the studies with an outstanding multi-disciplinary team of scientists, engineers and planners.

For further information contact: Greg Fisk, BMT WBM, gwfisk@wbmpl.com.au



Greg Fisk

Manager Environmental Planning

Greg is the project director and national co-ordinator for ecological character studies.

"Our studies showcase BMT WBM's in-house expertise across the fields of wetland ecology, coastal

processes, hydrology, water quality, and environmental planning and management. The analysis and presentation of data and information in our reports utilise both conceptual and quantitative modelling techniques to ensure the findings are technically rigorous as well as being able to be readily understood by decision makers."



Dr Darren Richardson

Manager Ecology

Darren is leading the development of the Corner Inlet Ramsar study on the coast of Southern Australia southeast of Melbourne. Located in the State of Victoria, it is the most southerly marine embayment and tidal mudflat system of mainland Australia.

"As a State marine park, the site is of international zoological significance as habitat for migratory wading birds and provides vital nursery habitat for fisheries of commercial and recreational significance due to extensive seagrasses."

"BMT was employed to assess the extent of ecological character change to the seagrasses and other wetland habitats of Corner Inlet that have historically been subject to dieback from water quality runoff and introduced algal species."

"The seagrasses of the inlet form a significant nursery habitat for juvenile fish and invertebrates, and the study is drawing upon our expertise in assessing the values and conditions of marine habitats and fisheries management. The Ecological Character Description (ECD) process challenges ecologists to assess the scope and impact of future ecological changes to wetland values. We have developed an indicator based approach which provides guidance to current decision makers as well as setting out a blueprint for future monitoring."



Lyn Raphael

Senior Environmental Scientist

Lyn is the project manager for a cutting-edge study assessing the potential impacts of climate change induced sea level rise in the Ramsar listed Kakadu National Park, one of the first Ramsar sites declared in Australia and one of the nation's most iconic natural assets.

"The National Park's enduring natural values stem from its exceptional beauty and unique tropical biodiversity, its variety of landforms and wildlife. Many of these species are found nowhere else in the world."

"The wetlands of Kakadu include estuarine rivers and creeks, broad floodplains, and freshwater lakes and billabongs, with freshwater areas often separated from estuarine areas by low natural levees formed by tidal processes. The potential impacts of sea level rise from global climate change is therefore a key concern, with the overtopping of these levees and associated intrusion of saltwater likely to change the essential character of the freshwater habitats."

"BMT was recently engaged by the Australian government to investigate the vulnerability of Kakadu's wetlands to climate change impacts."

"One of our key deliverables on this project was to develop a finite volume hydrodynamic model of the South Alligator River catchment, which drew on our continued experience and ingenuity in the field of numerical modelling. The ability of the model to replicate the current tidal and flooding processes of the river and to show how projected sea level rise could potentially affect nearby ecologically and culturally important sites by saltwater intrusion has been critical to developing and assessing possible adaptation options. Developing this complex model has been an enjoyable challenge for the team."

Introducing the wetland team



Cutting Carbon

the challenges facing the shipping industry



Some elements of the media are still keen to promulgate an ongoing debate on the nature and causes of climate change, but among the scientific community the consensus is overwhelming.

In 2007 Al Gore and the Intergovernmental Panel on Climate Change were awarded the Nobel Peace Prize in recognition of their work to provide a balanced assessment of climate change research. One of the scientists who collected the award is Professor Chris Field.

2009 is an important year in **climate change negotiations** (see box) as the world looks to Copenhagen in December when it is hoped the next round of targets for emission reductions will be agreed. Professor Field is in an optimistic mood.

“We are in the midst of a philosophical change. Previously discussion has focused on recognising the problem of climate change. Now the emphasis is on assembling appropriate responses.”

“I hope we see a trajectory to reduced emissions, in part through investment in new technologies and better dialogue with developing nations. But inevitably there has to be a price on carbon.”

“We must reduce our emissions from fossil fuels to close to zero and this is going to present real challenges to shipping and aviation in particular. **Biofuels** (see box) present an interesting opportunity, but the capacity to generate these fuels is finite. My research group has estimated that there are 300 to 400Mha of land on the planet which may be appropriate for biofuel production. This land has the capacity to meet between 5 and 10% of the global energy system demand and should be used strategically.”

“Our research shows that in some cases it may be more efficient to use land for production of biomass which is burned to generate electricity for battery powered transport than to produce

liquid biofuels for combustion engines.”

He identifies a strategic hierarchy of demand for oil based transportation and liquid biofuels.

“It seems likely that ocean shipping will need liquid fuel for some time to come. With decreasing oil reserves and increasing emissions, we may want to target petroleum use to those sectors where electrification is not possible. When this resource is depleted ocean shipping will have to use liquid biofuels or some other energy source”

Such a hierarchy demands that other parts of the shipping industry look to electrification and renewable energy sources with some urgency. But transportation issues are about more than just the fuel type used.

“We have to rethink fundamentally our approach to transportation. For example, in the automobile industry, it is not just about hybrid engines but how we design our cities and freeways and the development of public transportation. We need to find more holistically sustainable solutions.”



Professor Chris Field is the founding director of the Carnegie Institution’s Department of Global Ecology, Professor of Biology and Environmental Earth System Science at Stanford University, and Faculty Director of Stanford’s Jasper Ridge Biological Preserve. The author of more than 200 scientific publications, Professor Field’s research research emphasises impacts of climate change, from the molecular to the global scale.

Biofuels – what are they?

Biofuels are combustible materials derived from organic matter such as wood, animal excrement, algae, jatropha, maize and sugar beet. These sources can be converted into liquid biofuels, or burnt to produce energy.

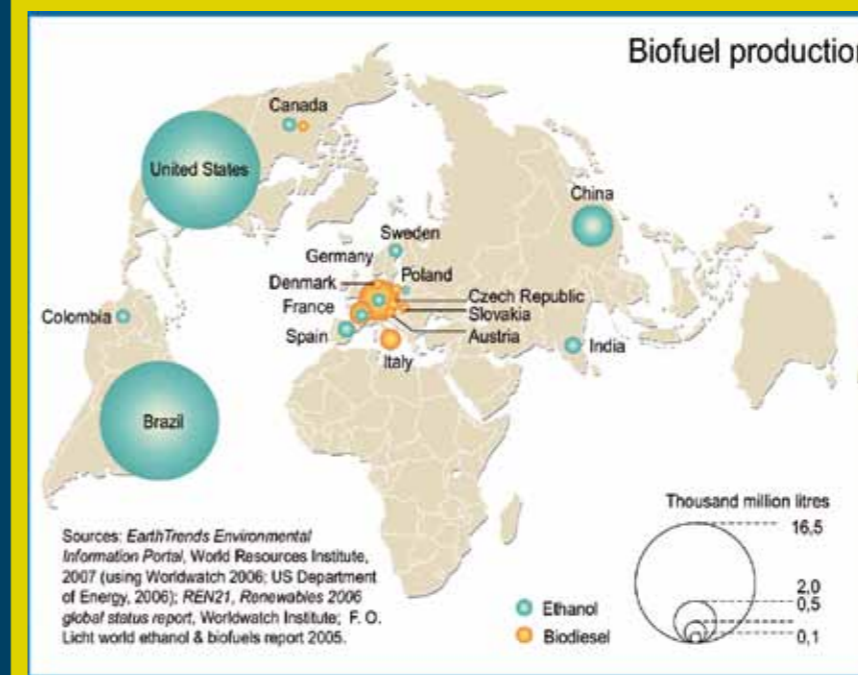
Production of first generation biofuels such as bio-ethanol derived from maize and sugar beet has doubled globally between 2000 and 2005; and production of bio-diesel has quadrupled in the same period.

Currently, Brazil is the leader in biofuel production, producing 45% of the global biofuel total in 2005; and providing 40% of the country’s non-diesel fuel. Plans for increased use of biofuels in Europe are controversial, with the European

Union’s biofuel targets of ‘10% use by transport by 2020’ being described as overambitious by the European Environment Agency’s scientific committee.

Although a potentially low carbon source of energy, biofuels can create negative impacts on biodiversity, food prices and land availability. However, the so-called second generation biofuels are much more efficient and less resource intensive to produce.

Biofuels are no longer seen as a panacea for global energy supply but are of particular interest to the transport sector and will certainly continue to form part of the energy mix.



“Time is against us” he says. “We’ve lost a decade since we first gained a proper understanding of climate change and we’re still dilly dallying today. Unless we can take decisive action soon things will get very difficult”. Despite this he remains hopeful.

“The problem is enormous but we’ve dealt with big challenges before such as the recovery after World War II or the massive environmental issues which faced the developed world through the 1970s and 1980s and which have now been controlled through effective management. There is still time to mitigate some of the more severe predicted consequences of climate change, but that window of opportunity is rapidly narrowing.”

More about climate change negotiations

The Intergovernmental Panel on Climate Change (IPCC) is a scientific panel established to provide objective information about climate change, based on the latest research.

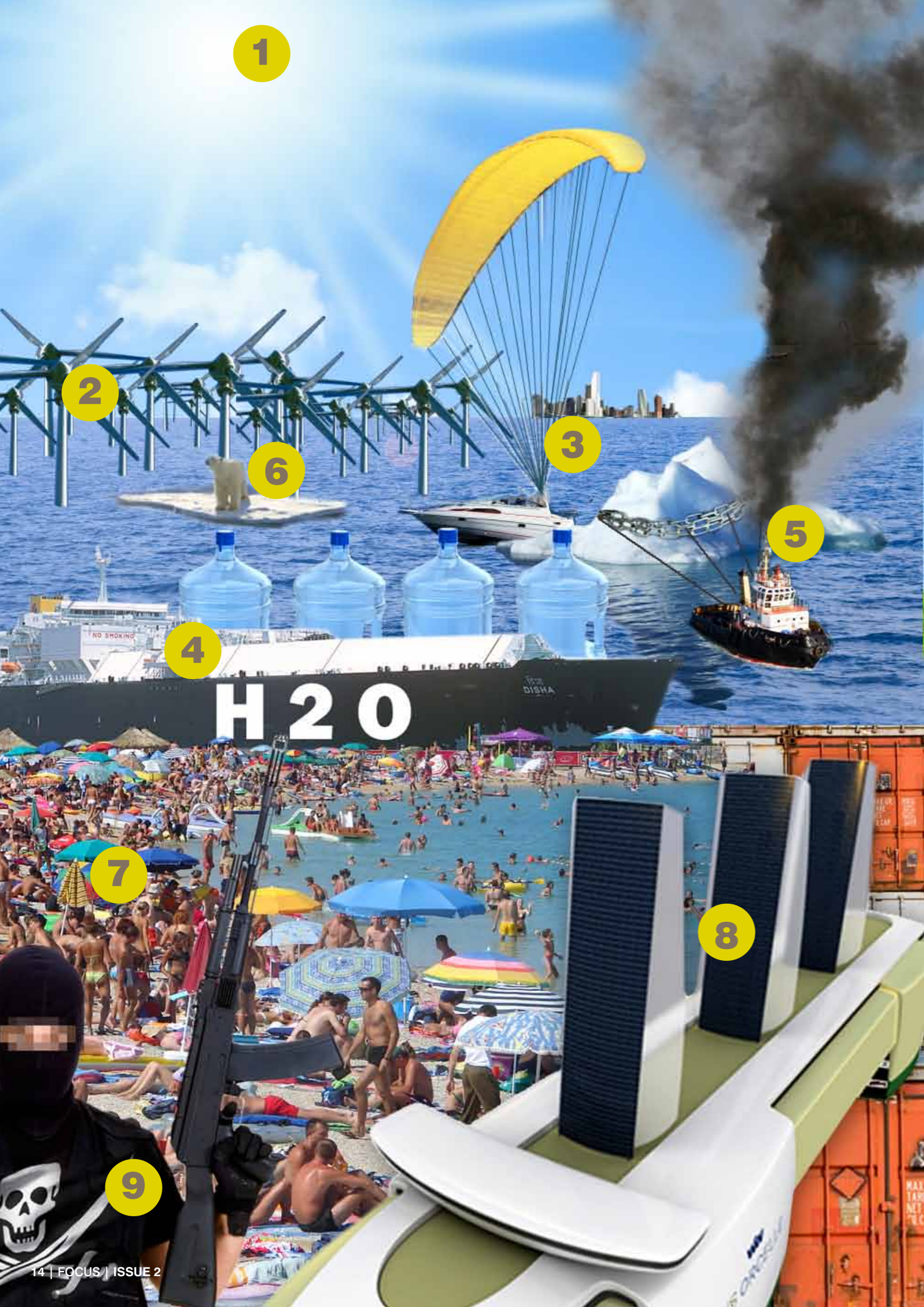
In its Fourth Assessment Report, published in 2007, it concluded that “most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations”. Its First Assessment Report in 1990 played an important role in the formation of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992.

The UNFCCC is a convention ratified by 192 countries which seeks to tackle the challenges of climate change. In 1997 the Kyoto Protocol, linked to the convention, set binding emissions reductions targets for certain countries up to 2012.

In December this year the UNFCCC nations will meet in Copenhagen to discuss a way forward beyond the 2012 commitments. With increasing evidence of climate change, the pressure on the Copenhagen meeting to make a real difference is intense.

A crucial question concerns emissions from aviation and shipping which were excluded from the Kyoto Protocol, but now seem likely to be subject to some form of emissions management. But perhaps the fiercest debate will consider how emissions from rapidly industrialising developing countries can be controlled.





FEATURE

looking over the horizon

A brief pause to reflect on the causes and consequences of the current financial crisis provides a clear illustration of some of the drivers that shape our world. But also how astonishingly easy it is to be blind-sided by events which seem so inevitable through the perfect lens of hindsight.

by Del Redvers

Over 90% of world trade is transported by ship. So we know that shipping is integral to our global society and as the world changes so must the shipping industry. Changes are predicted in trade routes, passenger demands, cruise itineraries, fuel types, propulsion systems, hull design... the list goes on and all underpinned by ever tighter legislation.

With long investment timescales ship owners and ports are two obvious examples of where greater foresight would be enormously beneficial. BMT always seeks to advance the boundaries of knowledge in the shipping industry and so commissioned a scenario planning exercise to consider how things might change over the next 20 years.

Take a moment to consider what you think will be different in the world of 2030. Will American hegemony be replaced by Chinese dominance? Will Europe be growing stronger or weaker? Will we be fighting over fossil fuel reserves? Will there be sufficient drinking water where it is needed? What will be the latest must-have gadget? Which companies will be topping the stock markets? Some questions we can address with more confidence than others, but certain common drivers lie behind them all.

A strategic tool

Scenario planning is primarily a strategic planning tool which allows many variables to be considered. It was originally developed for military planning purposes and was introduced to the business world by Shell in the 1970s. Since then many businesses and public sector

organisations have used the approach to inform their understanding of the future better and enable more effective decisions. Perhaps most notably the Intergovernmental Panel on Climate Change (IPCC) built a comprehensive framework of scenarios to explore carbon emissions and climate change for its Third Assessment Report in 2001.

The Future?

- 1 The last IPCC report predicted temperatures could rise by up to 6.4° C this century.
- 2 Global energy consumption is projected to double within the next 35 years. Offshore wind will be an increasingly important energy source.
- 3 Reducing fuel costs with the aid of a kite system is just one option for ship owners.
- 4 A UN report estimates that, by 2025, 66% of the global population could be without adequate water.
- 5 Projected growth suggests shipping could contribute 6% of global CO₂ emissions by 2020, and up to 50% by 2050.
- 6 Melting ice is contributing to sea level rises which could severely affect coastal areas where a tenth of the population lives.
- 7 In the next 40 years, the world's population is expected to rise by 40% to 9.1 billion.
- 8 A concept ship design for low emission transportation, the E/S Orcele combines fuel cells, wind, solar and wave power for propulsion.
- 9 The International Maritime Bureau reports worldwide pirate attacks up 100% in the first six months of 2009.

BMT's approach

In April, BMT brought together a formidable group of specialists from across its business with expertise in a variety of disciplines from port development to naval architecture. They were challenged to explore possible scenarios for the year 2030; a timeframe short enough to offer realistic projections for global trends such as population size, yet sufficiently distant that the impacts and consequences of these trends will be more apparent. Each scenario told a different story of the future based on these identified trends. Given BMT's passion for engineering, the scenarios particularly considered the scope for technological responses to global challenges.

Through the scenario planning workshop, the panel of experts sought to identify pivotal issues for the future of shipping. It focused on the question "What are the major changes shipping will see in the next 20 years?" Some scenarios assumed rampant population growth, increasing urbanisation and continued fossil fuel dependency. Others imagined significant advances in renewable energy technology, greater energy security and political stability.

Given the range of possible futures, it was interesting to see certain critical issues emerging time and again. The panel of experts felt growth in short sea shipping, changes to cargo types,



port developments, new technologies and security issues would be of particular significance. Some of BMT's domain experts explore these ideas further in this issue of Focus.

For BMT, scenario planning is another way of gaining greater insight and making better informed decisions about the future. It does not provide a definitive view of the future, indeed nothing can and of course we are always at the mercy of what Donald Rumsfeld called "the unknown unknowns". BMT plans to continue exploring the themes that emerged from this first scenario planning workshop to help its customers and the industry as a whole meet the challenges ahead.

For further information contact:
Del Redvers, BMT Group,
dredvers@bmtmail.com

“ **What are the major changes shipping will see in the next 20 years?** ”



Del Redvers

Del Redvers ran the scenario planning workshop with BMT experts. Following the success of this day, he has been asked to facilitate further events across the BMT group.

Del is a specialist in strategic sustainability and leads BMT's policy development and implementation in this area. He has over a decade of experience in helping companies to understand the commercial implications of global environmental and social issues and in developing ethical business models.

In addition to the shipping industry, Del has addressed sustainability challenges with football clubs, multinational banks, government departments, the pharmaceutical sector and extractive industries among others.

Initially graduating as a biotechnologist from Imperial College, London, Del began his career in sustainability as an environmental community development worker on inner city housing projects, before working in-house and latterly as a consultant across the private and public sectors.

Future: security

6,000,000 containers enter the US alone each year

only 2% are inspected

growing threat

Piracy and terrorism are security threats to commercial shipping that have received significant publicity in recent years. The drivers for these activities are complex, but usually include some measure of political instability. Weak, corrupt or otherwise volatile governments can create havens of criminality which can impact international commerce.

There are many factors which inflame political instability in a region, one of which is the availability and exploitation of natural resources and competition over the wealth this creates. In several of the possible futures considered in BMT's scenario planning exercise, the panel of experts agreed that regional politics will be further destabilised by the struggle for natural resources. This instability will inevitably result in threats to lawful trade.

Incidences of piracy were first documented in the 13th century BC and will continue and even increase for the foreseeable future as the pirates are backed by more sophisticated financing, logistics, operations and planning support. The causes of piracy are well beyond the control of any ship owner and, as the world's governments continue to seek political and economic solutions, the shipping industry must continue to develop appropriate risk mitigation measures and responses at sea.

reducing risk

The International Maritime Organisation (IMO) issued "Best Management Practices to Deter Piracy in the Gulf of Aden and off the Coast of Somalia" in February 2009. Most international trade organisations and some governments including the United Kingdom have adopted and further supplemented these recommended practices.

The recommendations range from comprehensive risk assessments to the adoption of physical barriers such as electrified fences and razor wire at shipboard points of access. Pirate attacks can be thwarted by evasive actions and employment of non-lethal weapons such as Long Range Acoustic Devices and water cannons. Defence mechanisms will undoubtedly become more sophisticated and powerful in years to come. However, these tools will only be effective as part of a sound shipboard security management system and in the hands of an aware and well-trained crew.

entry point challenge

Ports are economically critical infrastructure, handle large volumes of traffic and often have long landside perimeters to protect. As ships become increasingly difficult to attack successfully, ports may be perceived easier targets for political disruption or economic gain.

Container ports face a particular challenge. In the United States alone, more than six million containers enter the country each year of which a very low percentage are inspected, a number constrained by the cost and delay of inspection. Although the US Container Security Initiative has set a goal of 100% cargo scanning by 2012, and X-ray scanning and radiation detection technology are fairly well developed, the cost of meeting this goal may become prohibitive. Supply chain security, or ensuring transfer of security responsibility through each step of cargo transfer from origin to final destination is also a tremendous logistical puzzle.

In the future these considerable threats to assets, cargo and indeed all international trade could and should be managed through a single strategic global security system. But this would require a tremendous level of international co-operation to achieve and may not be on the immediate horizon. In the meantime with budgets expected to remain tight, careful and strategically vital investment decisions will have to be made by ship owners and port managers to meet current and future maritime security threats.

For further information contact:
Scott Staron, BMT Designers & Planners, starons@dandp.com

Future: port development

short sea shipping is responsible for **40%** of all freight moved in Europe

Since human history began in Africa some 7 million years ago, civilisation has expanded across all continents. People have always been on the move and the trend to increased urbanisation and economic migration has been a strong driver for the development of trade and transport infrastructure, including ports.

BMT's scenario planning exercise considered possible demographic, political and technological changes over the next two decades. Several of the issues identified through the scenario planning exercise, particularly the rise of short sea shipping, new routes, new logistic concepts, and new cargo types present interesting challenges for port development. Some of the implications are obvious, for example new cargoes will require new infrastructure, such as carbon dioxide or freshwater handling facilities. The availability of natural resources, particularly hydrocarbons, viable agricultural land and fresh water may influence human distribution and will certainly impact on trading and shipping routes. But where will the ports of the future be located?

short sea shipping on the rise

Post-panamax vessels continue to demand infrastructure investment in deepwater ports. The Panama Canal expansion project and introduction of new panamax container vessels with a capacity in excess of 12,000 TEUs will assure the ongoing dominance of regional hub ports. There is also a strong argument that current global trends may lead to increased intra-regional co-operation and a preferential modal shift to lower carbon transportation. Both these factors could contribute to an escalation in short sea shipping and inland navigation. Short sea shipping already accounts for around 40% of all freight moved in Europe. An increase in short sea shipping might encourage the redevelopment of smaller ports resulting in local economic and social benefits, through direct job creation, improved transport infrastructure and other opportunities.

green ports to benefit

Environmental impacts associated with port developments and operations are well documented and requirements to mitigate impacts will only become

more rigorous. As competition between seaports intensifies, several are looking at beyond compliance approaches to environmental performance, in search of that commercial edge. Positioning of ports as part of "green supply chains" will gain momentum. Initiatives to manage emissions of vessels alongside or in the vicinity of a port are already pursued, as are plans to minimise shore-side environmental impacts. Local electricity generation from wind, solar or biomass is likely to be integral to the port of the future allowing carbon neutral cold-ironing and perhaps the provision of some clean electricity to local communities as the technology evolves.

There will certainly be changes to the distribution, development and operations of ports in years to come. The question now is whether today's ports are looking to lead or follow?

For further information contact:
Wolfram Schaefer, BMT Transport Solutions, ws@bmt-ts.com

Future: cargo

the transportation of **fresh water** is likely to increase

It has been suggested that the first evidence of waterborne cargo dates back to the first millennium BC. Since that time our shipping trade routes have provided the lifeblood of world commerce, but as society evolves so does the nature of the cargoes transported.

There have been several innovations in freight transportation, such as the evolution of containerisation which although first appearing in the late 18th century really came into its own during the 20th century. As vessel design and shoreside infrastructure have evolved, it has become possible to transport new cargoes to meet the needs of new markets and this trend will of course continue.

carbon capture

It seems evident that the cargoes of tomorrow will be influenced by the trends explored in the scenario planning exercise. Technological advancements in carbon capture and storage lead to more transportation of carbon dioxide. For distances less than 500 miles, a pipeline may be the most economic method. But with greater volumes to store, shipping will have a significant role to play.

biofuels

Similarly the transportation of biofuels may increase if their development continues as a liquid fuel source. This will draw on much of the same infrastructure as existing liquid hydrocarbon transportation, but may force the development of new routes as the sources of production are likely to be very different from many of the oil producing nations of today.

fresh water transportation

The UN has identified fresh water availability as a major global strategic issue. Some have suggested that it could be a source of future conflict. There have already been instances of fresh water being transported by sea and as the value of this resource increases, it is a trend that seems likely to increase.

The rise of these and other new cargoes will impact on technological demands, trade routes, port infrastructure and generate new risks to be assessed and evaluated.

For further information contact:
Phil Thompson, BMT Group, pthompson@bmtmail.com

Providing a sustainable approach to defence procurement

The UK Ministry of Defence (MoD) is progressing towards ambitious government sustainability targets within its procurement activities. The targets are shared by the whole public sector with the MoD facing particular challenges, but also many opportunities, due to the nature of its diverse acquisitions – from food and clothing to ammunition and warships.

BMT Isis is supporting the MoD's ground breaking progress through close support and guidance and recently authored the 'Guide to Sustainability in Defence Acquisition'.

What is Sustainable Procurement?

This following definition is taken from the UK Government funded 'Procuring the Future, Sustainable Procurement National Action Plan'. "Sustainable Procurement is a process whereby organisations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organisation, but also to society and the economy, whilst minimising damage to the environment."

Sustainable procurement at the MoD enables the effective through life management of equipment, services and platforms (vehicles, ships etc) by understanding and improving the economic, environmental and social interactions associated with all life stages.

The 'Guide to Sustainability in Defence Acquisition'

The guide enables the MoD to empower its 100,000 staff, who provide support to the UK armed forces, to confidently address sustainability within procurement. It will be available this summer on the Acquisition Operating Framework, a web based authoritative source of policy and good practice for all MoD personnel (regardless of rank or job function) and industry partners. Personnel can scrutinise the sustainability of a purchase with the use of innovative tools for assessment.

Sustainability Presents Real Benefits for Defence

Sustainable procurement enables the MoD to realise its Defence Vision of "Defending the United Kingdom and its interests, strengthening international peace and stability and to be a force for good in the world."

For example, in assessing and reducing the energy requirements of equipment through life, the need for refuelling decreases as does its environmental impacts and associated costs. Reducing refuelling also decreases the requirement for personnel to enter into a theatre of operation, placing less people in harms way.

Reducing the hazardous material content reduces the cost associated with disposal, the potential harm to people involved during manufacture, in-service and disposal and of course the negative environmental impacts.

Considering interactions between sustainability factors enables greater understanding of the MoD's role in the world. For instance, understanding the increasing burdens that climate change is placing on different regions will allow greater understanding of areas of future conflict. This allows the MoD to accurately plan its procurement activities long in advance, effectively meeting future requirements.

Mark Hedges is a Senior Environmental and Sustainability Consultant at BMT Isis Ltd. He is an advanced lead auditor of environmental management systems, and as a member of the BSI technical committee, is assisting with the development of a new standard in sustainable procurement. He is also the author and creator of the first pan-MoD commercial guide on sustainable procurement practices – the 'Guide to Sustainability in Defence Acquisition'.

