

# FORUM

A MAGAZINE FROM DNV GL

JUNE  
01 2015



## THE CHANGEMAKER

UNIDO DIRECTOR GENERAL LI YONG URGES COMPANIES TO TAKE ADDITIONAL RESPONSIBILITY

PERTAMINA:  
TAKING SAFETY TO  
A HIGHER LEVEL

LEARNING FROM MACONDO:  
OIL AND GAS TAKES LESSONS  
FROM THE MACONDO  
INCIDENT

ROYAL CARIBBEAN:  
SETS NEW STANDARDS  
FOR EXCELLENCE IN THE  
CRUISE INDUSTRY

DUBAI:  
PAVING THE WAY TO  
MEET ITS ENERGY  
EFFICIENCY GOALS

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## MAKING AN IMPACT

At DNV GL we are committed to enhancing the positive impacts that our core business activities have on society. The greatest impact is through our services, standards and best practices which we develop for our customers and the industries we serve.

There is no doubt that some of our main markets, notably the shipping and oil and gas markets, are experiencing adverse conditions, and this is likely to persist over the next couple of years. Our role is to support customers and help them identify, assess and manage risks to enable them to become safer, smarter and greener. Integral to that is to check compliance and give impartial advice on how to improve safety and optimize efficiency and performance of their assets and day-to-day operations.

But there is also a larger risk picture facing companies and society: weak global governance means that businesses are competing in a globalized economy without a true level playing field. Also, there are challenges related to adapting to climate change, security of energy supply, political and social turmoil, the pace of technological change, and increasing public scrutiny - all calling for collaboration and trust-building between business, regulators and society at large.

I firmly believe that collaboration and innovation are cornerstones in achieving sustainable development and long-term prosperity. That is why we are devoting five percent of our annual revenues to research and collaborative innovation together with customers, industry partners, research institutes and universities, and why we engage in a range of initiatives with NGOs, opinion formers and other stakeholders.

As an example, we continue to support UNIDO (United Nations Industrial Development Organisation) which works to promote the concept of Green Industries. In this issue of FORUM, Director General Li Yong tells us that successful business leadership must be based on an approach that combines optimum returns for shareholders with responsibility for social and environmental performance. Also in this issue we highlight how we support our customers so that they can optimize business performance without compromising on safety and sustainability standards.

Indeed, for the past nine years as President and CEO, I have been heartened to see at first hand the difference that can occur when individuals from business make a determined effort to show leadership and take action to tackle pressing social and environmental problems. One of the greatest challenges of being a leader is the ability to juggle the competing demand of short-term, immediate commercial pressure with the long-term transformational change businesses must address to create sustainable growth.

It is therefore most pleasing to see that more and more customers are appreciating what we, DNV GL, set out to achieve. Certainly, the more our activities can be seen as part of the customer's value chain, the greater the impact of our work to safeguard life, property and the environment. In this way, we can help realize DNV GL's vision as well as all our customers' business goals.

I hope you find this issue of FORUM both interesting and informative. Through our collaborative approach and long-term commitment to safety, quality, technology and the environment, DNV GL is well-placed to serve you - our customers - in the challenging times that lie ahead.



*Henrik O. Madsen*  
Henrik O. Madsen  
DNV GL Group President & CEO



## REMI ERIKSEN APPOINTED NEW GROUP CEO AT DNV GL

The Board of Directors of DNV GL Group has appointed Remi Eriksen as the company's new Group President & CEO. He is succeeding Henrik O. Madsen, who is retiring on 1 August.



Remi Eriksen, DNV GL's new Group President & CEO.

Since October 2014, the Board of Directors has undertaken an extensive executive search and selection process to find and appoint the new DNV GL Group President & CEO, due to the planned retirement of the current Group President & CEO Henrik O. Madsen. Candidates from many countries, both inside and outside of the organization, and both men and women, have been reviewed.

Says Leif-Arne Langøy, Chairman of the Board of DNV GL Group: "On behalf of the Board, I am very pleased to announce that Remi Eriksen has accepted the position as DNV GL's new Group President & CEO. Eriksen has a solid track-record in leading positions within the company for two decades. He has gained extensive international experience in the oil & gas, maritime, and renewable energy industries, and has led our operations in Asia, Europe and

the Americas. His success in these positions led him to his current role as DNV GL Group Chief Operating Officer. In addition to his strong performance in managing the integration of DNV and GL, Eriksen has deep knowledge of our core markets and key industry technologies. Not least, he has displayed an acknowledged ability to foresee industry challenges and drive responsive solutions.

"I am also glad that after a thorough executive search and selection process, the best candidate was found among our own people. This will ensure the continuity of the company's values, culture and strategic direction. I really look forward to working with Remi Eriksen in the next phase of DNV GL's development," says Langøy.

Says Remi Eriksen: "I am very humbled and thankful for the opportunity to lead this

company where I have worked for the past 22 years.

"We now see challenging market developments in both the maritime and oil & gas industries. DNV GL will not remain unaffected, but I have strong confidence in our ability to constantly improve and develop our services. Even in tough markets, there will be a need for expert advice and services that can help improve efficiency, qualify new cost-effective technologies, and drive standardization of specifications and work processes - just to mention a few examples. In the energy sector and the business assurance market, I expect positive development in the next few years," says Eriksen.

"I believe the future will be characterized by a very complex and fast-changing world and a period of slower global growth. However, even with slower growth the world economy is still on track to more than double in size over the next 40 years. I see a future where trusted independent parties are increasingly needed to enable safe and responsible business performance and sustainable value chains.

"In this context, DNV GL's innovation capabilities, as well as our role as a standard setter and driver of joint industry collaborations, will be an increasingly relevant strength. It will be important for me that we continue our investments in people, R&D and innovation to develop new thinking, insights and solutions to the benefit of our customers and society," says Eriksen.

Says Chairman Langøy. "As Henrik O. Madsen is retiring after more than 30 years of service with us, the past nine years as Group President & CEO, I want to sincerely thank him for his commitment and extraordinary achievements in heading the company towards the world-leading positions we are in today."

## UN SECRETARY-GENERAL APPOINTS DNV GL CEO DR HENRIK O. MADSEN TO GLOBAL COMPACT BOARD



United Nations Secretary-General Ban Ki-moon



Dr Henrik O. Madsen, Group President and Chief Executive Officer of DNV GL

United Nations Secretary-General Ban Ki-moon has appointed Dr Henrik O. Madsen, Group President and Chief Executive Officer of DNV GL, as a new member to the UN Global Compact Board, the world's largest voluntary corporate sustainability initiative.

As a Board member, Dr Madsen will join other leaders from business, labour and civil society, and serve as a champion of the UN Global Compact and its mission. He will act in a personal and honorary capacity for a period of three years, starting from 1 June 2015.

In his letter of appointment, UN Secretary-General Ban Ki-moon welcomed Dr Madsen to "this joint effort to strengthen and guide the United Nations Global Compact", saying he was looking forward to working with Dr Madsen "through the Board towards our shared vision of a sustainable and inclusive global economy".

## DNV GL OPENS SINGAPORE SERVICE CENTRE

The new Singapore Service Centre (SSC) will streamline customer support and enhance customer experience by creating a single point of contact for all matters.

Singapore is a growing maritime hub from where approximately 1,500 DNV GL-classed vessels are managed by hundreds of ship managers. The new SSC, along with the existing technical helpdesk DATE (Direct Access to Technical Experts), will provide customers with easy, direct access to DNV GL services.

The SSC is currently available to customers in Singapore, with plans for rolling out the service to other countries in South East Asia.





## NEW GAS READY CLASS NOTATION LAUNCHED



*Barzan*, the first in a series of six 18,800 TEU container vessels ordered by UASC, was recently named at Hyundai Samho Heavy Industries (HSHI) in Mokpo, South Korea.

The vessel is the first to receive the new DNV GL GAS READY notation, which will also be given to her five sister ships and eleven 15,000 TEU vessels of UASC's latest eco-ship generation.

"We are proud to cooperate with UASC in realizing the world's greenest ultra-large container vessel," says Henrik O. Madsen, Group President and CEO of DNV GL.

"The trust placed in our expertise in alternative fuels has allowed us to implement the 'LNG ready' concept jointly with UASC as an industry first, and we are honoured that these next-generation ships are now also the first to receive the DNV GL GAS READY notation. UASC, truly a pioneering customer, now aims to reduce CO<sub>2</sub> emissions even further by converting ships to gas fuel operation as soon as the bunker infrastructure is ready."



## FIRST MEGA PROJECT AWARD IN INDONESIA

Classification and verification work is underway with Eni Muara Bakau B.V. on the Jangkrik floating production unit (FPU) project offshore Indonesia. Jangkrik is one of the country's first deepwater gas developments.

In a joint venture partnership with state-owned PT. Biro Klasifikasi Indonesia (BKI), DNV GL will deliver verification services for topside facilities and maritime classification of the FPU. This is the start of our first mega project in Indonesia.

The large scope of work will be provided by DNV GL's teams in Korea, Singapore and Indonesia.

Once operational, the newbuild spread-moored FPU will have the capacity to treat 450 million standard cubic feet of gas per day plus condensates. The unit is scheduled to start production in 2017.

"This project will provide a major boost to Indonesia's national gas production," said Richard Bailey, director for Asia Pacific

and the Middle East, DNV GL - Oil & Gas. "The contract will showcase DNV GL's capabilities to this burgeoning market."

Eni is operator of the block with a 55 percent interest, partnered by GDF Suez which holds the remaining 45 percent interest.



## SURVEY REVEALS HIGH POTENTIAL MARKETS

DNV GL has published the finds of a survey of regulators, EPCs, developers, manufacturers and investors involved in the MENA region's solar market. The survey confirms that Dubai and Jordan are considered the markets with the greatest short-term potential. Looking beyond two years, Saudi Arabia is seen as having the highest potential, despite the slow movement in the market today.

Jordan's PV feed-in tariff, and its tender process for large scale projects, is seen by survey participants as being the primary drivers of its solar market. Jordan has also recently launched its

second utility scale tender. Dubai trails Jordan only slightly in survey respondents' expectations, with the 200 MW Sheikh Mohammed bin Rashid Al-Maktoum Solar Park piquing the most interest. Dubai is also seen as likely to achieve its seven percent generating capacity solar goal for 2020.

The purpose of the survey is to assess the direction of the solar market in UAE, Saudi Arabia, Jordan, Oman, Kuwait and Qatar. The full DNV GL survey results can be accessed here:

<https://www.dnvgl.com/energy/details/middle-east/solar.html>

## THE TOP 100 SUSTAINABLE SOLUTIONS



The DNV GL-backed Sustainia100 study reveals leading sustainability innovations, technologies and practices deployed in 151 countries, and points to a new development: sustainability alternatives are increasingly becoming the affordable and convenient choice.

The new Sustainia100 study names the top 100 sustainable solutions after reviewing more than 1,500 projects and businesses on six continents. More than half of this year's selected innovations are not only competing on sustainability criteria, but also on affordability and convenience with for instance new reuse, recycling and take-back models.

By identifying 100 readily available innovations for cities, corporations and consumers, the Sustainia100 partners wish to highlight the potential for bottom-up transformation ahead of the much-anticipated climate change negotiations, COP21, in Paris later this year.

"We need to enable a major transformation, and this will require top-down governance and initiatives," says Bjørn Kj. Haugland, DNV GL Chief Sustainability Officer. "But, equally important, the transformation calls for a bottom-up revolution. A transformation shaped by new solutions, new technology and new innovations. As Sustainia's solutions demonstrate, we have the tools we need to build a better world and if we mobilize and follow this mindset, the climate negotiations in Paris could be a success."

The study is available free of charge at [www.sustainia.me](http://www.sustainia.me)

# THE CHANGE- MAKER

Industrialization is the key to solving many of the world's challenges related to poverty and inequality. But does it come at the expense of the environment? We met with LI Yong, Director General of UNIDO, to find out.

At the Vienna International Centre, Director General Li Yong and his team in the United Nations Industrial Development Organization (UNIDO) have a panoramic view of a city which embodies what industrialization can achieve. From its central location in the heart of Europe, Vienna was for centuries a prosperous area. But despite the city's success, the number of inhabitants remained fairly stable. However, when the industrial revolution kicked in around the year 1800, the population increased tenfold to more than two million in just over a century. For the first time in history, the living standards of the masses had begun to undergo sustained growth.

"Throughout history, industrialization has been the primary driver of economic growth and development," says LI Yong. "Whether we look at the development processes in Europe, the United States, Japan, or the many 'tiger' and 'dragon' economies in Asia that achieved rapid growth in more recent times, it was industrial development that generated wealth and shaped their success. The structural transformation which occurs when an economy makes the transition from agriculture and natural resource extraction to

productive activities has a dramatic development impact. Industry provides greater opportunities for value addition, productivity, capital accumulation, economies of scale, and technological progress than any other sector."

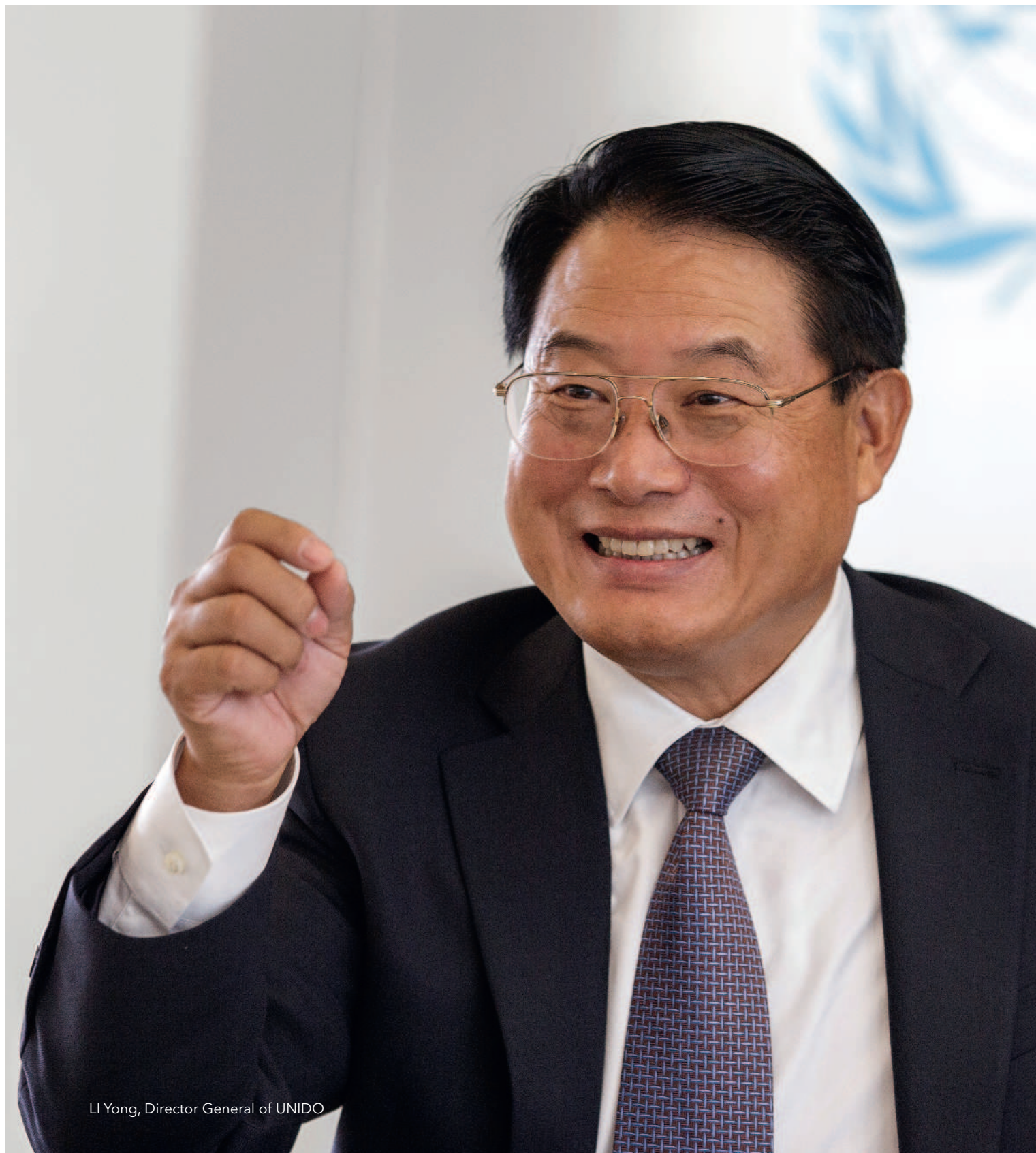
LI Yong points to the Republic of Korea, which had a per capita income of approximately 79 US dollars in 1960, making it one of the poorest countries in the world at the time. Through steady but rapid industrialization, the country advanced into a developed economy and had a per capita income of 30,000 US dollars in 2010.

## **Eradicating poverty**

"It is entirely feasible to eradicate poverty within the next generation," says LI Yong. "In the period 1990-2014 we have already seen a 50 percent reduction in of the number of people living in extreme poverty, defined as those living on incomes of less than \$1.25 per day.

However, in order to further reduce inequalities, industrial development must be socially inclusive. We need





LI Yong, Director General of UNIDO



LI Yong believes that tomorrow's successful companies are those that take additional responsibility.

to share knowledge and enable developing countries and regions to stand on their own feet. It is the only way to break their dependence on aid flows."

Halving extreme poverty before 2015 was one of the UN Millennium Development Goals, a blueprint to which all the world's countries and the world's leading development institutions voiced resounding support 15 years ago. The framework set clear goals to tackle some of the world's most pressing challenges - from the eradication of hunger to ensuring environmental sustainability. And while not all of the goals have been met, it is safe to say that the achievements have been impressive.

The child mortality rate has fallen by almost 50 percent since 2000. An estimated 3.3 million deaths from malaria have been averted, of which about 90 percent were children under the age of five living in sub-Saharan Africa. And 2.3 billion people have gained improved access to drinking water.

#### **Ensuring sustainable growth**

But with more than 7.1 billion people on the planet, and counting, is it really possible to harness the

benefits of industrialization in an environmentally sound way?

"There is no doubt that industrial processes have been associated with harmful emissions, pollution and environmental degradation in the past. But industrialization can, and must, be sustainable. Ensuring environmental sustainability is an imperative towards the realization of UNIDO's vision of Inclusive and Sustainable Industrial Development, which acknowledges the centrality of the economic growth dimension, driven by industry, but recognizes that this has to be achieved in the framework of social equity and environmental protection. This requires a shift in industrial production processes and techniques, which have traditionally left a significant environmental footprint on the Earth, towards a greener model of industrial development," explains LI Yong.

UNIDO works to promote the concept of Green Industries, helping developing countries secure resource-efficient low-carbon growth by moving to clean technologies, applying sustainable production practices and implementing environmental agreements.

### The next steps

Since the Millennium Development Goals come to an end in 2015, a new development agenda is in the making. The Sustainable Development Goals, which are currently being formulated and will be ratified by the UN member countries in September 2015, are built upon the Millennium Development Goals. They place even stronger emphasis on bridging development and sustainability, encompassing social, environmental and particularly economic aspects.

“The economic dimension is important. There is a strong link between sustainable development priorities and long-term business goals, and companies are crucial partners in order to achieve our global development goals. Consequently, we have stepped up our dialogue and collaboration with the private sector, financial institutions and civil society in recent years to enhance our impact by combining our efforts, know-how and resources.”

DNV GL is one of the companies partnering with UNIDO to drive change. In 2013, UNIDO and DNV GL entered into an agreement to develop and implement joint projects in the field of water footprint measurement, promote water management best practices, and help manufacturers in developing countries gain access to global supply chains through quality, quantity and sustainability improvements of their products.

LI Yong believes that tomorrow’s successful companies are those that take additional responsibility.

“I firmly believe that successful business leadership must be based on an approach that combines optimum returns for shareholders with responsibility for social and environmental performance. Leading businesses recognize that supporting the achievement of social goals such as food security, environmental sustainability, access to health and education, and good governance is fundamentally in their own interest. It can help to mitigate risk, develop new markets, and cultivate sustainable relationships with customers and investors.

“Company leaders are not only leaders of business, but leaders within society. They are a part of society, and not apart from it,” ends LI Yong.

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### ABOUT UNIDO

The United Nations Industrial Development Organization (UNIDO), established in 1966, is the specialized agency of the United Nations that promotes industrial development for poverty reduction, inclusive globalization and environmental sustainability. The organization’s mandate is to promote and accelerate inclusive and sustainable industrial development in developing countries and countries with economies in transition.

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### SOME KEY UNIDO PROJECTS

#### National Cleaner Production Centre of Viet Nam

Established in 1998, the Centre is engaged in a wide range of industry sectors and provides training and consultancy to businesses, governments and other organizations. The Centre has trained over 15,700 people. Reports from more than 300 companies working with the Centre show that they have achieved annual savings of around 9.7 million dollars, 43,000 tonnes of coal, eight million m<sup>3</sup> of water, 4,700 tonnes of chemicals and 63,000 MWh of electricity.

#### Revival of the textile industry in Ecuador

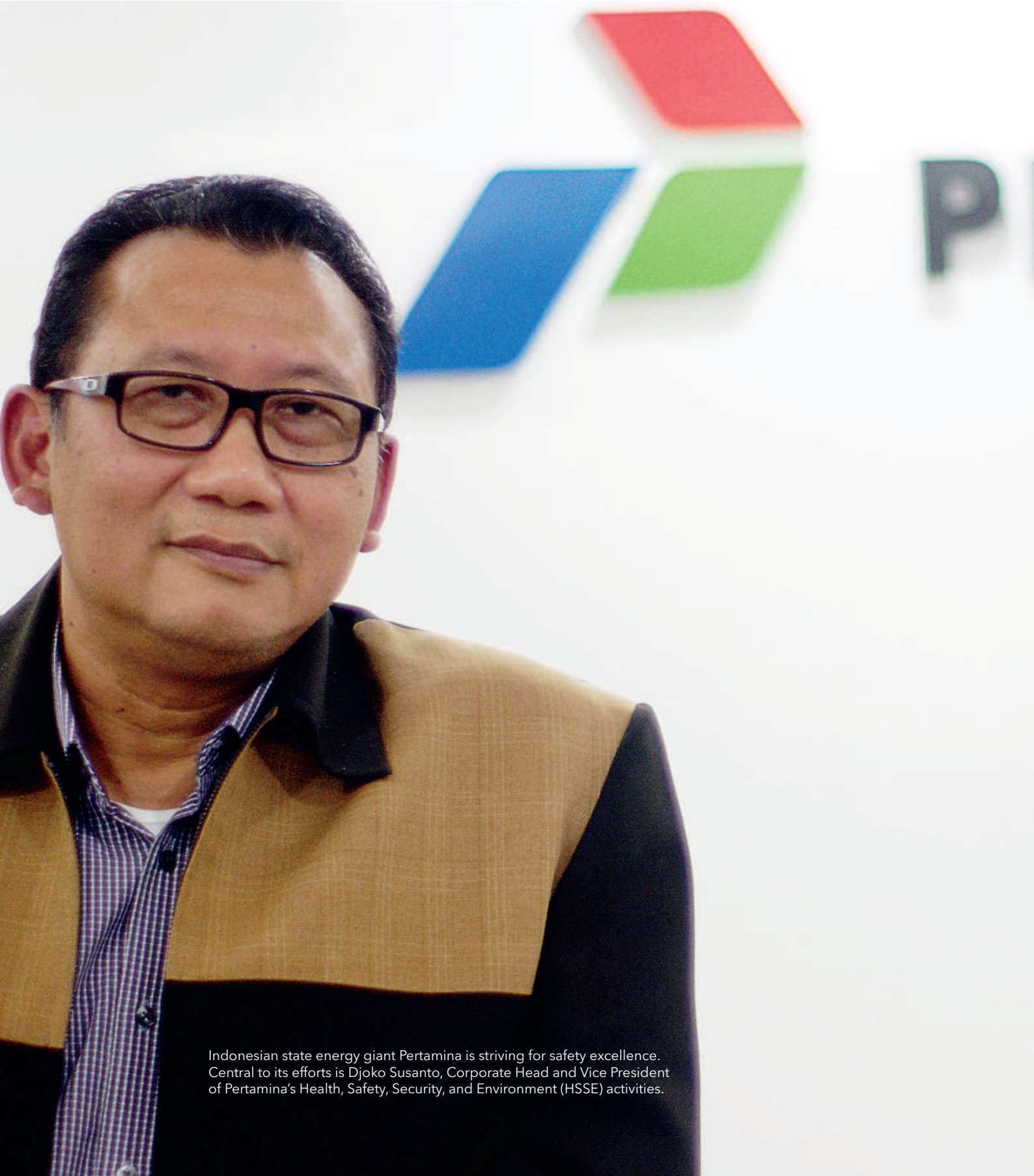
Strong competition from Asian producers coupled with high domestic inflation led to a significant setback of Ecuador’s important textile industry. Together with the Ministry of Trade and Commerce, UNIDO introduced a cluster approach to improve competitiveness and market access. Through introduction of new technology and bulk purchasing, the enterprises in the cluster achieved a 60% increase in sales, a 15% increase in salaries and a 15% reduction in production time.

#### Global Flagship Initiative: Mercury and chemicals management

UNIDO’s Chemical Leasing Programme provides an opportunity for companies to optimize the efficient use of chemicals and reduce water, raw material and energy consumption. This results in clear environmental advantages and economic benefits for both suppliers and users of chemicals. The Programme shifts the focus from the sales volume of chemicals to a more value-added approach. Over 40 ChL projects have been successfully implemented in cooperation with several multinational companies.

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Indonesian state energy giant Pertamina is striving for safety excellence. Central to its efforts is Djoko Susanto, Corporate Head and Vice President of Pertamina's Health, Safety, Security, and Environment (HSSE) activities.

# PERTAMINA

## AIMING FOR SAFETY EXCELLENCE

In today's global economy, a growing number of companies are implementing health, safety and environmental policies and programmes in order to maintain their competitive advantage. One such company is Pertamina, which has engaged DNV GL to assist in implementing the International Safety Rating System.

Since its foundation in 1957, the company has navigated a path of steady growth in terms of oil and gas production and exports in an increasingly competitive global economy. In developing its natural resources to meet the demands of industry, Pertamina has fostered policies aimed at achieving world-class performance in health, safety, security, and environmental (HSSE) matters.

Djoko Susanto, Corporate Head and Vice President of Pertamina's HSSE activities, comments: "Pertamina constantly strives to develop its operational performance. Our aim is to be a world-class energy company and our performance should reflect our goals."

Pertamina's core activities include oil, gas, and geothermal exploration and production, both onshore and

offshore. It aims to achieve the best in HSSE standards while guaranteeing production targets and good investment returns.

Explains Susanto, "We started looking at HSSE many years ago. We developed our own management systems that suited our needs. However, the company has grown significantly over the years, with more activities and employees (currently over 21,400) and with that comes added risk. We needed a proven system to measure our performance so we opted for DNV GL's International Safety Rating System (ISRS). The audits keep you focused and include a high degree of planning. This helps us identify and rank our risks."

He continues, "Also, I'm a firm believer in 'what gets measured gets done' and I see how HSSE relates to





As Indonesia's top-tier energy company, Pertamina is involved in a wide range of upstream and downstream oil, gas, geothermal, and renewable energy activities with operations in more than five countries. It is the first Indonesian company to be featured in the Fortune 'Global 500.'

the economic realities of production. While we have had a good record of safe manhours over the years, we have also experienced a few incidents that led us to reassess our management systems and procedures. Attaining an ISRS level is now a required KPI (Key Performance Indicator) for all Pertamina divisions, and this has been formalized by the Pertamina Board of Directors."

Eric Roos, DNV GL Principal Consultant, points out that the ISRS is a system to assess, improve, and demonstrate the health of an organization's business processes and applauds Pertamina for its work in HSSE matters.

"Pertamina started its ISRS journey back in 2007 when they were one of the first companies to adapt ISRS 7th



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**“I’m a firm believer in ‘what gets measured gets done’ and I see how HSSE relates to the economic realities of production.”**

**Djoko Susanto**, Corporate Head and Vice President of Pertamina’s Health, Safety, Security, and Environment (HSSE) activities

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Edition in Asia. Since then, they have moved through the levels getting more and more benefits from the system. Indeed, Pertamina’s management is very pro-ISRS and uses it to measure the performance of their management system and to demonstrate their HSSE performance to their external stakeholders. They see it as a top-down process, while also acknowledging the need to give a greater degree of ownership in the system to employees at all levels, strengthening positive attitudes and behaviour. Another key characteristic is their commitment to perform significantly better than anyone else in their industry, and this is reflected now in the Pertamina corporate requirement that ISRS should be a KPI. We have been impressed with their performance and Pak Djoko’s drive and leadership to implement the ISRS at all its divisions in a planned and structured way,” says Roos.

Adds Susanto, “As a responsible company, we want to find out how we can meet the expectations and requirements of our stakeholders, the industry, and the public. Continual improvement is the main premise of ISRS. Also, with a good management system in place, potential incidents or accidents can be avoided.”

Susanto emphasizes that a management system is no longer “something extra” that companies need to do for the sake of moral or corporate responsibility. It should be part of every company’s business strategy in order to help achieve competitive advantage, and with ISRS levels and “Statements of Performance”, the organization can demonstrate the suitability, adequacy, and effectiveness of the management system to the larger world.

“At Pertamina we regard customer care, technology and innovation, trustworthiness, and HSSE as inseparable factors that not only drive the business beyond the competition, but also give the company a higher ranking in the global energy sector.

“Indeed, our human capital is one of the most essential elements in our activities. They are the source and energy that enables the company to maintain the expected high quality standards in our activities,” says Susanto and concludes, “and that is why it is vitally important that we apply the best industry practice when it comes to HSSE. It’s an investment that we need to make to meet the growing energy demands in Asia and to become a world-class energy company.”

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#### ISRS IN BRIEF

ISRS is a system to assess, improve, and demonstrate the health of an organization’s business processes. The International Safety Rating System 1st Edition was developed in 1978 by Frank E. Bird, Jr., a safety management pioneer. In recent years, ISRS has changed to address sustainability issues including environmental, health, quality management, and sustainability reporting. In addition, ISRS 8th edition was launched in 2009 incorporating best practice in process safety management. For more information see: [www.dnvgl.com/isrs](http://www.dnvgl.com/isrs)

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# QUANTUM LEAP

With *Quantum of the Seas*, Royal Caribbean Cruises wanted to create a cruise ship unlike anything the world had seen before. To truly set new standards for excellence in the cruise industry, the company turned to some good old friends.





Meyer Werft is capable of building two cruise ships simultaneously.



The Azipod propulsion system cuts fuel consumption and emissions to air.



The 16 lifeboats are attached to the railings of Deck 5.

“We are proud of the many innovations found on *Quantum*, but our primary goal is to create a safe, memorable and truly unique passenger experience. Sometimes we have to push boundaries of what is possible at sea, but if the response to this vessel is any indication, it has been worth it.”

**Mika Heiskanen**, Royal Caribbean’s Director (Quantum Class)

At 168,666 GT, 348 metres long and 41 metres abeam, Royal Caribbean’s latest cruise ship *Quantum of the Seas* is a true giant, with a total capacity of 4,905 passengers and space for an additional 1,500 crew members. But *Quantum*’s size is only part of what makes her a game changer in the cruise industry. Take for example the North Star, a jewel-shaped capsule mounted to a crane near the ship’s bow, designed to take up to 13 passengers up more than 300 feet above sea level.

**The wow factor**

Still not impressed? *Quantum* also has a FlowRider which allows passengers to surf on board, a skydiving simulator, robotic bartenders, a climbing wall, and a satellite-enabled high-speed Internet service. The Music Hall can accommodate 559 guests. SeaPlex, a large, flexible space, can be used as a roller rink, a basketball court, a circus school, a bumper car arena or a dance hall. Another space, known as Two70°, features a three-storey-high room affording 270-degree panoramic ocean views, a café and an ice bar. Automatic window shades adjust to sunlight, and a 13-projector system can project live views from outside

the ship (or any other imagery) onto screens. At night, the space evolves into a highly dynamic entertainment venue that features six robotically controlled 100-inch LCD television screens, providing digital backdrops to complement live performances.

The technology and engineering behind many of these features represent “firsts” for the cruise industry. But according to Mika Heiskanen, Royal Caribbean’s Director (Quantum Class), every aspect of the design and construction of *Quantum* revolves around the passenger. “We are proud of the many innovations found on *Quantum*, but our primary goal is to create a safe, memorable and truly unique passenger experience,” he says. “Sometimes, we have to push boundaries of what is possible at sea to get what we want, but if the response to this vessel is any indication, it has been worth it.”

Heiskanen notes that, while many features of the Quantum Class vessels may seem revolutionary, elements of the ship’s design and construction can be traced back to earlier Royal Caribbean ship classes. “For example, our first cruise ship *Song of Norway*, built in 1970,



The world's most advanced cruise ship was built by Meyer Werft in Papenburg, Germany. *Quantum of the Seas* took less than two years to complete. In October 2014, the stately lady was delivered to Royal Caribbean Cruises.

featured a circular, glass-enclosed lounge called the Viking Crown, a concept that has been gradually transformed and upgraded over the years," he explains. "Echoes of this concept can be found on all Royal Caribbean vessels, including *Quantum's* Two70° space. Our design process is more evolution than revolution."

#### **Cruising the green way**

While many of *Quantum's* features are passenger-driven, Royal Caribbean also focused on reducing the vessel's environmental impact. Indeed, *Quantum* offers a number of energy-efficient solutions including optimized hydrodynamics, a heat recovery system, energy-saving LED lighting, an air lubrication system reducing hull friction in water, and a state-of-the-art exhaust gas treatment plant (a hybrid scrubber).

"By investing in these new technologies, we predict we will not only reduce carbon emissions but also achieve significant energy savings compared to our Freedom Class cruise ships," says Royal Caribbean Project Manager Mika Heiskanen. "This not only makes good business sense, but with passengers increas-

ingly sensitive to environmental issues, we strengthen our reputation as a responsible company."

#### **Partnering for success**

Heiskanen says that while Royal Caribbean has always had strong, in-house technical expertise, the company relies on a network of partners and suppliers to achieve their vision. "Class and the yard play an important role, and we have come to view our relationship with DNV GL and the Meyer Werft shipyard as more of a partnership than a traditional owner-supplier relationship," he says. "We tend to work with companies that understand our business, think like we do and have the competence to think outside the box."

Jörg Langkabel, Business Director at DNV GL in Hamburg, says that Royal Caribbean, Meyer Werft and DNV GL have enjoyed a relationship that dates back decades. "Our organization has deep roots with Royal Caribbean, and our relationship with Meyer Werft began in the mid-1990s," he says. "We got involved in the *Quantum* project at an early stage, providing advisory and verification services."





The glass gondola North Star lifts guests up to 90 metres above sea level for a unique panoramic experience.

DNV GL's Project Approval Manager, Siw Solstad, made sure that the more than 3,800 drawings - some of which included special designs - were reviewed and discussed thoroughly with the yard and owner during several intensive workshops prior to approval. Indeed, Langkabel notes that *Quantum of the Seas* is such an innovative vessel that existing SOLAS rules on passenger safety at sea did not cover all of her features. "Part of our role was to develop rules to ensure passenger safety for some of *Quantum's* unique spaces and attractions," he says. "For example, the North Star capsule and the skydiving simulator were built for operation on land, not for use on a moving vessel. And Two70° is such a large and complex room it required some new thinking with regard to fire safety."

For Langkabel, good cooperation between DNV GL's site team and yard personnel is critical. "Meyer Werft's production philosophy requires precise coordination of various suppliers, so we have to be efficient," he says. "By understanding what is important to the yard

and the owner, and working closely with them to support their businesses, we have been able to help them achieve their ambitions."

#### **Flow-line production**

Peter Hackmann, Meyer Werft's Head of Communications, explains that the yard has invested about 500 million euros to modernize production over the past decade. "We have built a laser welding centre, an automated pipe centre, computer-aided logistics and a material-flow control system. We upgraded our dry docks, invested in a wide range of automated equipment and redesigned our processes to speed up production," he says. "We have also put roofs on all of our facilities to avoid the production process being impacted by weather. We are building two huge cruise ships in one year - quite an achievement, given the complexity of these vessels."

Hackmann says the yard's production philosophy can be compared to the way cars are manufactured. Yet,



Star chef Jamie Oliver (with wife Juliette) in his first restaurant at sea.



Huge windows enable breathtaking views of the sea from the indoor pools.



SeaPlex is a convertible, multipurpose sports and family fun arena.

he notes, a cruise ship is far more complex. "Suppliers play a key role in keeping things moving on schedule," he underlines. "We expect them to be reliable, flexible and responsive, especially when issues arise. DNV GL has proven to be a good partner through all phases of the build, particularly for this project, which included so many innovations," Peter Hackmann emphasizes.

#### Trust and open communication

In fact, representatives from the yard, DNV GL and Royal Caribbean scheduled regular meetings every two weeks during the build, and even more often whenever they reached critical milestones. DNV GL's veteran Site Team Manager Andreas Hosak notes that unlike building commercial tonnage, the construction of cruise ships requires a lot of specialized expertise and good communication. "In terms of complexity, cruise ships are challenging, and even more so for such an advanced vessel as *Quantum*," he says. "Meeting the expectations of both the yard and the owner can be difficult, but we have been working with both for so long, there is a lot of trust."

Hosak says that this close relationship between class, the yard and the owner helped manage some challenging technical issues. "The sheer size of the hybrid scrubber created some headaches; we also spent a lot

of time working out fire safety with the Two70° space," he says. "In total, about 400 kilometres of piping and 2,200 kilometres of electric cables have been installed aboard *Quantum*. Also, because the air lubrication system to reduce hull friction was new, it took some time to get right."

In addition to his close cooperation with the yard, Royal Caribbean and suppliers, Hosak got a lot of support from his colleagues at DNV GL from all over the world, including China, South Korea, Greece, Latvia and Germany as well as the Regional Approval Centre at DNV GL's headquarters in Høvik, Norway. "We leaned on the expertise of our Noise & Vibration team, headed by Eileen Mandt-Brun, and our scrubber expert Markus Osterkamp during critical phases of the project," he says. "It was a real team effort."

For Hosak, now working on *Quantum*'s sister ship, *Anthem of the Seas* (due for delivery in the spring of 2015), the project has been a genuine success. "When you consider how many people were involved at different stages of the build, and look the end result, it is hard not to be proud of being part of the project," he says. "It may be known as *Quantum of the Seas* to passengers, but for me, a better name might be *Collaboration of the Seas*!"

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"DNV GL has proven to be a good partner through all phases of the build, especially for this project which included so many innovations."

Peter Hackmann, Head of Communications, Meyer Werft

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# SUCCESS BUILT ON MEDITERRANEAN VALUES



The launch of *MSC Oscar*, the world's biggest containership to date, has brought the success story of MSC Mediterranean Shipping Company to the fore. Here we look at a unique company history and the values transported to the next generation of a global maritime business.





The humble beginnings of MSC founder Gianluigi Aponte as a selfmade man are legendary. In 1970 the former captain borrowed several thousand dollars to buy his first cargo ship, a 1,750 GT second-hand vessel, and established a shipping line between the Mediterranean and East Africa. Over the years MSC added further vessels, and by the late seventies, the line was serving northern Europe, Africa and the Indian Ocean. MSC continued to grow and eventually became the renowned maritime empire it is today. Its strategy was using ships which could be operated at moderate costs.

In January 2015 MSC reached a historic milestone when it launched the DNV GL-classed, 19,224 TEU containership *MSC Oscar*, the new record holder in box capacity. MSC has 18 more 19,000 TEU vessels on order, which could make the Swiss operator the largest container shipping line in the world.



Diego Aponte, President and CEO of MSC Mediterranean Shipping Company, welcomes *MSC Oscar* at the naming ceremony.

#### Traditions and innovation

"For over 40 years the MSC family has been growing - and so has our fleet," says Diego Aponte, the founder's son. He joined MSC in 1997 and has been heading the Geneva-based company as President and CEO since October 2014. Today the Mediterranean Shipping Company employs 24,000 people around the world and operates more than 470 vessels sailing 200 different routes and calling at 315 ports. "I am immensely proud of our global team for their dedication, passion and commitment shown towards our customers whose unwavering loyalty has played a key role in our progress over the last four decades," says founder Gianluigi Aponte. "MSC is and always will be for the real world."

His son Diego Aponte looks back: "During the early years, MSC's cargo operations captured our family's values and respect for the sea. The culture of hospitality, drawn from the family's Mediterranean origins, encouraged the company to venture into new

*MSC Oscar* during her seatrials.





A stack of brand-new MSC containers waiting to be taken aboard.



Handling oversized or "out-of-gauge" cargo on board an MSC-owned containership.

"Our partnership with DNV GL continues to be an important part of our journey. It dates back more than 15 years, and almost all vessels built for MSC are DNV GL-classed."

**Diego Aponte**, President and CEO, MSC Mediterranean Shipping Company

business areas and inspired the founding of the cruise business in 1989 as a second pillar." He adds that MSC honours tradition yet maintains a strong focus on the future. "We have been leaders in cultivating an innovative approach to cargo shipping, cooperating with our industry partners. We have always worked hard. We continue to work hard, and are committed to working smarter to better serve our customers," says Diego Aponte, describing the company's philosophy.

**New-generation vessels**

MSC continues to invest in its state-of-the-art fleet. Named after Diego Aponte's son Oscar, who might succeed his father as third-generation CEO one day, the 395.4-metre *MSC Oscar* is only marginally shorter than the previous holder of the capacity record, *CSCL Globe* of 19,100 TEU - but *MSC Oscar* can hold as many as 19,224 TEU.

Thanks to the Route Specific Container Stowage (RSCS) class notation developed by DNV GL, the ship can utilize its cargo capacity most efficiently depending on the route, without compromising on safety.

She was delivered to her owners on 8 January 2015 - earlier than scheduled - by the Korean shipyard Daewoo Shipbuilding and Marine Engineering (DSME). "The design phase took six and a half months, and it took another eleven and a half months, or 45,000 man-days, to build this vessel," says Giuseppe Gargiulo, project manager for newbuildings at MSC. The vessel, which cost around 140 million US dollars, is one in a series of three ships ordered in 2013. All are to be operated by MSC based on a long-term charter agreement.

But this gigantic newbuilding project is not just about sheer size. Many forward-looking features have been integrated into *MSC Oscar*. For example, the engine has been optimized to enable automated fuel consumption control based on speed and weather conditions. The propulsion system has a broad optimal speed range for added operational flexibility. "Yes, it is a classic diesel engine, but it is electronically controlled, and as a super-long stroke engine, it features very low specific fuel oil consumption. In addition we have an 'exhaust gas bypass' to maximize vessel performance at lower engine loads," says technical



In 1999, the 4,056 TEU *MSC Diego* was the company's largest-ever newbuilding



The 9,000 TEU *MSC Pamela*, delivered in 2005, marked MSC's entry into the large-boxship market.

expert Gargiulo. What is more, the ship is equipped with the latest autopilot system, which enhances safety and reliability while supporting energy-efficient navigation. The adaptive control technology automatically optimizes steering, avoiding unnecessary rudder movements. "We have a full-spade rudder equipped by a rudder bulb to improve propulsion efficiency," Gargiulo explains.

#### Partners of long standing

"We are very pleased to mark this historic event with MSC and are proud to have been part of MSC's evolution into a world leader in container shipping," says Jan-Olaf Probst, Director Business Development at DNV GL. Diego Aponte adds: "Our partnership with DNV GL continues to be an important part of our journey. It dates back more than 15 years, and almost all vessels built by MSC are DNV GL-classed." The cooperation began with the *MSC Diego* in 1999, the largest newbuilding for MSC at that time. It was a milestone in company history, which is why the vessel was christened in honour of Gianluigi Aponte's son. Built by Hanjin Heavy Industries in South Korea, the 259.6-metre, 4,056 TEU vessel is still in service.

In 2005, another joint newbuilding project with DNV GL, the 9,000 TEU *MSC Pamela*, set a new world record for the number of containers carried on board. *MSC Pamela* also marked the company's entry into the large-boxship market.

Opting for DNV GL was thus a very conscious decision: "At MSC we strive to be the best in class and

we only work with the best industry partners," says Diego Aponte. And the success story continues: "In April of this year, *MSC Oscar* was joined by her sister ship *MSC Oliver*, built to the same demanding class regulations. This was yet another milestone in our relationship with DNV GL," he emphasizes.

#### New alliance

"Commissioning the world's largest-capacity containership is the next step in modernizing our fleet to meet the demands of today's shipping customers," Diego Aponte points out. To further strengthen the world's second-largest container shipping line, MSC has formed the 2M Alliance with number one player Maersk Line. This partnership was launched earlier this year when the network picked up its first containers at the port of Dalian in north-eastern China. On 25 January, *MSC Oscar* joined the Albatross stream from Dalian as part of 2M's vessel sharing agreement.

Diego Aponte is confident that the cooperation will pay off and raise the bar in terms of reliability and customer service. "The two leading shipping lines offer complementary services on East-West routes," says the MSC President and CEO optimistically: "In the course of 2015 we will begin to see the benefits of industry-wide consolidation into four consortia, which will bring more stability to the market." The MSC story continues, and the prospects are excellent.



# OIL AND GAS TAKES LESSONS FROM MACONDO

Marking the fifth anniversary of the Macondo incident in the Gulf of Mexico, a summary of inquiries into the tragedy flags up key ways to prevent a repeat.



**“Many key recommendations have been adopted in one form or another.”**

**Peter Bjerager**, Director for the Americas,  
DNV GL - Oil & Gas

Much has been done to reduce the risk of another major incident such as the Macondo tragedy, but more change is needed. This is a key message in a new summary<sup>1</sup> by DNV GL of findings and recommendations by 21 major inquiries into the BP Deepwater Horizon drilling rig explosion and oil spill in the Gulf of Mexico in 2010. The inquiries were conducted by governmental, industry and independent organizations in the US, UK, Norway and the Republic of the Marshall Islands.

“We have carried out this review because no single investigation provides a full overview of the actions recommended to prevent another Macondo,” says Peter Bjerager, Director for the Americas, DNV GL - Oil & Gas. “There will doubtless be further investigations, particularly around long-term environmental effects of the spill. The US Chemical Safety Board (CSB) intends to address organizational and human factors. Five years on, though, it is timely to review key lessons and recommendations.”

## Lessons learned

Broad subject headings for the recommendations from all 21 inquiries are summarized in the table on the right. Among technically-focused investigations, the US Justice Department commissioned a DNV GL forensic examination of the Deepwater Horizon rig’s blowout preventer (BOP) recovered from the seafloor. DNV GL made detailed recommendations<sup>2</sup> regarding BOP design and operation issues.

Among the most high profile studies, the US Deepwater Horizon Commission<sup>3</sup> and its chief counsel<sup>4</sup> included lessons learned for industry, government and energy policy. The Commission stressed how culture was a key factor for enhancing safety and discussed issues affecting BP, its contractors, and the industry in the Gulf of Mexico generally.

The organization and response by US federal and state agencies, and the cooperation of BP and the whole

<sup>1</sup> ‘Summary of Macondo inquiries’, DNV GL, 2015. Download at: [dnvgl.com/macondo](http://dnvgl.com/macondo)

<sup>2</sup> ‘Forensic examination of Deepwater Horizon blowout preventer, Vol I and II (appendices)’, DNV GL, 2011

<sup>3</sup> National Commission on the BP Deepwater Horizon oil spill and offshore drilling - main report and multiple topic papers, 2011

<sup>4</sup> Report of the chief counsel to the National Commission on the BP Deepwater Horizon oil spill and offshore drilling, 2011

## CATEGORIES OF FINDINGS AND RECOMMENDATIONS FROM 21 INQUIRIES INTO THE MACONDO INCIDENT

No.	Inquiry	Prevention	BOP design and operation	Contain and respond	Management and culture	US regulatory	International regulatory
01	DWH Commission - main	✓	✓	✓	✓	✓	
02	DWH chief counsel's report	✓	✓		✓	✓	
03	BP investigation	✓	✓	✓			
04	Transocean investigation	✓	✓	✓			
05	US Coast Guard	✓	✓	✓		✓	✓
06	BOEMRE	✓	✓	✓		✓	
07	Republic of the Marshall Islands	✓	✓	✓		✓	✓
08	Admiral Thad W Allen report			✓		✓	
09	DNV GL forensic investigation		✓				
10	Chemical Safety Board (US)	✓	✓		✓	✓	
11	Center for Catastrophic Risk Management (US)	✓	✓	✓	✓	✓	
12	National Academy of Engineering (US)	✓	✓	✓	✓	✓	
13	National Research Council (US)			✓			
14	US District Court Eastern Louisiana	✓	✓	✓			
15	Norway Petroleum Safety Authority - interim	✓	✓	✓	✓		✓
16	Norway Petroleum Safety Authority - final	✓	✓	✓	✓		✓
17	OGP	✓	✓	✓	✓		
18	OLF	✓	✓	✓	✓		
19	SINTEF	✓	✓	✓	✓		
20	UK HSL			✓			
21	US Transportation Research Board				✓	✓	

### Abbreviations

BOP: Blowout preventer

01 and 02 DWH: Deepwater Horizon

06 BOEMRE: US Bureau of Ocean Energy Management, Regulation and Enforcement (now BSEE and BOEM)

17 OGP: Now the International Association of Oil and Gas Producers

18 OLF: Now the Norwegian Oil and Gas Association

19 SINTEF: Stiftelsen for industriell og teknisk forskning (Norwegian independent research organisation)

20 UK HSL: UK Health and Safety Laboratory





industry, was commended by the national incident commander, Admiral Thad Allen.

In other nations, the Norwegian Oil and Gas Association (formerly OLF), led an inquiry for which DNV GL reviewed regulatory differences between the US and Norway. This concluded that the Norwegian Continental Shelf had robust legislation and safe operations.<sup>5</sup> It made 45 recommendations for improvements to prevention, intervention and response, and summarized those related to well control and response issues.

In the UK, the Health and Safety Laboratory (HSL) studied fire and explosion issues related to Macondo. HSL relied on key investigations elsewhere, mainly in the US, and found that recommendations from these generally matched those for offshore UK.<sup>6</sup>

### **The legacy**

DNV GL's summary of inquiries flags the legacy of reforms to reduce risk and improve occupational and process safety. "Many key recommendations have been adopted in one form or another," says Bjerager. He cites the emergence of two new US regulatory entities: the Bureau of Safety and Environmental Enforcement (BSEE) and the Bureau of Ocean Energy Management (BOEM). This has separated safety oversight from resource management. "The set-up now emphasizes

goal-based safety and includes increased numbers of inspectors to boost presence offshore in both safety and environment."

BSEE has issued new requirements for drilling safety, BOP recertification, negative pressure tests, professional engineer sign-off on casing and cement, and for a compulsory estimate of worst-case blowout events.

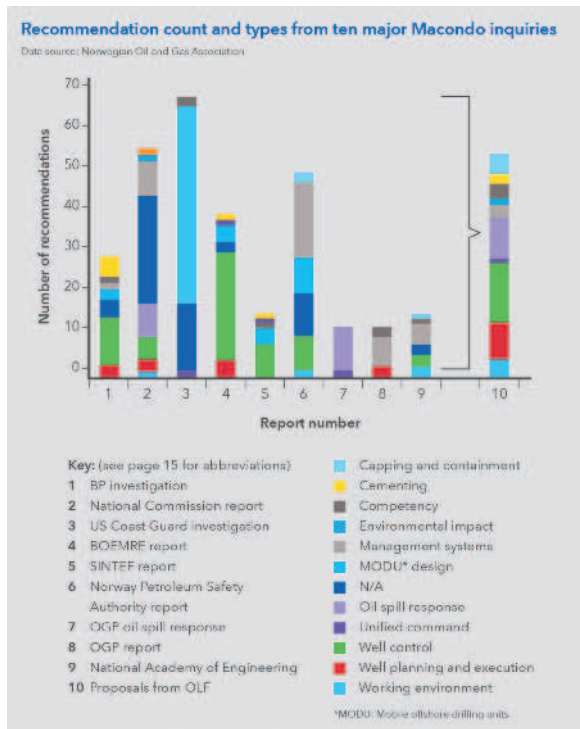
The American Petroleum Institute (API) and the International Association of Drilling Contractors have worked on an interface requirement between rig lessees and drilling contractors. Several new API standards are available. SEMS I & II have been implemented with the new Center for Offshore Safety defining the protocols and approving third-party audit service providers.

BSEE has provided guidance on safety culture, and is working with another US federal agency to implement a confidential reporting system for offshore incidents and near misses. The Bureau has also established the Ocean Energy Safety Institute within Texas A&M University. This will research longer-term issues such as risk, reliability data, and the best available and safest technologies.

The US Coast Guard service has issued guidance on additional fire and explosion assessments that it would

<sup>5</sup> 'Deepwater Horizon lessons learned and follow-up', Norwegian Oil & Gas Association, 2012

<sup>6</sup> 'Deepwater Horizon fire and explosion issues', UK HSL, 2014



like to see introduced, and has highlighted safety culture issues. Two response consortia have been established in Houston (MWCC and Helix). The International Association of Oil and Gas Producers (formerly OGP) has set up consortia at four international locations to provide emergency response support. API and the Norwegian Technology Centre, which develops NOR-SOK standards, have updated standards for drilling and well control, and have made their safety standards freely available. "Detailed assessments of fire and explosion lessons from Macondo have been made and are finding their way into designs," Bjerager adds.

CSB investigated the BOP failure after DNV GL's forensic examination. It concluded that regulations should be updated to identify critical parts of safety equipment and ensure that these all operate reliably. The co-chairs of the Deepwater Horizon Commission maintain the [oscaction.org](http://oscaction.org) website to monitor progress on implementation of its recommendations, and issue annual progress reports. "Generally it concludes that industry and the executive branch of the US government have done a good job implementing recommendations, but US Congress lags behind," says Bjerager.

**Global response**

There has been change elsewhere. The European Union (EU) is adopting a safety-case approach similar

to that of the UK, for all EU offshore developments. Australia has expanded coverage of its regulator, the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), to address drilling and environmental impacts because of Montara and Macondo, and to move closer to the goal of having a single offshore regulator.

"The UK and Norway believe their goal-setting approaches were not challenged by Macondo, but that many detailed aspects of drilling safety needed enhancement. The UK Health and Safety Executive (HSE), Norway's Petroleum Safety Authority and the International Association of Oil and Gas Producers are working on these issues," says Bjerager. "Still, some important recommendations for the US regulatory system have yet to be adopted. The US appears not ready to adopt mandatory risk assessment with a risk target nor, at least as a partial step, to nominate safety-critical items with defined performance standards."

**Download the report at: [dnvgl.com/macondo](http://dnvgl.com/macondo)**



# IT'S BIG. IT'S POWERFUL. IT'S BUILT FOR HIGH PERFORMANCE



*Cecon Pride* is the first in a series of three offshore construction vessels ordered by Cecon from Canadian Davie shipyard. She has meanwhile been renamed *Micoperi Pride*.

Chantier Davie Canada changes the game with the completion of the *Cecon Pride*. The Canadian shipyard proved its expertise by delivering one of the most complex commercial vessels ever built in North America.

After a tough start for the project and a restart of the yard, Chantier Davie Canada Inc. (or "Davie", as the company is known) rolled out a true game changer with the completion of the offshore construction vessel *Cecon Pride*. Named for its owner, Norwegian oilfield services company Cecon, the 130-metre *Cecon Pride* is the largest and most complex ship built in North America in the past 25 years. It's big, powerful and built for high performance.

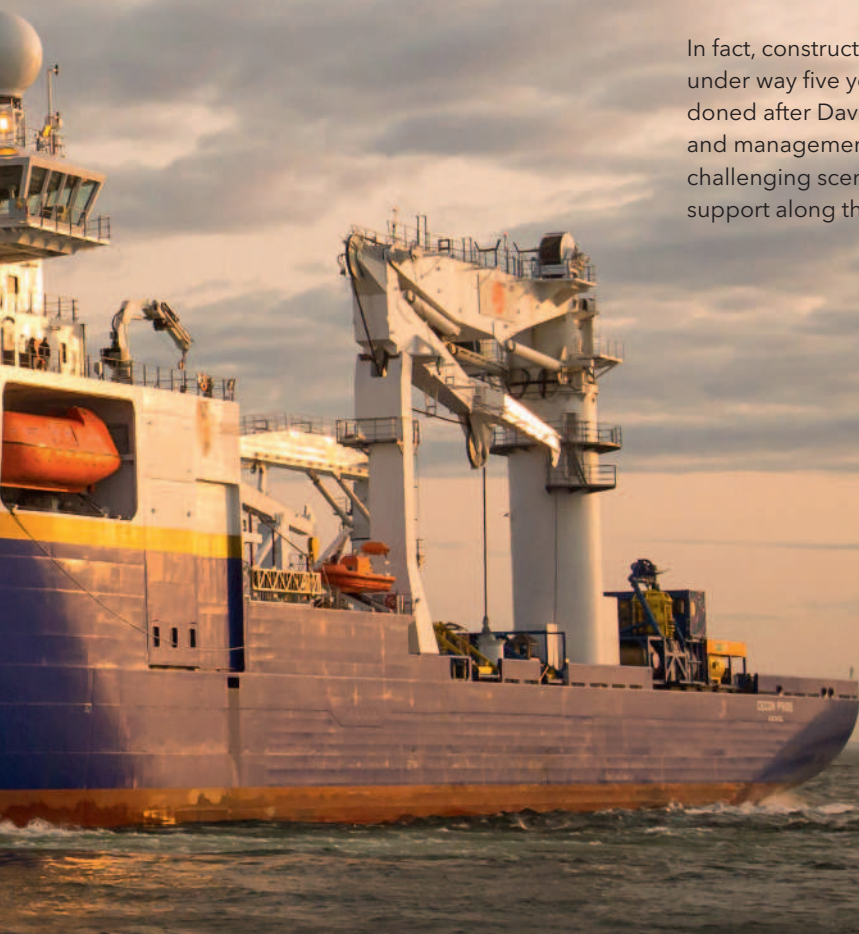
According to Davie CEO Alan Bowen, the completion of *Cecon Pride* signifies more than just a successful delivery of a high-spec vessel. "*Cecon Pride* represents a boost for North American shipbuilding," says Bowen.

"We are back on the map. Building such a complex vessel signals that we're the best in the business. This ship proves we can do it all here in North America, with our high-quality vessel construction capabilities and low-cost base."

#### **A team effort**

When it comes to building big ships, Chantier Davie Canada Inc. isn't exactly lacking in experience. In fact, 25 years ago, when a North American shipbuilding record was set for the largest vessel, Davie was the yard. But since then, the company - and the North American shipbuilding industry - has experienced ups and downs.

In fact, construction of *Cecon Pride* had actually got under way five years ago, but had since been abandoned after Davie underwent changes in ownership and management. Bowen is quick to admit that it was a challenging scenario. He credits DNV GL for providing support along the way.





“Owners and operators from North America can be confident that these vessels are built right here with their tough operating environments in mind. And if these vessels are good enough for our customers here, they will also be good enough for export to customers worldwide.”

Alan Bowen, CEO, Chantier Davie Canada Inc.

“It wasn’t easy restarting this cold, five-year-old project. We knew what was at stake,” he says. “The help and guidance from DNV GL was crucial, all the way from the contract phase until the very day the ship was delivered. It was a partnership where DNV GL worked hard with us every day to make sure this project turned out successfully. When issues were identified, they were swiftly dealt with and we all moved on. There was no feeling of hierarchy or ‘us’ and ‘them.’ It was truly a team effort.”

And the team effort produced results which are nothing short of amazing: built by a team of more than a thousand skilled shipbuilders, *Cecon Pride* is designed to perform a wide variety of functions for the oil and gas, renewable energy, and naval markets.

#### Building worldwide confidence

Following *Cecon Pride*’s launch in October 2013, the hull was outfitted and further works were added to the construction programme, to ensure the vessel could be deployed immediately from the shipyard to Europe in August 2014. She has already performed offshore construction activities on behalf of her charterer, who renamed her *Micoperi Pride*. Meanwhile work has begun on the two sister ships which will be delivered to the same owner.

*Cecon Pride* is the first of three ships in the new VS 4220 design series which features diesel-electric power generation systems feeding six electric thrusters. The vessel is also equipped with dynamic positioning (DP 3) to help steady her position while performing high-sea operations such as subsea construction, pipe laying, diving well intervention, and support of remotely operated underwater vehicles.

Bowen adds that his company has received great feedback, not just from North America and the North Sea but also from Asian customers, who have signalled

interest in Davie’s offshore construction vessels and multipurpose vessels. This feedback, Bowen adds, is proof that ships built in North America provide the same quality and durability as those constructed in other parts of the world.



Highly satisfied with the results: Davie CEO Alan Bowen emphasizes the constructive cooperation with DNV GL.

#### CHANTIER DAVIE CANADA INC.

“Davie” is Canada’s largest shipbuilder and one of the leading yards in North America. Employing more than a thousand skilled shipbuilders, Davie builds value-added vessels integrating complex technologies such as those required for heavy ice navigation, environmentally friendly LNG propulsion, and complex dynamic positioning. Davie has built over 700 vessels and is also a leading heavy industrial fabricator for the power, defense, transportation, and natural resources industries.





DUBAI:

# PAVING THE WAY TO MEET ITS ENERGY EFFICIENCY GOALS

With an established, comprehensive regulation system for Energy Service Companies (ESCOs) Dubai is paving the way to meet its energy efficiency goals. DNV GL has led the creation of the regulatory regime, which involved stakeholders from more than thirty organizations.

Dubai has set an ambitious target to improve energy efficiency throughout the Emirate, aiming for a 30 percent reduction in energy demand by 2030. The Regulatory and Supervisory Bureau (RSB), an entity created in 2010 to support Dubai's economic, social and environmental objectives through effective, independent, and transparent regulation, was tasked to find a way to support this goal.

"They viewed Energy Service Companies (ESCOs), which provide a variety of energy savings, conservation, and retrofitting services, as a potential means to help organizations implement the necessary energy efficiency measures," says Atif Mohammed, Area Manager, DNV GL - Energy Middle East. "However, there are very few ESCOs operating in Dubai, so the market

was largely underdeveloped and untapped. The RSB decided that they first needed to establish a regulatory framework for ESCOs to encourage the development of new ones and to promote their usage by companies seeking to reduce their energy consumption."

The RSB chose DNV GL to lead the creation of a transparent and solid regulatory regime for both ESCOs and the organizations using them, for several reasons according to Mohammed. "Our demonstrated competence in drafting regulations, and our knowledge of verification and measurement are key factors. Also, our expertise in ESCOs and their roles in demand-side management programs, as well as our knowledge of the principles behind ESCOs and performance contracting is relevant. I believe we were also selected

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## ENERGY DEMAND

- Global energy demand is surging. Oil, gas and coal shall represent 70% of the supply until 2030.
  - In sequence of demand (from higher to lower): oil, gas, coal, biomass, nuclear, hydro, wind then solar and biofuels.
  - To limit environmental impact and enhance recovery, other alternative source of energy is breaking through, namely, the renewables where solar has taken prudent steps in diversifying the fuel mix.
  - The governing body of the Dubai Supreme Council of Energy was set up to facilitate and deploy the Dubai Integrated Energy Strategy 2030 by developing an integrated approach to securing energy supply and employing efficient technologies for the sustainable growth of Dubai.
  - As the energy demand in Dubai will grow 3-4% annually, Dubai is driving abatement measures to reduce demand by an estimated 30% by 2030.
  - Dubai is pursuing a low-carbon economy to cope with its growth demand and achieve sustainable development.
- 

because of our significant local presence, complemented by DNV GL's broad global expertise, which enables us to provide recommendations tailored to Dubai's needs while taking into account best practices from other areas."

Because ESCOs are so little known in Dubai, DNV GL needed a way to provide confidence in the ESCOs for those who engaged them to implement their energy efficiency programs. DNV GL created an Accreditation Scheme specific to Dubai, which, while not mandatory, ensures that the companies that participate in the program are financially stable and possess the appropriate skills. DNV GL also developed a Measurement and Verification Standard to establish a consistent methodology for the ESCOs, tailored to Dubai's unique environment. To ensure that the legal framework was consistent for all ESCOs operating in the Emirate, DNV GL worked with a local law firm to develop contract templates for shared savings and guaranteed savings, as well as a dispute resolution system.

"For the project to be successful, intensive stakeholder management and collaboration was required," explains Mohammed. "To ensure that the process was transparent and comprehensive and that the stakeholders were able to express their opinions, concerns, and suggestions, we implemented a consultation method that is widely used in the United Kingdom, but has never been used in Dubai. This method uses a document that contains discussion topics related to the project and offers several possible options. It also provides questions for the stakeholders to gather their opinions and concerns regarding the available options. Workshops are also held to brief the stake-

holders about the project and clarify any outstanding questions."

To that end, DNV GL liaised with stakeholders from more than thirty organizations, including regulatory authorities, governmental institutions (Dubai Electricity and Water Authority, Dubai Municipality, Supreme Council of Energy, and Dubai Airport), financial institutions (Standard Chartered, Emirates NBD), property developers, ESCOs, and building owners and managers.

"We analyzed the feedback from all stakeholders, addressed the issues they raised, and communicated the outcome of their suggestions and input. To ensure acceptance of the regulations, we also held face-to-face meetings with key stakeholders. The process was designed to make sure that the concerns and suggestions of all the stakeholders were fully addressed, and that both the ESCOs and other stakeholders were satisfied with the final regulatory system," adds Mohammed.

As a result of DNV GL's work, Dubai now has an established, comprehensive regulation system for ESCOs that is paving the way to meet its energy efficiency goals. Several companies have already gained accreditation, and there is a system in place for more companies to become accredited. As additional companies become accredited, more and more organizations will be able to take part in the energy efficiency programs needed to reduce Dubai's energy consumption significantly.

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# SIEMENS DEVELOPS NEW FLAGSHIP OFFSHORE WIND TURBINE

DNV GL has awarded Siemens Wind Power with offshore prototype certification for its new seven-megawatt offshore wind turbine SWT-7.0-154 which will undergo field testing in Østerlid, Denmark.

The prototype certificate confirms the compliance of the wind turbine design with the mandatory prototype requirements of the IEC 61400-22 standard and the Danish Executive Order. Being granted prototype certification confirms all relevant safety features on

the turbine and allows installation of the prototype, to demonstrate how it performs. The prototype certification is a major step towards reaching the final type certification.



The new D7 model delivers nearly ten percent more energy production than its predecessor.

The new seven-megawatt offshore wind turbine has been developed by Siemens as an evolution of the company's flagship offshore wind turbine, the SWT-6.0-154, which has already set new industry standards in terms of gearless turbine design. The latest Siemens model delivers nearly ten percent more energy production than its predecessor under offshore wind conditions, while retaining the same proven reliability, which sees it recognized as the most innovative wind turbine on the market today.

DNV GL has also been contracted to carry out the Type Certification of the SWT-7.0-154 offshore turbine and is currently involved in the design evaluation process.

Jonas Stenzel, Head of Global Product and Technology Certification, Siemens Wind Power, commented: "The SWT-7.0-154m is the next step in turbine development based on our highly proven SWT-6.0-154 technology. As the market moves towards a greater demand for certification in the offshore arena, the new prototype

certificate for the SWT-7.0-154 with DNV GL provides an added level of reassurance and reliability to our customers and investors. The prototype certificate allows Siemens to install and test our new flagship offshore wind turbine."

Steffen Haupt, Global Head of Business Development and Sales, Renewables Certification at DNV GL, commented: "Such a demanding project requires not only the best in wind energy expertise, but also state of the art project management in order to deliver this project in a timely manner. Having supported Siemens with type certification of the SWP-6.0-154 last year, and to now see it grow to become the even bigger D7 turbine, DNV GL has been able to guarantee continuity for the certification process not only to Siemens as our customer, but also to their customers and partners."



# SOLAR SECTOR SPIES FLEXIBILITY AND STORAGE AS SMART OPPORTUNITY

As we move from an era in which 'generation is king' to 'grid is king', competitive advantage can be gained through Photovoltaics (PV) becoming a better grid citizen.



*'Change is on!'* This was the response of one original equipment manufacturer (OEM) to a recent DNV GL survey on the future of electricity.

Over 1,600 energy industry professionals from 71 countries provided their views on a scenario where renewables account for 70 percent of power sector generation. The results, published in the DNV GL report titled 'Beyond integration: Three dynamics reshaping renewables and the grid', provide insight into the energy transition underway.

It's clear that change is coming. When asked how quickly the transition could be made to a high renewables system in a secure and affordable manner, over four-fifths expected this by 2050. And well over

one-third believed this could occur within the next 15 years in their own market.

Of course, some questioned that 70 percent renewables was even achievable. Incumbents such as system operators and integrated utilities were more skeptical than average, and also more likely to say that a high renewables future challenged their organization.

One utility representative commented that clean energy had *'taken on the attributes of a religious cult'*, whilst an employee of a distribution system operator feared that *'there will be a revolt'* due to the cost implications. Yet even amongst these incumbents, three-quarters believed that the transition could be made by 2050.

## “The days of ‘monopolized’ power are coming to an end ... get smarter or get out of the way”

Member of a North American government agency

But what came through most strongly is that a high renewables system would be a gamechanger, requiring new ways of working. One member of a North American government agency gave a frank ultimatum: “The days of ‘monopolized’ power are coming to an end ... get smarter or get out of the way”.

### Getting smarter

How can the solar sector ‘get smarter’ ready for a high renewables future? Cost reduction remains important. But being a good grid citizen increasingly matters too.

As the proportion of variable renewables on the grid increases, we’re moving from an era in which ‘generation is king’ to ‘grid is king’. Grid issues are growing in prominence, with respondents ranking system operators highly when asked who is ‘most vital’ to the renewables transition.

Clearly, big initiatives such as interconnection and demand response can help manage variability. But the PV sector is realizing that it too has a role to play – that there is substantial long-term competitive advantage to be gained by tackling this grid challenge head-on.

Much can be achieved through tweaking solar technology itself, to enhance flexibility. Whilst there are fewer technical levers to pull in PV than in wind turbines, the potential is still significant, particularly through making use of sophisticated converter functionality. For instance, PV plants can offer grid support through fault ride-through, voltage regulation and active power controls. Plant design and siting issues can also prove significant.

### Spying storage

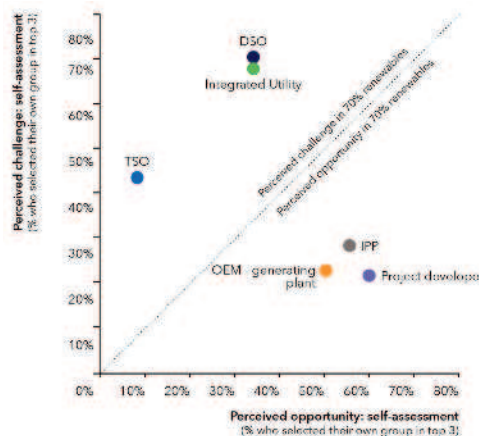
But in high renewables scenarios these approaches will not be sufficient. And this is where the survey’s findings get really interesting. 66 percent of respondents ranked energy storage in their top three most important factors for integrating a high share of renewables, scoring well ahead of options such as smart grids and regulatory changes. One employee of a manufacturer was bold enough to state that a power

system with 70 percent renewables was ‘science fiction’ without storage.

Looking at the PV business today, there is already extensive evidence of the sector taking a strategic interest in storage. Most recently, SunEdison announced plans to purchase up to 1,000 vanadium flow batteries from Imergy Power Systems to support Indian PV-powered minigrid projects.

There are challenges, of course. What services should storage provide? Is this best done at project level or grid level? And how to ensure cost-competitiveness with alternatives such as demand response?

But change is on, and it demands a smarter approach as system operation challenges grow. This means both being more flexible and engaging with energy storage. Cult or otherwise, it’s time for the PV business to go beyond cost reduction. It’s time to ‘get smarter’.



Felicity Jones, Senior Consultant at DNV GL Strategic Research & Innovation, is the lead author of DNV GL Energy’s global report: *Beyond integration: Three dynamics reshaping renewables and the grid*.  
<https://www.dnvgl.com/energy/publications/download/beyond-integration.html>



THE POWER OF THE STORY:

# TEACHING DOCTORS TO 'FEEL' PATIENT- CENTRED CARE

Margaret Murphy is the External Lead of the World Health Organization (WHO) Patients for Patient Safety programme. Following the death of her 21-year-old son, she has been teaching doctors and students how an engaged, knowledgeable patient can be the key resource in his or her own care.

What is the purpose of healthcare? The answer seems obvious: to care for the health of a patient. And if that's the case, then it logically follows that the patient would be at the centre of that picture; the focus of the care. But as Margaret Murphy knows all too well, it doesn't always work out that way. In 1999, her son Kevin died in hospital at the age of 21, following a tragic series of errors and oversights as he was passed through the Irish medical system.

"Very often those pieces of healthcare act in silos, they don't necessarily communicate with each other effectively," says Margaret. "And the really unfortunate thing is that healthcare doesn't always recognize that actually the patient is present throughout the full continuum of care. And the patient himself, or his carer or his family member, can actually be the glue in that process. He is a repository of useful information. But most importantly, he is the individual with the greatest vested interest in the outcome."

## **A preventable death**

Margaret says the medical system failed Kevin at every point of contact over a two-year period. Blood tests showing excessive calcium levels and a risk of renal failure were downplayed from the beginning. There was miscommunication between his specialist and GP. No referral to an endocrinologist. When Kevin's health worsened, further blood results again indicating high calcium levels were taken down on a Post-It note, and then stuck to the back of his GP's hospital referral letter. The letter did not mention the abnormal results, and the note was only discovered six weeks after Kevin's death. The hospital's standard blood tests did not include a calcium reading.

By the time Kevin was transferred to Cork University Hospital, his kidneys were failing and his calcium levels were higher than any ever recorded at the hospital: levels later described as "inconsistent with life". Yet he was only managed at registrar level, until senior doctors were available after the weekend. "Essentially he



Margaret Murphy has a huge regard for medical professionals, who do “phenomenal” work. But she realized parts of the system were broken. Sharing her family’s story and advocating for change “is the only way forward that makes any level of sense to me”

was asked can you please stay alive until Monday, and he wasn’t able to do that,” says Margaret. Kevin died that Sunday afternoon.

Experts later concluded Kevin had a solitary parathyroid adenoma, and if he’d had a low-risk surgery to remove the overactive gland he would be alive and healthy today. Kevin’s own father successfully underwent the procedure just three months after his son’s death.

#### **Closing ranks**

It wasn’t Kevin’s death alone that set Margaret on her path to becoming a patient safety advocate. “Not alone that the error was made, but how they responded to the error,” she explains. “We had a situation where we wanted simple answers to simple questions, and what we encountered was closing ranks. Lame

excuses. Muddying the waters. Protestations of loyalty to colleagues. All really inappropriate stuff. Which was more about damage limitation, rather than identifying improvement measures and preventing recurrence.”

A David and Goliath court battle followed as the Murphy family sought answers. Margaret’s story attracted the attention of Sir Liam Donaldson, who was in the process of establishing the WHO Alliance for Patient Safety. “He listened,” Margaret says. “He heard, and there’s quite a difference between listening and hearing, and then he acknowledged that something happened that shouldn’t have. And he didn’t offer any excuses. And then on his fingertips he enumerated the number of missed opportunities to save Kevin’s life. And finally he turned to me and said, you know Margaret, any one of them would’ve been enough.”





### **The power of the story**

Margaret says she has a huge regard for medical professionals, who do “phenomenal” work. But she realized parts of the system were broken. Sharing her family’s story and advocating for change “is the only way forward that makes any level of sense to me.”

“The patient story is really powerful,” she explains. “And the reason it’s powerful is because it evokes feelings. And it is those feelings that then influence behaviour. It’s how we feel about the information that affects how we deal with it.”

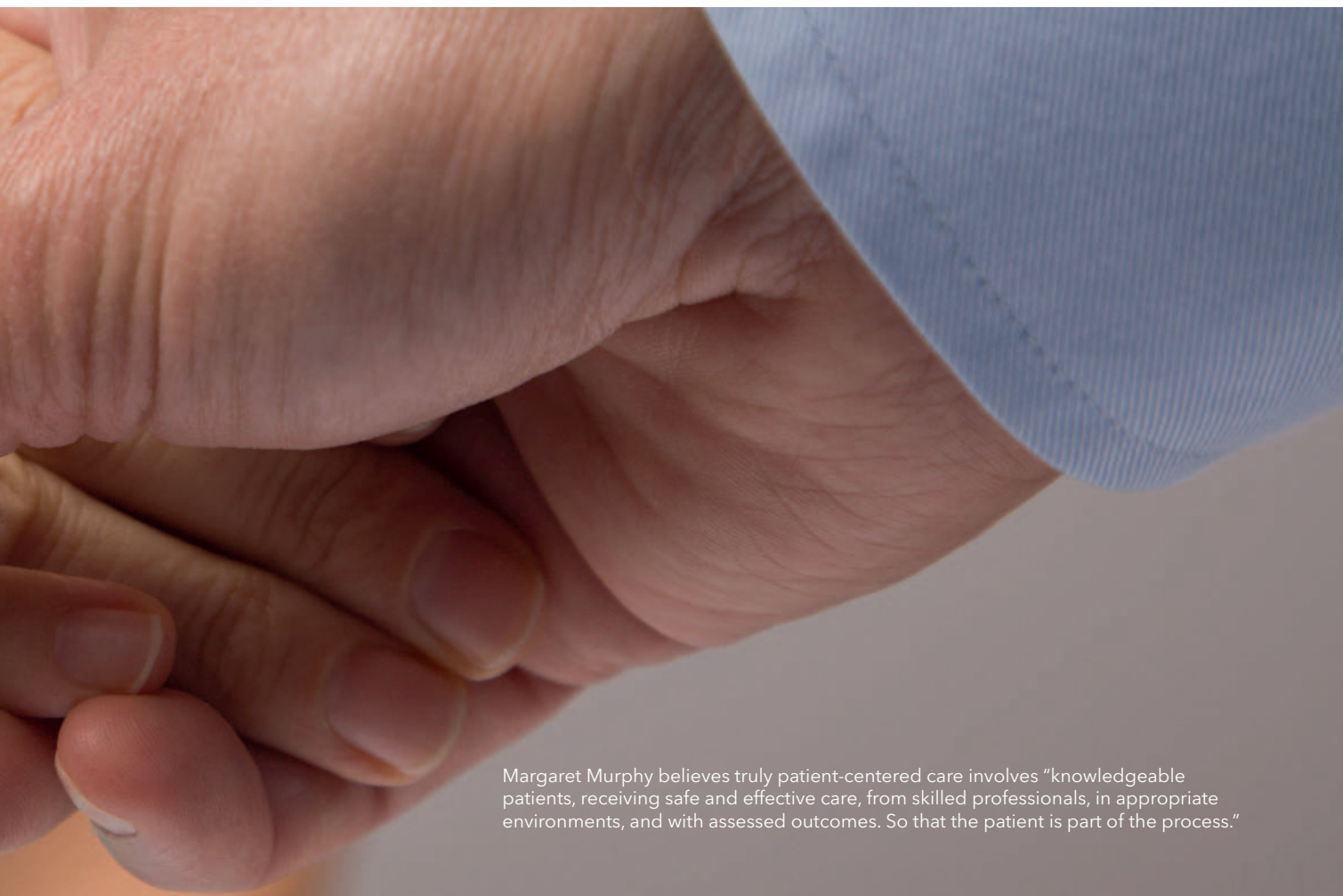
Margaret addresses both students embarking on their medical careers and established professionals, urging them to keep the patient at the centre of the picture. “Care is only patient-centred when it’s perceived as such by the patient,” she stresses. “It’s not really what the provider interprets as being patient-centred care.

It’s when the patient can actually go home and say yes, I was the centre of all that went on in there.”

She says truly patient-centred care involves “knowledgeable patients, receiving safe and effective care, from skilled professionals, in appropriate environments, and with assessed outcomes. So that he’s part of the process.”

Patient-centred care is not only crucial for the family when a person is left permanently disabled or dies as a result of medical error. Margaret also believes an “honest and honourable encounter between the harmed and the provider” is the only way for the medical staff involved to begin their own healing process, and make changes for the better.

After one of her presentations, a doctor approached Margaret saying early in his career he didn’t deal with



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a family properly after a patient death. More than 30 years later, he still remembers that family every day.

#### **Talk into action**

Margaret recently accompanied DNV GL’s Patient Safety team at the 20th annual BMJ IHI International Forum on Patient Safety and Quality in London. Together they launched a new publication, *The State of Healthcare - From Challenges to Opportunities*, which was developed in collaboration with Sustainia.

The *State of Healthcare* provides a snapshot of medical systems, primarily in Europe, China and the United States. As well as examining the challenges faced, the publication showcases examples of how fundamental change is being created: through systems approaches to risk management, and co-created healthcare that actively involves patients, care-givers and authorities. Margaret says it’s critical to make sure such work filters

down to frontline medical care, resulting in truly systemic change. “This is fine stuff, but it really counts for naught if it doesn’t impact,” she urges. “And it’s that impact that’s crucial. What you want is to have care safer and better for the man in the bed. The *raison d’être* of healthcare. And we can only achieve that by bringing all the forces together.”

She says if health professionals can learn from her story, and focus their attention on the patient as a knowledgeable resource, then Kevin’s death might make a difference. “Because you see, we can’t change the past,” Margaret says. “We just had to accept that. But what we were hoping was that that past might inform the present. And then in the present we could influence a better future.”



# EXPERTS MAP SUSTAINABLE GROWTH OPPORTUNITIES

Around 250 sustainability experts recently gathered on five continents to identify fifteen opportunities to address five major global risks. The result will be a map of opportunities for businesses and governments alike to be published in the second edition of the Global Opportunity Report in February 2016.

In June, 250 of the world's most innovative minds met in eight cities to tackle five major challenges to global resilience and sustainability. As part of the Global Opportunity Network, these experts will identify and map sustainable opportunities to be found in these global risks. After a vetting process, the results will be presented in a publicly available report. This was initiated by the UN Global Compact, DNV GL and the Monday Morning Global Institute.

"With this report, the partners aim to demonstrate how global sustainability challenges and risks can be seen as opportunities," says Bjørn Kj. Haugland, DNV GL Chief Sustainability Officer. "The work provides an open innovation platform where stakeholders worldwide can explore and capture sustainability opportunities and solutions. The most exciting of these go into the Global Opportunity Report."

The eight Opportunity Panels consisted of experts from business, public offices and civil society. They identified opportunities related to five specific risks: resistance to lifesaving medicine, the global food crisis, accelerating transport emissions, the loss of ocean biodiversity, and a generation wasted on youth unemployment. The first panel was held in San Francisco on



The workshops and an accompanying global survey will inform the Global Opportunity Report to be published in February 2016

29 May, followed by panels in São Paulo, Johannesburg, Oslo, Abu Dhabi, London, Delhi and Beijing.



Around 250 sustainability experts in eight destinations in Europe, South America, North America, Africa and Asia recently met to discuss how five selected risks can be turned into new business ideas for both countries and companies. Here, participants in the panel talks held at DNV GL's headquarters in Høvik, Norway.

"We need the input from all sectors to help investment areas with the promise of creating long-term value for society, not just short-term profit," adds Erik Rasmussen, Founder and CEO of Monday Morning Global Institute. "We don't stop at mapping the opportunities. The Global Opportunity Report also rates the opportunities in a large survey of public and private leaders worldwide. This rating helps identify the areas where strong alliances to bring about sustainable action can most likely be forged."

Haugland and Rasmussen believe it is no longer enough to manage risk on an ongoing basis. Rather, risks require systematic and comprehensive responses. It is from this mindset that a myriad of opportunities for building better societies and businesses arise.

"Businesses are responding to the global context, moving beyond their basic responsibilities and going into a strategic opportunity space. Indeed, more and more companies are seeing global challenges as opportuni-

ties," says Georg Kell, Executive Director, UN Global Compact. He concludes, "The Global Opportunity Report and Network strive to demonstrate that in every risk there is opportunity, and that every opportunity is sustainable, meaning that opportunities are chances to create long-term value, not just short-term profit."

After identifying a set of sustainable responses to the risks, the Global Opportunity Network will survey over 5,000 public and private sector leaders from around the world to rank the opportunities identified at the Opportunity Panels. The resulting guide to the global opportunities of the coming year will be published in the Global Opportunity Report in February 2016.

For more information:  
[www.globalopportunitynetwork.org](http://www.globalopportunitynetwork.org)





# ENABLING CHANGE

Change is needed more than ever, but it's hard. DNV GL's CEO-elect Remi Eriksen calls for a new sense of stewardship from business and sees new change agents emerging.

PHOTO NINA E. RANGØY

There is an old proverb saying if you don't change direction, you end up where you're going. Considering the massive impacts ahead from challenges such as climate change, increasing inequality, water crises and food shortages - just to mention a few from a basket of really bad apples - "where we are going" right now does not look all that attractive. If you ask Remi Eriksen, newly appointed President and CEO of DNV GL, we need to change direction more than ever. The trouble is, though, change is hard and the problems we are trying to steer clear of are really more difficult than ever.

"Throughout history, we have always had challenges, but I think they are tougher and more complex now. For one thing they are global and we really don't have global governance to match that. Also, they are too big and varied for one industry to solve alone. Climate change is especially complicated because the conse-

quences show up in so many different ways. You don't really feel them in one clear way everywhere. So we need to mobilize across industries and across borders to address them," says Eriksen.

This is why change needs leadership. The classic leadership attributes of setting a purpose, articulating far-reaching and inspiring ambitions and mobilizing around a common goal are definitely in demand. However, we need an extra facet to them, says Eriksen. Leadership needs to return to a more traditional concept; that of stewardship.

"I believe stewardship is as important today as it was 100 years ago. Whether you are running a business, a political party, a country or a farm, you should leave behind something that is better than what you inherited. Your charge is bigger than yourself and should always be your first priority," he says.

At the time of this interview, it had only been three days since it was announced that Eriksen was to take over the position as President and CEO of DNV GL. "As a verifier, standard-setter and advisor for businesses worldwide on how to advance safety and sustainability in their operations, the company has a special responsibility to make a change of direction possible," he says. "Especially since businesses are in many ways the entities best positioned to address some of the larger global sustainability challenges.

"Countries are not global, political parties are not global, but many businesses are. They can scale ideas, visions and technologies in multiple regions or globally, and this gives them a global reach and a global impact that many other actors don't have," says Eriksen.

He is essentially optimistic about businesses' ability and willingness to change to more sustainable operations. Multiple pressures from employees, markets and investors will do a lot to convince the laggards to catch up. "However, it will not be easy, and not all businesses will adapt in time," he says.

"I think we are in a period where the pressure for change is building. When that pressure is released, things will happen very quickly, and I believe we will see a lot of 'casualties' among businesses that don't accept the challenges ahead," he says.

However, those businesses that can and are willing to adapt can find new partners and collaborators in the

new powerful change agents – cities, says Eriksen. According to his analysis, cities are in many ways better suited to address the challenges faced by societies. They are more agile than most nations and definitely more so than international agencies, and they have the opportunity to apply solutions that can have an immediate impact on particular problems, while still having a positive effect on the long-term problems such as climate change.

"In many parts of the world, people might not see problems such as climate change as the most imminent threat if they are struggling with water or food scarcity or local pollution. Cities can address many of these problems and do so in ways that also help handle the long-term problems, if this is done wisely. I believe finding solutions for particular problems that also address the bigger challenges is the great opportunity in sustainability. It is the win-win initiatives that we have to become even better at spotting," he says.

"Of course if this was easy, it would most probably already have been done. However, for a company like DNV GL that exists to solve problems, this is indeed a challenge we are taking on.

"We spend quite a lot of time considering how we can help companies, industries and governments do things in a safer, smarter and greener way. And to be frank, it is these kinds of triple challenges that put an ear-to-ear smile on the faces of engineers," concludes Eriksen.

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## SUSTAINABILITY TO THE FORE

The coming years will see a lot more companies moving sustainability from specialized departments and isolated reporting into the core of their business. This will be assisted by rapid technological developments, for example in resource utilization efficiency and cleaner energy, says Remi Eriksen.

"We envisage large-scale deployment of cleaner energy solutions on both the supply and demand sides in the coming years. This is just one of the factors that make me believe that more companies will move beyond words and statements and incorporate sustainability into their operations, their day-to-day decision-making and their investment considerations. Why? Because it is viable and really the only right thing to do," he says.

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