Innovation and Partnerships

Shell Malaysia Innovation Summit 2013
"Innovation Driving Development"

Matthias Bichsel

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Since 1 July 2009, Matthias Bichsel is a Member of the Executive Committee of Royal Dutch Shell plc and Projects and Technology Director. In addition, he has country responsibilities for Australia, New Zealand, Oceania, India, Pakistan. This role combines representing Shell regionally with Governments and other stakeholders with overseeing capital project delivery globally.

As Projects and Technology Director, Matthias is responsible for the delivery of Shell's capital projects. He is also responsible for contracting & procurement activities, as well as Upstream and Downstream technology development & deployment in Shell. In addition, he has oversight of Shell's safety, environmental and social performance. His country responsibilities include representing Shell's interest with Governments and other stakeholders.

He was born in 1954 in Switzerland and joined Shell in 1980 after obtaining a Doctorate in Geology from the University of Basel, Switzerland.

Matthias has worked for Shell companies and affiliates in Bangladesh, Oman, Canada, Indonesia, the US and The Netherlands. In 1995, he became director of Petroleum Development Oman looking after exploration and deep oil field developments.

In 1999, he transferred to Houston as managing director of Shell Deepwater Services involved in all aspects of Deepwater exploration and development on a global scale. From 2002 to 2006, he managed as Executive Vice President Shell's global Exploration. From 2006 until mid 2009, he was Executive Vice President -Technical for Shell Exploration and Production.
He is a member of the American Association of Petroleum Geologists and the Society of Petroleum Engineers, where he is Member of the Industry Advisory Council.

In 2011, he was appointed an Honorary Professor at the Chinese University of Petroleum, Beijing.

There are significant interconnections – and even interdependencies – between energy, food and water systems. In his speech at the Shell Malaysia Innovation Summit, Matthias Bichsel, Projects and Technology Director, said Malaysia has demonstrated great success in partnerships to address energy-related challenges in the past. He outlined how innovation and partnerships will become even more essential to meet these challenges ahead.

Distinguished Guests, ladies and Gentlemen,

Good afternoon.

It's good to be back in Kuala Lumpur. I'm always excited by the energy and enthusiasm for innovation here. They bode well for the continuing development of this country. And they make Malaysia a great example of how to tackle some of the toughest challenges humanity has ever faced.

I'm not just talking about challenges having to do with a growing energy demand. There are also significant interconnections – and even interdependencies – between energy, food and water systems.

These intertwined challenges are too big and complex for one country – let alone one company – to overcome.

That said, Malaysia has demonstrated great success in partnerships to address energy-related challenges in the past.

Today I want to try to outline the landscape ahead, and show how innovation and partnerships will become even more essential to meet the challenges.

On a global level, we have the challenge of matching energy supply to growing demand.

By 2050, the UN says, the world will be home to 9 billion people – 2 billion more than today.

Also, relative to today, a greater percentage of those people will enjoy middle-class lifestyles – with middle-class energy usage – in their homes, businesses, hospitals, schools; and for personal and commercial transportation.

As a consequence, global energy demand in 2050 will be approximately twice what it was in 2000. And, what's more, oil and gas resources are becoming harder to find, access and extract.

But it's not just about increasing supply. Environmental stresses due to the production and use of energy also need to be managed carefully and competently.

Clearly, innovation is of paramount importance in all this. And innovation manifests itself in many forms.

One is diversification – adding new sources of cleaner and safer energy to the portfolio.

Then you have innovations that enable greater energy conservation and efficiency, at every step of the way, from exploration and production to consumption.

A third specific and very important area of innovation is carbon capture and storage – CCS. In its latest World Energy Outlook publication, the International Energy Agency highlights the importance of CCS as a key option to mitigate CO2 emissions. In the IEA's "450 Scenario" CCS would account for 12% of the reduction in global energy-related emissions.

CCS technology exists, but the pace of implementing it remains highly uncertain. Important factors here to achieve its potential are the right policies, investments and timing.

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If we zoom in a bit closer to Asia, the challenges are – if anything – intensified.

This region has bounced back well from the global economic downturn after 2008. The growth here has been very encouraging, but sustaining that growth will put significant pressure on the energy system.

The Asia-Pacific region as a whole consumes, today, about one-third of global energy. By 2035, this share is likely to be over half, according to the Asian Development Bank.

Many Asian cities already suffer from pollution; and urbanisation is steadily increasing. Urbanisation, per se, is not a bad thing: people relocate from the countryside for greater work opportunities. Those opportunities are sorely needed, as two-thirds of the world's poorest people live in Asia. But the situation needs to be carefully managed.

The bottom line is this: clean, affordable, abundant energy is vital to this region's future.

Fortunately, the natural resources in Asia are plentiful and diverse – including crude oil, natural gas, biomass and coal, with proved and probable oil reserves estimated at 10-13 billion barrels, and proved and probable gas reserves at 175-200 trillion cubic feet.

And if we included technically recoverable shale gas resources, then the numbers increase by an order of magnitude. According to the US Energy Information Administration, there are potentially more than 1300 trillion cubic feet of shale gas in Asia.

Malaysia is particularly well endowed with natural resources. Its territory, spread over mainland and islands, is fertile. And its ocean waters overlie rich oil and gas accumulations.

Its population is also skilled and culturally diverse. Malaysians are intimately familiar with the power of co-operation.

The nation has made significant progress towards ensuring universal access to modern energy in recent years. One way of measuring this progress is with the Energy Development Index – or EDI – which the International Energy Agency publishes. It is a composite measurement of how individual households and wider society get their energy.

Between 2002 and 2010, Malaysia's EDI score improved by about 12%. That made this country one of the top 10 improvers in the world.

The challenge at the country level is the development of sustainable energy industries, capable of supplying the energy – and the government revenues – the country needs for the current generation without jeopardising them for the next. And that requires a careful balancing of industries: biofuel, solar, oil and gas.

In all of this, as I emphasised at the beginning, innovation and partnership are paramount.

For Malaysia, this creates a special focus on several areas of petroleum technology. They can be broken down into upstream technologies, downstream technologies, and technologies that integrate both.

Malaysia has a number of important maturing fields. Shell discovered the country's first oil reservoir in 1910, and the first offshore field, at Baram, in 1963.

Mature fields are not empty fields. As you probably know, the average recovery from a conventional oil field is about one-third of the oil originally in place. Increasing that proportion is vital to meeting the energy challenge. That's why Shell and PETRONAS have agreed to partner on projects offshore Sarawak and Sabah, which will employ the technology of enhanced oil recovery.

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The additional production from these Enhanced Oil Recovery projects could contribute significantly to Malaysia's total daily oil consumption.

Unlocking new resources is equally high on the agenda in Malaysia, especially in the deep waters of the ocean.

Shell is partnering with PETRONAS and ConocoPhillips to develop the Gumusut-Kakap project, in waters over a kilometre deep. This is Shell's first deepwater project in Malaysia, and we're very glad to bring to it our 30 years of experience at the forefront of deepwater technology advances.

This development will feature the first deepwater semi-submersible production system to be manufactured in Malaysia. Peak oil production will be about 135,000 barrels per day. And an improvement to the oil recovery is already built in: associated gas produced along with the oil will be re-injected into the reservoir.

Another deepwater first for Malaysia is featured in the Malikai project. This development will incorporate the first tension-leg platform to be fabricated and installed in Malaysia.

It's a joint venture by PETRONAS, ConocoPhillips and Shell, and is located 100 kilometres offshore Sabah and in waters up to 500 metres deep. It involves 17 wells drilled from the 23,500 tonne TLP production facility.

We believe Malikai will be instrumental in cementing Malaysia's position as a regional deepwater hub and centre of excellence.

Deepwater developments in South East Asia sometimes involve high-pressure, high-temperature reservoirs. HPHT reservoirs are also commonly found in other Shell operating areas, including the Gulf of Mexico, the North Sea and West Africa.

Definitions of HPHT vary, but the most common is pressure above 10,000 psi and temperature above 150 degrees Celsius.

Such conditions present challenges for drilling, cementing and completion. They affect many aspects of the production process, from drilling risers to blow-out preventer systems. And – especially in the wake of the Macondo incident – they are subject to a wide array of environmental, health and safety standards.

So deepwater operations that are already costly – due to rig rental costs and long trip times – are made even more so.

Shell has been working hard with our partner Transocean to capture the learnings from Macondo, and come up with ways to improve process safety and operational performance, as well as reducing our environmental footprint.

We have awarded contracts to Transocean for four latest-generation new-build ultra deepwater drill ships. All the rigs are of the same type: this will allow for standardisation in their construction, to reduce costs and schedule risk. The rigs are designed to operate in water depths of up to 12,000 feet and drill wells to 40,000 feet.

They will have an array of state-of-the-art equipment on board, but the feature I want to highlight are two 15,000 psi blow-out preventers – a direct outcome of studying the Macondo details. The rigs are actually being built for 20,000-psi operations, which should be possible once suitable BOPs become available.

This is one example of how Shell is partnering with oilfield service companies to constantly push the industry envelope on safety and other areas of performance.

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Another example is drilling automation. Increasingly, we're letting machines handle the mechanical and hydraulic drudgery of drilling, while our well engineers devote their time perfecting and calibrating the computer algorithms that help to ensure high performance and safety.

Shell's SCADAdrill computer system connects to existing instruments and controls of a drilling rig. It operates and monitors all aspects of the drilling process, using common tools sourced from low-cost suppliers.

Turning to the downstream, I can mention a couple of examples where Shell is using innovative engineering to reduce the waste by-products of what it brings to market.

One is our patented process for manufacturing diphenyl carbonate – DPC, for short. DPC is one of the key intermediates for making polycarbonate, which is the largest volume thermoplastic for engineering applications, from optical media to automotive glazing – headlamp and tail lamp lenses, windscreens and much more.

Earlier this year, Shell announced the construction of a 500-tonne-per-year demonstration unit in Singapore to make DPC.

Why is DPC so important? For one thing, the market for polycarbonate is growing fast, about 4-5% a year. And the innovations in the DPC process are really game changing. Unlike the traditional intermediates for polycarbonate, DPC doesn't involve phosgene, which is highly toxic. The demonstration plant is also expected to show that the DPC process has significant advantages in terms of cost, efficiency and CO2 footprint.

I'd like to mention, also, Shell's award winning OMEGA technology. OMEGA standards for Only Mono Ethylene Glycol Advantage, because you get almost nothing but mono ethylene glycol – MEG – from the process.

MEG is a vital ingredient in certain textile fibres, plastic films, resins and engine coolants.

The OMEGA breakthrough resulted from the successful integration of Shell's ethylene oxide process with Mitsubishi's catalytic stand-alone MEG process. We took two complementary and highly selective processes; and made the combination work at world-scale capacity.

And, of course, I can't talk about downstream partnerships without mentioning Shell's highest-profile partnerships, the one we've maintained with Formula 1 racing giant Ferrari Scuderia since 1947. This year we celebrated our 500th race together.

Our technical collaboration continuously raises the performance of V-Power fuels and Helix lubricants – with advances that feed into the products we offer retail customers around the globe.

We also collaborate with motorbike champions Ducati on advancing the performance of lubricants for our two-wheeled customers. What we learn from their use in gruelling track races, we can feed into the products available on the forecourt – which is good news here in Malaysia, where the numbers of motorcycles and cars are very similar.

As I mentioned earlier, some of the technology areas where we innovate, with our partners, bridge the upstream and the downstream.

Two that spring to mind immediately are Gas to Liquids – GTL – and Liquefied Natural Gas – LNG.

The story of GTL goes back to the 1970s. Today, with our partner Qatar Petroleum, Shell is converting natural gas into liquids and chemical feedstocks at the massive Pearl GTL plant in Ras Laffan.

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"With our partner Qatar Petroleum, Shell is converting natural gas into liquids and chemical feedstocks at the massive Pearl GTL plant in Ras Laffan. And where did our GTL process prove its commercial viability? Here, in Malaysia, thanks to the Bintulu plant, which came onstream in 1993".

This $20 billion project is the culmination of more than three decades of research and development, which have yielded – so far – around 3,500 patents related to GTL.

And where did our GTL process prove its commercial viability? Here, in Malaysia, thanks to the Bintulu plant, which came onstream in 1993.

GTL fuel is virtually sulphur free, and has much lower emissions of hydrocarbons, particulates and other emissions than conventional fuels. So it addresses both sides of the energy challenge I spoke of: meeting rising demand and managing environmental stresses.

LNG is a longer-established route to monetisation of gas resources – one that Shell has pioneered since the 1960s, when we were partners in designing and building the first-ever commercial LNG plant in Algeria. And we've been an active partner in LNG here in Malaysia for quite a while too – also at Bintulu.

Over intercontinental distances, LNG has clear advantages over pipeline gas as a way to get natural gas from a field to an industrial-scale consumer. But it also has benefits as a transportation fuel for commercial road transport and marine fleets. Not only is it cheaper than alternative fuels in some cases, but it also has environmental advantages – with reduced emissions of sulphur, particulates and nitrogen oxides.

The LNG innovation journey has been an exciting one over the years, because of the extent and complexity of the value chain. And Shell has been a key player in instigating a revolution in the industry: I'm referring to floating LNG – FLNG.

Shell is the first company to start construction of an FLNG facility, for the Prelude field offshore Australia.

Why do I call FLNG a revolution? Because it allows us, for the first time, to unlock vital gas resources offshore without the need to lay any pipelines or build a liquefaction plant onshore.

This development builds on Shell's five decades of experience in LNG and over 35 years' experience with floating production, storage and offloading vessels. It also incorporates a lot of collaboration, and a great many innovations – to enhance both environmental and economic performance.

I hope I have given you a sense of the urgency for innovation and partnerships in global energy; and the breadth of innovation and partnerships to which Shell is committed.

For the coming years, we have adopted an 'open innovation' strategy – where we actively seek to work with companies, organisations and universities that can complement our own strengths; with people who are interested in sharing their ideas and capabilities with us, and in listening to and learning from ours.

That's what this Innovation Summit is all about: sowing the seeds of more innovation. I'm pleased to take part in it with you, and look forward to seeing what it yields.

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