Innovation is critical to overcoming urgent energy challenges

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Harry Brekelmans became Projects & Technology Director and a member of the Executive Committee of Royal Dutch Shell plc on October 1, 2014.

He joined Shell after graduating in 1990 with a degree in Petroleum Engineering from Delft Technical University in the Netherlands.

He began his career in the research and development department of Shell’s Exploration & Production (E&P) business in the Netherlands, followed by a variety of assignments in Egypt and the UK.

Harry was appointed Internal Audit Manager for Shell E&P Europe in 2003. In 2005 he became Global Audit Manager for both the E&P and Gas & Power businesses.

From 2007, he was Chief Executive Officer of Salym Petroleum Development, a Shell joint venture in Russia. In September 2009, he became Executive Vice President (EVP) for Shell Group Strategy & Planning.

In mid-2011, he returned to Russia as Country Chairman and EVP for Russia and the Caspian region.

He moved back to his native city, The Hague, the Netherlands, in early 2013 to take up a new role as EVP for Upstream International Operated.

Harry is a board member of the Global Leadership and Technology Exchange, which connects business, governments and civil society in seeking more efficient, low-carbon growth.
Innovation will be critical to overcoming the challenges of the energy transition the world is undergoing.

How to meet rising demand for energy while reducing greenhouse gas emissions is the key challenge Harry Brekelmans focuses on in his speech to the Shell Innovation Open House.

He looks at innovation in technology and in the supply chain. He also stresses the importance of encouraging the next generation of innovators.

Ladies and Gentlemen, good afternoon and welcome back from lunch.

Les quiero agradecer a todos por venir a este evento. Es realmente un gran placer poder verlos todos acá. [Thank you for coming to this event. It’s a real pleasure to see you all here.]

Rising demand, fewer emissions
Over the centuries, Mexico has been the proving ground for a wealth of inventions and discoveries. The Aztecs were the first civilisation to introduce compulsory education for boys and girls. The Mastretta car was invented here. The Instituto Politécnico Nacional recently won an international robotics competition. And best of all if you ask my children: it was the ancient Zapotec people who first invented popcorn.

I’d like to spend the next twenty minutes or so focusing on innovation in the context of the global energy system. Because the world is undergoing an energy transition. And innovation will be critical to overcoming the many challenges of this transition.

There’s one major and urgent challenge which I’d like to focus on today. And that’s meeting rising demand for energy while reducing greenhouse gas emissions.

More and more energy will be needed to power people and economies. In fact, global demand for energy is expected to be close to 40% higher in 2040, according to the International Energy Agency.

Multiple sources of cleaner energy will be needed to meet this demand. Fossil fuels currently make up 80% of the global energy mix. And they will continue to be essential for decades to come.

Renewables also have a key role to play, but they can only do so much. Challenges such as intermittency, availability and storage mean that other sources of energy will also be needed.

This outlook doesn’t mean that climate change can’t be addressed. It can and must be tackled.

One way of doing this is to switch from coal to gas: gas produces around half the carbon dioxide and one tenth of the air pollutants compared with coal. It’s also vital to develop further projects which capture carbon dioxide from industrial sources and trap it deep underground.

Another step is to implement stable systems which put a price on carbon emitted by industry. Such systems promote the use of gas and carbon capture and storage, as well as other low-carbon technologies.

As our energy system evolves this century, countries need to make a series of decisions. Every country must address different challenges and priorities. Some will move faster and play a bigger role than others in helping meet growing demand while cutting greenhouse gas emissions.

So what about Mexico? What role will it play in this energy transition?
Energy reform and emission reduction targets

Judging by recent actions, Mexico has a constructive role to play in the global transition.

The historic energy reform suggests as much. I applaud President Peña Nieto’s vision and the enormous effort by the Mexican government and legislature to enact it.

Future successes will, of course, take time. After all, energy projects are long-term: following successful exploration, it can take a decade or more for production to begin.

But the opening up of Mexico’s oil and gas sector to private companies has the potential to add much-needed resources to the global markets.

Look at oil. The current oil price is leading some companies to cut investments. But Shell is determined not to fall into the trap of a start-stop approach. Continued investment is critical, given that production from oil fields typically declines at a rate of on average 5% a year.

If there is no further investment in global oil production the gap between supply and demand could be 70 million barrels per day by 2040. This is the equivalent of six times the daily oil production in Saudi Arabia.

This means that the world needs sustained and substantial investment to meet the demand to fuel economic growth, especially in the developing world.

Mexico has recognised this future demand and the contribution it can make by creating the conditions that will allow further development of its huge energy resources.

Moving to climate change, your country is taking great strides forward.

Mexico, ahead of most ‘first world’ countries, is one of the first to submit its national climate plan to the United Nations ahead of the UN Climate Change Conference – COP21 – taking place in Paris in December.

Commitments include reducing greenhouse gas emissions 22% below business as usual levels by 2030. This and other ambitious targets have been set unconditionally, without financial support from developed countries.

I applaud you wholeheartedly for this. These kinds of steps will undoubtedly contribute to global efforts to reduce greenhouse gas emissions.

Importance of innovation

Recognising the urgent need for more energy with less impact on the environment is critical. So too is setting ambitious plans to address these challenges.

But having done this, the next step is delivering on these plans. Easier said than done.

For me, innovation is the single most important factor in ensuring that plans are achieved.

And that’s what I’d like to focus on. But before I do so, I want to lay out exactly what I mean.

In simple terms, innovation is about coming up with an idea, a product that overcomes a problem in a new and better way.

In energy circles, it’s perhaps most commonly associated with technology. But while innovation has been at the heart of extraordinary technological achievements, that’s not its be all and end all. Innovation is much more than gizmos.

It can be applied to all aspects of a project. Effective innovation can, for example, help streamline processes or establish entirely new business models.

And innovation isn’t something we can take for granted. It won’t happen at the scale we need unless we actively choose to make it happen.
need it to unless it’s encouraged and instilled in the new generations entering the world’s workforce.

Finally, although history tells romantic tales of innovative ideas being the result of solitary toil and single bursts of inspiration – that eureka moment – the reality is different. In the vast majority of cases, it involves hard work and collaboration with others over a long period of time.

That’s what innovation means to me.

I want to stress that it’s not a twenty first century idea for twenty first century problems. It’s been a core ingredient at the heart of the oil and gas industry since its infancy.

Back in the 1890s, carrying oil products by ship was problematic and dangerous – because they were carried in barrels, which could leak and took up too much space in the ship’s hold.

Safety concerns about this practice meant that oil wasn’t shipped through the Suez Canal, the main trade route between Europe and Asia.

Consequently, Shell commissioned the construction of the first bulk oil tanker. And in 1892, the SS Murex transported thousands of tonnes of kerosene to Thailand and Singapore, via the Suez Canal. Not only did this boost the volume of oil that could be transported. It was the catalyst for a revolution in the international oil trade.

And it all stemmed from an innovation.

I’d now like to share a few examples of innovation in action, to demonstrate its importance in the energy industry.

Technical innovation
First, technical innovation.

A few weeks ago, Shell successfully drilled down to a reservoir that was regarded as unreachable.

Traditional wells which are used to get oil and gas from the ground are ‘tapered’. After engineers have drilled down a few hundred feet, they put tubes down the hole. This protects the hole from the surrounding rock formations and ensures it doesn’t collapse. When the next section of the hole is drilled, it’s inevitably narrower because the tube for that section needs to fit through the first section. It’s a bit like squeezing one straw through another one. It’s not possible unless you use a smaller straw.

But recently, on the US side of the Gulf of Mexico, Shell managed to drill a hole which was the same diameter over several sections.

There were two reasons we were able to do this. First, we used tubing which can be expanded once it’s been put in place underground. And second, we used a unique tool with a steel cone which is lowered down the hole, then pulled up to expand the tube to the same diameter as the tube above it.

If we had used a traditional tapered well design to get oil from this reservoir, which is more than 3,500 feet below sea level, the end of the well would have been so narrow, we wouldn’t be able to extract an economic amount of oil.

To make this happen, a large number of people needed to collaborate from across our business.

Use of supply chain
While it’s more obvious to attach innovation to technical projects like this, it is also important when it comes to the supply chain.

In our upstream operations in the US Gulf of Mexico, teams from across the business got together to look at improving our supply chain. They wanted to overcome issues such as ordering too much material and too many components and the significant amount of time spent manually searching for their whereabouts.

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They came up with an electronic tracking system, which can be used jointly by vendors, contractors, and logistical partners.

In essence, this new system gives much more up-to-date information on the status of materials and components.

A recently concluded pilot project took place to see if this new system would deliver on its potential. And guess what? It led to a big reduction in costs.

Although this kind of system is relatively commonplace in other sectors, it’s not in the oil and gas industry. What this shows me is that it’s vital to look at ways of working outside your sector. It highlights the importance of asking questions. Of challenging the status quo.

And in this case, the positive result means that the days of regular phone calls with suppliers, and the offshore team sending dozens of emails back and forth are behind us. The new web-based collaborative tool gives real-time accuracy without taking up precious minutes.

Shell could potentially save hundreds of millions of dollars by rolling this new system out across multiple projects.

**Getting talented young people into the industry**

Over the past century, the oil and gas industry has continually broken boundaries.

Time and again we have confounded expectations. Whether we have drilled several kilometres below the surface of the sea, or operated throughout the year in extreme weather conditions.

Innovation has been behind each and every notable achievement. If we’re to maintain that record, high-calibre students must continue to come into our industry and to rise through the ranks. They’re the innovators of the future.

They’re the ones who will have to overcome challenges we don’t even know about. And as the world strives to find ways to meet higher demand for energy while reducing the environmental impact, they’ll be the lifeblood of our industry.

But in some countries throughout the world, there aren’t enough students graduating every year with the Science, Technology, Engineering or Maths degrees so essential to the oil and gas industry.

We can’t just cross our fingers and hope that more students will pursue these subjects in the years ahead. Much more needs to happen to encourage them.

How can this be done? I believe it’s about creating the capability to innovate. This means coming up with different ways to seek out and encourage the next generation of innovators.

In Brazil, for example, a player-powered football pitch in the heart of a favela in Rio de Janeiro aims to spark an interest in innovation.

The pitch was redeveloped using 200 high-tech, underground tiles which were designed by Pavegen. This technology company received a grant from Shell’s LiveWire programme, which helps young people start their own businesses.

Pavegen’s tiles capture kinetic energy created by the movement of the players. This energy is then converted into electricity to power the floodlights.

The project is part of a Shell initiative, which aims to help the world think differently about the future of energy and inspire a new wave of innovative young scientists and engineers.

This idea aims to show the young people who play football on this pitch that technology isn’t boring. I’m convinced that the more ways we can show them that there are a huge number of exciting job opportunities in the energy sector, the more
I’m convinced the innovations to come out of Mexico in the years to come will show it to be a leader as the world’s energy transition unfolds.

Thank you very much.

Conclusion
In conclusion: Mexico has long been a crucible of invention and discovery.

When it comes to the global energy system, it’s demonstrated a drive and commitment towards a future where much more energy is provided with far fewer emissions.

This future is possible if innovation embraces co-creation, collaborative problem-solving and cultivating next generation ideas.

The late Steve Jobs once said that “innovation distinguishes between a leader and a follower”.

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