China and the future of energy

Central Party School
The Communist Party of China
Beijing

Peter Voser

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March 20, 2012

Peter Voser became Chief Executive Officer on July 1, 2009. Before his appointment as CEO, Peter had been Chief Financial Officer (CFO) and an Executive Director of Royal Dutch Shell since 2004. He was CFO of the Royal Dutch/Shell Group of Companies from October 2004 to July 2005.

Peter was CFO and an Executive Committee Member of the Asea Brown Boveri (ABB) Group of Companies, based in Switzerland, from March 2002 until September 2004.

Peter joined Shell in 1982 after graduating in business administration from the University of Applied Sciences, Zürich. He went on to work in a number of finance and business roles in Switzerland, the United Kingdom, Argentina and Chile.

After moving back to London from Chile in early 1997, Peter became the Group Chief Internal Auditor. In 1999 he was appointed CFO of Shell Europe Oil Products.
He became CFO of the Global Oil Products Business in early 2001 and a member of the Oil Products Executive Committee.

From 2004 until April 2006, Peter was a member of the Supervisory Board of Aegon N.V.. He served on the Board of Directors of UBS AG from April 2005 to April 2010. He was a member of the Swiss Federal Auditor Oversight Authority from 2006 until December 2010.

Since April 2010 he has been a director of Catalyst, a non-profit organisation that works to build inclusive environments and expand opportunities for women and business. In March 2011, he was appointed to the Board of Directors of Roche. In July 2011, His Majesty the Sultan of Brunei awarded him the title of Dato Seri Laila Jasa in recognition of his services to the state of Brunei.

Peter is also active in a number of international and bilateral organisations, including the European Round Table of Industrialists and The Business Council.

A Swiss citizen, Peter was born in 1958. He is married to Daniela and they have three children.

China faces unique challenges ensuring a secure and cleaner supply of energy to maintain strong economic growth and continued social development in the decades ahead. In this speech, Shell CEO Peter Voser reviews China's central role in the world's surging demand for energy and explores options for the future. He looks at possible ways for China to diversify and increase energy supplies, boost the use of cleaner fuels, and moderate growth in demand. He highlights China's historic opportunity to lead the way toward a more sustainable energy system.

Thank you. It is a great pleasure to be back in China. And it is an honour to have an opportunity to speak with a group of leaders like yourselves.

I am always inspired by the energy and optimism here in China.

During a trip here last June I had the privilege of visiting the famous Daqing oil field, along with members of Shell's Board of Directors. I was impressed by the incredible determination of Wang Jinxi and the number 1205 drilling team in unlocking that important resource.

It was a potent reminder of the strength of the human spirit in the face of difficult challenges. That reminder is useful as we look into the future and contemplate the hurdles that lie ahead.

China is looking for secure and cleaner sources of energy to fuel continued growth and social development in the coming years and decades.

Indeed, China is at an important crossroad in its development. I think you have an historic opportunity to chart a different path from the energy-intensive one western countries have followed for the past century. One that leads to a new, more sustainable energy system that will underpin your country's continued growth.

For the next few minutes I would like to cover three main themes:

- The global trends shaping the future of energy.
- The implications those trends have for China.
- And possible ways for China to respond.

And, of course, I look forward to a lively discussion and to hearing your views.

Global energy trends

As you know, global energy trends are being driven by the world's rising population and rapid improvements in prosperity in developing countries. China is, of course, a significant contributor to these trends.

Last year we welcomed the 7 billionth person to the human race. At the rate we're going, by mid-century about 9 billion of us will share the planet.

At the same time, millions of people are climbing out of poverty. They are enjoying higher living standards and buying their first refrigerators and cars.

This is a great achievement. It also has potentially serious implications for all of us. The world's growing middle class is raising demand for some of the world's basic resources, from energy to fresh water and food.

One of humanity's biggest challenges today is finding a sustainable means of providing for the basic needs of the world's growing, wealthier population.

Let's look at energy. If the world continues on its current path of consumption, by 2030 global energy demand could grow by 33%. For perspective, that is the equivalent of

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creating an energy system twice the size of the USA's in less than two decades.

Almost all of that growth will come from the world's developing countries, with China accounting for a significant part of the increase.

One of the most important drivers of growth in energy demand in China will be transportation. As you know, a massive motorization of the population is already under way. In 2009, China overtook the USA to become the world's largest car market. Over the next 20 years, China's vehicle fleet is expected to increase from 190 million to 600 million.

Even assuming continued fuel efficiency improvements and increased use of alternative fuels, such as electricity, the growing thirst for gasoline and diesel means China's oil demand could more than double to 24 million barrels of oil a day by 2030. That's nearly one and a half times the current consumption of the USA.

Most of that demand will be met through imports, meaning China will be an increasingly important player in global oil markets.

Stepping back to look at the overall energy picture, if the current trend for growth in consumption continues, China's primary energy consumption could double by 2030. At that point, China would account for about one-fourth of global energy needs, up from 20% today. And Chinese demand would be nearly twice as high as in the USA, the world's next-largest energy consumer in 2030.

Increased energy use will also have environmental implications. Even with rapid growth of renewable energy sources, fossil fuels like coal and oil will continue to supply most of the world's energy. So society will continue to confront issues of local pollution, as well as rising levels of greenhouse gas in the atmosphere, which contributes to global warming.

We must also remember the powerful linkages between energy and other vital resources, such as water. Energy production is a large industrial user of water, so more energy will mean increased water use.

The linkages go both ways, of course, since energy is needed to supply, purify and distribute water for a growing number of homes and businesses.

With two-thirds of China's cities already short of water, this will also be part of the resource challenge for the future.

Supply challenges

Now let's look at the supply outlook. Energy supplies will struggle to keep up with the rapid growth in global demand. That will be particularly true for oil critical for transportation.

We believe global oil production will plateau at roughly 105 million barrels a day around 2030, up from the current 84 million barrels a day.

The Shell scenarios team projects that global demand for oil could begin to bump against supply limitations starting sometime around 2020, assuming current trends continue. This will create what we call a zone of uncertainty.

The uncertainty revolves around exactly how to bring supply and demand into balance. The world will need a combination of extraordinary efforts to increase energy supplies and extraordinary measures to limit the growth in demand.

At the same time, the pressures of rising demand and potential supply constraints are likely to impact prices.

Of course, no one can accurately predict the price of oil or any other form of energy in 20 years time. But unless there is a major economic disruption, generally I think we are likely to see a long-term upward trend in energy prices, as well as continued volatility. That will be especially true for oil.

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These trends could pose a particular challenge for China. Unlike many Western countries, whose development was aided for much of the last century by reliable supplies of cheap energy, China may need to chart a development path during a period of higher and rising energy prices. Likewise, China must manage growing energy use during a period of rising concern about global warming.

As you know, China's population will peak at about 1.4 billion somewhere around 2026.

By then China will be the world's biggest economy. But many citizens will likely still live in relative poverty. A major ongoing challenge will be supporting continued economic growth to improve the standard of living for large parts of the population.

For China, wise policy decisions in the next few years will be critical to ensuring sufficient energy to support China's continued development in the coming decades. And to ensuring an appropriate response to the serious threat of global warming.

This may sound daunting. But I'm an optimist and I think China is in an enviable position. You are still in the process of creating your own future. And there is much you can do to shape your destiny.

This is an historic opportunity for China to lead the world toward a sustainable energy system. It is a chance for China to avoid some of the development choices made in Western countries that allowed high energy use to become solidly anchored in infrastructure and ways of life.

Charting a way forward

Given the converging forces of rapidly rising demand and increasing difficulty in unlocking new energy supplies, what can China do to chart a sustainable growth path?

I think a three-part strategy is likely to help boost China's energy security and support the continued path of strong growth and social development. They are:

- Expand and diversify China's energy supply.
- Moderate the growth in demand by increasing the already significant efforts to promote energy efficiency.
- Promote new technology that helps accomplish the first two.

Let me address them one at a time. China, like the rest of the world, must continue to develop all available energy sources to keep up with demand.

No single solution will be sufficient. Strong investment will be needed in everything from oil and gas, to wind, solar, biofuels and nuclear.

Clearly there will be a growing place for renewable energy, an area where China already has a leadership role. China has quickly become the world's largest manufacturer of solar cells and wind power equipment. And the 12th five-year plan has set an ambitious goal of 15% of total energy coming from non-fossil sources by 2020. But there is still room to expand use of renewable energy even further, particularly solar.

Perhaps the greatest opportunity lies in increased development of natural gas resources. Natural gas has the potential to spark an energy revolution similar to the one already under way in North America.

Over the last decade or so, Shell and other energy companies have developed technology to unlock gas from dense rock such as shale. We use horizontal drilling and a technique called hydraulic fracturing, which pumps water under high pressure into the rock, creating cracks that allow gas to flow more freely to the well.

This technique has been pioneered in the USA, which just a few years ago feared gas production was destined for steady decline. Indeed, companies rushed to build

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terminals to receive imported liquefied natural gas.

Today those terminals stand mostly idle. Thanks to new technology, natural gas production reversed its decline in 2005 and surged nearly 20% by 2010.

The USA may now have 100 years of natural gas supplies at current consumption rates and will likely become an LNG exporter. The U.S. Energy Information Administration predicts that natural gas production will grow substantially over the next two decades and that by 2035, nearly half of all natural gas produced in North America will come from shale gas, up from just 16% in 2009.

The dramatic increase in supplies has led to much lower prices. Natural gas in North America now costs less than $2.50 per million Btu. That compares with a 10-year average of about $6 per million Btu.

Access to abundant supplies of affordable gas has given a powerful competitive advantage to North American industry. Chemical companies are looking to add capacity to take advantage of gas as an affordable feedstock.

The surge in gas supplies, coupled with increased production of oil in the western hemisphere, is making the USA less dependent on countries in the Middle East and West Africa for its energy supplies. By 2035, the USA will import about 17% of its energy, down from 29% in 2007, with most of those imports coming from neighbouring countries.

Natural gas can also have clear environmental benefits. Using it to generate electricity typically generates 40% to 60% less CO_2 than coal-fired power plants. It greatly reduces local emissions of sulphur-dioxide, nitrogen oxides and other pollutants. Gas-fired generators are a natural ally of renewable energy, since they can quickly ramp up when the wind dies or the sun doesn't shine.

Finally, generating electricity with gas is less water-intensive than either coal or nuclear.

What does all this mean for China?

China is still in the early days of developing its own tight gas resources, but the potential looks promising.

A recent study of tight gas resources in 32 countries by the U.S. Energy Information Administration estimated that China has recoverable tight gas resources of more than 1,000 trillion cubic feet. That is more than the USA and ten times China's current proved natural gas reserves.

What about the role of nuclear power as a source of low-carbon energy in the wake of last year's tragic events in Fukushima, Japan? Countries have responded differently, with some turning away from nuclear power, such as Germany, and others continuing to embrace it, such as France and India.

Overall, I think some development will continue. The USA, for instance, just granted regulatory approval for two new reactors. However, I expect safety reviews are likely to delay development of new capacity. And tighter safety regulations will likely bring higher costs.

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If China decides to continue its strong drive to develop nuclear energy, the sector will see tremendous growth. By 2030 China will have at least double the nuclear capacity of the USA.

Even so, because of the size of China's energy system, nuclear will remain a relatively small contributor to overall energy needs. By 2030 about 10% of electricity might come from nuclear power. By comparison, the USA currently produces slightly less than 20% of its electricity from nuclear.

Coal will continue to play the most important role in China's energy system, contributing about 50% of overall energy in 2030, compared to about 70% today. But

the environmental costs of its use are high and will need to be addressed. It is the country's leading source of urban air pollution and contributes at least 70% of China's CO_2 emissions.

To reduce environmental impact of continued coal use, China will need to install equipment to clean smokestack emissions, increase use of clean coal technology and develop capability to capture CO_2 emissions and store them safely underground.

Without carbon capture and storage technology, or some other form of emission reduction, by 2030 China could emit about 12 gigatons of CO_2 per year, or about 30% of global emissions from energy use.

Coal is also water-intensive. China's coal industry is responsible for more than 10% of all water consumption, if you include mining, coal preparation, power generation and chemicals production.

Managing energy demand

Developing all available sources of energy will help ensure a secure supply to continue China's rapid development. But it won't be enough.

China will need to redouble efforts to moderate growth in demand for energy.

Much progress has already been made, but the good news is that there is still room for improvement.

If China were able to make an extra effort and achieve leading levels of efficiency in all industrial sectors, the country's overall energy demand could be reduced by 10% by 2030.

I'm not saying it will be easy. Making such dramatic improvements would take huge effort and significant investment. But the payoff in energy security might be worth it.

Energy efficiency can be gained in countless ways, big and small. But focusing on a few specific areas will likely produce the greatest benefit.

The rapid rise in individual car ownership and increasing use of trucks to haul freight make road transport an important area for focus.

Greater emphasis on developing urban mass transit can help keep personal vehicles off the road. For instance, bus rapid transit corridors are a cost-effective and flexible option that can handle up to 50,000 passengers an hour – nearly as many as subways.

Increased use of alternative fuels for transport will also help boost efficiency and reduce demand for gasoline and diesel. Indeed, China has already made electric and hybrid-electric vehicle development a priority. Over time, China's large domestic market could help Chinese car manufacturers build world leadership in key automotive technology for the future.

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Another area of focus is smarter urban development. You know better than I do how rapidly China is shifting from a rural to urban society. As millions of people move into cities every year, urban floor space, including residential and commercial, is doubling every seven years, with more than a billion square metres added every year.

The traditional "big flat pie" model of Chinese urban development has resulted in relatively high energy consumption. A study of more than 700 Chinese cities by consultant Booz & Co. showed that cities with higher population density were more energy efficient. Similarly, sprawling cities in the USA are more energy hungry than compact European ones.

As China's cities grow at a rapid pace, careful planning and controlled urbanization can have a significant impact on future energy use.

So can improvements in construction standards. One estimate suggests that today

less than 5% of new buildings in China can be characterized as energy efficient.

A final area of focus is subsidies supporting consumption of fossil fuels. In a global survey, the International Energy Agency identified 37 countries with estimated subsidies totalling $409 billion in 2010. China's estimated subsidies totalling $21 billion were the fifth highest globally, after Iran, Saudi Arabia, Russia and India.

By masking the true cost of energy, subsidies encourage consumers to use more. The IEA estimates that if subsidies were phased out world-wide, global energy demand would fall 4% by 2020 and nearly 5% by 2035.

This is obviously a sensitive topic. Subsidies are often meant to ensure the poorest members of society have access to energy – an important goal.

Yet the IEA estimates that only 8% of the $409 billion in support in 2010 reached the poorest households. The agency argues that providing similar levels of financial support directly to low-income families would be far more efficient.

The role of technology

Let me now focus briefly on the important role innovation and technology will play in addressing China's energy challenges.

New ideas and new technologies will be needed to support many of the objectives I've been talking about. From improving energy efficiency and diversifying energy supply, to reducing CO_2 emissions and enabling cost-effective, large-scale use of renewable energy.

Innovation has driven the natural gas revolution that began in North America and is now expanding around the globe. It will be needed for future advances, such as improving battery performance so electric vehicles are more widely acceptable to consumers.

China will increase the likelihood of major breakthroughs by focusing attention on a limited number of areas that boost energy supplies, or reduce demand.

On the supply side they could include advanced biofuels and technologies to convert coal to gas or liquid fuels.

On the demand side they could include efficient co-generation technology and smart electricity grids.

China should also consider increased spending on research and development. In 2008, R&D spending at large and medium-sized Chinese companies averaged less than 1% of revenues. That compares with about 5% at similar companies in developed countries.

To concentrate human and financial resources on the most important areas, China could establish a National Energy Technology Laboratory. This would enable resource-sharing among national R&D institutions, universities, industrial enterprises and multinational corporations.

Shell's role

Before I conclude, let me briefly tell you what my company is doing to help address China's energy challenges. Much of it hinges on our deep and growing partnership with CNPC.

We have four priorities in China.

First, we are helping support growth through international cooperation with Chinese partners to bring energy supplies back to China. For instance, together with CNPC we acquired Arrow Energy in Australia to develop coal bed methane and turn it into liquefied natural gas for shipment to customers. We are also jointly exploring for gas in Qatar. And CNPC has taken a 20% interest in our Groundbirch tight gas project in Canada, where we are looking at the potential for producing liquefied natural gas for export.

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Here in China, we are developing tight gas resources with CNPC, helping to expand supplies of this cleaner-burning fuel. Together we are pursuing the Changbei project, exploring for gas in Sichuan Province and working on a coal bed methane project in Shanxi Province. And we're looking for other opportunities.

We're also cooperating on R&D and technology. That includes development of advanced seismic technology and a recently incorporated joint venture to develop an innovative, highly automated well manufacturing system to boost gas production.

Finally, we're helping Chinese oil and gas service companies gain access to business worldwide.

So I think our priorities help support China's overall energy priorities.

Conclusion

To summarize, fuelling China's continued rapid growth and social development presents significant challenges. They include ensuring a secure supply of energy, addressing environmental stresses from energy production and use, and dealing with the related stresses on other vital resources such as water.

But China's tremendous dynamism and the enduring spirit of "Iron Man" Wang Jinxi make me optimistic that these challenges will be overcome.

The critical elements for building a secure and sustainable energy system for the future will include expanding all available sources of energy, with special emphasis on natural gas; and aggressively promoting energy efficiency to moderate growth in demand.

The right mix of policies and incentives can help make that happen.

Thank you.

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