



Energy security through diversity

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Thank you and good afternoon.

It's great to be with you all. And Fred, can I congratulate you and your staff here at the Peterson Institute for your excellent research. Thanks to its non-partisan approach, your organisation provides the kind of objective insights that are all-too-often lacking in the halls of government, and it's something you should be very proud of.

Before I begin, I would be remiss if I didn't recognise that today is the fifth anniversary of a very sad day for us at BP. Five years ago on this day, fifteen people died and many more were injured, when an explosion tore through our Texas City refinery.

That tragic accident has changed in a profound and fundamental way our approach to safety and operations integrity - providing a safe working environment is a paramount responsibility, and our first and foremost priority.

That responsibility extends outside the company to the societies we operate in. In the current environment, bankers and the financial sector may have bumped oil companies like BP off the front pages of the newspapers, but it's a fact that energy security remains at the top of the global political and economic agenda. We have a major role to play.

James Schlesinger, who served as the first US energy secretary, once quipped that Americans have only two ways of thinking about energy: "complacency and panic." I agree with the sentiment but I'd substitute the word "Americans" for "people" because very few people ANYWHERE in the world think much about where their energy comes from. And the big swings in energy markets over the past couple of years illustrate Dr. Schlesinger's basic point.

Our challenge today is how to balance energy security, employment and economic development, with the issue of climate change. I firmly believe we can do it, but not without first acknowledging that the real problem lies above ground rather than beneath it. Getting the POLICY mix right is the surest way to avoid the traps of complacency and panic. So what underpins energy security?

In my opinion there are three key factors: diversity, competition and efficiency.

- First: Diversity - We need access to a wide range of different energy sources;
- Second: Competition - We need to encourage the best ways to explore, produce and distribute that energy;
- And third: Efficiency - We need to ensure we make the most of each unit of energy produced.

These factors aren't new, but we mustn't underestimate their significance. Reliable and affordable supplies of energy laid the foundation for the world's extraordinary economic progress to date, and were very taken for granted through much of the 20th century.

What's different in the 21st century is that energy security has become a defining issue. It is one element in a complex matrix with strategic, economic and environmental dimensions.



To address it, we must be clear about where we are and where we want to go. We need to set out practical pathways which lead us towards our destination. And we need a clear regulatory framework to enable business to invest with confidence in building a lower carbon future.

Creating a diverse energy mix

First let's look at the journey that lies ahead. BP's projections suggest we'll need around 45% more energy in 2030 than we consume today - and double by 2050. That's the equivalent of adding today's United States nearly twice over to world energy demand, and meeting it will require an annual investment of more than \$1 trillion a year - every year.

So how can we deliver on that demand sustainably?

Let's be clear - there are no silver bullets here.

A century ago, Winston Churchill recognised that "Safety and certainty in oil lie in variety and variety alone." This holds true today. On top of a more efficient use of energy, we will need a wider variety of sources in 20 years time.

The share of renewable energy will certainly increase, but we have to be realistic about how much it can actually contribute. As of today, all of the world's wind, solar, wave, tide and geothermal power only accounts for around 1% of total consumption. And given the practical challenges of scaling up such technologies, the International Energy Agency can't see them accounting for much more than 5% of consumption in 2030, even with aggressive policy support.

Nuclear energy and biofuels will also play a part, and by 2030 carbon capture technology could be deployed at scale. But there will still be a major role for hydrocarbons. Indeed the IEA analysis indicates that even in a low carbon scenario predicated on keeping the atmospheric concentration of CO₂ to less than 450ppm, hydrocarbons will remain dominant.

The good news is that we have enough reserves of oil - and even more of natural gas - and reserve estimates are rising as we develop new ways of unlocking both conventional and unconventional resources.

Our analysis indicates that the world has sufficient proven reserves for over 40 years of oil and 60 years of gas at today's consumption rates.

The cornerstone of our future energy security is the creation of a diverse supply - diverse in the forms it takes and diverse in the places it comes from.

At BP our own portfolio reflects this diversity. For example, in our low carbon energy business we have invested over \$4 billion to date, and we're continuing to invest more than \$1bn a year. At the same time, we're also planning to invest in Canadian heavy oil - a relatively carbon intense activity, but one that will play a major part in providing access to secure energy for North America. We believe both will be part of a broad and sustainable mix that embraces oil, gas, coal and renewables, producing and using them all with innovation and efficiency.

Government and the energy security architecture

Building such a future demands action both from business and from policy-makers. Business can provide the building blocks and tools - but we need to work within the architecture provided by governments. In my opinion, there are two ways in which the current energy security architecture can - and must - be strengthened.

First, with continuing pressure on supply, it's important to develop energy resources as efficiently as possible. That means opening up areas that have previously been closed to exploration and allowing



competition. Offering access to a range of potential operators encourages the most efficient solutions and often involves partnerships that develop new and innovative combinations of skills.

The key to producing these resources efficiently lies in advanced technology.

Take for example the US Gulf of Mexico. When BP went into the deepwater Gulf in the early 1990s, the area was known within the industry as "the dead sea." However, as a result of the technology we developed - primarily advanced seismic imaging techniques - it led to a series of extraordinary discoveries. Today, one in six barrels of oil produced in the US comes from the deepwater Gulf.

Similarly, the US revolution in shale gas over the past three years has been made possible thanks to new drilling and fracturing technology. That is a real game-changer when it comes to energy security in this part of the world.

The second area in which policy is critical is in addressing climate change. I can't stress enough just how important it is that we find a way forward on this issue. BP has been calling for action for more than a decade - preferably via creating a price for carbon through market mechanisms. Again, we believe competition will encourage the most efficient ways of cutting emissions.

And these are more than just words. At BP we factor a carbon cost into both our investment choices and the engineering design of new projects. This is our way of ensuring that our investments are competitive not only in today's world, but in a future where carbon has a more robust price.

Whatever your position on the science of climate change, the fact remains that the world is going to use a lot more energy in the coming decades and I believe we need to take urgent action to mitigate the effects of such an increase. Around the world millions of people are leaving poverty behind and enjoying a much better standard of living.

Looking at the scale of this transition, you realize it's just not sustainable to carry on without taking decisive action to start building a less carbon-intensive future.

I'd suggest there are clear signs that governments around the world are sensitive to this and are beginning to do something about it.

The process may seem somewhat disjointed - even frustrating - at times, an example being Congress's inconclusive attempts to pass a cap and trade bill. But that should not blind us to the progress that is being achieved.

Take last December's climate change summit in Copenhagen. Some people have suggested that it was a failure. I don't agree. Of course it didn't fulfil some of the more extravagant expectations. But for the first time since the climate debate began in earnest 20 years ago, the vast majority of the world's countries are now lined up and heading in the same direction. Most importantly, China and the US are on board. This is a huge step forward.

Both of those countries are now committing billions of dollars to renewable energy projects and efforts to improve energy efficiency. That wasn't happening two years ago.

The lack of a global treaty and comprehensive US legislation is unfortunate, but they need not be barriers to action. The key to progress is alignment, rather than agreement - moving in the same direction, but not necessarily in lock-step.

The crux of the matter is this. If policy makers provide a clear and stable framework for investment - whether in low-carbon energy or fossil fuels - then investment will flow. But if they don't, they run the risk that spare capacity will dwindle - and 'complacency' will give way to 'panic.'



Pathways to energy security and efficiency

This can't however be a one-size-fits-all approach. Each country or economic bloc will have to assess its natural advantages and its deficiencies, so that it can set a workable framework within which the market can deliver energy security.

At BP we find it helpful to think about this in terms of a range of "energy pathways" for different countries and industries. This highlights the most effective and efficient way of reducing carbon emissions while still meeting demand.

Our first conclusion is that, in all circumstances, energy efficiency is the No.1 priority. That means more efficient vehicles, buildings and electronic appliances - and therefore more investment in technology and infrastructure.

There's much more that efficiency can deliver. In the IEA's latest low-carbon scenario, efficiency accounts for a greater reduction in energy-related emissions by 2030 than renewable power, nuclear, carbon capture and biofuels combined.

Let me reflect on how the pathways might look in the US.

In transport, by far the most effective pathway to a lower-carbon transport industry is through making car engines more efficient.

Research has shown that the average fuel efficiency of passenger cars and SUV's here in the US improved from 16 miles per gallon in the mid 1970's to around 24 miles per gallon by 2005. This is obviously encouraging, but it's clear there's room for further improvement. In Europe, the average achieved by German, French, Italian and British cars is close to 36 miles per gallon.

Hybrid vehicles will also become increasingly important and in the medium term so too will advanced biofuels. Further down the line electric vehicles and hydrogen fuel cells will also have a part to play. But these need massive new infrastructure and their electricity or hydrogen needs to be produced more sustainably. Electric vehicles are only as low-carbon as the power that fuels them.

Looking at the power pathway, we believe it makes sense to use much more natural gas. Gas offers the greatest potential to achieve the largest CO₂ reductions - at the lowest cost and in the shortest time. And we can do all of this by using technology we have available today.

It's easily the cleanest burning fossil fuel - around 50 percent cleaner than coal. It's very efficient, and combined-cycle turbines fuelled by natural gas are quick and relatively cheap to build.

Given these facts, it seems extraordinary that the US is still focused on building COAL fired power plants. In recent years, coal has accounted for around 50% of US electricity generation but 81% of CO₂ emissions. Ramping up US natural gas consumption by a readily achievable one trillion cubic feet per year would allow 150GW of the oldest and most polluting coal plants to be retired - some of which have been going for nearly 100 years.

The good news is that there is plenty of natural gas available. The development of so-called "unconventional gas" - in shales, coal beds and tight rock - has roughly doubled US resources to between 50 and 100 years of consumption. In fact the US has just overtaken Russia as the world's largest natural gas producer.

So although natural gas is sometimes described as a "bridge fuel" to a lower-carbon future, it also has the resource base and the natural performance advantages to become a preferred energy choice.

We see natural gas as a key ingredient of a secure pathway to lower-carbon power together with energy efficiency, coal with CCS and with renewables and nuclear in the mix too.



As far as the role of nuclear is concerned - and President Obama has clearly stated he intends it to play a part in the mix - the process of renewal must start now. The US has not built nuclear power plants for decades, so it needs to progressively replace its existing fleet of stations before it can provide real growth.

That will be expensive and it's this that leads me to my final point: cost. In my view, it is vital - as we gear up to confront the problem of climate change - that we opt for the lowest-cost energy pathways available.

Energy efficiency, gas fired power, lighter cars and advanced biofuels all offer relatively low-cost routes - while more headline-grabbing options are not the most cost-effective in terms of cost per tonne of mitigated CO₂.

For example, with today's technology, carbon capture and storage to make clean coal is very expensive. Offshore wind is too - especially when compared with onshore wind, which is now an attractive business for BP in the United States.

Conclusion

So to conclude:

Creating a low-carbon economy will be far from easy and over time will require the wholesale re-engineering of the global economy. It will demand very significant investment by industry, which in turn requires a clear and stable regulatory regime.

The complexity and scale of the task make it especially important that those involved respect three principles:

First, efficiency - the best way to more secure energy is saving energy.

Second, diversity - there is no one, silver-bullet solution or technology that will deliver a secure energy future. A diverse mix of resources and technologies will be needed.

Third, competition - efficient markets and market mechanisms will provide the most effective way to produce and distribute energy and to induce change.

Without a credible and enduring framework, it will be impossible for industry to invest at the scale necessary to maintain and enhance our energy supply.

And the consequences of failure would be serious.

We need to ensure that we don't leave our children and grandchildren with the unknown hazards of climate change, and we need to keep the lights on in the future. If we can meet both these challenges, as I believe we can, we will truly have delivered energy security.