

The 2011 International Conference on Low Carbon Energy and Climate Change Talk by Steve Westwell, EVP BP, at Tsinghua University on 24 March 2011



Mr. Zeng, Mr. Zhang, Minister Xie, distinguished guests, ladies and gentlemen,

On behalf of BP, I am delighted to be here and I congratulate Tsinghua University on their Centennial celebration.

At BP, we also passed the 100 year milestone recently, and we look forward to continuing our close relationships with Tsinghua, Cambridge and MIT for at least the next century.

And this morning, I am particularly pleased to contribute to this Alliance Event by briefly discussing two topics:

- First, I will summarise some of the main points from BP's Energy Outlook 2030, which is an analysis of the emerging energy picture and challenges for the next two decades; and
- Second, I will explore how these challenges can be addressed through technology and partnership.

Before I start, I want to say a few words about the tragic oil spill that occurred in the Gulf of Mexico last April.

We are very sorry for what happened. We are fulfilling our commitments to the people who were affected, and fulfilling our commitments on environmental remediation.

We are determined to learn from this tragedy, and to share those learnings globally with regulators and the oil industry.

We are converting these learnings into tangible actions to further improve the safety of our operations. In particular, we have created a powerful, central safety and operational risk organisation.

However, we know that it will take a long time to rebuild trust.

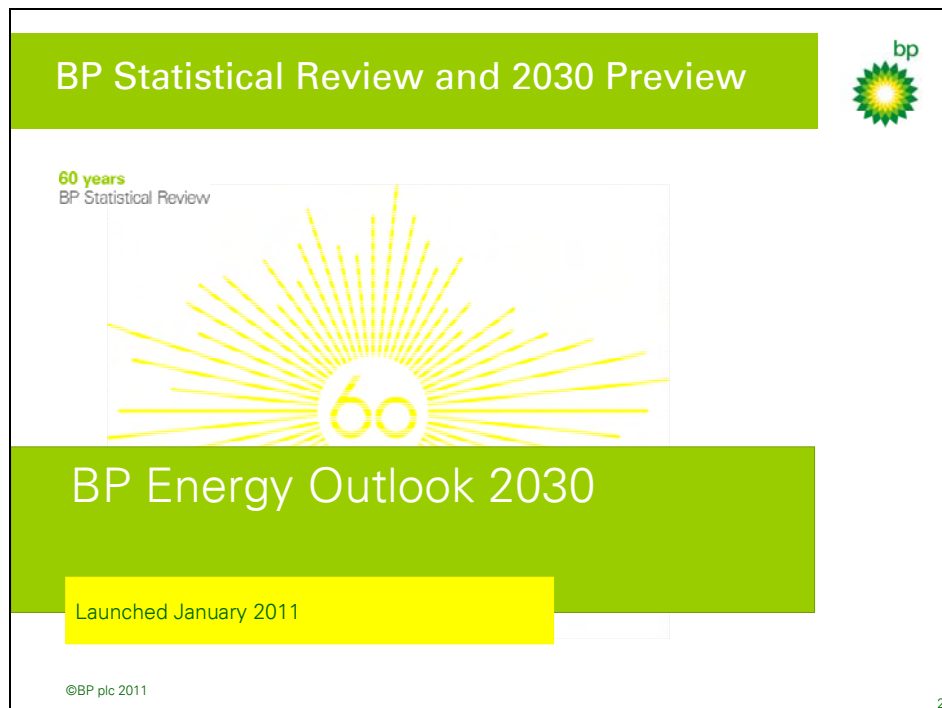
For the long term, we still believe we can play a constructive role in the challenge of meeting the world's growing demand for energy.

But to do this effectively, we must study how energy markets have developed in the past, and understand the dynamics of how they might develop in the future.

This is why our Economics team produces the BP Statistical Review of World Energy – documenting the way that different sources of energy are produced and consumed.

BP has been doing this every year for the past 60 years. Our aim is to share accurate data to inform important debates on energy markets, the environment and energy policy.

This year for the first time, we have published externally a forward-looking counterpart – a report we call the BP Energy Outlook 2030.

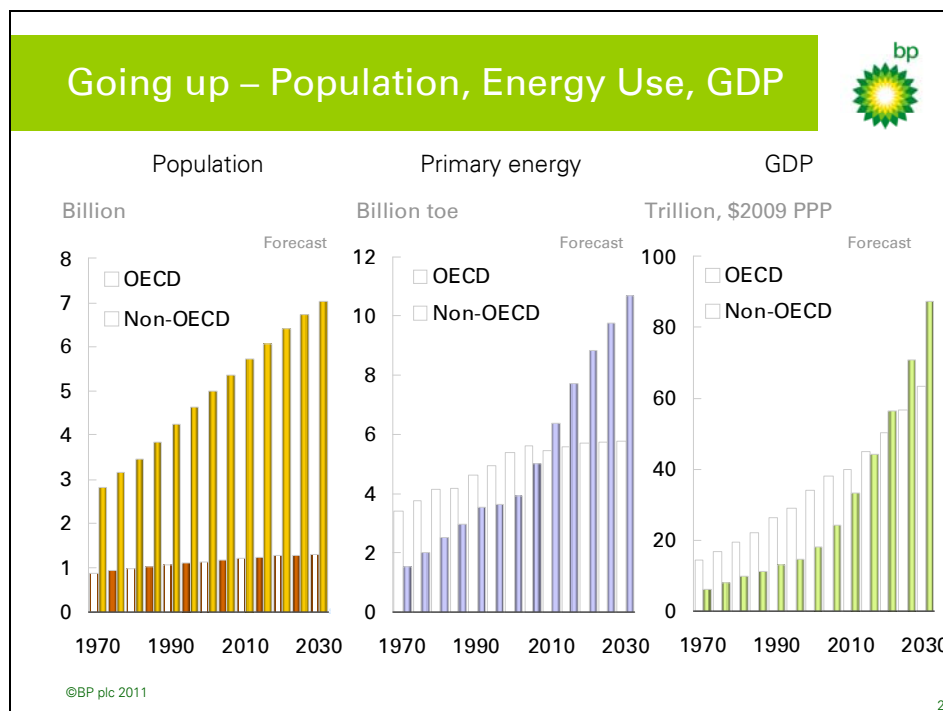


Naturally, forecasting is very different than tracking history. While we make every effort to ensure the accuracy of our historical data, I can pretty much guarantee you that our 20 year forecast will turn out to be wrong.

However, the power of a forecast is the rigour of understanding the dynamics of a complex system: supply must equal demand, it must be delivered to consumers and it depends on consumer choice, technological advancements, the economy and energy policy.

So let's start by taking a look at our projected trends in population, energy use and GDP. All of this information is in our Outlook 2030, which is available in Chinese and English on our website bp.com

This projection is taken from what we call our 'Base Case' scenario. This constitutes an assessment of the world energy path most likely to unfold from today's vantage point 'to the best of our knowledge'. It is based on patterns of demand and supply as well as judgments on future policy, technology and economic development – all of which have been informed by extensive consultation.

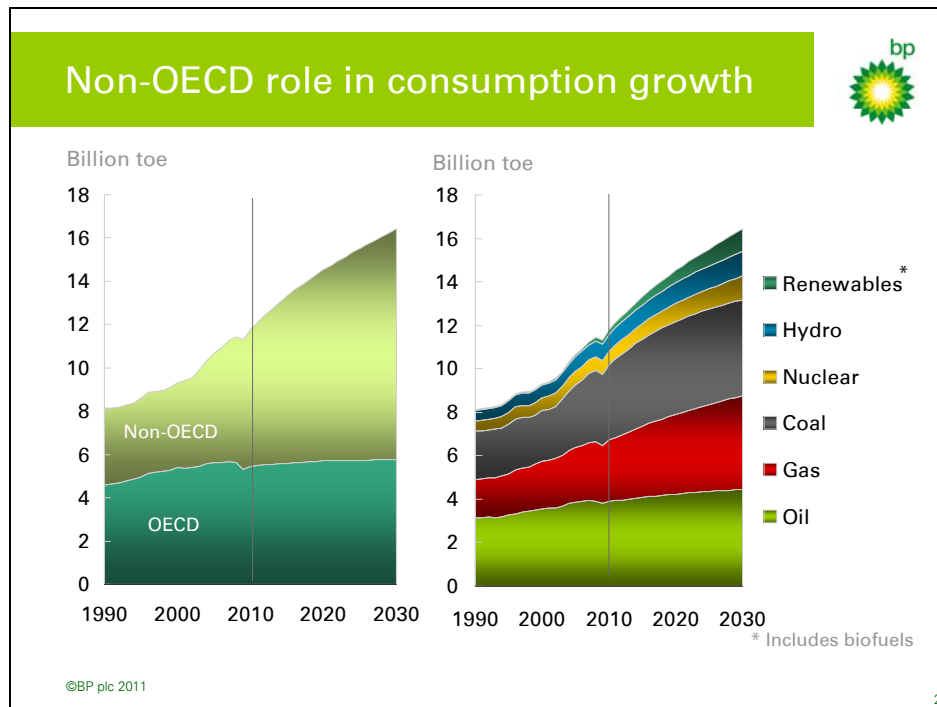


The charts here show a number of important global trends. While today's non-OECD countries have long outnumbered the OECD-member countries in population, they have only just overtaken OECD economies in total energy demand. And the non-OECD is projected to overtake the OECD in total GDP during the decade ahead.

Globally, over the last 20 years, population has increased by 1.6 billion people. And population is projected to increase a further 1.4 billion over the next 20 years. Global GDP has risen 87% over that same period and is expected to rise a further 100% by 2030. And, of course, primary energy demand is also expected to rise – by perhaps 40%.

The challenge is clear – a growing world population and growing income levels will lead to growing energy demand, even assuming significant improvements in efficiency.

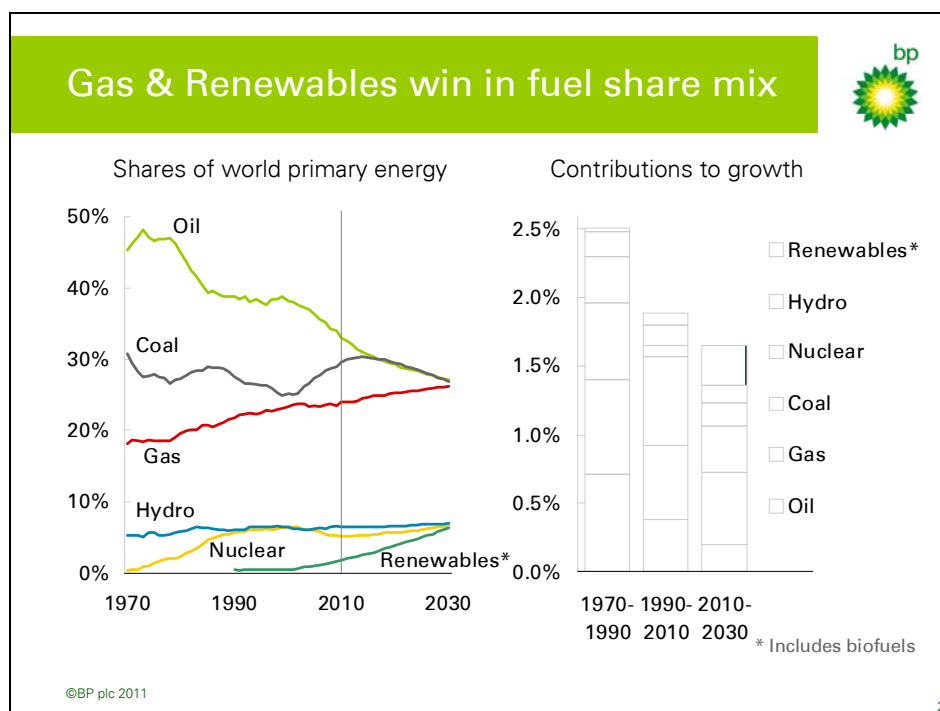
Meeting this demand raises questions about secure access to energy resources and environmental impacts.



This next chart also reflects our Base Case, and shows the sharp contrast between what the future holds in OECD countries and emerging economies. Non-OECD energy consumption is set to grow by 2.6% a year, compared to OECD growth of only 0.3%. Accordingly, the non-OECD economies are expected to drive over 90% of the global energy growth to 2030.

Energy intensity – that's the amount of energy required per unit of GDP generated – is projected to improve at an accelerating rate, largely as a result of technological advances and expected policy interventions to promote energy conservation and efficiency improvements. These efficiency gains help to keep OECD demand close to flat and underpin economic growth in non-OECD countries.

The chart on the right shows that energy sources are set to diversify over the next 20 years, with non-fossil fuels – including nuclear, hydro and renewables – becoming the biggest source of growth for the first time ever.



Conversely, we see fossil fuels, especially oil, losing market share. There is, of course, an important story about urbanisation and electrification behind this analysis, with natural gas being the preferred fossil fuel overall.

So, even our Base Case – again, this is what we see as the most likely outcome – includes a change in the energy mix that suggests a strong future for renewables, natural gas and nuclear. We completed this analysis prior to the tragic earthquake and tsunami that has afflicted Japan.

Fukushima, as well as the oil spill last summer and political unrest in North Africa and the Middle East, are clear reminders that the world's preferences on energy may be affected by events, especially over the short-term. There are no easy choices.

Returning to natural gas, it is the cleanest burning fossil fuel, producing some 50% less CO₂ than conventional coal-fired power generation - and it is plentiful. New technologies such as hydraulic fracturing and horizontal drilling are providing access to so-called unconventional resources that could provide enough gas to last another 100 years at today's consumption rates.

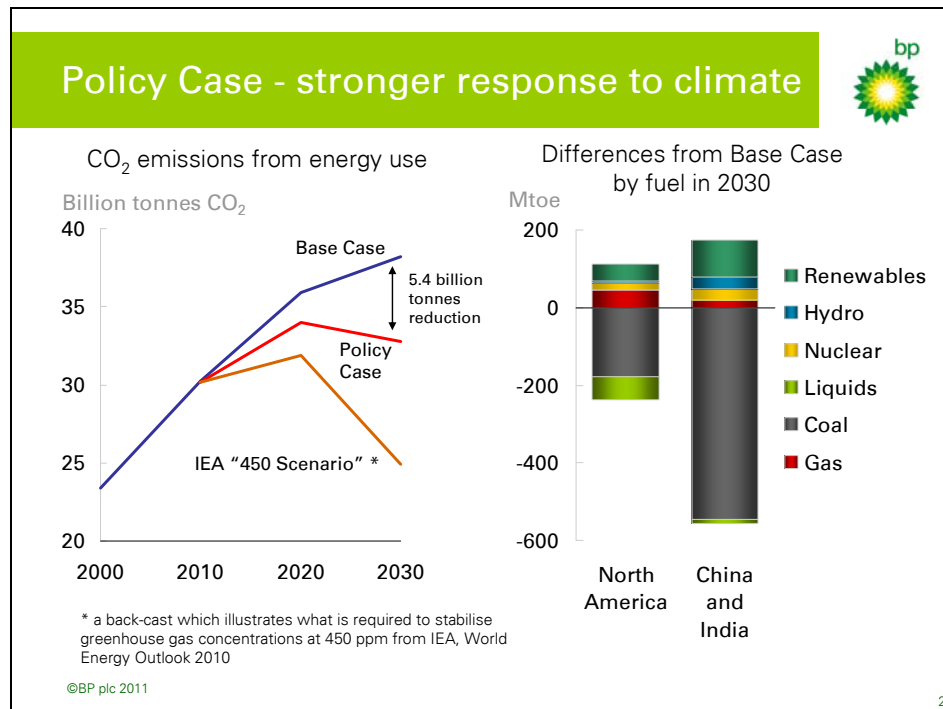
Wind, solar, biofuels and other renewables look set to grow their combined share in primary energy, from less than 2% now to over 6% by 2030 – though this assumes continued policy support, as well as cost reductions through technological advances and economies of scale.

But, despite the positive implications for economic growth and human well-being, we have to come back to challenges for the environment.

On climate change, scientists tell us that, in order to limit a temperature increase by the year 2100 to two degrees Celsius from the beginning of industrialisation, we need to limit equivalent CO₂ concentrations to 450 parts per million.

The IEA have calculated a backward-looking case of what needs to happen for a trajectory to reach that target. They have concluded that nothing in the current situation indicates that we are anywhere close to that trajectory. BP's analysis reaches the same conclusion.

What this means is that we are not on a trajectory to reach this greenhouse gas target during this century, and this underscores what BP's CEO Bob Dudley said at the launch of our 2030 Energy Outlook in January: 'It is not that anyone likes this result. It is a wake-up call. It means that a lot more needs to be done if the world is serious about meeting this target.'



To look at this further, we have considered what we show on the graph as the 'Policy Case'. What this means is a scenario – but we believe within the range of plausible scenarios – where governments take a more aggressive approach to influencing energy choice and reducing CO₂ emissions through mandates, subsidies and regulations.

What is important to note is that, even though we don't see this as the most likely outcome, it still falls far short of the IEA '450 Scenario' shown on the graph. It's a reminder of the scale of the challenge.

It's also interesting to consider the sources of incremental CO₂ abatement implied by our 'Policy Case' scenario - in this case, some 5.4 billion tonnes less CO₂ per year versus our 'Base Case'. From our analysis, we think it's likely that a significant contribution to the abatement would come from fuel switching. This includes not only additional switching from fossil fuels into renewables, but also more aggressive switching among fossil fuels vs. our Base Case.

Specifically, this means having an even higher growth rate in natural gas and a lower growth rate in the use of coal for power generation.

Not surprisingly, we would also need to have a major contribution from even faster energy efficiency improvements than projected in our Base Case.

And finally, we would need a contribution from Carbon Capture and Sequestration. In our 'Policy Case', we have projected additional sequestration of about half a billion tonnes per year by 2030. This is about 100 times greater than today's sequestration rates, but we don't see this starting to happen at any scale until after 2020. By 2030, this would need to be an important and accelerating abatement option.

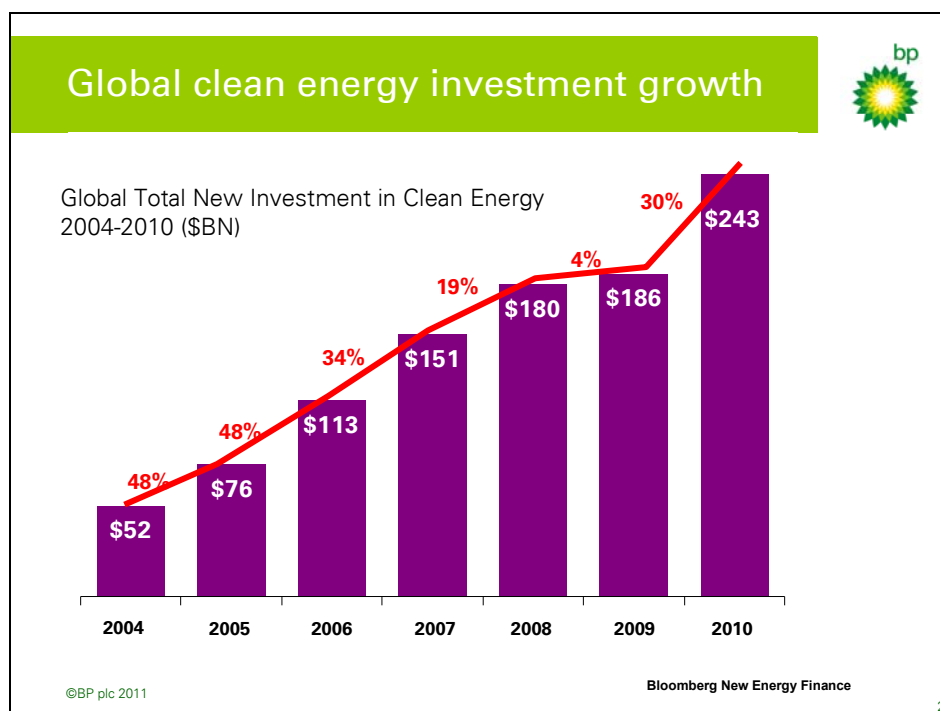
Overall, you can see how challenging this all looks.

Governments can support the move to a lower carbon economy. They can institute a price mechanism for carbon that incentivises more conservation and low-carbon energy choices. And they can provide transitional incentives to help commercialise emerging technologies with the potential to reduce carbon at scale in the future.

Well, the theory may be clear – but, in practice, it all depends on the price that society – led by governments – is willing to pay for the higher costs of low carbon alternatives. Unavoidably, these decisions are further challenged in times of economic difficulty. And recently, government support for low-carbon investment has been faltering in many countries.

I know that you will agree with me when I say that partnerships between academic institutions, the private sector and governments are vital to developing the deep engagement and understanding required to develop effective policies. If we get the policies wrong, then we may waste a lot of public money and lose a lot of precious time.

At this point, I'd like to switch and say more about the clean tech sector.



On the face of it, 2010 was significant 'recovery year' for clean tech as global clean energy investment surged 30% to a new record of 243 billion US dollars.

However, the clean-tech sector is facing tough conditions; with the high capital investment and long development times involved making it relatively high-risk, despite the ongoing stimulus packages and the stated desire by a number of governments to create 'green jobs'.

It's also important to understand that the dynamics driving the markets in China and India are very different to those in the US.

In the last quarter of 2010, seven Chinese energy companies went public through IPOs, raising 3.1 billion US dollars between them. In Europe, there was one major IPO at Enel Green Power, raising 3.5 billion US dollars, but the other four that took place raised just 320 million US dollars among them. In the US, there weren't any clean energy IPOs in the fourth quarter.

In addressing these challenging times and national variations, there is an opportunity for more effective partnerships and collaboration throughout the technology cycle – from Research & Development, through Demonstration and Deployment and into Commercialisation - both in Domestic and Overseas markets.

Effective partnerships based on mutual objectives and long term commitments can play a critical role in accelerating innovation, building capability and optimizing resources to meet a range of different national energy priorities.

In this regard, the most obvious example for me to discuss is my own company:

- How we are translating our view of the future energy challenges into action.

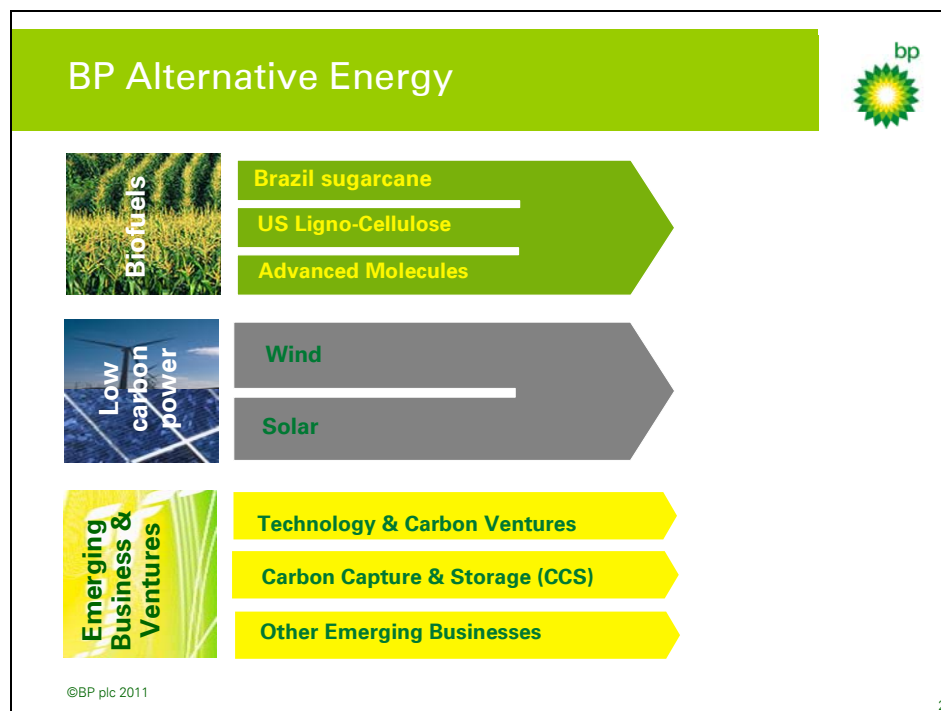
- How we are approaching our investments in Alternative Energy.
- And the importance of collaboration and venturing.

As a business, we are focusing on long term value growth, and making investments that play to our core capabilities in advanced technologies, international energy relationships and effective partnerships.

Naturally, the bulk of BP's investments over this period will continue to be directed towards oil and gas. This includes major new investments and partnerships in the fast growth economies of Brazil, Russia, India and here in China.

On top of this, we are investing in Alternative Energy.

In 2005, we committed to investing 8 billion US dollars in Alternative Energy by 2015. We are on-track, having already invested close to 6 billion. These businesses will form an important income stream for us and our partners in the decades to come.



Specifically, we focus on three areas where we can leverage our core capabilities:

- In Biofuels, which offer a genuine commercial alternative to hydrocarbon liquid fuels and where we have distinctive technology and capability. Our significant research investment includes a focus on second generation biofuels, which can address many of the water and land use issues.
- In Renewable Power, specifically Wind and Solar – both of which we see as complementary investments for gas-fired power generation – and both of which play to our strengths as capital intensive, technology-driven businesses.

- And in Emerging Business & Ventures – we have set up an entrepreneurial ventures business to invest in a range of promising technologies and markets, including those here in China. This unit also oversees our continuing interests in carbon capture and storage.

Scaling-up carbon capture and storage presents a number of challenges, the greatest of which is cost and therefore the requirement for policy support. Other challenges include efficiency losses, practical engineering issues and regulatory, social and policy matters.

We believe working with partners will be key to addressing these challenges and we are a member of the CO₂ Capture Project in which seven oil and gas companies are working together to carry out detailed studies on how to lower capture technology costs and ensure effective geological storage of CO₂.

On top of all this, we have long been aware that establishing a durable energy future includes many challenges, of which carbon is only one. The complex linkages between energy, climate, water and other ecosystem impacts are the focus of BP's Energy Sustainability Study, which is being led by our Chief Scientist, Professor Ellen Williams, and brings together leading academic experts including representatives from Tsinghua, MIT and Cambridge.

This study demonstrates that, in all probability, the world is likely to have to adapt to other resource constraints, such as potable water, before experiencing the full potential impacts of higher CO₂ in the atmosphere.

In summary, I'd like to reiterate the key points:

- Firstly, fossil fuels will remain a significant part of the energy landscape, but the next 20 years will see the development of a more diversified mix of energy supplies – creating real opportunities to bring low-carbon energies to scale.
- Secondly, the low carbon energy space has seen significant changes as a result of the global financial crisis, but there is a great richness of new technologies available to explore and, if viable, bring to industrial scale. We fully expect that the energy future will vary widely between countries as each one deals with their unique set of challenges and opportunities.
- Thirdly, we need to consider resource constraints beyond CO₂ in seeking to develop a sustainable and secure energy system.
- And finally, while it may be for governments to determine the pace of transition to a lower carbon economy through policy deployment, effective partnerships between academic centres of excellence in science & technology and large scale commercial energy businesses can enable this transition.

So, while I started this talk with some rather challenging projections, I'm happy to say that my conclusion is more upbeat.

At BP, we genuinely believe that human endeavour and ingenuity has the capacity to meet the energy challenges which the world faces – and by working in partnership, this capacity can be multiplied beyond the sum of the individual participants.

Thank you for the opportunity to contribute to this event, and I look forward to hearing other's views on these important matters.