



# Energy trends, opportunities and challenges

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**Job title:** Chairman

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Good morning everyone. It is a privilege to be here today. I am grateful for the opportunity to set the scene for our discussions.

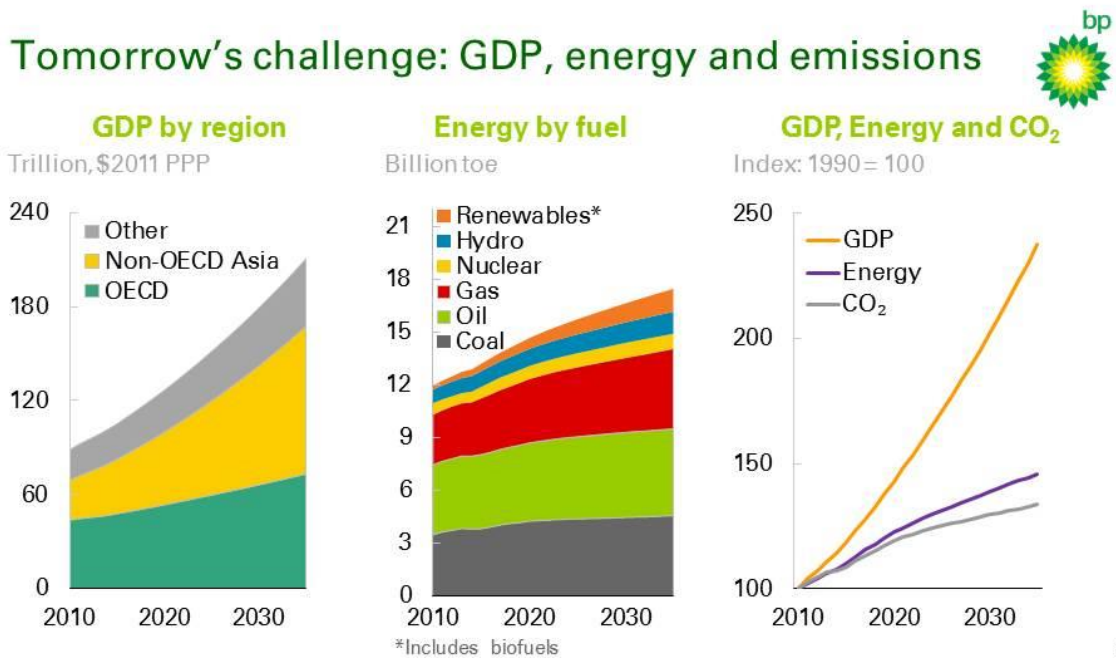
The world of energy is seeing major change as you all know. It is a complex landscape - with trends that can be difficult to understand. So, let me offer a few thoughts to start the conversation.

Change brings challenge - and opportunities

Some are economic, some are technological and others are environmental. But, they are connected, often with long term consequences.

The energy industry has an obvious, but not simple, long term task and challenge. And that is to supply the world with the energy it needs to drive development and economic growth while doing so sustainably.

I've illustrated this with a slide from BP's Energy Outlook to 2035.

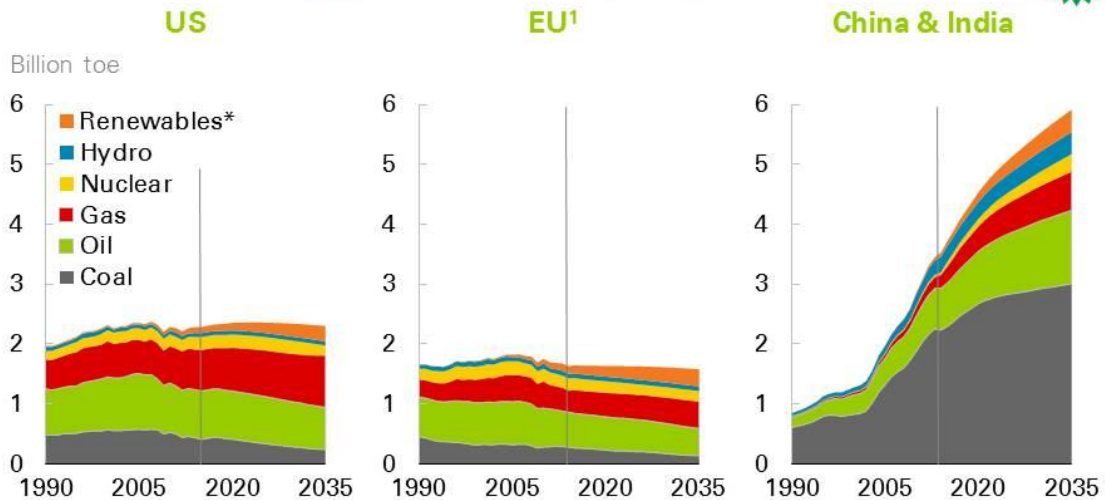


First, global GDP is set to roughly double in the next 20 years with the strongest growth in the emerging economies. We expect energy demand to grow by 35% with 95% of this growth coming from emerging markets.



Let me just quickly show a picture to illustrate this.

## Shifts in energy demand by region 1990-2035



<sup>1</sup>Today's borders \* Includes biofuels

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Every picture tells a story and this one is very clear. OECD will be more or less flat and EU's oil consumption, by 2035, could be down at the level we saw in the mid sixties.

China's and India's growth projections are based on a combined GDP rate of 5.5%. Just to illustrate their importance, if they instead would grow 4%, total global energy demand would be 8% lower by 2035.

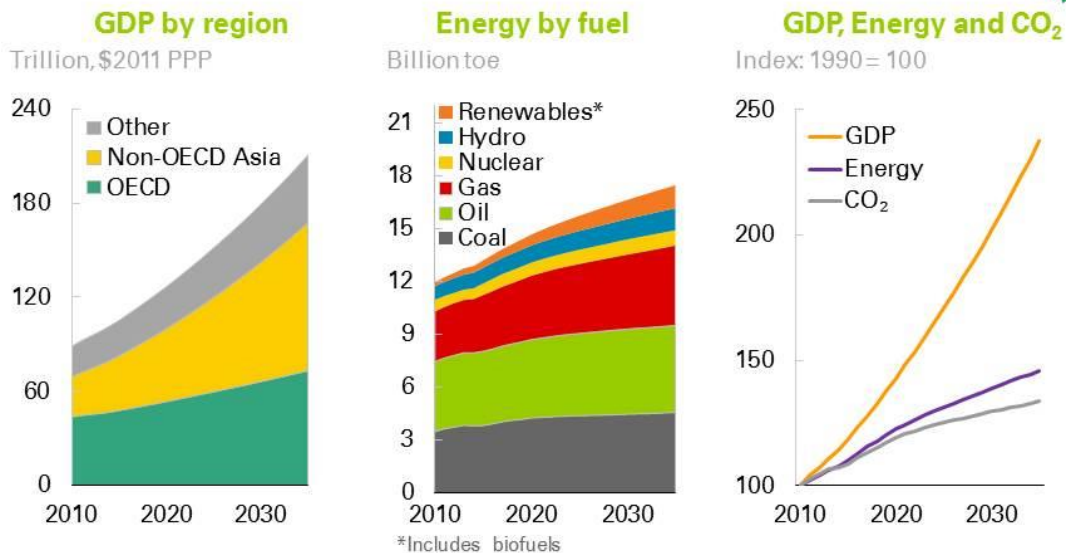
That reduction alone equals EU's entire energy consumption.

Let's be clear, I am not in any way saying that China and India are reckless polluters and are the ones with the problem. This is the effect of two of the world's most populated countries striving to reach our standard of living.

So back again to our previous picture.



## Tomorrow's challenge: GDP, energy and emissions



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Of the fossil fuels, gas will grow the fastest at 1.9%. And that is a positive as gas is the cleanest fossil fuel with half the emissions of coal. It is a ready substitute and can be a critical bridge to a low carbon society.

The fastest growth of all will come in non-hydro renewable energy where we expect a growth rate of over 6% a year. It starts, however, from a low base and it will take quite some time before it can make a real difference. But its time is coming!

Sweden, as you all know, is an encouraging early leader towards a carbon free society with two thirds of our energy coming from nuclear, hydro and other renewables.

The right hand chart shows the relationship between GDP, energy and CO<sub>2</sub>. Two things are happening here.

There is a widening gap between growth in GDP and growth in energy consumption. This is encouraging as they used to track pretty closely and is the result of greater energy efficiency. In fact, the amount of energy required to generate a unit of global GDP growth has fallen by 40% since 1970.

The lowest line in the diagram show CO<sub>2</sub> emissions. BP is projecting these to grow by 25% to 2035. This gap widens, as energy becomes less carbon intensive, with gas replacing coal and renewables replacing fossil fuels.

We are still, however, on a path that takes us above the 2 degree C level, the widely shared aim.

The good news is that if all countries implement their pledges in advance of Cop 21 in Paris, scientists estimate that the temperature increase could be limited to 2.7-3.5 degrees. This is still too high but a good step on the way from the 5 degrees increase estimated at COP 15 in Copenhagen.

### Shorter term challenges



So, that is the big picture. Let us look at our shorter term challenges and start with the oil price development.

## The new environment – lower for even longer



This slide shows the story of the recent fall, a drop from a three year plateau at over \$100 to below \$50 today. But there have in fact been similar drops 6 times over the last 30 years. Let's therefore look at this, against the bigger picture.

## So what's new?

### Oil prices 1980-present





Since 1980 it's been a bit of a roller coaster. 10 years ago, prices were very similar to today. But 20 years ago they were down at \$10, with spikes in between. So, volatility is normal in our industry with the recent three year plateau as an exception, not a rule.

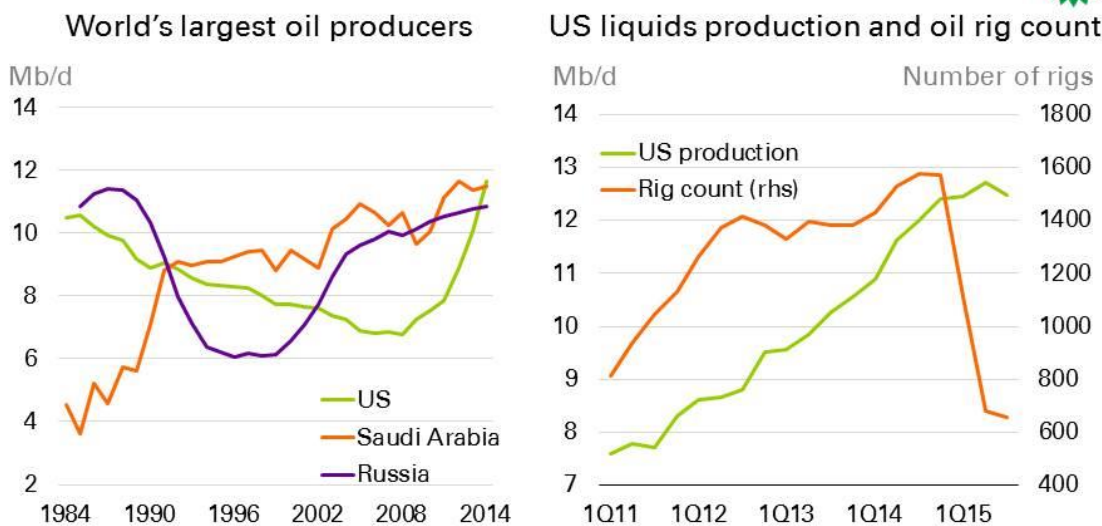
These price changes come from changes in supply and demand. When a fall in demand, causes the drop in price, for example in 2008, the prices tend to recover reasonably quickly as demand returns. But the current price drop is caused by oversupply and that makes a big and important difference.

The last time this happened was in 1986. Recovery was slow and took several years.

Could there also, in addition to what we learnt from the past, be something more long term as well? Maybe, and I will come back this.

So where is this increase in supply coming from?

## US shale revolution reaches new heights



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It is about the 'shale revolution' in the US. Let me mention a few simple takeaways from the slides. The US growth in oil production over the last three years, the green line to the left, is the fastest growth ever recorded.

In 2014 the US was the world's largest producer of oil. But as the oil price now has dropped so far, the number of oil rigs-in-use has fallen from 1600 to 600. Production, however, has only fallen by 5%.

There is, obviously, a time lag but new drilling techniques have quickly improved efficiency and led to increased annual production per rig. But at least, growth has stopped.

Moreover, shale production is a much more standardised, "manufacturing-like" and flexible process. It can stop and start quickly and better respond to price movements than other sources.

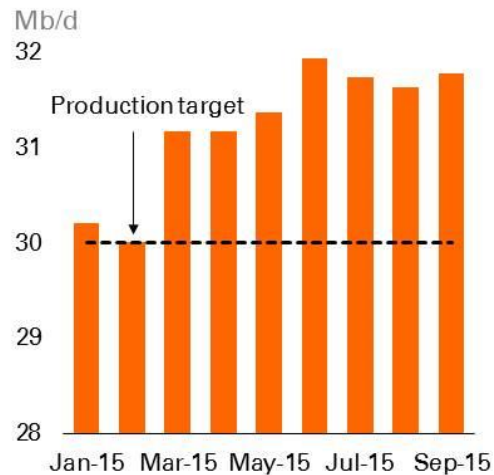


There is also shale potential outside the US, for example in China, Algeria, Argentina and Russia. These countries may not share the US entrepreneurial spirit but shale will be developed and the story will continue to run.

## OPEC defends market share



## OPEC monthly crude production



So, why hasn't OPEC responded, as they normally do?

OPEC usually plays the role of 'swing producer' and cuts and raises production to stabilise the market and the oil price. However, OPEC really only has the ability to stabilise the market in response to temporary shocks. They have never had the wish to stabilise the market in response to structural or persistent change.

OPEC has therefore decided to maintain its production, defend its market share and try to push out the highest cost producers from the market. In economic terms, the only rational thing to do.

So far I have focussed on supply but to this must also be added the weakening demand growth in China.

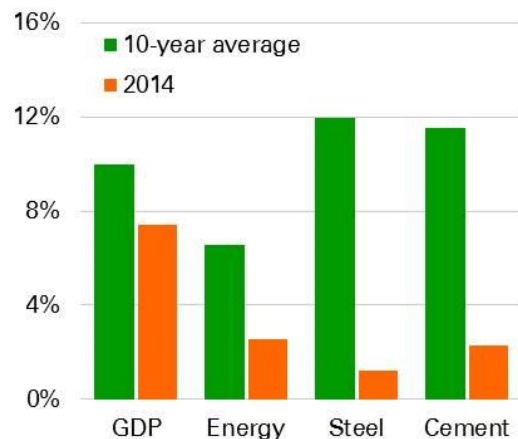


## Chinese economy continues to rebalance



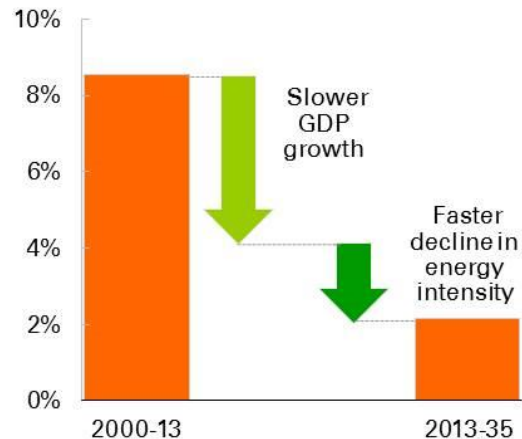
China: GDP and energy-intensive sectors

Annual change, %



China energy growth

Annual change, %



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The slide shows that, last year, growth in Chinese GDP slowed from the ten year average. This is particularly obvious when looking at energy intensive sectors such as steel and cement. China actually, between 2011 and 2013, used as much cement as the US did during the entire last century. This has now slowed dramatically.

China's strategy is to rebalance its economy from export-led manufacturing and infrastructure investments to a more service led economy and consumer consumption.

So let's sum up the current economic realities of oil.

- US oil production running at record levels.
- Flat demand in most OECD markets.
- Potentially slower growth in China.
- OPEC maintaining its production.
- Abundant global resources of shale.

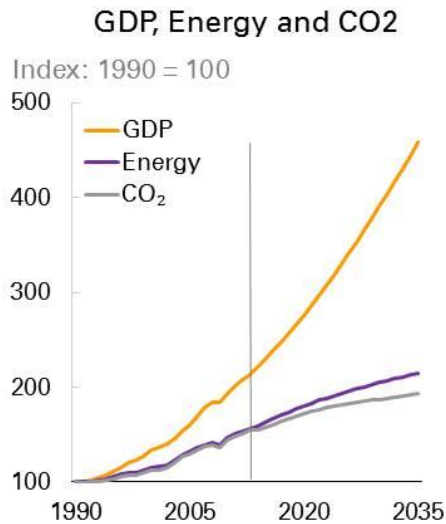
And let us not forget, all time high levels of oil storage. This is what has led to the current low oil price. For now and for consumers, this is great news. For producers, it's a challenge.

Growing economies will increase the demand but it will take a while to get to balance and oil prices should stay low for a few more years. We must not forget, however, that if we look back, most price shocks have been influenced by geopolitical events. These are almost impossible to predict but they will of course happen again.

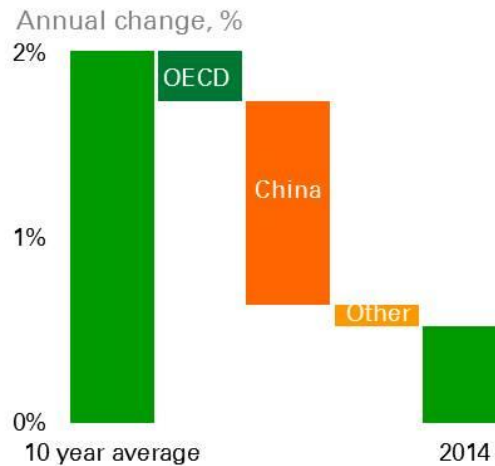
I have so far focused mostly on oil but gas and shale gas in particular, has an equally vital role in our world of energy. I will say more about gas in a minute as we look deeper at the environmental challenges.



## Global CO<sub>2</sub> emissions



**CO<sub>2</sub> growth: 2014 growth vs trend**



Carbon emissions continue to rise – although last year, as the right hand chart shows, they rose a lot less than recently, largely because of the slower growth in China.

The challenge, is to decouple economic growth from the growth in energy and emissions. GDP and energy are diverging but emissions growth has not decoupled from energy growth in the same way. So why is this?

The answer is quite straightforward. Companies, governments and individuals have had an economic motive to be energy efficient, because energy comes at a price, a quite high price. We save money by insulating buildings, driving more fuel-efficient cars and installing advanced motors in factories.

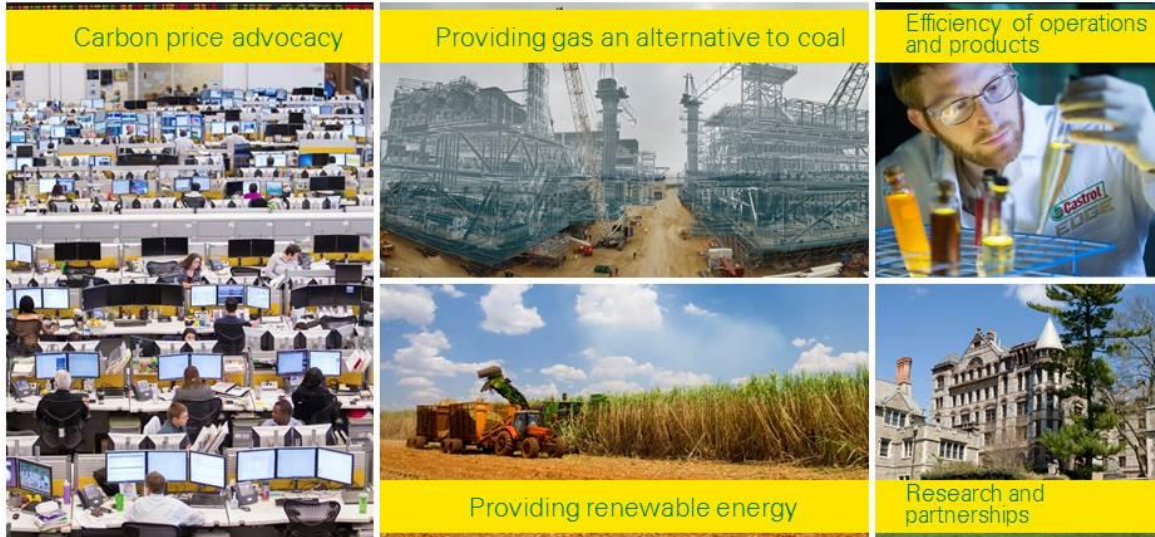
But as most CO<sub>2</sub> emissions are free of charge, there is not the same economic motive to reduce emissions. This is the reason why we strongly believe that carbon needs to come at a cost. In particular we think a widespread, well-designed carbon price is necessary to drive change at the global level.

We have supported and argued for this for 15 years, even though we know it represents an additional challenge.





## Carbon and climate – what business can do



### Addressing the environmental challenge

So, more broadly, what can business do to address the environmental challenge?

First, take part in the debate.

As I have said, support a carbon price. Clear ground rules will bring confidence for investments as well as be a further push for efficiencies. We are also working hard to cut our own energy consumption in production. This saves both emissions and costs – it's a win-win.

Energy companies as well as automotive and truck companies are working together to provide increasingly energy-efficient vehicles, fuels and lubricants.

Natural gas has much lower emissions and must play an increasing role. It can as I mentioned play a key role in the transition to a low carbon economy.

A switch of one per cent of the world's power generation from coal to gas would save as many emissions as increasing renewable capacity by 11%.

The renewable sector has an obvious and critical part in the long term future. The challenge is that renewable energy often is more costly than fossil fuels and yet dependent on government subsidies to grow to scale.

Renewables are all about technology and this brings me to an important consideration for the future. Technology will help us address many of our challenges and create the opportunities which we, in business, are seeking.

We, at BP, have recently published a Technology Outlook. This shows how technology could affect the future of energy in exciting ways. Let me focus on some of its conclusions.



Energy resources are more than sufficient to meet long term demand.

Technology has potential to increase the supply of fossil as well as non-fossil fuels while reducing cost.

And when the speed of change is not fast enough, the policy makers will have to use policy frameworks and incentives to seek the right balance between limiting emissions, overall costs and energy security.

The power sector offers the greatest scope for reducing emissions.

Transport is set to become more efficient. This will come initially from the internal combustion engine.

Electric or fuel cell vehicles still need significant technological advances to make them competitive.

Certain technologies, such as digital systems, bioscience and nanoscience are potentially disruptive to markets, trends and business models but far from mature.

Adapting today's energy infrastructure is not going to happen overnight. It is a transition that will take decades.

## Future challenges and opportunities for energy

This, to my mind, sums up the real future challenges and opportunities for energy. There is an economic challenge created by an abundance of potential fossil fuel resources and the current softening of demand. There is an obvious major challenge created by rising emissions.

But Sweden, as one example, has shown what is possible when governments put long-term policy frameworks in place.

From the business side, as I hope I have shown, we are committed to play our part. Generally, with the conference next week and the new market realities, we are opening a new chapter in the story.

Overall, I think it will be a positive one.

Thank you.