



Diversifying for the future energy landscape

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Introduction

Good morning, thank you Jim (Shea) for the introduction.

I'm delighted to be here - IP Week is always an important event in the energy calendar and as ever the Energy Institute has created a full and fascinating agenda.

Today's session is about the new era of energy.

We've had the era of wood.

Then coal.

Then oil.

Right now I would define this as the era of energy diversification.

In 10 minutes I will attempt to share with you:

Four trends that brought us to this point.

Four trends that define the diversification.

And four enablers of diversification.

I think at best that gives me about 30 seconds for each, so here goes.

Four trends that brought us to this point

1. In the last couple of decades we've seen a shale gale that has nearly doubled US oil production, while gas has grown by around 20% globally.
2. We have seen a renewables revolution that has quadrupled the global capacity of renewables other than hydropower.
3. We have seen technological advances enhancing recovery rates...
4. And we have seen digital transforming what is achievable.

Just recently an algorithm created by a BP employee helped us see through layers of salt to uncover a new "field in a field" - holding 200mn barrels of oil.

It took just a fortnight to process the algorithm in our supercomputer in Houston - whereas with 20th century supercomputers, we estimate it would have taken well over 1,000 years.

This tells us that the energy landscape is changing fast and is able to surprise.

And it makes the job of forecasting energy very difficult.

Four future trends

BP's latest edition of its Energy Outlook, which we launched yesterday, looks at a range of possible scenarios reflecting what the publication calls the "myriad of uncertainty".

Taken together, they cover a wide range of possible outcomes. But there are four trends I'd like to share with you.

1. First, we can be reasonably confident about rising energy demand, driven by rising GDP and population growth.

And it is in fast-growing developing economies, such as China and India where that growth can be found.

China, India and other emerging Asian nations account for around two-thirds of the growth in energy consumption over the next 20 years.

It is, however, India and not China who we anticipate will have the largest growth market for energy by the end of the 2030s as the country continues its rapid growth.

2. Second, is the recognition of the need for lower emissions.

The growth in carbon emissions has slowed in recent years, which is positive – although there is likely to be an uptick this year.

Yet even with this this slowing, emissions reductions fall well short of the sharp drop in carbon emissions thought necessary to achieve the climate goals set out in Paris.

3. Third, is the growth of natural gas, which will have an increasing role in the energy transition, accounting for around a third of the increase in global energy demand.

Growing around 1.6% a year it is expected by 2040 to overtake coal in share of primary energy, and will converge on oil.

That is a big shift in the global energy world order, and is due to several factors.

We see increasing levels of industrialization and power demand, particularly in emerging Asia and Africa. This accounts for around 70% of the growth in industrial energy consumption.

We see increasing availability of low-cost supplies – in the US of course, but also in the Middle East.

We see continued switching from coal to gas, especially in China. This has a major impact on coal, with the share industrial energy provided falling from almost a third today to less than a quarter in 2040.

And we increasingly see that gas is accessible, low-cost, and a cleaner alternative to coal when burned for power.

This is important as affordability is not a good to have, but a must have if we are to keep fuelling global prosperity.

For BP's part, we have the greatest growth in gas production of all supermajors out to 2020 as new projects come on line.

4. Fourth, we continue to see remarkable growth in renewables. Particularly when you consider the narrative around power generation over the course of the next 20 years.

As the world moves increasingly to electrification we can expect almost 70% of the increase in primary energy out to 2040 used for power generation.

And renewable energy's role in this growth is considerable, growing from around a 7% share of total power generation to a quarter in a couple of decades' time.

In the past, much of the growth has resulted from government policies, whether subsidies, mandates or regulations such as tailpipe emission limits.



Today, costs of renewable energy have fallen in many areas, particularly in solar power, where costs have come down by 80% over the past decade.

Undoubtedly costs will continue to fall and renewables will become more competitive in more places. But the pace of change is very hard to call.

The BP evolving transition case suggests likely growth of 7% per annum, accounting for 40% of the increase in energy out to 2040.

BP moved early on renewable energy, and today we have the largest operated renewables business amongst our peers.

We have a wind business that could power all the homes in a city the size of Birmingham.

A biofuels business in Brazil, which produces up to 800 million litres of ethanol equivalent out of 3 world-scale sugarcane ethanol plants.

And a biopower business, associated with the biofuels business, which has 224mw capacity - enough to power the plant and export excess to local grid.

What's more, we've recently returned to solar with a strategic partnership with Europe's leading developer, Lightsource. In doing so we are part of an energy that over the next couple of decades is expected to generate around a third of the world's total renewable power and up to 10% of total global power.

We are investing up to \$200 million a year on venturing and related activity to seed funding for a range of clean energy prospects

One example is Solidia Technologies, who can produce concrete with between 30 and 70% less CO₂. Great potential given that concrete is the single most-used substance on the planet, apart from water

It is worth noting that governments are directly responsible for around one-third of total energy R&D spending and two-thirds of clean-energy R&D.

This has helped support the growth in renewables.

Looking ahead we are projecting renewables will have around a 14% share of primary energy by 2040 - up from 4% today.

This is strong growth, but also reflects that government subsidies are likely to be phased out by the mid-2020s as renewables become increasingly capable of competing with other fuels.

Even if government subsidies remain at current levels, the most aggressive of scenarios shows that renewable energy falls short of being able to meet society's energy demands without assistance.

Therefore, a combination of renewable energy along with gas, and indeed oil, is important.

Four enablers

This brings me to my four key enablers, which are based in partnerships

1. First, we have partnerships of strengths.

Like BP is doing with Europe's leading solar developer, Lightsource, is important.

Unlike in the past where we manufactured panels, we have now partnered with Lightsource, bringing together their expertise in development with our global scale, relationships and expertise in major project management and delivery.

2. Second there is partnering to foster innovation.

In BP we are investing up to \$200 million a year on venturing and related activity to seed funding for a range of clean energy prospects.

This is about pursuing small businesses with big potential.

For example, we've invested in a company that can produce concrete with between 30 and 70% less CO₂.

The potential is huge when you consider that concrete is the single most-used substance on the planet, apart from water.

3. Third are partnerships in policy.

The most effective way in our view to limit greenhouse gas emissions is through a carbon price - be that cap and trade or carbon taxation.

BP's view is that carbon pricing is the most effective policy to limit greenhouse gas emissions as it incentivizes all actors – businesses and consumers – to take action on a wide range of fronts. For businesses, one of those actions is low carbon innovation – innovation in technologies, business models, markets and new resources including renewables.

To do this takes policy, so government and industry working is vital.

4. And this leads me to my final point, which is about partnering to accelerate progress.

It means the UN holding the ring, academia showing what needs to be done, governments creating the policies, and for businesses to create the innovations.

A good example of where businesses are showing such innovation is in the Oil and Gas Climate Initiative, which brings together 10 IOCs and NOCs representing 20% of the world's oil and gas production. It has invested \$1bn to lead to a reduction of 1bn tonnes of GHGs.

Conclusion

So they are my four trends to this point, my four future trends to diversification, and the four enablers to help bring them about.

We have much to debate, and as Madeline Albright said, "We should use our opinions to start discussions, not to end them."

So I look forward to discussing this further today.

Thank you.