Addressing Europe's energy challenge: the role of technology

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Iain Conn speech to The EU energy challenge

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Good morning everyone. May I add my welcome to this event and also convey my thanks to Science Business for working with BP on this programme of debate.

We are here to address a complex question: how the EU can shape a future that combines three factors - economic competitiveness, energy security and environmental sustainability.

It has been described as a 'trilemma' and there are no easy answers. However, one of the best ways to work towards solutions is through open debate among people with knowledge and responsibility in the field – people such as those in this room.

For me personally, after 29 years at BP, this is my last official speech on behalf of the company – but I suspect it won't be my last on the topic of energy and specifically that of the role of technology in supporting EU energy policy.

The reasons I joined an oil company back in 1986 are the same reasons that I will be joining an energy company founded on natural gas and electricity supply – Centrica – in a few weeks' time.

The energy business is fascinating: but rather complex.

It is fundamental to economic growth, to global development and to human progress.

Today I want to start with that big picture – the role of energy in the world's economy and society – and then focus in on challenges and priorities for Europe - and the role of technology in Europe's energy challenge.

1. The scale of energy

To begin at the global level, energy, by almost any measure, accounts for around 10% of the world's economy – and it is a 10% that underpins the other 90%.

In monetary terms, we spend about $7 trillion a year on energy around the world to fuel an economy worth over $70 trillion.

The issues of competitiveness, energy security and sustainability are huge and changing the equation that binds them takes time.

Europe has been struggling to change its energy system to address these big issues. It has been a worthwhile struggle and Europe has made significant progress. However, this has exposed the magnitude of the task. And I now believe European governments are waking up to the timescales and costs involved in changing such a huge system.

2. Europe's energy context

I identify four important aspects which make the European context particularly challenging.

First, Europe is a region of contrasts when it comes to energy. The EU uses around 15% of the world's oil and 13% of its gas. Yet its reserves amount to only 0.4% of the world's oil and 0.8% of its gas. This imbalance has consequences for the cost of energy in the EU.

Second, the EU has sought to lead on sustainable energy policy. This has consequences for public finances and the cost of energy in the EU.

Third, the EU social market economic model provides many universal public services, with minimum wage levels and relatively high standards of welfare.

This has consequences in terms of labour costs in comparison with competitors, particularly in Asia.

Fourth, the EU has seen some erosion in the scale and competitiveness of its great manufacturing sector. Manufacturing – particularly high-end, value-added manufacturing – remains a mainstay of the EU's economy – particularly its exports - and manufacturing requires significant energy and labour inputs.

On the very positive side, Europe has been key to many innovations in the world of energy.

The world measures energy in units of European surnames: Joules, Watts, Volts, and Ohms.

And the world moves and manufactures using machines invented by great Europeans: Daimler and Benz, Rolls and Royce, Diesel, Whittle and Siemens. Our everyday lives are full of products created through European innovation – from companies such as Ericsson, British Telecom, Alcatel and many more.

3. European energy and competitiveness

I'm mindful that those great innovators did not see their work as parcelled up into boxes marked energy, economy, environment or some other topic.

The issues are interwoven and in Europe we have tried, not always successfully, to respond to that fact with an integrated approach to policy.

One manifestation of that effort was the creation of a high-level group on competitiveness, energy and the environment in 2006/07. I had the privilege of serving on that group and its remit was essentially to advise the European Commission and to provide cohesion between industrial, energy and environmental policies. An important contribution was made by that group to the '20/20/20 by 2020' policy framework.

Looking back, I now see that work as part of a distinct phase in the evolution of what I call the EU's 'post-climate change awareness energy policy.'

The first phase spanned a decade from 1995 to 2005.

It was a phase of vision and alignment – shaping ideas and concepts to satisfy multiple goals – to support energy security and sustainability in particular.

The second phase was one of experimentation and growing understanding – including the high level group reflecting the mounting awareness of the need to integrate the goals of competitiveness, security and sustainability and to propose pragmatic targets.

Policies, technologies and constructs have been developed and tested – notably the Emissions Trading System and targets for renewable energy and energy efficiency.

The third phase is starting now and it needs to be one of pragmatic action as we pass the baton to a new Commission.

The EU has made a confident start on this phase with the 2030 vision and I welcome the EU's recent emphasis on industrial competitiveness, improvements in energy efficiency and infrastructure.

4. Priorities for energy competitiveness

What then should be the direction of travel for this next part of the journey?

I would urge the EU's policy-makers to focus on four interrelated priorities.

The first is to learn from experience.

The EU needs to build on its strengths and address its weaknesses.

A clear strength is the EU's lead in what we know as energy intensity – the energy required to generate each unit of GDP.

Very roughly, in the US it requires about one barrel of oil equivalent of energy to generate $1,000 of GDP.

In China it takes 2.5 barrels.

In Europe we require only three-quarters of a barrel – less than one third the energy consumption of China for an equivalent economic impact.

This is in large part because Europe leads the world in the production of fuel-efficient vehicles and energy efficient buildings. Our factories and industrial plants are also relatively energy efficient.

This advantage must be maintained and exploited.

The weakness that the EU needs to address is its struggle with other aspects of competitiveness, including our price of energy units which significantly offsets our efficiency - and our high labour costs.

These are significant competitive disadvantages.

Europe has labour costs that are generally more than double those of Asia.

And at the same time it has energy costs that are roughly double those of the US.

This partly explains why the EU economy is struggling to grow while China's economy is still expanding at over 7% a year and US GDP is also picking up.

Ironically, in the effort to shape a future that is both environmentally progressive and competitive, Europe has been leading, but on this path cannot win. The US has not been leading, but may be winning - and China has the greatest potential contribution, and if we engage with her, she may yet lead.

And this week in fact we have seen a milestone in terms of renewed leadership by the US and China, with the new targets announced in Beijing. John Kerry called it "something of great consequence", designed to inject momentum into the global negotiations. The US has set itself a more ambitious emissions reduction target – up to 28% by 2025 on 2005 levels – while China has pledged to bring her emissions to a peak by 2030. This is an important step towards the kind of clear, stable global carbon policy framework we wish to see -

and we need to look at the EU's environmental aspirations in that context.

The EU's carbon dioxide emissions from energy are relatively small in global terms – 4 billion tonnes equivalent of CO_2 last year out of a world total of 35 bn – China's alone are around 9.5 billion – and the EU total will fall to 3 billion tonnes in a world total of 44 billion by 2035.

And that that EU total has come down by around half a billion tonnes in the last decade.

Meanwhile, the US accounts for 5.9 billion tonnes of CO_2 emissions from energy and there too the total has come down by roughly half a billion tonnes over the same timeframe.

Some of this is attributable to economic factors and increasing energy efficiency – both sides of the Atlantic - but there is also an important difference.

Much of the US reduction arises from the application of technology to develop the shale reserves. This has provided significant volumes of economically viable natural gas that has taken the place of coal in many power plants.

Gas now makes up 30% of US energy but only 24% of the EU's and that gas is much cheaper in the US.

Meanwhile the EU has focused very strongly on renewables – alongside energy efficiency – as the major route to a lower carbon economy. And while CO_2 reduction has been achieved, the relative cost of a focus on renewables has created a significant burden for companies and consumers.

In other words, the US has achieved a similar reduction in emissions over a decade, but at a much lower cost to economic competitiveness relative to Europe.

I believe there is a big lesson for the EU here about the importance of gas in near-term competitiveness, energy security and sustainability. Replacing just 1% of the coal used in the world's power plants with natural gas would reduce emissions by as much as increasing renewable energy by 11%.

As Prof Marc Olivier Bettzüge of Cologne University said at the round table on natural gas: "If we continue to subsidize renewables, we basically crowd out gas."

Among the big questions for policymakers in Europe therefore are these – first, the degree to which the industries that provide our competitiveness should have to carry the costs associated with lowering carbon emissions through renewables when those industries are working hard to compete, and when Europe's

emissions are heading for a situation where, by 2035, they will be lower than those of India alone?

And second, have we got the balance right relative to the compelling alternative that is available in the form of natural gas?'

That takes me to the second priority for energy policy – which is to rebalance its focus.

This rebalancing takes several forms.

The first, in my view, is to rebalance the objectives of policy so as to address the economic and environmental issues together.

I believe logic dictates that competitiveness should become a much more significant policy driver.

Also, as I have indicated, I believe there is a strong case for rebalancing policy so as to encourage natural gas – and ongoing energy efficiency - as well as renewable energy.

Let me be clear. This does not erode my support for the ETS. In fact it is a strong argument for using a market-based trading system like the ETS to create a carbon price that can drive down emissions cost-effectively.

The difficult balancing act for policy makers is one of price level and timing - to shape the ETS in such a way that it takes account of all

material factors, including the need to maintain competitiveness over time as well as the need to limit GHG emissions.

My third policy priority is the shaping of pragmatic pathways for two big applications of energy – power and transport.

In terms of power, the evidence from the US and elsewhere demonstrates that the pragmatic pathway is energy efficiency, natural gas and – for some countries – nuclear, in addition to selective, cost-effective renewables generation. We must also continue to invest in research into longer-term renewable options.

For transport, I would advocate it is about fuel economy, downsized, boosted, hybridized internal combustion engines, and use of competitive biofuels. Again, we must continue to invest in research into longer-term options including electric vehicles.

I think these pathways are broadly consistent with many of the views expressed in the round table discussions.

Very briefly, my fourth and final policy priority is for the EU to play a global role in energy foreign relations.

Europe should use its influence on the international stage to help shape a better energy future and one in which the EU can create value from the strengths it has built up over the years.

BP has suggested that energy should be an explicit theme within the Transatlantic Trade and Investment Partnership, with the aims of improving the competitiveness of both parties.

Europe must also continue to play a pro-active role in climate change negotiations, not least because of the opportunities to monetize its expertise in energy efficiency by exporting or licensing technology. However the UNFCCC process can be slow, with the need to align 196 countries. It requires 'accelerants' to move things along independently and often these arise from the application of technology.

And let's not forget that the EU also punches above its weight in the energy industry with many global and international companies based here such as Shell, EDF, Areva, RWE, Total and of course BP and Centrica. These businesses and many smaller specialist firms make a significant contribution to international energy relations and the broad application of advantaged technology.

5. The role of technology in European energy policy

This brings me specifically to the roles that technology can play in European energy.

Technology - stimulated by the right market forces – gives me hope we can square the circle of Europe's energy challenges.

Technology essentially serves four ends in the energy industry:

- helping to support safety and reliability;
- assisting in finding and developing new resources;
- increasing energy efficiency per unit of GDP;
- And enhancing the sustainability of the methods of energy production and consumption.

In each area, Europe has the potential to harness technology in support of its own energy policy – and to enhance European competitiveness in the wider world.

For example, in regard to safety, corrosion is a material safety hazard in our industry – particularly where complex pipework is involved in refineries and other plants.

That's why we collaborated with Imperial College London in a business called Permasense. Permasense manufactures small sensors that are placed on pipes and other equipment to detect signs of corrosion on a 24/7 basis. These are now being deployed worldwide. Combined with other monitoring technologies and a deeper

understanding of corrosion mechanisms, we are making significant inroads into corrosion management.

Technology is also helping the EU to find new resources and helping EU companies to lead globally in this area.

The scope for progress here involves finding new oil and gas fields and developing non-fossil alternatives – but it also - and critically - includes increasing the recovery factor from the resources we have already found.

BP's Long-Term Technology View, or LTTV, indicates that simply applying the best technologies available today could increase the recoverable resource base from around three trillion barrels of oil equivalent to around five – and new technology developments could add a further two-and-a-half trillion.

One aspect of this is enhanced oil recovery. Historically, we have only been able to produce around 35% of a typical oil field's resources.

We now are now developing enhanced oil recovery technologies that are taking recovery rates over 60% in some cases.

These are coming out of our laboratories in the UK and being deployed around the world – as well as close to home in the North Sea.

When we deploy our new LoSal technology in Clair Ridge in the North Sea in the next few years we expect it to recover 42 million barrels of oil more than would otherwise be possible – at an incremental cost of just about $5 a barrel.

Looking to the contribution of technology to energy efficiency, this is the area where Europe needs to maintain its lead and that's why the Commission is right to have a clear plan for continuing improvements. Key applications in this area are obviously to buildings, power generation and transport.

Significant inroads on fuel economy are possible with the ability to approximately double the economy of the world's car parc with today's technology. Lubricants play an important role and through Castrol, BP is a leader in this area.

And energy efficiency overlaps with the final application of technology in energy – that of sustainability, and particularly carbon constraint.

Technology contributes to this area in several ways. As well as being central to energy efficiency, it is fundamental to the production of gas as a cleaner alternative to coal and it critical in the effort to commercialise renewable energy.

Much of that last effort of course is taking place in the R&D setting, in companies and universities around Europe.

And I should make a wider point here, namely that the EU possesses a material competitive capability in its world-class R&D base, plus the ability to join forces across national borders to collaborate in mission-directed multi-disciplinary R&D programmes that benefit Europe as a whole.

This capability needs to be maintained and developed as some would argue Europe is behind the US on multi-disciplinary collaboration. The Horizon 2020 programme is a strong example of publicly funded research. We also need to continue to make Europe an attractive place for private sector R&D, for example by simplifying processes around intellectual property.

In BP we seek to maximise the advantage of being based within such a rich R&D environment by investing a considerable proportion of our research budget in the EU. One example is the €80 million, 10-year, investment we are making in the BP International Centre for Advanced Materials, or BP-ICAM, based at the University of Manchester but also involving Imperial College, London and Cambridge University as well as the University of Illinois. These institutions – primarily European – are world-leaders in developing new materials such as alloys, coatings and membranes.

Conclusion

So let me conclude by summarising the argument I have set out. First, energy is fundamental to the global economy. A secure, sustainable prosperous future depends on getting energy right.

Second, the EU has reached a very challenging moment in economic terms with high labour costs and high energy costs, partly resulting from its well-intentioned support for renewable energy as a leading pillar in dealing with its energy challenges.

The EU therefore needs to learn from experience and rebalance its approach to focus more on competitiveness and broaden the scope of policy to reduce emissions, particularly by extending its leadership in energy efficiency – as manifested in energy intensity – to the access and use of more gas, whether domestic or imported from its gas-rich neighbours. Pragmatic pathways can be encouraged for power and transport. The EU should also leverage its global influence to the full in leading foreign energy relations.

Technology is fundamental to the success of this rebalancing and to each of the priorities I have outlined.

Technology can support safety. It is key to the search for new resources. It is the enabler of energy efficiency and it is necessary to balance the environment with competitiveness to create a more sustainable future.

The EU is very well equipped to take a lead in developing energy-related technology, given its strengths as a powerhouse of innovation and research.

All of us here today have a part to play in this journey and I look forward to continuing it with you.