

**Speech by Dev Sanyal, Executive Vice President and Group Chief of Staff, BP,
to the School of Advanced International Studies, Johns Hopkins University**

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The Energy Roadmap — Setting the Direction for 21st Century Energy

Thank you.

It is great to be here today. The School of Advanced International Studies is an institution I know well and admire – and that is some compliment from a graduate of the Fletcher School of Law and Diplomacy.

This school is unique in integrating a number of different elements.

First, SAIS brings together talented people who are destined to be future leaders in government, business and civil society. I think you had turned out 130 ambassadors at the last count.

Second, it is truly global, with three centres and students from 70 countries.

Third, it embodies what I believe is a very wise approach to leadership – one which emphasizes the responsibilities of leadership, rather than its privileges.

This goes back to its foundation during the Second World War by Paul Nitze and others who were acutely conscious of the responsibilities that the post war world would place upon America.

Ever since that time, the school has adopted a thoughtful and comprehensive approach – looking at each subject from every angle and encouraging a balanced and integrated view.

This is particularly true in the Energy, Resources and Environment programme which quite rightly requires graduates to study the environment as well as energy, given the clear links between the two areas.

Of course, you are fortunate to have in Dean Vali Nasr a great scholar, a great thinker and of course a great graduate of the Fletcher School.

So in several senses this is a place that has everything. And there is a parallel in this with the topic that I will be speaking about today.

If we are going to consider a roadmap for 21st century energy, it makes sense to start by having a vision of the destination – where do we want to be in the future?

As Yogi Berra put it so well - “if you don’t know where you’re going, you might wind up someplace else.”

The destination

The destination must be a place where different elements come together in terms of energy and the environment. To put it succinctly, we want energy that has the following attributes:

- Sufficiency – enough to meet demand affordably;
- Security - with each country knowing where its supplies will come from; and
- Sustainability – in other words, avoiding an unacceptable environmental impact that ultimately negates the economic benefits.

Given the long lifetimes of our assets, decisions made in our industry in the next decade or so will govern whether such a destination is reached in the next four or five decades.

It is important to remember to give due weight to each of these elements.

As students of leadership, you may have come across the research done around half a century ago by IBM, GE and DuPont when they tried to identify the skills of great leaders.

Initially they were unsuccessful – the leaders seemed to have little in common.

But then the companies looked again and realised that what the leaders had in common was not common skills - but common attitudes.

And among those common attitudes were two that I think are very important in considering energy and the environment.

First, great leaders are able to face facts - and change direction if needed; and second, they are comfortable with ambiguity – they are able to see the value in conflicting propositions.

I think this latter quality applies in great measure to the energy debate. For example, it is important to understand environmental risks such as those set out in last month's report by the Intergovernmental Panel on Climate Change at the same time as appreciating the real life-changing benefits that energy confers.

One way to see it is this. The volume of energy consumed by the non-OECD world now stands at 56% of the world total or just over 50 billion barrels of oil equivalent a year.

Fifty billion barrels is a big and faceless number. But what that number represents is in fact millions of human beings being lifted out of energy poverty.

Whenever I return to my country, India, I am reminded of the plight of those in energy poverty and the wonder of being able to escape from it into a world of economic freedom.

In rural villages across the developing world, those 50 billion barrels translate into lighting for schools, fuel for scooters, refrigeration for medicines – and many other practical aspects of human progress.

The fact that people are being lifted out of poverty as a result of energy which also has an ecological impact is the ambiguity we need to manage as we work towards a solution.

The starting point

Having defined the destination we are seeking to reach, let us look at where we are today and the events that have brought us here.

In particular, I want to identify five secular shifts that have taken place over the past few decades. And then in looking ahead I will pick out five forces that are likely to shape the future.

Demand - The rise of the non-OECD economies

The first of the five major shifts that have brought us to where we are today is the changing nature of demand for energy.

The growth in non-OECD demand has been much sharper than many forecasters projected.

Earlier, I said that the non-OECD world now consumed 56% of the world's energy. Not surprising, you may say, but the pace with which that demand has grown has been extraordinary.

In fact non-OECD demand was only 30% of the total in 1970 and since then it has more than quadrupled, consistently exceeding forecasts.

Conversely, demand in the older economies of the OECD has slowed more rapidly than many expected. Its highest level on record was in 2007 and it has fallen in four out of the last five years.

But looking ahead, because of non-OECD demand, our projection of the most likely outcome is that global consumption of energy will rise by another 30 billion barrels of oil equivalent - or 36% - until 2030.

Supply - The proof of plenty

The second secular trend I want to identify is the realisation that energy resources are in fact abundant – what you might term the “proof of plenty”.

This has been very much a 21st century development. Until the turn of the millennium, debate was dominated by fears of oil and gas running out or the so-called “Peak Oil” theory.

But in the 21st century, the shale gas and oil revolution has transformed the landscape in the US, confounding all forecasts. Shale gas and tight oil are now set to account for a fifth of the growth in global energy supply out to 2030 as the US continues production, and other countries start to follow suit in Asia, Europe, South America and Africa.

We estimate that the world has around 50 years’ worth of oil and 60 years of gas at current consumption rates.

Shale has also defeated forecasters. In 2005 the US government projected that the US would need to import around 5 billion barrels of oil in 2011 in net terms. In fact, as a result of shale and other factors, it only imported 3 billion. And in 2012, oil imports fell yet further to around 2.7 billion barrels.

Energy has also helped get America back to work. Oil and natural gas companies now support over 9 million jobs – directly and indirectly.

But shale is only part of the story. The energy industry is also opening up heavy oil developments and moving into deeper water as well as rapidly improving its techniques for maximising recovery from existing - and indeed undeveloped - fields.

For example, we are building a giant field project in the UK North Sea called Clair Ridge which is viable only because we can apply a technique of enhanced oil recovery called LoSal – using low salinity water. This will increase recovery rates significantly from what would have been expected a decade ago.

NOCs and IOCs

Innovations such as enhanced oil recovery have been essential for companies such as BP to prosper in a changing industry – and that brings me to the third important shift I want to cover.

Many of the international oil companies - or IOCs - have their roots in the age of empires. They once controlled the majority of the world's oil and gas reserves. However, the Yom Kippur war of almost exactly 40 years ago, the oil crisis and the nationalisations of the 1970s changed that forever.

National oil companies – or NOCs - now control the lion's share of reserves and the private sector majors have been obliged to make their living in open markets and on the challenging frontiers of the industry – such as deepwater and the development of unconventional oil and gas. For us, it has been a case of “innovate or perish”.

The emergence of the supermajors

This development is linked to the fourth big shift – also within the industry, but 25 years later.

This was the wave of mergers among the companies then known as ‘majors’ from which a smaller group of so called ‘supermajors’ emerged.

There then followed a period of consolidation within these companies as they combined their operations and realised economies of scale and synergies at a global level.

This was a phase of value creation through inorganic growth. And it gave way to another phase in which the supermajors have been investing to drive organic growth, by building a new generation of oil and gas production projects worldwide.

I will return to that, but I do not want to leave the topic of BP and the industry without recognizing the importance of safety and risk management.

The Deepwater Horizon accident of 2010 was a tragic illustration of some of the risks involved in our industry.

We have responded in several ways to that accident.

We have strengthened our operations to make them even safer. We have embedded a safety and operational risk team and enhanced our global practices. We also have hired people from other high hazard industries, such as aviation and the military, and benefited from their experiences.

More broadly, we have reshaped the company, divesting non-strategic assets and investing in strategic ones. As well as being designed to focus on the assets of the highest quality, this has helped to lessen complexity.

The paradox of carbon

The final historic shift I want to mention is our changing perception of the most effective ways to limit or reduce carbon emissions.

The importance of this has been underlined by last month's assessment report by the IPCC which said that warming of the climate system was unequivocal and extremely likely to have been caused in large part by human influence.

The IPCC's full synthesis report which also looks at potential responses will be issued next year.

In the meantime, the example of the US is instructive. Carbon emissions in this country have fallen dramatically and are now back to below their 1995 levels, due to a number of factors.

A key element is the substitution of gas for coal in power generation, given gas produces only half as much carbon as coal per unit of electricity generated.

Gas consumption went up 4% in the US last year while coal consumption went down by 12%.

Another factor is increasing energy efficiency, driven both by regulation and consumers demanding more affordable energy. That process was highlighted this summer when a VW Passat set a new world record for fuel economy by driving 8,000 miles around the US, averaging nearly 78 miles per gallon.

The common factor in these two developments – the rise of gas and energy efficiency - is that they are market-driven. The forces that have reduced emissions have also reduced costs. When the cleaner option is also the cheaper option, it wins.

And when it is more expensive, it does not.

And that has been graphically demonstrated in Europe where there has been no shale revolution and no other big new source of gas. As a result, gas prices have exceeded those of coal and Europe has imported America's surplus coal to burn for power.

Last year, this resulted in both coal consumption and carbon emissions rising in some European countries such as Germany and the UK. And this process, driven by the market, overwhelmed Europe's efforts to curb emissions via a trading system and a raft of mandates and subsidies for renewable energy.

Many of us would like renewable energy to play a bigger part in the solution. In BP for example we have a biofuels business, largely based in Brazil, where biofuels are competitive with fossil fuels.

However, we have to face the fact that, with a few notable exceptions, renewable energy is not competitive with fossil fuels without intervention. In fact non-hydro renewables are projected to account for only around 6% of all energy in 2030.

The journey

Therefore, with this context in mind, what can we say about the direction of travel – the roadmap for a 21st century energy industry.

Again I want to pick out five forces or trends – this time future trends that have the potential to set us on a course for sufficient, secure, sustainable energy.

The right conditions above the ground

The first of these is essentially the lesson of shale. Shale deposits exist in many countries – but the fact they have only been developed at scale in North America illustrates a key point.

It is not only a question of supplies being available *below* the ground, but also the right conditions existing *above* the ground.

And I believe the lesson of the shale revolution and other surges of investment is that the private sector will invest when the conditions are right, when fiscal and regulatory frameworks are supportive and markets are allowed to work.

In the US, the development of shale has been a classic case of markets at work – supported by favourable tax regimes, pipeline infrastructure and the fact that land owners also own the rights to minerals below their land.

In the UK, well targeted tax policies have prompted a major injection of investment into the North Sea with the result that production there is expected to rise again next year.

Governments can also promote conditions for investment by supporting activity that enables demand and supply to interact. A practical example is supporting cross-border infrastructure.

We are seeing this happen very decisively in Europe at the moment in the shape of the so-called “southern corridor” that is being constructed to bring natural gas from the Shah Deniz field in the Caspian Sea to southern Europe.

Governments can also make a major difference by partnering with companies to undertake research.

Again to take the example of shale, while BP actually invented hydraulic fracturing in 1947, some of the critical advances came as a result of major R&D programmes in the 1970s where government and industry worked together.

The supermajors coming of age

Indeed, industry has to play its part more generally. In order to take advantage of the conditions that governments create, companies need to be innovative, efficient and disciplined.

This is where I return to the progress of the supermajors. The second key trend for the future will be the level of success we achieve in demonstrating ourselves capable of generating *organic* growth through the recent wave of investment.

And to indicate the scale of that investment, McKinsey calculate that capex among the supermajors rose from around \$60bn in 2005 to around \$130bn in 2012.

We are now at a point where this phase of investment is starting to tail off and the resulting projects are starting to come on-stream. In BP, we are working to deliver a new series of major project start-ups between 2012 and 2014.

It is in our hands to excel in operating those projects and to maintain capital discipline as we select new ones to develop.

In BP, we have concluded that the way to grow value in this environment in a safe and reliable way is simply to focus on what we are best at.

A supermajor cannot be super at everything. Therefore, we have focused on the strengths we have developed over decades – exploration, deepwater, giant fields and gas supply chains, selected world-class downstream businesses, all underpinned by technology and relationships.

As one illustration of investing in strengths, we shortly expect to launch a new supercomputing centre in Houston. We have built this centre to take us to a new level in our ability to process seismic survey data and maintain a leading role in exploration.

This will be one of the world's most powerful civilian computing centres, with total capacity of two petaflops – enough to make two million billion calculations per second.

It is also an example of how we are investing in the US. We have roots in the US that go back to the 1860s. Our investments include oil and gas production, from Alaska and the Rockies to the mid-West and the Gulf of Mexico. We have three northern refineries, petrochemical plants, and a significant lubricants business under the Castrol brand, a wind business and a nationwide network of retail outlets.

In addition to our 20,000 employees, our business activities support approximately 260,000 US jobs.

We have invested \$55 billion in the US over the past five years which makes us both the largest energy investor in the US and the largest non-US-based investor in the country.

The approach of playing to strengths and building leading capability gives us something valuable to contribute to relationships.

For example, we have brought our expertise in exploration to our relationship with Reliance of India. This contributed to a significant deepwater discovery announced in May this year and another announced in August.

NOCs and IOCs working together

Relationships that bring together companies with complementary interests are very much the new order.

The oil industry's first chapter was dominated by IOCs - and its second – post 1970s - by NOCs. But the third chapter is evolving as a time of partnership between the two as companies realise they need to work together to achieve the right blend of assets, resources, investment, capability and technology.

Today in BP we partner with NOCs in many countries and in many ways. For example in Iraq we are working not only with Iraq's Southern Oil Company but with China's Petrochina. Other NOC partners include CNOC, Sinopec, Petrobras, Statoil, Sonangol and of course Rosneft.

Capability emerging as an ongoing challenge and competitive differentiator

Such partnerships are underpinned by many factors - but the chief one is capability.

And the growing importance of human capability is the fourth force I want to highlight as a driver of the energy future.

The baby-boomer generation is now retiring and the industry is facing a shortage of highly skilled engineers, technologists, geologists and other professionals.

The winners in tomorrow's energy industry will be the ones who can attract a new generation of great people who are capable of developing deep expertise.

We are in action around the world to do just that – and to do it by demonstrating that our industry is not only one that offers good rewards and exciting challenges – but does so in service of a worthy cause – providing people with heat, light, mobility, the foundation for economic development and growth.

A new view of carbon

Finally, let me mention a fifth trend that can help shape the future course of energy and that is our growing understanding of the best ways to limit carbon emissions.

The lesson of the US experience is that emissions are reduced most effectively when market forces act so that the lower carbon option becomes the lower cost option.

That has been the case both in the substitution of gas for coal and in the increase in energy efficiency.

However, if the market does not deliver emissions reductions by itself, then it is possible to bring market forces to bear by applying a carbon price, preferably through an effective cap and trade system. And in BP we support that approach.

Conclusion

As I said earlier, I believe history can help us plan for the future and today I have picked out five significant shifts in the energy industry's recent history from which I think we can learn.

First, the rise of the emerging economies of the non-OECD world, reminding us that demand remains strong as economies grow.

Second, the "proof of plenty" in the supply of energy, with more and more resources being brought within reach.

Third, the transformation of the industry in the 1970s, which gave National Oil Companies the majority of reserves and impelled International Oil Companies to become innovators.

Fourth, the emergence of the supermajors in the 1990s and early 2000s.

And finally, a changing perception of the best ways to control carbon.

Taking those themes together, I think we can sketch five qualities of a system that can deliver sufficient, secure and sustainable energy for the future.

It will provide the right conditions above the ground in terms of support for investment.

It will see the super-majors come of age as companies with particular areas of specialism and leadership.

It will see IOCs increasingly working in partnership with NOCs.

In all types of companies, capability will be paramount. The industry will need to attract people with great expertise and exceptional personal qualities.

And the growing understanding of what works in limiting carbon emissions will lead to a focus on market-based solutions – with the same forces acting to make energy sustainable as to make it sufficient and secure.

Both businesses and policy-makers have important choices to make. Decisions made from the Beltway to the boardroom will have a profound effect for good or ill on the future course of the world's economy and its environment as well as its energy supplies.

And the quality of those decisions will of course come down to people.

As Colin Powell said:

"Theories of management don't much matter. Endeavours succeed or fail because of the people involved. Only by attracting the best people will you accomplish great deeds."

Those organizations that attract graduates from this school will indeed be attracting the best people and it has been a privilege to join you today. I would now be interested to hear what you have to say about these issues and I wish you every success in accomplishing great deeds yourselves over the years to come.

Thank you.