Welcome and Introduction

Jason Bordoff, Professor of Professional Practice in International and Public Affairs, SIPA; Director, Center on Global Energy Policy

Thank you all for being here today, I want to let you all know who we are and why we are here in London today and what it is that we’re doing. My name is Jason Bordoff, I joined the faculty at Columbia University’s School of International and Public Affairs in New York City in January and I am director of the new Center on Global Energy Policy that Columbia University just started. Prior to that, I served for four years in the Obama Administration as Special Assistant to the President for Energy and Climate Change, on the staff of the National Security Council, among a few other positions in the Administration before that. I left, other than those jobs can burn you out a little bit, because I felt ready to do something else, but really left because I was extremely excited about what Columbia University was trying to build. I really can’t imagine a more interesting or important time to be doing what the University is doing: trying to help policy makers understand what to make of the rapidly changing energy landscape that we see right now in North America and around the world. I think a few decades from now we’ll look back at this moment, the one we’re living in right now, you know the next Dan Yergin that writes the next book on energy decades from now will write about this moment as a truly transformational moment in the world’s energy history.

We see new technologies unlocking vast new hydrocarbon resources around the world, clean energy technology is making exciting breakthroughs and the cost is dropping rapidly, the effects of climate change being felt more frequently and more severely. Just before I left the White House, I was kind of stuck in New York City because my family had already moved to New York – so the kids could start school – I couldn’t get back to Washington during Hurricane Sandy. We saw first-hand what increasingly severe weather, rising sea levels, and the impacts of climate can do to communities, as New York still tries to recover from that.

All these changes are having profound economic, security, and environmental implications. We are going to hear a lot about those today from a really distinguished group of panelists and speakers. The vast changes in our energy landscape need to be met by changes in our energy policy. In the US for example, where I worked, it’s really extraordinary to look at the kinds of issues that are on the table today that policymakers need to think about, that really would have been unimaginable just a few years ago for
policymakers to have to decide. Like, should the United States export energy? This is a pressing issue now in Washington, D.C., as you all know. How do we address infrastructure bottlenecks and flip our pipeline system on its head? Are there safety or other implications of moving a million, or a million and a half barrels a day of oil around North America by rail? The greatest innovation of the 19th century is now how we’re moving oil around North America. How do we revise biofuel policy? Because it was put in place at a time when everyone thought gasoline consumption was going up, and now it’s going down. And so there are all these changes that are happening: should our policy towards the Middle East change, if in fact we import very little oil from them moving forwards?

There are all these transformations and changes happening in the energy landscape and policymakers, I think, need good analysis to help them understand how to make good decisions so that policy can keep pace with all of these changes, so that we can realize the opportunities and address the challenges of the rapidly changing energy landscape, and ultimately whether we are able to meet the defining challenge for the next generation, which is how to provide affordable, secure, reliable access to energy without harming the planet.

So again, my experience in the White House was often that these issues hit your desk, you have much less time to really understand new developments than you would like. So you look around to see: where’s the best analysis? Who has already answered this question for me? And there is good work that is done out there, but I think too often, the policy that was most easily at hand, the policy analysis, was done by one interest group or another interest group, or you would see two competing papers that said precisely the opposite things and they were funded by interest groups on both sides. And you were looking for a trusted objective source of rigorous analysis, that was done in an accessible, easy to understand and policy-relevant way. I think again there were good institutions that do this, in the US, in Europe and here in the UK, but I think there is an opportunity to do even more, and so that is the mission for the Center on Global Energy Policy at Columbia.

To take a global perspective, provide a platform for cutting-edge research, informed by real world experience and market insights, and to help policymakers navigate the increasingly complex world of energy and understand what to make of all of the changes that I just talked about. I couldn’t imagine a better place to do the research than New York City, we are going to take advantage of the resources we have in New York, the global center for energy finance and markets – ok well New York and London, but that’s why we’re here, we’re here because we have to work together. Columbia has eight global centers around the world, located in key energy areas, like Brazil, China, the Middle East, and we’re going to make use of all of those to really do work in a bunch of those regions. And of course, Columbia’s world class faculty across a range of disciplines, from law to science to business, engineering, and all the rest, because you
need all those insights and expertise when you study energy, which is what makes it such a fascinating field.

As you can tell, I couldn’t be more excited about the Center’s potential, and what Columbia is trying to do. We’re already off to a really great start. We’ve hosted numerous events on everything from Russia’s oil outlook to India’s energy challenges and a host of others. About six weeks ago we had a kickoff event in New York, with a who’s-who lineup of people in the energy world: New York City Mayor Michael Bloomberg, National Security Advisor Tom Donilon, the acting Energy Secretary at the time Dan Poneman, Dan Yergin and many others. It’s worth looking at our website because both Mayor Bloomberg and Tom Donilon gave really important policy speeches. Mayor Bloomberg, who cares passionately about climate change, gave one of the most vigorous defenses of developing our shale gas resources that I’ve heard anyone give in quite a while. And the National Security Advisor, Tom Donilon, who is now the National Security Advisor for another month or two anyway, really laid out for the first time a comprehensive view of how the Obama Administration understands the national security implications of the energy boom that we’re seeing in North America and what it means. So I would encourage you to take a look at both of those things.

We are out grabbing talent wherever we can find it. I was thrilled when David Sandalow, who is here today, was acting Undersecretary of Energy in the Obama Administration and decided to leave government service, and he had his pick of jobs in the energy world, he decided to become the inaugural Fellow and Senior Research Scholar at Columbia; so he will be with us for the next year. Nobuo Tanaka, the former Head of the International Energy Agency, will be a non-resident Fellow at the Center for the next year. Sergio Gabrielli, the former head of Petrobras, who is not with us today, will be a non-resident Fellow for the next year, and we are staffing up so you will see more announcements of personnel coming soon. You can sign up for our list on our website or follow us on Twitter, or lots of other things to get all those announcements.

We’re off and running with a lot of exciting work, but as I said, because energy markets are global, because of the importance of London, as well as New York, to the worlds of energy finance and energy markets, we thought it was important to come here and introduce ourselves to the energy world here in London, since all of the policy work we are doing really requires coordinated action because all these issues span all borders. We wanted to make sure that everyone including energy executives, thought leaders, policy makers, journalists here in the U.K., knew what we were up to so that today we could begin a process of close collaboration moving forward. We hope this will be the beginning of many mutually productive partnerships and opportunities for collaboration.

For me it is a privilege to be back in the U.K. too, since this was also where I first developed my passion for energy. It was really studying Middle Eastern politics at
Oxford University on the Marshall Scholarship. I see that Minister Fallon has arrived, and now that a Minister of Parliament is here I can say thank you to the government for the opportunity to study here in the U.K., and earn my graduate degree here.

I want to say a few other words of thanks here. I want to thank Osman Shahenshah, from Afren PLC for making today possible. Nancy Barbowitz, Madeline Storms, Helen Eliott, and many others for all the work they did to put this event together. Jesse McCormick, who worked for me at the White House and I convinced him to leave Washington and move to New York to help start the Energy Center. He really has been indispensable every step of the way, so I want to say thanks to all of them.

A few quick procedural announcements: there will be the opportunity for Q&A during the program and during the onstage conversations as well. If you would like to submit a question there will be cards distributed, so please write your name, your question and your affiliation as clearly as possible, and to whom the question is addressed. We will collect those and bring them up to the moderator. Please take a moment to silence your cell phones; this is being webcast, so that will be for the benefit of our distinguished speakers and your fellow guests.

To set the stage for the conference and help us all better understand how the energy world is changing, I am really delighted that the Rt. Hon. Michael Fallon is here with us today. He has been a Member of Parliament since 1997, in March he was appointed Minister of State for the Department of Energy and Climate Change. This is evidently a man who felt like he was not busy enough, because he accepted this assignment on top of his service as Minister of State for Business and Enterprise in the Department of Business Innovation and Skills, a position he assumed in September 2012. Part of that was a senior member of the Treasury Select Committee, Deputy Chairman of the Conservative Party. The Minister will make brief remarks and then he and I are going to have a conversation on stage. I’ll open with a few questions, but again, I encourage all of you to provide me with questions that we can pose to him. Please join me in welcoming the Rt. Hon. Michael Fallon.

Keynote Remarks

Rt. Hon. Michael Fallon, MP, Minister of State for Energy, UK Department of Energy and Climate Change

Cheers, thank you very much. I am very pleased to participate in this London Launch Event for Columbia University’s Center on Global Energy Policy. I couldn’t really think of a better time for this to be launched. The next two decades will see global energy consumption increase substantially, driven by the rapid expansion of the Asian economies, bringing more and more competition for energy resources. Global supply is at the same time undergoing a quiet revolution as technological developments bring
new resources onstream, and the map of global energy productions becomes evermore diffuse. Alongside that, we have the need to grow our energy systems in a way that is compatible with the challenges of climate change, driving a range of low-carbon technologies to become ever more affordable. So, there is certainly no shortage of challenging issues on which the Center can provide valuable support to the international energy community.

I’d like to talk very briefly, if I may, about our strategy for working internationally to help us ensure domestic energy security in the U.K., to ensure access to the energy imports that we need at stable and affordable prices, and to ensure necessary investment in our energy sector.

Let me say a word first on our dependence on international energy markets. We are committed to reducing our greenhouse gas emissions by 80 percent by 2050. Our energy policies need to lead the way, including through reducing energy demand, and promoting low-carbon energy sources. Many of you will be familiar with our current work on electricity market reform, the green deal and smart meters, just to highlight a few examples. But even with all those efforts, U.K. oil and gas import dependency is set to rise, due of course to declining North Sea oil and gas reserves. Though I need to keep stressing the considerable investment opportunities that still remain in the North Sea. For oil, we became a net importer in 2006, in 2012 our oil import dependence stood at 36 percent, up from 24 percent the previous year. By 2020 our oil imports are expected to rise to 43 percent. And even with our 80 percent greenhouse gas reduction goals, we’re likely to be importing more oil in 2050 than we do today. And that is against a predicted slight decrease in U.K. oil demand to 2030. For gas we became a net importer back in 2004, in 2012 our gas import dependency stood at 49 percent. By 2020 that’s likely to rise to 56 percent. While the long-term picture of gas is difficult to predict, it will likely remain in our energy mix for decades to come. Unconventional gas production here is in its very early stages, so that impact, that potential impact, on our import gas dependency, is not yet clear. And regardless of the precise level of imports wholesale oil and gas prices in the U.K. will very largely be set by international markets. That in turn can have a very significant impact on economic growth and bills.

We’re also dependent on international markets for the investment we need. It has been estimated that we require some 110 billion pounds worth of investment by 2020 in the electricity sector alone, both to replace our dated infrastructure, and to diversify our system towards more low-carbon sources. This brings huge opportunities with it for businesses, for jobs and for economic growth. Analysis of the global energy outlook, and recent events, continues to underscore the importance of our policy responses, to the key risks to our energy imports and investment needs. Those can be brigaded together under five elements.

First, we need to promote low-carbon technologies, energy efficiency, to restrain rising...
oil and gas demand. Based on its new-policies scenario, the International Energy Agency estimates a 35 percent increase in energy demand from 2010 to 2035. Low-carbon energy sources will not expand sufficiently swiftly to displace fossil fuel growth, and oil demand is predicted to be 14 percent higher in 2035, and gas demand 50 percent higher. That has serious consequences for both energy security, and for climate change. That scenario draws on policies, which governments have committed to deliver, and of course there is more time for action to be taken. Restraining global energy demand will not only mitigate climate change, it will reduce the extent of price rises, just as domestic energy and transport policies can reduce our exposure to them. In both cases, that would reduce risks to economic growth and protect our households and businesses from increasing energy bills. Roots to achieving these ends include securing policy commitments for example seeking to remove fossil fuel subsidies, which encourage wasteful consumption throughout the G20. Market distorting fossil fuel subsidies that encourage excess consumption globally amounted to some 500 billion dollars in 2011, up almost 30 percent on the previous year. Sharing expertise, for example, working through the international renewable energy agency and other international bodies to support developing countries in moving to a sustainable, low-carbon energy system, and providing finance including through our international climate fund.

Second, we need to encourage investment in oil and gas production. That’s quite consistent with our climate change goals. Even under the IEA’s 450 scenario, the world will be consuming some 79 million barrels of oil a day in 2035, compared to 87 million barrels a day in 2011. Over the same time, production from existing sources of conventional crude will have declined from around 65 million barrels a day to 26 million barrels a day. So new sources of oil will be needed to make up that difference. Global gas demand actually rises by 2035, even under the IEA’s 450 scenario. However, we can’t assume that the necessary investment will flow of its own accord. Many of the countries with the most significant fossil fuel resources have difficult investment climates, and the uncertain economic environment is a further barrier. In addition, further work is required on the safe and sustainable exploitation of unconventional gas and unconventional oil in order to maximize global production. Unconventional gas and oil is expected to account for almost half the increase in global gas production between 2011 and 2035. Here we can look to the United States’ experience of the shale gas revolution for key lessons to be learned.

Third, we need to ensure reliable energy supplies, in particular encouraging greater liberalization of energy markets, and strengthen trading links and infrastructure. There has been progress on new supply routes, for example on the southern corridor, and better functioning of EU gas markets. Nevertheless, we remain today a very long way from a fully liberalized global energy market, especially for gas. And recent events in North Africa and Iran remind us that even in the largely globalized oil market, secure supplies are far from guaranteed.
Fourth, we need to work to enhance energy price stability. This last year has witnessed considerable energy price volatility with oil prices fluctuating between $89 USD and $127 USD, and gas prices fluctuating between 51 and 99 pence per third. Our own office for budget responsibility suggests that for an annual 10 percent increase in oil prices, GDP might reduce by not 0.1 percent in the first year of the oil price shock. We should continue to promote our longer-term supply side levers, notable increased market transparency, shared analysis of energy and financial markets, and enhanced producer-consumer dialogue, including through the international energy forum; however, we also need to recognize that all that work will only be effective if we also succeed in restraining demand.

Fifth and finally, we must work harder to secure international inward investment in our own energy infrastructure. The challenge here is to ensure that our policy design delivers sufficiently attractive terms for investors, while remaining affordable for our consumers. However, that of course is made more difficult by the global economic climate and strong competition for financial resources. This in turn, raises risks of undermining our energy security, restricting growth, and then us missing our energy climate goals. There is an important international dimension in ensuring that our very significant investment opportunities are known, are understood, and are appreciated by potential investors. Our reforms to the electricity market will provide investors with greater revenue visibility combined with greater certainty on the returns that they can expect. We are also looking at ways of incentivizing shale gas exploitation in the U.K. by looking at reforms to the tax regime.

In conclusion, these priority policy responses are of course not ones that we can deliver here on our own. Our bilateral relationships are key as are also our relationships with multilateral institutions. To take just a few examples, the G20 and the G8 provide the top-level political support, and call on other bodies to act. The International Energy Agency provides the data and analysis and can help promote energy security and low-carbon energy. The International Energy Forum has the core function of facilitating dialogue between the energy producers and consumer clubs, OPEC and the IEA, as well as the non-aligned countries. And there are several other organizations that have their own niches in scaling-up and accelerating low-carbon deployment, including the Clean Energy Ministerial and the International Renewable Energy Agency. We should also recognize, and here I come back to the role of the Center, the important role that can be played by think tanks and academic institutions, with independent evidence of policy analysis, that runs through the policy debates on how to ensure international energy security. And I have no doubt that Columbia University’s Center on Global Energy Policy will go on to make important contributions in this regard. And with that, I wish Jason and his colleagues all the very best. Thank You.
Keynote Conversation

Rt. Hon. Michael Fallon, MP, Minister of State for Energy, UK Department of Energy and Climate Change and Jason Bordoff

Jason Bordoff: Thank you very much Minister. We will take about 10 to 15 minutes for questions; we got started a little bit late but we will stop right at 6:30, we will not go later than that. We’ll take a few minutes now for questions. I’ll get some started, and then again, you all have cards, please pass them to the center and they can be brought up here.

You mentioned the figure 500 billion a couple of times, it was the amount of fossil fuel subsidies; it was also the amount that had currently been spent on clean energy. As a proportion of GDP, one question I’ve already received, that’s more than the IPCC and Stern Report say we need to spend to deal with greenhouse gas levels. So the question from the audience is: We’re nowhere near even reversing our greenhouse gas path now, are we spending the money unwisely, or were these estimates far too low?

Rt. Hon. Michael Fallon: Are we spending our money wisely? I mean these are commitments that we’ve made. These are international commitments, these are European commitments, these are legislative commitments that we’ve made in legislative force and we can’t escape them, and we have to build them in to the design of our policies.

JB: And why is it so much more costly to get to where we need to be? What opportunities are there to spend the money potentially much better than it is spent today?

MF: I’m not sure of the answer to that. I mean to spend the money more wisely or spend it more efficiently?

JB: Yeah, to spend it more wisely or more efficiently. I guess the question is really, did we have unrealistic assumptions about how much it would cost to deal with climate change, is it in fact much more costly than we thought it would be, or could the money possibly be spent in better ways than we see it being spent today?

MF: Well, we’re trying to tackle our responsibilities under climate change and trying to meet our goals in a very challenging economic environment. We have to try and balance the commitments we’ve made with the need to restrain costs for business and for our consumers, and that is true in our market and it is true right across the western European market. Obviously, this argument is phrased slightly differently in the United States, where you’ve had the benefit of shale gas. But it may be that the profiling of our expenditure to meet these commitments has had to be shaped by the economic
challenges that we face as a country, and that we may have to do more of it a little later than we would have liked, and bear the cost of it a little later than we would have liked. But these things have to be balanced. At the same time as making these commitments, I have to be clear, when I spoke; we have to renew our infrastructure. We are losing an extraordinary amount of our aging nuclear stations, our fossil fuel stations, and some of the older gas stations that will be going off our system in the next 10 years, and that would have to be replaced irrespective of our climate change commitments.

**JB:** I wanted to ask you about public acceptance. There was a story in the FT today about the new planning laws for wind. I wanted to ask about what they are, why they were needed, and how to gain public acceptance for wind. And then also, you can also talk about shale gas. You mentioned shale gas development in the UK and how you think about gaining public acceptance for unconventional gas development.

**MF:** Well let me just make the position clear about wind first of all. There was a real danger that we faced, I think, with the number of onshore applications, the number of cumulative applications in the same parts of the country, many communities felt they were literally under siege from these potential developments. I think we faced the very real possibility of the public being more generally poisoned against renewables unless we took action to clarify the framework, and that’s what we’ve done today. We have altered the balance back, not so much in favor of communities against development, but giving local communities, local people, much more involvement and much more say in where these things are going to be sited, and if they are, much more discussion at the earliest stage and if they are prepared to accept them, much more community benefit from them. So we have made that clear today, and I think you’ll find that clarifies the framework, not just for local communities, but also for developers. They know now, from today, that these things will not get approval unless they are more appropriately cited unless they also attract consent from the local communities in which they are going to be sited. That will apply particularly to applications in England.

So far as shale is concerned, obviously we’re starting a lot later than the United States. We’re going to do two things. We’re going to, first of all, strengthen, we have already strengthened, the regulatory framework, which we will allow people to explore for shale. That means exploring it in a way that can be done safely, and in a way that fully protects the environment. We’ve set out a number of the consents that are required, not only the licensing and the planning permissions, but the consent from the environment agency and health and safety executive, and then finally consent from me before any drilling or hydraulic fracturing takes place. We’ve set out a very robust regulatory framework, but against that we want to now actively encourage exploration. We have announced already there will be fiscal incentives for developers, we’re consulting the industry on that, and once they are agreed, they will take effect from the beginning of the next financial year in April. We’re planning, too, a program of community benefits, in the same way you have for wind, so that where drilling takes
place, residents will see significant discounts on their bills or again a package of particular benefits for their local community. We’ll make more details of that available in a few weeks time. We are looking hard at the planning system to make sure there are no particular wrinkles there that should hold up unnecessarily in the development, that we want to see. And, we are also ensuring that there will be sufficient licenses available. There are some 170 licenses out there already, but we’ve announced a fourteenth onshore licensing round, and we have started work on the environmental assessment and European law requires us to underpin that before the new round of licenses is available next year. So we’re doing everything possible to step of the pace of exploration, but at the same time we have in place a very robust framework of protections to ensure that the exploration and the production is done in a safe way that fully protects our environment.

**JB:** What do you think the outlook is? Can the US shale boom be replicated here? In what ways is the UK similar or different?

**MF:** Well, the geology we already know is different. So it may well be, and we are going to publish the first major survey of the Boland shales, the Northern shales across the north of England, we’re going to publish that in a few weeks time. Which will show us, there have been various estimates found, but that will show us much more scientifically, the best possible estimate of exactly what those reserves might be. But that will not tell us whether those reserves can be extracted technically or indeed economically to the extent that they’ve been extracted in the United States. So this is a different geology and we don’t yet know the answers to those questions. What we do know is that there’s the enormous potential of successful exploitation of shale to reduce the cost of our energy for our businesses, for our households, and what we do already decide is that it would be pretty irresponsible, given the estimates that are there, not to encourage people to get out and have a look.

**JB:** We have a few questions, and there is quite a bit of consistency in what people are interested in hearing about. One of the questions is about renewable energy, the outlook for renewables policy, particularly given the fiscal constraints in an era of austerity, what can be done to help manage costs around renewables? Offshore wind, solar, and onshore wind too.

**MF:** Well the purpose of our electricity market is reform, and I know it is frustrating, there will be a lot of people in this room wanting to see the final details, but legislation is half way through Parliament. It passed through the House of Commons on Tuesday night; it is now in the Upper House. But we don’t have to wait for that to become law, we will be publishing in July the draft strike prices, so there will be much more transparency around the kind of contracts, the contracts for difference that we will be offering to potential investors. And I hope then, by that greater transparency, it will be easier for investors to look across the piece, they will also be able to see, if we do
conclude terms with EDF over Hinkley, they’ll be able to see the heads of terms there, they’ll be able to see these draft’s strike prices that will apply across the technologies and I think have a clearer idea of the likely rate of return that is going to be available. Now that will apply whether it’s onshore wind, offshore wind, other nuclear or indeed further gas generation.

**JB:** And then there are several questions around climate policy, the future of the EU ETS, which as you know, has come under criticism for low prices, how do you view the future of the EU cap and trade program, it’s effectiveness? And then, also questions about the competitiveness impacts for the EU or also for the UK in particular, which I believe has proposed a price floor and how to do that and remain competitive internationally?

**MF:** Well a lot of questions wrapped up together there.

**JB:** We’re running out of time-

**MF:** Sure, is that why. There are a lot of questions wrapped up together there. We were disappointed by the vote in the European Parliament against the emissions back loading proposals, not in the least because we really didn’t see any other way of dealing with this particular issue. The European Parliament is returning to it. There’s no doubt in my mind that that particular vote had an immediate effect on the carbon price levels and we hope for a better result when the Parliament returns to that particular issue in the next few weeks. It is very important to us here in the UK, and the Chancellor keeps reminding us of this, that our industry is not put at a competitive disadvantage through all these steps that we have to take, to meet our obligations. Now of course we’re starting in terms of renewables from a lower base than many of the other western European countries, we’ve got some catching up to do. But equally, we do not want to see some of our energy intensive industries feel under pressure to reshore their activities, so there is a very careful balance to be struck there.

**JB:** Quite an active debate in the US, as you know, about whether we should be exporting our energy. How important do you think US natural gas exports are to the UK or more broadly, in terms of Europe’s negotiating position with Russia and other impacts it may have?

**MF:** Well, I’ve been following the debates and there’s political argument about whether you should be converting some of the terminals to be exporters rather than importers, and I think you have granted permission down in Louisiana for –

**JB:** We’ve granted two terminals –

**MF:** Two is it so far? It was one when I was there, but I do understand that debate, and in the end of course, it’s a matter for you and the United States. For us, in the end, we
have to reduce dependency on imports. That is very very clear to me as Energy Minister. We have to continue to grow our indigenous energy sources. That means, continuing to encourage renewables, getting a new generation of nuclear stations built, and if there is shale gas that can be extracted economically then we’ve got to go down there and get it.

**JB:** And what’s the timeframe for that? You face an issue with aging and retiring coal and nuclear power plants as you bring new supply online, which takes time, how do you meet the demands of domestic energy needs?

**MF:** Well very little was done. I didn’t want to be too party political about all this, but very little I’m afraid was done under the previous government in terms of investing in new generation. And we face a situation not only where some of these nuclear stations, nuclear is about 16, 17 percent of our energy infrastructure at the moment, some of these stations are going to be retired from the system in the 2020s, but we’re also losing some of the coal-fired and oil-fired stations earlier than was originally estimated. So we do face a very sharp need to encourage new investment. To put a new gas station online is at least four years, to put a new nuclear station online is at least seven years, so these are decisions that are now pressing on us, which is why we’re determined to get the legislation completed this year to get the new framework out there, for those of you who are interested in investing here, and doing what we can to encourage other sources, particularly renewables.

**JB:** Well we’ve kept you a few minutes over the promised time and I have many more questions, but hopefully you might accept an invitation to come answer them in New York and we can host you at Columbia University. Please join me again in thanking the Rt. Hon. Michael Fallon for taking the time to be with us today. We’re very grateful.

**Presentation of Current Energy Market Trends**

*Christof Rühl,* Group Chief Economist, BP

Thank you very much, for that, thank you for the invitation, let me just start first by congratulating you and every single person involved for setting up that center. I've been working on energy economics in my case now for a few years, and I genuinely am still searching for any other subpart of economics where the gap between the importance of a sector and what we actually know about it, and more importantly, what the public knows about it, is that large.

And energy is true where many people can say most anything when you read the newspapers, and when you are sitting in your White House position, and got frustrated because you couldn't get the right information, that's just one indicator of how the low, the low hanging fruits are in this area. So I'm very glad that you are doing this
undertaking and I could not imagine someone and I mean this seriously, better with your background, your capabilities, and with your ambition to get this off the ground. So with that is a good occasion and thanks for having me here. I was, unfortunately the slides the work, I thought I could be quicker without them.

I was asked to give a broad overview. We have heard already about global energy markets. I think we are all energy aficionados here, so I will skip very quickly over the big global picture to focus on one particular aspect which I think is of great interest currently. That is the implication of the so-called shale gas revolution in the U.S. The strategic, the political and the energy market, the economic and the energy market implications and in a broad sense we have some meat for discussion. So with that, let me just zoom through the first part, through the general energy world, and knowing myself, I'm going to do this without slides, otherwise it takes half an hour, and then spend some time briefly to give you a production profile of how we see the future of shale resources developing. Just so that we have some good starting point and then point out some of these strategic implications which may be worth discussing.

The global energy outlook, ours is not very different from what Minister Fallon just told you. We see growth of course in a growing world at about 36% between last year and 2030. People always pale when you tell them that, but if you look in the rear-view mirror, the system actually grew much faster the last twenty years than what everybody is predicting for the next twenty years. So we say 1.6% growth until 2030, the last twenty years has seen 2.1% growth. It is not impossible to believe that this will happen. It's going to be as it has been pointed out, an energy world where 80% will still be based on fossil fuels. Very few serious people would deny that, and it's going to be a world, which largely is driven by energy demand in the so-called developing part of this world, the industrializing countries of the non OECD.

A footnote here, much less well known and often you hear people ranting on about energy shortages among the privileged few typically in the OECD caused by that energy demand from the developing world. These guys are actually producing as much energy as they have been using over the last few years. The last ten years, I'm just diving out from the depths of doing the statistical review of last year. From the last ten years: contribution of non OECD to global energy consumption, 99%, contribution of the non-OECD to global energy production, 98%. So they do their part in that sense.

It’s going to be a world that is based on changing fuel shales. As we all know, it is a system that moves very slowly, but it does move. Most notably about them is the decline in the share of oil, which started as a true structural break, starting with the first oil price shock in 1973. We see that continuing. Next year, this year actually should be the 40th anniversary of oil losing market share year after year. And if things are halfway in line with the picture we are painting there, that will be a world by 2030 where we actually see the shares of the major fossil fuels converging, at about 25-27% each for
very different reasons and we don't have the time to go into that now. And then that's
the starting point for the following remarks.

This is of course, also a world where we just come out of ten years of high and rising
prices. You take the average oil price over the last five years and compare it with the
average oil price for a five year period ten years ago gone up by 240%, coal 130%,
natural gas globally more than 90%, so ten years of high and rising prices, and of course,
we would expect, even as non economists, that to trigger some changes in the system.
And we see those changes broadly speaking, on the demand side in much improved
energy efficiency all over the place.

One of the few reliable things, which again and again that fall out of the data is when
prices are high, energy efficiency improves in the long term full stop, whether we like
that or not, and we see it on the supply side, and that's what I want to talk about. On
the supply side, we have seen supply reactions and our fuel reactions to high prices,
which are captured in the topic of new technologies and the so-called shale revolution.
Just to give you an impression, in our book, for all the necessary increases in energy
production until 2030, about 20% of that increment which is necessary, will come from
new sources in the form of shale gases and shale oil. Another 17% if you wanted to, you
could include that will come in the form of renewable energy also in your sources. So
almost 40% from new stuff and the 60% from more of the same--more hydro, more
nuclear, more coal.

With that, let me spend five minutes or so, outlining to you some of what we think [are]
important characteristics of these new unconventional fuels, in particular tight oil are,
before coming to the conclusion, to the possible implications.

First of all, that stuff is almost everywhere, very different from the conventionals we are
used to. What you have on the left-hand side here, is an assessment of one of the latest
available from the IEA, about the technically-recoverable resources, not reserves here,
and you can you can see from the left-hand side it is fairly widely spread. In particular if
you take account of the fact that exploration is still in its infancy in many areas,
including what we know about the Middle East. On the right-hand side, you see our
production estimate as opposed to resource availability, ours to 2030. And you see that
us, and we are no exception here, almost any analyst predicts that, you see North
America sticking out like a sore thumb. People do expect, production of these new
resources, of shale resources, still to remain concentrated in North America for a
considerable period of time.

And that brings me to our production profiles, before I go into that, brings me to a
much, much broader question. We like others, predict that these resources will have a
considerable on the future of energy production and I’m going to detail how
considerable in a second. But don’t take my word for it, because in fact, of course, they
are already big. When you like at the U.S., the U.S. on average, imported about 12 million barrels of oil per day, in the period 2004-2007. By the end of this year, these imports will have fallen by half. If you step back and you ask yourself, "where did the last 5 years, the net increase in global oil production come from?" It didn't come from OPEC countries. It didn't even come from the Middle East. It came from 2 countries in particular: the U.S. and Canada, and it is all unconventional fuels.

And a very good starting point for any discussion of these widely spread unconventional fuel resources would be the question, "Why is it, that of all the countries in the world, it is the U.S. and Canada which generated this so-called shale revolution?" The intuitive answer to that question probably would be, "Well that must be where the resources are." We all know there are oil sands in Canada, and shale resources in the U.S. But that answer, I think, is almost certainly wrong. Because we also know, that there are more oil sands in Venezuela than in all of Canada. And nothing, but literally nothing came out of Venezuela in response to these ten years of high and rising prices. Most geologists would agree today that China has at least as many shale resources as the U.S., and nothing came out of China in response to ten years of rising prices. And you could game with deep-water production by comparing Mexico offshore with next door, the U.S. offshore.

The reason this happened in the U.S. and Canada, was most of all, that these are open systems with free access and capable of generating competition this way. Everyone can invest in the U.S., or Canada, and everyone does. And the history of that shale gas and now tight oil revolution is one of competition of breeding new technologies, which gave us, which made it possible to create these resources. It's an almost a Schumpeterian process with a lot of small and medium-sized firms moving in first, many of them losing their shirt[s] in this competition, and the big ones only coming after these technologies have been invented. I [will] come back to that point in a second.

Now let's focus more narrowly on what the characteristics are. What you have here is a production profile as we have compiled it to the best of our knowledge, taking into consideration, geology, what we know about geology anyway, the enormous infrastructure requirements necessary for that stuff, and also what we think about political developments.

On the left-hand side you have the global oil markets. We think that by 2030, global oil consumption and production will be somewhere around 104 million barrels per day, not so different from what other people are thinking. And you see how this looks like, the dark area at the bottom. This is conventional, non-OPEC oil production, gently declining, the North Sea, Alaska, the Cantarell Field in Mexico, resources like that. On top, that is oil production, crude oil light green and NGLs yellow. We see also that going up a little bit over time. And the fan, which is in the middle, these are the unconventional
resources we are talking about. Oil sands from Canada, a little bit of biofuels, and then the biggest part of the fan, this is tight oil.

The right-hand side shows you the production profile, as we see it developing for tight oil. What we have here is a profile, which has, but before I start with the correctors, let me put it in perspective. We have this resource as you know, hasn't been around, only a few years ago, so we started [at] virtually zero. We are now roughly speaking at about 2% of global oil production, already coming from tight oil after a very short period of time. We think it will continue to grow until it by 2030, covers about 9% of global oil production, about nine million barrels per day, considerable order of magnitude.

This production profile has three important characteristics. Number one, it continues for this 15-20 year period. We're looking [for] it to be driven mostly by developments in North America. North America will account for the bulk of production in the foreseeable future. Number two, and based on the production profile of North America, what we [are] seeing is a period of very, very rapid accelerating growth. We are in the middle of that, and then continued growth but at a decelerating rate. So growth slowing down after about 2020. Number three, there is of course, a number of other countries in here, which are expected to also develop this resource. The biggest one is Russia, which has tremendous tight oil resources. In this case here, estimated to produce about 1.5 million barrels per day. But the speed at which these countries come in and assume production, is not enough to change the fundamental shape of this profile, which has accelerating growth and then slowing growth from 2020 to 2030.

We have also, and also publicly available, a very similar profile like this for shale gas, which has advantage that we are further down the road and can make statements with a bit more accuracy. It doesn't look all that differently, but I wanted to keep in mind these characteristics, the bulk of it driven by North America, the production profile growing very rapidly until about 2020 and then decelerating. New countries coming in, but not quite fast enough to reverse that deceleration process. Now what do you do? You do something like this to your best knowledge, and you have no idea how close to reality it really is because we're at the very beginning of the process. So what we did, truth in advertising is we took our forecast and compared it with everybody else's forecasts. Turns out, at a long story's short that we are at the conservative end of the spectrum. Very hard to find people who are more pessimistic than us and that's another thing I want you to keep in mind and now makes us ready I think, to talk about the implications.

If we take this very conservative production forecast, there is a number of strategic implications we can outline, and I'll try to be very, very quick. Number one, especially if you are in my shoes, working for a commercial oil company, is of course the question, what will this do to prices? And the answer if the oil market would be a normal market, would be it brings prices down. The oil market is no normal market because we have
OPEC in there, and so in the case of oil markets, this question for the price impact translates pretty seamless of how is OPEC going to react to this? Your guess is as good as mine, but ours is that with this order of magnitude, which I have just outlined to you, OPEC will be willing and able to cut production.

What does that mean? It means that the demand of OPEC goes down until about the end of this decade. And that in response to these cuts, OPEC would generate spare capacity, roughly at a level of 6 million barrels per day. That's the highest level of spare capacity since the 1980's. And they will have to work for their money. They will have to maintain it for a number of years. This is not like the crisis in 2009 where you have short periods, short spikes of spare capacity.

Now imagine, this is a world where most of that spare capacity will have to be carried by Saudi Arabia. It's also a world where you have the U.S. and Russia, and Saudi Arabia being able to produce about ten million barrels per day each. And there you have Saudi Arabia sitting between Iraq on the one side, where production is growing, and Iran is an OPEC member but has not quota, and Iran on the other side, where we don't know what will happen over the next 5, 6, 7 years, but where production may also resume growth.

So this is a large uncertainty. First impact, it will put pressure on the configuration of oil markets as we know them on prices, and will put pressure concretely speaking on OPEC, just referring myself to oil.

The second one, we'll do this again faster without slides. The second implication is the enormous importance of policy and politics in this. I've told you already how widespread the resources is. What will narrow the range of uncertainty I've pointed out? Huge range of uncertainty in forecasts. Answer? It will be what our industry calls "above ground decisions." It will all be about how fast we provide access and what kind of restrictions for environmental or other reasons are you putting in place. We're already seeing this. In the U.S, we have production concentrated in the middle of the country, Dakota [and] Pennsylvania. We have fields in both coasts, in upstate New York and California, which are not accessed because of concerns about fracking. In Europe, you have the UK and Poland begging for more investment. You have France putting a moratorium in place outlawing fracking. And the UK as you heard it, in the middle, just like other countries in Europe. In China, you have a government decree to local companies to produce it. Didn't work very well so far. In Russia, you have huge known resources, and the government still thinking [about] where to go, where not to go. I don't want to speak of a primacy but there is an enormously large role for politics and policy in here, in determining how fast these countries come online, compared to resources availability, very different from the picture we are used to.

Number three is the implication which is probably most talked about. It refers to what is often grandly called the geopolitics of energy, and it really means the Middle East. We all grew up in this world where oil was the central fuel and the Middle East was the
central providing region, and I'm not making a political statement when I say, "We all grew up with a thought in the back of our minds that when push comes to shove, the largest consumer on the planet will do what is necessary to restore a certain degree of order, for better or for worse. And it's just I think, that we have that, all of us in the back of our minds, because I think, a fact of life. It's going to be, as we all know, a world in which the U.S. will dramatically need less oil imports, and which China will increase its import requirements greatly. The European Union will maintain to require higher imports, and that's a world where I can at least, the way I always put it, imagine a situation easily where in only seven or eight years from now, a Mr. or Ms. American President, looks at some really unpleasant developments in this very central region, and says, "No skin off my nose. I only need very little oil, and I can get it from Canada or Mexico." I'm not saying this will happen, but I'm saying there's a huge amount of uncertainty around this geopolitics of energy, so-called. I speed up even more.

Fourth impact is on the economy. Currently, this is mostly discussed in terms of the advantage the U.S. gets by cheaper feedstock and cheaper electricity prices versus Europe. The reality is that this impact is going to be much more massive. It's going to have a global economic impact. If you ask any economist over the last ten years or so, before the crisis, during the crisis, and after, "What's the biggest macroeconomic problem on the planet?" Chances are, he or she would have said, "It's these global imbalances." The huge trade deficit in the U.S, the huge trade surplus in China, in Europe, to some extent, the Middle East, and the question, how do they rebalance without [a] major shakeup, What I didn't know before we did these numbers, is that even today, with falling energy imports in the U.S., energy still accounts for fully 58% of the U.S. deficit for goods and services. That everything else equal will go away. At the same time, these very much rising energy imports means that energy costs will cut into their trade surplus. The same for Europe and if prices really come under pressure, the same for the surplus in the Middle East. This doesn't need to happen of course. The U.S. could decide to import more bicycles or exchange in movements come in wazoo. But what I want to point out is the impact of this is large enough for big multinational institutions to put taskforces in place to try to sort it out and calculate it. It's going to have a global impact, hopefully a positive one.

And finally, there's also a decision point in here, [which] has been alluded to already, for environmentalists, what's it's going to be, fear of fracking, or more use of shale gas to replace coal? We have in our outlook now, declining sunk carbon emissions in the U.S., not because of some complicated energy policy, but because of among other things, a pretty massive replacement of coal with gas in power generation, in bringing down carbon emissions drastically. And this is going to be a debate, which already is part of this political decision making of where you allow for this stuff to be produced, and where not. I have my own suspicions on it because fracking is a local problem issue [and] CO2 emissions are a global problem, and these things always end in the same way, but it is another valid case.
I'll stop here, but these are the five main points which I see, which I think are worth debating. What's it going to do to prices and the structure of energy markets? They put pressure on this configuration on markets as we know it. What is going to be the rule of politics? And that is going to be hugely bigger than what we have seen in the past. What is the impact on the geopolitics, and in particular, of energy of the Middle East, creating big uncertainty in that department? What's the global economic impact? Hopefully positive, but certainly with winners and with losers. And what's it going to be in terms of for those of us interested in environment which should be most of us in terms of pushing for these technologies or rejecting them on local grounds? Thank you.

Roundtable: Current Issues in Global Energy Markets

Nick Butler, Visiting Fellow and Chair of King’s Policy Institute, King’s College London
Michael Liebreich, Chief Executive, Bloomberg New Energy Finance
Christof Rühl
Moderator: Javier Blas, Commodities Editor, Financial Times

Javier Blas: I want to thank Columbia University for the kind invitation, sorry about the Twitter feed, but it has been restored. We have tracked the attacks to Syria, so apologies for that, the Twitter feed is back. I'm going to speak just very briefly on the panelists, but you have the bios in your booklets. Michael Liebreich is the Chief Executive for Bloomberg New Energy Finance, he has been working in the company since 2004 with a staff of 200 people. Bloomberg New Energy Finance obviously is providing information for people who are interested in new energy, particularly green forms of energy. But he has a fantastic engineering background from the University of Cambridge, where he was the winner of a very prestigious prize for thermodynamics. I was very interested in that piece of information from his bio.

Nick Butler, who didn’t suffer the attack on his blog for the Financial times – you didn’t suffer the attack on your blog?

Nick Butler: No, not as bad.

JB: Good. We are very pleased that Nick is contributing to the Financial Times through his blog on energy issues. But obviously, you know him much better for his fantastic work at BP, where he was group Vice President in charge of strategy, later he was on Downing Street as a Senior Policy Advisor, and more recently he became the chair of King’s College in London’s Policy Institute. And you know about Christof.

So I was very interested in your presentation because you were painting a war with Saudi Arabia, which makes me very worried about, in particular, the next ten years. I was in Vienna last week for the OPEC meeting and we have this ritual that is a real pain
for me. You could say that I’m not a particularly sporty guy, but we go jogging with Minister Al-Naimi of Saudi Arabia the morning before the OPEC meeting. He really enjoyed taking the press corps, and as my girlfriend usually says, “Minister Naimi is the only reason you get out of bed at six o’clock in the morning to jog 45 minutes.” I asked Mr. Naimi, “how worried are you about shale?” And he looked at me and first of all, he kind of mentioned something that I needed to skip breakfast after the jogging, and then he said, “we are fine. I am relaxed, we work on shale, it is not a problem for us.” Why are the Saudis so relaxed about shale oil?

Christof Ruhl: You are the second journalist to tell me about this morning jogging. I don’t know what would you have said in his position? I do think the order and magnitude, which we have in mind, is such that it will require adjustments from OPEC. If the posit is more optimistic as the outcasts arrive, than it will require even more dramatic adjustment. And we have seen the beginnings of this from many perspectives the real question is why oil prices are still where they are today? And the short answer is because we had big supply disruptions, in Libya in 2011, Iran in 2012, Saudi Arabia responding responsibly, and producing a lot more, and then starting at the end of next year, trying to cut back their production increase and that is likely to continue.

JB: Minister Naimi told us that before shale existed, or before shale became widespread, and before even the global economic crisis in 2008, he was saying Saudi Arabia was exporting to the United States about 1.4 million barrels a day. He said today we are still exporting 1.4 million barrels a day.

CR: Yeah, and Saudi Arabia has a proud tradition of making bilateral deals for oil export, and I don’t see that changing in the near future. What we do see on a more serious note already is exports being redirected. Last year in the US oil imports declined by about 900,000 barrels per day, mostly at the expense of North African production and also West African production. The reason for this is that what is produced in Africa is also light sweet crude, similar to tight oil it replaces.

JB: On that matter, this revolution, the shale revolution, will have very different impacts on OPEC members. If you look at West Africa, they’re the ones who are really suffering.

NB: Well, first of all, I draw two conclusions from the discussion we’ve had so far, before I come to answer your question. First of all, that I’m very sorry that Christof isn’t the Energy Minister in the UK. Secondly, how much dynamic change there is in the whole sector, and if I disagree at all, if I dare disagree with Christof’s excellent presentation, it is that I think he understates the degree of change that is going to come in the future. In my ill-spent youth, in BP I did work on the stats for the review and the Annual Energy Outlook that the company produces. I very sadly have a collection of all of them, going a long way back. I did look at this, and I didn’t have to go back further than 2007 to find one of those Outlooks that absolutely did not mention shale gas. We did not think at
that time that anything material was going to be possible. And I think you are understating now the potential for shale gas and tight oil, and other forms of change in the sector, greater energy efficiency, smart grids, gas, hydro, many many things, including things that we probably can’t imagine now that are going to impact this. So I think that there is a great danger of staying in this world where energy is defined around language and scarcity and dependence and ever-rising cost. When I think the reality, which will hit OPEC as well as the companies that are over investing in high cost projects, the reality is of a much more diverse production system, much more efficient use of energy right across the world, people leapfrogging technology rather than waiting to catch up with it. And I think we’re moving into an age of plenty, rather than an age of scarcity. And that will hit and change the calculations and the economic thinking of every player in the industry.

**JB:** Michael, one of the impacts of shale is that suddenly, we are all very excited about hydrocarbons once again. What does that mean for new forms of energy?

**Michael Liebreich:** That’s a good question. Interestingly enough, new forms of energy have not gone away because there is a discussion about hydrocarbons, which of course has sort of dominated the airwaves somewhat. Just to put it in perspective, investment in clean energy, so renewable energy, energy efficiency and so on, dropped for the first time in 2012. It dropped by 11 or 12 percent. It is still a quarter of a trillion dollars. And particularly when you look at the electrical system, the investment on the supply side, so generating capacity in renewable energy, is actually, globally, not that far behind global investment in fossil fuels. You would think it should only be gas given the news flow. But in fact, worldwide it’s about 40, 45 percent renewable energy, and then Europe of course it’s far more than 50 percent, it is 60 or 70 percent.

But I want to actually, we’ve had sort of uncertainty, and then we’ve had no no no it’s going to be worse for us, and I think it’s going to be more uncertain even than that. Using my thermodynamics prize I will now solve the Gibbs free energy equation for the world’s energy system in public here. But I think there is also a bigger context to all of this discussion. Because in a way, yes there is the new technology of shale tight oil and shale gas, but analyzing that, as Nick says, within the framework of scarcity or plenty, or even with the geopolitical framework of what does Saudi Arabia do, what we’ve got is a phase change. There is a revolution going on in the whole energy system, electrical system, and the transport system, which is of course becoming linked in very interesting and new ways. What we do is we predict things, and a month ago in New York at our summit, I predicted with great certainty the three things that would be of greatest importance, which would be: Unconventional oil and gas, would be increases in energy efficiency or in energy intensity, which have been very dramatic already and will continue, so I predicted they’ll continue and the third thing is very low cost renewable energy, clean energy; and also, the lowering cost of integrating intermittent energy, which is not constant, which will also continue to drop. And the And the fourth thing
that I predicted is that actually the future of the energy system can’t be predicted because we’re in this phase change period, which is discontinuous, and is therefore going to be an extremely volatile place to place capital and make financial bets.

**JB:** Nick you have done a lot in both the private and public sector, I want to take your public sector side, how do all of these: the shale revolution, this uncertainty that we have of where the energy market is moving, impact the European market? In particular, if there is such a thing as a European energy policy?

**NB:** There’s no European energy policy and I think there are attempts to create one, which are very legitimate and honest, but they have not yet succeeded. Every country is pursuing its own energy policy, which is related to its own natural resource base, its own domestic politics, and its own objectives. And I think that that will continue I don’t see a really coherent policy coming out of that at the moment. I think politicians are generally now struggling, by trying to meet at one in the same time three different objectives. One is security of supply because if the lights go out, government is in trouble; they’re blamed whether it’s actually their fault or not. Climate change, where they have made commitments to make reductions in the context of the approached march to a global deal, which was aimed for in 2009 but has not happened. And so you now have them where countries such as the UK, which are very law abiding and stick to the rules and stick to objectives that they’ve agreed to, now find themselves on this path towards cutting emissions when very few people are doing that. And the third element that they’re now trying to get hold of is competitiveness. And there’s a new and large-scale exercise across Whitehall, that started two weeks ago I believe, on the impact of relative energy prices, particularly relatively low prices in the US, on business here and in Europe. That has not finished yet. I look forward to reading it; I hope it’s released under freedom of information because I think it will show the large gap that is opening up. And I think that politicians trying to balance, trying to keep these three balls in the air are running into real difficulty, you know the science, the technology, everything that Michael talks about, I agree with, is now making it very very difficult for public policy to work in a very planned way.

**JB:** Christof, in this area of impact in policymaking in Europe, you mentioned in your fantastic presentation, that unconventional oil developed in the US and Canada, but there are other vast reserves as well. You mentioned Venezuela, Russia, what is the outlook for unconventional oil here in Europe?

**CR:** Depends whether you define Russia as part of Europe. It is difficult because in the European Union, in that respect, there is no unanimous policy; and so, you see countries struggling. And you see this division, as I said, with some Eastern countries being very interested for obvious reasons in exploiting these new supplies, and others being much more careful for environmental reasons. But I am the realist in this round, so let me say two things. One is with respect to European energy policy: it does exist in parts.
Unfortunately, many of the policies are very contradictory so what we have seen for example is the attempt at setting a carbon price for Europe, if done in the right way you define a target and then you hope that there will be positive price for the permits to pollute. But it wasn’t good enough so the European Union had to give itself renewable targets on top of their efficiency targets. As a result, this volume target was never in danger of being reached; and therefore, the carbon price dropped to below any meaning. Why is this important? Because now we have a situation where all of a sudden coal, which is being crowded out in the US by cheaper shale gas, is being exported to Europe. So you have this situation, enforced by the way in the UK, where you have mandated requirements for renewable energy eating into natural gas’ supply for power generation on one hand, and cheap coal imports eating into it from the other. Just an example of how the best can be the enemy of the good in this respect. I don’t dare to imagine how a unified policy for access to shale resources would measure up against their track record.

**JB:** Yes but, this goes beyond the politics of shale, and you know the business problems that develop. The US has an ownership system over the reserves, a very good oil industry with a very good oil service industry in place, is that an impediment or a handicap, or could that just all be resolved?

**CR:** I think in Europe we are still very far away from this even if we had a unified sensible policy. This is tremendously infrastructure-intensive, there’s a very high drilling intensity, it happened also in the US and Canada because there they have the drilling rigs, but in Europe, we don’t have the infrastructure, we don’t have the pipeline network, we don’t have the rigs, which could do all of this. But having them, the US of course fosters a competitive environment, it is also the geology is difficult, we had great disappointments in drilling in Germany and Poland where it was attempted. This is not the kind of thing where all of a sudden you take the technology of the US like a key and you open a door, and you know in Europe that’s not how it works. In Europe it has to be adapted and readjusted and so on. For the foreseeable future, I think even under the best of circumstances, it will take a long time to implement here.

**JB:** Michael, I want to go off of one thing Christof mentioned, what is and what does climate change policy mean for Europe? Particularly, do you see any future for the ETS system of carbon credits?

**ML:** Well technically, there is a future because until there is a decision not to have a future, well a future, I didn’t say it would be a future of lovely high carbon prices, which is what you may want me to say. I mean, thinking about European energy policy, it’s hard to imagine executing worse than has been executed. The problem with the EU ETS, setting a volume target and then first of all having a huge recession and having a system that can’t respond to that, so there’s no relativity in the target based on your economic growth; and then instituting large-scale conflicting policies, and then, trying the most
recent attempt which is called “back loading”, where you withhold some of the sales of carbon credits to release them at a later date, which is simple, it’s simply political interference. So if they want to have a system, which is based on a physical limit and they’re letting the price be what it might, then that’s what they have to do. And if they want to have a system where they intervene to create a price, then that’s what you have to do. One of them looks like, if you want to have a price, then you have to manage it like a currency. It’s an entirely artificial instrument that has to be managed with all the seriousness of a proper currency. And if you want to have a system that is really a volume-controlled system, then we have another very good example of that and it’s called “bit-coin.”

**JB:** Nick.

**NB:** I wanted to go back to Christof’s comment on shale in Europe. I’m not as pessimistic as that. I think you should remember that the shale industry is quite new. And that there is a learning curve, which you see in the US, in terms of the cost of seismic, the quality of the seismic, footprints that are required, the basic technology, the water management, the infrastructure development and I think you will see a simplification and naturally an improvement in the process as this business starts in Europe. Now, I don’t think it will occur everywhere for political reasons. I don’t think it will occur in Germany very soon and I’m pretty sure that despite the extensive tight oil resources north of Paris, I don’t see it occurring in France either. But don’t forget that Europe trades energy even if not everybody produces it. I was struck when I was in Germany last year to learn that although the Germans have said no more nuclear, when there’s a peak demand, they still manage to import electricity, which is nuclear-produced from France and the Czech Republic. And I think that even if shale is not produced in Germany and other countries, there will be gas and electricity produced through shale, which get right across the European market and will influence all the other parts of the market.

**JB:** The Rt. Hon. Michael Fallon made an interesting remark in his speech about how important it is to open trade for energy. Jason pressed him a bit on the situation with exports from the United States, and he was very cautious. And you were mentioning this report regarding what Whitehall is doing about the price gap between the US and Europe for our competitiveness. Do you think that Europe should be complaining to Washington very loudly and go to the WTO and say “I’m sorry, but gentlemen, stop the restrictions and please export crude oil because you are restricting trade.”

**CR:** I think to some extent I believe in free trade and it’s one of the biggest accomplishments of Europe to have this unified electricity market, which is very beneficial to have so the Germans don’t get too much into subsidies, it’s a different method. But I think Europe has already spoken on this issue because Maria van der Hoeven, Chief of the IEA, has stated in public that it would not be appropriate for the US to restrict exports of crude. It is an old regulation from the 30s and I understand
refineries are getting a good deal of it, because they are not allowed to export crude, but you are allowed to export products such as gasoline, so they get cheap American crude and then sell at world market prices. So yes, I think we should allow for that.

**ML:** I agree that we should, although I think the question has been invested with overly much importance in the recent debate. I mean first of all, you say should Europe complain, the permits that are currently under discussion only relate to countries for which are not covered by most favored nation-status. So in fact for Europe, those exports of natural gas, that’s not in question

**JB:** What about in regard to the ban on crude oil?

**ML:** There is a ban on crude oil but oil is a much more fundable market, the only number that matters in a way is how much headroom there is or how much globally. And it’s not as simple as that obviously, but I would hesitate to comment on crude oil economics in the presence of BP’s Chief Economist. But I think that the point is also the question of costs. Even if you allow free exports of US shale gas, the question is, at the moment you’ve got a situation where US gas is $4 per mm/ BTU and in Europe it’s $10 or $12, and in Asia it’s $15 or $18. And the question is really, even if you allow exports, what will happen to those price relativities? And by the way, even if you allow and you accelerate, as I think you should, the exploration for shale gas here in the UK, there’s a huge discussion because there’s this enormous gap that’s opened up between fact and the political discourse about what prices we’re likely to see. So quite clearly, we’re not going to see prices of $4 per mm/ BTU in the UK. There’s sort of the gift of god narrative from the politicians, it’s just absurd, and it could potentially waste us five years of rational energy policy whilst we believe that if we do allow fracking, and I absolutely believe we should, my gas team has done quite a lot of work on what cost we might see in the UK for shale gas, and we’re looking at $7 to $12 per mm/ BTU. So then you have US gas at maybe $5.50 or $6, who knows, then you have a cost of importing to Europe, which will be another $3 or $4, and you’ll have a price here of $8 or $9 and the competitiveness issue. And so I think that we’ve got to not over estimate the role that exports could play in changing that dynamic. And then over in Asia you’re most likely to see higher prices maintained as well.

**NB:** I agree. I’d put it a slightly different way. I think there’s much too much emphasis on the US export positions. I think the biggest impact on the market is that the US is not importing. So that the flows of gas from say Trinidad or North Africa or elsewhere, which everybody used to assume would go into the US, are now coming into Europe. Also because we’ve had this decade of high prices, a lot of money has gone into the sector so people have found quite a lot of gas. East Africa, Eastern Mediterranean, offshore India, offshore Brazil, all those sites are now under development and Australia. Some of them look quite expensive, but the money’s going in and the developments are likely to be completed. That is going to increase the supply when the U.S. is now, pretty
much, a self-sufficient market. Where is that going to go? It’s going to go into Asia and into Europe, and that is where the price effect will be found.

ML: On that point, although we’ve got these unexpected either source of supply or direction of supply, you’ve also got unexpected demand. Post-Fukushima, you have the world’s third largest economy stepping out of 20 percent, 30 percent of its energy source. You have Germany exiting nuclear, you’ve got enormous growth in China, enormous growth in India. So what you’ve got is a world that’s awash with supply, but it’s also awash with demand.

NB: Right.

JB: Nick, you were mentioning something then of the high cost of production in Australia, and how some of those places are no longer considered optimal for investment, and previously you made the comment that some companies maybe investing in the wrong projects, in very expensive projects. Do you think that we have been on a rising tide where high prices seemed to be keeping everyone swimming and now the tide is beginning to recede and some oil or gas companies are going to look like they lost their clothes?

NB: An awful lot of companies sit in their boardrooms and look at that nice graph that Christof showed of all the prices rising over the last five years. They read forecasts from people like Goldman Sachs, who for whatever reason think it’s going to go to $200 per barrel and that all gas prices are going to reach a sort of nation market price level; and they think that then we can invest in anything and everything. And that is why I think that too many people have gone to the Arctic and too many people are going to very deep water areas where their costs are just going up and up and up, and if my view is right and Mike’s view is right, I think the consensus so far is that the prices are going to at least plateau and in some cases could come down. And that will leave people with projects that require prices of $100 per barrel or the equivalent, or more, and they are, yes, they are looking a bit stranded. And that is why actually, I think the international oil companies, despite the recent upturn in the stock market, are now 30 percent lower than they should be.

CR: Well there is at least one company who listens to a different story in the boardroom. I think there is an important, a serious issue here also worth being mentioned when you talk about prices and the potential for them coming down sharply. Which may be one of the reasons why your jogging partner was relaxed, and which also may be one of the reasons why they are not quite so gung-ho as Nick in saying that everything changes tomorrow. When oil prices collapsed in the 1980s, at least two things were markedly different from what we have today, other than OPEC coherence. One is that in the 1980s, demand was actually falling, when now consensus would have it that because of this rapid rise in non-OPEC economists demand is slow but likely to continue, and the
other and more important one is again in the nature of this new resource. In the 1980s the oil supplies that were coming on were largely the North Sea and Alaska, similar in size. But the companies running them actually faced an almost binary choice when the prices crashed. They could keep production running, or they could cut it. There was very little scalability of that. Most of them decided, because of the large cost to keep it running. It is different for tight oil and we see how different it is for shale gas now, because of the immense drilling intensity, this is actually a scalable supply. In response to falling prices, you can scale back production. We are seeing this right now in shale gas when prices have undershot. Production now for the first time this quarter, and first quarter of this year, actually fell, production increase turned negative. That is true also in the case of oil. Now it is true, simplification, standardization sets in, prices come down very rapidly and depending on whom you listen to the price now for tight oil in the US is somewhere between $40 and $60 per barrel. But certainly you would see a reaction if global prices would get anywhere near there.

**NB:** I do agree that all of this won’t happen tomorrow. These are quite medium-term trends, they’re not instant price fixed. I’m not saying that prices will come down to $40 or even $60 per barrel. I just think they’ve reached a plateau and they’re more likely to come down than go up; and I think that where we perhaps disagree Christof is you have confidence in the ability of Saudi Arabia to manage the market, which I have lost because I am not sure now that given the very rapid rise in domestic demand, in Saudi Arabia with a growing population, and everybody having cars and using gasoline at very very low subsidized prices, which they find it difficult to stop that system. I think now that the flexibility that they have, given their need for revenue, in cutting back production is much less than it used to be.

**CR:** Well that’s the revenue maximizing strategy for them. If you look at current prices and Saudi production costs, it is to cut rather than not to cut. I mean your guess is as good as mine, this is an area which we cannot know. But this is exactly why we need these kind of energy centers, because when you read the newspapers, most people don’t point the finger at this point; and it is indeed the crucial point.

**ML:** One of the key differences between the last time in the 80s, and now is that the cost of production in Saudi Arabia has changed. If you include the social costs of production in Saudi, then you get to the point where their budget break even is something like $80 or $85 now. How do they shut the spigots off and ensure social cohesion? In terms of the uncertainty we’ve also not talked about social uncertainties. There’s really unpredictable stuff out there. Not just in the oil producing regions, but even here domestically, how do we know how the debate about shale gas will play out really in Europe? How do we know how it will play out in the US? What will happen with the divestment movement? These are really big unknowables. So I think anybody who paints this gently positive or slightly gently negative picture, I think that’s a really risky business to be in.
CR: I thought you said you were super positive?

JB: We have a couple of questions from the audience, and we have literally three minutes to go. But Christof it is a question for you. How much do US coal exports, at the moment at a record level, lower global prices for thermal coal, and in turn increase coal demand worldwide? Or is US exports of thermal coal crowding out other coal sources? Meaning probably South Africa, Russia, Australia.

CR: So what we have seen is that coal demand again, we will publish the numbers on the 12th of June, so I have to be very careful or my colleagues will crucify me. We have seen coal as a very fast-growing fuel, and what happens is that it does crowd-out natural gas in some places. And it’s not only exports from the US which have gone up, it is also Russia which is benefitting there on the coal-side and losing out on the gas-side. Another example of a large company denying the significance of shale gas for the longest time, and now we are being punished from an unexpected corner. If you’ll allow me just one clarification, I think this is also important for this debate. Yes there are some countries that desperately need the revenue, some oil-producing countries; but some of them, including the ones you mentioned have huge financial reserves, and have been known to run deficits for years in the past. So again it’s more complicated than saying they need so much for their budget. I hear this all the time, it’s more complicated than that.

JB: Michael, a question that is very much on the front page of the newspaper, is solar panels and China tariffs. What do you think that the US and the UK should be doing about this?

ML: The US and the UK, well. First of all, if you look at all of the clean energy technology, solar amongst them but also all the others, the most important thing for those industries is to drive down their costs. And you do that by using the best technology and the best supply chain, and by the way a message to those economists who think we shouldn’t be doing clean energy because first we have to kind of sit in a laboratory, we have to get to scale, we have to get the low-financing costs as well. So you have to use the best financing technology too. And so in that context, if you look at those trade tensions, they are entirely unhelpful not just for the clean energy industry, but also for broader policy goals that we have signed up to and that we believe in. If you want my opinion of what should happen, I think that the politicians should grow up and stop having trade wars about what’s really quite a minor and young industry, in fact whose priority should be to drive down costs. You look at Apple iPads, nobody is having a trade war because they’re manufactured in China; yet, solar panels, there is this trade tension around them. I think that what’s going to happen, certainly in Europe, I would imagine that those tensions are going to lead to almost nothing. Simply because the only place that makes solar panels on any scale in Europe is Germany and Merkel has understood
that it’s not in Germany’s interest to have a trade war over solar, which will then hit their exports and so on. I think this is going to sort of simmer and die away. I couldn’t comment on the US and what sort of, you know, where that could go. I think in any case, whatever the outcome of those trade disputes are, what you’re not going to see is higher prices of solar panels or the resurgence of manufacturing capacity in solar either in the US or in Europe, simply because there are so many providers in Asia, whether it’s Chinese companies moving production to Malaysia, or whether it’s the Taiwanese or whether it’s Koreans or whether it’s production in a number of other countries. We are now living in a world of cheap solar. That’s just part of the new reality, so I think that in a sense the trade dispute is also, it sells newspapers or subscriptions to online news services or whatever. But it’s actually not the major economic driver that I think it’s being portrayed to be.

**JB:** Michael thank you very much. I think with that we are going to stop here. We have some pointers for our colleagues at Columbia University to start developing their research. Please join me in thanking the fantastic panel this afternoon.

### Roundtable: Meeting Our Energy Policy Challenges

*David Hobbs*, Head of Research, King Abdullah Petroleum Studies and Research Center  
*David Sandalow*, Inaugural Fellow, Center on Global Energy Policy  
*Nobuo Tanaka*, Non-Resident Fellow, Center on Global Energy Policy  
Moderator: *Jason Bordoff*

**Jason Bordoff:** That really was a fascinating discussion and raised a host of important questions, and I take you up on your offer to do your analysis. It’s good to know that our research agenda is already headed in the right direction because most of the topics that you heard covered are on the research agenda for what we plan to do over the next two years at Columbia. What the panelists don’t know is I was going to call most of them to ask them to do the analysis for us, so they’ll have to answer the questions that they posed. But it’s exactly the right set of issues.

So again, you have the introductions in your books so I’m not going to walk do them and do lengthy introductions for everyone. Just a reminder, David Sandalow, now with the Columbia Center on Global Energy Policy is our inaugural fellow. Before that was at the Department of Energy and we’ve been colleagues for a long time at the Brookings Institute, before we worked together in the Obama Administration, so I was just thrilled that David chose to be colleagues again and join the new center at Columbia. Nobuo Tanaka, the former head of the International Energy Agency. I was also quite honored that he agreed to be a fellow at the center. And then David Hobbs, whose rigorous energy analysis at IHS CERA and now at KAPSARC. We all aspire to produce product like them and aspire to have the checkbook you have to do it with too. [laughter]
So I wanted to start just with, I think it would actually be quite interesting to just pick up on a couple of the topics that we heard. There are other topics I want to come to also, but just pick up a couple of topics that you heard the last set of panelists talk about, and just get your take on those things. So let me just pick a couple of those. There was a lot of discussion about the future of OPEC, the future ability of Saudi Arabia to affect world energy markets given non-OPEC production and rising internal Saudi demand. David, you’re at the King Abdullah Petroleum Studies and Research Center. Do you have thoughts on what you heard, and your view on that?

David Hobbs: Well firstly, thank you for your invitation to become a fellow at the center. [laughter]

JB: Well, I thought you had a non-compete agreement at KAPSARC, no? [laughter] We'll talk, we'll talk afterward.

DH: We should definitely, and just for the record, I heard BP actually offered to fund the research agenda, not just suggesting things you should be pursuing. [laughter]

And Saudi Arabia is one of those places that almost everyone who goes there has misconceptions that turn out to be entirely overstated. The rate at which Saudi internal demand is growing, if nothing changed and their production didn’t increase would indeed have an impact on global markets, but I think even they know that and there's a sporting chance that something is going to change. Not least is plans for 40 GW for solar generation for potentially just shy of 20 GW of nuclear generation, improving the efficiency of their existing fossil fuel generation fleet, improving the efficiency of demand, whether it be in lighting, whether it be in air condition. I admit having gasoline at 60 cents a gallon or maybe as much as a dollar gallon depending whether you go on premium gasoline means that one of the most pleasant places to sit in Saudi Arabia is in your large vehicle is in your large vehicle with the air conditioning on, and a surprisingly large number of people do that. But again, even social trends change over time, so I am probably a glass is three-quarters full kind of a guy when it comes to thinking about how that's going to change.

I do want to pick up on the other suggestion around the Gulf region, which was that you can end up, in which an American administration of any hue would say I'm not fussed about security in the region. Even if you could imagine Canadians selling oil to the United States for less than world market prices and they are enormously grateful to America for its attempts to delay the Keystone pipeline. So you've got a favor in the bank to help you of course.

So the truth of it is, even if America could insulate itself, or sorry, the United States, could insulate itself from global prices, the lack of insulations of the economies with which the United States trades, means that an oil shock for the rest of the world is a
shock for the U.S. economy. So the strategic interest is there regardless of whether America is self-sufficient or indeed, a net exporter. And in any case, can you imagine squandering five and ten decades of strategic interests, friendships, and trust, for potentially a couple decades of self sufficiency before having to return to that particular party. It just, it's not a calculus that makes any sense for any administration in the future, so I would dismiss that as being one of the major risk factors. America will continue to have a strategic interest in the Gulf and in its stability, and it is unlikely to cede that relationships, or those relationships to any other power.

**JB:** This was something that at our launch six weeks ago in New York, National Security Advisor Tom Donilon said quite clearly, which was even if we significantly reduce oil imports from the Middle East, the U.S. has a clear strategic interest in remaining in the Middle East. Oil prices are set in a global market. That was I think an important statement to hear from the administration. So on those two topics, the potential to what extent a U.S. president in a few years will still care about the Middle East because of U.S. oil production or shifts in global crude flows? And also this question about OPEC and Saudi Arabia. David and Nobuo, I want to see if you have comments on each of those things. And I'm shameless about now getting media attention for the center, so also as a former DOE official if you want to say something controversial about Keystone, you should [laughter].

**David Sandalow:** I agree with David completely about what you just said about U.S. interests in the Middle East, and it was likely to happen there I think for all the reasons you said in terms of oil prices being global, in terms of the United States being deeply integrated into the global economy. I would add to what you said by underscoring the United States' significant enduring interest in the Middle East beyond oil and oil markets including fighting terrorism and non proliferation, and the decades of relationships as you said, that you mentioned, and just to underscore in case there's any question about this as Jason just said, the President's National Security Advisor just said so, in a speech at Columbia University, so I think there's no question at the opening of this center, so I think there's no question about that analysis. That's right, there's the book [laughter].

Let me say too, how delighted I am to be at this center, and to be working with Jason again. And I've done a couple of tours in government and out of government, and one thing I've found is when you are in government generally, you're a consumer of ideas, not a producer of ideas. And it's absolutely critical to have centers like Columbia is launching here that will generate the quality analysis. I'm just delighted to be here.

**JB:** Thank you. We're delighted to have you. From your perspective, we see the global crude map looking quite different, right? The oil slowing East of the Suez, not the other way. What does that mean for countries in the Pacific Rim? For their interests in the Middle East? For OPEC's relationships with those countries?
Nobuo Tanaka: Thank you Jason. I worked for the IEA for four years. I left about two years ago, and now I'm the former Executive Director and this title is very useful. I can say anything I want without taking any responsibility [laughter], so this is kind of [a] fun job now in commenting [on] very radical things, and some kind of crisis in the Middle East, especially the Iranian crisis which could have some impact [on] the Hormuz Straight's navigation is one of the major concerns. For all the executive directors of the IEA, that's a nightmare scenario if some kind of closure [or] disruption happens there. And certainly the IEA says in 2030, 90% of the oil from [the] Middle East will go to Asia. So the Hormuz Straight is getting more important and [the] Malacca Straight is getting even more important.

And I saw recently the report by the Department of Defense of the United States, to the Congress about the military preparedness of China, and their concerns about the sea lanes and so-called critical interests of the country. This is a very geopolitical meaning and China is very well prepared for the future. Are other countries in Asia do[ing] the same?

This is my question and I am warning the Japanese, all the Japanese public that certainly the U.S. government or administration is always engaging to the Middle East peace. The White House or administration always says that, but Congress or the public may say different. Because certainly if something happens, bloodshedding happens of the U.S. military forces in the Middle East. Certainly, the U.S. public will ask who are the free riders, China, India, Japan, Korea. All these countries are always considered to be free riders.

So we have to prepare for the emergency of the Middle East oil shock and Japanese current situation after Fukushima is totally vulnerable. Two nuclear reactors now running in Japan out of fifty, and these two will be stopped in September because of the regular checkup, and then we will have no nuclear reactors running. And more than 90% of the energy we depend on the fossil fuels, and this is a really dangerous situation for Japan. So I'm cautioning that the government should take more preparedness for this kind of [situation] occurring.

We learned, Japan learned their lesson in the March 11th two years ago, that we [need] to avoid the kind of unpreparedness, or think about [the] unthinkable. That is the lesson we learned. And [the] Iranian crisis, may happen more often than once in [a] thousand years like [the] tsunami, so how can we, Japan be more prepared for [an] emergency is what I'm trying my best to convince, that restarting of the nuclear power plant is the most important for Japan, but [we're] not yet getting the consensus. So this issue of nuclear crisis in Japan and Iranian crisis together, is [a] compounding effect to the Japanese economy is very, very dangerous.

JB: Do you want to comment David?
DS: I wanted to draw a link between what Nobuo was just saying about Fukushima and the shale gas discussion that has happened so far here, and the exuberance in the public dialect. I don't know whether its irrational or rational exuberance about shale, but there is extraordinary exuberance. And for years, if one worked in and around the nuclear sector, you often heard people say that a nuclear accident anywhere is a nuclear accident everywhere. We found that was the case when Fukushima happened. And this accident that happen that was result of the largest earthquake in a century, right, led to essentially, a shutdown of nuclear industry halfway around the world in parts of Europe, as well as in Japan.

And there was the same risk with shale gas production with major ground water accident[s] I think, and it's part of the uncertainty here and so I guess the last panel, which I think it went from Christof to Nick to Michael, increasing the amount of uncertainty estimates. I would go even further on that. I think that the IEA's tremendous report on the "Golden Rules for a Golden Age of Gas" and other reports show that shale gas production can be done safely, and by and large today, it has been done safely. But there's a risk that it won't be done safely and we've seen the visceral reaction of local communities to ground water contamination. That type of thing could put a major chill in the shale gas revolution.

JB: That's a good point and obviously, all energy production, whatever form, comes with risks, and I guess the question is whether an accident like that would be more like a nuclear accident or more like the Deepwater Horizon spill where we put things on hold for six months, we improved regulations, and went right back to work, and it really didn't really deter offshore production elsewhere around the world, in which shale would be most similar to because on the one hand, it's more of a local activity, on the other hand, people are sensitive about their drinking water, as you said.

Your point, Nobuo, about the energy needs of the Pacific Rim. That sort of brings us to the other topic that panel before us talked about, which was the global implications of the North American shale revolution. How you heard people say that energy exports from the U.S. really aren't that big a deal, whether we do them or not. Is the view from where you live different? How important are U.S. natural gas exports and just generally, how important is the shale revolution in North America to meeting the energy needs and helping to potentially lower the prices of natural gas in the Pacific Rim.

NT: Yeah. I think the U.S. exportation of the LNG to Asia is very dramatic, and will cause a dramatic change in Asian gas market[s] and I hope that will trigger the new thinking in the pricing formula in Japan, or in Asia, because Japan is importing for example, the gas by only LNG. We could import gas from Russia by pipeline. That is what I am strongly advocating because we need diversity. For the diversity's sake of LNG, something the U.S. exportation will help. The shale revolution is very interesting because that [is]
creating the three divided independent course[s] of price[s] in Asia, in Europe, [and] in [the] United States.

One of the reason[s] is that the higher the oil price, the lower the gas price in the United States. It's simple because of the demand for gas is not coming up fast enough to match the oversupply so to speak, because the shale revolution makes it possible that if the liquid content of the gas is higher and then you can sell the liquid condensate as you say at the oil price, so that gas could be cheaper. I mean you can sell the gas for almost nothing. Or even you can burn it as a prairie. So gas is a kind of associated gas and that will go regardless of the price. So that's a situation in the U.S. The gas price is so low while oil prices [are] so high.

Meanwhile, Japan is linking the gas price to these high oil price[s], so structurally this kind of thing should be changed, and Japan should argue that the sustainable pricing formula is not linking oil, but some other way of accommodating the successful economic growth in Asia, not only in Japan, but in China, replacing the coal. Japan may be replacing nuclear, and some kind of new formula is definitely necessary. So for that sake, U.S. exportation of LNG to Asia helps. The pipeline from Russia will help. Maybe Alaskan gas may help also if it is available in a commercially viable price.

**JB:** David Hobbs, your thoughts on sort of the global implications of the North American shale transformation and also on this question on price formation and Asia. Do you think this oil linkage is here to stay? How much pressure will it come under?

**DH:** Can I get to both of those, but I think there's a point that I want to pick up from the last panel that speaks to it, which was...

**JB:** Yes, you should pretend I'm not there. Just say whatever you want to say [laughter].

**DH:** Is that right? See, think how much easier your life would be if you had gotten me within your governance structure as even an occasion.

It's really to the extent, that the big swing I fear is not American shale gas or North American shale gas in the global markets. It's the pace of shale gas expansion in the global markets in terms of indigenous production. And a lot is made of the U.S and Canada, and the structure of ownership. Just within the United States, you look and see development on private versus federal lands. It's almost an accident when there's an expansion on the federal lands because there's are so many things to stop it from happening that it goes ahead on private lands. But then you think, "Well, Canada doesn't have any private lands? It's again, state owned, so that can't be the difference."

It's probably the lesson, and I think they touched on it, and I just wanted to reinforce it. That is there is a diversity of small players who are prepared to take risks and are
prepared to lose their shirts, but others will follow behind. When you have large companies, it's very rare that a large company will drill 50 wells before it finds what works. They'll get out after five or six as has happened in Europe. And yet the rest of the world seems to be intent on trying to take the big companies who are there or less likely to continue losing their shirts until the play ends up working. And there's a difference between the success of the company and the success of the play.

The government sees themselves as the overarching owner of the play, and won't even let the companies invest as much or drill as many unsuccessful wells before they find it, and that's the pacing factor. And in fact, when you look at Canada, Canada had the diversity of players, regardless of the ownership of the minerals, and a non-interventionist government that didn't know better in terms of what was a sensible level of risk. So that's probably I think, what's going to delay the expansion of shale gas and mean that if there is an impact it will come from North America and supply it to the rest of the world. And it's already happening.

America exports natural gas, it just calls it coal. As a former colleague of mine said the other day, and I actually agree with her, "You can try and pretend that you're going to restrict exports of gas from the United States, but it will just end up being squeezed out of Canada. No constitutional amendment that says Canada has to send gas to the United States, so you can remove that from the mix. In fact, Canada is equivalent in size to the sum of the intended exports, so you can get that swing without making the change. Now if you then take it to, what does that mean in terms of price formation? Shock, horror, supply and demand will be the two critical factors in determining what price formulation formula there will be, and I have no idea what the long term future of supply and demand will be.

What I can say is that everyone overestimates how much it's going to change in the short term and underestimates how much it's going to change in the long term. And if anyone believed my forecast of what the future might hold and went and invested on the basis of it, it would by definition make my forecast wrong. So my best chance of being right is if no one believes a word I say, which puts me in a slight bind, sitting up here on this panel, so [it's] best not to say anything.

**JB:** David, do you have comments on sort of the global overseas impacts of sort of the North American shale situation and then also just maybe for many non-Americans in the audience, if you could say a little about what's happening with energy export debate in the U.S. How it's viewed? Why is it such a big deal and a little bit about the atmosphere on it?

**DS:** Great. Just to pick up on David's point, the increase in Chinese demand over the past couple of years has outpaced the increase in incremental supply from the United States. I think today, the U.S. has roughly one vehicle for every person. China has roughly one
vehicle for every ten to twelve people, so an even lower ratio, so there's plenty of opportunity for increased oil consumption from China, let alone the rest of the developing countries. China has new fuel efficiency regulations out in the past month of so. I think there's been a lot of commentary about, a lot of skepticism in the commentary about the extent to which those fuel economy standards are going to be enforced. So there is plenty of opportunity for incremental demand as David is saying.

The political debate on exports in the United States is a very interesting one because the phase change has been so rapid in the United States. I think the body of politics is still getting used to it. The notion that we've been having this conservation is I think, jarring, or at least surprising to many. I think Americans are used to being concerned about energy independence. It's been a buzzword for four decades now. There are very strong free trade currents running through, I think both political parties, particularly in the center of both political parties, particularly in the elites, but there's also a kind of visceral feeling which you can see in the polling data, that if we have this resource, why should we send it abroad? And it's just there, and we after all, have a vibrant democracy, so I think that the political leaders are balancing those factors as they make decisions on this.

I was on a very interesting panel, the Boao Forum in China about two months ago on shale gas with some CEOs from around the world and I find it interesting. One of them said, "Whatever the U.S. administration decides to do with shale gas exports," he said, "I predict that very little shale gas will ever be exported from the United States." And it struck me and I'm reporting his view because it was shared by a number of other business leaders there. His comment was, "This was the first time in history that we've ever seen a major manufacturing power also be a major gas producer." He said that, "What will happen," he predicted, "is manufacturing moves to the United States to take advantage of the gas, not that it gets exported in major quantities," so...

DH: David, why is there no visceral reaction against exporting coal though, since it's your resources?

DS: It's a very interesting question. I don't have a very good answer to that. I think it's probably because the political dialogue has been around oil and gas, and that energy independence is focused around oil and gas discussion. But you're quite right. It's an interesting observation that there's not that type of visceral reaction among the U.S. public towards exporting coal.

JB: And there's been a lot of discussion about the manufacturing renaissance and the reinvestment coming back to the U.S. because of low natural gas prices, and people may connect that more than they do low coal prices. There has been, I do think that my own view that after an issue like Keystone or something like that, coal exports will become one of the next issues that the U.S. environmental community galvanizes around
because it is a very concrete thing. It is very visible, and I think there is increasing concern among environmentalists about coal exports.

Which comes to this question that was the one I wrote down on the card last time, which I think good analytic is useful on, and we'll be doing at Columbia: To what extent are U.S. coal exports actually changing prices and affecting global demand? Or to what extent they're just substituting for coal but otherwise would have come from somewhere else, but not actually leading to increased greenhouse gas emissions. Did you, David want?

**DS:** I should have said the point you just made, and it's worth underscoring. There is some objection to coal exports in the United States. It's more in environmental community and it's in the West coast of the United States where I think there's going to be some real objections. But by and large, it has not been a big dialogue about the exports that are currently coming into...

**DH:** Less objections to the production of coal rather than necessarily the exports enable production, and that's the objection.

**JB:** We talked a little about increased Middle East crude flowing to the Pacific Rim, and that brings up the question of the future of global energy governance. We have the IEA made up of OECD countries. We have increasing consumption of Middle East crude in the Pacific. China is building up a strategic petroleum reserve of something like 200 million barrels I think. But we don't really have a mechanism to coordinate with them on maintaining global oil markets stability in the face of disruptions. You are uniquely positioned to offer some thoughts on what you think the future of global energy governance might look like and how it might evolve given the changing production and consumption patterns.

**NT:** Yeah. This is [an] interesting question, which I try very hard how to modernize or improve the security system of the IEA. As a non-European Executive Director, I try very hard to get China and India into the IEA. That was not successful because many Europeans were against that, because that could create huge governance change in the system, because if China or India joins, they will have a very substantial part of the voting rights. So this issue is very tricky, but if [the] IEA doesn't have these emerging economies within the framework, then its relevance will disappear. So certainly, this tricky issue must be tackled very seriously. Now, I think some of the emerging economies are trying to be an association to the IEA, or some kind of a quasi membership is now under discussion.

But [an] interesting question is that if [the] United States is more or less energy independent, U.S. obligation of having strategic stockpile will diminish substantially. So the total amount of oil, which is readily available for the joint action, will decline and
this is very interesting. The IEA should take seriously what this energy independence of the U.S. means to the organization. Probably, China is interested in working closely with the IEA, but sometimes they always say that they want to build the Asian IEA, which China is the initiating member. And the amount of consumption or import of China-India will surpass the import of Asia toward 2030. That is the IEA estimate.

So if that is the case, the energy security framework will be a kind of linking that the different regional arrangement of energy security because it's no longer the issue of oil, but it's more the issue of gas, and gas could be supplied by pipelines, not only LNG. And also the electricity supply security is getting more and more important, and this issue is very regional, so Europe is trying to make a collective energy security by connecting gridlines and pipelines, even with North Africa.

So this is one interesting model of energy governance. The U.S.-Canada-Mexico to some extent, do the same. Latin America is chaos. ASEAN countries doing some of the similar connection or linkage models. Northeast Asia do[es] not have anything. Japan is very isolated. Japan now has a territorial problem with our neighbors. How could Japan be protect[ive] of its interests or natural energy security interests, together with our neighbors, this is a very challenging question for Japan, but the global governance is a kind of alliance of the regional energy security governance mechanism in the future. IEA may play a linking role of this regional framework of comprehensive energy security framework.

JB: Great, thank you. There are a few other topics I want to come to before we wrap up, and we about eight more minutes left, but on this topic, do you either of you have any...

DH: Only to draw attention to Nobuo's important observation that if America runs down the scale of its strategic reserves, that is significant on a global level, and something that people ought to be thinking about in terms of what that means for future volatility.

DS: Just to add a slightly different point, I agree with Nobuo that the future of global energy governance will involve multiple institutions. We've seen over the past four years, the growth of the Clean Energy Ministerial, which just launched in 2010, and it's now the fourth, third one was held here in London about a year ago. The fourth was held in Delhi. It's become an important institution for coordinating ministers on the new clean energy agenda. I think we're going to see more of that type of growing institution linked in part by the IEA in the years ahead.

JB: I'm just, David Hobbs, on your point, analytically, if you were a policymaker in the U.S. is there a reason you think you would want to reduce the size of a reserve if consumption is roughly the same but production is going up a lot and imports are going down?
DH: If you use the IEA's metric, then yes you would naturally want to do so, I think the point being in recent years, the strategic petroleum stocks have been used as a political economic tool rather than the supplies of last resort to deal with a true disruption. And if you want to have that degree of freedom, if you still want to have that lever in the market, then running down those stocks would have an implication.

DS: This is a big topic, I don't know if you know [laughter]. The United States today, we have 697 million barrels I believe in the Strategic Petroleum Reserve. The United States and some people here will know who are experts in this, owns this oil. In [a] number of other countries, the oil held in reserves are not actually owned by the government, but are part of commercial stocks under various arrangements. A potential topic for the center, Jason, is looking back at the collective releases in prior years, and looking at how effective different types of structures are in that context.

JB: Yeah, and a how separate topic is I mentioned, Hurricane Sandy earlier in the day, and there are many policymakers and governors such as Governor Cuomo in New York who have raised the question, of whether part of our reserves should be in refined product, not just crude oil and whether we should swap some of that out, and there is that mix in some European reserves.

Also on the last panel, I think Michael Liebreich got the question of [with] all the excitement about shale, and we don't talk about renewables anymore, we've sort of fallen victim to that too. So I wanted to ask you, David Sandalow, can you talk a little bit about the future of renewable energy in an era of austerity and fiscal constraints in the U.S.? What is the outlook and what will the policy drivers be? And also in China which you have studied quite a bit as well?

DS: I quite agree with Michael that the fundamentals on solar are very strong here and I think it's going to be one of the major disruptive factors in the energy industry over the course of the next decade. We've seen price declines of about 80% over the past four or five years in solar, and I think we're probably going to see another decline, not just in price, but in cost by the way, of about 50% over the course of the next decade at least.

And that has profoundly disruptive implications for the utility industry. It's certainly in the United States, where I know this best, and less in other OECD countries with existing grids. I mean we in the United States, an electric grid that is essentially the same as it was 100 years ago with large centralized power stations, and technology for distribution that Thomas Edison would recognize if he were reincarnated and came back here. And there is substantial reason to question whether or not ten or twenty years from now, there isn't going to be real erosion of revenues of these centralized utilities as a result of distributed generation by the way, not just from solar, but also potentially from fuel cells using natural gas.
And when you add into that, complications involving the integration of intermittent renewables into the grid, distributed demand efficiency technologies, and then cyber attacks and their potential implications on the grid, it's actually going to be a hugely transformational time in the electric sector, which is not quite the question you asked me. You asked me about a question about renewables, and I think the biggest impact in renewables to answer your question, is gonna be solar, but I think wind is also very promising. The United States with all the talk about natural gas, we actually added more wind capacity than any other type of generation capacity in the United States in the past year or two, and that's a trend that's likely to continue.

I don't want to crowd out the remaining time, but if you could just broaden the question a little bit, because this relates to some of the work I plan to do at Columbia. An interesting question to step back and ask is, "Ten or twenty years from now, if a group like this met, what are the technologies that might be hot then that are being discussed that aren't being discussed today?"

Something to comment, in 2007, the BP report didn’t even mention shale, so what are the possibilities for ten years from now? I don't know the answer to that, but I certainly think solar is a possibility. We're talking a little about solar, but I would, knowing that what somebody said, "It's dangerous to make predictions, especially about the future." But I would make one confident prediction and two guesses.

The one confident prediction is that the role of high-performance computing in big data will be transformational in the energy sector. It's really quite remarkable. Today's super computers have the power of about a million personal computers. With simulation techniques, we can now accelerate the rate of energy innovation in some industries. Two quick examples. One, in wind farms, we've seen that wind turbines were built to optimize production from a single turbine but not wind farms overall, and using modeling techniques, we're now optimizing the power production for wind farms in different ways. And I think the nuclear is another area that could benefit from this high performance computing, so high confidence there. The high confidence is that high-performance computing and big data will transform this sector.

But two specific technologies that I think are interesting, one of them is methane hydrates. Actually, the Japanese are putting some money into this. We're still a long ways away from commercial viability with methane hydrates, but if there were some breakthrough, that would be transformational and could make the shale gas revolution look small. Another very interesting beyond-the-curve technology, are driverless cars. It's remarkable what could happen in this area, and I saw a presentation recently when somebody raised their hand and was skeptical about this technology. And this speaker who knew about this said, "Look, remember, the baseline is very low. Humans are terrible drivers, and a computer is not going to drive drunk or is going to text, and well, it drives. On a related point, a computer just beat the world champion in the game of
Jeopardy! and that computer was listening, processing, and speaking the answer, so we're getting...

DH: That's like the World Series of baseball. It's played in America. There's no one else who plays Jeopardy!, so describing it as the "world champion of Jeopardy!" I'm sorry that's... [laughter]

DS: I'm sorry I said that, but I think, anyway keep your... [laughter]

DH: I'm may have focused on the wrong bit of your comment there, I'm sorry... [laughter]

DS: I've spoken for too long, but I think that it's unclear what the implications of this vehicle technology is going to be on the energy sector but it could be pretty big.

JB: No, this is exciting work and I'm looking forward to knowing the answer. I was typing up some notes on my laptop for the panel today sitting on the Eurostar train this morning and I didn't realize the person next to me was reading over my shoulder and at one point, he just leaned over went, "Cold fusion." So maybe that's the answer. [laughter]

DS: May that is...absolutely. [laughter]

DH: If you'd gone business class, you wouldn't have a nutter sitting next to you. [laughter]

JB: [laughter] That checkbook we were talking about before...Last question from our audience. We've been here about two-and-a-half hours, Nobody has mentioned Russia. Has it become irrelevant in the context of global energy policy?

NT: Ah, that's interesting. Certainly, it will remain [a] very substantial key player. Even though they made a mistake in judging what is the shale revolution means. Especially Gazprom made a mistake that, it was wishful thinking that shale revolution may be very small or even doesn't apply, but actually it applies. So Gazprom was penalized for losing its exclusive rights of exportation of gas to their competitors. So the competitors now [are] offering their new ideas to the Japanese. So this competition is interesting. So certainly those companies or countries that make a mistake of judging what is happening in the energy sector will suffer. But certainly, Russia has a huge potential of gas, coal, oil, everything. And if Russia is getting more serious about energy efficiency in the gas sector, they can just double the potential exportation.

So I think Russian policy is now moving away from Europe toward [the] Asia Pacific by possibly East Siberian gas and its pipeline to the Pacific. I think there's a good chance
that Japan has the pipeline connection to Russia, and that would certainly diversify the way of transportation of gas to Japan because suppose that Russia will eventually sell gas to China, maybe also to Korea. I don't know about North Korea, but North Korea will be a part of the total Korea, and in that situation, I think Japan cannot stay out without any connection of pipeline. So East Asia with Russia, may play some very interesting role[s] by connecting each other. How does [the] U.S. respond to that? This is another interesting question for me, maybe to Jason, that this kind of regional integration, and what's the role, pivotal role of the United States in East Asia? In this kind of energy linkage or connection, but I think even with that situation, Russia will play some important role.

**DH:** I think we focused today on the things that are going to change very rapidly in proportionate terms and so part of Russia's handicap of elbowing its way into this conversation is it's the largest energy producer in the world depending on how you chose to define it, and therefore, the inertia of that system coupled with the policy checks and balances that it should nothing happens too rapidly in Russia means that it's probably offers less interesting conversation than other things. Is it going to be important in global energy? It's an energy superpower. It has always used its energy in a geopolitical way. It will as Nobuo say, definitely, look, it's not only Washington D.C. that's pivoting to Asia, I think that Russia is pivoting to Asia as well. But when you're working in fungible commodity markets, a pivot in one direction creates a reaction elsewhere, but in aggregate, Russia will continue to be a very large player in the energy market and what it doesn't supply in one place, it will be supplied by others.

**JB:** Great. We've gone four minutes over, and I apologize for that. I want to thank you all for coming today. I've learned a lot. It's an exciting time in energy. There are a lot of unanswered questions, and so I leave even more excited, and reinvigorated about my new job, and the kinds of questions that we are tasked with trying to answer. So I hope you'll look for the exciting work coming out of the Center on Global Energy Policy in the months and years ahead.

Check us out and follow us at energypolicy.columbia.edu. Follow us on Twitter @ColumbiaUEnergy along with FT Energy, which is indispensable on Twitter. We have lots of exciting events in June. Christof will be releasing the BP Annual Energy Outlook in New York, Fatih Birol will be releasing the IEA's new climate report at Columbia in New York. The IEA will be releasing the medium-term natural gas report at Columbia in New York, and then we'll have lots of research product of our own coming out in the months to follow that.

So thank you again for being here today and please join me again in thanking all our speakers for their insights today. Thank you.