

World Energy Outlook 2012

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Introduction:

Jessica Mathews,
President,
Carnegie Endowment for International Peace

Moderator:

David Burwell,
Director, Energy and Climate Program,
Carnegie Endowment for International Peace

Speakers:

Daniel Poneman,
Deputy Secretary of Energy,
Department of Energy

Maria van der Hoeven,
Executive Director,
International Energy Agency

Fatih Birol,
Chief Economist,
International Energy Agency

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JESSICA MATHEWS: Good morning. I'm Jessica Mathews, president of the Carnegie Endowment. It's a pleasure to welcome you all on this gray morning to – for a very important release of the “2012 World Energy Outlook,” one of the most important documents in the whole field of energy from the world's foremost source of authoritative data and analysis on energy, the International Energy Agency. It's a real honor for us to host this U.S. launch of the report, and we're enormously happy both to have all of you here and to have the report's chief authors and the deputy secretary of energy to talk about it.

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This is a paradoxical year on energy policy because we are all used to thinking – trained to think of this enormous supertanker that is the world energy market. And we expect a supertanker to move very slowly; we don't expect it to change course quickly. And yet, all of a sudden, we are looking at some astonishing shifts in the fundamentals of the energy market, fundamentals that some of us have lived with for decades and which seem to have changed – not seemed to have, but which have changed literally overnight. So we are – we are being asked and challenged to think very differently about some of the things that we have taken for granted for decades.

Just one finding, of course that you've probably already heard on the news, is that this new IEA report finds that the U.S. is on its way to becoming the world's largest oil producer by 2020, larger even than Saudi Arabia. This is a once-unthinkable state of affairs which has profound implications beyond the energy markets for geopolitics, for world security, for climate change and for the global economy.

I should point out that the thing that never gets said on the news discussions is that this figure of becoming the world's largest oil producer is compounded of two things: It's compounded of increased production and reduced demand. And the reduced demand comes principally from one of the great achievements of the Obama first term, the enormous increase in CAFE standards. And that's – I've worked on energy policy since the 1970s, I hate to say – that's the missing link in the U.S. mental picture of energy, which is that net availability is compounded both of supply and demand. People still have a hard time remembering that.

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The “Outlook” also repeats and underlines its warning from last year that the world is not on a sustainable path yet with respect to climate change. It is true that U.S. oil consumption has fallen and will decrease further because of CAFE, that coal consumption in the U.S. is down, and – as natural gas becomes the low-cost source for power consumption – and that the U.S. is on pace to meet its Copenhagen goal of 17 (percent) to 20 percent reduction below 2005 carbon emissions by 2020. But depending on how unconventional oils are developed, the U.S. may be cleaning up its own climate act only to export the carbon-laden fuels elsewhere, into the exact same atmosphere whose impacts we live with.

At the same time that American – American overall energy use is still much too carbon-intensive, and emerging markets' – emerging countries' demand will continue to rise, which leads to – (sighs) – I'm trying to think of the right adjective – if you're paying attention, I think terrifying predictions about likely warming by mid-century or end of the century. You'll hear today 3 (degrees)

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to 3 ½ degrees Celsius by mid-century; others have projected 4 (degrees) to 6 degrees by 2100. The likely impacts of that degree of warming is going to be probably catastrophic or is exceedingly expensive beyond, certainly, the capacity of huge number of countries to deal with.

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All of this is happening as the world's leaders gather today in Doha for the climate change conference. And so I hope we will be thinking of the whole range of energy policies this morning, not just the all-of-the-above that we constantly hear about here, which are always referred to as sources of supply, but also sources of improved efficiency, of reducing demand.

I won't take more of your time from this distinguished panel. I want to both thank all of them for being with us. You're going to hear first from the U.S. deputy secretary of energy, Dan Poneman, someone who during his long years of public service in Washington has gained a reputation as one of our more thoughtful and well-informed experts on a whole range of issues, including where he and I used to work together on nuclear power and nonproliferation. We will then hear from the head of the IEA, Maria van der – van der Hoeven. She is a senior member of the – she was previously a senior member of the Dutch Cabinet as minister of economic affairs and has been a powerful and important leader of the IEA in her current post. Fatih Birol will speak third. He's the IEA's chief economist, has been lead author of this report for many years and a key contributor always.

The discussion will be moderated by David Burwell, who directs Carnegie's Energy and Climate Program. And let me turn it over to David.

DAVID BURWELL: Thank you, Jessica. One of the joys of working here at Carnegie is to work for a person who is not only a great thinker and a great writer and a great – and a scientist but is also passionate about this issue of energy and climate, and Jessica is certainly that. So it's a real honor to be here and to run this program.

The mission of the Energy and Climate Program here at Carnegie is to provide a platform for leaders, experts and scholars to inform and discuss pressing energy and climate issues both domestic and global. However, regardless of the precise topic, the work of the International Energy Agency, and in particular the annual "World Energy Outlook" report, is considered a prime source of objective information on these topics. We are very pleased to again host the launch – the U.S. launch of this report.

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On format, as Jessica noted, we will first have some remarks by Secretary Poneman from the Department of Energy – unfortunately he has to leave at 10:30, so he will start; followed by Maria van der Hoeven, who will give an overview of the report and some of its implications on both supply and – on both energy and climate issues; followed by Fatih Birol, who will present in detail the results and – of this outlook. That will be followed by a question-and answer period of – we hope to have at least 30 to 40 minutes on question-and-answer and wrap up a little bit before noon.

So with that, why don't I introduce – turn it over to Deputy Secretary Poneman.

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DANIEL PONEMAN: Thank you, David. It is truly a pleasure – it's always a pleasure to come to Carnegie, and it's an especial pleasure today. For those of us in this field, we wait for this report every year like a kid waiting for his Christmas presents. It makes us – maybe it makes us seem like policy wonks, but I think it has the additional virtue of being true.

[00:10:22]

And I would be remiss if I didn't say a few words about my good friend and your leader here at Carnegie, Jessica Tuchman Mathews. And I didn't compare notes with David – so he can see, I scribbled this down myself. (Laughter.) But first of all, you know, in that world of people who care deeply and passionately about energy and climate and security, Jessica Tuchman Mathews is legendary, and properly so. And I came up with the three things that really strike me when I think about Jessica: She is an original thinker with compelling logic, and she writes beautifully. And so I think – I think we, all of us, owe a debt of gratitude for all of her thought leadership for all these years, so – (applause).

And it's always a pleasure to have the opportunity to share the stage with Maria van der Hoeven and Fatih Birol. I haven't seen you since last week, as I think about it. (Laughter.)

But it also gives us an opportunity to stop and think – and some of us of a certain age can remember when there wasn't an IEA; it's a little hard to think of it now because it has become so pivotal in our world, so central analytically and otherwise, but of course it was a creature of earlier oil crises. And it's truly a mark of the progress the agency has made and its extraordinary leadership that it has moved from an emergency mechanism to someplace where it's really a center of thought leadership; it's a center of analytical rigor; it's a center of where not only the data is collected fairly and honestly but that it is thought through and written about fairly in a way that really has made the place not only a forum where people go to have honest discussions about energy and its implications and climate, but also has a robust, muscular ability to rise to a crisis and deal with actually the kinds of causes that led to its creation in the first place. And in that respect, I think we all owe a debt of gratitude to the agency and its leadership.

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And even in the relatively short time I've encumbered my current position, to think of the very critical moments we faced when we lost 1.3 million barrels a day of oil from the Libyan oil disruption, and we worked intensively in our own respective countries but through the mechanisms of the IEA for a collective response that I think assured the world that its oil demands would continue to be met. So really the IEA has grown beyond its original mandate and is something that I think we all have a great deal to be thankful for.

Now, they venture into areas that I and many others would shrink from, such as predicting the future. And I tried to find out who made that famous line first, about predictions are very dangerous, especially about the future. So I've got – the candidates are Neils Bohr, Casey Stengel and Yogi Berra. But the point is I'm not going to do that – (chuckles) – but I honor and thank Maria and Fatih for presenting their findings looking ahead.

And you know what? This is a case in which, in some instances, the results and the endpoint are less important than the process, because we need to be thinking of the implications of – things

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that we are doing are – as we sometimes say, they are baked into our processes for years and for decades to come. So if the IEA were not doing this, somebody would need to, or we would just be careening into a future that we did not understand with implications not only for ourselves, not only for our neighbors but for our children and their children. So I think, again, we all owe a debt of gratitude. It is a different world even now, and I don't have to venture far into the future to reflect on the transformational events that we've seen here in the past few years.

And I will confine myself for a few minutes to the United States. We do have a transformed energy picture, and we do have, as Jessica was saying, an all-of-the-above strategy. But I want to be very, very clear that energy efficiency and demand-side management is an integral part of all-of-the-above. And it's been a prodigious part of what we have seen so far in terms of improvements of our energy picture. We have a variety of initiatives that the president has led – Better Buildings initiatives, Clean Fleet initiatives – as Jessica was noting, very, very important step taken with the new fuel economy standards doubling to 54.5 miles per gallon, a standard which is going to have a tremendous benefit not only in terms of managing U.S. demand but also in terms of reducing our impact on our climate. And so that is, I want to be very clear, part of the story.

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At the same time, there's no getting around the fact that our hydrocarbon picture has been vastly transformed – the shale gas revolution, I think Dan Yergin likes to call it – and I think it's a fair description to go from very, very modest investment to – I'm still proud, even though I wasn't there at the time – the Department of Energy invested on the order of \$137 million into these abstruse technologies that no one had much interest in in the late '70s and early 1980s. And now we see, since 2000, we've gone from something like 2 percent to over 35 percent of our annual gas production out of shale gas resources. We're the leading gas producer in the world now, and it is making all kinds of opportunities available to us that we're seeking to capitalize by using smart technology.

And if you look at some of the grants that we have made through our Advanced Research Projects Agency for Energy, ARPA-E, into things that could be done for compressed natural gas vehicles, for example, that could improve the materials that are used for the tanks – so you could lighten up the tanks; you could improve the absorbent materials so you could get more molecules packed in. And if you were able to get the natural gas vehicles that now are confined mainly to fleet applications to be applicable across the wider light-duty and passenger vehicle fleet, the demand would go sky-high. Our greenhouse gas emissions would decline still further. And we have tremendous opportunities out there to realize.

The story on oil is one that is an incredible story as well. We are now, for the first time since 1949, net exporters of oil product. Our production is higher than any time since the mid-'90s. Since 2008, our imports of oil have declined from 57 (percent) to 42 percent. So it's really made a huge difference. But if – one thing the president's been very clear about is that this aspect of our policy and this benefit that we have achieved through the responsible development of these resources is no excuse to turn away from the future.

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In fact, in addition to the demand-side management that we were talking about a few minutes ago – obviously, we are strongly committed to the renewable energy resources; we’ve doubled production of power from our wind and solar and geothermal resources. In terms of carbon-free electrons, we’ve had the Nuclear Regulatory Commission approve the first new commercial nuclear power plants in this country in three decades. And we are continuing in all aspects to pursue the all-of-the-above strategy, including the billions of dollars that we have invested in clean coal technology and carbon capture and sequestration.

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So it’s a historic moment; it’s a pivotal moment. And we have to keep in mind as we pursue these technologies that in so doing we’re not only addressing this nation’s energy security, but we’re creating the jobs for the future. We are at the cutting edge of technologies that have tremendous promise for improved living conditions around the world, increased prosperity for the American people and for all those who are investing in these cutting-edge technologies. And it’s a moment of great promise, in short.

As we do this, we have to keep always in mind what I know that Maria and Fatih will talk about in terms of the impact on our climate and how we can make smart decisions today that will have beneficial effects in the long run.

[00:19:25]

I just want to make one other comment about the work of the IEA, because one of the things that they do and they do well is they take deep dives on particular countries. And for the last year or so we have been focused very, very heavily on Iraq as we have pivoted from one form of U.S. involvement to another form, and a form that is seeking to secure the gains that were so painstakingly won over the last decade, and as we see this tremendous opportunity of a nation that’s got on the order of 160 billion barrels of reserves in the south – and I don’t know what the IEA numbers are, but something like 45 billion barrels in the north, and the progress that has already been made as they have now reached something on the order of 3.3 million barrels of oil production a day is something that has the prospect of bringing not only a great future and prosperity to a unified and stabled Iraq, but also, frankly, a very important contributor to global oil markets, to making sure the demands that are continuing to rise in Asia and the Middle East are met even as the OECD demand tends to level out, but I fear I will encroach a bit onto my colleagues’ time and their expertise, so I will stop by turning to Maria van der Hoeven.

I would just say about her – I’ve had the opportunity now – for four years now, since one of the earlier international meetings of the International Energy Forum, to work with Maria van der Hoeven, and she is an outstanding public servant of impeccable integrity, a keen intelligence, and, I think, an unflinching realism when it comes to not only facing, but also talking about the energy challenges that we all face today. I think we – all of us owe a lot to Maria van der Hoeven and her leadership of the International Energy Agency; I’m sorry that I will miss the longer presentations here now, but I am looking forward to having further opportunities even later today to exchange thoughts and views, and it’s a very exciting day for all of us. And with that, I would say to all of you, thank you for the great work that you do here at Carnegie in helping keep us honest and thinking about these very challenging issues, and I’d like to close by thanking and welcome to the microphone Maria van der Hoeven. Thank you.

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(Applause.)

MARIA VAN DER HOEVEN: Well, Dan, thank you very much for your nice words, but before you leave – I don't predict the future.

MR. PONEMAN: Oh.

MS. VAN DER HOEVEN: No – I'll tell you why. We have some assumptions – we put them in a model, and then there's outcome, but if reality changes and we have to change the assumptions because of reality, game changes – there will be a different outcome. So let's be vigilant.

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MR. PONEMAN: Vigilance is the (lotch ?) word.

MS. VAN DER HOEVEN: OK.

MR. PONEMAN: And we didn't plan this.

MS. VAN DER HOEVEN: (Laughs.)

MR. PONEMAN: This is what you call a colloquy. (Laughter.) Thank you.

MS. VAN DER HOEVEN: Thank you – see you.

Well, dear friends, thank you very much for having us here today. And I think it's important that we realize we are talking about a model – about a scenario and about the outcome of a model, but a moment, things change, because – reality changes because we are game changers. Well, then, the outcome of the change – and this is something we have always to be very careful about. I'll come back to that later once again. What we can see it is – at this moment, we have a global energy system that is hugely complex; it's constructed of many interconnected parts. They pull and push on one together, and all of these changes need to be analyzed and understood together if decisions are to be taken that put the world on a track towards a secure, affordable and sustainable energy future.

Now, that's what we plan to do with the World Energy Outlook 2012. We take new developments into account and we paint a comprehensive picture of the global energy system now and in the future. And the big question, of course, is what does it tell us? Well, it – what Energy Outlook 2012 tells us a few things. The first is, the global energy landscape is changing rapidly, and these changes will recast our expectations about the role of different countries, regions and fuels over the coming decades. And let me explain some of the reasons why.

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At this moment, we can see three game changers. One of the game changers is the unconventional oil and gas production, especially here in North America and the United States. The second game changer is Iraq, and the third game changer – who is not really completely visible, but

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will have the – but will really have the chance to be a real game changer is energy efficiency, and we are – I am going to – we are going to talk about three of these. Now, in World Energy Outlook, we highlight a resurgence in the oil and gas supply in some countries, and this was mentioned before – it was the high prices and new technology that are really unlocking North America’s unconventional oil and gas resources, but repercussions of that will be – will be felt globally. And this surge in unconventional oil production – oil and gas production in the United States – has changed its outlook from being pessimistic a few years to being optimistic now.

We project that the United States will reclaim its status as the world’s largest oil producer for the time. There will – I would like to make two comments on that. One is that it will accelerate the switch in direction of international oil trade with an increasing share of Middle East exports going to Asia, and the second thing is, it looks like – as if there’s money to burn, but there is no money to burn, because if you burn it, your money is gone. And if we look into the position of the United States, it does not make the United States independent, because even in 2035, all demand will be met by imports – 25 percent of it will be met by imports. And oil is a global market – not like gas. It’s different.

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Now, going back to the Middle East and to Iraq, a country whose ambitions to expand oil and gas output will not be limited by the size of its resources or by the costs of producing them, and we can see that after a decade of war, Iraq’s oil production is already touching new highs, and it stands as the world’s third largest exporter. Well, we project that it will produce much more in the future, reaching more than 6 million barrels a day in 2020, and more than 8 million barrels a day in 2035. Gas – yes, gas – the global outlook for gas continues to be bright, but the regional picture, of course – (inaudible) – and we can see that reflected in the prices that gas commands in different markets around the world. Very low prices here in North America, and they feed through to very low electricity prices, and that provides a competitive benefit – a competitive advantage to domestic industry. But there’s another consequence as well. It frees up coal supplies, and the coal supplies, they go to Europe, pushing down Europe’s coal prices and making it more attractive than gas for many power generators.

And we can see this, for instance, in the Netherlands, where many gas turbines are running at low operating levels. Now, looking forward, the – our World Energy Outlook projects that global gas amount will grow by around 50 percent by 2035, and that the price relationships between the regional gas markets will strengthen as liquefied natural gas traders – trade becomes more flexible and contract terms evolve, and this, again, will mean that changes in one part of the world are felt more quickly elsewhere. We also project that nearly half of the increase in global supply between now and 2035 will be unconventional gas, but there has to be a note of caution, because unconventional gas business is still in its formative years, and a global bloom – a global boom in production is not assured.

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So while the World Energy Outlook confirms that, for instance, global demand for electricity will grow rapidly, the sources of this supply will change in several ways. So there is a need to respond to policy decisions such as those in Germany and Switzerland to scale back the role of nuclear, and Japan and France have also signaled an intention to reduce their reliance on nuclear.

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Well, and it's – of course, it's obvious – countries that do step away from nuclear will need other sources of generation to fill the gap, and, well, it's quite simple to see what that – what that is. It's fossils, and, of course, it's renewables. So what – although we lower our outlook for nuclear compared with last year, globally it's still expected to grow in absolute terms, and that's driven by expanded generation in China, Korea, India and Russia.

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Now, in many developed countries, there will be a significant focus on replacing aging power sector infrastructure, and in many emerging countries, the focus will be on the need for large-scale investments in new supply, as this is where most of the demand growth will occur. And the – there will also be a need to respond to new electricity market developments within individual countries and regions. Competitive markets are creating stronger links between gas and coal while, at the same time, these markets need to adapt to the increasing role of renewables.

Now, I would – I would like to mention a few words on our third game changer. You know, every year, World Energy Outlook focuses on a different view, and this year, it takes a cross-cutting perspective by focusing on energy efficiency. And I fully agree with what you said, Jessica, because as it – it's important – it's as important in meeting rising demands as in – because if you want to meet rising demands, energy efficiency is as important as additional growth in supply, and this is exactly what the U.S. experience shows us. It's not only about growing production – growth and production – it's also about a decrease in demand, and that's energy efficiency. So let's not forget about this issue, because it's vital, also, for the future. It's a key option, energy efficiency. It's a key option in the hands of policymakers, because it offers cost-effective benefits with regard to energy security, emissions reductions and, well, a number of other domestic policy objectives, and we have seen, in the last year, major energy-consuming countries having announced new measures. For instance, China targeting a 16 percent reduction in energy intensity by 2015.

Here in the United States, having adopted new fuel economy standards with obvious effects; the European Union committed to a cut of 20 percent in its 2020 energy demand, and Japan aims to cut 10 percent from electricity consumption by 2030. But despite these and these – all these new measures, current efforts fall well short of tapping the full potential, and that's what we're doing in this world energy outlook. We map out, in detail, how much more potential exists if we simply adopt those measures that fully justify themselves in economic terms, and if – by doing that, by 2035, we can achieve energy savings equivalent to 18 percent of global energy consumption to 2010. And savings on such a scale reinforce the fact that efficiency in energy use, again, is just as important to our energy future as unconstrained energy supply, and increased action on efficiency can serve as a unifying energy policy that brings multiple benefits and also see to it that we extend the lifetime of our fossil fuel resources – let's not forget about that.

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Now, I've touched on a range of developments that are shaping and reshaping our energy world, and unfortunately, taking all of these issues into account, the World Energy Outlook also concludes that the world is still failing to put the global energy system onto a more sustainable path. We can see that the world's energy needs continue to increase, driven by rising incomes and a growing global population, and the huge potential for increases efficiencies, which could slow this growth dramatically, will remain unrealized unless governments act to break down the barriers that

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exist. We've seen fossil fuel subsidies increasing to over more than 500 billion (dollars) globally, and appetite for reform – it appears to be waning in a number of countries.

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And despite the climate imperative, the outlook for our energy system continues to be one dominated by fossil fuels and one where we – where we fail to keep a trajectory consistent with a global temperature increase of no more than two degrees Celsius; it looks more than 3.6 (degrees) or even more. And furthermore, while the U.N. Year of Sustainable Energy for All has a positive impact, yes, we are still in a world where 1.3 billion of the world's poorest people live without modern energy, without access to electricity. So taken together, the analysis within the World Energy Outlook reinforces the simple fact that no country – not even the United States or North America – no country is an energy island. The interconnections between different fuels, markets and prices are intensifying, and furthermore, it tells us that in a world where the energy landscape continues to change, our energy policies cannot be set in stone.

So I would like to Fatih and his team for what you have been doing to – and once again, delivering such a comprehensive piece of analysis. And, you know, more than once, this book is referred to as the energy bible, but Fatih doesn't like that, so that's why I think we change it. It's an atlas; it's more like an atlas, because it shows us the path we are on, and it's guiding us also towards a more efficient, more sustainable energy future. So, Fatih, I'm going to stop my remarks and the floor is yours.

(Applause.)

FATIH BIROL: Thank you very much. So first of all, thank you very much to Carnegie as well for inviting us back to here to share our views on the World Energy Outlook, and our executive director already gave you the big picture. Let me go through and try to explain you how we see the world and what the key messages are.

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I guess is the – OK. So first of all, yes, the foundations of global energy system are shifting, slowly but surely and with implications for everybody. Consumers, producers, rich, poor – (inaudible) – for everybody. And there are a few drivers of that shift. One is the oil and gas – on commercial oil and gas revolution in the North America and Iraq. Some of you, when I – I noticed that when secretary – Deputy Secretary Poneman and our executive director are talking about Iraq, I see some colleagues are not convinced that Iraq may be a game changer, because some people may think, there are many countries in Middle East, and Iraq is one of them. This is wrong, because – why Iraq could be a game changer – not only that it has a lot of potential to grow the oil, but also, Iraq is very different compared to some of its neighbors in terms of investment framework and how the country is run.

So Iraq is a very different country in terms of key characteristics compared to others, and there is a lot of oil to come from Iraq in the next years. The second one is nuclear power. After Fukushima, we have seen Germany, Switzerland, Japan and now even in France, there are changes in the nuclear policies. So this would mean that we would – we may well see lower share of nuclear in the future, which, at the end of the day, will have an impact on the other fuels. If nuclear goes

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down, the system will compensate it by other fuels. It can be renewables or gas or coal; this will affect that.

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And the third driver is the efficiency. Our executive director told you that there is a growing momentum now – we talk about energy efficiency years and years in the international energy circles, but there's a growing momentum. Only in last year, four major economies put legislations in place in terms of energy efficiency. U.S. talked already, China introduce five-year plan, a 16 percent intensity implement target – a very strong one, by the way – which is much more important than the United States in terms of its global impacts. Japan has an important target in terms of (electrical savings ?), and the – we have the energy which is a directive in Europe now.

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Oil prices – when we talk about high oil prices, many people think, immediately on the 2008, 147 (dollars,) when the price are high – and this is definitely wrong, to think only about that, because what affects the economy, what affects the decision-makers not only one day, but on average – when you look at the year 2012, this year, first of January today, we have the highest oil price ever in the history, and this is very important, ladies and gentlemen, especially when the global economy is in such a fragile situation.

Natural gas is a completely different story. Natural gas prices in Europe is up to five times higher than in the United States, and in Asia, eight times – this is a huge one – eight times higher than United States, and it is a much more striking – if you think that only five years ago – only five years ago, natural gas prices in these three regions were more or less the same – perhaps only one with under half-dollar difference, and within five years of time, this – more or less a similar price there was change a lot, and there is a big divergence, and our analysis show that they may get closer, but there will be still a big gap between these three regions with major consequences that I will comment in a minute.

On sustainability – it is a huge problem, and some of you may know, who follow the Outlooks in some time – since 10 years, we look this fossil fuel subsidies, and it gets international support in the context of G-20 and peace work and so on. I tell you, you know what this 523 billion mean? It means the following: In Europe, we have a modest carbon price, about \$5 per ton of CO2. We think, can it going to higher, 20, 30.

In United States, it's a strong debate about putting CO2 prices in order to clean up, and people are thinking, \$20, 30 (dollars), there is a big debate. But what – 520 billion subsidies mean, it is about \$110 per ton of CO2, and is – (inaudible) – to emit. So you have – on one hand, you think of 20 (dollars), \$30 to clean up, but on the other hand, you give \$110 to pollute the world. So therefore, for me, fossil fuel subsidies are the number-one enemy of the fight against climate change. So we have to take this into account.

Another one: Last year, carbon – (inaudible) – emissions increased a full one gigaton, a big increase, and when we look at the date of the first six months of this year, we see that this trend is continuing, whereas renewable energies are in difficulty. After almost 10 years of increase in

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renewable energy investment in the world year-by-year, for the first time in 2012, we are expecting a decline in global renewable energy investments.

And another point, it is also highlighted by our executive director, since indicated in the outlook, we look at the issue of energy and the poor. And today, 1.3 billion people, 20 percent of global population, has no access to electricity, in sub-Saharan Africa, India, Pakistan and Bangladesh. And we think, as International Energy Agency, this is not only an energy issue, this is not only an economic issue, but beyond that, this is maybe a moral issue for all of us, an issue that we follow very strongly in the IEA.

[00:42:27]

We saw Deputy Secretary kind of talk about the IEA and how it was founded, and we are of course having challenges, as all organizations. One of the challenges we are facing is the fact that the share of our governments, member governments, in the global energy use is declining, and declining significantly. When we were founded in mid-'70s, the share of our member countries, the OECD countries – namely U.S., Canada, European countries, Japan, Australia, New Zealand and Korea – their share in the global energy use was about two-thirds. And very soon, it will go down to one third, a big decline of our government's or nation's share. And what is increasing is China, of course, India and Middle East, are the emerging countries.

And what does this mean? This means the following: The center of gravity of the global energy use is moving to East, leaving West and moving to East. And the energy demand investment on the others will be there, and the decisions which will be made in Beijing or in New Delhi, will not only affect those markets, but all of us through different trade, technology and other linkages.

Now, the story of United States, we have been seeing a decline in the U.S. oil production years and years, but as a result of the technological developments, as we have described in our World Energy Outlook, we expect an increase in the U.S. production. And it is widely reported, we expect U.S. to overtake Saudi Arabia within the five years of time.

[00:44:29]

U.S. will be the largest oil producer of the world, but Saudi Arabia is and will remain the largest oil exporter of the world. So these are two different things, being the largest producer and largest exporter. They are two different issues, and Saudi Arabia will be still the largest exporter of the world.

In terms of natural gas, four years ago in the World Energy Outlook, we said a silent revolution is taking place in North America in terms of natural gas, and this silent revolution became loud and beyond North America now. But whatever's in the United States is that we expect the unconventional gas to grow strongly and United States to overtake Russia around 2015, clearly, as the largest natural gas producer of the world. So within 10 years of time, we expect United States will be the largest oil producer and largest natural gas producer of the world.

Iraq – as the Deputy Secretary mentioned, this year we focused on Iraq and made a special study with the – (inaudible) – Iraqi government, with Iraq, even though our numbers differ significantly. We expect Iraqi oil production to double very soon, and these numbers are – as I said

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– significantly lower than the government numbers. But even so, ladies and gentlemen, Iraq will play a crucial role.

I know that we have a lot of colleagues from the – from the diplomatic circles here. There are many numbers, but if they want to remember one number, if I may suggest to them, is the following: In the next 20 years, almost 50 percent of the growth in global oil production will come from Iraq and the rest from all other countries put together. So every second barrel which should be added to the growth of global oil production will come from Iraq, so we cannot overstate the importance of this very country. And Iraq will be exporting oil mainly to Asia. A key destination will be China.

[00:47:02]

There will be growing trade access between China and Iraq in two ways, not only that the Iraq oil will go to China, but – when I mentioned the growth in Iraqi oil production, important, 30 percent of that growth will come from the oil fields in Iraq, which are either directly owned by the Chinese companies, or Chinese companies in consortium with other companies. But these are important developments in that direction.

And Iraq has not only huge resources of oil and gas, and as Mr. Deputy Secretary mentioned those numbers, and I can assure you that at least part of his speech will need to be updated in a couple of years of time, because there has not been enough, or at all, extraction work in Iraq to discover new resources. With the extraction act, which is starting, those resources, some will go up, and let's not forget that it is very cheap to produce oil in Iraq. To produce one barrel of oil in Iraq is about 15 times cheaper than for example Canadian oil sands or 10 times cheaper than the Russian oil if you want to put in a context.

Now, Middle East and United States, another point that is, I think, one of the important findings of our World Energy Outlook. United States, until recently, was importing a significant chunk of its oil from key Middle East producers. And looking at the demand and supply picture in United States, and the – what is going on around United States with neighbors, we expect that the need to import Middle East oil very soon will go literally to zero. So there will not be a need to import Middle East for United States in the next years to come.

U.S. will still import oil, but this may well be coming from shorter distances as it provides much more economic aspects. And when we look at the Middle East, again, there's a big change, big shift, and is also something for the diplomats and others to think about, what does it mean. Until very recently, half of the Middle East oil was going to West and half of this was going to East. And very soon, we will see that about 90 percent of the Middle East oil will go to Asia. And this means something. This has a lot of implications from the security of sea lanes to, I don't know, the trade issues, to issues of the foreign policy and the others, but this will be definitely a major change.

[00:50:00]

Natural gas. (Inaudible) – United States, Canada, Australia and the countries are changing the natural gas picture, and there are winners here, there are losers and there are countries in between. Winners are definitely the ones like Australia, U.S. and Canada. Losers are the ones, the traditional gas exporters. They are losing for two reasons, one, in terms of volumes they export,

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they will export less volumes, less gas compared to what they expected before the shale gas revolution; and second, the price of gas that they are – they were selling will be a bit different than what they talked before.

[00:50:55]

Now, this was – (inaudible) – trade, worldwide natural gas trade among the regions, and this would be a much more (interwoven ?) in the next years to come as it is out of new producers coming in the picture, such as United States, for example. And exporting gas, we expect United States around 2020, Australia increasing its exports and that'd be much more of a flexible natural gas markets, which means – and I come to countries in between now, such as the important countries, such as Europe, will have a lot of strong cards in their hands in their negotiations with the traditional gas exporters. This is – as I said, this is a gift that North America gave to Europeans, deliberate or not, but this is definitely a gift. But whether or not Europeans will be able to make use of this is another story. It remains to be seen. But this is definitely a major change in the gas markets as well.

Is our – (inaudible) – director told you, one of our key preoccupations is the energy security. And in fact, all the governments in the world are preoccupied with energy security today, and energy security is becoming a crucial element of foreign policy as well. For example, China is very much preoccupied with energy security. Two weeks ago, we had the Chinese Communist Party conference, and it was one of the key topics that they have discussed, as we read the newspapers.

And China today, ladies and gentlemen, imports about 15 percent of it is gas and 50 percent, half of it, is oil. And this is a major preoccupation for China and also of course for Europe, India and others. And when we look at the future, we understand that they have a reason to be worried, as you see in this picture. (Inaudible) – is growing substantially, China is growing, India is growing, Europe is growing, Japanese is not growing because it cannot grow more than 100 percent but it is almost there. But all others are growing significantly. But there is one country which is going in the other direction, which is the United States. U.S. becomes gas exporter – (inaudible) – importing, and imports go down significantly.

Now, here's a point that I wanted to make, that – (inaudible) – already mentioned our – (inaudible) – director as well. When our book came out, we received a tremendous press coverage that we could have never – I could have never imagined. But they were kind enough to report our book, but they were not right enough to report our numbers. The – (inaudible) – dependency going down in the United States is not only because of the growth in production – it is one part of the (gain ?) – but also is a result of the introduction of fuel efficiency standards finally, I should say, in the United States. So the production – (inaudible) – production will go up – one factor which is good. The other factor is, domestic consumption will be much lower as a result of the new fuel efficiency standards. This is very important. The success story has two legs. Otherwise it couldn't run. One leg is the production world, the other leg is the lower demand.

[00:54:46]

If the – (inaudible) – North Dakota in the success story, other driver is the Detroit. You should definitely put these two things together in our mind. And this is, of course, important for the other countries and also for the United States to understand that efficiency does matter, and provide you concrete results in terms of energy security and beyond.

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Now – (inaudible) – we have a lot of colleagues here I see from the utilities, from the power companies. We see that Japan nuclear will be different than much – (inaudible) – done before and coming as strongly as a result of – (inaudible) – renewables and gas replacing that. Europe and natural gas and renewables may, as a result of government subsidies – I will come to that in a moment. Renewable growth is driven by the renewable subsidies, and the United States continuation of the natural gas growth and we will – we are looking (for it ?) here, but the administration will decide about renewable support schemes. But assuming that it will – (inaudible) – we see renewable on gas to replace United States and help to reduce the carbon footprint further.

[00:56:05]

India. A major – (inaudible) – India. This number is a big number. If there was no China, India would be the China – because of the numbers you see here. And India becomes, around 2020, the largest coal importer of the world. And this is something very crucial, especially for the Asia markets. We have a lot of numbers in our book, and they are all, at least for me, very interesting. But there is one number for me which is more interesting than all others, even more interesting than the Saudi or the U.S. number – namely, despite this growth in India, the electricity generation growth, the spectacular growth, there are many economic historians also, even from the universities I see here, and they know that the indicator for a civilization, in terms of economies – (inaudible) – electricity consumption per capita – despite this – (inaudible) – electricity consumption per capita in India in the year 2035 – 2035 – will be equal to the electricity consumption in the United States in the year 1947. So there will be still 100 years of a difference between these two world(s), just then to put the things in a context between rich and poor, is between developed and developing countries.

And yet, of course, we have our China. There is China, so therefore, it is China's coming, so it is dominating the entire energy picture. China will add this additional capacity of electricity generation in the next 20 years equal to one United States of today plus one Japan of today. In 20 years they are adding the United States, what we are talking here about U.S., plus a Japan. This is all addition to the existing capacity of China.

And what does this mean to – (inaudible) – only nice graphs and colors and so on? It means the following. Whatever China goes for in terms of technologies, fuels and so on will affect all of us. If China goes for a technology – let's say technology – (inaudible) – I don't want to give a name – for the electricity generation, even though it's a new technology – (inaudible) – huge growth of that technology and application of technology – (inaudible) – of that technology will go down as a result of learning by doing, and this will have major implications for this profitability and for the other markets. Therefore, it is the reason I am saying the decision which should be made in Beijing will be very important for all of us, even though we don't live in China.

[00:59:00]

Now, I imagine – (inaudible) – strongly, which is a good news for the climate change and energy security, but this is mainly as a result of subsidies. And today, renewable subsidies are about \$88 billion, and the important thing is, about half of those renewable subsidies are already locked in. The – which means the government have already promised the renewable producers that is locked in, and in Europe and in other countries, as a result of the fiscal challenges we are facing, renewable subsidies are under a lot of discussions, and some countries are already cutting the renewable subsidies. So therefore, the renewable projections are showing in our charts, this green bars are very much hinging on whether all the subsidies will be there. There are renewable projects which do not

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get much subsidies, but the bulk of it – especially off-shore wind, solar – will still need significant renewable subsidies.

[01:00:13]

Now, I mentioned to you about this change in the foundation of the global energy system. There are two major components of that. One is on the geopolitical balances and our executive director already told you about that. And I'm sure many of you will talk about this. But the other one is on the competitive economic situation, positioning of countries. And this is one of the indicators I mentioned to you, natural gas prices – very different in Europe, in U.S. and Japan.

The other one is electricity prices. Electricity prices will be very different from each other, which is crucial for the heavy energy industries on top of the natural gas prices differentials I mentioned to you. For example, in Europe where we live – our executive director and me and the other IEA colleagues – the – we are going to pay 50 percent more electricity prices than United States and about three times higher – 300 percent higher than in China. And Japan is even worse – much more higher-cost basis.

Why in Europe we pay more money? Because of the following: First, natural gas as imported for generation is much more expensive. Second, in Europe we are leaving the – in some countries – the nuclear power generation, which is cheap to produce electricity. And most, of course, power plants are already up and running, but we are killing them – we are shutting them down, which is another reason. Third, we have carbon prices and others don't. And fourth, we have significant renewable subsidies in many countries.

So – and U.S. is, of course, enjoying a very low-cost base here, and it may well be an opportunity for the U.S. colleagues to take. It may well very timely to look at how they deal with the climate change challenges here, whether or not they can consider some changes in the pricing policies. But otherwise, it provides a major economic competitive advantage of United States and China vis-à-vis Europe and Japan in terms of the having energy industries. And we know that some of the industries in Europe are now moving away because of the high energy costs, and also for the purchasing power of the citizens, this is definitely not good news.

[01:02:58]

A topic that we look for the first time in the IEA in the World Energy Outlook is the energy and water. Today about 15 percent of the global water use is consumed by energy. And this is set to increase significantly. And this is used for electricity generation, for cooling the power plants, and for fossil fuel production and biofuels production. And our numbers show that for the – (inaudible) – generation, shale gas production, oil sands, there will be a more and more of a problem of water. And the water is becoming a criteria in assessing the feasibility – economic feasibility of the energy projects in the future. And this would be because of its economic – because of its feasibility.

So, let me come to the second message – the first one on the changing global energy landscape, and the second one is, as our executive director told you, this year we focused on energy efficiency. And we look at country by country, sector by sector, what is the potential – economically viable potential for energy efficiency. We have the country numbers and we have the global number.

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Even the policies that we mentioned – what is in the United States, the – (inaudible) – does in Europe, efficiency directive, China, Japan. Even if those policies were to be pushed in the next 20 years, there will be still – there will be still two-thirds of the economically viable potential will be left unused – two-thirds. And this is definitely at least an economic sin.

Last week, I was in Oslo – our executive director and myself – going to many countries and discuss this with governments and industry leaders. In a meeting I was with the CEO of a major international oil company in Norway. And I ask him, what would you do if you had an oil field that is producing handsome profits, which the price is now, and you produced one-third of this oil field, the oil, and after that, you closed the – you put the cement on the field and don't use it anymore. What would you tell your people? He said, I would fire the responsible engineer.

[01:05:41]

And here it's exactly the same story. It's exactly the same story. Two-thirds of the energy is still there, and I don't know whom you should fire here because there is no responsible engineer. So we have to find a way to make use of these two-thirds of the energy efficiency potential. And this is definitely a very disappointing picture. One good – of course, one promising, one hopeful indication in this picture is when we look at the different sectors, it is the industrial sector which uses most of the potential compared to others.

Why it is hopeful? Because with all respect to colleagues from industry here, industrial sector has only one objective – or at least, one main objective – which is to make money. It is, if they – if they make the most of the potential in which there is money in this thing, and there is a business case for the energy efficiency improvements, which is definitely good news. Now, but generally when we look at the countries, I can tell you that what this tells us is that energy efficiency policies is an epic failure of the international policymaking. Of course, there are exceptions, but when we look at it globally, this is definitely an epic failure – at least, I think so.

[01:07:14]

Now, what we have done is that to provide a guidance for our governments, for the others, if they push the button for the economically viable energy efficiency measures in the transportation sectors, the equipments, the home equipments, in industry and so on, how would it change the world? This is our central scenario. And this is – on the base of that, we made the efficient – (inaudible) – and now you're assuming that the governments will push the button for the economically viable efficiency measures.

And what we see is that worldwide we save a lot of coal, we save a lot of oil, gas, and everything, which means the – we have the same comfort, same lifestyles, and on top of that, we are using less energy, which is very good news for energy security. Second, those efficiency policies are very good in order to reduce the energy expenditure of the consumers because even though if they go – for example, they go and they want to buy a television set. There are two television sets, exactly the same quality, exactly the same standards, but one of them is more efficient but hundred dollar more expensive.

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If they go and buy the hundred dollar more expensive one, in few years of time this money will be paid back in terms of lower energy bills. And what we have calculated that in all the countries, we see a net gain in terms of the expenditure going down, but of course governments need to get organized to make the consumer to buy the higher-capital cost in the beginning, but economically much better choices for the consumers to buy the television set. And this is of course we had this – we have explained in our work how it is to be done, what governments need to do to push the consumers to make the right choices and provide the right information.

This is the second advantage of energy efficiency. The first is less energy used and good for United States, the second, good for the economy. The third and the last one is on the climate change. Climate change, we have the Doha meeting starting this week. And you rarely – at least, I rarely see any significant news in the newspapers and there is no momentum. To be frank, the momentum about the climate change is sliding down slowly but surely. It is where we are now. And to have a – very soon a legally binding agreement – to hope that will be really a bit far stretch, at least for the time being.

[01:10:20]

But the good news is – but – (inaudible) – first – (inaudible) – the bad – the bad news. The bad news is the following. With the – if we draft – put new policies in place with the current policies, global temperature is set to increase 6 degrees Celsius – the current policies in place, close to 6 degrees Celsius. And this will have devastating effect for everybody; even the schoolchildren know it by now. And every year in the World Energy Outlook, we look at where we are; we put a tick – yes, we are following the – that rather horrible trend when we look at the CO₂ emissions. We are following that trend in a loyal way every year.

But the world leaders – the good news, OK, the good news from the world leaders – they agreed to limit the temperature increase to 2 degrees Celsius. This is definitely good news. But this agreement is, of course, not a legally binding agreement. And we at the IEA, in the context of World Energy Outlook, wanted to know how much room we have to come at this 2 degrees trajectory. This is what is the room of maneuver? Are we – did we already miss the boat or not?

[01:11:29]

What we have done is that we made the assumption – we said, let's assume – to make – (inaudible) – to understand where we are – next 20 years, we do not build, worldwide, any new power plant. It is frozen. No new cars come in the streets. No new factories are built. From the existing infrastructure – power plants, cars and factories – how much emissions will come, just only from the new ones? And how does it compare with the emissions – (inaudible) – us to stay under – below this green line?

And what we have found out, ladies and gentlemen, is that only from the existing ones, if nothing built new in the next 20 years, we are already eating up about 80 percent of the emissions which are allowed us to stay under 2 degrees – even if we don't do anything, which is, of course, completely nonsense. We are building power plants; new cars are coming; new factories are built. And every day this time is ticking, and this is the only room of maneuver left for us.

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And if there is no legally binding agreement very soon which will change the energy investment trends, as of – according to our calculations, as of the year 2017, only five years from now, we may well say goodbye to a 2 degrees trajectory. The door may well be closed. And this is definitely bad news for all of us, which means forget the 2 degrees – (inaudible) – 2017. It means we have to say goodbye to the lifestyles, to the way of life we are enjoying – or living, at least – today. And to be honest with you, we do not see, as I say, the major hopes that there will be international legally binding agreement worldwide.

So we thought, when we look at the options we have in hand – (inaudible) – with renewables – which is zero technology – zero-emission technology; nuclear power – we – it is also in a difficult situation; carbon capture and storage – a very crucial technology, but that is not – unfortunately not yet there. We thought, what happens if the efficiency button – like the efficient world (scenario ?) we just describe you – is pushed forward? If the governments push the efficiency button, what happens?

[01:14:02]

What we see is that, if the efficiency is pushed, this door maybe open an additional five more years. So the efficiency policies can help us – the door to 2 degrees to be closed – not in 2017, but we will buy time – additional time for five years. And looking at the general discussions on climate change, this five years may be precious for us. Perhaps the mood, the atmosphere, the ambience about the climate change and how the world leaders see may change, and we may well see a broader agreement and action there. And second, those five years may give us more time to – some technologies which are not mature enough now can be mature and can be much more – (inaudible) – in the markets.

So energy efficiency is therefore not only good for energy security, not only provides economic benefits for the consumers and the economies, but also good to address the climate change and other environmental problems.

So let me finish our presentation by trying to put our thoughts together. The energy issues are becoming more and more complex. And therefore the decisions which are taken on the energy front may well have implications directly for environment or on – for economy – or vice versa: Decisions taken on the economy side may well have implications for energy and environment. It is more of a complex issue between these three objectives. And therefore the job for the governments – not only energy but environmental finance and others – will be much more tougher in the next years to come. Hence you have the International Energy Agency here, trying to provide guidance to you.

[01:16:03]

(Inaudible) – the outlook for energy production use is changing, and it will definitely redefine the relative balances of the countries in the global economic landscape. And the geopolitical balances are changing very quickly because energy is definitely one of the key aspects of the geopolitical considerations. Iraq, we believe, will be crucial for the global oil markets in the next years to come, with its huge oil resources and the need for growth.

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Climate change is slipping off the policy radar in almost all countries in the world. And the problem is the following, as our chart shows you – or I thought it show you: The later we fix the problem, the more costly it will be. The more costly it will be, the more difficult it will be to have an agreement. The more – the longer it takes to an agreement, the more costly it will be. And then you have the vicious circle there. And therefore it is – inaction is very dangerous, and therefore we suggest that energy efficiency can be the policy button of the day to address the countries who are going in difficulty in terms of the economy to help the economies, to help the climate change, and can help us to keep the door open to 2 degrees.

[01:17:42]

I started this presentation by describing you the unconventional energy revolution taking place in North America, with all its implications. This was a prediction – or this was a – what we have foreseen in the “World Energy Outlook” four years ago. It was good, but now I would like to finish by saying that I hope to see another unconventional energy revolution, and this time on energy efficiency, in the – in the United States and elsewhere. This is the IEA’s hope. Thank you very much. (Applause.)

MR. BURWELL: Thank you, Fatih, for that good and sobering presentation. We now have about a half an hour for questions. Before that, I’d like to take my privilege as a moderator to make two comments – one bad news and one good news.

First, I want to thank, again, IEA for being not only the atlas on energy issues but also the bell-ringer on climate change, which was not in your original mission but which you have become the champion for, ringing that bell over the last several years. One – on the bad-news side, we’ve noticed that 6 degrees Celsius being the business-as-usual road we’re on is absolutely unacceptable. They point out that the new policy scenario – I don’t know if that was out, but it’s declared – but it’s about 3.6 degrees Celsius as well, which is almost unacceptable – as unacceptable as well in terms of its impact. So – and the new policy scenario assumes that all policies presently declared are implemented and all commitments made under Copenhagen are met. And that’s also a very iffy question, whether even the new policy scenarios will be met.

[01:19:40]

On the – on the – on the good-news side – and this is only maybe slight – but there are things going on in lifestyle and demographics that could accelerate the efficiency and other improvements.

Since we mentioned the CAFE standards here in the United States, and since we’ve – target transportation as one of our areas of expertise here at Carnegie, it is worth pointing out that not only are CAFE standards, which are basically mostly in the future here in terms of the benefits of the new standards, it’s the actual travel in the United States that’s going down as well. While GDP is recovered and is going up 1 ½ (percent) to 2 percent a year, actual travel in terms of vehicle miles traveled has been going down absolutely – not per capita but absolutely about 1 (percent) to 1 ½ percent a year for the last six years.

So there’s something else going on out there in lifestyle change, in demographics, reurbanization, young people not driving as much. They don’t want the – you know, turn 16 and

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they don't want the car; they want the iPhone. And so there is hope that there are some other things going on that may give us a little bit more opportunity to get those efficiency benefits. And so those are my comments.

[01:21:17]

Now we have – let's take two or three questions at the same time. We have Anisha (ph) and – is that the only microphone? Do we have another one? We have Amber (sp). OK. Why don't we take – right here, and then in the middle, the man with the goatee, and then in the back, way back, just to make sure. So why don't we take this one first.

Q: Hi. I'm Alan Kieswater (ph). And I would like to ask a question about the role of Iran, because you emphasized Iraq, but I think Iran, whose production is now suppressed because of embargos, also will play an important role. Could you comment, please?

MR. BURWELL: OK – (inaudible) –

Q: Thank you, Fatih, for that wonderful presentation. You mentioned problems for nuclear in the OECD. However, where the – have the greatest electricity growth, in Asia and Middle East, the options and the opportunities for nuclear might be much better. Construction costs are lower. The regulatory environment is different. There's much less competitive power markets, so the private investor doesn't have to assume the financial risk of nuclear power. So – and given the importance of reducing global greenhouse gas emissions, it would seem that this would be an important area to emphasize, especially if international institutions could do a better job in creating a culture of safety as these new countries develop nuclear power.

[01:23:00]

MR. BURWELL: OK, nuclear issues. And in the back. Could you, when you ask a question, say who – identify yourself and the – your organization? Way back there, Amber (sp).

Q: Hello, Scott Tong, Marketplace, public radio. In your oil projections, the U.S. is projected to surpass the Saudis and then fall back quickly. How important are the assumptions about the well depletion rates in that calculation?

MR. : What rates?

MR. BURWELL: The what rates?

Q: The well depletion rates.

MR. BURWELL: OK. So we have the role of Iran in the future energy scenario, nuclear safety, particularly in the Middle East, and oil depletion rates.

OK, Maria, want to take the first?

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MS. VAN DER HOEVEN: Well, I would like to answer your first question. But before doing that, I would like to make a comment on the bell-ringing on climate change, because this is – really, I think, is a very important one.

[01:23:58]

Of course, we are not a climate agency. We are an energy agency. But we are fully aware of the impact of energy on the climate, but also the other way around, the climate influence on energy security, for instance on electricity. We have seen Sandy. We've seen floodings. We've seen the tsunami. It all shows us that this interdependence between the climate, weather conditions, and energy is increasing. And this really needs to be looked into, and we need to have a different kind of realism. We need to have a different kind of contingency planning.

We started to work on that just a couple of weeks ago because we really are very concerned about this interdependence between climate, weather conditions, et cetera, on one hand, and energy security on the other hand.

Then the role of Iran – what we can see at this moment, that is that around 1 million barrels a day are being produced but are not – but are not brought to the market. So that means that the sanctions do have an impact, and that's what it was all about.

The other side, we can see that others are taking up. We can see North Dakota brings – producing around 600,000 barrels a day. We see Saudi Arabia bringing – producing more, and we've seen the demands went down for around 500 million barrels a day. So altogether at this moment, the oil market is sufficiently supplied, but let's be very careful about this. There is no room for complacency and we have to be vigilant about it. And of course, there has been – there has been discussions about something else, that is, there are stocks, there are stocks all over the world, and within the 28-member countries – (inaudible) – there are emergency stocks. They are there, and of course, we can only use them if there is a real need to that, but they are there. And this, I think is also something that has to be the back of the mind of trade, is that the stocks are there. OK.

[01:26:00]

MR. BIROL: Thank you.

Now, about nuclear power, you are completely right. Nuclear is a technology which can produce electricity at lower costs, and reducing the CO2 emissions, and we always highlight this. And this year, our projections for nuclear power is about 10 percent lower than last year, but nuclear is still growing. And it is growing mainly coming from China. About half of the capacity increase worldwide in nuclear will come from China, followed by India, Korea, Russia and other countries.

But I should tell you that the life for nuclear is also becoming, even in those countries, a bit difficult, because new safety measures are increasing the cost of capital, and there is a – in terms of competitiveness, the life is becoming more difficult, and – but in those countries, these are more government decisions, so they've done the market competition in many of those countries. Therefore, nuclear will grow, but mainly, almost exclusively, coming outside of the OECD countries.

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In terms of the declined rates on a well basis, they are very, very high, and – (inaudible) – but on a play basis, on a field basis, it is between 5 (percent) to 10 percent per year. This is definitely more significant than the convention oil production, but according to our analysis with the – an oil price around 75 (dollars), \$80, there will be enough incentive to decompensate the decline and get the new oil out.

But one thing I wanted to take you – bring to attention, when you look at our projections, after 2020, the light tight oil is slowing down – (inaudible). Mainly, we are very careful about the resource base numbers. We are – if the resource bases can grow, we can see continuation of the light tight oil. But currently, we grow up to 2020, and the bulk of the resource base is – by that time, is only the exploited and then slows down.

[01:28:16]

But if in the meantime, if new discoveries come, then it will be definitely continuous growth.

And Mr. Moderator, one point for you: The U.S. CAFE standards, this is definitely very good news, as we have – as our executive director said, as I said, and everybody – but let's don't go over the board. Even then, the U.S. car fuel efficiency will be lower than many other OECD countries. Let's be – put the things in a context here. Sorry to say that, but this is unfortunate – (inaudible).

MR. BURWELL: Point taken.

OK, let's – right here, and the gentleman right there, and let's get the lady way back there in the left.

[01:28:55]

Q: Thank you so much. Satna Partikiva (sp).

I was wondering your view on Iraq. You mentioned it's going to be one of the pivotal countries to produce oil, and how do you see the water issue playing in producing – increasing the production of oil in Iraq, especially in southern Iraq, particularly given that water is in a severe scarcity in Iraq? And do you see that water could be replaced with natural gas injection in oil fields in southern Iraq?

Thanks.

MR. BURWELL: (Inaudible) – have that man right there in front of you.

Q: Hi, my question was about energy –

MR. BURWELL: (Inaudible) – identify yourself –

Q: Matt Bandic (sp) with S&L Energy.

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My question was about energy efficiency. If I'm a regulated utility – and here I'm speaking about the U.S. because it's what I'm most familiar with, but I imagine this is the case in many countries – if I'm a regulated utility, and I'm trying to meet new demand, most of my incentives would be to build a new power plant, because that's where I'm going to make my money as opposed to energy efficiency. So with that in mind, I was wondering what are some of the specific things – the regulatory and legal changes that could be made to realize these energy efficiency gains and push utilities in that direction.

[01:30:23]

MR. BURWELL: OK. And then we had a lady at the back of the room.

Q: Hi. I'm Courtney Schlisserman with Argus Media. And I wanted to touch on carbon capture and storage. You mentioned that it's not very popular right now. And it seems that there are numerous reasons, including paying for such technology. And I'm wondering – you know, one thing that's been mentioned in the U.S. in enhanced oil recovery as the potential for a market for the byproducts of carbon capture and storage. Do you think that there is a market for OER? And if not, are there any other so-called clean technologies that could make coal more acceptable on an emissions basis?

MR. BURWELL: OK. Water as a constraint on oil development in Southern Iraq, utilities – how to make energy efficiency profitable and, number three, CCS – advanced oil recovery as a potential use of CO2.

MR. BIROL: Perhaps I can start with the injection and the CCS and our executive director can tell us more on the regulatory issues, on the efficiency front. For Iraq, there are – I mean, we mentioned these numbers, but there are many challenges to increase their production and at least two big challenges. One on the – having a consensus between the central government and the regional governments, and having a hydrocarbon law that everybody can go and invest and get their returns and the Iraqis get their oil revenues and reconstruct their country. This is one.

The second one is on the infrastructure side – need for transportation facilities, pipelines and other things. And what you mentioned, the injection of the water is a key issue. For the colleagues who are not very familiar with this issue, in order to get the oil out of the ground, you have to inject water in. And in Iraq, this is becoming a major issue because even for the water – the in-land water for the natural aquifer is going down, for the potable – for the – for the drinking water.

[01:32:52]

So what the Iraqi government is now doing is to make a major effort to bring seawater to the fields in the south of Iraq, where 80 percent of production is set to come. And if this project is finalized, it will be definitely very good news to get the oil out of the ground. And if it doesn't work out, this will be a major problem.

And then you've got the other options, such as gas injections that really, for me, not the first option that the government should go, because in Iraq today, a big portion of the gas – (inaudible) – flared. And whether or not this could be used is a second question. But the water is a major issue and the bringing sea water is a huge project that, if it continues, it will definitely solve that problem.

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In terms of CCS – the CCS – I mean, the – when – (inaudible) – looking at coal. Coal remains the – we say the gas is growing, renewables are growing, but coal, even though it loses market share, it remains the backbone of the global energy generation in the next 20 years. So there is no doubt about it. And therefore, the CCS is a very crucial technology. But as crucial as it is, we don't see much happening. There is a major economic barrier there. Without the carbon price in many countries, it is very difficult to see CCS to permeate markets.

And even in the context of the – advanced oil recovery, I do not see a major growth there unless there is a strong government pushed backed by economic incentives. I am sorry to tell you but, looking at our numbers, the situation at this moment doesn't look very bright for CCS, even though we need CCS very much, as well as other clean coal technologies. But the good news is that in many Asian countries now, the new coal-fired power plants have significantly higher efficiency rates, thermal rates, than compared to in the past. But this doesn't, of course, help to slow down the CO2 emissions – (inaudible) – more than half of the – (inaudible) – CO2 emissions come from coal only.

[01:35:18]

MS. VAN DER HOEVEN: Whenever you're talking about energy efficiency, especially in power generation, I think it's really very, very important to see how it can be achieved. And of course, regulatory changes are one of the issues that are at stake, I agree, on the other hand. But let's have a look at it. It is are we going to make money, or are we going to burn money? And if you – if you really go on using as much coal and gas in your power generation as you're doing now, you are burning money. It's as simple as that. So it's not only about regulation; it's also look into the viability of your business case and look into best available technology.

My second remark is about what could you do, for instance. One of the things that could be done is energy performance requirements, for instance, for existing coal-fired power plants. That could be one of the issues that could be done. And the other, of course, is, well, why not have a look at the CHP? And I know there is, at this moment, an adoption of a goal of deploying 42 gigawatts new industrial CHP by the end of 2020. And many states offer incentives for CHP projects. And this really is again – (inaudible) – to achieve efficiencies. And this, combined heat and power plants, can really have – can achieve efficiencies of over 85 percent. And of course, I know there are some constraints about transporting the heat, for instance. But it's also, again, about how to use best available technologies and do it in a different way.

[01:36:51]

Well, of course, energy efficiency, as we put and as you put it in the World Energy Outlook, is a – is a possible game changer. But we would like to see how it's going to continue to be that and if it's really going to be that. And that's exactly the reason why from 2013, we'll have a midterm market report on energy efficiency. We have now one on coal, on gas and on – and on oil. We started this year with a midterm market report on renewables, and there will be one on energy efficiency from 2013. And that doesn't take the longer horizon – time horizon, as we do in the World Energy Outlook, but it takes a five-year time horizon, and it shows what, in the short term, is being – is achievable in energy efficiency.

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MR. BURWELL: Combined – CHP is combined energy and power – heating and power, for those who don't know. And also, if you're talking about how to make money out of demand reduction, I suggest you talk to David Hawkins, who's here from NRDC, who's a leader in that subject. And putting conservation in the rate base is one way to do it, and that's well-understood in the regulatory process here in the United States.

Right here, and then you in the middle, and then the man over there on the right. Name, please.

Q: Brice Immer (sp) with Market News International. So my first question will be the OECD came out with a report this morning predicting that a global recovery will be hesitant and sluggish over the next two years. So how do you see that uneven recovery impacting or affecting demand in the near term? And then you also said that you also see the oil markets as well-supplied – as fully supplied for the moment. So if we see a strong unexpected recovery, would that then change because demand might then go up, and then we need more supply on the market?

[01:38:44]

MR. BURWELL: OK.

Q: Hi, Bill Murray with Energy Intelligence Group. You talked a bit about the way the media kind of portrayed one element and not the other element of the announcement last week. But another thing I thought was missed was when you talked about geopolitical issues involved with U.S. production, the difference between being an exporter and being a producer – are, as you say, much different. Saudi Arabia will remain the swing supplier for years and decades to come. Just – I – it'd be interesting to get your highlights on why that's important and why, in many ways, nothing's changed in terms of oil markets.

[01:39:28]

MR. BURWELL: And that man over there on the right.

Q: Paul Ballard (sp) from – oh, sorry.

MR. BURWELL: No, this man over here.

Q: So sorry.

MR. BURWELL: You're next.

Q: Thank you. Ben Geman with The Hill newspaper. Thanks so much for your remark today. Just had a somewhat specific question, actually, about the tally for fossil fuel subsidies in 2011. Is that – excuse me, \$523 billion figure – is that only consumption subsidies, sir, or does that include the production subsidies, such as some of the tax breaks for oil and natural gas production that we see in the United States? Thank you.

MR. BURWELL: OK, and the economic recovery affecting demand –

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MS. : (Off mic.)

MR. BURWELL: – and subsidies issue and – I can't read my own writing here. What's the third one?

MR. BIROL: Saudi Arabia's – (inaudible) –

[01:40:15]

MR. BURWELL: Saudi – oh, the implication of Saudi Arabia being still the major exporter.

MS. VAN DER HOEVEN: Yes, when there will be a real economic recovery, it will certainly affect demand, because this moment that it – at this moment the demand went down for about 500 million barrels – 500,000 barrels a day, so it will affect demand. And then, of course, the question is what will be the production to meet that demand?

Well, as I mentioned before, it's not only from United States; it's also from Iraq. And we expect Iraq to be really one of the biggest exporting countries, the biggest exporting country in the future. And of course this will put some constraints on OPEC, because if – as you know, OPEC has a – has a ceiling, a production ceiling. So these questions will be, I think, one of the most important questions to be answered at OPEC itself, either what are they going to do about the ceiling, the moment that Iraq production will really – will really be there. And the second thing is in what way will it affect the quota within OPEC countries?

The – so the second thing I would like to mention about your – about your question, about the demand and about supply, is what's happening in the Middle East and combine, actually – make a reference to the fossil fuel subsidies in the Middle East, because what's – what – but Fatih will go into – in more into detail in that.

But what we can see there is that because of the increasing fossil fuels subsidies in the Middle East, we can see that a lot of domestic production is now used for domestic demand. So if you – if you do something about energy efficiency in one hand, reduce the fossil fuel subsidies on the other hand, in the Middle East, it frees up extra oil for export as well.

And I think this is something that has to be answered by the countries there, because – but it's important, because it's not only important because the fossil fuel subsidies, but it's also important because it will increase their export revenues. And this, I think, that – is something that can't be – that can't be forgotten.

Fatih.

[01:42:22]

MR. BIROL: And thank you. Saudi Arabia's role – I don't think that Saudi Arabia – first of all, United States will not replace Saudi Arabia, so it's a completely two different stories.

MS. : No.

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MR. BIROL: Saudi Arabia is – let me repeat – is and will remain the largest oil exporter of the world. And we have seen that in the last couple of occasions. Saudi Arabia made very important steps in order to comfort markets, which is very much appreciated, and I don't see any diminishing role of Saudi Arabia as a result of United States' oil production increasing. Our numbers show that Saudi Arabia will be still the – if I may say it so – the central banker of the oil industry for many years to come.

[01:42:11]

In terms of subsidies, these are the – we look at the consumption subsidies, the prices at the pump. And – but biggest portion of this comes from the Middle East countries. And before the – around 2010, many Middle East countries already announced their intention to reform their production regimes. But in the year 2011, as a result of several factors, we have seen that the – not – leave aside the reducing the subsidies, we have seen a significant increase of subsidies in key Middle East and North African countries, which is – (inaudible) – implications include the one that Maria just tell you, because in many countries there, the export availability becomes a problem because of their domestic consumption.

MS. VAN DER HOEVEN: Yep, that's right.

MR. BIROL: Because you – exporting oil is different; producing oil is different. You export what you produce minus what you consume at home. If you consume a lot at home – (inaudible) – very low, artificial prices, huge demand, then you have little to export, but you use a lot of money. Therefore this is a key issue and one of the issues that we are going to work on in the next – (inaudible) – looking at the subsidies and the impact on the key producing countries.

MR. BURWELL: If you can figure out how to raise the – elevate the subsidies for oil and gas in the Middle East, you could let us know – (chuckles) – here in the United States. Really difficult.

You first, and then you had a comment, the guy who wanted to talk? Why don't you go first, and then you, and then David.

[01:45:02]

Q: Hi. I'm Paul Ballad (sp). I'm from Way Venture Advisory Group (sp) and – (inaudible) – newspaper. The question I have is about poverty. You mentioned that 20 percent of the world's –

MR. BURWELL: Can you speak up a little bit? Pick up your mic.

Q: Yeah – 20 percent of the world's population is dependent on non-fossil fuel. In other words, they don't have access to electricity. And I was wondering what your model projects in terms of the level of poverty in 2035, and what are you assuming about people's consumption of energy if they're not having access to electric power? I know, from work I've done in the past, that there are countries where – certainly, in sub-Saharan Africa, where 90 percent of the population doesn't have access to electricity, and they use biomass. And much of the biomass has actually been

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depleted, so presumably that – we’re going to see further depletion in years to come. Do you – how do you factor that into your assessment?

MR. BURWELL: OK.

[01:45:50]

Q: Hi. Tamar Hallerman, with Exchange Monitor Publications. Mr. Birol, you mentioned kind of the transformative quality that China has when it adopts newer technologies. And you also mentioned earlier how you don’t see the future for CCS being as bright as people thought it would be a couple years ago. But this year we’ve seen a lot of major investment from the Chinese in CCS. So I’m wondering how hopeful you are in that nation being able to transform that technology.

MR. BURWELL: And David.

Q: Yes – Dave Hawkins, with – Dave Hawkins, with Natural Resources Defense Council. Thanks for the plug. And you can go to our website and see all the states that have adopted sharing for – profit-sharing for energy efficiency investments, and it is changing utility behavior in those states. My question had to do with the analysis on energy efficiency.

And you mentioned that two-thirds of the efficiency in the news – in the economically viable efficiency in the new policy scenario would go unpursued. That suggests that either the modeling is not using an economically derived deployment formula or that you’re incorporating some non-economic barriers. And if you could clarify, that would be helpful.

MR. BURWELL: OK. Demand, and – or, as a relation to poverty levels in 2035; China CCS, is that high potential; and the models for why aren’t we being more energy efficient.

MR. BIROL: Thank you. So – very quickly – now today 1.3 billion people, we said, have no access to electricity. And despite economic work worldwide, despite technological progress, in 2035, according to our numbers, there will be still 1 billion people who will have no access to electricity. But the difference is that, currently, 1.3 billion in sub-Saharan Africa and in South Asia – India, Pakistan, Bangladesh – this 1 billion will be almost – big portion will be only in sub-Saharan Africa. The – South Asia is becoming more electrified, and it will be confined problem for sub-Saharan Africa.

[01:48:19]

And this lack of electricity access is one part of the energy poverty problem. The other one is the using traditional biomass. The – (inaudible) – the agricultural waste, this is another problem. And today, 2.6 billion people use this for cooking purposes. And I didn’t – I know that – I don’t know if we have colleagues from Department of State – the Department of State – and the secretary is very much engaged for the cook stoves, bringing – (inaudible) – to the – to the people, because it creates a lot of, in addition to economic, health problems, respiratory diseases.

Every year, 1.5 million women and children died because of the respiratory diseases caused by the using primitive cook stoves run by wood or agricultural waste. So – and therefore we think it is a crucial aspect, and it is the reason we consider this energy and poverty. One of the key issues

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for the IEA – (inaudible) – one of the key issues for the IEA, and we are going to definitely follow it up.

[01:49:32]

China – yes, China, there are definitely some pilot projects on CCS, but – and these are very encouraging. But to be honest with you – I mean, when you look at the number of power plants China is building, and without CCS, there is overwhelming difference there. And if China was to have an economic incentive to push to CCS and other incentives, this would definitely be – as you said, given the size of the market, this would definitely change the picture. But I don't think the numbers I know doesn't bring us – (inaudible) – that will be a game changer, even though for China, CCS is not only important for the – for the climate change, for the – for the CO2 emissions, but also some other considerations.

So David, first of all, thank you very much for your kind slides. David is somebody that I should also recognize. He makes out of our slides much more beautiful slides than you originally have. (Laughter.) Thank you very much for that. I get a lot of inspiration from your slides and see all of your website very carefully. These are, (you're right ?), the many barriers in terms of energy versus implementation of noneconomic barriers. And it is the reason the – we believe that the energy efficiency, if there will be a (unconvention ?) energy revolution, energy efficiency, this will be – the governments will be the ones who need to push this – (upon ?) this and to – I shouldn't say destroy but to eliminate these noneconomic barriers. And this is the reason I think wherever we go, we push this energy efficiency agenda.

MS. VAN DER HOEVEN: Yes. And just to have two examples, and examples that we have – well, we foresee them in all the countries – it's for instance – who pays, for instance, for the energy efficiency measures, it's not always the same as one who gets the benefits. And especially when we look into buildings, where you have the owner-tenant relationship, this is really one of the biggest problems we are – we are facing.

[01:51:37]

And the other one is, of course, you also have – (inaudible) – incentives. If you have a more efficient energy household appliance, for instance, well, that's that always encouraged to use less – to use less energy, use less power. No, because, you see, electricity bill is coming down. So what do people sometimes do instead of having one washing machine, they have two; instead of one fridge, they have two. Well, that's also something that has to be looked into. So we have to have also some kind of a pricing policy, a fuel pricing policy and electricity pricing policy. Just give two examples.

MR. BURWELL: OK. We are almost out of time. We have time for – that's two more questions and then – ma'am right behind you – (inaudible). And if we – is there another – let me take that – (inaudible) – right here unplugged.

Q: Thanks very much. George Dragnich (ph), North Courts (ph) – (inaudible) – insurance company.

I'd be interested in what you were saying – you alluded to the cost of industry and the – and the effects of industry in your remarks, Dr. Birol. Recently, last month, German industrialists

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complained to the government that costs producing in Germany had gone up on an incremental basis because they had given up nuclear energy – the same would be the case with Japan – because there is no cost competition that the U.S. can benefit on nuclear energy; it's essentially the same. And so the effect of those countries giving up nuclear energy is to benefit America as an industrial base, which is great for America. But I wonder, since you did allude to that in your remarks, if you could tell us a bit more about what the IEA is doing, (what would be ?) your economic analysis seeing how the cost the energy for industry plays out downstream. Thank you.

MR. BURWELL: This man right here?

[01:53:34]

Q: We're going to be a little less – (inaudible) –

MR. BURWELL: Take the –

Q: (Inaudible) – the case

MR. BURWELL: Make the – take the microphone, identify yourself.

Q: (Inaudible) – case, actually, in one of your charts, for investing in the carbon reduction emission technologies from our current infrastructure of fossil burning facilities. But yet I don't hear any recommendation on the level of investment that could be made by the global entities that need to use fossil fuels, India, Pakistan, China. But yet we're calling for incentives for renewable. And yet renewable is not critical in one sense from one of your charts. We have to keep these facilities operating that are fossil fuel. So where and how can we get, in a positive sense, that investment, and how much should it be in the carbon emission reduction technologies? I'm Ed Helminski, Exchange Monitor Publications.

[01:54:35]

MR. BURWELL: Nuclear competitive advantage to U.S. and energy efficiency?

MR. BIROL: OK. Now the nuclear – the less nuclear in Europe is definitely bad – I mean, from our point of view, bad news for the Europeans, for at least three reasons. One, their economic competitiveness is in trouble because of the – (inaudible) – prices go up, and second, their CO2 emissions go up because you cannot replace all the nuclear (material with ?) – which is – never happens. You have coal. You have gas and other things. And third, they have to import it, energy, to replace the nuclear power. Their energy security is in difficulty.

It may be good news for America, but I think it is a very – how shall I say – good news for America but bad news for the world. So this is because CO2 emissions will go up. So not everything is good for America is – I shouldn't finish the sentence – so that this is – so I should say it is – less nuclear means definitely higher CO2 emissions and higher energy costs – so therefore, definitely for Germany, for Switzerland and for the other countries, higher energy costs, meaning losing of competitiveness. And this is happening.

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And you see, for example, a major German petrochemical giant is now moving to the United States because of the lower cost base; again, major Dutch and English oil companies moving to the United States for petrochemical because of the low costs.

[01:56:20]

So therefore, we shouldn't be surprised if there is more reallocation of the industries because of the high costs in Europe – you mentioned the (Bid E ?), the report – and going to other countries.

And of course this is good news for the United States because of the – the current account deficits will be pushed downwards, dollar will be stronger, and the trade deficit will be lower.

The other question was about the –

MR. BURWELL: Having investment in renewables?

MR. BIROL: Investment in renewables.

MR. : (Off mic) – investment in carbon capture – (off mic).

MR. BIROL: Investment – there are two different things: one, what we would like to see and the second, what we think – what will happen under certain assumptions. What we would like to see is definitely more investment in lower carbon technologies. And in many press conferences you call for higher investments for lower carbon technologies, but we have to report that this is our wish, but what is happening in the markets is different from that. So this is the reason why we are pushing the governments to create the environment for providing incentive for the industry to go for lower carbon technologies.

[01:57:33]

Industry will not go and invest just to save the world. They will go and invest if there is money in return there. And governments have to make sure that the industry will get a return. Whatever we say as the IEA, industry will like our charts and books and everything, but they will not go and because we have nice charts here. They will go and invest because – if there's a significant return for them.

So therefore it is more for the governments than for the IEA. We just give the recommendations to governments. It's up to them to create the environment.

MS. VAN DER HOEVEN: Well, and when we are talking about the renewable subsidy schemes, I think that we – the two of us, we say over and over again, yes, we need subsidy – subsidies for renewables because then there will be more deployment and costs will come down, but please see to it that you make these subsidy schemes in a reasonable way, so that we are flexible. And the moment costs are coming down, then you need less subsidy, and we've seen, for instance, in Germany and in Spain, where there was a solar PV bubble, nobody wants to have that because it's a burden on your taxpayers. But the same taxpayer wants to have clean energy, so you see to it that

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your subsidy schemes are flexible and that you – if costs come down, then the amount of support has to come down as well.

[01:58:50]

MR. BURWELL: OK. We've run out of time. I do hope that you'll be – stay for a few minutes for media questions, but let's thank this terrific panel for their discussions. (Applause.)

(END)