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The Global Growth Agenda
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TERM GAS MARKET REPORT
Briefing

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Moderator:

Vladimir Feygin, Director, Institute for Energy and Finance

Panellists:

Maria van der Hoeven, Executive Director, International Energy Agency

Laszlo Varro, Head of Gas, Coal and Power Division, International Energy Agency

V. Feygin:

Colleagues, Forum guests and participants, may I have your attention. We are beginning the session. We have a small problem: the Russian and English names for the session do not match completely. Today the International Energy Agency (IEA) is presenting its medium-term gas market forecast for the next five years. The Russian text states that this is a gas market report for the first half of 2013, which is incorrect. Rather, they will be providing a five-year forecast based on the results from the first half of 2013. The unusual situation in which we now find ourselves means that changes are happening fast, and how these changes will play out in Russia is also a significant issue. We will consider the first half of 2013 and some likely future developments. As you know, the International Energy Agency regularly drafts forecasts and scenarios. This is a very reputable organization, and our guests are authoritative. As far as the natural gas market is concerned, I can say as someone who works in this industry and as a colleague of the panel guests that four years ago the gas market situation was, in my view, somewhat strange. Natural gas had obvious advantages, but the forecasts predicted that its role would not grow or only grow very little. Coal had obvious drawbacks, but for a number of reasons its consumption was predicted to grow. Then the International Energy Agency published this wonderful report in which we were presented with a 'Golden Age of Gas' scenario. And then it published the Golden Rules for a Golden Age of Gas report. According to the authors of these rules the potential of gas could be unlocked to its full extent. These reports allowed for a certain breakthrough because they provided society with a better understanding of the potential of gas.

I cannot anticipate what will be said today because right now the market situation is again murky. Just look at Europe: you would think that gas should be prevalent there, but we are seeing a renaissance of coal. So what should happen in the next five years? I would like to give the floor to Maria van der Hoeven, Executive Director of the International Energy Agency, who has a great track record on matters relating both to diplomacy and energy. I hope that Ms. van der Hoeven can bring us up to speed given her consummate knowledge of the situation. So,

what will we see in the next five years? What do we see now in light of the results of the first half of 2013?

M. van der Hoeven:

Thank you very much, Mr. Vladimir Feygin, for your kind introduction. Ladies and gentlemen, it is a pleasure to be here with you today. This is the first time ever that the International Energy Agency (IEA) has launched a report in a partner country, and not a member country. We chose Russia for this because this is a gas market report and Russia and gas are synonymous. This report is very much intertwined with what is happening in Europe, with what is happening in Asia.

It is important to understand that gas remains a fuel of contradictions, however strange that may seem; it stubbornly resists globalization. There are still large discrepancies between the major oil producing regions in terms of pricing, market outlooks, and industry structure. Efficient markets and subsidized monopolies coexist in the world of gas today. Even in regions affected by energy poverty, large-scale gas flaring persists. Reducing flaring is one of the key measures that we recommended in our World Energy Outlook report, released earlier this month.

The *2013 Medium-Term Gas Market Report* covers the evolving gas markets. It is a part of an IEA series that conducts five-year forecasts for each of the major fuel markets. The 2013 edition of the Gas Market Report comes at an absolutely crucial moment. The coming five years will be very important for the global gas economy. Gas has already arrived as a major fuel and power generator, but the next five years will see it emerging as a significant transportation fuel, driven by abundant supplies, infrastructure investments, as well as concerns about oil dependency and air pollution. During this period, natural gas vehicles – buses, heavy trucks – will have a bigger impact in reducing oil demand than biofuels and electric cars combined. I would like to outline a few of the major themes. Then Mr. Laszlo Varro, Head of Gas, Coal and Power Division at the IEA, will take you down through the report with some slides; the report was written under his authority

There are three major themes in the report. The first one of these is the outlook for American exports, which looks brighter than in previous years. The forecast is based on the continuing success of unconventional, upstream gas production, which remains remarkably robust and displays impressive technological progress. The second major LNG export project – Freeport– was approved. Freeport, together with the Sabine Pass, will transform the United States into a sizeable LNG exporter in a few years. A recent report of the Department of Energy robustly argues that LNG exports improve the welfare of the United States. We fully agree with this assessment; we see open, transparent markets as the best framework to provide energy security. If flexibly priced then American gas can provide the liquidity for the development of an Asian gas hub and a more integrated market. It can also provide an option for European buyers seeking to diversify from pipeline imports. American and Canadian gas exports will therefore contribute a flexible, competitive alternative in the global LNG market.

My second point is that all of this is important because the LNG market may become very tight otherwise. We can see security issues in North Africa, West Africa and Yemen, posing threats to exports operations there. We see domestic demand growth, often on the back of subsidized prices, and as diverting gas exports in the Middle East, North Africa, and Indonesia. We see a decline in output from existing fields; they pose problems in Oman, Egypt, and Indonesia. The persistent tightness of LNG markets is a major concern; it limits the contribution of gas to sustainable energy security.

A tight LNG market also has important wider consequences. It means the ongoing competitiveness of coal in Asia, where alternative gas import sources and domestic production are limited. That, of course, has an obvious impact on carbon emissions and local pollution. As LNG redirected from Europe is emerging as an important supply source for Asia, this leaves room for the recovery of Russian exports to Europe. Last but not least, the tightness of LNG greatly increases investor interest in North American LNG projects.

My third point is that, at least in the medium-term, demand for imported gas will remain buoyed by constraints to domestic gas production in places like China and Europe. Chinese policymakers have encouraged gas, because of its

relatively clean burn. China is making enormous efforts to expand upstream production, with a focus on unconventional gas. It does hold large shale gas reserves, however, comparable to those of the United States, but they are proving extremely difficult to access, despite recent successful shale oil extractions lessons learned in the United States.

The obstacles that China faces are largely due to a complex geology that does not favour the United State's experience and technology. Other obstacles are high population density, water scarcity, and various regulatory impediments. We are confident that China will eventually overcome these challenges. However, at least until 2020, in our view, Chinese energy production growth will be dominated by other sources such as tight gas, coal bed methane, and even coal gasification, rather than shale. In addition to the growing role of gas in China, there will be growing import needs.

Europe suffers from many of the same problems, including population density and regulatory impediments; these limit any prospects for competitive shale gas production. However, in Europe, public acceptance is a big issue. An IEA Special Report in 2012, as already mentioned by Mr. Feygin, showed how important public confidence is to the future of the shale gas industry. We presented a set of golden rules for shale gas production to earn and maintain that confidence. The situation in Europe should be a sign to operators elsewhere of the importance of maintaining this social acceptance.

The unconventional-gas revolution in the United States will impact gas markets over the medium-term, more by spilling North American exports onto the LNG market than by the spread of that revolution itself. In a tight gas market, with rising demands and new uses for gas, such as natural gas vehicles – also outlined in this gas report. Extra flexibly priced supplies will be welcomed in Asian and European gas markets, enhancing energy security, reducing carbon emissions, and improving local pollution conditions. Additionally, they will help to encourage market integration and contractual flexibility. This is a short survey of what is in the report. I would like to ask Mr. Laszlo Varro to take us through the report itself and go into it in more detail. Thank you.

L. Varro:

Thank you very much, Ms. van der Hoeven. I would also like to thank Ms. Corbeau, the lead author of the report, who is also attending here. Ladies and gentlemen, what we see is a continuing global demand for gas. Global gas consumption is growing by almost 100 billion cubic metres per year. By the end of the projection period, in 2018, the global gas system will have grown almost as much as the Russian gas industry today. Having said that, though, we are actually seeing a slowdown in the global growth of gas compared to previous years.

We revised our projections downwards by more than 70 billion cubic metres, which is a medium-sized European country, due to persistent weakness in European demand, and also because of persistent problems of upstream supply in the Middle East and North Africa. Even after this slowdown, however, gas is growing much more rapidly than oil, and possibly more rapidly than total energy use. Most importantly, however, in the absence of a significant slowdown in the Chinese economy, coal continues to grow more rapidly than gas.

The important new phenomenon is that natural gas vehicles are now playing a major role in both driving gas demand and reducing oil demand. Natural gas vehicles are not new technology; they have been around for decades, but were completely marginal up until recently.

At this stage, we are witnessing a continuous increase of US gas production. In fact, over the next five years, the United States will be providing 21% – more than one fifth – of global gas production. This is in spite of fairly low gas prices. The reason for this is threefold. One: there is strong technological improvement in the US shale gas industry, better drilling techniques, better seismic and fracking techniques.

Very importantly, the United States has an oil service industry which is able to apply mass-manufacturing methods and very efficient mass operations, drilling one well after the other. The industry has proven to be very adept in redirecting drilling from dry gas formations to wet gas formations, so the number of drilling rigs oriented to gas is falling, while the number of drilling rigs for oil has been increasing. However, you should not imagine this as a black and white situation;

this is not like you switch off gas and switch on oil. There is large-scale gas production coming from projects associated with oil. Consequently, US gas production continues to grow despite this redirection.

The further growth of shale gas in the United States will be of a greater magnitude than any commercial development outside of North America. On the other hand, we also see coal keeping its position in the United States. Last year, the United States delivered a very large carbon dioxide emission reduction, which was not because of climate policy, but because of cheap gas. For that, you needed really cheap gas: the USD 2 per cubic metre that we saw last year. As US gas prices recover, we foresee coal holding its position at the current level, and gas capturing the growth. So, carbon dioxide emissions from the US's electricity go back to having a global impact.

There will be a lot of gas in North America to go somewhere. There is a need for North American gas in international markets. Last year, we saw a truly exceptional decline in global LNG supply. The bad news is that this came from systemic issues where we do not expect a rapid recovery, either because of the very rapid growth of domestic demand in producing countries, especially in the Middle East, or because of security issues or similar problems impacting on upstream development. In fact, over the next five years, we are projecting a decline in gas exports from the Middle East. The domestic energy system, especially the power generation sector, absorbs large quantities of gas. This has benefits for oil markets. Global oil demand by 2018 will be USD 800,000 lower than it would be without the Middle Eastern countries increasing gas-fired power generation and reducing oil burn. The international gas markets, however, will find their ability to export constrained.

There are enormous ongoing investments in Australia to increase the LNG supply. Australian LNG is currently the biggest investment that we have anywhere in the world economy, in any sector; it is over USD 150 billion. As an indication of the very strong demand for LNG, 85% of the future production of the projects under construction is already contracted by various Asian utility providers, such as Japan and China, for long-term supply. There will be little additional supporting supply coming in. Another concern is that while Australia is

a politically stable, geopolitically secure country, the Australian LNG projects are technically difficult; there is a significant risk of project delays and cost overruns. So this is going to be a secure supply, from an energy security point of view, but not a cheap one; these projects are quite expensive.

If I combine the continuing success of upstream production in the United States with the continuing tightness of LNG markets, not surprisingly, there is a very strong investor interest in North American LNG export projects. If you take projects at an advanced stage – and by advanced stage we mean they either already have the approval from the US Government, or they are waiting for the approval but already have export contracts signed – those projects will actually transform the United States into the number three in LNG exports worldwide, after Qatar and Australia, with the combined exports of Russia, Egypt, Yemen, and Oman. Very interestingly, Japanese utilities have already signed contracts for US LNG exports, roughly equivalent to the rise in additional gas demand needs that we saw in Japan after the Fukushima earthquake. If those projects go ahead, then Japan will be in a position to buy pre-earthquake level of imports from conventional exports, and procure the incremental export needs from the United States.

China alone has more than 30% of global gas demand growth. Until recently, the Chinese energy system was completely dominated by coal, resulting in what is now a very serious air quality problem. China is addressing this air quality problem with very radical policies that include hydropower, nuclear power, and also renewable electricity, but natural gas plays a major role. Among the big emerging market countries with rapidly growing energy demand, China is the only one which has cold winters and needs winter heating. We foresee a rapid increase in natural gas being used in China in winter for heating buildings. We also foresee natural gas playing an important role in reducing coal consumption in Chinese industry; replacing it with natural gas in machine-operated industries. China is investing in gas-fired power generation, yet they are building far more coal-fired plants than gas-fired plants. Whereas, globally, natural gas is primarily used as an electricity generation fuel, in China, industry power supply and domestic heating needs are more important.

China has growing domestic upstream production. In fact, the growth of Chinese production is extremely impressive by any standard, as is the scale of the Chinese energy system. China has a very large energy system. Coal production in China is greater than the oil production of the entire Middle East. Even if China did succeed in transplanting the entire US shale gas industry into China, that would only cover 7% of China's energy consumption needs. What we foresee is that, despite China's successful increase in gas production, China will have rapidly increasing import needs.

In fact, over the next five years, China's import needs will grow by the increment of Germany's import needs today. We foresee roughly half of that to be pipeline imports, and the other half will be LNG. The pipeline imports to China are going to be from Turkmenistan and Myanmar. Russian imports will only come in after 2020 because, although Russia has very large gas resources in Siberia, the necessary infrastructure is still insufficient at the moment. Russia still needs to develop some very large gas fields in remote areas, under harsh climatic conditions, as well as build several thousand kilometres of fuel gas pipelines. From a strategic time horizon, this makes perfect sense, but we do not foresee that happening over the next five years.

Now, at the same time in Japan, the new Japanese Government is committed to restoring nuclear power. What we foresee is that the restoration of nuclear power in Japan will be able to stabilize Japanese gas consumption at the current level. Japan is currently burning large quantities of oil for power generation, so as nuclear comes back, the first priority will be to reduce oil-fired power generation. On the other hand, in Europe, we foresee some light at the end of the tunnel for the European gas industry.

European gas consumption may bottom out this year, or early next year. We see a marginal recovery of gas-fired power generation in Europe but, importantly, we never reach the pre-financial crisis level. Projected growth in European gas consumption over the next five years is 12 billion cubic metres, from the current, very low level, which is still well below pre-crisis level.

We are not optimistic about the ability of the European shale gas industry to replicate the success of the United States. Some countries, like France, have

banned shale gas development; other countries, like Poland, are enthusiastic, but they have difficulties building up their industry. Poland, last year and this year, has drilled roughly 40 shale gas valves, around 80 valves in two years, which is more or less comparable to what one single shale gas plain experiences in an average week. For Poland to replicate the upstream of major shale plains in the United States, it would need to ramp up drilling activity by roughly a factor of 100, which presents a serious challenge to the industry.

Natural gas vehicles are an important new phenomenon. Not technologically, because the technology is not very complex; it is an internal combustion engine with minor modifications. In fact, countries like Pakistan or India or Argentina have been using natural gas vehicles for decades. However, these countries have not played a major role in global oil demand. This time, on the other hand, natural gas vehicles have made a breakthrough in two countries which do play a major role in global oil demand: the United States and China. The policy drivers are somewhat different. In the United States, the main policy driver is the ready availability of cheap shale gas, and the very large price differential between gas and oil fuels. China, as I mentioned, is a growing gas importer, and is prepared to go for natural gas vehicles, mainly because of air quality concerns.

In the United States, the next five years will primarily be about building the infrastructure. The gas is there, and the economics are very attractive, but you need to have gas filling stations that can cope with large volumes of gas, where road trains, trucks and buses, as well as cars, can fill up. Our projection, for the coming five years, is a significant investment in refuelling infrastructure and a broad range of LNG trucks coming on the market. However, growth over the next five years will be driven by CNG buses and CNG delivery trucks; mainly urban transportation. That will deliver roughly USD 120,000 per day of oil demand reduction in the United States.

In China, the main policy driver is reducing air pollution. With a natural gas vehicle, a 10% reduction in carbon dioxide emissions can be achieved. It is helpful from a climate change point of view, but it will not save the world. An almost complete elimination of particulate and sulphur dioxide emissions needs to be achieved. Given the air quality problems in major Chinese cities, China is

prepared to go down that route. Very importantly, public transport does not play a very important role in the United States, where people usually commute by car, but it is extremely important in China. The market for mass-transit buses in China is four times bigger than in the United States, and these buses are increasingly being converting to natural gas.

China is currently constructing roughly 5,000 kilometres of gas pipelines every year. They are working on rolling out the pipeline infrastructure and the refuelling infrastructure simultaneously, which is a very efficient development. The ramping up of gas as transport fuel in China is four times higher than in the United States, despite the difficulties of increasing shale gas production. Overall, we foresee that over 10% of the growth of transport fuels globally will be supplied by natural gas, and natural gas is emerging as a major transportation fuel.

These are the key messages in the *2013 Medium-Term Gas Market Report*. Ms. van der Hoeven and I will be happy to take questions and comments.

From the audience:

You mentioned transport, gas in the United States and China, and different motivations. What role do you see for Europe and gas in terms of transport? Secondly, what are your thoughts on the split between small-scale LNG and compressed natural gas vehicles?

L. Varro:

What we see in Western Europe is that a number of major gas utilities realize that European gas demand might never recover to the pre-financial crisis level, and they are looking for new markets for gas. Transport is certainly one potential market. There are some interesting developments in Europe as well – using LNG in shipping, for example, or using CNG in public transport. Quite importantly, if we want to use LNG as a transport fuel, the largest cost is the liquefaction itself. Even if a region does not have large domestic gas production but you import LNG, the gas will arrive at the LNG terminals in liquefied form. If you can set up a distribution infrastructure, then it can supply the transport industry sector. Having

said that, the growth that we see in Europe is a fraction of what we see in China or in the United States.

From the audience:

As you know, the price of gas in the US has almost doubled in a little less than a year. The debate surrounding which market price will satisfy the producers of shale gas in terms of their return on investment continues today even in the US, and so far there has been no clear answer. We know that the shale revolution began due to much higher spot prices for natural gas in the US. By the way, the production of gas in the US in recent months may still be growing, but the rate of growth in annual terms is almost zero as opposed to 6–7% a year earlier. Is the IEA considering a scenario where the US does not become a gas exporter within the next few years? What are America's equilibrium prices for the export of LNG to the world market, according to the IEA? Thank you.

M. van der Hoeven:

For the time being, though, that is still largely wishful thinking. They are going to export, although not immediately; more likely in three years' time. However, the two projects we mentioned, the Sabine Pass and Freeport, will go ahead because they want to make money out of it, which is understandable. I agree with Mr. Varro that it is not black and white; we can see that production is decreasing in some wells and increasing in others: gas and oil coming out together. Of course, it is what you indicated, that the most money is made out of oil, not gas, but the moment that gas can be exported, to Europe or other countries, that will make a huge difference.

I have one remark about the free markets. What we can see, at the moment, is that the American market is quite isolated with, at the moment, around USD 3 to USD 4 per British thermal unit (Btu). In Europe, it is around USD 10. If you go to Asia, it is around USD 18 to USD 20. They do not think that acceptable any more. Of course, at the moment, it is the way it is. What we can see, with new LNG coming to market and finding its way into Asia, is that this will put pressure on the traditional, oil indexed, pricing mechanisms. At the same time, what we

can also see is the wish to develop spot markets in Asia – in Shanghai, in Japan, and in Singapore. Whether that will lead to lower prices cannot be foreseen, but it will put the pressure on and make the market more liquid and more transparent for sure. Coming back to the other part of your question about the heavy, high prices – when will it change, Laszlo?

L. Varro:

You are absolutely right that the shale gas revolution itself was triggered by very high gas prices. However, over the past five years, we have seen very significant technological improvements, so we should not make the mistake of assuming that shale gas development needs the same prices as it did in 2007. It is now much more efficient, both in terms of seismic exploration and in terms of drilling. Even in our World Energy Outlook, the United States is still an LNG exporter, even in 2035. This is not going to alter.

V. Feygin:

Do I understand correctly that there are signs of a slowdown in gas drilling in the US? This is a critical question for shale gas because of the very short amount of time between the drilling and production phases. These are processes which occur very quickly. Is it right to say that at current price levels the rate of drilling for shale gas in the US has slowed down?

L. Varro:

The number of drilling rigs oriented towards gas projects is declining in the United States. With the development of multiple drilling, however, there is no longer a one-to-one relationship between drilling and production, because one drill, one valve can produce more. Also, there is still a lot of associated gas production from wet gas and oil-oriented projects. Now, you are absolutely right that there are dry shale gas areas, such as Haynesville in Louisiana, where drilling activity is down by 85%; it has essentially stopped. Those dry shale gas areas could come back to production in roughly two or three years, if gas prices go up a little. What we see is that gas production growth is based on current fuel

prices. If you have a higher gas price level than the current prices, then you would have even more growth in gas production in the United States.

M. van der Hoeven:

Our opinion is always based on facts and figures. So it is not the opinion of the IEA; it is an analysis based on facts and figures, and it needs to be done that way. It needs to be credible; we have to continue to take care of our own integrity. It would therefore not be wise, for instance, for an executive director to make political statements. I cannot do that anymore; I was doing that when I was a government minister, but I cannot do that anymore.

A. Mason:

My name is Arthur Mason. I am going to try to address this question in a different way, but it is still the same concern. If you go back about 15 years, we see natural gas go in cycles of five to seven years. We had a robust transfer to electricity production during the 1990s, where we thought we had gas forever. Then we saw a tightening, around 2000 through 2006, where all of a sudden we see all of these frontier projects possibly come on: LNG terminals for import, Arctic gas, Western, Canadian. Then, all of a sudden, shale kicks in, around 2006. We recognize that around that time, and here we are now, saying it is forever. Given this, on some level, if we look back in time, we do have volatility, a boom and bust situation going in five to seven-year cycles. I was wondering if we could just approach this question in a different way and ask whether you would be willing to tell us some of the things that might be in the back of your mind, that could actually suggest that we might see another period of volatility, given that we do go through these periods without knowing what the future might bring?

M. van der Hoeven:

You are quite right on one point – we have seen volatility. There is another thing, however; you cannot say that the shale gas revolution has been coming unexpectedly. It was there for a while; the techniques were there; the technology

was there, but it was ramped up because of the high prices, as you mentioned. That was surprise to some people – the ramping up.

A. Mason:

I just have one correction to that. In 2004, there was a lot of discussion in Congress over federal legislation to support Arctic development. That would have destroyed the organic growth, had that legislation been implemented. I am talking specifically about the financial incentives, such as the regulatory guarantees. The politics could have changed on some level.

M. van der Hoeven:

Yes, you are right. Political volatility is there, and it depends on the political framework as to whether some kind of exploration is there or not. It is important that we realize that what is different from oil is that we have gas almost everywhere, although it is not only shale gas; there are other gas resources as well. I mentioned coal bed methane, for example.

You talked about the Arctic, and that it is of the utmost importance that all countries engaged in the Arctic cooperate on this issue, because the eyes of the whole world will look through a magnifying glass at what is happening in the Arctic. If anything goes wrong there – and it does not matter who is doing it – then the whole industry will be out of business. That is all about the Arctic – it is of the utmost importance that we realize that the world has been changing, with what has happened with shale gas, and in the United States. At the moment, mistakes are being made, and it will really have an impact on the whole gas industry. That is why it is of the utmost importance that where you can cooperate, you do. Of course, there is competition as well, but competition can never be about security.

There is another game changer coming up – the methane hybrids, in Japan. They are not yet fully visible, but they are there, and I can tell you one thing: they are working very hard on it, very hard.

From the audience:

As you know, today in Russia we are witnessing an internal debate about what the price of gas should be insofar as the price of gas in Russia is regulated. My question is this: do you have an idea of what a fair domestic price for gas in Russia should be in light of the global competitiveness of Russian industry and investment in the gas sector?

V. Feygin:

I will clarify: the price of gas is regulated for Gazprom.

From the audience:

The price of gas is regulated for both Gazprom and also for the entire industry, since everything is tied to that price. After all, Gazprom dominates about 80% of the market.

V. Feygin:

Gas prices are not regulated for other suppliers, though we have a single market.

From the audience:

But I still have not asked my question yet.

V. Feygin:

We understand. I was not answering your question. I was simply clarifying.

M. van der Hoeven:

You know, that is a typical domestic Russian question. You have got one market, and that it is important. When you have more markets, and you have competitors in your markets, the situation will be different. Do not ask me what a fair price for Russian gas, in Russia, could be. We are not the ones to answer that. That is not up to us.

From the audience:

I have another question about Russia, but not about internal prices. As you are well aware, there are a number of LNG projects that Russian companies have announced in the last year, and some others in the last couple of years. There is an opinion now, that maybe those projects would be too expensive because there is no infrastructure and the conditions are very harsh. I would like to hear your opinion of those LNG projects that have been announced, and if this is in the near future or maybe sometime later. Perhaps you have some analysis about whether there is a market for this gas. Thank you.

M. van der Hoeven:

I will start the answer, and then Mr. Varro will continue on that. Will there be a market for that gas? The answer is yes. Where will it be? Not in Europe, but in Asia. Of course, the European market will be a market for Russia, as it is now, but it is not the only Russian market. Russia produces much more gas than can be absorbed by Europe. It is important to diversify; this is absolutely necessary, not only with LNG, but also with pipelines. Laszlo?

L. Varro:

Yes. The growth in demand for gas is roughly equivalent to a major LNG project every six months, so there is very significant growth out there. A very large proportion of that is China itself. Of course you can deliver Russian gas to China by pipeline, from East Siberia, and that is also on the agenda. For other Asian countries, pipelines are not really an option, so that has to be LNG.

You are right that we are talking either about the Russian Pacific or the Arctic. Those LNG projects are not easy, technically, and not very cheap. The good news from a Russian perspective is that the Australian projects, which are currently dominating LNG investments, are not easy and not cheap either. The next generation of projects, which would come, for example, from offshore East Africa, are only under exploration. There is nothing that would suggest that those projects would be easy and cheap. Therefore either of the Russian LNG projects can be competitive in global markets, in our view, but will they be as profitable as

exporting from West Siberia to Europe by pipeline? No, they will not be, they are going to be very capital-intensive.

C. Granville:

Hello, my name is Christopher Granville, from Trusted Sources Research. There was talk, just a minute ago, about political volatility on the supply side. I would be interested in any comments you have on the same type of volatility on the demand side, especially in Europe, but also, for that matter, in China, where the demand growth you were describing seems to presume abundant supply, with more global integration of gas markets and a reduction in that average price that we see at the moment.

In Europe, in particular, based on your observations of previous responses of energy policy to supply, would you expect that the arrival of US LNG, and other gas supplies, on the European market might have the result of encouraging national governments to increase the share of natural gas in their energy mix? In particular as a way to achieve climate change objectives on the one hand, but on the other to not impose excessively high electricity prices on their households at a time of great structural economic weakness, if not economic distress, in Europe?

M. van der Hoeven:

What we can see in Europe at the moment is a switch, not from coal to gas, but from gas to coal. The question is, of course, how can that be turned back around? It has to do with prices, and also with the 20-20-20 Goals. There will be a new commission, a new European parliament next year. What will happen after that? We just do not know. It would be fantastic if we could know, but we do not. So that is one part of the answer.

The other thing is, as you quite rightly pointed out, gas is an ally of renewables when it comes to climate mitigation and achieving climate goals. This is something that is really underestimated in Europe.

My last remark is that there is not a single European price for electricity. At the moment we can see that electricity prices in Germany are among the highest,

and that this is because of the cost of renewables, and their phasing out of nuclear energy. In other countries, it is different. Regarding renewables, if we really want to see more renewables in Europe and have them producing electric power at a cheaper price, we need to develop a market for that. That is something that is still in its infancy; it is not yet there.

One of the problems Germany is facing is that they are not producing solar energy in all the locations where it could be produced cheaply. Then, of course, the problem is that you have to transport it. There are transport problems within Germany and also, for instance, between France and Spain. So there are quite a number of issues that need to be solved. Coming back to your remark – gas could and is an ally for Europe and the world in growing into a greener future, and should be used more as an ally. Now, China, Laszlo.

L. Varro:

Yes. Actually, gas is not cheap in China. The major Chinese cities have different gas prices because there is no national gas price regulation. They do have gas price levels comparable to, or sometimes even higher than, Europe. Yet gas consumption is growing quite rapidly in China because of their serious air quality problems. The city of London was heated by coal 50 years ago, and air quality was awful. Once the British Government decided, in the 1950s, that they had to clean the air, natural gas was the only practical solution for that.

The expensive nature of Chinese gas means that the role of gas will be limited in the electricity sector. China is building nuclear power plants, hydropower plants, wind power plants, coal technologies, among others. If you want to heat a million buildings with something, in a major Chinese city, that cannot be done with a million nuclear reactors. It can be only be done using coal or gas, and if you use coal, you have an air quality disaster on your hands. If you use gas, however, you will have clean air. We believe that the outcome of our considerations, which we perceive to be very serious in China, will drive gas demand, even at reasonably high gas prices.

From the audience:

My question is about the technology used for extracting gas from methane and methane hydrate reservoirs. I would like to know if you expect any changes in the technology of methane hydrate extraction in the near future? Under what conditions could such a methane extraction technology be used according to your calculations?

M. van der Hoeven:

I mentioned methane hybrids in Japan. This is a technology that is there, that they are producing, but the question is: how fast can they produce in an economically viable way and in huge quantities? It is not in our report, because we do not think that it will be possible to have this within the five years that this report covers. Some think it might; we think it might not, but I mentioned it because it could be another possible game changer. Let us not be surprised, therefore, when it pops up. That was the background to my answer. However, we do not have any facts or figures on that, do we?

From the audience:

When, in your opinion, will the time finally come for such global projects as the Shtokman field?

L. Varro:

No. This discussion should be addressed to Gazprom, because they are leading this project. I can tell you, though, that we foresee Russia remaining the largest gas exporter by a significant margin; Russia is emerging as a credible LNG exporter. Of course, there is project-by-project competition. Some Russian projects progress better than other Russian projects. I cannot comment specifically on Shtokman. But as a big picture, Russia is the biggest gas exporter for the years to come, and is becoming an important LNG player as well.

M. van der Hoeven:

I would like to mention another one, and that is the Yamal megaproject and the Bovanenkovo gas field. I was there, and watched what is happening there; it is of

utmost importance. Also, the way in which these gas fields are being exploited is also very important because it shows that it can be done under very difficult circumstances and yet in an environmentally responsible way.

V. Feygin:

You asked about technology and technical solutions. I do not think this is a hopeless issue. I agree that this is a question for Gazprom and the project operators.

From the audience.

Thank you. I am from the Netherlands. A few years ago, the IEA published its Golden Rules for a Golden Age of Gas. What is your impression, your assessment on the response of governments and industry to this advice? Did industry take these lessons and do something with it, or is it something that was not really heard by governments and industry?

M. van der Hoeven:

It was heard. We had our first meeting with representatives from governments, industry, NGOs, and regulators, together, two months ago in Paris. The result of that was that there will be further steps in exchanging good practices and knowledge. Everybody is very much aware of the fact that it is not only about technology, or the environment, or water, or rules and regulation, but it is also about public support. Maybe that is not as important in one country as it is in another, but I can tell you one thing: when you are working in a densely populated country, and you are discussing shale gas issues, it is important to have that transparency and public support, because without it, the industry will not be able to do anything at all. That is something which all of the participants realized. We heard it from all over the world. We will continue to work on it because there is only one alternative, and that is that gas stays where it is. That is the point: if you want to get the gas out, you have to do it in a responsible way and see to it that you gain public acceptance, not only at the beginning but also during the whole process.

V. Feygin:

I will say several words about new developments surrounding this topic that I find interesting. At the beginning of her presentation Ms. van der Hoeven raised the issue of gas flaring. This has been a traditional issue for the Soviet Union, for Russia, and now it is an issue for the US and Canada. This is due to the rapid development of shale gas extraction by smaller companies, which carry on their own business in the absence of strict regulation of this issue because they have never had to address such regulatory issues. This has led to the fact that currently the number of sites where gas flaring occurs has increased enormously. This problem must be addressed. It is not a question of mismanagement. It is a very serious issue of regulation. The economy itself on the whole acts in accordance with what is allowed by regulations across a number of issues. This is how I see it.

There is another very interesting point: we have just heard that the LNG market has suddenly become tight. It was very difficult to predict this. I was very surprised to see that the volume of LNG extracted in Europe declined last year. The limited volumes of LNG on the market were mostly exported to Asia because prices are higher there. And just two years ago everyone thought during the European crisis that the market would be flooded with cheap LNG. And then the outlook changed sharply, or at least it did as of last year. It would seem that the market for natural gas is not globally unified, in which prices would be the same on a common market. However, the market has proved to be very interdependent. And every year or even more frequently we see the phenomenon wherein one part of the market begins to affect another. This dynamic situation leads to a state of affairs that can be very difficult to predict. On the other hand, the current market picture is turning out to be very interesting and lively. This is the reality, and my colleagues may agree with me.

You were talking about Europe, and in particular about the public acceptance of shale gas. In my opinion the issue is somewhat larger than this. We are talking about the public acceptance and state acceptance of gas in general as a fuel. And it raises questions of the type that have been asked. We are working

together with Laszlo Varro. I will express my opinion: of course, Europe's response to this challenge is external in nature. It seems to be related to the economy, with the struggle for the right climate, but there are other answers to these very same questions. These answers in particular have to do with gas. We must strive to change the situation so that the political background of these answers is not the main component. What was said about China also seems to be important. Of course, gas consumption in the developed cities along the east coast will continue to grow and grow. What struck me most about my first visit to Beijing was the constant smog, which is the result of the use of coal in conjunction with the geographical region surrounding the Chinese capital. It is hard to do something about this problem, even over the long term. But on the other hand, if China were to agree to switch its power plants over to gas, it would be a serious thing, because it is a different pricing level.

We can also see the same situation in Europe. Why has Europe been using coal? I think that gas will not be able to compete in price with coal at power plants unless climate impact measures are implemented in the form of a normal price on carbon emissions. Such measures currently do not exist either in Europe or anywhere in the world. All scenarios for reducing emissions would suggest that some sort of fee payment needs to be made for emissions. Currently emissions do not entail any fees, so we see fluctuations in the market's reactions which are not regulated by anything, nor are they softened by policy. I think that this situation is unlikely to last for long, because otherwise we will witness some unpleasant consequences.

Finally, I will say something regarding your comments about how to develop LNG deliveries to Asia. Deliveries are being made on the basis of long-term contracts. However, there has been discussion about developing a platform for trading gas in Singapore or elsewhere, because gas prices there are very high. When it comes to international contracts and investing tens of billions of US dollars, as Laszlo mentioned, then the entities that conclude these contracts want a certain predictability. Predictability is tied to long-term contracts. We are speaking to our European partners about this, because they are always citing the predictability of the American market. But the US market is an integrated market that has no

borders: market forces actually affect it. The market between Russia and the European Union is not integrated. The market between Australia and gas consumers in Northeast Asia is not integrated. Here, investors have a different point of view: long-term contracts do not wither on the vine, and they play a role. Perhaps this is also an interesting phenomenon, especially in a situation where there is a clear need for these investments. Then, we witness the revival of long-term contracts. This is simply my observation.

Now I would like to turn the floor over to our guests. I would like to hear if they found all of this interesting, and if they have any comments or observations to make.

M. van der Hoeven:

The answer is yes. I would like to make a few comments on what you mentioned, Vladimir. You are quite right – the gas market is a complicated market: it is a market of contradictions, without one globally set price. It is a market in which long-term contracts play a role, not only now but also later. It is a market in which spot prices will also play a role. The point is, how do we find the right mixture there. It is also a market that is very difficult because it has a competitor and that competitor is coal; abundant and cheap. As long as the world accepts coal as the number one energy resource – and it looks like that is the case at this moment – then it will be difficult for gas.

What can be done about that? We have seen in China, at this moment, that they are introducing emissions trading. In Australia, they are introducing a price on carbon, a carbon tax. This has to be done in some way or another. It can be done differently; it can be done in several ways. If you do not want to put a price on carbon by, for instance, an emissions ceiling or monetary value, then make it mandatory to have CCS, Carbon Capture and Storage. If that does not happen, then it is not so easy for gas to compete with coal. It is one of the things that is not only your concern, as you mentioned, but our concern as well, and it should be the concern of our governments and politicians.

L. Varro:

I have found this panel very useful, and highly interesting. I am very glad of the opportunity to bring this report here, not only because Russia is very important in the development of gas but also because gas is considered to be very important in Russia. It is one of the countries where you can attract the most intensive interest and the highest amount of participation for our topic of gas, and that is very exciting.

Regarding your concerns, you are right, there is a significant difference between the development of gas and that of oil, and that it is down to infrastructure. In oil, if you invest USD 1 in exploration and production, you have to invest USD 0.03 in infrastructure, in pipelines or tankers, so the investment in oil is completely dominated by the production side. In gas, this proportion is USD 0.42, which means that for USD 1 invested in gas upstream, you have to invest USD 0.42 in gas infrastructure, in LNG or pipelines. So a very large investment is needed upstream, but the role of infrastructure is more than ten times larger. That alone has made a big difference between the two markets, and that will always create different market structures and different roles for contracts. We are very much aware of that.

V. Feygin:

In reference to your concluding remarks I would like to say that, historically speaking, when the Gazprom system or the Unified Gas Supply System of the USSR was being developed, there was always something like the following proportion: between 60–70% of expenditures went into transport infrastructure (that is even more than what you are talking about). This was due to the fact that the fields were easy to develop (they were enormous) while the distances were huge, both for transport inside the country and for export. This ratio has now slightly shifted towards extraction, but the situation in Russia and the Soviet Union has strongly emphasized the role of infrastructure. I agree with you completely.

If there are no more pressing issues, I would like to thank the International Energy Agency and its representatives for a very interesting report and for the

fact that, as Ms. van der Hoeven stated, for the first time ever, the IEA chose to launch a report in a partner country and not in a member country. It seems to me that neither they nor we have been disappointed. Thank you very much.