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Модератор:

Джон Торнхилл, Редактор раздела «Инновации», The Financial Times

Выступающие:

Йенс Биргерссон, Президент, главный исполнительный директор, ROCKWOOL International A/S

Антон Боутс, Руководитель международной практики, нефтегазовая отрасль, «Делойт», ЮАР

Николай Подгузов, Заместитель Министра экономического развития Российской Федерации

Максим Соков, Генеральный директор, En+ Group

Чарльз Хендри, Государственный министр энергетики (Департамент энергетики и изменений климата) Соединенного Королевства Великобритании и Северной Ирландии (2010—2012 гг.)

Димитрис Цицирагос, Вице-президент, глобальные услуги, Международная финансовая корпорация (IFC)

Игорь Честин, Директор, Всемирный фонд дикой природы (WWF) России

Хакима Эль Хайт, Министр окружающей среды Королевства Марокко

J. Thornhill:

Good morning. My name is John Thornhill, from the *Financial Times*. It is a great pleasure to moderate this session today on Addressing Climate Change: Potential Costs and Opportunities.

We are, I think, on the verge of a huge transformation of energy. The economic, political, technological, and financial aspects of energy are going to be transformed over the next few years. The United Nations Climate Change Conference in Paris has set ambitious targets to limit global temperature increases. This will impose costs on a lot of existing businesses, and may leave them with vast amounts of stranded assets. It is an issue not just for the companies themselves, but also for their investors, and for all of us as stakeholders in that investment world.

But it is also, I think, an enormous opportunity. I have heard one person active in this area describe this as one of the biggest investment opportunities of the twenty-first century. The world needs energy that is reliable, affordable, and does not produce carbon. A number of very ambitious private sector initiatives, such as the Breakthrough Energy Coalition backed by Bill Gates, have focused on this as an area of great opportunity.

So, can we save the planet, and particularly, can we save the planet without inflicting massive economic and financial costs on our economies and societies?

To address these issues, we are joined by a fantastic panel today of ministers, business leaders, and industry experts. I am going to introduce each of them as I call on them to speak, and we will have a first round of initial comments, and then I will try to corral the conversation on one or two of the key points that emerge, and then I will open it up to the floor for questions as well.

I am going to start with Hakima El Haite, to my right, who is the Minister Delegate for the Environment of the Kingdom of Morocco, and is also the Champion of Climate Change in Morocco. I wondered if you could start, Minister, by just setting the framework for this debate by telling us what you thought were the

main issues that came out of the Paris talks, and how they affect Morocco? What are you going to do differently as a result of the agreements that were reached in Paris?

H. El Haite:

Thank you, Mr. President, Your Excellencies, ladies and gentlemen. Let me first thank the Russian Federation for this invitation, and for giving me this opportunity to share the view of the incoming Presidency of COP 22.

I will simply say that the Paris Agreement has brought two main issues, or two main objectives. The first is to decrease emissions, and the only way to do that is to take steps to reduce emissions in the industries, the contribution of countries, and also to multiply initiatives and coalitions dealing with the issue of low-carbon technologies.

What does this mean? It means that we have to change everything, to change the way we go about design, manufacturing, building, and industrialization. The contributions which were proposed by all the countries in Paris showed that we were not able to reach the objectives on reducing emissions and to address the climate change issue. That was the first objective.

The second objective of Paris was that countries should help developing countries and those which are suffering from climate change, and which are not responsible for the pollution and emissions, to adapt to climate change and to face climate change. You know, this is a focus for the small islands which are at risk of disappearing because of rising sea levels; this is the case for developing countries in Africa and the least developed countries, which are losing many, many millions of hectares of agricultural land each year.

For example, 500 million hectares have been completely lost because of climate change, and because of the increase in the temperature, meaning millions of people have no access to drinking water, 600 million around the world; more than 1.2 billion people have no access to energy; many millions of people, 30 million,

are moving and migrating because of climate change, and it seems that this will reach 200 million by 2030.

There are many impacts related to climate change and to CO₂ emissions, so the Paris Agreement wanted to bring answers to such issues, which are not just environmental issues, but which are becoming economic issues, and also political issues, and security issues.

So, the decisions which come out of the COP 22 Presidency will try to give answers to those countries and try to find solutions to increase the momentum, to involve the private sector, to involve NGOs, to involve regions. You know, 93 companies around the world emit 63% of emissions. This is huge.

So what we are trying to do, through the Lima–Paris Action Agenda, which is the agenda of the private sector and regions, is to increase the involvement of the private sector, of regions, to get them to participate very strongly in this fight against emissions and climate change.

J. Thornhill:

Thank you very much. That was a great opening, framing, of the debate.

I would now like to come to Nikolai Podguzov, who is the Deputy Minister of Economic Development of the Russian Federation. Clearly, this issue is of enormous concern to Russia, being such a big oil and gas producer, and with the economy being so dependent on oil and gas. How high a priority is climate change for the Russian Government and how do you think Russia will adapt to this new world?

N. Podguzov:

Thank you very much, John. Let me speak in Russian.

Парижское соглашение и Парижская конференция по климату стали глобальными событиями: почти 200 глав государств посетили Париж, чтобы обсудить проблемы климатических изменений. Очевидно, что эти проблемы

очень серьезны и в мире им уделяется все больше внимания. Россия приняла на себя в рамках Парижского соглашения определенные обязательства по сокращению выброса парниковых газов на 25—30%, до уровня 1990 года. Достичь этого показателя необходимо к 2030 году — полагаю, что мы справимся с поставленной задачей, и, возможно, это даже не потребует масштабных структурных изменений в экономике.

Парижское соглашение и парижская встреча задают направление для стратегии низкоуглеродного развития, что подразумевает серьезные изменения относительно того, как в мире будут распределяться инвестиции, какая экспортная продукция будет наиболее востребована, каким производствам удастся привлечь дополнительные инвестиции, а какие, в силу низкой энергоэффективности, не смогут на них претендовать. Все эти вопросы требуют глобального переосмысления и выработки стратегии низкоуглеродного развития в России, чем сейчас и занимается Министерство экономики. Мы хотим предложить долгосрочную стратегию до 2050 года, она будет затрагивать и другие стратегические документы, поскольку фактически нам предстоит работа над новой экономической моделью.

Возможен ли динамичный экономический рост в условиях модели низкоуглеродного развития? Конечно, возможен. Обратимся к примеру Великобритании, которая добывает значительные объемы нефти и газа в Северном море. Углеводороды составляют около 11% британского экспорта, тем не менее в структуре ВВП Великобритании вся добывающая промышленность составляет всего 2,4%.

Значительный потенциал для формирования новой, менее затратной структуры экономики находится в сфере производства и использования энергии. Затраты энергоресурсов на единицу ВВП в России в 2,4 раза превышают аналогичный показатель стран ОЭСР, в 2 раза —

среднемировой уровень и в 1,5 раза — уровень Канады. Очевидно, что нам необходимо активно работать в этом направлении.

Основная часть выбросов парниковых газов — более 80% — связана с использованием органического топлива. Соответственно, можно говорить о потенциале повышения энергоэффективности в сфере ЖКХ, в электроэнергетике, в сфере транспорта, в промышленности. Все эти задачи необходимо решить и задать тренды в плане развития на ближайшее десятилетие. Во многих случаях снижение энергопотребления является рентабельным, и соответствующие проекты необходимо реализовывать. К сожалению, частный бизнес не всегда заинтересован в реализации этих проектов, потому что отдача от них ожидается в будущем. Длинные деньги — это серьезная проблема для российской экономики, без поддержки государства здесь будет тяжело что-то предпринять.

Вместе с тем один рубль вложенных в энергоэффективность инвестиций в долгосрочной перспективе дает порядка трех рублей отдачи. По нашим оценкам, для того чтобы трансформировать нашу экономику в соответствии с моделью низкоуглеродного развития, необходимо в течение следующих 20 лет осуществить инвестиции на сумму порядка 120 миллиардов евро, то есть примерно 6 миллиардов в год или 2—3% от ежегодных объемов инвестиций в российскую экономику — это представимые цифры. Министерство экономики с целью выработки инструментов поддержки также будет предлагать определенные подходы с привлечением длинных денег, с возможной поддержкой тех, кто эти проекты реализует.

Очевидно, что самое эффективное стимулирование перехода к низкоуглеродному развитию — налоговое. В этой сфере необходимо выработать различные стимулирующие меры, как минимум в краткосрочном горизонте планирования. Инструмент длинных денег — привлечение средств НПФ, это тоже важнейшая задача, и здесь нужно конструировать проекты так, чтобы потенциальным инвесторам было

интересно. Большой пласт работы придется на компании с государственным участием, которые в первую очередь сосредоточены в сырьевом секторе. Мы видим, что такие глобальные игроки, как ExxonMobil и Total, активно инвестируют в альтернативную энергетику, развивают это направление в рамках диверсификации своей инвестиционной деятельности. Для крупных российских компаний эта задача также актуальна, и этот тренд должен быть скорректирован в их дальнейшей инвестиционной деятельности. Таковы основные выводы Минэкономки по результатам Парижского соглашения.

J. Thornhill:

Great, thank you very much. I would now like to come to Charles Hendry. As a former Energy Minister from Britain, how likely is it, do you think, that the world is going to meet the climate targets set in Paris, and how is it going to be done?

C. Hendry:

John, thank you very much. I think that this is a really important session. I think the fact that Ban Ki-moon spoke yesterday at the beginning of his remarks about the importance of climate change shows why it is so relevant. I think, particularly in a country like Russia, what we are seeing in the major hydrocarbon economies, in Saudi Arabia, in Kazakhstan, in the countries of the Gulf, is that if they want to maintain their hydrocarbons for export, then there needs to be a shift towards renewables and low-carbon generation to meet the energy demands of their own people.

I think the second aspect of that is that Russia has an extraordinary historical technological genius, one of the leading countries in the world for science and technology. We are in a period of, I think, unparalleled technological innovation in the energy sector, and some of that genius in Russia is very well placed to take advantage of that, to come up with the solutions which the world is looking for.

I think that, to see a real change, countries are going to have to move a bit outside their comfort zone, and they are going to have to do things which show leadership and which take risks in policy terms.

In the United Kingdom, we have locked ourselves into a legal framework whereby we are required to reduce our carbon emissions by 80% by the 2030s. And the policies framed by the government now are all targeted at meeting that objective. That has meant that we have seen a real step change. The UK was one of the few countries in the world to meet its Kyoto commitments, but we did that almost by accident. It coincided with the gas coming out of the North Sea, and it made sense economically for us to switch from coal to gas. Now, in order to make the next step, we have got to have much clearer government policies and much clearer drivers.

Last year, across the world, we saw USD 285 billion of investment into renewables. That was a huge increase on just the year before, and in fact it was twice as much as the combined level of investment in coal and gas electricity generation. In the United Kingdom, we saw USD 22 billion of investment in renewables, the fourth largest in the world, which is quite extraordinary.

But it also shows how you can move from being behind everybody else – go back to 2010, we were second bottom in the EU in terms of renewables – but since then we have seen our volume of electricity generated from renewables rise from 5% to 25% in just six years. So, a step change.

Part of that was because of the legal obligations, the legal framework; part of it was by reinventing our electricity market, and giving fixed, long-term price guarantees to investors, where they are legally locked in, so government cannot change those over time, and we have given those price guarantees over 20, 30 years, in order to encourage investment. Because for us, this is not something which is done by government – our government does not invest in the energy sector – we have to attract international companies to invest in the United

Kingdom, and they make global choices and have to find something which is more attractive in the United Kingdom than they find elsewhere.

That increase which we have seen in investment, I think shows that that is the case.

We have put in our own carbon floor price, because we frankly had no confidence in the European Emissions Trading Scheme. Over the years, it has delivered almost nothing, and certainly nothing in terms of long-term predictability. So, we have put in place our own programme, and we have tried to make sure that industry has the confidence that if it does invest in these sectors, then it is guaranteed to get the returns which it needs.

There has been a major programme of energy efficiency: the historic nature of our agreement with Russia on energy cooperation was on energy efficiency, and I think we can do more together in that space.

We can also do more on smart technology, one of the most transformative aspects of this debate, which will really put consumers in charge in a way that they have never been before, and trying to drive that forward, I think is really key. Now, we cannot do this without gas, because the renewables we have in the United Kingdom are inherently unpredictable – it is some solar, some wind, a lot of offshore wind – and therefore if we want to balance the generation and meet demand, then we need to have gas in the mix. And that requires, I think, a long-term dialogue, a long-term relationship, with gas-exporting nations like Russia, as our own gas is in decline.

But John, in your earlier remarks, you talked about what is often called the trilemma: how you balance security of supply, affordability, and low carbon. I think we have rephrased that in the United Kingdom. The first element is security of supply: the overwhelming responsibility of government in energy policy is to deliver security of supply. Secondly, it is low carbon, but it must be affordable, so we are making tough choices as to which are the most affordable technologies. And thirdly, it is wider UK benefit. Where will we get the better economic gains for

the United Kingdom? We will not find them in solar, because we import it all from China. We will not find them in onshore wind, because we import the equipment from Denmark and Germany. But we will find them in offshore wind. We lead the world in offshore wind. We may be able to lead the world in tidal. We may be a world leader in capture and storage.

So we have made energy choices which tie in with our economic and industrial choices, and I think that is going to be of really significant long-term benefit to us. We are very keen to share what we are doing. I think there are many areas here with Russia and other economies, where we are all trying to do the same thing. We recognize the skills base which is here; I think we have got many complementary skills, and we therefore see tremendous opportunities to do this together, because ultimately, we will achieve more if we work collectively.

There is a phrase in the UK which is that if we all do a little, we will get there. Our Chief Scientist said, "If we all do a little, we will achieve a little." What we actually have to do is we all have to do a lot. And we achieve much more by working collaboratively and together than we do by working individually.

J. Thornhill:

Great, thank you very much. I noticed that you did not mention nuclear as part of the mix. What do you make of the UK's energy policy on nuclear? Do you think we need to go ahead with Hinkley Point and massive new investment?

C. Hendry:

I think we will see new investment in nuclear. It is a core part of our low-carbon agenda. The Hinkley Point one with EDF and the Chinese I think will happen, it has been a very fraught process, but we have got many other investors, Japanese and others, who are keen to be part of the nuclear regeneration in the United Kingdom. That could be an area where we develop a good skills base as well. The challenge for us, though, is that we have got to be careful that we do

not lock ourselves into an old technology when there are a range of new nuclear technologies which are beginning to come forward.

J. Thornhill:

OK, thank you. Now, I think all of the ministers have talked about the fact that this is a very high priority, but it is also a massive challenge. We are going to have to reinvent our economic model in order to meet the targets, if we are going to succeed.

So I would now like to call on Anton Botes, who is the Global Oil and Gas Practice Leader from Deloitte, based in South Africa. How likely is it that we are going to achieve this new economic model, and what needs to be done? How is the private sector going to respond to these public sector goals?

A. Botes:

Thank you very much, and thank you to everybody for allowing me to be part of this panel.

I made a couple of notes on certain things that the honourable ministers said, which I just want to give a couple of observations on.

We need to adapt and face climate change with involvement and participation from the private sector. It is possible. We need to be proactive, but the industry needs to have confidence that the private sector will get a return on this.

Let me take it from that angle, and share with you just a couple of observations and maybe a perspective from the private sector side.

I do not think that there is any question that climate change is a real, real issue facing us, and that it needs to be addressed going forward. If you look at energy and resource companies, you will find safety, health, and environment right up there on the agendas of boards and CEOs, because they are critical issues.

Let me have a deeper look at the environment.

Climate change is one of those things that a typical CEO needs to address via the macros that a CEO needs to balance: the political environment, economics, social, legislative, technological, aspects, and the physical environment. These are things that, through company strategies, need to be addressed and dealt with strategically.

So, it is right up there on board agendas, and the willingness is absolutely there to deal with that from a private sector perspective, and I am specifically coming from an energy and resource company perspective.

If you look at the market environment that these companies are faced with, customers are very sensitive around climate change and customers are actually demanding that companies deal with these issues, through whatever the consumer product is that they need to deal with. So, from a market environment point of view, customers and suppliers are right up there in terms of expecting companies to deal with this; and then there is the competitive environment: if you do not deal with this as well or better than your competitors do, you will go out of business.

But the challenge is that CEOs have to optimize shareholder value over time. Now, energy and resource companies are capital-intensive companies. These companies need to make capital investments that yield returns over 20, 25, 30 years. So, they are faced with the dilemma that between growth and profitability and asset efficiency and the expectations from shareholders on shareholder returns, they need to take a well-balanced approach to capital investment.

Now, the observation is that energy and resource companies are very seriously focusing on energy efficiency, on shifts in the energy mix towards renewables, towards cleaner sources of energy, but this will take time. And I think what I would like to plead for is that we be realistic around the timeframes, and that from the point of view of the political and legal environment, the technological environment and investment, we make it as easy as possible for companies, and

specifically the leadership of energy and resource companies, to step up to the challenge.

So, let us make it as easy as possible, because the willingness is there, and I think we will see results going forward.

J. Thornhill:

Thank you. Now, I wondered if I could look at this from an environmental perspective, and turn to Igor Chestin, who is the Director of the World Wildlife Fund in Russia. Do you think governments and the private sector are doing enough to address the problem of climate change?

I. Chestin:

I will speak in Russian, if I may.

И. Честин:

Я думаю, что ситуация с Парижским соглашением сильно изменилась. И хотел бы напомнить, что в России было много возражений против ратификации Киотского протокола, в том числе на самом высоком уровне, — в итоге протокол все-таки был ратифицирован. Как мы знаем, Россия не потеряла ни одного рабочего места, рубля или доллара. Более того, в рамках проектов совместного осуществления была проведена модернизация достаточно большого количества ТЭЦ. Также в рамках Киотского протокола в России был зарегистрирован первый в мире лесной климатический проект, на основе которого другие страны стали развивать свои проекты, то есть имел место только положительный эффект.

Многие в нашей стране считали, что и Парижское соглашение не надо ратифицировать, однако, надо отдать должное Правительству, здравый смысл возобладал, и соглашение было подписано. Между Киотским протоколом и Парижским соглашением есть серьезные различия по двум

аспектам. Протокол задавал жесткие рамки для разных стран, ограничивая выбросы парниковых газов. При этом способ, каким страна достигала снижения выбросов, оставался полностью на ее усмотрение. Парижское соглашение является стимулирующим. Если Киотский протокол в первую очередь создавал новую правовую основу для того, чтобы страны двигались в каком-то направлении, то Парижское соглашение, скорее, фиксирует уже имеющийся тренд. Очень важно, что последние два года возобновляемые источники энергии развиваются вне зависимости от цены на нефть. Раньше говорили, что они станут экономически выгодными при цене 100 долларов за баррель. Сегодня мы видим, что возобновляемые источники энергии выгодны и при цене в 50 долларов за баррель. Что будет происходить дальше в связи с Парижским соглашением и как это отразится на нас?

Во-первых, уже начался серьезный процесс — бегство из инвестиций в уголь, дивестиции, которые к 2020 году достигнут порядка 500 миллиардов долларов. Растут инвестиции в возобновляемые источники энергии (ВИЭ). В 2015 году они впервые превысили совместные инвестиции в уголь и газ, составив 286 миллиардов долларов. Мощность ВИЭ без крупных гидроэлектростанций составляет 770 ГВт — это вдвое больше, чем совокупная мощность атомных электростанций в мире, и в три раза больше, чем вся мощность электростанций в Российской Федерации. Рост ВИЭ составляет 20—30% — фактически это самая быстро развивающаяся отрасль экономики. В солнечной электроэнергетике этот рост равен 50% в год. Это огромный бизнес, который развивается и в котором, к сожалению, Россия пока не принимает должного участия. При этом лидерство переходит от Севера — США и ЕЭС — к Китаю и странам Азиатско-Тихоокеанского региона, где находятся основные инвестиции в эту отрасль. Что происходит у нас? По прогнозам, основанным на имеющихся в нашей стране политиках и трендах, Международное агентство по возобновляемой

энергетике предсказывает, что к 2030 году Россия будет глубоким аутсайдером в системе ВИЭ. Показатели, которых мы должны достигнуть в рамках энергетической стратегии — 4% к 2030 году, — это игрушечные цифры по сравнению с мировыми трендами.

В начале июня был заключен альянс по развитию ВИЭ между США, Индией и Китаем. В это же время в Аналитическом центре при Правительстве РФ проходила Третья международная конференция по энергосбережению и ВИЭ в России и странах СНГ, на которой действия стран-партнеров были расценены чуть ли не как всемирный заговор Севера, Юга и Востока против бедной Российской Федерации. Более того, звучали речи о том, что развитие ВИЭ не должно идти в ущерб потребности в традиционных источниках энергии, — все равно как если бы производители арифмометров защищали свои производства в то время, когда весь мир уже работает на персональных компьютерах. Для нашей страны это фактически означает стабилизацию, консервацию серьезного отставания — как технологического, так и интеллектуального. В данном случае я бы хотел привести слова уже ставшего известным в России уральского фермера Василия Мельниченко, который сказал, что самое страшное — это даже не то, что мы оказались в экономическом кризисе, а то, что мы начали с удовольствием обустриваться на этом дне. То есть на примере ВИЭ очень хорошо демонстрируется отсутствие запроса на развитие. Возникает традиционный вопрос: что делать?

На мой взгляд, нужно, во-первых, кардинально пересмотреть проект энергетической стратегии, сделав главный упор на развитие ВИЭ. В эту отрасль должны идти все средства, которые выделяются на научно-исследовательскую работу, опытно-конструкторские работы по линии государства. Должны быть созданы низкоуглеродные стандарты, которые существуют во многих банках. Недавно был создан банк Азиатско-Тихоокеанского региона, где есть доля российского присутствия, и у него

очень жесткие природоохранные критерии. Наш Центральный банк не дает guidelines с рекомендациями, куда и как вкладывать средства коммерческим и тем более государственным банкам.

Во-вторых, необходимо ввести платы за выброс углерода. На сегодняшний день они введены во многих странах, цены разнятся от 1—3 долларов за тонну выброшенного углерода в Мексике до 170 долларов за тонну в Швеции. В разных странах этой системой покрываются разные доли выбросов: от 15% всех выбросов в Финляндии до 80% всех выбросов в ЮАР. Думаю, что наша страна могла бы начать с 500 рублей за тонну и с 20—25% всех выбросов парниковых газов, а потом посмотреть, как это будет работать и стимулировать бизнес. Кроме того, надо запретить использовать уголь в качестве ископаемого топлива — в данном случае я говорю не о коксующемся угле, который нужен в металлургии, а о том, который используется на ТЭЦ. Мы находимся в выигрышном положении: доля электростанций, работающих на угле, у нас значительно меньше, чем в Китае, Германии, Индии. Речь идет о создании всего-навсего 120 000 альтернативных рабочих мест, что позволит нам полностью отказаться от сжигания угля для производства электроэнергии. Спасибо.

J. Thornhill:

Thank you very much. Now, we have heard a lot about how we want to change the energy mix, but we have not talked about the need to reduce the use of energy. I want to ask our next speaker, Jens Birgersson, who is the Chief Executive Officer of ROCKWOOL, which is a fascinating insulation company, to talk a bit about what the company does and how it might help address this challenge.

J. Birgersson:

Anton has talked about the role of the CEO, and I am one of those fortunate CEOs that has one of the existing solutions which does not require much to solve a large part of the problem.

I have a background in physics and mathematics, so I like to see things through. It is very easy to talk about renewables, but it gets complicated when you have to get into the issue of back-up capacity to cover when the wind does not blow or cover existing investments: it is very hard to run that.

But when you look at the pure, raw statistics for what we use energy for today, at the end, the challenge – we can talk about the COP 21 challenge – is that we need to get the kilowatt hour output per GDP or the CO₂ output per GDP down. That is the challenge. If we start to get that moving, we will be on the right track.

If we then look at mundane, existing technologies, and doing things we know how to do, this can actually have a big impact. I will give an example. When it comes to energy use in Europe, including Russia, the biggest consumer is housing, at 40%. After that comes all industrial production and all transport. The order depends a bit. But by far the biggest is existing housing. It is very easy to talk about what we should do with new housing: it is easy to build a new house with perfect energy values. But the real question that I would like to get on the table is: what do we do with the housing we have, commercial and residential, that is using 40% of the energy, and implicitly also the CO₂?

The answer is not high-tech. The answer is relatively simple. You insulate them. If you insulate them, they also work as a battery for renewables that may go up and down, because you do not need to heat it all the time; you can heat it when you have electricity.

I am a big fan of reliability of supply, too, of course – that needs to be solved.

So, for me, it is quite a mundane task, in a way: get the existing stock of buildings insulated. But politically, it is not easy. If I look at myself as an individual, it is a relatively long investment. In our case, the CO₂ you use to produce a tonne of stone wool is recouped 100 to 200 times over, so the economics is right there.

But when you look at me as an individual, I have the choice of doing something on the wall, but I put something on top and no one will see it, as opposed to building a new kitchen maybe, and enjoying that in three months' time. Which do I choose?

If you are a politician and you look from the outside, you have a payback that on the aggregate level absolutely makes sense. Imagine we drop that 40% to 20%; that is what we can do, without innovation, just with existing technology. How do you get that going politically? You need to step into an area that is very tricky. How do you incentivize people to renovate their houses to make them more energy-efficient instead of buying their kitchen?

So, politicians have a big role to play, the technology is there, we can achieve a 20% drop with no innovation, no nothing, just leadership and incentives.

J. Thornhill:

Thank you very much. I came across some scientists the other day who are developing the concept of printable batteries, so that you could squirt batteries into the space that is normally taken up by insulation, which seems to me a fascinating idea, where you could then use electricity at the best times and then you store it in your house and release it when it is needed. Is that possible, do you think?

J. Birgersson:

I actually believe you can be much more low-tech than that, because if you insulate the house, you do not need to take any raw material and create batteries; you actually have a lot of storage in your water heater and in the air, the furniture, and the house itself. And if it is a hot day, you open the building up, you bring in the heat, you close it in the evening, you do not need to heat at all, you get a zero-energy system without any active or new parts.

So look after the windows, look after the insulation, and that in itself is a massive battery.

J. Thornhill:

Thank you. I would now like to come to Maxim Sokov, from Russia's En+ Group. We have heard that, for the private sector, this is a massive opportunity, but you are also part of RUSAL, which is a massive user of energy. How do you see the balance between what you are going to do to save energy and how you can perhaps make money out of this opportunity?

M. Sokov:

Thank you very much, John. Let me also speak in Russian for everybody's benefit.

Коллеги, я считаю, что с точки зрения российского бизнеса эту ситуацию надо рассматривать не как угрозу, а как некий вызов и возможность. Вчера прошла особенно интересная панель под эгидой Роснефти, присутствовали представители разных нефтегазодобывающих компаний и высказывались разные точки зрения. Одна из них заключается в том, что российская экономика зависима от добычи и реализации углеводородов и большая часть бюджета формируется за счет доходов от их реализации. Это, безусловно, так. Мы можем говорить и о том, что большое количество рабочих мест формируется в угледобывающей и углеперерабатывающей промышленности. Но сегодня мы видим — и это звучит в выступлениях всех спикеров, — что мир меняется очень быстрыми темпами. Если мы этого не признаем, то через десять лет российская экономика будет просто неконкурентоспособной.

Мир активно вводит плату за углерод. Многие банки уже включают плату за углерод в свои модели, какая бы она ни была — 2, 3 или 100 долларов. На мой взгляд, 170 долларов в Швеции — это too much. В идеале нужно

выработать сбалансированный подход, стимулирующий равномерное развитие низкоуглеродной промышленности и энергетики по всему миру. Конечно, можно закрыться в домике и говорить, что мы не будем ничего делать, потому что нам и так хорошо, что, безусловно, факт. Но чем быстрее меняется мир, тем меньше у нас времени отреагировать на его вызов. Инвестиционный цикл крупных проектов, особенно в энергетике, составляет пять, семь или десять лет. За этот срок мир сильно изменится. Мы, энергетическая компания и одновременно производитель алюминия, считаем, что он поменяется на 90% или 100%. В реальности большая часть российского бизнеса ставит перемены под сомнение и рассчитывает на то, что условия изменятся на 20 или 30%, но тоже довольно высокий показатель.

То, что мир поменяется через 15—20 лет, очевидно всем. Ввиду длинного инвестиционного цикла, особенно в энергетической отрасли, надо принимать инвестиционные решения уже сейчас. Чтобы сохранить конкурентоспособность бизнеса и экономики, мы должны учитывать фактор изменяющегося мира, вызов конференции по вопросам климата COP21 и низкоуглеродной экономики. Со своей стороны мы считаем, что плата за углерод в мировом масштабе неизбежна, поэтому нужно проанализировать все возможные варианты и начать готовиться к ее введению.

Коллега очень хорошо говорил, что есть определенный клиентский спрос — customer demand — на чистую энергию, и многие крупные компании — GE, Exxon, Unilever — уже заявили о том, что будут приобретать только продукты, произведенные с использованием источников чистой энергии. В Европе есть специальный «зеленый тариф», когда люди добровольно платят более высокую ставку за электричество, если оно произведено из чистых источников электроэнергии.

В ответ на этот вызов компания «РУСАЛ» предприняла такую инициативу, как «зеленый алюминий». То есть мы обещаем, что на горизонте

следующих пяти лет (до 2020—2021 года) 100% алюминия в нашей компании будет произведено с использованием чистой электроэнергии. Это снижает углеродный след и, как результат, повышает конкурентоспособность нашего товара в будущем. Спасибо.

J. Thornhill:

Thank you very much. Now, it is often easy to forget when we talk about these things that energy is a very good thing. Crudely put, it stops people from dying from excessive heat or cold, and helps economic development. And that is the business of the World Bank.

We have with us Dimitris Tsitsiragos, the Vice-President of Global Client Services at the International Finance Corporation (IFC). I wondered if you could tell us about this tension that must exist at the World Bank between the imperative for development, helping people to get access to the basic living standards that the Minister from Morocco was talking about, and this imperative to reduce carbon emissions?

D. Tsitsiragos:

Thank you, John, for the invitation, and thank you for being here. In many ways, the advantage or disadvantage of going last is that many people have addressed many of the things that I had in mind! I think ample topics have been brought up. For us at the World Bank Group, addressing climate change is a priority, and it is a priority because we see an interconnection between climate change, sustainable development, and equity. As you heard from Her Excellency the Minister, a lot has happened in recent years in terms of addressing poverty. Our goal is to reduce poverty and also boost prosperity around the world, and our fear is that if we do not deal with climate change, a lot of these gains are going to be reversed, and we have figures that say that up to 100 million people may return to poverty by 2030.

Now, how do we deal with this? The thing is, we see clearly that there is a need for dialogue here, and for engagement between the public and private sectors in tackling climate change. I think this is the opportunity. When I look at this particular region, this is one region that is highly vulnerable to changes and increasingly to changes in climate, and increases in temperature. The Europe-Central Asia region depends very much on agriculture. If you look at the studies, the Black Sea coast, the northern part of Russia, Mongolia, and the northern part of China are some of the most vulnerable areas to an increase in temperatures. So this is something that is a priority for governments and has to be addressed in this part of the world.

On our end, you talked about the challenge between energy and development. I think addressing the energy shortages around the world is one of the big challenges of development, and also one of the opportunities, because if you have energy, you can have manufacturing, you can create jobs, you can promote growth.

Today, and you heard it earlier, the world is changing in many ways. You see more and more money going into renewables. We heard earlier that investment in renewables hit a peak last year, and what we have seen is that more and more investment in renewables is going on in the emerging markets. The other thing that we see is that the cost of renewables in some of the emerging markets is coming down, and it is coming down significantly. I think that plays a role, because that creates opportunities.

At the same time, what we are seeing going forward is that more and more of the private sector is getting into this business. We think that the private sector is going to put in most of the investment in renewables going forward; we see a role for governments to create the regulatory framework, the enabling environment for renewables to grow. At the same time, as you heard from earlier speakers, the focus is on doing away with coal, but looking at gas, for example, as a transition fuel: gas to power is big and important in many of the emerging markets. You

need to have a balanced energy mix between renewables and the more traditional fuels, with more focus on renewables going forward.

The other thing that I think is also very important is that we see investment in renewables and investment in energy efficiency as highly profitable. I think that is one thing that people miss. We have studies that show that you can get up to high rates of return on investment in energy efficiency and renewables. I think that is all for businesses.

One of the other things we have heard about is that we can talk a lot about renewables, we can talk about different energy mixes, but the easiest and the quickest win is on energy efficiency. We heard about energy efficiency with green housing, we can also talk about energy efficiency in manufacturing and in industries, because that in many ways enhances competitiveness.

We can take the example of Russia. The energy efficiency potential of Russia is equal to the energy consumption of a country like France, so you can see what difference energy efficiency will make in a place like Russia.

Renewables are coming on stream, and I can quote some recent figures: there were bids for solar power plants in Mexico at 3 cents. We just did a round for solar power in Zambia, where we got bids as low as 6 cents per kilowatt hour. This indicates the trend and the direction.

If you are a government, what do you need to do? I think the challenge in many ways for renewables is access to the grid, and I think investment in the grid is very important. I also think that the stability of the regulatory environment, looking at what has happened in Europe in recent years, is very important for investors.

So these are some of the areas that we are working on. At the same time, we are also working on the financing side, because when you talk about green buildings, this is a big opportunity; it is a big need. More and more of the world, especially in the emerging markets, is becoming urbanized, and yes, one can look at the existing stock, but also, going forward, one has to look at how you bring down the energy consumption of housing, which is the biggest consumer of energy around

the world. One also has to create the financing solutions and provide the financing for consumers and also for industrial players, for entrepreneurs, to be able to go out and borrow so that they can put the necessary energy efficiency investments in place.

J. Thornhill:

Great. Now, I know that there has been a very robust debate within the IFC about whether to continue to build coal-fired power stations. What is your position on this? Clearly, there is an urgent development need for a lot of people, but there is environmental damage as a result of that. Where do you stand?

D. Tsitsiragos:

We are not financing any coal plants. We have a policy; we have developed an energy approach, as the World Bank Group. We stay away from coal, but also recognize that there might be certain exceptions. There might be cases in some of the poorest countries, where you have no other access to energy, where I think coal might be the solution, but we do not have any such recent examples in anything we are looking at.

For us, when I look at our power businesses, I see about 70% of our investments are in renewables today, in hydro, wind, and solar, so these are our priorities. We are also looking at gas. I think this is the main thrust of our interventions in the power space.

J. Thornhill:

A lot of the speakers have mentioned the importance of renewables, that this is the kind of great hope for investment. But I wondered if I could ask any members of the panel if they had strong opinions about which forms of renewables are the most likely. Which are going to prove the most efficient and profitable? Who would like to answer that? Charles.

C. Hendry:

I think it depends where you are, but the important thing should be that you should harness the resources where they are strongest, rather than harnessing them where they are fairly weak. What we can then do is use new forms of interconnection, where you can transport power over very significant distances with few losses. For example, we are looking at tapping into Icelandic geothermal technology and bringing that through an interconnector to the United Kingdom, working with Norway to work with their hydropower, and saying that it makes more sense to look at this with a holistic, international approach, rather than each country just looking at its own.

I think that this is also a particularly important opportunity for Africa, in terms of the geopolitics. Cheap power on a local basis offers transformation for Africa and many economies which currently have many people who do not have access to power at all, and it brings refrigeration, say for food and for medication; it brings lighting for businesses and schools; it brings the opportunity for economic development, and that is perhaps the most transformative aspect.

But as we are hearing from the World Bank, we are now almost at the point where these can be done in many places without subsidy, and that, I think, is a breakthrough point.

A. Botes:

John, I want to add to that. Natural gas, at this point in time, I think should not be underestimated, because natural gas is much cleaner than other forms of hydrocarbons; it is very efficient, you can transport it through liquefied natural gas, and I think if we really look at what gas could do, and the flows of gas between the different markets, and supply and demand around the globe, that would be a good return on a very strong investment, from an investment side.

J. Thornhill:

Thank you. Minister?

H. El Haite:

I would like to be more concrete, and not compare the renewables or alternatives. The world is changing, as ministers have said, and we have to change. We have a reality now, which is the energy mix, and all of us understand that this is a process, and we need to accelerate the implementation of real solutions. But we have the reality of this energy mix.

Now, when you are speaking about renewables around the world, you cannot put solar everywhere, so you should take into account the context, the capacity of the country, and the conditions. I think that we should address, in each country, the strategy for reaching emissions neutrality in the energy mix, but globally we should ensure that policies are coherent, to achieve this neutrality in emissions. This will make us think about all the renewables, maybe gas, solar, etc.

If you look at Morocco, for example, Morocco has implemented its renewables strategy and we now have in operation what may be the largest renewable solar power installation. By 2020, 42% of our electricity mix will come from renewables, and this will go up to 52% by 2030.

But the situation in Morocco was that we were completely dependent on fossil fuel and we were bringing our energy in from abroad. It was a very heavy burden on our budget. So climate change here was an opportunity for our country, and we invested in renewables, in hydro, in wind, and we will have maybe the most significant share of renewables by 2030.

And, by the way, we are also phasing out subsidies on fossil fuels. So when we are speaking about the mix and about public-private partnership, the private sector needs visibility on global policies, it needs predictability on global policies, and it needs coherence.

You cannot, on the one hand, say, “OK we will go to renewables”, and on the other hand, subsidize fossil fuels. We are currently subsidizing fossil fuels to the tune of USD 600 billion a year, and we were negotiating as part of the Paris Agreement for only USD 100 billion over 20 years.

I really congratulate the World Bank: the World Bank has taken the decision not to invest in coal any more. So, globally, we should have this coherence on international policies, on where we want to go. By 2050, we need to take action which will limit the temperature increase to two degrees, and to keep it to 1.5 degrees by 2100, so now, we should switch to a new mode of industrialization, energy efficiency, changes to transport, changes in building, changing the mix, but we should establish this coherence globally, in order to make our industry competitive.

If you have a carbon price in your country and this price is not fixed in a very strong country, your industry will not be competitive internationally.

So, we should establish a carbon price worldwide to harmonize the market. I think that all developed countries should lobby for this coherence worldwide.

J. Thornhill:

Thank you. Now, I would like to open this up to questions from the floor. Does anyone have a question?

J. Gray:

I am James Gray; I am from the UK Parliament. I am very interested in what Charles Hendry had to say about the plentiful geothermals. I would be interested to know more about the cost of the interconnector which is proposed between Iceland and the UK, and whether the infrastructure cost will not simply make the value of the energy unaffordable.

C. Hendry:

James, can I first say that perhaps all of us would wish to send through you our commiserations back to the United Kingdom for the terrible killing of a British Member of Parliament yesterday? I think that this conference would wish to send a message of solidarity and support.

The issue which I think we face with Iceland is that Iceland is already producing green aluminium; it has the highest usage of electricity in the world per head, but also the lowest carbon emissions. The opportunity therefore to tap into that and to bring that power to the United Kingdom is, I think, a great one. It could not have happened a few years ago when it was already being talked about because the losses in transmission would have simply been too great.

We are now looking at some upgrading of the power generating capability in Iceland. That would probably be some geothermal, some hydro, potentially some wind, and then bringing that to the United Kingdom, and that would be done at a cost below any other renewable source, below home-developed renewables, and below the cost of new nuclear.

So, I think it makes real sense in terms of the need for meeting baseload demand; it makes real sense in low-carbon terms, and in affordability terms. It is the sort of new opportunity which I think is now ripe for exploration.

Из зала:

Олег Кличко, генеральный директор ОАО «Иркутскэнерго». На этой и других панелях подробно обсуждали традиционную энергетику, причем речь шла исключительно об электроэнергии, вырабатываемой на угле и газе. Но мы с вами знаем, что значительная часть электроэнергии вырабатывается в режиме когенерации, то есть одновременно с производством тепловой энергии. А переход на ВИЭ не позволяет решить проблему обеспечения потребителей теплом. Наша компания работает на территориях, где температура держится выше нуля всего три месяца в году. Как относятся

эксперты к производству электроэнергии на традиционных объектах энергетики в части теплофикационной выработки? Спасибо.

Н. Подгузов:

Спасибо за вопрос. Наверное, эксперты добавят что-то к моему ответу. Действительно, режим когенерации очень важен для соответствующих регионов России, но я не начинал бы обсуждать проблему выбросов парниковых газов и повышения энергоэффективности именно с этих объектов, так как у нас достаточно широкое поле деятельности.

Я согласен с коллегами, которые говорят, что стратегия энергоэффективности должна быть скорректирована с проблематикой выбросов. Текущая ситуация задает новые стандарты ведения бизнеса и конкурентоспособности, и они должны быть правильно прописаны в наших стратегических документах, нужно дать правильный сигнал бизнесу. Конечно, могут быть изъятия из этого принципа, о чем свидетельствует Ваш пример. Однако вопросы, связанные с когенерацией, — это все-таки не первоочередные вопросы, которые нам необходимо решать с учетом специфики российских регионов.

М. Соков:

Николай, я соглашусь и не соглашусь одновременно. Я говорил о долгосрочном инвестиционном цикле, в который надо уже сегодня закладывать ответы на вызовы следующих десяти лет. Я не говорю обо всех регионах, но для части регионов стратегическим ответом может стать газификация. Газ — это тоже традиционный вид топлива, но он дает гораздо меньше выбросов, чем уголь. Можно посмотреть на это с точки зрения существующих проектов: строительство газотранспортной системы «Сила Сибири» позволяет естественным образом газифицировать целый ряд регионов и в большой степени решить проблему когенерации и

перехода с угля на газ. Но повторяюсь — сегодня мы закладываем то, что получим через десять лет. Создание низкоуглеродной энергетики — это стратегический вопрос, который нигде не решается в рамках одного года.

J. Thornhill:

Thank you. Minister?

H. El Haite:

I would just like to be precise. I was interested to listen to this discussion concerning the comparison of energy sources, and I would like to remind you that the IEA, the International Energy Agency, has given some figures which are interesting. The figures are that by 2030, we will have 28% of energy coming from coal, 26% from fossil fuels, 23% from nuclear, and 20% from renewables, and with this mix, we will not reach the Paris objectives. We should increase the share of renewables.

This should allow us to think as countries and as parties about how to address our strategies, our government strategies and private sector strategies, to be able to face the challenge.

One issue is the financial issue in those countries which are poorer. The World Bank representative said that they are only investing in coal when the country is very poor and cannot address the need with another solution. So, maybe the key issue is the financial issue, and we should innovate in terms of financial tools to be able to achieve the transition. The carbon price, which has now been introduced by 40 countries around the world, can be a solution, can be an issue to create incentives for companies, for the private sector, but also to create a fund to finance investment in countries which are poor.

There are many prices around the world; what we need to do is to have a common worldwide price and to rethink how we can invest this money for energy transition and for a global transformation of the energy mix.

J. Thornhill:

We are almost out of time, but I want to ask one final, very quick question to all of the members of the panel. You have one sentence to reply to this, and I will go from my right to my left.

What is the biggest thing that we can do today to get us towards the Paris targets? If you had unlimited power, what is the one thing you would implement right now to move towards those targets?

Jens.

J. Birgersson:

I would spend some time on running through the mathematics of what the next sensible steps are now, because a lot of things are not understood. For example, electric cars: are they good or bad? Renovation of houses: how do you finance that? Renewables: what do you do about capacity charges for the ones that provide back-up when the renewable source is not there? There are fundamentals that need to be nailed down from that perspective, so that we understand it.

J. Thornhill:

Thank you. Charles?

C. Hendry:

Cooperation on technology. I think there is incredible work being done right across the world in businesses, in universities, and elsewhere, but it is too isolated, it is being done too separately. The big steps forward will come by bringing those together, by acting in a much more substantial and global way to bring forward the technologies at a faster pace.

J. Thornhill:

Thank you. Maxim?

M. Соков:

Я бы сказал, кооперация по единому регулятивному режиму в мире, будь то введение платы за углерод или другие меры, — это единственное, что позволит создать определенные *inside incentives* для развития современных технологий, о которых говорил Чарльз. Страны, которые не будут включены или интегрированы в эту систему единого регулирования, неизбежно потеряют конкурентоспособность экономики и товаров, то есть, по сути, потеряют возможность их экспортировать.

J. Thornhill:

Thank you. Minister?

H. El Haite:

I will say democratize the information on climate change to make all citizens of the world aware of the challenges; energy efficiency; and also invest a lot in innovation.

J. Thornhill:

Thank you.

Н. Подгузов:

Мне кажется, что для России очень важно поднять проблематику по данному вопросу на максимально высокий уровень, выработать стратегию низкоуглеродного развития и дать четкие сигналы бизнесу, чтобы он смог адаптироваться к новым условиям.

J. Thornhill:

Thank you.

D. Tsitsiragos:

I would also say energy efficiency. I think that is the quick win. At the same time, focus on technology and R&D, to see how one can bring about the changes that will result in lower emissions.

J. Thornhill:

Anton?

A. Botes:

Lots of things are happening all around the world, politically, economically, and so forth. I would like to see more collaboration, and taking the practicalities of population growth, energy growth, and the mix into account and make that happen collaboratively.

И. Честин:

Я предложил бы то, что уже предлагалось, — с одной стороны, введение платы за углерод, а с другой — создание финансовых механизмов для повышения энергоэффективности в разных секторах. В первую очередь это, конечно, ЖКХ, в том числе новые строящиеся дома, которые совершенно не соответствуют современным технологическим стандартам.

J. Thornhill:

Thank you very much. We will have to conclude it there. But, by my count, there is a collective demand for more information, for more cooperation and collaboration, for more investment, particularly in innovation, for energy efficiency, and for charging for carbon emissions.

Thank you very much to all the members of our panel for a very interesting discussion, and thank you very much for coming.