

## PANELISTS' DISCUSSION

### **Nobuo TANAKA**

What is your view, André?

### **André CAILLÉ**

I very much agree with what has just been said by my colleague from Germany. I do not think there will be a comeback for coal in the US simply because you can buy natural gas from shale gas now basically at the same price as 25 years ago. We have to realise here that it is available because the resource is there. It is accessible because the network distribution for gas is very much developed in the US. It is much more developed than the railroad system is for coal. In fact, there is no space at this time on the railroad system to carry coal to support the so-called coal revolution ; and thirdly, energy has to have what WEC calls the three A s. It therefore has to be affordable, and I think natural gas fired power plants generate power at a lower price than coal can, especially if you are talking about clean coal. This is obvious. I think your proposal yesterday to take coal from 30% to some 3% is what needs to be done. That is the low-hanging fruit, as our colleague just said.

The way we present this is very important because I think humanity will use coal someday, but the fact of the matter is that in the next few decades, we simply do not have the technologies to use it properly. Why will we be using it? Because there is 100, 200-year reserves in China, in the US and in India, so coal is going to be produced, but it cannot be produced today because we do not have the technology. It is the same problem in essence as with renewables because we do not have the technologies to produce them and keep them affordable. We have to work on research. There has to be a lot of investment in research. Lots of it was expected to come from the US industry.

Now the least I can say is that the president's decision will not support investors in new technologies. I mean if you do not have access to the US the market is much less. Finally, I want to make sure I represent the right situation for Canada. I am alongside my colleague here because, in Canada, like Germany, the new government has been very forceful in supporting the Paris Agreement, but he has got the same objective as the former government. Plus, with the actual action plan, we will not even meet these low objectives. The difficulties are not only about President Trump decision. The difficulty is about many countries not taking decisions. Thank you.

### **Nobuo TANAKA**

Olivier?

### **Olivier APPERT**

I would like to come back to the Trump policy decisions. In fact, clearly I am convinced that this will have a minimal impact on the energy mix and on the CO2 emissions of the United States for four main reasons.

The first one is related to coal. As you said, coal is not competitive compared to gas. Gas reserves are huge and it may perhaps stop the ongoing decline for a few years, but not for the long term. Secondly, the Trump policy will only have a minor impact on the development of renewables in the United States. Renewable development is not really linked to federal policy and regulation and incentives are decided and implemented at the local level, states and local authorities.

Thirdly, a significant share of CO2 emissions in the US as well as in many countries comes from the transport sector and for the time being, the Trump administration did not change the CAFE standards, which has been decided by consensus by the Obama administration. Fourthly, for the last few years, we have seen a strong US mobilisation of industry and local stakeholders. Some states and municipalities have put in place emission treating systems and major



industry has shown a strong commitment to climate change. Just yesterday, I was surprised by the announcement by ExxonMobil that it will spend USD 1 billion per year on researching green energy.

These are four major reasons that explain how the Trump decision will not have a direct impact. It will have an indirect impact, but it is a diplomatic impact and some countries may follow the example of the United States to drop their commitments of COP 21. I will not refer to any country, but you get the idea, and I would also like to highlight the fact that Trump's diplomacy may also have a dramatic impact on the energy scene in the short term. Consider the international policy towards Venezuela, Russia, the Middle East and specifically Iran. This is really a short-term threat on the energy sector over the next few years.

**Nobuo TANAKA**

Thank you. I cannot agree more on what you mentioned about the impact of the Trump decision on clean energy development. Mr Lee, do you have any comments?

**Lee HYE-MIN**

Yes. Mr Pflüger, I think you have a point, but I think your point is rather regarding the basic problems of the Paris Agreement itself rather than Donald Trump's decision to withdraw. I can understand his scepticism because many studies show that the Agreement would actually have a relatively small impact on climate change at a tremendous cost. I think that is true, so that is one thing.

What I want to say is that despite the many drawbacks of the Agreement, I wonder whether we have any other alternative. It is the consensus that emerged in a very difficult manner by more than 186 countries, in which North Korea also participated. Even North Korea ratified the Paris Agreement much earlier than South Korea. I wonder whether there is any alternative. The Paris Agreement is not perfect. There is no dispute settlement mechanism. Therefore there is no way to enforce the commitment. There are many things to be made from now until the end of the next year, but it is not certain. They can emerge. However, our fight against climate change must continue. It is not an option. In that point, I think the G20 Leaders' Declaration is symbolically meaningful. Thank you.

**Nobuo TANAKA**

Thank you. Masuda-san?

**Tatsuo MASUDA**

I would like to comment on one big trend, which will override any backward movement by a government. For example, there is the big "Breakthrough Energy Coalition" by 28 billionaires in the world, which was declared in November 2015, just on the eve of the Paris Agreement. Many investments are taking place, thanks to that private money. There are many other coalitions of this type, such as C40, which are 40 big capital cities in the world joining together and this number has increased to almost 100 already.

There are also universities aligning with each other and many companies are working together. There are many alliances in the transport sector or renewable sector, so I think we should not get carried away too much with the activity of a single government like the United States or a single political leader like Trump. Time and tide are moving much faster than political leaders may think and already the big ship has departed. From this point of view, I honestly am not that much worried about whatever Mr Trump might say. That is my feeling. Thank you.

**Nobuo TANAKA**

Ladislav, I think you have something to say.

**Ladislav PASZKIEWICZ**

I just want to make one comment about low-hanging fruit because I think we have to be very pragmatic. We see here from the discussion we had on the Trump administration that at the end of the day, even though the US made that decision and I worry that it may have some negative impact, the reality is that the price of gas just means that the US today is probably the best in class or the second-best in class in terms of CO2 emissions because of the switch, and so it is not because of a political decision. It is because of market activity and I think that it is very important that regulations should actually make markets work in the right way.

You took the very good example of Great Britain, where with a price of STG 18 per ton for CO2, the switch between coal and gas for power generation took place almost immediately in the country, with very significant benefits in terms of CO2 emissions. I think that for all the countries where you have the chance of having some coal-powered power plants and gas-powered power plants, you do not need to make any investment. Just by increasing the price of CO2 in case it is not naturally the case as it is in the US, but to a low level, you can switch because you then have gas-powered power plants rather than coal-powered power plants, just for economic reasons.

I think we need to follow up on this low-hanging fruit policy, and not necessarily have a global price for CO2 worldwide. That is not going to happen, but we could have a local price or between several countries on a regional basis with interconnections between different areas to be efficient, and that is a really pragmatic approach that I think we should follow.

**Nobuo TANAKA**

Yes, that is a very good point. Friedbert, can you do that in Germany, set a certain carbon price to reduce coal to something else? As you have said, Germany burns 50% of power from coal. How do you reduce coal in Germany?

**Friedbert PFLÜGER**

It is a little bit less than 50%, but at the moment we have negotiations for a new government in Germany, so the Green Party, which is part of the negotiations, of course says, 'Get out of coal. Let us set a closure date for the last coal power plant, just as we have done for phasing out nuclear power'. The other two parties, the Christian Democrats and Free Democrats, are against it, the main reason being the strength of the coal lobby, which includes the trade unions in certain areas.

In areas like Saxony or North Rhine-Westphalia, there is a long tradition of coal. Trade unions are strong there. Nobody actually says, 'We love coal or want to continue', but it is a battle of interests and, therefore, I believe we will not get very far. Regarding the question of having some sort of national carbon price: We all know the ETS system has not led very far. The ETS price for carbon is so low that it is not an incentive to switch from coal to gas. But then there is indeed a discussion about introducing, like in Britain, a national coal tax or something similar. However, again, I think it will not be included in any coalition contract. So, I am very sorry to say that I believe we will continue to pursue a build-up of wind and solar, but we will also stick with coal.

**Nobuo TANAKA**

This is interesting. André?

**André CAILLÉ**

I want to make a specific suggestion. Wind power and solar power are recognised as renewables. In the case of hydro, it is not so clear. It depends very much on the country. In some places it is and in some place it is not, but the fact of the matter is that in many instances, wind and solar are simply not affordable. It is very nice to say, but it will not happen because people will decide for themselves. The decision is going to be made locally.

I suggest that an approach be made, especially to the UN, to make hydro, a low-hanging fruit, fully recognised as a renewable. Maybe it had not been in the past and I do not want to reopen these discussions, but having the facts before us when it comes to climate change, I think there is an urgency here and we need an already available renewable, which is hydro in many parts of the world, including Africa, South America and Asia. Why not make all those international organisations change their mind a little bit? At least for a while, the time it will take us to make wind and solar affordable, let us allow hydro development in Africa. It would simply double the amount of power available at a reasonable price in Africa.

**Nobuo TANAKA**

Yes, André, I fully agree. Canada has lots of potential hydro also, but if you say so, I am very happy to add nuclear as a clean and sustainable power. Korea, Japan and France represent nuclear and that is very important that the World Bank and so on should finance.

**André CAILLÉ**

I do not know why we are taking away low-carbon sources. It is not reasonable.

**Nobuo TANAKA**

I fully agree. We should not discuss this too much, but coal is a very important issue. We understand the German difficulty, but in other parts of the world, maybe France, Canada, or the US, because of the market, coal use is going to decline. That is what you said.

**André CAILLÉ**

Yes. If you are looking at the figures of the last few years, you will find coal-powered generation is declining, although coal production is increasing because it is exported.

**Nobuo TANAKA**

I will ask Masuda-san because Japan is planning to build coal power plants.

**Tatsuo MASUDA**

Japan is heading in the opposite direction from many countries. Currently, if my memory is correct, there are 44 either planned or under construction coal-fired power plants in Japan. There are two reasons. One is the stoppage of nuclear power plants. Only several of them returned to life and 48% of the population in Japan is against restarting nuclear power plants. That is the first reason.

Reason number two is that the energy market is in the middle of liberalisation and by the fiscal year 2020, unbundling will be completed. That means utility companies lose competitive power and for that reason cost-cutting is a priority, despite increased CO2 emissions. This is a big issue, but even though the Japanese government is very determined to have a green economy, it cannot stop the desire for survival by companies in a very competitive market and we have to do something about that.

My idea is that burying coal under the ground completely is probably not realistic because there is a desire even in Japan to use coal. The question is how can we use coal in a cleaner way. Clean coal technology is not really clean because it emits less CO2, but it is not completely free from CO2. Maybe the next agenda is turning to CCS and CCUS. Total is leading those technologies and really supporting those technologies.

A realistic approach is that we have to use all energies available to make it affordable and accessible to everybody, and jeopardising or demonising coal is not a way of managing this global economy that needs energy. I think we have to invest more in technology so that we can use even hydrocarbons in an environmentally friendly way and coal should

be a target for us to approach so that we can use coal with less CO2 emissions and this will ultimately lead to a global application of CCS and CCUS technology. That is my scenario. Thank you.

**Nobuo TANAKA**

Is Germany using CCS or CCUS?

**Friedbert PFLÜGER**

No. We did have two pilot projects, but there was opposition. We had the same sort of opposition that we had against nuclear. Reacting to the fears of the population, the German government decided not to pursue this course. However, I happen to agree completely with Tatsuo. In many countries around the world, such as India, Colombia, Kosovo, which has the largest lignite reserves in Europe, and many others, this would make sense. Kosovo is not an ideal example because it is a relatively small country, but even the big players, such as China, will need coal until late into the century. If we know that this is a reality, we cannot preach and only say, 'Renewables, renewables, renewables'. It is much better from my point of view to redirect some of the enormous subsidies that we put into solar and wind to CCS and CCUS. Of course, that means that we need higher CO2 prices because only then will CCS and CCUS suddenly make sense. However, if we can create a business case here, we can really boost the effect of climate policies.

**Nobuo TANAKA**

Ladislav?

**Ladislav PASZKIEWICZ**

I fully agree with what you just said. It is clear that under the two-degree scenario of IEA, there is no way to achieve this scenario without CCS. It is not a question of whether we like it or not, but a question of if we want to get there, we have to find ways to make CCS or CCUS with the use of CO2 work. I fully agree that if you do not have any carbon price, it is very difficult to make a business case. If you just use subsidies, which for a start are needed, you need private money later because you need business cases. You are not going to develop full CCS over time without private money. You need to have a business case.

A company like ours is dedicating 10% of R&D to carbon capture, so that is a huge effort being done and I think this is absolutely key in the process. Now, there is a thorny question that you raised about what CCS should apply to, and that is a question here because there is limited storage ability for CCS. In that regard, probably in our view, it is better to dedicate CCS to gas power plants because even though they need less CO2, on an energetic basis, it is actually more efficient to concentrate the CCS effort on gas-fired power plants rather than on coal-fired power plants. In my view, it is an additional benefit of following the gas chain and advocating for gas as a transition fuel because unfortunately the ability to store CO2 will be limited at some point in the future.

**Nobuo TANAKA**

I know that the Norwegian government has set a carbon tax at more than USD 60 per ton, and that is the reason why Statoil is doing CCS.

**Ladislav PASZKIEWICZ**

Statoil, Total and Shell.

**Nobuo TANAKA**

If the government shows that kind of determination with the pricing, CCS is always possible. If the German government decides to set a carbon tax of USD 60 per ton, it is always possible, but they are more political decisions they do not like to make.

**Ladislav PASZKIEWICZ**

I will add just one comment to that. Costs go down when you pay attention and you work on it. Sometimes I hear criticism saying, 'Oh no, CCS can only work if you have USD 100 per ton'. We have to start somewhere and we will make progress and we will reduce cost and we will be more efficient, but it needs to be started somewhere and it may be more and more efficient. When the oil price drops from USD 120 to USD 60, I can tell you that the industry has adapted. In our view, it will be about the same for CCS, but we need to start somewhere. You do not necessarily need to have a very high price on CO<sub>2</sub>.

**Nobuo TANAKA**

I understand. Olivier?

**Olivier APPERT**

I have been involved for quite a long time at the EU level on CCS and I would just like to make two comments. Unfortunately, in Europe, besides some companies such as Total, we have lost the momentum of CCS and the leaders are now in the US and China. In Europe, we will again be me-toos.

My second comment is that the UK even before Brexit, has been able to set their own policy on carbon tax, but also to relaunch nuclear energy with a specific contract for difference which apply also for renewables. There is a huge investment in gas. Unfortunately, I am afraid that in Europe, except for the UK, it will be very, very difficult to cope with the challenge of setting up a carbon price, mostly if there is no agreement in Germany. I think if there is no agreement from the German government on a CO<sub>2</sub> tax or a CO<sub>2</sub> price, then we will wait for years to have a significant price signal in Europe. It would also be useful to have a focus on coal.

**Nobuo TANAKA**

That is very interesting. It is not Trump, but the German government that is stopping this exercise. Lee-san?

**Lee HYE-MIN**

I have a question for the energy expert. You are talking about the inevitability of coal use. According to the IEA, coal power generation takes up 41% of the entire world power generation, being the largest contributor to climate change. How can we address climate change if we do not deal with this issue? I think that is the first question I would like answered.

Secondly, I would like to talk a little bit about Korea's new administration policy with regard to energy. I think, Mr Pflüger, if you came to this year's Knowledge Forum, you would have different views. The new Korean government that took office in May is taking a very bold energy approach. It is very different from the previous government. This administration has decided to halt construction of new coal-powered generators and they will decide to shut down the old coal-powered generators at the end of their design lives. These measures will definitely contribute to international joint efforts to respond to climate change. We are now going away from coal-powered generation.

The third point I would like to make is that at the G20 leaders' meeting, the very important issue on climate change is how to phase out inefficient fossil fuel subsidies, while safeguarding needs over the medium term. I think Mr Tanaka, you have dealt with that issue at the IEA.

**Nobuo TANAKA**

Correct.

**Lee HYE-MIN**

Though the leaders agreed to phase out inefficient fossil fuel subsidies in 2009, they cannot make any step forward regarding that declaration. There is no way and even the US under the Obama administration proposed to make it clear about the medium term. The medium term needs to be 2025. Even that proposal was rejected by India, Brazil, Russia and Turkey, but now the experts say the fossil fuel subsidy needs to be continued. How can we implement the leaders' declaration to phase out inefficient fossil fuel subsidy?

Lastly, with regard to André's point on hydro, I was ambassador to the Philippines. Korea and Japan supported the Philippine government in constructing hydro and this faced very strong opposition from the locals. They raised questions about the environment, so it is very difficult to go forward with hydro in some developing countries. Thank you.

**Tatsuo MASUDA**

Just coming back to CCS, many people here may believe it is very costly to capture CO<sub>2</sub>, but technology is developing very quickly and today the lowest cost of capture is USD 40 per ton. This was achieved by a British company called Clean Carbon Solutions and run by my friend Aniruddha Sharma. In Japan, Kyoto University is working on a special membrane that is porous, and can capture CO<sub>2</sub> at one-tenth of the current cost, but it takes another four to five years. They have to first build a plant, but this is already on the horizon. This kind of competition is ongoing everywhere. Their target is to make CCS and CCU profitable commercially. In today's world of competition for better technology, those changes will occur sooner rather than later.

My dream, and it will no longer be a dream in 10 years from now, is that CCS and CCU could be commercially viable options. If you think about CCS in big coal-fired power plants, it is a daunting task, but if you think about CCS with a chemical plant on a smaller scale, then with all these innovations, the cost will come down, so we should believe in economic mechanisms, competitive mechanisms to find better solutions.

My last point is about hydro. As the ambassador said, the environment downside is too great and also landfill in a water dam is a daunting task as well. I do not see much prospect for hydro and it is better not to promote hydro because of the environmental implications, both in developed and developing countries. Thank you.