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I am Nobuo Tanaka. Let us start the energy and climate workshop. This is the energy session. I have a short presentation on how I see the current energy, security, climate mitigation, and sustainability issues being combined. There are some issues for security as well as policy and geopolitics. It covers what we are going to discuss really well. I have a presentation. I used to work for the International Energy Agency (IEA), which always gives some interesting insights into the world energy outlook. The new one will come very soon, but last year, it was the WTO 2017 version.

They gave us four very interesting revolutions in the energy sector, upheavals, you may say. The first one is the US shale revolution, which makes the US the undisputed global leader for oil and gas. This is a very strong word, undisputed, because the US is already a gas exporter and will soon be an oil exporter. Energy independence, energy dominance is what former President Obama as well as Mr Trump wished to talk about. The US is a hegemony in fossil fuels. Coal is also abundant in the US.

A second revolution is the solar photovoltaic revolution. The IEA first admitted that solar photovoltaic will be the cheapest source of energy, new energy, new electricity in many countries. This is the first time ever the IEA admitted it, and this has a huge impact on the relative price of the mix. For gas, for coals, and for nuclear, this has huge implications. The third one is China, and China is moving towards a green revolution by using gas to replace coal, and there are lots of renewables, with expanding gridlines. China's green revolution is the third revolution.

The fourth one is electrification, using electric vehicles, digitalisation, and AI. This is the feature of the future energy. This will force countries to reappraise their energy security and sustainability strategies. Those who do not understand will perish. That is what they say. The important thing is that the latter three revolutions are happening in China, while the US is leading the fossil fuels, so Chinese strategy is clear. It involves connecting gridlines and using photovoltaic, solar, and wind for the electric vehicles. The US is the conventional leader of conventional energy through the shale revolution. China is trying to be the new-generation revolution with the photovoltaic electricity, EV etc.

This dichotomy is happening in the world energy market. Which side you are taking or which policy you are taking between these two major players is the issue. I have outlined energy dependence on oil and importation. There is an axis for the gas import ratio and one for the oil import ratio. I have outlined imports of both oil and gas, exports of both oil and gas, and the change from the current situation to 2040. China is now importing 60% of oil and about 30% of gas. It will soon be an 80% importer of oil and a 40% gas importer. India is getting worse and Japan and Korea are stuck at 100%, because we continue to import 100% of oil and gas. We are stuck there.

The US is moving towards the other direction. This is a very big contrast. The US will be the exporter of both oil and gas in the future. The US is joining the exporter side rather than the importer side. China's policy is building another axis, the third axis of renewable energy. It is increasing renewable energy and reducing the fossil fuel dependency from the Middle East, from Russia, and from the United States. That is China's geopolitical strategy, so they have much more freedom, regarding the destabilising Middle East, or fighting with Russia.

The US advantage from this shale revolution is tremendous, while Japan and Korea should depend on the oil and gas from the Middle East. However, the situation from the Middle East is that as everybody knows, the US retreated from their JCPOA with Iran. This geopolitical situation is certainly causing suffering for countries like China, India, and the ASEAN countries in the future. There is also the European Union, Japan, and Korea. In a way, these countries should strive for collective energy security vis-à-vis exporting countries.

I do not want to go into it too much, but I have outlined where the future of the energy mix will happen, with all the renewables. Nuclear will play a role, but it will be very limited. Gas will still be important. Coal will reduce its importance.



This is the cost of power generation in China. Solar is getting very cheap, and wind is getting cheaper, while the coal and gas increase means that solar will be the cheapest source of energy in 2040. That will definitely make a huge impact in China's energy mix.

This is what China is saying about global energy interconnection. This is an electricity version of the One Belt, One Road strategy. Do we connect our grid to China for cheaper renewable sources, but lose some independence? Or do we independently develop our energy security and sustainability? This is a real challenge for the countries around us. Mr Bakkoury, President of Masen talked about connecting Morocco to Europe by gridlines, and it is already connected. Europe has established this connectivity of gridlines and pipelines. This is the collective energy security and sustainability strategy, and Morocco is joining this European integration of the energy sector. This is one good example and model of sustainability.

Japan's real problem is inside Japan that we have separated East and West frequency zones, so we lost electricity after the great earthquake and tsunami. The Western part has lots of spare capacity, but cannot transmit that electricity to the East, so blackouts happened. Hokkaido recently had a total blackout in the Northern island, because the connectivity was very weak. For security purposes and the use of more renewables, this integration or connectivity is very important.

I have outlined the 100% renewable energy companies, RE100. I have asked this question to Carlos Ghosn: Are you joining this? GM, BMW, Apple, and big, famous corporations are members, and there are 140 and more. These will be 100% renewable energy users by 2030 or 2050, and they are requesting their suppliers to do the same. If that is happening, which company in the supply chain of these major global companies buy the power generated by coal for example?

Coal has no future. How can we get out of coal to do something else? How can we even get rid of oil and gas for fuel purposes in the future? Then what kind of future should the Middle Eastern oil and gas producing countries think about? This is to live with this kind of structural change, which is triggered by the demand side. This demand-side pressure will be a very big one for energy supply. We are always talking about the supply side, but the demand-side sustainability pressure will be very strong. That is the reason why I asked this question to Carlos Ghosn this morning.

When will the peak of oil happen? IEA's sustainability development scenarios say it may happen as early as 2020. It should happen by 2020. In the likely scenario, the peak demand for oil will not happen so easily. I was invited by Saudi Aramco to make some assessments with Daniel Yergin about two years ago. When will the peak demand for oil happen? That was the question to me. I said, 'By 2030, maybe'. Maybe Leila will tell us more, but Saudi Aramco is thinking about hydrogen for the future of clean oil. That is an interesting technological development. This geopolitical pressure, as well as sustainable pressure, will make a huge impact on everybody. That is what I wanted to say.

The final point is about nuclear. Can nuclear survive? There is a cost curve of relative electrical generation by Lazard, the American investment bank. Nuclear is moving up dramatically because of the Fukushima accident. The cost of safety is making the cost of the nuclear light-water reactors higher and higher, while solar and wind are getting cheaper and cheaper. How can nuclear continue? This is the question which I asked the former French Prime Minister, Laurent Fabius, last night. Can France lead the global community in using more nuclear for the sake of sustainability with the cost curve? This is a real challenge for France, Japan, and those countries that want to use nuclear.

Richard COOPER

That is for new nuclear.

Nobuo TANAKA

Yes, this is for new nuclear.

Richard COOPER

This is not for outstanding.

Nobuo TANAKA

No. Outstanding is much cheaper. You are right. That is correct. The outstanding nuclear power in Japan is much cheaper. This is a new plant. Replacing the old reactor with a new one does not make any sense. That is the point. You are right, Mr Cooper. Thank you very much. I have outlined the average cost of power generation in the different countries. Japan has the highest cost, while Russia, China, Canada, the US, and others are lower. Can Japan compete with other countries if the cost of electricity is so high? How can we make a cheaper mix of electricity by using more renewables etc. and be competitive? This is a difficult but interesting issue which we want to discuss.

The only solution for nuclear is the fourth-generation small modular type. The current big light-water reactor will not have any future. There are countries that are interested in the light-water reactor systems, but are stopping it. This is probably not a good idea. It does not have any cost competitiveness relative to the renewables. Let us stop here, and we will start the exposés from our panellists.