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Let us go to the energy and environment session. I just want to tell you what I presented to the group as the chair. There is a group called Innovation for Cool Earth Forum, which was created by Prime Minister Abe about five years ago. I am the chairman of this group, and it calls for what the global community should do by linking the people, specialists all around the world. 70 countries and more than 1 000 engineers participated in a discussion. It took place last week in Tokyo.

We are focusing this year on the issue of bending the trajectory much more seriously with green finance and government policy. Carbon dioxide emissions are growing 2% per year, and this is the trajectory of the average growth of CO₂ since the Industrial Revolution. The gap between this trajectory and net zero emission is widening every year. How to bend the trajectory of CO₂ emissions is a very serious matter.

Prime Minister Abe called for the unconventional and discontinuous innovation. What are they? I have outlined several parts of it. We are talking about individual technologies and social innovations as well, and the immediate peak and vigorous decline are necessary. I have provided the infographic of this year's ISF, but we need a quick turnaround of the peak, and we should achieve the peak as soon as possible. Then a vigorous decline is necessary. Another one in focus is that the frontline people are women, and women's role in climate change mitigation could be stressed and emphasized much more.

Women are much greener than men and also, women may suffer more from climate change. Engaging women with the decision of climate change as well as business models could be one way. I am personally promoting the idea that the financial people talk about the investment, ESG investment and SDG investment. However, this climate lens investment should come with the gender lens investment. The companies who are in favor of gender equality may be much friendlier to the climate mitigation. That kind of new methodology could be very worthwhile.

There are four revolutions in the energy sector. There is what the IEA, which I was executive chairman of some time ago, is calling for. The first one is the US shale revolution. Everybody knows about this. Shale gas and oil make the United States the undisputed leader in gas and oil. It is a carbon area. The second revolution is that solar photovoltaic energy will be the cheapest source in the future. This is a dramatic statement by the IEA and I have never said that before, because solar was a very expensive technology, but now, solar will be the cheapest. That will probably be a big pressure to other sources like coal, gas and nuclear.

The third revolution is China. China is pushing the green revolution by renewables in a dramatic way, so China's energy independence is by renewables, and it is a dichotomy with the US. The US and China are the two largest users of energy, and they are moving in totally different directions. The fourth revolution is electrification, and energy is supplied through electricity, for big data, AI, digitalization and electric vehicles.

The latter three revolutions are mainly happening in China, led by China. The first one is the US. At this moment, US policy under President Trump is dominated by fossil fuels, while China is trying to have more sustainable, renewable dominance. This is the question for every country, which must take it seriously. Energy security could be very different by taking different options. The fifth revolution which I am calling for and thinking about is demand-driven transformation. TCFD is Taskforce for Financial Risk Disclosure, a movement by Mark Carney of the Central Bank in the UK as well as Michael Bloomberg in the United States.

They called for the disclosure of climate risk by corporations. This helps investors and asset managers focus more on the risk of climate change. When 2°C or 1°C containment is happening, what kinds of risks do the corporations have? A typical one is about how much coal power you are using. There is another example of this kind of movement. There are companies calling themselves 100% renewable energy companies in 2030 or 2050. These companies are requesting to do the same for their supply chain companies. Apple is a typical example.



Those who are selling parts to Apple are requested to do the same. The Japanese companies are selling to Apple. However, if they cannot buy the electricity generated by renewables, Apple ask them to produce it in China because there are plenty of renewables in China. That pushes corporations to buy only electricity generated by renewable energy. Coal power plants will no longer be sustainable. There are many plans in Japan to build a new coal power plant, but one after another, these plans are being aborted. This kind of demand-driven transformation is probably coming much earlier than expected. In China, the carbon dioxide emissions peak may come as early as 2022.

Peak demand for oil may come in 2025. This is more than 10 years earlier than expected a couple of years ago. This rapid change in the market, or corporate behavior, will have the power to make a difference. Hydrogen could be one of the interesting solutions, which we had discussed. There are some green finance investment issues, and carbon price was discussed in a session. The carbon price and carbon tax is a very desirable way, so the discussion about a carbon central bank is a very good idea for stabilization if the carbon market happens.

The carbon price is the method for encouraging more sustainable investment. However, in China, solar photovoltaic is getting cheaper than coal, so there is no need for a carbon price. China was thinking about and planning to make six or seven regional and provincial carbon markets, but they are thinking about aborting it, because already, solar prices are the cheapest. Why do we have to give incentives for solar? Maybe the world is moving much faster than we are thinking.

We talked about several energy sectors. One example is biomethane. Biomethane is a sustainable source. We moved away from coal to natural gas, but even natural gas is hydrocarbon, so to move away from natural gas, maybe biomethane could be the solution. There is biomethane from waste, so we can reduce waste. It is much cleaner, and at the same time, there will be a negative reduction of carbon dioxide if CCS is combined with it.

Another example of a sector was nuclear. Nuclear was picked up on by one of the panelists, and he mentioned new technologies, advanced reactor systems, and small modular reactor types. With small modular reactors, it is easy to change the operation or utilization level, so it is very friendly to renewable energy, which is of a volatile nature. The nuclear reactor may not be the baseload, but it may frequently change the operation level. This small module reactor can possibly be very compatible with renewable energy, but for that, government policy is important, to enable such reactors to be fully deployed.

Another sector which we picked up on is solar or biomethane, especially in developing countries. Morocco is very successful player in solar. Morocco has one of the largest solar farms in the world, and it allows the energy generated by solar to be connected to Europe. Some European companies, in Germany, Spain, Portugal and France, have a memorandum of understanding with Morocco to create a regional integrated electricity market. This is a way to use more renewables which are volatile. In a larger market, this is a very interesting solution for using more renewables.

This could also be a very good model for East Asia. I am in favor of building the network connection with Japan to Korea, Korea to China, China to Mongolia and Japan to Russia. This is of a very geopolitical nature. However, this kind of regional integration of the power line or gas pipeline could unite this very conflicted nature between Japan and Korea. Connecting power lines is a very important step to make these countries move towards peaceful coexistence.

We know that the European Union came from the ECSC. After the Second World War, France and Germany stopped killing each other and created the agreement. After 60 years, it has become the European Union. Controlling materials which are substantial contributors to war is a way to make peace. Electricity is probably the most important source for national power. Therefore, controlling electricity together between Japan, China, Korea and Russia may pave the way to future political coalition in the Far East. We will discuss Far East issues this afternoon, but this kind of connectivity of gridlines is the model of Europe and a model for Morocco and the European countries. Maybe we should think seriously about this in the future.

Lastly, there is a person called Greta Thunberg, a 16-year-old girl who made shockwaves among the environment personnel in New York at the United Nations discussion. This represents the generational divide in views about sustainability. It is not a gender divide, but a generational divide may exist, so we must be much more serious to move towards this claim that action is necessary. We need more action to step towards sustainability with many issues which



we have discussed as such. We have to respond quickly to her in the next few years. This was a very dramatic, drastic request, but we have to get serious about that. Thank you very much.