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WMF Key Note Speech

Impact of COVID-19 on Energy Transition

Before starting my speech, I would like to express my deep gratitude to all the people throughout the world engaged in their respective duties in the fight against the COVID-19 pandemic.

In addition to the tremendous loss of life and livelihoods, this entrenched and difficult-to-mitigate pandemic has caused huge negative impacts in every aspect of our daily lives, on the operations of companies large and small, on trade of material and goods, on cultural/art activities and so on, through lockdowns of cities, international and domestic travel restrictions, social distancing practices and other health and safety measures. Consequently, global production, trade and consumption have shrunk drastically, pushing the world economy into an unprecedented downturn with great uncertainty around the timing and speed of its recovery.

As it is most important for us to protect human life and maintain stability of society as much as possible, there has been a massive worldwide increase in and shift of fiscal expenditure, including investments, toward urgent needs such as subsidies for the unemployed and small companies, for public health and medical care, for research and development activities in vaccines and therapeutic medicines, etc. While we recognize the inevitable fiscal problems facing governments around the world in the future, emergency spending continues at a historic scale.

Accordingly, public expenditure other than for such emergency purposes has been subjected to scrutiny and faced increasing pressure for reductions. In the private sector, our business activity aimed at advancing global sustainability is not an exception from this tendency; companies severely hit by the pandemic have delayed a considerable number of investments and non-urgent operational tasks.

However, all of us, whether public or private, need to be reminded of the importance of the pursuit of global sustainability as our responsibility to future generations, despite the increasing fiscal pressure. Some public and private

organizations, in fact, have managed to find ways to continue their investments as much as possible. For example, the European Union is effectively integrating expenditure on decarbonization policies into economic stimulus packages, which, I think, is very wise and strategic policy-making. By doing so, they are determined to lead the global sustainability movement rough the great difficulties caused by the COVID-19 pandemic.

Indeed, some of the current large scaled efforts to advance sustainability are characterized by complex interdependence. That is, if some critical activities are discontinued, it will not be easy for us to restore them and to maintain efficient execution of the overall activities. Therefore, following the EU's leadership, we had better find ways to maintain our current vital efforts so as not to disrupt the overall progress. In cases where it is difficult to continue one's efforts, we must consider combining our activities with others, or securing public/governmental support. This might include innovative schemes could help stimulate stagnated economies through. It might also be a good opportunity for certain countries to skip some transitional processes; emerging countries, for example, could better deploy new investments into more renewable energy systems and advanced thermal power plants with much lower CO2 emissions or with CO2 capture and storage systems that are technologically and financially supported by developed countries.

Now, I would like to proceed to "the impact of COVID-19 on the global energy transition", and would like to present to you my perceptions in the following categories:

1) Interest in Investment/ Need of Incentives
2) Technologies for Energy Transition
3) Pathways to the Goal

First, then:

1) Interest in Investment/ Need of Incentives

   The pandemic has lowered levels of global physical production, trade of goods and materials, number of travelers, and so on, at an unprecedented scale. Then, in turn, energy consumption throughout the world has been reduced significantly, and, accordingly, energy suppliers are facing decreases in revenue and profit. As this severe situation is not expected to dramatically improve soon, many of these energy firms will likely delay or reduce long term and non-urgent investments, such as those associated with energy transition.

This Pandemic has made it more difficult for many energy suppliers to maintain their current energy transition programs and activities without financial incentives, including tax-based or otherwise, from government or other public authorities. They have unexpectedly faced bigger financial challenges than before in their transition programs, by shifting their energy resources from coal to natural gas, and/or to non-fossil sources such as wind, solar, hydrogen and nuclear. Under these less favorable financial conditions, they will have to find possible ways to manage huge investment expenditures over extended periods as well as to withstand competition in the market, where new ventures are also aiming to enter.

While this describes the general environment, there are exceptions. Some countries, energy suppliers and venture enterprises have been able to maintain or accelerate their current activities not only because they can take advantage of already developed robust grid systems, well-balanced power generation systems, or strong financial foundations, but because they, with a long-term strategic perspective, are aiming to lead the next generation of technology and to enjoy the accompanied business opportunities.

As I have explained, the present status of public and private interests in investment and the need for incentives concerning energy transition in countries around the world varies significantly. So, I would like to stress that we must continue our current efforts to the utmost extent by developing alternative plans and innovative schemes and be prepared to quickly restore and accelerate our efforts when the pandemic's impact subsides.

Here, I would like to mention how importantly and broadly the activities of the WMF contribute to and support our pursuit of global sustainability. Indeed, the WMF has made great progress by inventing and elaborating on such advanced socio-economic and technological concepts as "Use Less", "Use longer" and "Use Smarter" with their respective KPI's. These concepts have already proved their universal applicability to societal activities and investments for better and safer standards of living, more efficient and welfare-oriented industrial operation, stimulating scientific research and exploration toward the same direction as well. Moreover, we have found that a considerable number of WMF activities do and will significantly contribute to our pursuit of a world of low energy consumption, through the combination of implementation knowhow and designs necessary for smart city, smart grid,

smart building, smart production and recycling of material and goods, smart mobility and transportation, etc. These technologies that WMF is promoting will improve our society not only in terms of low energy consumption but in terms of many other benefits such as higher efficiency and quality, better environmental characteristics, improved security, and so on. We see that those activities related to smart concepts have been affected less than the activities in other areas. Importantly, both the users and suppliers of smart technologies can enjoy their respective benefits; the suppliers' incentives are especially strong because they can usually expect big increases in market demands by replacing existing products, systems and services with new, improved ones.

Next, I would like to look at:

2) Technologies for Energy Transition

There have been two streams of development toward Net-zero CO2 emissions; one is to abate CO2 emissions by producing and using electricity generated with lower or no carbon emissions, and the other is to absorb CO2 by recycling or fixing carbon.

The technology for abating CO2 emission mainly consists of the following:

a) High efficiency power generation, such as high temperature Gas Turbine Combined Cycle (GTCC), Integrated coal Gasification Combined Cycle (IGCC), have been already developed and implemented in commercial operations.

   100% hydrogen firing power generation at the existing 440MW GTCC power station in The Netherlands is expected to be achieved in 2025; and, the technology for 30% hydrogen firing power generation has already been established in the next generation GTCC.

   Under the uncertainties caused by the pandemic, some utility companies have tentatively delayed new investments of large scaled power stations. However, I am satisfied to see that advanced countries seem to manage to maintain their current efforts to support emerging countries with increasing demand for energy through governmental or other institutional finance.

Looking at other generation technologies, the ongoing introductory projects based on fuel cell hydrogen power generation have not been influenced by the present uncertainties, because these projects are relatively small and promoted in advanced countries that can support them financially and technologically.

b) Renewable power generation, such as solar, wind, geothermal, and hydro, is well established technology and has been implemented in commercial operations over decades.

   To further expand the share of renewable energy in the total energy supply in the world, it is necessary to promote the development of more advanced energy storage systems, to introduce and extend improved transmission and distribution systems for electricity and to secure stable back-up/substituting power plants such as nuclear power stations and advanced GTCC power plants with flexible and wide turndown (out-put adjusting) capability.

   As the investments and development of such supporting systems and infrastructure require very large expenditure and often take multiple years to complete, we should carefully watch how well the balance of renewable energy capacities and their supporting systems is maintained and should rectify it when it is necessary from time to time.

c) Except for railway systems, most electrification efforts for mobility systems such as automobiles, ships and airplanes are still under the development stage, and it will take time before we see these technologies implemented in our daily life; commercialization and adoption will depend on the needs of society, incentives/regulations by government or public authority, among other factors.

   Even under the far-reaching effects of the pandemic, we do not see any significant slowdown in the race to develop electric vehicles (EV's) that can compete with internal combustion engine vehicles (ICEV's) and capture significant share in the global automobile market. This race continues to be as competitive as ever, and there seems to be little impact from the pandemic, due largely to the attractiveness of the future global market for EV's and the relative strength of prominent automobile suppliers worldwide who can afford such investments. Moreover, they

have likely decided there is no other way than taking these risks to survive over the long run.

The technology for absorbing CO2 consists of the followings:

a) Carbon recycling technology exists in various industrial fields ranging from the already commercialized and traditional dry ice making to urea production from ammonium. However, the sizes of these applications are small, particularly considering the vast amount of CO2 we need to recycle.

   Large scale carbon recycling technologies such as methanation for chemical uses are still in the very early stages of development, and such development activities do not seem to be affected much by this pandemic for the time being. There are, nevertheless, many hurdles to overcome in developing the technology at scale, especially in view of achieving commercial viability.

b) Carbon fixing technology is also in the early stage of development; for example, although an artificial photosynthesis process at industrial scale has been under development in many laboratories and company research facilities, it is expected to take a long time to realize a commercially competitive technology to economically and drastically decrease CO2 emissions in the atmosphere.

c) A few technologies to capture CO2 are proven and have been implemented in industrial fields such as enhanced oil recovery, urea production from ammonium, etc. I am proud that we continue to work in earnest to improve the carbon capture technology by reducing both its capital and operating expenditures, which promises to play an important role in decreasing CO2 emissions.

And, finally

3) Pathways to the Goal

Although our final goal is clear and generally accepted by many countries in the Paris Agreement, dialogue is marked with a range of opinions about the pathways to reach that goal. These opinions exist due to differences in countries' existing energy-mixes, affordability of energy transition costs, energy

security considerations, etc. Some countries elect to take radical and accelerated approaches because they can do so, while others chose to select steady step-by-step approaches due to a need to mitigate the burden to their economies and societies.

This pandemic will cast on people and governments great future uncertainty, thus influencing the arguments on these different pathways toward the final goal. When people and governments see such uncertainty, I think, they generally prefer to avoid excessive burden or risks, resulting in an increase in countries favoring a steadier approach.

Considering the length of time expected to reach the goal and the possibility of further innovations in coping with global warming, there will be different pathways for different countries to approach our common final goal. Each country should be pragmatic and flexible, while always sharing our knowledge and information on the best available technologies and pursuing international collaboration as much as possible.

To end my speech, I would like to say:

At this video presentation, I am taking advantage of today's convenient digital communication technology to satisfy hopefully 70 to 80% of my responsibilities.

As members of the WMF, we are fortunate to have opportunities to discuss broad themes with great complexity involving medium to long-term policy making, the economy, roles of business and science, possible technological breakthroughs and so on. I am reminded that it is very important and essential to secure opportunities for non-virtual/direct exchanges of a variety of opinions, objective or intuitional ideas, and so on by people with various backgrounds and expertise. This way, I believe, is the best way to reach practical and innovative ideas with a variety of possible or permissible pathways toward our common goals.

Then, I do wish that I could be in Nancy and be able to talk with all of you directly, not through this distant, albeit convenient, web.

Thank you for your attention,