

## ACCELERATE

## Accelerating the Active Decarbonization of our Planet

### Abstract

The amount of carbon dioxide in the atmosphere is at its highest level in four million years. If we want to meet our goal of capping global warming at 2°C, urgent action is required to both slash emissions and remove carbon dioxide from the atmosphere. Emerging negative emissions technologies such as direct air capture and materials able to absorb massive amounts of carbon will play a crucial role, but large-scale demonstrations are still a decade away. That means we probably need to combine accelerated R&D efforts with aggressive carbon pricing, major reforestation, and new agricultural and industrial approaches that help create a circular economy.

- How can we get promising decarbonization technologies out of the lab that are viable in the marketplace?
- How can we reach an agreement on a global minimum carbon price and how should we set carbon prices?
- How can we ensure that the burden of decarbonization is shared equitably?

### Participants

*Moderated by:*

**Janos Pasztor**, Executive Director, Carnegie Climate Governance Initiative C2G, Hungary/Switzerland

*With:*

**Jim Hagemann Snabe**, Chairman, Supervisory Board, Siemens AG; Chairman of the Board of Directors, A.P. Møller–Mærsk A/S; Member, GESDA Diplomacy Forum, Denmark (*remotely*)

**Gerald Haug**, President, German National Academy of Sciences Leopoldina; Professor for Climate Geology at ETHZ; Director, Climate Geochemistry Department and Scientific Member at the Max Planck Institute; Member, GESDA Academic Forum, Germany

**Sergio Mujica**, Secretary-General, International Organization for Standardization; Member, GESDA Diplomacy Forum, Chile

**Wendy Lee Queen**, Tenure Track Assistant Professor, Laboratory of Functional Inorganic Materials, at EPFL, United States



### Highlights

Ahead of the UN climate summit in November at Glasgow, Scotland, much of the world was pinning its hopes on governments to urgently commit to effective measures for countering the abundance of heat-trapping greenhouse gases in the atmosphere, which once again reached a new record in 2020, with the annual rate of increase above the 2011 to 2020 average. Concentration of atmospheric carbon dioxide (CO<sub>2</sub>) reached 413.2 parts per million in 2020, or 149% above pre-industrial levels; methane (CH<sub>4</sub>) was 262% and nitrous oxide (N<sub>2</sub>O) was 123% above levels from the mid-18th century threshold when the fossil fuel era began. Though the COVID-19 pandemic temporarily slowed the rise of new emissions, it had virtually no impact on atmospheric concentrations of greenhouse gases, which raise the global mean surface temperature that reflects both land and ocean areas. By now some extreme impacts appear unavoidable due to long-term effects from fossil fuel burning, though humanity still has a brief window to avoid some of the worst scenarios if it undertakes swift emissions cuts, the UN's Intergovernmental Panel on Climate Change warned in August.

"It's very clear that the response of governments and the response of others is simply insufficient," Janos Pasztor, a nuclear engineer and former senior UN diplomat who headed the world body's climate diplomacy, said in framing the issue. "Now, the challenge is huge, and we need to decarbonize the world by the middle of the century, and then we must reach net zero, and then we have to go to net negative, because life doesn't stop at 2050. And we have to do it in a way that the transition is just, so that everybody is able to move forward positively to accelerate the decarbonization process."

The Nobel Prize-winning IPCC offered five likely scenarios for what would happen when the world exceeds the 2015 Paris Agreement's goal of preventing average global temperatures from rising more than 2°C above pre-industrial levels, or 1.5°C if possible. Since the world already warmed by more than 1°C, each scenario in the latest IPCC report – which reviews the latest research including land and ocean temperatures, emissions, extreme weather, drought, wildfires and sea level rise – shows the world crossing the 1.5°C threshold in the 2030s, faster than predicted. The report emphasized that human-caused climate change is causing severe and widespread impacts on Earth, such as heatwaves, drought and flooding, and these will be dramatically worse at 2°C than at 1.5°C. Ocean warming and melting ice sheets will likely cause sea level rise of five to ten metres into the 22nd century, IPCC reported. Extreme heat waves happen five times more often now and will occur 14 times as often if the 2°C threshold is breached; once-a-decade droughts happen 70% more often now.

"I would like to make a bold opening statement. The 2° Paris target is gone in ten to 15 years. The 1.5° target is already gone," said Gerald Haug, an expert in geosciences and oceanography. "If we would act in the next five to ten years, there's the opportunity to keep the 2° target. I think we have five to ten years for action. We do not have a knowledge problem. And I think this is where we go next; and we have a serious implementation problem. So, this where GESDA, Switzerland, Geneva – science-meeting-technology-meeting-diplomacy – could be very useful." Haug said the most potentially effective instrument that the world could use to combat climate change is carbon pricing. Two years ago, the International Monetary Fund (IMF) recommended a steep global tax on carbon emissions within a decade as the most effective way to reduce heat-trapping gases. The IMF report said imposing a global tax that rises to \$75 per ton of carbon by 2030 could reduce emissions by 35% over the next decade. That would help meet the 2°C limit set in the Paris treaty. Without such urgent action, the IMF said in its climate mitigation report, global temperatures are projected to rise by double the Paris goal, or 4°C above pre-industrial levels, by 2100.

Such a tax would raise coal prices by 214%, increase electricity prices by 43% and send gas prices for cars up by 14% around the world, according to the IMF. A carbon tax of \$50 per ton would send coal prices up by 142%, raise electricity prices by 32%, and send gas prices for cars up by 9%. But it would quickly reorder the global economy, creating demand for more sustainable energy sources and greener fuels. A more recent IMF report found nations spend \$11 million per minute on subsidies for fossil fuels. "At the moment we are still at exponential growth. Ever since the Paris agreement, nothing has happened," said Haug. "The sharpest knife we have is a CO<sub>2</sub> price. And if we could manage this, with a good example starting here all over Europe, together with the United States and then probably China, that would be the winner. Without that knife, there's very little opportunity and chance that we meet the Paris agreement."

A poll of the session audience found just 13% believe the world is on track to scale up for global decarbonization and negative emissions; an overwhelming 87% believe it is not. Some 43% of respondents named insufficient political will by political leaders as the biggest impediment to the timely scaling up of techniques and technologies for decarbonization, and eventually net negative emissions. Another 30% said the private sector, motivated only by the profit motive, is the biggest impediment; 23% mainly blamed inadequate government mechanisms; 3% pointed to inadequate standards and regulations. No one chose an overabundance of standards and regulations as the biggest culprit.

"It's clear that business plays the major role in the action necessary. Policymakers can create environments which makes it attractive or unattractive to pollute, or attractive to solve the problem. But we need to do the action," said Jim Hagemann Snabe, who has pushed for a pragmatic stance on climate as chairman of both Moller-Maersk, the Danish conglomerate that dominates container shipping, and Siemens, Europe's leading industrial group. "And that's a little bit how I look at this problem and hence take on a big responsibility as well in business. I have one fundamental assumption. I believe we have the technologies necessary. That doesn't mean we don't need to develop much more. But we have enough that we shouldn't be waiting. We need action. And so, I'm actually driving the point around the leadership to act and not just to talk."

Siemens committed in 2015 to achieving carbon neutrality by 2030, and by 2020 it had cut emissions by 54% which provided "an indication for me that it's possible and it's not just empty words", said Snabe. Then Maersk committed in 2018 to achieving carbon neutrality by 2050, but "to be carbon neutral in a shipping company is not so easy. We can't just use batteries. It would take 60% of the capacity of the vessel", he said. "We knew we had to have the first vessels sailing in 2030 with a zero-carbon technology, and then we would spend 20 years to replace the entire fleet of vessels, 750 roughly. You can't just pile that up as waste, that would be an even bigger climate disaster. So that's why it was an ambitious plan." Now, Snabe, who calls himself a "concerned optimist", supports setting a global price on carbon. "It has to be a global price, at least in main regions, China, the United States, Europe has to participate. Otherwise, it's moving the problem around, you're not solving it," he said. And he envisions a future in green fuel with demand outstripping supply. "And that, I think, is good news potentially, because when demand is higher than supply, you actually have a wonderful business opportunity for anyone who invests early. And that's maybe my last point. I begin to see that it is becoming good business – you make money – if you invest in sustainable solutions. We have crossed that tipping point where the discussion should not be, can we afford it? It's almost the opposite," he said. "The Stone Age didn't end because we ran out of stone. It ended because there was a better technology. And we are looking into that technology now."

In the audience, Jean-Pierre Danthine, a professor at EPFL, and president of the Paris School of Economics, noted there is near-unanimous agreement among economists that global carbon pricing is the best way to go, but persuading citizens and their elected leaders to go along is harder. "It's the fact that you need to convince the people, not only the businesspeople, but also people on the street, that an extra tax is really necessary. And this is extremely difficult," said Danthine, who was deputy

chairman of the Swiss National Bank from 2012 to 2015, partly blaming the problem on a mistrust of scientists and policymakers. "In Switzerland, we got to a 51 per cent vote against the CO<sub>2</sub> tax. It's not that we need a lot more, but I think that we need everyone, including probably the multilateral community, because things have been able to move from multilateralism a bit better than at the national levels."

From the panel, Wendy Lee Queen said her work has convinced her that the key to expanding the use of solar energy is through more use of materials with engineered properties created from specialized processing and synthesis technology, including ceramics, high value-added metals, electronic materials, composites, polymers, and biomaterials. "We know that historically, energy transitions are slow, and so we're going to continue emitting CO<sub>2</sub> from the combustion of fossil fuels for many years to come," said Queen, a chemist and material scientist who focuses on development design and production of hybrid organic and inorganic materials. "And so really at the end of the day, we also need advanced materials to capture that carbon dioxide from large point sources like coal-fired power plants or maybe large-scale transportation like ships. And then we've got another problem. What do we do with that carbon dioxide?" she asked. "If we really want to reach net zero and go negative, we've got to really start pushing negative emissions technologies forward. For instance, direct air capture. You also need advanced materials to remove the carbon dioxide directly from the atmosphere." But, she emphasized, much of her lab work deals in small-scale 'grams' rather than 'tons' – making it difficult to know exactly what might be needed for industry to dramatically scale up its production levels.

Standards can help, said Sergio Mujica, a lawyer with expertise in regulatory affairs from his work with several international organizations. He noted the 165-nation International Organization for Standardization that he heads was created in the aftermath of World War II to help rebuild the world and support economic and social development. "We have a longstanding tradition in contribution to environmental topics, maybe some of you know the 14000 series on environmental management," he said. "We also have a relatively new technical committee on carbon capture and storage. That committee is led by Canada. There are some 20-plus countries participating in that committee and there are already 11 standards that have been produced there and four more in the pipeline. But it's just the top of the pyramid because there is a lot more to do in this area."

Pasztor noted "We keep coming back to this issue: the scale is huge, yet we can do it! It's possible." And there are some positive developments in the private sector and with advanced materials, he said. "There

are ways to go ahead. But if we don't get our act together, then it's going to be very serious," said Pasztor. Then we have to say pretty much goodbye to our [UN] Sustainable Development Goals, because we're not going to meet them."

## Takeaway Messages

**The challenge is to expedite the technology to decarbonize the world by 2050, then reach net zero, then get to net negative, in a way that is fair to everyone.**

**The 2° Paris target is gone in ten to 15 years; the 1.5° target is already gone.**

**The "sharpest knife" for accomplishing decarbonization is setting a global price, or tax, on CO<sub>2</sub>.**

**Clean energy provides a better business model than fossil fuels, and business leaders cannot afford to wait any longer to make the transition. Many of the technologies needed are already here.**

**Research and technology assessment is needed. For many advanced materials, scaling up their use from the lab to industries has not yet been demonstrated.**

**GESDA can play an active role in communicating the need for global CO<sub>2</sub> pricing and how urgently the world needs to act – and in building trust among all communities.**

### More information

[Session recording on YouTube](#)

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