

Climate Change Brings New Challenges for Infrastructure Ecosystems

In a lively conversation, panelists from around the world discuss the need to adopt game-changing technologies and mindsets to address climate change through infrastructure changes

The infrastructure landscape is increasingly being shaped by the changing state of the environment, the need to take action to fight climate change, and digital connectivity. Innovation, resilience, and partnerships will be at the core of sustainable, resilient infrastructure. The publication by the Intergovernmental Panel on Climate Change (IPCC) of *Climate Change 2021: The Physical Science Basis* lays out that there is no denying climate change is occurring and details some of the resulting adverse impacts. Innovating and updating infrastructure globally is part of the solution to mitigate the harmful effects of climate change.

Infrastructure is at the forefront of challenges that need to be solved and improved globally since it has direct impacts on economic advancements and quality of life. The United States has shown its commitment to infrastructure with the passing in the Senate of a \$1 trillion bipartisan infrastructure bill. This is just a start for what is necessary to bridge the existing infrastructure gaps. According to the G20's Global Infrastructure Hub, worldwide, economies will need to devote \$98 trillion to meet infrastructure gaps and be in line with the United Nations Sustainable Development Goals (SDGs).

During the Frame the Future of Infrastructure session on August 11, global leaders from academia, policymaking, and the corporate sector discussed

how to accelerate and advance infrastructure to meet today's most pressing global challenges. Panelists discussed the necessity of funding innovative infrastructure, the need to adopt game-changing technologies and mindsets, and the difference in infrastructure amongst different local realities.

The session gathered insights from Dr. Mahmoud Abdulwahed, Director, President's Strategic Innovation Office, Qatar University; Ms. Elisa Jagerson, General Partner, Wildcat Venture Partners; Ms. Frannie Léautier, CEO, South-Bridge Investments; Ms. Pia Henrietta Moon, CEO and Co-Founder, Carbo Culture; and Mr. Charles O. Holliday, Jr., Chairman, GFCC, and former Chairman, Royal Dutch Shell plc.

Need for Rapid Change

The need to invest heavily in innovative infrastructure solutions has been accelerated by climate change. There are two ways to reduce carbon dioxide in the atmosphere and ultimately regulate climate change impacts—reduce the greenhouse gas output and sequester the greenhouse gases that already exists in the atmosphere. Through a combination of innovative technology, lots of investment, and policy changes, carbon emissions can be lowered to manageable levels.

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"We have got to move right now. There might be a more perfect system in the future if we had more time, but we don't. We have to move right now, and by right now, I mean this year, with massive movement."

Mr. Charles O. Holliday, Jr.
Chairman, GFCC
Former Chairman, Royal Dutch Shell plc

Companies like Carbo Culture turn plant matter into a stable form of carbon called biocarbon in a process called carbon sequestration. As pointed out by Ms. Moon, "The carbon removal market today is about 3 million tons, but it needs to get to over 10 billion tons." This disparity can only be met with more investment in carbon sequestration technology, infrastructure, and companies.

Participants

Dr. Mahmoud Abdulwahed

Director, President's Strategic Innovation Office, Qatar University

Ms. Elisa Jagerson

General Partner, Wildcat Venture Partners

Ms. Pia Henrietta Moon

CEO and Co-Founder, Carbon Culture

Ms. Frannie Léautier

Partner, CEO of SouthBridge Investment, Kigali

Mr. Charles O. Holliday, Jr.

Chairman, Global Federation of Competitiveness Councils (GFCC)

Former Chairman, Royal Dutch Shell plc

Hosts

The Hon. Deborah L. Wince-Smith

President, Global Federation of Competitiveness Councils (GFCC)

President & CEO, Council on Competitiveness

Dr. Roberto Alvarez

Executive Director, Global Federation of Competitiveness Councils (GFCC)



WATCH THE CONVERSATION

"Developing countries and emerging economies where, because there is little to no infrastructure, there is an opportunity for innovation and leapfrogging that has actually become a very dynamic place where lessons can be learned."

Ms. Frannie Léautier

Partner, CEO of SouthBridge Investment, Kigali

Immediate investment in climate tech and green infrastructure is necessary to accelerate the development of start-ups and create long-lasting, sustainable infrastructure. From Ms. Jagerson's perspective, in 2010, there was heavy interest and investment in what at the time was called clean tech, but it was a bust and "it took 10 years to get venture capitalists and early-stage investors back into the game...We cannot afford another 10 years." Without sufficient investment in new climate tech, the ability to reduce carbon emissions to manageable levels will be significantly impacted. There needs to be fundamental changes in the technology available to create sustainable infrastructure, and lack of funding will stunt the ability to change.

Using What Exists

Enhancing and expanding partnerships between universities, industries, and governments to accelerate infrastructure change is a potential pathway forward. Drawing from her expertise, Ms. Wince-Smith identified the successful partnerships in the United States between the government and research institutions to create national laboratories that have been able to leverage large-scale investments and multidisciplinary research, resulting in huge innovation projects.

Partnerships between universities and industry are an accessible starting point to accelerate the transition to a net-zero economy. For that to happen, it is essential to accelerate the translation of research and ideas into R&D and eventually to start-ups that can grow in the market. Dr. Abdulwahed shared that by "creating the whole ecosystem from R&D into commercialization startups and utilization," it is possible to expand the success rate of new solutions in the market. One of the answers in Qatar has been the development of innovation clusters like Qatar Mobility Innovations Center (QMIC). Such organizations act as innovation incubators that approach problems by looking at the whole picture—from research to product.

Addressing infrastructure challenges as quickly as possible requires more than just establishing partnerships. Repurposing technology that already exists can lead to changes in sustainable infrastructure, and help cities and nations to close the infrastructure gap.

For Dr. Abdulwahed, repurposing existing technology—such as the education sector going remote during the COVID-19 pandemic—can create many opportunities to address infrastructure challenges. "There are quite significant sustainability impacts (of remote learning), from city emissions reductions from transportation, facilities management, and

"I divide emerging economies into two parts. There's those that are contributing significantly. We're talking about 30 to 50 percent of all emissions. And then there's a bunch that don't participate at all. They aren't the problem, and they are paying the first price."

Ms. Elisa Jagerson
General Partner, Wildcat Venture Partners

many other things from the education perspective." The technology has been available, but there was no apparent need to educate remotely on a mass scale prior to the pandemic. The key to transformation is to combine and use existing technologies in new ways, through novel business models.

From Ms. Léautier's perspective, there is a huge opportunity in combining existing technology and scientific advancements with design, architecture and construction to create self-healing infrastructure. Ms. Léautier further described the opportunity: "Imagine a huge bill to repair infrastructure in the United States by including self-healing and self-repairing mechanisms and technologies into the infrastructure itself." These types of solutions that combine existing technology with government action are a step forward in modernizing infrastructure.

Government Intervention

Without government support and action, sustainable infrastructure change cannot happen. There needs to be an immediate and long-term commitment from governments on pricing carbon into the economy and giving funding to companies that are developing innovative technologies.

Companies that are in early-stage development need government financial help to continue their work when it is deemed too risky for commercial lenders. To accelerate the growth of innovative clean tech companies, obtaining money at a faster turnaround could be a game changer. Ms. Moon described the need as "even getting a loan for 50 percent of what people are asking, and at a faster turnaround because companies don't have nine months to wait around. Speed is key, and forget about making mistakes along the way. We're going to make mistakes, but we need to move faster."

Incorporating the cost of carbon into the economy is a must. One solution could be a green premium, which would be a price on polluting. This is expected to have a significant impact on companies' efforts and willingness to reduce their carbon footprints. Having to be responsible for carbon emissions throughout their product's entire lifecycle could alter the way companies conduct business. Ms. Moon put it succinctly: "The idea is that if you're doing something destructive or polluting, you would have to pay. And through that, the sustainable alternatives would be cheaper. That's the way that the business models will work for infrastructure in the future."

Ms. Jagerson understands governments face challenges when accounting for carbon in the economy. "The ugliest word in policy is carbon tax, but if the cost of carbon isn't embedded into the economy and ecosystem in some more tangible way, and nobody's accountable for paying for it, we won't rein (climate change) in."

"There are technologies in many industries that can be transferred into other industries that creates technology sustainability in the different industry. One can change the business model of a particular domain by using current technologies."

Dr. Mahmoud Abdulwahed
Director, President's Strategic Innovation Office,
Qatar University

There are options for how to implement a carbon tax, for example, instituting a cap and trade system, or Corporate Average Fuel Economy (CAFE) standards.

There is space for innovation when it comes to environmental policy changes. Mr. Holliday pointed out that in the United States, taxes and policy changes are an increasingly politicized and partisan issue. Without innovative thinking on policy solutions, changes in physical infrastructure might be moot.

Going Forward

All panelists agreed that to fix the globe's infrastructure problem, there needs to be a two-pronged approach: innovative, sustainable, and resilient technology advancements; and financial and policy support from the government. The

world needs game changers, and as Mr. Holliday noted, the world needs multiple game-changing innovations, especially when it comes to energy and the climate crisis.

Up and coming areas that have the potential to be big game changers are energy, water, self-healing architecture, maintenance embedded into infrastructure design, hydrogen as an energy source, and biotech. All these ideas have the potential to alter the globe when it comes to the climate crisis and improving the quality of life for people of all communities. As Dr. Alvarez closed the session, he reflected on a path forward: "This is a puzzle. Many of the pieces are out there, but we need to connect those by combining elements that we already have in new ways."

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Ms. Pia Henrietta Moon
CEO and Co-Founder, Carbon Culture