Battelle Conference on Innovations in Climate Resilience - March 29-30, 2022

VerifiGlobal

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The Battelle Conference on Innovations in Climate Resilience took place in Columbus Ohio on March 29-30, 2022. Tim Hansen of 350Solutions attended the Conference and presented the VerifiGlobal Clean Technology Innovation Initiative (CTII).

1. Opening Session

The opening session, “Mobilizing the Whole-of-Government to Deliver Innovations in Climate Resilience”, featured Gina McCarthy the National Climate Advisor to the U.S. Government. Her remarks provided a call to action on climate change in the US, presenting a summary of actions being undertaken by the Biden administration to address and integrate climate change mitigation and adaptation in government actions. A significant foundation for this is the bipartisan infrastructure bill, which includes funding for not only fixing national infrastructure in water, power, transportation, and other areas, but also for developing new infrastructure to support the future power grid. Ms. McCarthy also commented on actions focused on setting aside and managing public lands in ways that natural carbon sinks are maintained forever. Finally, she discussed the need to approach all of these issues with an eye toward equity and ensuring that funds flow to communities of need and environmental justice areas.

2. Keynote Presentations

The conference keynote presentations focused on the need for climate mitigation and adaptation technologies, both to achieve committed targets and to adapt to changes already occurring. On the adaptation side, there was a strong indication of the growing need for models, predictive tools, and other approaches to support decision-making regarding potential adaptation requirements due to climate induced problems, such as flooding and flood risk. The keynotes included the following:

The role of Innovation in DOD's approach to Climate Change Adaptation and Mitigation, Richard Kidd, Deputy Assistant Secretary of Defense (Environment & Energy Resilience), Office of the Assistant Secretary of Defense (Sustainment). This keynote addressed the Department of Defense's approach to climate change, with an emphasis on approaches to innovation, technology and impact of procurement policy. With the Defense department's numerous bases, significant level of energy consumption, and exposure to impacts on mission due to increasing storms and natural disasters, climate change has become a focal issue for DoD. The need for enhanced resilience in the face of climate change is driving the DoD to deploy climate resilient, energy secure solutions and technologies.

Department of Defense Climate Adaptation Plan (CAP), Kathleen White, Program Director Climate Change, Office of the Deputy Assistant Secretary of Defense (Environment and Energy Resilience); Office of the Assistant Secretary of Defense (Sustainment). This keynote addressed the Department's Climate Adaptation Plan (CAP), which the Secretary of Defense signed in September 2021. This plan recognizes the interrelationships between climate adaptation, climate mitigation, and climate resilience.

From Threat Multiplier to Solutions Provider: What can National Security Teach Us about Innovations in Climate Resilience? Sherri Goodman, Former Deputy Undersecretary of Defense, Environmental Security. This keynote addressed how the US military, one of the world's largest carbon polluters, is combatting climate change and how we can learn from this in doing more to reverse the worst impacts of rising seas, extreme weather events, wildfires, drought and more.

Achieving Climate Security, Sharon Burke, Founder and President, Ecospherics, addressed the following questions - What might a future of climate insecurity look like? What do the projections suggest, and what trade-offs do individuals, communities, and states face now to achieve future climate security? What is the role of military organizations? How can decision support tools help improve policies and investments?

Advanced Reactors: Resilience in Drive Towards Net-zero, Alice Caponiti, Deputy Assistant Secretary,Office of Nuclear Energy, DOE. Nuclear energy is one of the most resilient, clean, and reliable energy sources on the grid today. Ms. Caponiti addressed the work that the Department of Energy is doing to make sure that nuclear energy technologies are available to meet society's energy needs and carbon reduction goals while supporting the economic vitality of communities.

Electric Industry - Know your Risks and Invest for Success, Patricia Hoffman, Acting Assistant Secretary, Office of Electricity. This keynote addressed the opportunity for states and utilities to obtain federal funding to support a significant change in electric infrastructure. We are at a critical decision point. Coordination and collaboration at an unprecedented scale are needed to succeed.

Mineralizing CO2 as Limestone Aggregate in Concrete, Brent Constantz, Founder and CEO, Blue Planet. Rock represents the largest reservoir to sequester CO2. Over 55 Gt of rock is mined annually. Most of it is limestone and used as aggregate (sand and gravel), the principal component of concrete. There are over 30 Gt of concrete poured annually. Mineralization of CO2 to form limestone, which is 44% by mass CO2, is a form of permanent CO2 sequestration. Over 20 Gt of CO2 could be permanently and profitably sequestered in aggregate in concrete in the built environment annually, as concrete is the most used building material. About 40% of concrete is specified and paid for by governments, allowing governments to leverage their revenue neutral procurement powers to mitigate CO2. Something that all nations, even the poorest countries on the globe, can utilize.

UCLA Sustainable LA Grand Challenge: A model for transforming cities through strategic public-private partnerships, Eric Hoek, Professor, UCLA, Department of Civil & Environmental Engineering and the Institute of the Environment & Sustainability. This keynote addressed how the UCLA Sustainable LA Grand Challenge is transforming Los Angeles into a sustainable megacity through research, expertise and education by public and private partners.

Putting the "Green" in Greenland, Kenneth Høegh, Head of Representation, Greenland Representation in Washington D.C., shared his perspectives on Greenland, the Arctic, Greenlandic social and business conditions, foreign and security policy in the Arctic, and bilateral cooperation between Greenland, Denmark and the US.

3. Panel Discussions

In addition to the keynote presentations, there were two panel discussions:

On the Path to a Decarbonized World: Insights from Space, Earth and the Ocean.

Moderator: Martin Keller. **Panelists:** Francis Wiese, Ph.D., Environmental Services Group Senior Principal, Technical Leader for Marine Science in the US, Stantec; John M. Grunsfeld Ph.D., Founder and President of Endless Frontier Associates; Bill E. Easterling, III, Professor of Geography and Earth System Science, Pennsylvania State	This panel explored the importance of understanding innovations in climate technology as a whole to better position us to be resilient. The key question raised was: What do an astronaut, marine ecologist, and geoscientist all have in common when it comes to climate resilience? The answer: Perspective….to uncover the fact and fiction of climate change from the expanse of earth's orbit, to the land, and into the depths of the oceans.

You have a game-changing solution for climate resilience. Is that enough?

Moderator: Jen Schwartz, Senior Features Editor, Scientific American. **Panelists:** Sherri Goodman, Former Deputy Undersecretary of Defense, Environmental Security; Brent Constantz, Founder and CEO, Blue Planet; Sharon Burke, Founder and President, Ecospherics; Blake Bextine, Program Manager, DARPA	The pandemic showed us that the most effective scientific solutions—even that ones that seem highly desirable—run into barriers at implementation. Innovations in climate resilience often face similar challenges: politicization, inequitable access, institutional distrust, misinformation, inadequate infrastructure, short-term thinking, and so on. What would it take, then, to prioritize preventative technologies and policies instead of reacting to a cascade of climate crises? How can climate solutions at the federal level consider local needs, resources, and expertise more deliberately? Who bears the onus of resilience, and how can both government and industry make it easier for individual people and communities to adapt? And how can leaders in climate resilience promote solutions that integrate "mitigation" with "adaptation," rather than framing those strategies in conflict with one another?

4. Conference Technical Program

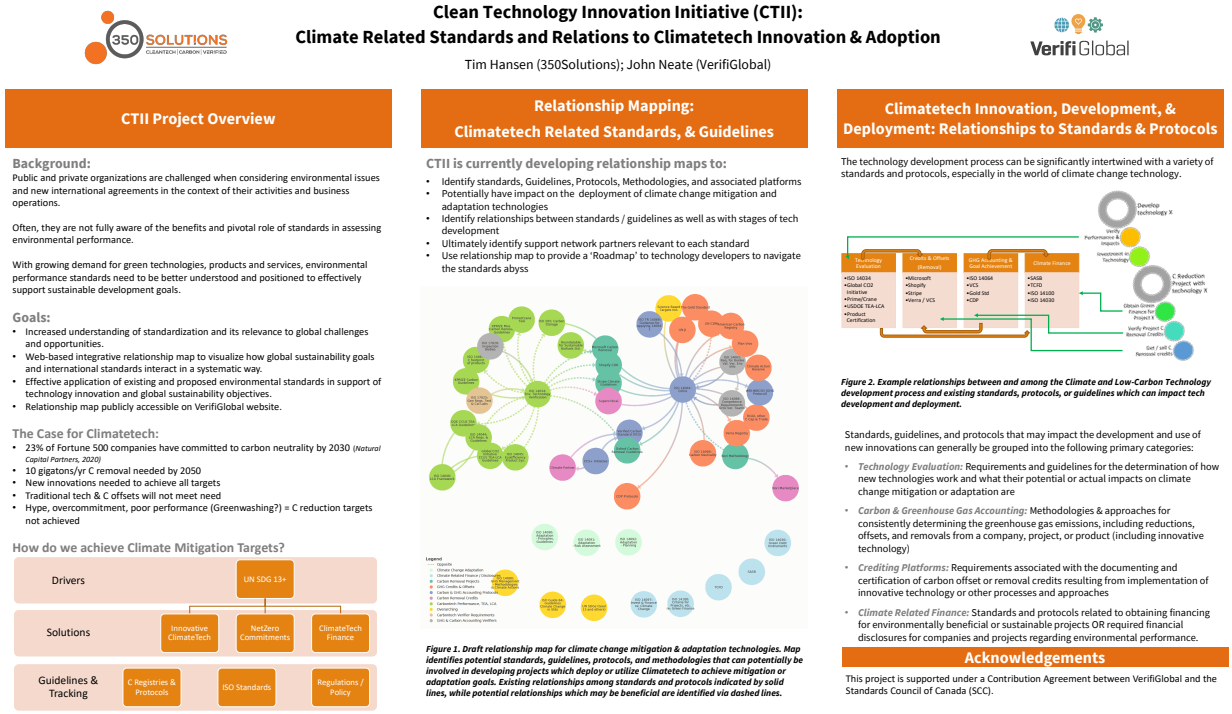
The Technical Program consisted of two Tracks.

Track A included the following topics:
A1. Translation of Climate and Multi-Sector Models into Decision Making
A2. Integrated, Multi-Scale Energy- Climate-Water Modeling for Mid- and Long-Term Planning, including Real-Time and Near-Term Operational Predictions of Extreme Events
A3. Approaches that Co-Optimize Decarbonization and Climate Resilience, including in Industrial Processes
A4. Lifecycle and Economic Analyses of Carbon Capture, Water Purification, and Ecosystem Restoration
A5. Technologies to Enable Circular Economy and Efficient Recovery of Materials, Including CO2
A6. Testbeds to Monitor Ecosystem Health and Response to Disturbances
A7. Case Studies of Large-Scale CO2 Capture and Storage Projects.

Track B included the following topics:
B1. Case Studies Prioritizing Infrastructure Resilience Policies and Actions Based on Consequence
B2. Novel Designs, Materials, and Integration for Adaptive or Hardened Buildings and Infrastructure
B3. Case Studies and Test Beds for Monitoring Vulnerability and the Cascading Impacts of Sequential and Multiple Events on Resilience
B4. Strategies to Quantify, Reduce, and Counteract the Effects of Climate Change, such as Drought, Flooding, and Movement, or to Address the Underlying Health Inequities Created by Climate Change
B5. New Approaches to Farming and Food Production, as well as Innovations in Agriculture to Adapt to Change

5. Clean Technology Innovation Initiative (CTII)

The CTII presentation was titled "Clean Technology Innovation Initiative (CTII): Climate Related Standards and Relations to ClimateTech Innovation & Adoption. It focused on the growing need for climate mitigation and adaptation technologies, and the role standards can play in supporting deployment of technologies to address the problem. The primary focus was on the development of the mitigation/adaptation standards relationship map, as related to the innovative climate technology development cycle.



During the session, several attendees commented on the need for the mapping, because of the lack of clarity regarding the various standards, protocols, and guidelines being utilized in this sector, and their relationship amongst each other, as well as when they are used or implemented throughout the technology development cycle.

Overall, discussions were very positive. The need for the relationship mapping was confirmed by several, with new potential technology focus area identified by many attendees as relevant for ETV, including monitoring technologies for climate change applications (air, methane, soil carbon, and others). Two companies discussed their use of monitoring technologies to validate the impact of projects, technologies, approaches, etc. on CO2 or CH4 emissions.

One is the Battelle based NEON program (near earth observation network) which is using instrumentation towers with CO2 monitors to identify changes in ambient CO2 levels and relate them to reductions (mitigation) from tech deployment, or to monitor CO2 sequestration and identify leakage, or to monitor local areas for changes resulting in increased emissions (CH4 leak detection).

The other group is LI-COR Environmental that developed and provided monitoring instrumentation for the NEON project. LI-COR Environmental is also developing new monitors and data processing technology to support on-the-ground verification of CO2 emissions changes.

Soil carbon monitoring technology is another area where additional technical capability needs to be developed to provide improved capability in monitoring GHG emissions changes due to various purportedly beneficial practices.

6. Other Comments and Observations

Stormwater controls and mitigation approaches – There was significant interest in stormwater controls and mitigation approaches, and a couple talks focused on best practices and approaches to mitigate stormwater impacts. One focused on mitigation for construction projects, and adapting to the fact that more frequent and intense storms are occurring. Verification programs focused on these 'technologies' are needed.

There were also several talks about technologies and for addressing some of the adaptation related impacts, such as erosion control techniques, resilient stream repair, etc.

Modelling and prediction - There were several presentations focused on models and prediction of flooding, storms, droughts, and other climate impacts – even down to things like water temperature in Philadelphia Water Supply and landslide risk prediction. The point being that all of these models are developed to identify increased risks and serve as decision-support tools to identify the severity of potential problems to address and how to de-risk. With the amount of models and tools being developed, there is a role for verification – i.e., (a) who is verifying the tools and identifying which ones are most accurate or beneficial, and (b) once the risks are identified, who is providing information on verified solutions and their potential impact? In addition, can the tools be used for scenario analyses using different technologies?

An overall observation during these talks was 'we need more' – e.g., the climate situation is serious, resulting in increased risk to businesses, the Dept. of Defense, communities, the natural environment, the built environment, and our resources. We need more and better tools to more accurately predict and identify the levels of risk in various scenarios

Climate change mitigation - On the mitigation side, there were several relevant technologies discussed which can provide a potentially significant impact, including reduction of carbon emissions, and support toward achieving net-zero commitments. Technologies of interest include:

- CO_2 utilization in concrete – a growing focus of mitigation, with potential to increase the embodied carbon in buildings to reduce the carbon footprint of the built environment.
- Electric vehicles and EV charging (with renewables)
- Renewable energy generation, specifically with a focus on incorporating energy storage and developing distributed (or at least redesigned and more interactive) grids to reduce risk of power outage due to storms or other events
- Advanced nuclear reactors (small modular reactors)

While there are technologies being developed to address both mitigation and adaptation, we need more and need to accelerate development and deployment (including financing). We also need to be better prepared to support decision-making regarding best choices to deploy.

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