Innovations in Climate Resilience Technologies

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Background/Objectives. The 2018 publication of the Intergovernmental Panel on Climate Change (IPCC) Special Report reaffirmed the growing consensus that emission reductions alone will not be enough to curb climate change. The IPCC report estimates that all pathways to keep global warming to 1.5°C above pre-industrial levels will rely on carbon dioxide removal (CDR) on the scale of 100 to 1,000 gigatons over the course of the of the 21st century in addition to emission cuts and the transformation of high-emitting sectors, such as energy, transportation, and agriculture.[1] This challenge is magnified when in the face of the expected growth in the global economy by 2050 and expected consumption increase in energy and other commodities. It is undeniable that technology will need to play a large role in climate mitigation strategy. Carbon capture and storage (CCS) technologies and direct air capture (DAC) of carbon must be considered towards the goal of meeting warming targets as well net zero carbon targets.

Approach/Activities. While the literature surrounding CCS and DAC has expanded in the past several years, a majority of the literature focuses on the high economic costs of the technologies, citing the need for regulatory action without providing specific recommendations for policy actions.[2–4] This paper examines the current state of CCS and DAC technologies, exploring and providing an overview of the developments made in the processes, as well as costs and challenges of implementing both technologies. The paper seeks to analyze the current policy landscape as it relates to policy assisting with the implementation of CCS and DAC, in order to examine whether the current regulatory framework allows these technologies to accomplish its environmental goals and as well as if the regulations adequately promote the use of these technologies. This paper's research is limited to CO_2 emissions and does not address other greenhouse gases that contribute to global warming. The sectors that include agriculture, forestry, and other land use are an important contributor to global warming, especially related to high global warming potential pollutants such as methane and nitrous oxide, and are not addressed in this research. Also, the regulatory programs reviewed are limited to the United States.

Results/Lessons Learned. CCS and DAC are key technologies needed to remove carbon from the atmosphere and meet the climate mitigation challenge. While promising, both technologies are relatively new and expensive to implement. Uncertainty and high costs can be a deterrent for businesses to invest in these technologies. Therefore, it is important that there be a well-designed policy framework to enable and incentivize CCS and DAC projects. This framework should assist in managing risks while helping provide stable and predictable revenue to help reduce cost of projects. Some policy initiatives have begun at both the state and federal level, but the lack of clear federal legislation for the reduction of greenhouse gases poses a significant barrier to the proliferation of CDR technology. A stronger push is needed to enable projects, de-risk the transportation and storage infrastructure and create effective policies and regulations. These initiatives would help spur growth of much needed projects to solve the climate change challenge and meet net-zero carbon goals.