

Testimony of the Honorable Charles D. McConnell

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To the House Select Committee on the Climate Crisis Hearing:

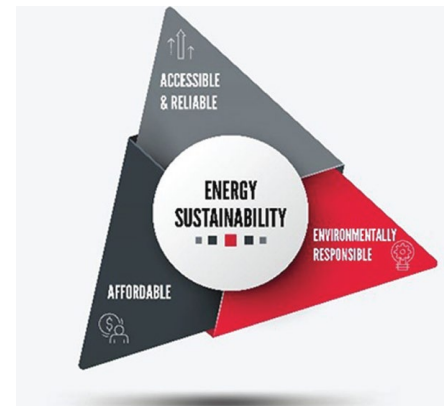
Manufacturing a Clean Energy Future: Climate Solutions Made in America

February 2, 2022

Carbon Management: Focusing Policies, Investments and People for Real Commercial and Progressive Solutions

Thank you for the opportunity to testify on Manufacturing a Clean Energy Future – and specifically solutions that are Made in America. It is particularly gratifying that the technology and commercial advancements in carbon management that were in the early stages at DOE, 10 years ago when I served as the Assistant Secretary, have evolved into solutions that can be deployed at commercial scale. The energy transition demands these solutions, and it is once again proof positive that such investments in technology development can and do pay dividends to the American people. We must grow these efforts by focusing on addition to the American industry by removing key barriers in technology, financing, policy while ensuring that energy equity and environmental justice is addressed. The US has a once in a generation opportunity to continue to be the global leader in energy, and it must happen through addition of capabilities and opportunities and subtraction of barriers and dogma.

The world's population and human development are growing at a rapid pace and the availability of affordable and reliable supply of sustainable energy forms the basis of this growth. The energy transition will succeed through a strategic approach to sustainable energy development, focused on satisfying what is known as the Energy Trilemma – energy supply that is reliable, affordable and environmentally sustainable.



WHY CARBON MANAGEMENT IS CRUCIAL

The Center for Carbon Management in Energy (CCME) at the University of Houston (UH) was established in January 2019 with the vision of powering the energy transition to create solutions that can

satisfy this Energy Trilemma. CCME and UH are partnering with industry and other thought leaders to lead impactful, multi-disciplinary change to technology, regulations, and policy, involving science, business, and law, as well as advancing education to develop a future-ready workforce ready to benefit the society at large.

We created this center in close engagement with our colleagues at UH, industry, and a broad group of stakeholders. Our external energy advisory board identified the need for the CCME, the university invested in the initial seed funding of the center, and our industry partners now continue to invest in the public private partnership to advance carbon management.

Carbon Management is in full development within companies in Oil and Gas, Petrochemicals, Electric Power, Cement, Steel, and several other manufacturing entities. They are not only pledging to be net zero carbon emissions by 2050 – but are investing in real emissions reduction technologies. This is the essence of our carbon management efforts at the University of Houston.

Our UH CCME has positioned its efforts to span broadly across the US and is proud to have external collaborations in place with the Energy & Environmental Research Center (EERC) at the University of North Dakota in Grand Forks, the University of Wyoming's Energy Institute, the University of Illinois and their carbon sequestration efforts in partnership with Battelle in Columbus OH as well. The further collaborations with other universities and associations through the Southern States Energy Board also provide a national organization of effort. All of these universities are organized around, and working on, various aspects of the decarbonization challenge that are essential to meeting the climate challenge.

Let me emphasize that it is critical we not confuse the mission to be the elimination of the fossil fuel industry. The mission is to eliminate emissions – and do it sustainably, affordably and reliably. The fossil fuel industry supplies over 80% of the world's energy at a time where energy demand and population growth are anticipated to challenge the access to energy in all parts of the world.

Frankly we cannot grow by subtraction – we must utilize all energy fuels and technologies. Choosing one solution exclusively is neither practical nor productive. Geographic constraints, access to fuels and technologies, and the general status of the economies in all regions of the world – all of these externalities and many others will drive the most effective means of decarbonization. Industry will be at the forefront of these emissions reduction efforts with their pledges to achieve Net Zero. The industry's actions to realize such Net Zero pledges will make significant impact. I recently published [an opinion in The](#)

[Hill \(Appendix A\)](#) that outlines how such pledges are not hollow statements of dogma and address meaningful pathways to decarbonize.

Clearly the mission is a mission that requires AND - not either/or

Reliable – affordable - resilient energy AND carbon emissions reduction and the ultimate elimination of greenhouse gases that impact climate.

AND not just in our country but to the global marketplace that looks to the US for such leadership.

New Opportunities for Carbon Management

Currently, technical, economic, policy and regulatory challenges must be addressed to create the broad commercial deployment of Carbon Capture Utilization and Storage (CCUS). And industry has also recognized the key elements of the commercialization opportunities and challenges for commercialization of carbon capture utilization and storage to be

- Significant potential for CO₂ storage in underground deep geological formations, as well as storage through enhanced oil recovery (EOR), including offshore capacity for storage and EOR. This, coupled with proximity to sources that produce CO₂, presents an opportunity to significantly reduce transportation costs and infrastructure requirements.
- Local wealth of intellectual capabilities and industrial know-how related to carbon management, especially carbon capture and sequestration through EOR, offering a unique and distinctive advantage;
- Nonetheless, legal, and regulatory barriers exist, driven in part by the consideration of CO₂ as a waste product. The role and characteristics of injection wells change over the lifetime of the project, leading to classification issues, risk and liability, and pore space ownership issues.
- And clearly the utilization of CO₂ as a product for use in chemicals manufacturing, building products, etc. provides an opportunity across the country for non-geologic utilization that will be essential to the broad commercialization opportunities.

Category	Transformative Challenges	Existing Research Programs, Proposed Legislation, Project Specific Challenges
Stakeholder Engagement, Environmental Justice, and Workforce Transition	<ul style="list-style-type: none"> Stakeholder engagement Environmental justice Workforce transition 	
Policy, Legal, and Regulatory Capacities	<ul style="list-style-type: none"> Facility permitting Pipeline permitting Class VI UIC primacy Long-term site stewardship 	<ul style="list-style-type: none"> Increasing the duration and sizing 45Q to incentivize investment Regulatory certainty associated with GHG reduction goals State guidelines for access to pore space Incentives to develop CO₂ infrastructure Feasibility of repurposing existing pipelines for CO₂ Facilitating source-sink matching Costs associated with pipeline construction
Commercialization Enablers – Risk Reduction, Financial Markets	<ul style="list-style-type: none"> Storage risks Life-cycle assessment and cost-benefit of low-carbon products or fuels marketing of low-carbon products or fuels 	<ul style="list-style-type: none"> Decrease parasitic load Improve capture technologies Cost to capture CO₂ from dilute and/or multiple streams Optimization of space for retrofit Identification of additional utilization purposes Identify CO₂ purchasers and suppliers improve efficiency of CO₂ to products or fuels

The National Petroleum Council (NPC) produced a document at the request of the Secretary of Energy at DOE and submitted it in Dec 2019. Entitled “[Meeting the Dual Challenge – A roadmap to at scale deployment of carbon capture, use and storage](#)”. This national effort was then subsequently taken up by the UH CCME as we published a white paper called “[CCUS –A Lynchpin to the Energy Transition](#)” that outlines the phased implementation of CCUS in the Greater Houston area. My colleagues at UH’s Bauer Business school and UH Energy also developed a [whitepaper outlining the crucial role hydrogen should play in decarbonizing industry](#). These documents provide insights into the opportunities and challenges and also the fundamental economics of investing in real emissions reduction technology that will produce real reductions.

And subsequently there are investments being made in the marketplace today by industries to make such impacts and they are in key strategic industry segments.

Projects Are Already Underway

- First is Carbon Capture Utilization and Storage (CCUS) discussed above. I'm certain you are aware of the \$100B project conceptualization that the 14 significant CO₂ emitters in the Gulf Coast have come together to promote. It's not one big project but an alignment of the industry players to work together collectively along with our university to promote and realize the vision. Most of those industries are also members of the UH CCME organized CCUS consortia that is made up of 40 plus member organizations from not only industry but multiple academic institutions, NGOs, and legal firms. We were launched last year through the support of the DOE Office of Fossil as part of the Southern States Energy Board's programmatic support aimed at the broad commercial deployment of CCUS. This designation for UH is not to simply be a regional center but to support that national work in CCUS required to achieve commercialization. Our consortia have developed a roadmap and aligned these critical industry participants to accelerate industry deployment and to deliver commercial impact. The consortia recognizes 1) financial and investment incentives – 2) policy and regulatory frameworks and 3) people and stakeholder engagement as the critical enablers that are essential to advance CCUS into a broadly deployed commercial transition enabler. CCUS is not a perpetuation of the fossil fuel industry – it is the most effective and rapid enabler of the energy transition.
- Second is hydrogen and the development of massive increases in H₂ production - decarbonized to deliver the clean fuel of the future. Our university is working with Shell and the Wood group in a DOE project to decarbonize a steam methane reformer through advanced carbon capture technology. Natural gas generated H₂ is nearly 90% of the current world production and volumes are anticipated to grow by 5-10X in the coming 50 years. In a separate project that will advance the US as a global leader in hydrogen and the hydrogen economy, we [are working with Shell on transporting liquefied hydrogen](#). ...
- And thirdly there is the need for de-carbonized electricity that is available 24/7. This baseload electricity can fuel the energy transition electrification needs and utilize the abundant and low-cost fuels in our country... The World's first zero-emissions Allam cycle power plant will be built in Illinois at the ADM site by 8 Rivers LLC. The ADM carbon sequestration geologic site was developed with DOE as was the Net Power process technology and will provide commercialization of decarbonized baseload electricity. Natural gas-based power with CCUS has been endorsed by the administration as a requirement for this Clean Energy Future.

PARTNERSHIPS AND MADE IN AMERICA

A Call to Act Now to Lead Carbon Management Globally

The near-term challenge for carbon management is rapid deployment to benefit from economies of scale and reductions in commercialization risks. Currently, we have reliable and commercially proven technology to mitigate the challenge; and what we need are market-based solutions incentivized by economics, regulations, and policies that remain stable over time to accelerate early-stage development. This is all for the “good of the public” That good is the reduction of GHG emissions in the most significant manner, in the most rapid and effective means possible. Decarbonization will come from conservation, it will come from new means of fuels for transportation for land, rail, and shipping and from the abundance of new technologies that are emerging daily.

But these technologies will be insufficient – especially in the short term – to make a meaningful impact to GHG emissions. Existing industries will continue to operate to meet the energy demands of society and the necessary recognition of the transformative technologies in these industries is critical.

Frankly we cannot grow by subtraction – we must have all energy fuels and technologies to meet this demand. What Made in America requires is:

1. Broader energy security and energy diversity to develop reliable and affordable energy options that meet the de-carbonization expectations globally.
2. Preserving existing jobs while creating new opportunities for long-term employment without dislocating or disbanding the substantial technological, financial, intellectual, and social capital that has been invested in and produced by our energy systems;
3. Minimizing disruption to the economy while ensuring energy access and safeguarding the rights of citizens;
4. Accountability and responsibility towards capacity building and inclusive participation of all stakeholders.
5. Providing a global roadmap for real success. Recognizing global differences and designing solutions that are able to migrate. This will accelerate positive global climate impact and accelerate US commerce to provide real solutions to the world.

Higher education institutions have a central role in advancing carbon management. The examples of ongoing research and projects at the University of Houston that I have described today are focused on delivering measurable results through technological, financial, policy, and legal breakthroughs. At the heart of these capabilities is the exceptional quality of our academic faculty and researchers. We remain committed to serving the city of Houston, Texas, and the United States through our wide-ranging educational and research offerings, partnerships with local and global entities, and contributions to the community.