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Energy and Mineral Resources Subcommittee
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Good afternoon. My name is Greg Upton. I'm the Interim Executive Director[i] of the Louisiana State University Center for Energy Studies[ii]. Thanks for having me.

In my testimony today, I'd like to provide some perspective into Louisiana's road to decarbonization[iii], how a historically hydrocarbon intensive economy is evolving, and then how federal policies to restrict the supply of fossil-based hydrocarbons, if pursued, might impact this strategy.

But first, a few stylized facts:

One: U.S. energy demand has been relatively flat over the past decade, and this trend is expected to continue.[iv] On one hand, economic growth increases energy demand. On the other, efficiency reduces energy demand. In net, in the U.S. these two effects are approximately in balance. For example, U.S. gasoline and electricity demand are within two percent of levels observed ten years ago.[v]

Second: But U.S. oil production has increased by 83 percent,[vi] natural gas production by 47 percent,[vii] and renewable energy production by 51 percent[viii] over the same ten-years.

So, domestic energy *demand* has been relatively flat, while energy *supply* has increased. One might ask, where have these products gone?

The answer lies in Stylized Fact 3: The U.S. is an exporter of hydrocarbon-based products. These products are not only fuels; but also include chemical products, such as fertilizers and polymers. In 2022, the U.S. exported $341 billion[ix] in oil, gas, refined products, and chemicals, with 58 percent of these products coming from the Gulf Coast region.[x] Excluding chemicals, 88 percent of oil, gas and refined products exports came from the Gulf Coast. Facilitating and expanding exports has attracted billions of dollars of capital from all over the world.[xi]

So where does decarbonization fit into this?

The 2016 Paris Agreement includes more than 190 countries, accounting for over 98 percent of global emissions. Today, customers around the world are asking companies to (1) credibly document lifecycle emissions and (2) reduce emissions. Investors, again from all over the world, are increasingly considering the carbon intensity when deciding where to build capital.

To attract capital and sustain demand, hydrocarbon-based manufacturers are balancing two objectives: First, companies must remain cost competitive. If they invest too heavily in reducing emissions, their products could become too expensive for the global market. But second, companies also seek competitive emissions profiles. If the manufacturing sector ignores this call

to decarbonize, and exclusively focuses on cost, the sector might also find itself at a competitive disadvantage.

How is this relevant to the two bills being discussed today, one bill on the continuation of offshore leasing;[xii] the other on hydraulic fracturing?[xiii] Both bills are in response to potential federal policies to restrict domestic oil and gas supply.

The answer lies in the strategies to decarbonize. Over the next decade, fossil fuels will continue to play an important role in our energy mix.[xiv] They currently make up over 80 percent of global energy consumption[xv], and energy consumption *globally* is expected to *grow*.

Companies are investing in carbon capture, utilization and storage, hydrogen and ammonia production, electrification of industrial processes alongside emissions reductions on the grid, utilizing bio-based feedstocks, as well as investments in the production of lower emissions sources of fossil-based hydrocarbons. Companies are also paying increasing attention to leaks and fugitive emissions.[xvi]

Most of these pathways, and thus prior-mentioned investments, require the availability of fossil fuels. The U.S. Energy Information Administration's most recent Annual Energy Outlook's base case scenario is that U.S. fossil fuel production continues to increase,[xvii] while energy-related carbon dioxide emissions are reduced.[xviii] In my opinion, policies aimed at reducing fossil fuel *supply* in the U.S. put this decarbonization strategy at risk, as investments in decarbonizing this industrial supply chain are likely to slow if firms anticipate reduced access to feedstocks. While reducing domestic supply can reduce global consumption, through the channel of increased prices for consumers, some of this supply decrease will be offset by oil and gas production elsewhere, whether domestically or internationally. Economic theory predicts that it is the interaction between emissions intensity of different supply sources and consumption reductions induced by increased prices that determine the net impact of supply restrictive policies on emissions.[xix] That's a mouthful. So, put more simply, the net effect of supply-reducing policies on emissions is ambiguous, but economic theory unambiguously predicts increased prices for consumers.

While supply restricting policies might seem like the logical way to rapidly reduce emissions, in my opinion this is not an efficient strategy for achieving politically and economically sustainable emissions reductions over the coming decades. Other policies such as prioritizing lower carbon sources of energy, reducing demand for emitting activities, and market-based policies might be better choices if the goal is to reduce greenhouse gas emissions.

Thank you for your time.

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[i] And Associate Research Professor.

[ii] The Louisiana State University Center for Energy Studies (CES) was created by the Louisiana Legislature in 1982. CES is mandated to provide energy information and analysis that responds to the needs of the legislature, public agencies, business and civic groups, as well as the general public.

[iii] For more on Louisiana's specific decarbonization strategy, see the Louisiana Climate Action Plan. Climate initiatives Task for Recommendations to the Governor. February 2022.

[iv] U.S. Energy Information Administration. Annual Energy Outlook 2023. Table 1. Total Energy Supply, Disposition, and Price summary. Total consumption (in quads) in 2032 is anticipated to be within one percent of 2022 total consumption (in quads).

[v] U.S. Energy Information Administration. Weekly U.S. Product Supplied of Finished Motor Gasoline Thousands Barrels Per day. Comparison of average weekly value in 2022 (most recent year of data) to 2012. 2022 value is 0.62 percent higher than 2012.
U.S. Energy Information Administration. Form EIA-861, "Annual Electric Power Industry Report.", Form EIA-861-S, "Annual Electric Power Industry Report (Short Form)" and Form EIA-923, "Power Plant Operations Report." Table 2.2. Sales and Direct Use of Electricity to Ultimate Customers by Sector, by Provider, 2011 through 2021 (Megawatt hours). 2021 total end use (most recent year of data) is 1.6 percent higher than 2011 value.
[vi] U.S. Energy Information Administration. U.S. Field Production of Crude Oil (Thousand Barrels per Day). Sourcekey: MCRFPUS2. Comparison of 2022 and 2002.
[vii] U.S. Energy Information Administration. U.S. Natural Gas Gross Withdrawals (MMcf). Sourcekey: N9010US2. Comparison of 2022 and 2002.
[viii] U.S. Energy Information Administration. U.S. energy facts explained. U.S. Primary energy production by major sources, 1950-2022. Renewables accounted for 8.9 quadrillion British Thermal Units in 2012 and 13.4 quadrillion British Thermal Units in 2022, an increase of 50.6 percent.
[ix] U.S. Census Bureau. USA Tarde Online, State Export Data (Origin of Movement) by NAICS. Includes: NAICS 211 – Oil and Gas; 324 – Petroleum & Coal Products; 325 – Chemicals.
[x] Gulf Coast includes Alabama, Louisiana, Mississippi, and Texas.
[xi] LSU Center for Energy Studies. 2023 Gulf Coast Energy Outlook. This annual outlook identified approximately $180 billion in investments since 2011, with an addition $175 billion in current announcements in our region.
[xii] H.R. 5616 (Rep. Graves), *"BRIDGE Production Act of 2023."*
[xiii] H.R. 1121 (Rep. Duncan), *"Protecting American Energy Production Act."*
[xiv] U.S. Energy Information Administration. Annual Energy Outlook. Table 1. Total Energy Supply Disposition and Price Summary. In 2022, EIA estimates that fossil fuels, including petroleum and other liquids, natural gas, and coal made up 80 percent of the total quads of energy. By 2050, EIA estimates that fossil fuels will make up 66 percent. Over that time period, petroleum and other liquids consumption will reduce by 2 percent and natural gas consumption will reduce by 6 percent. Coal is anticipated to see the largest reduction in consumption; 66 percent reduction between 2022 and 2050. Note this footnote is referencing *consumption*, not *production*.
[xv] U.S. Energy Information Administration. International. Primary Energy. World. Comparing coal, natural gas, and petroleum to total consumption. Quad btus.
[xvi] For a recent review of upstream flaring and methane emissions see:
The Economics of Natural Gas Flaring in US Shale: An Agenda for Research and Policy. Agerton, Gilbert & Upton. *Review of Environmental Economics and Policy*, volume 17, number 2, summer 2023.
[xvii] U.S. Energy Information Administration. Annual Energy Outlook 2023. Table 1. Total Energy Supply Disposition and Price Summary. U.S. oil production base case scenario grows by 11 percent between 2022 and 2050. U.S. dry natural gas production base case scenario increases by 15 percent over this same time period.
[xviii] U.S. Energy Information Administration. Annual Energy Outlook 2023. AEO2023 Narrative. Figure 1.
[xix] Considers an upward sloping supply curve and downward sloping demand curve on P, Q axes (with P on the vertical axis and Q on the horizontal axis). Basic economic theory predicts that a

policy to shift supply “left” will increase the equilibrium price (P^*) and decrease the equilibrium quantity (Q^*). But the reduced quantity in equilibrium is less than the specific supply that is restricted from the market, as production will increase elsewhere in response to the price increase. This is what simplistic economic theory would predict. The specific magnitude of the effect is an empirical question and could be different in the short-term and long-term and different based on what specific supply restricting policies are considered.