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Good morning. Thank you Chair Johnson and Ranking Member Tonko for the opportunity to testify.

Permit me to begin by contrasting rhetoric with reality. The phrase, an "energy transition," the goal to replace hydrocarbons, has origins that trace back to a 1977 speech by President Jimmy Carter. There we find a lot of familiar rhetoric such as, "the greatest challenge that our country will face during our lifetime," and the need to "act quickly" in order to "have a decent world for our children and our grandchildren." This was all motivated by the belief the world was running out of hydrocarbons.

In our time the "transition" rhetoric is directed at replacing the over abundant supply of hydrocarbons in service, of course, of reducing carbon dioxide emissions. Despite decades of transition policies and spending, oil, gas, and coal today supply 82% of global energy.

To put reality into a more recent context, the past two decades have seen over $5 trillion of global spending on wind and solar and similar efforts to avoid hydrocarbons. This did reduce hydrocarbons' *share* of energy, but by just two percentage points. The quantity, not share, of hydrocarbons consumed globally has increased by an amount equal, in energy-equivalent terms, to adding *six* Saudi Arabia's worth of oil output. And today solar and wind combined supply under 4% of world energy. For context: burning *wood* still supplies 10%.

But energy transitionists now claim this time is different. There *are* differences. Costs of wind, solar and batteries are radically better. But another key difference is a shift in the nature and location of critical upstream industrial infrastructures.

Because of underlying physics realities, fabricating wind, solar and battery hardware entails a radical increase in use of a range of minerals from copper and nickel, to aluminum and graphite, and rare earths such as neodymium. Increases range from 700% to 4,000% more minerals per unit of energy production. This will require an astonishing, unprecedented increase in output from the old-school industries of mining and mineral refining.

While the U.S. is the world's biggest hydrocarbon producer, China is the world's biggest producer of energy minerals and has a global market share at least triple the U.S. share of

hydrocarbons. China produces over 60% of the world's aluminum, refines over half of the world's copper, 90% of rare earths, 60% of refined lithium, 80% of lithium-battery graphite, and 50% to 90% of the chemicals and polymer parts used in lithium batteries. That dominance will not be easily or quickly altered.

Because minerals industries are energy intensive, China has a profound advantage with its low-cost electric grid that uses coal for two-thirds of power production. And China is building more coal plants at the rate of roughly one a week, and will for close to a decade. Those *additional* coal plants will lead to an *additional* 2 gigatons of CO2 emitted per year.

Meanwhile, U.S. Inflation Reduction Act spending of over $1 trillion dollars on alternative energy will require, directly or indirectly, purchasing energy minerals from China. That spending will lead to an estimated reduction of 1 gigaton in U.S. CO2 emissions. Seems like a bad trade.

The U.S. already saw a 1 gigaton per year reduction in emissions over the past decade without massive subsidies, or imports due to the well-known shale revolution that collapsed the cost of natural gas making it cheaper than coal. The collateral effect of that brought huge economic and geopolitical benefits for the U.S.

All these realties point to some more sensible options when it comes to a goal to reduce global carbon dioxide emissions.

Rather than subsidize U.S. assembly of batteries using imported materials, instead encourage, even subsidize if we must, domestic production of pipelines and ports to export more liquified natural gas. That would yield greater emissions reductions per dollar spent by encouraging other nations now planning to burn more coal to instead import U.S. LNG. It would also benefit domestic industries and the balance of trade, as well as yield non-trivial geopolitical benefits. A start would be to change the mission of the DOE office that regulates permissions to export LNG to instead repurpose it as an office of export assistance.

Other options that would be more cost effective than those driven by IRA subsidies would include a more sensible and expansive posture towards nuclear energy, pursuing improved combustion efficiency, and engaging serious efforts to resolve the barriers to reshoring far more U.S. mining and refining.

Thank you.
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