United States House of Representatives
Select Committee on the Climate Crisis

Hearing on February 2, 2022
"Manufacturing a Clean Energy Future: Climate Solutions Made in America"

Questions for the Record

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The Honorable Kathy Castor

1. **How would a solar investment tax credit help encourage domestic manufacturing of solar energy components?**

The United States is poised for a boom in domestic manufacturing. Clean energy tax incentives have launched massive private investments and can do so for manufacturing. In our 2019 Manufacturing Whitepaper, SEIA recognized that federal policies, including demand and supply incentives, are critical to building a strong domestic manufacturing base. The business incentives offered in recent legislation and continuation of the solar investment tax credit offer just that.

A wave of announcements is starting to show how strong U.S. solar manufacturing can be if these incentives become law. Companies such as Enphase, REC Americas, Maxeon, Hanwha Q CELLS, and Meyer Burger are looking to either create new manufacturing capacity in the United States or expand existing facilities. The incentives would also spur manufacturing of inverters and trackers. New facilities will stimulate investments in new machine tool capacity such as ingot pullers, pick and place machines, and laminators, and from companies that produce solar glass, junction boxes, encapsulants, back sheets, and frames.

2. **Why is it important for the federal government to invest in recycling and reuse of critical minerals, such as tellurium, that are important inputs to clean energy technologies such as solar panels? For instance, the Bipartisan Infrastructure Law invests $7 billion in critical mineral supply chains, including a $140 million program recently announced by the Department of Energy to develop a first-of-a-kind refinery to extract rare earth elements from coal ash waste. How could these efforts complement new mining and processing domestically and around the world?**

Securing supply chains is an issue of national security. Most solar panels do not use critical minerals. Efforts to innovate around ways to reuse and recycle critical elements as well as support for research around materials that can function in the solar and storage supply chains is an important role for the federal government. We support efforts to responsibly and safely extract and process key elements necessary for solar and storage domestically. Innovation developed while utilizing US resources can also help lead the world in better management of our global natural resources and can spur an economic opportunity. Continuing to rely on materials from countries that do not share America's interests threatens U.S. climate and energy security. The United States needs stable, long-term industrial policy to create business certainty and an environment where

domestic manufacturing for clean energy can thrive.

3. **How can solar energy and electric vehicles be complementary solutions as we work towards increasing economic growth and meeting our climate goals?**

A recent study found that solar owners are 66% more likely to own an electric vehicle. Still, EVs are a small fraction of the number of cars on the road today. While there are more than 5.6 million EVs worldwide, they only account for 2.2% of the global vehicle market share and less than 2% of the vehicle market in the United States. There's room for both automobiles and utilities to embrace these newer technologies and develop new business models that can benefit them both. For example, both fast charging infrastructure and community solar are ripe for collaboration and further innovation. These innovations will ultimately help to lower prices and improve access to both technologies, enabling more customers to drive EVs and go solar. Electric vehicles and solar go hand in hand and additional federal investments will help spur the growth of both industries.

For example, SEIA board member Sunrun recently announced a partnership with Ford Motor Company to serve as the preferred installer of solar Ford to charge the new electric F-150 Lightning truck. When charged, this truck can also serve as a backup power source for the homeowner if there is a power outage. Innovations like this are keys to unlocking the promise of solar and storage as climate and resilience solutions.

4. **How could scaling up solar energy help reduce residential energy bills and transportation fuel costs for U.S. consumers and consumers around the world?**

Scaling up solar energy and electrifying both heating and transportation can help save consumers money and mitigate the impact of any fossil fuel price shocks. While the price of petroleum and its products (gasoline, heating oil and propane) moves based on global supply and demand dynamics, the cost of electricity is based mostly on domestic factors. Increasing electricity generation from solar, other renewables and with the help of energy storage, the remaining impact of variable fuel costs on electricity prices will decrease further because solar and wind have zero fuel costs and are now the most cost-effective source of new electricity generation. We can start putting more electric vehicles on the road that can then charge from affordable and predictable domestic electricity. We can start replacing heating oil and propane heaters with electric heat pumps that cost little more than an air conditioner, again moving to affordable and predictable domestic electricity.

To go even further, we can pass policies support domestic manufacturing to make sure we can make solar equipment, batteries, electric vehicles, and heat pumps here and further increase the resilience of our supply chains, removing the risk of increased shipping costs and more.

5. **Could you please explain how renewable energy development, land conservation, and the protection of sensitive species can be complementary goals?**

Utility-scale solar power generation facilities play a number of important conservation and ecosystems services roles. To ensure these roles grow and adapt as more utility-scale solar is deployed to meet private- and public-sector clean energy goals, the solar industry frequently collaborates with experts from government (including the National Renewable Energy Laboratory (NREL) and the Solar Energy Technologies Office (SETO)) and NGOs (including the Electric Power Research Institute and Renewable Energy Wildlife Institute) on siting-related research and best practices.

Background

Protection of wildlife and ecosystems is and will remain a paramount concern for the solar energy industry as it seeks to build nearly 125 new gigawatts annually of new solar capacity. Deploying more solar energy will sharply reduce the carbon, sulfur, and mercury emissions that come from burning fossil fuels, saving approximately 60,000 American lives each year, and helping our nation address the threats of climate change, which are existential to many species of concern[1] and the ecosystems on which they rely.[2]

A January 2022 study by Lawrence Berkeley National Laboratory[3] found that utility-scale power density has increased significantly since 2013. Whereas a general rule of thumb had been that utility-scale solar required 5-10 acres/MW, the most recent study found that, as of 2019:

Fixed-tilt facilities generate 0.35 MW/acre – i.e., about 3 acres/MW

Tracking facilities generate 0.24 MW/acre – i.e., about 4 acres/MW (tracking facilities require fewer PV panels to generate the same output as fixed-tilt but require greater spacing and therefore more land)

In other words, a given utility-scale facility with 100 MW nameplate capacity constructed today would require around 300-400 acres of land, depending on the technology and configuration of the facility. Compared to 2013, this means that new solar facilities require 20-70% less land to generate the same amount of electricity. And there is reason to expect that solar power density will continue to increase as it has since 2013, as confirmed by NREL efficiency trends for module manufacturers.[4]

Land Conservation

The biggest loss of land comes from expanding urban areas and low-density residential development.[5] This loss is usually permanent, whereas the life of a solar facility can span from 20 to 40 years, allowing land to be reclaimed after decommissioning and put back into agricultural or other use. By conserving and temporarily converting working lands, solar development can help regenerate healthy vegetation, soil, and water, reduce erosion, and displace higher-impact forms of energy production.[6] This is not the case with other forms of development such as residential and commercial construction that permanently remove soil and vegetation. Increasingly, solar developers are also adding dual-use capability to solar facilities, enabling the same parcel of land to be used for solar power in addition to growing crops, accommodating sheep or cattle grazing, and/or enhancing local ecosystems with native and pollinator-attracting

plants. According to the American Solar Grazing Association, co-locating grazing operations with solar facilities increases soil carbon sequestration, moisture, microbes, and biodiversity, while reducing reliance on herbicides and fossil fuels used in clearing and mowing equipment. It can also enhance water quality by reducing runoff.

In addition, proposed solar projects undergo extensive environmental review before being permitted. There's no advantage to trying to develop a solar project in sensitive habitat or in a manner that disturbs large tracts of land suitable for agriculture – these can make the permitting process take longer and increase costs and uncertainty. Responsible developers spend significant effort and resources assessing siting, including considerations for minimizing impacts to land, before moving forward with a project.

Protection of Sensitive Species

As noted above, the benefits of reducing the impacts of climate change on wildlife are well-understood. Solar energy is environmentally beneficial to many species by reducing greenhouse gas emissions and mitigating climate impacts to their habitats. Generally speaking, habitat loss is usually one of the largest drivers of any given species' decline. Large-scale solar development can also serve a land conservation role that will benefit future wildlife populations. This includes development of deep roots for non-displaced vegetative species and proliferation of regional vegetation to increase habitat for wide range of species.

Solar developers take protection of species into account well before breaking ground on a project. Common siting tools can inform developers about mapped critical habitats, known species ranges, and critical constraints analysis to determine the protected species and habitats at or near solar sites, as confirmed through later field verification. Developers may also rely on other forms of due diligence such as outreach to the U.S. Fish and Wildlife Service and state wildlife agencies. A variety of pre-construction studies are often conducted by solar developers. These can include habitat assessments to minimize impacts on species of potential concern, wetlands, trees, and other sensitive resources on the landscape which support wildlife.

In November 2021, SETO released the results of its Request for Information regarding Solar Impacts on Wildlife and Ecosystems.[7] Some of their key findings include:

"[T]he most well-understood benefit of solar energy is its role in mitigating the adverse impacts of climate change. … [U]tility-scale solar energy will play a pivotal role in decarbonizing the grid and that achieving decarbonization goals is crucial for preserving biodiversity throughout the U.S. and globally."

"[T]he most common process for assessing adverse impacts to wildlife from solar development is compliance with federal statutes that protect sensitive species and their habitat. These federal laws include the Endangered Species Act (ESA), Bald and Golden Eagle Protection Act (BGEPA), and National Environmental Policy Act (NEPA)."

"[S]olar development could create habitats through vegetation restoration or microclimates beneath panels and could preserve habitats that would have otherwise gone to other forms of development."

"Mitigation strategies … include the use of native vegetation and habitat buffer zones. … [N]ative vegetation can be used to reduce habitat impacts of solar facilities. Vegetation choices can preserve habitat as well as provide support for pollinators and assist with the infiltration of

stormwater. Many respondents also pointed to vegetation management practices that minimize the use of herbicide and mowing as a positive for wildlife."
"One of the most common minimization methods … is the use of wildlife-friendly fencing. Small and medium animals can access the site with only 4-6 inches of clearance at the bottom of fencing. Including openings in fences and promoting species mobility through habitat corridors was a commonly mentioned way of reducing the wildlife impacts of solar development."

The Honorable Earl L. "Buddy" Carter

1. **The Biden Administration has openly signaled their hostility to domestic mineral production with the cancelation of the Twin Metals Mine in Minnesota (see attached op-ed). Some domestic solar manufacturers are nearly entirely reliant on China for tellurium, a mineral that is a copper mining byproduct. Given the Twin Metals decision, is SEIA actively lobbying the administration to approve more domestic mineral production?**

SEIA supports domestic mineral production. The vast majority of the solar panels installed in the U.S. are crystalline silicon, which does not use tellurium and the components of which are available in the United States. About 5% of global solar module production utilizes tellurium. According to the US Geological Survey in 2020, imports of Tellurium from 2015-2019 were from Canada, 64%; China, 25%; Germany, 7%; and other, 4% (https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-tellurium.pdf).

2. **According to the attached article, "China accounted for 61% of estimated global tellurium production in 2020 and 21% of world reserves, according to the U.S. Geological Survey." How can a SEIA member claim to be "decoupled" from China while also admitting Chinese tellurium is essential to their process? Given the opacity of the tellurium market, how can Congress and US Customs and Border Protection be sure tellurium is not being produced with forced labor?**

   Attachments:

   Op-ed on Twin Metals: ***https://thehill.com/opinion/energy-environment/592877-twin-metals-mine-cancellation-is-a-gut-punch-to-us-steelworkers#***

   Article on Tellurium mining: ***https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/first-solar-s-growth-plans-hinge-on-opaque-market-for-tellurium-68010925***

Tellurium is used in about 5% of solar panel production. Tellurium can be obtained from multiple locations. According to the US Geological Survey in 2020, imports of Tellurium from 2015-2019 were from Canada, 64%; China, 25%; Germany, 7%; and other, 4% (https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-tellurium.pdf).

There are currently efforts underway to diverse supply and develop more tellurium in the United States as well. It is also important to have diversity in technology.

Since October of 2020, SEIA has been calling on solar companies to move their supply chains out of Xinjiang. The risks of forced labor in the region are just too high. Companies have told us that they have moved supply chains out of Xinjiang, and many are having independent third-party audits. These audits are conducted to verify that their supply chain partners do not use forced labor and that materials in solar products do not come from Xinjiang.

By understanding the source(s) of key inputs, manufacturers can then evaluate their supply chains for the risk of forced labor and provide the audited results to stakeholders, such as U.S. Customs & Border Protection.

References Page

Witnesses may use internal footnote citations or create a reference page at their discretion.