November 30, 2022

To: U.S. Department of Energy (DOE) Office of Manufacturing & Energy Supply Chains (MESC) and Office of Policy (OP)

Attached are comments from the American Council on Renewable Energy (ACORE) in response to the Department of Energy's Request for Information on the Defense Production Act.

Thank you very much for this opportunity to provide input.

Sincerely,

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American Council on Renewable Energy (ACORE) Comments in Response to Request for Information on the Defense Production Act

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I. INTRODUCTION

ACORE is a national nonprofit organization that unites finance, policy and technology to accelerate the transition to a renewable energy economy. ACORE's members span renewable energy technologies and constituencies, including developers, manufacturers, top financial institutions, major corporate renewable energy buyers, grid technology providers, utilities, professional service firms, academic institutions, and allied nonprofit groups. We greatly appreciate the opportunity to provide these comments to the Department of Energy (DOE) on this Request for Information (RFI).

ACORE strongly supports the use of all available tools to catalyze the development of a domestic clean energy supply chain, while recognizing that fully building out a domestic supply chain cannot be accomplished within the needed time frame to deploy the clean energy generation to meet the growing demand for these resources and achieve the Administration's carbon reduction goals. Although trade and tariff policy are not under the purview of DOE, it is essential that any clean energy onshoring strategies be accompanied by a minimization of impediments to imports of needed components and raw materials to the extent practical within current legal frameworks, such as the use of exclusions from the Section 301 tariffs for solar PV materials and components.

The remainder of these comments provide ACORE's responses to the questions posed in the RFI. We recognize that given the uncertainty of available funding for the use of the DPA

relative to the scope of the supply chain needs, the DPA tools may not themselves have a significant impact on the domestic supply chain but can catalyze the growth of the domestic clean energy industry already spurred on by the incentives contained in the Inflation Reduction Act (IRA).

II. RESPONSES TO QUESTIONS IN THE RFI

In these comments, ACORE is responding to a subset of the questions posed in Area 1: Technology Supply Chain Challenges and Opportunities.

1. **For which of the technology areas covered in this RFI, or products therein, do you think most urgently require support from DPA tools and why? Please fill out chart below for the technology(ies) for which you are providing input (among transformers and grid components; solar; insulation; and/or hydrogen components).**

Technology	What are the decision criteria for your answer?
Solar PV – Polysilicon	• As the International Energy Agency recently observed, "Polysilicon production capacity can be a limiting factor in global production capacity expansion, followed by ingot and wafer manufacturing."[1] This same reasoning applies to the U.S. and therefore should be a priority for DPA funding within the solar PV technology area. • There is a dormant U.S. industry for polysilicon refining with a sunk cost of several billion dollars.[2] These facilities can therefore be restarted at a lower capital cost than investing in new facilities, which will provide an initial catalyst to the supply chain.
Solar PV – Ingots, Wafers, Glass and Other Components	• There is currently no U.S. domestic production of ingots and wafers.[3] Due to the multi-stage production process for crystalline polysilicon solar PV, DPA funds should also target ingot and wafer production to

[1] *Special Report on Solar PV Global Supply Chains*, International Energy Agency (July 2022), https://www.iea.org/reports/solar-pv-global-supply-chains ("IEA Solar Supply Chain Report")

[2] *Solar Photovoltaics – Supply Chain Deep Dive Assessment*, U.S. Department of Energy (February 24, 2022), https://www.energy.gov/sites/default/files/2022-02/Solar%20Energy%20Supply%20Chain%20Report%20-%20Final.pdf ("DOE Solar Supply Chain Report")

[3] *Id.*

Technology	What are the decision criteria for your answer?
	establish domestic purchasers of polysilicon and in turn, suppliers of ingots and wafters for the cell and module production. • To the extent funding is available, DPA support would be beneficial for other components, including glass and aluminum frames which are also primarily located in China,[4] with only three glass manufacturers identified in the U.S.[5]
Electrolyzers and Fuel Cells	• While the Production Tax Credit for hydrogen provided in the IRA is expected to spur growth in the industry, "green" hydrogen is estimated to account for less than one percent of total hydrogen produced in the U.S.[6] Therefore, there is a significant need for the growth of the clean hydrogen sector. • DOE's own analysis of the requirement for achieving 2050 net-zero carbon goals entails electrolyzer capacity requirements of up to 1,000 GW, compared to the approximately 0.17 GW of capacity currently installed or planned in the U.S.[7]
Grid Components - Transformers, HVDC Converters, Inverters, and Rectifiers	• As transmission is expanded, key grid components, especially transformers, along with HVDC converters, inverters and rectifiers will require a more certain supply chain, which has historically been volatile. • A significant expansion of HVDC transmission will be needed to integrate renewable resources into the grid and achieve needed resilience.[8] A reliable supply chain for the necessary HVDC components, such as converter stations, will minimize future bottlenecks to this transmission expansion.

[4] *Id.*

[5] *Catalyzing American Solar Manufacturing*, Solar Energy Industries Association (2022), https://www.seia.org/sites/default/files/2022-08/SEIA%20Manufacturing%20Roadmap%202022_4.pdf

[6] *Manufacturing the Hydrogen Infrastructure that America Needs* (October 26, 2022), https://www.bloomenergy.com/blog/manufacturing-the-hydrogen-infrastructure-that-america-needs/

[7] *Water Electrolyzers and Fuel Cells Supply Chain - Supply Chain Deep Dive Assessment*, U.S. Department of Energy (February 24, 2022), https://www.energy.gov/sites/default/files/2022-02/Fuel%20Cells%20%26%20Electrolyzers%20Supply%20Chain%20Report%20-%20Final.pdf ("DOE Fuel Cell Supply Chain Report")

[8] See for example, *A transmission boom is needed to realize the Inflation Reduction Act's benefits, and it will pay for itself*, by Barbara Tyran, Utility Dive (October 6, 2022), https://www.utilitydive.com/news/transmission-boom-clean-energy-benefits-inflation-reduction-act/633156/

2. What are the greatest barriers (e.g., financing or market constraints) to U.S. manufacturing, development, and deployment that the DPA tools described in the background can help address?

a. Transformers and Grid Components:

As acknowledged in the RFI itself, the current transformer shortage is well documented and will be exacerbated by the expansion of the transmission and distribution system to meet the demand created by the increasing electrification of buildings and transportation.

Addressing the transformer shortage would be a valuable priority for the DPA and will entail both greater access to input materials and a sufficient workforce. Given that transformer production requires hands-on labor, workforce constraints are a major contributor to this shortage.[9] As discussed later in these comments, ACORE recommends that the use of the DPA incorporate measures to improve workforce training and attraction.

Moreover, the growth of clean energy will place additional pressure on the demand for inverters and power electronics, which are manufactured in multiple global locations, resulting historic volatility in these segments of the supply chain.[10]

[9] See for example, *How a transformer shortage threatens the grid*, Energy Wire (October 20, 2022), https://subscriber.politicopro.com/article/eenews/2022/10/20/how-a-transformer-shortage-threatens-the-grid-00061717

[10] DOE Solar Supply Chain Report.

For long-distance HVDC transmission, the converter stations are the costliest component of long-distance transmission and reducing such costs will be needed to achieve the expansion of the HVDC system.[11]

b. Solar photovoltaics:

Since passage of the IRA, multiple companies have announced new or expanded domestic solar production facilities.[12] But there is still a significant gap between this domestic supply and the growing demand.[13] Moreover, because the supply chain for solar PV involves multiple stages, any impediments to access to materials or components from an individual stage will slow production down in later stages.

At the beginning of the solar PV production chain, access to refined polysilicon from China and subsequent components produced from that material has been greatly limited by seizures carried out under the Uyghur Forced Labor Protection Act (UFLPA). A lack of clarity

[11] See *Energy and Water Development and Related Agencies Appropriations Bill 2023 - Report* (June 30, 2022), directing DOE to develop an HVDC moonshot initiative. https://www.congress.gov/117/crpt/hrpt394/CRPT-117hrpt394.pdf

[12] See for example, *Enel Announces Intentions to Build Solar PV Cell & Panel Manufacturing Facility in U.S.*, November 17, 2022, https://www.enelnorthamerica.com/newsroom/news/search-press/press/2022/11/solar-panel-manufacturing; *First Solar Selects Alabama for Fourth American Manufacturing Facility*, November 16, 2022, https://investor.firstsolar.com/news/press-release-details/2022/first-solar-selects-alabama-for-fourth-american-manufacturing-facility/default.aspx, *REC Silicon and Mississippi Silicon Announce MOU for Solar Supply Chain Expansion*, August 22, 2022, https://www.globenewswire.com/en/news-release/2022/08/22/2501854/0/en/REC-Silicon-REC-Silicon-and-Mississippi-Silicon-Announce-MOU-for-Solar-Supply-Chain-Expansion.html

[13] See for example, Edurne Zoco, Executive Director, Clean Technology & Renewables, S&P Global Commodity Insights recently stated that these recent announcements are encouraging but "not to the scale the U.S. market needs." *U.S. solar tax credits hike factory activity but supply lines limit growth*, Reuters (November 10, 2022), https://www.reuters.com/business/energy/us-solar-tax-credits-hike-factory-activity-supply-lines-limit-growth-2022-11-10/

around importer reporting requirements and uncertain detainment timelines have resulted in a substantial number of solar products to be held up at the U.S. border.[14]

Aside from UFLPA implementation, the global supply of polysilicon has been tight relative to demand and prices. The International Energy Agency observed that "rapidly growing global PV demand, fires and maintenance in existing plants in China, and slow ramp-up period for new plants, are all expected to keep the polysilicon market tight."[15] These high polysilicon prices have in turn caused wafer prices to increase significantly since 2021.[16]

c. Insulation: Not commenting

d. Clean hydrogen (electrolyzers, platinum group metals, and fuel cells):

This is an industry without a significant historical supply, but that is rapidly growing, and as DOE observed, the supply chain for electrolyzers and fuel cells is still to be fully established.[17] Therefore ensuring that there is a sufficient development of this supply chain in advance of the growing demand will be essential for avoiding any shortfalls in supply.

3. Which DPA tool(s) and contracting vehicles would best help address the barriers identified in Question #2, to strengthen U.S supply chains: purchases, purchase commitments, financial assistance, subsidy payments, or other (e.g. use of Other Transactions Authority

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14 See for example *Exclusive: U.S. blocks more than 1,000 solar shipments over Chinese slave labor concerns*, Reuters (November 11, 2022), https://www.reuters.com/world/china/exclusive-us-blocks-more-than-1000-solar-shipments-over-chinese-slave-labor-2022-11-11/; *Solar Panels Piling Up at US Border on Xinjiang Forced Labor Law,* https://www.bloomberg.com/news/articles/2022-08-15/solar-panels-piling-up-at-us-border-on-xinjiang-forced-labor-law

15 IEA Solar Supply Chain Report.

16 *Id.*

17 DOE Fuel cell Supply Chain Report.

or a Partnership Intermediary Agreement)? Please respond for one or more technology areas below:

a. Transformers and electric grid components:

Purchase commitments would be a useful tool to ensuring an adequate supply of key grid components as transmission is expanded, especially transformers, as well as HVDC converters and inverters. Such commitments have the added benefit of providing manufacturers with the certainty needed to increase training, recruitment and hiring to address workforce constraints, which is especially needed to address the transformer shortage.

Ongoing material subsidies would be beneficial to support expanded and continued domestic production of transformers and other grid components such as inverters, converters, and rectifiers which are used for solar and wind generation, energy storage, and green hydrogen production. Such subsidies could specifically target domestic production of raw materials (including rare earths/materials, and metals) and components (including semiconductors, printed circuit boards, and grain-oriented electrical steel) used in the manufacture of grid equipment.

b. Solar photovoltaics:

Given the significant demand for solar PV, which is further accelerated by the IRA, the use of purchases or purchase commitments for the final stages of the supply chain – cells and modules – would not be the optimal tools. Instead, upfront financial investments would best provide the needed stimulus for a domestic supply chain, if targeted to the earlier stages (polysilicon, ingots and wafers). Because polysilicon plants and ingot and wafer factories are

significantly more capital-intensive than cell- and module-manufacturing facilities,[18] these stages of the production would likely benefit from upfront contributions to their capital costs.

DPA tools should focus on fully commercialized technologies, such as crystalline-polysilicon or heterojunction, rather than technologies that are still in development and therefore more suitable for R&D funding.[19] Given the efficiency gains of some of the more advanced cell designs, including heterojunction,[20] targeting DPA funds towards domestic production of these technologies would be advantageous.

Economies of scale are important in the solar PV industry and will allow for obtaining the greatest production value from the capital investment. The Solar Energy Industries Association notes that in the utility-scale segment "project developers require large volumes of products to be delivered over a relatively short period. "[21] DPA funds should therefore target entities with potential for significant scale and those that are vertically integrated.

Moreover, additional capital investments in recycling facilities are needed, and DPA funds could provide capital funds to further spur this segment of the industry given the important role of recycling in the supply chain.[22] But DOE should align the use of the DPA for

[18] IEA Solar Supply Chain Report.

[19] Other DOE programs, such as the PV Research & Development and Solar Incubator programs are examples of mechanisms to direct funding to R&D on promising technologies, such as perovskite.

[20] IEA Solar Supply Chain Report; *New efficiency record for the innovative solar cells produced by 3SUN based on heterojunction technology*, February 20, 2020, Enel Green Power, https://www.enelgreenpower.com/media/news/2020/02/3sun-solar-cell-bifacials-efficiency-record

[21] IEA Solar Supply Chain Report.

[22] See *Expanding a Circular Renewable Economy and Improving End-of-Life Management for Renewable Technologies*, by Maheen Ahmad, American Council on Renewable Energy (November 14, 2022), https://acore.org/expanding-a-circular-renewable-economy/

this segment with other existing programs, such as the $750 million Advanced Energy Manufacturing and Recycling Grant Program created by the Infrastructure Investment and Jobs Act (IIJA) for this purpose, to ensure that the DPA complements such existing programs.[23]

c. Insulation: Not commenting.

d. Clean hydrogen (electrolyzers, platinum group metals, and fuel cells):

DOE notes in the RFI that "DPA tools could mitigate demand-side risk by guaranteeing offtake for hydrogen and fuel cells." ACORE agrees and recommends the use of a demand-side approach by using the DPA for the direct purchase of fuel cells and electrolyzers for use in government facilities. Such purchases would further drive the development of electrolyzers and fuel cells, provide economies of scale to their manufacture, and can also benefit the industry by cultivating experience and expertise within this technology sector to serve as a government vendor.

4. For the eligible technology areas covered in this RFI, which segments in the supply chain do you think DPA tools should prioritize and why? Please fill out the chart below for technology(ies) for which you are providing input and add rows for multiple entries per technology as needed.

ACORE has filled in the chart below. The reasoning for these is provided in the responses to the prior questions.

[23] https://www.energy.gov/articles/biden-harris-administration-advances-750-million-program-strengthen-clean-energy

Technology	**Upstream** (Critical raw materials production)	**Manufacturing** (Critical processed materials, subcomponents/ components, end products)	**End of life** (Recycling)	**Deployment** (Installation, infrastructure)
Solar PV	*Refined Polysilicon*	*Ingot and Wafer Production*	*Where applicable*	
Grid Components	*Raw Materials (including rare earths/materials, and metals)*	*Components (including semiconductors, printed circuit boards, and grain-oriented electrical steel); Transformers, HVDC Converter stations, Inverters and Rectifiers*	*Where applicable*	
Clean Hydrogen				*Installation of fuel cells and electrolyzers*

8. What criteria/requirements/procedures should the government consider for selecting qualifying projects for DPA support?

To maximize the benefits of investments to spur a domestic production of these clean energy technologies, ACORE recommends that DOE use the DPA funds to also address the critical workforce needs, to the extent practicable, such as by incenting apprenticeship and training programs along with ensuring wages that motivate individuals to pursue and relocate for these clean energy jobs. For example, DOE could require that a share of DPA capital and ongoing subsidies be used to support or create workforce training and apprenticeship programs, especially in disadvantaged communities, with a commitment to use trainees for DPA-funded projects.

ACORE also recommends that DOE adhere to the Justice40 priorities in selecting qualifying projects, such as by ensuring that these projects provide benefits to residents of disadvantaged communities while avoiding additional pollution burdens. In addition, ACORE

urges that the use of the DPA supports minority and women-owned business enterprises (MWBE), such as by targeting such businesses or facilities that are purchasing from MWBEs.

III. CONCLUSION

ACORE appreciates the opportunity to submit these comments and urges DOE to continue its dialogue with stakeholders in future opportunities to utilize the DPA for clean energy.