Request for Information on Clean Energy Supply Chain Analysis

ISSUE DATE: April 26, 2024
SUBJECT: Request for Information (RFI)

Description

This is a Request for Information (RFI) issued by the U.S. Department of Energy's (DOE) Manufacturing and Energy Supply Chains Office. The RFI seeks public input to improve DOE's clean energy supply chain analysis. Specifically, this RFI seeks input on:

- Data and Information to Support Supply Chain Analysis
- Supply Chain Analysis Methods and Data

Background

In 2022, DOE established the Office of Manufacturing and Energy Supply Chains (MESC) as part of a DOE realignment to secure and strengthen domestic supply chains. MESC has multiple funding programs which focus on deploying and scaling up manufacturing capacity, in order to develop a resilient energy sector industrial base. DOE defines the Energy Sector Industrial Base (ESIB) holistically to represent the energy sector and associated supply chains that include all industries, companies and stakeholders directly and indirectly involved in the energy sector. In addition to funding public investment in manufacturing industries, MESC is also developing state-of-the-art supply chain analysis for clean energy technologies, to identify strategic opportunities for investment at various components of the supply chain. These tools serve as the analytical backbone helping to inform program implementation and investments.

I. REQUEST FOR INFORMATION

Purpose

The purpose of this RFI is to solicit feedback from industry, academia, labor unions, and state, local, tribal and territorial governments, and other stakeholders on issues related to clean energy supply chains. DOE is specifically interested in information and/or data that supports internal supply chain analysis and improvements to the methodology for future updates. This is solely a request for information and not a Funding Opportunity Announcement (FOA). DOE is not accepting applications.

DOE may use this RFI as an opportunity to further engage with respondents related to supply chain analysis.

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Supply Chain Analysis Framework

Technologies and Components considered

To organize potential RFI responses, MESC has developed a supply chain analysis framework. MESC request respondents to adhere to this framework when applicable, but welcomes responses outside of outlined technologies, components, and supply chain categories.

For this supply chain analysis RFI, MESC considers 20 clean energy technologies across production & generation, transmission & distribution, and key end markets. This list of clean energy technologies is not intended to be exhaustive or exclusive. The RFI also includes components for these technologies, for which applicable responses should explicitly labeled. Relevant responses outside of these technology areas or for components of these technologies that are not listed are also welcome. Respondents should only respond to components for which their organization has direct experience or insight and do not need to respond for all components.

Technologies and Components considered

Clean Energy Technologies and Components		
Clean Energy Sub-Technology	Components	Clean Energy Technology (and corresponding Portal)
Biofuels	Feedstock, pre-treatment equipment, biofuel reactors, chemical conversion catalysts, storage infrastructure, delivery infrastructure (for hydroprocessed esters and fatty acids (HEFA) or gasification and fischer-tropsch process)	Biofuels
Carbon Capture	Monoethanolamine, triethylene glycol, steel (pipeline, injection and well monitoring, pumps), advanced alloys, cement, cast iron (pumps), compressors and pumps, solvent or sorbent, advanced technologies (membranes, metal organic framework, catalysts)	Carbon Capture

Clean H2	Platinum group metals (PGM) & catalyst, proton exchange membrane electrolyzer (PEMEC), solid oxide electrolyzer (SOEC), alkaline electrolyzer, proton exchange fuel cell (PEMFC), solid oxide fuel cells (SOFC), alkaline fuel cell, power electronics.	Hydrogen
EV manufacturing and charging	Battery, EV drive systems, power electronics, light duty vehicle assembly, medium and heavy-duty vehicle assembly, charging hardware, charging software	Electric Vehicles and Batteries
Gen III+ Nuclear	Nuclear fuel, nuclear island (reactor components), facility materials	Nuclear Energy
Gen IV Nuclear	Nuclear fuel, nuclear island (reactor components), other core components, molten salt reactor components, gas fast reactor components, sodium fast reactor components, facility materials	Nuclear Energy
Geothermal Power	Turbine, generator, evaporator+condensor, cooling system, gas removal system, drilling rigs	Geothermal
Green Steel / Aluminum	Aluminum, primary steel, secondary steel, anodes, alumina	Green Steel / Aluminum
Grid – Transmission & Distribution	Poles, cables and conductors, breakers, low and medium voltage switchgears, high voltage direct current (HVDC) transmission systems	Grid
Grid – Energy Storage	Lead acid batteries, flow batteries, sodium batteries, metal air batteries	Electric Vehicles and Batteries
Grid - Transformers	Distribution transformers, large power transformers, transformer windings, transformer bushings, grain-oriented electrical steel, amorphous steel, mineral oil, tap changers, continuously transposed conducting (CTC) copper wire, arresters, fuses, switches, control systems, insulators	Grid
H2 Refueling	Dispensing components, cryogenic pumps, storage tanks	Hydrogen
H2 Storage	Pipes, compressors, liquefiers, storage tanks, tube trailers	Hydrogen

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Hydropower	Turbine, generator, governor, excitation system, penstock	Hydropower
Lithium-ion batteries	Cathode active material, anode active material, separator, electrolyte salts, electrolyte solvent and solution, battery cells, battery packs	Electric Vehicles and Batteries
Offshore Wind	Balsa wood, fiber-reinforced composites, monopile-grade steel, rare earth permanent magnets, generators, bedplates, hubs, flanges, towers, blades, nacelles, monopile foundations, subsea cables, installation and service vessels	Wind Energy
Onshore Wind	Towers, blades, nacelles, foundations, cabling equipment	Wind Energy
Residential Heat Pumps	Evaporator and condenser, expansion valve, compressor, controller, refrigerant, integration	Heat Pumps
Solar	Metallurgical grade silicon, polysilicon, silver paste, ingots/wafers, solar cells, solar glass, crystalline silicon (c-Si) c-Si modules Cadmium Telluride (CdTe) modules, mounting structures, tracking hardware, module frames, inverters	Solar Energy

Methodology

For each component, 9 categories of a supply chain are outlined, along any of which a particular component may experience supply chain challenges. These 9 categories can be assessed both for domestic availability in the US and their global accessibility to the US. The 9 supply chain categories:

1) Availability: Abundance of raw material required for fabrication
2) Extraction: Capacity to extract raw materials
3) Processing: Capacity to process raw materials
4) Capital Equipment: Availability of capital equipment
5) Sub-Assembly: Availability of sub-assembly manufacturing
6) Final Assembly: Availability of final assembly manufacturing

7) Construction: Availability of labor for construction
8) Plant Operations: Availability of labor for plant operations
9) Installation: Availability of labor for plant operations

To evaluate the supply chain challenges for a given component along each supply chain category, respondents should discuss:

- The extent to which demand exceeds supply
- The extent to which the supply chain is resilient or fragile (geographic, operational, or sole source vulnerabilities)
- Near-term state (present to 5 years)
- Future state (5-10 years)
- Both in terms of domestic availability and global accessibility to the US

The responses from this RFI, organized into the above framework, will be used to develop color-coded supply chain heatmaps to visually assess investment opportunities across the supply chain. These heatmaps are similar to the ones shared in the August 2023 Supply Chain Progress Report from MESC, reproduced below.

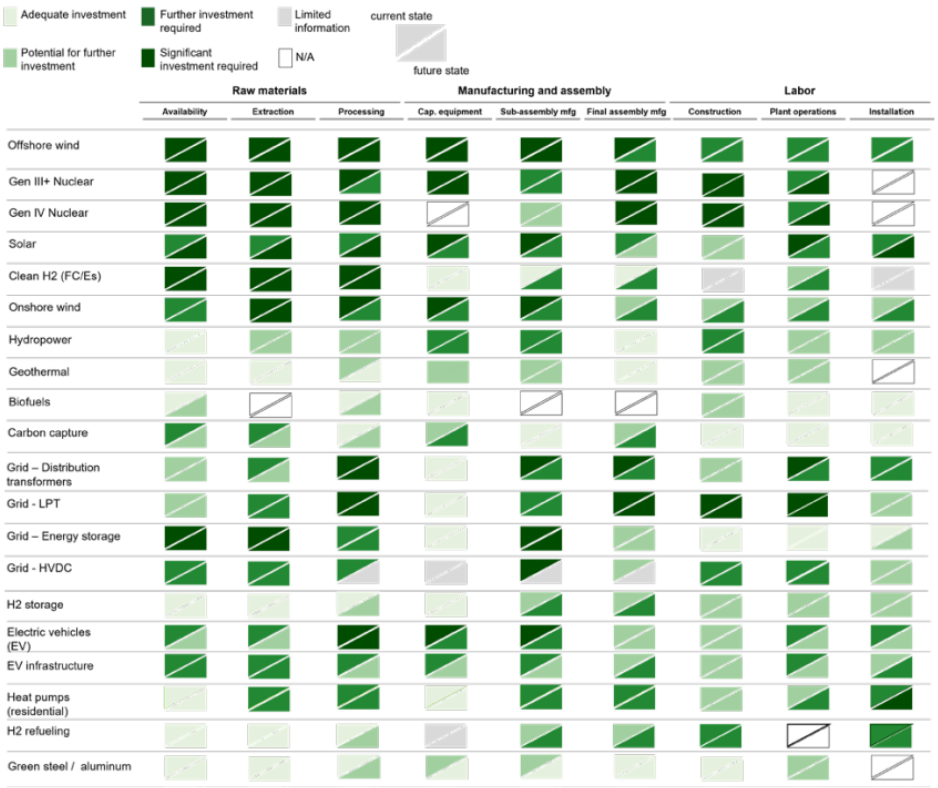

Figure 3. Visualization of Initial Cross-cutting Areas of Opportunities

Request for Information: Categories and Questions

Category 1: Data and Information to Support Analysis

To support DOE supply chain analysis, please provide data and/or information that could support supply chain analysis organized by the framework outlined above. Please include the specific component-levels, which of the 9 supply chain categories it falls into, and present versus anticipated future states for which the provided data and/or information is meant to address. Data and/or information should inform the following factors described below. Hypothetical examples of data and/or information are provided, but responses may take any form.

1.1 Using the illustrative table provided as a guide, indicate where there exist supply chain risks for specific technologies and/or components along the 9 supply chain categories described above. Components and technologies should draw from Table 1 where applicable, but other components and technologies will also be accepted.

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1.2 For technologies and/or with identified supply chain risks, indicate whether these risks:
- currently exist and affect the respondent, or
- are anticipated to arise in the next 5-10 years

1.3 For technologies and/or with identified supply chain risks, provide a qualitative description of the extent to which the supply chain risk is the result of:
- demand and supply mismatches - symptoms of demand supply mismatch can include: *long lead times for specific components, high demand for specific end products leading to shortages, high profit margin industries capturing supply of specific components that are critical for multiple clean energy technologies, or others.*
- Fragile supply chains – symptoms of fragile supply chains can include*: challenges with vendor lock-in, sole-source suppliers, particular components that are sourced exclusively abroad, workforce development and skill shortages, price manipulation by foreign entities, market monopolies or monopsonies, price instability affecting long-term facility planning, or others.*

1.4 For technologies and/or with identified supply chain risk, provide a quantitative assessment of relative degree of supply chain risk on a 1-4 scale, where 1 is lowest risk and 4 is highest risk. Use the following scale to quantify the information or data provided for a given component in a present or future state in the following way:
- 1: Demand does not exceed supply and there are no identified vulnerabilities in the supply chain
- 2: Demand exceeds supply or there are some vulnerabilities in the supply chain
- 3: Demand exceeds supply and there are some vulnerabilities in the supply chain
- 4: Demand far exceeds supply and there are multiple vulnerabilities in supply chain

Category 2: **Supply Chain Analysis Methods and Data**
DOE is interested in information regarding supply chain analyses methods and data.

2.1 What are relevant datasets, data extraction and intelligence, and data analysis techniques related to clean energy supply chains, and how could fit, inform, and/or align with the methodology and framework presented?

2.2 What are relevant existing or novel supply chain analyses, models, and techniques and how are they applied to clean energy supply chains?

2.3 What are relevant sources of financial information and investment analysis for clean energy industries and their associated supply chains? Example information could include

costs related to domestic on-shoring, profit margins along different parts of the supply chain, impacts of Inflation Reduction Act provisions, and interest rates.

2.4 What are possible improvements to the analysis framework, the categorization of components and technologies, or technologies to include in an expanded scope? For information on additional components and technologies, explain their relevance to clean energy technology deployment and include supply chain challenges

Request for Information Response Guidelines

Responses to this RFI should be submitted electronically **no later than 5:00pm (ET) on June 10, 2024**, through the online portals listed below. Do not submit confidential business information.

Category 1:

- Biofuels
- Carbon Capture
- Electric Vehicles and Batteries
- Geothermal
- Green Steel/Aluminum
- Grid
- Heat Pumps
- Hydrogen
- Hydropower
- Nuclear Energy
- Solar Energy
- Wind Energy

Category 2:

- Methods and Data

Interested parties may also submit comments electronically to MESCanalysis@hq.doe.gov and include "Supply Chains RFI" in the subject line of the email.

DOE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

Disclaimer and Important Notes

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This RFI is not a Funding Opportunity Announcement (FOA); therefore, DOE is not accepting applications at this time. DOE may issue a FOA in the future based on or related to the content and responses to this RFI; however, DOE may also elect not to issue a FOA. There is no guarantee that a FOA will be issued as a result of this RFI. Responding to this RFI does not provide any advantage or disadvantage to potential applicants if DOE chooses to issue a FOA regarding the subject matter. Final details, including the anticipated award size, quantity, and timing of DOE funded awards, will be subject to Congressional appropriations and direction.

Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for proposals or abstracts. Your response to this notice will be treated as information only. DOE will review and consider all responses in its formulation of program strategies for the identified materials of interest that are the subject of this request. DOE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that DOE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind DOE to any further actions related to this topic.

Evaluation and Administration by Federal and Non-Federal Personnel

Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to DOE providing their response to non-Federal parties. Non-Federal parties given access to responses must be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.

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