Supply Chain: Exiting Covid 19 and Looking to the Future

Life During and DOE Supply Chain Efforts

NHA
National Hydropower Association

WATER.POWER.WEEK.
WASHINGTON, D.C. • MARCH 13-15, 2024
CAPITAL HILTON • WATERPOWERWEEK.COM

Commissioning During Covid

- Plans Change
  - Over Seas suppliers were unable to travel
  - New technologies for communications were essential
    - Camera, display to see drawings, Microsoft Teams integration
  - Complex schedules, workarounds, and teamwork
    - Schedules for milestones were critical!

Gaps in Domestic Hydropower Supply Chain

- Unpredictable and variable demand signals
  - Hydropower demand is especially unpredictable, and it is difficult to keep shops open
  - Long life, high MW ratings, low quantities, complex rehabilitations, large investments

- Severely limited or non-existent domestic suppliers for hydropower products and materials
  - **Single domestic facility** for windings > 100 MW for large hydro generators
  - **Single domestic facility** with large (50-75 tons) forging capabilities for large hydro shafts
  - **Single domestic foundry** with casting capabilities > 10 tons for large turbine runners
  - **Single domestic supplier** of grain-oriented electrical steel (GOES) for U.S. transformer manufacturers
  - **Two domestic suppliers** of non-oriented electrical steel (NOES) for U.S. hydro-generator manufacturers
  - Domestic sources are not regionally congruent

- Loss of experienced and skilled workforce

Preliminary Recommendations

- Aggregate Demand
  - Est. $28B for planned refurbishment (8-yr cycle) and replacement (100% by 2050) for federal fleet alone
  - Demand could be higher if net zero is considered
  - Est. >$5B for new federal hydropower and PSH facilities
- Work with low carbon technologies to impact upstream common components/materials
- Examine federal fleet (~50%) to improve supply chain
  - Include provisions that encourage American content in addition to pricing
  - Increase involvement of small business through:
    - Minimizing upfront work
    - Assistance with bonding requirements
  - Evaluate FTA import regulations
- Education and Investment Opportunities
  - Develop Best Practices for Refurbishment/Replacement/Upgrade Fleet
  - Develop whole life cost model methods to optimize replacement schedules
  - Define and promote domestic capabilities
  - Invest in advanced manufacturing opportunities

Supply Chain: Exiting from COVID-19 and Looking to the Future

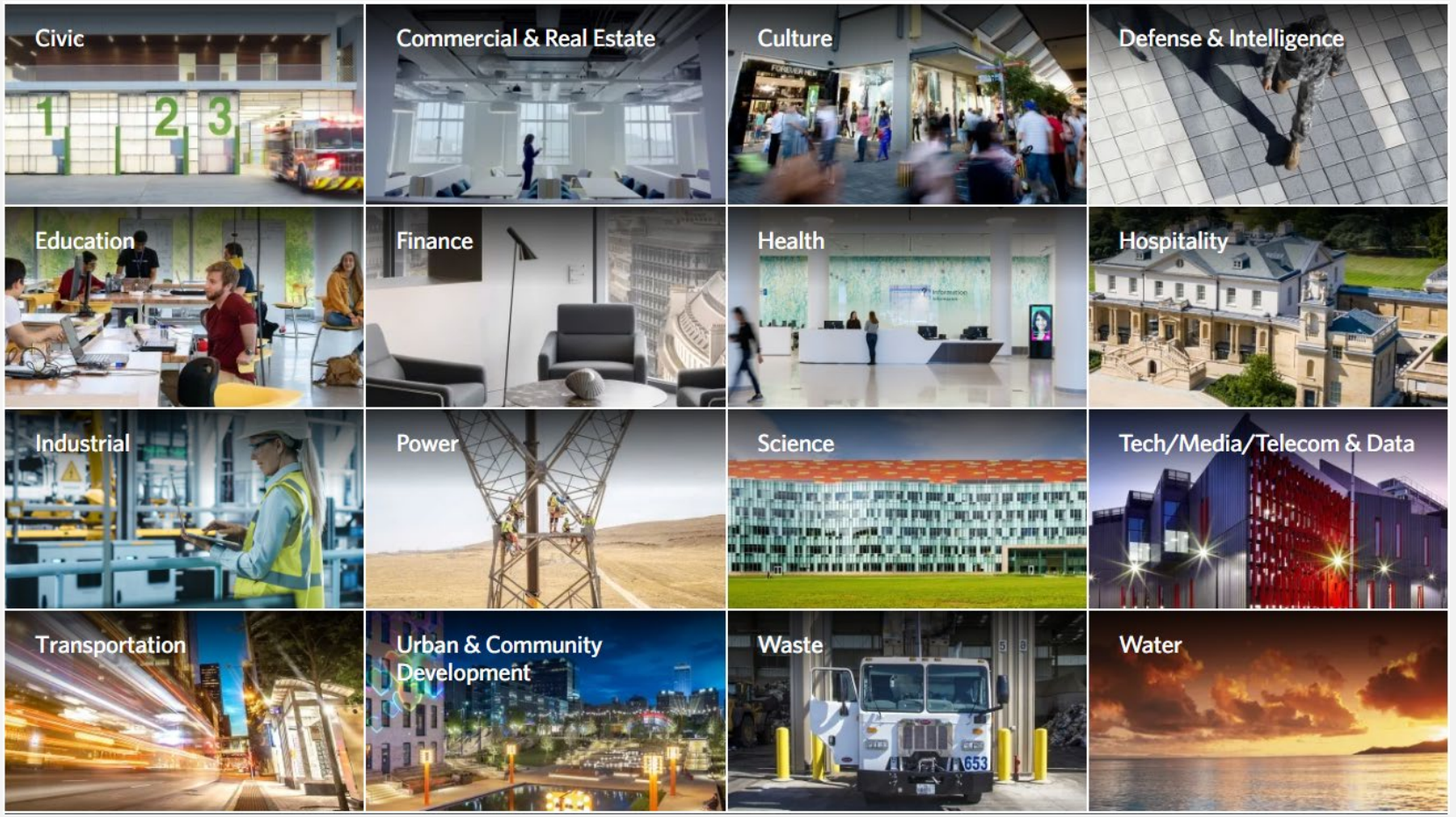
A Consultant Perspective

NHA
National Hydropower Association

WATER.POWER.WEEK.
WASHINGTON, D.C. • MARCH 13-15, 2024
CAPITAL HILTON • WATERPOWERWEEK.COM

HDR

12K+	Employees Worldwide
200+	Offices Around the Globe
15	Countries Where We Operate
16	Markets We Serve
107	Years of Pushing Boundaries



New Norms vs Old Norms

Workforce Resiliency & Composition

New Tools and Modes of Internal/External Interaction

Project Execution

Flex to the Moment

Relationships Matter - *Perhaps Now More Than Ever*

The Only Constant is Change

INSIGHTS

Ventilation and Transmission: HVAC and Adapting to COVID-19

Effective heating, ventilation and air conditioning systems have always been part of maintaining a healthy building environment, and with the impact of COVID-19 ...

more

INSIGHTS

Green Shoots: Positive Sustainability Outcomes Post-COVID

Part of the Pandemic Paradigm Series: Buildings Through a COVID Lens Sustainable buildings cover the holistic building, including its supply chains, connections and ...

more

INSIGHTS

Specifying Fan Coil Units in a Post-COVID Environment

Adrian Gray, HDR's Global Corporate (Offices) & Commercial Director, outlines his belief that infectious disease transmission should be embedded in ventilation regulations. In ...

more

INSIGHTS

Telemental Health and the COVID-19 Behavioral Health Crisis

Telehealth and the Mental and Behavioral Health Crisis: A Pandemic Side-Effect The COVID-19 pandemic and the subsequent economic downturn has adversely affected the ...

more

INSIGHTS

Jon Crane Discusses Health Care Design in the Age of COVID-19

In this article, the second installment of a Lab Manager five-part series, "Necessity Is the Mother of Invention During COVID-19," Jon Crane, director ...

more

Supply Chain: Exiting from COVID-19 and Looking to the Future

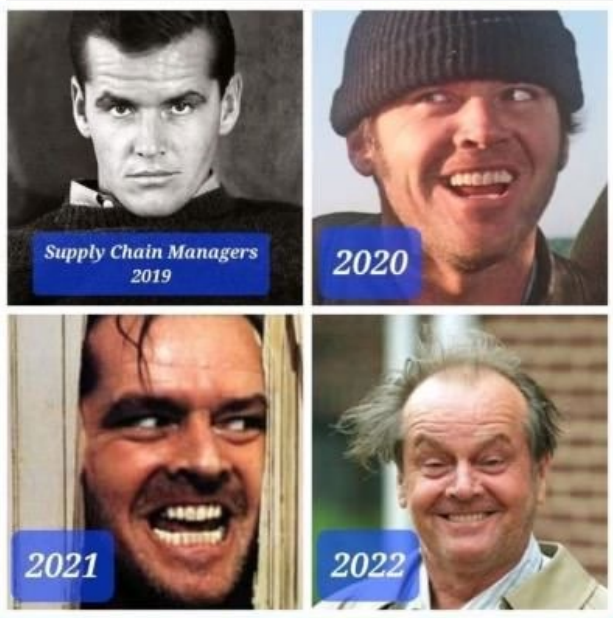
An OEM perspective

Katia Debian, GE Vernova

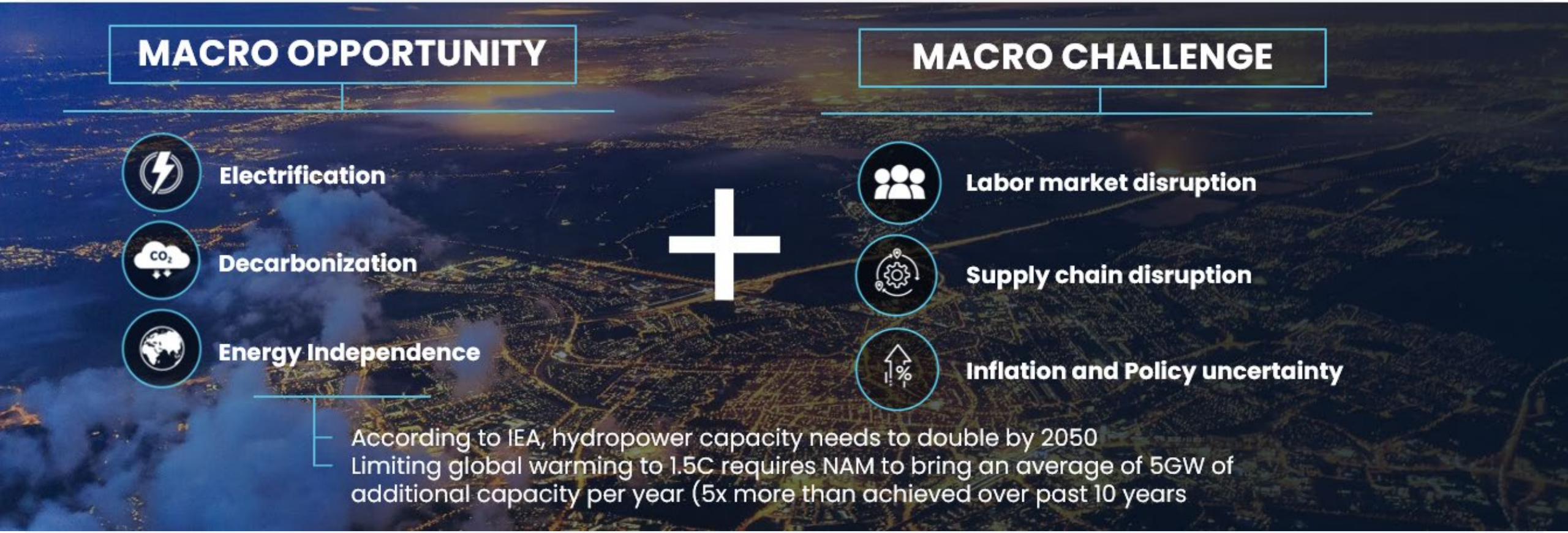
NHA
National Hydropower Association

WATER.POWER.WEEK.
WASHINGTON, D.C. • MARCH 13-15, 2024
CAPITAL HILTON • WATERPOWERWEEK.COM

The pandemic in memes…



GE Vernova Hydro View



Supply Chain Management: What changed?

The supply shock that started with the pandemic and the demand shock that followed exposed vulnerabilities in all supply chains. Temporary trade restrictions, shortages, transport constraints, talent war… coupled with geopolitical tensions changing the trade dynamics

- greater political considerations in supply strategy with domestic content
- eliminate dependence on sources that are perceived as risky
- ESG focus
- while sustaining competitiveness

What we learned, what changed,

- More engagement of C-suite into Operations
- Specific risk assessment to further identify our vulnerabilities
- Diversify our supply base , develop new sources to create flexibility
- While also strengthening partnership and booking capacity (through demand forecasting)
- Lean on a LEAN mindset to keep improving

MESC

OFFICE OF MANUFACTURING AND ENERGY SUPPLY CHAINS

The Office of Manufacturing and Energy Supply Chains

Zack Valdez, Ph.D.

Strategic Advisor

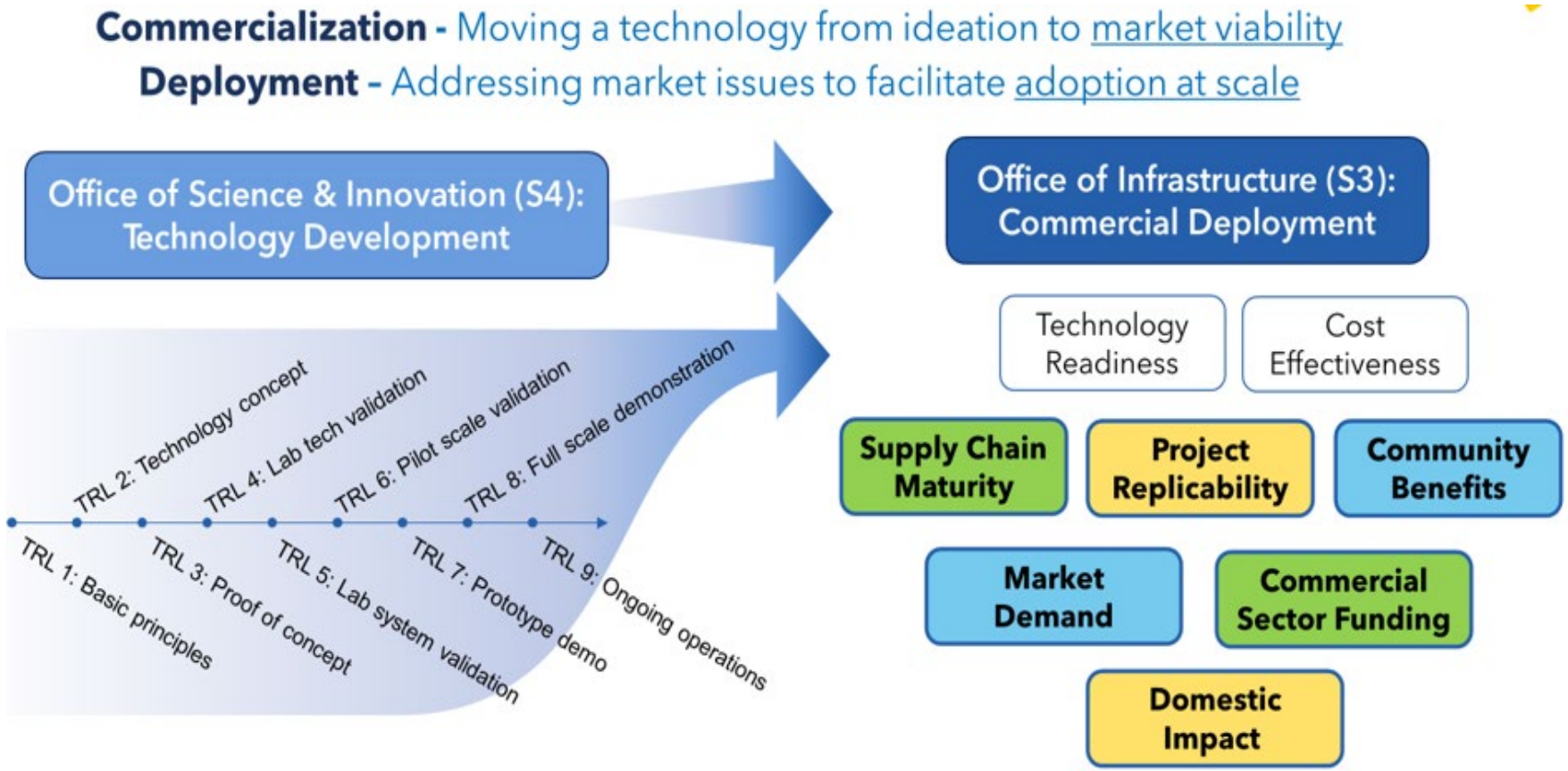
Zack.Valdez@hq.doe.gov

Manufacturing and Energy Supply Chain office drives development and deployment of technologies

MESC is working alongside private capital to be a force multiplier to **secure domestic supply chains.**

All DOE and MESC investments follow a **data-driven approach**, building on modeling, mapping, and analysis.

MESC is **supporting workforce** through manufacturing programs at universities, community college, and trade-schools for entry-level to mid-career support.



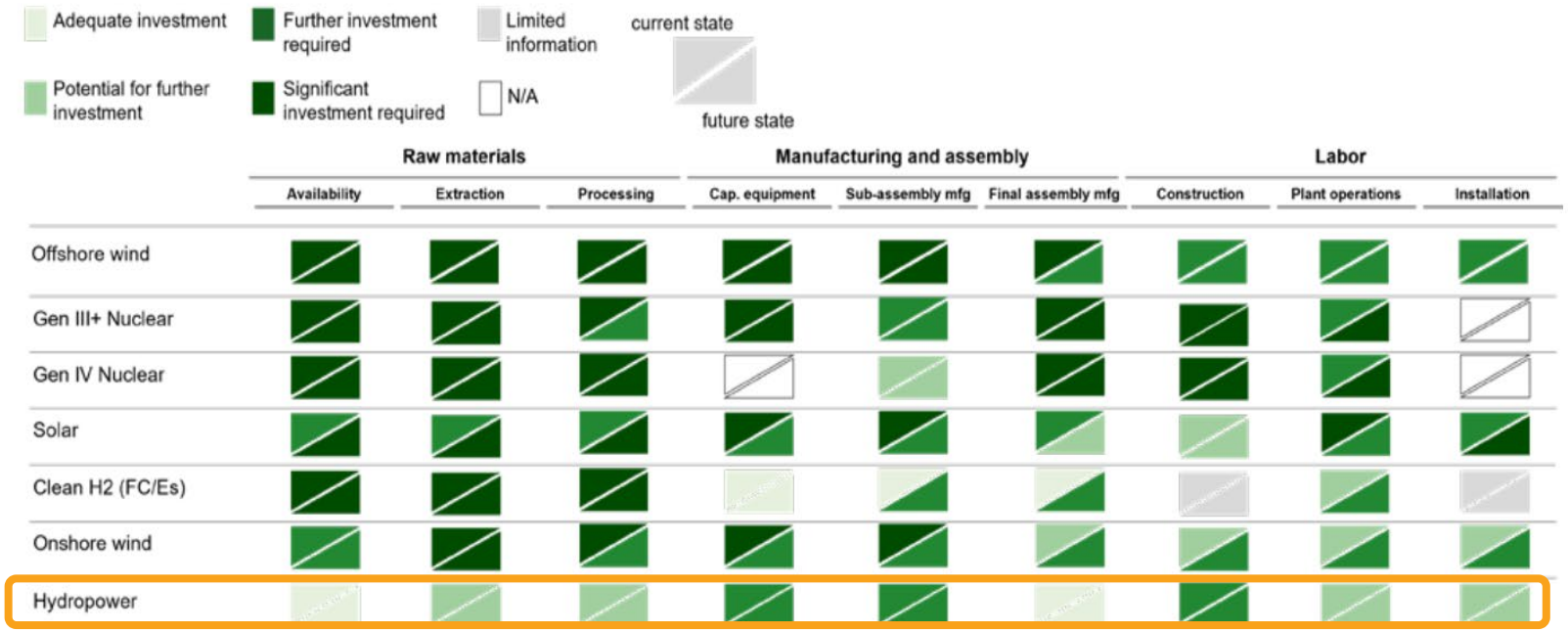
MESC
OFFICE OF MANUFACTURING AND ENERGY SUPPLY CHAINS

Maintaining the Supply Chain Progress Report (Aug 2023)

https://www.energy.gov/mesc/reports

- Summarizes DOE progress in **building and securing supply chains to support the American energy sector industrial base**:
  - Securing critical materials
  - Expanding energy sector manufacturing
  - Growing the domestic clean energy workforce
  - Building out supply chain capabilities
- Identifying **supply chain vulnerabilities/opportunities to identify priorities and align investments**

Component/Equipment	Relevant Technologies	Vulnerabilities
Large Castings and Forgings	Onshore wind, offshore wind, hydropower, and nuclear	U.S. does not have large-scale domestic castings and forgings capabilities to meet demand; certain technologies, such as nuclear, require higher grade equipment than others.
Rare Earth Magnets	EVs, onshore wind, and offshore wind	U.S. does not have manufacturing capability for Neodymium magnets with China dominating more than 92% of the capacity
Battery Components	EVs and grid energy storage	China maintains a stronghold in mid and downstream battery supply chain. China manufactures most cathodes (89 %), anodes (93 %), separators (89 %), electrolytes (94 %), and cells (75%)



Investment opportunities underway and beyond…

Legend
- Scope defined by ARRA in 2009
- Scope added by IRA

48C ITC

Clean Energy Manufacturing and Recycling

- Re-equip, expand, or establish Industrial or manufacturing facility for production **or recycling of** clean energy and energy efficiency technologies

Critical Materials Processing, Refining, and Recycling

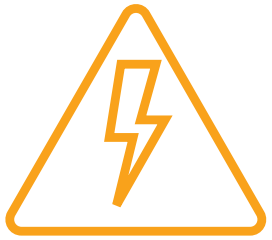
- Re-equip, expand, or establish an industrial facility to process, refine, or recycle critical materials (50 USGS minerals + DOE critical materials)

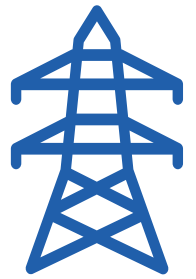
Industrial GHG Emissions Reductions

- Re-equips industrial or manufacturing facility to reduce greenhouse gas emissions by at least 20%

Defense Production Act

- 70+ year old statue provided to DOE this administration
- Support production and capacity of manufacturing to secure and strengthen energy ecosystem
- $250M Heat pumps – quick, targeted funding capability





MESC
OFFICE OF MANUFACTURING AND ENERGY SUPPLY CHAINS

Thank you

energy.gov/mesc

MESC@hq.doe.gov

Office of Manufacturing and Energy Supply Chains, U.S. Department of Energy

MESC
OFFICE OF MANUFACTURING AND ENERGY SUPPLY CHAINS