

Industrial Technology Innovation Advisory Committee Meeting

July 17, 2024
12 pm – 5 pm ET

Virtual (ZoomGov)

*We will start
momentarily...*



Meeting Recording Announcement

This Zoom call, including all audio and images of participants and presentation materials, may be recorded, saved, edited, distributed, used internally, posted on DOE's website, or otherwise made publicly available. If you continue to access this call and provide such audio or image content, you consent to such use by or on behalf of DOE and the Government for Government purposes and acknowledge that you will not inspect or approve, or be compensated for, such use.

Housekeeping Reminders

- General audience does not have the ability to unmute and/or turn on camera during this presentation.
- The chat has been disabled.
- Public comments:
 - The deadline for submitting public comments to share during this meeting was 5:00 pm EDT on July 15
 - You may send a written statement to ITIAC@ee.doe.gov

ITIAC Nominations

- DOE is continually seeking ITIAC nominations for consideration for future membership vacancies and to maintain balance in points of view
- Submissions should include the nominee's name, resume, biography, and any letters of support
- Committee members are appointed for a two-year term and may be reappointed for up to two successive terms
- Submit nominations/questions to ITIAC@ee.doe.gov

See website for more details: <https://www.energy.gov/eere/iedo/industrial-technology-innovation-advisory-committee#candidates>

Welcome & Opening Remarks



Sharon Nolen
ITIAC Chair
Eastman Chemical



Dr. Zach Pritchard
Technology Manager
ITIAC Designated Federal Officer
Industrial Efficiency and
Decarbonization Office

Welcome New ITIAC Members



Sunday Abraham



Sergio Espinosa

Agenda – July 17, 2024 ITIAC meeting

Welcome and opening remarks	12:00 – 12:10 PM
Report-Out: Barriers Subcommittee	12:10 – 12:40 PM
Report-Out: Industrial Sectors Subcommittee	12:40 – 1:10 PM
Report-Out: Cross-Cutting Technologies Subcommittee	1:10 – 1:40 PM
Break	1:40 – 1:50 PM
Report-Out: Workforce & Social Considerations Subcommittee	1:50 – 2:20 PM
Report-Out: DOE Current Work and Gaps Subcommittee	2:20 – 2:50 PM
Report-Out: Economic Competitiveness Subcommittee	2:50 – 3:20 PM
Break	3:20 – 3:30 PM
Discussion	3:30 – 4:45 PM
Public Comment	4:45 – 4:55 PM
Conclusion	4:55 – 5:00 PM
Adjourn	5:00 PM

Gaps

Overlaps

Timeline (questions/comments)

General questions/comments

Subcommittees

- Barriers (B)
- Industrial Subsectors (IS)
- Cross-cutting Technologies (CCT)
- Workforce & Social Considerations (WSC)
- DOE Current Work & Gaps (DOE)
- Economic Competitiveness (EC)

Mural Board

- **Enter comments on the Mural board at any time**
- **Comments on the first four items will be discussed during the discussion section**
- **Subcommittee comments will be discussed later during subcommittee meetings**
- **Feel free to use suggested abbreviations if you are commenting on a subcommittee**

Subcommittee Report-Outs

Report-Out: Barriers Subcommittee Lead: Cathy Choi	12:10 – 12:40 PM
Report-Out: Industrial Sectors Subcommittee Lead: Subodh Das	12:40 – 1:10 PM
Report-Out: Cross-Cutting Technologies Subcommittee Lead: Eric Masanet	1:10 – 1:40 PM
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Report-Out: Economic Competitiveness Subcommittee Lead: Akshay Sahni	2:50 – 3:20 PM

Barriers

Subcommittee

20240717 ITIAC Update

Agenda

- Barriers Subcommittee Members
- What is success?
- Proposed scope
- Barrier categories and assignees
- Project plan with milestones
- Progress to date

Subcommittee members

- Betsy Dutrow
- Sue Clark
- Abigail Regitsky
- Sasha Stashwick
- Neal Elliott
- Eric Masanet
- Cathy Choi

What does success look like for Barriers Subcommittee?

- Barriers identified and prioritized
- Identified entities that are in positions to take action to respond to and/or overcome the barriers
- Identify facts, data and associated analysis technique to determine the extent/severity of barriers and impact of the barriers
- Recommendations to overcome barriers with most emphasis on those barriers of greatest impact to achieving DOE ITIAC goals

Proposed scope

SCOPE:

- Survey and analyze barriers to adoption of emissions reduction technologies
 - Access to low-cost clean energy and its value chain
 - Process to deployment
 - Technology gaps
 - Infrastructure, permitting & policy support
 - Financing and market demand
 - Workforce

Barrier categories and assignees

1. Access to low-cost clean energy to power— Sasha & Eric
 - Low C fuels/feedstocks (green H2, biomass, renewable feedstocks)
2. Electricity cost (as a barrier to adoption) – Sasha & Eric
 - Including energy value chain
3. Pilot to demonstration to deployment (and supply chain) - Neal
4. Technology gaps (where R&D can help) – Sue
5. Infrastructure, permitting & policy support - Betsy & Neal
6. Financing and market demand barriers – Cathy
 - Policy drivers and/or private sector demand for long-term offtake of clean goods
7. Workforce - Neal

Project plan with milestones

	Owner	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25
Finalize "What is success for Barriers"																			
Subcommittee"	Cathy																		
Complete Definition for Access to low-cost																			
clean energy to power	Sasha, Eric																		
Complete Definition for Electricity cost (may be a																			
barrier to adoption)	Sasha, Eric																		
Complete Definition for Pilot to demonstration to																			
deployment (and supply chain)	Neal																		
Complete Definition for Technology gaps (where																			
R&D can help)	Sue																		
Complete Definition for Infrastructure &																			
permitting & policy support	Betsy, Neal																		
Complete Definition for Financing barrier:																			
market demand (policy or private sector) - long-																			
term offtake of clean goods																			

Jun-Aug: Barrier categories identified and defined

- By Oct 2024:
- Barrier categories refined definitions and actors/influencers identified.
 - Brainstorm analysis tools/techniques to determine extent and impact of barriers

- By Mar 2025
- Make recommendations to overcome barriers for each category
 - Implement analysis technique to prioritize barriers

By Sep 2025: Incorporate into ITIAC report, Prioritized Barriers and Recommendations

Progress to date

- Barrier categories identified with initial definitions

1. Access to low-cost clean energy to power – Under Construction
2. Electricity cost (may be a barrier to adoption) including energy value chain
 - Draft Barrier Definition
 - Industrial electrification offers one of the most impactful and cross-cutting strategies to reduce industrial sector emissions via both fuel-switching to electricity and shifting electrical load to times when surplus renewable electricity is available. Both reliability and the cost of clean electricity are major barriers to industrial electrification. The latter is despite the fact that renewable energy is already the cheapest form of new electricity generation.
3. Pilot to demonstration to deployment (and supply chain)
 - Draft Barrier Definition:
 - Changes in technology and their integration into supply chains require approaches that allow for the development of an understanding of how the technology will function in an integrated context.

Historically this has been accomplished through pilots that are then scaled to production levels. This approach is both capital intensive and time consuming. For the US to keep up with global changes and challenges it will be important to streamline this process. An emerging strategy is to use process virtualizations to assess and refine the integration of new technologies into plants and value chains. This approach can dramatically speed the process but requires the development of knowledge to build and validate models required to accomplish these goals. Building this capacity will require both changes in academic training as well as the creation of new workforce.

4. Technology gaps (where R&D can help) – Under Construction

5. Infrastructure, permitting & policy support

- Draft Barrier Definition:
 - Industry's willingness and ability to implement new decarbonization technologies is impacted by several factors, including infrastructure, permitting, and policy support.
 - *Infrastructure* is a system that supports the installation and use of a new
 - *Permitting* is the set of legal requirements that enable new technologies to be installed
 - *Policy support* refers to a set of legal, financial, and regulatory plans that are designed to reduce risk for industry uptake of new technologies

6. Financing barrier and market demand barriers

- Draft Barrier Definition: .

- Financing barriers are obstacles that businesses encounter that challenge their ability to access, manage, and grow their financial resources.
- Market Demand: Under Construction

7. Workforce

- Draft Barrier Definition:

- Availability of adequate, trained workforce represents a major barrier to both retrofit of existing facilities as well as investments in new manufacturing.

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INDUSTRIAL TECHNOLOGY INNOVATION ADVISORY COMMITTEE (ITIAC)

Industrial Sectors Subcommittee met on July 8, and minutes were produced

1. Subodh Das, Lead
2. Betsy Dutrow
3. Eric Masanet
4. Joe Powell
5. Sridhar Seetharaman
6. Jolene Sheil

OUR TASK

Subcommittee leads should plan to share progress at the July 17th meeting.

Summary of Discussions

Subcommittee to determine which industries to address.

Chemical manufacturing (20%*) must be covered & expanded to include chemical processing.
Petroleum refining (17%) Importance questioned

Iron and steel (7%) are already a big focus, and the US sector is already more electrified than the rest of the world

should we include non-ferrous metals/materials? (e.g., markets for Cu, Al, Si, and critical minerals may grow due to demand for implementing energy transition) ?

Glass (strong support), Aluminum, Pulp & Paper (strong support), Recycled Materials (already decarbonized), rare earth, and critical materials

Food and beverage (6%) must be covered

Cement (2%) scope 1 impact small? Need more discussions

All other manufacturing (31%) How to proceed Which and how to select

Non-manufacturing industrial (17%) How to proceed Which and how to select
Data centers, mining, urban agriculture, and construction

*Percent of Industrial MMT CO₂

Action Items

1. Dr. Das requested a list of DOE roadmaps and reports on industrial sectors. Dr. Pritchard will resend this list.
2. Dr. Pritchard will check funding figures by sector and determine if funding information beyond DOE is available.
3. Dr. Das will identify other action items to define the criteria for selecting which sectors the Committee should address. GHG? Economic Impacts? Now? Future? New subcommittees could be formed. Additional resources can be brought
4. Resource Inventory - Shared Documents

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Cross-Cutting Opportunities Subcommittee

ITIAC Update
July 17, 2024

Agenda

- 1) Subcommittee members
- 2) What does success look like to your subcommittee by September 2025?
- 3) Proposed cross-cutting opportunity areas
- 4) Next steps - topic assignments
- 5) Project plan with milestones

Subcommittee members

- Neal Elliott
- Comas Haynes
- Sharon Nolen
- Jeffrey Rissman
- Sridhar Seetharaman
- Jolene Sheil

What does success look like?

- Clear guidance on what Congress can do (vis a vis DOE and its ecosystem) to accelerate changes that span across, and can address common challenges among, most/all industrial sectors
- Identification of barriers and linkages to the barrier discussions/subcommittee
- Specific recommendations that apply to cross-cutting technologies themselves
- Evidence-bases (energy savings, cost savings, jobs, etc.) should be strong for more confident conclusions

What does success look like? (continued)

- Identify and use clear metrics to compare and discuss the opportunities, and perhaps tradeoffs between them, in a way that aligns with key priorities or M&V convention
- Inclusion of emerging technologies and need for R&D programs to accelerate them
- Address the need for better industrial sector data availability and also how those data could be collected so that we can better understand, monitor, and track the energy/decarbonization progress of the sector
- Identify education and workforce training opportunities and their value

Cross-cutting opportunities identified

1. Carbon capture, utilization, and storage (CCUS)
2. Circular economy/demand reduction
 - a. Materials efficiency (could be its own category?)
 - b. Remanufacturing
 - c. Recycling
3. Dynamic load management
 - a. Grid support
 - b. Energy storage (including thermal)
4. Digitalization
 - a. Smart manufacturing
 - b. Artificial intelligence
 - c. Machine learning (not the same as AI)
 - d. Process simulation for improvement, optimization, etc. (akin to digital twins)
 - e. Controls and optimization
 - f. Additive manufacturing

Cross-cutting opportunities identified (continued)

- 5. Electrification
 - a. Process electrification
 - b. Thermal storage
- 6. Energy efficiency
 - a. Inclusive of traditional cross-cutting systems such as motors, pumps, compressed air, steam systems, etc.
 - b. Heat integration
 - i. In-plant
 - ii. Interplant (industrial clusters, district heating)
- 7. Infrastructure
 - a. Electric power capacity (e.g., need for substations)
 - b. Hydrogen infrastructure
 - c. Captured CO₂ compression, transport, and storage
 - d. Coordinating among companies for shared new energy supplies

Cross-cutting opportunities identified (continued)

- 9. Non-CO2 GHG emissions
 - a. Refrigerants
 - b. Process emissions (e.g., semiconductors)
 - c. Fugitive methane emissions
- 10. Renewable heat, fuels, and feedstocks
 - a. Solar thermal
 - i. Inclusive of storage
 - b. Geothermal (direct)
 - c. Ambient, waste heat, and geothermal heat pumps
 - d. Bioenergy (solid, liquid, gaseous)
- 10. Self-generation
 - a. Combined heat and power (and what to do about it)
 - b. Nuclear/SMRs
- 11. Supply chain resilience
- 12. Water supply, quality, treatment, and the energy-water nexus
- 13. Workforce

Next steps

- Identify areas of overlap and synergy during the July 17th meeting
- Refine and finalize cross-cutting opportunity topics and subtopics
- Subcommittee assigns lead(s) for each topic
- Subcommittee decides upon chapter structure/approach
 - Offer prioritization of opportunities?
 - Distinguish between demand-side or supply-side opportunities?
 - Categorize by short-term, mid-term, and long-term nature?
 - Quantify potential savings associated with each topic?
 - Other approaches to align with overall report messaging?

Project plan

Task/milestone	Start	Finish	Status	Owner	2024				2025														
					Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Initial subcommittee content scoping	1-Apr-24	16-Jul-24	In progress	All	x	x																	
July meeting slides	1-Jul-24	10-Jul-24	In progress	Eric M		x																	
ITIAC full committee meeting		17-Jul-24		All		x																	
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Research/drafting of zero order draft (ZOD) section outlines/text	15-Aug-24	1-Oct-24		All			x	x															
Internal review/discussion of ZOD section outlines/text		1-Oct-24		All					x														
ZOD section outline/text revisions	1-Oct-24	15-Oct-24		All					x														
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ITIAC in-person report-out meeting	29-Oct-24	30-Oct-24		All					x														
Internal discussion/identifications of revisions for first order draft (FOD)		15-Nov-24		All						x													
FOD section drafting	15-Nov-24	15-Feb-25		All						x	x	x		x									
Internal review/discussion of FOD sections		15-Feb-25		All										x									
FOD section revisions	15-Feb-25	15-Mar-25		All										x	x								
FOD submission to ITIAC		15-Mar-25		Eric M											x								
ITIAC review/discussion of FOD	15-Mar-25	15-Apr-25		All											x	x							
Internal discussion/identifications of revisions for second order draft (SOD)		15-Apr-25		All												x							
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Final revisions to sections (third order draft)	1-Aug-25	1-Sep-25		All															x	x			
TOD submitted to ITIAC		1-Sep-25		Eric M																	x		
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Report submission to Secretary		15-Sep-25		ITIAC																		x	
Final section revisions based on Secretary review (fourth order draft)	1-Nov-25	15-Nov-25		All																		x	x
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Final report submitted to Congress		30-Nov-25		ITIAC																			x

Scope coordination and finalization

Research, first draft, and discussion

Revisions, reviews, and iterations

DOE Secretary review

Final revisions and submission to Congress

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**We are on a break and
will return at
1:50 pm ET**



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ITIAC Workforce and Social Considerations Subcommittee

Success for subcommittee:

Incorporating in the report critical workforce and social considerations and recommendations that are necessary to increase technological and economic competitiveness of industry in the US and achieve emissions reduction in industrial sectors.

Scope:

- Workforce training
 - How can DOE help turn this from a barrier to deployment to an opportunity/consideration in advance?
 - Have community colleges and other training providers kept up with needs?
 - What changes are needed to train the non-traditional manufacturing workforce?
- Workforce availability & demographics
- Technology deployment impacts on the workforce
- Occupational safety & health considerations
- Community/stakeholder engagement
 - DOE requiring info on this in FOAs
- Role of the Labs in these issues

Needs for discussion in full committee:

- Overlap between subcommittees must be better understood to further our subcommittee’s work, particularly the Barriers subcommittee and the Recommendations to DOE subcommittee.
- Structure of the report outline & whether this is a standalone section or woven into other parts

Factfinding conversations with DOE: (could try to combine some of these to simplify scheduling)

- Office of Energy Jobs
- Office of Energy Justice & Equity
- IEDO
- MESC

Proposed Timeframe:

Q3 2024	Factfinding meetings
Q4 2024	Write this subcommittee’s contribution to the report
Q1 2025	Deliver contribution to the full committee for incorporation in the report and to resolve differences

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DOE Current Work and Gaps Assessment Subcommittee

ITIAC Update

July 17, 2024

Members (8): Jeffrey Rissman (co-chair), Sasha Stashwick (co-chair),
Abigail Regitsky, Cathy Choi, Comas Haynes, Eric Masanet, Sridhar
Seetharaman, Sue Clark

Agenda

- What does success look like for your subcommittee by September 2025?
- Proposed outline of report chapter
- Project plan with milestones
- Additional information needs

Success – the report chapter includes:

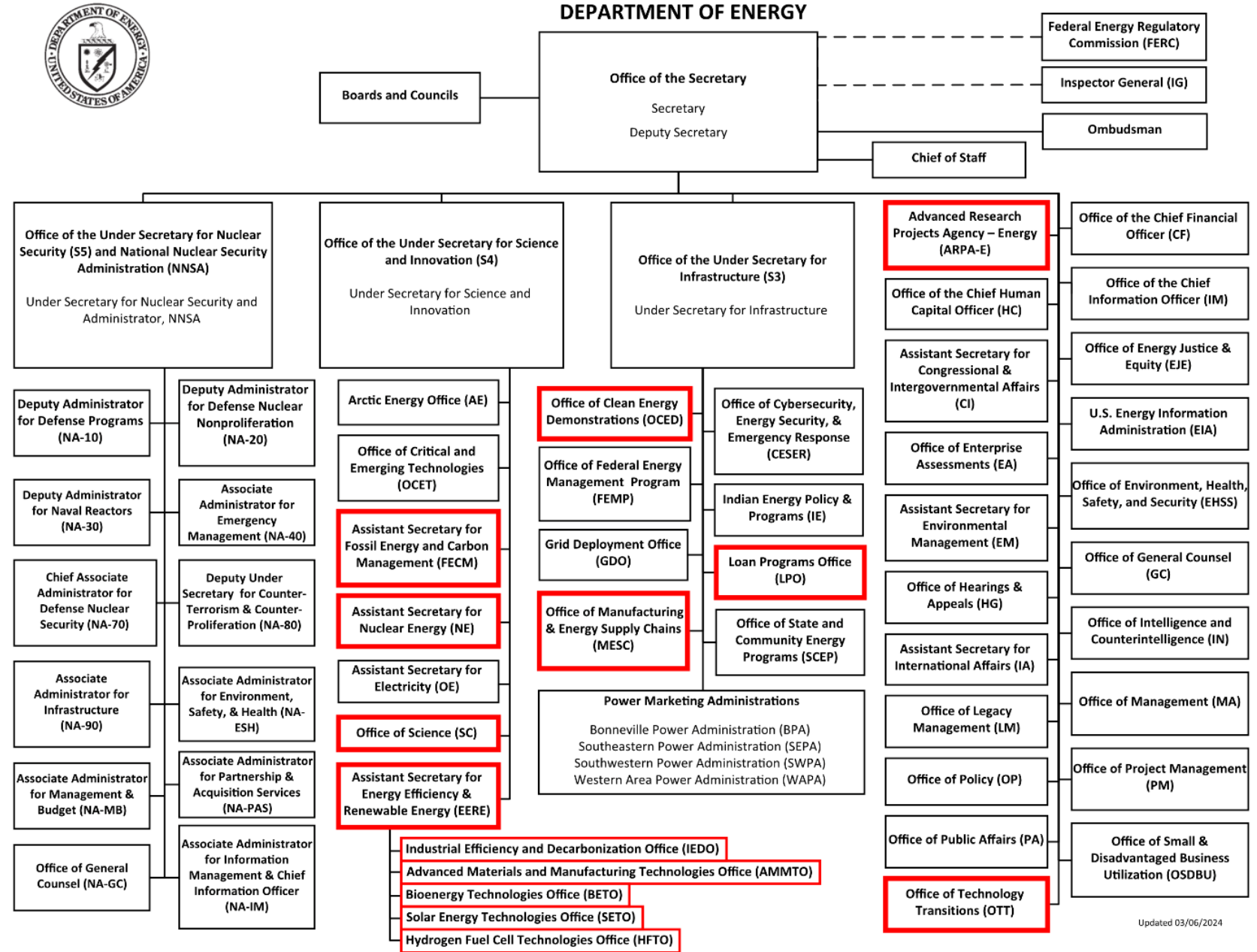
- Comprehensive overview of DOE's existing activities and programs pertaining to accelerating a transition to clean and competitive U.S. industry
- Comprehensive set of useful and actionable recommendations for DOE to help:
 - Optimize existing programs and technology choices
 - Seize opportunities (e.g., identified in other ITIAC report chapters)
 - Overcome barriers
 - Serve as a coordinator (across agencies, labs, academia, industry, etc.)
 - Use other policy tools and advise other agencies as appropriate

Overview of Chapter Outline

- **Section 1:** Overview of DOE's Current Structure and Activities Pertaining to Industrial Decarbonization
 - Overview chart/infographic and tables detailing DOE offices and programs that work on industrial decarbonization today, with current funding levels and the technology readiness levels of the technologies they support.
- **Section 2:** Recommendations for DOE
 - Contain 7 subsections, which are detailed in the following slides (tentative, open to the committee's feedback)

Section 1

- Strictly factual
- Situates the reader before we get into recommendations
- Draft tables were provided with the meeting materials (12-page document)



Section 2: Recommendations for DOE

1. Review of each office and its major industry-related programs identified in Section 1
 - E.g., what technologies each should focus on, whether its funding level should change, and any other considerations specific to that program
2. Recommendations to advance solutions identified by ITIAC
 - Ways DOE can facilitate multiple commercial/industrial segments adoption of technologies
 - How DOE can provide better data and modeling tools about industrial energy use to better track or estimate progress
 - *More detail on these points is included in the outline provided with the meeting materials*

Section 2: Recommendations for DOE

3. Recommendations to overcome barriers identified by ITIAC

- Barriers: (1) Cost of clean energy, (2) Ability for new technologies to go from lab to large-scale use, (3) Infrastructure and permitting barriers, (4) Trained workforce, (5) Financing and market demand
- Coordinated action/influence from DOE, research institutions, industry partners, commercial entities, federal and state legislators, and utilities can overcome barriers

4. Addressing DOE structure, gaps, and redundancies for improved DOE effectiveness or efficiency

- Recommendations to fill gaps not being addressed by DOE funding or programs
- Whether to reduce or keep duplication across parts of DOE (i.e., sometimes it is useful to have two approaches/teams working on the same problem)

Section 2: Recommendations for DOE

5. Coordination-related recommendations

- Ways DOE can convene multiple agencies and other stakeholders to further industrial decarbonization.
- Ways to enhance public-private research partnerships with national labs and ensure resulting IP for clean industrial technologies is licensed on fair and reasonable terms in low- and middle-income countries

6. Standards-Related Recommendations

- Ways DOE can facilitate the development and upkeep of codes and standards, working with standard-setting entities like ISO, ASME, ANSI, IEEE, NIST, etc.
- Test procedures and minimum energy performance standards for more types of industrial equipment to the extent permitted under 42 U.S.C. § 6295(q)(1), “Energy Conservation Standards,” Part A-1, “Certain Industrial Equipment.”

Section 2: Recommendations for DOE

7. Suggestions DOE can make for other entities (e.g., Congress, other agencies, etc.) to do things to improve DOE's effectiveness on industrial decarbonization
 - DOE's budget requests to Congress
 - DOE submitting comments to rulemakings by other agencies, such as FERC
 - Any missing authorities DOE may need to most effectively promote clean and competitive U.S. industry

Project Plan

Credit to Eric Masanet, chair of the cross-cutting technologies subcommittee

			2024					2025												
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Additional information needs

- Our chapter depends partially on the findings of other subcommittees (and we want to make sure our recommendations reflect their ideas)
- So, other subcommittees providing our subcommittee with their main bulleted recommendations, when they become available, could be helpful.

Subcommittee Report-Outs

Report-Out: Barriers Subcommittee Lead: Cathy Choi	12:10 – 12:40 PM
Report-Out: Industrial Sectors Subcommittee Lead: Subodh Das	12:40 – 1:10 PM
Report-Out: Cross-Cutting Technologies Subcommittee Lead: Eric Masanet	1:10 – 1:40 PM
Break	1:40 – 1:50 PM
Report-Out: Workforce & Social Considerations Subcommittee Lead: Anna Fendley	1:50 – 2:20 PM
Report-Out: DOE Current Work and Gaps Subcommittee Leads: Jeffrey Rissman, Sasha Stashwick	2:20 – 2:50 PM
Report-Out: Economic Competitiveness Subcommittee Lead: Akshay Sahni	2:50 – 3:20 PM

Economic Competitiveness Subcommittee

No update was provided as lead was unable to attend

Gaps

Overlaps

Timeline (questions/comments)

General questions/comments

Subcommittees

- Barriers (B)
- Industrial Subsectors (IS)
- Cross-cutting Technologies (CCT)
- Workforce & Social Considerations (WSC)
- DOE Current Work & Gaps (DOE)
- Economic Competitiveness (EC)

Mural Board

- **Enter comments on the Mural board at any time**
- **Comments on the first four items will be discussed during the discussion section**
- **Subcommittee comments will be discussed later during subcommittee meetings**
- **Feel free to use suggested abbreviations if you are commenting on a subcommittee**

Report outline subcommittee membership

Other subcommittees	Report outline subcommittee member(s)
Industrial Sectors	Sridhar, Eric
Cross-Cutting Technologies & Opportunities	Sridhar, Eric (lead), Neal, Sharon, Jeff
Barriers	Abigail, Neal, Eric
Workforce & Social Considerations	Abigail, Sridhar
Economic Competitiveness	Abigail, Neal, Akshay (lead)
DOE Current Work & Gaps Assessment	Abigail, Sridhar, Eric, Jeff (lead)

Technology Focus Areas 42 U.S. Code § 17113(c)

1. Industrial production processes, including technologies and processes that—
 - a. Achieve emissions reduction in high-emissions industrial materials production processes, including production processes for iron, steel, steel mill products, aluminum, cement, glass, pulp, paper, and industrial ceramics;
 - b. Achieve emissions reduction in medium- and high-temperature heat generation, including—
 - i. through electrification of heating processes;
 - ii. through renewable heat generation technology;
 - iii. through combined heat and power; and
 - iv. by switching to alternative fuels, including hydrogen and nuclear energy;
 - c. Achieve emissions reduction in chemical production processes, including by incorporating, if appropriate and practicable, principles, practices, and methodologies of sustainable, green chemistry and engineering;
 - d. Leverage smart manufacturing technologies and principles, digital manufacturing technologies, and advanced data analytics to develop advanced technologies and practices in information, automation, monitoring, computation, sensing, modeling, and networking to—
 - i. model and simulate manufacturing production lines;
 - ii. monitor and communicate production line status;
 - iii. manage and optimize energy productivity and cost throughout production; and
 - iv. model, simulate, and optimize the energy efficiency of manufacturing processes;
 - e. Minimize the negative environmental impacts of manufacturing and sustainable chemistry while conserving energy and resources, including—
 - i. by designing products that enable reuse, refurbishment, remanufacturing, and recycling;
 - ii. by minimizing waste from industrial processes, including through the reuse of waste as other resources in other industrial processes for mutual benefit; and
 - iii. by increasing resource efficiency; and
 - f. Increase the energy efficiency of industrial processes;
2. Alternative materials that produce fewer emissions during production and result in fewer emissions during use, including—
 - a. Innovative building materials;
 - b. High-performance lightweight materials; and
 - c. Substitutions for critical materials and minerals;
3. Development of net-zero emissions liquid and gaseous fuels;
4. Emissions reduction in shipping, aviation, and long-distance transportation;
5. Carbon capture technologies for industrial processes;
6. Other technologies that achieve net-zero emissions in nonpower industrial sectors, as determined by the Secretary, in consultation with the Director; and
7. High-performance computing to develop advanced materials and manufacturing processes contributing to the focus areas described in paragraphs (1) through (6), including—
 - a. Modeling, simulation, and optimization of the design of energy efficient and sustainable products; and
 - b. The use of digital prototyping and additive manufacturing to enhance product design

ITIAC has experience and knowledge in all major focus areas.

Strategic Plan

Summary of 42 U.S. Code § 17114(d)(2)

Timeframe: Not specified

Purpose: Set forth a plan for achieving the goals of the program, including for the technology focus areas

- Specify near-term and long-term qualitative and quantitative objectives relating to each technology focus area
 - include research, development, demonstration, and commercial application objectives
 - specify the anticipated timeframes for achieving the objectives
 - identify the appropriate role for investment by the Federal Government, in coordination with the private sector, to achieve the objectives
 - identify the public and private costs of achieving the objectives
 - estimate the economic and employment impact in the United States of achieving those objectives
- Include plans for developing emissions reduction technologies that are globally cost-competitive, including, as applicable, in developing economies
- Leverage relevant existing roadmaps

Reports

Summary of 42 U.S. Code § 17114(f)

Frequency: Not later than 2 years after 12/27/2020, and every three years thereafter, submit to Secretary; 60 days after receipt, Secretary submits copy to Congress

Report Contents:

Advise on Technologies

- Describe how committee has carried out duties and any relevant findings
- Identify technology innovation opportunities
- Identify technology gaps in the private sector or other Federal agencies
- Recommend improvements to technology screening criteria and management of the program
- Recommend changes to focus areas, if necessary

Program Evaluation

- Evaluate progress and RD&D activities
- Progress made in achieving goals of the strategic plan and, if necessary, an update to the strategic plan
- Review management, coordination, and industry utility of the program
- Assess the extent to which progress has been made under the program in developing commercial, cost-competitive technologies in each focus area
- Assess the effectiveness of the program in coordinating efforts within DOE and with other Federal agencies

**We are on a break and
will return at
3:30 pm ET**



Adjourn

Thank you!

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