U.S. DEPARTMENT OF ENERGY
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY
INDUSTRIAL EFFICIENCY & DECARBONIZATION OFFICE

Industrial Technology Innovation Advisory Committee Meeting

October 30, 2024
9 am – 1 pm ET

U.S. Department of Energy
Washington, D.C. & 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 October 25
  - 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

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

Agenda – October 30, 2024 ITIAC meeting

Welcome and opening remarks	9:00 am
Industrial Efficiency and Decarbonization Office presentation	9:10 am
Report out – ITIAC Subcommittee on DOE Current Work and Gaps Assessment	10:00 am
Report out – ITIAC Subcommittee on Barriers	10:30 am
Break	11:00 am
Report out – ITIAC Subcommittee on Workforce & Social Considerations	11:15 am
Discussion – ITIAC Subcommittee on Economic Competitiveness	11:45 am
Discussion and Next Steps	12:05 pm
Public Comment	12:50 pm
Adjourn	1:00 pm

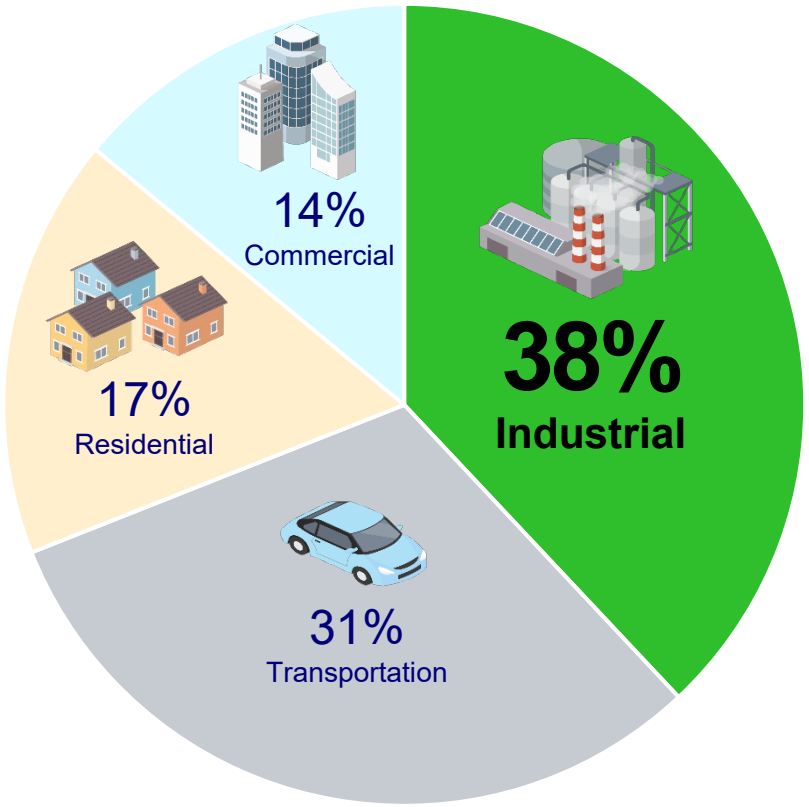
U.S. Department of ENERGY | Office of Energy Efficiency & Renewable Energy

IEDO: Oct. 2024 Update to ITIAC

Dr. Avi Shultz, Director,
Industrial Efficiency and
Decarbonization Office

BUILDING A NET-ZERO CLEAN ENERGY FUTURE

U.S. Greenhouse Gas Emissions, 2018 (million metric tons CO_2eq)



The U.S. industrial sector (manufacturing, agriculture, mining, and construction) accounts for:

33%

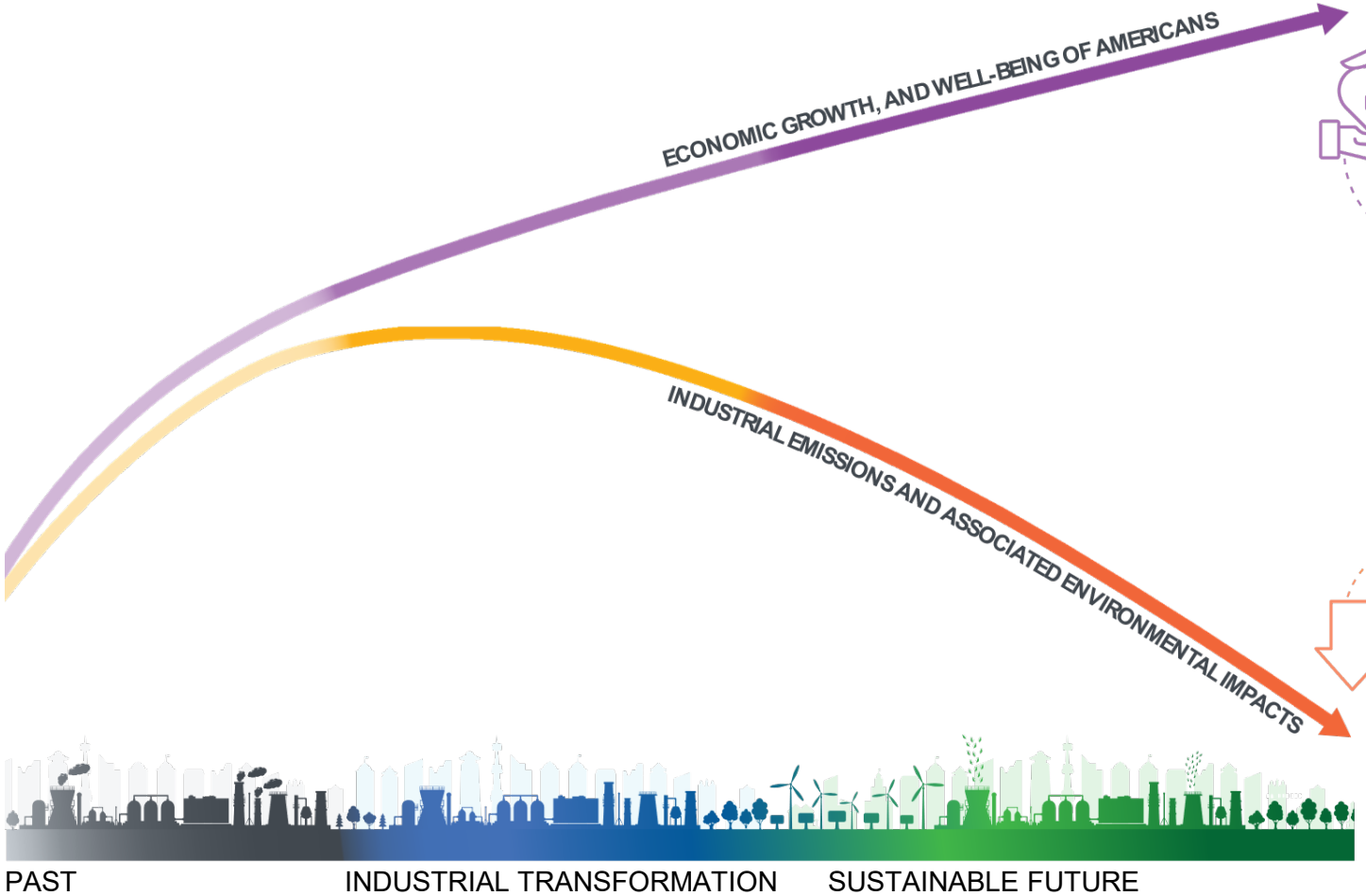
of the nation's primary energy use

38%

of total CO_2 emissions

Manufacturing Energy Consumption Survey, U.S. Energy Information Administration (2021).
Monthly Energy Review, U.S. Energy Information Administration (2024).
Annual Energy Outlook, U.S. Energy Information Administration (2021).
Inventory of U.S. Greenhouse Gas Emissions and Sinks, U.S. Environmental Protection Agency (2024).

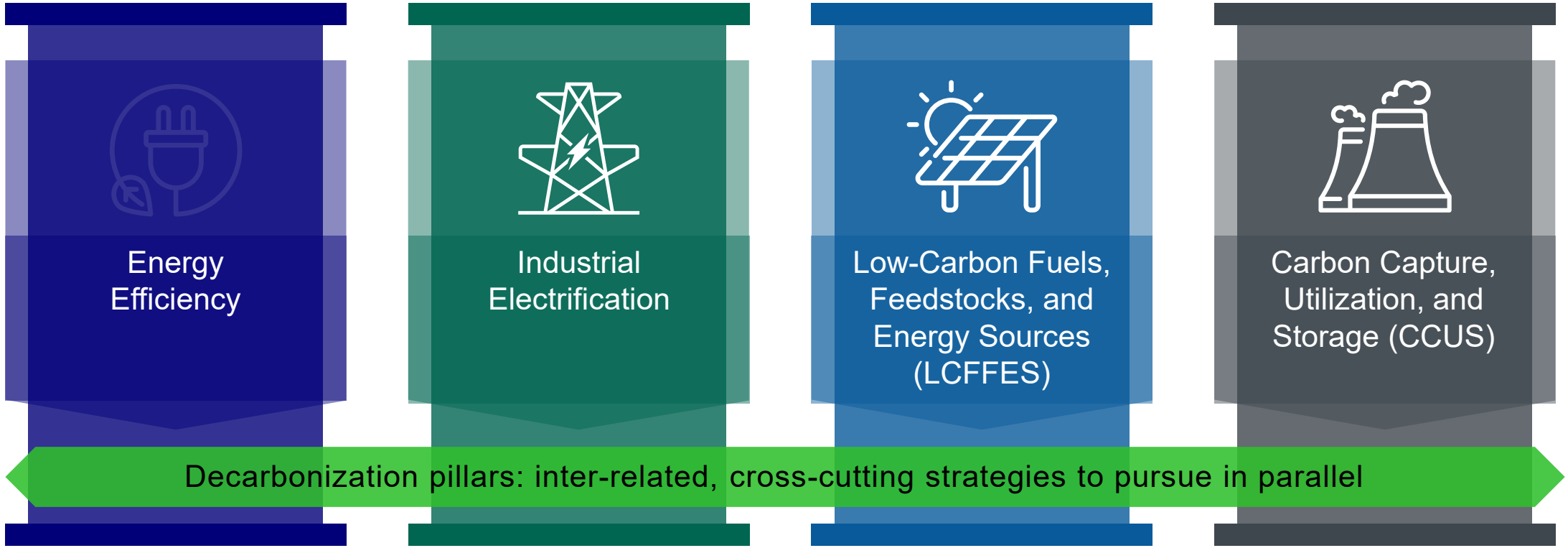
DECARBONIZING MANUFACTURING IS AN OPPORTUNITY FOR AMERICA'S ECONOMY



- Healthier communities
- Stronger and more competitive U.S. industry
- Stable and well-paying jobs

- Reduced GHG emissions
- Reduced criteria air pollutants
- Reduced water pollution
- Decreased impacts on biodiversity

INDUSTRIAL DECARBONIZATION PILLARS



Iron & Steel **Chemicals** **Food & Beverage** **Petroleum Refining** **Cement**

PATHWAYS FOR U.S. INDUSTRIAL TRANSFORMATION:

Unlocking American Innovation

- Identify **cost-effective and industry-specific pathways** to achieve net-zero greenhouse gas (GHG) emissions by 2050
- Address **technological, economical, societal, and environmental & health impacts**
- Present **tailored pathways, metrics, and targets** for overcoming barriers

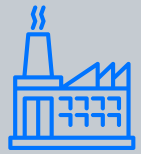
INDUSTRIAL EFFICIENCY AND DECARBONIZATION OFFICE (IEDO)

Dr. Avi Shultz
Director

Paul Gauche
Deputy Director

Joe Cresko
Chief Engineer

Paul Majsztrik
Energy- and Emissions-Intensive Industries



FY24
$113M

Paul Gauche
Acting Cross-sector Technologies

FY24
$81M

Anne Hampson
Technical Assistance and Workforce Development

FY24
$43M

Lauren Hall
Operations Supervisor

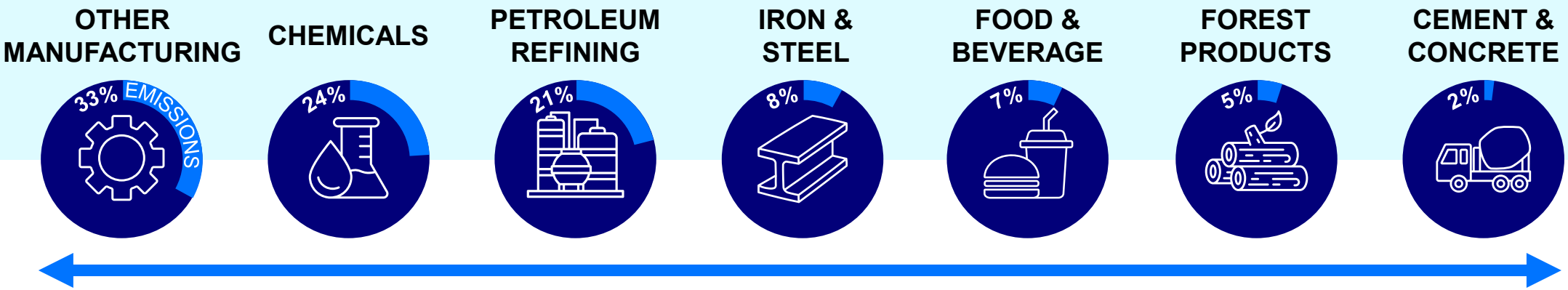
Ava Coy
Program Manager
Technical Project Officers

Mattie Gainer
Strategic Communications Lead

$237 Million
FY24 Budget

IEDO'S RESEARCH & DEVELOPMENT STRATEGY

Energy- and Emission-Intensive Industries



Cross-Sector Technologies

Thermal Processes & Systems

Low-Carbon Fuels, Feedstocks, & Energy Sources

Emerging Efficiency

Water & Wastewater Treatment

Over $500 million in R&D over two years

Annual Energy Outlook with Projections to 2050. U.S. Energy Information Administration (2023).

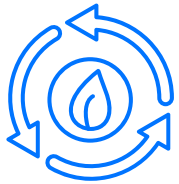
IEDO TECHNICAL ASSISTANCE & WORKFORCE DEVELOPMENT

Public /private partnerships

to help manufacturers and industrial organizations set and achieve long-term energy intensity reduction goals

Education and Training

for the current and future manufacturing workforce



No-cost tools and resources

for manufacturers to reduce GHG emissions and improve energy efficiency and competitiveness

End-user support

stakeholder engagement, and technical services for the industrial sector

TA WORK PRODUCTS INCLUDE:

ENERGY ASSESSMENTS | **PEER-TO-PEER NETWORKING** | **TOOLS & TRAINING** | **TECHNOLOGY SCREENING** | **PROJECT PROFILES**

THEME: DIVERSE FUNDING MODALITIES

FOAs/NOFOs: FY24 FOA Selections

Manufacturing Institutes: EPIXC and RAPID

Prizes: Industrial Energy Storage Systems Prize

PIAs: ISEED Collaborative

Lab Calls: Cement & Concrete Center of Excellence

IEDO FY24 CST FOA SELECTIONS

On Tuesday, October 8, 2024, DOE announced the selection of **16 projects** selected as part of a **$38 million** funding opportunity on cross-sector technologies.

These projects will advance research, development, and pilot-scale demonstrations of cross-sector process and equipment technologies with wide applicability and high emissions reduction potential.

	Topic Area	Number of Awards	Federal Funding
1	Electrification of Industrial Heat	5	$12,553,347
2	Efficient Energy Use in Industrial Systems	6	$13,737,783
3	Decarbonizing Organic Wastewater and Wet Waste Treatment	5	$12,224,930
	Total	**16**	**$38,516,060**

HEATING, BAKING, DRYING WITH LASER TECHNOLOGY FOR FOOD AND PULP AND PAPER INDUSTRY SECTORS

CENTER FOR ADVANCED RESEARCH IN DRYING

City/State: Worcester, MA

Federal Funding: $2,750,000

Project Lead: Worcester Polytechnic Institute

Partners: University of Illinois at Urbana-Champaign; RAPID Manufacturing Institute; Reading Bakery Systems; Electric Power Research Institute; Alliance for Pulp and Paper Technology Innovation; IPG Photonics

Description: Worcester Polytechnic Institute (WPI) and partners aim to develop and demonstrate process heating electrification utilizing laser technology and integrate laser technology with other heating and drying technologies including ultrasound and infrared. Proposed efforts also include development of models, sensors, and an artificial intelligence based algorithmic framework. The project will leverage an existing pilot-scale drying testbed at WPI to demonstrate enhancement in energy efficiency of up to 40% in food applications and 20% in paper applications with required capacity and with improvement or no degradation in product quality. Successful research leading to commercialization would advance electrification approaches for reducing on-site GHG emissions in the food processing and paper industries.

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AQUEOUS-PHASE ROLL-TO-ROLL CONTINUOUS MANUFACTURING OF ROBUST AND TUNABLE GRAPHENE OXIDE MEMBRANES FOR FRACTIONATION OF COMPLEX FEEDSTOCKS

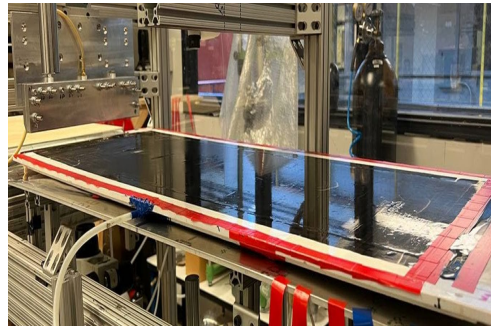
City/State: Atlanta, GA

Federal Funding: $2,126,875

Project Lead: Georgia Tech Research Corporation

Partners: Mott Corporation

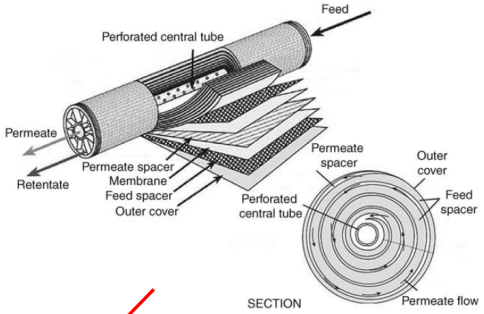
Description: The Georgia Institute of Technology and its partner aim to: 1) develop and scale-up a continuous roll-to-roll (R2R) fabrication process for the robust and tunable reduced graphene oxide (rGO) and rGO-X nanofiltration membrane technology, and 2) assemble spiral wound elements and operate a continuous pilot skid to optimize separation characteristics. GO-based compositions along with the polymeric supports can enable excellent performance and stability in harsh conditions of high pH, high temperature, and high solid content loading. The spiral wound rGO and rGO-X membrane modules will be extensively evaluated, optimized, and validated by demonstration for six-month continuous operation. Impact areas can also extend to emerging challenges of removing high molecular weight compounds in pyrolyzed bio-oils, crude biofuels, waste plastics etc. The project's technical approach truly advances graphene oxide membranes and demonstrates the energy balance through modeling in early stages. The technology has a high impact potential in decarbonizing various cross-sectoral spaces.

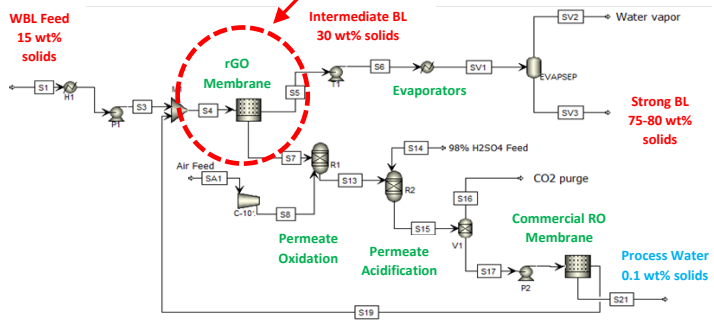


RGO membrane continuous fabrication

Spiral wound element assembly

Detailed module evaluation and optimization in real BL





Novel process design and TEA/LCA

RAPID ADVANCEMENT IN PROCESS INTENSIFICATION DEPLOYMENT (RAPID)

- A new, **5-year, $40 million** investment to drive RD&D of advanced process technologies to enable **more resilient, lower cost, and reduced energy and carbon footprint manufacturing** in the process industries.
- Follow-on funding from **DOE's original $70M investment**.
- Includes the production of chemicals and fuels, which account for **more than a third** of all U.S. industrial emissions and energy consumption.
- RAPID's work will align with the **Clean Fuels & Products Shot**.

RAPID

DOE INSTITUTE FOCUSED ON ELECTRIFYING PROCESS HEAT

- The Electrified Processes for Industry without Carbon **(EPIXC)** Institute is DOE's 7th Clean Energy Manufacturing Innovation Institute.
  - Allocates up to **$70M** in federal funding over the next 5 years to fund RD&D projects to electrify process heating.
  - Mobilizes a multisector coalition of private companies, National Labs, universities, labor unions, and community partners to create an innovation ecosystem.
  - Bridges the gap between research and commercialization to move novel electrification processes out of the lab and into the market.

EPIX
Electrified Processes for Industry without Carbon

ASU Arizona State University

U.S. Department of ENERGY | Office of Energy Efficiency & Renewable Energy

INDUSTRIAL ENERGY STORAGE SYSTEM PRIZE

Prize to accelerate market adoption for cost-effective energy storage concepts and technologies for industrial applications and data centers

AMERICAN MADE CHALLENGES
U.S. DEPARTMENT OF ENERGY

IEDO is seeking innovative ideas using thermal energy storage in the following categories

1. Industrial cooling energy storage
2. High temperature industrial energy storage
3. Industrial thermal storage for hybrid cooling, heating, and power

[Industrial Energy Storage Systems Prize | HeroX]

U.S. Department of ENERGY | Office of Energy Efficiency & Renewable Energy

NEW ISEED WORKFORCE INITIATIVE

- $3 million in funding for new Industrial Sustainability, Energy Efficiency, and Decarbonization (ISEED) Collaborative to help **grow the readiness of the workforce** needed to decarbonize the U.S. industrial sector.
- ISEED will provide assistance to partners across the manufacturing sector to develop and disseminate instructional **curricula and training programs focused on industrial sustainability, energy efficiency, and decarbonization**.

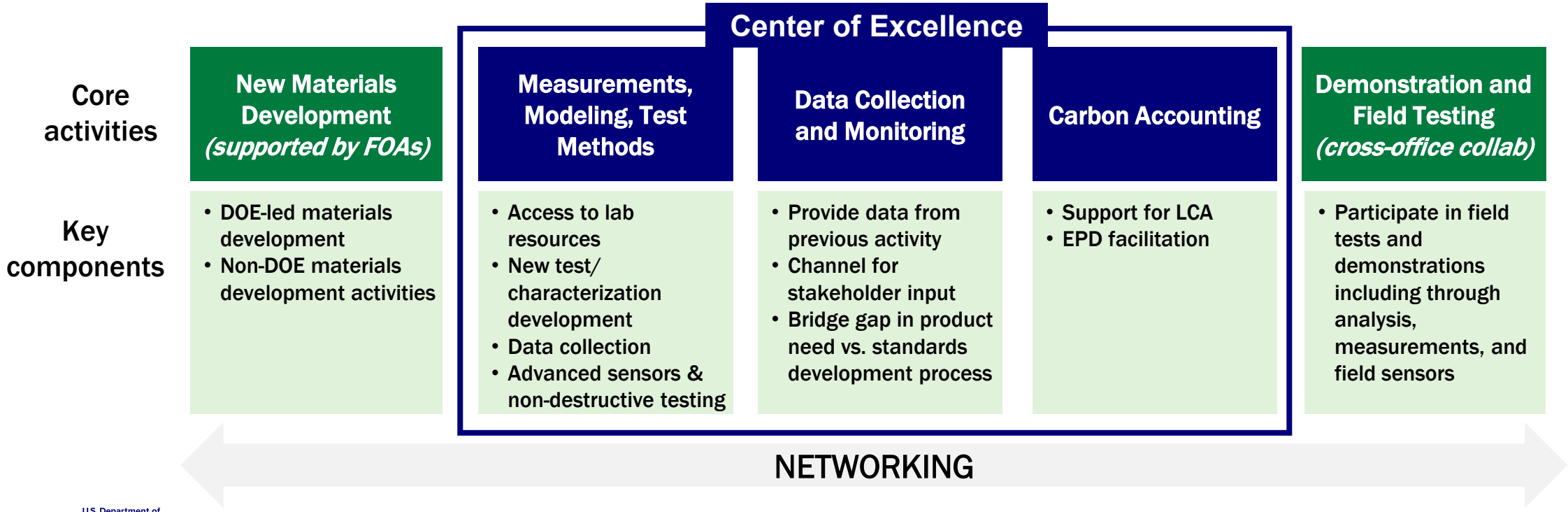
Applications due: November 1, 2024

CEMENT & CONCRETE CENTER OF EXCELLENCE

OBJECTIVES:

Safely accelerate the development and adoption of new cement and concrete materials through advanced materials analysis, modeling, and demos.

Foster collaboration between stakeholders (industry, startups, federal & state agencies, non-profits, academic, national laboratories, etc.).



THEME: DATA CENTER EFFICIENCY AND DECARBONIZATION

DATA CENTER DEMAND COULD GROW FROM ~4-6% TODAY TO ~9%+ OF TOTAL ELECTRICITY DEMAND BY 2030

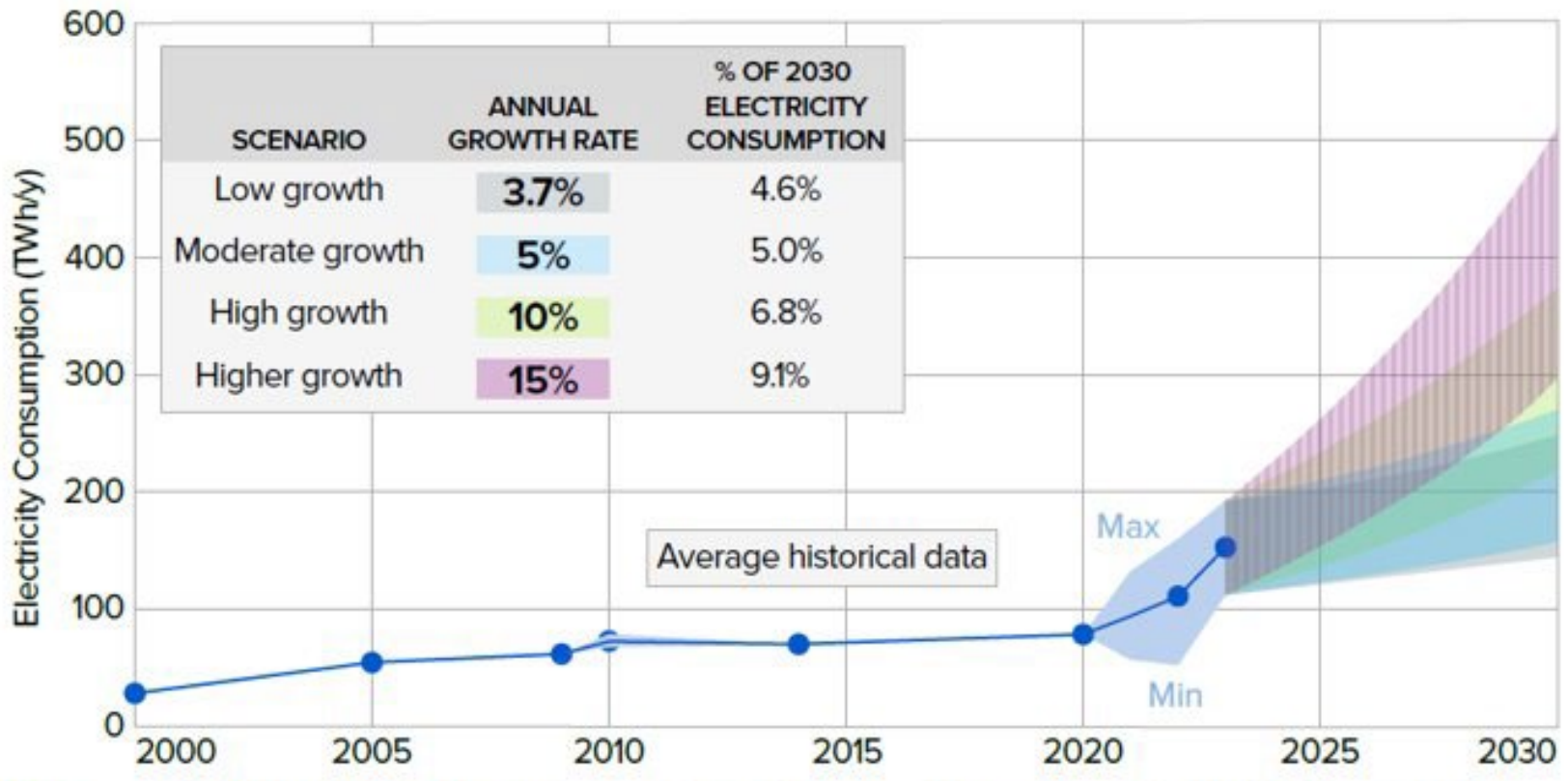


Figure ES-1. Projections of potential electricity consumption by U.S. data centers: 2023–2030 . % of 2030 electricity consumption projections assume that all other (non-data center) load increases at 1% annually.

DOE APPROACH TO DATA CENTER LOAD GROWTH

Achievements to date:

- Summer 2024: Published resources at **energy.gov/electricitydemand**
- September 2024: White House, DOE, DOC convening on critical AI infrastructure; **prioritize AI data centers** in the overall growth efforts
- Ongoing: Connecting with hyperscalers, data center operators, utilities, state/local officials, communities to assess challenges and opportunities

DOE's investment areas:

- Engage the industry with technical and financial assistance through DOE's Data Center Engagement Team:
    - Contact: businesshub@hq.doe.gov
    - Resources: **energy.gov/electricitydemand**
- Promote and expand DOE resources for the industry (ex: coal site redevelopment, clean energy projects on DOE lands)
- Support regional convenings with stakeholders for coordinated development

RD&D AND TECHNICAL ASSISTANCE FOR DATA CENTERS

CST: RD&D on Thermal Management and Energy Systems Integration

- **Thermal Management:** immersion cooling systems; waste heat recovery and utilization.
- **Energy Systems Integration:** combined cooling, heating, and power (CCHP); energy storage systems.

TAWD: LBNL Center of Expertise for Energy Efficiency in Data Centers

- Provides tools, training, and technical expertise in the deployment of efficient energy management practices in data centers
- Data Centers Profiler (DC Pro) and other assessment tools to estimate the energy performance of a data center and help identify opportunities for improvement
- Data Center Energy Practitioner (DCEP) program to develop a data center workforce skilled in energy-efficient data center operation

Advanced Materials and Manufacturing Technology Office

EES2

Energy Efficiency Scaling for 2 Decades

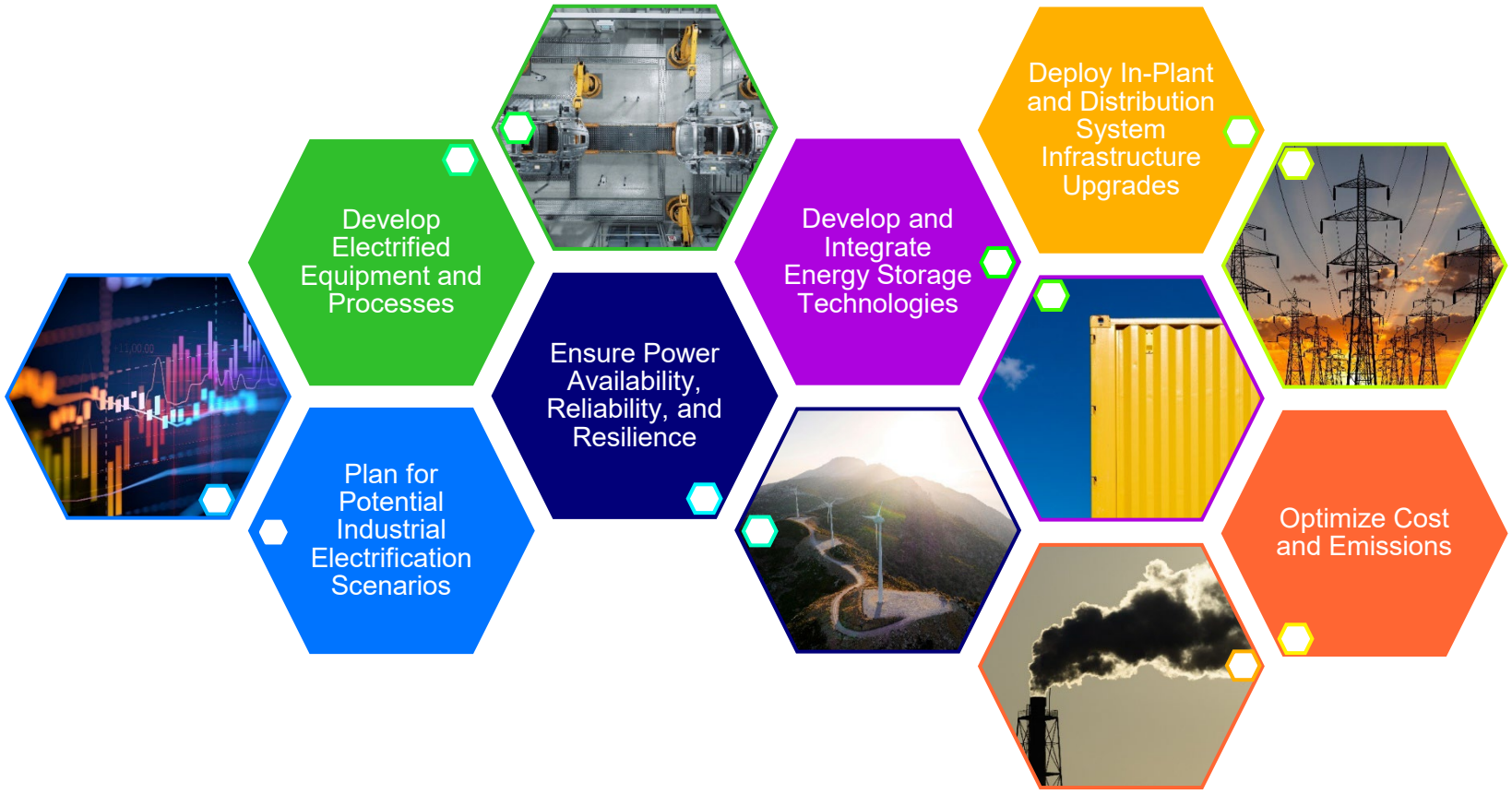
Buildings Technology Office

Better Buildings® U.S. DEPARTMENT OF ENERGY

ARPA-E

COOLERCHIPS

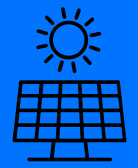
THEME: SUPPORTING INDUSTRIAL ELECTRIFICATION THROUGH INDUSTRY-GRID INTEGRATION

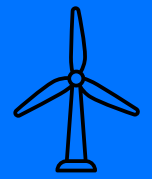


ONSITE ENERGY PROGRAM

Provides technical assistance, market analysis, and best practices to help industrial facilities and other large energy users increase the adoption of onsite clean energy technologies.

Onsite Energy
Technical Assistance Partnerships
U.S. DEPARTMENT OF ENERGY





- Battery Storage
- Combined Heat and Power
- District Energy
- Fuel Cells
- Geothermal
- Industrial Heat Pumps
- Renewable Fuels
- Solar PV
- Solar Thermal
- Thermal Storage
- Waste Heat to Power
- Wind

THEME: INDUSTRIAL COMMUNITIES R&D COMMUNITY BENEFIT PLANS

Diversity, Equity, Inclusion, and Accessibility (DEIA)

- Increasing minority representation in the sector to leverage skills of entire society

Workforce Development

- Identification and development of workforce training programs
- Skill and knowledge documentation

Energy Equity And Environmental Justice (EEEJ)

- Anticipated project benefit to disadvantaged and underserved communities

Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) milestones strengthen commitments and maximize positive impact

IEDO CBP RESOURCES

Development of website resources for IEDO applicants on Community Benefit Plans

- Comprehensive guidance on strengthening CBP applications
- Outlines of weak, strong, and excellent plan components with guiding questions and examples

Considering Communities in Industrial Decarbonization Webinar Series

- First webinar featured 3 expert panelists from national lab and academic institutions
- 172 unique viewers across diverse geographic regions, with recording hosted on IEDO website
- Second webinar in planning stages

ENTER THE FRAMING THE FUTURE PHOTO CONTEST

Submit your photo of America's industrial transformation by November 21, 2024. Winners of six photo categories will share a $27,000 total prize pool.

Thank you!

Subscribe to our newsletter **“The Production Line”** to get the latest information.

www.energy.gov/eere/iedo/subscribe-iedo-newsletter

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Situation

ITIAC will produce a report to the Secretary. Desired aspects:

- Meaningful
- Impactful
- Shorter rather than longer (max pages for similar report ~ 65 pages)
  - Discuss including (or not) lengthy appendices to include all subjects)
- Should include recommendations (which will be reported on # adopted in future years)
  - Recommendations should be listed early in the report with executive summary
  - Recommendations should be listed to the vital few and prioritized in order
- May include findings
- Should not repeat information already in the public domain

Options

1. **Continue with report outline (could assign ~ # of pages to each subcommittee)**
    - Advantages: Structure already developed
    - Cons: Could easily result in lengthy document repeating some information already available

2. **Consider main areas to focus on (examples: Data (what did Joe C say here?) and Recycling (plastics, aluminum, scrap steel, etc.)**
    - Advantages: Structure lends itself to a shorter document, minimizes potential for duplication
    - Cons: Could be seen as incomplete (need to check against the charter)

3. **Use barriers as a focus and describe recommendations to address the barriers**
    - Advantages: Structure lends itself to a shorter document, minimizes potential for duplication
    - Cons: Could be seen as incomplete (need to check against the charter)

4. **Use recommendations as the focus – include recommendation, how are they defended, could include background**
    - Advantages: Similar to an existing report structure, lends itself to shorter document, puts recommendations front and center
    - Cons: Could be seen as incomplete (need to check against the charter)

Recommendation

We are on a break and will return at 11:00 am ET

Subcommittee Report-Out

Report-Out: Subcommittee on DOE Current Work and Gaps Assessment Leads: Jeff Rissman and Sasha Stashwick	

Subcommittee on DOE's Current Work Assessment and Gaps; progress to date

- Held three subcommittee meetings since summer full ITIAC meeting
- Gathered data and made tables of existing DOE programs
- Initial recommendations bulleted out for a subset of section content
- Assigned leads to all sections to flesh out recommendations
- Jeff has worked closely with Outline subcommittee to ensure thoughts from this section are well reflected in ITIAC report outline

Outlined subtopics for report section

1. Comprehensive overview of DOE's existing activities and programs pertaining to accelerating a transition to clean and competitive U.S. industry
2. Comprehensive set of useful and actionable recommendations for DOE to help:
    a. Provide better data and computer modeling to assess clean industrial progress and needs
    b. Optimize existing DOE programs and technology choices
    c. Ways DOE can help seize opportunities or overcome barriers
    d. How DOE can serve as a coordinator
    e. How DOE can use other helpful policy tools
    f. How DOE can advise other agencies
    g. How DOE can best understand industrial needs and challenges and partner with industry

Next steps

- Confirm deadline via Sharon + ITIAC leadership for first draft of our subcommittee section
- Agree how to handle references (with guidance from Sharon + ITIAC leadership)
- Assigned leads for each subtopic create first drafts
- Jeff and Sasha combine first drafts into a single document
- Hold subcommittee call for synchronous review of first drafts; make comments in margins and detailed edits offline

Subcommittee Report-Out

Report-Out: Subcommittee on Barriers

Leads: Cathy Choi

Barriers Subcommittee

20241029 ITIAC Update

Subcommittee members

- Betsy Dutrow
- Sue Clark
- Abigail Regitsky
- Sasha Stashwick
- Neal Elliott
- 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

Project plan with milestones

	Owner	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	Cathy														
Complete Definition for Workforce	Neal														
Complete Definition/Actors/Notes for Access to low-cost clean energy to power	Sasha, Eric														
Complete Definition/Actors/Notes for Electricity cost (may be a barrier to adoption)	Sasha, Eric														
Complete Definition/Actors/Notes for Pilot to demonstration to deployment (and supply chain)	Neal														
Complete Definition/Actors/Notes for Technology gaps (where R&D can help)	Sue														
Complete Definition/Actors/Notes for Infrastructure & permitting & policy support	Betsy, Neal														
Complete Definition/Actors/Notes for Financing barrier: market demand (policy or private sector) - long-term offtake of clean goods	Cathy														
Complete Definition/Actors/Notes for Workforce	Neal														
Brainstorm analysis tools/techniques to determine extent and impact of barriers															
Barriers slides complete and sent to ITIAC for 6 month report out	Cathy														
Mid-Year subcommittee Report-out (6 month)	All	29-Oct													
Write-up Recommendations for Access to low-cost clean energy to power	Sasha, Eric														
Write-up Recommendations for Electricity cost (may be a barrier to adoption)	Sasha, Eric														
Write-up Recommendations for Pilot to demonstration to deployment (and supply chain)	Neal														
Write-up Recommendations for Technology gaps (where R&D can help)	Sue														
Write-up Recommendations for Infrastructure & permitting & policy support	Betsy, Neal														
Write-up Recommendations for Financing barrier: market demand (policy or private sector) - long-term offtake of clean goods	Cathy														
Write-up Recommendations for Workforce	Neal														
Implement analysis technique to prioritize barriers															
Barriers slides complete and sent to ITIAC for 12 month report out	Cathy														
Full Committee Review & Discussion Complete Report Draft (12 month)	All														
Incorporate into ITIAC report: Prioritized Barriers and Recommendations															
Full Committee Presents Report Final Report Prepared, Approved, and Sent to Secretary (18 month)	All														
Final Report Sent to Congress	DOE ITIAC														

Gap with Technology Barriers

By Oct 2024:

- Barriers subcommittee need to complete tasks per the outline

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

Barriers

Electricity cost (as a barrier to adoption) – Sasha

- ✓ Includes the need for access to this low-cost electricity
- ✓ Need for utility rate plans that pass through wholesale electricity pricing and recognize the value of flexibility provided by certain industrial technologies

Access to low carbon fuels and feedstocks

- ✓ **Bioenergy - Sasha**
- ➢ Should this group address H2 as a fuel since DOE has many other offices addressing H2 as a fuel? Suggestion: Focus on industrial applications of H2 and the barrier of sourcing H2. Industry specific sections will address the technology of using H2 within their industrial processes.
- ➢ Do we have ITIAC members or connections that have expertise in H2?
- ✓ **Address industries that burn their own byproducts as fuel (e.g., refineries burn refinery fuel gas and petcoke; pulp and paper and wood and wood products industries burn biogenenic waste). The fuel is free today and would become a waste stream needing disposal or transformation into a sellable product if it could no longer be burned. - ?**
- ➢ Do we have ITIAC members or connections that have expertise in In-situ byproducts used as energy?

Barriers

Pilot to demonstration to deployment (and supply chain) – Neal

Technology gaps (where R&D can help) – Sue

- Can we leverage Cross-Cutting Technologies and Opportunities Subcommittee?
  - Similar deliverables of definition, actors

Water adequacy and energy-water nexus– Neal

- ✓ Barrier is due to consumption (how much is available, quality of water e.g. intrusion and salinity of aquifers) and discharge
- ✓ Needed for cooling, for CHP, feedstock for making hydrogen, etc.

Infrastructure, permitting & policy support – Betsy, Neal

- ✓ How to get the required infrastructure built quickly, affordably, and efficiently.
- ✓ Streamlining process for approving and building electricity transmission and distribution.
- ✓ Infrastructure for other clean energy sources, such as green hydrogen or sustainable bioenergy
- ✓ Educate on policy drivers and/or private sector demand for long-term offtake of clean goods
- ✓ For a while, green government procurement programs can provide a reliable offtake market for cleanly-produced products, but eventually the private sector needs to be the main off-taker
- Should we include Carbon management infrastructure – storage, transportation, wells, pipelines or is this scope creep?

Barriers

Financing and market demand barriers – Cathy

- ✓ Potential capital issue with desalination for water adequacy; how does the water utility get recovery of capital costs?

Workforce needs– Neal

- ✓ access to sufficient science, technology, engineering, and math (STEM) talent

Data access and modeling – including access/quality and standard metrics

- ✓ Data availability and modeling
  - ✓ Creating appropriate models, census data, models used by industry
- ✓ Metrics and standards
  - ✓ Coordination with US and globally of standards organizations (e.g. ISO, UL etc.)
  - ✓ Engage DOE International Office – treaty of global governments on decarbonization

➢ Is there an existing ITIAC member with this expertise who can lead this?

Process to Prioritize - Brainstorm

- How to evaluate
  - Maturity of barriers' recommendation/solution
  - Maturity/accuracy of data available for the cause of the barrier
  - Maturity/accuracy of the model that is simulating the cause of the barrier
  - Maturity/accuracy of the model that is simulating the impact of the barrier's solution
- How to measure impact of the barrier
  - Magnitude of impact of overcoming barrier
- How to measure long-term sustainability of the barrier solution if implemented
- How to measure political viability of the barrier's solution if implemented

Attributes against which to "judge"

- How to measure long-term sustainability of the barrier solution if implemented
- How to measure political viability of the barrier's solution if implemented
- US based companies are able to seed, grow, harvest technologies they are producing

Thought experiment/rear view mirror ideas

- Cement or Steel, market structure and barriers to transition
  - Commercialization: What does it take to sustainably move forward
  - Compare to current barrier categories of barrier
- Similar Industry topic to “Charging station funding”
  - Rear view mirror: what could be done differently
- Industry Investment cycle
  - Share of industries coming up for reinvestment and what needs to be true to have deep decarbonization
- All subcommittee members Review the lift-off report and/or website:
  - https://liftoff.energy.gov/wp-content/uploads/2024/02/LIFTOFF_DOE_Industrial-Decarbonization_REV022724.pdf or https://liftoff.energy.gov/industrial-decarbonization
- Action: DOE will assign a facilitator for thought experiment/rear view mirror
- Action: Use elements of the lift-off report against the thought experiments

ITIAC Subcommittee on Workforce and Social Considerations

Subcommittee Members:

Anna Fendley (Lead)

Comas Haynes (Co-Lead)

Sue Clark

Abigail Regitsky

Sridhar Seetharaman

Proposed Timeframe as Reported at Previous ITIAC Full Committee Meeting

Q3 2024 Factfinding meetings

Q4 2024 Draft this subcommittee's contribution to the report

Q1 2025 Deliver contribution to the full committee for incorporation in the report and to resolve differences

Progress from Recent Meetings

Framing of our intent/ statement of success

Precursors to “factfinding” from IEDO and other parts of DoE on how they currently address social & workforce considerations

Initial clarification/discussion of explicit contributions to the report

Framing of Our Intent/ Statement of Success

Subcommittee Mission: Incorporate within the report critical workforce and social considerations and recommendations that are necessary to increase technological and economic competitiveness of industry in the US, as well as achieve emissions reduction in industrial sectors.

[Considerations and recommendations will include attention upon equitable means of community engagement and pathways for diverse workforce talent to enter or "upskill" into related careers.]

Factfinding Regarding IEDO's/DoE's Address of Social & Workforce Considerations

Precursors to "factfinding" from IEDO and other parts of DoE on how they currently address social & workforce considerations (e.g., high-level overview of R&D approach versus demonstration/deployment approach regarding community benefit plans) — **factfinding still in process inclusive of present full committee meeting**

- *Important to fully acknowledge and base recommendations upon pre-existing structures and initiatives given the expanse of this topic and efforts to address it*

Initial Clarification/Discussion of Contributions to the Report

An explicit "Chapter 7: Workforce and Social Considerations" {As of Oct. 25, 2024}

- Workforce training – including manufacturing workers, and trades that support manufacturing like electricians, pipefitters, construction workers, welders, etc.
- Workforce availability & demographics
- Ensure sufficient access to workers with STEM and related skills
- Manage any job disruptions and negative impacts of technology deployment on the workforce
- Community/stakeholder engagement when industries build new plants, retrofit or build additions to plants, or make other changes that impact the community (such as layoffs)
- How national labs help with workforce development
- Occupational safety & health considerations
- Reducing pollutant impacts on frontline communities

Supplemental collaboration to assist other chapters (e.g., "Chapter 3: Cross-cutting Technologies & Opportunities")

Goals for Next Meeting in Q4 2024

Agree on an outline for the Workforce & Social Considerations chapter of the report and confirm agreement with outline subcommittee [yet still have some room to treat this as a “living document” in concert with the outline committee]

Discuss topic overlap with other subcommittees and suggestions for collaboration

Take initial assignments for drafting

Goals for Next Meeting in Q4 2024

Identify additional people to help with input, these may include:

- EWD needs identified from the cross-cutting committee i.e. electricians/electrical workers.
- Sectors sub-committee on identified industry specific EWD needs
- IBEW representative in ITIAC on electrical needs
- Can we get input from DoL on their identified gaps and strategy for manufacturing EWD

Barriers

Scheduling: We aim to have one more meeting in the middle of the present quarter and put meetings on the calendar for 2025 as soon as possible

Inefficient topical overlap with other subcommittees: We aim to identify those as soon as possible via our subcommittee's representation on other subcommittees

Subcommittee Discussion

Subcommittee on Economic Considerations

a. Need for a carbon border adjustment mechanism (CBAM) or other GHG-based border fee to protect domestic industrial firms from competition from dirty producers abroad
    i. Need to track provenance and GHG intensity of imported products, perhaps coordinating with the European Union, which has the same data collection needs for their CBAM
b. Addressing operating cost gap though policies such as tax credits or access to more favorable electricity rates
c. Access to upfront financing for upgrading to clean industrial processes and equipment (grants, tax credits, low-cost loans)
d. Ensuring a market for long-term offtake of clean goods
e. Industrial technology exports – exporting and licensing American clean industrial technology to help clean up industries overseas while making the U.S. a global technology leader
f. Alignment between U.S. and international standards to facilitate technology interoperability and policy compatibility. Examples:
    i. PFAS rules
    ii. Embedded carbon accounting (for CBAM)
    iii. Other standards harmonization
g. Supply chain resilience (e.g. versus shipping disruptions, natural disasters, etc.)

Path Forward

- Organize subcommittees into technology assessments and program evaluation
    - Technology assessments: industrial subsectors, cross-cutting technologies
    - Program evaluation: workforce and social, DOE assessment and gaps
    - Between both elements: barriers and economic competitiveness
- Address report requirements through a combination of formal recommendations and findings
    - Findings may formally acknowledge, for example, industry trends, DOE successes, adequacy of existing program strategies, etc.
    - Recommendations should be clear and actionable by DOE
    - Revisit all outline topics to ensure there is a clear recommendation or finding that could be attached & legislative direction to ensure there are no gaps
    - Don't duplicate information already in the public domain
- Tabled for January: The overall report should not exceed X pages; the report should not include more than Y recommendations.
- By the next full Committee meeting (~January 2025), subcommittees will develop possible recommendations/findings, develop plans to validate those recommendations/findings, and begin executing those plans
- The Outline subcommittee will pivot to focus on integration and coordination

Public Comment

Public Comment	12:50 pm

- The deadline for submitting a request for public comment to share during this meeting was 5:00 pm EDT on October 25 as shared in the Federal Register Notice (FRN)
- You may send a written statement at any time to ITIAC@ee.doe.gov
- For future meetings, the public comment period will generally be held at the end of the meeting (or last day for multi-day meetings)

Adjourn

Thank you!