

INDUSTRIAL TECHNOLOGY INNOVATION ADVISORY COMMITTEE (ITIAC) MEETING MINUTES

Date and Time: October 29, 2024, 9 a.m. – 5 p.m. ET
October 30, 2024, 9 a.m. – 1 p.m. ET
Location: U.S. Department of Energy Headquarters, 1000 Independence Ave. SW, Washington, D.C., broadcast via ZoomGov, hosted by DOE Industrial Energy and Decarbonization Office (IEDO)
Purpose: Industrial Technology Innovation Advisory Committee (ITIAC) Meeting

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Participants

Committee Members in Attendance: Ms. Sharon Nolen, Chairperson; Dr. Sunday Abraham; Dr. Cathy Choi; Dr. Subodh Das; Ms. Betsy Dutrow; Dr. Neal Elliott; Dr. Comas Haynes; Dr. Joe Powell (remote Day 1; in-person Day 2); Dr. Abigail Regitsky; Mr. Jeffrey Rissman; Dr. Sridhar Seetharaman; Ms. Jolene Sheil; Ms. Sasha Stashwick

U.S. Department of Energy (DOE) Participants: ITIAC Designated Federal Officer (DFO) Dr. Zachary Pritchard, Alternate Designated Federal Officer (ADFO) Dr. Celina Harris, Dr. Avi Shultz, Mr. Joe Cresko, Dr. Paul Gauche, Mr. David Borak, Mr. James Haug, Ms. Abby Blum, Ms. Melia Manter, Mr. Ramsey Fahs, Mr. Joe Paladino

ITIAC Staff: Pamela de los Reyes, Caroline Dollinger, Simone Hill-Lee, Mahia Qureshi

Committee Members Not Attending: Dr. Sue Clark, Ms. Anna Fendley, Dr. Akshay Sahni, Mr. Sergio Espinosa, Dr. Arun Majumdar

Meeting Summary

The fourth meeting of the Industrial Technology Innovation Advisory Committee ([ITIAC](#)) was held October 29–30, 2024, in person at DOE headquarters in Washington, D.C. ITIAC subcommittees presented updates on their work to define and outline content of the ITIAC report to be presented to the Secretary of Energy with analysis and recommendations for decarbonization of the industrial sector as outlined in the ITIAC Charter. Members also discussed the direction and the best way to present the information that has been prepared. To inform the Committee’s work, DOE offices provided presentations on their industrial decarbonization activities. The Office of Clean Energy Demonstrations (OCED) provided an overview of its current activities, funding awards, and Regional Clean Hydrogen Hubs (H2Hubs). The Office of Electricity (OE) presented its strategy on industrial electrification and challenges to implementation. The Industrial Efficiency and Decarbonization Office (IEDO) gave an overview of the office’s plans for Fiscal Year 2025.

In accordance with the provisions of Public Law 92-463, the meeting was open to the public. Members of the public were invited to attend virtually via the Zoom platform. As described in the Federal Register Notice ([89 FR 81058](#)), members of the public were able to register to provide oral statements and submit written statements to ITIAC@ee.doe.gov.

Materials Provided to the Committee

- [Agenda](#)
- Presentation slide decks
 - [Day 1 slides](#)
 - [Day 2 slides](#)
 - [OCED presentation](#)
 - [OE presentation](#)
- [Public comment](#)
- Mural brainstorm
- [Focus areas](#), described in section 454(c) of the Energy Independence and Security Act (EISA) of 2007 as amended by Pub. Law 116-260
- Draft outline for ITIAC’s report

Materials provided to the Committee are available on the [ITIAC website](#).

Welcome and Opening Remarks of October 29, 2024

ITIAC Designated Federal Officer (DFO) Dr. Zachary Pritchard opened the ITIAC meeting with introductions and roll call of members in the room and online.

ITIAC Chairperson Ms. Sharon Nolen welcomed the members and remarked the ITIAC has been making great progress since its initial meeting held in March 2024. She commented that recent severe weather events may raise awareness about climate assumptions, and the Committee has an opportunity to make a difference.

IEDO Deputy Director Dr. Paul Gauche welcomed members and briefly highlighted the importance of the work on industrial decarbonization. He underscored IEDO's mission and vitality and commented there is a lot of work to be done.

Status of Regional Clean Hydrogen Hubs and Industrial Demonstrations Program

Melia Manter, Engagement Office, OCED, opened the presentation with a background on the Industrial Demonstrations Program (IDP). **Abby Blum**, Engagement Office, OCED, gave an overview of the projects that were awarded, noting that projects' fact sheets and community benefit summaries are available on the OCED website. **Ramsey Fahs**, Policy Advisor, DOE, focused on the hubs demand side support program and gave an overview of the status of the H2Hubs. **James Haug**, Associate Director over Hydrogen Hubs, OCED, presented that the selection of the H2Hubs initiated negotiations with the federal government to fund the projects and define milestones and go/no go points. The scope of the H2Hubs concept is to invest in the supply, demand, and connecting infrastructure to bring all aspects online at the same time.

Discussion Highlights

Mr. Fahs responded to questions from Committee members regarding funding throughout the lifetime of H2Hubs projects that the support for operational costs is part of the funding appropriated for the awarded H2Hubs projects.

Committee members asked for clarification about the delivery of high-quality hydrogen to industry facilities from the hubs. **Mr. Haug** stated that some hubs are planning pipelines as a subproject to connect suppliers and large users. Since the non-federal investment in the hubs is approximately 80% of the capital, the business case needs to be justified to invest in that infrastructure. He also noted that some projects are dropping out of the portfolio to move forward without hubs funding because of timing restrictions under the National Environmental Policy Act (NEPA).

Dr. Abigail Regitsky asked how timelines for projects will be managed within the portfolio if projects begin and conclude different times. She also asked if there is an expectation for all projects to meet final investment decisions at the same time.

- **Mr. Haug** and **Mr. Fahs** confirmed that all the projects will be on different timelines based on size, type, etc. The flexibility of the timelines is built into the structure of the H2Hubs program, however, OCED is grappling with how to design the program to manage all the variables.

Dr. Cathy Choi asked if retraining or reskilling was part of the process for possibly displaced workers.

- **Ms. Blum** responded that training will vary by project. Many jobs are construction workers whose training will be upscaled, but there is also a set of facility jobs that will train onsite.

Dr. Choi noted that she did not see rail in the list of distribution projects on the slide presented.

- **Mr. Haug** stated there are no rail-specific projects in the scope of the hubs currently, but the infrastructure is expected to be utilized if it is already in place, e.g., ammonium delivery.

Ms. Sasha Stashwick asked if the program is trying to identify a replicable model for demand side support or identify other models that are more bespoke for commodities (clean hydrogen or steel) or services (carbon removal).

- **Mr. Fahs** stated the program is not trying to apply a model but using the institutional infrastructure from DOE to organize the program.

Mr. Jeffrey Rissman asked what changes would be implemented if the program is reauthorized in the future to help OCED better achieve its mission.

- **Mr. Haug** outlined factors that have caused frustration or insecurity for industry in the program to date. Refinements that could improve flexibility might include addressing uncertainty in the 45V tax credits, working with NEPA to ensure that robust environmental studies are efficient to limit delays, and determining ways to streamline the environmental studies through a programmatic approach to reduce new assessment requirements.
- **Ms. Blum** noted that the success of IDP is being applied to the H2Hubs to make it as successful as possible. She noted it is challenging to move as quickly as the selectees would like, but appetite for the innovation is a driving force.
- **Ms. Manter** added that every project that gets awarded is a little bit easier as the process is refined. Also, CBP is an entirely new process for applicants, but it is a big part of the program, and selectees will get comfortable with it over time.

Dr. Comas Haynes asked how detailed the reporting on the implementation of the CBP, specifically reporting requirements on social considerations and workforce training. He also asked if DOE offices are sharing lessons learned internally.

- **Ms. Blum** responded that the awardees will be required to report on the activities and events that are outlined in their CBPs. Reporting will follow a general format at the end of each phase, but also each project will have its own specific reporting tailored to the activities, boards, training, etc., in its CBP. She noted that the DOE offices and other agencies are trying to coordinate as much as possible.
- **Mr. Haug** noted that the CBP is approximately one third of the requirements for award.
- **Ms. Manter** stated that building the CBP into each phase of the projects for the H2Hubs allows it to be part of the go/no go process rather than just a static document. She added that not all agencies or offices administer CBPs in the same way, but sharing the experiences is valuable.

Dr. Neal Elliott commented that companies doing work under the CHIPS Act¹ are finding a need for longer lead times for workforce training and recruitment. He asked if there is consideration to move those activities into an earlier phase in the H2Hubs projects.

- **Mr. Haug** noted that there is an overall need for more engineers and technical tradesmen in general. Regardless of CBPs, companies need to have a plan to make sure there is a qualified workforce in the location. A big part of the H2Hubs project CBPs should be early training programs so that when construction starts, the workforce is available. He added part of the

¹ “H.R.4346 - CHIPS and Science Act,” <https://www.congress.gov/bill/117th-congress/house-bill/4346>.

planning phase with the awardees is to help companies that do not have the experience with workforce planning to track regional workforce issues.

Transforming Industry Workshop and Request for Information

Joe Cresko, Chief Engineer, IEDO, provided an overview of Pathways for U.S. Industrial Transformations vision study and the input received from the stakeholder workshop. The Pathways report will be a comprehensive and detailed analysis of the approach, barriers, frameworks, and activity to achieve low to near net-zero emissions as individuals, organizations, and a society. The goal is to publish the vision study report by the end of the year.

Dr. Elliott commented that most of the industrial development is occurring in 15–18 U.S. states and asked if a regional segmentation overlay to the pathways analysis has been done.

- **Mr. Cresko** responded that there is some assessment for regionality. For example, proximity to geological storage is used to inform the uptake of carbon capture and sequestration technology. There is a value to seeing pathways broken down in a layered and sequential approach, which sets the stage for the work to be applied in a more targeted way.

Chairperson Nolen asked for clarification on the transition from fossil-fueled combined heat and power to a replacement fuel.

- **Mr. Cresko** replied that a concern with any transition involves the consequences of locking in certain technologies early while technologies advance. Companies must consider the size of the investment, how adaptable technology will be to other forms of combustion (e.g., co-fire hydrogen), investing in R&D, and future constraints of the resource as part of investment calculations. DOE can help identify the issues to consider, but facilities ultimately make the decisions about investment in new technologies or fuels.

Dr. Elliott asked if the models are able to consider disruptions within the value chain, such as introduction of a new intermediary process or technology.

- **Mr. Cresko** stated it is not considered explicitly, but there are models for supply chains that account for inputs and outputs at each step, such as National Renewable Energy Laboratory's Materials Flows through Industry tool. He added no single model provides the insight, rather a range of models must be used.

Dr. Joseph Powell commented that the ITIAC Subcommittee on Industrial Sectors identified circularity as a critical factor in decarbonization. He added that industry has conducted studies on feedstock utilization, and the energy requirements and thermodynamics in some of the pathways will be more energy- and cost-intensive than fossil fuels.

- **Mr. Cresko** noted there is a circularity futures study within DOE that is a follow up to the 2015 *Renewable Electricity Futures*² study that looks at some of the points that Dr. Powell raised across the range of industries' products and materials at end of life.

In response to Committee members' questions about availability of the models for the Pathways report, **Mr. Cresko** confirmed that the intent is to release the models to the public—first the report, followed by the models. Sharing the spreadsheet models will allow industry and academia to change assumptions and

² "Renewable Electricity Futures for the United States," June 4, 2015, <https://www.energy.gov/eere/analysis/articles/renewable-electricity-futures-united-states>.

inputs, and the models can be adapted by users to be more specific. The models were designed for insight, directionality, and guidance, but they could have limitations.

Dr. Subodh Das noted that ITIAC has identified additional sectors beyond those in the decarbonization roadmap and asked how DOE would incorporate the additional sectors into the roadmap.

- **Mr. Cresko** stated that the report includes a section that mentions other sectors not included in the main six that were modeled. The report tries to qualitatively identify factors important to those other subsectors, i.e., emissions impact from technologies across the aluminum supply chain and adding aluminum to the critical materials list. The report incorporates a few case study examples in the rest-of-industry section, but points to outside resources for details.

Ms. Betsy Dutrow noted that for the farming industry, emissions impacts are from fertilizer and inputs from the manufacturing sector. She noted that materials and circular economy will impact the industry.

- **Mr. Cresko** responded that research at Oak Ridge National Laboratory (ORNL) indicated that reduction of food loss and waste through the supply chain from farms to consumers equates to energy and material efficiencies.

Report Out: ITIAC Subcommittee on Report Outline

Chairperson Nolen asked for input on the report outline, looking for overlaps among subcommittees, gaps in the content, and agreement on the outline and format of the report. The goal is to reach agreement among members on the format and organization of the report. She introduced the chapters of the report, and members of the Report Outline subcommittee gave an overview of each section in the outline. She also reminded members to document comments or questions on the Mural board. Each subcommittee was scheduled to present a more detailed discussion of its progress later in the meeting.

Discussion Highlights

Mr. Rissman stated that the *Economic Competitiveness* chapter makes specific points that could help ensure manufacturing competitiveness in the United States.

- **DFO Pritchard** noted that some items, such as policy recommendations, edge into areas on which the Committee might reframe as actions that DOE could take to further these goals.

Dr. Regitsky highlighted the *Workforce and Social Considerations* chapter's look at existing training and the role of DOE in expanding training.

- **Chairperson Nolen** noted the Industrial Training and Assessment Centers (ITAC)³ should be included in the section as well.

Mr. Rissman stated there is potential for content in the *DOE Current Work Assessment and Gaps Analysis* chapter to overlap with other chapters, so this chapter focuses on DOE's work and what gaps need to be filled.

- **Dr. Elliott** suggested adding Department of Commerce with respect to workforce, infrastructure availability, (particularly electricity and water), non-CO₂ greenhouse gas (GHG) emissions, and CHIPS and Sciences Act as an example agency for Subsection 6.

³ "Industrial Training and Assessment Centers (ITACs)," Office of Manufacturing and Energy Supply Chains, <https://www.energy.gov/mesc/industrial-assessment-centers-iacs>.

Chairperson Nolen noted that the last sections were *Recommendations* and *Summary and Conclusions*. She noted that recommendations should be consolidated in one place from earlier sections and prioritized. This section would not include new recommendations. The final section of the report is planned as a brief summary and conclusions gleaned from all other sections.

- **DFO Pritchard** stated that per Federal Advisory Committee Act (FACA) guidelines, the DFO must report the number of recommendations made by the Committee and how many of those were implemented by DOE each year. He noted that reporting is easier when the recommendations are summarized in one place.

Chairperson Nolen expressed a preference for the Committee to have agreement on the outline of the report, incorporating any specific changes noted during the subcommittee report outs in this meeting. The level of detail in the report should also be decided to determine the length of the report.

In response to Committee members' questions about the format of report recommendations, **Mr. David Borak** clarified that there is no set way to provide recommendations. As the DFO of the Secretary of Energy Advisory Board (SEAB), he shared that SEAB structures its annual reports based on the current Secretary's preference for shorter reports with recommendations to be highlighted as main points. However, ITIAC's report format is up to the Committee to determine the best way to convey its message.

Committee members discussed potential structures for the report, with several recommendations for moving the Recommendations section to the front of the report followed by detail. Members also discussed the voice and format of the individual chapters. It was noted that this report has a large scope and the Charter should be reviewed to make sure the report addresses the requirements of Congress and the Secretary.

- **Mr. Cresko** suggested that the members pick out root issues across the sections to identify the connections and synthesis issues to present as priorities.
- **DFO Pritchard** suggested that the initial report from the committee could be structured as a high-level discussion with focused recommendations, followed by separate, sector-specific reports with more detailed recommendations.

Report Out: Subcommittee on Industrial Sectors

Dr. Das introduced the subcommittee members and gave an overview of the sectors considered for the development of the *Industrial Sectors* chapter of the ITIAC report. Several sectors are well covered by existing roadmaps: iron and steel, aluminum, cement, and chemicals. More work is needed in pulp and paper and data centers, and other recommendations were provided on the last slide of the subcommittee's presentation. Subcommittee members presented additional summaries of the section content within the chapter and identified the main focus of each.

In the interest of time, **Chairperson Nolen** deferred the discussion of this chapter to the end of the day.

Integrated System Planning and Coordination within the DOE Office of Electricity

Joe Paladino, Senior Advisor, DOE Office of Electricity (OE), gave an overview of OE with focus on grid investment strategies and end use through coordination with other offices. The electrical grid is going through a major transformation due to coordination and integration of renewable resources and unprecedented growth of off-take for new technologies. The goal is to determine how to move through the transition to operate the grid in an efficient and effective manner to sustain reliability, resilience, portability and security.

Discussion Highlights

Dr. Elliott gave an example of an industrial facility proposing a 1-GW system to connect to the grid in three years. The current grid cannot handle the capacity; and utility upgrades, regulation, and planning could take up to 15 years. He asked how to reconcile this reality in the current market.

- **Mr. Paladino** suggested implementing a staged strategy for changes negotiated between the utility and industrial site owner could meet the needs. Some energy may be purchased or generated by industry, then the utility may want to have an agreement to determine a staged strategy for providing the balance. Policy makers may want industry growth for jobs and economic growth, but the utility is restricted on expenditures, and the structure for long term financing of the growth will have to be developed. Policy makers must be involved to drive the prioritization strategy.
- **Ms. Sheil** noted the politics of many regions may make it difficult to move forward.

Mr. Rissman commented that while industries might use distributed energy resources (DER) and distributed generation (DG) and could be flexible about consumption timing, the net effect will be greater demand. Some modeling of a clean industrial sector has shown a growth of demand by 2.3% annually for 30 years, which does not include the non-industrial growth.

- **Mr. Paladino** referred to a study⁴ by Synapse Energy that cited energy efficiency as a major resource to help meet future energy demands.

Chairperson Nolen asked if OE foresees deregulation to allow more opportunities to work across jurisdictions. She gave an example of an industrial plant that is on the edge of an electrical territory and saw it as an opportunity to work with another provider but was restricted by regulation.

- **Mr. Paladino** supported moving to a regional paradigm. The grid system was not designed from top down originally, and now has discontinuities that need to be addressed. Coordination among providers needs to become a priority.

Mr. Cresko asked if OE had studied scenarios looking specifically at industry input using microgrids, onsite energy, etc. He suggested industrial power generation could offset the demand and asked if that might be a gap in analysis that could be done collectively across DOE.

- **Mr. Paladino** responded that DER is limited in how much it can provide, and with anticipated load growth, storage will not alleviate the strain on demand.

Report Out: Subcommittee on Cross-Cutting Technologies and Opportunities

Dr. Elliott introduced the subcommittee members and noted that the subcommittee invited Neil Brown from Eastman Chemical Company as an outside expert on direct use of heat from renewable sources and bioenergy. Dr. Elliott outlined the content of the cross-cutting chapter of the report, followed by a more detailed discussion of each topic within the chapter outline.

Mr. Rissman added to Dr. Elliott's comments regarding circular economy and non-CO₂ GHG sections of the report. Circular economy is the idea of putting products and materials to their highest and best use at each point in their life cycles to extend their longevity. Non-CO₂ GHG means methane, primarily leakage from natural gas-using equipment or fertilizer plants; nitrous oxide (N₂O), primarily a byproduct of nitric

⁴ "Distributed Generation Potential, Value, and Policies for Washington, D.C.," Synapse Energy Economics, Inc., <https://www.synapse-energy.com/distributed-generation-potential-value-and-policies-washington-dc>.

and adipic acid manufacturing; and fluorinated (F) gases, which can be the trickiest as they are used as refrigerants, propellants and aerosols and are harder to control.

Discussion: Industrial Sectors and Cross-Cutting Technologies and Opportunities

Committee members discussed pollutants that might be included in the Cross-Cutting section, including thermally-generated oxides of nitrogen (NO_x) from the steel industry and black carbon. **Mr. Rissman** responded that NO_x is not generally considered an important GHG and that black carbon is not in scope at this point as consideration is not given for particulates, but the subcommittee could look into these if needed. Some Committee members expressed agreement that black carbon should be addressed. It was also suggested that water as a GHG be added as a footnote as it is not anthropogenic but may be impacted by emissions.

Dr. Elliott acknowledged overlaps highlighted by Dr. Powell between the industrial and cross-cutting chapters and asked for input to refine the content of the cross-cutting chapter, drop things not considered material to the discussion or identify topics that have not been considered.

Dr. Choi expressed disagreement about including data centers in the *Industrial Sectors* chapter. Data centers use energy, but she views them as providing a service rather than a product. She asked if data centers should even be in the scope of the report. Committee members discussed the pros and cons of including data centers.

- **Ms. Dutrow** suggested data centers are a growing consumer that can limit the availability of electricity for industry to use to decarbonize and perhaps should be considered as a barrier.
- **DFO Pritchard** noted that different DOE offices, including IEDO and others, handle different aspects of data center energy consumption. He also suggested the Committee consider putting weight behind SEAB published recommendations on data centers, or adding to those recommendations.

Dr. Powell noted that refining, the largest Scope 3 emitter, is another sector that is potentially missing from the report. However, their outputs are for transportation.

Dr. Powell commented that agriculture is treated as a critical issue in Europe because of GHG emissions and land use, and it represents a large area that the Committee is not covering.

Ms. Dutrow suggested that aluminum might not be a critical industry to cover because the United States does not have any primary production plants. Unless the discussion is on secondary (recycled) steel and aluminum, maybe it should be left out.

- **Dr. Das** stated there is an explosion of secondary aluminum technologies and investments. The United States produces the most scrap and landfill in the world which could take the place of primary aluminum processing.
- **Dr. Regitsky** supported covering secondary aluminum and steel as part of a circular economy. There is interest in reshoring primary capacity in a natural security mindset. The Committee should not necessarily ignore the primary production, instead addressing the history and the capacity for regrowth of the industries.

Ms. Stashwick recommended narrowing the focus to a few high impact recommendations. She suggested making a statement that acknowledges there are intersections in certain industries that ITIAC has identified as important issues that warrant deep dives but are out of scope for this report. This focus can increase the potential of the report to have influence and effect. Members agreed with the suggestion.

Dr. Choi suggested mining did not need to be acknowledged as its GHG emissions are mostly from vehicles at the mine site, so it might not be impactful.

Ms. Stashwick asked what percentage of GHG emissions IEDO considers to be generated by the six sectors that the Committee has agreed to include.

- **Mr. Cresko** stated that if refining was included, they would represent probably 75–80% of the GHG footprint. He further suggested that a full accounting of embodied carbon tracks back to primary mined materials, and EIA tracks offroad and construction vehicles as part of industry.
- **Dr. Choi** clarified that the life cycle of the mined materials is different from the activity of mining.

Dr. Regitsky noted a slight difference between the sectors on the outline vs. the ones on the slide. Refining, which is on the outline but not on the slide, will make a big difference on how much emissions are captured. Pulp and paper is not on the outline.

- **Dr. Powell** offered to include refining with the chemicals overview but will need more subcommittee members to help.
- **Dr. Regitsky** restated that Ms. Sheil had noted that folding paper is not covered but confirmed with members its part of the paper industry.

Chairperson Nolen recapped the decisions for the Industrial Sectors subcommittee thus far.

1. Include the top six sectors on the list (iron/steel, chemicals, cement, paper/pulp, food/beverage, aluminum) in the report
2. Add refining to the chemicals sector
3. State that these sectors contribute approximately $\frac{3}{4}$ of emissions for industry, but may need to verify that number
4. Subsectors Subcommittee will review the rest of the list (Other non-ferrous [Cu, Ni, etc.], glass, agriculture, forest management, data centers, mining) and decide whether to make comments on them

Later in the meeting, **Chairperson Nolen** suggested combining the Cross-cutting Technologies and Industrial Sectors with findings and recommendations. She added that the two topics could include the technologies and program evaluation and focus on the findings and recommendations for each technology.

Ms. Dutrow, Dr. Regitsky, and Dr. Elliott expressed the importance of reviewing the ITIAC Charter to check sure that outline items fall within the Committee's charge and that no critical areas are omitted.

Summary and Day 1 Closing Remarks

Chairperson Nolen summarized the changes that the Committee discussed for the report format.

- Recommendations should be something actionable and that will make a difference.
- Shorter format was preferred over a longer report. The use of appendices can help to shorten the report.
- Subcommittees can refer to the existing documents that DOE has already published instead of restating the findings.

- The executive summary needs to be clear and meaningful.
- Recommendations will be given priority at the beginning of the report.

Adjournment

The meeting for October 29, 2024, was adjourned at approximately 4:43 p.m. EDT.

Welcome and Opening Remarks of October 30, 2024

DFO Pritchard welcomed members to the second day of the meeting. **Chairperson Nolen** announced updates to the agenda, in which Dr. Avi Shultz will first present on DOE's Industrial Efficiency and Decarbonization Office (IEDO), followed by a continuation of the discussion on the report structure.

Update on DOE IEDO Activities

Dr. Avi Shultz, Director, IEDO, expanded on the overview of IEDO activities given at the March 2024 ITIAC meeting, focusing on new or upcoming activities and announcements. IEDO has had over \$500 million in R&D projects over the past two years. The Office announced its first Partnership Intermediary Agreement (PIA) that utilizes a third-party contracting mechanism to reduce the overhead for applicants. Some of IEDO's 2024 announcements include the selection of 16 projects as part of a \$38 million funding opportunity on cross-sector technologies, launched the Industrial Energy Storage System Prize to accelerate market adoption for cost-effective energy storage concepts and prize technologies for industrial applications and data centers, announced the new Industrial Sustainability, Energy Efficiency, and Decarbonization (ISEED) Collaborative to assist manufacturing partners to develop and disseminate instructional curricula and training programs, and announced plans to create a Cement and Concrete Center of Excellence to foster stakeholder collaboration through (1) measurements, modeling, and test methods; (2) data collection and monitoring; and (3) carbon accounting.

Dr. Shultz also described IEDO's activities related to load growth and energy demand. Lawrence Berkeley National Laboratory is developing an objective analysis of grid load growth, which is anticipated for release by the end of 2024. DOE has published preliminary resources⁵ around load growth and has been working with the White House and the Department of Commerce to address AI infrastructure. DOE is creating an AI Data Center Engagement Team to support AI data center development with technical and financial assistance. On RD&D and technical assistance for data centers, IEDO and the Advanced Materials & Manufacturing Technologies Office (AMMTO) are working jointly on the Energy Efficiency Scaling for 2 Decades (EES2) Program to improve chip technology. IEDO and the Building Technologies Office are partnering on HVAC and cooling technologies. IEDO and Advanced Research Projects Agency-Energy (ARPA-E) are collaborating on ARPA-E's COOLERCHIPS Initiative, developing innovative technologies for data center cooling.

Discussion Highlights

Dr. Elliott asked how IEDO is coordinating with OE and others on the regulatory interface issues with data centers.

- In response, **Dr. Shultz** described DOE's Grid Modernization Initiative, which is led by the DOE Integrated Strategies Office and works across DOE to create the grid of the future. Within the initiative's Clean Energy Innovator Network, the DOE Office of Energy Efficiency and Renewable Energy is helping to fund staff and fellowships at organizations to build capacity toward the integration of clean energy resources.

Mr. Rissman asked if load growth drivers such as data centers, industrial electrification, electricity to produce green hydrogen, and electric vehicles are viewed in balance, or if data centers are viewed as most important.

⁵ "Electricity Demand Growth Resource Hub," U.S. Department of Energy, www.energy.gov/electricitydemand.

- **Dr. Shultz** responded that the Pathways work is not aiming to predict which pathway(s) will be dominant over others in the future. Data center load growth provides a near-term learning opportunity to work with utilities and understand challenges. Data centers are a near-term focus and there's been engagement with the White House and Administration around ensuring a holistic AI strategy.

Dr. Choi inquired on how IEDO's work expounds on the Hydrogen Hub. i.e., through efficiency or new technologies.

- **Dr. Shultz** noted that through development, input on technical challenges and expertise will be provided to OCED and other organizations. Findings on infrastructure, facility level challenges, and end-use technologies will be incorporated into the new program's initiatives.

Dr. Regitsky asked a series of questions:

- Does DOE have authorization to shepherd successful IEDO R&D projects to demonstration projects, e.g., through future OCED projects? **Dr. Shultz** indicated that IEDO works closely with OCED's project review team. There is authorization to shepherd projects into demonstration, however the next set of industrial demonstration programs do not exist yet because OCED does not have appropriations to conduct another round.
- Does IEDO have the ability to share the number of applications received versus available funding? OCED shares this information. **Dr. Shultz** responded that they have received similar responses from the community and are discussing with this with General Counsel.
- Has IEDO considered working with hyper-scalers thinking about building data centers to ensure they are decarbonized through the Cement and Concrete Center of Excellence? **Dr. Shultz** commented that the Cement and Concrete Center of Excellence is considering this and can flag as an opportunity for engagement.

Dr. Haynes asked if IEDO establishes best practices, evaluations, and reviewing their progress of CBPs.

- **Dr. Shultz** said that projects using CBPs have just started deploying, and data is not available yet. He flagged this to include a strategy around evaluations.

Report Out: Subcommittee on DOE Current Work and Gaps Assessment

Mr. Rissman reviewed progress in which the Subcommittee has held three meetings since its last update to the Committee in July 2024. They have gathered data on existing DOE programs, compiled initial recommendations, assigned leads to all sections, and worked closely with the Report Outline Subcommittee. The set of actionable recommendations for DOE include the following: (1) provide better data and computer modeling to assess clean industrial progress and needs; (2) optimize existing DOE programs and technology choices; (3) establish ways DOE can help seize opportunities or overcome barriers; (4) determine how DOE can use other helpful policy tools; (5) identify how DOE can advise other agencies; (6) determine how DOE can understand industrial needs and challenges and partner with industry.

Next steps for the Subcommittee include confirming a deadline for the first draft, determining how to handle references, assigning subtopic leads for first drafts, combining subtopic drafts into a single document, and holding a subcommittee call for a synchronous review of the draft.

Discussion Highlights

- **Dr. Elliott** suggested adding the Department of Defense to the list of agencies for DOE coordination to include the manufacturing and procurement perspective. He added that the Office of Management and Budget is a potential collaborator in this process.
- **Ms. Dutrow** mentioned a group across the federal government that participates in a Buy Clean Task Force.
- **Mr. Cresko** added that in Spring 2024, a Climate and Trade Task Force was developed, including a data-focused subgroup.
- **Mr. Rissman** thanked the members for informing him of these existing task forces.

Report Out: Subcommittee on Barriers

Dr. Choi shared that the ITIAC Subcommittee on Barriers had reviewed the proposed outline for the *Barriers* chapter. The subcommittee rearranged a few items and wanted to invite discussion about topics that the Subcommittee on Report Outline added to the chapter.

On the barrier related to access to low carbon fuels and feedstocks, **Dr. Choi** invited feedback on whether to address hydrogen as a fuel in the discussion, and she asked if any members are interested in providing expertise in this area. She suggested including industrial applications of hydrogen and the barriers associated with sourcing hydrogen.

- **Dr. Powell** and **Dr. Haynes** offered to provide expertise.
- **Dr. Haynes** and **Dr. Elliott** added that the Subcommittee on Cross-cutting Technologies and Opportunities is also discussing hydrogen sourcing barriers while also exploring how hydrogen is used for decarbonization and identifying applications for DOE prioritization.

Dr. Haynes suggested that the Subcommittee on Barriers could focus on the sourcing of hydrogen, while the cross-cutting subcommittee assesses applications of hydrogen.

Dr. Choi also asked ITIAC members if they have expertise or connections to experts on the use of in situ byproducts for energy. This topic was also added to the barrier related to access to low carbon fuels and feedstocks.

- **Dr. Powell** and **Dr. Elliott** offered to provide expertise on industries that burn their own byproducts for fuel. Dr. Elliott raised the question on whether to treat these fuels as renewables, noting this is a current issue on whether to treat waste fuels as renewable assets (i.e., for tax credits) or as something else. The Onsite Energy Technical Assistance Partnerships regularly struggle with how to treat biomass. Dr. Powell noted this as an opportunity for the 45Q tax credit as it enables hydrogen and carbon capture and storage. The barrier could be framed as inconsistent policy guidance on the tax credits.
- **Ms. Dutrow** cautioned that the issue might be broader than actions that DOE could take.

Dr. Choi noted that the barrier on technology gaps has not been defined and asked whether the Subcommittee on Cross-cutting Technologies and Opportunities should address it instead. The tentative plan is that the Subcommittee on Cross-cutting Technologies and Opportunities will take on technology gaps; and if barriers are identified, they will be addressed in the *Barriers* chapter.

Under the barrier of infrastructure, permitting, and policy support, **Dr. Choi** asked whether carbon management infrastructure should be included and whether any ITIAC members can contribute expertise.

- **Dr. Elliott** highlighted overlap with the Cross-cutting Technologies Subcommittee, in which discussion on the approach will be held offline.
- On the barrier related to data access and modeling, **Mr. Rissman** and **Dr. Elliott** offered to provide input to Dr. Choi, including access and quality of standard metrics. They asked if they could engage a former ITIAC member who previously facilitated discussion on data availability.
- **DFO Pritchard** noted that he will confirm whether the expert can join this discussion.

Report Out: Subcommittee on Workforce and Social Considerations

Subcommittee co-lead **Dr. Haynes** presented on behalf of subcommittee lead, Ms. Anna Fendley, who was unable to attend. He highlighted that considerations and recommendations will include a focus on equitable means of community engagement and pathways for diverse workforce talent to enter or “upskill” into related careers. The subcommittee plans to make recommendations based on existing structures and initiatives within DOE and other agencies.

Progress from recent subcommittee meetings includes framing the intent and statement of success, identifying fact finding needs from IEDO and other parts of DOE, and initial clarification discussion of contributions to the report. Defining the scope of the workforce, e.g., pre-college, technical vocational college, college graduates, is still needed. The subcommittee has discussed initial considerations regarding CBPs and emphasized the importance of measuring its effectiveness. Dr. Haynes highlighted the need for expertise on national labs’ approach towards workforce development. He noted the potential challenge of redundancy with other chapters, stating that information should be complementary. The goals for the subcommittee’s next meeting in Q4 include agreement on a chapter outline, discussion on topic overlap with other subcommittees, and establishing initial assignments for drafting.

Dr. Seetharaman inquired whether the Subcommittee could harness the Manufacturing Strategy Report presented by the Department of Labor during their meeting this year with the Manufacturing Council.

- **DFO Pritchard** responded that he would try to find a Department of Labor contact.

Report Out: Subcommittee on Economic Competitiveness

DFO Pritchard added that the subcommittee has met once and needs a new lead. **Dr. Regitsky** volunteered, highlighting that revisions are required for the chapter’s outline.

Consolidated Discussion on Report Structure

The Committee discussed report structure and development at various points during the October 29–30, 2024, meeting. This section consolidates the discussion.

Chairperson Nolen presented potential options for report structure development, discussing the pros and cons of each option and noting that options can be combined. The first option proposed continuing with the report outline, though this could result in a lengthy report. The second option would organize the report around the main focus areas.

- **Mr. Rissman** noted that the second option requires agreement on focus areas, which could be subjective among Committee members.
- **Dr. Regitsky** suggested highlighting focus areas as findings in the Executive Summary.

Ms. Stashwick suggested the report could focus on ways DOE utilizes flexible policy tools to achieve its goals, enhancing coordination internally at DOE and with other agencies, and how to optimize DOE programs.

Option three uses barriers as a focus and describes recommendations to address the barriers. **Dr. Haynes** raised a concern that the resulting report could be perceived as incomplete, given the large scope of ITIAC's charge.

Referencing the ITIAC Charter, **Ms. Dutrow** commented that "proposing mission and goals" for DOE's industrial emissions reductions RD&D would be achievable in the first report. However, developing the strategic plan, as specified in the Charter, is more of a long-term activity that would not be completed in the timeframe for the first report. She suggested that ITIAC select how much of the ITIAC charge is manageable to address in the initial report and to develop a schedule for addressing remaining items in future reports.

- Adding to Ms. Dutrow's points, **Dr. Haynes** commented that the charge to "advise on technologies" is a good fit for the initial report. He remarked that the program evaluation component is important to include in the report, but expressed concern about the Committee's bandwidth to conduct the evaluation.
- **Dr. Elliott** agreed, adding that the evaluation could be accomplished by commenting on whether the program is on the right track.
- **Mr. Rissman** shared that the ITIAC Subcommittee on DOE Current Work Gaps and Assessment has compiled the funding levels for relevant DOE programs, but evaluating each one would result in a lengthy report. He suggested focusing on the top five or six recommendations and supporting those with facts and findings.

A fourth option uses recommendations as the focus, including background and how they are defended. **Dr. Elliott** commented that it would be beneficial to Congress and the Secretary of Energy to prioritize recommended findings and actions.

- **DFO Pritchard** outlined key points of agreement for the Committee to reach consensus on. He highlighted the previous discussion on organizing the report by the two major areas of requirement, i.e., technology assessments and program evaluations.
- **Dr. Regitsky** suggested organizing the report via levels of consideration, e.g., identifying priorities for cross-cutting sectors, mapping DOE programs, and considering DOE gaps and making recommendations. She suggested revisions towards the Industrial Sectors' outline, proposing the focus on criteria selection for programs and specific technologies.
- **Chairperson Nolen** indicated that one option is to continue with the current report outline structure and to integrate Dr. Regitsky's proposed format.
- **DFO Pritchard** raised a potential issue with this option as it could create dependencies among subcommittees. He went on to explain that the program evaluation could be pulled from the Subcommittees on Workforce and Social and DOE Gaps and Assessment. The Subcommittees on Barriers and Economic Competitiveness could contribute towards recommendations and findings.

Dr. Elliott suggested keeping Subcommittee on Report Outline and transitioning it into a report integration and coordination role.

Dr. Haynes recommended that subcommittee leads meet periodically to share updates and progress.

Chairperson Nolen emphasized for subcommittees to utilize the report outline and Charter and to avoid duplication and to identify priorities as they think about findings and recommendations. She also encouraged members to join other subcommittees that have vacancies if they are interested.

Plans for next meeting/action items

- The next full ITIAC meeting will be held virtually in January 2025. A scheduling poll will be distributed to determine dates.
- Members will determine the maximum page limit for the report at the next full meeting in January.
- Members are asked to fill out the availability poll for the in-person meeting in March 2025.
- By the March 2025 meeting, subcommittees are expected to develop possible recommendations and findings, plans to validate those recommendations and findings, and begin executing those plans. Each subcommittee will work independently and continue sharing files on Box.
- Example reports and recommendations will be compiled and shared with members.
- The report outline will be updated and shared with members.

Public Comment Period

Miriam Rotkin-Ellman, Technical Advisor at the Environmental Justice Health Alliance, compiled her comments gathered on behalf of almost 40 grassroots and national organizations. She made two requests. First, industrial decarbonization technologies and pathways must be assessed for environmental justice and health impacts. Community benefit plans and agreements are not a substitute for rigorous evaluation and response. Second, chemical sector decarbonization pathways should include demand reduction, such as a decrease in the production of toxic chemicals and plastic. Decarbonized ammonia, benzene, methanol, and ethylene oxide are still toxic and threaten the health and safety of fence line and EJ communities. Reducing the production of single-use plastics has many environmental and public health benefits. Ms. Rotkin-Ellman thanked ITIAC for the opportunity to bring the concerns of environmental justice communities to the Committee conversation. She added that combatting environmental injustice and racialized health disparities require climate solutions that reduce toxic exposures, especially in fence line communities.

Chairperson Nolen thanked Ms. Rotkin-Ellman for her engagement and providing comments.

Adjournment

The meeting for October 30, 2024, was adjourned at approximately 12:39 p.m. EDT.

Respectfully submitted:

Zachary Pritchard
Designated Federal Officer

I hereby certify that these meeting minutes of the October 29–30, 2024, ITIAC meeting are true and correct to the best of my knowledge.

A handwritten signature in black ink, appearing to read "Sharon A. Nolen". The signature is fluid and cursive, with a large initial 'S' and a distinct 'N'.

Sharon Nolen
Chairperson, Industrial Technology Innovation Advisory Committee