The DOE Webinar will begin shortly . . .

- **Why is there no sound?**
  - Once you logged into the webinar, you were provided two options to listen to this broadcast. The first option is through your computer speakers, the second option is via dialing the phone number provided to you upon login to the webinar. If you chose to listen through your computer speakers, you may need to turn your speaker volume on or up.
- **Will DOE provide access to the recorded webinar after the meeting?**
  - Yes, all those who registered will receive a link to the slides and to the recorded webinar soon after the meeting. It will also be available on the DOE SBIR/STTR web site.
- **Where can I find the Topics being discussed today?**
  - This link will take you to the Funding Opportunity Announcement (FOA) page that lists the FY 2025 Phase I Release 2 Topics: https://science.osti.gov/sbir/Funding-Opportunities
- **What if my question was not answered at today's webinar?**
  - Please contact the point of contact that follows each subtopic in the document listed above for further clarification.
  - If you have a question about the grant application process, please send us an email at: sbir-sttr@science.doe.gov.

DOE SBIR/STTR
Phase I Release 2 Topics Webinar

Topics associated with the
FY 2025 Phase I Release 2
Notice of Funding Opportunity

Topics 2-10

DOE SBIR/STTR Programs Office

November 20, 2024

TODAY'S AGENDA

Topics Introduction	DOE SBIR/STTR Programs Office
Topic 2-10	Office of Energy Efficiency and Renewable Energy

FY 2025 Phase I Schedule

	Release 1	Release 2
Topics Issued	Monday, July 8, 2024	Tuesday, November 12, 2024
Webinar(s)	Week of July 22, 2024	Week of November 18, 2024
NOFO Issued	Monday, August 5, 2024	Monday, December 16, 2024
NOFO Webinars	Thursday, August 8, 2024 (Webinar) Friday, August 9, 2024 (Q&A)	Thursday, December 19, 2024 (Webinar) Friday, December 20, 2024 (Q&A)
Letters of Intent (LOI) Due	Tuesday, August 27, 2024	Tuesday, January 7, 2025
Non-responsive LOI Feedback Provided	Monday, September 16, 2024	Monday, January 27, 2025
Applications Due	Tuesday, October 8, 2024	Wednesday, February 26, 2025
Award Notification	Monday, January 6, 2025	Tuesday, May 27, 2025

Phase I Funding Opportunity Announcements
Participating DOE Programs (FY 2025)

Phase I Release 1

- Office of Advanced Scientific Computing Research
- Office of Basic Energy Sciences
- Office of Biological and Environmental Research
- Office of Fusion Energy Sciences
- Office of High Energy Physics
- Office of Nuclear Physics

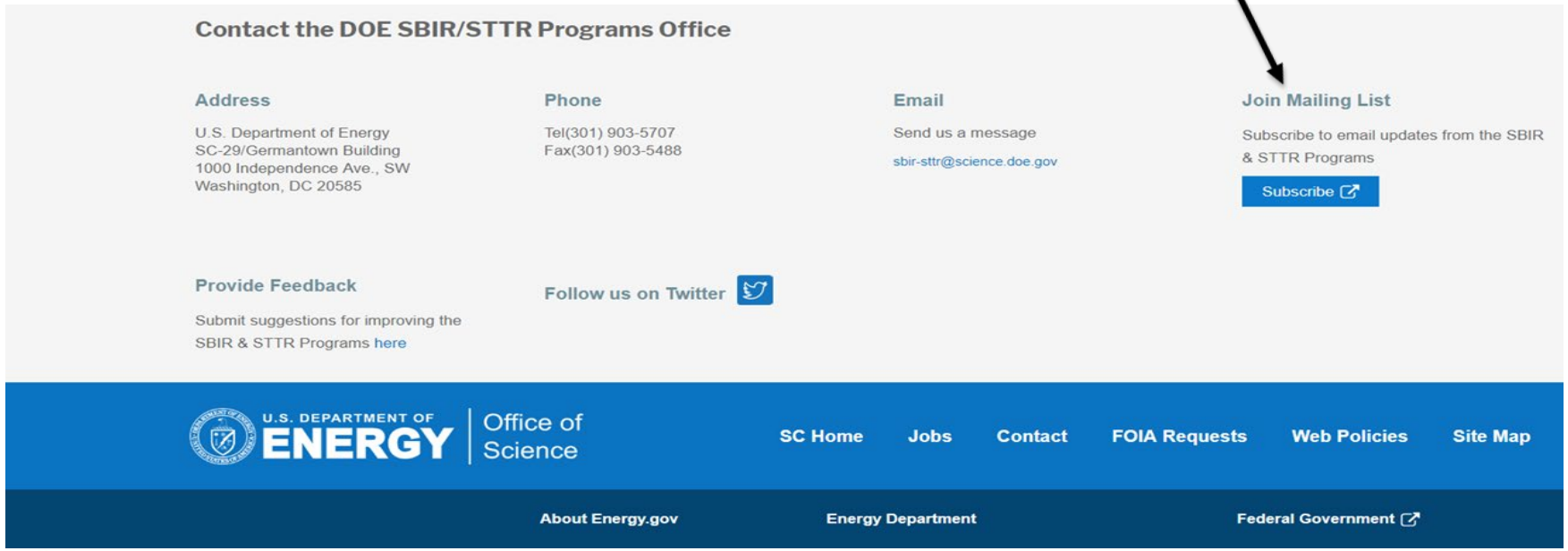
Phase I Release 2

- Office of Cyber Security, Energy Security, and Emergency Response
- Office Of Defense Nuclear Nonproliferation Research And Development
- Office of Electricity
- Office of Energy Efficiency and Renewable Energy
- Office of Environmental Management
- Office of Fossil Energy and Carbon Management
- Office of Nuclear Energy

Notice of Funding Opportunity (NOFO) Webinar

- FY25 Phase I Release 2 NOFO will be issued on **December 16th**
- Join our Mailing List – this field is on every DOE SBIR/STTR web page
  - Following the issuance of the NOFO, look for an email with a link to the NOFO

- Webinar on **December 19th** and Q&A Webinar for this **December 20th**
  - Overview of the FY 2025 DOE SBIR/STTR Programs
    - Following the issuance of the NOFO, look for an email announcing this webinar



Reminder - Phase 0 Application Assistance Program

- Phase 0 application assistance program is available for first-time DOE SBIR/STTR applicants
- Participants receive an individual coach who is an expert in our application process.
- Registration is open now and onboarding is in process!
- Services are expected to begin in December
- Visit http://www.dawnbreaker.com/doephase0/ to determine your eligibility and apply to Phase 0

Topic Basics

- Topics are created by DOE program managers and define important technology breakthroughs needed in R&D areas that support the DOE mission
- Topics are organized by DOE Program Office, e.g., EERE, FECM, etc.
- DOE program managers are listed with each subtopic
  - Questions to DOE program managers are limited to clarification of the topic and subtopic (including references)
  - Clarification is provided to help ***you*** determine whether your technology fits within the topic and subtopic
  - You may communicate with these topic managers from the release of topics until the grant application due date
  - The decision to apply is ***yours***

Example Topic

- Topic & Subtopic
  - You must specify the same topic and subtopic in your Letter of Intent and grant application
- Topic Header
  - Lists the maximum award amounts for Phase I & Phase II and the types of application accepted (SBIR and/or STTR)
- Program Manager
  - Each subtopic lists the responsible DOE program manager
- "Other" Subtopic
- References

12.INSTRUMENTATION FOR ADVANCED CHEMICAL IMAGING

Maximum Phase I Award Amount: $150,000	*Maximum Phase II Award Amount:* $1,000,000
Accepting SBIR Applications: YES	*Accepting STTR Applications:* YES

The Department of Energy seeks to advance chemical imaging technologies that facilitate fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels. The Department is particularly interested in forefront advances in imaging techniques that combine molecular-scale spatial resolution and ultrafast temporal resolution to explore energy flow, molecular dynamics, breakage, or formation of chemical bonds, or conformational changes in nanoscale systems.

Grant applications are sought in the following subtopics:

a. **High Spatial Resolution Ultrafast Spectroscopy**
Chemical information associated with molecular-scale processes is often available from optical spectroscopies involving interactions with electromagnetic radiation ranging from the infrared spectrum to x-rays. Ultrafast laser technologies can provide temporally resolved chemical information via optical spectroscopy or laser-assisted mass sampling techniques. These approaches provide time resolution ranging from the breakage or formation of chemical bonds to conformational changes in nanoscale systems but generally lack the simultaneous spatial resolution required to analyze individual molecules. Grant applications are sought that make significant advancements in spatial resolution towards the molecular scale for ultrafast spectroscopic imaging instrumentation available to the research scientist. The nature of the advancement may span a range of approaches including sub-diffraction limit illumination or detection, selective sampling, and coherent or holographic signal analysis.

Questions – Contact: James Rustad, James.Rustad@Science.doe.gov

b. **Time-Resolved Chemical Information from Hybrid Probe Microscopies**
Probe microscopy instruments (including AFM and STM) have been developed that offer spatial resolution of molecules and even chemical bonds. While probe-based measurements alone do not typically offer the desired chemical information on molecular timescales, methods that take advantage of electromagnetic interactions or sampling with probe tips have been demonstrated. Grant applications are sought that would make available to scientists new hybrid probe instrumentation with significant advancements in chemical and temporal resolution towards that required for molecular scale chemical interactions. The nature of the advancement may span a range of approaches and probe techniques, from tip-enhanced or plasmonic enhancement of electromagnetic spectroscopies to probe-induced sample interactions that localize spectroscopic methods to the molecular scale.

Questions – Contact: James Rustad, James.Rustad@Science.doe.gov

c. **Other**
In addition to the specific subtopics listed above, the Department invites grant applications in other areas that fall within the scope of the topic description above.

Questions – Contact: James Rustad, James.Rustad@Science.doe.gov

References:

1. U.S. Department of Energy, 2006, Office of Science Notice DE-FG01-05ER05-30, Basic Research for Chemical Imaging, BES Chemical Imaging Research Solicitation. (http://science.energy.gov/~/media/grants/pdf/foas/2005/DE-FG01-05ER05-30.pdf).

2. National Research Council, 2006, Visualizing Chemistry, The Progress and Promise of Advanced Chemical Imaging, National Academies Press. (http://www.nap.edu/catalog.php?record_id=11663).

Topic C60-02: ADVANCED MATERIALS AND MANUFACTURING TECHNOLOGIES

Maximum Phase I Award Amount: $250,000	**Maximum Phase II Award Amount: $1,600,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: NO	**Accepting STTR Fast-Track Applications: NO**

a. Digital Twin Technology for Quality Assurance of Clean Energy Products
b. Compiler-Based Approaches for Secure by Design for Industrial Control Systems
c. Acoustic and Electric Field-Assisted Manufacturing for Better Batteries, Power Electronics, and Microelectronics
d. Efficient & Responsible Critical Material Refining
e. Mechanical Recycling of Textiles

Questions: Subtopic a & b – Sudarsan Rachuri, Sudarsan.rachuri@ee.doe.gov
Subtopic c – Tina Kaarsberg, tina.kaarsberg@ee.doe.gov
Subtopic d – Helena Khazdozian, helena.khazdozian@ee.doe.gov
Subtopic e – Allison Robinson Turner, allison.robinsonturner@ee.doe.gov

SBIR/STTR Topics

Dr. Sudarsan Rachuri

AMMTO

Sudarsan.Rachuri@ee.doe.gov

U.S. Department of ENERGY

Compilers-based approaches for secure-by-design for industrial control systems (ICS)

The smart manufacturing offers vast opportunities for innovation and growth, but it also introduces new risks, particularly in the manufacturing sector.

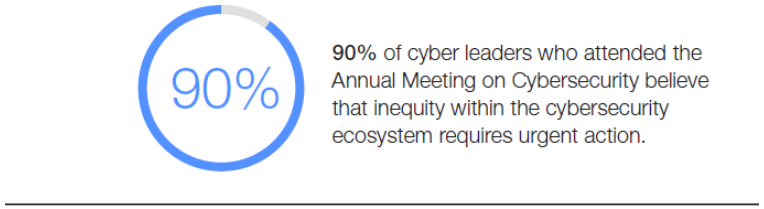
As advanced technologies are integrated into operational technology networks for hyperconnectivity, there is a critical need for sophisticated cybersecurity solutions to protect these systems.

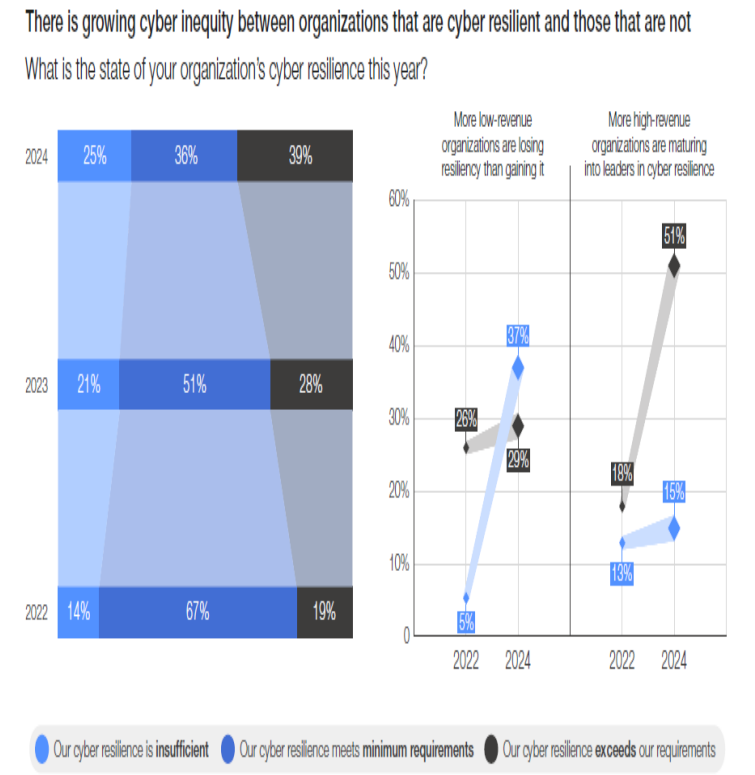
However, many manufacturers are still underprepared, lacking the necessary cyber capabilities and monitoring to secure their increasingly connected environments, leaving them vulnerable to emerging threats.

Cybersecurity is especially critical for industrial control systems (ICS) and data acquisition system (DAQ) for manufacturing industry.

ICS systems control and monitor industrial and infrastructure processes that produce products and deliver services

- It includes SCADA, DCS, PCS, PCN, PLC/PAC, and BACS.
- Secure by design
  - technology products are built in a way that reasonably protects against malicious cyber actors.
  - will continue to suffer vulnerabilities; however, a large set of vulnerabilities are due to a relatively small subset of root causes.





supervisory control and data acquisition (SCADA) systems, data acquisition system (DAQ), distributed control systems (DCS), process control systems (PCS), process control domains (PCN), programmable logic controller and programmable automation controller systems (PLC/PAC), and building automation and control systems (BACS). The Common Weakness Enumeration (CWE) and Common Vulnerabilities and Exposures (CVE

Compilers-based approaches for secure-by-design for industrial control systems (ICS)

The problem: All plant downtime due to cyber-attacks in 2020 was because of targeted ransomware, despite IEC 62443 compliance and other seemingly robust defensive postures. The current ICS and DAQ systems have many cybersecurity weaknesses and increases the risks to the manufacturing industry. The CWE and CVE databases are crucial for identifying and addressing cybersecurity issues in ICS and DAQ systems.

Innovation: The compliers-based approaches can leverage the CWE and CVE databases and ICS and DAQ system design using Electronic Computer-Aided Design (ECAD) systems can be made more secure, reducing the risk of cyberattacks and ensuring the reliability.

Objective: Develop a software system that can capture cyber weaknesses and vulnerabilities of ICS and sensors for DAQ. This software system should help in realizing secure by design and secure by default of design and manufacturing of ICS and DAQ hardware and software systems.

Metrics of success: **PHASE 1**

1) A report on the complete analysis of CWE and CVE issues for ICS and DAQ
2) A report on the design of the compliers-based software system for capturing CWEs during the design of ICS and DAQ using ECAD system.
3) A prototype of the software system and test results from (1) and (2)

Metrics of success: PHASE 2

1) Industry use case for design and development of a specific ICS using the software
2) Industry use case for design and development of a specific sensor using the software
3) Feasibility analysis of this software for other sensors and controllers for manufacturing applications incorporating real-time monitoring.

Prior art: Though there are some hardware and software solutions available, they do not provide an Integrated Design and Development Environment that can capture relevant CWEs during design

Expected partners (R&D, manufacturing, customers): OEMS, SMMs, Hardware and software solution providers, Cybersecurity solution providers (IT/OT), CyManII and its members.

Important references

https://cwe.mitre.org/documents/cwe_usage/guidance.html
https://www.cve.org/
https://www.cisa.gov/securebydesign
https://nvd.nist.gov/

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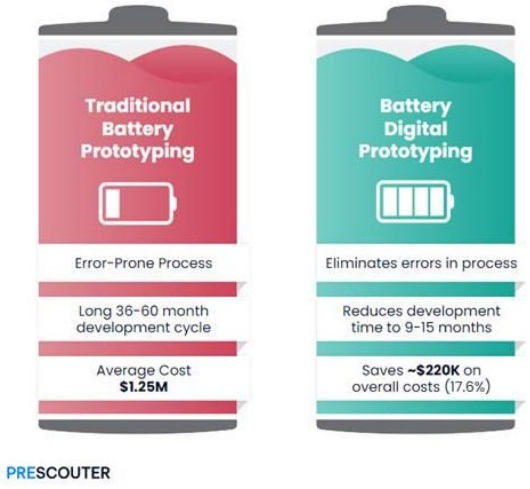
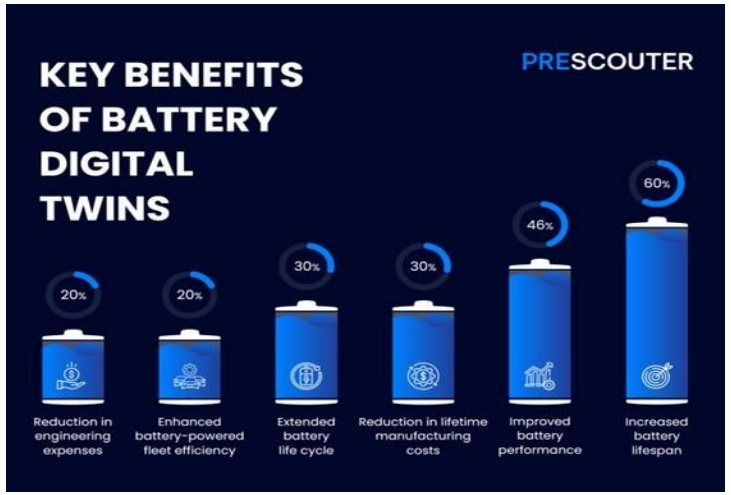
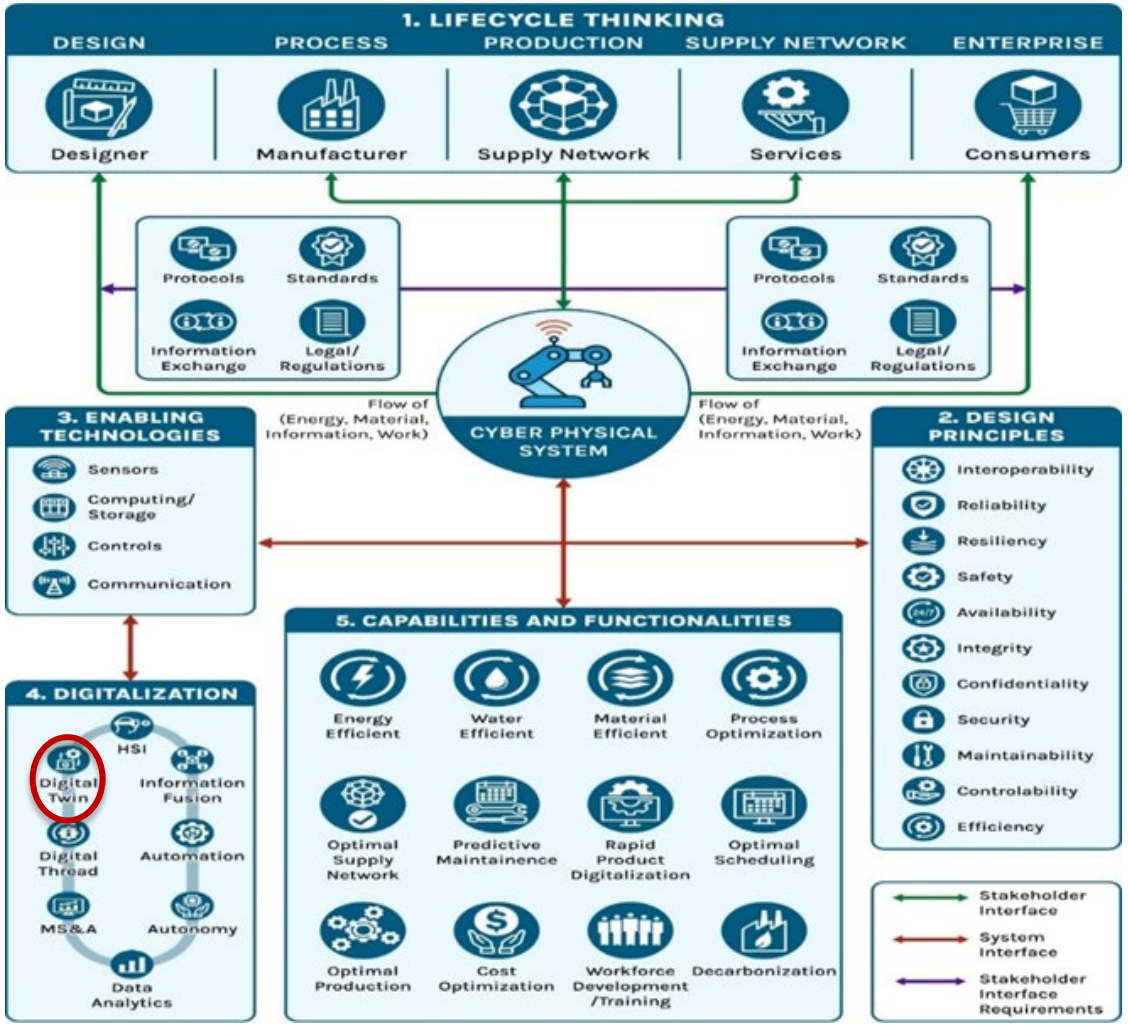
Digital Twin Technology for Quality Assurance for Clean Energy Production

- A manufacturing digital twin (DT) is a virtual representation of real-world manufacturing entities and processes, synchronized at specified frequency and fidelity of the system's behavior in its operating environment .
- DT system understands the past, provides situational awareness of the present, and anticipates the future, enabling rapid, effective, and proactive decision-making.
- Deployment of manufacturing DTs can be transformative in enabling digital intelligence for clean energy production.
- Intelligence in manufacturing translates to faster and timely decision making through advanced knowledge-driven frameworks that include artificial intelligence (AI), machine learning (ML), along with semantic and cognitive capabilities.







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Compilers-based approaches for secure-by-design for industrial control systems (ICS)

The problem: The digital transformation of clean energy production is still in its early stages. Reasons include:1) a lack of complete understanding of the quality and variability across the production process, 2) a lack of clear model of cause and effect of process and production parameters on quality, and 3) digitalization opportunities and challenges of production processes – what parameters need to be measured and controlled, how to measure them using metrology equipment and sensors, data pre and post processing for data analytics, and software and hardware for a data acquisition system (DAQ).

Innovation: If successful, this effort will provide a vehicle to encourage small and medium sized enterprises (SMEs) to provide technical solutions to manufactures to achieve higher levels of performance though smart manufacturing practices, DTs, and digital transformation of their manufacturing.

Objective: The project should develop a complete analysis of quality and variability issues across the entire production process for selected clean energy application. The project should analyze the requirements for DT for clean energy manufacturing across all stages of the selected production process – product twin, process twin, equipment twin. The project should also develop a small lab-level prototype of a DT (at any stage of the production process), based on the fit for purpose and requirements.

Metrics of success: PHASE 1

A report on the complete analysis of quality issues across the entire production process for the selected clean energy application

A report on the requirements for DT for manufacturing across all stages of the selected clean energy production process

A report on inventory of metrology equipment for in-situ measurements, sensor technologies, edge devices, and related digital assets.

A proof-of-concept of DT at any one stage of the selected clean energy production process

Test results from the preliminary evaluation and analysis of this prototype

Metrics of success: PHASE 2

Expand the work to include the full production process for selected clean energy application

Analyze the requirements to expand the work to include supply chain DT

Develop a best practice for developing DT framework for quality assurance for selected clean energy application

Develop a simple software platform for showcasing the framework

Feasibility analysis of this QA framework that can be extended to multiple clean energy applications.

Prior art: Though there are some DT platforms available, there are no specific DT for clean energy technology products production

Expected partners (R&D, manufacturing, customers): OEMS, SMMs, Hardware and software solution providers, DOE labs, CESMII and its members

Important references

https://doi.org/10.1016/j.rser.2023.113280

https://doi.org/10.24406/publica-495

https://doi.org/10.1016/j.joule.2023.05.005

https://doi.org/10.1016/j.isci.2021.102332

https://www.anl.gov/partnerships/batpac-battery-manufacturing-cost-estimation

https://doi.org/10.17226/26894

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Topic C60-03: JOINT ADVANCED MATERIALS AND MANUFACTURING TECHNOLOGIES / BIOENERGY TECHNOLOGIES OFFICES TOPIC: PLASTIC CIRCULARITY

Maximum Phase I Award Amount: $250,000	**Maximum Phase II Award Amount: $1,600,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: NO	**Accepting STTR Fast-Track Applications: NO**

a. Plastic Circularity

Questions: Allison Robinson Turner, allison.robinsonturner@ee.doe.gov from AMMTO
Lisa Guay, lisa.guay@ee.doe.gov from BETO

Topic C60-04: BIOENERGY TECHNOLOGIES

Maximum Phase I Award Amount: $200,000	**Maximum Phase II Award Amount: $1,100,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: NO	**Accepting STTR Fast-Track Applications: NO**

a. Bioenergy Feedstock Logistics Improvements (EES)

Questions – Elizabeth Burrows, Elizabeth.Burrows@ee.doe.gov
Sara Gonzalez, Sara.Gonzalez@ee.doe.gov

Topic C60-05: BUILDING TECHNOLOGIES OFFICE

Maximum Phase I Award Amount: $200,000	**Maximum Phase II Award Amount: $1,100,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: NO	**Accepting STTR Fast-Track Applications: NO**

a. Windows
b. Affordable TES Systems
c. Advanced Air Leakage Detection and Air Sealing Technologies
d. High Performance Insulated Cladding for Residential Field Applied Applications
e. ResStock Data Analysis Tool for States and Local Governments
f. Multifamily Energy Use Data Research
g. NO2 monitors
h. Heat pumps for manufactured houses.

Questions: Subtopic a – Marc LaFrance, marc.lafrance@ee.doe.gov
Subtopic b – Sven Mumme, sven.mumme@ee.doe.gov
Subtopics c &d – Kyle Biega, kyle.biega@ee.doe.gov
Subtopics e, f, g & h – Asa Foss, asa.foss@ee.doe.gov

Topic C60-05: BUILDING TECHNOLOGIES OFFICE (Continued)

Maximum Phase I Award Amount: $200,000	**Maximum Phase II Award Amount: $1,100,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: NO	**Accepting STTR Fast-Track Applications: NO**

i. Easier & More Accurate Manual J Technology
j. Serviceable Mini-Split/PTHP/PTAC
k. Highly Efficient Dehumidification
l. Heat Pump Water Heater (HPWH) Installation Cost Reduction

Questions: Subtopics i & l – Alexander Rees, alexander.rees@ee.doe.gov
Subtopics j & k – Payam Delgoshaei, payam.delgoshaei@ee.doe.gov

Topic C60-06: GEOTHERMAL HEATING AND COOLING

Maximum Phase I Award Amount: $200,000	**Maximum Phase II Award Amount: $1,100,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: YES	**Accepting STTR Fast-Track Applications: YES**

a. Low-impact drilling systems for GHPs
b. Rapid Site Assessments for Geothermal Heat Pumps
c. Geothermal Heating and Cooling for Protected Agriculture

Questions – Michael Weathers, michael.weathers@ee.doe.gov
William Vandermeer, william.vandermeer@ee.doe.gov

Topic C60-07: ENHANCED GEOTHERMAL SYSTEMS DATA UTILIZATION

Maximum Phase I Award Amount: $200,000	**Maximum Phase II Award Amount: $1,100,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: YES	**Accepting STTR Fast-Track Applications: YES**

a. High Temperature Elastomers for Enhanced Geothermal Applications

Questions – William Vandermeer, william.vandermeer@ee.doe.gov
Michael Weathers, michael.weathers@ee.doe.gov

Topic C60-08: HYDROGEN AND FUEL CELL TECHNOLOGIES

Maximum Phase I Award Amount: $200,000	**Maximum Phase II Award Amount: $1,100,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: NO	**Accepting STTR Fast-Track Applications: NO**

a. Safety Technologies for Large-Scale Hydrogen Deployments
b. Novel Concepts for Low-Energy, Low-Cost Hydrogen Loss Mitigation
c. Durable, Efficient, and Low-Cost PEM Fuel Cell Cathode Catalysts for Heavy-Duty Transportation Applications
d. Membranes and Separators for Alkaline Electrolyzers

Questions: Subtopic a – Jacob Englander, jacob.englander@ee.doe.gov
Subtopic b – Kevin Carey, kevin.carey@ee.doe.gov
Subtopic c – Gregory Kleen, gregory.kleen@ee.doe.gov
Subtopic d – Anne Marie Esposito, annemarie.esposito@ee.doe.gov

Topic C60-08: HYDROGEN AND FUEL CELL TECHNOLOGIES (Continued)

Maximum Phase I Award Amount: $200,000	**Maximum Phase II Award Amount: $1,100,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: NO	**Accepting STTR Fast-Track Applications: NO**

e. Innovative Manufacturing Concepts to Support Scale-Up of Medium- and Heavy-Duty Fuel Cell Trucks
f. In Situ Diagnostic Tools for Clean Hydrogen Production
g. Power Electronics Enabling Conversion of Low-Cost Intermittent Electricity to Low-Cost Hydrogen
h. Facilitate the Development and Expansion of a Robust Supply Chain for Hydrogen and Fuel Cell Systems and Components

Questions: Subtopic e – Eric White, eric.white@ee.doe.gov
Subtopic f – McKenzie Hubert, mckenzie.hubert@ee.doe.gov
Subtopic g – Will Gibbons, william.gibbons@ee.doe.gov
Subtopic h – Greg Kleen, gregory.kleen@ee.doe.gov

Topic C60-09: INDUSTRIAL EFFICIENCY AND DECARBONIZATION OFFICE (IEDO)

Maximum Phase I Award Amount: $200,000	**Maximum Phase II Award Amount: $1,100,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: NO	**Accepting STTR Fast-Track Applications: NO**

a. Destruction Technologies for PFAS in Biosolids
b. Reducing Environmental Impacts of Chemicals Manufacturing
c. Thermal Management and On-Site Energy Technologies for Data Centers
d. Industrial Thermal Performance Efficiency (EES)

Questions: Subtopic a – Mark Philbrick, mark.philbrick@ee.doe.gov
Subtopic b – Felicia Lucci, felicia.lucci@ee.doe.gov
Subtopic c – Zach Pritchard, zachary.pritchard@ee.doe.gov
Subtopic d – Serguei Zelepouga, serguei.zelepouga@ee.doe.gov

Subtopic 60-09.a Considerations

- DOE recognizes that this is not an easy problem
- Need to watch for creation of any new PFAS as a result of incomplete demineralization
- **Must use real biosolids – strongly encourage partnership with an actual Water Resource Recovery Facility (with letter of support)**
- Understood that closing the F mass balance can be challenging
- Sludge Volume Reduction as important side benefit
- Applications involving incineration are not of interest – all other technologies are elgible
- Removal alone also not of interest, must focus on destruction

Topic C60-10: JOINT IEDO/BETO EES TOPIC: ENERGY EFFICIENT AQUEOUS SEPARATION TECHNOLOGIES

Maximum Phase I Award Amount: $200,000	**Maximum Phase II Award Amount: $1,100,000**
Accepting SBIR Phase I Applications: YES	**Accepting STTR Phase I Applications: YES**
Accepting SBIR Fast-Track Applications: NO	**Accepting STTR Fast-Track Applications: NO**

a. Unit Operations for Efficient Recovery of Value-Added Chemicals
b. Reducing Contaminants in Product Streams

Questions: Subtopic a & b – Barclay Satterfield, may.satterfield@ee.doe.gov
Subtopic b – Maxim Kostylev, maxim.kostylev@ee.doe.gov

DOE SBIR/STTR Programs Office
Contact Information

- SBIR/STTR Web: https://science.osti.gov/sbir
- Email: sbir-sttr@science.doe.gov
- Phone Assistance Hotline: 301-903-5707
- DOE Phase 0 Assistance Program: https://doephase0.dawnbreaker.com/
- DOE Application Assistance: https://science.osti.gov/SBIRLearning