U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

AMMTO & IEDO JOINT PEER REVIEW

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Onsite Energy and CHP Deployment

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Background: Onsite Energy and CHP Deployment

For more than two decades, DOE's technical assistance efforts have advanced awareness and facilitated increased deployment of combined heat and power (CHP), waste heat to power (WHP) and district energy technologies.

To support the evolving needs of the industrial sector, IEDO is continuing its work on CHP, WHP, and district energy and leveraging the existing program model to deliver technical assistance for an additional set of onsite technology solutions.

Alignment with IEDO, EERE, and DOE Mission

- Deployment of clean distributed energy resources -- like CHP, solar PV, storage, wind, geothermal, and others -- **helps grow the clean energy economy**, improve public health, strengthen U.S. energy security, and achieve the President's goal of **net zero carbon emissions 2050**.
- As an alternative to conventional fossil-fueled systems and purchased grid electricity, clean onsite energy strategies are a key component of pathways identified in **DOE's Industrial Decarbonization Roadmap,** including Low-Carbon Fuels, Feedstocks, and Energy Sources and Electrification.
- In addition to lowering emissions, onsite energy offers other direct benefits for manufacturers to **save energy, cut costs, and gain greater control over how and when energy is used** in their facilities.

Overview: IEDO Onsite Energy Deployment

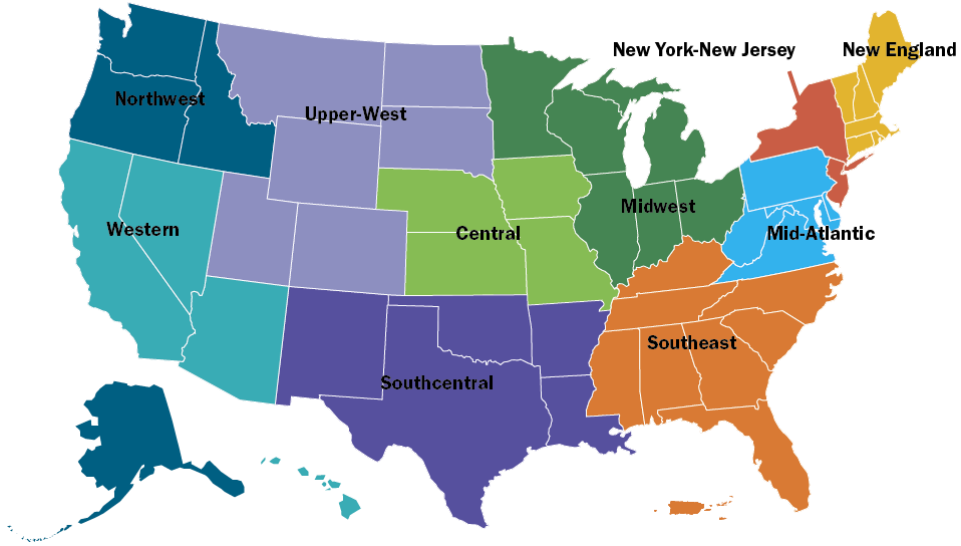
FY23 | $13M

The Onsite Energy Deployment program is a new initiative to establish a regional network of technical assistance partnerships to help industrial facilities and other large energy users to increase the adoption of onsite clean energy technologies.

battery storage | combined heat and power | district energy | geothermal | industrial heat pumps | renewable fuels | solar PV | solar thermal | thermal storage | wind

The Onsite Energy Program will establish a regional network of Technical Assistance Partnerships (TAPs) to help:

- Identify cost-effective technologies for achieving decarbonization targets and resilience requirements
- Highlight pathways for accelerating the integration of onsite clean energy technologies
- Engage with stakeholders, including utilities and policymakers to identify and reduce barriers to deployment of onsite energy
- Reduce greenhouse gas emissions in the industrial sector while prioritizing energy justice and workforce development



Challenges and Barriers

- Manufacturers are increasingly seeking to integrate clean energy at their facilities and identify technology solutions that can **reduce their use of fossil fuels**
- Companies encounter **considerable barriers** to deploying onsite technologies that can help meet GHG reduction goals and resilience requirements
- Independent analytical tools, technical assistance, and other resources are needed to support industry in **identifying and installing cost-effective onsite technology options**

Key Barriers to Onsite Energy Deployment

Upfront capital costs

High-temperature processes

Permitting and regulations

Geography and space availability

Utility engagement

Workforce

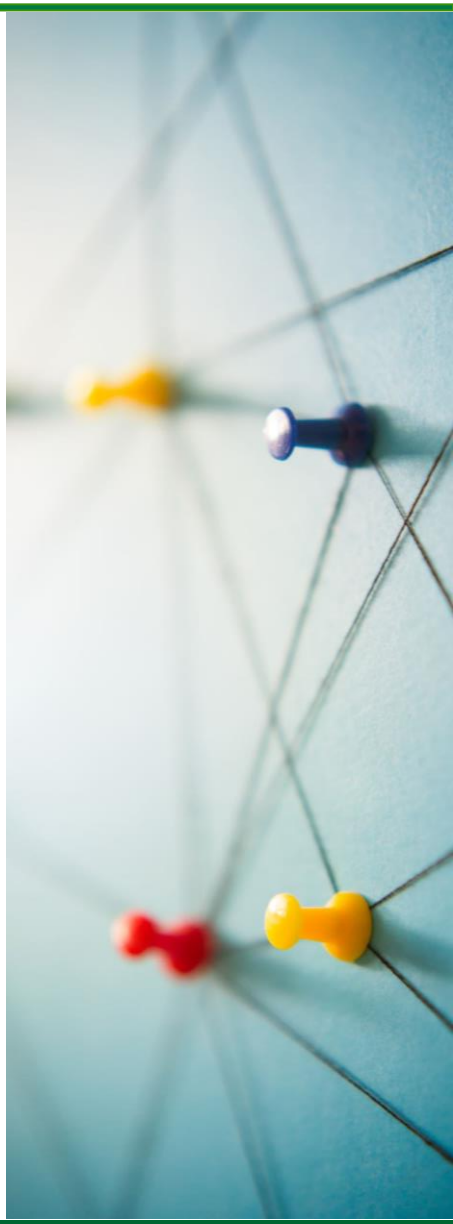
Objective and Targets

Objective

- Provide technical assistance, tools, and resources on a regional basis to industrial and other large energy users interested in onsite clean energy and engage with stakeholders to facilitate widespread adoption.

Key Strategies

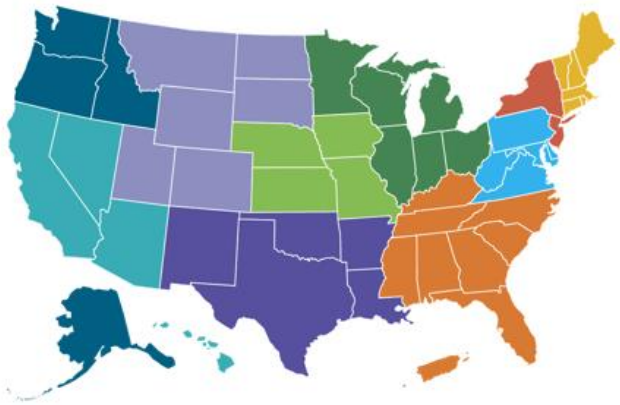
- **Leverage existing CHP program model** and expand to include a broad range of clean onsite energy technologies to meet decarbonization goals.
- **Strategically focus CHP activities** on heavily fossil geographies, hard to decarbonize industries, sites with long-term resilience requirements, and facilities with flexible fuel outlooks.
- **Pair deployment priorities with R&D investments** to prepare for the future by addressing challenges with renewable fuels and developing technologies for flexible grid connections.
- **Coordinate Across EERE and DOE** by building connections with existing and new DOE TA programs, and deepening relationships with technology experts in EERE offices.



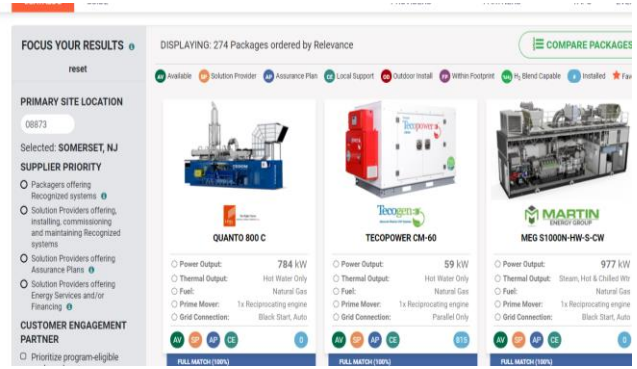
CHP Deployment Program Activities

DOE's CHP Deployment Program provides technical assistance and resources to end-users interested in CHP and engages with stakeholders to facilitate more widespread adoption of CHP technologies.

CHP TAPs



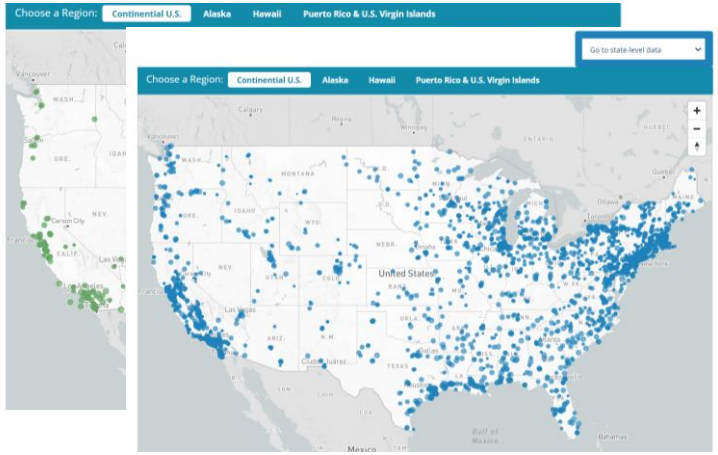
CHP eCatalog



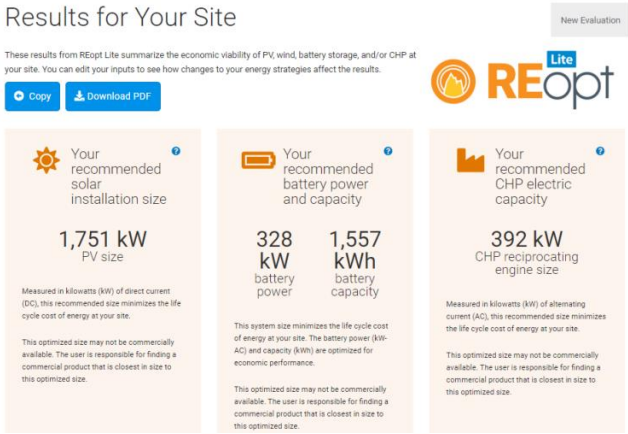
Packaged CHP Accelerator

Publications

CHP and Microgrid Installation Databases



Screening Tools



CHP Technical Assistance Partnerships (CHP TAPs)

End User Engagement

Partner with manufacturers and other end users to advance technical solutions using CHP as a cost effective and resilient way to ensure U.S. competitiveness, use local fuels, and enhance energy security.

Stakeholder Engagement

Engage with strategic stakeholders including regulators, utilities, and policymakers, to identify and reduce the barriers to using CHP to advance regional efficiency, promote energy independence, and enhance the nation's resilient grid.

Technical Services

As leading experts in CHP (as well as microgrids, heat to power, and district energy) the CHP TAPs work with sites to screen for CHP opportunities as well as provide advanced services to maximize the economic impact and reduce the risk of CHP from initial CHP screening to installation.

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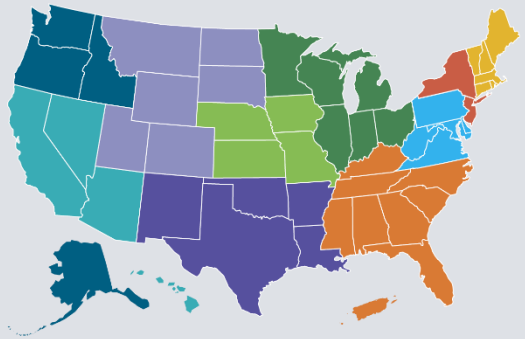

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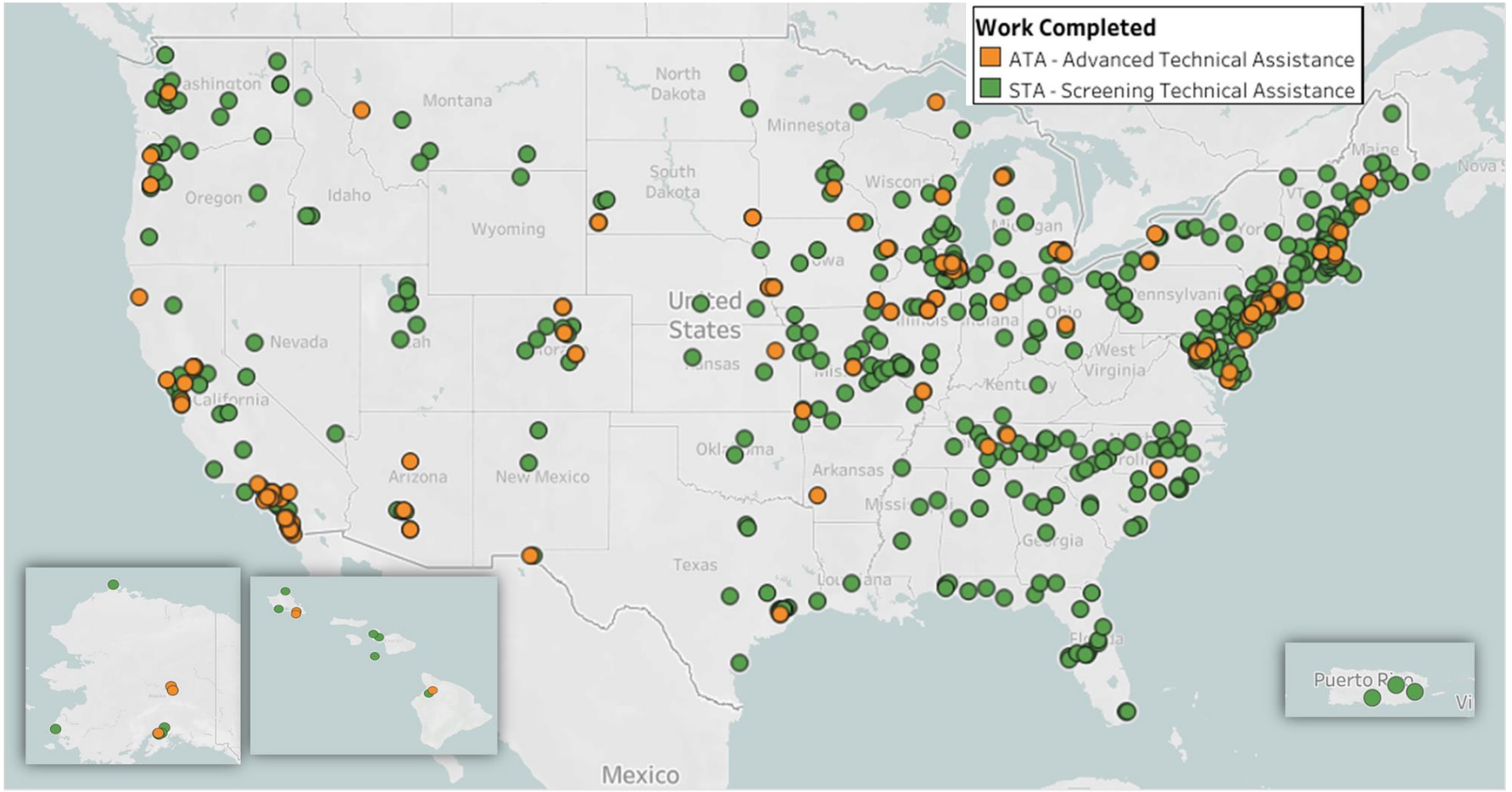
CHP TAP Technical Assistance Across the United States

Over 1,000 technical assistance activities completed during 2018 - 2023

- Screening Technical Assistance (STA): 948
- Advanced Technical Assistance (ATA): 131



CHP TAP Program Impacts from Technical Assistance

Direct technical assistance activities of the CHP TAPs support avoidance of **33 trillion Btus of fuel consumption annually** and **5.1 million tons of CO_2** compared to separate production through current CHP installations.

Data includes **213 sites** with CHP that have received technical assistance since 2010, with a total installed capacity of **2,332 MW**.

Energy and Carbon Savings

33 TBtu/yr
Reduced Fuel Consumption

=

5.1 million tons
Carbon Dioxide Avoided

CO_2 Savings Equivalent To Avoiding

10.7 million
Barrels of oil consumed

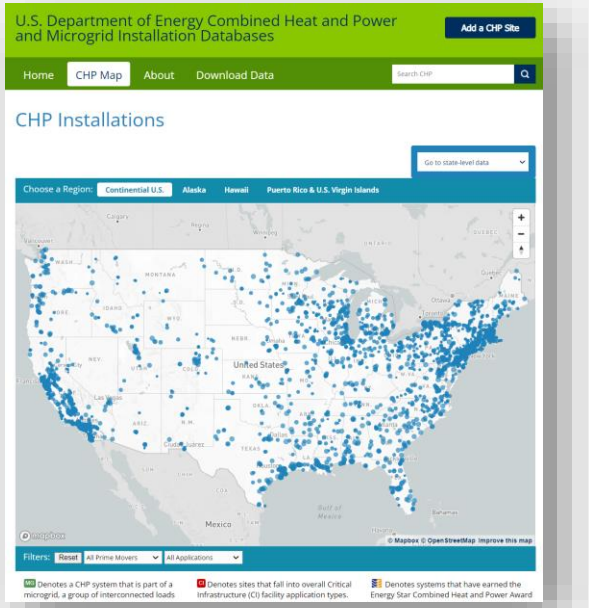
OR

1 million
Gas-powered vehicles driven for one year

Data represents direct technical assistance for sites installed after 2010, including ATAs, STAs, Qualification Screenings, Feasibility Studies, 3rd Party Reviews, RFP/Proposal Reviews, Design Reviews, and other technical assistance activities. Emission reductions based on comparison with marginal generation from AVERT regional marginal emissions rates (Uniform EE factors). Energy and emissions savings calculation assumes capacity factors and thermal utilization values between 50% and 100%, depending on the end-use application. Equivalencies are based on EPA Greenhouse Gas Equivalencies Calculator.

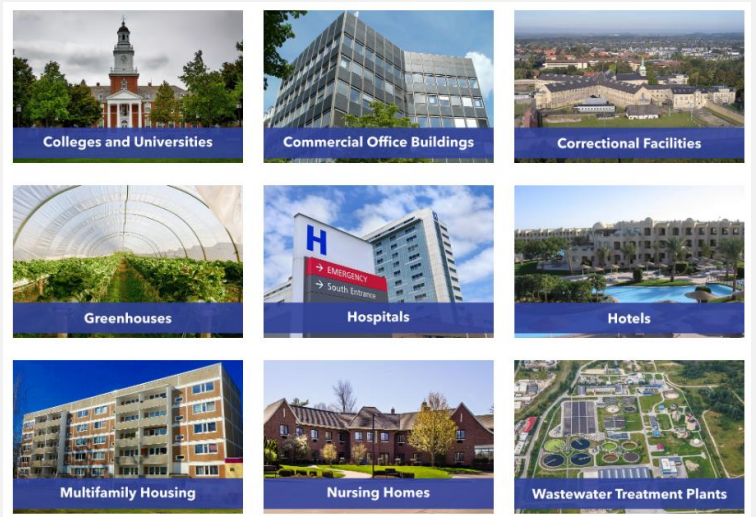
Accomplishment: Updated and New CHP Program Resources

Updates to CHP & Microgrid Installation Databases



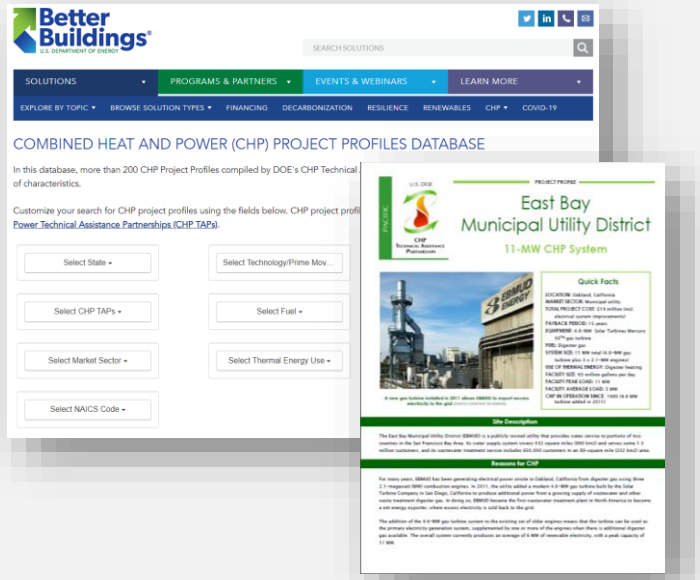
Learn details about over 4,700 CHP sites (81.5 GW) and 685 microgrids (4.4 GW) installed in the U.S.

Completed CHP Market Sector Fact Sheet Series



See how CHP economically meets energy demands and resilience for a variety of building types in 9 different market sectors.

CHP Project and Policy/Program Profile Databases



Search over 330 profiles showcasing CHP projects, policies, and programs in online database:

- Project profiles: 251
- Policy and program profiles: 85

Highlight: Collaboration with Better Plants & IACs

Better Plants U.S. DEPARTMENT OF ENERGY

Better Climate™ CHALLENGE U.S. DEPARTMENT OF ENERGY

- CHP In-Plant Training: 5-part virtual sessions in December 2022
- Coordination with Technical Account Managers to conduct CHP screenings
- Educational webinars as part of the Better Plants Webinar Series
- Focused technical session and virtual reality training at Better Plants Summit in April 2023
- *Upcoming*: New CHP virtual reality module with Better Plants Partner Harbec Plastics
- *Upcoming*: Onsite Renewable Energy and Storage Working Group with Better Climate Challenge

Industrial Assessment Center U.S. DEPARTMENT OF ENERGY

- Coordination with IACs to follow-up on CHP referrals, participate in assessments, and respond to technical questions
- Educational webinars for IAC students, Directors and Alumni as part of the IAC Webinar Series
- Joint meetings, tours, and hands-on training sessions for IAC students to learn about CHP
- Workforce Development: IAC students hired and mentored as CHP TAP analysts
- *Upcoming*: Supporting IAC Implementation Grant Program for small and medium manufacturers

Success Story: Benton Harbor Wastewater Treatment Plant

Benton Harbor – Saint Joseph Joint Wastewater Treatment Plant (BHSJ-WWTP)

2018: DOE Industrial Assessment Center (IAC) at University of Illinois-Chicago (UIC) performed energy assessment. The plant expressed interest in CHP and DOE IAC engaged Midwest CHP TAP for technical assistance

2019: The plant decided to have a feasibility study conducted. The Midwest CHP TAP helped secure state grant funding to complete the study and reviewed the findings.

2020: Preliminary design and engineering for the project completed

2023: 660 kW CHP system ordered with commissioning 2023

Transitional Program Activities

Onsite Energy Request for Information	• *August 2022* | *DE-FOA-0002830* • Objective: Gather input from industrial stakeholders on barriers and opportunities to integrate onsite clean energy technologies; inform programmatic planning for a new Onsite Energy Program
Onsite Energy TAP Funding Announcement	• *February 2023* | *DE-FOA-0002945* • Objective: Announce a $23 million funding opportunity to establish the regional network of Onsite Energy TAPs for three years with selections anticipated in June – July 2023
Onsite Energy Topic in TAWD Lab Call	• *March 2023* | *DE-LC-0000019* • Objective: Award $3 million per year for national laboratory analysis team to provide expertise, research, and analysis in renewables and storage for the Onsite Energy Program for four years
REopt Case Studies for Industrials	• *Started August 2022* | *Ongoing* • Objective: Use REopt to evaluate economics and feasibility of onsite energy technologies including CHP, solar PV, wind, and storage at industrial sites using site-specific data; share key takeaways
Microgrid Installation Database	• *May 2021* | *Ongoing* • Objective: Maintain a publicly available interactive tool that maps and tracks multi-technology microgrids in the U.S., including technology, end-user application, capacity, operating year, etc.

Looking Ahead: Activities On-the-Horizon

- **Launch Onsite Energy TAPs**
  - Build out IEDOs menu of technical assistance services and start providing technical resources, tools, and guidance to manufacturers pursuing onsite energy projects.
- **Conduct Market Analysis to Define Opportunity Space**
  - Collect data on existing onsite installations in the industrial sector
  - Understand renewable resource potential for specified technologies by geography
  - Characterize existing electric and thermal footprint of industrial subsectors and by state
  - Assess technical/economic potential for onsite technologies in subsectors by state
  - Conduct tools landscape analysis comparing techno-economic analysis tools for distributed energy resources
- **Refine Strategic Program Priorities**
  - Identify industrial subsectors and regions best-suited to adopt onsite energy
  - Prioritize efforts and investments in highest impact technology areas and markets

Questions?

Onsite Energy and CHP Deployment

Meegan Kelly, Technology Manager

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