NASEO State Industrial Working Group: Industrial Assessment Centers and Complementary Technical Assistance

May 3, 2023, 3:00 pm ET

Welcome and Introduction

Rodney Sobin, NASEO

Industrial Assessment Centers

John Smegal, Industrial Assessment Center Coordinator, Office of Manufacturing and Energy Supply Chain (MESC), U.S. DOE

CHP/Onsite Energy Technical Assistance Partnerships

Meegan Kelly, Technology Manager, Industrial Energy and Decarbonization Office (IEDO), U.S. DOE

Better Plants Program

John O'Neill, Technology Manager, Industrial Energy and Decarbonization Office (IEDO), U.S. DOE

IAC Perspective: Working With States

Kody Powell, Director, Intermountain Industrial Assessment Center and Associate Professor, Dept. of Chemical Engineering, University of Utah

States updates and discussion

Wrap-up

NASEO
National Association of State Energy Officials

NASEO State Industrial Working Group: Industrial Assessment Centers and Complementary Technical Assistance

May 3, 2023, 3:00 pm ET

Logistics:

- Please mute when not speaking
- This Forum is meant to be interactive – we encourage discussion. Please use “raise hand” to be recognized or use chat function.
- We will record presentations.

NASEO State Industrial Working Group

https://www.naseo.org/naseo-state-industrial-working-group

- Help State Energy Offices and others to identify, develop, and enhance resources to advance clean manufacturing/industry.
- Enhance cooperation and coordination across technical and business assistance programs.
- Support economic development and productivity, emissions and environmental, and energy reliability and resilience objectives.
- Strengthen existing industries.
- Advance new technologies and industries.

Inquiries: industry@naseo.org

NASEO State Industrial Working Group

https://www.naseo.org/naseo-state-industrial-working-group

- Working Group

California	North Carolina
Colorado	Pennsylvania
Connecticut	South Carolina
Indiana	Tennessee
Kentucky	Utah
Maine	Virginia
Michigan	Washington
Mississippi	Wisconsin
New York	

- State Energy Offices and others

Inquiries: industry@naseo.org

NASEO State Industrial Working Group

https://www.naseo.org/naseo-state-industrial-working-group

- Web resources and e-mail updates
  - Technical and business assistance programs
  - Funding and financial provisions (incl. IIJA/BIL & IRA)
  - Reports, studies, tools, organizations
  - Events
- Recent items
  - Renewable Thermal Collaborative - Policy Finder, *Industrial Electrification in U.S. States* report, Heat Pump Decision Support Tools
  - RFI Domestic Manufacturing Conversion Grants for EVs
  - TA for Prospective Advanced Energy Manufacturing and Recycling Grant Applicants
  - DOE FOA: $54 Million to Expand Industrial Assessment Centers (IACs) and Create Building Training and Assessment Centers (BTACs)
  - DOE FOA: State Manufacturing Leadership Program
  - DOE FOA: Industrial Efficiency and Decarbonization Office (IEDO) FY23 Multi-Topic FOA
  - DOE FOA: Industrial Demonstrations
  - DOE FOA: Onsite Energy Technical Assistance Partnerships
  - ENERGY STAR 2022 certified plants
  - U.S. Treasury initial guidance on 48C Qualifying Advanced Energy Project Credit

NASEO State Industrial Working Group

https://www.naseo.org/naseo-state-industrial-working-group

- Forums and exchange – candidate topics
  - IRA tax credits: 45X and 48C
  - NIST Manufacturing Extension Partnership; EPA ENERGYSTAR Industrial Program
  - Renewable Thermal Collaborative (RTC) Renewable Thermal Vision; Industrial Electrification
  - DOE Industrial Decarbonization Roadmap; DOE Heat Shot
  - Defense Production Act; CHIPS and Science Act provisions
  - Plus, State Focus Features
- State cases studies – experiences, lessons

We welcome your feedback and suggestions!

Industrial Assessment Centers (IAC) Program Overview -- NASEO State Industrial/Manufacturing Working Group Forum

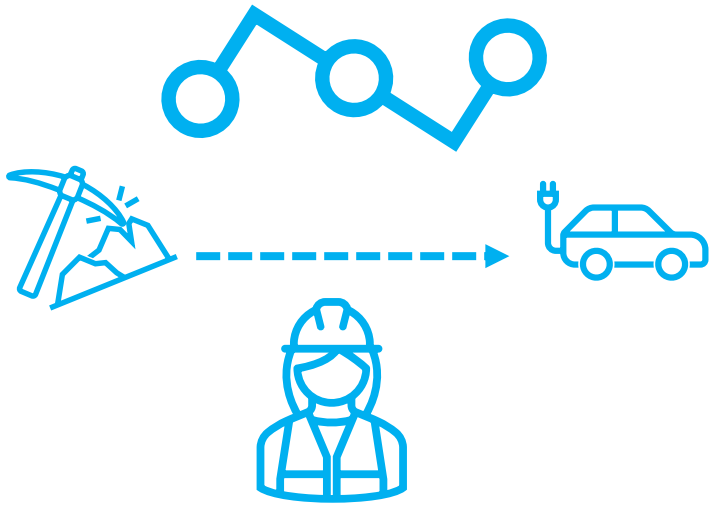
John Smegal, Mustafa Mahmoud, & Jeremy Avins
Office of Manufacturing and Energy Supply Chains

May 3, 2023

1. Overview of MESC
2. Introduction & History of the IAC Program
3. BIL Expansion of the IAC Program
4. Deep Dives into BIL Expansion of the IAC Program
   - IAC Centers of Excellence
   - Skilled Trade IACs & BTACs
   - IAC Implementation Grants

Overview: Office of Manufacturing and Energy Supply Chains

Mission: **Strengthen and secure** manufacturing and energy supply chains needed to modernize the nation's **energy infrastructure** and **support a clean** and **equitable energy transition**.



~ $16 Billion in programs of grants and industrial tax credits

- **Scale-Up and Deployment** of new manufacturing infrastructure
- **Support Manufacturing** Facility Upgrades to achieve decarbonization Goals
- **Bolster small and medium manufacturing** enterprises and support communities in energy transition.
- **Develop domestic manufacturing** clean energy workforce capabilities and resources

IAC Program: A two-part vision

1. A **skilled clean energy & manufacturing workforce** that represents the diversity of America

2. A **reinvigorated manufacturing base** prepared to lead the global clean energy transition

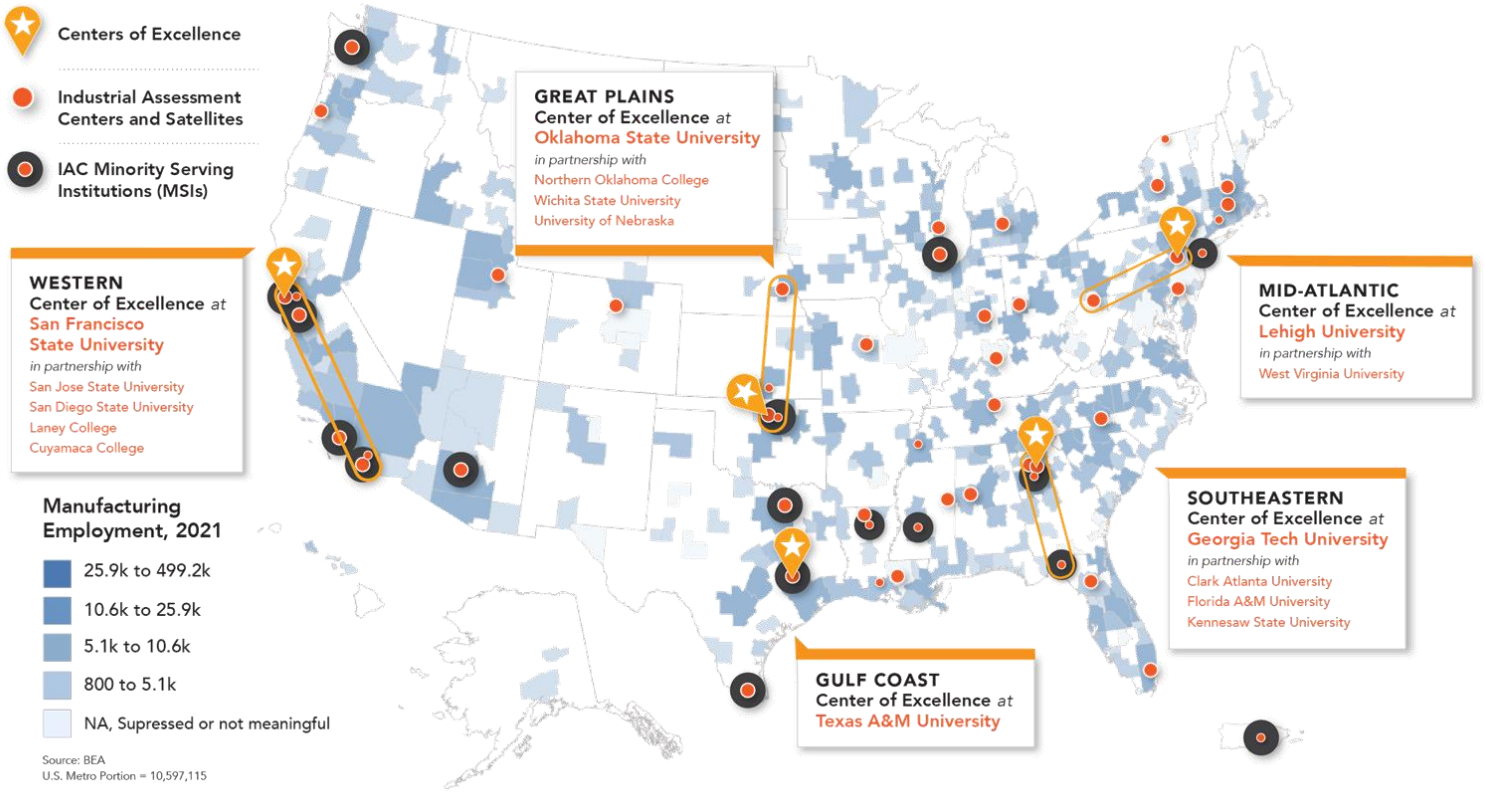
Overview: IACs have strengthened manufacturers for over 45 years

- IACs have two purposes:
  - Train the next generation of energy-savvy engineers and energy management workers
  - Provide no-cost, in-depth energy assessments and TA to small and medium-sized manufacturers (SMMs)
- IACs have operated since 1976 with bipartisan support
  - The program receives direct Congressional funding ~($15M year), along with major BIL expansions
  - Continuous adaptation to changes in the manufacturing sector, industrial processes, and energy policy sustain the program's support
- There are 37 IACs today. IACs have conducted nearly 20,000 assessments and provided nearly 150,000 recommendations to SMMs.

New expansions: Bipartisan Infrastructure Law allocates $550M

- **$150M to enlarge the program**
  - **5 Regional Centers of Excellence** to support the IAC network, accelerate innovation, and expand outreach to SMMs
  - **New skilled trades IACs** at community colleges, trade schools, and union/labor-management programs
  - **Apprenticeships and internships** with a federal cost share
  - **A national clearinghouse** of best practices
- **$400M for implementation grants**
  - **Cost-share grants to SMMs** to take on recommendations from IAC and DOE Combined Heat and Power TA assessments
  - **Opportunities to qualify** other assessors for SMM grant eligibility

IAC Centers of Excellence



Current opportunity: $54M to create skilled trades IACs and "BTACs"

FOA Topic 1 ($35M): IACs at community colleges and trade schools

- 12-65 awards, as cooperative agreements
- $150k-$1M/year for 3 years

FOA Topic 2 ($10M): IACs at union training programs

- 1-15 awards, as cooperative agreements
- $150k-$3M/year for 3 years

FOA Topic 3 ($9M): Building Training and Assessment Centers (BTACs)

- 8-10 awards, as cooperative agreements
- $300k-$400k/year for 3 years

The new IACs will reinforce the Program's focuses

Expand clean energy career pathways through credential, degree, apprenticeship and apprenticeship readiness programs, and labor-management training programs

Assess and support SMM plants, independently or in conjunction with IACs at 4-year universities, possibly including support for installation and initial operation

Promote applications of emerging concepts and technologies in SMMs in concert with IAC Centers of Excellence

NB: BTACs will operate analogously, with a focus on commercial and institutional buildings' energy performance

FOA details: https://tinyurl.com/mwfwft88

BIL 40521.b1 Statute: IAC Implementation Grants

- $400M in funding available through FY 2026
- Grants awards of up to $300,000 per manufacturer
- Eligibility exclusively for small- and medium-sized[1] manufacturing firms
- To address recommendations by IACs, DOE Combined Heat and Power TA Partnerships, or other assessments deemed equivalent by DOE

1. Small- and medium sized manufacturer is a firm with: a gross annual sales of less than $100M, fewer than 500 employees at the plant site, and annual energy bills between $100,000 - $3,500,000

What is a

- Improve site energy and/or material efficiency
- Improve site cybersecurity practices/program
- Improve site productivity
- Reduce site waste production
- Reduce site greenhouse gas emissions and/or nongreenhouse gas pollution

Cost Share Requirements

This non-federal share is **calculated as a percentage of the Total Project Cost**

For example: a Project with Total Project Costs of $200,000,000 would require a $100,000,000 non-federal share of costs in order to have a 50% cost share.

Allowable Types of Cost Share

- Cash Contributions:
- In-Kind Contributions
- Unrecovered Indirect Costs (with prior approval)

Generally Prohibited Costs

- Costs paid by federal government under another award
- Pre-award costs prior to the signing of the Selection Statement by the DOE Selection Official
- Fee or profit, including foregone fee or profits

Financing options	Description
State and Local Public Programs[1]	• Loans and/or grants from local/state government entities
Private Loans (Incl. SBA-Guaranteed)	• Borrow money directly from banks or other private lenders
Utility Programs	• **On-bill financing:** Supply capital to fund energy efficiency projects & repaid via existing utility bill • **Rebate Programs**: Provide will offer a credit for installing energy efficient equipment
Leases	• Lease necessary equipment without purchasing outright, with decision to purchase outright at the end of lease
Energy Savings Performance Contracts (ESPC)	• Energy service company (ESCO) coordinates installs & maintains project equipment at facility. ESCO is paid from the associated energy savings of the project

1. Ensuing that funding does not originate from federal funding

Community Benefits: Four priorities to help build a clean & equitable energy economy

Justice40

Meet or exceed the objectives of the Justice40 initiative that **40% of benefits accrue to disadvantaged communities** across the country

Diversity, Equity, Inclusion, and Accessibility

Equitable **access to wealth building opportunities (teaming, access to good jobs**, business and contracting opportunities, etc.)

Good Jobs

Create **good-paying jobs to attract and retain skilled workers** and ensure workers have a **voice on the job over decisions that affect them**

Workforce and Community Agreements

Meaningful **engagement with community and labor partners** leading to formal agreements

Upcoming opportunities: More TA and grants to SMMs

First tranche of implementation grants
to SMMs who have received an IAC or DOE Combined Heat and Power TA assessment

Qualification of additional assessors
as "IAC-equivalent" to make client SMMs eligible for implementation grants

Regional collaboration through IAC COEs
to align IAC efforts with other manufacturing and workforce efforts

Contact: IACProgram@doe.gov

U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

CHP and Onsite Energy Technical Assistance Partnerships

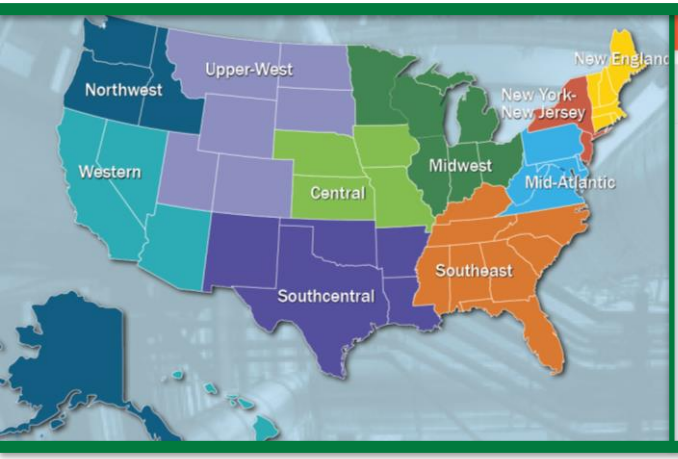
Meegan Kelly, Technology Manager

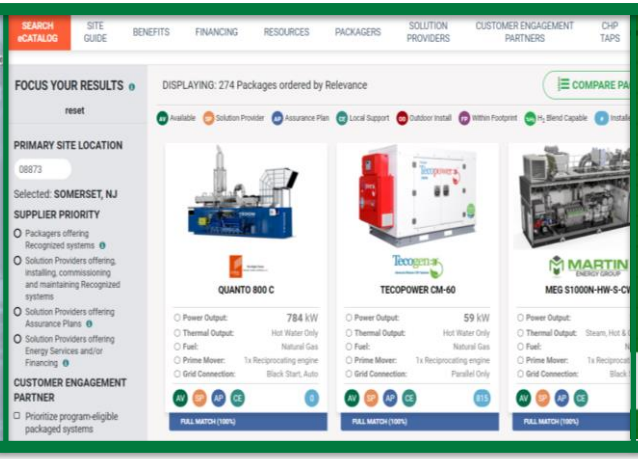
Industrial Efficiency and Decarbonization Office

May 3, 2023

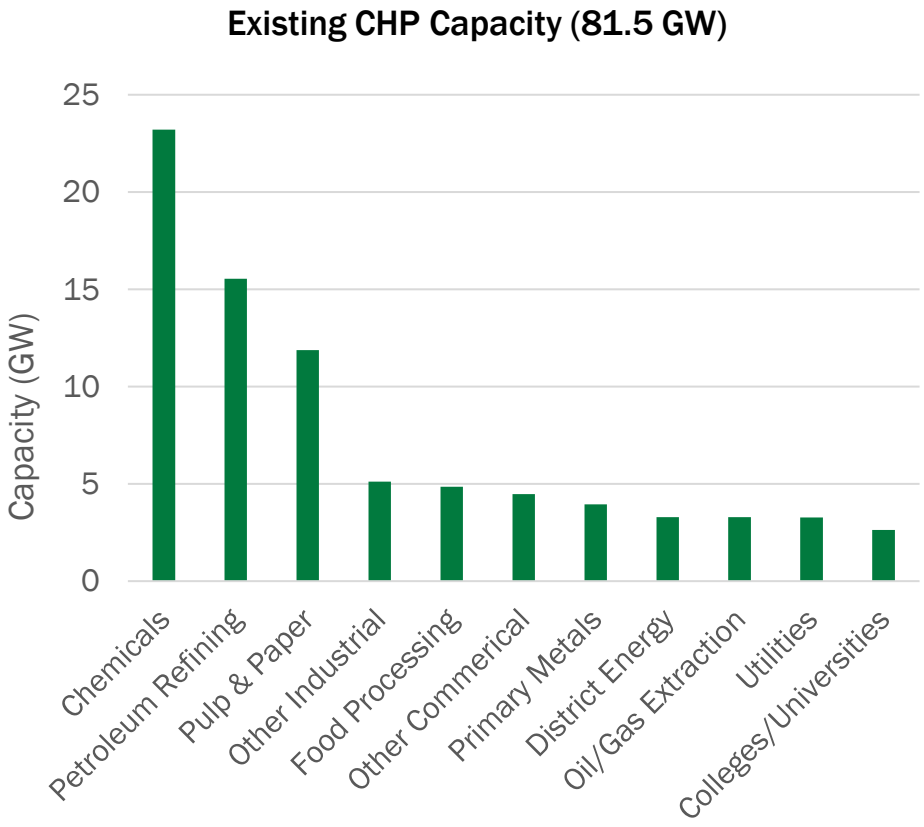
Overview

- Background and Context
- CHP Technical Assistance Partnerships (TAPs) - What We Do
- Tools and Resources for State Energy Offices
- Onsite Energy Program and Transitioning to Onsite Energy TAPs





CHP Installations Today in the United States



Avoids **1.3 Quadrillion Btus** of fuel consumption annually.

Avoids **218 million tons of CO_2** compared to separate production.

81.5 GW of installed CHP at more than **4,700** industrial and commercial facilities.

7% of U.S. electric generating capacity; 13% of generation.

CHP Technical Assistance Partnerships (TAPs)

Upper-West
CO, MT, ND, SD, UT, WY
www.uwchptap.org
Marina Badoian-Kriticos
Houston Advanced Research Center
281-364-6033
mkriticos@harcresearch.org

Midwest
IL, IN, MI, MN, OH, WI
www.mwchptap.org
Cliff Haefke
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312-355-3476
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New England
CT, MA, ME, NH, RI, VT
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dvorak@maine.edu

Northwest
AK, ID, OR, WA
www.nwchptap.org
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Washington State University
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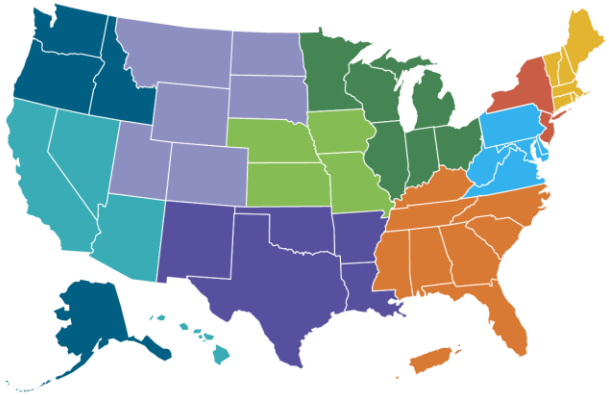
VanHoldeD@energy.wsu.edu



New York-New Jersey
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www.nynjchptap.org
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End User Engagement

Stakeholder Engagement

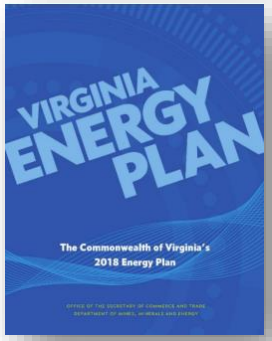
Technical Services

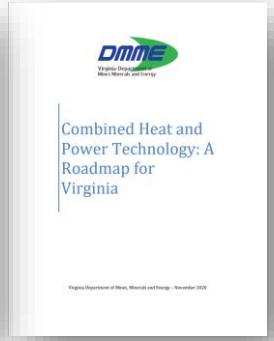
https://betterbuildingssolutioncenter.energy.gov/chp/chp-taps

CHP TAPs and State Energy Offices

Presentations, Webinars, and Trainings

Coordination with SC Energy Office





State Energy Planning Support

Collaboration with Virginia Department of Mines Minerals and Energy (DMME)

https://chptap.ornl.gov/profile/425/Virginia_CHP_Roadmap.pdf

Outreach Events

NASEO Annual Meeting
October 13-15, 2021
Portland, Maine

Photo Credit: Fox 2 Detroit

Stakeholder Meetings

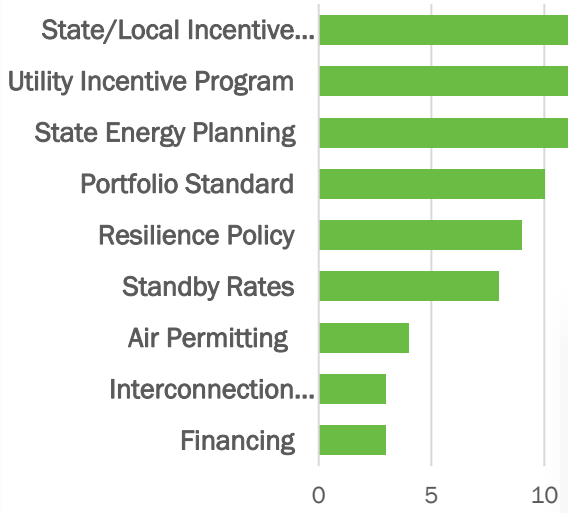
Participation in MI Healthy Climate Conference
April 11-12, 2023
Detroit, Michigan

Resources: “Project” Profiles and “Policy & Program” Profiles

CHP Project Profiles Database

https://betterbuildingssolutioncenter.energy.gov/chp/chp-project-profiles-database

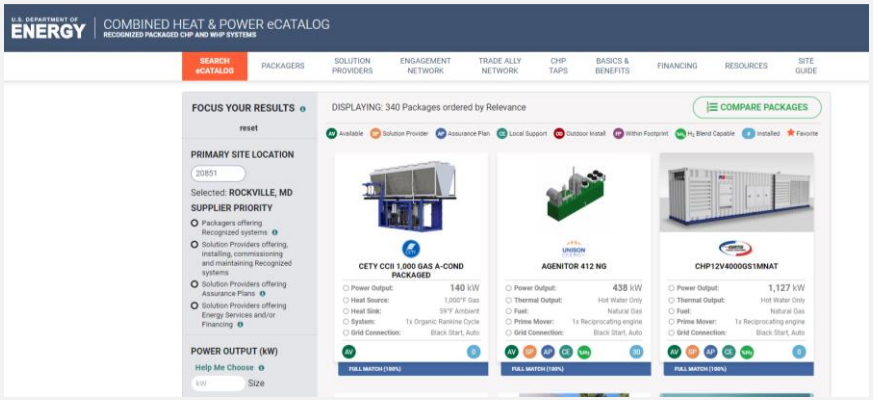
Policy and Program Profiles



https://betterbuildingssolutioncenter.energy.gov/chp/chp-policy-and-program-profiles

Packaged CHP Systems: CHP eCatalog & Engagement Network

CHP eCatalog

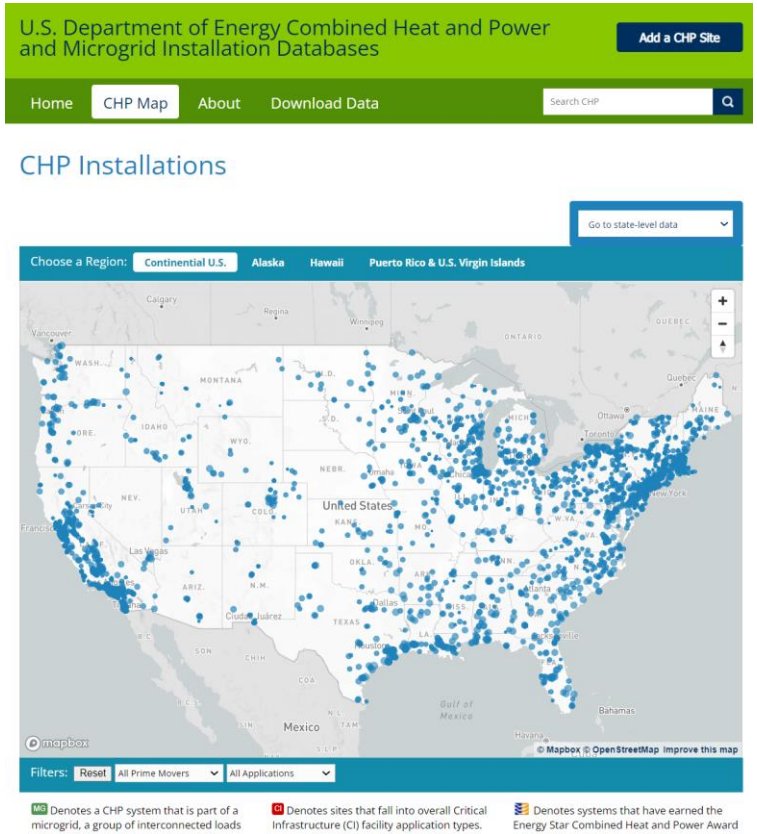


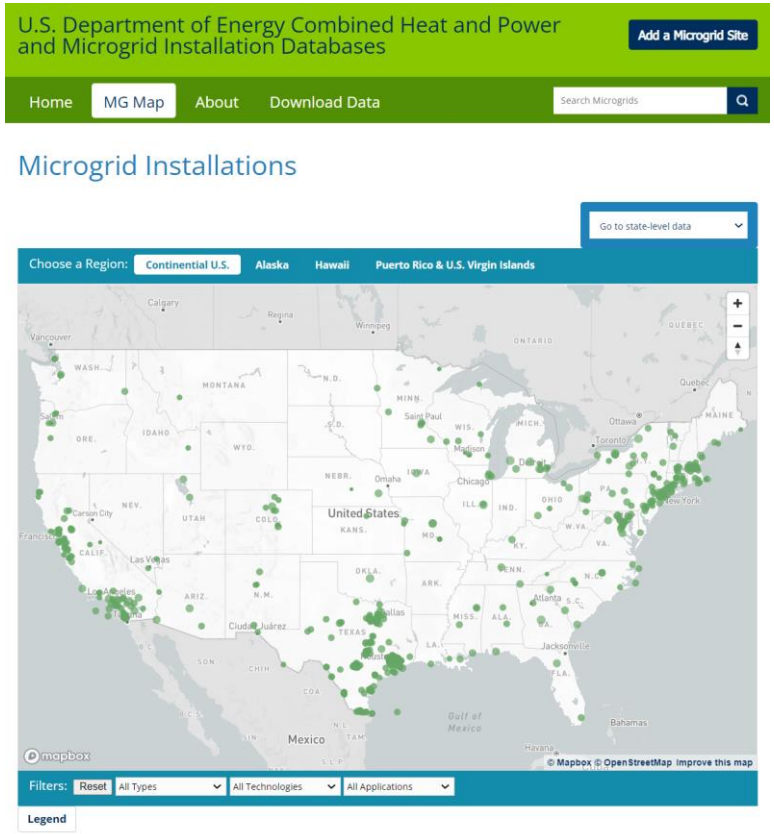
A national, searchable web-based catalog provides engineers with DOE-recognized CHP suppliers and technical data for CHP packages. The eCatalog currently includes 340 CHP product packages and averages 600+ users per month.

Customer Engagement Network

Within the eCatalog, CHP Engagement Network members (utilities, federal agencies, states, and municipalities) promote their CHP-related programs, which can include education and outreach, technical assistance, incentives or other financial support.

Tools: CHP and Microgrid Installation Databases





Looking Ahead: IEDO Onsite Energy Deployment

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

Learn more: https://www.energy.gov/eere/amo/onsite-energy-program

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

Onsite Energy TAP Program Launch Activities

Questions?

Onsite Energy and CHP Deployment

Contact Me: meegan.kelly@ee.doe.gov

John O’Neill, Industrial Efficiency and Decarbonization Office (IEDO)

Manager, Better Plants and Better Climate Challenge

U.S. DEPARTMENT OF ENERGY

DOE's Better Plants & Better Climate Challenge

Helping manufacturers and other industrial organizations save money and improve sustainability

Increased Energy Productivity

Lower Greenhouse Gas Emissions

Water Savings

Waste Reduction

How Do the Programs Work?

Through **Better Plants** and the **Better Climate Challenge**, DOE partners with industrial organizations to set and achieve ambitious, long-term, portfolio-wide sustainability goals:

- Energy intensity (25% in 10 years)
- Greenhouse gas emissions (50% in 10 years)
- Water efficiency
- Waste reduction

Partners commit to:

- Publicly committing to their goal(s)
- Submitting energy/emissions data annually
- Knowledge sharing with their peers

DOE commits to:

- Providing direct, ongoing technical assistance
- Developing resources, tools, and trainings
- Convening partners and subject matter experts

Better Plants®
U.S. DEPARTMENT OF ENERGY

Better Climate CHALLENGE
U.S. DEPARTMENT OF ENERGY

Why Companies Join Better Plants

Recognition

Developing Innovative, Replicable Solutions with Market Leaders

- National Recognition
- Peer to Peer Networking
- Better Building Solutions Center

Technical Assistance

Making Energy Efficient Investments Easier

- Technical Account Managers
- Software tools for energy management and analysis
- Financing Navigator
- Diagnostic Equipment Program
- Technical Publications

Access to Innovation

Innovation to Drive Savings

- DOE National Lab Visits
- Industrial Technology Validation

Workforce Development

Helping You Meet Your Challenges of Today, and Tomorrow

- In-Plant Trainings
- Virtual trainings
- Energy and Decarbonization bootcamps

All Better Plants Partners

Better Climate Challenge – Industrial Partners

Technical Assistance: Technical Account Manager

- Helps Partners develop a roadmap to achieve their goals
- Helps Partners set energy and emissions baselines, track data, and identify energy savings opportunities
- Inform about DOE and external resources

"Like having a free consultant on retainer"
--Andy Terrey, City of Phoenix Water Services

Technical Assistance: Tools and Resources

Diagnostic Equipment Program

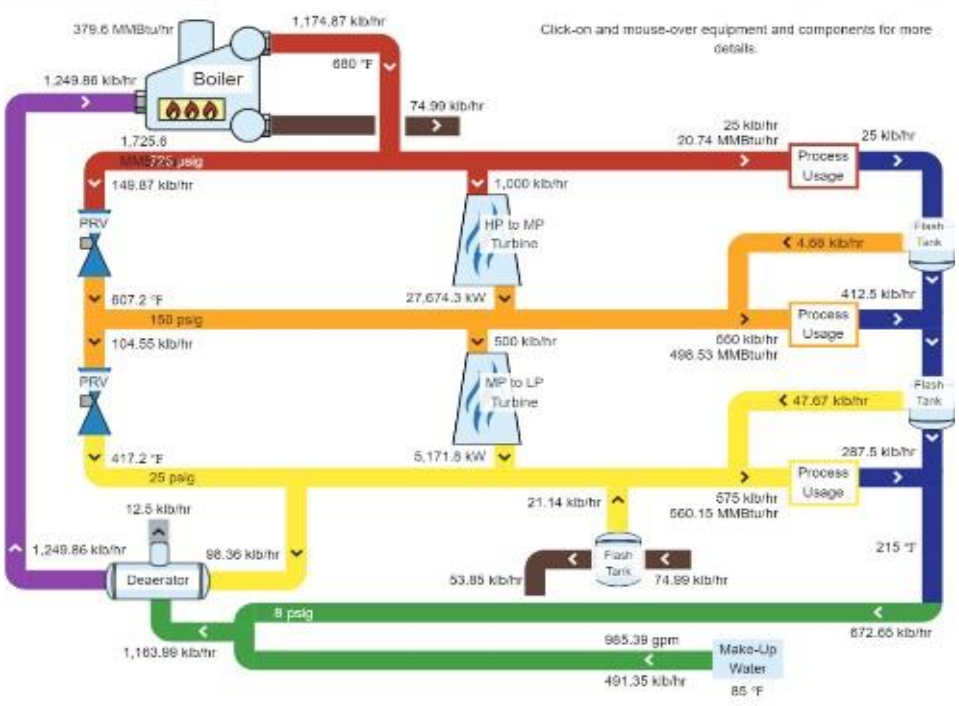
- Evaluate system performance
- Measure energy losses
- Quantify savings opportunities

Field data is best for evaluating system performance

Technical Assistance: Software Tools

MEASUR Tools Suite

https://www.energy.gov/eere/amo/measur



[Steam/Boiler Systems](#)

[Pumping Systems](#)

[Fan Systems](#)

[Motor Systems](#)

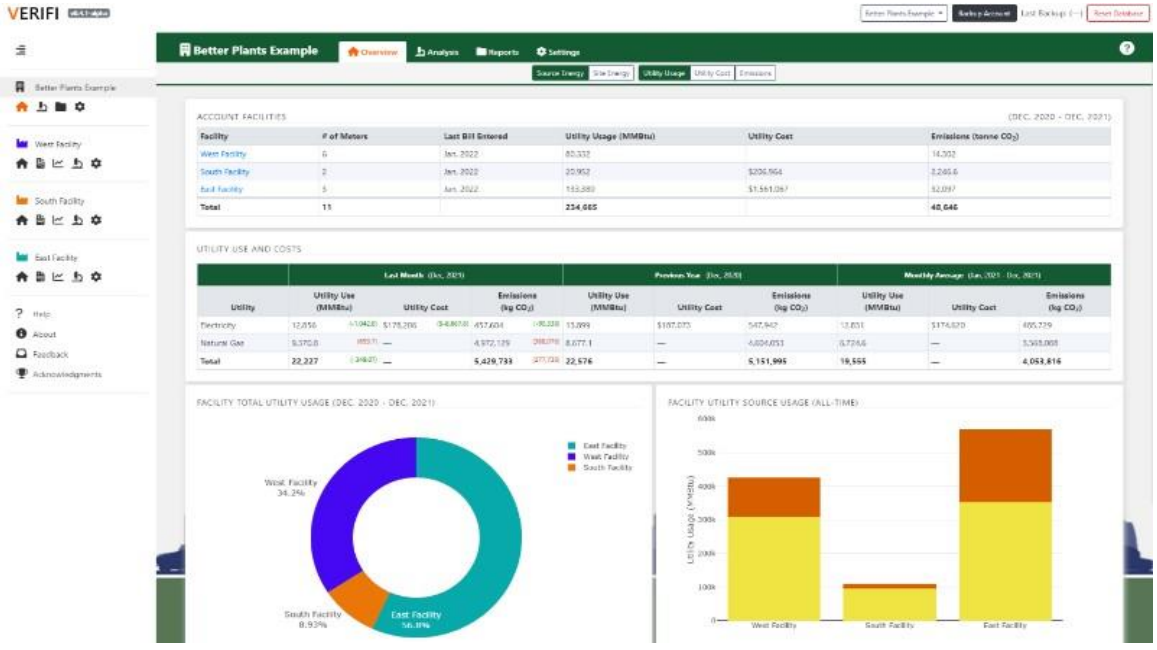
[Compressed Air](#)

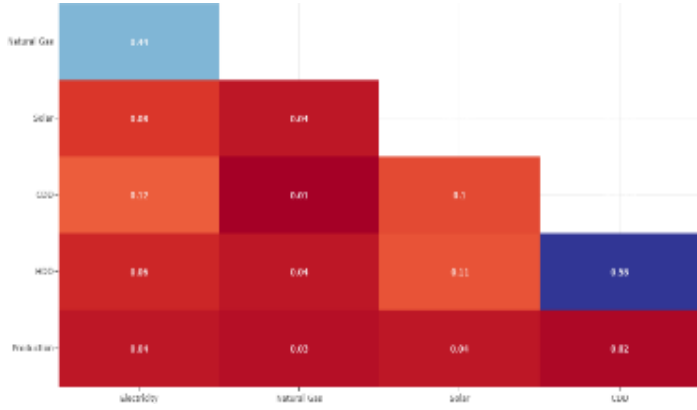
[Process Heating/Furnace Systems](#)

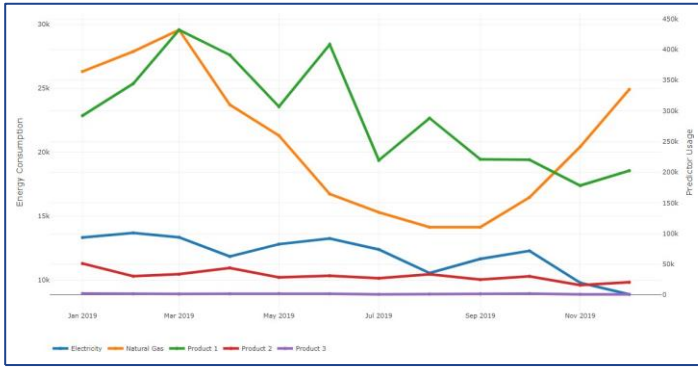
[Energy Treasure Hunts](#)

Technical Assistance: Software Tools

VERIFI Tool







- **Available for Beta testing, visit:**
  https://verifi.ornl.gov/ https://github.com/ORNL-AMO/VERIFI/releases

Technical Assistance: Low Carbon Tools and Calculators

The Department of Energy and Oak Ridge National Lab have developed several tools to help jump start organizations' journey to **lower carbon emissions**. Partners are encouraged to take advantage of these free tools and calculators, below, to plan projects, calculate carbon emissions, and determine the impact of electrification.

Carbon Inventory Calculator

This calculator lets the user **determine carbon dioxide emissions** for given combustion fuel, biofuel, refrigerant charge, purchased gases, purchased electricity from the grid. It also helps to calculate the emissions fuel use for transportation.

Click here to access.

Electrification Impact Calculator

Use this calculator to estimate **potential cost and CO_2 emissions savings** resulting from changing from fuel-based equipment to electrical equipment (output rates determined by the EPA and Electronic Code of Federal Regulations.

Click here to access.

Low Carbon Action Plan Tool

DOE has developed this Action Plan Tool, which you can use to **think through your low carbon strategy and develop low carbon pathways** for your plants and account for carbon emissions from onsite fuel consumption and purchased energy.

Click here to access.

Technical Assistance: Other Initiatives

Water Savings

Transporting and treating water in an industrial facility requires energy. Additionally, the efficient use of water can also lead to a more reliable water supply, reduced risk, and improved water quality. Through the **Water Savings Network**, Better Plants partners set goals to save water and receive recognition and tailored technical support.

Waste Reduction

The **Waste Reduction Network** helps partners reduce waste, improve energy performance, and reduce operating costs. This network allows industry leaders to demonstrate what is achievable in waste reduction while helping DOE understand real-world problems and solutions, which aids other organizations in creating or improving their own waste programs.

Supply Chain Efficiency

Around 40-60% of a manufacturing company's energy and carbon footprint can reside upstream in its supply chain. Better Plants works with partners through the **Supply Chain Initiative** to encourage their suppliers to leverage program resources and collectively set, track, and meet energy goals.

Workforce Development: In-Plant Trainings

Better Plants returned to delivering In-Plant Trainings again in 2022

TAMs and external experts provide trainings on how to conduct assessments, use DOE tools, and implement projects

Currently accepting applications for 2023 Spring INPLT Solicitation!

Since 2011:

- 150+ INPLTs
- 2400 trainees
- Identified >$50M in energy savings

In-Plant Training Topics:

- Pumping Systems
- Fans
- Compressed Air
- Steam
- Process Heating
- Industrial Refrigeration
- Water/Wastewater Treatment
- Energy Management
- Water Efficiency
- Energy Treasure Hunt

Workforce Development: Virtual Trainings

Virtual Trainings have expanded consistently since their start in 2020.

Trainings are now offered on a rolling basis – and open to anyone!

"Our team believes this will have a huge impact on our energy systems and help save our company both energy and money."

- Alex Floyd, Tyson Foods

"Each instructor is a true expert in their field… we plan for more colleagues to attend in the future now that we see the value"

- Ann Dougherty, Roppe Holding Company

"The instructions, demonstrations, and instructor were really straightforward and helpful. It made everything much more approachable and easy to understand."

- Tyler Rodey, Plastics Engineering Company

Topics

- Water Efficiency
- Wastewater Treatment
- 50001 Ready
- Motor Systems
- Drinking Water
- Compressed Air
- Activated Sludge Wastewater Treatment
- Fan Systems
- Steam Systems
- Pumping Systems
- Process Heating
- Ammonia Refrigeration
- Process Cooling
- **Waste Reduction –new!**

Workforce Development: Boot Camps

- Goals:
  - Crash course on energy and decarbonization fundamentals
  - How to use DOE tools & diagnostic instruments
  - Get employees up to speed on these key strategic priorities
- Bootcamps on energy (Oct 16-20) and decarbonization (Aug 22-25)
- Held in-person at Oak Ridge National Laboratory – mix of classroom/hands-on learning

Access to Innovation: Technology Days

- **Tour** World-Class Lab Facilities
- **View** Demonstrations of innovative Technologies
- **Hear** from Experts from the Lab and Industry
- **Learn** how to easily partner and leverage technology
- **Network** with BP partners and lab technologists

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Argonne
NATIONAL LABORATORY

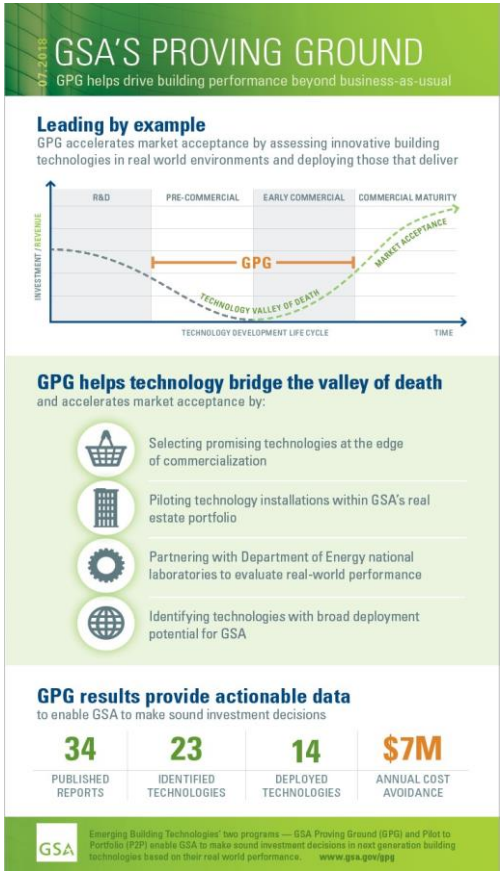
BERKELEY LAB
Lawrence Berkeley National Laboratory

OAK RIDGE
National Laboratory

Lawrence Livermore
National Laboratory

Access to Innovation: Industrial Technology Validation

- Goal: reduce risk associated with installing new technologies
- DOE will evaluate technologies in real-world operational settings at partner locations.
- Pair technology vendors with industrial host sites
  - Partners receive independent insights on technology energy performance
  - Vendors receive validation of performance claims



Recognition

Other: Better Buildings Solution Center

More than 2,500 solutions are available publicly in the Better Buildings Solution Center

Showcase Projects:

- Successful Energy Savings Case Studies

Implementation Models (Playbooks):

- Overcome barriers: finance, data, energy management, staff training, partnering with utilities, and more
- Multi-faceted and applicable across sectors

Technology Focus Area Pages

- 13 focus areas, from compressed air to renewables
- DOE tip sheets and publications, software tools, webinars, and contact information for a subject matter expert

Additional Resources, Toolkits, Case Studies

energy.gov/bbsc

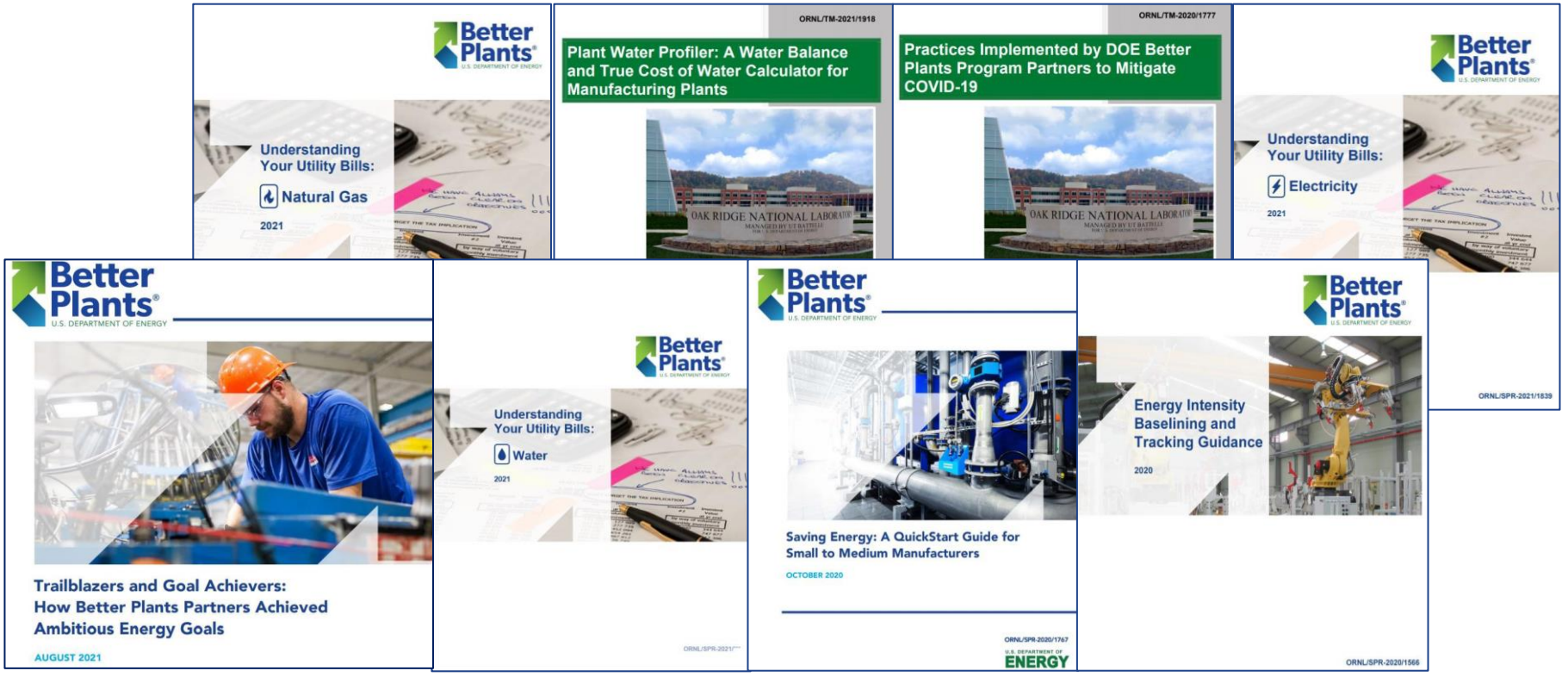
Other: Webinars and Online Learning Resources

Webinars are offered throughout the year. You can view live sessions or watch recordings on a variety of topic areas covering industrial EE and decarbonization.

Sample list of webinar resources:

- Driving Decarbonization With 50001 Ready
- Implementing Renewable Energy in Industrial Facilities
- Going All-Electric in Large-Scale Systems
- Industrial Demand Response
- Online Learning for Industrial Partners

Other: Resource Documents



Other: Better Climate Challenge Working Groups

GHG Emission Reduction Audits and Assessments

This working group will focus on scoping, procuring, and executing GHG emissions reduction audits and assessments, collaborating with technical experts on best practices.
Starting in July 2023

On-site Renewable Energy and Storage

This working group will focus on implementing on-site renewable energy and energy storage systems and understanding and addressing key barriers.
Starting in August 2023

Low-emission Alternatives to Industrial Thermal Loads

Partners in this working group will identify the most promising technology pathways to decarbonize industrial thermal loads under energy efficiency, electrification, low- GHG fuels, and carbon capture technology pillars.
Starting in August 2023

How we can collaborate with SEOs

- Webinars convened by SEOs to engage manufacturing base and inform them of DOE resources
  - Partnership not always required!
- Leverage Better Plants network to understand key barriers that could be alleviated with state policy
- Sector-specific expertise from TAMs
- Other ideas?

Impact

To date, Better Plants partners have cumulatively saved:

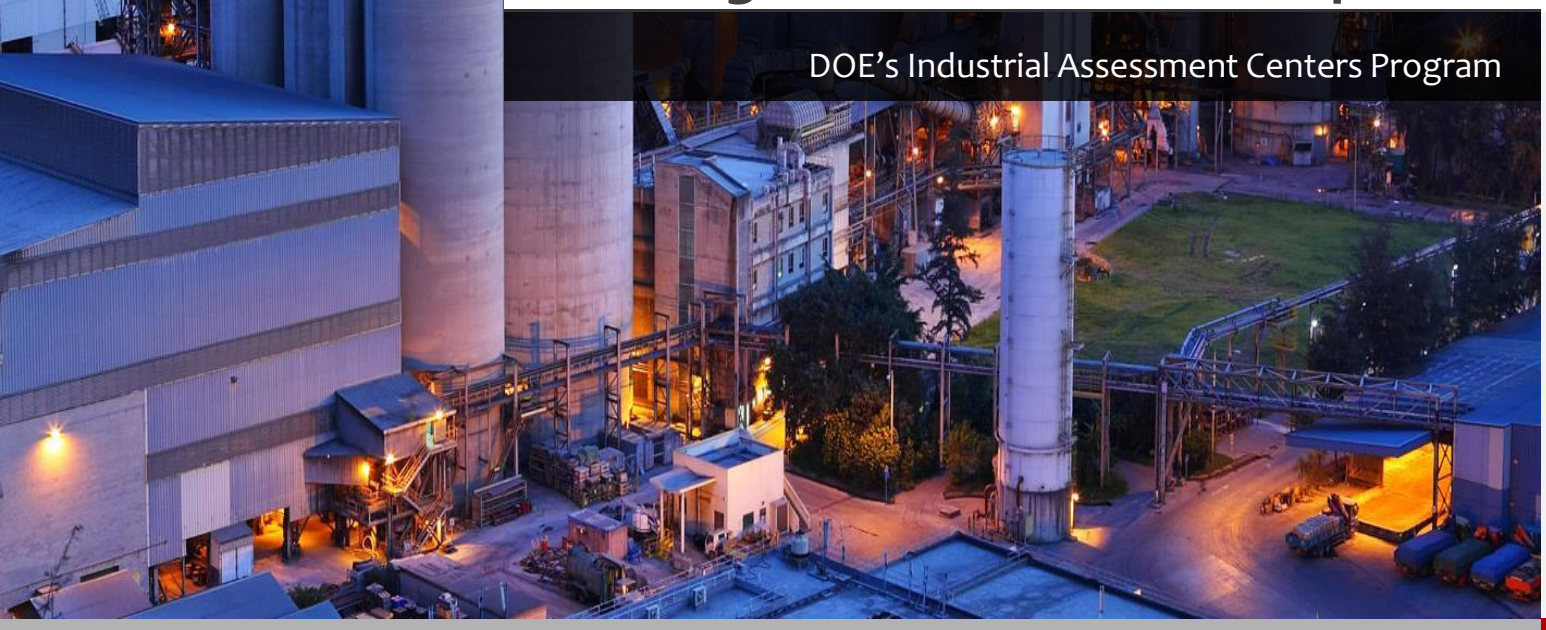
- **10.6 Billion Dollars**
- **2.2 Quadrillion BTUs**
- **131 MMTCO2**
- **1.8% energy intensity per year**

Today:

- **280+** partners
- **> 3,500** facilities
- **74** goals achieved

Industrial Assessment Centers:
Working with States to Make an Impact on Decarbonization

DOE's Industrial Assessment Centers Program

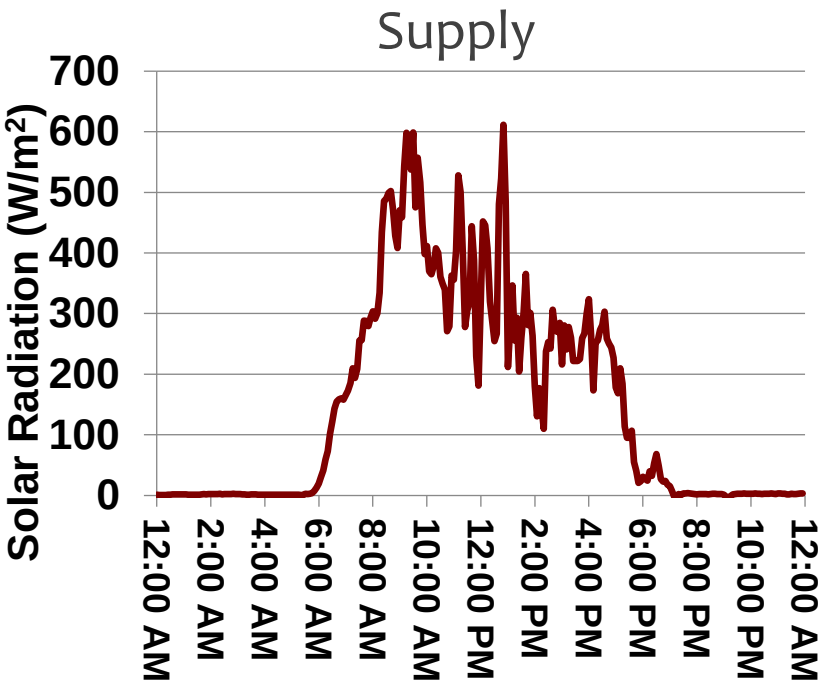


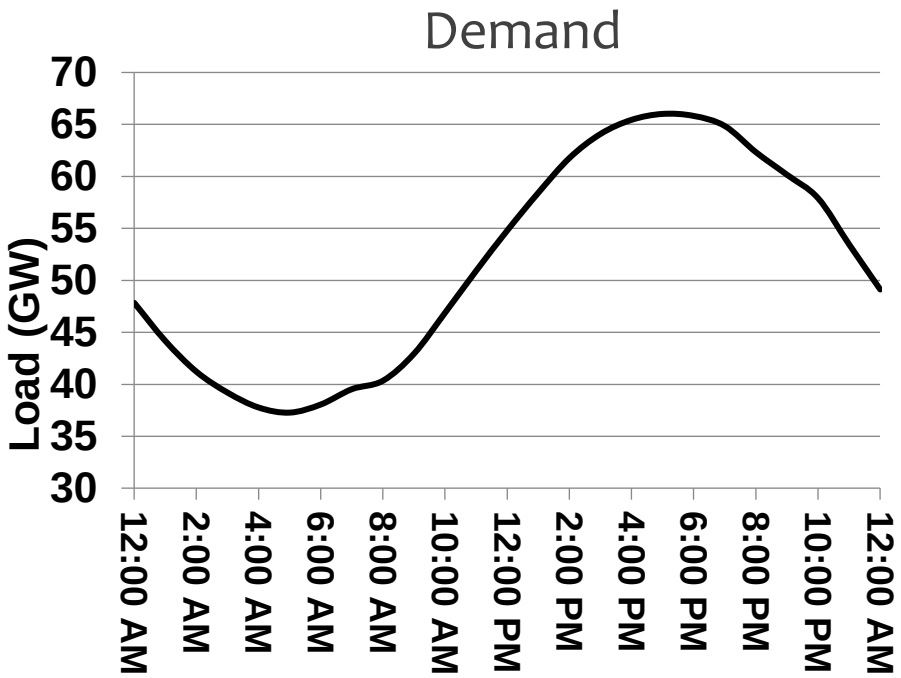
Intermountain Industrial Assessment Center
THE UNIVERSITY OF UTAH

UTAH GOVERNOR'S OFFICE OF
ENERGY DEVELOPMENT

Industrial Assessment Center
U.S. DEPARTMENT OF ENERGY

A Major Issue with Decarbonization





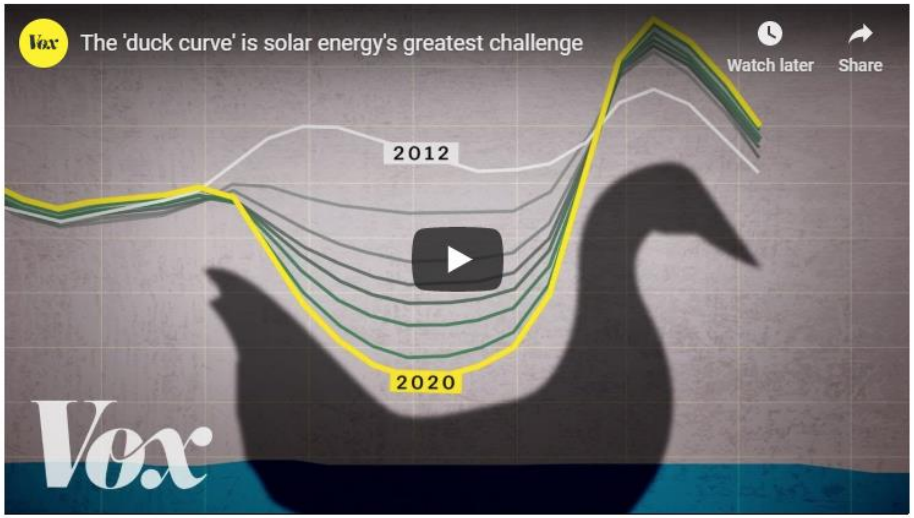
The Infamous Duck Curve

This "duck curve" is solar energy's greatest challenge

Renewables require a change in the how we supply electricity.

By Carlos Waters | carlos.waters@vox.com | May 9, 2018, 4:40pm EDT

SHARE



Carlos Waters/Vox

IEDO FY23 Multi-topic Funding Opportunity Announcement

Industrial Efficiency & Decarbonization Office

Funding Opportunity Announcement Number: DE-FOA-0002997

Topic 3: Exploratory Cross-Sector R&D – This topic will include emerging R&D areas for technologies and materials that enable industrial decarbonization.

- **Subtopic 3a: Enabling Flexible Industrial Energy Use** — This subtopic will focus on emerging transformational technologies that maintain manufacturing resilience and economic competitiveness while integrating renewable energy into industrial manufacturing processes. Potential areas of interest include industrial load flexibility and thermal energy storage systems.

Can we work smarter and not just harder?

Photo courtesy of NBC News

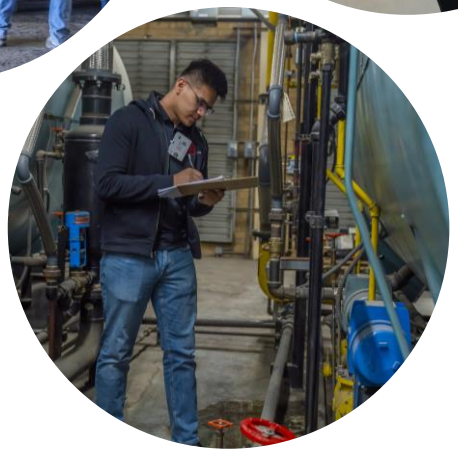
UTAH OFFICE OF ENERGY DEVELOPMENT

Industrial Assessment Center
U.S. DEPARTMENT OF ENERGY

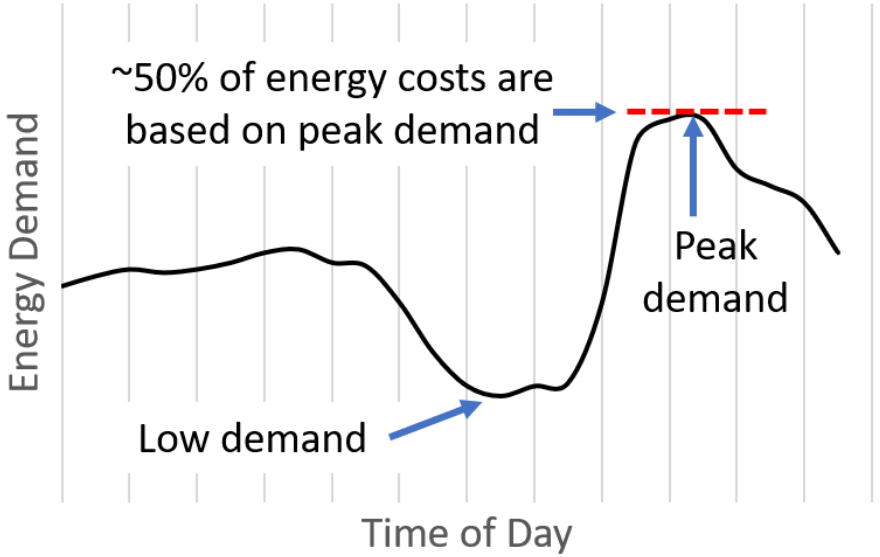
Intermountain Industrial Assessment Center
THE UNIVERSITY OF UTAH


POWER
COMMERCIAL
MANUFACTURING
MANUFACTURING
RESIDENTAL

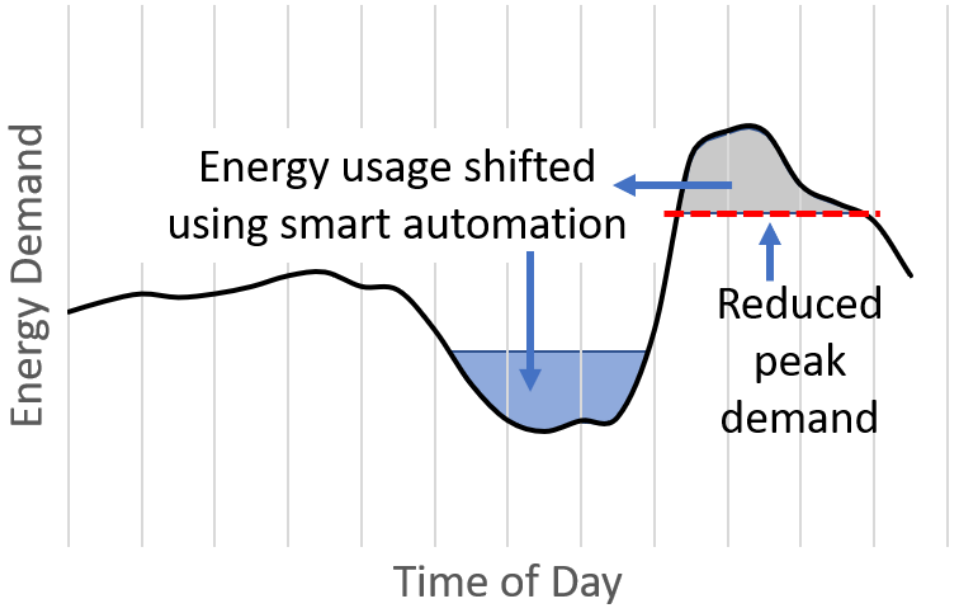
Enter the Industrial Assessment Centers Program



Grid-Responsive Smart Manufacturing: An IAC Supplemental Program Sponsored by the Utah Office of Energy Development



UTAH GOVERNOR'S OFFICE OF
ENERGY DEVELOPMENT



A Minerals Processing Facility with Big ESG Goals

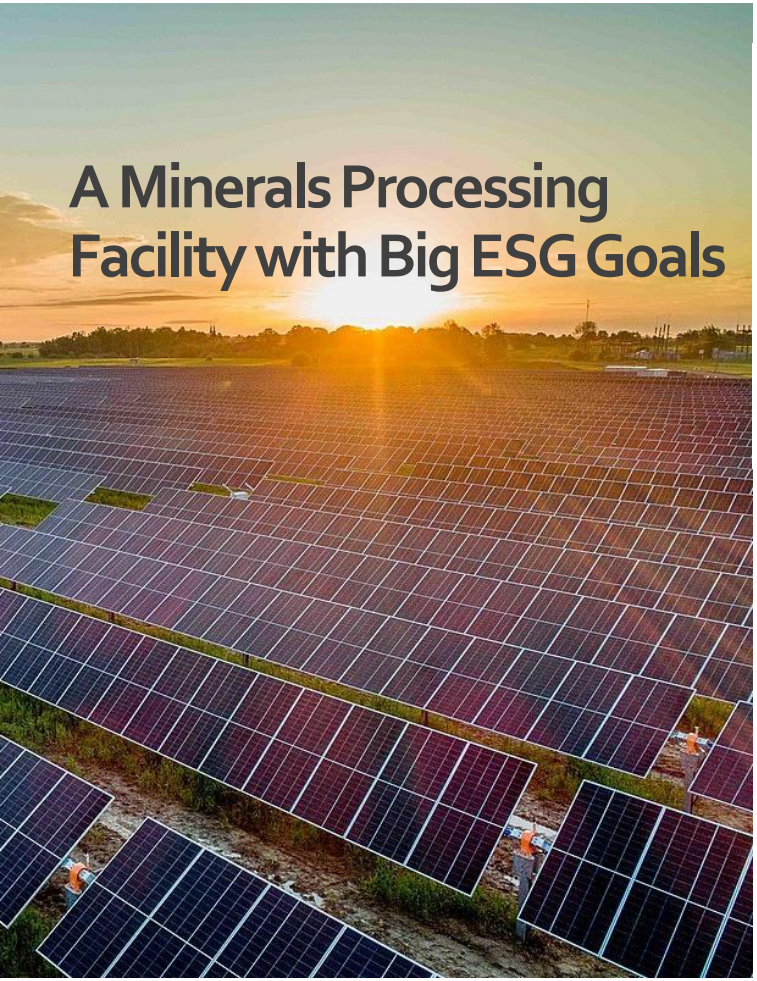
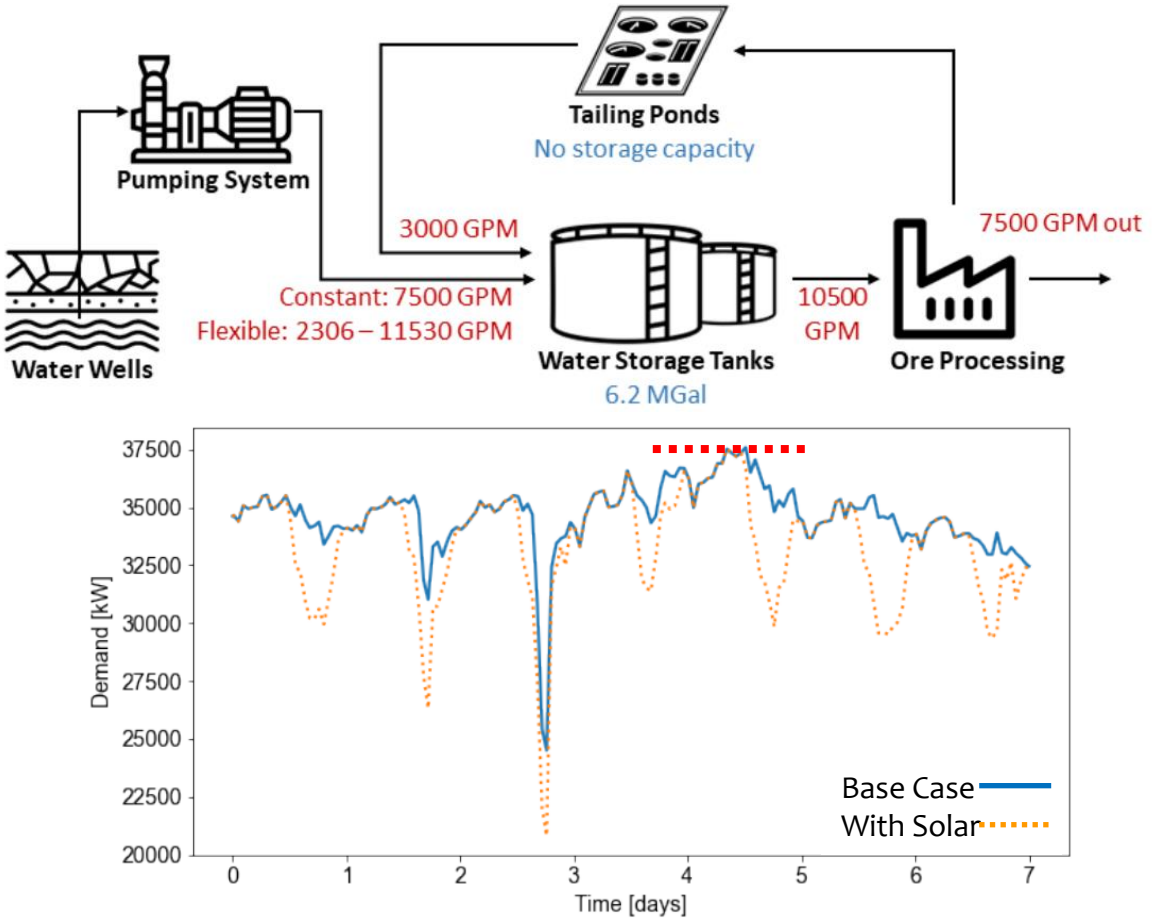
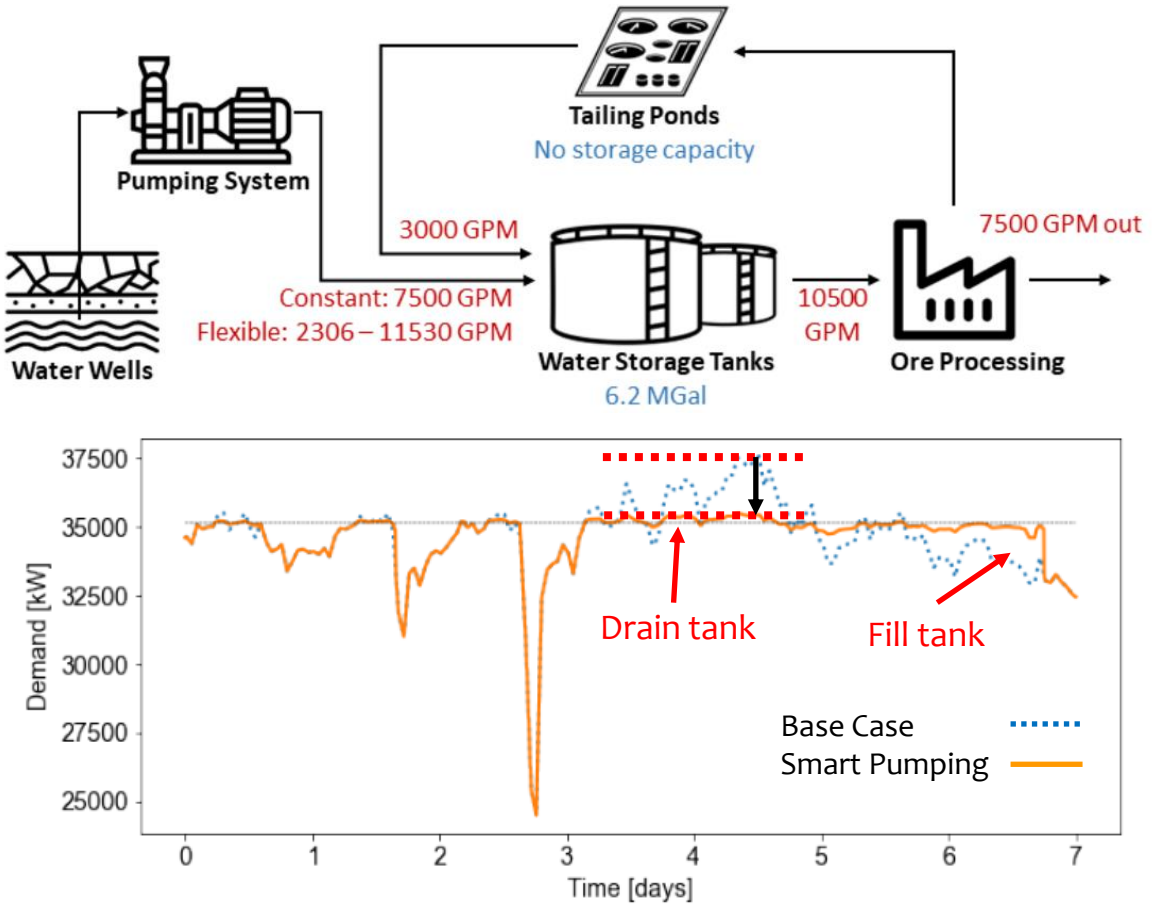


Photo courtesy of Wikipedia



A Smarter Solution Using Existing Infrastructure

Photo courtesy of Contain Water Systems



The Results of Working Smarter

Scenario	Avg. Monthly Peak Demand (kW)	Project Cost ($)	Savings ($/yr)	Time Required to Recoup Investment (yrs)
Business as usual	35,919	-	-	-
Solar	35,850	$7.6M	$269K	28.4
Battery	34,638	$3.6M	$318K	11.5
Solar + Battery	34,258	$11.3M	$664K	17.0
Smart Pumping	34,428	$250K	$372K	0.7
Solar + Smart Pumping	33,906	$7.9M	$755K	10.5

Results from "Grid-Responsive Smart Manufacturing: Can the Manufacturing Sector Help Incorporate Renewables?"
Chen et al., *IFAC PapersOnLine*, Volume 55, Issue 10, 2022

The Impact of an IAC and State Energy Office Partnership

Improving the economics of battery storage for industrial customers: Are incentives enough to increase adoption?

Anne Dougherty, Blake Billings, Nestor Camacho, Kody Powell

Techno-economic analysis of the impact of dynamic electricity prices on solar penetration in a smart grid environment with distributed energy storage

Moataz Sheha [a], Kasra Mohammadi [a], Kody Powell [a, b]

Grid-Responsive Smart Manufacturing: Can the Manufacturing Sector Help Incorporate Renewables?

Yunzhi Chen [1], Blake Billings [1], Sammy Partridge [1], Brittany Pruneau [1], Kody M. Powell [1, 2]

Integrating a Microturbine into a Discrete Manufacturing Process with Combined Heat and Power Using Smart Scheduling and Automation

Moriah Henning [1], Derek Machalek [2], Kody M. Powell Ph.D. [2]

Automated electrical demand peak leveling in a manufacturing facility with short term energy storage for smart grid participation

Derek Machalek, Kody Powell

Dynamic optimization with flexible heat integration of a solar parabolic trough collector plant with thermal energy storage used for industrial process heat

Jake Immonen, Kody M. Powell

Industrial battery operation and utilization in the presence of electrical load uncertainty using Bayesian decision theory

Blake W. Billings [a], Philip J. Smith [a], Sean T. Smith [a], Kody M. Powell [a, b]

Mine operations as a smart grid resource: Leveraging excess process storage capacity to better enable renewable energy sources

Derek Machalek, Aaron Young, Landen Blackburn, Pratt Rogers, Kody M. Powell

Partnerships: The Key to Making Real Change

- Collaboration and community are key
- State Energy Office is a community organizer
- Make connections between many diverse and specialized programs
- Rely on technical experts to provide solutions
  - Boots on the ground