Office of Clean Energy Demonstrations

THE OFFICE OF

CLEAN ENERGY DEMONSTRATIONS

Industrial Demonstrations Program Selections National Briefing

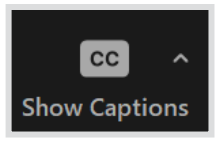
Office of Clean Energy Demonstrations

U.S. Department of Energy

March 27, 2024

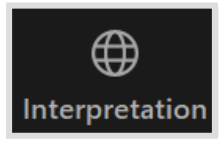
Webinar Logistics

How do I turn on live captions?



Click on the **“Show Captions”** button in the control panel at the bottom of your screen.

How do I turn on Spanish or ASL interpretation?



Click on the **“Interpretation”** button in the control panel at the bottom of your screen.

Is this webinar being recorded?

Yes, this webinar is being recorded and will be available on the DOE YouTube channel and the OCED website within the next week.

Will the slides be shared?

Yes, a copy of the presentation slides will be shared via email with registrants and on the OCED website within the next week.

Agenda

- Welcome
- OCED Overview
- IDP Program Overview
- Community Benefits and Engagement
- Sector and Project Overviews
- Next Steps & Resources
- Wrap-up & Close

Opening Remarks

INDUSTRIAL DEMONSTRATIONS PROGRAM SELECTION SNAPSHOT

OCED
Office of Clean Energy Demonstrations

$20+ BILLION
Total Funding
(Federal and private cost shares)

OVER
14 MILLION METRIC TONS
of avoided emissions annually

85% would reduce criteria air pollutants
(28) PROJECTS

TENS OF
THOUSANDS
total jobs

with
19 committed to union labor
PROJECTS

Industrial Demonstrations Program Overview

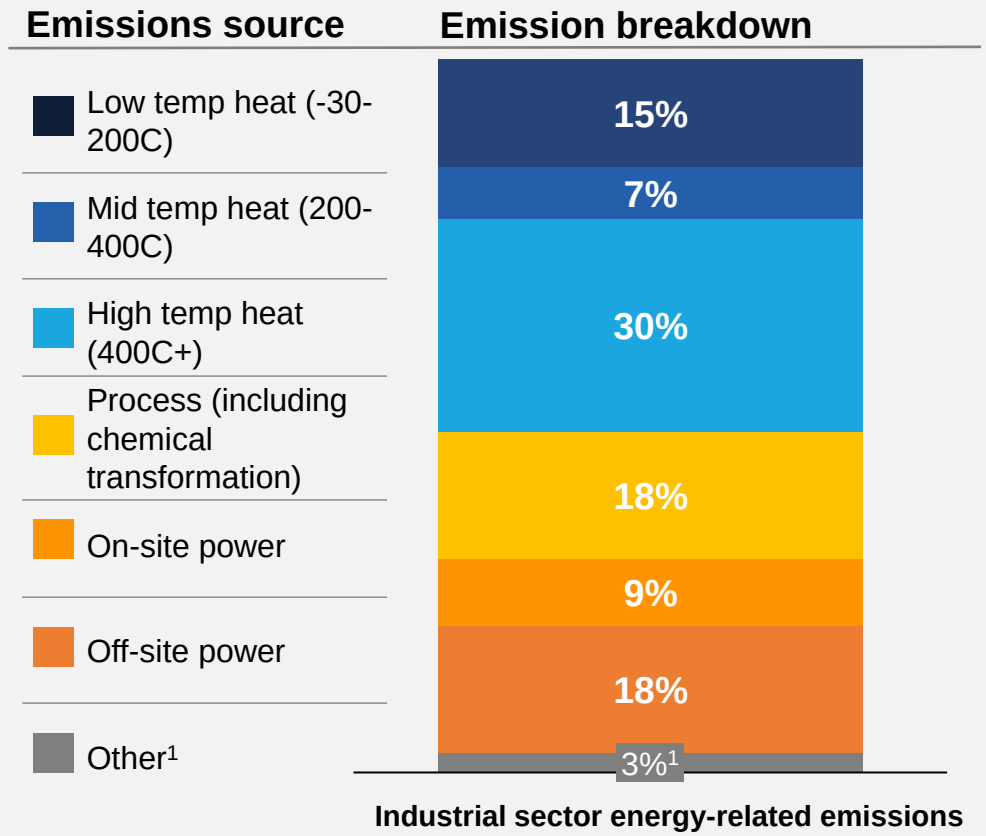
Industry Poses a Substantial Decarbonization Challenge

The production of iron and steel, cement, chemicals and refining, glass, paper, aluminum, and other durable materials form the **foundation of our economy**—our roads, bridges, homes, buildings, cars, clothes and fabrics – and **clean energy infrastructure** like wind, solar, battery, and transmission components.

The industrial sector accounted for approximately one third of U.S. CO2e emissions* and is considered **difficult to decarbonize** due to**:**

- wide array of industrial operations
- diversity of energy inputs
- range of emissions sources, including heat, power, feedstocks, and processes.

Emissions breakdown for industrial sectors of focus
2021, MT CO_2e



*Source: “Annual Energy Outlook 2021 with Projections to 2050,” U.S. Energy Information Administration, Feb. 3, 2021.

1. Includes quarry and logistics emissions (Cement)

$20+ billion investment

for transformational, advanced industrial facilities to

Solidify a first-mover advantage for U.S. industry in low- and net-zero carbon manufacturing

Substantiate the market for clean products through high-impact, replicable solutions

Build broadly shared prosperity for American workers and communities

Across **hard-to-abate sectors** including:


Aluminum & Metals


Cement & Concrete


Chemicals & Refining


Process Heat


Food & Beverage


Glass & Ceramics


Iron & Steel


Pulp & Paper

Industrial Demonstrations Funding Opportunity: By the Numbers

411 concept papers reviewed

>$60B federal funding requested

~$100B in matching private cost-share

130 concept papers encouraged to submit full applications

110 full applications submitted

33 projects selected

For up to **$6B** federal funding

Matched by **$14B** in private cost-share

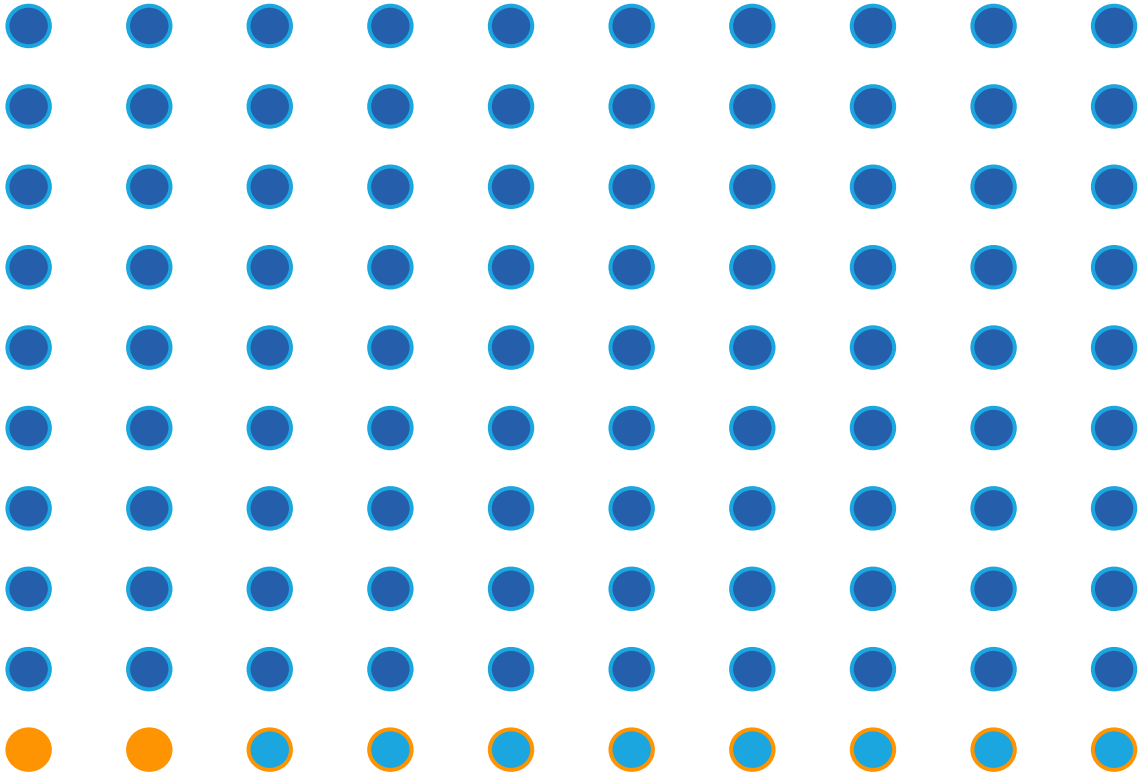
OCED
Office of Clean Energy Demonstrations

Selectees Delivered on Ambitious Program Priorities

Deep Decarbonization	**Target:** 50 – 75% emissions reductions per project	**Result:** Average **77% reduction** in carbon intensity & ~**14+ million MT CO2e reduced** annually
Timeliness	**Target:** Accelerate decarbonization into this decade	**Result:** Average performance period of **less than 6 years**
Market Viability	**Target:** Spur follow-on investment in lower-embodied carbon goods	**Result:** **35+ products** to be produced with lower embodied emissions; multiple with premium offtake agreements in place today
Community Benefits	**Target:** Select projects with the greatest benefit for the greatest number of people	**Result:** **85% of projects** improve air quality; investment will create **tens of thousands of jobs** across the United States

Unlocking a $1 Trillion Investment

$20+ billion government-enabled total investment represents important **early 2%** of the $700B - $1.1T investment required to **decarbonize the industrial sector using emerging technologies.***



U.S. need

IDP proposed projects

411 applicants requested over $60B in DOE funding with ~$100B in matching private sector cost share

IDP selected projects

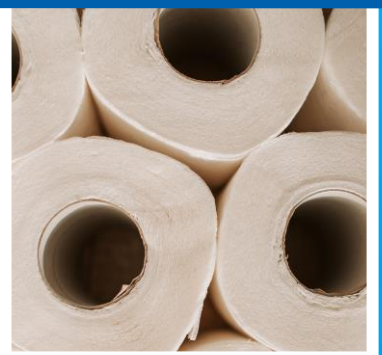
33 projects will match $6B in federal funds with $14B in private cost share for a total investment of $20B

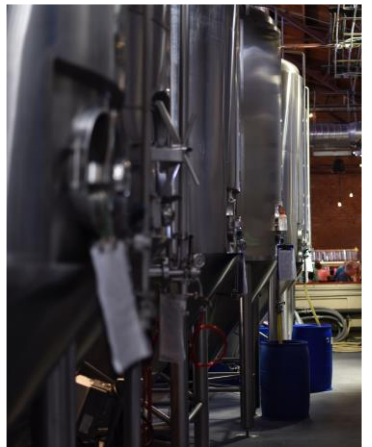
OCED
Office of Clean Energy Demonstrations

*Source: DOE Pathways to Commercial Liftoff Industrial Decarbonization Report. $700B to 1.1T represents the estimated potential capital investment required to decarbonize the eight industrial sectors of focus in the IRA, including chemicals, refining, iron and steel, food and beverage, cement, pulp and paper, aluminum, glass and reach net zero by 2050. This number was calculated by estimating the capital expenditure for scaling select deployable and demonstration-stage decarbonization levers (e.g., CCS, clean on-site power generation from renewables, energy efficiency measures) for each industry.

Sector and Project Overviews







IRON & STEEL

6
projects

$1.5B
federal investment

2.5M
metric tons CO_2 avoided annually

Note: Anticipated based on information provided to the Department of Energy as of March 2024

	Traditional Production	Demonstrations	Real World Impact
Ironmaking	 Blast Furnace + Metallurgical Coke (from coal)	 Direct Reduced Ironmaking + H_2 Hydrogen	 High Grades of Steel
Finishing Process	 Heat from Fossil Fuels	 Induction + Flexible Fuels + Electricity	 Resilient Infrastructure

OCED
Office of Clean Energy Demonstrations

Hydrogen-Ready Electric Melting Furnace Iron and Steel Retrofit

Selectee:
Cleveland-Cliffs Steel Corporation

Location:
Middletown, Ohio

Federal Cost Share:
Up to $500 million

Image credit: Cleveland-Cliffs Steel Corporation

Proposed Activities:

- Install a hydrogen-ready, flex-fuel Direct Reduced Iron (DRI) and two electric melting furnaces
- Lead to the replacement of one of Cleveland-Cliffs seven operating blast furnaces
- Reduce approximately 1 million metric tons GHG emissions per year
- Create 1,200 union construction jobs and 170 permanent jobs, preserving site's 2,500 jobs including 2,000 International Association of Machinists and Aerospace Workers
- Utilize iron-ore pellets from Cleveland-Cliffs mines in Michigan and Minnesota, represented by United Steelworkers
- Reduce air and water emissions

Hydrogen-Fueled Zero Emissions Steel Making

Selectee:
SSAB

Location:
Perry County, Mississippi and Montpelier, Iowa

Federal Cost Share:
Up to $500 million

Image credit: SSAB

Proposed Activities:

- Build the first commercial-scale facility in the world using the HYBRIT®, fossil-free Direct Reduced Iron (DRI) technology with 100% hydrogen in Perry County, Mississippi
- Expand SSAB's Montpelier, Iowa steelmaking facility to utilize the resulting hydrogen-reduced DRI
- Reduce emissions from the DRI manufacturing process by 81%, providing a pathway for deep decarbonization of U.S. iron and steel production
- Generate an estimated 6,000 construction jobs and 540 permanent jobs
- Signed letter of intent for Hy Stor Energy to supply green hydrogen and renewable electricity to the DRI facility

Low-Emissions, Cold-Agglomerated Iron Ore Briquette Production

Selectee:
Vale USA

Location:
U.S. Gulf Coast

Federal Cost Share:
Up to $282.9 million

Image credit: Vale USA

Proposed Activities:

- Create a first-of-its-kind production facility for a viable low-emissions alternative to traditional iron ore pellets
- Reduce the need for industrial heat, resulting in a flexible product that can be used at both direct-reduced and blast furnace ironmaking
- Reduce CO_2 emissions by an estimated 60%
- Reduce certain criteria air pollutants like sulfur oxides by roughly 99%
- Create more than 1,000 construction jobs and nearly 200 permanent jobs

Iron Electric Induction Conversion

Selectee:
United States Pipe and Foundry Company

Location:
Bessemer, Alabama

Federal Cost Share:
Up to $75.5 million

Image credit: United States Pipe and Foundry Company

Proposed Activities:

- Replace a coke-fired furnace with electric induction melting furnaces
- Reduce the cost of operations, improve manufacturing capacity, and enhance overall melting process and reliability
- Result in an estimated 73% reduction in carbon intensity at the Alabama Works ductile iron pipe production facility
- Generate more than 220 construction jobs, upskill 36 employees to higher-skilled and higher-paying roles
- Improve air quality including reductions in particulate matter, nitrogen oxides, and sulfur oxides for nearby communities

Induction Melting Upgrade

Selectee:
AMERICAN Cast Iron Pipe Company

Location:
Birmingham, Alabama

Federal Cost Share:
Up to $75 million

Image credit: American Cast Iron Pipe Company

Proposed Activities:

- Electrify its process by replacing a cupola furnace with four induction furnaces, eliminating coke (derived from coal) combustion
- Reduce melt process carbon dioxide emissions by an estimated 95% at its Birmingham, Alabama facility
- Retain high-paying jobs by improving AMERICAN Cast Iron Pipe Company's competitiveness
- Establish a Community and Labor Engagement Taskforce for this project to keep stakeholders informed, obtain feedback, and track the status of its community benefits commitments

Steel Slab Electrified Induction Reheat Furnace Upgrade

Selectee:
Cleveland-Cliffs Steel Corporation

Location:
Lyndora, Pennsylvania

Federal Cost Share:
Up to $75 million

Proposed Activities:

- Electrify the only production facility for high-silicon grain oriented electrical steel (GOES) in the U.S.
- Anchor a crucial component of our energy supply chain and prove out a widely replicable pathway among the many iron and steel facilities that use reheat furnaces across the U.S.
- Anticipate a 100% reduction in direct greenhouse gas emissions associated with the high-temperature reheat furnaces
- Sustain the 1,000+ existing jobs at Butler Works and will support 160 jobs at Zanesville Works in Ohio where electrical steel is finished

CEMENT & CONCRETE

6
projects

$1.6B
federal investment

4M
metric tons CO_2 avoided annually

Note: Anticipated based on information provided to the Department of Energy as of March 2024

Traditional Production

Limestone with embodied carbon – released to the atmosphere during manufacturing

Cement plant releases emissions to atmosphere

Demonstrations

Silicate-based rocks like basalt replace limestone

Clay calcined and blended to produce cement, decreasing the need for carbon-intensive limestone

Cement plant with carbon capture

Real World Impact

Multiple decarbonized options for the most widely used building material in the world

OCED
Office of Clean Energy Demonstrations

Lebec Net Zero Cement Plant Project

Selectee:
National Cement Company of California, Inc.

Location:
Lebec, California

Federal Cost Share:
Up to $500 million

Image credit: National Cement Company of California

Proposed Activities:

- Produce carbon-neutral cement by using locally sourced biomass, replace clinker with calcined clay and limestone (LC3), and use carbon capture and sequestration
- Sequester the plant's remaining 950,000 metric tons of carbon dioxide each year
- Create 20-25 permanent jobs; 100% of hourly workforce is represented by the United Steelworkers
- Work with non-profit Helmets to Hardhats to fund and offer diverse workforce training programs and opportunities
- Improve air quality for the surrounding community

Mitchell Cement Plant Decarbonization Project

Selectee:
Heidelberg Materials US, Inc.

Location:
Mitchell, Indiana

Federal Cost Share:
Up to $500 million

Image credit: Heidelberg Materials US, Inc.

Proposed Activities:

- Construct and operate an integrated carbon capture, transport, and storage system
- Capture at least 95% of the carbon dioxide from one of the largest cement plants in the nation and store it in a geologic formation beneath the property
- Prevent two million tons of carbon dioxide per year from entering the atmosphere
- Create 20-25 permanent jobs and 1,000 construction jobs at plant supported by multiple labor unions, including the United Steelworkers
- Conduct project-wide training and company-wide engagement and education on community benefits and impacts

Low-Carbon Calcined Clay Cement Demonstration

Selectee:
Summit Materials, Inc.

Location:
Port Deposit, Maryland; McIntyre, Georgia; Elmendorf, Texas; Sulphur Springs, Texas

Federal Cost Share:
Up to $215.6 million

Image credit: Summit Materials

Proposed Activities:

- Will assess the construction of four new calcination facilities to demonstrate the viability of displacing high-emitting, limestone-based cement with a clay-based product
- Use the project's range of sites to showcase this demonstration's replicability with diverse clay sources and cementitious products around the country
- Reduce approximately 1 million metric tons of carbon emissions per year
- Create over 4,000 direct, indirect, and induced jobs across the four sites during the project lifetime
- Negotiate Community Workforce Agreement or Project Labor Agreement for the construction phases at each site
- Provide tailored local workforce training investments

Deeply Decarbonized Cement

Selectee:
Brimstone Energy, Inc.

Location:
TBD

Federal Cost Share:
Up to $189 million

Image credit: Brimstone Energy, Inc.

Proposed Activities:

- Construct first-of-a-kind commercial-scale demonstration plant that would fundamentally transform the way cement is made
- Produce 140,000 metric tons per year of decarbonized industry standard Ordinary Portland Cement (OPC) and supplementary cementitious materials
- Use calcium silicate rocks and alternative production methods to avoid more than 120,000 metric tons of carbon dioxide emissions per year
- Create up to 100 permanent jobs and 450 construction jobs
- Establish a Community Advisory Council, once location is finalized, to educate and advise Brimstone on community concerns including workers' rights, smart growth and environmental justice, and workforce development

Electrochemical Cement Manufacturing

Selectee:
Sublime Systems, Inc.

Location:
Holyoke, Massachusetts

Federal Cost Share:
Up to $86.9 million

Image credit: Sublime Systems, Inc.

Proposed Activities:

- Build a new, ultra-low-carbon cement manufacturing facility to make cement electrochemically instead of using fossil-fueled high heat
- Produce cement with calcium silicate-based feedstocks in place of carbon-intensive limestone
- Create 70 to 90 permanent manufacturing jobs and continue partnership agreement with the United Steelworkers
- Support the local education system through curriculum enhancement and partnership with the Smithsonian Science Education Center

Limestone Calcined Clay Cement Production

Selectee:
Roanoke Cement Company, LLC

Location:
Troutville, Virginia

Federal Cost Share:
Up to $61.7 million

Image credit: Roanoke Cement Company, LLC

Proposed Activities:

- Utilize a widely available clay type to minimize the most carbon-intensive component in cement
- Validate the market for calcined clays in a region with high demand for concrete
- Reduce carbon intensity by an estimated 83%
- Create 25 permanent jobs and up to 115 construction jobs
- Develop a Training and Education Consortium to promote workforce development
- Establish a Community Advisory Panel to ensure two-way engagement and community-informed project decisions

CHEMICALS & REFINING

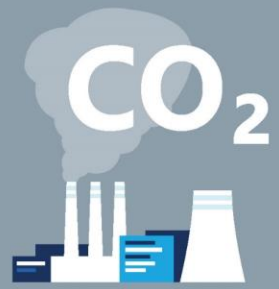
& SEPARATIONS PROCESSES FOR PULP & PAPER

8
projects

$1.3B
federal investment

3M
metric tons CO_2 avoided annually

Note: Anticipated based on information provided to the Department of Energy as of March 2024

	Traditional Production	Demonstrations	Real World Impact
Carbon Capture and Utilization	 Carbon process emissions released to the atmosphere	 Carbon captured and routed to a new process for upcycling	 Fuels for marine transport Polymers for apparel Electrolytes for lithium ion batteries
Value-Added Recycling	 Waste landfilled or incinerated	 Chemical byproducts and textiles recycled	 High-quality plastics for food and medical applications Decarbonized fuels
Process Heat	 Fossil-based high-temperature heat	 Specialized, decarbonized burners Thermal batteries powered by renewables Membrane separation	 Major CO_2 emissions reductions and improved air quality for communities

OCED
Office of Clean Energy Demonstrations

Polyethylene Terephthalate Recycling Decarbonization Project

Selectee:
Eastman Chemical Company

Location:
Longview, Texas

Federal Cost Share:
Up to $375 million

Image credit: Eastman Chemical Company LLC

Proposed Activities:

- Construct a first-of-a-kind plastic molecular recycling facility integrated with low-carbon renewable energy, capable of taking waste streams that are typically landfill or incinerated and turning them into virgin-quality polyethylene terephthalate (PET)
- Use thermal energy storage combined with on-site solar power to decarbonize process heating operations
- Create product with 70% lower carbon intensity compared to fossil virgin PET and approximately 90% reduction when including avoided incineration emissions
- Create 200 permanent jobs and 1,000 construction jobs
- Support the renovation of the Paula Martin Jones Recreation Center and turn it into a hub for community outreach, workforce training, and more

Baytown Olefins Plant Carbon Reduction Project

Selectee:
Exxon Mobil Corporation

Location:
Baytown, Texas

Federal Cost Share:
Up to $331.9 million

Image credit: Exxon Mobil Corporation

Proposed Activities:

- Use new burner technologies for ethylene production to enable the use of hydrogen in place of natural gas across high heat-fired equipment
- Avoid 2.5 million metric tons of carbon emissions each year (more than 50% of the plant's total emissions)
- Create 400 construction jobs, 15% of which would be offered U.S. Department of Labor-approved apprenticeships, and train 140 current plant workers in the use of hydrogen
- Create three flagship programs for residents to expand non-traditional education pathways
- Reduce criteria air pollutants for the local community

Sustainable Ethylene from CO_2 Utilization with Renewable Energy

Selectee:
T.EN Stone & Webster Process Technology, Inc.

Location:
U.S. Gulf Coast

Federal Cost Share:
Up to $200 million

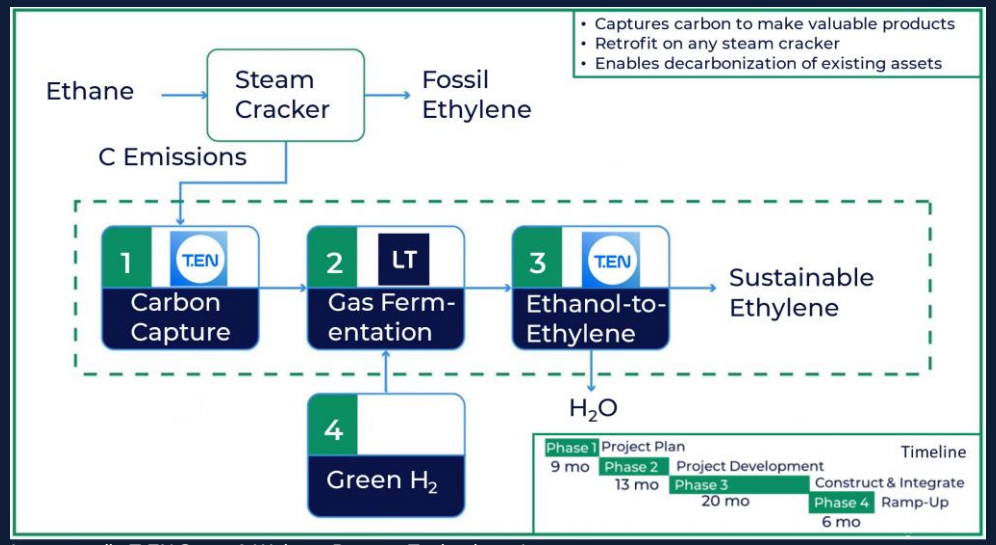


Image credit: T.EN Stone & Webster Process Technology, Inc.

Proposed Activities:

- Utilize captured carbon dioxide from ethylene production by applying a biotech-based process and green hydrogen to create ethanol and ethylene
- Deploy LanzaTech's Gas Fermentation technology, previously supported by ARPA-E, to demonstrate the ability to capture and upcycle carbon dioxide to ethanol in any industry with carbon dioxide emissions. The ethanol is then converted to ethylene using Technip Energies' proprietary Hummingbird® technology.
- Create 200 construction jobs and 40 permanent jobs
- Hire locally and approach unions, community groups, and labor groups once site is finalized to negotiate, review, and update agreements for quality jobs and community collaboration

Star e-Methanol

Selectee:
Orsted P2X US Holding LLC

Location:
Texas Gulf Coast

Federal Cost Share:
Up to $100 million

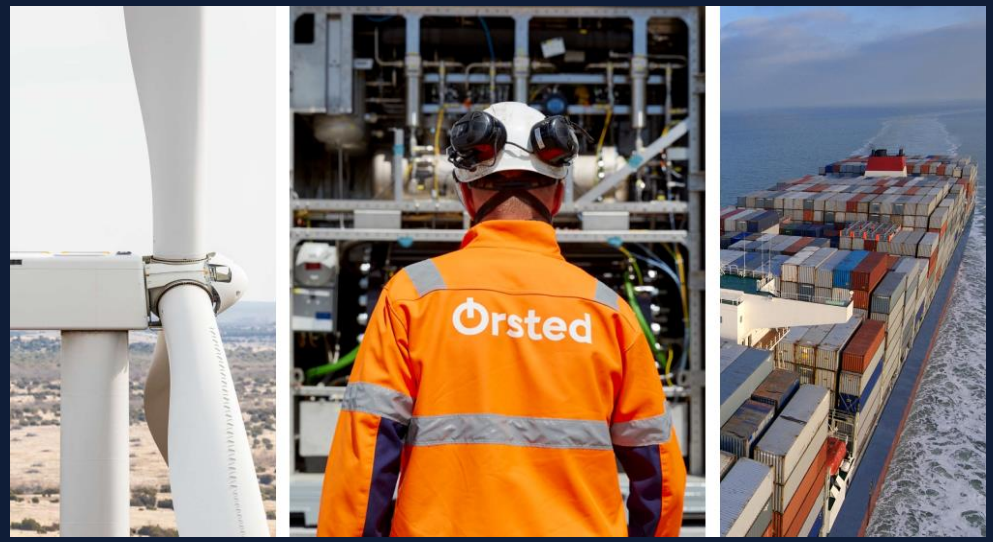


Image credit: Orsted P2X US Holding LLC

Proposed Activities:

- Capture biogenic carbon dioxide from a local industrial facility and synthesize with clean hydrogen to produce up to 300,000 metric tons of e-methanol per year
- Reduce carbon footprint of the methanol production process by more than 80% compared to traditional methods
- Prove out supply and demand for renewable hydrogen-derived alternative fuels for the marine shipping and transportation sector
- Create 50 permanent jobs and 300 construction jobs
- Work with the University of Houston to develop a curriculum around zero-carbon fuels and the hydrogen economy to equip workers with skills to take part in the new energy economy

Novel CO_2 Utilization for Electric Vehicle Battery Chemical Production

Selectee:
The Dow Chemical Company

Location:
U.S. Gulf Coast

Federal Cost Share:
Up to $95 million

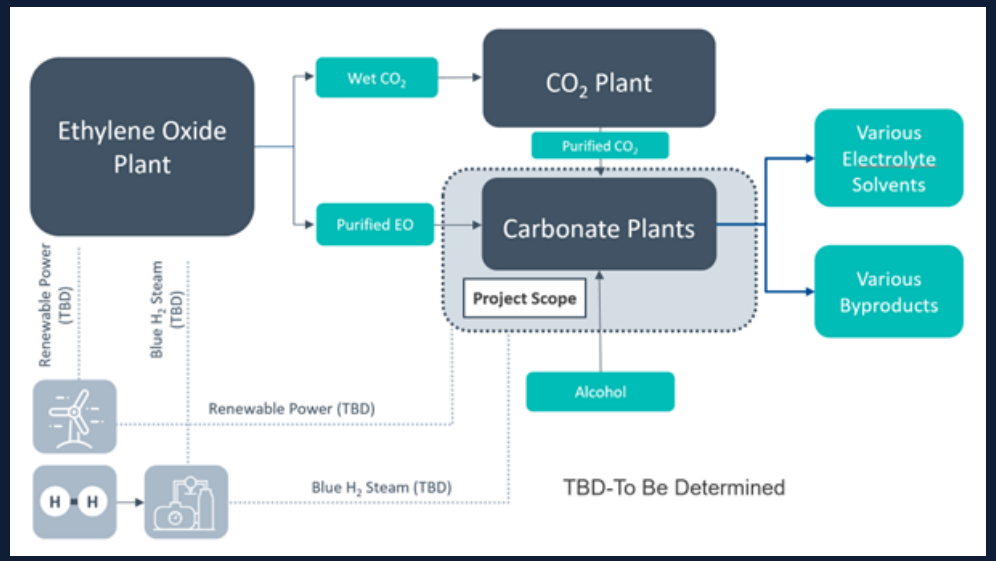


Image credit: The Dow Chemical Company

Proposed Activities:

- Design and construct facility with the intent to capture and utilize approximately 100,00 tons of carbon dioxide per year
- Produce essential components of electrolyte solutions needed for domestic lithium-ion batteries
- Provide supply chain resilience by establishing a domestic manufacturing base for the U.S. electric vehicle and power storage markets
- Create roughly 50 permanent manufacturing jobs and roughly 600 construction jobs
- Partner with diverse manufacturers, educational institutions, accelerators, and more

Syngas Production from Recycled Chemical Byproduct Streams

Selectee:
BASF Corporation

Location:
Freeport, Texas

Federal Cost Share:
Up to $75 million

Image credit: BASF Corporation

Proposed Activities:

- Recycle liquid byproducts into syngas, which will be used as a low-carbon feedstock for BASF's Freeport operations
- Use plasma gasification and renewable power to replace targeted natural gas-fired incineration, decreasing carbon dioxide emissions by up to an estimated 90% at the BASF Freeport site
- Enable uptake for a technology that is widely able to recycle liquid byproducts into additional production feedstock like syngas or hydrogen
- Improve local air quality
- Create additional permanent jobs

Chemical Production Electrification and Heat Storage

Selectee:
ISP Chemicals, LLC an Ashland Company

Location:
Calvert City, Kentucky

Federal Cost Share:
Up to $35.2 million

Image credit: ISP Chemicals, LLC an Ashland Company

Proposed Activities:

- Replace natural gas boilers with electric heat delivered with a thermal battery, reducing GHG emissions associated with steam generation by nearly 70%
- Demonstrate electrification with thermal heat storage using Electrified Thermal Solutions' Joule Hive system, supported by ARPA-E, as a scalable, highly replicable, readily deployable, and customizable decarbonization solution
- Continue partnership with the International Association of Machinists and Aerospace Workers to support a thermal battery skills development training program
- Continue participation in the Calvert City Community Advisory Team

Pulp and Paper Energy Efficiency and Electrification Upgrades

Selectee:
International Paper Company

Location:
Mansfield, Louisiana

Federal Cost Share:
Up to $46.6 million

Proposed Activities:

- Use Via Separations' novel membrane-based technology, previously supported by ARPA-E, to decarbonize a thermal process
- Demonstrate a transformative improvement in energy efficiency of industrial separations, reducing 75% of CO_2 emissions per gallon of clean water removed during pulp production
- Sustain 700 direct and indirect jobs at the Mansfield site
- Create middle school STEM curriculum alongside the existing elementary school program to promote local education and workforce development

ALUMINUM & METALS

5
projects

$900M+
federal investment

4M+
metric tons CO_2 avoided annually

Note: Anticipated based on information provided to the Department of Energy as of March 2024

	Traditional Production	Demonstrations	Real World Impact
Primary Aluminum	Energy-intensive technology that struggles to compete in the global marketplace	State-of-the-art, energy-efficient smelter designed to run on 100% renewable energy	High-purity aluminum critical to defense, aerospace, electricity and transportation applications
Recycling	Material landfilled or shipped overseas for recycling	U.S.-based recycling adds value for consumers	High-purity copper for semiconductors and electric vehicles
Process Heat	Fossil-fired heat needed for multiple process steps	Fuel switching and new processes improve efficiency and remove heating steps	Decarbonized aluminum for tech companies, beverages, and packaging

OCED
Office of Clean Energy Demonstrations

Green Aluminum Smelter

Selectee:
Century Aluminum Company

Location:
Prefer Kentucky or Ohio/Mississippi River Basins

Federal Cost Share:
Up to $500 million

Image credit: Century Aluminum Company

Proposed Activities:

- Build the first new U.S. primary aluminum smelter in 45 years and double the size of the current U.S. primary aluminum industry
- Avoid an estimated 75% of emissions from a traditional smelter due to a state-of-the-art, energy-efficient design and use of carbon-free energy
- Enable the onshoring of supply chains for materials critical to energy, national defense, and electric vehicles
- Create approximately 1,000 permanent jobs with advanced wages, represented by the United Steelworkers, and 5,500 construction jobs

Advanced Copper Recycling Facility

Selectee:
Wieland North America Recycling

Location:
Shelbyville, Kentucky

Federal Cost Share:
Up to $270 million

Image credit: Wieland North America Recycling

Proposed Activities:

- Enable the recycling of a diverse mix of copper scrap and other metals, turning it into high-purity copper suitable to support multiple applications including electric vehicles and semiconductors
- Reduce carbon emissions, potentially establishing the lowest carbon footprint globally for high-end copper applications
- Increase the resilience of the U.S. copper supply chain as global copper demand is expected to almost double by 2035
- Create as many as 200 permanent jobs through the phases of project development, fostering sustainable economic growth within the community

Low Carbon SmartMelt Furnace Conversion

Selectee:
Constellium

Location:
Ravenswood, West Virginia

Federal Cost Share:
Up to $75 million

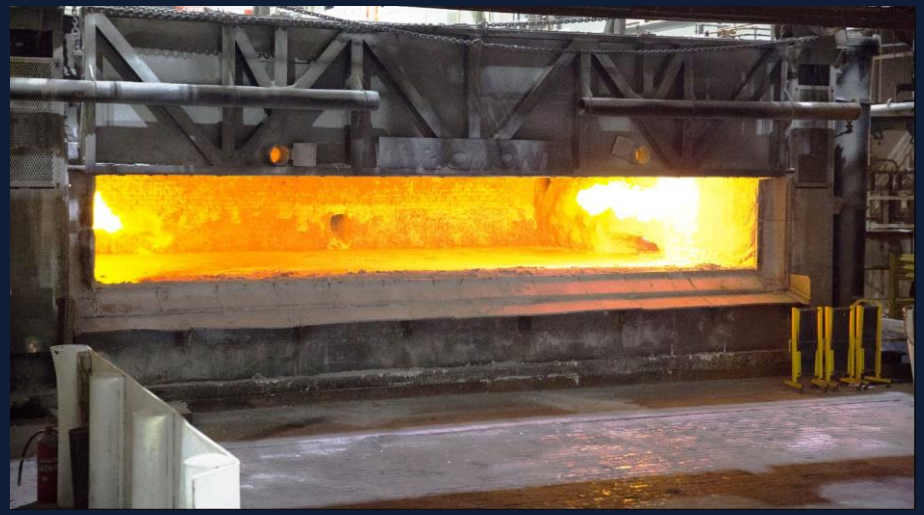


Image credit: Constellium

Proposed Activities:

- Deploy a first-of-a-kind zero carbon capable aluminum casting center in a legacy facility in the U.S.
- Install low-emissions SmartMelt furnaces that can operate using a range of fuels, including clean hydrogen
- Build a Community Benefits Building with a new training and wellness center for all employees and an onsite childcare facility
- Reduce carbon emissions, improve air quality and improve worker safety

Zero Waste Advanced Aluminum Recycling

Selectee:
Real Alloy Recycling

Location:
Wabash, Indiana

Federal Cost Share:
Up to $67.3 million

Image credit: Real Alloy Recycling

Proposed Activities:

- Construct the first zero waste salt slag recycling facility in the U.S. and the most energy-efficient facility of its kind
- Build a processing plant on the back end of an existing aluminum recycling facility to enable normally landfilled salt slag components to be recycled back into the aluminum recycling process or beneficially used in other industries such as cement
- Improve aluminum circularity that Real Alloy Recycling estimates to be 95% less carbon intensive
- Generate approximately 100 construction jobs and nine permanent jobs in addition to securing the existing 33 jobs at the Wabash, Indiana facility

Nexcast - Next Generation Aluminum Mini Mill

Selectee:
Golden Aluminum

Location:
Fort Lupton, Colorado

Federal Cost Share:
Up to $22.3 million

Image credit: Golden Aluminum

Proposed Activities:

- Upgrade the Fort Lupton, CO facility using the Nexcast process to reduce natural gas consumption, improve process efficiency, and recycle 15% more mixed-grade aluminum scrap
- Produce aluminum products for electric vehicle and other clean energy technology applications
- Help solidify the U.S. as a world leader in decarbonized secondary aluminum production
- Train existing Fort Lupton employees on this new technology and work with partners to develop workforce training programs available to the whole community
- Utilize approximately 86% less water as compared to direct chill technology, which is critical in the increasingly arid western U.S.

HEAT

3 GLASS |
3 FOOD & BEVERAGE |
2 PROCESS HEAT

8
projects

$700M+
federal investment

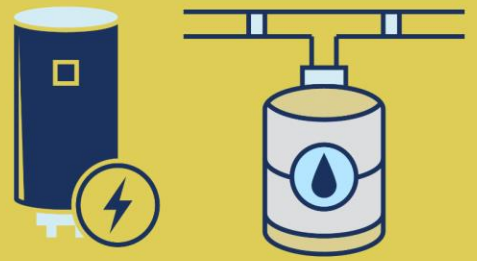
1.5M
metric tons CO_2 avoided annually

Note: Anticipated based on information provided to the Department of Energy as of March 2024

Traditional Production

Heat is critical for many manufacturing processes – and today most plants rely on fossil fuels

Demonstrations



Specialized decarbonized burners
Thermal batteries powered by renewables
Electrification approaches including microgrids, electric boilers, heat pumps, and more

Real World Impact

Decarbonized versions of products Americans use every day

OCED
Office of Clean Energy Demonstrations

Food & Beverage

Delicious Decarbonization Through Integrated Electrification and Energy Storage

Selectee:
Kraft Heinz

Location:
Champaign, IL; Columbia, MO; Fremont, OH; Holland, MI; Kendallville, IN; Lowville, NY; New Ulm, MN; Muscatine, IA; Mason City, IA; Winchester, VA

Federal Cost Share:
Up to $170.9 million

Image credit: Kraft Heinz

Proposed Activities:

- Upgrade, electrify, and decarbonize process heat at ten facilities
- Apply a wide range of technologies including heat pumps, electric heaters, and electric boilers in combination with biogas boilers, solar thermal, solar photovoltaic, and thermal energy storage to demonstrate the integration of multiple decarbonization pathways
- Reduce emissions by more than 300,000 metric tons of carbon dioxide per year
- Create an estimated 500 construction jobs across the ten sites
- Add an Energy Champion position to the current People Committees at each site to represent any worker concerns and serve as coordinator between the project team and plant workers

Heat Batteries for Deep Decarbonization of the Beverage Industry

Selectee:
Diageo Americas Supply, Inc

Location:
Shelbyville, KY and Plainfield, IL

Federal Cost Share:
Up to $75 million

DIAGEO

Proposed Activities:

- Replace natural gas-fired heat with Rondo Heat Batteries powered by onsite renewable energy and electric boilers
- Reduce carbon emissions by nearly 17,000 metric tons per year
- Decarbonize the production facilities for spirits, ready-to-drink cocktails, and Bulleit whiskey
- Create approximately 144 construction jobs across the two locations
- Continue use of unionized contractors at both facilities
- Share facility air and water quality data with the public to inform local communities

Decarbonization of Unilever Ice Cream Manufacturing

Selectee:
Unilever

Location:
Covington, TN; Sikeston, MO; St. Albans, VT; Waterbury, VT

Federal Cost Share:
Up to $20.9 million

Image credit: Unilever

Proposed Activities:

- Replace natural gas boilers with electric boilers and industrial heat pumps using waste heat recovery across four ice cream manufacturing sites
- Reduce carbon dioxide emissions by more than 14,000 metric tons per year, with a pathway to address 100% of heat-related process emissions
- Create 240-300 construction jobs
- Continue serving each site's local community through previous partnerships, such as Milk with Dignity (VT) and the Tipton County Manufacturing Council (TN)

Glass

Glass Furnace Decarbonization Technology

Selectee:
O-I Glass, Inc.

Location:
Tracy, California; Zanesville, Ohio; Toano, Virginia

Federal Cost Share:
Up to $125 million

Image credit: O-I Glass

Proposed Activities:

- Rebuild four furnaces across three O-I facilities in California, Ohio and Virginia to reduce scope one carbon dioxide emissions
- Combine five cutting-edge technologies on each furnace across different glass colors and container types
- Support up to 300 construction jobs per project (up to 1,200 across four furnaces)
- Reduce waste heat and increase electrification, making the furnaces more energy efficient, reducing both direct and indirect emissions

Hybrid Electric Glass Furnace Project

Selectee:
Gallo Glass Company

Location:
Modesto, California

Federal Cost Share:
Up to $75 million

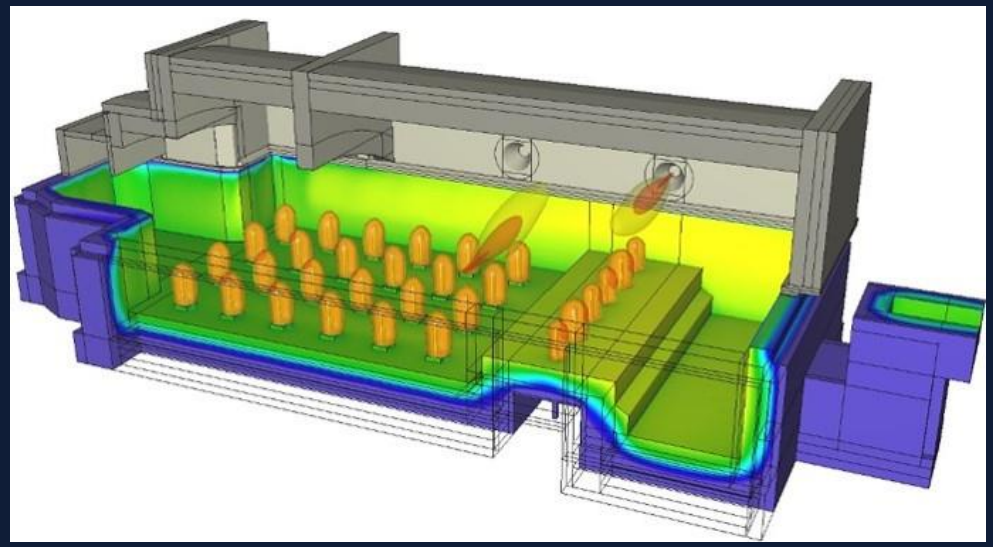


Image credit: Gallo Glass Company

Proposed Activities:

- Install a demonstration hybrid electric furnace to reduce natural gas use by 70% and increase recycled content by 30% in its glass bottle production process
- Contribute to the decarbonization of a large portion of glass for California's wine and spirits industry
- Generate a significant number of new, permanent jobs at Gallo Glass and within the local recycling community
- Establish a glass collection programs, which provide California Redemption Value (CRV) proceeds to support the construction of a centralized new inclusive playground to serve school-aged children

Flexible Fuel Electric Hybrid Glass Furnace Demonstration

Selectee:
Libbey Glass

Location:
Toledo, Ohio

Federal Cost Share:
Up to $45.1 million

Image credit: Libbey Glass

Proposed Activities:

- Replace four regenerative furnaces with two larger hybrid electric furnaces to reduce an estimated 60% of carbon dioxide emissions associated with the manufacturing of glass tableware products
- Replace up to 80% of the melting energy with renewable-sourced electricity
- Generate approximately 268 construction jobs
- Reduce criteria air pollutants, including nitrogen oxide, sulfur oxide, and particulates, which would improve the air quality surrounding the facility

Process Heat-specific Projects

Steam-Generating Heat Pumps for Cross-Sector Deep Decarbonization

Selectee:
Skyven Technologies

Location:
TBD

Federal Cost Share:
Up to $145 million

Image credit: Skyven Technologies

Proposed Activities:

- Electrify steam production to replace natural gas boilers across a diverse array of industrial customers that currently rely on fossil-fired heat
- Deploy across multiple sectors to demonstrate replicability
- Improve air quality at each facility by eliminating associated criteria air pollutant emissions from the displaced natural gas boilers

Vikrell Electric Boiler & Microgrid System

Selectee:
Kohler

Location:
Casa Grande, Arizona

Federal Cost Share:
Up to $51.2 million

Image credit: Kohler

Proposed Activities:

- Install electric boilers and a microgrid system consisting of a solar array and battery energy storage system
- Eliminate carbon emissions from natural gas boilers for industrial process heating
- Alleviate stress on the energy infrastructure and enhance grid stability for local residents
- Create approximately 400 permanent jobs at Greenfield Plant
- Demonstrate the viability of a renewables and microgrid system to decarbonize process heat emissions from a wide range of manufacturing processes

Portfolio Snapshot – Pathways to Commercial Liftoff

IDP Projects Substantially Address the Liftoff Opportunity Space

Decarbonization Levers

	Chemicals	Refining	Iron & Steel	Food & Beverage	Cement & Concrete	Pulp & Paper	Aluminum	Glass
Carbon capture, utilization, & storage	✓	✓			✓			
Industrial electrification	✓		✓	✓	✓		✓	✓
Energy efficiency	✓	✓	✓	✓	✓	✓	✓	✓
Electrolytic hydrogen	✓		✓					
Raw material substitutions	✓		✓		✓			✓
Alt. fuel (non-H2)				✓	✓		✓	✓
Alt. production methods	✓		✓		✓	✓	✓	

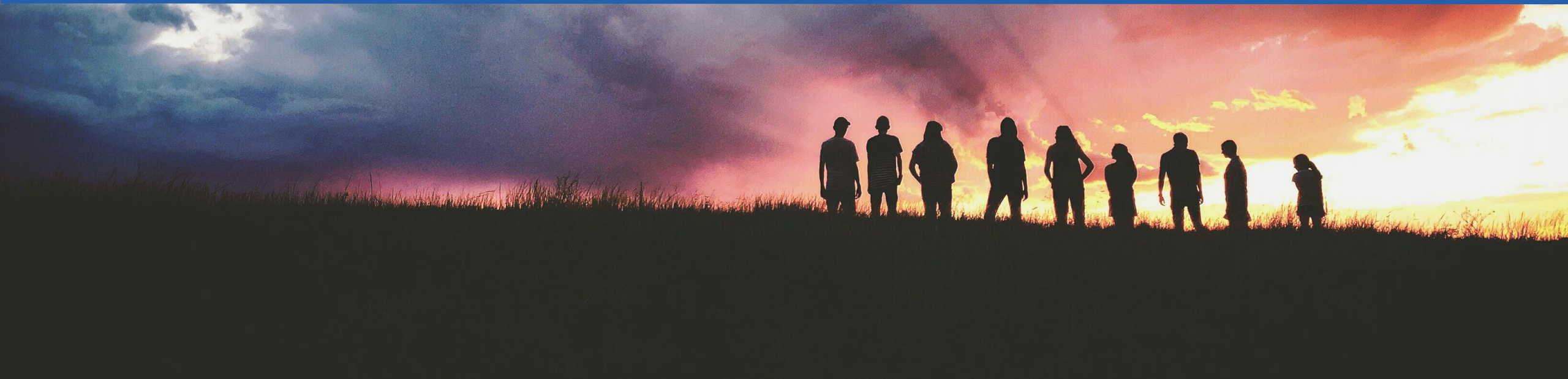
■ Lever demonstrated in project(s)

□ Lever not demonstrated in project(s)

Blank represents limited relevance to sector decarbonization

visit liftoff.energy.gov

Community Benefits



Community Benefits

Selectees described strategies and methods of accountability to ensure:

- Meaningful, two-way community and labor engagement
- Diversity, equity, inclusion, and accessibility
- Benefits to the surrounding community
- Quality jobs and workforce development
- Furthering the Justice40 Initiative

By **prioritizing community benefits**, we can ensure the next chapter in America's energy story is marked by greater justice, equity, security, and resilience.

The Inflation Reduction Act supports this goal by giving priority to projects that provide the **greatest benefit to the greatest number of people in nearby communities**.

Community & Labor Engagement

Diversity, Equity, Inclusion, & Accessibility

Greatest Benefit for the Greatest Number

Investing in the American Workforce

Justice40 Initiative

Community Benefits Snapshots

Doing Well by Doing Good for Everyday Americans

Gallo Glass will support recycling education in the community and participation at local schools. The project will establish of glass collection programs – including in disadvantaged communities – and provide California Redemption Value (CRV) proceeds to support the construction of a centralized new inclusive playground.

By replacing the burning of coke with electric induction, **U.S. Pipe and Foundry** would substantially improve air quality including reductions in particulate matter, nitrogen oxides, and sulfur oxides for communities nearby the Bessemer, Alabama, site. U.S. Pipe also has collective bargaining agreements with United Steelworkers, International Association of Machinists and Aerospace Workers, and the International Brotherhood of Electrical Workers at Bessemer.

Sublime Systems is setting the stage for new entrants in U.S. manufacturing. The company's project expects to create 70-90 permanent manufacturing jobs in a Holyoke, Massachusetts, an area that that once produced nearly all the United States' writing paper. Sublime Systems and the United Steelworkers have signed a strategic partnership, and the company has also signed Memoranda of Understanding to negotiate project labor agreements with the region's building trade unions.

Constellium Aluminum plans to build a Community Benefits Building with a new training and wellness center for all employees and an onsite childcare facility to support diversity. 100% of the hourly workforce of Constellium Ravenswood is represented by United Steelworkers Local 5668.

Next Steps & Resources

Next Steps – Negotiations

Award Negotiations: DOE OCED will begin the negotiations process with project selectees

After Award: ***IF the projects receive an award (successful negotiations)***

- OCED makes a cooperative agreement award
- NEPA: OCED will work with the awarded project partners to ensure compliance with the National Environmental Policy Act (NEPA)
- Local communities (state, local, and community stakeholders) will have the opportunity for ongoing engagement with OCED and the awardees(s)

Get Involved

How could this project impact me?

Learn more about OCED's Community Benefits Plan Framework →

What is the Industrial Demonstrations Program?

Learn more →

Project selected

WE ARE HERE

Announcement and Negotiations
Projects have been selected, but awards have not been made

Project awarded

1 ~12-18 months

2 ~2-3 years

3 ~2-4 years

4 ~2-4 years

Anticipated phases

Phase 1: Project Planning
Community Benefit Commitments Public

Phase 2: Project Development
Community Benefit Commitments Public

Phase 3: Install, Integrate, Construct
Community Benefit Commitments Public

Phase 4: Ramp-Up & Operate
Community Benefit Commitments Public

Ongoing community engagement throughout each phase

Learn more about project phases →

When are the project-specific briefings being held?

Learn more and register here →

How do I stay informed?

Sign up for updates →

OCED
Office of Clean Energy Demonstrations

Community Benefit Commitments Public
Go/No-Go Decisions

Next Steps – Virtual IDP Regional Briefings

OCED will hold five regional community briefings to share information with the regions hosting IDP projects.

Information and to register:

Southern Region
(AL, GA, LA, MO, MS, TX)
Monday, April 15, 2024 | 6:00 – 9:15 PM EST

Mid-Atlantic / Appalachia Region
(KY, MD, PA, TN, WV, VA)
Tuesday, April 16, 2024 | 6:00 – 8:30 PM EST

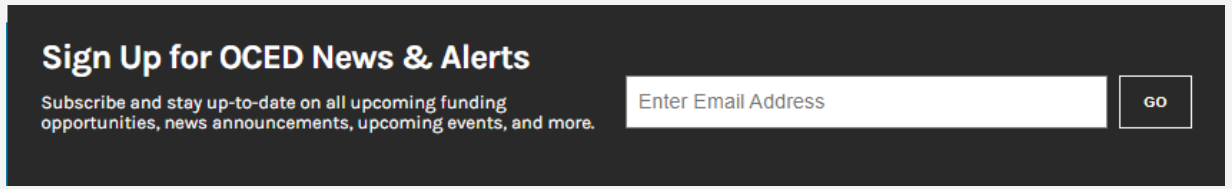
Midwest Region
(IA, IL, IN, MI, MN, OH)
Thursday, April 18, 2024 | 7:00 – 9:00 PM EST

West Region
(AZ, CA, CO)
Monday, April 22, 2024 | 8:00 – 10:00 PM EST

Northeast Region
(MA, NY, VT)
Tuesday, April 23, 2024 | 6:00 – 7:45 PM EST

For more information

- **For questions regarding IDP projects email engage_industrialdemos@hq.doe.gov**
- **OCED Website & Newsletter Sign-up energy.gov/oced**
  Scroll to bottom to sign up here:



- **OCED Exchange (RFIs, NOIs, and FOAs) oced-exchange.energy.gov**
- **Follow us on LinkedIn linkedin.com/company/doe-oced/**

IDP Resources

Industrial Demonstrations

- Program Page
- Press Release
- Overview of Selected Projects
- Local Engagement Opportunities
- OCED CBP fact sheet

Justice40 Resources

- Justice40 Initiative
- Energy Justice Dashboard (BETA)
- Climate and Economic Justice Screening Tool

Additional Resources

- NEPA Resources
- Industrial Decarbonization Pathways to Commercial Liftoff Reports
- DOE Industrial Decarbonization Roadmap

Thank you!

OCED

Office of Clean Energy Demonstrations

For more information, please visit energy.gov/OCED