



THE OFFICE OF CLEAN ENERGY DEMONSTRATIONS



Industrial Demonstrations Program Selections National Briefing

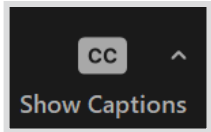
Office of Clean Energy Demonstrations

U.S. Department of Energy

March 27, 2024

Webinar Logistics

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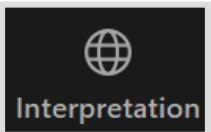


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Is this webinar being recorded?

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

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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



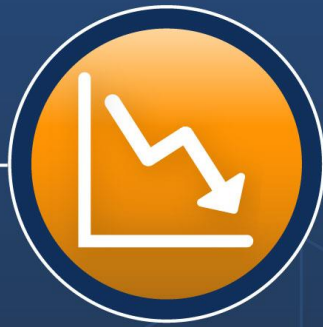
OCED
Office of Clean Energy Demonstrations



\$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

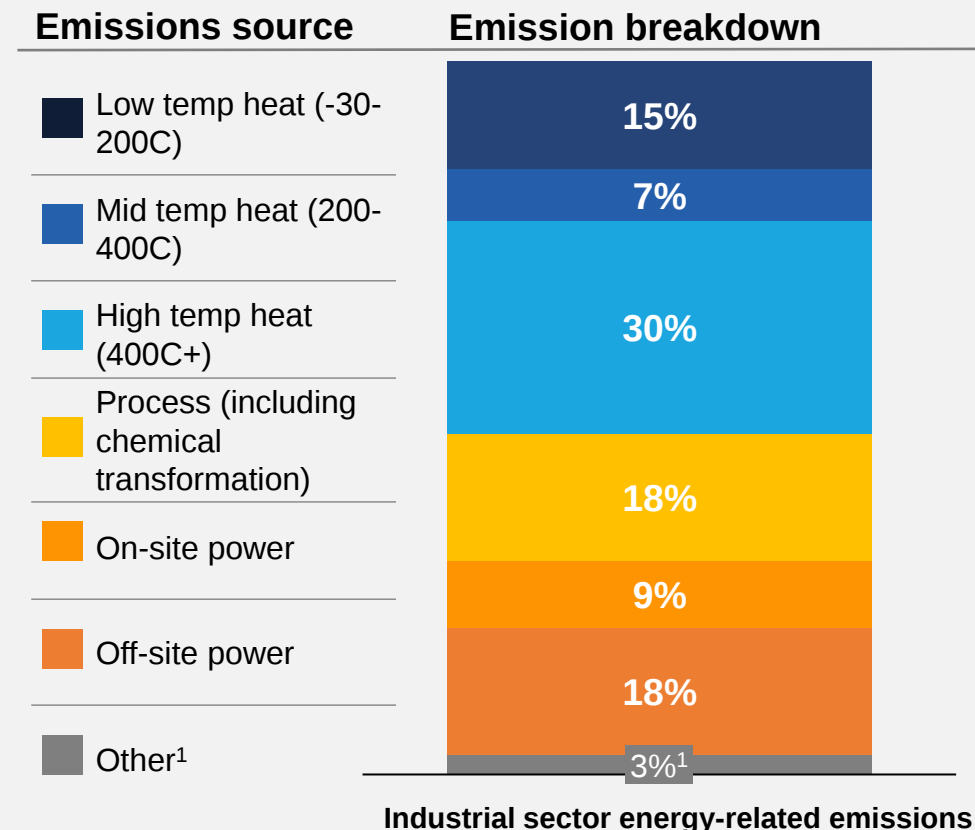
Industry Poses a Substantial Decarbonization Challenge

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 CO₂e



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



\$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

For up to

Matched by

33

projects
selected

\$6B

federal
funding

\$14B

in private cost-share



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

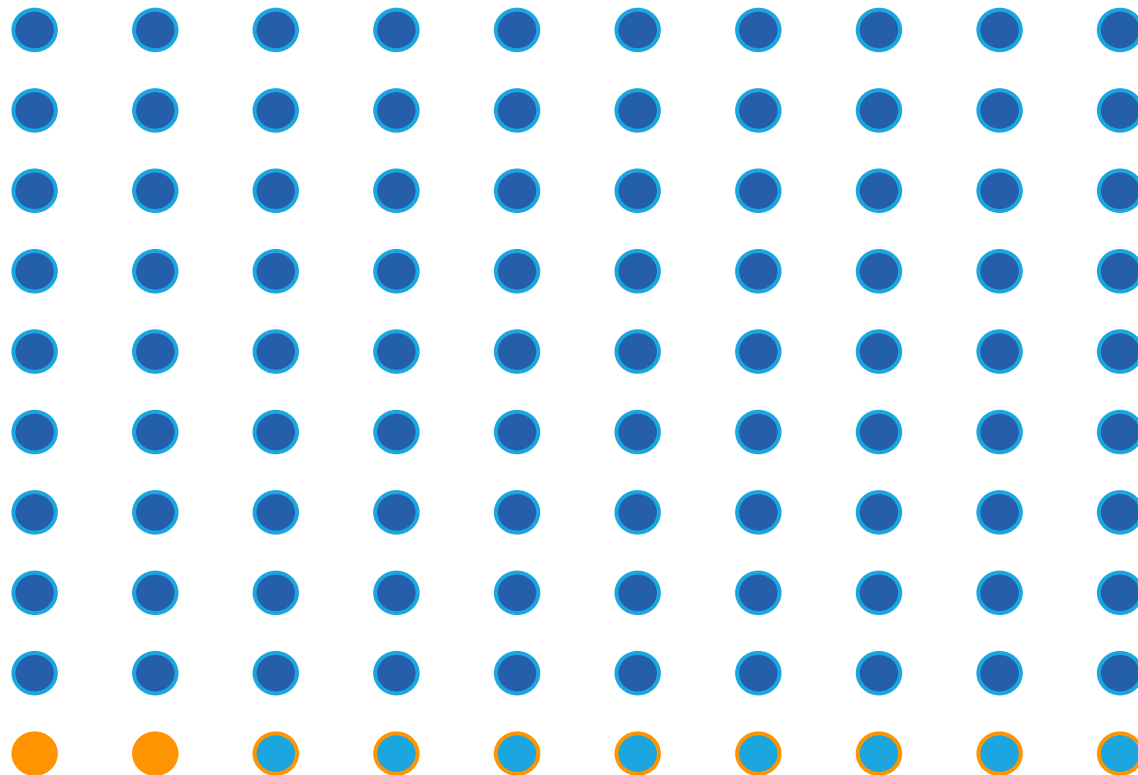
Target:
Select projects with the greatest benefit for the greatest number of people

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



Sector and Project Overviews



IRON & STEEL

6

projects

\$1.5B

federal investment

2.5M

metric tons CO₂
avoided annually

Ironmaking

Traditional
Production



Blast Furnace

+



Metallurgical
Coke
(from coal)

Demonstrations



+

H₂

Direct Reduced
Ironmaking

Hydrogen

Real World
Impact



High Grades of Steel

Finishing Process



Heat from Fossil Fuels



Induction

+



Flexible Fuels

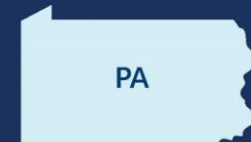
+



Electricity



Resilient Infrastructure



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



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

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



Image credit: Cleveland-Cliffs Steel Corporation

Hydrogen-Fueled Zero Emissions Steel Making



Selectee:
SSAB



Location:
Perry County, Mississippi
and Montpelier, Iowa



Federal Cost Share:
Up to \$500 million



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

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 CO₂ 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



Image credit: Vale USA

Iron Electric Induction Conversion



Selectee:

United States Pipe and Foundry Company



Location:

Bessemer, Alabama



Federal Cost Share:

Up to \$75.5 million

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



Image credit: United States Pipe and Foundry Company

Induction Melting Upgrade



Selectee:
AMERICAN Cast Iron Pipe Company



Location:
Birmingham, Alabama



Federal Cost Share:
Up to \$75 million

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



Image credit: American Cast Iron Pipe Company

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 CO₂
avoided annually

Traditional
Production



Limestone with embodied carbon –
released to the atmosphere
during manufacturing

Demonstrations



Silicate-based rocks like basalt replace limestone



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

Real World
Impact



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

CO₂



Cement plant releases emissions to atmosphere

O₂
Oxyfuel



Cement plant with carbon capture



Pistachio
shells



Thermal
battery



VA



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



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

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



Image credit: National Cement Company of California

Mitchell Cement Plant Decarbonization Project



Selectee:
Heidelberg Materials US, Inc.



Location:
Mitchell, Indiana



Federal Cost Share:
Up to \$500 million

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

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



Image credit: Summit Materials

Deeply Decarbonized Cement



Selectee:
Brimstone Energy, Inc.



Location:
TBD



Federal Cost Share:
Up to \$189 million

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



Image credit: Brimstone Energy, Inc.

Electrochemical Cement Manufacturing



Selectee:
Sublime Systems, Inc.



Location:
Holyoke, Massachusetts



Federal Cost Share:
Up to \$86.9 million

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



Image credit: Sublime Systems, Inc.

Limestone Calcined Clay Cement Production



Selectee:
Roanoke Cement Company, LLC



Location:
Troutville, Virginia



Federal Cost Share:
Up to \$61.7 million

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



Image credit: Roanoke Cement Company, LLC

CHEMICALS & REFINING

& SEPARATIONS
PROCESSES FOR
PULP & PAPER

8

projects

\$1.3B

federal investment

3M

metric tons CO₂
avoided annually



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

Carbon Capture and Utilization
Value-Added Recycling
Process Heat

Traditional
Production



Carbon process emissions
released to the atmosphere



Waste landfilled
or incinerated



Fossil-based high-temperature heat

Demonstrations



Carbon captured and routed to a new
process for upcycling



Chemical byproducts and textiles recycled



Specialized, decarbonized burners
Thermal batteries powered by renewables
Membrane separation

Real World
Impact



Fuels for marine transport
Polymers for apparel
Electrolytes for lithium ion batteries



High-quality plastics for food
and medical applications
Decarbonized fuels



Major CO₂ 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

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



Image credit: Eastman Chemical Company LLC

Baytown Olefins Plant Carbon Reduction Project



Selectee:
Exxon Mobil Corporation



Location:
Baytown, Texas



Federal Cost Share:
Up to \$331.9 million

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



Image credit: Exxon Mobil Corporation

Sustainable Ethylene from CO₂ Utilization with Renewable Energy



Selectee:

T.EN Stone & Webster Process Technology, Inc.



Location:

U.S. Gulf Coast



Federal Cost Share:

Up to \$200 million

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

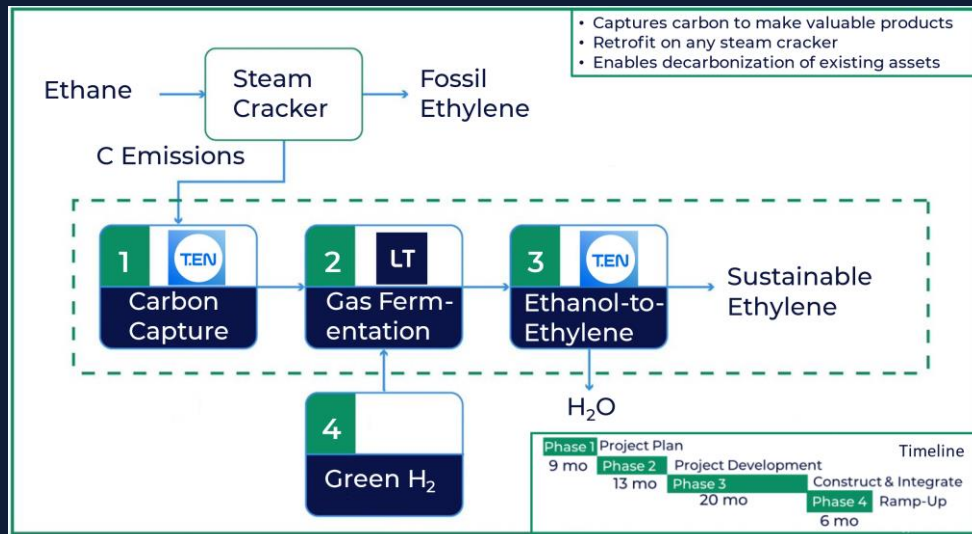


Image credit: T.EN Stone & Webster Process Technology, Inc.

Star e-Methanol



Selectee:
Orsted P2X US Holding LLC



Location:
Texas Gulf Coast



Federal Cost Share:
Up to \$100 million

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

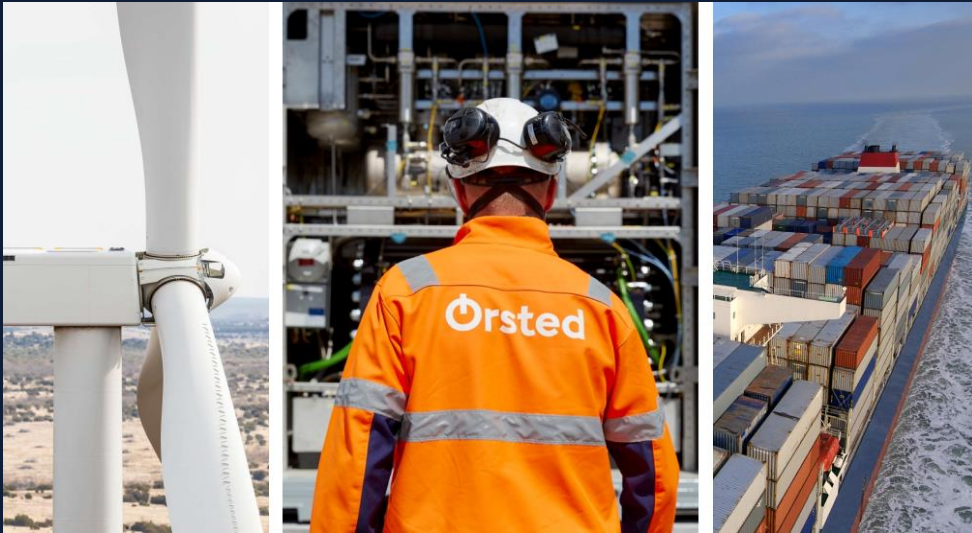


Image credit: Orsted P2X US Holding LLC

Novel CO₂ Utilization for Electric Vehicle Battery Chemical Production



Selectee:
The Dow Chemical Company



Location:
U.S. Gulf Coast



Federal Cost Share:
Up to \$95 million

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

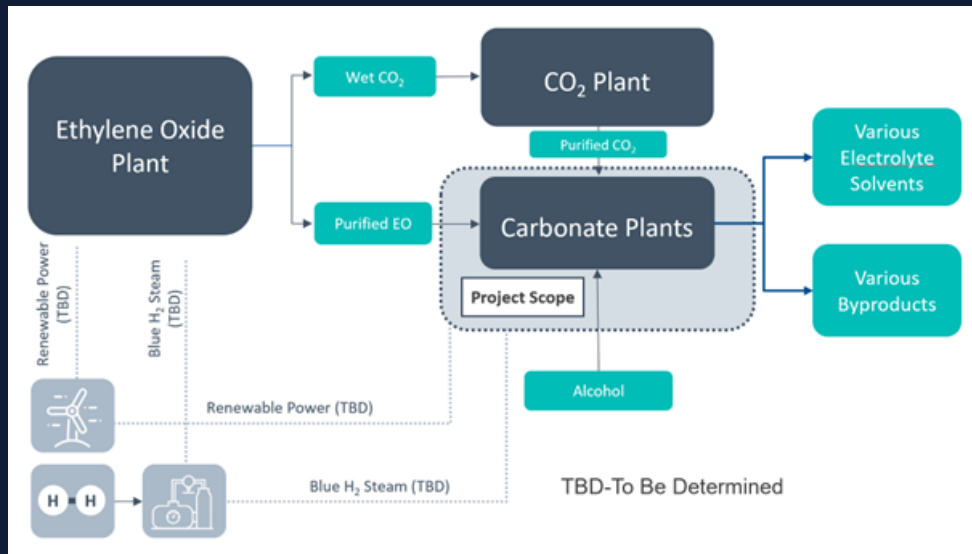


Image credit: The Dow Chemical Company

Syngas Production from Recycled Chemical Byproduct Streams



Selectee:
BASF Corporation



Location:
Freeport, Texas



Federal Cost Share:
Up to \$75 million

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



Image credit: BASF Corporation

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

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



Image credit: ISP Chemicals, LLC an Ashland Company

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 CO₂ 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



**International
Paper**

ALUMINUM & METALS

5 projects

\$900M+ federal investment

4M+ metric tons CO₂ avoided annually



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

Primary Aluminum
Recycling
Process Heat

Traditional Production



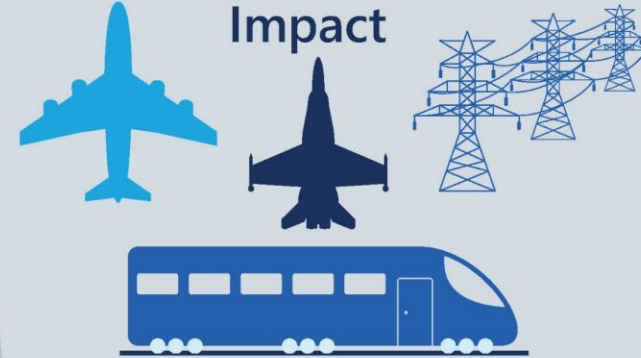
Energy-intensive technology that struggles to compete in the global marketplace

Demonstrations



State-of-the-art, energy-efficient smelter designed to run on 100% renewable energy

Real World Impact



High-purity aluminum critical to defense, aerospace, electricity and transportation applications



Material landfilled or shipped overseas for recycling



U.S.-based recycling adds value for consumers



High-purity copper for semiconductors and electric vehicles



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

Green Aluminum Smelter



Selectee:
Century Aluminum Company



Location:
Prefer Kentucky or Ohio/Mississippi
River Basins



Federal Cost Share:
Up to \$500 million

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



Image credit: Century Aluminum Company

Advanced Copper Recycling Facility



Selectee:
Wieland North America Recycling



Location:
Shelbyville, Kentucky



Federal Cost Share:
Up to \$270 million

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



Image credit: Wieland North America Recycling

Low Carbon SmartMelt Furnace Conversion



Selectee:
Constellium



Location:
Ravenswood, West Virginia



Federal Cost Share:
Up to \$75 million

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



Image credit: Constellium

Zero Waste Advanced Aluminum Recycling



Selectee:
Real Alloy Recycling



Location:
Wabash, Indiana



Federal Cost Share:
Up to \$67.3 million

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

REAL ALLOY



**RESPONSIBLE
ALUMINUM**

Nexcast - Next Generation Aluminum Mini Mill



Selectee:
Golden Aluminum



Location:
Fort Lupton, Colorado



Federal Cost Share:
Up to \$22.3 million

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.



Image credit: Golden Aluminum

HEAT

3 GLASS |
3 FOOD & BEVERAGE |
2 PROCESS HEAT

8

projects

\$700M+

federal investment

1.5M

metric tons CO₂
avoided annually

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



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



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

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

LET'S MAKE
LIFE
Delicious
KraftHeinz

Image credit: Kraft Heinz

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

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

DIAGEO

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

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)



Image credit: Unilever



Glass



Glass Furnace Decarbonization Technology



Selectee:
O-I Glass, Inc.



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



Federal Cost Share:
Up to \$125 million

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



Image credit: O-I Glass

Hybrid Electric Glass Furnace Project



Selectee:
Gallo Glass Company



Location:
Modesto, California



Federal Cost Share:
Up to \$75 million

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

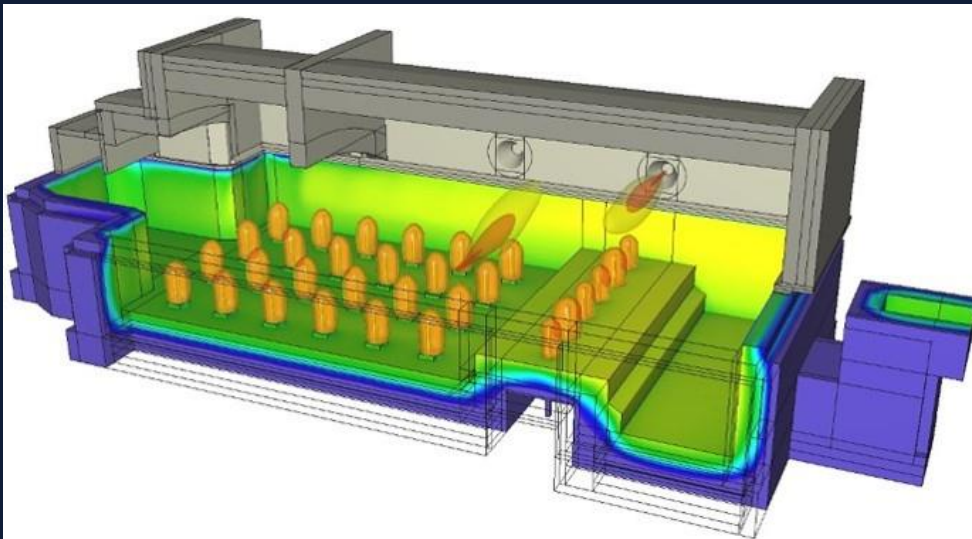


Image credit: Gallo Glass Company

Flexible Fuel Electric Hybrid Glass Furnace Demonstration



Selectee:
Libbey Glass



Location:
Toledo, Ohio



Federal Cost Share:
Up to \$45.1 million

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



Image credit: Libbey Glass



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

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



Image credit: Skyven Technologies

Vikrell Electric Boiler & Microgrid System



Selectee:
Kohler



Location:
Casa Grande, Arizona



Federal Cost Share:
Up to \$51.2 million

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



Image credit: Kohler



Portfolio Snapshot – Pathways to Commercial Liftoff

IDP Projects Substantially Address the Liftoff Opportunity Space

	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	✓		✓		✓	✓	✓	

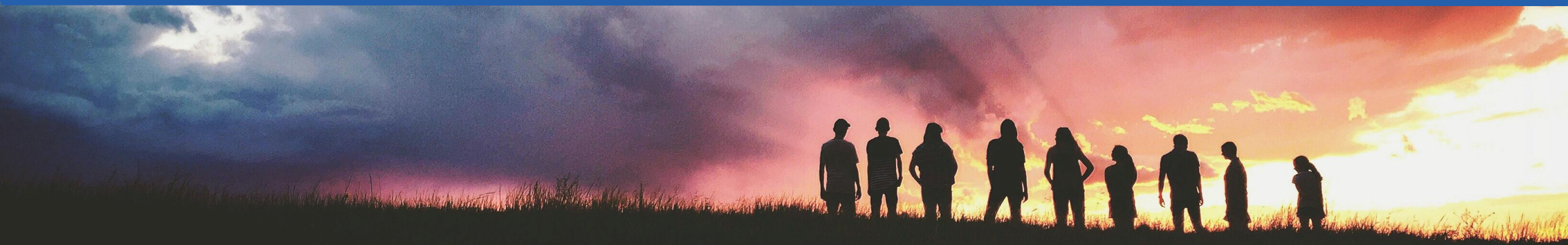
 Lever demonstrated in project(s)
 Lever not demonstrated in project(s)
 Blank represents limited relevance to sector decarbonization

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

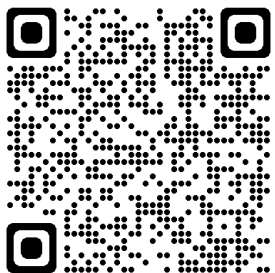
Next Steps – Negotiations

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



When are the project-specific
briefings being held?

Learn more and register
here →

1

~12-18 months

2

~2-3 years

3

~2-4 years

4

~2-4 years

Anticipated phases

Phase 4: Ramp-Up & Operate

Community Benefit Commitments Public

Phase 3: Install, Integrate, Construct

Community Benefit Commitments Public

Phase 2: Project Development

Community Benefit Commitments Public

Phase 1: Project Planning

Community Benefit Commitments Public

Ongoing community
engagement throughout
each phase

Learn more about project phases →

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:

Sign Up for OCED News & Alerts

Subscribe and stay up-to-date on all upcoming funding opportunities, news announcements, upcoming events, and more.
- 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