



CENTREPOLIS
Accelerator

at Lawrence Technological University

Industrial Decarbonization Innovation Challenge
Developing the Carbon Neutral Factory of the Future

NASEO Event Sept 13, 2023

<https://www.centrepolis.org/industrial-decarbonization>

MISSION

Centrepolis Accelerator mission is to...

- 1) help cleantech “hardware” product developers in designing and manufacturing their products in Michigan; and
- 2) help existing Michigan manufacturers adopt energy efficiency and industry 4.0 technologies to reduce emissions and improve their operational efficiencies allowing them to be more globally competitive.

Our Mantra...

To enable those with ideas for physical products to create and recognize their dreams, to help them build businesses and manufacturer their products right here in Michigan



Build4Scale training

**Build4
Scale** 
U.S. Department of Energy



0 Course Introduction



1 Self-Assessment



2 Detailed Design Package



3 Design for Mfg, Assembly, & Reliability



4 Beta Prototype & Test Plan



5 Communication, Selection, & Negotiation



6 Regulation, Certification, & Industry Stds



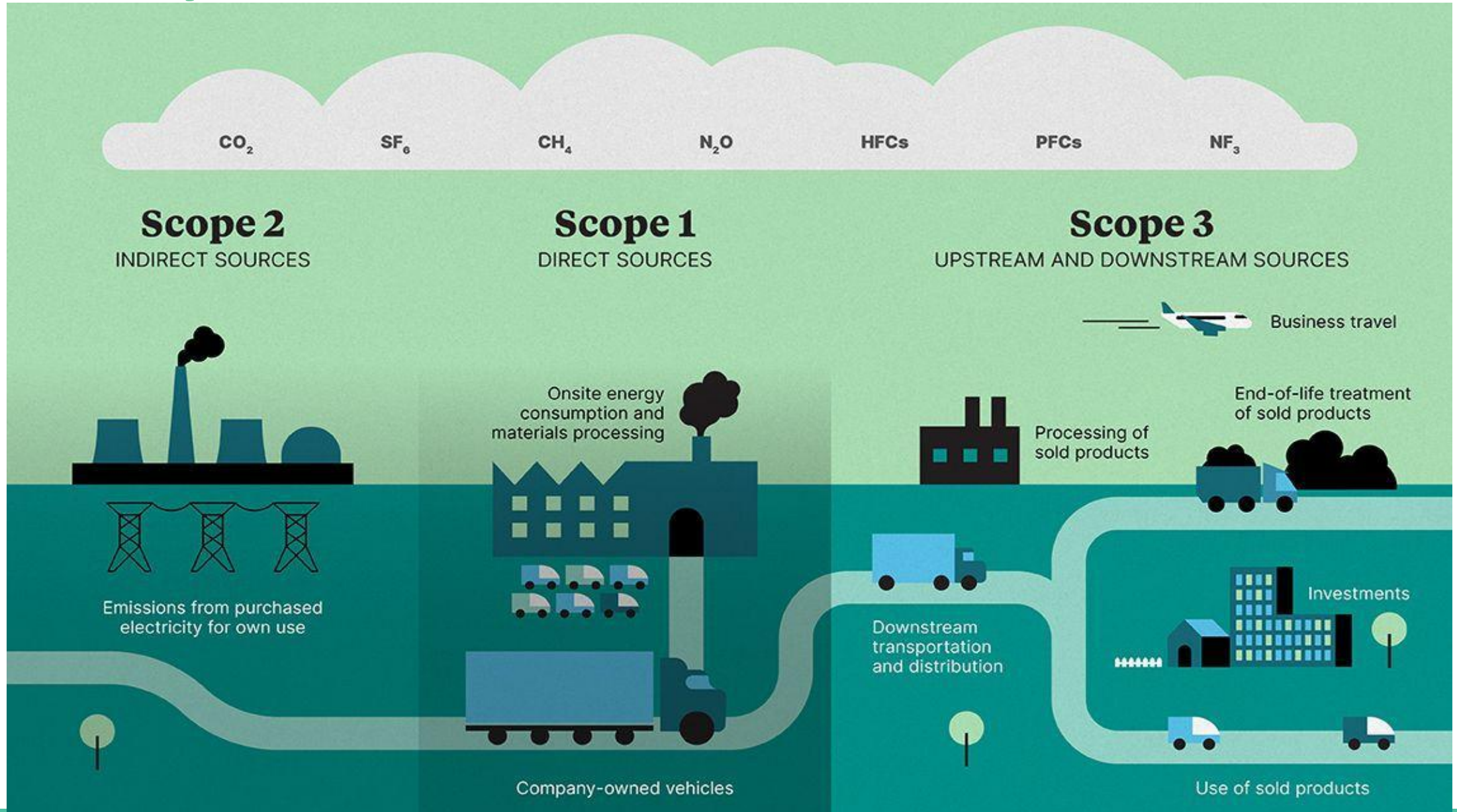
7 Sustaining Quality & Warranty Plan



Resource Library



Why Focus on Industrial Decarbonization





DOE Roadmap Table for Achieving Net Zero by 2050

TABLE 1. DECARBONIZATION PILLARS WITH EXAMPLES OF TECHNOLOGIES FOR INDUSTRY

Energy Efficiency	Industrial Electrification	Low-Carbon Fuels, Feedstocks, and Energy Sources (LCFFES)	Carbon Capture, Utilization, and Storage (CCUS)
Energy efficiency advancements minimize industrial energy demand, directly reducing the GHG emissions associated with fossil fuel combustion.	Industrial process technologies that utilize electricity for energy, rather than combusting fossil fuels directly, enable the sector to leverage advancements in low-carbon electricity from both grid and onsite generation sources.	Substitution of low- and no-carbon fuels and feedstocks for fossil fuels can further reduce combustion-associated emissions for industrial processes.	This multi-component strategy for mitigating difficult-to-abate emissions involves capturing generated CO ₂ before it can enter the atmosphere; utilizing captured CO ₂ whenever possible; and storing captured CO ₂ long-term to avoid atmospheric release.
<u>Energy efficiency technology examples:</u> <ul style="list-style-type: none"> • Energy management approaches • Thermal integration of process heat • Smart manufacturing • Improved technologies and processes; system integration 	<u>Industrial electrification technology examples:</u> <ul style="list-style-type: none"> • Electrification of process heat (e.g., heat pumps) • Electrification of hydrogen production for industrial process use 	<u>LCFFES technology examples:</u> <ul style="list-style-type: none"> • Fuel-flexible processes • Clean hydrogen fuels and feedstocks • Biofuels and biofeedstocks • Concentrating solar power • Nuclear • Geothermal 	<u>CCUS technology examples:</u> <ul style="list-style-type: none"> • Post-combustion chemical absorption of CO₂ • CO₂ pipelines and other CCUS-supportive infrastructure



DOE Roadmap Graphic for Achieving Net Zero by 2050

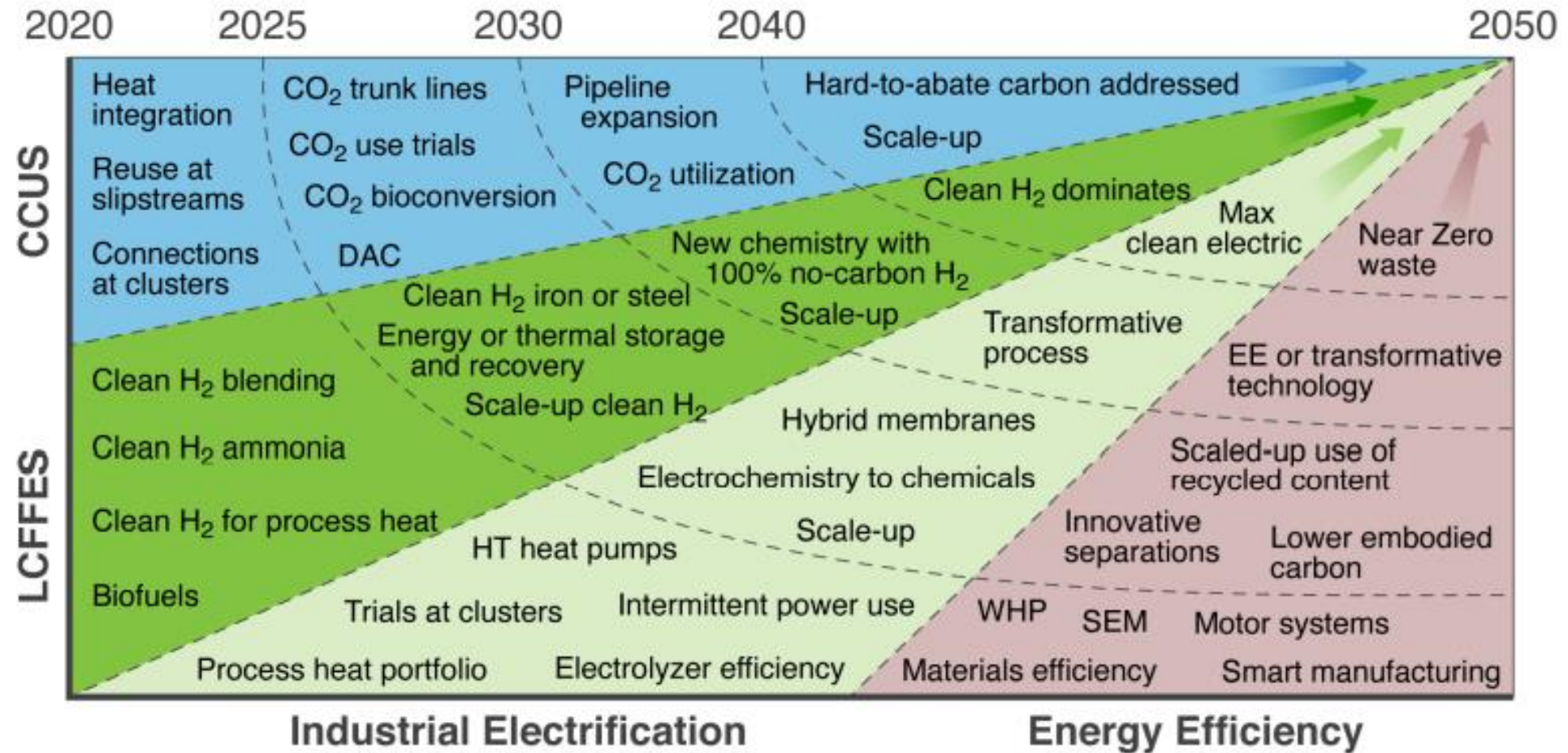


FIGURE 10. LANDSCAPE OF MAJOR RD&D INVESTMENT OPPORTUNITIES FOR INDUSTRIAL DECARBONIZATION ACROSS ALL SUBSECTORS BY DECADE AND DECARBONIZATION PILLAR.



Challenge Partners

We're sponsored by world class organizations across the public and private sectors

State and Federal Organizations



Private Sector Industry Sponsors





Industrial Decarbonization Innovation Challenge

This Challenge globally crowdsources best in class process energy efficiency, electrification and low carbon fuel technology firms and connects these solutions to our corporate partners to address problem statements and support their Scope 1, 2 & 3 emission reduction goals.

<https://www.centrepolis.org/industrial-decarbonization>





Focus Areas - Green Factory of the Future



Source: BCG analysis.



Industrial Decarbonization Innovation Challenge Ideas

- **Decarbonize How We Manufacture Things** - How might we enable traditional machine applications to switch to sustainable energy sources. How might we improve carbon capture? To reach Net-Zero, we need to use clean energy and production processes. Some Examples of technologies we're looking for:
 - Unique fuel switching technology for traditional machine applications
 - Breakthroughs in Hydrogen fuel or electric boiler
 - Substitutes for natural gas equip, methods to retrofit and electrify natural gas
 - Carbon capture systems for manufacturing procedures and plants
 - Decarbonizing and or electrifying paint curing and drying ovens
 - Decarbonized water heating technologies
 - Decarbonizing dewatering and moisture removal
 - Affordable and scalable biofuel technologies
- **Decarbonize the built environment** - Making how we run and monitor the buildings we occupy is important, but we need to decarbonize the way we build these environments. How might we make current buildings more efficient and at the same time build new structures without emitting carbon?
 - Low cost energy consumption metering
 - Dynamic supply balance across multiple energy sources (Grid, Wind, Solar, Battery)
 - Dynamic load balancing
 - Breakthrough energy efficient building technologies
 - Water monitoring and reduction
 - Systems that heat or cool isolated work areas locally without having to cool and heat the whole building
- **Decarbonize through the Circular Economy** - How might we leverage new circular design processes, materials, and manufacturing technologies to eliminate new carbon from the industrial supply chain?
 - Material, product recycling and waste reduction technologies
 - Improve onsite scrap recycle and reuse
 - Increase the use of non-virgin materials in manufacturing
 - Create new materials and manufacturing processes that are carbon neutral or carbon negative
 - How can we recycle and reuse foams (insulation foams) throughout the product life cycle?
 - How can we reuse parts of returned products that can be recycled back into the manufacturing process?
 - How can we utilize “digital passport” to improve the circularity of our products for supply chain transparency



Demo and Pilot Opportunities

Up to \$250,000 to support Industrial Decarbonization Pilots & Demonstration and / or product development services

<https://www.centrepolis.org/industrial-decarbonization>





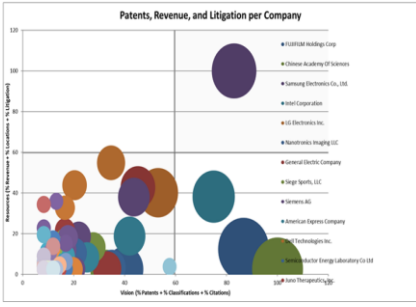
How We Scout Technology Solutions



Automation Alley									
Automation Alley Industry 4.0 Accelerator									
Company	Column	Notes	Pipelines	YOUR SCORES	THIS	START APP	FINALIZE APP	TAILORED	INVESTORS & AFFILIATE
ELMIR			Final	Automation Alley Industry...	Automation Alley Ind...	Prototyping & Test	Apr 27 '22	Improving the safety of marine engines with data.	European Institute
Creative (DOW)			Final	Automation Alley Industry...	Automation Alley Ind...	Apr 24 '22	-	The Mission: 3D Model for interior decorations and ...	
Reason to use			Final	Automation Alley Industry...	Automation Alley Ind...	Apr 23 '22	-		
Berry Clean Super Berry Clean LLC			Final	Automation Alley Industry...	Automation Alley Ind...	Sold production	Apr 22 '22	We manufacture cold process soap bars made with natura...	
Cyber Enterprise Incorporated			Final	Automation Alley Industry...	Automation Alley Ind...	Apr 20 '22	-	Data Led Innovation Platform through Connect...	Samsung C&D&S, S
AS2TS LLC v.s.i			Final	Automation Alley Industry...	Automation Alley Ind...	Prototyping & Test	Apr 19 '22	Cloud computation and prediction analysis for ...	Generator Backed In
Centre for Sustainable Action			Final	Automation Alley Industry...	Automation Alley Ind...	Apr 18 '22	-	Expansion makes business sustainable	University James PNC
MI Board			Final	Automation Alley Industry...	Automation Alley Ind...	Prototyping & Test	Apr 18 '22	Device for trading investment analysis and ...	USF, S&S
Madiform			Final	Automation Alley Industry...	Automation Alley Ind...	Sold production	Apr 17 '22	platform for selling custom colored furniture internet...	
Ciberfortia			Final	Automation Alley Industry...	Automation Alley Ind...	Prototyping & Test	Apr 15 '22	Workforce distribution through program of robot...	
CloudFront			Final	Automation Alley Industry...	Automation Alley Ind...	Prototyping & Test	Apr 15 '22	We are automating financial	Adaptive Software
140 Tech Demo P...pat			Final	Automation Alley Industry...	Automation Alley Ind...	Prototyping & Test	Apr 8 '22	-	



TOP 20 U.S. PATENT HOLDERS (# Patents)			
FUJIFILM	13	Dell	4
Chinese Academy of Sciences	13	Semiconductor Energy Lab	4
Samsung	10	Juno Therapeutics	4
Intel	9	Taiwan Semiconductor	3
LG	8	EssilorLuxottica	3
Nantronics Imaging	7	Renesas Electronics Corp	3
GE	6	Novartis	3
Siege Sports	5	The Travelers Companies	3
Siemens	5	Canon	2
Amex	5	Carl-Zeiss-Stiftung	2



NOTE: Data was pulled from searches in the M-SBDC Innography Database. Most patent filings do not reference "Industry 4.0" (I4.0) in any meaningful way. Many companies do not file patents related to I4.0 tech, preferring instead to retain their technical advantage with trade secrets. Therefore, data reflects only patent assignees who have filed or been awarded patents in the U.S. and is not intended to provide meaningful conclusions about the IP leadership position of firms in the I4.0 space.

Source: Michigan Small Business Development Center (M-SBDC), 2020



Over \$1 Billion Invested in Startups Through Gust

Gust connects startups with the largest collection of investors across the world.

For Startups
Build a profile and share it with investors to get funding.

For Investors
Access powerful deal flow management tools on a secure platform.

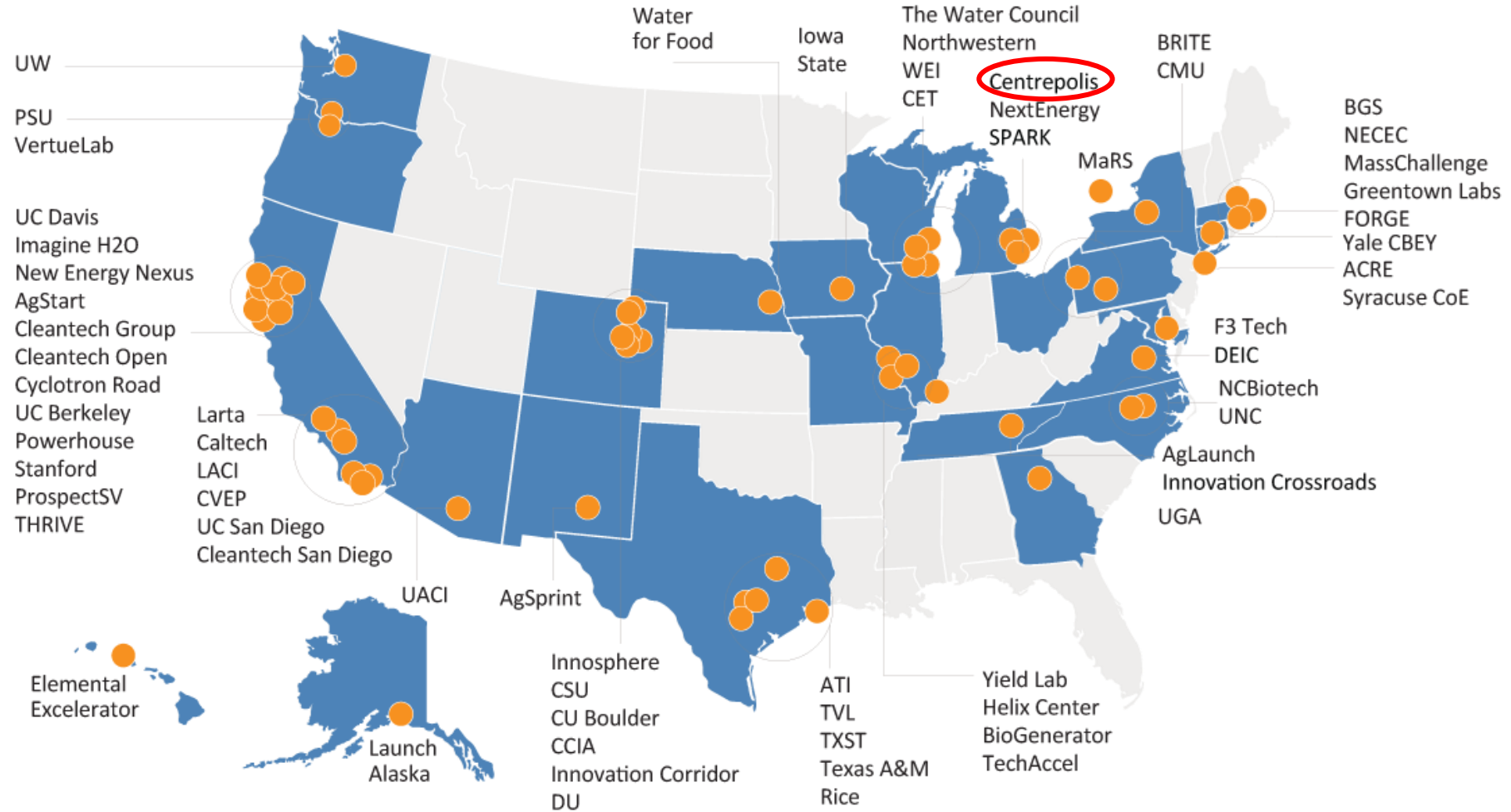
For Accelerators
Increase applications, manage the application process, and make your cohorts happy.



Industry 4.0 Venture Backed Companies					
Company ID	Company Name	HQ Location	Primary Industry Code	Verticals	Last Financing Date
148194-30	Arctech Technologies	Sunnyvale, CA	Electronics Equipment and Instruments	Advanced Manufacturing, Artificial Intelligence	10-Apr-2020
434417-17	ADAMIDE	Darmstadt, Germany	Automation/Workflow Software	Internet of Things	02-Apr-2020
170586-36	Adit Global	Las Vegas, NV	IT Consulting and Outsourcing	Advanced Manufacturing, Big Data, Cyber	10-Feb-2017
1209-67	Arcti	Boulder, CO	Business/Productivity Software	Big Data, IoT	16-Apr-2020
84112-84	Arora (United States)	New Providence, NJ	Electronics Equipment and Instruments	Advanced Manufacturing, Internet of Things	13-Nov-2019
69122-69	B2ST	Toronto, Canada	Business/Productivity Software	Advanced Manufacturing, Artificial Intelligence	01-May-2020
260503-91	BlueBridge AI	Fallux, MD	Business/Productivity Software	Advanced Manufacturing, Artificial Intelligence	14-Mar-2019
230589-01	Braincube (Media and Information Services (BIS))	Issy-les-Moulineaux, France	Media and Information Services (BIS)	Artificial Intelligence & Machine Learning	08-Oct-2016
120567-72	Camtec Analytics	Toronto, Canada	Business/Productivity Software	Advanced Manufacturing, Artificial Intelligence	26-Oct-2020
161814-34	Cybus	Hannover, Germany	Business/Productivity Software	Advanced Manufacturing, Internet of Things	09-May-2019
237678-01	Data Dumbie	Houston, TX	Business/Productivity Software	Advanced Manufacturing, ERP Payments	24-Sep-2020
20089-38	DevoIQ	Houston, TX	IT Consulting and Outsourcing	Advanced Manufacturing, Big Data	15-Apr-2020
128194-29	Diogen	Hannover, MD	Network Management Software	Cybersecurity, Industrial, Internet of Things	31-Jul-2020
277702-01	e-onnect	Paris, France	Business/Productivity Software	Internet of Things	03-May-2018
184761-63	EvoIQ	Munich, Germany	Business/Productivity Software	CloudTech & DevOps, Internet of Things, Mobility	26-Aug-2020
220474-02	EdgeMind	Southbury, CT	Software Development Applications	CloudTech & DevOps, Internet of Things, I	20-Apr-2018
184875-03	Edigy	Mayenne, France	Application Specific Semiconductors	Advanced Manufacturing, Internet of Things	06-Jan-2015
16899-01	Element Analytics	San Francisco, CA	Business/Productivity Software	Advanced Manufacturing, Artificial Intelligence	26-Jun-2020



Working with a network of cleantech incubators nationally





Working with a network of cleantech accelerators across the globe





Targeting Tech Solutions Funded Already by...

U.S. DEPARTMENT OF
ENERGY | Energy Efficiency &
Renewable Energy
ADVANCED MANUFACTURING OFFICE





Targeting DOE Funded Industrial Decarbonization Projects

PLANT-WIDE CASE STUDIES

[ALCOA: C-SUITE PARTICIPATION IN ENERGY EFFICIENCY INCREASES ACCOUNTABILITY AND STAFF ENGAGEMENT THROUGHOUT THE ORGANIZATION](#)

[SUCCESS STORY: CHROME DEPOSIT CORPORATION](#)

[COOK COMPOSITES AND POLYMERS COMPANY ACHIEVES SUPERIOR ENERGY PERFORMANCE GOLD CERTIFICATION](#)

[ECK INDUSTRIES, INC. REALIZES SAVINGS THROUGH SMARTER LIGHTING SOLUTIONS](#)

[FLAMBEAU RIVER PAPERS MAKES A COMEBACK WITH A REVISED ENERGY STRATEGY](#)

[FREESCALE SEMICONDUCTOR SUCCESSFULLY IMPLEMENTS AN ENERGY MANAGEMENT SYSTEM](#)

[HARBEC PLASTICS: 750KW CHP APPLICATION - PROJECT PROFILE](#)

[SUCCESS STORY: INGERSOLL RAND DISCOVERS HIDDEN SAVINGS WITH A THREE-TIERED ENERGY AUDIT MODEL](#)

[MID-SOUTH METALLURGICAL MAKES ELECTRICAL AND NATURAL GAS SYSTEM UPGRADES TO REDUCE ENERGY USE AND ACHIEVE COST SAVINGS](#)

[NISSAN SHOWCASES THE RESULTS OF AN ENERGY-WISE CORPORATE CULTURE](#)

[OWENS CORNING AND SILICON VALLEY POWER PARTNER TO MAKE ENERGY SAVINGS A REALITY](#)

[SAVE ENERGY NOW ASSESSMENT HELPS EXPAND ENERGY MANAGEMENT PROGRAM AT SHAW INDUSTRIES](#)

[SOLUTIA: UTILIZING SUB-METERING TO DRIVE ENERGY PROJECT APPROVALS THROUGH DATA](#)

[VOLVO TRUCKS ACHIEVES LOFTY ENERGY AND CARBON GOALS](#)

STEAM CASE STUDIES

[BOISE INC. ST. HELENS PAPER MILL ACHIEVES SIGNIFICANT FUEL SAVINGS](#)

[CHRYSLER: SAVE ENERGY NOW ASSESSMENT ENABLES A VEHICLE ASSEMBLY COMPLEX TO ACHIEVE SIGNIFICANT NATURAL GAS SAVINGS](#)

[DOW CHEMICAL COMPANY: ASSESSMENT LEADS TO STEAM SYSTEM ENERGY SAVINGS IN A PETROCHEMICAL PLANT](#)

[GOODYEAR TIRE PLANT GAINS TRACTION ON ENERGY SAVINGS AFTER COMPLETING SAVE ENERGY NOW ASSESSMENT](#)

[J.R. SIMPLOT: BURNER UPGRADE PROJECT IMPROVES PERFORMANCE AND SAVES ENERGY AT A LARGE FOOD PROCESSING PLANT](#)

[LONGEST-SERVING ACTIVE PAPER MILL IN THE WESTERN UNITED STATES UNCOVERS NEW WAYS TO SAVE ENERGY](#)

[SAVE ENERGY NOW ASSESSMENT HELPS EXPAND ENERGY MANAGEMENT PROGRAM AT SHAW INDUSTRIES](#)

[STEAM SYSTEM EFFICIENCY OPTIMIZED AFTER J.R. SIMPLOT FERTILIZER PLANT RECEIVES ENERGY ASSESSMENT](#)

[TERRA NITROGEN COMPANY, L.P.: AMMONIA PLANT GREATLY REDUCES NATURAL GAS CONSUMPTION AFTER ENERGY ASSESSMENT](#)

MOTORS CASE STUDIES

[IMPROVING EFFICIENCY OF TUBE DRAWING BENCH](#)

[MOTOR SYSTEM UPGRADES SMOOTH THE WAY TO SAVINGS OF \\$700,000 AT CHEVRON REFINERY](#)

[OPTIMIZING ELECTRIC MOTOR SYSTEMS AT A CORPORATE CAMPUS FACILITY](#)



Targeting DOE Funded Industrial Decarbonization Projects

PROCESS HEATING CASE STUDIES

[ENERGY ASSESSMENT HELPS KAISER ALUMINUM SAVE ENERGY AND IMPROVE PRODUCTIVITY](#)

[LARGEST PRODUCER OF STEEL PRODUCTS IN THE UNITED STATES ACHIEVES SIGNIFICANT ENERGY SAVINGS AT ITS MINNTAC PLANT](#)

[INDIRECT-FIRED KILN CONSERVES SCRAP ALUMINUM AND CUTS COSTS](#)

COMPRESSED AIR CASE STUDIES

[BRIGGS & STRATTON: PUTTING ALL ENERGY EFFICIENCY OPTIONS ON THE TABLE](#)

[FUJIFILM HUNT CHEMICALS U.S.A. ACHIEVES COMPRESSED AIR SYSTEM ENERGY-REDUCTION GOALS WITH A THREE-PHASED STRATEGY](#)

[SUCCESS STORY: INGERSOLL RAND DISCOVERS HIDDEN SAVINGS WITH A THREE-TIERED ENERGY AUDIT MODEL](#)

[NISSAN NORTH AMERICA: HOW SUB-METERING CHANGED THE WAY A PLANT DOES BUSINESS](#)

[SHERWIN-WILLIAMS' RICHMOND, KENTUCKY, FACILITY ACHIEVES 26% ENERGY INTENSITY REDUCTION; LEADS TO CORPORATE ADOPTION OF SAVE ENERGY NOW LEADER](#)

[SOLUTIA: UTILIZING SUB-METERING TO DRIVE ENERGY PROJECT APPROVALS THROUGH DATA](#)

[SOLUTIA: MASSACHUSETTS CHEMICAL MANUFACTURER USES SECURE METHODOLOGY TO IDENTIFY POTENTIAL REDUCTIONS IN UTILITY AND PROCESS ENERGY CONSUMPTION](#)

PUMPS CASE STUDIES

[CASE STUDY - THE CHALLENGE: IMPROVING SEWAGE PUMP SYSTEM PERFORMANCE](#)

[NEW WATER BOOSTER PUMP SYSTEM REDUCES ENERGY CONSUMPTION BY 80 PERCENT AND INCREASES RELIABILITY](#)

[OPTIMIZING ELECTRIC MOTOR SYSTEMS AT A CORPORATE CAMPUS FACILITY](#)

[OPTIMIZED PUMP SYSTEMS SAVE COAL PREPARATION PLANT MONEY AND ENERGY](#)

[CASE STUDY - THE CHALLENGE: SAVING ENERGY AT A SEWAGE LIFT STATION THROUGH PUMP SYSTEM MODIFICATIONS](#)

FAN CASE STUDIES

[CASE STUDY - THE CHALLENGE: IMPROVING THE PERFORMANCE OF A WASTE-TO-ENERGY FACILITY](#)

[CASE STUDY - THE CHALLENGE: IMPROVING VENTILATION SYSTEM ENERGY EFFICIENCY IN A TEXTILE PLANT](#)



Industrial Decarbonization Innovation Challenge Timeline

Industrial Decarbonization Innovation Challenge Timeline	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
Project Activity											
Work with sponsoring companies to prioritize innovation needs											
Prep for Challenge launch including marketing and communications assets				Launch							
Recruit technology developers to provide innovative solutions				Apps Open		Apps Due					
Review applications and match solutions to prioritized needs											
Downselect and set up interviews with sponsors to evaluate solutions											
Work with sponsors and solution providers to evaluate strategic relationships											
Option: Includes Pitch Day to highlight best in class solution providers											Pitch Day

<https://www.centropolis.org/industrial-decarbonization>



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