



Central Iowa Community Financing Roadmap

December 2025

**RMI is an independent,
nonprofit organization of
experts accelerating the clean
energy transition.**

**Our mission: Transform the
global energy system to secure
a clean, prosperous, zero-
carbon future for all.**





About this document

RMI prepared the Central Iowa Community Financing Roadmap to help regional stakeholders understand and take ownership of cleantech-led economic development opportunities and maximize the local economic impact and benefits of these opportunities. This roadmap identifies feasible, equitable pathways toward the clean economy and economic mobility by identifying priority industries, local investment barriers, and key coordination needs. Stakeholders like economic development organizations and community lenders will be able to use the roadmap to chart a collaborative path forward while leveraging local priorities and strengths to attract private capital for locally driven impact.

Central Iowa Community Financing Roadmap

Project Overview and Goals

WHY

To identify opportunities at the intersection of economic and community development



Accelerate bankability of cleantech and resilience projects



Attract private capital to previously overlooked markets



Build local industry through new approaches to cleantech financing



Foster small businesses to ensure equitable benefits to community

WHO

Economic and community development stakeholders



Community lenders



Industry



Business associations



Economic development organizations



Nonprofits



State and local government



Workforce training organizations

WHAT

- Place-based investment strategy to help **capitalize on local resilience and cleantech opportunities**
- Highlight areas of competitiveness, constraints, and coordination related to cleantech-led economic development
- Facilitate community ownership and collaboration among local stakeholders

Our analysis focused on central Iowa

Stakeholders interviewed include:



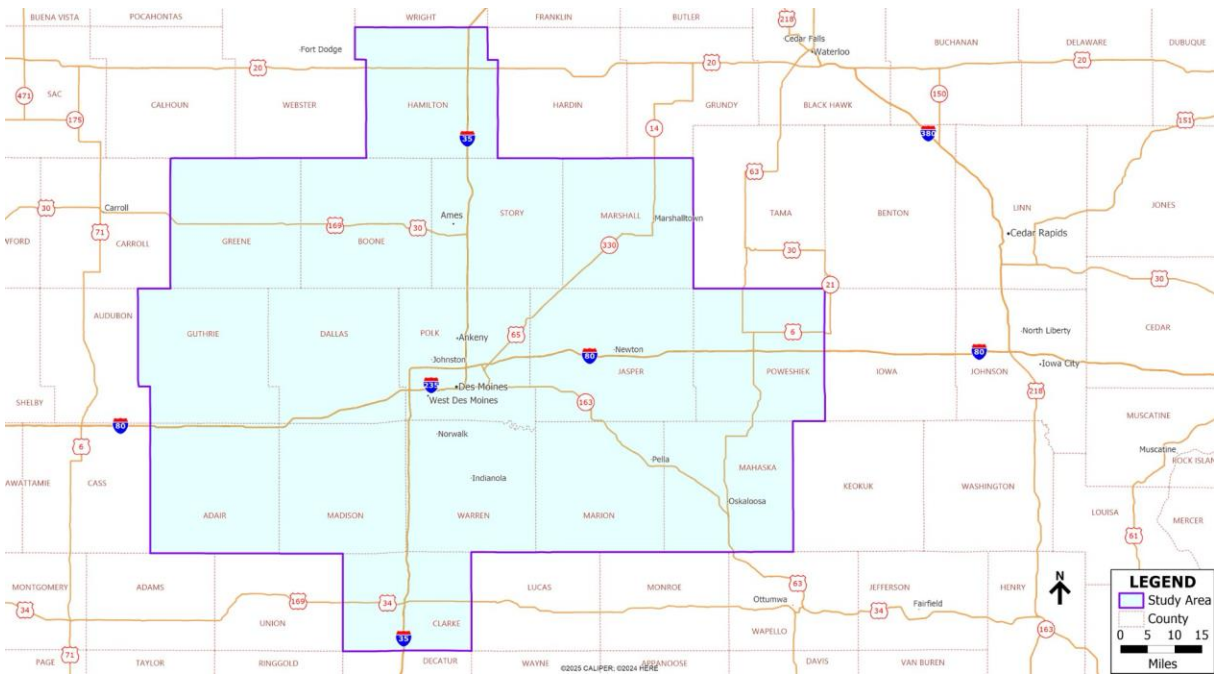






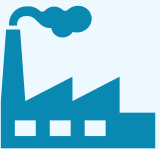
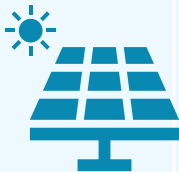






Cleantech drives the clean economy

This roadmap uses a broad definition of cleantech including deploying clean energy, manufacturing clean energy technologies and energy-efficient consumer products, and research and development to support deployment and manufacturing. These are activities that can drive regional economic development by creating jobs and attracting investment.

	Manufacturing		Energy efficiency
	R&D		Energy deployment

Project key findings

Competitiveness

- The central Iowa region has established strengths in wind energy, ethanol production, agricultural innovation, and manufacturing.
- Metal fabrication for clean technologies, energy-efficient building retrofits, and manufacturing bio-based building products offer additional economic opportunities for the region.

Constraints

- Rapid growth in electricity demand threatens Iowa's cheap industrial electricity.
- Workforce development is limited by a lack of upskilling and retraining programs.
- Capital constraints hinder innovation, small business financing, and the commercialization of innovative cleantech technologies.

Coordination

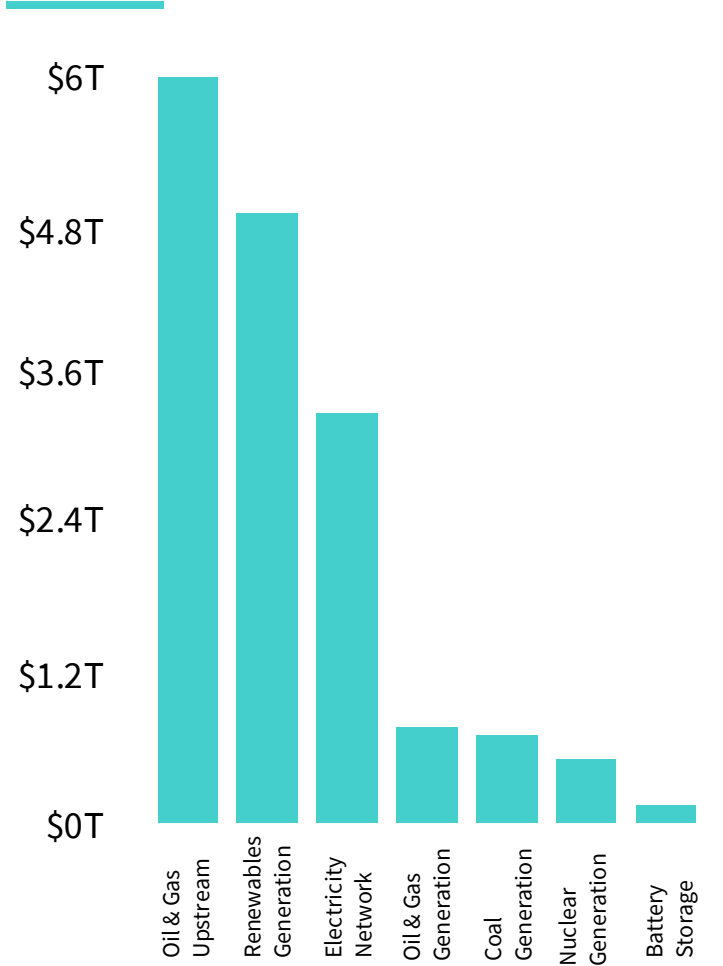
- Limited cooperation among local governments and financiers in Iowa has hindered major investment and inclusive economic growth.
- Strong coordination in agricultural innovation offers a positive example.
- Substantial building sector gaps remain in contractor training, consumer education, and workforce development.



National and state context

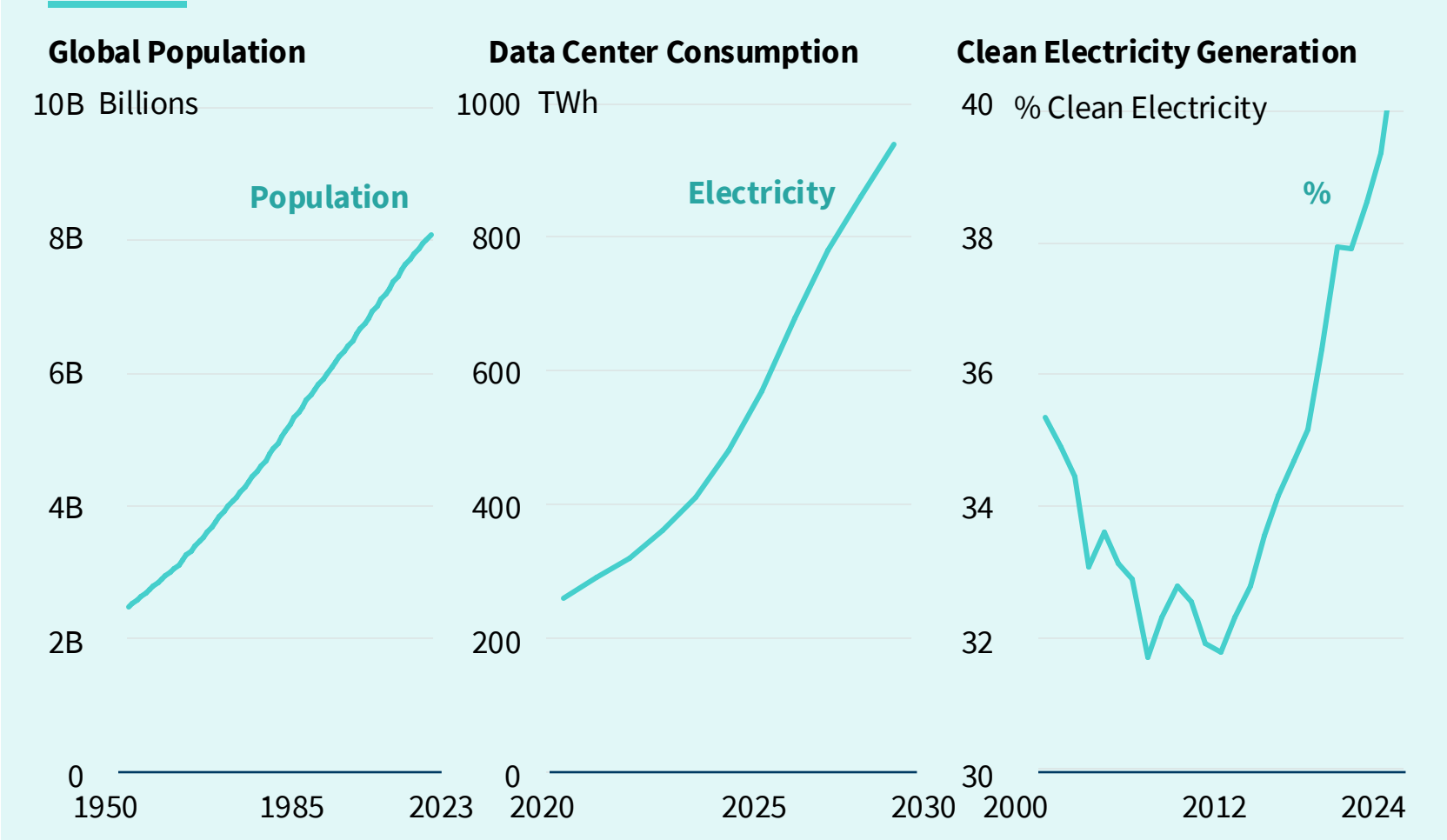
Global trends in AI and electrification are driving record investment in energy

Cumulative Global Energy Investment



Note: Investment Since 2015

Driven by three factors: Demographics, Digitalization, Energy Innovation

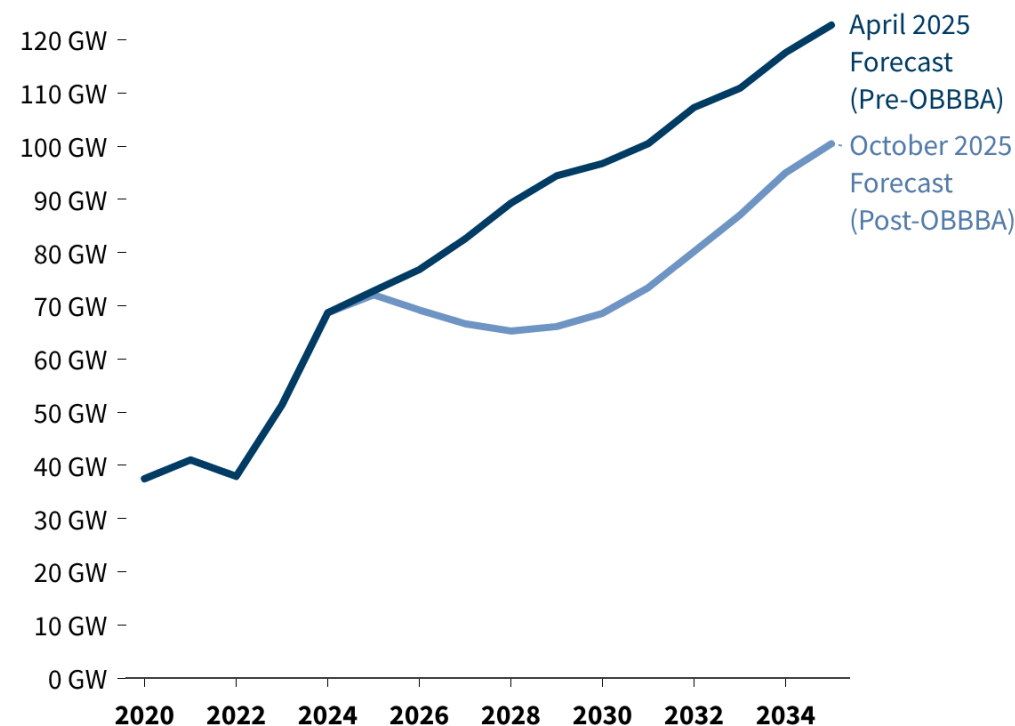


Source: IEA World Investment Outlook 2025, Our World in Data, IEA, Ember



This high demand for electricity will drive continued clean energy deployment, even with changing federal policy

Projected annual new build for solar, wind, and storage in the United States

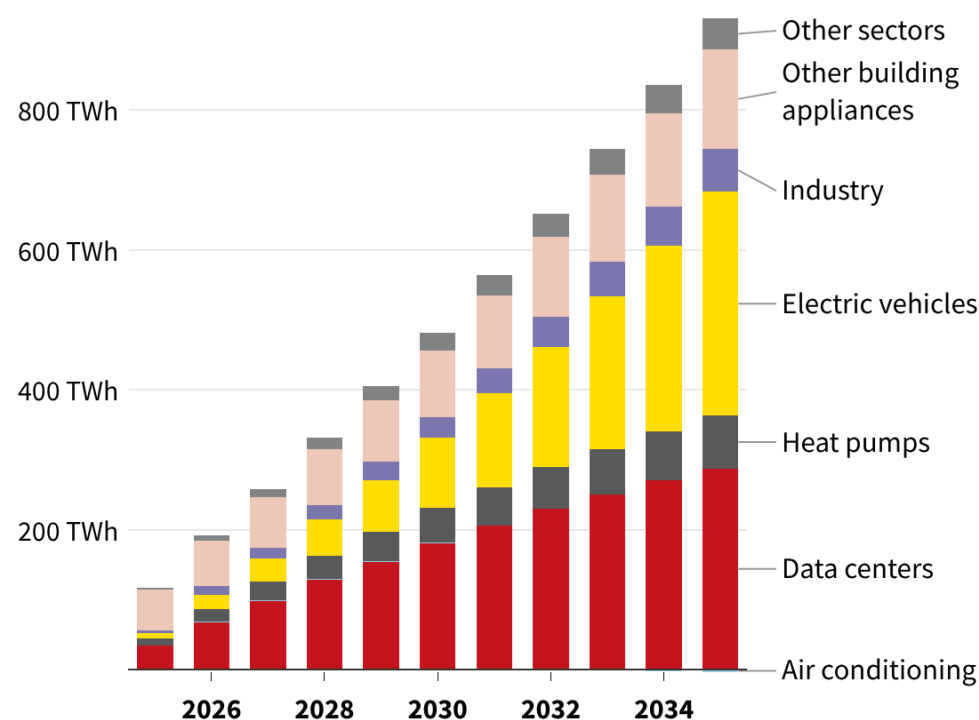


OBBBA refers to the "One Big Beautiful Bill Act."

Source: BloombergNEF



Projected electricity demand growth in the United States



Source data is current to April 2025.

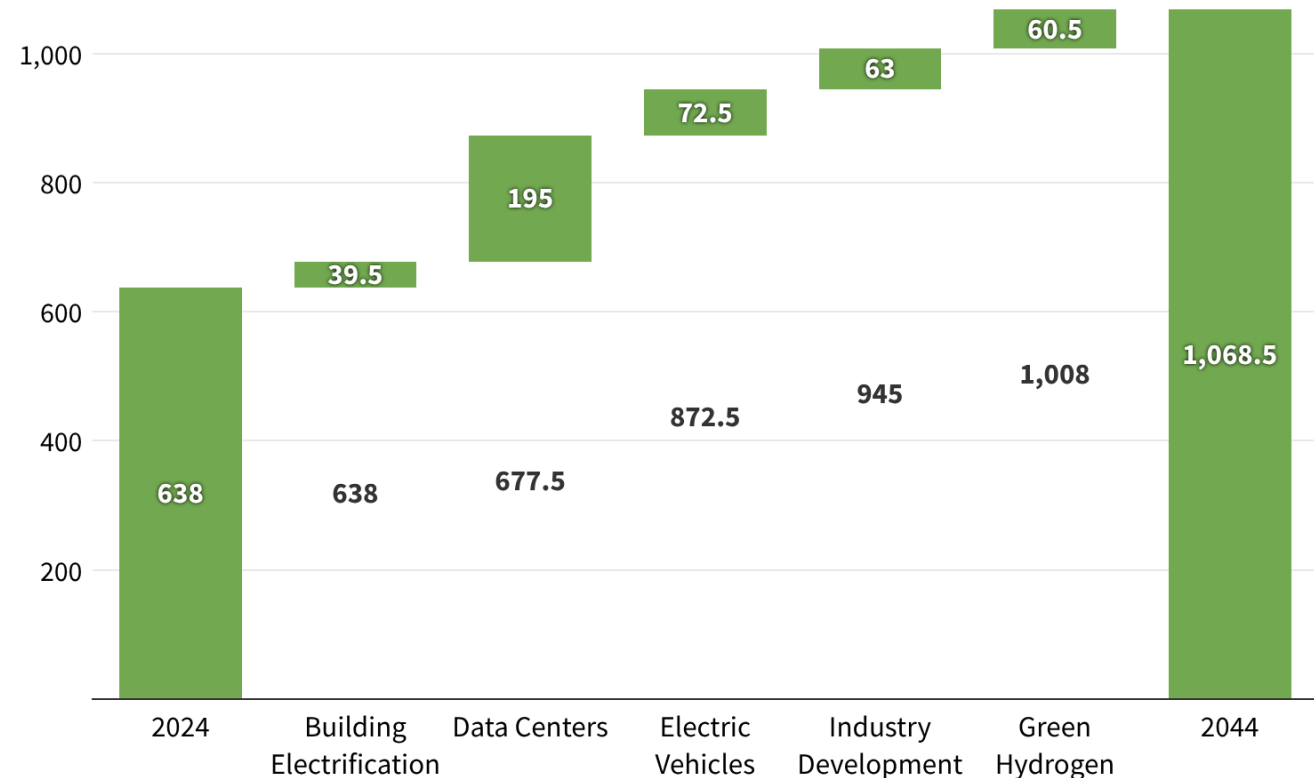
Source: BloombergNEF, Economic Transition Scenario



Projected load growth requires more generation and transmission

- Data centers, electric vehicles, and industry are expected to drive electricity demand in Iowa and surrounding states.
- Iowa needs both new capacity and transmission expansion to meet this growing demand.

Midcontinent Independent System Operator (MISO) demand growth drivers through 2044, TWh



Source: MISO

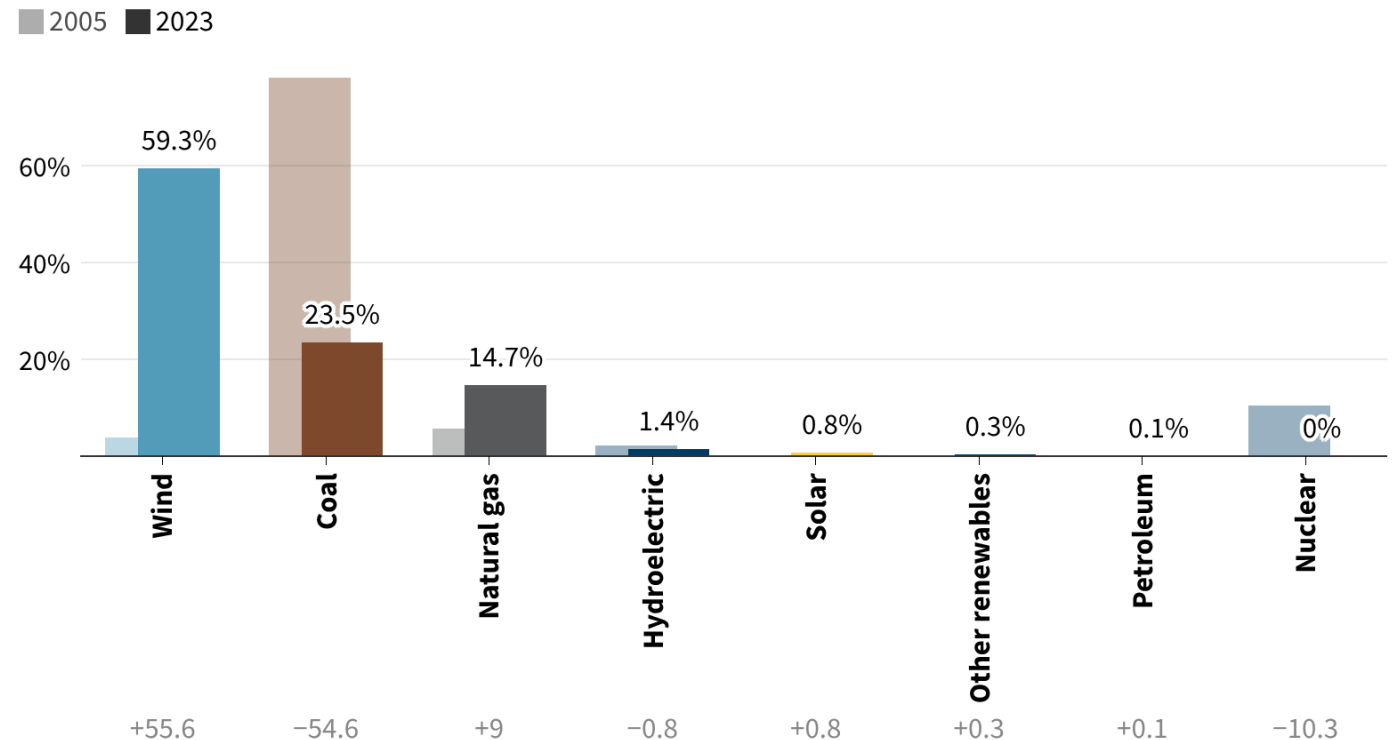


Iowa's electricity generation relies on wind

- Iowa's power mix has shifted from coal-dominant to wind-dominant over the past two decades.
- Federal production tax credits, Iowa's early renewable portfolio standard, and favorable siting conditions positioned the state as a national wind leader.
- Iowa will need expanded transmission, energy storage, and more flexible demand-side resources to maintain reliability and balance future load growth.
- Iowa has improved grid reliability through programs like the Iowa Grid Resilience Fund, but its heavy reliance on wind and limited storage capacity leave it vulnerable during extreme weather events and periods of high demand.

Wind has seen a 54% increase in generation capacity in Iowa's electricity mix

Iowa's electricity generation mix, 2005 to 2023

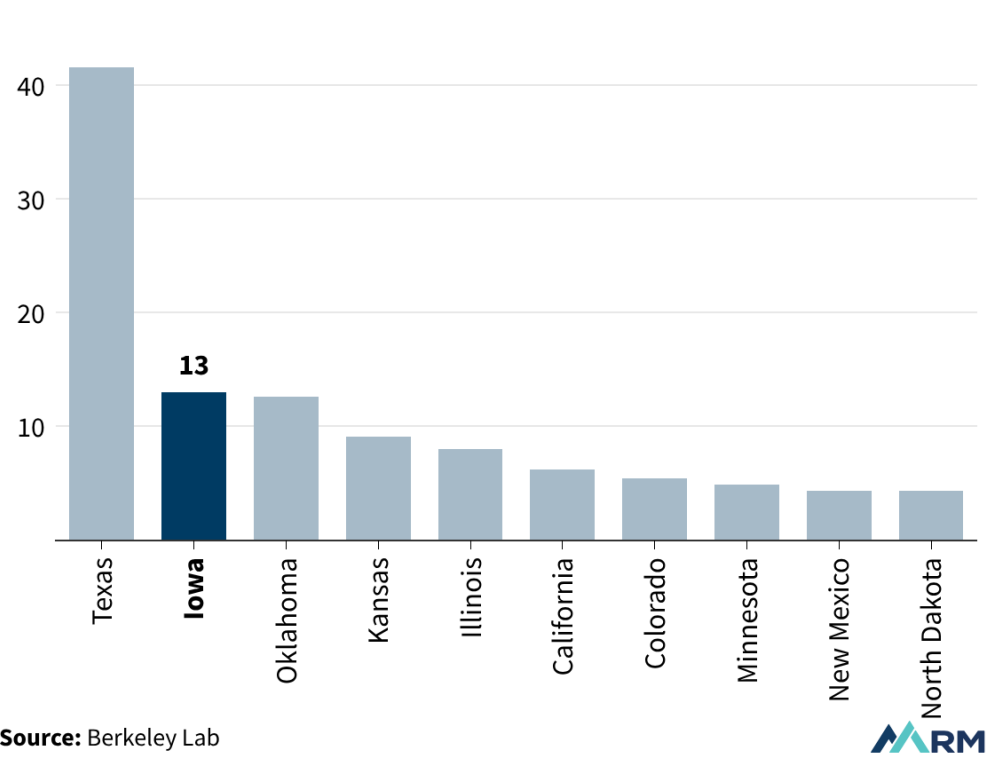


Source: EIA

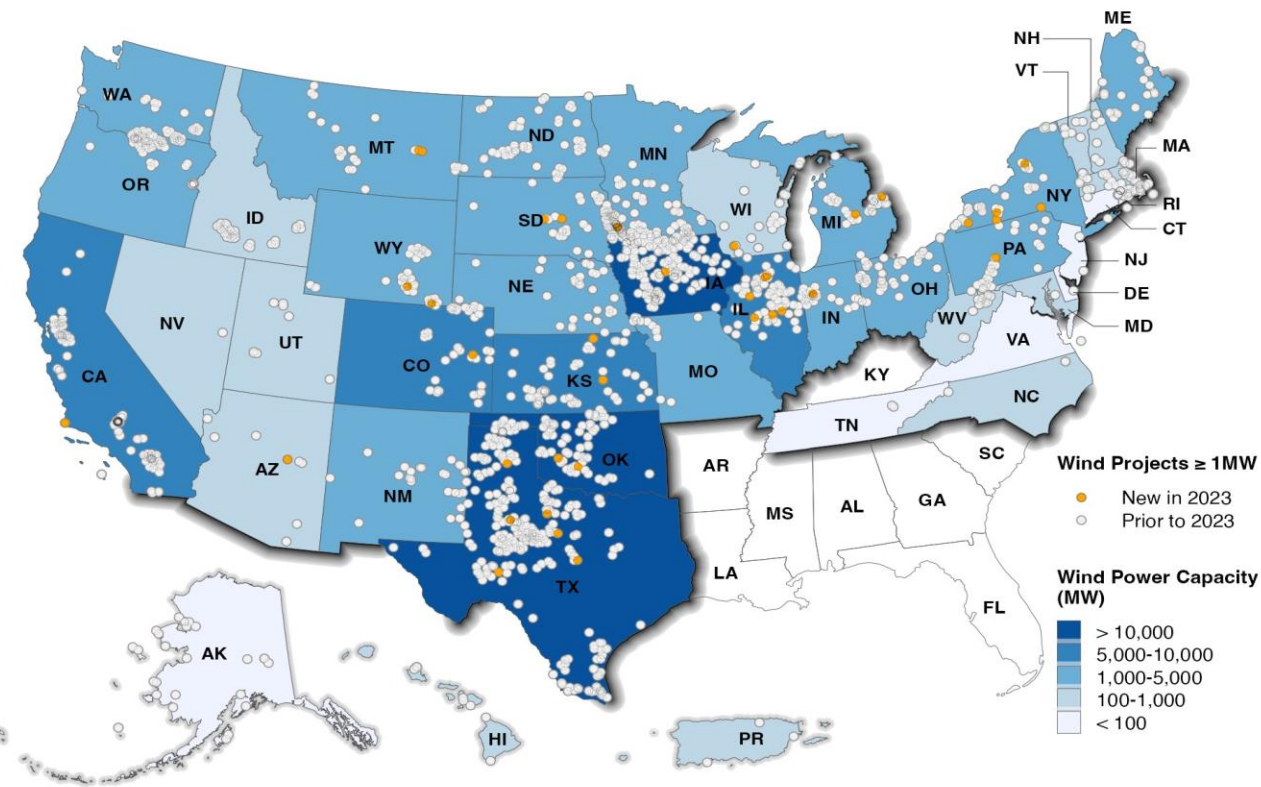


Iowa has the second largest cumulative installed capacity of wind in the country

Wind cumulative installed capacity (GW) by state, 2023



Wind Projects and Wind Power Capacity by State

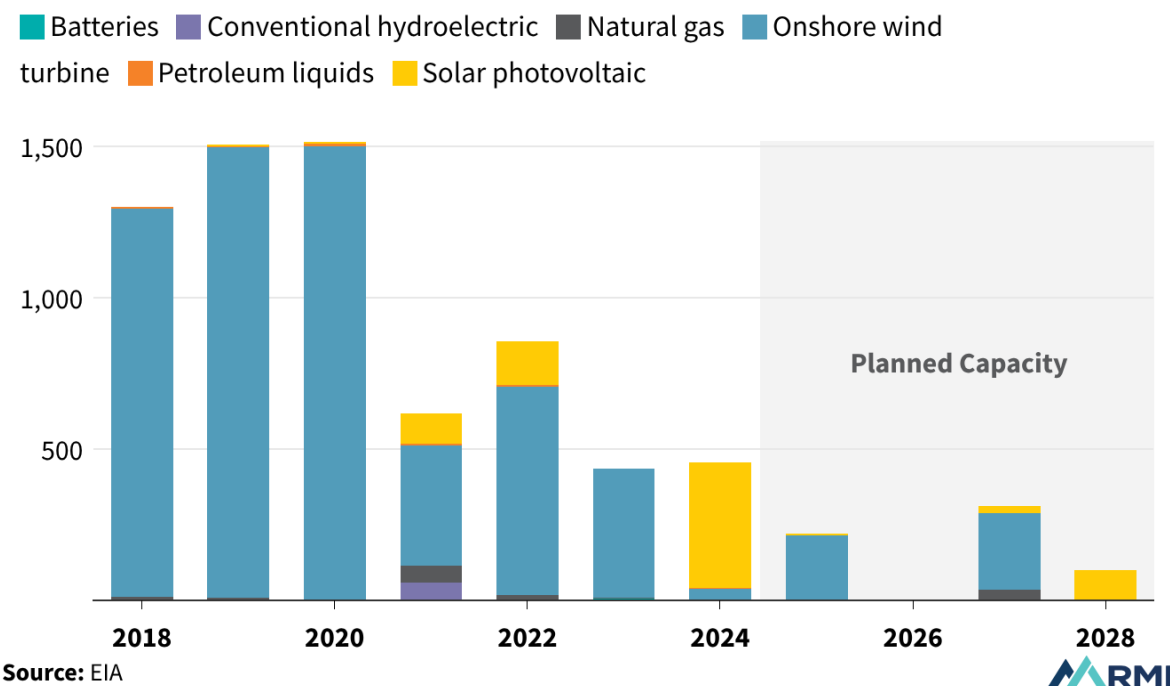


Solar is growing as wind additions slow

- **New capacity additions slowed after 2020 but also diversified.**
- **Small storage projects appeared in 2021–2023, and solar additions began to accelerate — particularly a 400 MW project in 2024.**
- **With fewer prime wind sites, developers are diversifying energy sources.**

Iowa generation additions since 2018

Measured in nameplate capacity (MW)

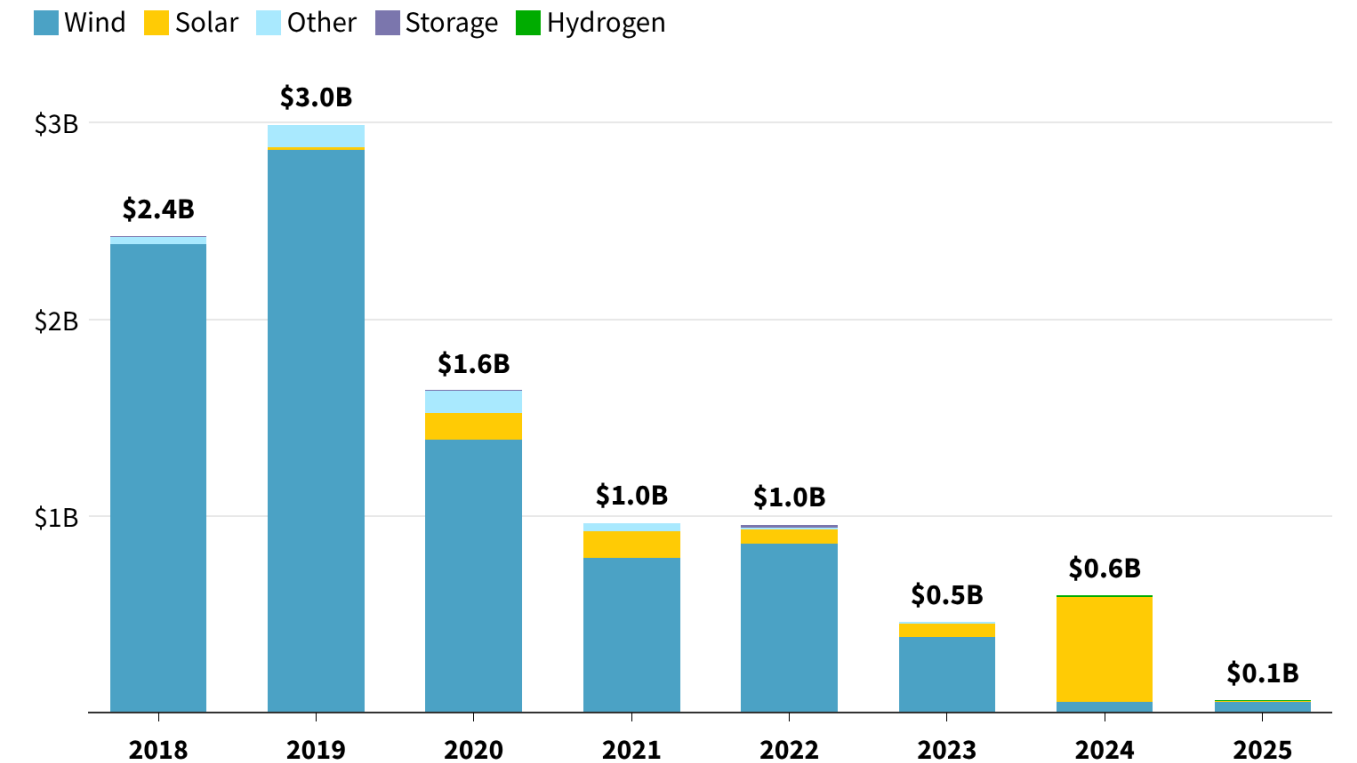


Clean energy investment in Iowa favored wind and has slowed

- **Investment in deploying clean energy and clean technologies has not diversified to make up for the decrease in wind.**

Clean energy investment in Iowa, 2018-2025

2024 million USD



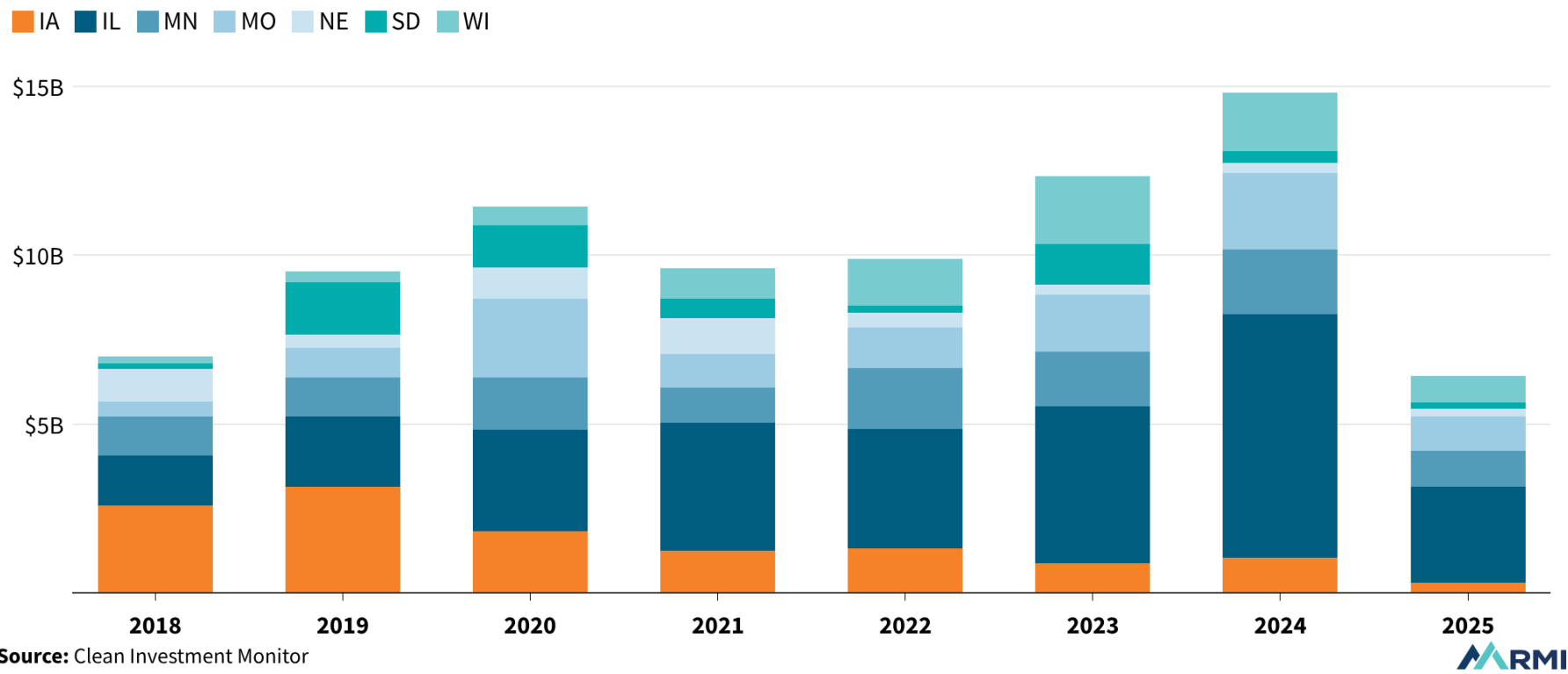
Source: Clean Investment Monitor



Some neighbors have been better able to capture growing clean energy investment

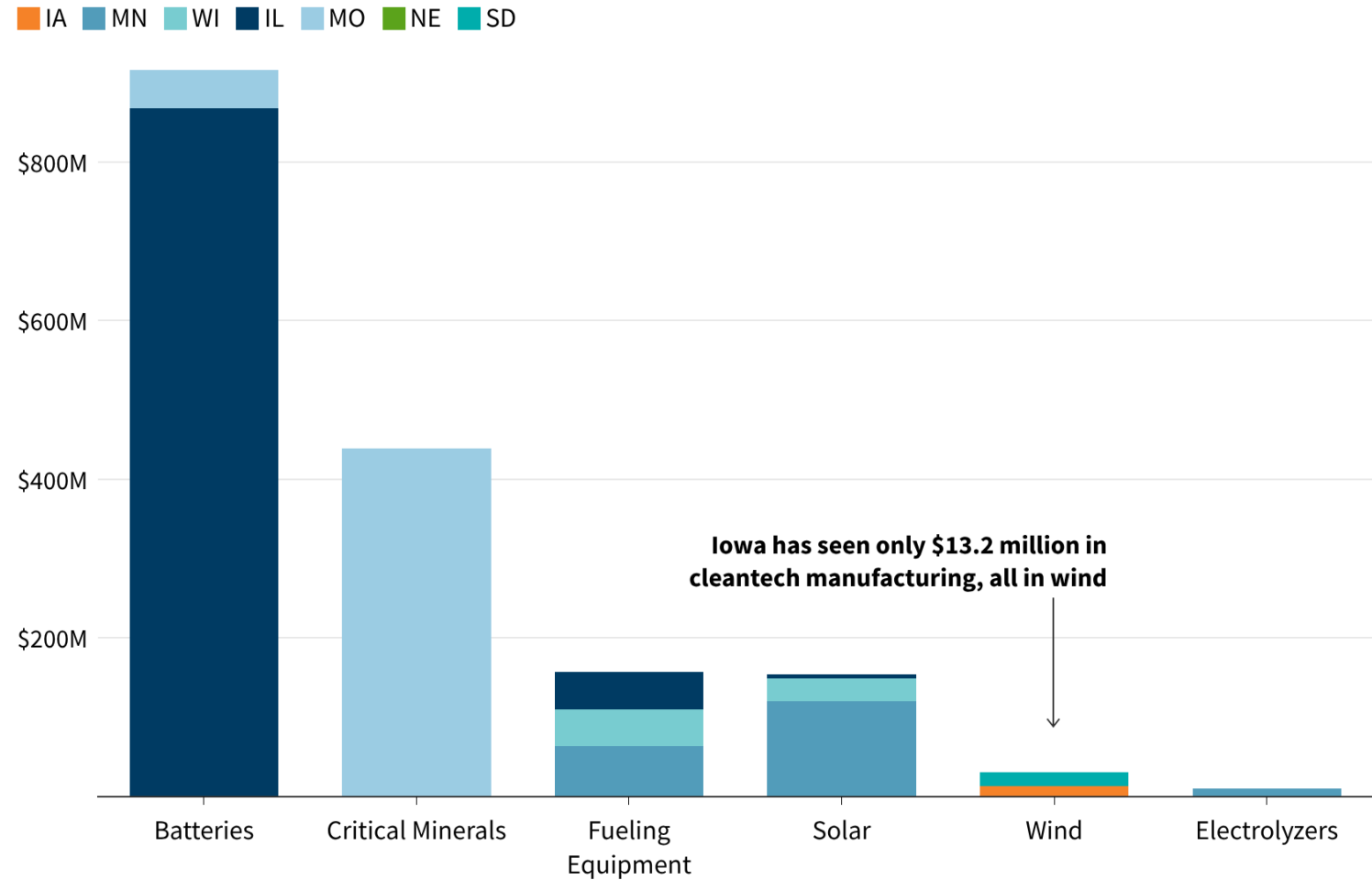
All clean energy investment by year, 2018-2025

In 2024 USD. Includes energy, industry, manufacturing, and sales.



Federal incentives brought little cleantech manufacturing to Iowa

Cleantech manufacturing investment (2018-2024)



Source: Clean Investment Monitor



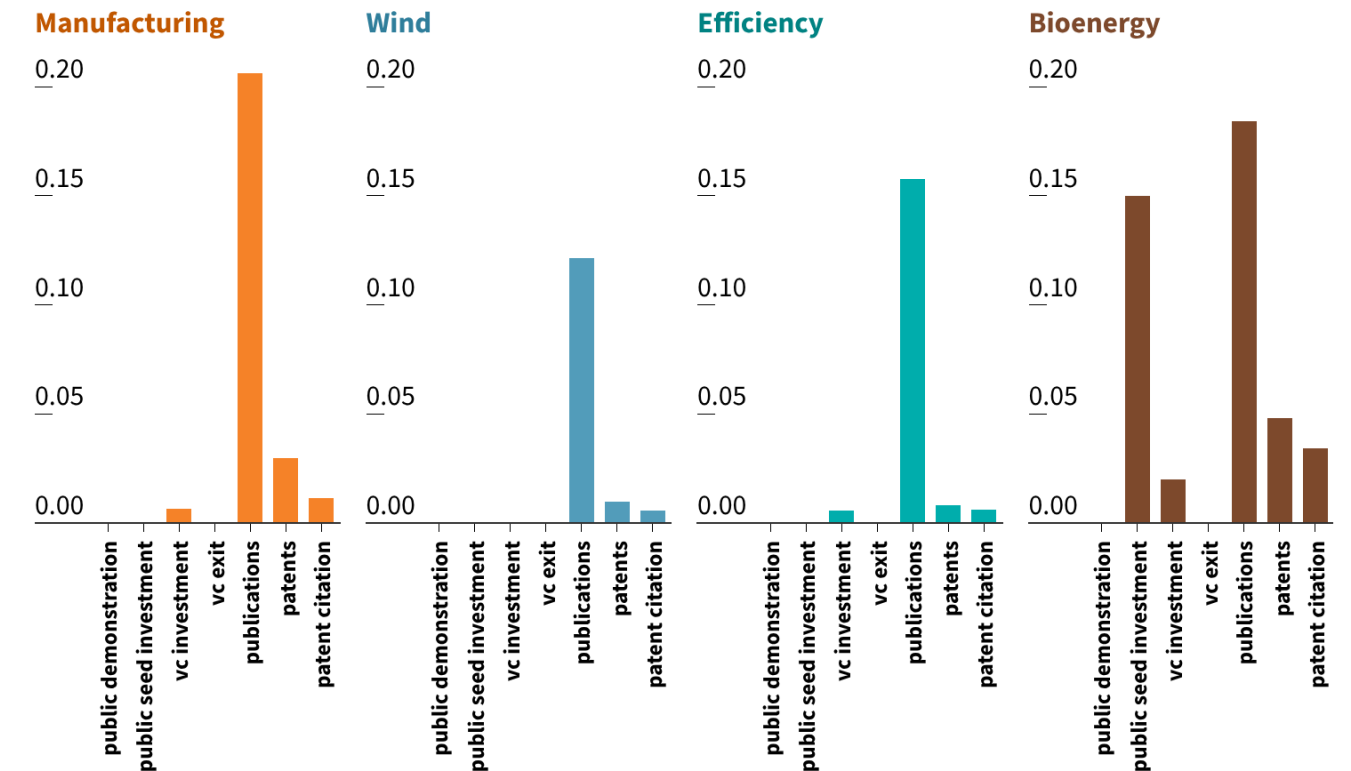
Iowa scores low on cleantech innovation compared to other states

Iowa shows consistently low scores across most clean energy innovation metrics (RD&D, venture activity, patents, publications), with only modest relative strength in efficiency, wind, and bioenergy.

Iowa's innovation ecosystem remains limited by a small R&D base, low venture capital activity, and the absence of major corporate anchors driving cleantech commercialization.

Cleantech innovation in the state of Iowa

Iowa scores low on the innovation index across clean energy technologies

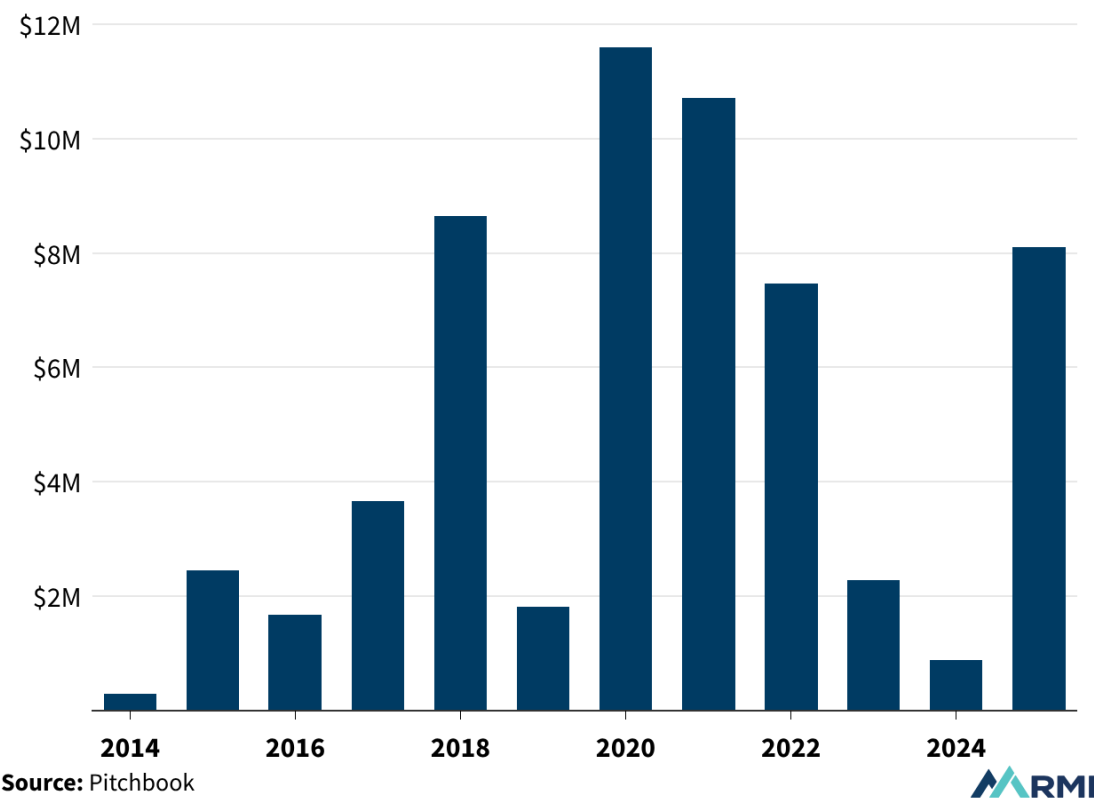


Source: ITIF

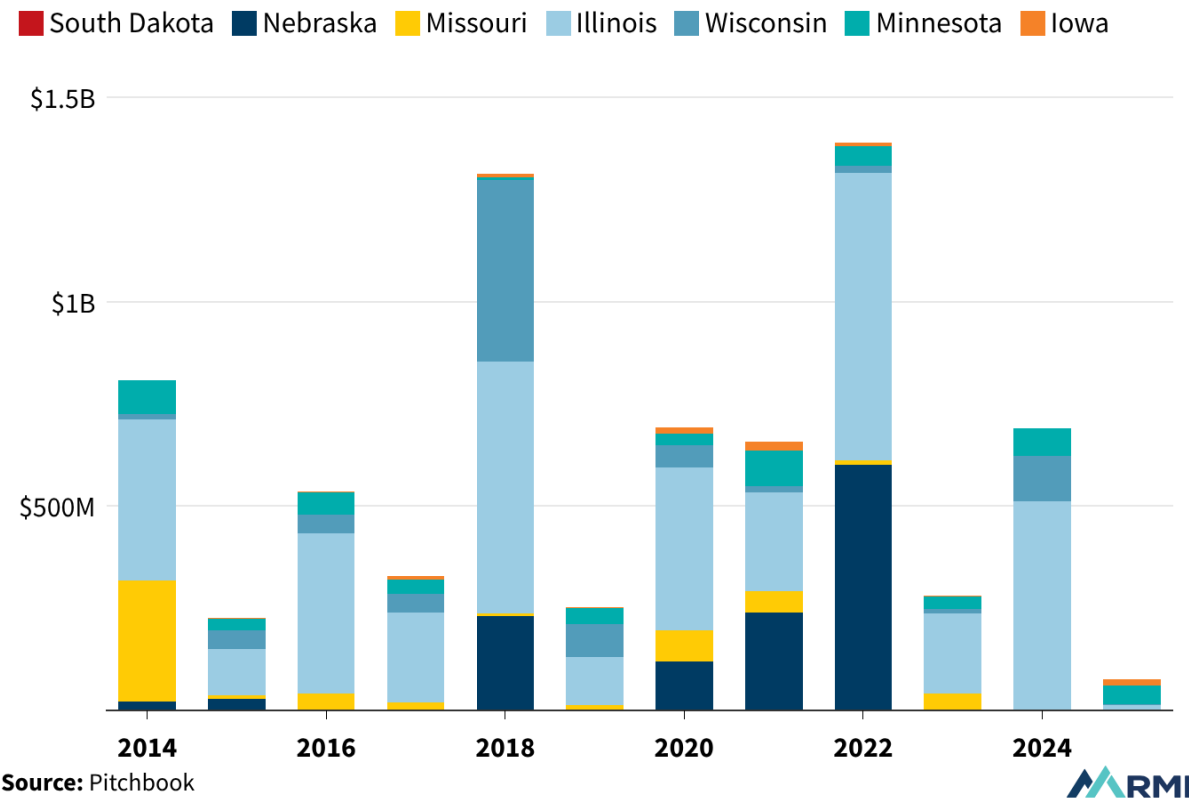


Iowa has seen little cleantech venture capital

Cleantech VC investments in Iowa

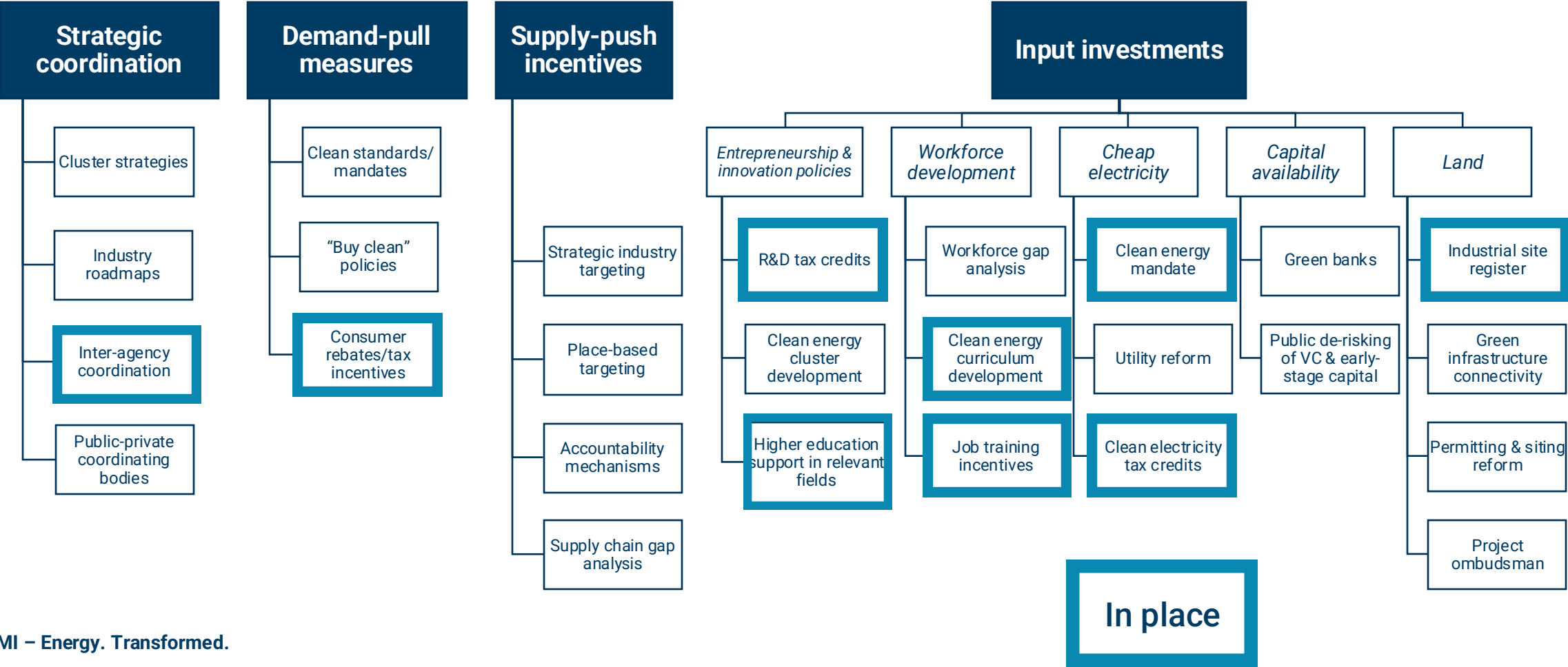


Cleantech VC investments in Iowa and neighboring states



Cleantech-led economic development requires policy support

Iowa has scattered supportive measures but lacks the coordinated industrial strategy, financing tools, and workforce alignment seen in other states.

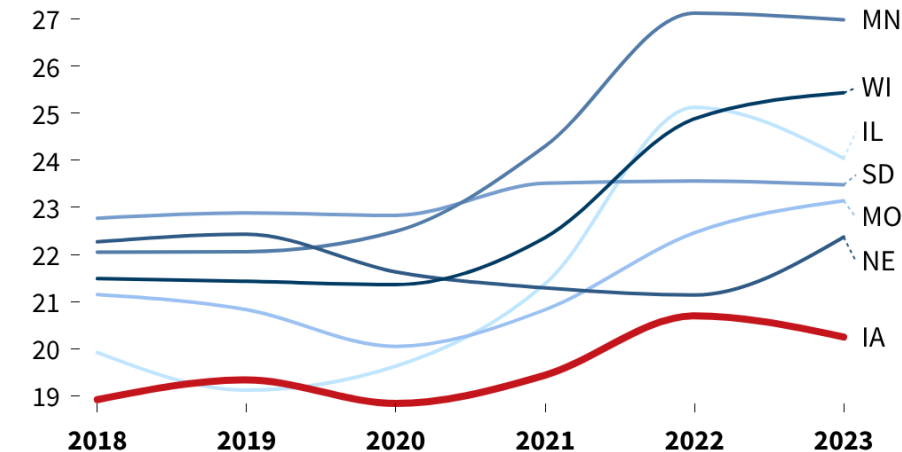


Iowa has low and stable industrial electricity prices compared to other states in the region, attracting AI and manufacturing to central Iowa

- Data centers have flocked to the region in recent years.
- Manufacturing similarly benefits from the low industrial electricity rates.

Iowa has the lowest industrial electricity prices in the region

Industrial electricity prices



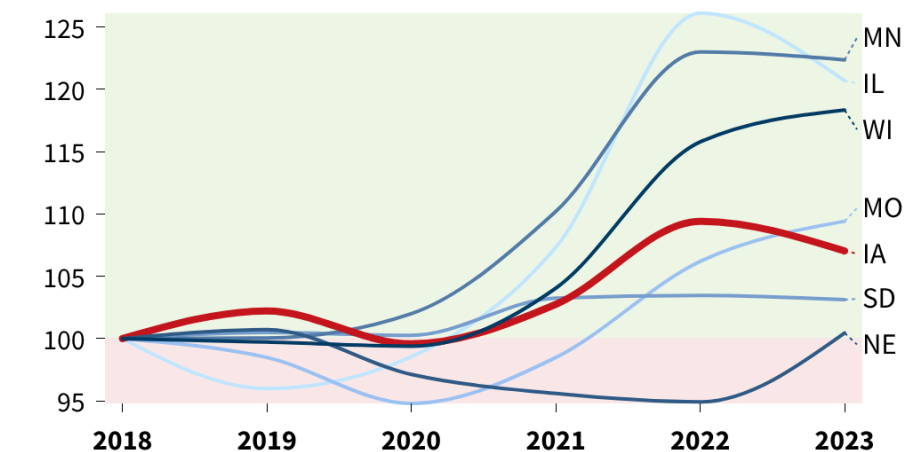
Note: Prices in \$/MMBtu

Source: EIA SEDS



Iowa's industrial electricity prices have been decreasing

Industrial electricity price growth, 2018–2023



Indexed to 2018

Source: EIA SEDS





Competitiveness

Competitiveness Key Messages



The region has strong research and innovation capabilities, underpinned by its deep specialization in ag tech.



High rates of homeownership and active nonprofits can enable home efficiency retrofits.



Iowa's ethanol industry positions it well for new markets like sustainable aviation fuel.



Existing strengths in manufacturing and bioprocessing create opportunities in cleantech industries.

Agriculture innovation provides a strong model for the region to follow in new sectors



ISU Research Park supports research and testing and gives businesses access to equipment and talent pipelines from across the ISU system, providing a supportive ecosystem for innovation.



Cultivation Corridor's Cultivo program brings international ag tech companies to Iowa to deploy innovative technologies and approaches, integrate them into the US market, and connect them with local partners and investors, helping to scale local innovation globally.



Major companies like John Deere, Corteva, and Bayer have a significant presence Iowa, driving innovation and attracting other businesses.

Central Iowa is well positioned to deploy building energy efficiency retrofits

- **High rates of homeownership in central Iowa ensure owners are empowered to retrofit their units and that the resulting energy efficiency benefits go directly to owners.**
- **The region has established nonprofits, housing organizations, and financiers that provide a strong model of deployment for housing retrofits.**
 - Neighborhood Finance Corporation provides over 200 loans a year to homeowners.
 - The Iowa Nature Conservancy has aggregated 450+ solar projects.
 - Polk County Housing Trust Fund allocates over \$2 million annually to build, preserve, and maintain affordable housing.

Iowa's established biofuels industry sets it up for future opportunities

- **Iowa is a leading producer of ethanol, with the state producing 27% of the nation's ethanol in 2023.**
- **Central Iowa's contribution to ethanol production, from feedstock to bioprocessing to research, makes the region competitive in growing segments like sustainable aviation fuel (SAF) production.**
- **SAF and corn-based consumer products offer additional economic opportunities for corn growers.**

Strong and diverse manufacturing capabilities set up the region to expand or pivot into new industries

- **The region boasts a range of advanced manufacturing capabilities applicable to sectors including agriculture, energy, and transportation.**
 - Many of Iowa's manufacturers are small to mid-sized companies, and while the sector is highly diverse, it includes many businesses that specialize in low-rate, high-complexity production.
 - Iowa State University Center for Industrial Research and Service (CIRAS) specializes in assisting small to medium-sized industrial companies in Iowa. This includes one-on-one support to help them adapt to market, technology, and regulatory changes.
- **Established industries lay the foundation for continued local innovation.**
 - Iowa State offers a robust continuum for startups, from international and university-derived ventures, with access to funding, talent, and infrastructure, resulting in several companies reaching IPO and retaining their operations locally.
 - ISU Research Park benefits from a strong nucleus of developer talent, supporting multiple generations of startups, particularly inform-based SaaS and the intersection of agriculture and engineering, which fosters ongoing innovation and startup activity.
 - There is untapped opportunity for innovation in building materials using agricultural byproducts.

Cleantech Opportunities

Part 1

**Quantitative approach: Industry
prioritization matrix**

A data-driven industry prioritization identifies potential cleantech opportunities

Methodology

The prioritization matrix shows the region's relative strengths and competitive assets in clean energy and cleantech based on market, employment, investment, resource, technical, and innovation metrics.

The factors are normalized and weighted to construct an index value (from 0 to 1) across five value-chain segments: R&D, manufacturing, construction, inputs, and operations.

Note: Scores for all R&D industries are based on the same aggregate R&D data, so the feasibility, location quotient, employment, and complexity columns in the table show the same values for different industries. We have excluded industries in the R&D segment from this table for visual simplicity. Employment numbers reflect total workforce in relevant industries.

Assessing Cleantech Industry Priorities for the Greater Des Moines Region

Industry	Phase	Index Rank	Prioritization Index ▼	Feasibility	Location Quotient	2024 Employment	Investment (\$ millions)	Technology Readiness	Complexity
Energy Efficient Heating/Cooling	Manufacturing	#1	1.00	0.19	1.77	13,531	0	8	3
Solar	Operations	#2	0.91	0.32	1.13	10,632	46	7	0
Wind Energy	Manufacturing	#3	0.82	0.18	1.29	13,838	0	8	4
Enabling Professional Services	Operations	#4	0.78	0.27	0.33	13,251	0		3
R&D	Operations	#5	0.68	0.23	0.19	7,719	0		8
Ag tech	Manufacturing	#6	0.68	0.19	2.41	8,012	0		-1
Energy Efficient Lighting	Manufacturing	#7	0.63	0.28	0.15	175	0	9	6
Biofuels	Manufacturing	#8	0.59	0.32	0.45	1,640	0	7	2
Energy Efficient Heating/Cooling	Operations	#9	0.56		0.37	655	0	8	
Electric Vehicles	Manufacturing	#10	0.53	0.30	0.30	1,608	0	7	2

Table: RMI Graphic • **Source:** Synthesis of BLS, Clean Investment Monitor, NREL, Lightcast, and DOE data



A data-driven industry prioritization identifies potential cleantech opportunities

Industry drivers of index rankings

Index Rank

Description

- 1 High employment in sheet-metal manufacturing and parts assembly
- 2 High feasibility, investment in solar deployment, high employment in relevant trades
- 3 Heavy fabrication capability, rail/interstate logistics, big wind fleet
- 4 Large finance and insurance industry employment
- 5 High concentration of ag-innovation and ISU research capabilities also support Des Moines
- 6 Large manufacturer of agricultural equipment, welding/machining talent (but low complexity)
- 7 High complexity amplifies existing capability in assembly of complex products
- 8 High feasibility with a sizable employment base and low technology risk
- 9 Proven technology with high technology readiness levels
- 10 Strong existing capability in assembly of complex products

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Cleantech Opportunities Part 2

Qualitative approach: Industry mapping

Two approaches to mapping existing capabilities onto cleantech opportunities

Identify existing capabilities

1 Ag tech manufacturing capabilities



2 Bioprocessing capabilities



Use cleantech analysis frameworks

RMI's Clean Growth Tool provides a quantitative assessment of future cleantech industries based on a location's existing capabilities

RMI's stakeholder interview process allows for a qualitative mapping of future cleantech industries

Map capabilities onto cleantech opportunities

Cleantech opportunities

- Electric industrial vehicles
- Solar components
- Wind components
- Transmission equipment

Cleantech opportunities

- Green building materials
- Biofuels
- Algae-based additives
- Bio-plastic polymers

Mapping Iowa's ag tech manufacturing capabilities to cleantech opportunities

Capability to opportunity matrix



Industry shown in each box is the largest contributor to that cleantech industry's feasibility score.

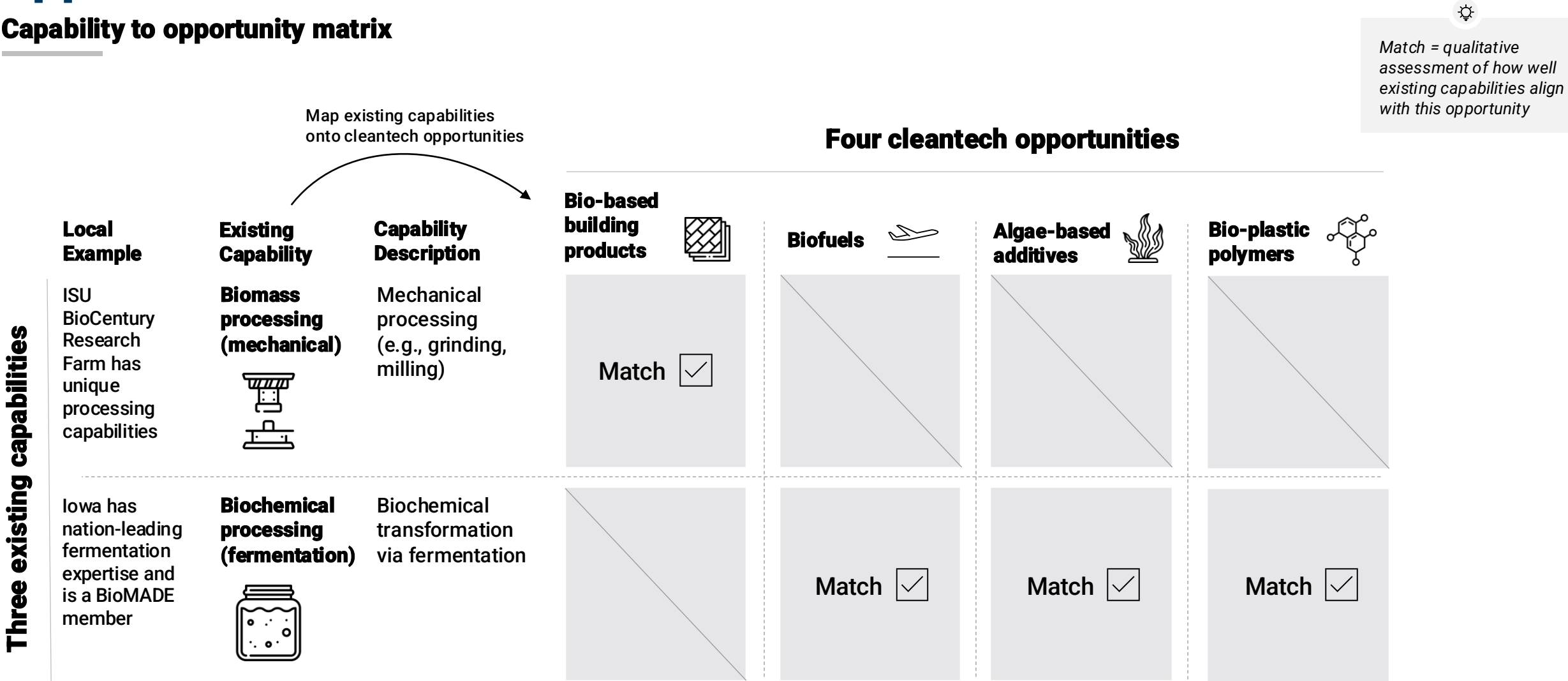
			Four cleantech opportunities			
Three existing capabilities	Local Example	Existing Capability	Electric Industrial Vehicles 	Solar Components 	Wind Components 	Transmission Equipment 
	Quality Manufacturing in Urbandale, IA (welding)	Metal fabrication & welding  ① Identify local industries ② Choose industry that most drives each cleantech opportunity	- Forging and stamping - NAICS: 3321	- Cutlery and hand tool manufacturing - NAICS: 3322	- Cutlery and hand tool manufacturing - NAICS: 3322	- Cutlery and hand tool manufacturing - NAICS: 3322
	Vermeer in Pella, IA (agricultural machinery equipment)	Machinery manufacturing 	- Agriculture, construction, and mining machinery manufacturing - NAICS: 3331	- Metalwork machinery manufacturing - NAICS: 3335		
	John Deere in Ankeny, IA (cotton harvesters)	Transportation equipment manufacturing 	- Other transportation equipment manufacturing - NAICS: 3369			



Note: 4-digit NAICS industries reflect Des Moines metropolitan statistical area (MSA) strengths due to limited data at the county level.
Source: RMI's Clean Growth Tool

Mapping Iowa's bioprocessing capabilities to cleantech opportunities

Capacity to opportunity matrix

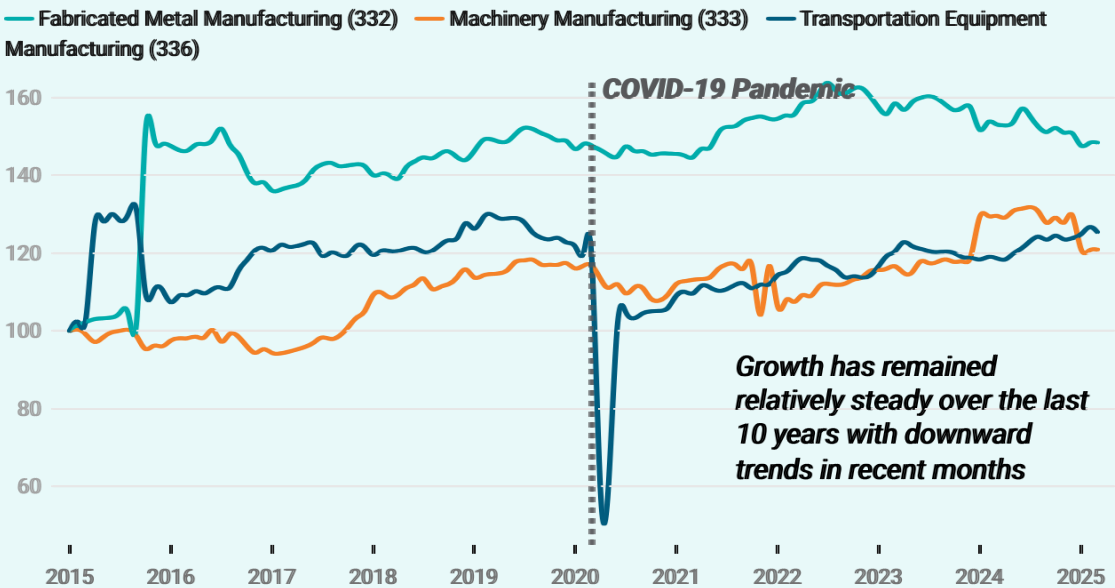


Industry mapping can help central Iowa expand or redeploy skills from at-risk sectors to growing cleantech industries

Iowa's current ag-tech manufacturing growth is flat

Greater Des Moines employment growth in select manufacturing industries, 2015–2025

Index, January 2015 = 100



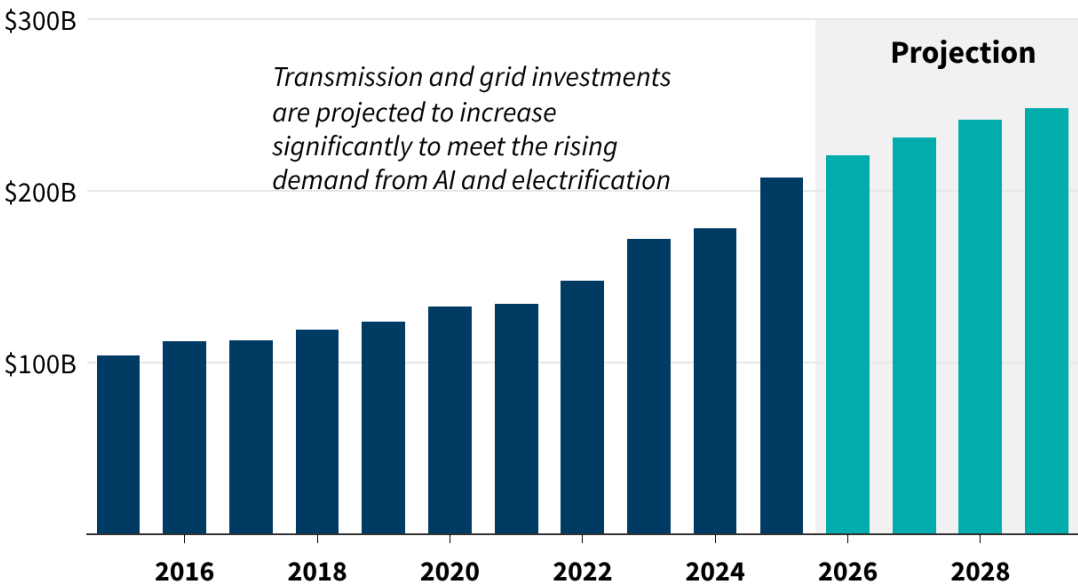
Source: Bureau of Labor Statistics (BLS)

While transmission equipment investment is booming

Electric utility capital expenditures, 2015–2029

Data for US investor-owned utilities

■ Actual ■ Projection



Source: Edison Electric Institute



Constraints

Constraints Key Messages



Data centers are driving rapid growth in electricity demand, even as wind deployment has trailed off and solar is growing slowly.



A lack of upskilling and retraining programs hampers the development of a cleantech workforce.



Few community development financial institutions (CDFIs) and limited green lending options make it difficult for low-income residents and small businesses to access financing for clean energy.



A conservative investment culture, limited venture capital, and tech-to-market commercialization challenges hinder innovation and new manufacturing opportunities.

Massive load growth threatens cheap electricity

- **Data centers in central Iowa have rapidly increased local electricity demand, which threatens to drive up electricity costs for residential and commercial customers.**
- **Meanwhile, wind deployment has slowed, and there is limited policy support in the state for solar.**
- **Meeting demand will require new generation and transmission.**

The region faces several workforce challenges

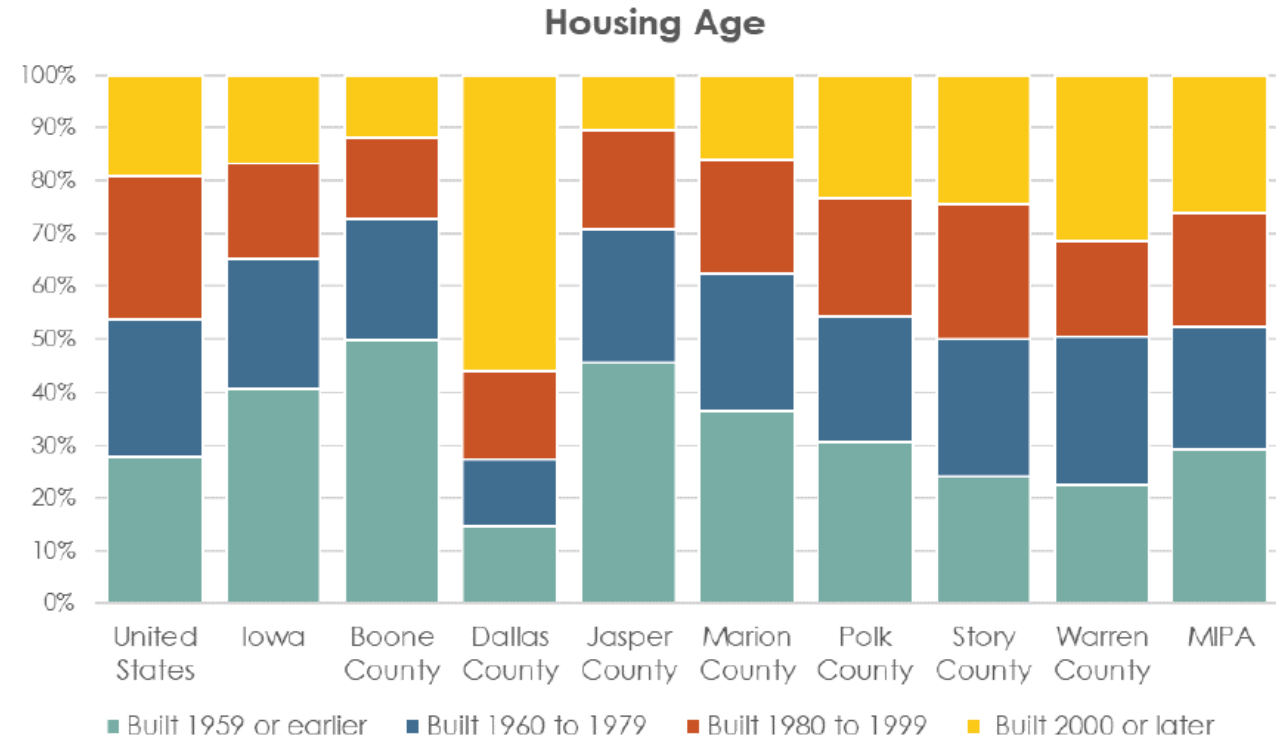
- **Construction and other skilled trades are concentrated in urban areas and are limited in rural areas.**
- **Employers often find that new employees coming from community colleges need substantial on-the-job training.**
- **Without dedicated programs elsewhere, employers turn to third-party vendors or in-house staff for upskilling and retraining, especially for advanced manufacturing.**
- **Recent layoffs in agriculture processing have shifted workers into distribution, warehousing, and transportation sectors.**
- **Central Iowa has few cleantech-related workforce programs.**

Limited capital and green lending experience inhibit financial growth

- Iowa has very few CDFIs, which leads to gaps in capital for low-income residents and small businesses.
- **Financial institutions in Iowa are not purposefully engaged in clean energy financing, with few showing interest in developing this market.**
 - Most residential loans are handled as one-off financing, and there is no established business model for green lending among credit unions in the state.
 - Currently, there are no private dedicated providers for local solar lending, and banks have not made it a line of business.
- **Past lenders in the energy space have struggled, such as Greenpenny, a solar lending offshoot of Decorah Bank & Trust, which closed due to regulatory and financial difficulties.**

The region's housing stock is aging

- Much of central Iowa's housing stock is older, with roughly 50% of homes built before 1970 in the mid-Iowa region.
- Iowa's residential housing stock is primarily single family, representing 93% of homes in the state.

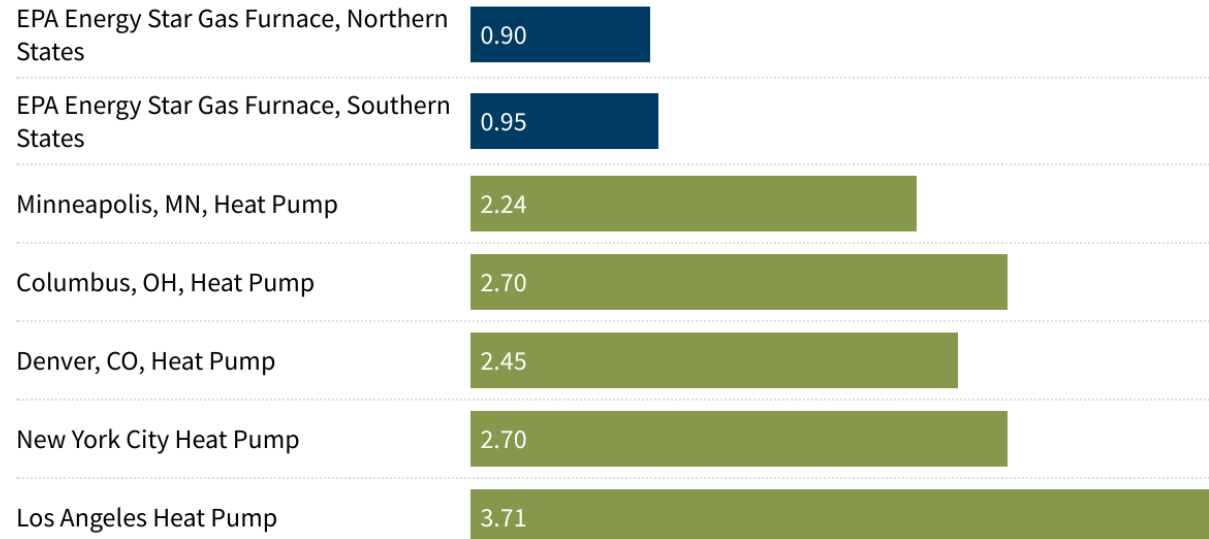


The housing stock needs energy efficiency retrofits, but awareness and costs pose challenges

- **Varying ages of housing across counties, plus the high rate of single-family homes, mean that every retrofit project is different, limiting economies of scale.**
- **Contractors (and homeowners) are uninformed or misinformed about the benefits of technologies like heat pumps, limiting uptake.**
- **Up-front costs for weatherization and efficient appliances are a barrier for homeowners, especially as federal and state funding have declined in recent years.**

Appliance Heating Efficiency, Various Climates

Coefficient of Performance (COP)



Modern heat pumps are more efficient than furnaces, even in cold climates

Major challenges for agriculture and ag tech point to a need to pivot...

- **The agriculture sector faces rising input costs, layoffs at major companies, reduced equipment purchases, and stagnant crop prices.**
- **Ag equipment manufacturing in Iowa has been down for several years, with the sector struggling to recover post-COVID, reducing overall manufacturing capacity in the state.**
- **Past downturns in commodity prices shifted investment to outside the United States, highlighting the need for local innovation to maintain global market share.**



The U.S. Agricultural Sector Under Stress

By Menzie Chinn · October 20, 2025
Robert M. La Follette School of Public Affairs and Department of Economics, University of Wisconsin-Madison

BusinessRecord

Iowa's ag manufacturers balance trade uncertainty with innovation, long-term planning   



Gigi Wood | Oct 10, 2025 | 6:00 am | 12 min read time | 2,775 words |
[Ag and Environment](#), [All Latest News](#), [Manufacturing](#) |

...But the nature of the sector and macro trends hinder innovation

- **Many Iowa manufacturers operate with little or no debt, preferring to grow through retained earnings rather than outside investment.**
- **Avoiding outside financing can limit expansion and innovation, making it harder to support a shift to cleantech and manufacturing growth.**
- **Agriculture generally lags in venture capital availability.**
- **Federal agencies like the National Science Foundation are moving away from early-stage translational research funding, requiring private sector partners to fill the gap.**
- **The gap between technology readiness and market demand poses a major barrier for scaling innovative technology from the R&D stage to manufacturing, especially for small to midsize manufacturers.**



Coordination

Coordination Key Messages



Limited cooperation among local governments in Iowa has hindered the region's ability to attract major investments and foster inclusive economic growth.



There is a coordination gap for financiers, with limited stakeholders working in the green finance space.



Strong coordination exists in the agricultural research and innovation space, supported by partnerships among universities, industry, and economic developers.



Organizations working on energy efficiency retrofits coordinate well, but major gaps remain in contractor training, consumer education, and workforce development.

Limited cooperation among local governments has hindered the region's ability to attract major investments and foster inclusive economic growth

- Iowa has a history of limited intergovernmental cooperation, which has hampered the state's ability to attract major investments or win federal awards.**
- Some non-governmental stakeholders feel that local governments can be hesitant to work with them as equal partners or that they cut other stakeholders out of cooperative opportunities.**
- In response, nonprofits have modeled more cooperative approaches, such as in the housing and energy efficiency retrofit sector.**

Stakeholders see opportunities to close finance and economic development coordination gaps

Local coordination presents some strengths:

- **Local nonprofits and community organizations note strong coordination with financial institutions.**
- **Iowa's credit unions coordinate through the Iowa Credit Union League.**
- **Economic developers have been effective in facilitating small to medium projects.**

Remaining gaps:

- **Local financial institutions with complementary expertise, like the Iowa Energy Fund and Iowa Center for Economic Success, have expressed interest in partnering.**
- **More consistent, organized coordination between economic development organizations and financial institutions would support cleantech deployment.**

Possible solutions:

- **The Credit Union League could be the basis for a broader green lending network to:**
 - Share knowledge and build capacity among lenders
 - Support structured coordination with economic development organizations

Strong coordination on ag innovation has solidified regional leadership

- Regional coordination is strongest in ag research and innovation.
- Innovation leaders work alongside economic developers to promote industry growth.
- Partnerships between ag- and manufacturing-focused organizations have supported research, innovation, and workforce development at the intersection of agriculture and manufacturing.

AMES REGIONAL ECONOMIC
Alliance

BioConnect  Iowa

CIRAS



CORTEVA
agriscience

AMERICA'S
cultivation
CORRIDOR

IOWA
Economic Development


IOWA STATE UNIVERSITY
ResearchPARK

Kent
CORPORATION



JOHN DEERE

 **GREATER DES MOINES**
PARTNERSHIP

Workforce development requires intersectional coordination to overcome fragmentation

- **Companies work with community colleges to design custom programs. This benefits the companies but often results in fragmented training options, especially in clean energy.**
 - Partnerships between community colleges and universities have strengthened in recent years, aiming to ensure that community colleges can teach technologies emerging from universities, but educational facilities are not agile enough to address emergent workforce needs in the same way that industry orgs and nonprofits can.
- **At the state level, Iowa Workforce Development, the Iowa Business Council, the Iowa Association of Business and Industry, and chambers of commerce coordinate to ensure workforce development programs are grounded in workforce needs.**
 - However, additional industry players and third-party training providers are needed to keep workforce agile and responsive to industry needs like upskilling and retraining.
- **Wisconsin's workforce intermediary program Big Step could be an example of enhanced training coordination for Iowa**
 - Stackable credential and certificate offerings offer growth opportunities for workers.
 - Big Step coordinates employer-driven initiatives to align with state workforce priorities while meeting employer needs.

Existing players in the retrofit space coordinate well, but there are major gaps in the ecosystem

Local coordination presents some strengths:

- Housing organizations are piloting innovative approaches and are actively pursuing opportunities to coordinate efforts.
- Neighborhood Finance Corporation has partnered with organizations like Habitat for Humanity and the City of Des Moines on major initiatives, including a \$6 million owner-occupied repair program.

Remaining gaps:

- **Contractor and consumer education on home electrification is a major gap; planned education did not move forward following City of Des Moines restructuring.**
- **No organizations in the region provide ongoing contractor training specific to energy efficient buildings.**
- **The Polk County Housing Trust Fund previously piloted a program to train contractors from communities of color, and the Evelyn K. Davis Center for Working Families previously offered construction training.**

Possible solutions:

- Showcasing successful energy efficiency retrofits and quantifying their operational savings could help build the case for broader adoption among homeowners and contractors.
- Expanding prior pilots to provide ongoing training programs specific to energy efficiency retrofits.

Focus areas



Buildings

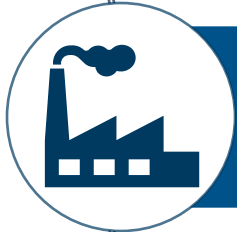
Bio-based building products

Energy efficiency retrofits

Bio-based building products offer central Iowa an opportunity to develop a new industry



Developing a local industry to process and use agricultural byproducts for building products leverages Iowa's existing resources and provides an additional revenue stream to farmers.



Leveraging the region's existing manufacturing capabilities and facilities creates additional manufacturing jobs.



Manufactured materials can be used in local retrofit and new construction projects and can also be exported to a broader, national construction market.

What are bio-based building products?

- A wide range of building products can be manufactured using agricultural byproducts.
- Product types can range from insulation material to panelized walls and roofs, and the manufacturing process varies based on the feedstock.
- Iowa has ample feedstocks — such as wheat straw, corn stover, and corn cobs* — that are prime inputs for bio-based building products.

*Choosing byproducts not used for another purpose can ensure an additional revenue stream without undermining an existing one.

RMI – Energy. Transformed.



Blow-in fiber insulation



Rigid exterior continuous insulation



Fiber batt insulation



Prefabricated straw wall panels



Continuous insulation SIPs



Compressed fiber boards

Bio-based building products provide equivalent replacements to most commercially available building materials

- A wide range of agricultural byproducts can be used, depending on availability in the regional market.
- Building materials from agricultural byproducts like straw and corn-based products are comparable in cost and insulative performance.
- Domestically produced materials may be more competitive in coming years due to certainty of supply and relative cost compared to trade-exposed imports.

BUILDING ASSEMBLY	CONVENTIONAL PRODUCT TYPES	BIO-BASED PRODUCT TYPES
Foundation	• Typical concrete	• Biochar concrete aggregate • Microalgae cement • Net shell aggregate • Mineralized bio-aggregate
Cavity insulation (exterior walls, roof and floor)	• Fiberglass batt	• Cellulose batt • Wood fiber batt • Hemp fiber batt • Grass batt • Hempcrete • Straw • Mycelium insulation • Seaweed batt • Flax fiber batt • Sheep wool batt • Rice hull insulation
Flooring	• Rigid core vinyl flooring (LVT) • Ceramic tile	• Bio-based carpet • Engineered wood* • Linoleum (liquid applied) • Hempwood • Mycelium tiles • Bio-cement tiles
Structural sheathing (walls, roof)	• Oriented strand board (OSB)	• Gypsum/cellulose panels • Recycled drinking box panels • Straw board panels • Paper sludge panels • Reed grass board • Com board • Wood wool board
Continuous insulation (exterior walls)	• EPS foam board	• Wood fiber board • Compressed straw board • Hemp fiber board • Com stover board • Eelgrass board • Hempcrete board
Exterior wall cladding	• Brick • Fiber cement	• Engineered wood • Fiber cement • Seaweed brick • Mineralized bio-aggregate
Interior partitions	• Wood stud framing • Drywall (gypsum board)	• Recycled cardboard studs • Compressed straw board • Com cob board • Clay fiber board • Hemp board • Flax core panels
Interior finishes (walls and ceilings)	• Drywall (gypsum board)	• Straw board panels • Paper sludge panels • Eelgrass board • Wood wool board • Com cob board • Clay fiber board

Case study: Hempitecture

Hempitecture, based in Idaho, produces a line of hemp-based building materials including loose fiber insulation, exterior continuous insulation, hemp fiber batt insulation, and more.

- **Hempitecture uses a 33,000 sq. ft. manufacturing facility to run a custom-designed manufacturing process for its range of hemp-based materials.**
- The company utilizes its position on a transit corridor to supply construction markets in the Rocky Mountain region and the Pacific Northwest.
- 1,500+ projects have been built with Hempitecture products since the company started in 2013.



*Hempitecture's
hemp wool
product*

*Hempitecture's
custom-designed
manufacturing
facility in Jerome,
Idaho*



Case study: TimberHP

With the downturn of the paper-production industry in Maine, Timber HP turned a former paper mill into a wood fiber insulation manufacturing facility.

- **TimberHP created 130+ jobs, almost double the average number of workers at an average Iowa manufacturing facility, and sells \$160 million in insulation annually to the region at a comparative cost to conventional materials.**
- **Uses local wood byproducts as supply, reducing supply chain risk, to produce a product line already well-established in Europe, reducing required research and development, to derisk investment.**
- **The reuse of a pre-existing manufacturing site reduced up-front investment.**



TimberHP's factory is housed in a former paper mill in Madison, Maine. Courtesy of TimberHP.



TimberHP's batt insulation product being installed in a wall assembly. Courtesy of TimberHP.

Bio-based building products offer revenue to farmers while creating manufacturing jobs



Provides additional use cases and value for byproducts for farmers.

- Farmers are able to expand the market with additional use cases and develop a new revenue stream.



Reselling of byproducts through an aggregator keeps additional labor low.

- Aggregators work with a network of farms to collect and resell agricultural byproducts, streamlining the supply chain.
- Many aggregators typically harvest 20%–50% of stover to leave coverage for soil health and erosion control.



Processing, manufacturing, and installation create additional jobs.

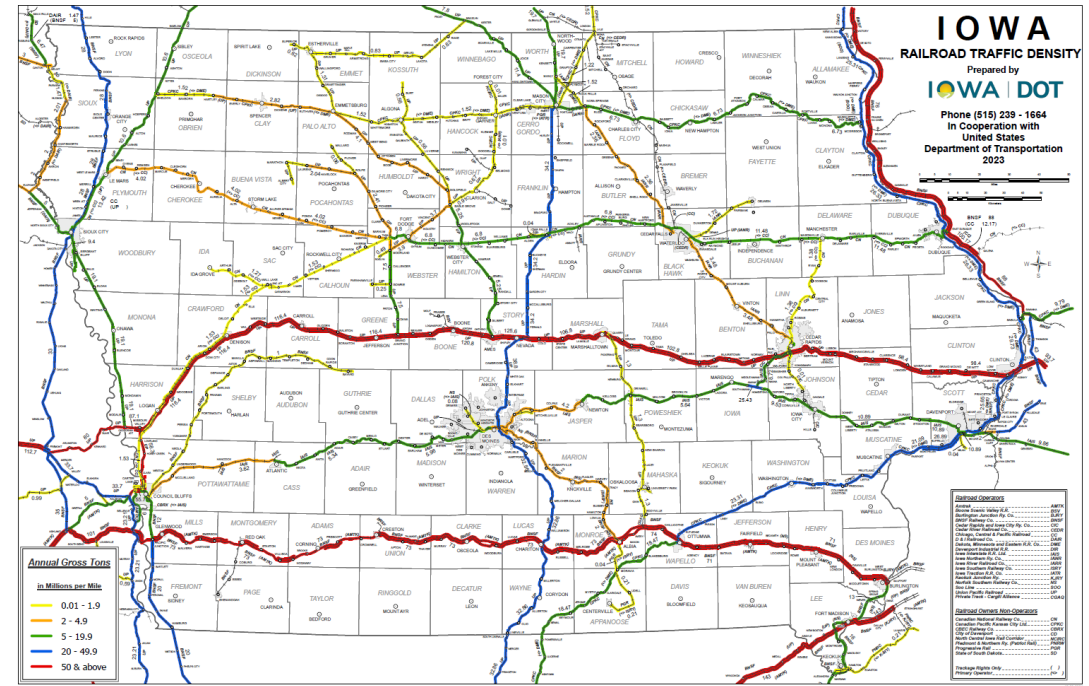
- More complex products, like structural components or prefabricated panels, can also include advanced manufacturing positions like computer numerical control operators and construction technicians.

Central Iowa is well-positioned to attract bio-based building product manufacturers

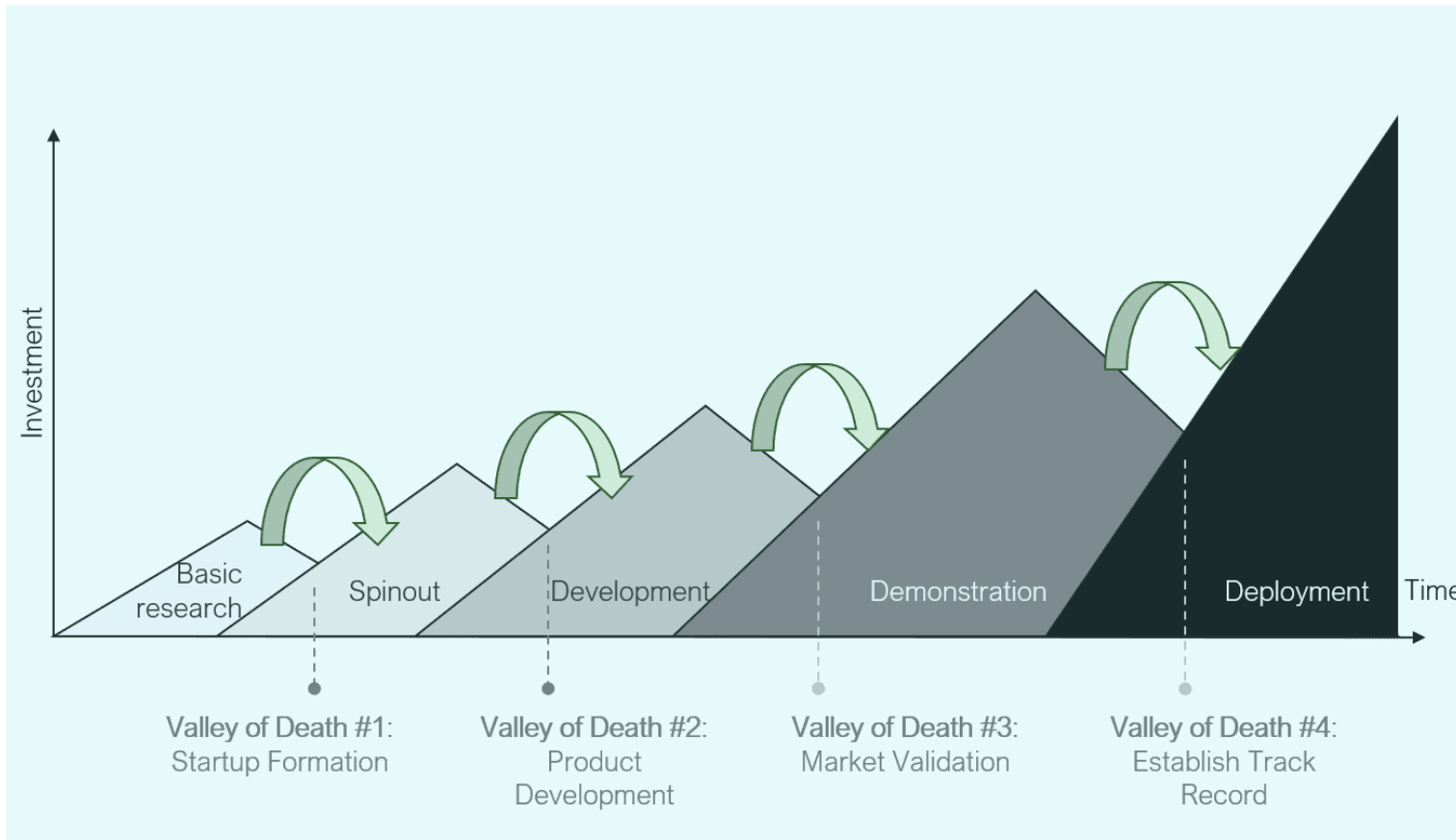
- **Central Iowa has the assets needed to attract manufacturers of bio-based building products to establish a hub for this emergent and growing industry.**
 - Processed building materials can be shipped beyond the region, but unprocessed feedstock should be sourced locally to keep cost and transport logistics low.
 - Central Iowa's established manufacturing capabilities, including available land, existing facilities, equipment manufacturing, and manufacturing workforce are key to attracting manufacturers to the area.
 - Organizations like Cultivation Corridor and ISU CIRAS can help connect farmers and manufacturers.
 - ISU Research Park can support with design, testing, and logistics.
- **A few manufacturers, like CornBoard Manufacturing Inc, produce bio-based consumer or packaging products in Iowa but have not yet expanded to building products.**
- **Many regional aggregators, including VERBIO and FiberX, own and operate or partner with biorefineries.**

Central lowan manufacturers have access to key markets in the United States

- Central Iowa serves as a central logistics hub and transportation corridor in the Midwest, positioning it to deliver building materials to several rapidly growing cities and states across the country.
- Leveraging the local transit network of highways and rail positions in central Iowa can allow the state to export these materials broadly to expanding construction markets.
 - Bio-based building materials can be used locally in Iowa projects as well as in expanding construction markets like South Dakota, Wisconsin, Illinois, and Michigan.
 - Bio-based building materials are suitable for both new construction and retrofit projects, expanding potential market size.



Attracting manufacturers will be critical to developing this sector



- As with most manufacturing-based industries, bio-based building products require high up-front investment in piloting, testing, and building out manufacturing lines.
- The buildings industry is time-intensive and regulated, lengthening payback periods.
- Support from local players like ISU Research Park, CIRAS, and America's Cultivation Corridor can help to shorten these payback periods.
- Additional financial incentives would help to support this new industry in scaling past the manufacturing valley of death.

Concerted effort is needed to attract manufacturers

- Focused business attraction will be needed to develop the industry in central Iowa.
- State or regional funding for manufacturing facility development is a key incentive for ag manufacturers.
 - As federal support through programs like the Loan Program Office have been reduced, these incentives could be of even higher value to new startups looking to build manufacturing lines.
 - Pairing private funding with government investment can make these opportunities even more competitive and engage regional financiers to build out this burgeoning industry.



Illinois
Department of Commerce
& Economic Opportunity

Business Attraction Prime Sites Capital Grant Program

Award amounts for eligible projects will be formula based, and an applicant may apply for a grant of up to **\$10,000 per new job created**. Grants will range from \$250,000 to \$25 million. This grant opportunity also includes a **1:1 match requirement**, meaning grant funds can only cover 50% of the total eligible capital expenses for the proposed project.

Eligible projects may include new construction and renovation of industrial and commercial facilities, including associated infrastructure improvements and the purchase and installation of durable equipment. Construction or renovation of facilities to be used as warehouses are not eligible.

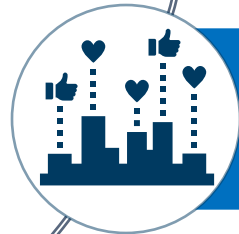
Energy efficiency retrofits create jobs and community benefits



Energy efficiency retrofits are essential for preserving the value of the region's housing stock and for residents' health, safety, cost savings, and comfort.



Training a contractor workforce in energy efficient approaches that meet the central Iowa housing market needs creates additional jobs and builds out a necessary trades workforce.



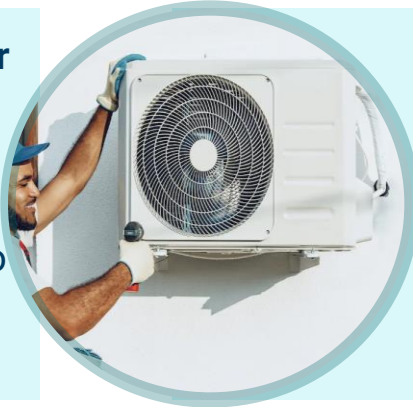
Bulk purchasing models can support scaling by securing lower pricing, create a pipeline for demand, and support workforce development efforts by ensuring steady and predictable work.

Central Iowa's varying homes need a range of retrofit interventions for energy efficiency

Retrofit interventions may include:



Insulation and air sealing:
Sealing and/or insulating attic, roof joist, wall, floor, ductwork to reduce heat loss and transfer



HVAC:
Upgrading or repairing HVAC systems to reduce energy load profile with efficient heating and cooling

Neighborhood Finance Corporation has made substantial progress deploying retrofits through their Energy Advantage program, but retrofits are **inherently complicated and difficult to scale**, requiring stakeholders working across finance, workforce development, advocacy, and consumer education.



EnergyStar rated windows:
Upgrading windows and doors as needed to reduce heat loss/transfer



Structural improvements:
Addressing any outstanding repairs
Ensuring exterior leaks are addressed



Energy efficient appliances:
Installing efficient appliances to save energy and money for consumers in daily use

Building retrofits drive economic development in several ways

Benefits of retrofitting the housing stock for economic development include:



Direct: Costs of construction and retrofit, including local supplier purchases.



Indirect and induced: Provides upstream supplier activity, such as purchasing insulation, windows, heat pumps, etc. Building product suppliers in turn purchase raw materials, packaging, logistics, and labor from others.



Anchor demand: Housing retrofits create a steady, local, low-risk project pipeline that attracts private capital and de-risks investment.



Local supply chains: Predictable demand supports regional prefab manufacturing, component assembly, logistics, and construction services.



Workforce development: Creates skilled, career-ladder jobs from pre-apprentice to project manager.



Innovation platform: Retrofits serve as testbeds for cleantech deployment for innovative building products and systems.



Structural cost savings: Resident and tenant savings in avoided energy bills, avoided maintenance, avoided outage/heat-risk costs.

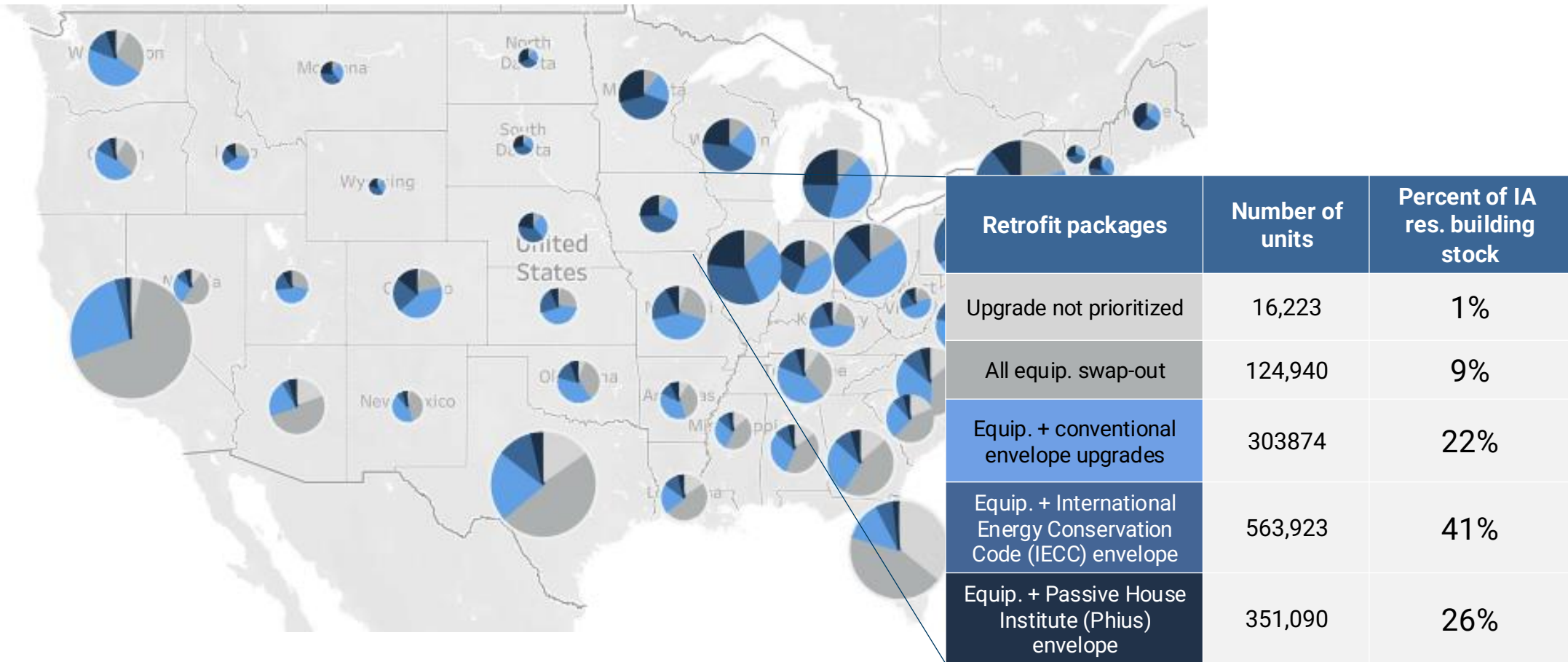


Asset value uplift: Higher net operating income for owners from increased rents, lower operating expenses, fewer repairs, lower vacancy, improved collateral quality, rooftop solar PPAs, EV charging fees, or grid services payments.



Public co-benefits: Additional benefits include health (asthma/heat-related), educational attainment from healthier homes, local air quality, and resilience.

90% of all homes in Iowa require envelope improvements to be energy efficient



* Figure refers to the goal of transitioning the building stock to: No on-site fossil fuel use, low power and thermal loads, obtains all energy from a carbon-neutral grid and/or carbon-neutral local resources currently or before 2050 under a planned scenario, and reduces impact on the grid through peak and general demand reduction and grid interactivity (or, alternatively, through off-grid operation).

Aggregating demand provides a path to scaling retrofits

- **The Nature Conservancy Iowa has successfully aggregated solar installation across both commercial and residential customers.**
 - Grow Solar is program that provides residents and businesses with better prices for solar installations through group purchasing.
 - The program combines volume purchasing with community education to make solar more accessible and affordable for property owners.
- **Pairing this program with energy efficiency retrofits or leveraging this model of bulk purchasing to secure a pipeline of demand and unlock cost savings could promote scaling, support consumer and contractor education, and secure affordable prices through bulk purchasing agreements.**

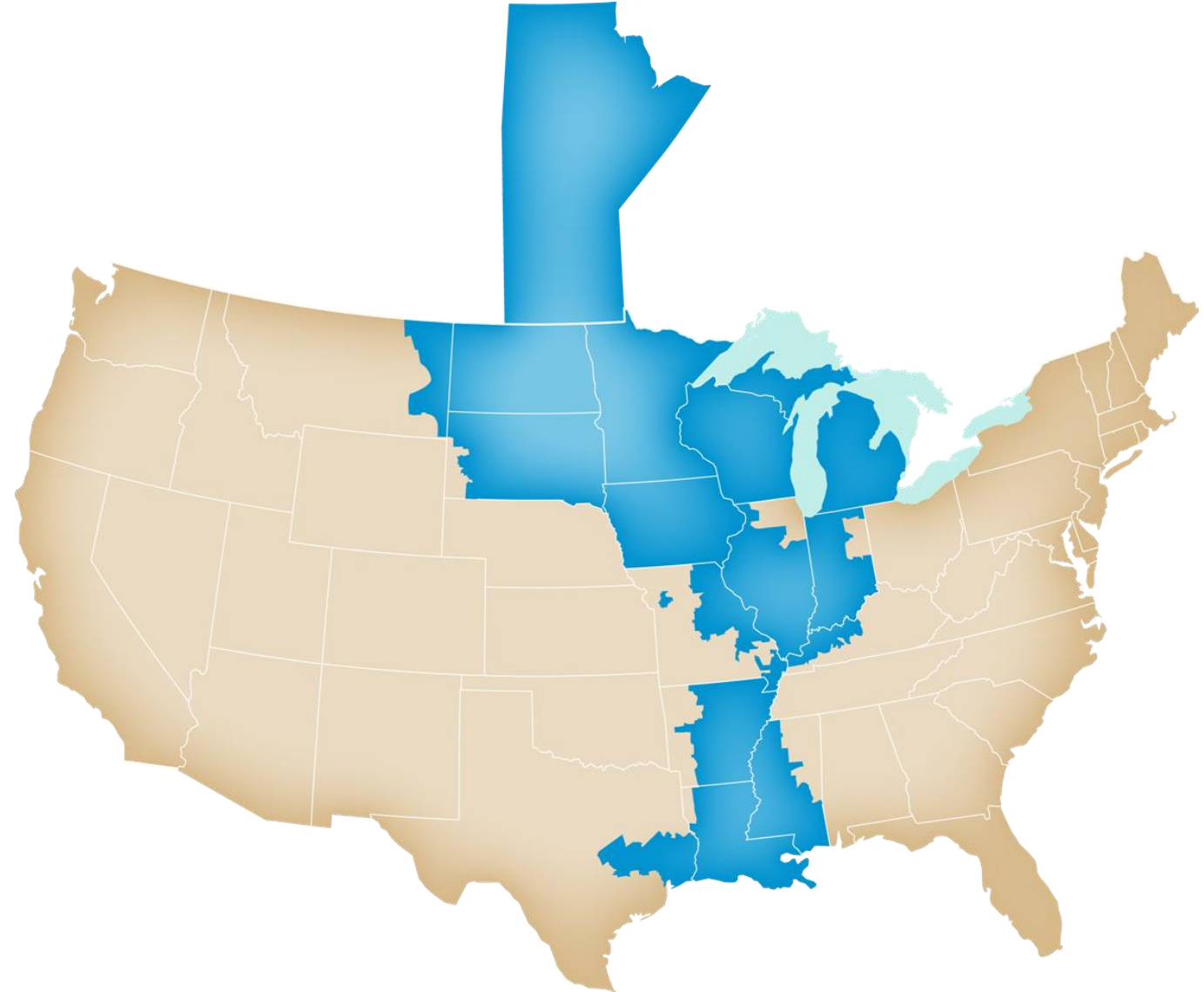


Transmission

Additional transmission is essential to enable load and generation growth in Iowa

Iowa is part of the Midcontinent ISO's regional grid

- The Midcontinent Independent System Operator, or MISO, runs across 15 states and Manitoba.
- MISO operates regional electricity markets and is responsible for transmission planning and new generator interconnection.

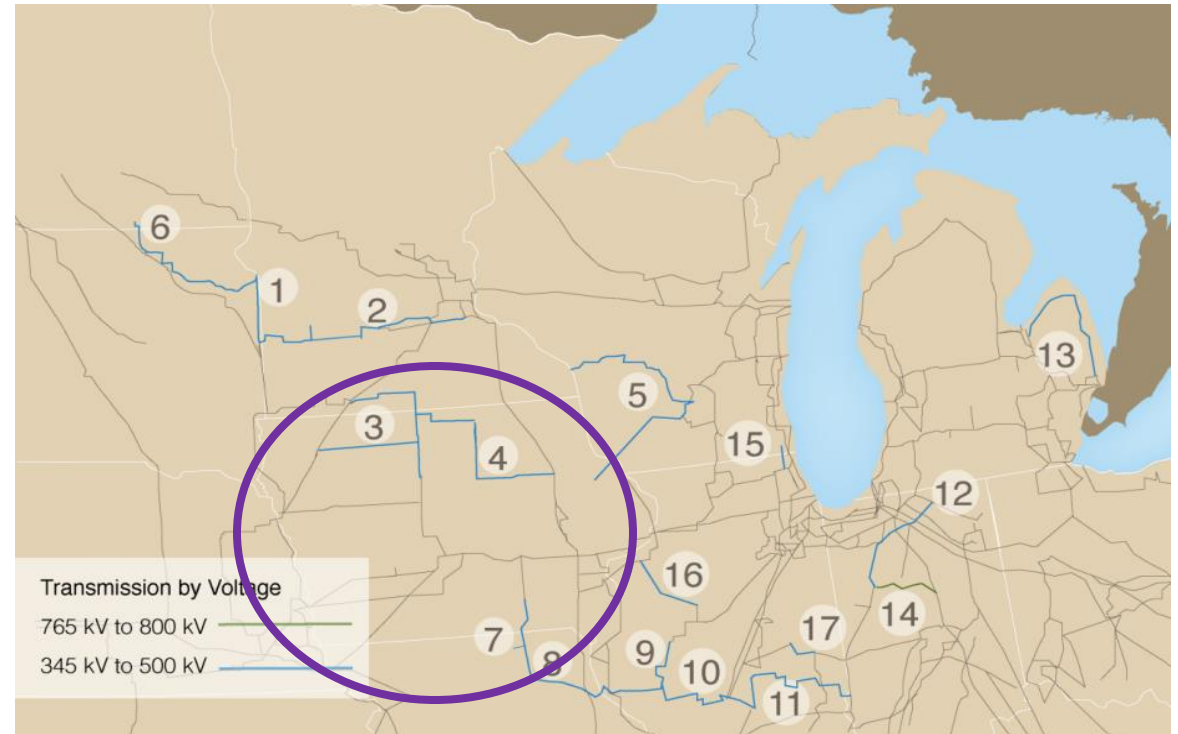


MISO's past transmission investments have generated significant savings for Iowa

Since 2010, MISO and Iowa's utilities have developed three high-voltage projects through the Multi-Value Project portfolio process.

Multi-Value Projects — 2010

- Includes three 345 kV projects in Iowa at a cost of \$1.8B with \$5.2–\$7.5 billion in total benefits to Iowa.
- All projects are energized and operational.
- Iowa's load zone received some of the highest benefits of any state.



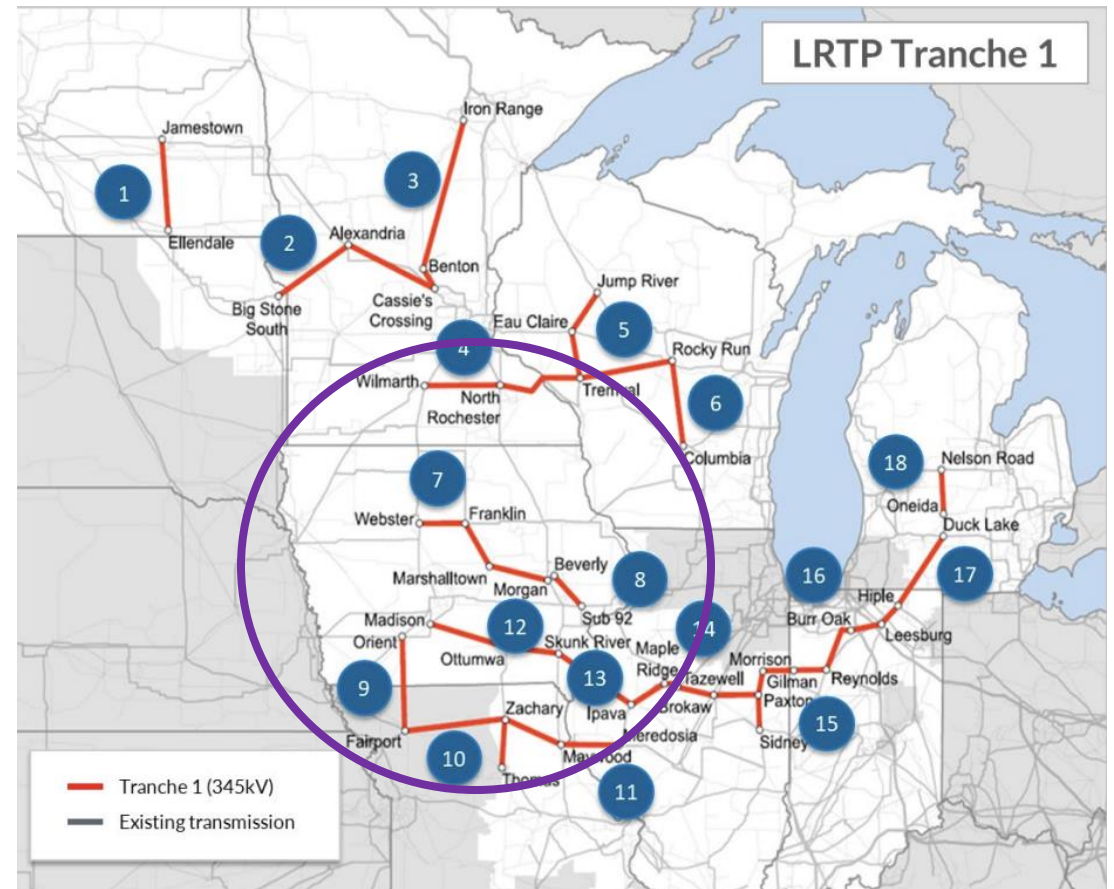
Source: MISO, "MTEP17 MVP Triennial Review," September 2017, <https://cdn.misoenergy.org/MTEP17%20MVP%20Triennial%20Review%20Report117065.pdf>

MISO LRTP projects are an important next step to advance transmission in Iowa

MISO has identified several transmission buildout opportunities in Iowa, including central Iowa, through its Long-Range Transmission Planning (LRTP) process.

Tranche 1 — approved in 2021

- Includes five 345 kV projects for Iowa at a cost of \$1.5 billion with \$4.8–\$6.7 billion in total benefits to Iowa.
- Uses existing transmission rights-of-way.
- Is entering the Iowa Utilities Commission (IUC) siting process.

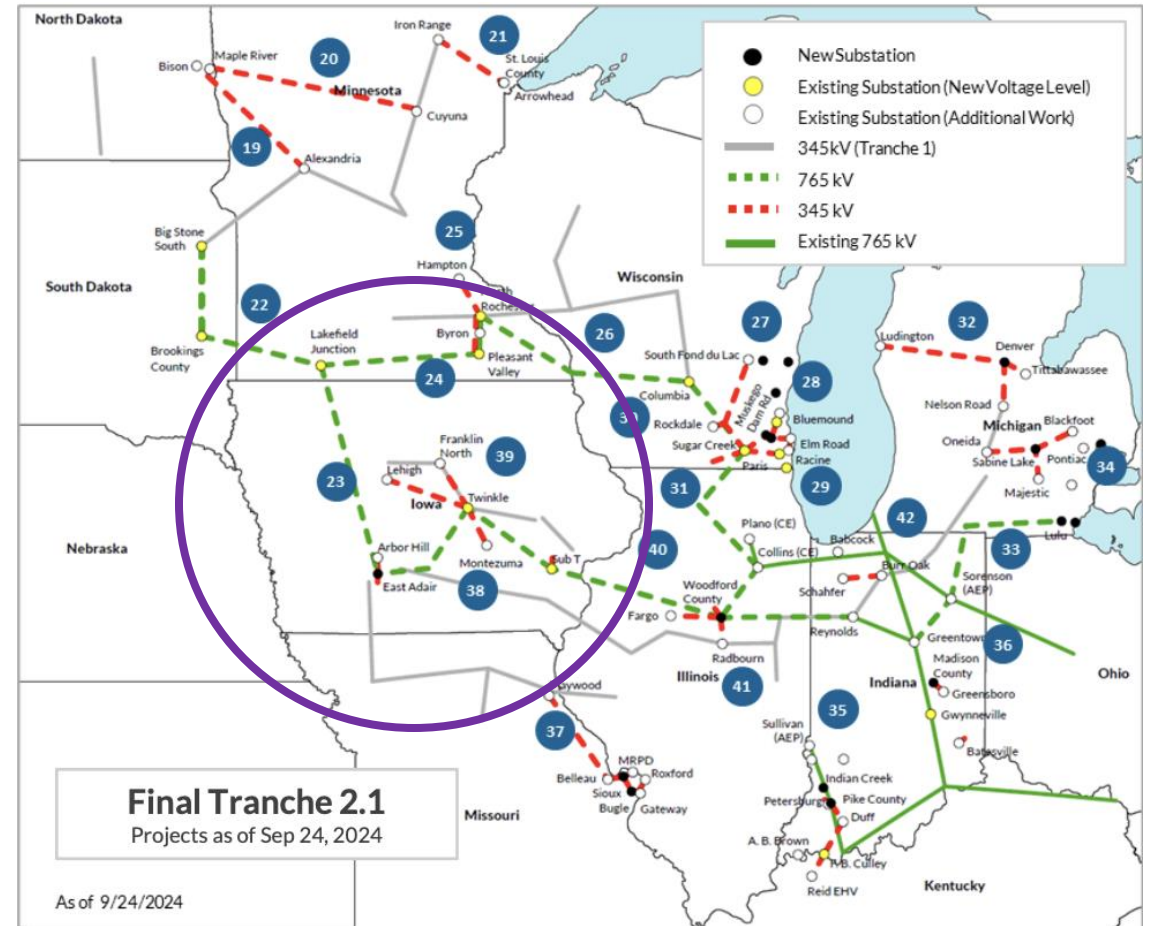


MISO LRTP projects are an important next step to advance transmission in Iowa

MISO has identified several transmission buildout opportunities in Iowa, including central Iowa, through its Long-Range Transmission Planning (LRTP) process.

Tranche 2.1 — approved in 2024

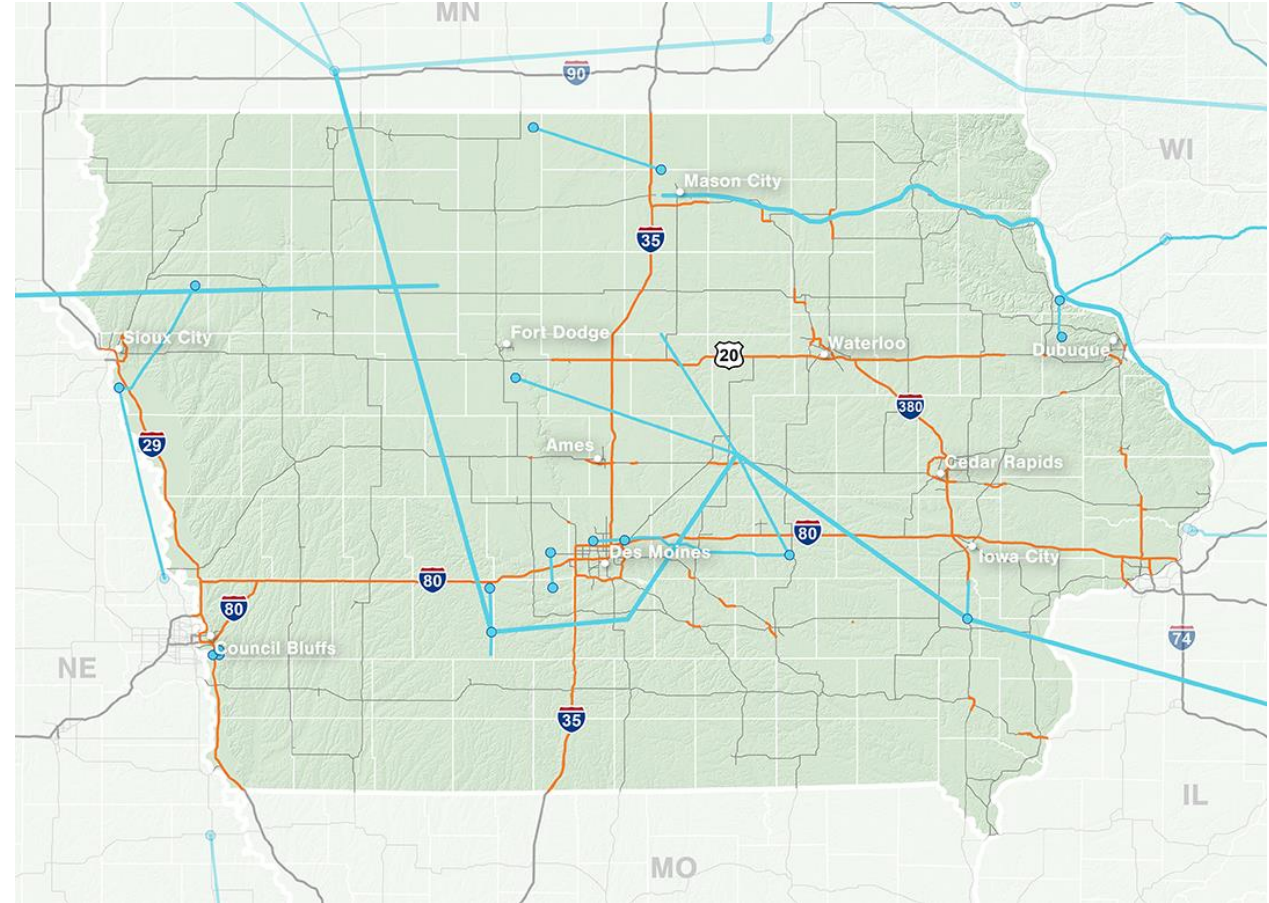
- Includes three projects for Iowa at a cost of \$3.2 billion with \$5.6–\$9.7 billion in total benefits to Iowa.
- Two of these projects are 765 kV.
- Routing begins next year.
- All three may require new rights-of-way.



Source: MISO, "LRTP Tranche 2.1 Portfolio Update," September 24, 2024, <https://cdn.misoenergy.org/20240924%20LRTP%20Workshop%20Item%20002%20Tranche%202.1%20Final%20Portfolio%20Overview649676.pdf>

Siting is becoming a major challenge for Iowa's transmission buildout

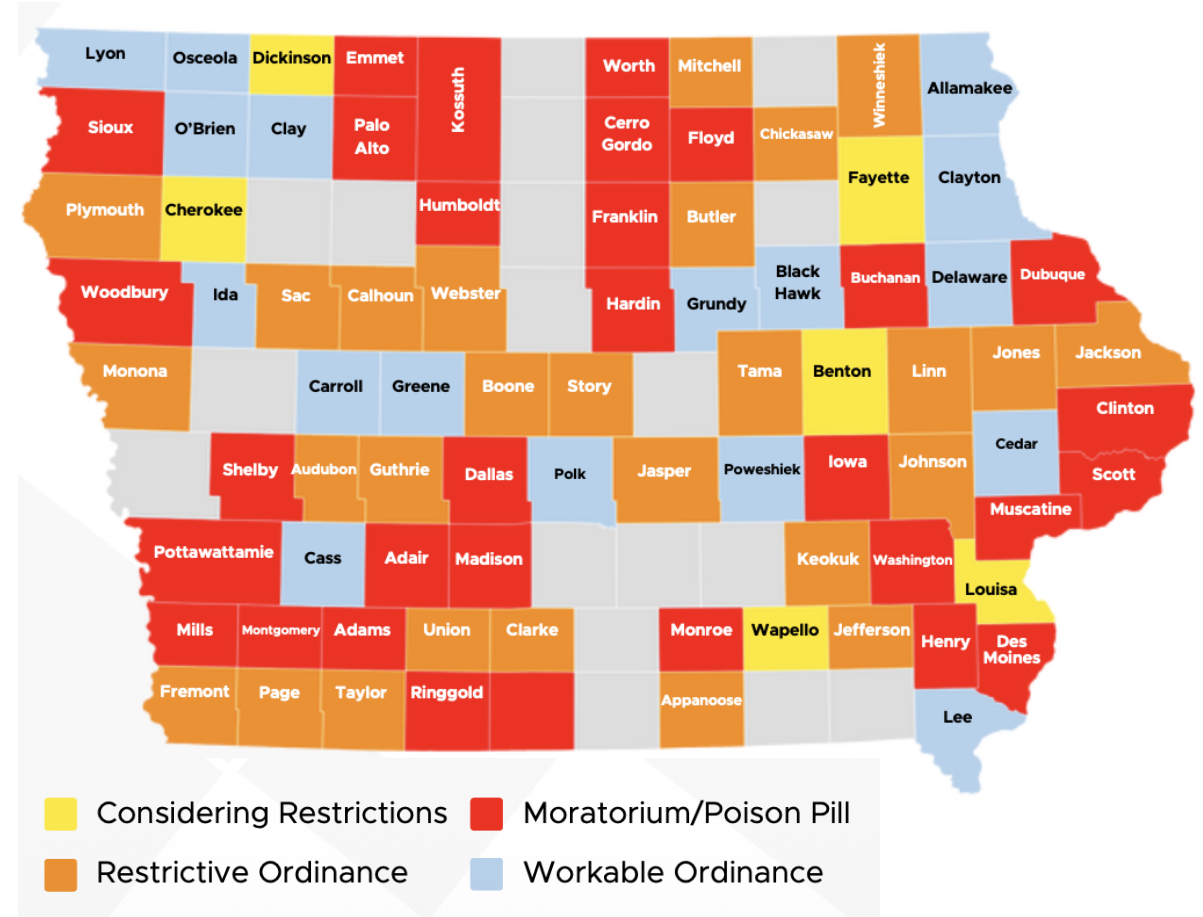
- Other siting requests (e.g., wind and solar projects, CO₂ pipelines) are causing local government and resident fatigue and opposition that could slow transmission projects.
- Co-location of transmission with other rights-of-way could ease siting.
 - Siting in existing rights-of-way can result in 60%–70% faster siting timelines.
 - Legislation to allow co-location with highways has gained traction in Iowa and is likely to be introduced again this coming session.



Source: "Iowa Coalition," NextGen Highways, accessed Nov 7, 2025,
https://nextgenhighways.org/state_coalition/iowa-coalition/

County-level siting restrictions are rising, challenging new generation projects

- **As of October 2025, almost 60% of Iowa counties have passed restrictive ordinances on wind, solar, or storage projects.**
- **This threatens Iowa's ability to meet load growth and support economic development.**
 - Commercial wind and solar operations have brought \$29 billion in investment to Iowa since 2023, including \$74 million in direct landowner payments.



Advanced transmission technologies (ATTs) can help Iowa unlock more grid capacity for less

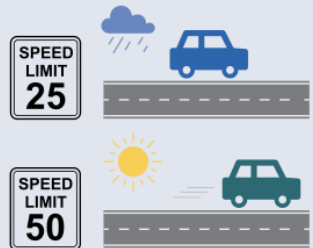
IUC could:

- ✓ Require its utilities to assess ATT potential and deploy where financially practical
- ✓ Require consideration of ATTs as part of the IUC issuing a permit

Dynamic line rating (DLR)

Hardware or software that adjusts the carrying capacity of transmission lines based on real-time conditions

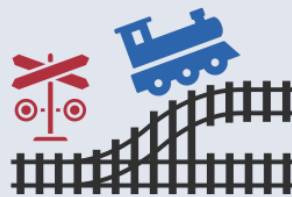
Transit analogy: Weather-adjusted speed limits



Advanced power flow controller (APFC)

Hardware that pushes power away from overloaded lines with capacity constraints onto lines with spare capacity

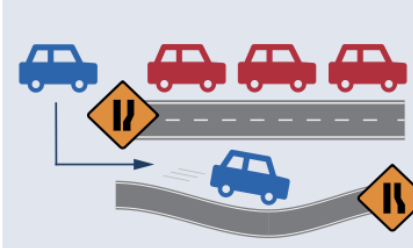
Transit analogy: Railroad switching stations that direct trains to free tracks



Topology optimization (TO)

Software that identifies grid reconfigurations to optimally route power flows around congested areas (broader than “transmission switching”)

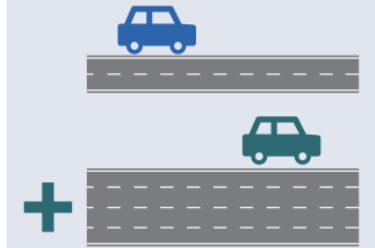
Transit analogy: Re-routing drivers around traffic



Advanced conductors

New conductor materials that enhance the performance of the transmission line (reduce sag, line losses, etc.) and can dramatically increase capacity in-place

Transit analogy: Widening a highway





Ethanol and Sustainable Aviation Fuel

Sustainable aviation fuel offers an additional market opportunity for ethanol

- **Regional demand is growing**
 - Minneapolis–Saint Paul airport is partnered with MN SAF Hub; at Chicago airports, United and Southwest are using SAF.
 - Illinois has a demand-side state-level credit of \$1.50/gallon of purchased SAF for use in Illinois.*
- **Iowa passed a bill to create a tax credit that would incentivize SAF production by giving businesses \$0.25/gallon of SAF produced in Iowa using feedstocks produced in Iowa (capped at \$1 million per business).**
- **The 45Z Clean Fuel Production federal tax credit ends in 2027; support from corn production states could lead to an extension.**

What is sustainable aviation fuel?

- Sustainable aviation fuels (SAF) are drop-in fuels that have at least a 50% reduction in life-cycle greenhouse gas emissions compared to petroleum-based jet fuel.
- Alcohol-to-jet (AtJ) is a production method that converts ethanol into SAF (see the next slide for more pathways).

Multiple SAF production processes exist

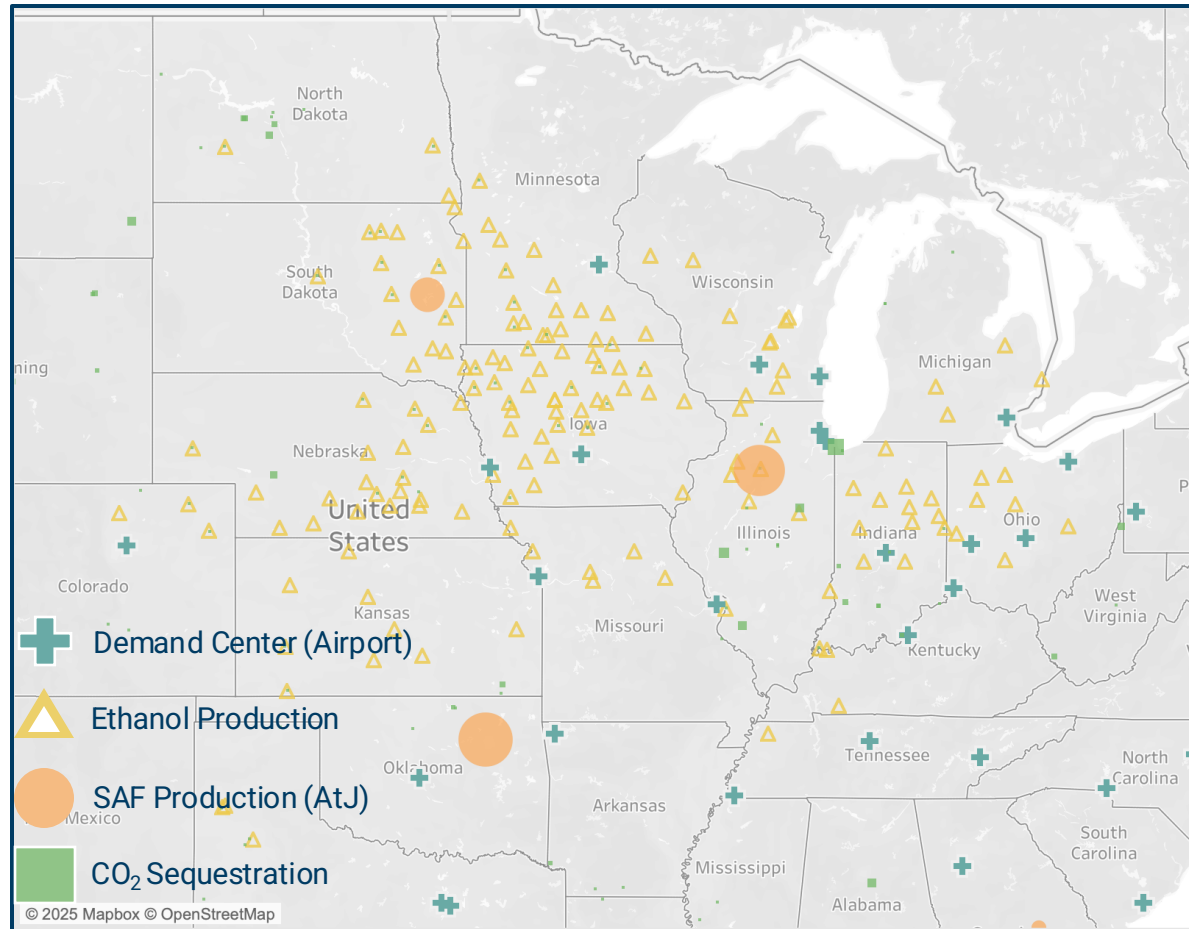
HEFA SAF is approximately 98% of SAF on the market today and is traded as a liquid commodity.



	Hydro-processed Esters and Fatty Acids (HEFA)	Alcohol to Jet (AtJ)	Gasification + Fischer-Tropsch (G-FT)	Synthetic Fuel — Power to Liquids Via Fischer-Tropsch (PtL)
Maturity	Mature — Safe, Proven and Scalable	Commercialization underway	Commercial Pilots Feedstock selection is challenging	Pilot
Feedstock	Waste/Residue lipids, oil energy plants	Agricultural residues, cellulosic energy crops, ethanol/isobutanol	Municipal Solid Wastes Woody biomass	Sustainable CO ₂ + renewable electricity
% LCA GHG reduction vs. fossil Jet Fuel	73%–84%	85%–94%	85%–94%	99%
Outlook	Can cover 5%–10% of global jet fuel demand. Feedstock scale-up & sustainability issues.	Cheap feedstock with fragmented collection / supply chain. Food versus fuel concern(s) with specific types of feedstock.	Cheap feedstock but segregation issues and syngas cleanup issues.	Industrial or Biogenic Point source CO ₂ capture in medium term, Direct air capture in long term. Clean Electricity is limited.
ASTM Certification	D7566	D7566	D7566	D7566

Table adapted from World Economic Forum, *Clean Skies for Tomorrow: Sustainable Fuels as a Pathway to NetZero*, 2021.

Infrastructure investments for Alcohol-to-Jet (AtJ) will enable supply in the Midwest to access coastal demand centers, requiring investments in transportation, carbon capture, and fuel distribution



Feedstock Considerations:

AtJ benefits from cheap and widely available ethanol feedstock, but supply chain fragmentation poses challenges. Ethanol produced in Iowa becomes even more competitive when coupled with carbon capture and storage (CCS). CCS will be required to make the AtJ SAF compliant with tax codes (50% reduction from fossil jet fuel).

Supply Chain Considerations:

Ethanol production is concentrated in the Midwest, with a number of sequestration sites in Illinois, illustrating the opportunity for an AtJ SAF Hub in the Midwest. However, demand centers are more prevalent on the coasts and will require transportation logistics to access.

Appendix: Cleantech Analysis Methodology

Cleantech Opportunities

Part 1

Quantitative approach: Industry
prioritization matrix

Industry prioritization matrix methodology

How RMI assessed industries in the 12-county greater Des Moines region

Data used

- Jobs & specialization: NAICS-based 2024 regional employment and job concentration in the region
- Feasibility (existing capabilities) complexity (specialization): NAICS-based
- Investment: capital expenditures for facilities
- Resource signals: local resource capabilities (physical or natural assets) and cost (levelized cost of energy [LCOE])
- Maturity and policy context: technology readiness (TRL), state policy/innovation indicators

How the scoring works

- 1 Build from county-level data, then roll up to the 12-county region
- 2 Normalize all metrics to a common 0–1 scale
- 3 Rank industries in order from highest to lowest normalized score to assess strongest ones

How the data is weighted

- Feasibility, complexity, specialization (location quotient), and workforce scale (2024 jobs) are weighted more heavily in the matrix

Cleantech Opportunities Part 2

Qualitative approach: Industry mapping

The Clean Growth Tool and feasibility

The Clean Growth Tool allows users to determine how competitive cleantech industries are in a region and compared to other regions.

Feasibility Definition

Feasibility is one of the metrics the tool uses to measure how easily a region can grow a given cleantech industry based on how related it is to industries and skills that are already strong locally.

Drivers of Feasibility

Drivers of feasibility are the local industries that are already present that provide the capabilities that make the given cleantech industry feasible. Some drivers contribute more than others.

Feasibility Calculation

We calculate feasibility by looking at all the “local” industries that tend to co-locate with a target industry. For each target industry, we check which of those local industries a region is specialized in and weight them by how closely related they are. Combining those weighted local industries gives us a single feasibility score.

Mapping Iowa’s ag tech manufacturing capabilities to cleantech opportunities

Step 1. What ag tech manufacturing capabilities are strong in central Iowa?

Local Examples Existing Capability

Quality Manufacturing in Urbandale (welding)	Metal fabrication and welding
Vermeer in Pella (agricultural machinery equipment)	Machinery manufacturing
John Deere in Ankeney (cotton harvesters)	Transportation equipment manufacturing

Methodology

Identifying the existing capabilities: Conducted stakeholder interviews and literature research to identify the three capabilities most consistently cited as regional strengths in Central Iowa's ag tech manufacturing industry.

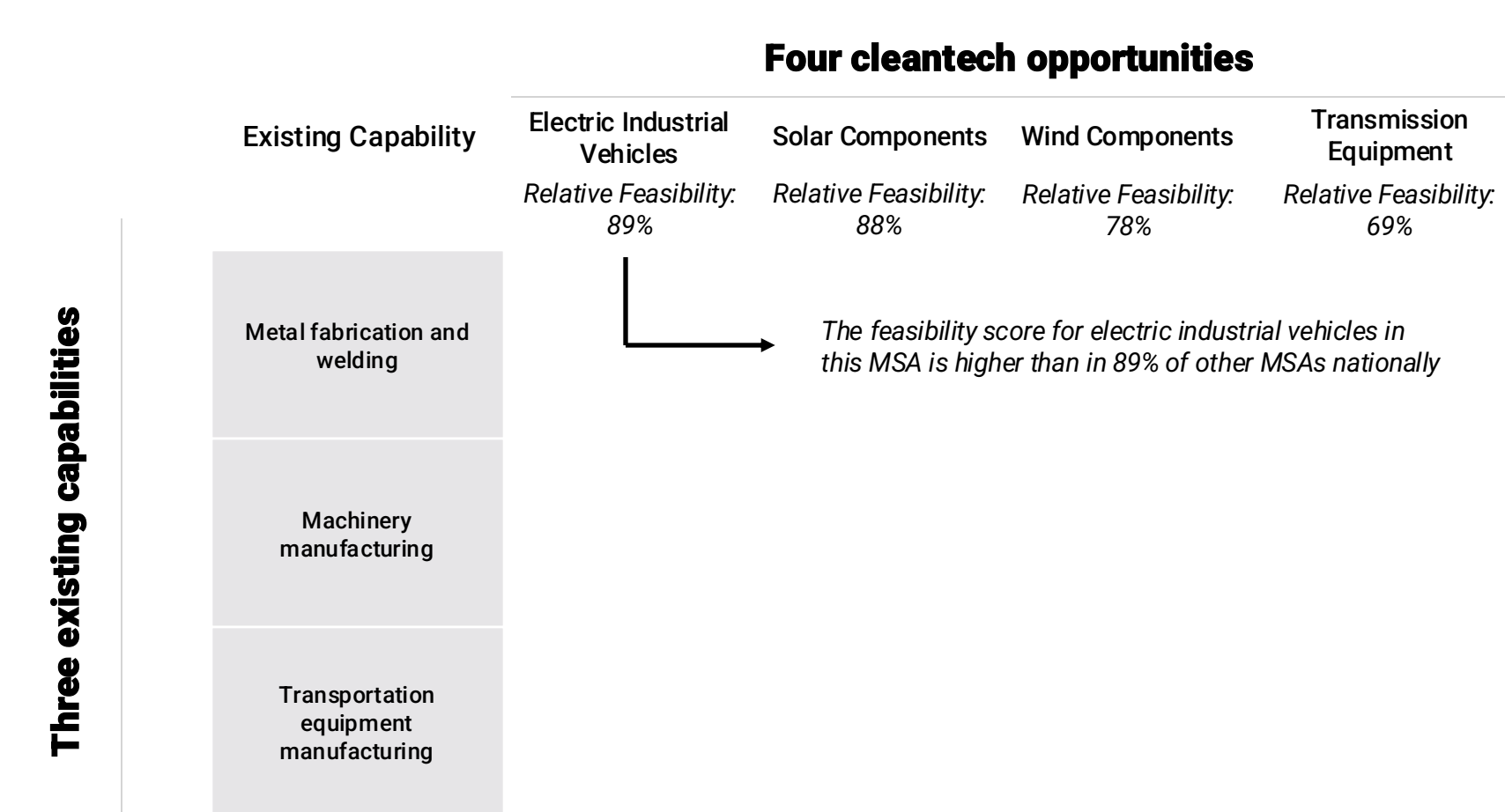


Source: RMI’s stakeholder interviews and literature research.

Three existing capabilities

Mapping Iowa's ag tech manufacturing capabilities to cleantech opportunities

Step 2. What cleantech industries are more feasible in the Des Moines MSA compared to other MSAs in the country?



Methodology

Identifying cleantech opportunities: Using the Clean Growth Tool, we identified industries in the Des Moines MSA that have higher relative feasibility (>50%) compared to other metro areas in the United States.



Note: MSA data used for feasibility drivers due to limited data at county level. Source: RMI's Clean Growth Tool.

Mapping Iowa’s ag tech manufacturing capabilities to cleantech opportunities

Step 3. Identify local NAICS industries in each capability and identify the top one that most strongly connects it to each cleantech opportunity.

Four cleantech opportunities

Three existing capabilities

Existing Capability	Electric Industrial Vehicles	Solar Components	Wind Components	Transmission Equipment
Metal fabrication and welding	Forging and stamping NAICS: 3321	Hand tool manufacturing NAICS: 3322	Hand tool manufacturing NAICS: 3322	Hand tool manufacturing NAICS: 3322
Machinery manufacturing	Agriculture, construction, and mining machinery manufacturing NAICS: 3331	Metalworking machinery manufacturing NAICS: 3335	X	X
Transportation equipment manufacturing	Other transportation equipment manufacturing NAICS: 3369	X	X	X

Methodology

Identifying the bridge industry: The table shows the local industry that has the greatest contribution to the feasibility score of each of these cleantech industries (i.e., has the most overlapping capabilities with each cleantech opportunity). An X means none of the NAICS codes in that capability are meaningful drivers for that opportunity.



Note: MSA data used for feasibility drivers due to limited data at county level. Electric Industrial Vehicles column combines “Electric Industrial Vehicles” and “Electric Vehicles” categories from the Clean Growth Tool. Source: RMI’s Clean Growth Tool.

Mapping bioprocessing capabilities

Turning Iowa's bioprocessing capabilities into cleantech opportunities

Capability to Opportunity Matrix

		Four green product opportunities				
		Existing Capability	Bio-based building products	Biofuels	Algae-based additives	Bio-plastic polymers
Two existing capabilities	ISU BioCentury Research Farm has unique processing capabilities	Agricultural biomass processing (mechanical) <i>mechanical separation (e.g. grinding, milling)</i>	✓	✗	✗	✗
	Iowa has nation-leading fermentation expertise and is a BioMADE member	Biochemical processing (fermentation) <i>biochemical transformation via fermentation</i>	✗	✓	✓	✓
		Interpretation for this cell: Iowa's strong capabilities in fermentation can use algae as an input to credibly produce algae-based oils and proteins for a range of products like supplements or agricultural feed.				

Legend

Each cell pairs one local industry by NAICS code with one cleantech opportunity. A green check indicates a match; a gray X indicates no match.

- ✓ **Yes** – This capability matches onto a future cleantech opportunity
- ✗ **No** - This capability does not match onto a future cleantech opportunity

Methodology

We used a **literature review** for cleantech mapping for bioprocessing due to insufficiently granular NAICS codes associated with biomass processing and fermentation and the absence of these activities in the Clean Growth Tool's cleantech taxonomy.



Note: Less geography-specific; applies to regions with similar capabilities. The Clean Growth Tool crosswalk does not include bioprocessing capabilities and was not used for this mapping.

SOURCE: RMI'S CLEAN GROWTH TOOL



Thank you

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