

Green Investment & Innovation Pipelines

Great Lakes Investment Strategy

Final Draft

June 2023

Contents

| | | |
|----------|--|-----|
| 1 | <u>Executive Summary</u> | 3 |
| 2 | <u>Context & Methodology</u> | 7 |
| 3 | <u>What drives international investment decisions?</u> | 12 |
| 4 | <u>Strengths and Weaknesses of the Great Lakes Region</u> | 16 |
| 5 | <u>Energy Transition Opportunities in the Great Lakes Region</u> | 27 |
| 6 | <u>Global Opportunity across Key Sectors</u> | 71 |
| 7 | <u>Key Markets for Investment Targeting</u> | 106 |
| 8 | <u>1-Year Plan</u> | 117 |

Annex A-C: Attached separately



1. Executive Summary



Executive Summary

Origin and Background

Given the enormous economic opportunity across energy transition sectors, RMI seeks to assist in the development of an investment attraction program for the Great Lakes region to boost economic development and innovation by understanding sector and market trends and cultivating leads that will invest in the region.

In this regard, RMI has engaged OCO Global to conduct an in-depth supply and demand analysis for the Great Lakes regions and key energy transition sectors, collecting insights that inform the following lead generation exercise. █

Approach

We collated data on 11 key pillars – 5 for demand and 6 for supply – on 268 indicators for 175 international markets and all 50 US states and developed a dynamic supply & demand model to reflect high potential emerging sectors and markets. The key pillars are outlined below.

To provide more in-depth insights, we held ten interviews with economic development agencies from across the region, mostly at the state level but also at the city or region level.

Finally, we conducted supplemental secondary research to provide more context where needed.

What drives international investment decisions?

Before implementing an investment promotion strategy, EDOs should be sure they fully understand what drives an investor’s decision-making process when considering where to invest and how those drivers and motivators can change depending on the sector.

We analyzed global investment drivers across five high-priority sectors and found that the below are the most significant factors in site selection:

- Domestic market growth
- Proximity to markets or customers
- Skilled workforce availability
- Favorable regulatory environment

| Demand | Supply | |
|---------------------------------|---------------------------------|---------------------------|
| Macroeconomics & Sustainability | Macroeconomics & Sustainability | |
| Imports | Business Environment | Talent & Innovation |
| Foreign Investment | Exports | Foreign Direct Investment |
| Capital Investment | Capital Investment | |

Executive Summary

Strengths and Weaknesses of the Great Lakes Region

Through our data analysis and conversations with regional EDOs, we have outlined a set of strengths that define the regional value proposition and that should be used as key selling points in any outreach and promotional messaging.

We have also captured regional weaknesses to provide a comprehensive understanding of the Great Lakes' offer and help handle objections.

Regional Strengths

- Access to Water
- Natural Assets & Resources
- Low Risk of Extreme Weather
- Innovation & Research Ecosystem
- Highly Educated & Skilled Workforce
- Existing Industrial Supply Chain
- Infrastructure & Connectivity
- Access to Large Markets
- Lower Costs

Regional Weaknesses

- Slower Population Growth
- Labor Laws
- Lack of International Prominence
- Little Strategic Focus on Energy Transition Sectors
- Tax and Incentives
- Politicization
- Permitting & Site Availability
- Access to capital

Energy Transition Opportunities in the Great Lakes

In order to analyze investment opportunities across energy transition sectors, we mapped out the industries, resulting in 10 overall sectors and 22 subsectors (all outlined on slide 10.)

Following the initial data analysis and conversations with RMI, we landed on five high-potential opportunity sectors on which to focus, outlining the Great Lakes' capabilities and detailing the size of the global demand opportunity for those sectors and technologies.

- **Electric Vehicles** – The largest recent FDI opportunity in the region.
- **Batteries & Components** – The second-largest FDI opportunity in the Great Lakes by capital expenditure.
- **Low-Carbon Iron & Steel** – An emerging sector for the region where it has the potential to become a global leader given its industrial legacy.
- **Hydrogen** – An emerging sector for the region with strong potential, especially given iron & steel, chemicals, and manufacturing clusters.
- **Solar Power** – An emerging sector for the region with most investment in deployment, but manufacturing capabilities could attract new production-focused investment.

Other high-potential but not high-priority sectors include energy transmission equipment, energy transition metals, wind, low-carbon vehicles & components (i.e., non-automotive heavy machinery and transport), waste management, and low-carbon concrete & cement.

Executive Summary

Global Opportunities across Key Sectors

As mentioned, the report details the size of the global demand opportunity for the five high-priority sectors, as well as some of the key trends.

- **Electric Vehicles** – The second-largest global FDI opportunity by capital expenditure.
- **Batteries & Components** – The second-largest FDI opportunity in the Great Lakes by capital expenditure. Most large-scale projects are supplying the electric vehicle market and are focused on lithium-ion batteries.
- **Low-Carbon Iron & Steel** – An emerging global sector where most of the largest investments in the iron & steel industry have focused on decarbonizing the production process.
- **Hydrogen** – The largest global FDI opportunity by capex, and all of the largest project announcements are focused on green hydrogen.
- **Solar Power** – The second-largest global FDI opportunity by the number of projects, much of it in solar deployment, but all deployment will need to be supplied.

Other high-potential but not high-priority sectors include low-carbon vehicles & components (i.e., non-automotive heavy machinery and transport), wind power, energy transition metals, energy transmission equipment, and waste management. |

Key Markets for Investment Targeting

Finally, ahead of any investment attraction exercise, it is crucial to understand which markets have the highest potential for lead generation. Our supply and demand model compared and analyzed 175 international markets and all 50 US states to see which countries and states are leading markets when it comes to investment activity in the ten key energy transition sectors, as well as their macroeconomic status.

We found that North America, Western Europe, East Asia, and Oceania are the largest demand markets overall. The top ten international markets are the US, Germany, China, UK, Canada, France, Netherlands, India, Australia, and Spain, in that order.

It is also important to have a targeted approach to lead generation, and as a result, we have chosen to prioritize the top three markets:

- **United States** – the US is the largest source of foreign investment projects for several of the high-growth and high-priority sectors.
- **Germany** – Germany is the second-largest source of foreign investment, only behind the US for several of these sectors.
- **China** – China is a major player in the energy transition sectors and home to significant companies across the supply chain

2. Context & Methodology



Context & Objectives

Origin & Background

The last few years have demonstrated the incredible size and growth of the economic opportunity in energy transition sectors. New technologies and innovations, falling prices, and surging interest from climate and energy security concerns are driving this growth, growth that is not expected to slow down any time soon. According to the International Energy Agency (IEA), in 2022 global investment in clean energy reached over \$1.6 trillion, and it is projected to reach \$1.75 trillion in 2023. And in the US, the Inflation Reduction Act's \$392 billion in climate provisions, both through direct spending and tax credits, could lead to \$1.7 trillion in investment over the next ten years just in the US.

RMI seeks to capitalize on this opportunity and accelerate this transition in the US by helping to facilitate investment in regional economies across the country, starting with the Great Lakes, home to much of the US industrial base and with great potential for growth in these sectors. Specifically, RMI is assisting in the development of an investment attraction program to boost economic development and innovation by cultivating leads from across the energy transition economy for the Great Lakes region.

In this regard, RMI has engaged OCO Global as a consultant to conduct an in-depth supply and demand analysis for the Great Lakes regions and key energy transition sectors as part of the project's Phase I. The study will support strategy development, understanding of sector and market trends, and will inform the lead generation activity in Phase II.

Objectives

- 1) **Identify the primary motivators** driving investor decisions in priority sectors when considering where to invest and how this should affect key messaging
- 2) **Assess the competitiveness** of the Great Lakes states and the included MSAs in a national and intraregional context
- 3) **Identify priority sectors** and potential supply chain gaps to guide successful lead generation efforts
- 4) **Conduct global trend analysis** to develop relevant industry insights across the energy transition sectors to inform the strategy
- 5) **Identify priority demand markets** that can act as the target markets for any lead generation efforts
- 6) **Set out the 1-Year-Plan** for the project, outlining the lead generation efforts of Phase II

Supply & Demand Data Analysis Approach

Methodology

Quantitative Analysis

We developed a supply and demand model that collated data on 11 key pillars – 5 for demand and 6 for supply – for international markets and US states. These pillars were also given a scale factor, either 1.0 or 1.5, to reflect relative importance.

Data was gathered for 268 indicators under each pillar for 175 countries and 50 US states; countries with populations less than 275,000 were excluded from the analysis. For each indicator, all countries were ranked and then scored on a scale out of 100 with that score then weighted to reflect its relative importance. For the full list of indicators, weightings, and sources, please see Annex C. [▶](#)

The data was analyzed first on the supply side, looking at the seven states of the Great Lakes region, including focusing on 13 key Metropolitan Statistical Areas (MSAs). We then looked at the demand side to understand key global trends, see what sectors and what markets are most active and have the highest potential as targets of investment attraction efforts.

Qualitative Analysis

In order to gain a deeper understanding of the strengths, weaknesses, trends, and investment opportunities, we spoke with economic development agencies and energy companies from across the seven states, including: Jobs Ohio, Minnesota DEED, Greater MSP, Indiana EDC, World Business Chicago, Wisconsin EDC, Milwaukee 7, and APEX Accelerators. We were not able to speak with representatives from Pennsylvania and Michigan.

Analytical Framework

| Supply & Demand | |
|---------------------------------|---------------------------------|
| Demand | Supply |
| Macroeconomics & Sustainability | Macroeconomics & Sustainability |
| High Priority Sectors | Business Environment |
| Medium Priority Sectors | Talent & Innovation |
| Low Priority Sectors | High Priority Sectors |
| | Medium Priority Sectors |
| | Low Priority Sectors |

Defining the Energy Transition Economy

Sector Scope

Full Sector Scope

The Energy Transition Economy is a term that encompasses a broad range of concepts, technologies, and products related to sustainability and decarbonization efforts across industries. For the purposes of this study, the “Green Economy Sector” will be defined as made up of the ten subsectors as outlined in the table below.

There are energy transition applications and opportunities across almost all industries. However, this study aims to focus on the opportunities in the decarbonization technologies, particularly in heavy industry, manufacturing, construction, and transport, and as a result the following sectors are not included: consumer products, agrifood, finance, communication, information technology, creatives, and services.

High Priority Sectors

Moreover, guided by our data analysis, this report includes deep dives into five high-priority sectors on both the Great Lakes supply side and the global demand side. These sectors are iron & steel, batteries & components, electric vehicles, solar power, and hydrogen. The following slide details our methodology in collecting data on these five sectors.

** We have collected trade data for a subset of sectors, including three high-priority sectors: iron & steel, batteries & components, and electric vehicles. We have collected investment data for all sectors and subsectors.*

| Sector | Subsector |
|--|---|
| Low-Carbon Construction Materials | Low-Carbon Iron & Steel |
| | Low-Carbon Cement & Concrete |
| | Wood & Timber |
| Energy Storage | Batteries & Components |
| | Battery Management Systems |
| Low-Carbon Vehicles & Components | Electric Vehicles |
| | Charging Infrastructure |
| | Low-Carbon Vehicles & Components |
| Low-Carbon Energy Production | Solar Electric Power |
| | Wind Electric Power |
| | Marine Electric Power |
| | Geothermal Electric Power |
| Energy Transmission Equipment & Utility Systems | Energy Transmission Equipment |
| | Smart Grid Systems |
| Hydrogen & Biofuels | Hydrogen |
| | Fuel Cells |
| Carbon Capture, Utilization, & Storage (CCUS) Pipelines | Biofuels |
| | Carbon Capture |
| Energy Transition Metals | Carbon Removal |
| | Energy Transition Metals |
| Low-Carbon Heating & Cooling Machinery & Equipment Manufacturing | HVAC Systems |
| | Solid Waste Management & Recycling (Services & Technologies) and Biomass Electric Power |
| Waste Management | |

Defining the Energy Transition Economy

High-Priority Sector Definitions

Electric Vehicles

The sector includes the manufacture of electric vehicles (EVs), their components, and assembly (including passenger cars and commercial vehicles, i.e., vans, buses, trucks) that are either partially or fully powered on electric power.

Our investment data sources enabled data collection targeting the electric vehicles market segment with a high level of accuracy. Our trade data sources relied on both HS codes and NAICS codes, which offer different levels of granularity. We have used HS codes at the global level, providing us with the needed detail; however, the NAICS codes used for US-level data account for the broader automotive industry.

Batteries & Components

The sector includes components or services relevant to the manufacture of batteries for grid-level energy storage and electric vehicles, excluding pumped hydro storage.

Our investment data sources enabled data collection targeting this market segment with a high level of accuracy across the battery assembly supply chain, excluding raw materials. For trade, HS codes again enabled more granularity, covering products such as cells & batteries, electric accumulators, transformers, etc. while the NAICS data included semiconductors and various electronic components.

Iron & Steel

The sector includes components or services relevant to extracting and refining low-carbon iron and steel and their products.

Our investment and trade sources did not enable data collection focused solely on low-carbon production methods for iron and steel. We have therefore opted to show the growth of this industry in more qualitative ways and particularly at the global level.

Hydrogen

The sector includes the production of low-carbon hydrogen, both through using renewable energy and electrolyzers and through combining natural gas and carbon capture, as well as hydrogen-related technologies such as fuel cells.

Our investment sources enabled data collection to target this specific sector with a high level of accuracy.

Solar Power

Finally, this sector includes the manufacture and deployment of energy production systems, assets, and components used to generate solar electric power.

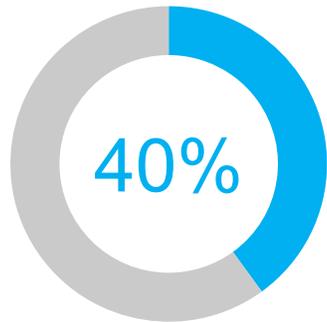
Our investment sources enabled data collection to target this specific sector with a high level of accuracy.

3. What drives international investment decisions?

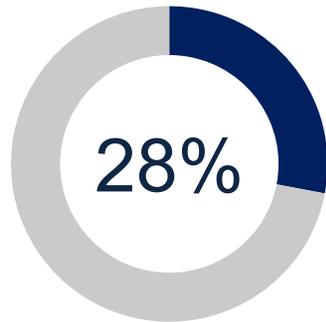


Investor Motives across Energy Transition Sectors

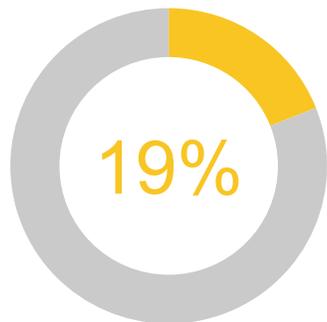
Domestic market growth and proximity to customers are the most important factors influencing investor decisions across the energy transition sectors.



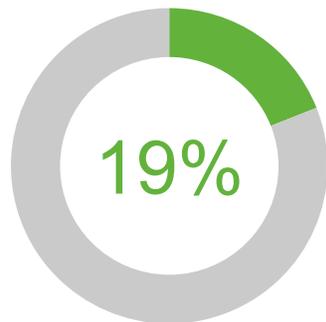
Domestic market growth



Proximity to markets or customers



Regulatory environment



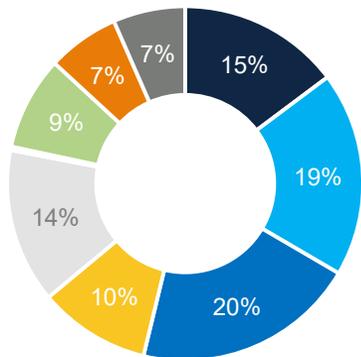
Natural resources

- Before implementing an investment promotion strategy, **EDOs should be sure they fully understand what drives an investor’s decision-making process when considering where to invest** and how those drivers and motivators can change depending on the sector.
- For this data, we looked at global projects across energy transition sectors to see the most influential determinants. This data analysis covers 4,055 FDI projects where a total of 785 motives were recorded for 489 projects.
- Unsurprisingly, **domestic market growth is the top motive driving investor decision-making**, mentioned in 40% of project announcements. Growth helps define where opportunities lie and where investors can gain market share and a good return on investment. Proximity to markets or customers (28%) follows, highlighting the importance of good infrastructure and connectivity to both domestic and international markets.
- A favorable regulatory environment and access to natural resources are also influential drivers, both mentioned in 19% of FDI project announcements.
- **Many more motivators impact which location is chosen**, including skilled workforce availability (13%), government support (9%), transport infrastructure (8%), industry cluster (7%), and technology & innovation (4%).
- The following slide shows how this breakdown changes depending on the sector.

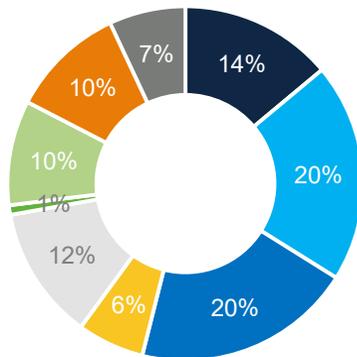
Investor Motives by Priority Sector

Investor motives can vary considerably by sector depending on the needs of the industry, though domestic market growth and proximity to customers still tend to be the two biggest driving factors regardless of sector differences.

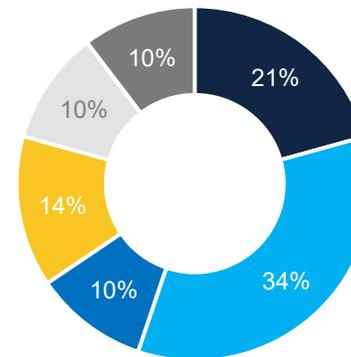
Electric Vehicles



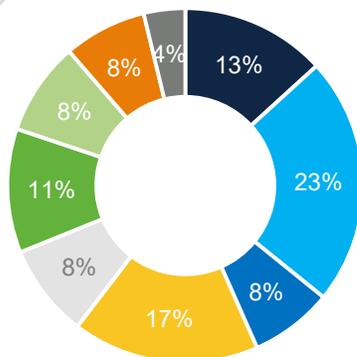
Batteries & Components



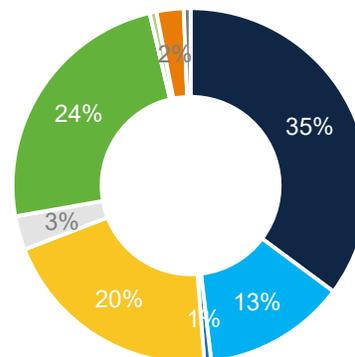
Iron & Steel



Hydrogen



Solar



Electric Vehicles, Batteries & Component, and Hydrogen projects all cite innovation & research hubs as a motivating factor, while practically no projects cited it in the iron & steel and solar sectors.

What does this mean?

Given these influential drivers, any outreach efforts should try to demonstrate strengths and capabilities that directly address those investor priorities.



Demonstrate growing demand for products within targeted sectors.



Demonstrate proximity and easy access to customers, either sector clusters or direct consumers.



Outline the size, skill level of, and training opportunities for talent in your given area.



Demonstrate a favorable regulatory environment in your area, i.e., regulatory burden or existence of regulatory support.

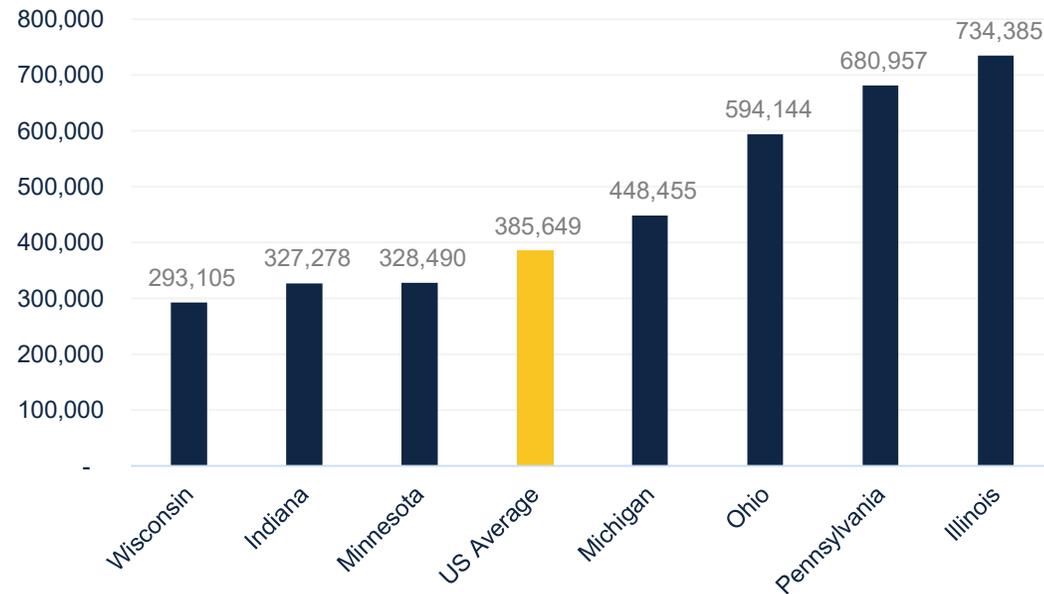
4. Strengths and Weaknesses of the Great Lakes Region



Macroeconomics & Sustainability

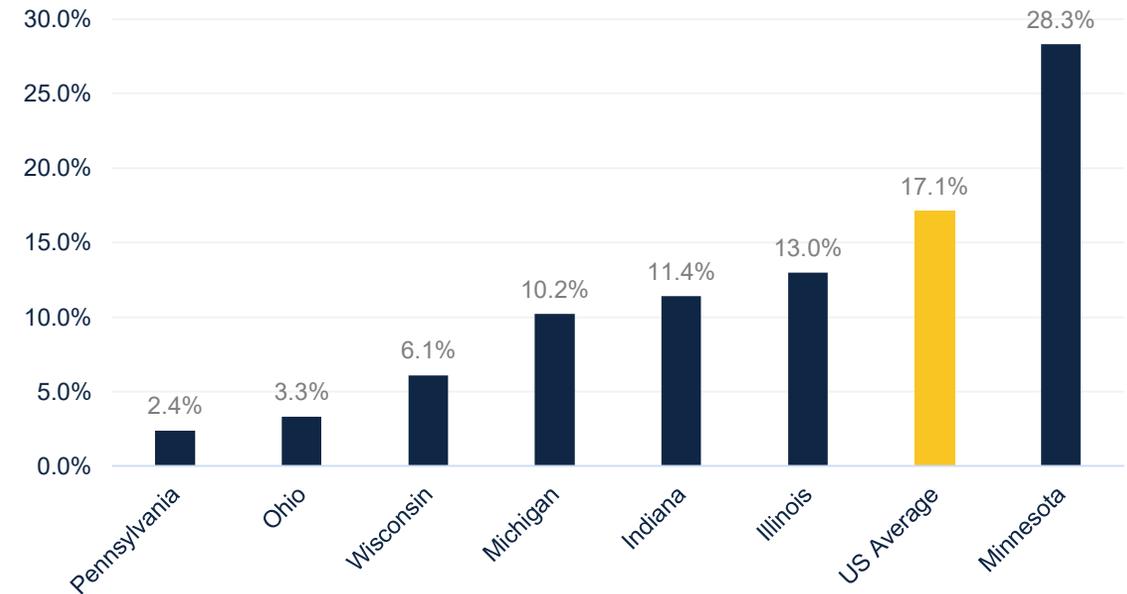
With a strong and growing regional GDP and some national leadership on sustainability metrics, the Great Lakes is well-positioned to attract investors looking for a strong and strategic market to invest in.

GDP by US State in 2021 (\$m)



With a GDP of \$3.4 trillion – and rising – in 2021, the Great Lakes is an economic powerhouse that offers enormous opportunities to investors.

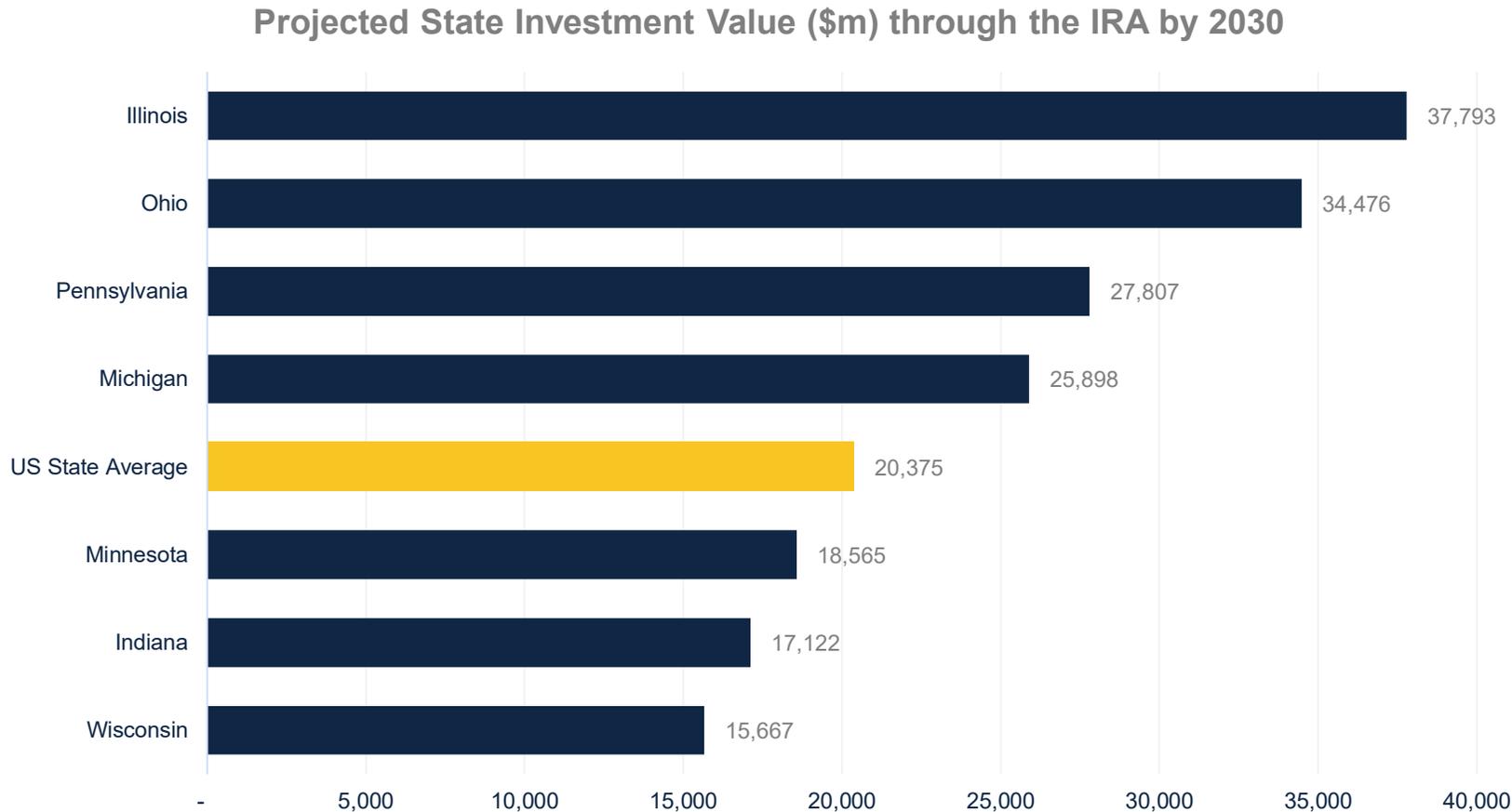
Renewable Energy Share of Power, 2022



Minnesota is a regional and national leader in the deployment of renewable energy generation (ranked 13th nationally) with opportunities for growth in the rest of the Great Lakes.

Sustainability – Impact of the Inflation Reduction Act

Illinois is expected to attract the most investment through the IRA by 2030, followed by Ohio, Pennsylvania, and Michigan.



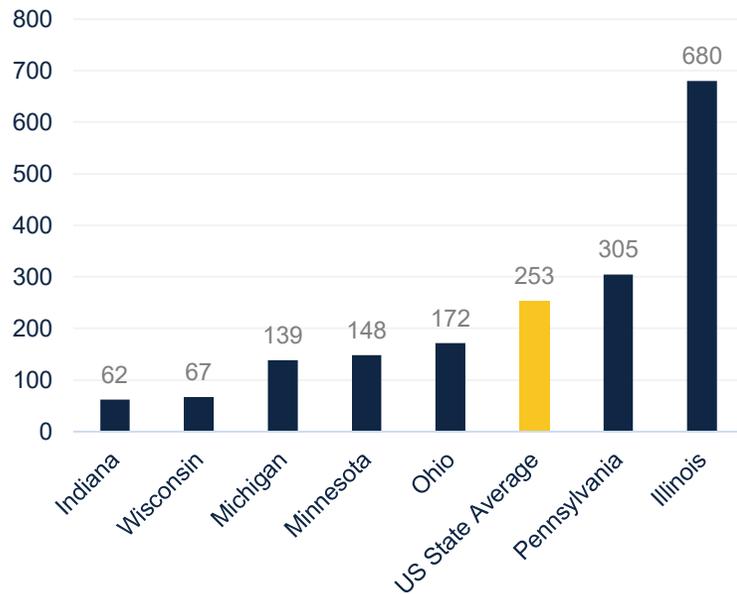
The Great Lakes is projected to benefit significantly from the Inflation Reduction Act's climate-aligned funding, gaining \$177bn in funding or 18% of the national total.

Several states – Illinois, Ohio, Pennsylvania, and Michigan – are projected to see markedly higher investment levels than the US state average.

Business Environment

The Great Lakes region benefits from the best infrastructure and connectivity in the whole country, lower costs, and decent access to capital.

No. of Active Investors, 2018-2022



National Rankings for Cost of Doing Business, 2022

| State | Rank |
|------------------|------|
| Indiana | 2 |
| Ohio | 4 |
| Michigan | 9 |
| Wisconsin | 13 |
| Pennsylvania | 22 |
| Illinois | 31 |
| Minnesota | 41 |
| Regional Average | 17.4 |

National Rankings for Infrastructure, 2022

| State | Rank |
|------------------|------|
| Indiana | 1 |
| Ohio | 2 |
| Illinois | 3 |
| Minnesota | 4 |
| Pennsylvania | 12 |
| Wisconsin | 15 |
| Michigan | 19 |
| Regional Average | 8.0 |

Access to capital for most states is below the US state average, but **Illinois ranks 3rd nationally** for the number of active investors between 2018 and 2022.

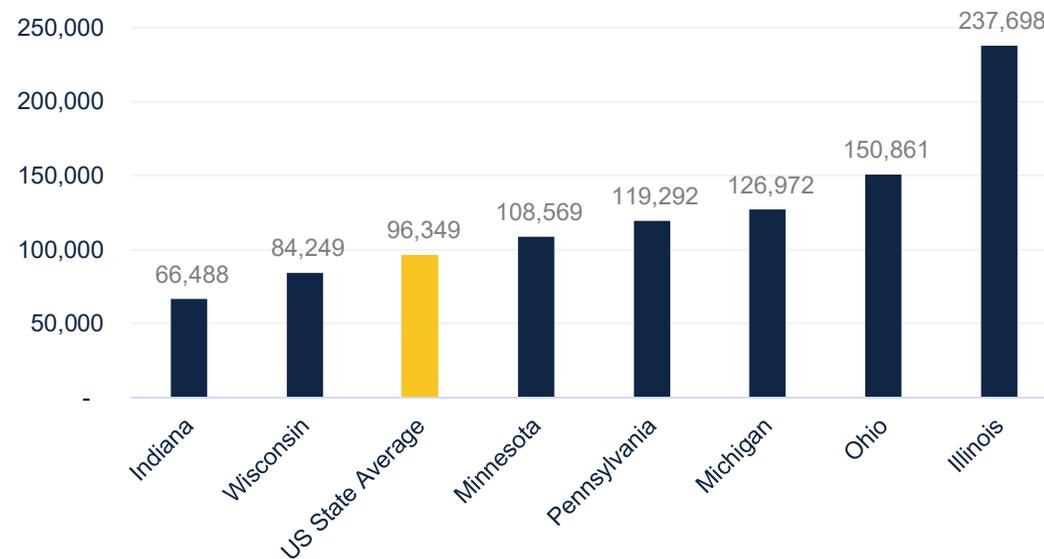
The Great Lakes has the **2nd best average regional ranking for the whole US** on cost competitiveness.

The Great Lakes has the **best average regional ranking for the whole US** on infrastructure.

Talent & Innovation

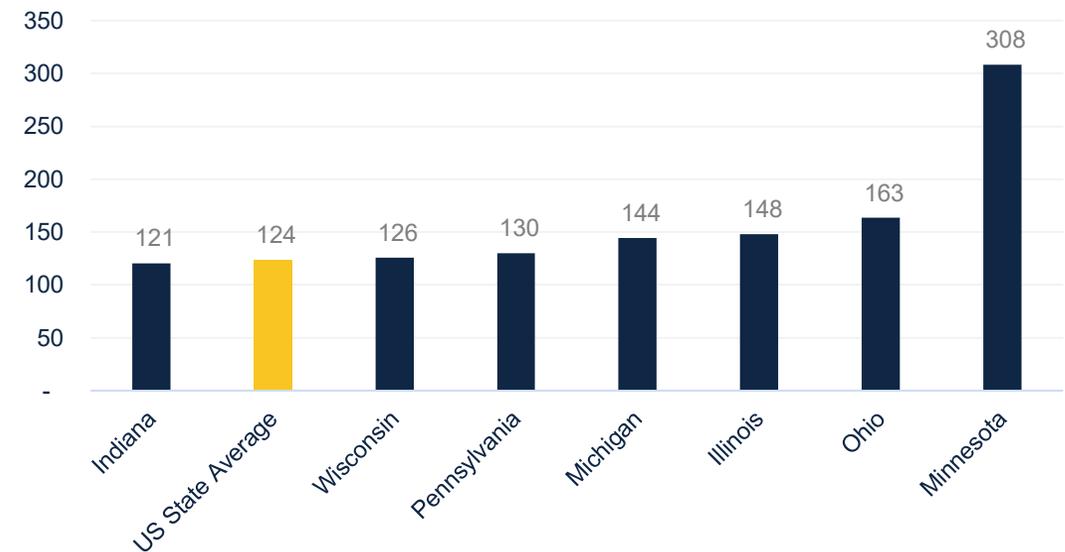
With both skilled technical workers and a high level of innovation and research, the Great Lakes offers both aspects to potential investors in the same region.

Students at Technical & Vocational Colleges, 2020



The region has a strong base of skilled technical workers, and most states have above-average vocational student populations. Combined, the region has a pipeline of almost 900,000 skilled workers, ranking it 3rd nationally.

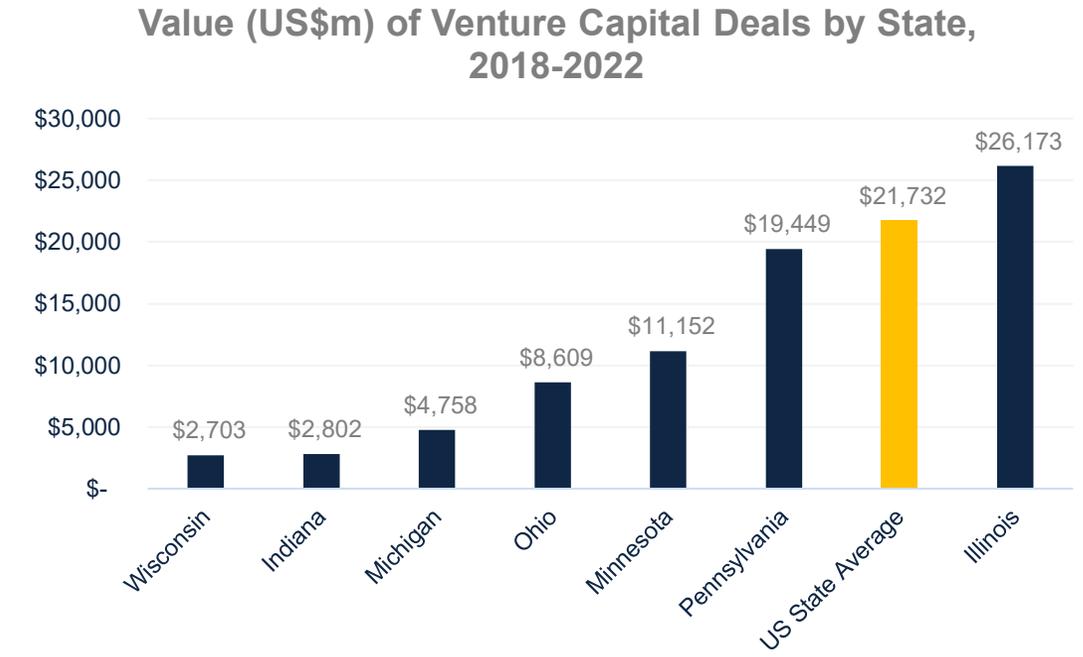
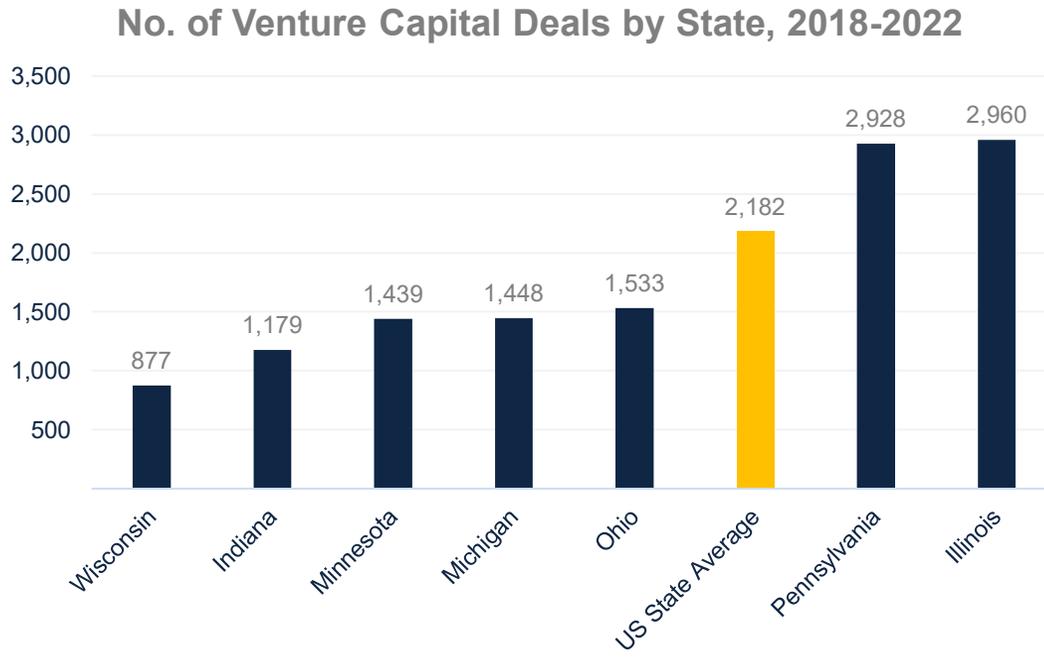
Patents Intensity
(Patent applications per 1,000,000 people, 2022)



Almost all states in the Great Lakes have a higher intensity of patent applications than the US state average, demonstrating its considerable innovation capabilities.

Talent & Innovation

However, levels of venture capital across the region, for both deal count and value, tend to be lower than the national average, though with some high-performers: Pennsylvania and Illinois.



Access to capital for startups in the Great Lakes heavily depends on the state, with **some demonstrating impressive levels of venture capital investment activity**. However, several states fall below the national average and by a significant margin. If California were removed from the analysis, the US state average would drop to 1,514 deals and a value of \$11,637m.

Qualitative Insights of Regional Strengths

Regional Strengths

Access to Water

Almost all EDOs mentioned regional access to water as being a key strength and natural asset that is and will become increasingly important. Especially given the water intensity of a lot of manufacturing activity, the reliability in the Great Lakes – one of the largest sources of freshwater in the world – is a critical benefit.

Natural Assets & Resources

Besides the iron ore and other mineral deposits, the region also has abundant wind and solar resources to transit into the renewable energy.

Low Risk of Extreme Weather

The region's low risk of extreme weather, especially in comparison to the dry west and hurricane- and tornado-prone south and southeast, is another important benefit listed by several of the EDOs. While not all investors have this factor on their radar, it is increasingly mentioned in conversations.

Innovation & Research Ecosystem

Most EDOs mentioned the research and innovation capability within the region. That is backed by both world-class universities and research institutes and the overall welcoming and innovative environment to support energy transition.

Highly Educated & Skilled Workforce

The high quality of education, especially in universities, across the whole region was cited numerous times, particularly for engineering and STEM-related degrees. The technical and vocational college systems also work with the private sector to deliver relevant training, and the history of heavy industry means that the talent pool is familiar with and skilled at many of the exact jobs needed for the energy transition.

Existing Industrial Supply Chain

Beyond talent, the strong industrial base was cited by several EDOs as a key attraction point. From taking advantage of existing supply chains, connecting with industry clusters to using or retrofitting existing manufacturing facilities, investors can benefit enormously by locating in the Great Lakes given its industrial legacy.

Infrastructure & Connectivity

Finally, the region has well-established infrastructure and transportation systems with extensive highways and easy access to airports, rail lines, and ports that connect to both domestic and international markets.

Lower Costs

While not all states are equally low cost, they do tend to be more cost competitive than either of the country's coastal regions.

Qualitative Insights of Regional Strengths

Regional Weaknesses

Slower Population Growth

Demographic issues have been cited by several EDOs as a major concern for the region. Recent demographic trends have skewed towards the southern US at the expense of states in the Great Lakes (and elsewhere). This could lead to a tight labor market and a shortage of workforce in the long term, driving business away to other regions.

Labor Laws

Four out of the seven Great Lakes states are not “right-to-work” states, providing greater protections for workers but less flexibility for businesses. Some EDOs noted that this is not much of a concern for their investment attraction efforts given they are targeting Northern and Western European companies with a similar culture.

Lack of International Prominence

Several EDOs mentioned that the region falls short in international awareness in comparison to more well-known states such as New York, California, and Texas.

Little Strategic Focus on Energy Transition Sectors

For most EDOs, actively targeting this investment either started just a few years ago or has not begun yet, with agencies mostly reacting to inquiries rather than pursuing a clear strategy.

Tax and Incentives

Overall, although almost all EDOs mentioned that they provide discretionary incentives and funding to support companies – depending on the investment value, jobs created, and location – some do not offer them given local political climates. Moreover, almost all of these support mechanisms are sector-agnostic, not really focusing on energy transition projects, with Minnesota as the exception.

Politicization

Although this affects most of the country, the Great Lakes is a region made up of both red and blue states, which can impact any collaboration opportunities that could benefit the region as a whole by solving cross-state issues. Moreover, opposition to renewable energy projects at both the state and local levels can hamper investment and deployment.

Permitting & Site Availability

Again, the issue of permitting and site availability is relevant across the country. Companies can face logistical, infrastructural, and administrative barriers to accessing the right sites for their investment. This is particularly problematic for large projects, which are a significant share of energy transition projects.

Great Lakes Foreign Investor Testimonials

“

"Our new Detroit subsidiary, our first in North America, will allow us to serve local needs. By locating **close to our customers**, we will be able to better understand their needs and improve our global supply chain. "

Allan Wang, General Manager, North America at CATL

“

“[Minnesota’s] **favorable regulatory environment, excellent wind resource**, and **advantageous transmission expansion**, is vital to bringing wind projects to operation.”

Kate O'Hair, Development Vice President, EDF Renewable Energy

“

"We found Columbus to have the right ecosystem of potential **supply chain partners, academic partners**, and the **right fit for workforce** as we are looking at hiring production operators, R&D engineers and a full leadership team to run our North American activity."

Christophe Gurtner, Chief Executive Officer, Forsee Power

“

"We chose to invest in Indianapolis, Indiana due to its **strong pro-business climate** and **optimal proximity to customers**."

Jens Luehring, Chief Executive Officer of Messer Americas

Intra-Regional Pillar Analysis

Illinois and Ohio have the most competitive general business environment, scoring highly across most pillars. However, there are some key differences: Minnesota, Illinois, and Michigan lead on sustainability while Ohio, Pennsylvania, and Wisconsin lead on cost competitiveness.

| | Macro & Sustainability | | Business Environment | | | Talent & Innovation | |
|--------------|------------------------|----------------|------------------------|--------|--------------|---------------------|------------|
| State | Macro-economics | Sustainability | Ease of Doing Business | Cost | Connectivity | Talent | Innovation |
| Illinois | High | High | High | High | High | High | High |
| Ohio | High | Medium | High | High | High | High | High |
| Minnesota | Medium | High | Medium | Medium | High | Medium | High |
| Pennsylvania | High | Medium | Medium | High | High | High | High |
| Michigan | High | High | Medium | Medium | High | High | High |
| Indiana | High | Medium | Medium | High | High | Medium | Medium |
| Wisconsin | Medium | Medium | High | High | Medium | Medium | Medium |

Metropolitan Statistical Area Pillar Analysis

The Greater Chicago area unsurprisingly performs best within the Great Lakes region given its size and legacy as a key strategic location; Minneapolis-St. Paul and Columbus, OH also rank highly, according to our general business environment analysis. Some data points use state-level data.

| | Macro & Sustainability | | Business Environment | | | Talent & Innovation | |
|---|------------------------|----------------|------------------------|-------------|--------------|---------------------|-------------|
| Metropolitan Statistical Area | Macro-economics | Sustainability | Ease of Doing Business | Cost | Connectivity | Talent | Innovation |
| Chicago-Naperville-Elgin, IL-IN-WI | Green | Green | Green | Green | Green | Green | Green |
| Minneapolis-St. Paul-Bloomington, MN-WI | Green | Green | Light Green | Light Green | Green | Green | Green |
| Columbus, OH | Green | Light Green | Green | Green | Light Green | Light Green | Light Green |
| Cincinnati-Middletown, OH | Green | Light Green | Green | Green | Green | Light Green | Light Green |
| Detroit-Warren-Dearborn, MI | Green | Green | Light Green | Yellow | Light Green | Green | Green |
| Cleveland-Elyria, OH | Light Green | Light Green | Green | Green | Green | Light Green | Light Green |
| Pittsburgh, PA | Light Green | Yellow | Light Green | Green | Light Green | Light Green | Light Green |
| Indianapolis-Carmel-Anderson, IN | Green | Light Green | Light Green | Light Green | Green | Light Green | Light Green |
| Toledo, OH | Yellow | Light Green | Green | Green | Light Green | Light Green | Light Green |
| Grand Rapids-Kentwood, MI | Green | Green | Light Green | Yellow | Yellow | Light Green | Light Green |
| Madison, WI | Light Green | Light Green | Light Green | Green | Yellow | Yellow | Light Green |
| Milwaukee-Waukesha, WI | Light Green | Light Green | Light Green | Green | Light Green | Light Green | Light Green |
| Fort Wayne, IN | Light Green | Light Green | Yellow | Light Green | Light Green | Yellow | Yellow |

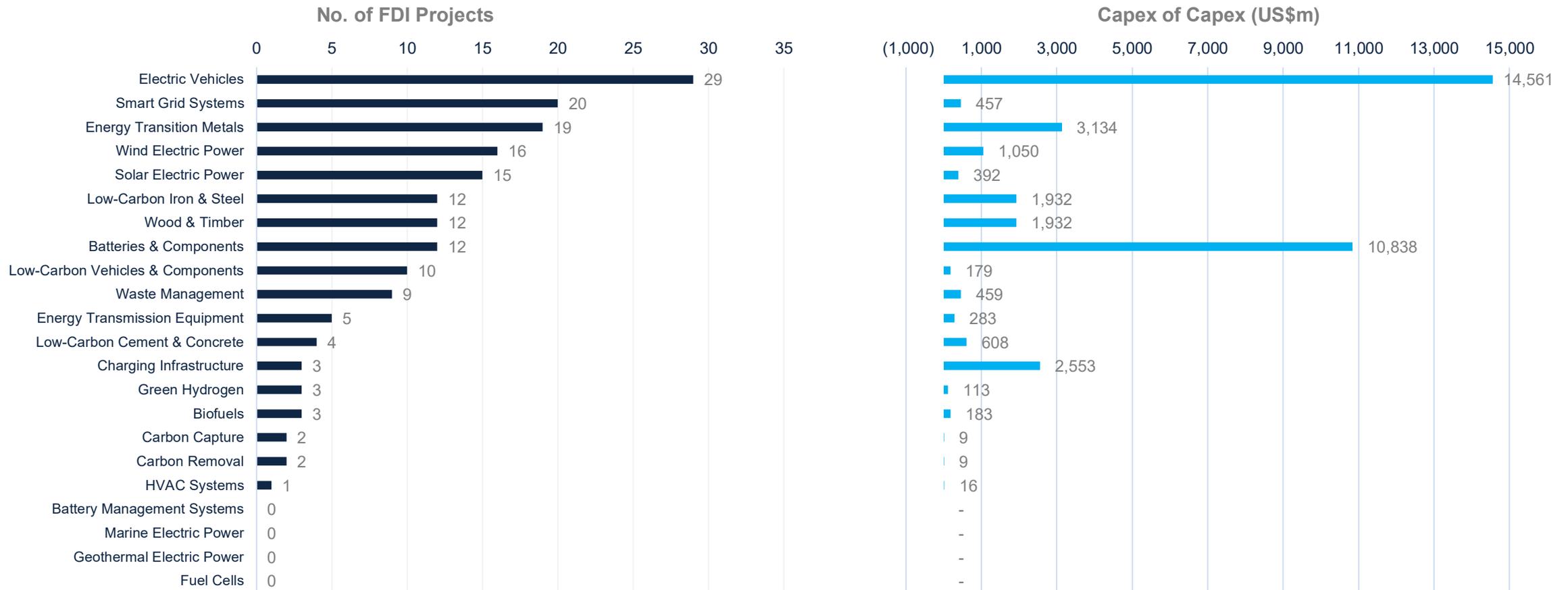
5. Energy Transition Opportunities in the Great Lakes Region



Opportunity Overview of Key Energy Sectors

Over the last five years, the Great Lakes have seen a significant amount of capital and foreign investment in key energy transition sectors, with particularly high-value projects in the EV, batteries, and transition metals sectors.

Size of FDI Opportunity in Key Energy Transition Sectors (2018-2022)

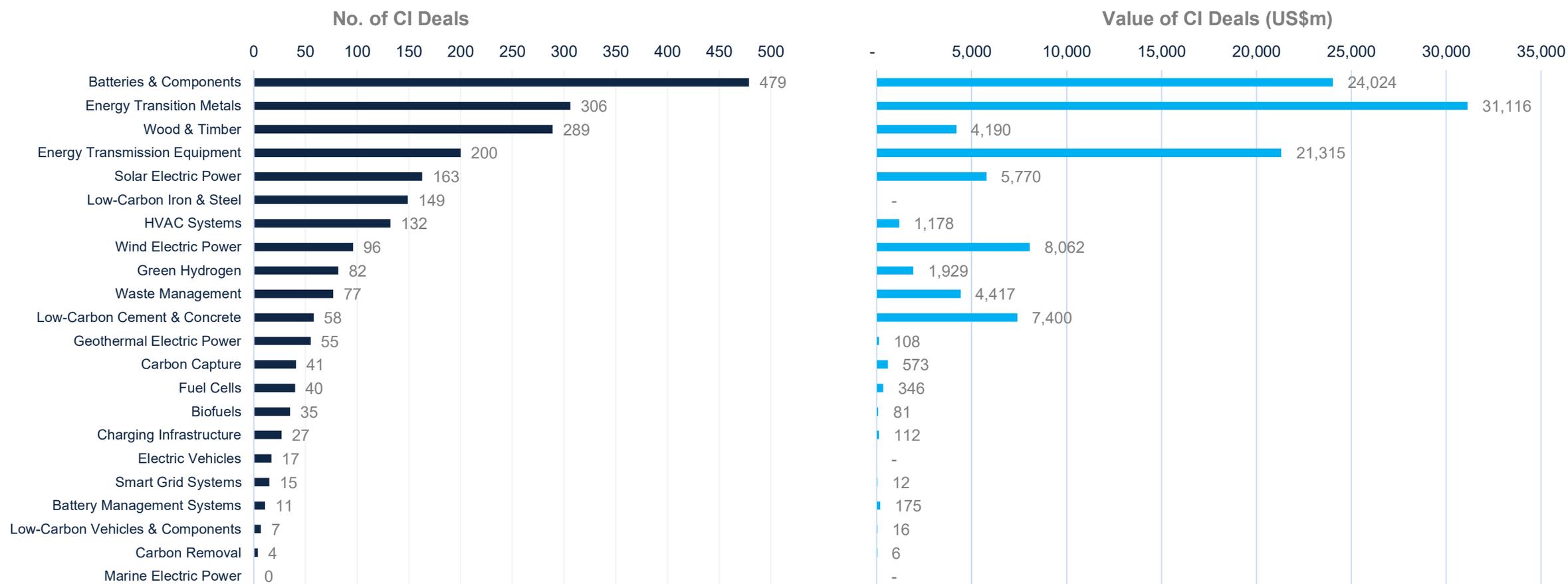


Source: OCO Analysis, fDi Markets.

Opportunity Overview of Key Energy Sectors

Capital investment trends partially align with foreign investment trends. Batteries and transition metals have received high levels of investment but so have energy transmission equipment, wind, and cement & concrete.

Size of Capital Investment Opportunity in Key Energy Transition Sectors (2018-2022)



Source: OCO Analysis, Pitchbook.

Intra-Regional Sector Analysis

Investments in the EV and battery supply chain have mostly been in Illinois, Michigan, and Ohio; Ohio and Indiana both have strong solar power clusters; and iron & steel is strongest in Pennsylvania, Ohio, and Michigan.

| State | Electric Vehicles | Batteries & Components | Solar Power | Wind Power | Energy Transmission Equipment | Smart Grid Systems | Hydrogen | Energy Transition Metals | Iron & Steel | Biofuels |
|--------------|-------------------|------------------------|-------------|------------|-------------------------------|--------------------|----------|--------------------------|--------------|----------|
| Illinois* | 🎯 | 🎯 | 🎯 | 🎯 | | | | | | |
| Michigan** | | | | | | | | | | |
| Ohio | 🎯 | 🎯 | | | | | 🎯 | | | |
| Pennsylvania | | 🎯 | | 🎯 | | | 🎯 | 🎯 | 🎯 | |
| Indiana | | | 🎯 | | | | 🎯 | | 🎯 | |
| Wisconsin | 🎯 | | | | 🎯 | | | 🎯 | | |
| Minnesota | | | 🎯 | 🎯 | | | 🎯 | | | 🎯 |

The above table maps out each state’s sectoral capabilities using the results from our supply and demand model as well as which states are interested in or already targeting the various sectors based on our conversations with EDOs from across the Great Lakes. Given that we spoke mostly to state-level EDOs, we have opted to display just target sectors by state for consistency.

Source: OCO Analysis. For full list of indicators and weightings, please see Annex C.

* Based on conversations with World Business Chicago and therefore not fully representative of Illinois.

**No response from EDOs in Michigan.

Metropolitan Statistical Area Sector Analysis

At the city region level, EV, battery, and hydrogen investments have mostly centered around Chicago and Detroit; solar investments have concentrated in Indianapolis too; and iron & steel in Pittsburgh, Detroit, and Chicago.

| Metropolitan Statistical Area | Electric Vehicles | Batteries & Components | Solar Power | Wind Power | Energy Transmission Equipment | Smart Grid Systems | Hydrogen | Energy Transition Metals | Iron & Steel | Biofuels |
|---|-------------------|------------------------|-------------|------------|-------------------------------|--------------------|----------|--------------------------|--------------|----------|
| Chicago-Naperville-Elgin, IL-IN-WI | Green | Green | Green | Green | Green | Green | Green | Green | Green | Green |
| Detroit-Warren-Dearborn, MI | Green | Green | Yellow | Green | Green | Yellow | Green | Green | Green | Yellow |
| Minneapolis-St. Paul-Bloomington, MN-WI | Yellow | Yellow | Yellow | Green | Yellow | Green | Green | Green | Green | Green |
| Pittsburgh, PA | Green | Green | Yellow | Yellow | Green | Yellow | Yellow | Green | Green | Green |
| Milwaukee-Waukesha, WI | Yellow | Green | Yellow | Green | Green | Green | Green | Yellow | Green | Green |
| Indianapolis-Carmel-Anderson, IN | Yellow | Green | Green | Green | Green | Yellow | Yellow | Green | Green | Yellow |
| Columbus, OH | Yellow | Yellow | Green | Yellow | Green | Green | Green | Green | Green | Green |
| Cleveland-Elyria, OH | Green | Green | Yellow | Yellow | Green | Yellow | Green | Green | Green | Green |
| Grand Rapids-Kentwood, MI | Yellow | Green | Yellow | Green | Green | Yellow | Yellow | Yellow | Green | Green |
| Cincinnati-Middletown, OH | Green | Yellow | Green | Green | Green | Green | Yellow | Green | Green | Green |
| Madison, WI | Yellow | Green | Green | Yellow | Yellow | Green | Yellow | Green | Yellow | Green |
| Toledo, OH | Yellow | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Yellow | Green | Yellow |
| Fort Wayne, IN | Yellow | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Green | Yellow | Yellow |

Source: OCO Analysis. For full list of indicators and weightings, please see Annex C.

Electric Vehicles

The Electric Vehicles sector is a huge opportunity for the Great Lakes region, one that has already seen numerous multi-billion-dollar investments.

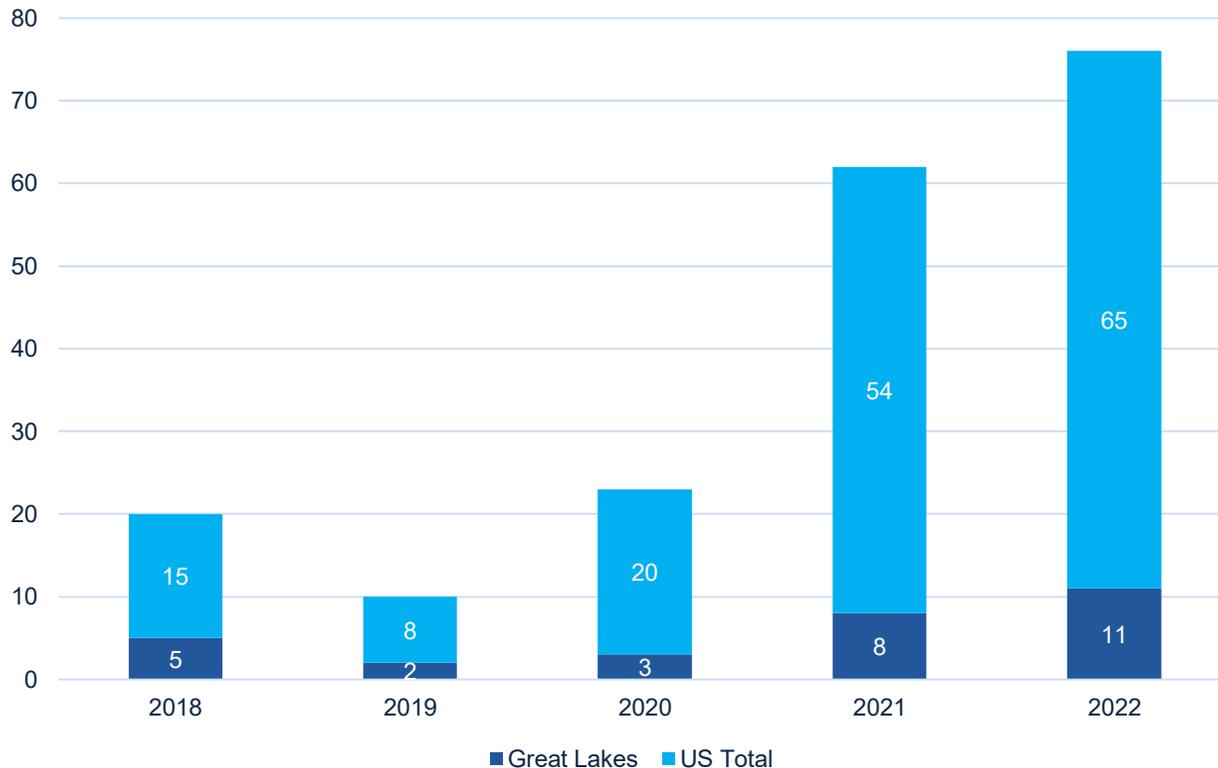
Perhaps unsurprisingly, many of these large investments are landing in Ohio and Michigan, with a particularly strong concentration around Detroit. These states – alongside the whole region – have a strong legacy of automotive manufacturing, thereby offering investors the expertise, talent, and existing supply chains needed for their large-scale investments.



FDI Opportunities in the Electric Vehicles Sector

Foreign investment in the electric vehicles sector has grown dramatically in the Great Lakes at a 22% CAGR since 2018. The national growth rate has been even higher, indicating room for the region to capitalize on its strengths.

No. of FDI Projects in Electric Vehicles in the Great Lakes and nationally, 2018-2022



Great Lakes



22%

Projects - CAGR 2018-2022

29

Total Projects
(2018-2022)

\$14,561m

Total Capex
(2018-2022)

14,563

Total Jobs
(2018-2022)

United States



44%

Projects - CAGR 2018-2022

162

Total Projects
(2018-2022)

\$62,388m

Total Capex
(2018-2022)

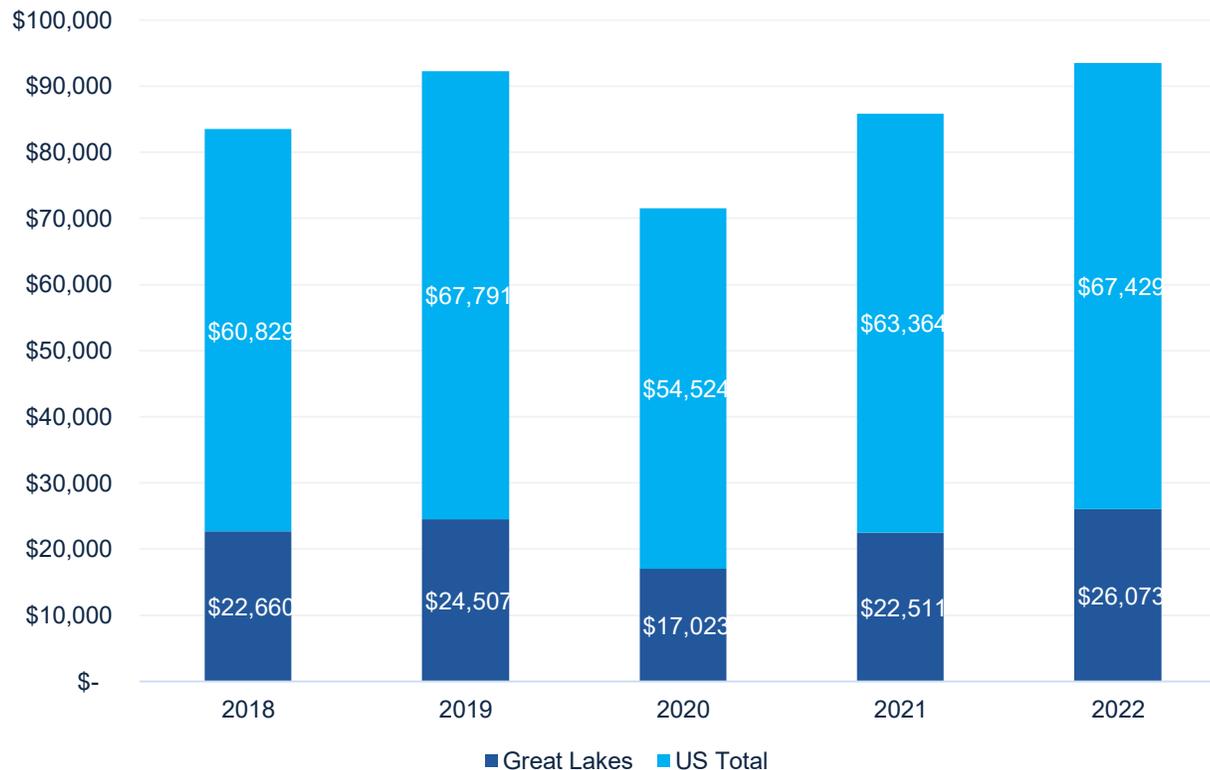
72,095

Total Jobs
(2018-2022)

Export Opportunities in the Electric Vehicles Sector

The Great Lakes region is the number two US region for exports in the automotive* sector, responsible for 38% of national exports in 2022. It is just behind the Southeast (\$27.8bn in 2022).

Value of Exports (US\$m) in the Automotive Sector in the Great Lakes and Nationally, 2018-2022



Great Lakes

↑ **3.6%**
CAGR 2018-2022

\$26,073m
Total Export Value
(2022)

United States

↑ **2.6%**
CAGR 2018-2022

\$67,428m
Total Export Value
(2022)

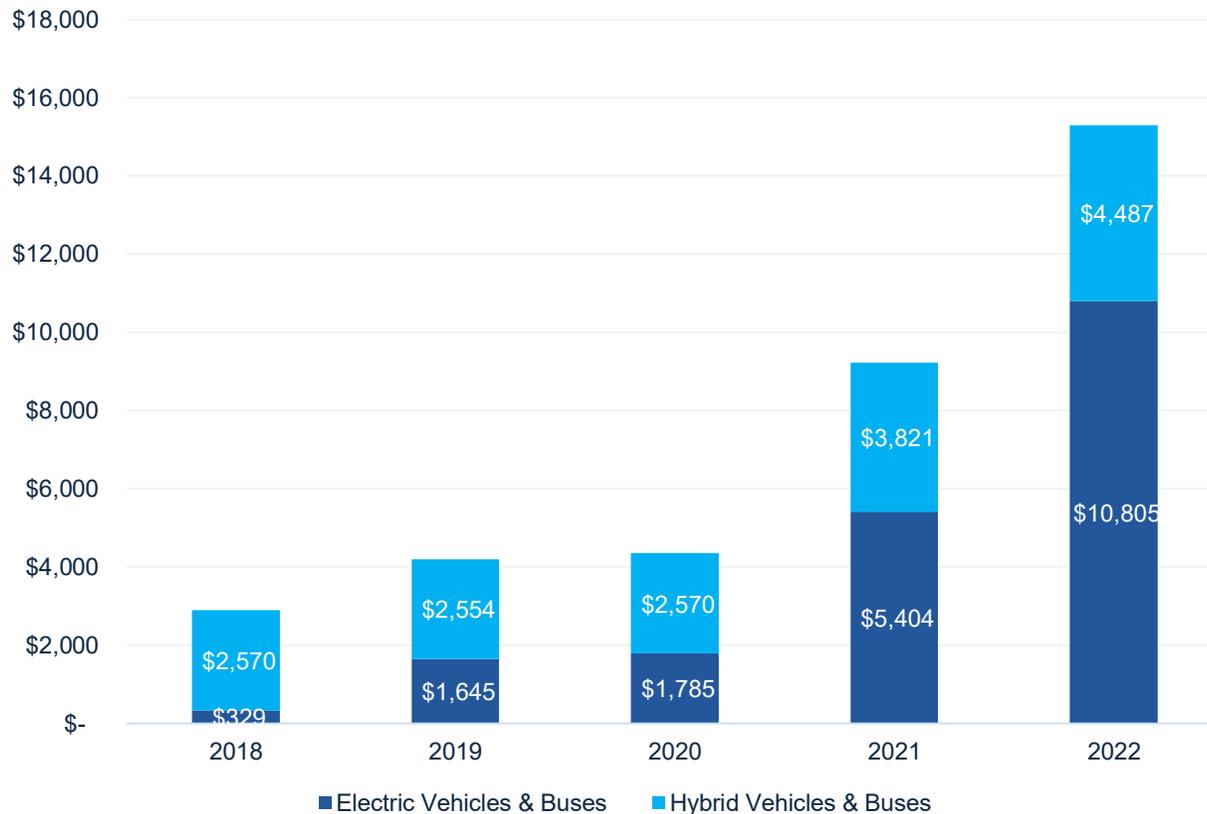
Source: OCO Analysis, USA Trade.

* Data availability constrained the granularity of state-level data, and therefore this data includes the whole automotive industry rather than focusing on electric vehicles.

Export Opportunities in the Electric Vehicles Sector

US exports of hybrid and fully electric vehicles have skyrocketed over recent years and represent the lion's share of growth in the automotive industry.

US Electric & Hybrid Vehicle Exports (US\$m), 2018-2022



Electric Vehicles & Hybrids

52%
CAGR 2018-2022

\$15,292m
Total Export Value
(2022)

Traditional Automotive Sector

-1.7%
CAGR 2018-2022

\$42,541m
Total Export Value
(2022)

Source: OCO Analysis, COMTRADE.

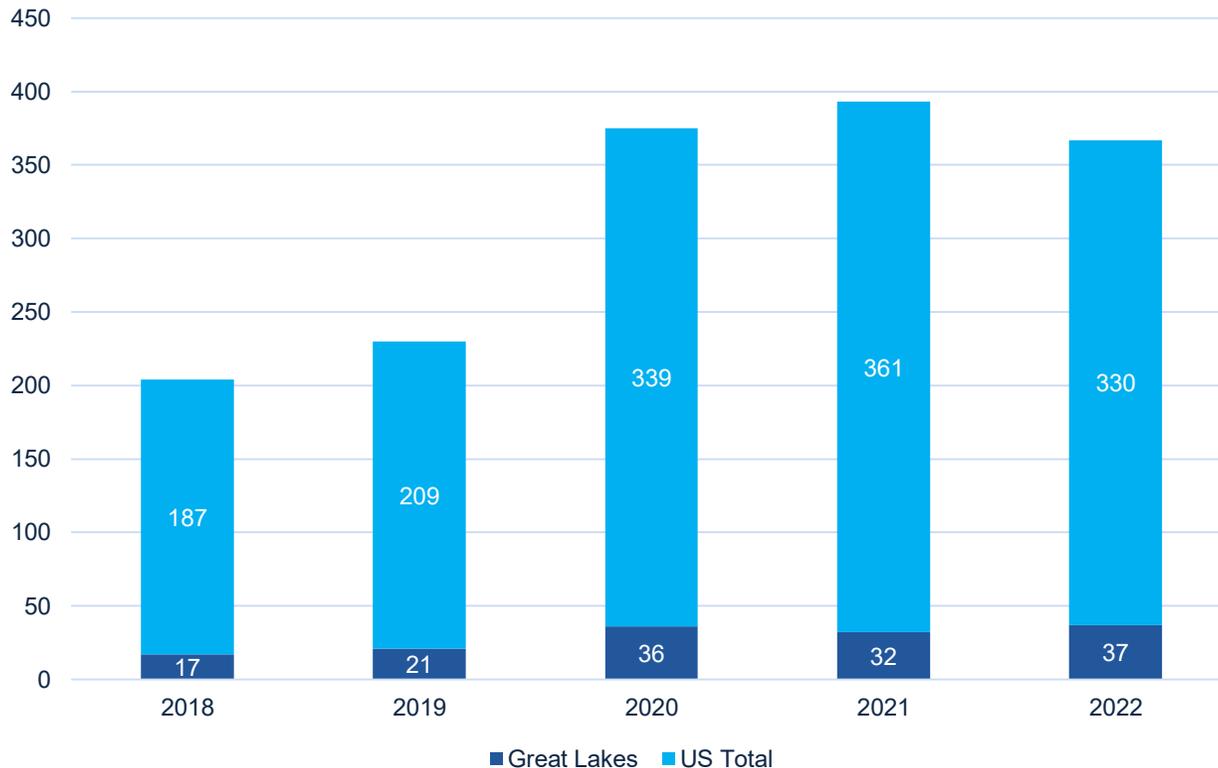
* Data availability at the international level offered more granularity, thereby showing the growth of US exports in electric and hybrid vehicles.

** The value of total US exports for both categories differs slightly between the two different sources, USA Trade and COMTRADE, due to different coding systems.

Capital Investment in the Electric Vehicles Sector

While capital investment in electric vehicles in the **Great Lakes** is a small share of the US total, it **has performed significantly better than the US as a whole**, showing consistent growth since 2018.

No. of Capital Investment Deals in Electric Vehicles in the Great Lakes and nationally, 2018-2022



Great Lakes



22%

CAGR 2018-2022

143

Total No. of Deals
(2018-2022)

46%

CAGR 2018-2022

\$1,207m

Total Value
(2018-2022)

United States



15%

CAGR 2018-2022

1,426

Total No. of Deals
(2018-2022)



-32%

CAGR 2018-2022

\$13,508m

Total Value
(2018-2022)

Top 10 Foreign Investments in Electric Vehicles

(2018-2022)

Major foreign investors have committed billions of dollars in investments in the region.

| Company | Company & Project Description | State | Capex (US\$M) |
|------------------------------------|--|----------------------|-----------------|
| Honda (Japan) | <u>Aug 2022</u> – Automaker Honda Motor Company, a subsidiary of Japan-based Honda Motor Company, has announced it will invest \$3.5bn in a lithium-ion battery plant for electric vehicles in Fayette County, Ohio, US. The project will be a joint venture with South Korea-based LG Energy Solution and will employ 2,200. The companies aim for an annual production capacity of approximately 40 GWh with the batteries supplied exclusively to Honda facilities in North America to power Honda and Acura EV models. The project is receiving support from relevant authorities. Construction is planned to begin in early 2023, with production expected to commence by the end of 2024. | Fayette County, Ohio | \$3.5bn |
| Stellantis (Netherlands) | <u>Jul 2021</u> – Netherlands-based Stellantis, a multinational automotive manufacturing corporation, has announced that in a joint venture with Samsung SDI, a subsidiary of South-Korea based Samsung Group, it will invest more than \$2.5bn to build an electric vehicle battery plant in Kokomo, Indiana. The new facility will supply battery modules for a range of vehicles produced at Stellantis' North America assembly plants. Targeted to start operations in the first quarter of 2025, the plant aims to have an initial annual production capacity of 23-gigawatt hours, which will later be increased to 33-gigawatt hours. The investment is expected to create 1,400 new jobs and could gradually increase up to \$3.1bn. The project is supported by Indiana state officials and the Indiana Economic Development Corporation. <i>“Just under one year ago, we committed to an aggressive electrification strategy anchored by five gigafactories between Europe and North America. Today’s announcement further solidifies our global battery production footprint and demonstrates Stellantis’ drive toward a decarbonized future outlined in Dare Forward 2030. I am grateful to Governor Holcomb and Secretary Chambers along with Mayor Moore, and their teams as well as to all my colleagues for their support and dedication to bring this operation to Kokomo, a city that holds a rich and long history for our company,” said Carlos Tavares, chief executive officer, Stellantis.</i> | Kokomo, Indiana | \$2.5bn |
| Gotion (China) | <u>Sep 2022</u> – Gotion, a researcher and developer of batteries for vehicles, and a subsidiary of China-based Guoxuan High-tech Co, has announced it plans to build a new manufacturing facility at the intersection of 18 Mile Road and 220th Avenue in Mecosta County, Michigan, US. The site will see an investment of up to \$2.36bn and create 2,350 jobs by 2032. The facility is expected to produce up to 150,000 tonnes of cathode material and 50,000 tonnes of anode material a year for electric vehicles. The Michigan Economic Development Corporation is working with the company to establish the project in the state, with the state estimated to be contributing about \$715 million in financial incentives for the Gotion facility. | Michigan | \$2.36bn |

Top 10 Foreign Investments in Electric Vehicles

(2018-2022)

Major foreign investors have committed billions of dollars in investments in the region.

| Company | Company & Project Description | State | Capex (US\$M) |
|--|---|--------------------|----------------|
| LG Chem (South Korea) | <u>Dec 2019</u> – LG Chem, a petrochemicals, information and electronic materials company and a subsidiary of South Korea-based LG, has announced plans to open a manufacturing facility for electric vehicle batteries in Lordstown, Ohio, in a JV with Michigan-based General Motors. Representing an investment of \$2.3bn , it will be located near GM's closed assembly plant there and will employ more than 1100 staff. Construction is to begin in mid-2020 and the plant will have an annual capacity of more than 30 gigawatt-hours when open in 2022, with the flexibility to further expand. It will accelerate GM's initiative to introduce 20 new electric vehicles globally by 2023. | Lordstown, Ohio | \$2.3bn |
| LG Energy Solution (South Korea) | <u>Jan 2022</u> – LG Energy Solution, an electric vehicle battery manufacturer and a subsidiary of South Korea-based LG, has announced that it will invest \$1.5bn to expand its lithium-ion battery manufacturing site in Holland, Michigan. The investment will construct a new building and several support buildings, totaling around 92,905 sq m. Expected to complete in 2025, the expansion will create up to 1,000 new jobs. The project is supported by the city of Holland in the form of a \$525m incentive package, as well as by the Michigan Economic Development Corporation. | Holland, Michigan | \$1.5bn |
| Semcorp Manufacturing (China) | <u>Mar 2022</u> – Semcorp Manufacturing USA, a manufacturer of separator film used within lithium-ion batteries and a subsidiary of China-based Semcorp, has announced plans to invest \$916m to open a manufacturing facility in Sidney, Ohio. Located at the Sidney Ohio Industrial Park, the 78,970 sq m facility will manufacture separator film, a key component in batteries for electric vehicles . It will serve the electric vehicle battery market in North America. The plant is expected to create around 1,200 new jobs. The Ohio Tax Credit Authority has approved a 15-year, 2.1% tax credit for the project, estimated at a value of \$22.7m. The project is supported by JobsOhio, the Dayton Development Coalition, the Sidney-Shelby Economic Partnership, the city of Sidney, and Shelby County. <i>"SEMCorp chose the Sidney location because of the state's impressive commitment to vocational education, preparedness for a large-scale project like ours, the strong work ethic in the region, and proximity to key customers. We're thrilled to call Sidney home, and we're going to do all that we can to earn the trust of the local community," said James Shih, vice-president, global projects.</i> | Sidney, Ohio | \$916m |
| Toyota (Japan) | <u>April 2021</u> - Automotive company Toyota Motor Manufacturing Indiana, which operates as a subsidiary of Japan-based Toyota Motor, is to expand its facilities in Princeton, Indiana, US. The company will be adding two new electric SUVs to production which will create 1400 jobs. Production will start in mid-to-late 2023. Toyota also said that the new SUVs will have a semi-automated driving system which will allow for hands-free driving in certain conditions. Additionally, the vehicles will have a remote parking feature that allows the driver to park while outside the vehicle using a smartphone. | Princeton, Indiana | - |

Top 10 Foreign Investments in Electric Vehicles

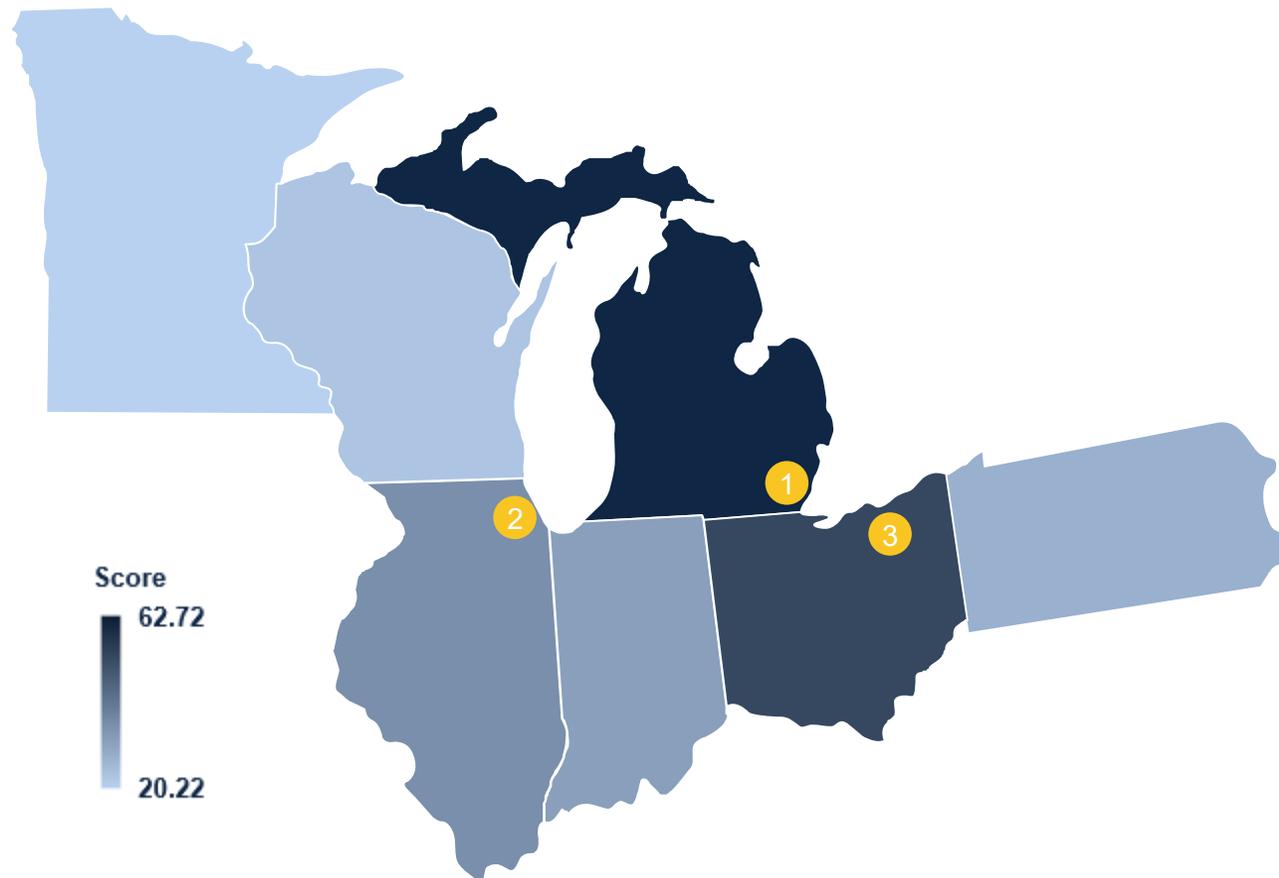
(2018-2022)

Major foreign investors have committed billions of dollars in investments in the region.

| Company | Company & Project Description | State | Capex (US\$M) |
|----------------------------------|--|------------------------|---------------|
| FLO (Canada) | <u>June 2022</u> - FLO, a subsidiary of Canada-based AddÉnergie, a provider of smart charging solutions for electric vehicles, will open an EV charger manufacturing facility in Auburn Hills, Michigan, US. The facility will create 500 new jobs and is expected to be operational by late 2022. The project is supported by the Michigan Economic Development Corporation. The company expects to produce 250,000 EV chargers by 2028 for the US market. | Auburn Hills, Michigan | - |
| SF Motors (China) | <u>Mar 2018</u> – SF Motors, a manufacturer of electric vehicles and a subsidiary of China-based Chongqing Sokon Industry Group, will commence operations at its new \$160m facility in Indiana, US by the end of 2020. The company has plans to hire many of the 435 employees who lost their jobs when AM General closed the plant. The facility could employ 200 workers by the end of 2018 and will allow the firm to better serve the US market. | Indiana | \$160m |
| Lion Electric (Canada) | <u>May 2021</u> – Canada-based Lion Electric, a manufacturer of electric school buses , has announced it is to establish a manufacturing facility in Joliet, Illinois, US. The company is to invest at least \$70m over a 3-year period. The company will build an 83,610 sq m facility which will have an annual production capacity of 20,000 all-electric buses and trucks. The facility will create 745 jobs and is to begin operation in the second half of 2022. P33 and Intersect Illinois worked to secure the project for Illinois. It will serve markets in the US. | Joliet, Illinois | \$70m |

Regional Capabilities and Cluster Identification

Michigan has the largest cluster of recent electric vehicle investment in the region, especially in Greater Detroit; Ohio and Illinois follow, with clusters in Chicago and Cleveland-Elyria.



| Metropolitan Statistical Area | Score | Rank |
|---|-------|------|
| Detroit-Warren-Dearborn, MI | 51.36 | 1 |
| Chicago-Naperville-Elgin, IL-IN-WI | 39.27 | 2 |
| Cleveland-Elyria, OH | 14.95 | 3 |
| Pittsburgh, PA | 12.55 | 4 |
| Indianapolis-Carmel-Anderson, IN | 11.34 | 5 |
| Cincinnati-Middletown, OH | 8.19 | 6 |
| Milwaukee-Waukesha, WI | 6.34 | 7 |
| Columbus, OH | 5.86 | 8 |
| Grand Rapids-Kentwood, MI | 5.63 | 9 |
| Minneapolis-St. Paul-Bloomington, MN-WI | 4.02 | 10 |
| Madison, WI | 2.84 | 11 |
| Toledo, OH | - | 12 |
| Fort Wayne, IN | - | 13 |

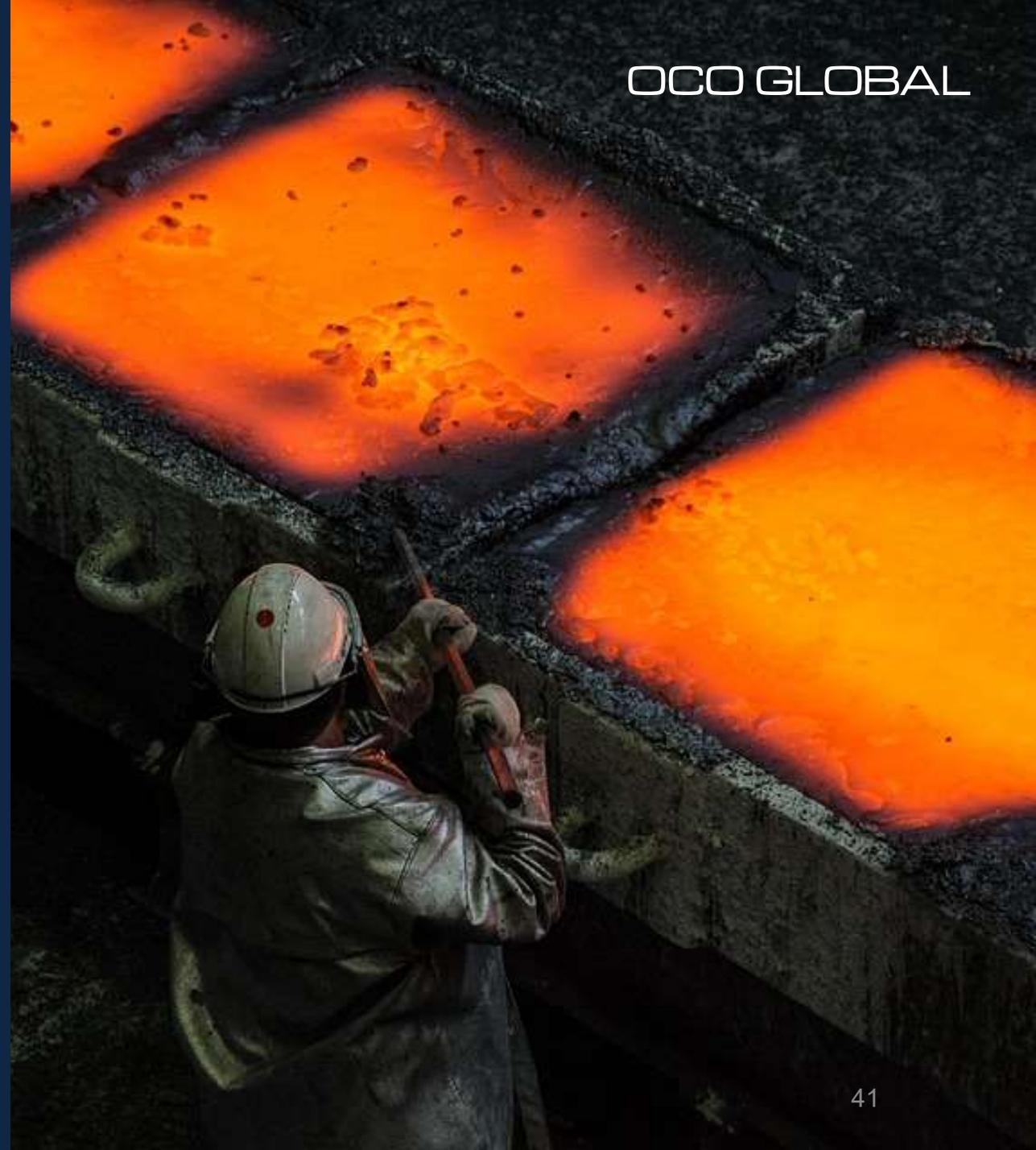
Source: OCO Analysis.

* Score is based on the supply & demand data model developed to understand capabilities across locations and sectors. Full list of indicators available in Annex C.

Iron & Steel

Although the iron & steel industry in the Great Lakes region does not currently have much foreign investment in low-carbon production processes, the region's historical strength gives it a unique advantage in this emerging industry, one that has enormous global potential.

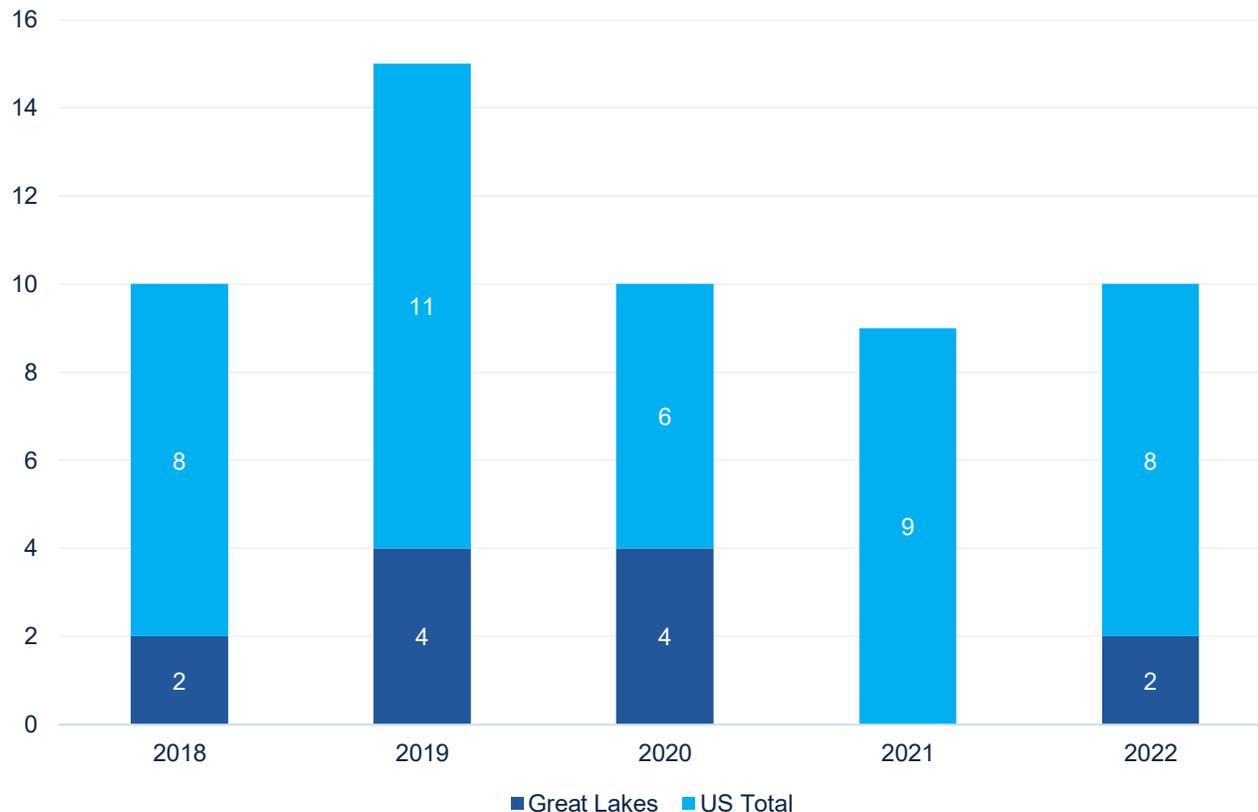
We have therefore analyzed this sector using data on the traditional industry to show the region's strength, while highlighting the low-carbon opportunity at the global level.



FDI Opportunities in the Iron & Steel Sector

Foreign investment in the iron & steel sector has not shown significant growth in the Great Lakes since 2018. The national growth rate has been flat as well, indicating a relatively stable investment landscape.

No. of FDI Projects in Electric Vehicles in the Great Lakes and nationally, 2018-2022



Source: OCO Analysis, fDi Markets.

Great Lakes

28.5%

Share of US Total FDI Projects

12

Total Projects
(2018-2022)

\$1,932m

Total Capex
(2018-2022)

313

Total Jobs
(2018-2022)

United States

0%

Projects - CAGR 2018-2022

42

Total Projects
(2018-2022)

\$3,936m

Total Capex
(2018-2022)

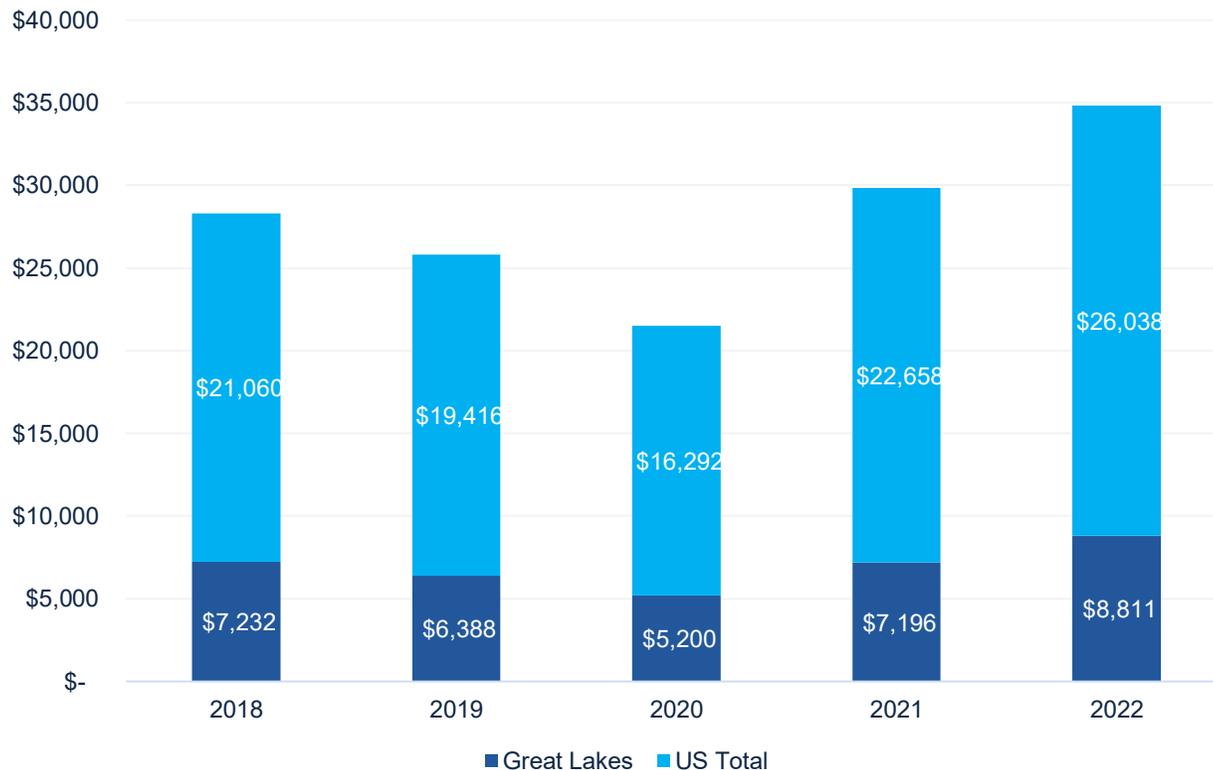
2,402

Total Jobs
(2018-2022)

Export Opportunities in the Iron & Steel Sector

The Great Lakes region is the number one US region for exports in the iron & steel sector, responsible for almost 34% of national exports in 2022. The second-largest export region, the Southwest, exports 20% of the US total.

Value of Exports (US\$m) in the Iron & Steel Sector in the Great Lakes and Nationally, 2018-2022



Great Lakes

5.1%

CAGR 2018-2022

\$8,811m
Total Export Value
(2022)

United States

5.4%

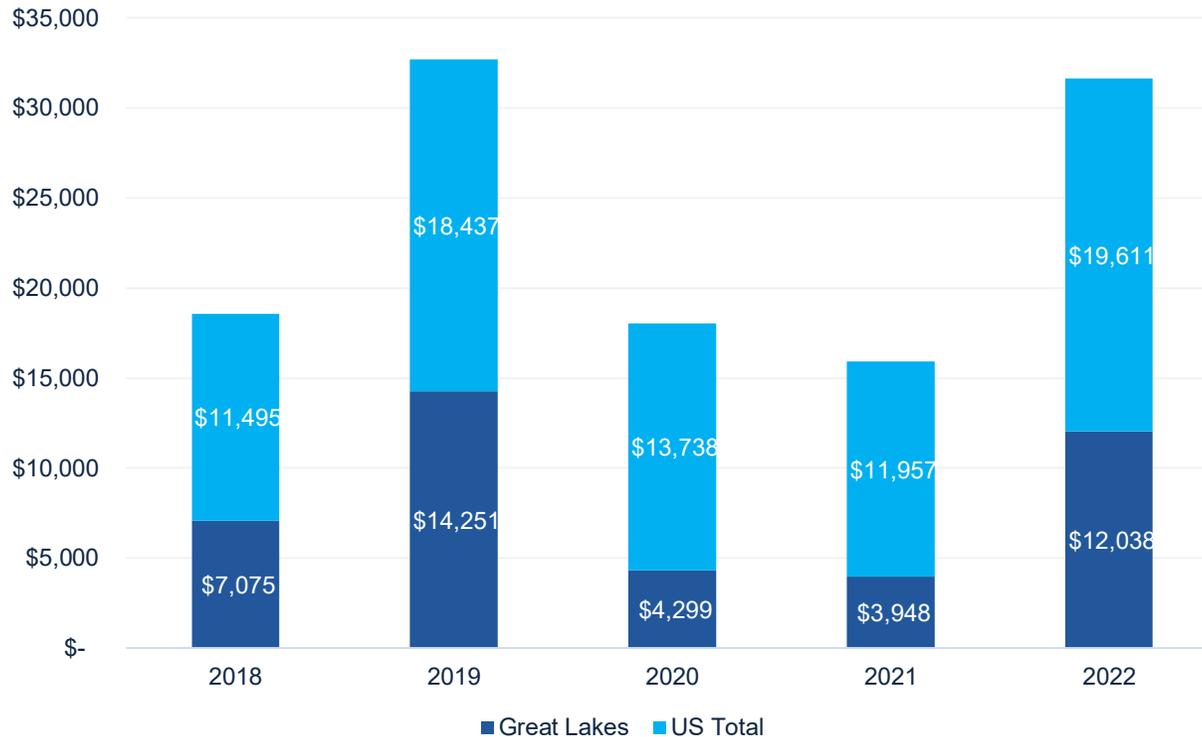
CAGR 2018-2022

\$26,038m
Total Export Value
(2022)

Capital Investment in the Iron & Steel Sector

That the number of capital investment deals is falling while the total value is increasing – both nationally and in the Great Lakes – indicates **an industry shift towards fewer but larger investments in the iron & steel industry**. Over half of these investments are mergers & acquisitions.

Value (US\$m) of Capital Investment Deals in Iron & Steel in the Great Lakes and Nationally, 2018-2022



Great Lakes



-5.1%
CAGR 2018-2022

1,701

Total No. of Deals
(2018-2022)



30.7%
CAGR 2018-2022

\$41,611m

Total Value
(2018-2022)

United States



-2.6%
CAGR 2018-2022

5,028

Total No. of Deals
(2018-2022)



42.1%
CAGR 2018-2022

\$75,239m

(2018-2022)

Top 10 Foreign Investments in Iron & Steel

(2018-2022)

Foreign investors are committing millions of dollars in the region, including in low-carbon steel projects.

| Company | Company & Project Description | State | Capex (US\$m) |
|---|--|--------------------|------------------|
| BlueScope Steel (Australia) | <u>August 2019</u> - Australia-based Bluescope Steel, a manufacturer and distributor of flat steel products, announced it will invest A\$1bn to expand its North Star steel mill in Delta, Ohio, US. It will increase capacity at the facility by 40% and is scheduled for completion in 2022-2023. | Delta, OH | \$700m |
| JSW Steel (India) | <u>June 2018</u> - JSW Steel, a manufacturer of iron and steel products and subsidiary of India-based OP Jindal, has announced its plans to invest close to \$500m at an electric arc furnace (EAF) steel mill it is acquiring in Mingo Junction, Ohio, in the US. It will create 100 new jobs. The two-phase investment plan involves the revamping and restarting of the steel mill as well as modernizing the hot strip mill. | Mingo Junction, OH | \$500m |
| Petmin (South Africa) | <u>February 2019</u> - Petmin USA, a producer of metallurgical anthracite and a subsidiary of South Africa-based Petmin, will invest \$475m to establish a high-grade pig-iron plant in Ashtabula, Ohio. The facility will serve markets in North America. | Ashtabula, OH | \$475m |
| AMG Vanadium (Netherlands) | <u>June 2019</u> - AMG Vanadium, a subsidiary of the Netherlands-based AMG Advanced Metallurgical Group and a company that converts spent refinery catalyst to provide an alloy called ferrovanadium and other products to the carbon and stainless-steel industries, will invest \$200.65m to open a new facility in Zanesville, Ohio. This new site will create 102 positions and almost double AMG Vanadium's capacity to process spent catalyst, with an estimated 34,000 tonnes of spent catalyst processing capability. Construction will begin in quarter three in 2019 and is expected to finish in 2021. <i>"We are moving forward on this project thanks to the support we have received from the state of Ohio, Muskingum and Guernsey counties, and all of our public and private sector partners," said Hoy Frakes, president of AMG Vanadium.</i> | Zanesville, OH | \$200.65m |
| GFG Alliance (United Kingdom) | <u>January 2019</u> - UK-based GFG Alliance, a steel company, is to expand its electric arc furnace steelmaking facility in Bartonville, Illinois. The plans double the facility's production capacity before 2021. It is part of a company strategy to lift its annual US steel mill capacity to 5 million tonnes. | Bartonville, IL | - |

Source: fDi Markets, Various.

Top 10 Foreign Investments in Iron & Steel

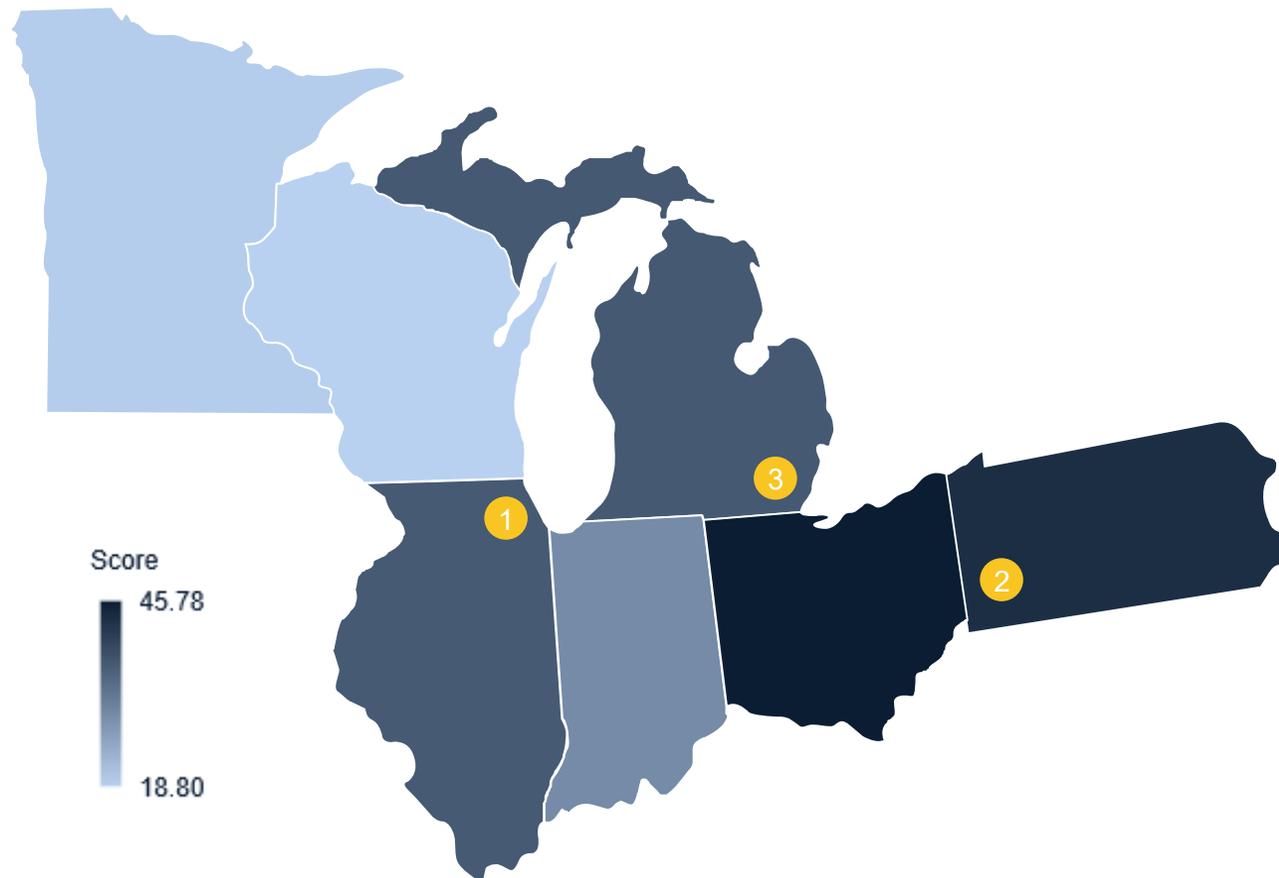
(2018-2022)

Foreign investors are committing millions of dollars in the region, including in low-carbon steel projects.

| Company | Company & Project Description | State | Capex (US\$M) |
|---------------------------------------|---|---------------------|---------------|
| PolyTech America (Japan) | <p><u>November 2020</u> - PolyTech America, a sheet metal lamination firm and a joint venture between Toyo Kohan, an ultimate subsidiary of Japan-based Toyo Seikan Group; US-based Polytech International; Sumitomo Corporation of America, an ultimate subsidiary of Japan-based Sumitomo Group; and Toyota Tsusho, an ultimate subsidiary of Japan-based Toyota Motor, will invest \$15m to establish a manufacturing plant in Canton, Ohio, US. The firm will create 30 jobs at the plant which will produce aerosol cans and pull-tab cans.</p> <p><i>"This location provides very good access to our customers and our company," said Naomi Yabuta, chief executive officer, PolyTech America</i></p> | Canton, IL | \$15m |
| Inox Market Service (Italy) | <p><u>May 2020</u> - Italy-based Inox Market Service, a manufacturer and distributor of steel and specialty steel products, is to establish its North American headquarters in Delaware county, Indiana. The company will invest \$15m to build a 13,005 sq m plant at the site. It is scheduled to open in 2021.</p> | Delaware County, IN | \$15m |
| Tenaris (Italy) | <p><u>August 2020</u> - Tenaris, a supplier of steel tubing and a subsidiary of Italy-based Techint, has announced it will invest \$11m to expand and upgrade its steel facility in Koppel, Pennsylvania. The expansion project is expected to complete in the second quarter of 2021.</p> | Koppel, PA | \$11m |
| ArcelorMittal (Luxembourg) | <p><u>March 2022</u> - Luxembourg-based ArcelorMittal, a steel and mining company leading globally in steel decarbonization projects, has relocated its North American headquarters from Chicago, Illinois to Schererville, Indiana. This involves an investment of \$10.4m.</p> | Schererville, IN | - |
| Lucchini RS (San Marino) | <p><u>March 2022</u> - Steel manufacturing company Lucchini RS, a subsidiary of San Marino-based Sinpar, has opened a sales office in Philadelphia, Pennsylvania. Lucchini North America will focus on business opportunities in the US and Canada. This involves an investment of \$5.1m.</p> | Philadelphia, PA | - |

Regional Capabilities and Cluster Identification

Ohio has the largest cluster of recent iron & steel investments in the region; Pennsylvania and Illinois follow, with city-level clusters in Chicago, Pittsburgh, and Detroit.



| Metropolitan Statistical Area | Score | Rank |
|---|-------|------|
| Chicago-Naperville-Elgin, IL-IN-WI | 22.94 | 1 |
| Pittsburgh, PA | 18.83 | 2 |
| Detroit-Warren-Dearborn, MI | 12.30 | 3 |
| Indianapolis-Carmel-Anderson, IN | 11.67 | 4 |
| Cleveland-Elyria, OH | 11.61 | 5 |
| Minneapolis-St. Paul-Bloomington, MN-WI | 9.77 | 6 |
| Cincinnati-Middletown, OH | 8.21 | 7 |
| Toledo, OH | 7.76 | 8 |
| Grand Rapids-Kentwood, MI | 7.74 | 9 |
| Milwaukee-Waukesha, WI | 7.42 | 10 |
| Columbus, OH | 7.26 | 11 |
| Fort Wayne, IN | 3.16 | 12 |
| Madison, WI | 2.05 | 13 |

Source: OCO Analysis.

* Score is based on the supply & demand data model developed to understand capabilities across locations and sectors. Full list of indicators available in Annex C.

Batteries & Components

The Batteries & Components sector is an emerging and highly promising sector for the Great Lakes, an integral part of the so-called 'battery belt.' The region has already successfully attracted several multi-billion-dollar investments, supporting the development of the battery supply chain. Foreign investments have surged in recent years, representing a growing economic opportunity.

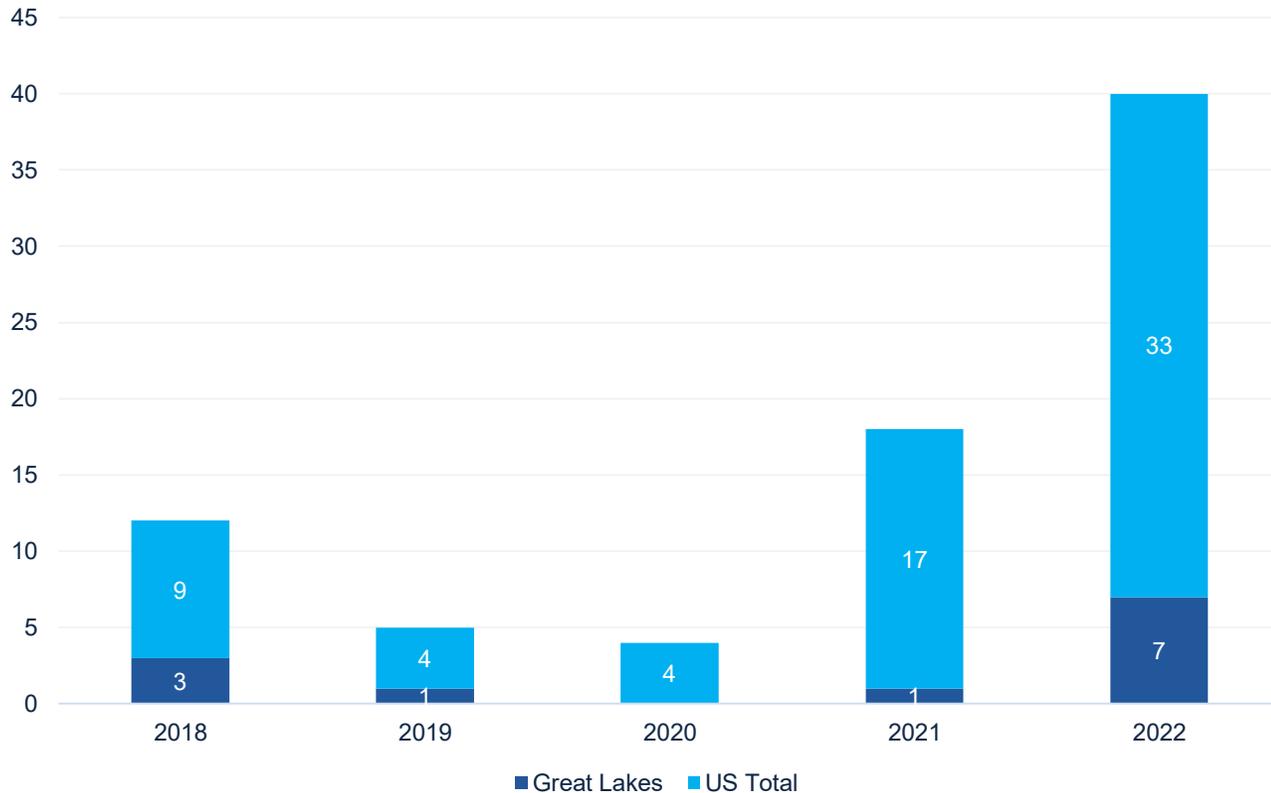
The energy storage supply chain hubs, unsurprisingly, strongly match those of the electric vehicles sectors with Michigan, Illinois, and Ohio coming out on top.



FDI Opportunities in the Batteries & Components Sector OCO GLOBAL

Foreign investment in the batteries & components sector has grown dramatically in the Great Lakes at a 24% CAGR since 2018. National growth has been even higher, indicating room for the region to capitalize on its industrial legacy.

No. of FDI Projects in Batteries & Components in the Great Lakes and Nationally, 2018-2022



Great Lakes



24%

Projects - CAGR 2018-2022

12

Total Projects
(2018-2022)

\$10,838m

Total Capex
(2018-2022)

7,747

Total Jobs
(2018-2022)

United States



38%

Projects - CAGR 2018-2022

67

Total Projects
(2018-2022)

\$42,630m

Total Capex
(2018-2022)

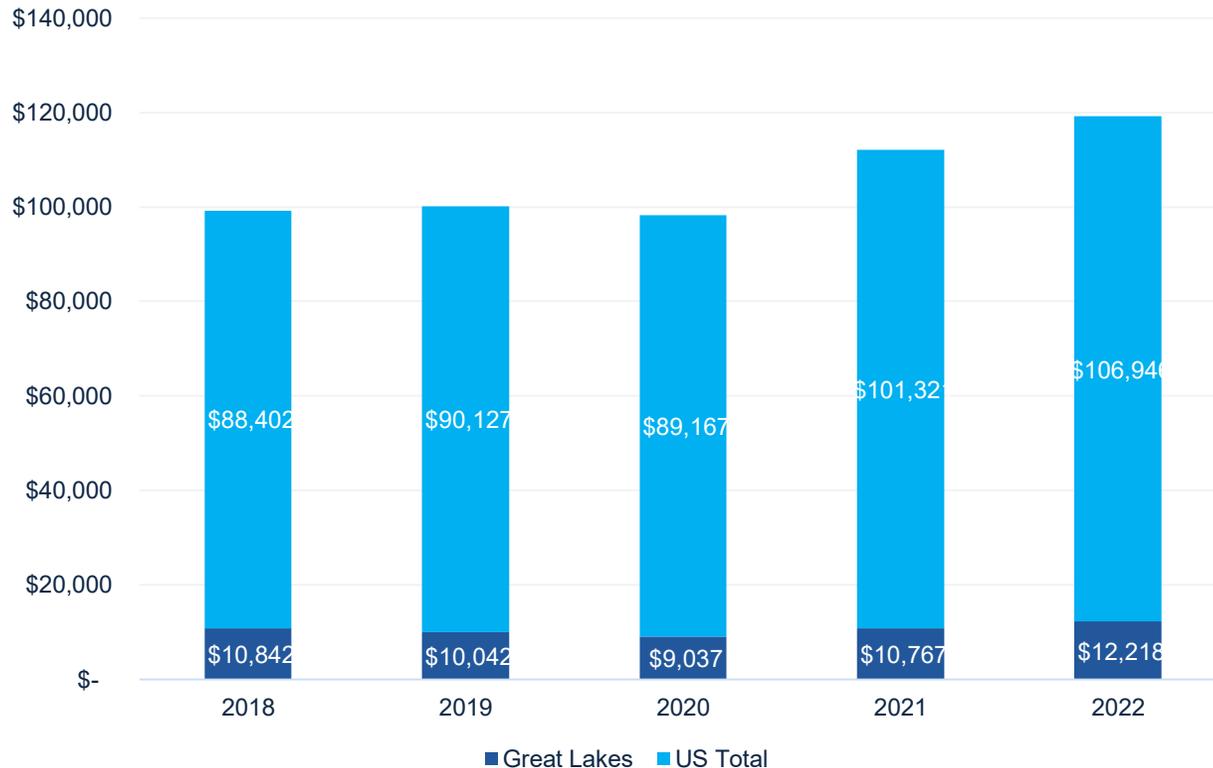
26,616

Total Jobs
(2018-2022)

Export Opportunities in the Batteries & Components Sector

Batteries & components exports have grown steadily over the past five years, up by around \$2 billion for the Great Lakes since 2018. The whole US has had even stronger growth, again indicating urgency for the Great Lakes to quickly move to capitalize on this opportunity.

Value of Exports (US\$m) in the Batteries & Components Sector in the Great Lakes and Nationally, 2018-2022



Great Lakes

↑ **3.0%**
CAGR 2018-2022

\$12,218m
Total Export Value
(2022)

United States

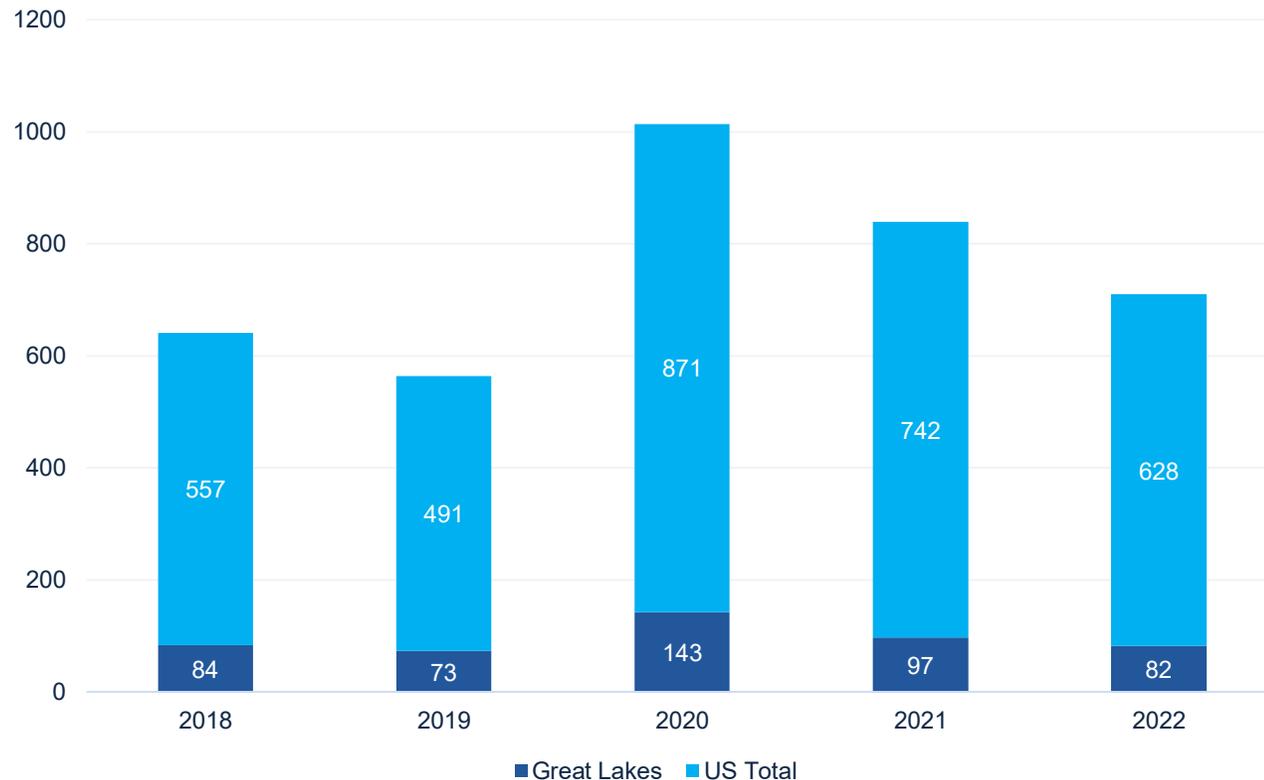
↑ **4.9%**
CAGR 2018-2022

\$106,946m
Total Export Value
(2022)

Capital Investment in the Batteries & Components Sector

Capital investment in batteries & components was an incredible \$24bn across 2018-2022 in the Great Lakes, also growing at a small but steady CAGR over that time period.

No. of Capital Investment Deals in Batteries & Components in the Great Lakes and Nationally, 2018-2022



Great Lakes



0.6%
CAGR 2018-2022



1.1%
CAGR 2018-2022

479
Total No. of Deals
(2018-2022)

\$24,024m
Total Value
(2018-2022)

United States



3.0%
CAGR 2018-2022



23.1%
CAGR 2018-2022

3,289
Total No. of Deals
(2018-2022)

\$224,225m
Total Value
(2018-2022)

Top 10 Foreign Investments in Batteries & Components

(2018-2022)

Major foreign investors have committed billions of dollars in battery manufacturing facilities, especially lithium-ion.

| Company | Company & Project Description | State | Capex (US\$M) |
|---------------------------------------|---|--------------------|----------------|
| Honda Motor Company (Japan) | <u>August 2022</u> - Automaker Honda Motor Company, a subsidiary of Japan-based Honda Motor Company, has announced it will invest \$3.5bn in a lithium-ion battery plant for electric vehicles in Fayette County, Ohio, creating 2,200 jobs. The project will be a joint venture with South Korea-based LG Energy Solution and will employ 2200. The companies aim for an annual production capacity of approximately 40 GWh with the batteries supplied exclusively to Honda facilities in North America to power Honda and Acura EV models. The project is receiving support from relevant authorities. Construction is planned to begin in early 2023, with production expected to commence by the end of 2024. Joint investment at the plant may reach \$4.4bn. | Fayette County, OH | \$3.5bn |
| Stellantis (Netherlands) | <u>July 2021</u> - Netherlands-based Stellantis, a multinational automotive manufacturing corporation, has announced that in a joint venture with Samsung SDI, a subsidiary of South-Korea based Samsung Group, it will invest more than \$2.5bn to build an electric vehicle battery plant in Kokomo, Indiana. The new facility will supply battery modules for a range of vehicles produced at Stellantis' North America assembly plants. Targeted to start operations in the first quarter of 2025, the plant aims to have an initial annual production capacity of 23-gigawatt hours, which will later be increased to 33-gigawatt hours. The investment is expected to create 1400 new jobs and could gradually increase up to \$3.1bn. The project is supported by Indiana state officials and the Indiana Economic Development Corporation. <i>"Just under one year ago, we committed to an aggressive electrification strategy anchored by five gigafactories between Europe and North America. Today's announcement further solidifies our global battery production footprint and demonstrates Stellantis' drive toward a decarbonized future outlined in Dare Forward 2030. I am grateful to Governor Holcomb and Secretary Chambers along with Mayor Moore, and their teams as well as to all my colleagues for their support and dedication to bring this operation to Kokomo, a city that holds a rich and long history for our company," said Carlos Tavares, chief executive officer, Stellantis.</i> | Kokomo, IN | \$2.5bn |

Top 10 Foreign Investments in Batteries & Components

(2018-2022)

Major foreign investors have committed billions of dollars in battery manufacturing facilities, especially lithium-ion.

| Company | Company & Project Description | State | Capex (US\$M) |
|--|--|---------------|----------------|
| LG Chem (South Korea) | <u>December 2019</u> - LG Chem, a subsidiary of South Korea-based LG, has announced plans to open a manufacturing facility for electric vehicle batteries in Lordstown, Ohio, in a joint venture with Michigan-based General Motors . Representing an investment of \$2.3bn , it will be located near GM's closed assembly plant there and will employ more than 1100 staff.. Construction is to begin in mid-2020 and the plant will have an annual capacity of more than 30 gigawatt-hours when open in 2022, with the flexibility to further expand. It will accelerate GM's initiative to introduce 20 new electric vehicles globally by 2023. | Lordstown, OH | \$2.3bn |
| LG Energy Solution (South Korea) | <u>January 2022</u> - LG Energy Solution, an electric vehicle battery manufacturer and a subsidiary of South Korea-based LG, has announced that it will invest \$1.5bn to expand its lithium-ion battery manufacturing site in Holland, Michigan. The investment will construct a new building and several support buildings, totaling around 92,905 sq m. Expected to complete in 2025, the expansion will create up to 1000 new jobs. The project is supported by the city of Holland in the form of a \$525m incentive package, as well as by the Michigan Economic Development Corporation. | Holland, MI | \$1.5bn |
| Semcorp Manufacturing (China) | <u>March 2022</u> - Semcorp Manufacturing USA [Subsidiary of Semcorp] (China) is investing \$916.00m in the city of Sidney (OH) (Shelby County (OH) - Ohio), United States in the Electronic components sector in a Manufacturing project, creating 1200 jobs. Semcorp Manufacturing USA, a manufacturer of separator film used within lithium-ion batteries and a subsidiary of China-based Semcorp, has announced plans to invest \$916m to open a manufacturing facility in Sidney, Ohio. Located at the Sidney Ohio Industrial Park, the 78,970 sq m facility will manufacture separator film, a key component in batteries for electric vehicles. It will serve the electric vehicle battery market in North America. The Ohio Tax Credit Authority has approved a 15-year, 2.1% tax credit for the project, estimated at a value of \$22.7m. The project is supported by JobsOhio, the Dayton Development Coalition, the Sidney-Shelby Economic Partnership, the city of Sidney, and Shelby County. <i>"SEMCorp chose the Sidney location because of the state's impressive commitment to vocational education, preparedness for a large-scale project like ours, the strong work ethic in the region, and proximity to key customers. We're thrilled to call Sidney home, and we're going to do all that we can to earn the trust of the local community," said James Shih, vice-president, global projects.</i> | Sidney, OH | \$916m |

Top 10 Foreign Investments in Batteries & Components

(2018-2022)

Major foreign investors have committed billions of dollars in battery manufacturing facilities, especially lithium-ion.

| Company | Company & Project Description | State | Capex (US\$M) |
|-----------------------------|--|-------------|---------------|
| Akasol (Germany) | <u>November 2018</u> - Vehicle battery manufacturer Akasol, a subsidiary of Germany-based Schulz, has announced plans to invest \$40m to open a production facility in Detroit, Michigan. The project is expected to create 224 jobs. Initial production will begin in 2020, focusing on high energy density battery systems . By 2021, Akasol is planning to increase production to 400 MWh in a three-shift operation. The facility will serve markets worldwide and forms part of the company's international expansion plan. The state of Michigan is supporting the project with a \$2.24m grant. | Detroit, MI | \$40m |
| Inobat (Slovakia) | <u>June 2022</u> - Slovakia-based InoBat, a start-up which develops advanced battery cells for electric vehicles, has announced it is partnering with New York-based Ideanomics to build its new North America headquarters in Indiana. The new R&D and production facility for battery module and pack assembly will have an initial annual production capacity of 100 MWh. Both parties aim to further construct a full commercial-scale battery module and pack assembly plant with an initial 2-3 GWh yearly production capacity. The companies have been assisted by the Indiana Economic Development Corporation and are currently negotiating a potential incentive package. InoBat has also announced it is exploring the option to construct a tailor-made battery cell production facility with an initial 4 GWh annual capacity. | IN | - |

Top 10 Foreign Investments in Batteries & Components

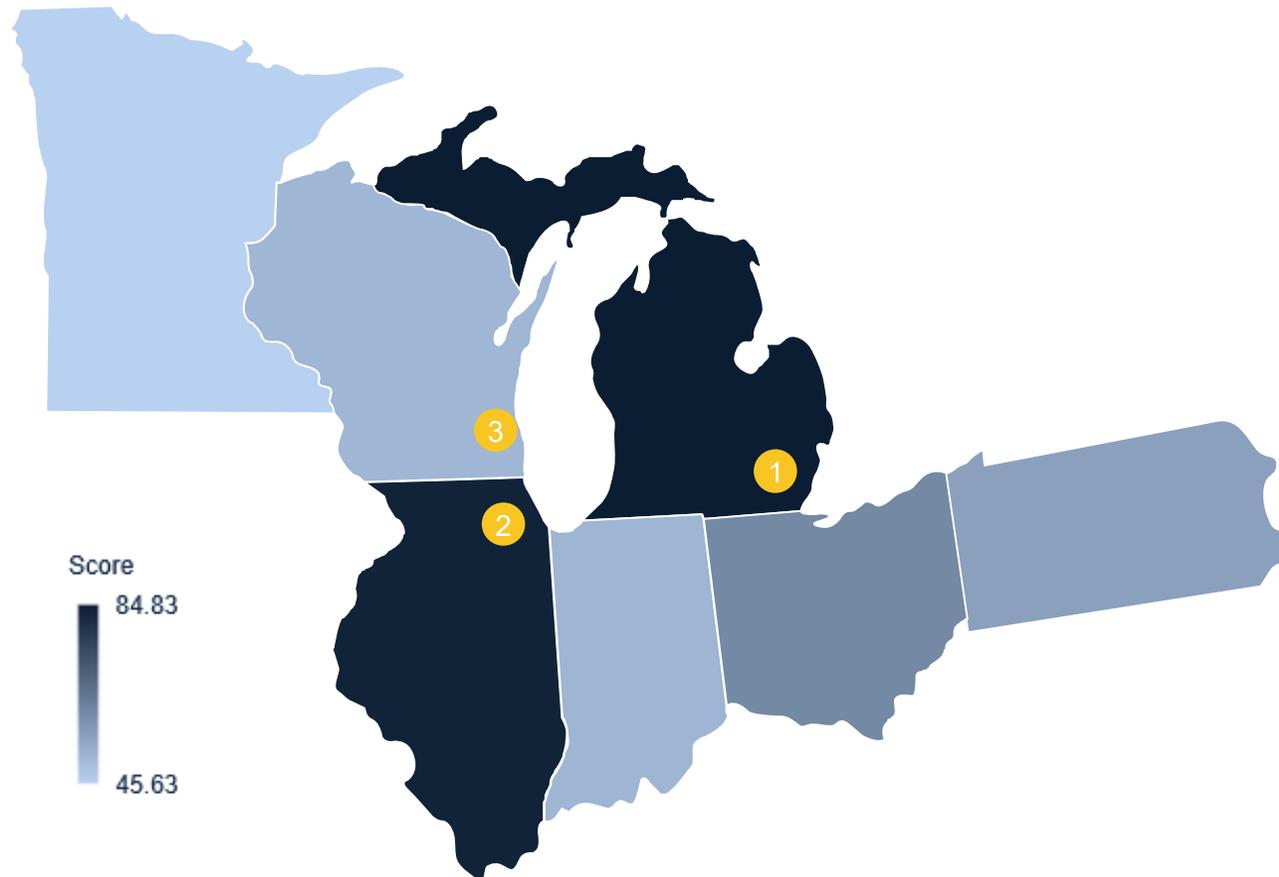
(2018-2022)

Major foreign investors have committed billions of dollars in battery manufacturing facilities, especially lithium-ion.

| Company | Company & Project Description | State | Capex (US\$M) |
|---|--|------------------|-----------------|
| Forsee Power Solution <i>(France)</i> | <p><u>June 2022</u> - France-based Forsee Power Solutions, which specializes in battery system technology, has announced it will establish its new North America headquarters and battery gigafactory in Hilliard, Ohio. The new 12,820 sq m facility will act as the company's industrial base to target the growing commercial vehicle market, primarily buses, trucks, off-highway vehicles, light urban and utility vehicles and trains. The development forms part of the company's aim to achieve a production capacity of 3 GWh in the US by 2027, involving an investment of €13.76m and creating 150 jobs . The site, located at 4555 Lyman Drive, will also have R&D capabilities.</p> <p><i>Forsee Power will establish an industrial base in the United States to target the growing commercial vehicle market, primarily buses, trucks, off-highway vehicles, light urban and utility vehicles and trains. This will not only optimize costs and the supply chain – which is beginning to take hold on the continent – but it is also a requirement for certain key markets such as the city bus market, which requires a local presence to comply with the FAST Act (70% of value must be produced locally in public procurement). “We found Columbus to have the right ecosystem of potential supply chain partners, academic partners, and the right fit for workforce as we are looking at hiring production operators, R&D engineers and a full leadership team to run our North American activity,” explains Christophe Gurtner, chief executive officer, Forsee Power.</i></p> | Hilliard, OH | \$13.76m |
| EVE Energy <i>(China)</i> | <p><u>December 2022</u> - EVE Energy North America, a subsidiary of China-based energy company Eve Energy, has announced it will construct a new research and development facility in Lewis Center, Ohio. It will focus on the testing, design and storage of lithium-ion batteries. The new facility will see an investment of \$5.7m and is expected to create 12 new jobs. The company is receiving a \$1m Research and Development Centre grant from JobsOhio.</p> | Lewis Center, OH | \$5.7m |

Regional Capabilities and Cluster Identification

Michigan has the largest cluster of recent batteries & components investments, especially in the Greater Detroit area; Illinois follows closely behind, then Ohio and Pennsylvania.



| Metropolitan Statistical Area | Score | Rank |
|---|-------|------|
| Detroit-Warren-Dearborn, MI | 61.49 | 1 |
| Chicago-Naperville-Elgin, IL-IN-WI | 55.80 | 2 |
| Milwaukee-Waukesha, WI | 38.05 | 3 |
| Madison, WI | 21.55 | 4 |
| Indianapolis-Carmel-Anderson, IN | 20.39 | 5 |
| Pittsburgh, PA | 19.57 | 6 |
| Cleveland-Elyria, OH | 18.40 | 7 |
| Grand Rapids-Kentwood, MI | 16.78 | 8 |
| Columbus, OH | 13.62 | 9 |
| Minneapolis-St. Paul-Bloomington, MN-WI | 11.61 | 10 |
| Cincinnati-Middletown, OH | 1.67 | 11 |
| Fort Wayne, IN | 0.71 | 12 |
| Toledo, OH | - | 13 |

Source: OCO Analysis.

* Score is based on the supply & demand data model developed to understand capabilities across locations and sectors. Full list of indicators available in Annex C.

Hydrogen

Hydrogen has been gaining attention as a potential clean energy solution, demonstrating dramatic growth rates over the past few years, but its development is still in the relatively early stages in the region with lower investments when compared to other sectors.

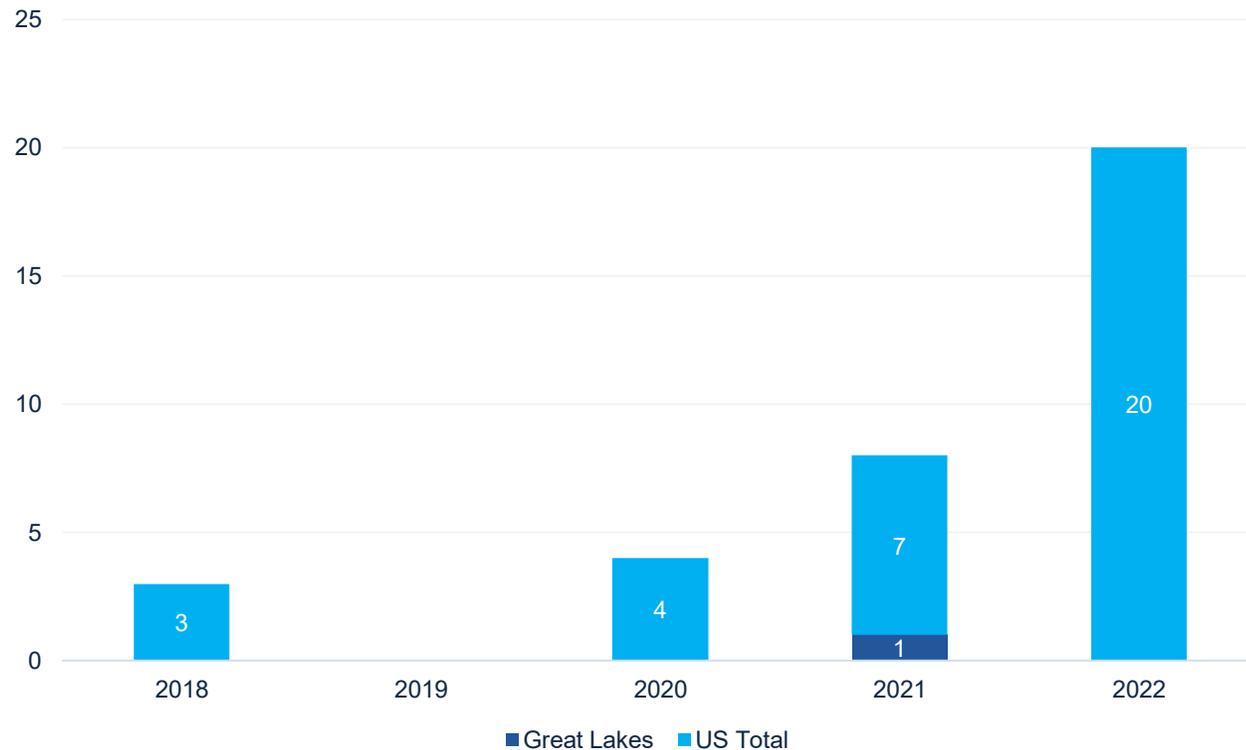
However, the Great Lakes region has been actively exploring hydrogen opportunities, and several initiatives and projects are underway to explore and promote hydrogen-related activities, including two potential Hydrogen Hubs in the region.



FDI Opportunities in the Hydrogen Sector

Only a very small share of national hydrogen FDI has landed in the Great Lakes. However, with the regional hydrogen hub and surging national investment, the region can actively target the sector to capture more of the global investment.

No. of FDI Projects in Green Hydrogen in the Great Lakes and nationally, 2018-2022



Great Lakes

0%

Projects - CAGR 2018-2022

1

Total Projects
(2018-2022)

\$113m

Total Capex
(2018-2022)

49

Total Jobs
(2018-2022)

United States



61%

Projects - CAGR 2018-2022

34

Total Projects
(2018-2022)

\$4,119m

Total Capex
(2018-2022)

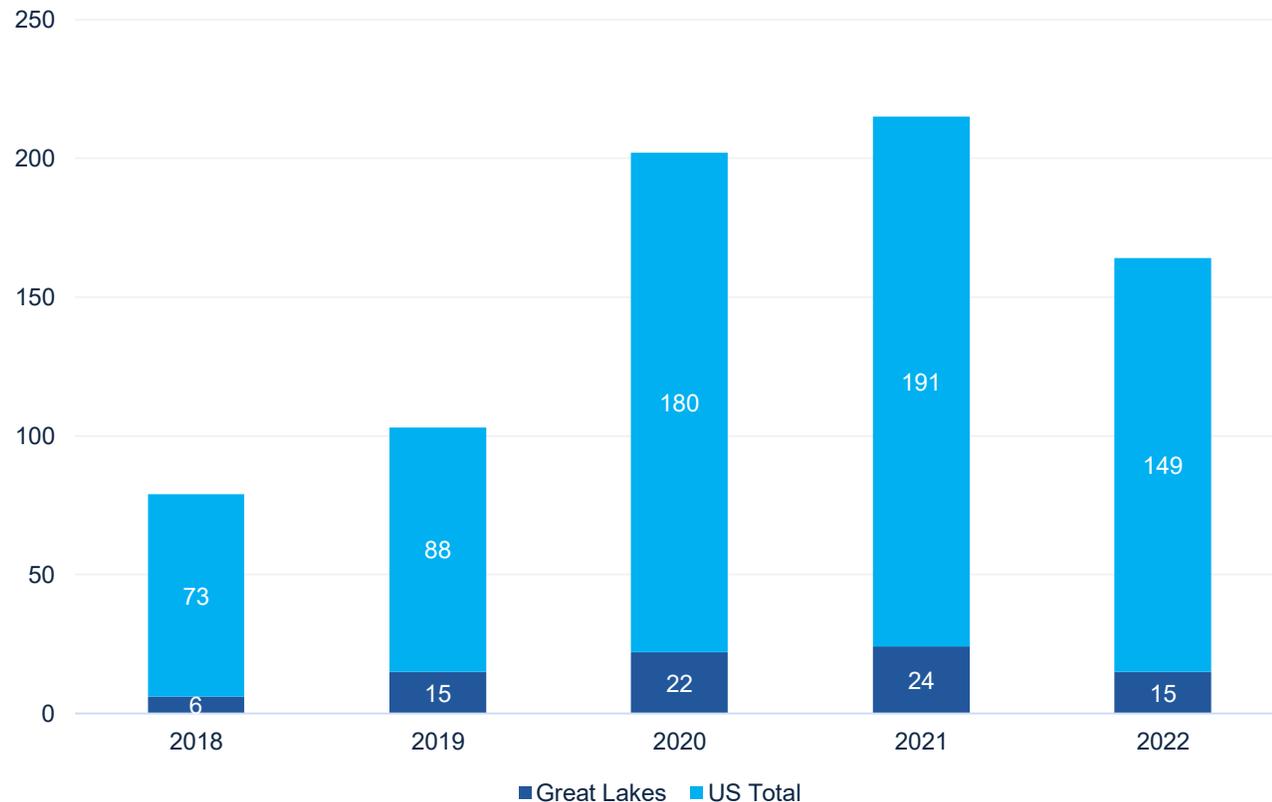
2,417

Total Jobs
(2018-2022)

Capital Investment in the Hydrogen Sector

Regional capital investment in hydrogen is growing at a much faster rate than at the national level. Moreover, while deals fell in 2022, hydrogen is still an emerging sector with rising interest since 2018.

No. of Capital Investment Deals in Hydrogen in the Great Lakes and nationally, 2018-2022



Great Lakes

↑ **25.7%**
CAGR 2018-2022

82
Total No. of Deals
(2018-2022)

↑ **240%**
CAGR 2018-2022

\$1,929m
Total Value
(2018-2022)

United States

↑ **19.5%**
CAGR 2018-2022

681
Total No. of Deals
(2018-2022)

↑ **76.1%**
CAGR 2018-2022

\$28,001m
Total Value
(2018-2022)

Top 10 Companies for Investment in Hydrogen

(2018-2022)

In the Great Lakes, most investment in hydrogen is still in the early stages with several companies raising VC funding.

| Company | Company Description | HQ Location | Total Raised |
|--------------------------------|---|----------------------|----------------|
| AmmPower1 | <i>(Foreign Investment)</i> August 2021 - Canada-based AmmPower Corp., a hydrogen and mineral extraction developer, has opened a manufacturing and development facility in south-east Michigan, US. AmmPower will use the site to develop new catalysts and production processes for synthesizing green ammonia and creating hydrogen. | Canada | - |
| Wabash Valley Resources | Founded in 2016, Wabash Valley Resources is an operator of an ammonia production plant intended to eliminate carbon emissions and create a sustainable hydrogen economy. The company manufactures anhydrous ammonia and stores it at the plant for distribution to local industrial and agricultural users around, enabling clients to gain nitrogen for their fields at competitive costs. | West Terre Haute, IN | \$50m |
| GasTechno | Founded in 2004, GasTechno is a developer of non-catalytic gas-to-liquid technology designed to convert methane to methanol in one step. The company is also engaged in developing conversion kits for trucks that will operate on methanol, hydrogen, and electricity to reach near-zero emissions, enabling clients to meet carbon reduction goals. | Walloon Lake, MI | \$30.55 |
| Advanced Ionics | Founded in 2017, Advanced Ionics is a developer of an electrolyzer technology designed to produce low-cost onsite industrial green hydrogen. The company's technology can be used for ammonia and fertilizer production, hydrogenation, metal fabrication, glass, methanol, synthetic fuels, chemicals, and power plants, enabling clients to eliminate carbon dioxide emissions from hydrogen production. | Milwaukee, WI | \$4.86m |

This list of companies differs from that of other sectors because only one foreign company invested in the region for this sector. Therefore, we have opted to show that one foreign investment alongside hydrogen-focused companies that have raised the most capital since 2018 in the Great Lakes.

Source: fDi Markets, Pitchbook.

* All companies listed are headquartered in the Great Lakes while the capital investment data on the previous page also captures investment in companies with a non-HQ office in the Great Lakes.

Top 10 Companies for Investment in Hydrogen

(2018-2022)

In the Great Lakes, most investment in hydrogen is still in the early stages with several companies raising VC funding.

| Company | Company Description | HQ Location | Total Raised |
|--------------------------|--|----------------|----------------|
| United Hydrogen | Founded in 2005, United Hydrogen is a producer of hydrogen and hydrogen products intended to provide a clean environment and lead to lesser dependence on foreign oil. The company's hydrogen products consist of both gaseous and liquid state hydrogen, produced through a method that incorporates electrolysis and a proprietary purification process, enabling businesses to receive and use products that exceed industrial grade purity standards. | Canonsburg, PA | \$4.00m |
| Noble Gas Systems | Founded in 2017, Noble Gas Systems is a developer of gas storage and delivery technology designed for chemical and gas industries. The company's technology is flexible and safe for compressed gases that include oxygen, hydrogen, nitrogen, and other chemical and industrial gases, enabling clients to store and utilize high-pressure gases economically. | Novi, MI | \$3.70m |
| Power to Hydrogen | Founded in 2019, Power to Hydrogen is a developer of advanced reversible fuel cell technology and low-cost AEM electrolysers designed to convert renewable electricity and water into high-pressure hydrogen and oxygen, and when needed back to power. The company's advanced AEM design and catalyst technology delivers the production of low-cost green hydrogen from increasing renewable energy, enabling people to have a brighter energy future. | Columbus, OH | \$2.45m |
| Sesame Solar | Founded in 2017, Sesame Solar is a manufacturer of solar nano-grids intended to serve as a self-contained, solar power generator that can be set up quickly. The company's nano-grids using solar and green hydrogen generate clean, off-grid power and come prefabricated to meet essential services and emergency response needs across various scenarios, enabling clients to have easy access to a renewable energy source for use anytime, anywhere. | Jackson, MI | \$2.30m |

Source: Pitchbook.

* All companies listed are headquartered in the Great Lakes while the capital investment data on the previous page also captures investment in companies with a non-HQ office in the Great Lakes.

Top 10 Companies for Investment in Hydrogen

(2018-2022)

In the Great Lakes, most investment in hydrogen is still in the early stages with several companies raising VC funding.

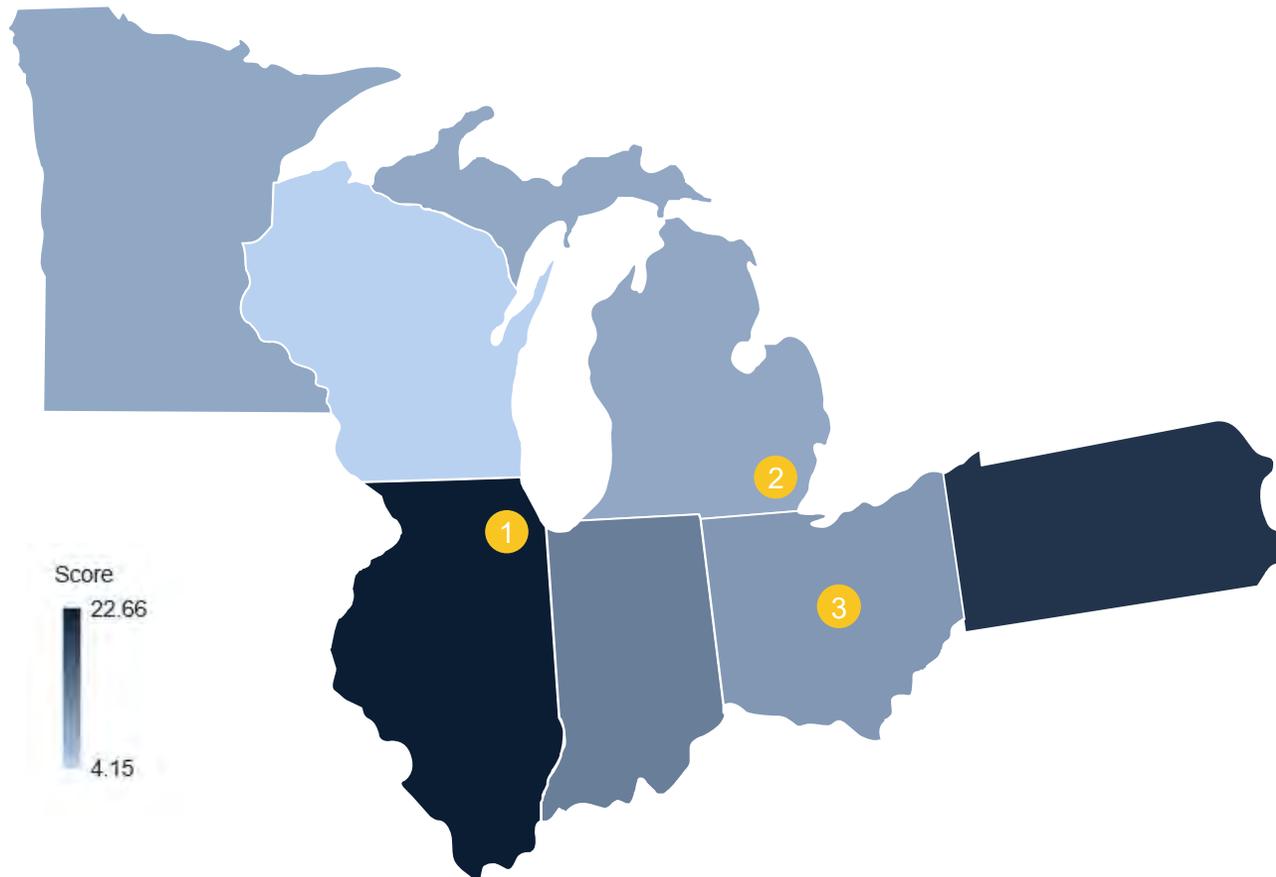
| Company | Company Description | HQ Location | Total Raised |
|------------------------------|--|----------------|----------------|
| Standard H2 | Founded in 2019, Standard H2 is a developer of hydrocarbon refining technology designed to convert hydrogen sulfide into high-purity hydrogen instead of dirty water . The company offers to save significant amounts of capital, operating expenses, maintenance expenses, and disposal costs by eliminating the claus process reactor for handling hydrogen sulfide, enabling clients to efficiently reduce the cost of emitting toxic waste into the environment. | Doylestown, PA | \$2.04m |
| SenSevere | Founded in 2010, SenSevere is a developer of hydrogen sensors designed to offer real-time safety and compliance monitoring systems . The company's hydrogen sensor assist to detect faulty conditions that may lead to explosions in industrial processes, enabling electrochemical and energy markets to provide chemical detection in industrial processes at locations where no monitoring previously existed due to the harshness of the operating environment. | Pittsburgh, PA | \$0.60m |
| Celadyne Technologies | Founded in 2018, Celadyne Technologies is a developer of nanocomposite membranes designed to be used in high-performance electrolyzes and fuel cells with simple heat and water management . The company's membrane uses various technologies to offer many benefits of a ceramic separator such as lower hydrogen crossover and also works at low humidity and elevated temperature conditions, enabling users to get hydrogen economy for better catalyst durability at a low cost. | Chicago, IL | \$0.57m |

Source: Pitchbook.

* All companies listed are headquartered in the Great Lakes while the capital investment data on the previous page also captures investment in companies with a non-HQ office in the Great Lakes.

Regional Capabilities and Cluster Identification

Illinois has the largest cluster of hydrogen companies and investment in the region, especially in the Chicago area; Pennsylvania follows, and there are also clusters in the Greater Detroit and Central Ohio



| Metropolitan Statistical Area | Score | Rank |
|---|-------|------|
| Chicago-Naperville-Elgin, IL-IN-WI | 12.93 | 1 |
| Detroit-Warren-Dearborn, MI | 7.52 | 2 |
| Columbus, OH | 6.04 | 3 |
| Cleveland-Elyria, OH | 5.06 | 4 |
| Minneapolis-St. Paul-Bloomington, MN-WI | 4.97 | 5 |
| Milwaukee-Waukesha, WI | 3.85 | 6 |
| Pittsburgh, PA | 0.64 | 7 |
| Indianapolis-Carmel-Anderson, IN | - | 8 |
| Grand Rapids-Kentwood, MI | - | 9 |
| Cincinnati-Middletown, OH | - | 10 |
| Madison, WI | - | 11 |
| Toledo, OH | - | 12 |
| Fort Wayne, IN | - | 13 |

Source: OCO Analysis.

* Score is based on the supply & demand data model developed to understand capabilities across locations and sectors. Full list of indicators available in Annex C.

Solar Power

The solar power sector is a large and growing industry but one where the Great Lakes has not seen as much investment as elsewhere in the US. Moreover, most foreign investment projects have focused on energy deployment rather than manufacturing.

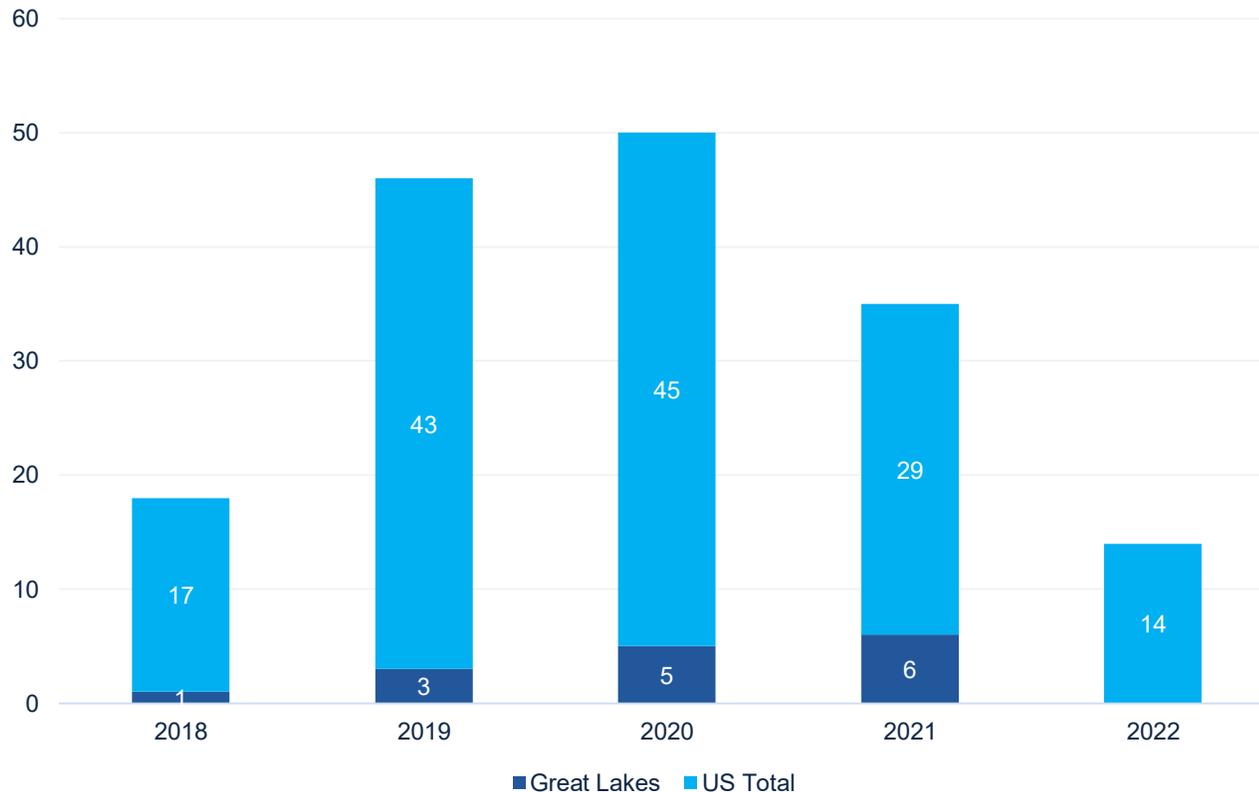
However, foreign solar supply chain companies have landed in the region, notably in Indiana, Minnesota, and Ohio, creating the building blocks for a strong cluster if the sector is actively supported.



FDI Opportunities in the Solar Power Sector

Foreign investment in the solar power sector peaked in 2019 and 2020 nationally but **continued to grow in the Great Lakes region until 2021**. However, there were no projects in 2022.

No. of FDI Projects in Solar Power in the Great Lakes and Nationally, 2018-2022



Great Lakes

15
Total Projects
(2018-2022)

\$392m
Total Capex
(2018-2022)

N/A
Total Jobs
(2018-2022)

United States

148
Total Projects
(2018-2022)

\$4,573.5m
Total Capex
(2018-2022)

69
Total Jobs
(2018-2022)

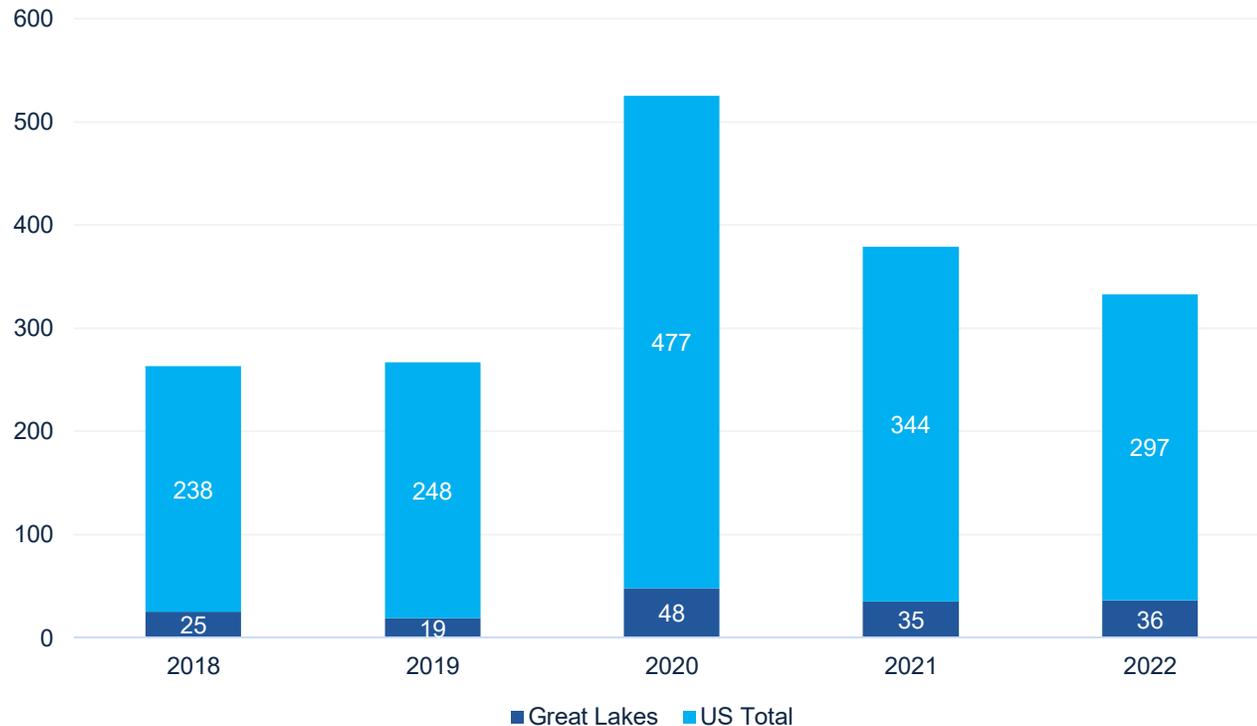
5%
CAGR 2018-2022

Source: OCO Analysis, fDi Markets.

Capital Investment in the Solar Power Sector

Capital investment for solar power in the Great Lakes has grown at a CAGR of 9.5%, higher than the national rate. This indicates that solar power has great potential for Great Lakes to capitalize on its strength.

No. of Capital Investment Deals in Solar Power in the Great Lakes and Nationally, 2018-2022



Great Lakes



9.5%
CAGR 2018-2022



74.5%
CAGR 2018-2022

163

Total No. of Deals
(2018-2022)

\$5,770m

Total Value
(2018-2022)

United States



5.7%
CAGR 2018-2022



37.3%
CAGR 2018-2022

1,604

Total No. of Deals
(2018-2022)

\$49,806m

Total Value
(2018-2022)

Top 10 Foreign Investments in Solar Electric Power

(2018-2022)

Major foreign energy companies have invested in multiple projects in the region to deploy solar power.

| Company | Company & Project Description | State | Capex (US\$m) |
|---------------------------------------|--|----------------------|---------------|
| EDP Renewables (Portugal) | <u>April 2018</u> - EDP Renewables North America, a developer of wind farms and solar parks and an ultimate subsidiary of Portugal-based Energias de Portugal, will invest \$242m to establish a solar farm in Randolph County, Indiana. The Riverstart Solar Park will have a capacity of 200 megawatts and will serve the Indiana market. It is scheduled to begin operations in 2022. | Randolph County, IN | \$242m |
| Avangrid Renewables (Spain) | <u>July 2021</u> – Renewable energy specialist Avangrid Renewables, a subsidiary of Spain-based Iberdrola, is set to develop a 150-megawatt solar power plant in Putnam County, Ohio, US. The 1350-acre Powell Creek Solar project, to be situated across Palmer and Liberty Townships, will produce enough energy to supply 30,000 homes a year in Ohio. It represents an investment of \$150m. | Putnam County, OH | \$150m |
| Heliene (Spain) | <u>October 2022</u> - Heliene, a provider of solar modules, and a subsidiary of Spain-based Helios Energy Europe, has announced it will expand its original facility in Mountain Iron, Minnesota, US. The company will upgrade equipment at the facility, expanding its capacity to 300 MW . The announcement follows the company recently opening a previous expansion which had been announced in September 2021. | St. Louis County, MN | - |
| Grasshopper Energy (Canada) | <u>October 2021</u> - Canada-based Grasshopper Energy, a green energy solutions provider, has announced its plans to establish solar energy plant facilities in Pennsylvania, US. This involves an investment of \$216.9m and is part of a larger project which will see additional solar plants constructed across the north-east of the US. | PA | - |
| Clenera (Israel) | <u>September 2021</u> - Clenera, a renewable energy company and subsidiary of Israel-based Enlight, has announced plans to develop a new solar power plant in Warrick County, Indiana. The Rustic Hills solar project, with an expected capacity of 120 MW, is set to come online by the end of 2023. The 640-acre plant will supply power to Indiana. | Warrick County, IN | - |

Top 10 Foreign Investments in Solar Electric Power

(2018-2022)

Major foreign energy companies have invested in multiple projects in the region to deploy solar power.

| Company | Company & Project Description | State | Capex (US\$M) |
|---|--|--------------------|---------------|
| Fox Squirrel Solar (France) | <u>July 2021</u> - Fox Squirrel Solar, an ultimate subsidiary of France-based Electricite de France, has announced plans to develop a 577-megawatt solar power plant in Madison County, Ohio. The Fox Squirrel complex could generate power for 129,900 homes annually. It is scheduled to become operational by the end of 2022 and will cover between 4000 and 4500 acres of land. | Madison County, OH | - |
| National Grid Renewables (United Kingdom) | <u>February 2021</u> - National Grid Renewables, part of UK-based energy group National Grid, has begun construction work on a 200-megawatt solar farm in Coles County, Illinois. The Prairie Wolf solar farm is expected to eliminate 285,000 tonnes of carbon dioxide emissions a year. It is scheduled to become operational in late 2021. | Coles County, IL | - |
| EDP Renewables (Portugal) | <u>January 2021</u> - EDP Renewables North America, a subsidiary of Portugal-based Energias de Portugal, has announced plans to develop a new solar power plant in Indiana, US. It is one of two planned projects with a combined power capacity of 275 megawatts. It is set to become operational in 2023. | IN | - |
| National Grid Renewables (United Kingdom) | <u>June 2020</u> - Geronimo Wind Energy, a renewable energy company and subsidiary of UK-based National Grid, has announced plans to develop a new solar power plant in Clinton County, Michigan. The Bingham Solar installation is scheduled to become operational by the end of 2020. It is one of two projects which will produce 40 megawatts of solar energy, powering approximately 8000 Michigan homes. | Clinton County, MI | - |
| NSG Group (Japan) | <u>January 2019</u> - Japan-based NSG Group, a glass producer, is to set up a new 46,450 sq m manufacturing facility in Troy, Ohio, US. It will produce transparent conductive oxide coated glass to support the growing solar market. Construction will begin in the spring of 2019, and it is expected the plant will be operational in the second half of 2020. It is expected to create 125-150 new jobs. | Troy, OH | - |

Regional Capabilities and Cluster Identification

Ohio and Indiana has the largest cluster of recent solar power investments in the region; Illinois follows, with clusters in the Chicago area



| Metropolitan Statistical Area | Score | Rank |
|---|-------|------|
| Chicago-Naperville-Elgin, IL-IN-WI | 24.80 | 1 |
| Indianapolis-Carmel-Anderson, IN | 17.20 | 2 |
| Madison, WI | 6.69 | 3 |
| Cincinnati-Middletown, OH | 6.24 | 4 |
| Columbus, OH | 5.03 | 5 |
| Minneapolis-St. Paul-Bloomington, MN-WI | 4.46 | 6 |
| Pittsburgh, PA | 4.37 | 7 |
| Cleveland-Elyria, OH | 2.68 | 8 |
| Detroit-Warren-Dearborn, MI | 2.41 | 9 |
| Milwaukee-Waukesha, WI | - | 10 |
| Grand Rapids-Kentwood, MI | - | 11 |
| Toledo, OH | - | 12 |
| Fort Wayne, IN | - | 13 |

Source: OCO Analysis.

* Score is based on the supply & demand data model developed to understand capabilities across locations and sectors. Full list of indicators available in Annex C.

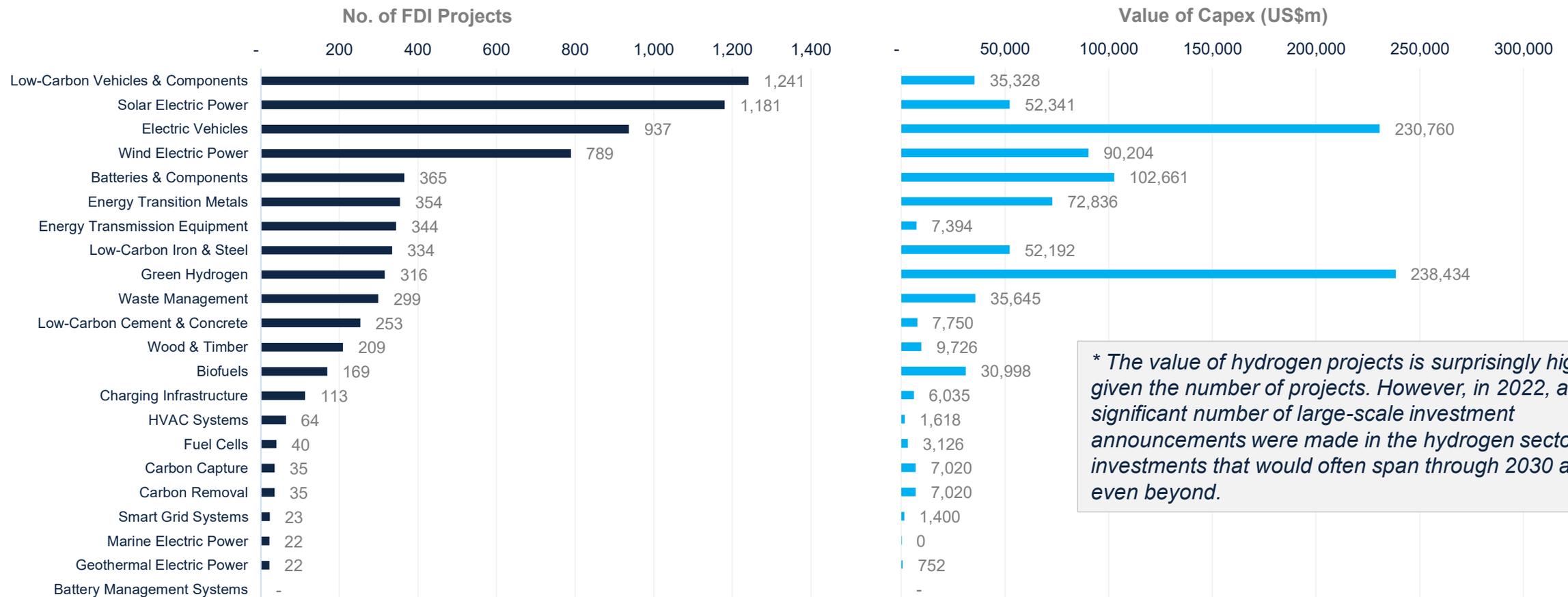
5. Global Opportunity across Key Sectors



Global Opportunity across Energy Transition Sectors

Between 2018 and 2022, energy transition technologies have received the most investment by capital expenditure out of all sectors globally, above ICT & electronics, construction, agribusiness, life sciences, financial services, and others.

Size of Global FDI Opportunity in Ten Key Energy Transition Sectors (2018-2022)

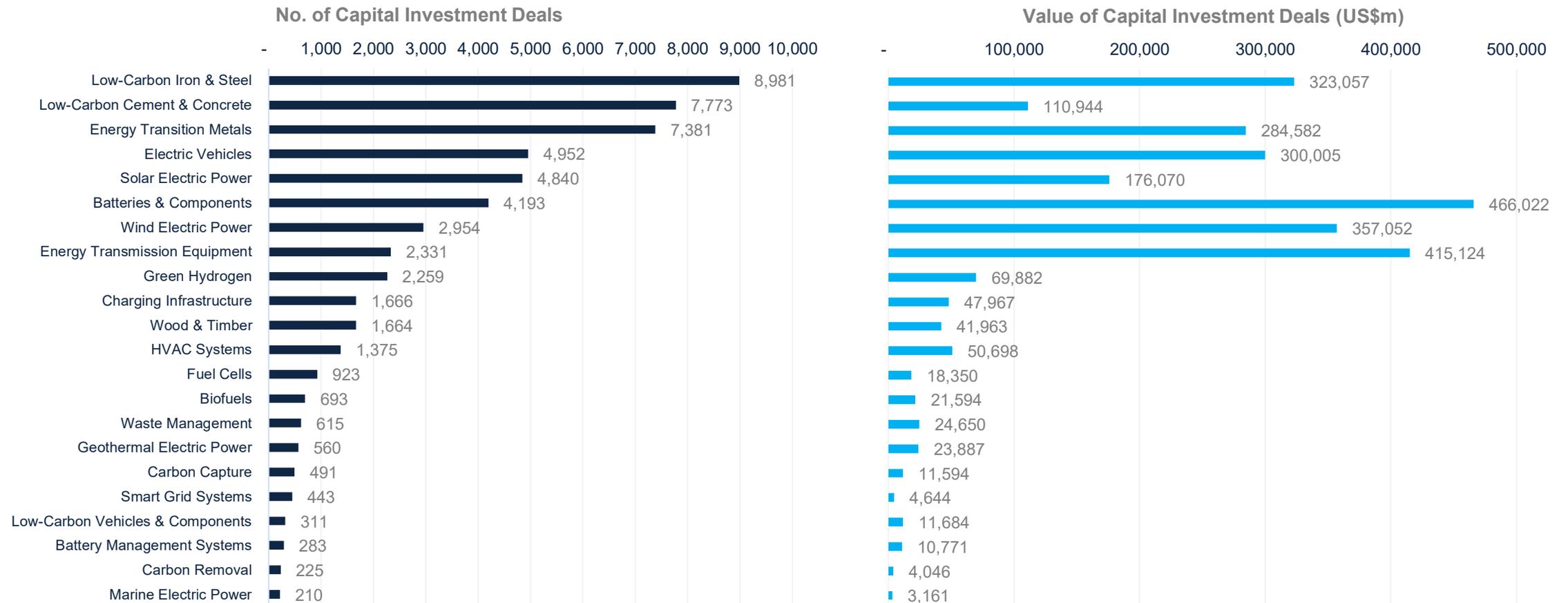


** The value of hydrogen projects is surprisingly high given the number of projects. However, in 2022, a significant number of large-scale investment announcements were made in the hydrogen sector, investments that would often span through 2030 and even beyond.*

Global Opportunity across Energy Transition Sectors

Capital investments in batteries & components, energy transmission equipment, wind electric power, and iron & steel are surging, with hundreds of billions of dollars in investments.

Size of Global Capital Investment Opportunity in Key Energy Transition Sectors, 2018-2022



Source: OCO Analysis, Pitchbook.

Electric Vehicles

The electric vehicles sector is one of the most sought-after for foreign direct investments. The last few years have seen an incredible amount of growth across project numbers and capital investment values.

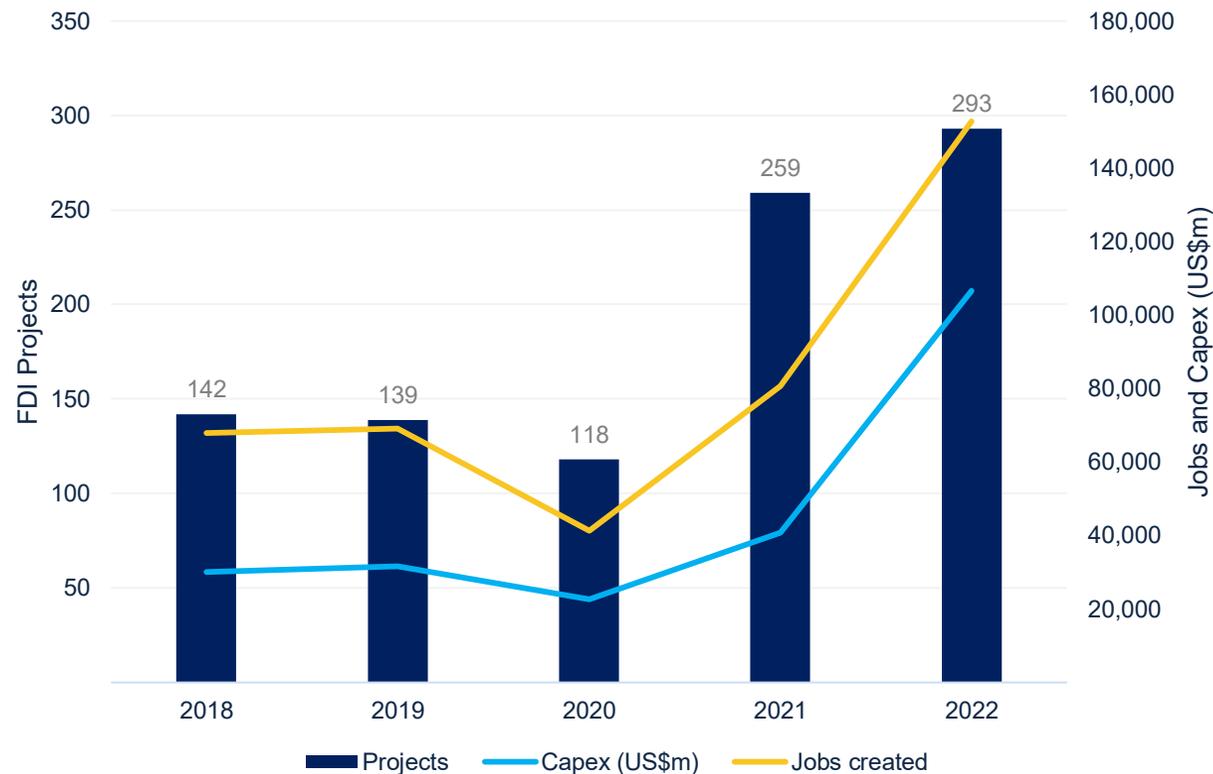
The sector is still in its early days, with EVs taking just 14% of global passenger car sales in 2022. There is room for growth and investments are projected to continue, offering a critical economic development opportunity for the Great Lakes.



FDI Opportunities in the Electric Vehicle Sector

Global foreign investment in electric vehicles has risen dramatically in the last two years across all metrics, projects, capital expenditure, and jobs created.

Foreign Investment in Electric Vehicles Globally, 2018-2022



Globally

18.82%
Projects - CAGR 2018-2022

938
Total Projects
(2018-2022)

\$231,260m
Total Capex
(2018-2022)

409,466
Total Jobs
(2018-2022)

Top Three Source Markets



United States

162 Projects



Germany

109 Projects



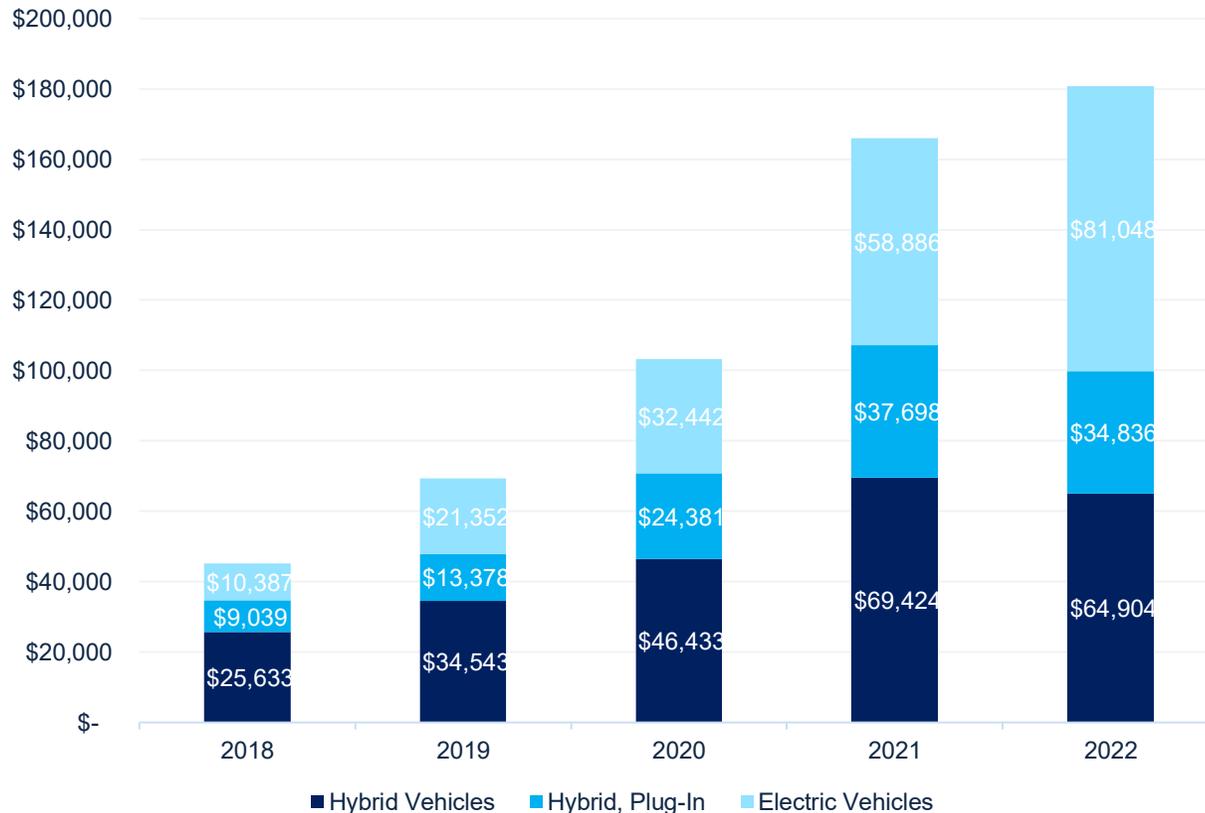
China

105 Projects

Import Opportunities in the Electric Vehicle Sector

Imports of electric-only vehicles are overtaking both plug-in and non-plug-in hybrid electric vehicles. The electric vehicle segment's global imports have grown at 67% CAGR in comparison to the 42% across all three segments.

Global Import Value of Electric Vehicles, 2018-2022



Globally

↑ **42%**
CAGR 2018-2022

\$180,788m
Total Import Value
(2022, or latest available)

Top Three Markets



Germany

\$29,898m



United States

\$27,087m



Belgium

\$12,565m

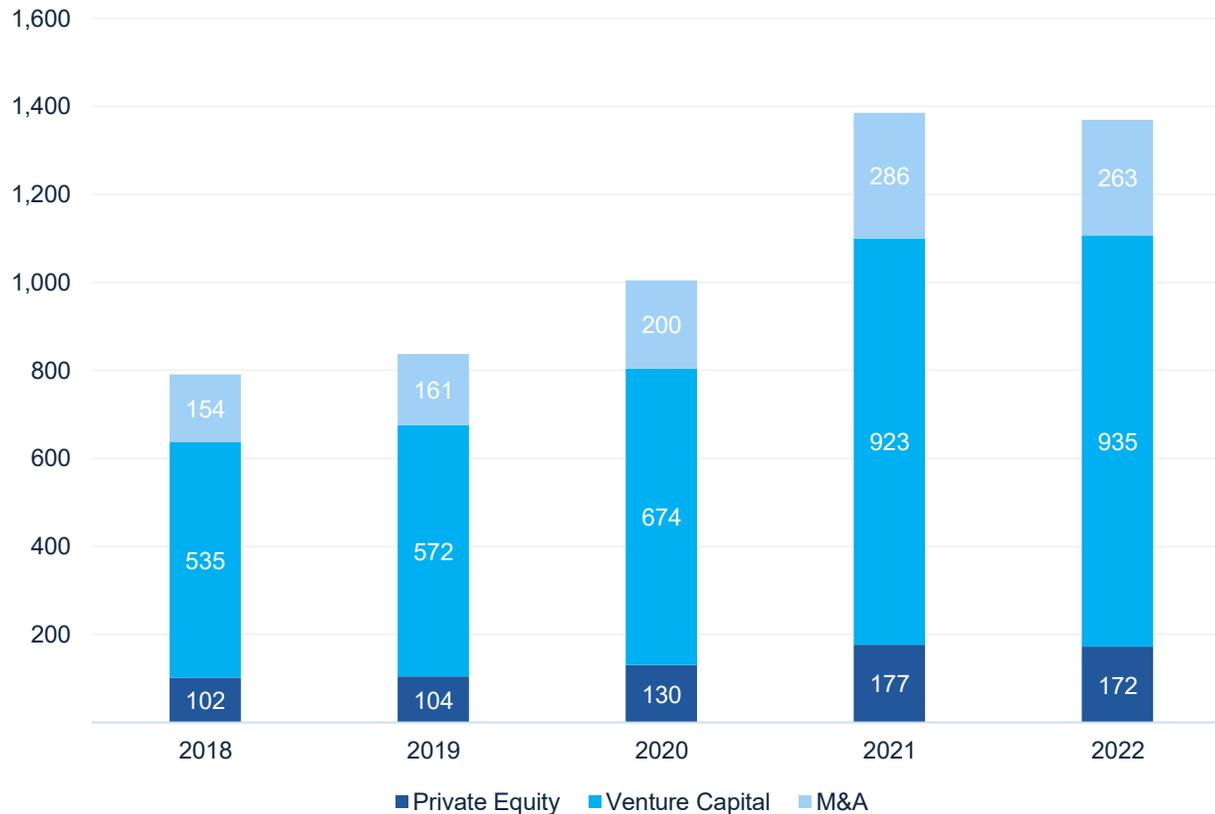
Source: OCO Analysis, COMTRADE.

* Please note that 2022 data is incomplete since not all reporting countries have released their data as of this report writing. It is therefore lower than in reality.

Capital Investment in the Electric Vehicle Sector

Capital investments in the sector have also grown both quickly and steadily: the number of deals rising by 15% CAGR and their value rising by almost 24% each year.

No. of Deals in Electric Vehicles globally, 2018-2022



Globally



4,957
 Total No. of Deals
 (2018-2022)

\$300,065m
 Total Value
 (2018-2022)

Top Three Markets



United States

\$104,328m



China

\$75,857m



Sweden

\$12,261m

Top 10 Foreign Investments in Electric Vehicle

(2018-2022)

The last few years have seen enormous and forward-looking investments in the EV sector and its supply chain.

| Company | Company & Project Description | Country | Capex (US\$M) |
|---|--|------------------------|----------------|
| Hon Hai Precision Industry (Foxconn) (Taiwan) | <u>January 2022</u> - Taiwan-based Hon Hai Precision Industry, a consumer electronics manufacturer that trades as Foxconn, will build a factory on 200 hectares of land in Batang Industrial Park in Batang, Indonesia. The factory will make battery cells, cathode precursors and telecommunication spare parts in addition to electric vehicles, representing an investment of \$8bn . The company is in talks to relocate its telecommunication's spare part manufacturing facilities from China to Batang, Indonesia. The company signed a memorandum of understanding in January 2022 with Indonesia-based mining company Indika Energy and Taiwan-based electric bike maker Gogoro Taiwan to develop electric vehicles ecosystem that focuses on electric battery, electric mobility, and associated industries in Indonesia. | Batang, Indonesia | \$8bn |
| Contemporary Amperex Technology (China) | <u>August 2022</u> - China-based Contemporary Amperex Technology (CATL), which develops lithium-ion batteries for electric vehicles and energy storage systems, has announced that it will invest €7.34bn to build a 100GWh battery plant in Debrecen, Hungary. Covering an area of 2.21 million sq m in the Southern Industrial Park of Debrecen, the plant will supply both cells and modules to automakers in Europe. Subject to shareholder meeting approval, the construction of the first production facilities could start by the end of 2022. <i>Debrecen is located at the heart of Europe, and with close proximity to some auto plants of its customers such as Mercedes-Benz, BMW, Stellantis, and Volkswagen, CATL's Debrecen plant will enable it to better cope with the battery demands of the European market, improve its global production network development, and help accelerate e-mobility and energy transition in Europe.</i> | Debrecen, Hungary | \$7.5bn |
| Hyundai Motor (South Korea) | <u>April 2022</u> - South Korea-based Hyundai Motor, which manufactures motor vehicles and related parts, has announced that, in a strategic partnership, it plans to open an electric vehicle and battery manufacturing facility on an 11.8 million sq m site in Bryan County, Georgia. The company will invest \$5.54bn in the Hyundai Motor Group Metaplant America and will receive an additional \$1bn from its suppliers . The site will have the capacity to build 300,000 vehicles per year . Construction has begun in October 2022, with production slated to commence in the first half of 2025. The project is expected to create 8100 jobs. The company aims to establish a stable supply chain for EV battery and other EV components in the US market. <i>"Hyundai and the people of Georgia share many qualities: respect for our histories, ingenuity, creativity, and determination to make the world better for the next generation," said Euisun Chung, chairman. "Today, our EVs are recognized as best in class, and with this partnership, we are determined to be the global leader in electrification, safety, quality, and sustainability. With the Hyundai Motor Group Metaplant America, we will continue to evolve beyond an automaker to the world's leading mobility solutions provider."</i> | Georgia, United States | \$5.5bn |

Top 10 Foreign Investments in Electric Vehicles

(2018-2022)

The last few years have seen enormous and forward-looking investments in the EV sector and its supply chain.

| Company | Company & Project Description | Country | Capex (US\$M) |
|---|---|---------------------|-----------------|
| Tesla (United States) | <u>November 2019</u> - US-based electric vehicle manufacturer Tesla has announced the opening of its new gigafactory in Gruenheide, Germany. The site will produce complete vehicles , its model 3 and model Y, as well as battery cells, packs and drivetrains for Tesla vehicles. The factory will have a production capacity of 500,000 vehicles annually. The company has invested €5bn in the facility, ultimately creating 12,000 jobs, with 3,000 employees already hired for the site's opening. | Gruenheide, Germany | \$5.49bn |
| Contemporary Amperex Technology (China) | <u>November 2020</u> - China-based Contemporary Amperex Technology, a lithium-ion battery producer, is investing \$5.1bn to build a manufacturing plant in Indonesia. This plant will manufacture electric vehicle batteries. Construction of the new plant is set to start in 2021 with production estimated to commence in 2024. | Indonesia | \$5.1bn |
| Tesla (United States) | <u>December 2022</u> - US-based electric vehicle manufacturer Tesla Motors has announced plans to open a new electric vehicle manufacturing plant in Monterrey, Mexico. The company will invest more than \$5bn in the site, with plans to create between 7,000 new jobs. Construction is set to begin in 2023, with plans for a production capacity of one million vehicles per year. The company is also considering the establishment of electric battery production at the site in future. | Monterrey, Mexico | \$5bn |
| Tesla (United States) | <u>May 2018</u> - US-based electric car company Tesla Motors has purchased an 864,885 sq m plot of land in order to construct a new gigafactory in the Lingang area of Shanghai, China. Representing an investment of \$5bn, the new factory will initially have the capacity for about 250,000 vehicles and battery packs per year, and plans to eventually double that , for the Greater China region. The planned facility's floor space will be 1.7 million sq m and its first cars are expected to be on the market in the first quarter of 2020. | Shanghai, China | \$5bn |

Top 10 Foreign Investments in Electric Vehicles

(2018-2022)

The last few years have seen enormous and forward-looking investments in the EV sector and its supply chain.

| Company | Company & Project Description | Country | Capex (US\$M) |
|---|--|------------------------------|-----------------|
| Hyundai Motor (South Korea) | <u>November 2022</u> - South Korea-based Hyundai Motor, which manufactures motor vehicles and related parts, has signed a memorandum of understanding to develop a new electric vehicle battery manufacturing facility in Bartow County, Georgia, US. The project, a joint venture with South Korea-based SK On, will see an investment of \$4-5bn and is expected to create more than 3,500 jobs . The facility will supply Hyundai Motor's plants in the US. It will be located at Bartow Centre, a zoned manufacturing and industrial site located on Highway 411 and is aiming to begin operations in 2025. The company worked with the Georgia Department of Economic Development as well as with county and state officials to establish the project in the area. | Georgia, United States | \$4.5bn |
| Bravo Motor Company (United States) | <u>March 2021</u> - Bravo Motor Company Brasil, a subsidiary of US-based autonomous, connected and electric vehicle manufacturer Bravo Motor Company, is to set up a manufacturing facility in Belo Horizonte, Brazil. Called Project Colossus 1, it will involve an investment of 25bn reais and the creation of 13,813 direct and indirect jobs by 2029. It will produce electric vehicles and battery packs. The facility is expected to commence operation in 2023. | Belo Horizonte, Brazil | \$4.36bn |
| Northvolt (Sweden) | <u>March 2022</u> - Sweden-based Northvolt, a battery manufacturer, has announced plans to build its new 60 GWh lithium-ion battery manufacturing plant in Heide, Germany. The €4bn gigafactory, Northvolt Drei, is to employ 3000 people and will produce its first batteries for electric vehicles in late 2025, serving markets in Europe. The facility will also have an on-site battery recycling plant to provide a sustainable solution for end-of-life electric vehicle batteries recovered from markets in Europe. The company is being supported by Germany Trade and Invest. <i>Peter Carlsson, chief executive officer, said, "We're excited to announce Northvolt Drei – a project which fits well into a promising future cluster of clean technology ventures emerging in northern Germany and advances the wider European transition towards a sustainable society within which Germany plays a crucial role." Access to German industrial competence and automotive expertise will provide additional opportunities. Local manufacturing expertise of the Schleswig-Holstein region and Heide will ensure the factory is delivering batteries of the highest quality, while the factory itself will provide critical labor force experience with battery technology – an emerging cornerstone technology of the European economy.</i> | Heide, Germany | \$4.25bn |

Batteries & Components

The global investment opportunity in energy storage and batteries is highly promising and continues to grow rapidly. As the world transitions towards renewable energy sources, the need for efficient and reliable energy storage solutions becomes increasingly critical.

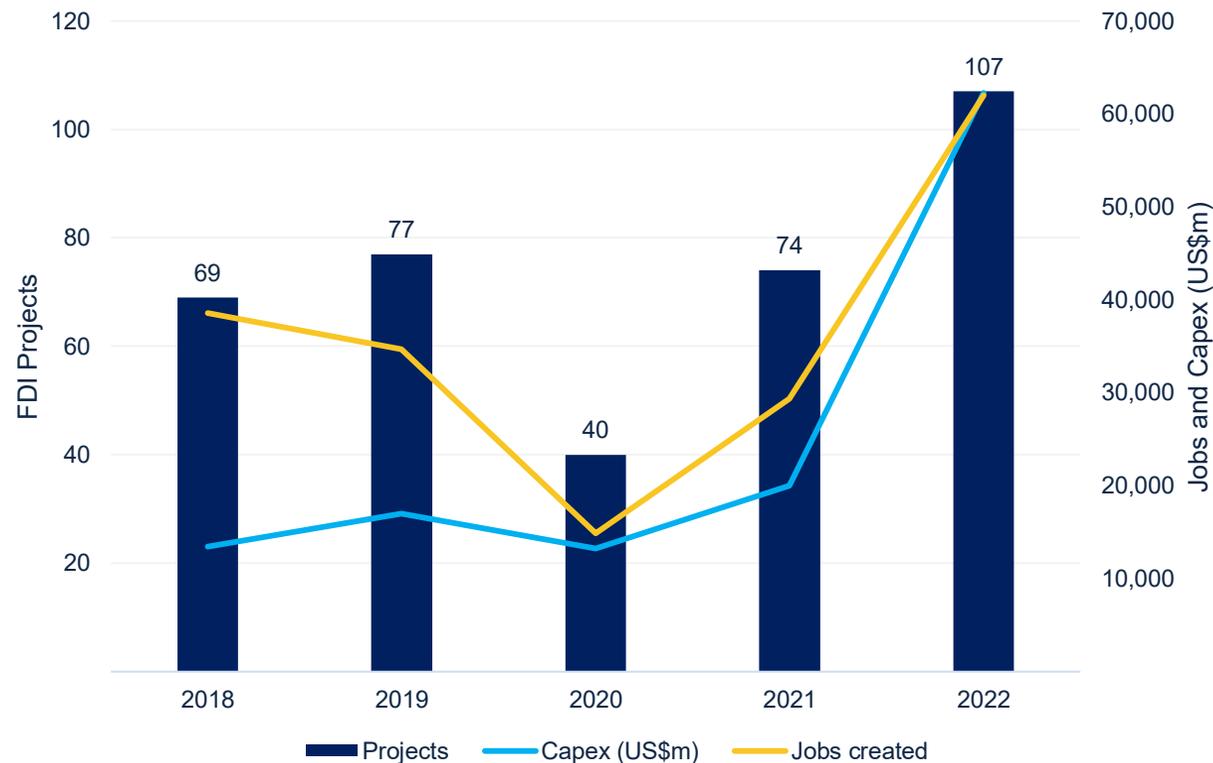
The sector presents a significant opportunity for EDOs to target the growing list of investors aiming to capitalize on the expanding market demand for energy storage technologies, including lithium-ion batteries, flow batteries, and other emerging storage solutions.



FDI Opportunities in the Batteries & Components Sector OCO GLOBAL

Like the EV sector, foreign investments in batteries & components have also surged in recent years. These projects have high capital expenditure and create a lot of new jobs.

FDI Projects in Batteries & Components Globally, 2018-2022



Globally

10.4%
Projects - CAGR 2018-2022

365
Total Projects
(2018-2022)

\$102,661m
Total Capex
(2018-2022)

71,002
Total Jobs
(2018-2022)

Top Three Source Markets



United States

67 Projects



Germany

47 Projects



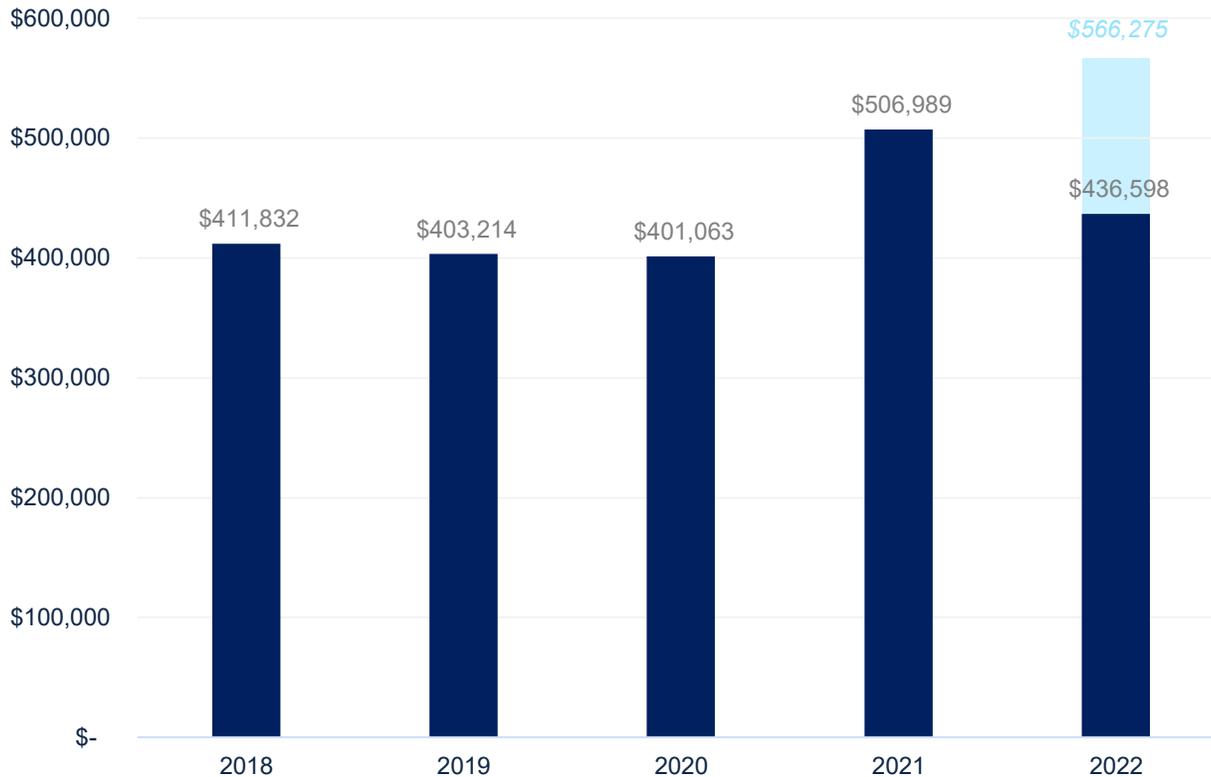
China

39 Projects

Import Opportunities in the Batteries & Components Sector

Global trade in batteries & components has reached more than \$500 billion in recent years, rising by around \$100 billion just between 2020 and 2021.

Import Value (in \$m) in Batteries & Components Globally, 2018-2022



Globally



1.5%

CAGR 2018-2022
(Based on reported data)

\$566,275m

Total Import Value
(2022, or latest available)

Top Three Markets



United States

\$102,265m



Germany

\$55,426m



China

\$45,427m

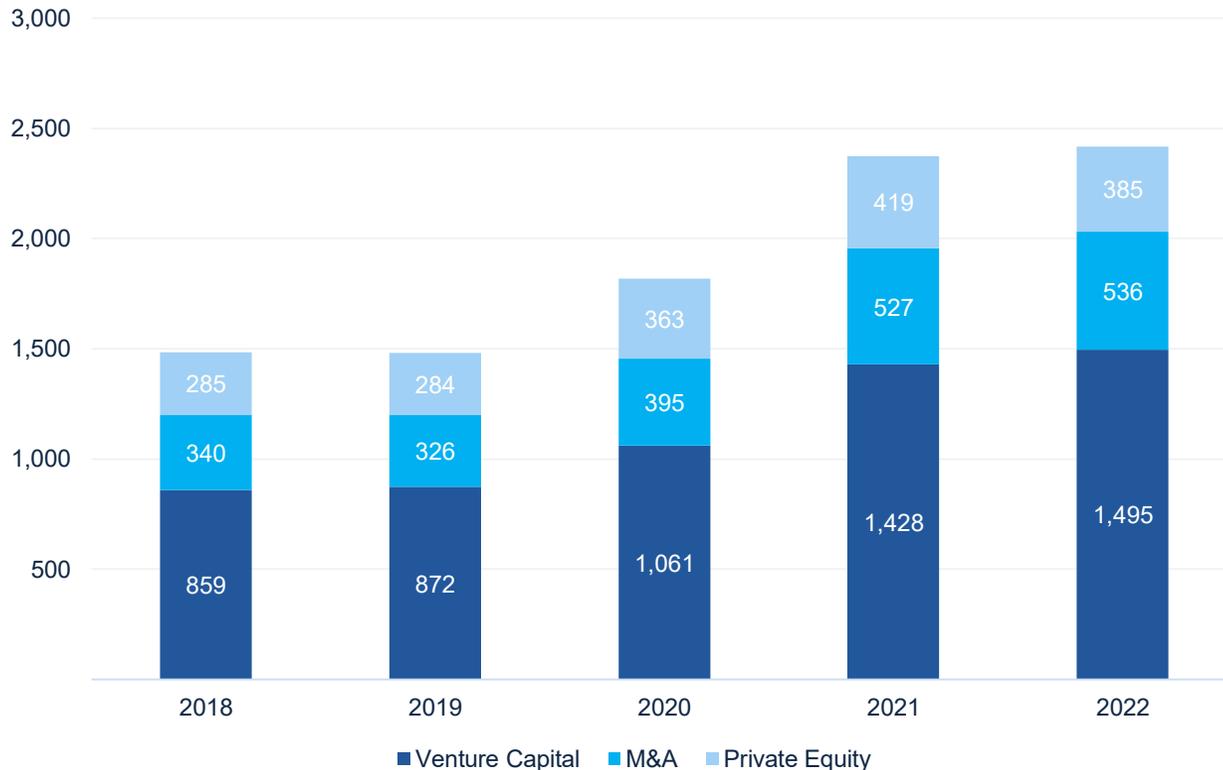
Source: OCO Analysis, COMTRADE.

* Please note that 2022 data is incomplete since not all reporting countries have released their data as of this report writing. It is therefore lower than in reality, and we have added an estimate combining 2022 data and latest available data for reporting countries without 2022 data.

Capital Investment in the Batteries & Components Sector

The growth narrative continues in capital investments where **batteries & components** have shown strong and consistent growth in the last five years for both the number and the value of deals.

No. of Deals in Batteries & Components Globally, 2018-2022



Globally



8,192
Total No. of Deals
(2018-2022)

\$440,005m
Total Value
(2018-2022)

Top Three Markets



United States

\$209,580m



China

\$115,860m



Canada

\$21,821m

Top 10 Foreign Investments in Batteries & Components

(2018-2022)

Many of the multi-billion-dollar investments are focusing on electric vehicle batteries, especially lithium-ion.

| Company | Company & Project Description | Country | Capex (US\$M) |
|---|--|------------------------|-----------------|
| Hon Hai Precision Industry (Foxconn) (Taiwan) | <u>January 2022</u> - Taiwan-based Hon Hai Precision Industry, a consumer electronics manufacturer that trades as Foxconn, will build a factory on 200 hectares of land in Batang Industrial Park in Batang, Indonesia. The factory will make battery cells, cathode precursor and telecommunication spare parts in addition to electric vehicles, representing an investment of \$8bn . The company is in talks to relocate its telecommunication's spare part manufacturing facilities from China to Batang, Indonesia. The company signed a memorandum of understanding in January 2022 with Indonesia-based mining company Indika Energy and Taiwan-based electric bike maker Gogoro Taiwan to develop an EV ecosystem that focuses on electric battery, electric mobility, and associated industries in Indonesia. | Batang, Indonesia | \$8bn |
| Contemporary Amperex Technology (China) | <u>August 2022</u> - China-based Contemporary Amperex Technology (CATL), which develops lithium-ion batteries for electric vehicles and energy storage systems, has announced that it will invest €7.34bn to build a 100GWh battery plant in Debrecen, Hungary. Covering an area of 2.21 million sq m in the Southern Industrial Park of Debrecen, the plant will supply both cells and modules to automakers in Europe . Subject to shareholder meeting approval, the construction of the first production facilities could start by the end of 2022. <i>Debrecen is located at the heart of Europe, and with close proximity to some auto plants of its customers such as Mercedes-Benz, BMW, Stellantis, and Volkswagen, CATL's Debrecen plant will enable it to better cope with the battery demands of the European market, improve its global production network development, and help accelerate e-mobility and energy transition in Europe.</i> | Debrecen, Hungary | \$7.49bn |
| Contemporary Amperex Technology (China) | <u>November 2020</u> - China-based Contemporary Amperex Technology, a lithium-ion battery producer, is investing \$5.1bn to build a manufacturing plant in Indonesia. This plant will manufacture electric vehicle batteries. Construction of the new plant is set to start in 2021 with production estimated to commence in 2024. | Indonesia | \$5.1bn |
| Hyundai Motor (South Korea) | <u>November 2022</u> - South Korea-based Hyundai Motor, which manufactures motor vehicles and related parts, has signed a memorandum of understanding to develop a new electric vehicle battery manufacturing facility in Bartow County, Georgia, US. The project, a joint venture with South Korea-based SK On, will see an investment of \$4-5bn and is expected to create more than 3,500 jobs . The facility will supply Hyundai Motor's plants in the US. It will be located at Bartow Centre, a zoned manufacturing and industrial site located on Highway 411 and is aiming to begin operations in 2025. The company worked with the Georgia Department of Economic Development as well as with county and state officials to establish the project in the area. | Georgia, United States | \$4.5bn |

Top 10 Foreign Investments in Batteries & Components

(2018-2022)

Many of the multi-billion-dollar investments are focusing on electric vehicle batteries, especially lithium-ion.

| Company | Company & Project Description | Country | Capex (US\$M) |
|-----------------------------|---|--------------------------|-----------------|
| Northvolt (Sweden) | <p><u>March 2022</u> - Sweden-based Northvolt, a battery manufacturer, has announced plans to build its new 60 GWh lithium-ion battery manufacturing plant in Heide, Germany. The €4bn gigafactory, Northvolt Drei, is to employ 3,000 people will produce its first batteries for electric vehicles in late 2025, serving markets in Europe. The facility will also have an on-site battery recycling plant to provide a sustainable solution for end-of-life electric vehicle batteries recovered from markets in Europe. The company is being supported by Germany Trade and Invest.</p> <p><i>Peter Carlsson, chief executive officer, said, "We're excited to announce Northvolt Drei – a project which fits well into a promising future cluster of clean technology ventures emerging in northern Germany and advances the wider European transition towards a sustainable society within which Germany plays a crucial role." Access to German industrial competence and automotive expertise will provide additional opportunities. Local manufacturing expertise of the Schleswig-Holstein region and Heide will ensure the factory is delivering batteries of the highest quality, while the factory itself will provide critical labor force experience with battery technology – an emerging cornerstone technology of the European economy.</i></p> | Heide, Germany | \$4.25bn |
| Stellantis (Netherlands) | <p><u>March 2022</u> - Netherlands-based Stellantis, a multinational automotive manufacturing corporation, is to invest \$4.1bn to establish a large-scale electric vehicle battery manufacturing facility through a joint venture with South Korea-based LG Energy Solution in Windsor, Canada by the first quarter of 2024. The JV company will produce lithium-ion battery cells and modules to serve North America. It will have an annual production capacity in excess of 45 GWh and will create an estimated 2,500 new jobs. The new factory will be built at 9865 Twin Oaks Drive and is supported by the City of Windsor and the Ontario government.</p> <p><i>Canada is committed to establishing a broad, local battery ecosystem by leveraging, among other things, its leadership in the generation of electricity from renewable sources.</i></p> | Windsor, Canada | \$4.1bn |
| Panasonic (Japan) | <p><u>July 2022</u> - Panasonic Energy, a provider of battery technology-based products and solutions which operates as a subsidiary of Japan-based industry conglomerate Panasonic, has announced its plans to build a \$4bn battery plant in the state of Kansas. The site is expected to create about 4,000 jobs and includes a facility for research in next-generation battery technology. The company has identified a site in De Soto, Kansas for the project. It has won approval to receive incentives from Kansas to build the plant. The facility will serve the US automotive market.</p> | Kansas, United States | \$4bn |

Top 10 Foreign Investments in Batteries & Components

(2018-2022)

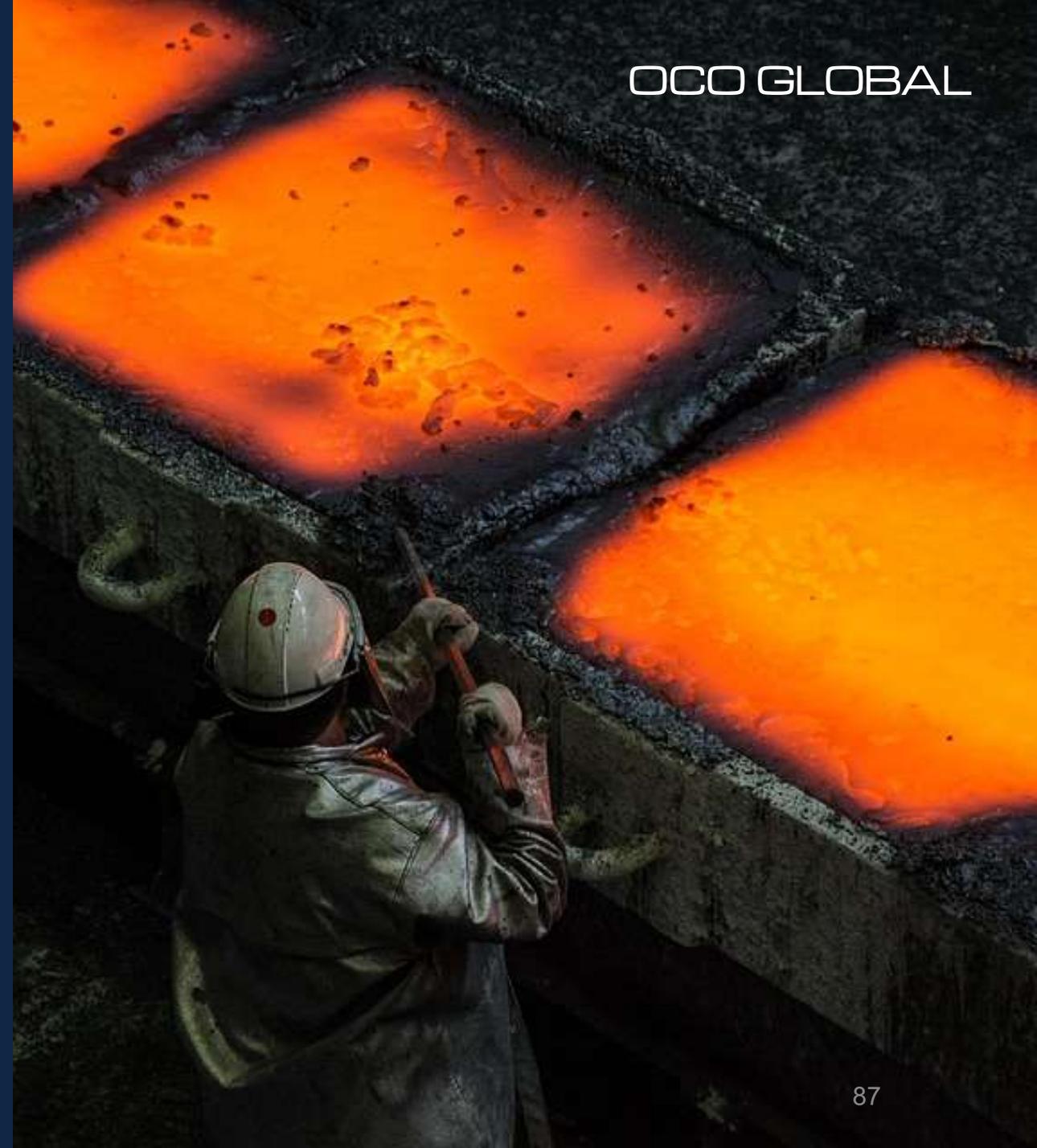
Many of the multi-billion-dollar investments are focusing on electric vehicle batteries, especially lithium-ion.

| Company | Company & Project Description | Country | Capex (US\$M) |
|------------------------------------|--|-------------------------------------|-----------------|
| Italtvolt <i>(Italy)</i> | <u>April 2022</u> - Italy-based Italtvolt, a battery cell technology company, has announced plans to construct a 54GWh lithium-ion manufacturing plant in Imperial Valley, California, US. The project will be operated by newly created entity, Statevolt, and is expected to receive an investment of \$4bn. The company has signed a letter of intent with US-based Controlled Thermal Resources for the supply of locally produced lithium and geothermal energy to the planned battery factory. It is expected to serve markets in the US. | California, United States | \$4bn |
| VinFast <i>(Vietnam)</i> | <u>January 2022</u> - VinFast, an electric vehicle start-up and a subsidiary of Vietnam-based Vingroup, has announced plans to open a battery factory in Chatham County, North Carolina. Initially, battery packs with supplied cells will be assembled at this site and in the future cells will also be manufactured . The company is planning to invest \$4bn in the facility located along Moncure Flatwood Road. Construction will begin by the end of 2022 and is expected to be completed by July 2024. The project is in addition to an electric vehicle manufacturing facility to be set up in the US which was announced by the company in March 2021. | North Carolina, United States | \$4bn |
| Toyota <i>(Japan)</i> | <u>October 2021</u> - Toyota Motor North America, a subsidiary of Japan-based Toyota Motor, has announced it is entering a joint venture with Toyota Tsusho to establish a new company and build an automotive battery plant in Liberty, North Carolina. The plant is expected to start production in 2025. Initially, the project was expected to see an investment worth \$1.29bn until 2031 and the creation of 1750 new jobs, but the company has increased the investment value by \$2.5bn, creating a further 350 jobs. The company selected the Greensboro-Randolph Megasite, with the North Carolina Department of Commerce and the Economic Development Partnership supporting the project. The project, to be operated by Toyota Battery Manufacturing, North Carolina (TBMNC), is part of a wider multi-billion investment by Toyota Motor through 2030 for the production of automotive batteries, including batteries for electric vehicles , in the US. <i>Chris Reynolds, executive vice-president, corporate resources for Toyota Motor North America, said, "We chose North Carolina for several reasons, including its extensive and well-maintained infrastructure, four international airports and two seaports, its consistent ranking as one of the top states to do business, its world-class education system and, importantly, its outstanding and diverse workforce."</i> | North Carolina, United States | \$3.79bn |

Iron & Steel

Although much of the data collected for this sector is not able to capture how much investment and trade is specifically focused on low-carbon production of iron and steel, digging into the projects reveals that almost all the largest foreign investment projects in the sector have focused on producing 'green steel'.

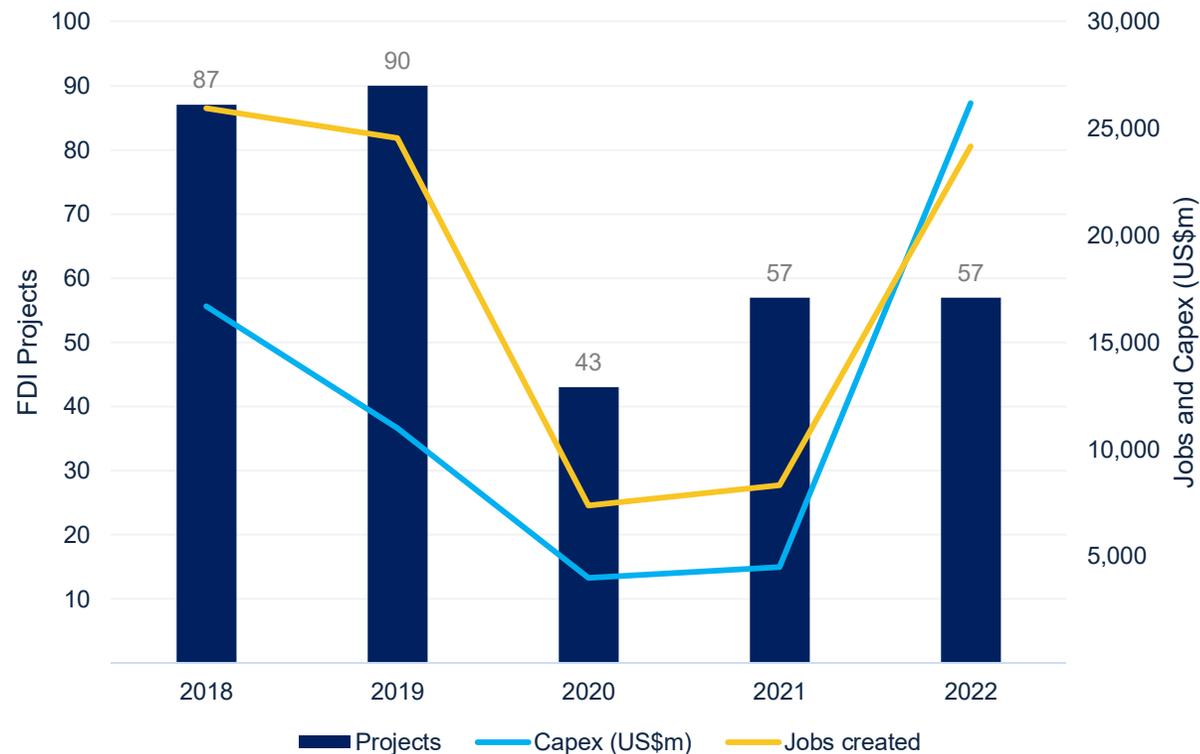
So far, over \$72bn in investments have been announced globally, according to the Green Steel Tracker, from companies aiming to decarbonize the almost two billion tons of iron and steel produced annually.



FDI Opportunities in the Iron & Steel Sector

The capital expenditure and number of jobs created from iron & steel foreign investment projects have surged even though the number of projects has fallen since 2019. Green steel is driving most of the recent large-scale investments.

FDI Projects in Iron & Steel Globally, 2018-2022



Globally

10.3%
CAGR 2018-2022

334
Total Projects
(2018-2022)

\$52,192m
Total Capex
(2018-2022)

20,755
Total Jobs
(2018-2022)

Top Three Source Markets



United States

42 Projects



Germany

29 Projects



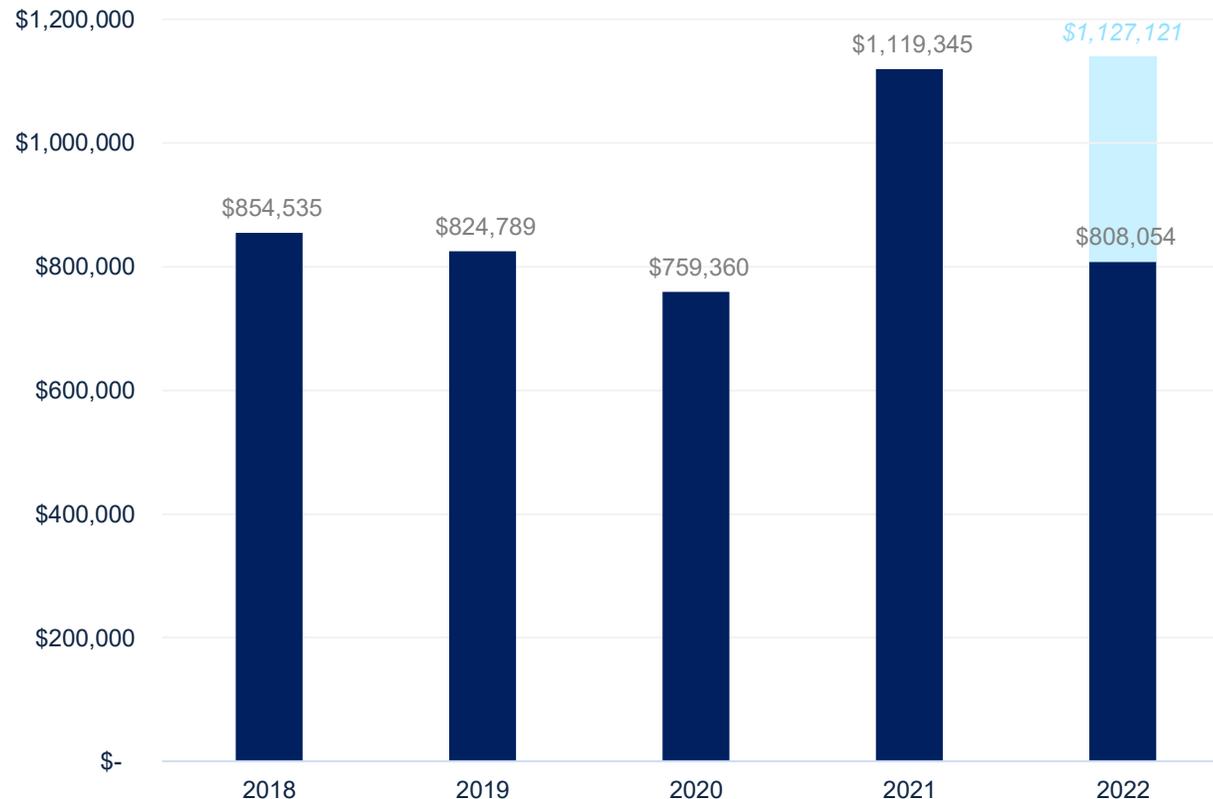
United Kingdom

19 Projects

Import Opportunities in the Iron & Steel Sector

Global imports of iron & steel have remained fairly stable since 2018, with the high in 2021 partly reflecting the higher commodity prices at the time.

Import Value (US\$m) of Iron & Steel Globally, 2018-2022



Globally



1.4%
CAGR 2018-2022
(Based on reported data)

\$1,127,121m
Total Import Value
(2022, or latest available)

Top Three Import Markets



China

\$181,235m



United States

\$107,154m



Germany

\$76,207m

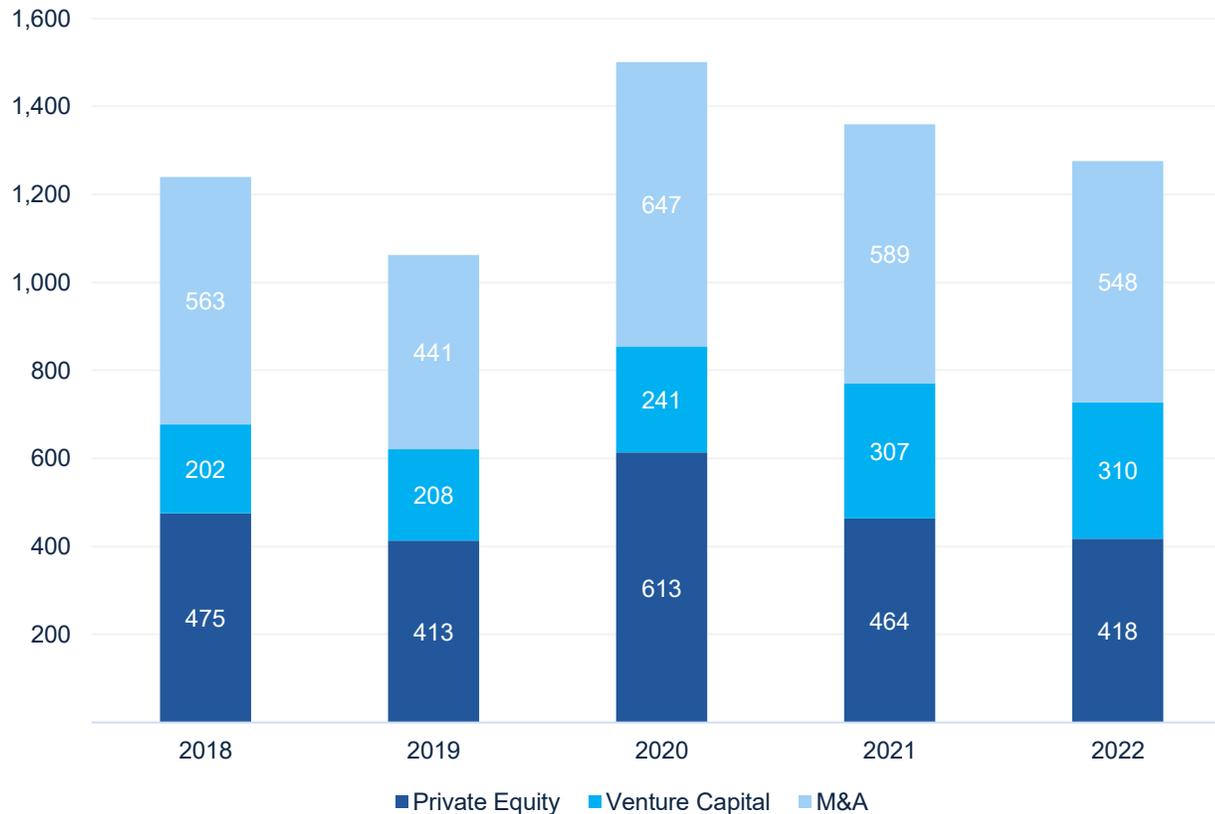
Source: OCO Analysis, COMTRADE.

* Please note that 2022 data is incomplete since not all reporting countries have released their data as of this report writing. It is therefore lower than in reality, and we have added an estimate combining 2022 data and latest available data for reporting countries without 2022 data.

Capital Investment in the Iron & Steel Sector

Capital investments in this sector have fluctuated over the last few years although **their value has grown steadily, up almost 8% year-on-year.**

No. of Deals in Iron & Steel globally, 2018-2022



Globally



Top Three Markets



United States

\$98,633m



Saudi Arabia

\$69,605m



India

\$19,543m

Top 10 Foreign Investments in Iron & Steel

(2018-2022)

Almost all the largest foreign investments announced globally in the last few years are focused on low-carbon production.

| Company | Company & Project Description | Country | Capex (US\$M) |
|--|---|--------------------------------------|----------------|
| POSCO (South Korea) | <u>December 2022</u> - South Korea-based steel producer company POSCO has announced it plans to invest \$12bn in green steel production in Australia by 2040. This is part of the company's plans to invest a total of \$40bn in Australia with partners by 2040. Within this, \$28bn is planned to be invested in green hydrogen manufacturing . The company is cooperating with the government of Australia. | Australia | \$12bn |
| Hesteel Group (China) | <u>December 2018</u> - China-based Hesteel Group, a provider of iron and steel products, is to invest \$4.4bn in a joint venture with Philippines-based Steel Asia Manufacturing to establish a company that will produce iron and steel . The two companies will construct a factory in Cagayan de Oro, the Philippines, which is expected to be complete by 2023 and generate an initial 10,000 jobs. Annual production is expected to reach eight million tonnes of iron and steel using green technologies . | Cagayan de Oro, Philippines | \$4.4bn |
| Essar Group (India) | <u>September 2022</u> - India-based Essar Group, a diversified conglomerate, is to invest \$4bn to establish an integrated flat steelworks plant in Ras Al-Khair, Saudi Arabia by the end 2025. The four-million tonnes per annum plant will have continuous casting and hot strip capacity, cold rolled coil capacity, a tin plate line, and two direct reduced iron plants. The new facility will also have two direct reduced iron plants, each with a 2.5m t/y capacity . | Ras Al-Khair, Saudi Arabia | \$4bn |
| Panhua Group (China) | <u>June 2018</u> - China-based steel producer Panhua Group is to invest \$3.5bn in a new integrated steel manufacturing plant in the Misamis Oriental Special Economic Zone, Mindanao, Philippines. The 305-hectare plant will consist of a port, an integrated steel mill with a capacity of 10 million tonnes, an industrial park and other downstream industries. It is expected to be completed by 2025. | Northern Mindanao, Philippines | \$3.5bn |
| Shadeed Iron and Steel (India) | <u>December 2022</u> - Jindal Shadeed Iron and Steel, a subsidiary of India-based Jindal Group, will invest \$3bn to establish a green steel plant in Duqm, Oman. The facility is expected to be completed in 2026 and will process five million tonnes of steel per year. Between 30-40% of the plant's output will serve the Oman market, with the remainder serving global markets. | Duqm, Oman | \$3bn |

Top 10 Foreign Investments in Iron & Steel

(2018-2022)

Almost all the largest foreign investments announced globally in the last few years are focused on low-carbon production.

| Company | Company & Project Description | Country | Capex (US\$M) |
|---|--|--------------------|-----------------|
| Rio Tinto Group (United Kingdom) | <u>September 2022</u> - UK-based Rio Tinto Group, a mining company, and China-based China Baowu Steel Group have agreed to enter a joint venture with respect to the Western Range iron ore project in Pilbara, Australia. The companies will invest a combined \$2bn to develop the iron ore mine . Construction is expected to begin in early 2023 with first production anticipated in 2025. The mine will require 800 ongoing operational roles which are expected to be filled by existing workers transitioning from other sites in the Paraburdoo mining hub. | Pibara, Australia | \$2bn |
| Mintal Group (China) | <u>August 2019</u> - China-based Mintal Group, a steel company, has announced plans to establish a \$2bn ferrochrome carbon, stainless steel, and colour metal factory in the Nghi Son economic zone in Thanh Hoa, Vietnam. The facility will cover an area of 300 hectares and the first phase of the plant will produce 1.5 million tonnes of ferrochrome carbon per year. The second phase will produce one million tonnes of stainless steel and one million tonnes of colour metal per year. | Thanh Hoa, Vietnam | \$2bn |
| IMR Metallurgical resources (Switzerland) | <u>March 2020</u> - Switzerland-based IMR Metallurgical Resources AG, a global resource partner to the international power and steel industry, plans to invest \$1.62bn to establish a steel plant in Kadapa, India. It will have a capacity of 10 million tonnes and is expected to create new jobs. | Kadapa, India | \$1.62bn |
| Southern Copper (Mexico) | <u>December 2019</u> - Southern Copper, a mining company and a subsidiary of Mexico-based Grupo Mexico, is planning to build a \$1.4bn foundry in Ilo, Peru. The project forms a part of the company's plans to invest \$8bn in the expansion of its operations in Peru . | Puerto Ilo, Peru | \$1.4bn |
| Colomi iron Mineracao (Singapore) | <u>March 2019</u> - Colomi Iron Mineracao, a company engaged in iron mining activities which operates as a subsidiary of Singapore-based Colomi Singapore, plans to invest over 11bn reais to set up operations in the state of Bahia, in Brazil. The company will invest 4.6bn reais in the construction and operation of a mine , located some 200km from Juazeiro. Another 5bn reais will go towards improvements to the Centro-Atlântica (FCA) rail line and 2bn reais towards the Aratu-Candeias port for exportation. The project is expected to start operations by the end of 2023. It will principally serve markets in China. | Bahia, Brazil | \$1.2bn |

Hydrogen

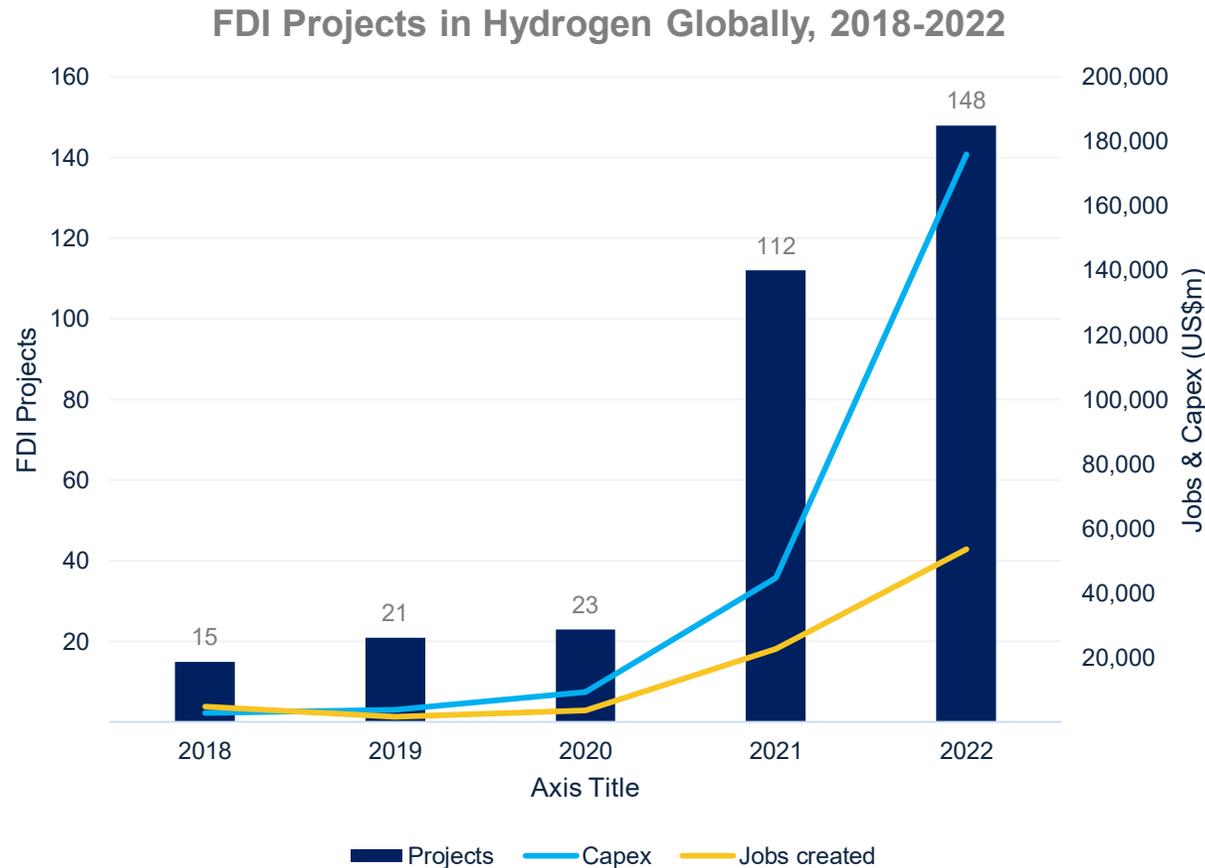
Hydrogen is a versatile and clean energy carrier with applications across a range of industries, and as countries worldwide look to reduce their carbon emissions, hydrogen has gained significant attention and investment as a key solution to decarbonizing the economy, especially for hard-to-decarbonize industries such as steel and sustainable fuels.

According to the Hydrogen Council, 680 large-scale project proposals worth US\$240 billion have been put forward. While deployment is lagging slightly, the pipeline is enormous and looks set to continue growing.



FDI Opportunities in the Hydrogen Sector

Foreign investments in the hydrogen sector have skyrocketed like no other sector, showing a 77% CAGR since 2018. Many investments have high capital expenditure and will be developed through 2030.



Globally



77%
CAGR 2018-2022

319
Total Projects
(2018-2022)

\$238,434m
Total Capex
(2018-2022)

86,250
Total Jobs
(2018-2022)

Top Three Source Markets



United States

34 Projects



Germany

30 Projects



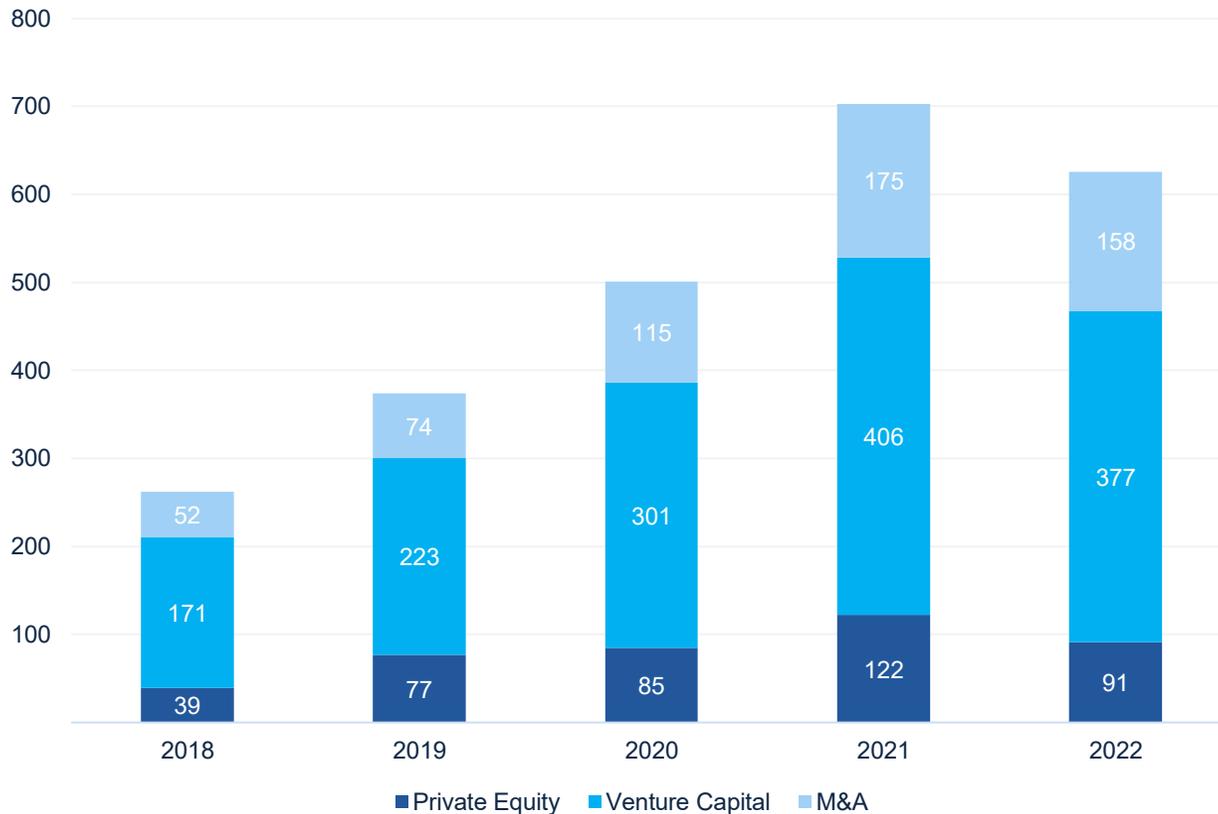
Spain

30 Projects

Capital Investment in the Hydrogen Sector

The number of deals and their capital investment value have also risen rapidly, with annual growth rates between 25% and 55%. The combined value of investment deals between 2018 and 2022 was over \$62 billion.

No. of Deals in Hydrogen Globally, 2018-2022



Globally

25.4%
CAGR 2018-2022

54.2%
CAGR 2018-2022

2,106
Total No. of Deals
(2018-2022)

\$62,675m
Total Value
(2018-2022)

Top Three Markets



United States

\$29,644m



India

\$6,448m



China

\$6,006m

Top 10 Foreign Investments in Hydrogen

(2018-2022)

All of the largest hydrogen investments are focusing on green hydrogen production, especially as a low-carbon fuel.

| Company | Company & Project Description | Country | Capex (US\$M) |
|--|---|-------------------------|-----------------|
| POSCO (South Korea) | <u>December 2022</u> - South Korea-based steel producer company POSCO has announced it plans to invest \$28bn in green hydrogen manufacturing in Australia by 2040. This is part of the company's plans to invest a total of \$40bn in Australia with partners by 2040. Within this, \$12bn is planned to be invested in green steel production. The company is cooperating with the government of Australia. | Australia | \$28bn |
| ACME Group (India) | <u>August 2022</u> - India-based ACME Group, a solar energy company, has announced plans to construct a \$13bn green hydrogen plant in Ain Sokhna, Egypt, which is part of the Suez Canal Special Economic Zone. The plant, to be built over 4.5 million sq m, is to produce 2.2 billion tonnes of green hydrogen annually. The company signed a Memorandum of Understanding with the General Authority for Suez Canal Economic Zone (SCZONE), the Sovereign Fund of Egypt, the Egyptian Electricity Transmission Company (EETC) and the New and Renewable Energy Authority (NREA). | Ain Sokhna, Egypt | \$13bn |
| Globeleq Generation (United Kingdom) | <u>August 2022</u> - UK-based power company Globeleq Generation has announced it intends to build a 3.6GW hydrogen production hub within the Suez Canal Economic Zone in Egypt. The hub is to be powered by 9GW of wind and solar capacity within the zone. The company has signed a Memorandum of Understanding with Egypt-based New and Renewable Energy Authority (NREA), the General Authority for Suez Canal Economic Zone (SCZONE), the Sovereign Fund of Egypt for Investment and Development (TSFE) and the Egyptian Electricity Transmission Company (EETC). The \$11bn green fuel production plant will be located on an area of 10 million sq m and have a production capacity of 2 million tonnes annually. | Suez, Egypt | \$11bn |
| LEAG (Czech Republic) | <u>September 2022</u> - LEAG, a utility company and ultimate subsidiary of Czech Republic-based EPH Group, has announced it is planning to set up the Gigawatt Factory hub for the production of renewable electricity in the Lausatia region in Brandenburg, Germany. The Gigawatt Factory will be combining a green hydrogen plant, fuelled by 1000MW of wind and solar systems to be set up on post-mining land, and innovative storage solutions. A capacity of seven gigawatts are expected to be built up by 2030. The project is to see investments of more than €10bn. | Brandenburg, Germany | \$10.8bn |

Top 10 Foreign Investments in Hydrogen

(2018-2022)

All of the largest hydrogen investments are focusing on green hydrogen production, especially as a low-carbon fuel.

| Company | Company & Project Description | Country | Capex (US\$M) |
|---|--|----------------------------|-----------------|
| Total Eren (Luxembourg) | <u>February 2022</u> - Total Eren, a subsidiary of Luxembourg-based renewable energy company Eren Groupe, has announced plans to invest Dh100bn in a hydrogen and green ammonia project in the Guelmim-Oued Noun region of Morocco. The facilities will be built on a 170,000-hectare site. The production of these new energies will be based on wind and solar energy. The plant will be capable of transforming 10 GW of clean electricity . Total Eren plans to start the related works in 2025, with the beginning of the production planned in 2027. | Guelmim-Oued Noun, Morocco | \$10.3bn |
| Fortescue Future Industries (Australia) | May 2022 - Renewable energy company Fortescue Future Industries (FFI), a subsidiary of Australia-based Fortescue Metals Group, is to implement hydrogen projects in Egypt with investments of up to \$10bn until 2030 . The state's contribution to the projects ranges between \$500m and \$630m. | Egypt | \$10bn |
| ReNew Power Ventures (India) | <u>July 2022</u> - India-based ReNew Power Ventures, a renewable energy company, has announced plans to invest \$8bn to establish a green hydrogen facility at Suez Canal Economic Zone in Suez, Egypt. ReNew, backed by investors, including Goldman Sachs and Abu Dhabi Investment Authority, will be eyeing to produce 220,000 tonnes of the clean fuel annually in the country in the coming years. | Suez, Egypt | \$8bn |
| Energix Energy (Australia) | <u>February 2021</u> - Australia-based Energix Energy, a developer of renewable energy projects, has announced plans to develop a utility-scale green hydrogen plant in Pecem, Brazil. The Base One project will produce enough green hydrogen to power the lives of over 200 million people in developing economies. The plant represents a total investment of \$5.4bn , with commissioning scheduled for 2024. The 500-hectare facility will produce up to 100GW of capacity in future. The hydrogen produced will be exported globally from Pecem Industrial Complex Port free zone. <i>Our planned facility in Brazil [...] provides a strategic location with direct access to all major international markets via ocean freight and a deep sea port.</i> | Pecem, Brazil | \$5.4bn |

Top 10 Foreign Investments in Hydrogen

(2018-2022)

All of the largest hydrogen investments are focusing on green hydrogen production, especially as a low-carbon fuel.

| Company | Company & Project Description | Country | Capex (US\$M) |
|---------------------------------|--|------------------|---------------|
| AP Moller – Maersk (Denmark) | <u>November 2022</u> - Denmark-based AP Moller - Maersk, a shipping company, is to establish a large-scale green fuel production facility in Galicia, Spain. The company has announced that it will produce e-methanol from green hydrogen to fuel its operations as part of its decarbonisation plan. This investment is part of a larger €10bn plan to establish two green fuel production sites in Spain , located in Andalusia and Galicia. The plants are expected to produce 200,000 tonnes of e-methanol per year by 2025, which is to be increased to one million tonnes by 2027, and eventually to two million tonnes in future. If ammonia surpasses e-methanol as a global maritime fuel, the company has announced that it will produce this at its second production plant in Spain instead of e-methanol. AP Moller - Maersk plans to establish five or six such production sites globally , including one green fuel site in Cairo, Egypt. | Andalusia, Spain | \$5.4bn |
| AP Moller – Maersk (Denmark) | <u>November 2022</u> - Denmark-based AP Moller - Maersk, a shipping company, is to establish a large-scale green fuel production facility in Galicia, Spain. The company has announced that it will produce e-methanol from green hydrogen to fuel its operations as part of its decarbonisation plan. This investment is part of a larger €10bn plan to establish two green fuel production sites in Spain , located in Andalusia and Galicia. The plants are expected to produce 200,000 tonnes of e-methanol per year by 2025, which is to be increased to one million tonnes by 2027, and eventually to two million tonnes in future. If ammonia surpasses e-methanol as a global maritime fuel, the company has announced that it will produce this at its second production plant in Spain instead of e-methanol. AP Moller - Maersk plans to establish five or six such production sites globally , including one green fuel site in Cairo, Egypt. | Galicia, Spain | \$5.4bn |

Solar Power

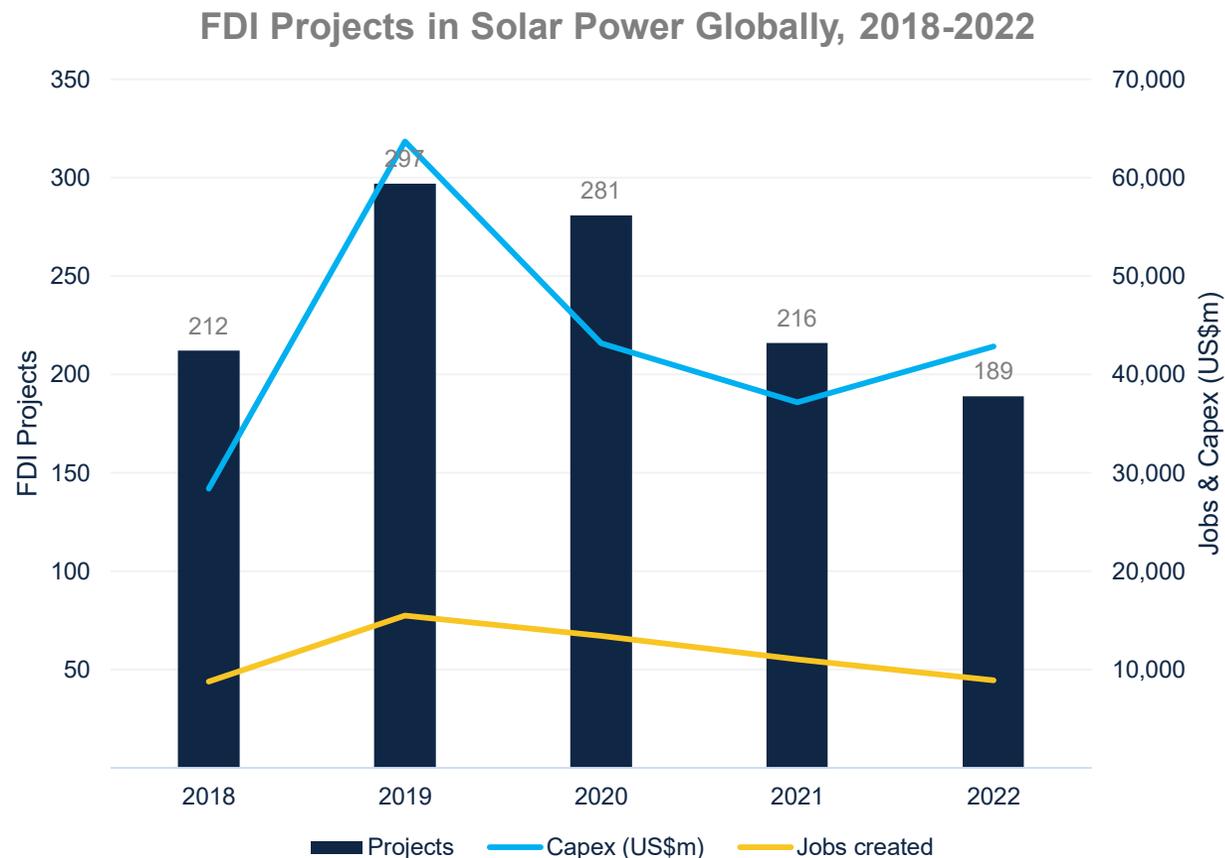
Solar power has emerged as the leading source of renewable energy, offering abundant electricity across the globe at highly competitive prices that have helped boost the demand for photovoltaic technologies.

While much of the supply chain and manufacturing is in Asia, the Inflation Reduction Act provides key benefits for manufacturers of solar products including those companies that produce wafers, cells and modules, likely attracting foreign investment that might not otherwise have come to the US.



FDI Opportunities in the Solar Power Sector

Although the sector has not seen much growth in foreign investment since 2019-2020, the continued drive towards renewable sources of energy and the low cost of solar is set to increase demand for solar panels globally.



Globally

3.35%
CAGR 2018-2022

1,186
Total Projects
(2018-2022)

\$52,341m
Total Capex
(2018-2022)

1,439
Total Jobs
(2018-2022)

Top Three Markets



United States

148 Projects



Spain

121 Projects



Brazil

68 Projects

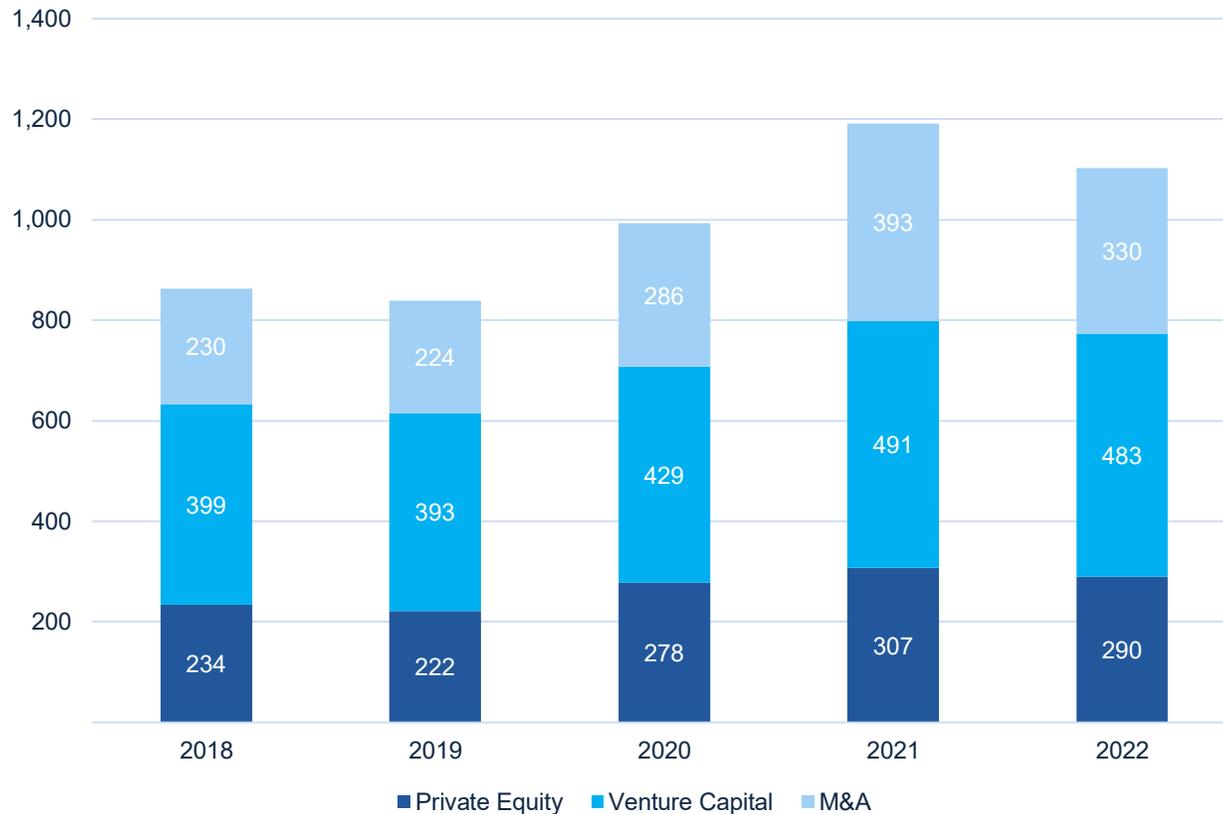
Source: OCO Analysis, fDi Markets.

* These investments include a large share of solar power deployment projects as well as manufacturing projects.

Capital Investment in the Solar Power Sector

Capital investment in the solar power sector has had steady upward growth between 2018 and 2022, with a combined investment value of \$176 billion across the five years.

No. of Deals in Solar Power Globally, 2018-2022



Globally



5.58%
CAGR 2018-2022



10.6%
CAGR 2018-2022

4,842
Total No. of Deals
(2018-2022)

\$176,071m
Total Value
(2018-2022)

Top Three Markets



United States

\$50,845m



Spain

\$24,777m



India

\$18,807m

Top 10 Foreign Investments in Solar Power

(2018-2022)

Much of the recent investment in solar panel manufacturing projects has both come from and landed in Asia.

| Company | Company & Project Description | Country | Capex |
|---|---|------------|-----------------|
| Risen Solar Technology (China) | <u>June 2021</u> - Risen Solar Technology, a subsidiary of China-based solar module manufacturer Risen Energy , is investing \$10.1bn to open a factory in the Kulim District of Malaysia. The facility, to commence output in the first quarter of 2022, will create 3,000 jobs and achieve an annual production capacity of 3 gigawatts within the first five years of operating. The company will be based in the Kulim Hi-Tech Park. | Malaysia | \$10.1bn |
| GlobiTech (Taiwan) | <u>February 2022</u> - GlobiTech, a manufacturer of silicon wafers and subsidiary of Taiwan-based Sino-American Silicon Products, is expanding its presence in Sherman, Texas, US. It will open a new silicon wafer production plant. The facility will see an investment of \$5bn and is to create 1,500 new jobs. Construction on the new site is expected to begin in 2022 with production from the first fab anticipated as early as 2025. The company has been working with the Sherman Economic Development Corporation on establishing the project and has been offered a \$15m Texas Enterprise Fund (TEF) grant along with a \$10,000 veteran-created job bonus. <i>Doris Hsu, chief executive officer, GlobalWafers, said the company selected the city of Sherman because of its "aggressive local and state incentives, ample resources and especially the business and personal relationships that we have developed over 20 years."</i> | Texas, USA | \$5bn |
| GCL Technology Holdings (Hong Kong) | <u>March 2021</u> - Hong Kong-based GCL-Poly Energy Holdings has announced it will invest \$2.78bn in a new factory located in Mongolia. The new factory is a joint venture with Shangji Automation Co Ltd. The joint venture sees the equity stake split between GCL-Poly Energy 65% and Shangji Automation Co Ltd 35%. The factory will have a 300,000-tonne-annual-production-capacity. | China | \$2.78bn |
| GCL-Poly New Energy Co. (Hong Kong) | <u>April 2018</u> - GCL-Poly (Suzhou) New Energy Co, a subsidiary of Hong Kong-based GCL-Poly Energy Holdings, is to build a new manufacturing facility in the Economic and Technological Development Zone in Qujing, China. The firm is investing \$1.4bn to open the new facility which will manufacture 20GW monocrystalline silicon ingots. The investment will come in the form of a joint venture with the Qujing Municipal Government in Yunnan Province. | China | \$1.4bn |

Source: fDi Markets.

* These top investment projects have been selected more carefully to include projects investing in the supply chain and manufacturing of solar panels rather than large deployments.

Top 10 Foreign Investments in Solar Power

(2018-2022)

Much of the recent investment in solar panel manufacturing projects has both come from and landed in Asia.

| Company | Company & Project Description | Country | Capex |
|---|---|--------------|---------------|
| Hanergy Thin Film Power (China) | <u>February 2019</u> - Hanergy Thin Film Power, a subsidiary of China-based clean energy specialist Hanergy Holding Group, is planning to establish a solar thin-film manufacturing facility in Saudi Arabia. The project will represent an investment of \$1bn. The project will be a joint venture with Saudi-based Ajlan & Bros. | Saudi Arabia | \$1bn |
| Solargise (United Kingdom) | <u>September 2018</u> - Solargise Canada, a division of UK-based Solargise, a solar panel manufacturer, plans to invest \$741.14m in a new 329,000 sq m solar panel manufacturing site in Salaberry-de-Valleyfield, Canada. Construction of the first phase is projected to begin before quarter three of 2019 and will create 450 direct jobs with an investment of \$741.14. The facilities will produce polysilicon ingots, wafers, HIT photovoltaic cells and plastic-free glass photovoltaic solar panels with an annual capacity of 1GW. The total investment for both phases of the project is \$1.79bn. | Canada | \$741m |
| GCL System Integration Technology (Hong Kong) | <u>March 2020</u> - GCL System Integration Technology, a subsidiary of Hong Kong-based Golden Concord Holdings, is planning to invest \$704.37m to set up the first phase of a solar panel manufacturing plant in Hefei, China. It will have an annual production capacity of 15 gigawatts of solar panels. The company will expand further on the basis of sales and utilisation of the facility. | China | \$704m |
| Jinko Solar (China) | <u>September 2021</u> - China-based JinkoSolar, a photovoltaic power producer, has announced plans to invest \$500m to open a monocrystalline ingot and wafer manufacturing facility in Quang Yen Coastal Economic Zone, Vietnam. The facility will have an annual manufacturing capacity of 7 GW and will be operational in the first quarter of 2022. It will supply the global market. | Vietnam | \$500m |

Source: fDi Markets.

* These top investment projects have been selected more carefully to include projects investing in the supply chain and manufacturing of solar panels.

Top 10 Foreign Investments in Solar Power

(2018-2022)

Much of the recent investment in solar panel manufacturing projects has both come from and landed in Asia.

| Company | Company & Project Description | Country | Capex |
|------------------------------------|---|-------------|---------------|
| Global Wafers (Taiwan) | <u>April 2018</u> - GlobalWafers Co, a manufacturer of silicon wafers and subsidiary of Taiwan-based Sino-American Silicon Products, is planning to expand its production facility in Cheonan, South Korea. The \$449m expansion will expand production capacity at the site, which produces 12-inch silicon wafers . Once complete, the expanded facility will allow the company to fulfill orders placed by local vendors. The company expects the expansion to be complete by 2020. | South Korea | \$449m |
| Enel Green Power (Italy) | <u>April 2018</u> - Enel Green Power North America, which operates renewable energy sites in North America and acts as a subsidiary of Italy-based Enel, has announced it is planning to build a solar photovoltaic cell and panel manufacturing facility in the US. Initially, the facility is to have a capacity of 3 GW annually, which is to be scaled up to 6 GW eventually. Construction of the proposed factory is expected to begin in the first half of 2023, with completion scheduled for the end of 2024. The facility is expected to create up to 1,500 new jobs by 2025. The site selection process is ongoing as of November 2022. It will serve the US market. | USA | - |

Source: fDi Markets.

* These top investment projects have been selected more carefully to include projects investing in the supply chain and manufacturing of solar panels.

6. Key Markets for Investment Targeting



Target International Target Markets

North America, Western Europe, East Asia, and Oceania are the largest markets overall, with high levels of imports and investment activity across energy transition sectors.

- **Ahead of any investment attraction exercise, it is crucial to understand which markets have the highest potential for lead generation.** As mentioned, our supply and demand model compared and analyzed 175 international markets and all 50 US states to see which countries and states are leading markets when it comes to investment activity in ten key energy transition sectors, as well as their macroeconomic status.
- **We found that North America, Western Europe, East Asia, and Oceania are the largest demand markets overall.** The top ten international markets are the US, Germany, China, UK, Canada, France, Netherlands, India, Australia, and Spain, in that order.
- **California and Texas, however, rank higher than many international markets,** with California outcompeting the Netherlands for 7th place globally and both Texas and California outcompeting India, Australia, and Spain.



California



Texas



US



China



Germany



UK



Canada



France



Netherlands



India



Australia



Spain

United States

Despite the dominance of Asia across supply chains in energy transition sectors, the US is the largest source of foreign investment projects for several of these still-emerging and high-growth sectors. With high concentrations of investment across the country, especially in California and Texas, opportunities for US companies to continue expanding in new regions are plentiful.

Moreover, with the significant boost to investment and support for domestic manufacturing coming from the Inflation Reduction Act, there are great opportunities for investment attraction and economic development.



The United States as a Source Market for Investment

The United States is the number one source of foreign investment projects in several energy transition sectors, including highly-sought after sectors like batteries & components, electric vehicles, and hydrogen.



Electric Vehicles

161

Total Projects
(2018-2022)

\$37,356m

Total Capex
(2018-2022)



Batteries & Components

52

Total Projects
(2018-2022)

\$2,986m

Total Capex
(2018-2022)



Iron & Steel

6

Total Projects
(2018-2022)

\$236m

Total Capex
(2018-2022)



Hydrogen

49

Total Projects
(2018-2022)

\$16,129m

Total Capex
(2018-2022)



Solar Power

68

Total Projects
(2018-2022)

\$1,761m

Total Capex
(2018-2022)

#1

source market for
batteries &
components FDI
projects

#1

source market for
hydrogen FDI
projects

Source: fDi Markets.

* Capex values do not include estimates where project values are not reported.

Notable Headlines

Recent government action through the IRA and the CHIPS Act is set to spur even more investment in the sector, supporting the development of supply chains and manufacturing capability.

from **Renewing America**

How the Inflation Reduction Act Will Help the United States to Lead in the Clean Energy Economy

The IRA not only benefits the climate but also strengthens American competitiveness and spurs clean energy innovation.

EQS GROUP | EQS Group

BayWa r.e. and Meyer Burger strengthen U.S. domestic manufacturing with solar panel procurement partnership

FORBES > BUSINESS > ENERGY

2023 Energy Predictions: IRA Spurs Clean Energy Boom, Electric Trucks Accelerate, Battery Demand Surges, EPA Cuts Power Sector Pollution

Energy Innovation: Policy and Technology Contributor

Mercedes signs binding offtake agreement with H2 Green Steel as the companies look at North American opportunities

By [Charlie Currie](#) on Jun 07, 2023 | [Translate](#)

[NEWS](#) | [POWER](#)

Germany

Germany is at the forefront of the global energy transition, known locally as the "Energiewende." The country has set ambitious goals to reduce greenhouse gas emissions, increase energy efficiency, and support industry development. Germany has also invested heavily in research and development, fostering technological innovation in clean energy solutions.

Moreover, companies in Germany, as part of the European Union, will benefit from Europe-wide €250 billion Green Deal Industrial Plan announced in early February.



Germany as a Source Market for Investment

Germany is behind only the US for the volume of investments one of the top three sources of global investment in energy transition technologies, particularly in sectors like iron & steel, EVs, and batteries & components.



Electric Vehicles

149

Total Projects
(2018-2022)

\$38,329m

Total Capex
(2018-2022)



Batteries & Components

42

Total Projects
(2018-2022)

\$7,286m

Total Capex
(2018-2022)



Iron & Steel

31

Total Projects
(2018-2022)

\$181m

Total Capex
(2018-2022)



Hydrogen

21

Total Projects
(2018-2022)

\$12,180m

Total Capex
(2018-2022)



Solar Power

96

Total Projects
(2018-2022)

\$738m

Total Capex
(2018-2022)

#1

source market for
iron & steel FDI
projects

#2

source market for
electric vehicle FDI
projects

Source: fDi Markets.

* Capex values do not include estimates where project values are not reported.

Notable Headlines

Germany's government and the European Union are both working to accelerate energy transition industry development through supportive policy mechanisms and upcoming EU-wide industrial policy.

Green
Climate
Politics

Germany Lines Up €50 Billion to Help Heavy Industry Go Green

- Program intends to cover additional cost of clean production
- Steel, chemicals and cement companies could benefit from aid

The Energy Transition | European Commission announces €250 billion Green Deal Industrial Plan

Published on 8th Feb 2023

The race across Europe to build green steel plants

By Maddy Savage

BBC News, Stockholm

17 Mar 2023, 12:21 [Carolina Kyllmann](#), [Julian Wettengel](#)

Germany welcomes EU plans to lead global shift to climate-neutral industry

China

China is a major player in the global energy transition, and the country's government is committed to supporting the development of renewable energy and energy efficiency technologies to help the country achieve its net zero target by 2060.

Given the size of China's economy and the growth of its energy transition industry, the country is full of opportunities for investment attraction to facilitate clean growth.



China as a Source Market for Investment

China is one of the top three sources of global investment in energy transition technologies, particularly in sectors like iron & steel, EVs, and batteries & components.



Electric Vehicles

108

Total Projects
(2018-2022)

\$35,311m

Total Capex
(2018-2022)



Batteries & Components

47

Total Projects
(2018-2022)

\$23,775m

Total Capex
(2018-2022)



Iron & Steel

29

Total Projects
(2018-2022)

\$13,234m

Total Capex
(2018-2022)



Hydrogen

4

Total Projects
(2018-2022)

\$1,058m

Total Capex
(2018-2022)



Solar Power

47

Total Projects
(2018-2022)

\$1,020m

Total Capex
(2018-2022)

#2

source market for
iron & steel FDI
projects

#3

source market for
electric vehicle FDI
projects

Source: fDi Markets.

* Capex values do not include estimates where project values are not reported.

Notable Headlines

China is world-leading in its production and deployment of energy transition technologies, and both companies and the government are investing enormous sums of money to help transform China’s industrial capabilities.

How China’s largest coal-producing province is on its way to becoming a green steel leader

Shanxi, a top coal-producing province in North China which has been struggling with high levels of air pollution – is on its way to becoming a green steel leader in the country following the steps it has taken to prepare for the energy transition and to upgrade its steel industry over the past decade

China Invests \$546 Billion in Clean Energy, Far Surpassing the U.S.

China accounted for nearly half of the world’s low-carbon spending in 2022, which could challenge U.S. efforts to bolster domestic clean energy manufacturing

By Sarah Lyall and F. Lee Copeland

SUSTAINABLE FUTURE

China’s energy transition sees ‘staggering’ progress on renewables

PUBLISHED WED, MAR 8 2023 1:26 AM EST | UPDATED WED, MAR 8 2023 6:37 AM EST



Sam Meredith
@SAMMEREITH

SHARE [f](#) [t](#) [in](#) [✉](#)

Business / China Business

China expected to be world’s largest importer of clean hydrogen, Deloitte says as it urges world to scale up production capacity by 2050

- China is estimated to be the world’s largest importer of clean hydrogen, requiring 13 million tonnes a year by 2030, Deloitte report says
- Asia-Pacific will capture almost 55 per cent of the clean energy market in 2030, driven by demand in China, India, Indonesia, Japan and Korea; Deloitte executive

7. 1-Year Plan



1-Year-Plan 2023 – *Pilot Project*

Great Lakes

| Month | Stage | Deliverables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|--|---|---|---|---|---|---|---|---|---|---|---|----|----|----|
| Phase 1 <i>Go-to-Market Strategy</i> | 1) Strategy & Regional Proposition | Go-to-Market Strategy | | | | | | | | | | | | |
| | 2) Research & Intelligence | Target-list and profiling of 150-200 companies / institutions | | | | | | | | | | | | |
| Phase 2 <i>Engaging & Connecting</i> | 3) Targeted Engagement | 12-14 investment leads | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> - Prospecting of target companies - Qualifying outreach messaging - Networking & trade show attendance - Organise meetings | | | | | | | | | | | | | |
| Phase 3 <i>Community</i> | 4) Community Platform | Community Platform Established 2 Online Events hosted | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> - Build and host digital community & multi-event platform - Platform promotion - Host online events | | | | | | | | | | | | | |

1-Year-Plan 2024

US Region No. 2 with the possibility of including additional regions, as requested

| Month | Stage | Deliverables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|------------------------------------|---|---|---|---|---|---|---|---|---|---|----|----|----|
| Phase 1 <i>Go-to-Market Strategy</i> | 1) Strategy & Regional Proposition | Go-to-Market Strategy | █ | | ◆ | | | | | | | | | |
| | 2) Research & Intelligence | Target-list and profiling of 150-200 companies / institutions | | | █ | ◆ | | | | | | | | |
| Phase 2 <i>Engaging & Connecting</i> | 3) Targeted Engagement | 12-14 investment leads | | | | █ | | | | | | | | ◆ |
| Phase 3 <i>Community</i> | 4) Community Platform | Community Platform Established 2 Online Events hosted | | | | █ | | | | ◆ | █ | | | ◆ |

**CHALLENGE.
CREATE.
COLLABORATE.**



OCOflobal.com