

# ELECTRIC TRANSMISSION & DISTRIBUTION INFRASTRUCTURE PERSPECTIVES

Q1 2025

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# **ELECTRIC TRANSMISSION & DISTRIBUTION INFRASTRUCTURE**

## MARKET OVERVIEW

# ELECTRIC TRANSMISSION & DISTRIBUTION (T&D) OVERVIEW

## TRANSMISSION & DISTRIBUTION OVERVIEW

- The "electric grid" consists of power plants, transmission lines and distribution lines delivering electricity worldwide
- Power plants generate electricity in remote areas and transmit it over long distances through high-voltage lines to substations
- At substations, electricity is converted to lower voltages and then distributed to end users via distribution lines
- The shift to renewable and clean energy, increasing energy use in sectors like data centers, and the rise of electric vehicles, are straining the grid and reducing its reliability
- Significant investments are being made to improve the grid's reliability and capacity to meet growing energy demands
- Traditionally, electricity is generated far from cities and transported over long distances, necessitating substantial investment in transmission infrastructure
- Global investment in power grids totaled \$310 billion in 2023 and is projected to reach ~\$700 billion each year from 2024-2030<sup>(a)</sup>
- From 2021-2022, spending on transmission infrastructure increased, with \$30 billion spent in 2022, driven by the need for renewable energy capacity
- The U.S. and E.U. require extensive investments in renewable energy and transmission infrastructure, with a combined \$152 billion forecasted for new or upgraded assets by 2026 and a projected 60% expansion of transmission systems in the U.S. by 2030<sup>(b)</sup>

## U.S. KEY FACTS & FIGURES

**\$124B** projected grid infrastructure spending in 2024<sup>(c)</sup>

**5M+** miles of distribution lines<sup>(d)</sup>

**\$8,851** average cost per minute of a data center power outage<sup>(e)</sup>

**11,000+** total power plants<sup>(f)</sup>

**4B+** total kilowatt-hours of energy output in 2023<sup>(g)</sup>

## E.U. KEY FACTS & FIGURES

**€93B** projected grid infrastructure spending in 2024<sup>(c)</sup>

**500,000+** kilometers of distribution lines<sup>(h)</sup>

**250+** total GW wind turbine capacity<sup>(i)</sup>

**9,500+** total power plants<sup>(j)</sup>

# PRESIDENT TRUMP ANNOUNCES SIGNIFICANT PRIVATE-SECTOR INVESTMENT IN ARTIFICIAL INTELLIGENCE (AI) INFRASTRUCTURE

## OVERVIEW OF PRESIDENT TRUMP'S INVESTMENT

- On January 21<sup>st</sup>, President Donald Trump announced a private-sector investment aimed at enhancing the United States' AI infrastructure. The initiative, named **Stargate, is a collaborative effort involving OpenAI, SoftBank, and Oracle**
- The consortium has committed an initial \$100 billion, with **plans to increase the investment to \$500 billion over the next four years**
- Stargate plans to construct **20 data centers**, each encompassing half a million square feet, with the initial centers already underway in Texas
- The initiative is projected to generate over **100,000 jobs** across the United States, contributing to economic growth and technological advancement
- This investment aims to enhance AI capabilities, including applications such as analyzing electronic health records, thereby improving healthcare outcomes
- The Stargate initiative **represents a landmark collaboration between leading technology companies and the U.S. government**. By investing heavily in AI infrastructure, the project aims to position the United States at the forefront of technological innovation, fostering economic growth and addressing critical challenges through advanced AI applications

## STATEMENTS FROM KEY FIGURES ON STARGATE'S SIGNIFICANCE

### Donald Trump, U.S. President

- Emphasized the strategic importance of the investment, stating that it would "ensure the future of technology" in the U.S. amid global competition

### Sam Altman, CEO of OpenAI

- Expressed enthusiasm for the initiative, highlighting its potential to "create hundreds of thousands of jobs" and accelerate medical advancements, including rapid disease cures

### Larry Ellison, Chairman of Oracle

- Discussed the health benefits, noting that AI could enable "early cancer detection with a blood test" and facilitate the development of personalized mRNA vaccines

### Masayoshi Son, CEO of SoftBank

- Highlighted the transformative potential of AI, stating that "artificial super intelligence will come to solve the issues that mankind never, ever have thought that we could solve"

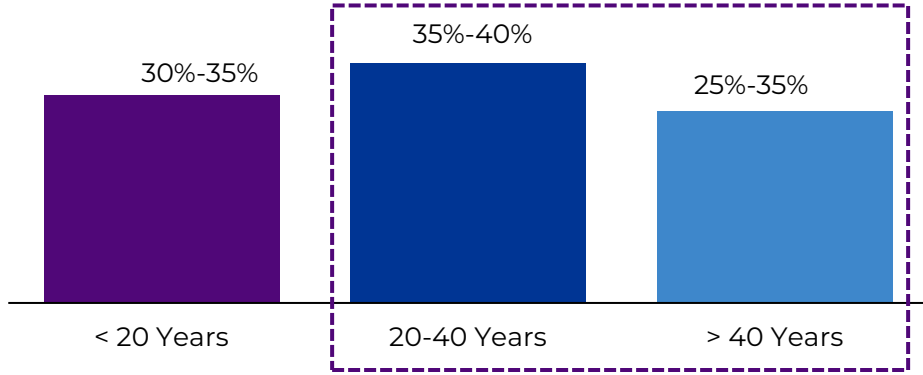
# AGING GRID INFRASTRUCTURE REQUIRING TRANSFORMATION

## AGING GLOBAL GRID

- Much of the U.S. and E.U. power grid infrastructure is outdated due to decades of underinvestment
- Utilities must upgrade, overhaul, “harden” and maintain infrastructure to meet new safety and regulatory requirements and prevent electrical disturbances
- Older grids were designed for one-way flow of electricity, but a transition to more reliable grids or a smart grid network is necessary to accommodate automated two-way flows
- Europe's distribution grid is at risk, with 25%-35% of its infrastructure over 40 years old as of 2020, potentially rising to 40%-55% without timely replacements<sup>(a)</sup>
- Approximately 70% of all transformers on the U.S. electrical grid are older than 25 and the average transformer is ~40 years old<sup>(d)</sup>
- Both the U.S. and E.U. need significant investments to address the pressures of aging infrastructure

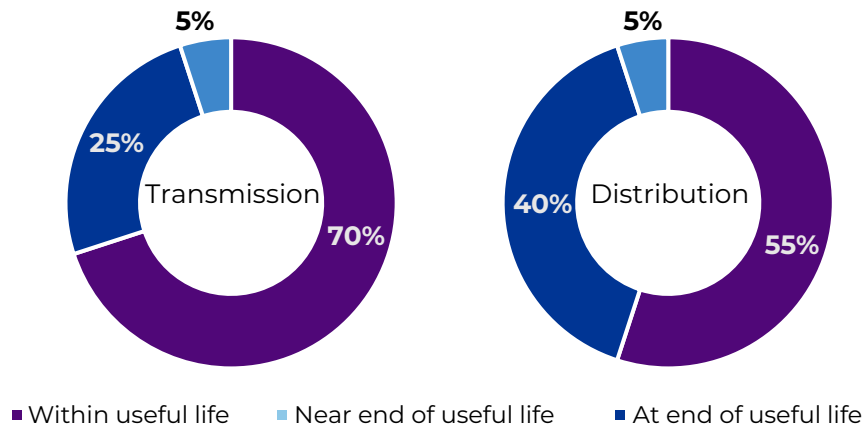
## AGING E.U. LOW-VOLTAGE POWER LINES

Average Age of Low-Voltage Power Lines in the E.U. in 2020 (as a % of Total Existing Infrastructure)<sup>(a)</sup>



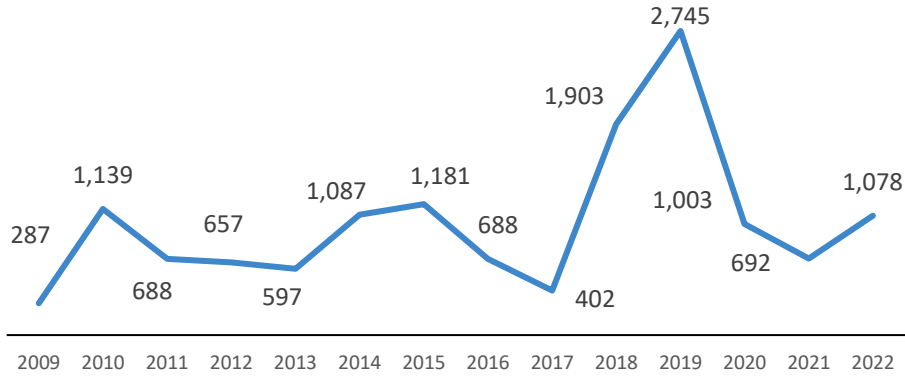
## AGING U.S. T&D INFRASTRUCTURE BASE

Existing T&D Infrastructure Age in the U.S. (as a % of Total Existing Infrastructure)<sup>(b)</sup>



## U.S. ELECTRICAL DISTURBANCE LOSSES

Average Electrical Disturbance Losses in the U.S. (MW)<sup>(c)</sup>



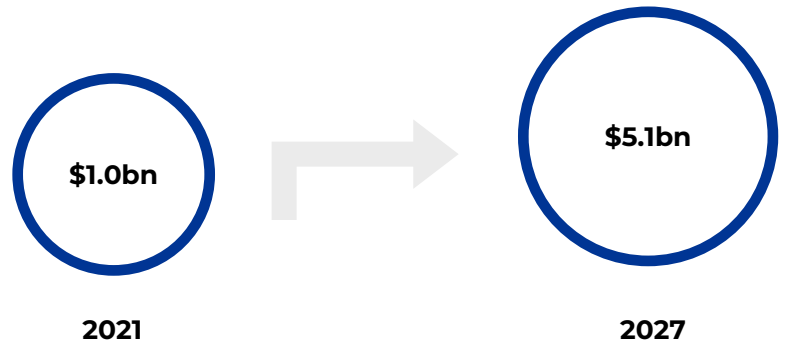


# THE INFLATION REDUCTION ACT (IRA) AND MICROGRIDS

## THE INFLATION REDUCTION ACT OVERVIEW<sup>(A)</sup>

- Signed in August 2022, the IRA allocates \$369 billion in federal funding over the next decade to combat climate change by i) driving investment in domestic energy production while promoting clean energy, and ii) providing benefits in the form of tax credits, federal loans and grants
- IRA could drive nearly \$3.5 trillion in cumulative capital investment over the next decade in new energy supply infrastructure in the U.S.
- The IRA puts the U.S. on track to achieve GHG emissions level reductions that are 30% to 42% lower by 2030 vs. 2005 levels
- Over \$270 billion of investment in domestic clean energy infrastructure has been made since the IRA's signing

## FORECASTED ANNUAL CAPITAL INVESTMENT IN MICROGRIDS<sup>(B)</sup>



## IRA KEY BENEFITS

-  **Lowering Energy Costs for Americans**
-  **Increasing American Energy Security**
-  **Investing in Decarbonizing All Sectors of the Economy**
-  **Focusing Investment in Disadvantaged Communities**
-  **Supporting Resilient Rural Communities**

## FEDERAL SUPPORT FOR MICROGRIDS<sup>(C)</sup>

- A microgrid is a set of distributed energy systems (DES) operating dependently or independently of a larger utility grid, providing flexible local power to improve reliability while leveraging renewable energy
- The IRA offers 30% tax credits for microgrids
- The IRA enables the use of microgrids for electricity fleets
- ~\$1 billion direct grant support for state and local governments for clean heavy-duty vehicles
- Incentives for installation of efficiency products and building electrification upgrades

# SIGNIFICANT INTERCONNECTION QUEUE DUE TO CURRENT GRID INFRASTRUCTURE





## THE INTERCONNECTION QUEUE OVERVIEW<sup>(a)</sup>

- **Interconnection** is the set of rules that new electricity generation, such as solar, wind, natural gas, energy storage, nuclear, etc., must follow to connect to the electric grid and deliver to customers
- The interconnection queue has reached significant levels with the entrance of additional wind, solar and storage assets, **leading to a lower capacity weighted project completion rate**
- The rapid development and expansion of renewables and new interconnections processes put pressure on transmission providers and has **resulted in substantial interconnection backlogs**
- The interconnection queue is **~2x the size of the United States' current grid-scale generation fleet**, with renewables accounting for more than 94%

## INTERCONNECTION QUEUE BACKLOG<sup>(a)</sup>

Regional Transmission Organizations (RTO) / Independent System Operators (ISO)	Capacity in Queue (MW)	Average Months in Queue
CAISO	186,569	43.4
ERCOT	178,957	22.2
ISO-NE	36,230	24.2
MISO	258,934	n/a
NYISO	113,536	24.0
PJM	165,753	24.4
SPP	120,258	25.1
<b>Total</b>	<b>1,060,237</b>	<b>27.2</b>

## DEPARTMENT OF ENERGY'S MEASURABLE SUCCESS TARGETS FOR 2030<sup>(b)</sup>

-  **Reduced Interconnection Process Time**  
*Average time from request to agreement*
-  **Lowered Cost Uncertainty**  
*Standard deviation of interconnection costs*
-  **Increased Completion Rates**  
*Completion rate for projects that entered facility study phase*
-  **Maintained System Reliability / Grid Hardening**  
*Number of system disturbances due to modeling inaccuracy*

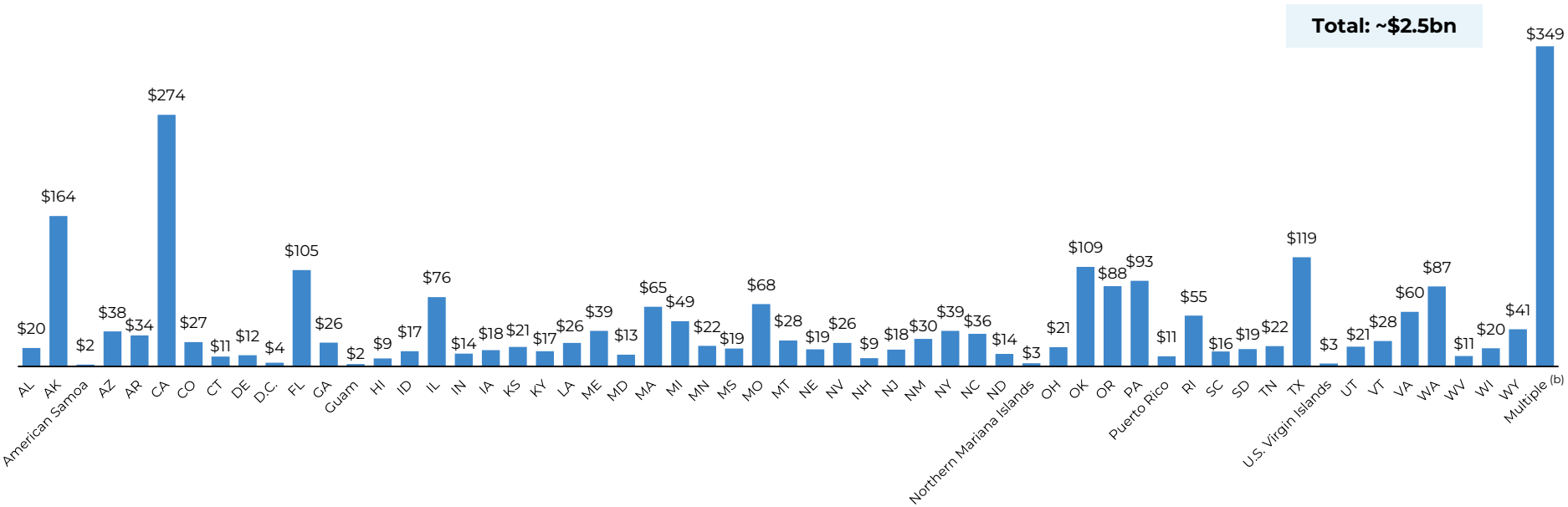
Target Value by 2030	Recent Value
<b>&lt; 12 Months</b>	33 Months (2022)
<b>&lt; \$150 / kW</b>	\$551 / kW (2020-2021)
<b>&gt; 70%</b>	45% (2016)
<b>Zero</b>	4 (2022)



# U.S. GOVERNMENT FUNDING FOR GRID OVERHAUL AND TRANSFORMATION OF POWER INFRASTRUCTURE

## ANNOUNCED ELECTRICITY-RELATED FUNDING THROUGH THE INVESTING IN AMERICA AGENDA

Total Funding Amount for each State (\$ in millions)<sup>(a)</sup>



### SELECT STATE INFRASTRUCTURE PROJECTS

- **California:** Investments from matching grants will be used to expand clean energy infrastructure, enhance grid reliability and support renewable energy projects to modernize the state's electricity systems
- **Alaska:** Funding programs will target the goals of strengthening energy infrastructure, increasing access to renewable energy and improving grid resilience in remote communities
- **Texas:** Matching grants will be used to fund the enhancement of grid reliability, expansion of renewable energy capacity and modernization of electricity infrastructure to support a sustainable energy future
- **Multiple:** Funding for multi-state projects will enhance regional infrastructure, support clean energy initiatives and improve interconnected grid systems across state lines

a) Source: The White House; b) "Multiple" refers to funding for projects that span multiple different states

# GRID INFRASTRUCTURE SPENDING BY MAJOR UTILITIES

## UTILITY SPENDING ON GRID INFRASTRUCTURE

- Annual spending by major utilities to produce and deliver electricity increased 12% from \$287 billion in 2003 to \$320 billion in 2023 as measured in real 2023 dollars, according to financial reports to the Federal Energy Regulatory Commission (FERC)
- Capital investment in electric infrastructure primarily drove the spending increase, more than doubling over the period as:
  - Aging generation and delivery infrastructure were replaced or upgraded to resist fire and storm damage
  - Utilities installed first natural gas-fired generation, then wind and solar generation, and, more recently, battery storage
  - New lines were connected to renewable resources
  - New technology, including smart meters, sensors, and automated controls, was added to the system
- From 2018-2023, Investor-Owned Utilities (IOUs) filed for \$36 billion to modernize their distribution grid, representing a CAGR of 35%
- These investment trends are expected to continue as the need for a modernized grid grows
- IOUs are planning to invest approximately \$121 billion on transmission construction between 2023 and 2026

## UTILITY CAPITAL SPENDING T&D BREAKOUT

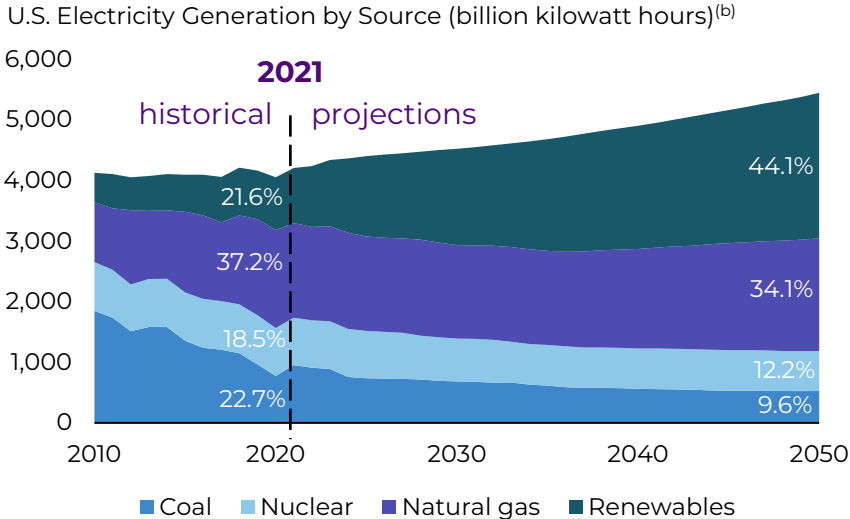
- Capital spending on the **distribution** system, responsible for delivering electricity to end users, was the primary driver of electricity spending increases over the last two decades. Capital investment in distribution infrastructure **increased by \$31.4 billion, or 160%, from 2003 to 2023**
  - **More than one-fifth of this increase occurred between 2022 and 2023** when spending **increased by \$6.5 billion to a total of \$50.9 billion** as utilities replaced and upgraded aging equipment and installed new lines, transformers, and other equipment for **“grid hardening”** to help neighborhood electricity grids withstand extreme weather events and to manage the intermittency of renewable resources
  - Capital spending on overhead lines, poles, and towers increased the most. **Utilities spent \$17.4 billion on overhead infrastructure in 2023, an 11% increase from 2022 and a 220% increase from 2003**
- Spending to **produce electricity** fell 24% from 2003 to 2023, mainly due to lower fuel costs and, to a lesser extent, the retirement of older, costlier-to-maintain fossil fuel plants. Fuel costs, the main operating expense, make up most of the production costs
- Spending on electricity **transmission** systems **nearly tripled from 2003 to 2023, increasing to \$27.7 billion**. Electricity transmission systems consist of the wires and structures required to transmit high-voltage power long distances from the generator to the neighborhood, lower-voltage distribution grid

# GROWTH OF RENEWABLE ASSET POWER GENERATION

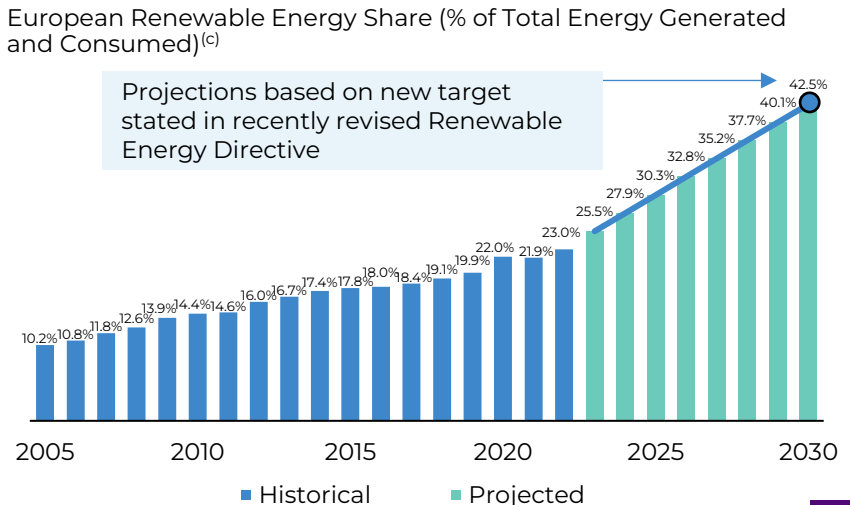
## RENEWABLE POWER OVERVIEW

- Growing demand for clean energy is driving a surge in new renewable asset projects in the U.S. and E.U.
- Utilities need to invest in T&D infrastructure to connect these new renewable generation assets to the grid and manage the variability of renewable energy
- Investments in T&D infrastructure would help eliminate harmful emissions, increase energy efficiency, and reduce wasted energy
- By the end of 2020, over 5,000 projects in the U.S. were waiting to be connected to the power grid<sup>(a)</sup>
- To accommodate the new renewable and distributed energy infrastructure, utilities must build new power lines, transformers, substations and other critical components
- The share of electricity generation from renewable sources in the U.S. is expected to rise from 22% in 2021 to 44% by 2050. In Europe, renewable energy is projected to make up 34% of the electricity supply by 2028<sup>(b)</sup>
- The Renewable Energy Directive in the E.U. was revised in 2023 to institute a new binding renewable energy share target of 43% for 2030, demonstrating the significance of the clean energy transition<sup>(c)</sup>

## U.S. KEY FACTS & FIGURES



## E.U. KEY FACTS & FIGURES



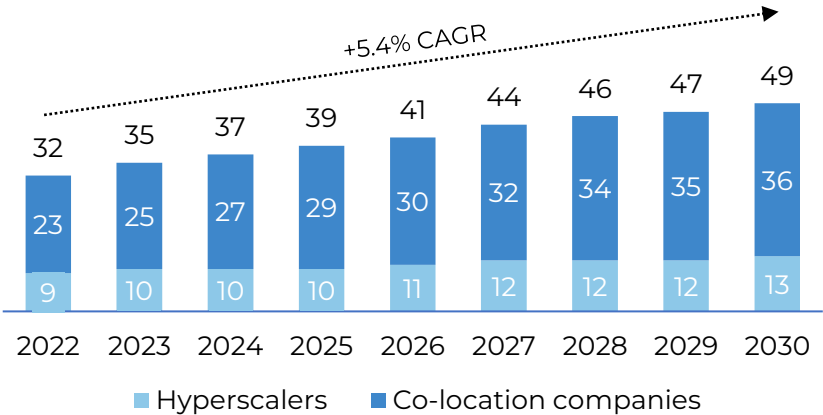
# DATA CENTERS POWERING THE FUTURE ECONOMY

## GLOBAL DATA CENTER OUTLOOK

- The global data center industry is growing rapidly, driven by rising demand for digital services, cloud computing, and AI technologies. In the U.S., energy requirements are projected to double from 17 GW in 2022 to 35 GW by 2030, accounting for 40% of the global market, reflecting a surge in global data storage and processing needs
- Investors have numerous opportunities along the data center supply chain, including direct stakes in data center companies or areas like advanced cooling systems, modular infrastructure, and renewable energy integration
- Rapid expansion poses challenges, particularly in managing environmental and energy impacts. In Europe, electricity use is expected to nearly triple by 2030, requiring grid upgrades and greater renewable energy adoption
- At the forefront of technological transformation, the industry offers significant investment potential, driven by expanding cloud adoption, edge computing, and advancements in AI and machine learning, all requiring robust, high-capacity infrastructure
- The growing demand for hyperscale data centers, exceeding 100,000 square feet, drives investment. These facilities support global cloud providers, tech giants, and e-commerce platforms, offering scalability and efficiency for long-term growth amid surging demand for seamless digital experiences

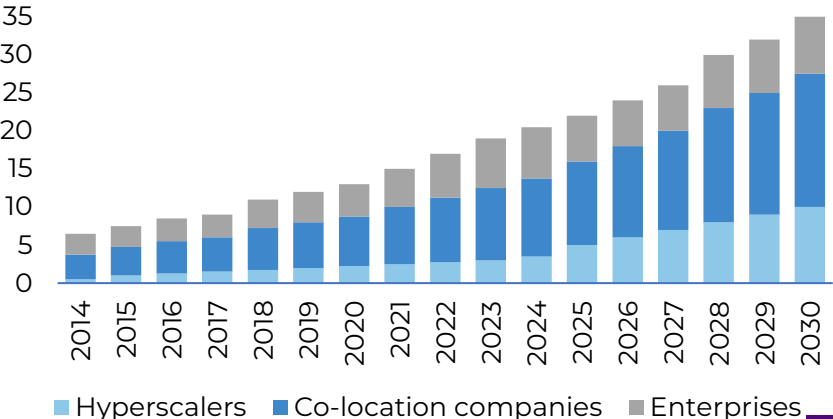
## GLOBAL SPENDING ON THE CONSTRUCTION OF DATA CENTERS

Data Center Construction Spending (\$ in billions)



## U.S. DATA CENTER DEMAND IS FORECAST TO GROW BY ~10% / YEAR UNTIL 2030

Data Center Power Consumption by Providers / Enterprises (gigawatts)

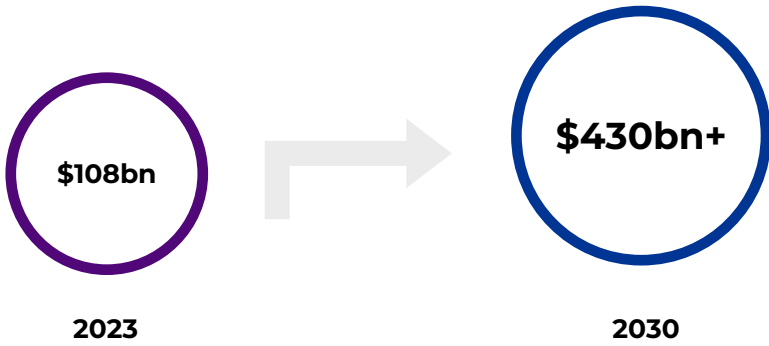


# SMART BUILDING TECHNOLOGIES POISED FOR SIGNIFICANT GROWTH

## GLOBAL SMART BUILDING TECHNOLOGY OVERVIEW AND OUTLOOK

- The global smart building market, valued at \$108 billion in 2023 and is projected to grow at a CAGR of 28.5% from 2024 to 2030, driven by government support and an increase in smart city projects globally
- Integrated systems in smart buildings encompass not just HVAC but also lighting, security, access control, and energy management. These systems work in synergy, sharing data and insights to optimize the overall performance of the building
- Integration is made possible by advancements in network infrastructure and the standardization of communication protocols, allowing different systems and devices to communicate and work together seamlessly
- AI and machine learning algorithms have further enhanced the capabilities of smart buildings, providing predictive insights for maintenance, energy usage optimization, and environmental control
- Cloud computing has facilitated the storage and analysis of vast amounts of data generated by smart buildings, enabling remote monitoring and management
- The rapid growth of the smart building industry drives demand for modern infrastructure and energy efficiency
- Many existing buildings have outdated legacy systems in place that are not compatible with modern smart technologies, but new adaptable technologies are being developed that can be integrated with older systems

## GLOBAL VALUE OF SMART BUILDING TECHNOLOGY MARKET

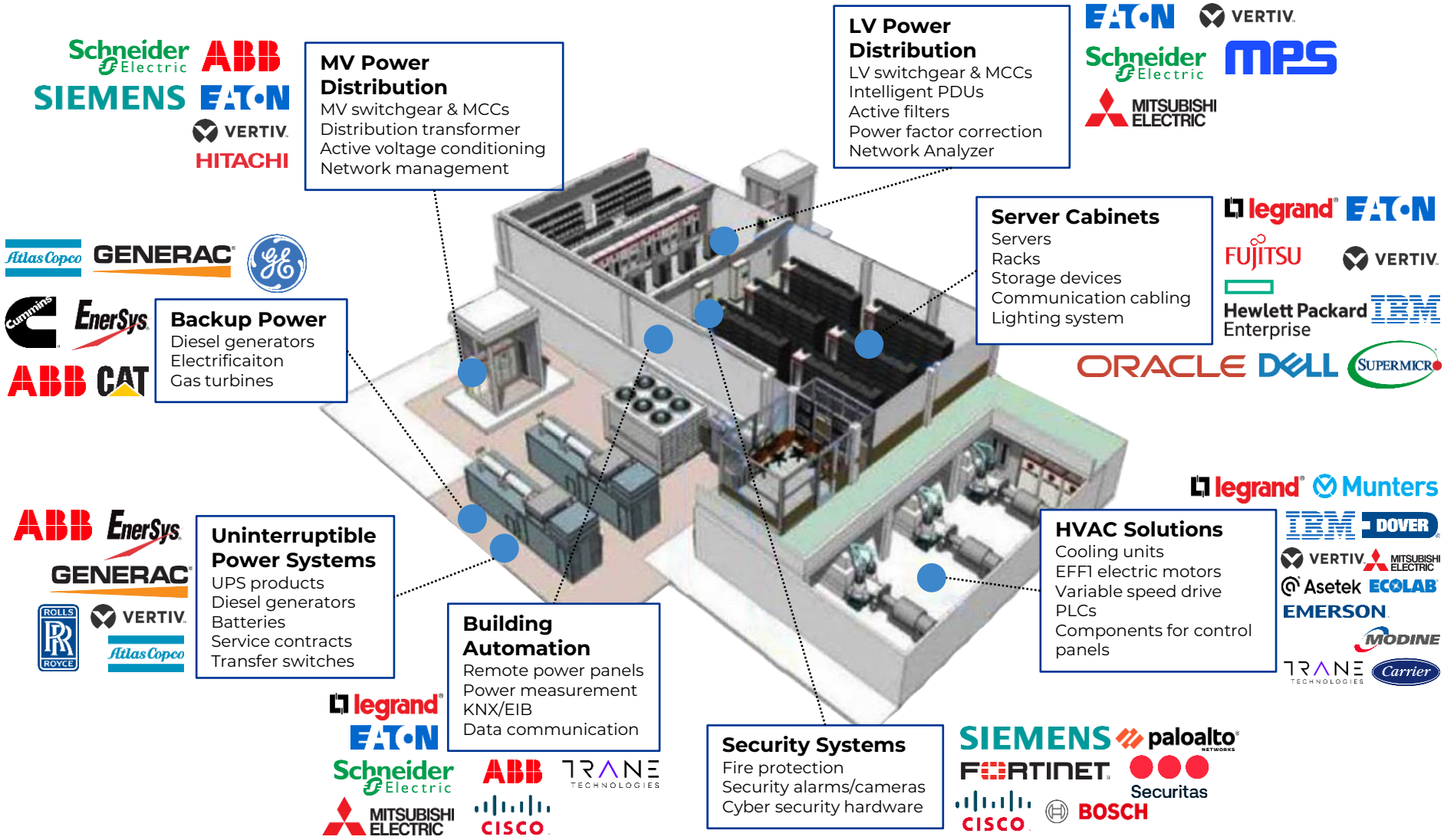


## EMERGING TRENDS IN SMART BUILDING TECHNOLOGY

- ✓ **Artificial Intelligence and Machine Learning**
- ✓ **Expansion of IoT Devices**
- ✓ **Edge Computing**
- ✓ **5G Connectivity**
- ✓ **Sustainability and Energy Efficiency**

# SELECT DATA CENTER POWER, SECURITY, AND COOLING PROVIDERS

## SELECT MARKET LEADERS (NOT EXHAUSTIVE)



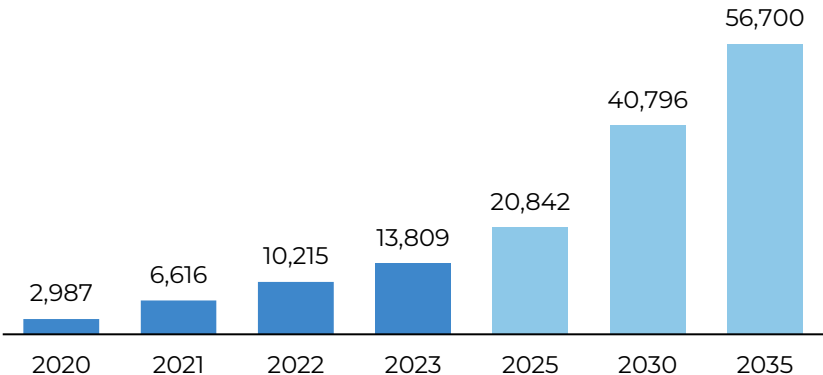
# ELECTRIC VEHICLE PRODUCTION FUELING DEMAND FOR ELECTRICITY AND POWER DEVICES

## GLOBAL EV OUTLOOK

- Companies in the electrical infrastructure and power sector stand to benefit from global demand for hybrid and electric vehicles as they produce products and power devices that are critical in the production of electric vehicles and motor drives
- The trend towards electrification of transportation has accelerated in recent years and is still in the early stages. NREL estimates that electricity consumption in the U.S. will rise to 4,600TWh by 2050 without EV adoption
- Electric car sales continue to rise and are projected to reach approximately 17 million units in 2024, representing over 20% of global car sales, indicating their increasing acceptance across the world
- Despite challenges such as tight margins, fluctuating battery metal prices, high inflation and reduced purchase incentives in some regions, global electric car sales have remained robust, with 25% growth in the first quarter of 2024 compared to the same period in 2023
- In 2024, electric cars are expected to capture up to 45% of market share in China, 25% in Europe, and over 11% in the United States, driven by manufacturer competition, decreasing battery and car prices, and continued policy support
- Hybrid is the largest segment in the global hybrid and electric car market, accounting for 66% of the market and the fully-electric segment accounting for 34%
- Europe accounts for 39% of the global hybrid and electric car market value, followed by the U.S. with 14%, Germany with 11%, Scandinavia with 4% and the Rest of the World with 32%

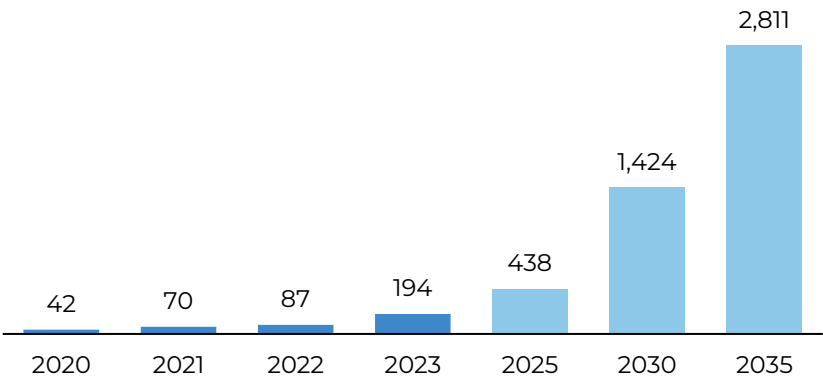
## GLOBAL EV SALES

Global EV Sales (vehicles in thousands of units)



## GLOBAL EV ELECTRICITY DEMAND

Global EV GWh Demand (GWh in thousands)





# THE ELECTRIC TRANSMISSION & DISTRIBUTION ECOSYSTEM

## WHY INVEST?

### STEADY DEMAND

Electricity is a necessity of modern life regardless of economic cycles, providing a consistent demand for transmission and distribution products and services



### SECULAR GROWTH

Aging infrastructure and the need for grid modernization to support the shift to renewable and clean energy as well as increasing energy use from data centers, smart buildings, and electric vehicles



### PRIVATE SECTOR ROLE TO PLAY

Many governments face significant balance sheet pressures that constrain their ability to finance projects or drive necessary innovation

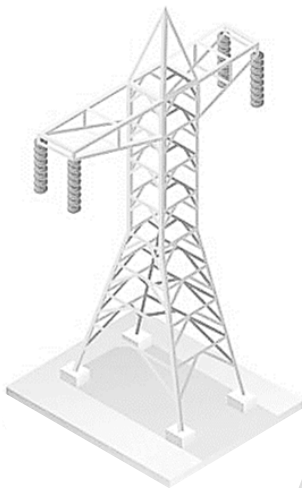
### REGULATORY SUPPORT

Utilities often operate under regulated frameworks, providing stability in pricing and revenue visibility

# **ELECTRIC TRANSMISSION & DISTRIBUTION INFRASTRUCTURE**

## SUPPLY CHAIN OVERVIEW

# KEY COMPONENT CATEGORIES WITHIN UTILITY INFRASTRUCTURE



**230 – 745 kV**

## TRANSMISSION

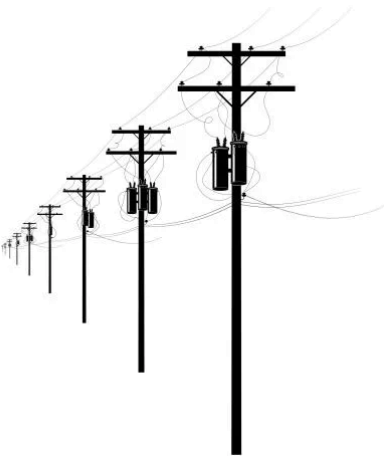
Transmission products are essential to the electrical grid, enabling the reliable and efficient transfer of electricity across long distances. These systems consist of interconnected conductors (wires), supported by various components such as poles, transformers, connectors and insulators. Together, transmission lines, transformers and related equipment ensure the high-voltage power generated at its source is successfully delivered to distribution networks



**69 – 230 kV**

## SUBSTATION

Substation products play a crucial role in the electrical grid by facilitating the transition between transmission and distribution systems, enabling the stepping up or stepping down of voltage levels. Acting as the grid's control center, these products include transformers, circuit breakers, switchgear and control systems, all of which are essential for delivering energy safely and reliably



**12 – 35 kV**

## DISTRIBUTION

The distribution grid represents the last stage of the electrical grid, delivering energy from substations to end users. Distribution products are responsible for lowering voltages to levels that are safe and suitable for customer use. This network consists of lines, poles, transformers and switching and protection devices, all working together to ensure the safe delivery of electrical power to consumers

## POWER LINES

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- Power lines are used to transport electrical power from the generation plant to the consumer at very high voltage and current levels
- Transmission lines carry electric energy from one point to another in an electric power system. They can carry alternating current or direct current, or a system can be a combination of both
- Electric current can be carried by either overhead or underground lines
- Transformers at power plants boost the voltage up to 100,000 volts and sometimes much higher before sending electricity on its way over transmission lines. This lowers the current in the lines, reducing the wasted energy and making sure that as much power as possible makes it to customers at the other end

## SUBSTATIONS

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- A substation is an interface point between various parts of the grid
- Common applications:
  - Step-up – raise the voltage from generators so electricity can be transmitted efficiently
  - Step-down – lower the voltage from transmission lines for use in some industrial applications or to feed the distribution system
  - Distribution – further lower voltage levels which can be used in most industrial, commercial and residential needs
- Key components include transformers, circuit breakers and switches, meters and protective relays
- Ancillary components include current transformers, potential transformers and fuses

# T&D COMPONENTS (CONT'D)

## TRANSFORMERS



- Transformers convert voltage levels to facilitate the efficient transmission of power over long distances, which is crucial for maintaining grid reliability
- At generation stations, voltage is stepped up to high levels—sometimes exceeding 100,000 volts—allowing for efficient long-distance transmission while reducing energy losses
- Upon reaching the distribution network, voltage is then stepped down to safer levels suitable for consumer use, ensuring reliable electricity delivery to homes and businesses
- These critical devices help the electrical grid maintain a balance between efficiency and safety, effectively minimizing energy losses during transmission while ensuring stability across various power systems
- Found in both transmission substations and local distribution networks, transformers serve as vital links in the operation of the electrical grid

## CIRCUIT BREAKERS



- Circuit breakers are vital components in electrical systems, designed to protect circuits from overloads and short circuits by automatically interrupting the flow of electricity
- By detecting faults in the electrical circuit, these devices ensure the safety of both the infrastructure and connected equipment, preventing damage and reducing the risk of electrical fires
- Circuit breakers come in various types, including thermal, magnetic and hybrid models, each tailored to specific applications and levels of protection required in different settings
- Their ability to reset after tripping allows for quick recovery and minimizes downtime in electrical systems, making them essential for maintaining operational efficiency
- Widely used in residential, commercial and industrial settings, circuit breakers play a crucial role in the overall reliability and safety of electrical distribution networks

# T&D COMPONENTS (CONT'D)

## PROTECTIVE RELAYS



- Designed to monitor electrical parameters and detect abnormal conditions that could indicate potential faults or failures
- By continuously analyzing current, voltage and frequency, these relays can quickly identify issues such as overloads or short circuits, enabling prompt action to isolate affected areas and maintain system stability
- Various types of protective relays exist, including electromechanical, solid-state and digital models, each offering unique features and capabilities suited for specific applications in critical infrastructure
- The integration of protective relays into the grid enhances overall reliability by facilitating automatic circuit disconnection, which prevents damage to equipment and minimizes the risk of widespread outages
- Widely employed in substations and across transmission lines, protective relays play a crucial role in ensuring the safety and resilience of electrical systems, safeguarding critical infrastructure against unforeseen disruptions

## METERING



- Metering systems are key components of the electrical grid, used to accurately measure and monitor the flow of electricity between generation, transmission and distribution points
- These systems provide real-time data on power usage, voltage levels and current, enabling utilities to efficiently manage load distribution, prevent imbalances and detect inefficiencies in the grid
- Advanced metering infrastructure (AMI), including smart meters, enhances grid visibility and allows for two-way communication between utilities and consumers, improving the accuracy of billing and energy management
- By integrating metering systems with grid operations, utilities can quickly identify issues like energy losses, unauthorized usage, or equipment failures, supporting more responsive and reliable grid management
- Used in substations, distribution networks and consumer endpoints, metering plays a critical role in maintaining the operational efficiency and financial stability of the electric grid

# ILLUSTRATIVE ELECTRIC TRANSMISSION & DISTRIBUTION INFRASTRUCTURE MAP

SELECT MARKET LEADERS (NOT EXHAUSTIVE)

**Transmission**

**Substation**

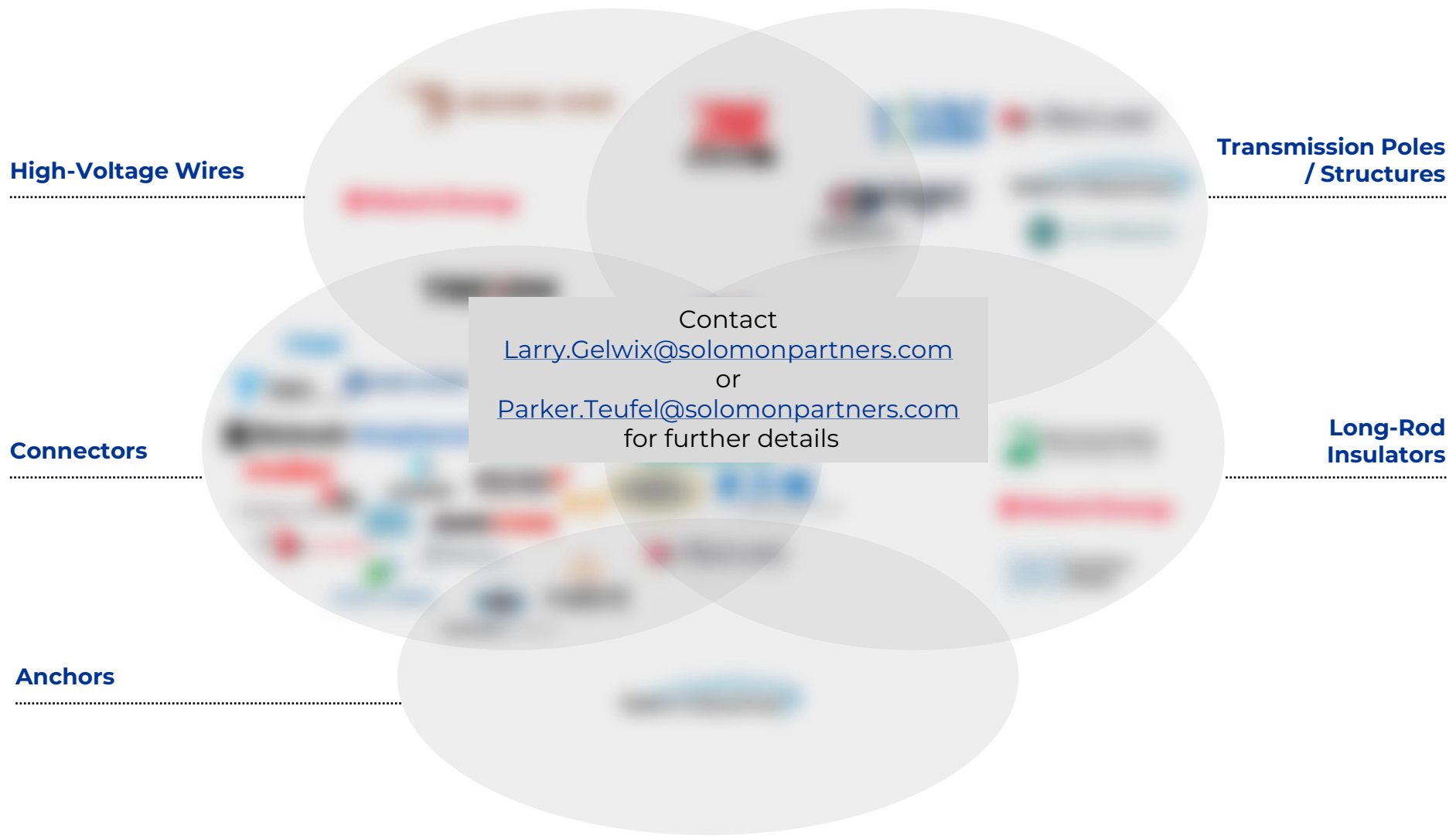
**Distribution**

Contact  
[Larry.Gelwix@solomonpartners.com](mailto:Larry.Gelwix@solomonpartners.com)  
or  
[Parker.Teufel@solomonpartners.com](mailto:Parker.Teufel@solomonpartners.com)  
for further details



# ILLUSTRATIVE ELECTRIC TRANSMISSION MAP<sup>(a)</sup>

SELECT MARKET LEADERS (NOT EXHAUSTIVE)



a) Some logos are shown in multiple places on map to cover full breadth of relevant product offerings

# ILLUSTRATIVE ELECTRIC SUBSTATION MAP<sup>(a)</sup>

SELECT MARKET LEADERS (NOT EXHAUSTIVE)



a) Some logos are shown in multiple places on map to cover full breadth of relevant product offerings

# ILLUSTRATIVE ELECTRIC DISTRIBUTION MAP<sup>(a)</sup>

SELECT MARKET LEADERS (NOT EXHAUSTIVE)



a) Some logos are shown in multiple places on map to cover full breadth of relevant product offerings

# **ELECTRIC TRANSMISSION & DISTRIBUTION** VALUATION AND M&A PERSPECTIVES

# SELECT COMPARABLE COMPANY TRADING MULTIPLES

## THE PUBLIC MARKETS EXHIBIT A PREMIUM FOR SIZE AND DATA CENTER EXPOSURE

	Specialist	Specialist	Diversified	Diversified	Diversified	Diversified	Emerging Broadline	Diversified
<b>CY 2024E EV / EBITDA</b>	41.2x	25.7x	22.8x	22.1x	19.4x	18.2x	17.9x	17.8x
<b>CY 2025E EV/EBITDA</b>	26.9x	20.0x	20.5x	18.0x	17.0x	16.8x	16.3x	15.7x
<b>Comparable Company</b>	GE VERNOVA	VERTIV	EATON	Amphenol	Schneider Electric	HUBBELL	nVent	ABB
<b>Enterprise Value (\$mm)</b>	\$83,808	\$40,700	\$131,254	\$84,982	\$157,074	\$23,908	\$12,653	\$107,498
<b>Market Cap (\$mm)</b>	90,966	38,509	123,125	81,367	144,374	22,248	10,420	103,788
<b>CY 2024E Revenue (\$mm)</b>	35,039	7,827	24,999	14,978	38,956	5,699	3,025	32,648
<b>CY 2024E Revenue Growth</b>	5.4%	13.7%	8.1%	21.0%	(2.2%)	6.6%	(7.4%)	1.8%
<b>CY 2024E EBITDA Margin</b>	5.8%	20.2%	23.0%	25.7%	20.8%	23.1%	23.3%	18.5%
<b>% of Relevant Revenue</b>	19.2% <sup>(a)</sup>	63.0% <sup>(b)</sup>	69.8% <sup>(c)</sup>	72.0% <sup>(d)</sup>	78.7% <sup>(e)</sup>	45.3% <sup>(f)</sup>	81.8% <sup>(g)</sup>	44.7% <sup>(h)</sup>
<b>Relevant End-Markets</b>	<ol style="list-style-type: none"> <li>Gas Power</li> <li>Hydro Power</li> <li>Nuclear Energy</li> <li>Steam Power</li> </ol>	<ol style="list-style-type: none"> <li>Data-centers (Cloud &amp; Enterprise IT)</li> <li>Communications (Power Solutions)</li> <li>Commercial &amp; Industrial</li> </ol>	<ol style="list-style-type: none"> <li>Data-centers &amp; Distributed IT</li> <li>Utilities</li> <li>Industrial &amp; Commercial</li> <li>Aerospace</li> <li>Residential Buildings</li> <li>e-Mobility</li> </ol>	<ol style="list-style-type: none"> <li>Industrial</li> <li>Automotive</li> <li>IT / Data Comm.</li> <li>Communications</li> <li>Aerospace &amp; Defense</li> <li>Mobile Devices &amp; Networks</li> </ol>	<ol style="list-style-type: none"> <li>Buildings (Residential and Non-Residential)</li> <li>Industry (Discrete, Hybrid and Process)</li> <li>Data-centers and Networks</li> <li>Infrastructure (Utilities and Transportation)</li> </ol>	<ol style="list-style-type: none"> <li>Power Grid T&amp;D / Utilities</li> <li>Electrical Solutions</li> <li>Industrial</li> <li>Residential and Retail</li> <li>Telecommunications</li> <li>Oil &amp; Gas / Chemicals</li> <li>Data-centers</li> </ol>	<ol style="list-style-type: none"> <li>Industrial</li> <li>Commercial &amp; Residential</li> <li>Infrastructure Energy</li> </ol>	<ol style="list-style-type: none"> <li>Buildings / OEM</li> <li>Power Generation &amp; Distribution</li> <li>Chemical / Oil &amp; Gas</li> <li>Renewable Energy</li> <li>Data-centers</li> <li>Water / Wastewater</li> </ol>

Source: Capital IQ market data as of 1/28/2025;

Note: Enterprise value calculations exclude operating lease liabilities;

a) Electrification business segment;

b) Power Management and Thermal Management sales as a % of 2023 guidance;

c) Defined as FY23 sales for Electrical Americas and Global regions;

d) FY23 sales for Communication Solutions + Interconnect and Sensor Systems segments;

e) Defined as Energy Management segment for FY23;

f) Electrical revenue per 2024E forecast from Wolfe equity research, includes Non-Residential and Industrial revenue from Utility segment (Jan. 30, 2024);

g) Defined as Enclosures and Electrical & Fastening Solutions for FY23 sales;

h) Defined as Electrification segment revenue (as a % of total sales) per ELIP portfolio review

# SELECT COMPARABLE COMPANY TRADING MULTIPLES (CONT'D)

## THE PUBLIC MARKETS EXHIBIT A PREMIUM FOR SIZE AND DATA CENTER EXPOSURE

	Diversified	Diversified	Diversified	Emerging Broadline	Emerging Broadline	Specialist	Emerging Broadline	Emerging Broadline						
<b>CY 2024E EV / EBITDA</b>	17.3x	15.4x	14.6x	14.4x	13.2x	14.3x	12.5x	11.5x	9.2x	7.9x	8.1x	5.2x	6.9x	2025E Median: 15.7x
<b>CY 2025E EV/EBITDA</b>														
<b>Comparable Company</b>	<b>Honeywell</b>	<b>SIEMENS</b>	<b>Johnson Controls</b>	<b>legrand®</b>	<b>Littelfuse®</b>	<b>THERMON</b>	<b>Sensata Technologies</b>	<b>Atkore®</b>						
<b>Enterprise Value (\$mm)</b>	\$168,397	\$210,645	\$62,230	\$29,660	\$5,986	\$1,118	\$6,968	\$3,466						
<b>Market Cap (\$mm)</b>	146,767	165,833	50,870	26,286	5,688	976	4,276	2,866						
<b>CY 2024E Revenue (\$mm)</b>	38,269	79,522	26,720	8,846	2,187	497	3,910	3,072						
<b>CY 2024E Revenue Growth</b>	3.7%	(7.3%)	(0.7%)	(5.3%)	(7.6%)	10.6%	(3.2%)	(13.2%)						
<b>CY 2024E EBITDA Margin</b>	25.4%	18.1%	16.2%	23.2%	19.1%	19.6%	22.4%	21.7%						
<b>% of Relevant Revenue</b>	30.8% <sup>(a)</sup>	27.7% <sup>(b)</sup>	32.3% <sup>(c)</sup>	73.9% <sup>(d)</sup>	57.2% <sup>(e)</sup>	91.0% <sup>(f)</sup>	23.1% <sup>(g)</sup>	90%+ <sup>(h)</sup>						
<b>Relevant End-Markets</b>	<ol style="list-style-type: none"> <li>1) Aerospace Technologies</li> <li>2) Industrial Automation</li> <li>3) Building Automation</li> <li>4) Energy &amp; Sustainability Solutions</li> </ol>	<ol style="list-style-type: none"> <li>1) Automotive</li> <li>2) Machine Building</li> <li>3) Commercial Buildings</li> <li>4) Pharma &amp; Chemicals</li> <li>5) Electronics &amp; Semiconductors</li> <li>6) Power Distribution</li> <li>7) Data-centers</li> </ol>	<ol style="list-style-type: none"> <li>1) Commercial / Residential</li> <li>2) Fire &amp; Security</li> <li>3) Industrial</li> <li>4) Sustainable Infrastructure</li> <li>5) Software Solutions</li> </ol>	<ol style="list-style-type: none"> <li>1) Residential</li> <li>2) Non-Residential</li> <li>3) Data-centers</li> <li>4) Industrial</li> <li>5) Infrastructure</li> <li>6) Renewable Electricity</li> <li>7) Connected Products</li> </ol>	<ol style="list-style-type: none"> <li>1) Transportation</li> <li>2) Electronics</li> <li>3) Industrial</li> <li>4) Commercial &amp; Passenger Vehicles</li> <li>5) Renewable Electricity</li> <li>6) Data-centers</li> </ol>	<ol style="list-style-type: none"> <li>1) Oil &amp; Gas</li> <li>2) Chemical / Petrochemical</li> <li>3) General Industrial</li> <li>4) Commercial</li> <li>5) Renewables</li> <li>6) Power</li> </ol>	<ol style="list-style-type: none"> <li>1) Automotive</li> <li>2) Heavy Vehicle</li> <li>3) Off-Road</li> <li>4) Industrial</li> <li>5) Aerospace</li> <li>6) Appliances</li> </ol>	<ol style="list-style-type: none"> <li>1) Commercial &amp; Industrial</li> <li>2) Utilities</li> <li>3) Data Center &amp; Warehouses</li> <li>4) Safety &amp; Infrastructure</li> <li>5) Residential</li> <li>6) OEM / Transportation</li> </ol>						

Source: Capital IQ market data as of 1/28/2025;

Note: Enterprise value calculations exclude operating lease liabilities;

a) Defined as Honeywell Building Technologies + Process Solutions (Performance Materials) for FY23;

b) Defined as Smart Infrastructures segment and 10% of Digital Industries Revenue per Electronic & Semiconductor exposure;

c) Defined as Products & Systems under Building Solutions for North America and EMEA/LA per FY23 10-K;

d) FY23 sales for mature countries (excludes South Korea, South America, Africa and Middle Europe)

per 2023 Annual Report;

e) Electronics (fuses, electromechanical switches, interconnect solutions etc.) segment revenue for FY2023 per 10-K;

f) Excludes Strategic Adjacencies and Rail & Transit disclosed in FY24 investor presentation;

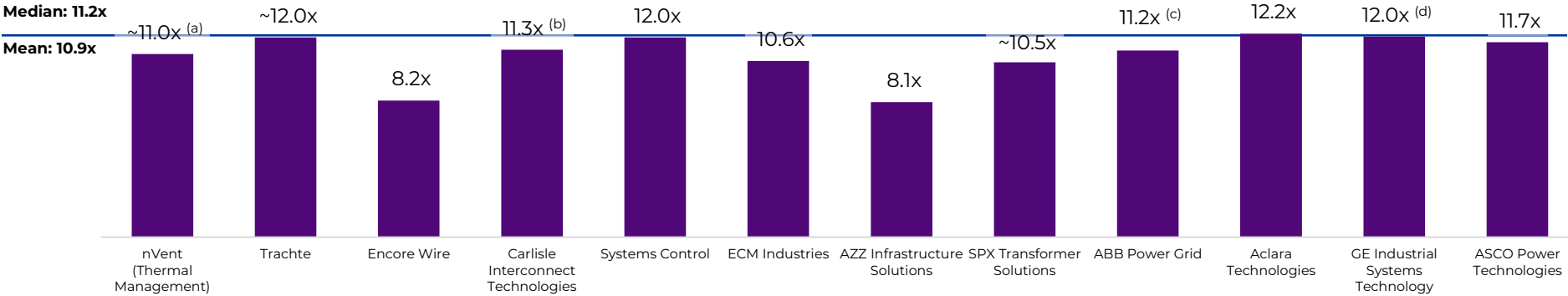
g) Defined as Industrial, Aerospace, Appliance and 'Other' end-markets per Evercore research report (Feb. 6, 2024). Sensata is targeting \$2bn electrification revenue (\$1.2b EV/\$0.8bn Industrial) by FY2026 per J.P. Morgan equity research (Feb. 6, 2024);

h) Per FY23 earnings presentation, includes Safety & Infrastructure ("Electrical Support") segment

Private and Confidential

# SELECT PRECEDENT TRANSACTION MULTIPLES

## EV/EBITDA (LTM)



	1	2	3	4	5	6	7	8	9	10	11	12
<b>Acquirer</b>	Brookfield	nVent Electric	Prysmian	Amphenol	Hubbell	nVent Electric	Fernweh Group	GE-Prolec Transformers	Hitachi	Hubbell	ABB	Schneider Electric
<b>Ann. Date</b>	Aug-24	Jun-24	Apr-24	Jan-24	Oct-23	May-23	Jun-22	Jun-21	Dec-18	Dec-17	Sep-17	Jul-17
<b>EV (\$M)</b>	1,700	695	4,147	2,025	1,100	1,100	300	645	1,100	1,100	2,600	1,250
<b>LTM Revenue (\$M)</b>	595	~250	~2,600	900	400	415	375	n.a.	n.a.	500	2,700	468
<b>LTM EBITDA Margin</b>	~25.0%	~23.0%	~19.5%	~20.0%	22.9%	25.1%	9.9%	n.a.	n.a.	18.0%	8.0%	22.8%
<b>Product Focus Areas</b>	Mission critical electrical thermal solutions such as cables and wires	Custom-engineered control building solutions	Broad range of copper and aluminum electrical wire and cables	Advanced high-performance interconnect systems, sensors and antennas	Turnkey solutions, equipment enclosures and control and relay panels	Electrical and consumable products such as wiring and cable management	Switchgear, electrical enclosures and medium-high voltage bus ducts	Custom electrical solutions such as medium and large power transformers	Power and automation products, systems and services	Meters and edge devices, metering infrastructure and engagement software	Switchgear and components for lighting control and power supply equipment	Electrical equipment such as compressor and generator controls
<b>Key End Markets</b>	Industrial, commercial, construction, mining	Transmission and distribution, renewable energy, power generation, data centers and water	Healthcare, data centers, airport expansion, oil and gas, transit, power, wastewater treatment and construction	Industrial, commercial aerospace, test & measurement and medical technologies	Electric utility providers	Retail, utility, renewable energy, commercial and industrial	Appliances, construction, HVAC and transportation	Utility, civil, commercial and industrial	Gas, power generation, chemicals and water	Water, gas and electric utility	Electrification, data centers and industrial	Data centers, healthcare, commercial buildings and wastewater

Source: Company websites, Mergermarket, PE Hub, PitchBook, press releases  
 a) Based on estimated 2023 EBITDA  
 b) Estimated 2024E sales and adjusted EBITDA per press release at announcement  
 c) Operating EBITA before share of corporate costs. Hitachi acquired an 80.1% share of the business and then acquired the remaining 19.9% in 2022  
 d) Per equity research estimates



# SELECT PRIVATE EQUITY ACTIVITY – LAST ~12 MONTHS

Announcement Date	Target	Acquiror	Target Description
Nov-24	 (Odyssey Investment Partners)		Manufacturer of a wide variety of electrical connectors, mechanical and digital time controls, wire management products and other related electrical components
Sep-24	 SALIENT (LFM Capital)	 TRYSTAR <sup>®</sup> (Blackstone / Barings / Goldner Hawn)	Manufacturer and assembler of electrical control panels and emergency power products
Aug-24	 TRYSTAR <sup>®</sup> (Goldner Hawn)	 Blackstone (Majority)  BARINGS GOLDNERHAWN (Minority)	Distributor and manufacturer of temporary electrical power products, welding cable lead, electrical distribution panels and welding racks
Jul-24	 INSULATION TECHNOLOGY GROUP (PHI Industrial)		Manufacturer of high and ultra-high voltage porcelain insulators for mission-critical applications within electrical substations, overhead transmissions and distribution infrastructure
Jun-24		 TRANSFORMER COMPANY (Neos Partners)	Offers a variety of transformers can be designed for an array of configuration options; top or side entry variations, partial and full-length air terminal chambers and close coupling flanges
May-24	 SPARKSTONE ELECTRICAL GROUP (4C Capital, Charter Growth Capital, Promise Holdings)	 GEMSPRING GREENBRIAR Growth Investment 	Manufacturer of custom-built electronic equipment intended to cater to the needs of power distribution processes
Mar-24	 Powering the Future (Graycliff Partners)	 OAKTREE	Manufacturer of custom electrical equipment including switchgear, power quality products, transformers and integrated systems for customers in the utility, renewable energy and data center markets
Dec-23	 POWER GRID COMPONENTS, INC. (Shorehill Capital)		Multi-product line supplier of highly engineered, quality power equipment, primarily used in substations to build and maintain the North American power grid
Dec-23	 inRCORE (The Jordan Company)	 TJC WARBURG PINCUS Growth Investment	Manufactures intelligent products including power inductors, gate drive transformers, planner transformers, transceiver modules and other products
Oct-23		 WIND POINT PARTNERS	Manufacturer of distribution transformers and transformer components intended to serve the electrical supply sector
Oct-23	 SUNBELT SOLOMON (Trilantic North America)	 FINBACK INVESTMENT PARTNERS <sup>™</sup> Growth Investment	Manufacturer of transformers and electrical equipment intended for commercial, industrial and utilities markets

# SOLOMON PARTNERS OVERVIEW

# SOLOMON IS ANCHORED IN A LEGACY OF INTEGRITY AND WISDOM

## CULTURE OF GROWTH AND EXCELLENCE WITH SECTOR EXPERTS PROVIDING PREMIER SERVICE

### WE ARE

the go-to advisors in the sectors we cover, bringing unmatched expertise to every transaction

**180+**  
Investment Bankers

**35+**  
Partners & MDs

**\$300B+**  
Transaction Volume <sup>(a)</sup>

**5x+**  
Growth Since 2016 <sup>(b)</sup>

### OUR PEOPLE

live and breathe the services and sectors they advise on, providing unparalleled analysis, understanding and access

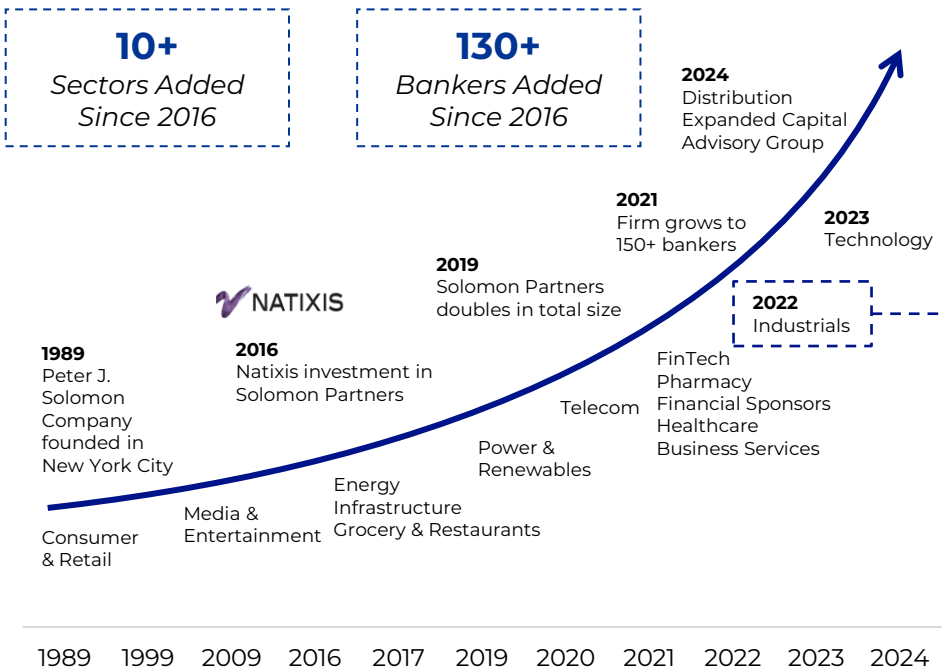
### OUR PRIORITY

is tailored client service rooted in honesty and integrity

### OUR REACH

is global through our partnership with Natixis, with access to coverage in Europe, the Americas, the Middle East, Asia and Australia

### STRATEGIC EVOLUTION WITH INVESTMENT IN DEEP SECTOR EXPERTISE



### OUR INDUSTRIALS CORE FOCUS AREAS

- Aerospace and Aviation Services
- Capital Goods, Automation and Electrical Equipment
- Defense and Space
- Government Services
- Industrial Services
- Industrial Technology and Software
- Motion and Flow Control
- Transportation

a) Includes transaction volume completed by Solomon Partners bankers at their prior firms  
b) Growth since 2016 measured by Solomon Partners banker headcount

# SELECT SOLOMON TEAM MEMBERS



**Larry Gelwix**  
Partner,  
Head of Industrials

[larry.gelwix@solomonpartners.com](mailto:larry.gelwix@solomonpartners.com)

- More than 20 years of professional experience, the majority of which has been dedicated to advising clients on strategic mergers, acquisitions, divestitures and minority investments across the aerospace and industrials sectors
- Prior to joining Solomon Partners, Larry was with Greenhill & Co. and Lehman Brothers
- His background also includes working in the commercial aerospace industry



**Michael Vinciguerra**  
Managing Director,  
Business Services

[michael.vinciguerra@solomonpartners.com](mailto:michael.vinciguerra@solomonpartners.com)

- Michael has over 16 years of experience advising private, public, and private-equity clients on mergers and acquisitions, recapitalizations, private capital raises, and other financial advisory assignments
- Over the course of his career, Michael advised on over 70 transactions including over 45 completed M&A transactions in the Environmental and Industrial Services sector



**Tim Bath**  
Partner, Co-Head of  
Infrastructure, Power &  
Renewables

[tim.bath@solomonpartners.com](mailto:tim.bath@solomonpartners.com)

- A leading advisor to clients across the European and North American infrastructure markets, Tim has more than 15 years of experience in providing strategic and financial advisory services on some of the sector's most high-profile and historic projects
- With a specialization in transportation infrastructure, his combined transaction value of roughly \$30 billion includes advising on buy and sell-side mergers and acquisitions



**Vinod Chandiramani**  
Partner, Head of  
Capital Advisory

[vinod.chandiramani@solomonpartners.com](mailto:vinod.chandiramani@solomonpartners.com)

- Vinod has nearly 20 years of experience, including advisory and principal investment activities focused on financing transitional capital or special situations opportunities, liability management, restructuring, divestitures and acquisitions
- Vinod has represented companies, creditors, investors and participated in transactions involving more than \$400 billion in liabilities or invested capital across an array of sectors



**Jeff Pollard**  
Partner, Co-Head of  
Infrastructure, Power &  
Renewables

[jeff.pollard@solomonpartners.com](mailto:jeff.pollard@solomonpartners.com)

- Has over fourteen years of experience in the power and renewables sector, which includes strategic and financial advisory work totaling well in excess of \$100 billion
- Prior to joining Solomon Partners, Jeff was a Managing Director at Goldman Sachs & Co., where he spent over a decade and led the unregulated power generation business



**Parker Teufel**  
Vice President

[parker.teufel@solomonpartners.com](mailto:parker.teufel@solomonpartners.com)

- More than 10 years of professional experience, the majority of which has been dedicated to advising clients on strategic mergers, acquisitions, divestitures and minority investments across the aerospace and industrials sectors
- Previously worked for JP Morgan and Greenhill & Co. in their respective Industrials practices before joining Solomon Partners

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