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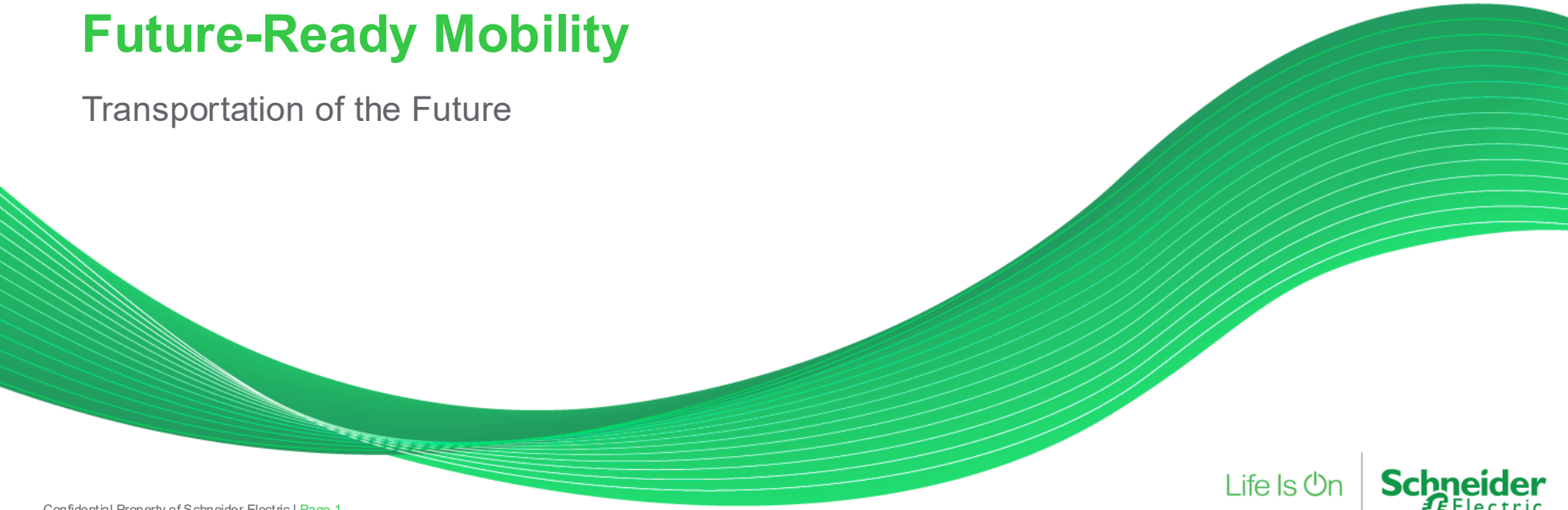
Innovation Days

Future-Ready Mobility

Transportation of the Future



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Pauline BLOT GEORGES
Global Transportation Leader
Schneider Electric

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Agenda

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1 Transportation Trends

2 Build the Port of the Future

3 Smart Airports

4 Build Rail and Urban Transport of the future

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Transportation infrastructure is going through massive challenges

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X3.5

Source: OECD

24%

Source: UN

€750B

Source: Saudi Infrastructure Expo

Transportation Infrastructure of the future will be integrated, decarbonized & climate resilient

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Here are 3 ways transport authorities & operators can build decarbonized and resilient Infrastructure of the Future

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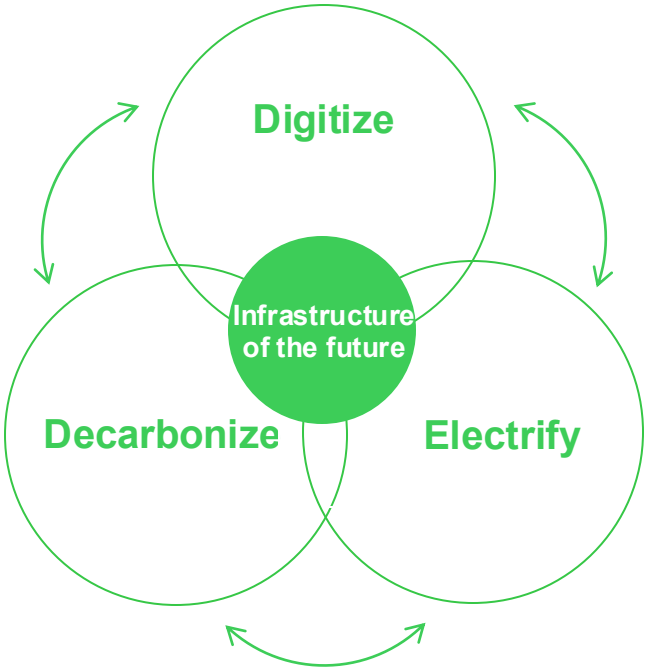
Rail & urban transportation

Digitize
Improve efficiency at facility level



Ports

Airports

Reduce carbon footprint
Electrify, Reduce, Replace and Engage value chain

Electrify & ensure uptime
Eliminate power outage and ensure continuity of operations

Our strategy is to digitize, decarbonize and electrify transport infrastructure through our unique suite of software solutions

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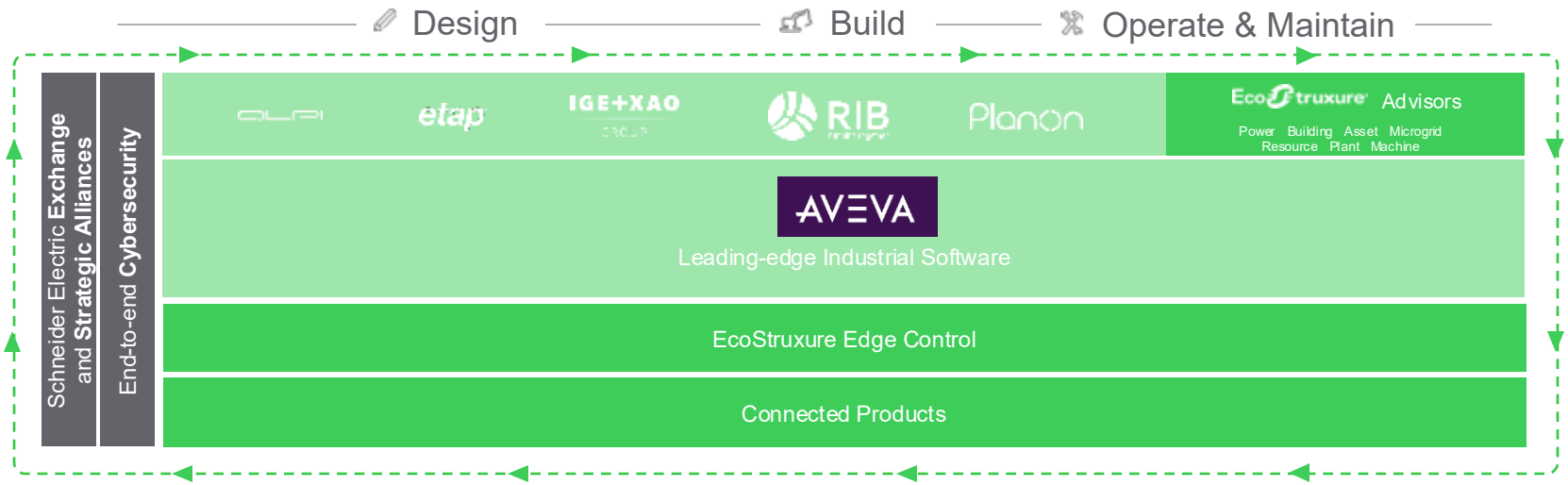

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With EcoStruxure for Transportation as the technologic foundation

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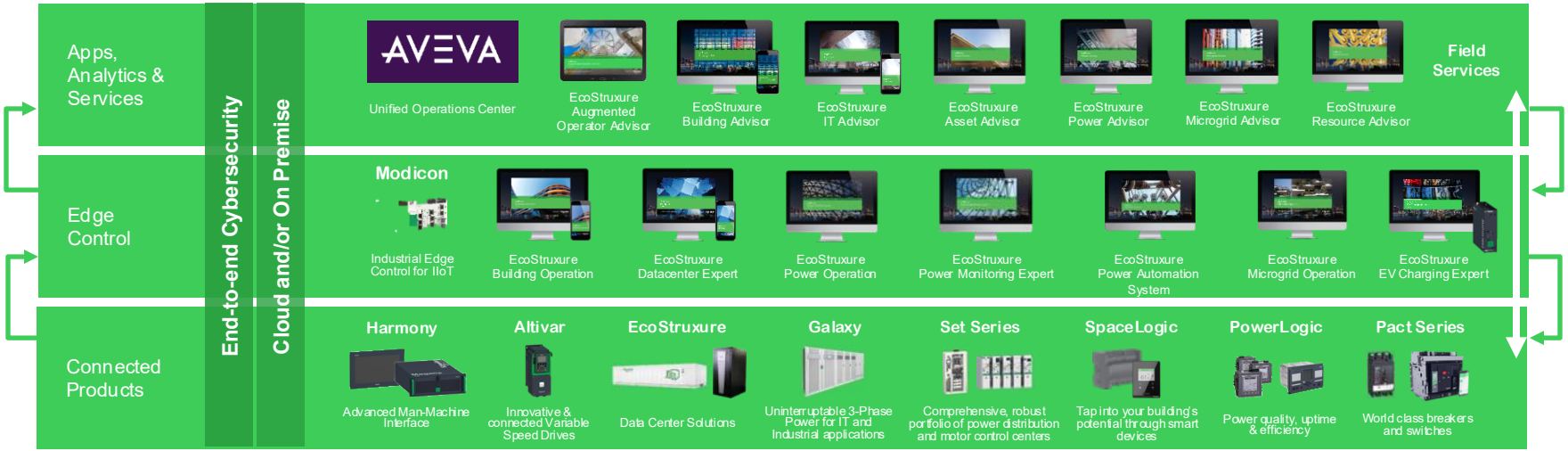
Reliable Electrification | Digitalization | Decarbonization

EcoStruxure™ Architecture



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Build the Ports of the Future

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Ports can electrify energy consumed to minimize environmental impact and improve sustainability

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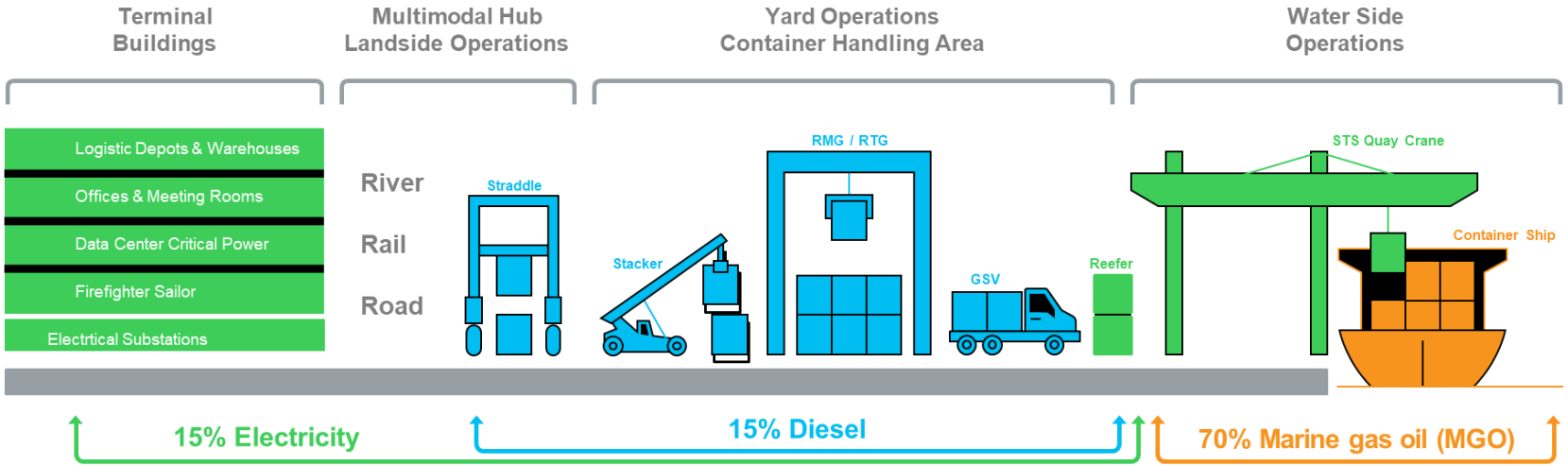

Electrify port vehicle fleets

Invest in charging infrastructure for cargo handling equipment and trucks, utilize renewable energy sources, & implement smart energy management systems to optimize usage.

e-Cranes

Electrify diesel-powered cranes such as RTG, straddle carrier, ensuring optimum reliability and reducing downtime.

Shore Power

Install onshore power supply at berths to connect ships to the grid, enabling them to turn off their diesel generators.

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Ports are adopting digital, moving from traditional to smart

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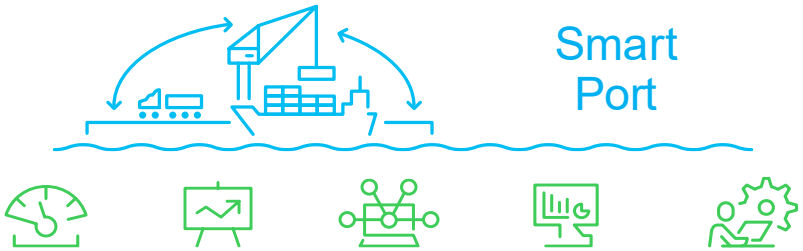
- Manual interference
- Operation sheets
- Unmonitored process
- Siloed subsystems
- Scattered visibility
- Limited efficiency



- Automated operation for higher productivity
- Efficient operation
- Real time monitoring
- Data-centric decision making
- Higher reliability
- Sustainable initiatives

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Schneider Electric can help you build the "Green Ports of the Future"

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Reliable electrification

Electrify port with safer electrical distribution

- Deliver infrastructure for shore power systems for all vessels
- Electrical infrastructure for crane equipment, refrigeration equipment and all other port-related operations
- Deploy charging infrastructure for e-vehicles, cargo handlers' equipment, e-cranes.
- Upgrade infrastructure to power new and future demand while ensuring safer operations

Digitization

Manage and maintain efficiently

- Manage and maintain centrally the overall electrical distribution in port leveraging digital twin
- Break siloes and empower operator's decision making with a Unified Operation Center (UOC) & Centralized Data management (PI)
- Build resilience to mitigate OT cybersecurity risks.

Decarbonization

Reach port carbon neutrality

- Define the port decarbonization roadmap
  - Reduce scope 1: Electrify (shore to ship, e-vehicles)
  - Reduce scope 2: Optimize the use of onsite renewable, source green energy
  - Reduce scope 3: Engage your community in decarbonization journey
- Extend lifespan & reduce waste by modernizing electrical distribution asset

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We Digitize port infrastructure

Energy Management
ETAP digital twin
EcoStruxure Power Operation
EcoStruxure Digital Services

1. Infra-asset management
2. Electric Vehicle Chargers
3. Reefer energy management
4. Shore power connection
5. River cruise & barges connection management

EcoStruxure Microgrid Operation

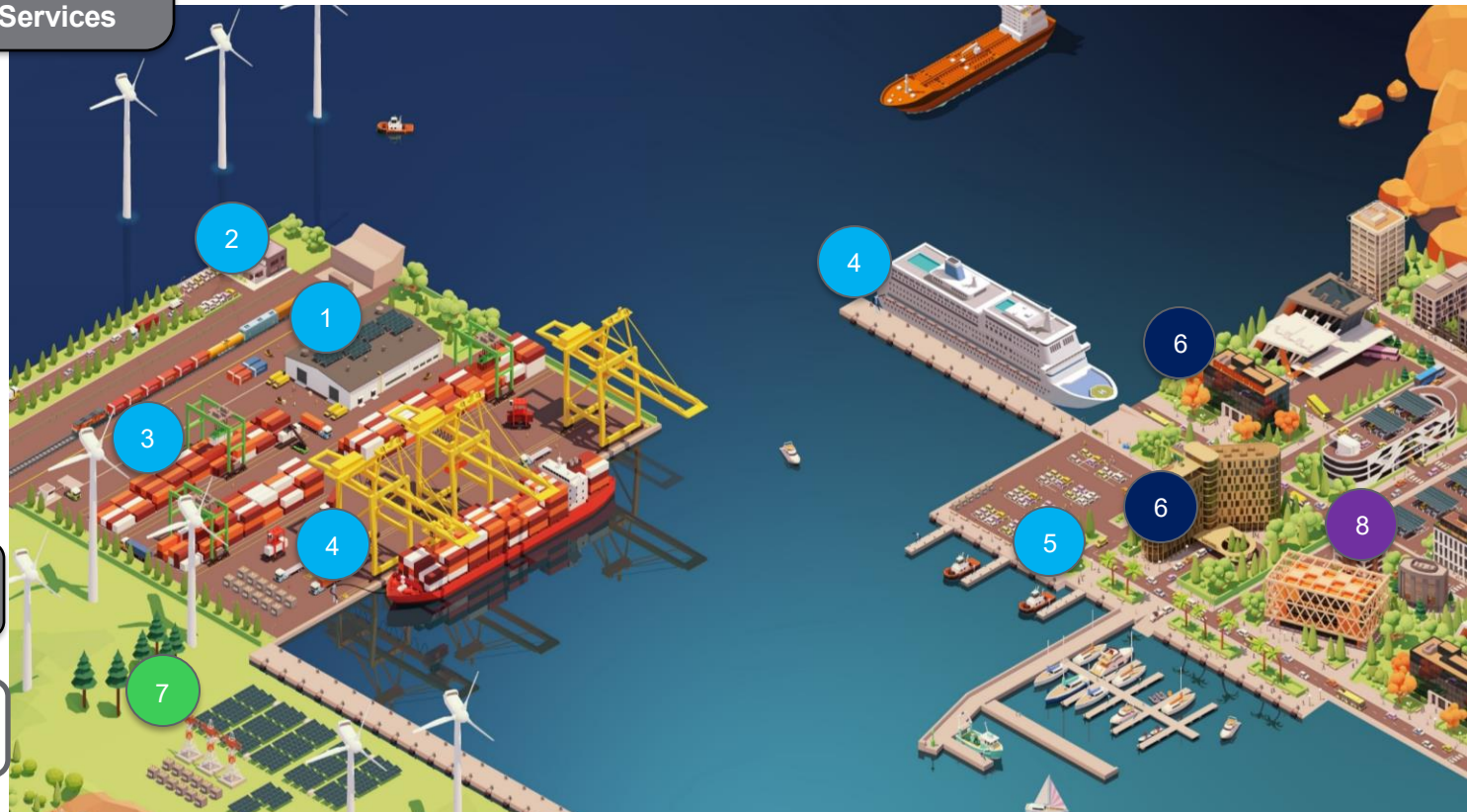
7. Solar Energy, Battery Storage System (BESS) & Wind Energy

AVEVA Unified Operation Center

8. Port control center unified platform

EcoStruxure Building Operation

6. Terminal & offices BMS



Port of Marseille, France

Shore power as an enabler for transformation

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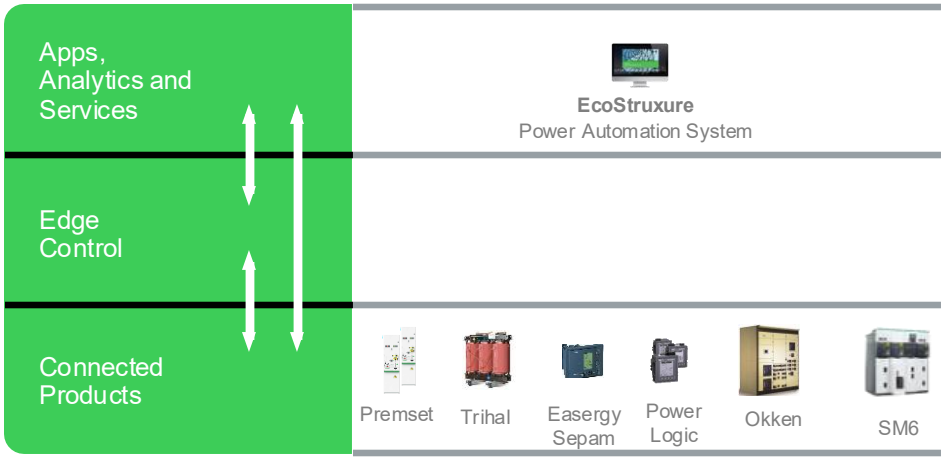
EcoStruxure™ Innovation At Every Level



Customer challenge

Connect simultaneously 2 cruise vessels (32MVA) in 60hz by 2026 cruise season

Manage a complex and growing electrical infrastructure

Integrate renewable energy to provide green electricity to vessels (9MVA solar panels)

Schneider solution

Provide all MV/LV equipment for shore power, ensuring safe connection and compliance with IEC 80005-1 standard

Provide studies and project management, including selectivity studies and integration in the existing port SCADA

100%

Resilient Energy for Critical Infrastructure

40%

CO2 emissions reduction in 10 years

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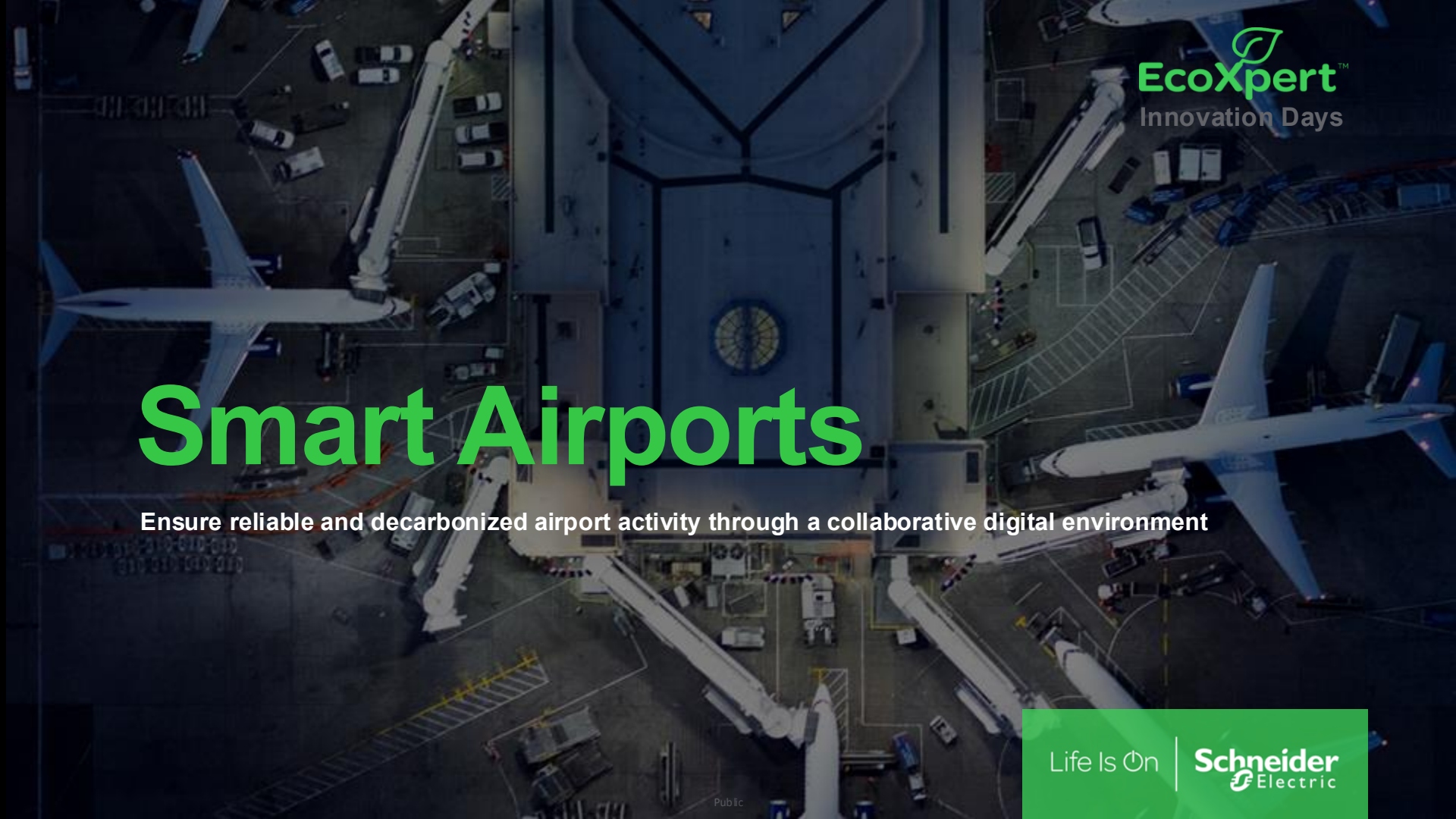

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Smart Airports

Ensure reliable and decarbonized airport activity through a collaborative digital environment

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Why must airports digitize and decarbonize?

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Reliability

Maximize airport facility uptime and prevent millions in revenue losses

- Power outage at Atlanta Airport costs Delta **USD$25-50M**[1]
- Backup generator failure caused a **5 Hour** power outage at Perth Airport[2]

Digitization

Manage & operate efficiently

- Energy costs make up as much as **10%-15%** of an airport's operating budget[3]
- Lighting and Cooling account for **46%** of an average airport's electricity usage[3]

Decarbonization

Towards net zero in the Aviation Industry

- **Jan 2025 it's more than 800** airports worldwide under ACI's Airport Carbon Accreditation program[4]
- **89** Carbon Neutral airports under ACI ACA program[5]

Source: [1] CNBC News Article 2018 [2] WA Today News Article 2022 [3] OUC Energy Advisor Article 2020 [4] ACI News Article 2023 [5] ACI Airport Carbon Accreditation annual report 2021-2022

Electrify, Digitize and Decarbonize to build the Airports of the Future

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Maximize airport **facility uptime** and prevent millions in revenue losses

Manage & operate facilities efficiently

Towards **net zero** in the Aviation Industry

Key solutions

1 Reliable electrification

- **Modernize** electrical distribution for more reliable infrastructure with a digital twin to maintain integrity over time
- **Maintain** infrastructure using digital support services for peace of mind
- Implement a **Microgrid** to allow independence from the Grid
- **Secure Power** for critical assets

2 Digitization

- **Manage and maintain centrally** the airport's buildings and overall electrical infrastructure
- **Break siloes** and improve operator's effective collaboration with a Unified Operation Center
- Mitigate **OT Cybersecurity** risks

3 Decarbonization

- **Define the airport decarbonization roadmap** towards net zero
- **Reduce scope 1**: Electrify buildings, Provide EV charging infrastructure
- **Reduce scope 2**: Optimize the use of onsite renewable, improve energy efficiency of terminal buildings, source green energy
- **Extend lifespan & reduce waste** by modernizing electrical distribution asset

From airside to terminal to landside, we deliver best-in-class solutions

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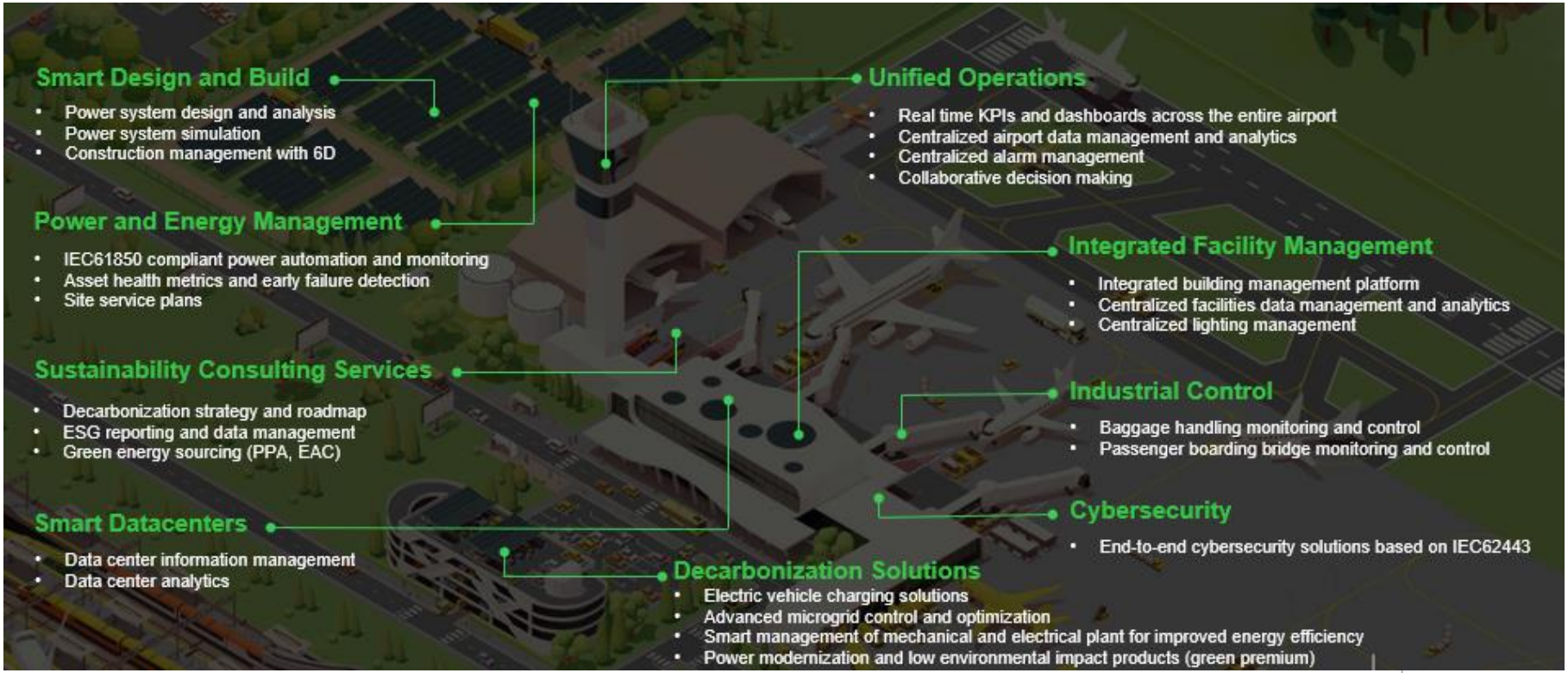

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JFK International Airport

Electrified, Digitized, Decarbonized

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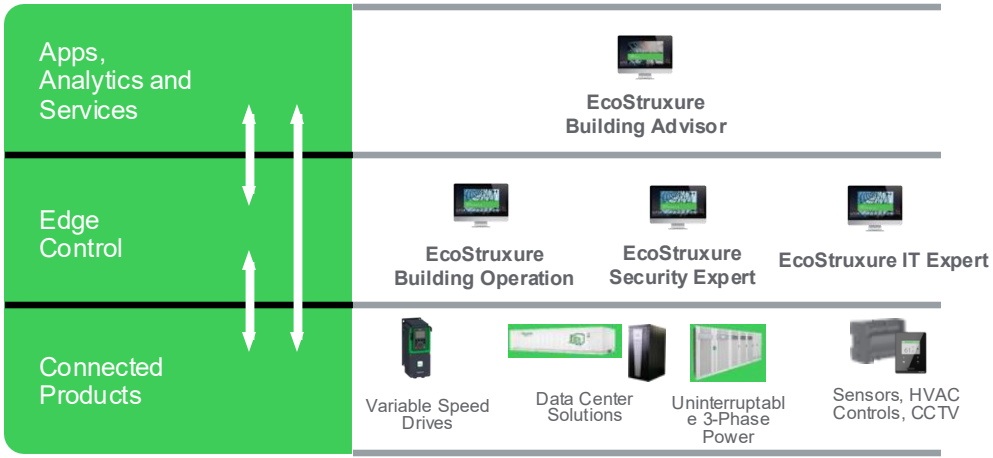
for Airport



Customer challenge

Transform NTO into a resilient airport that can function off-grid during power disruptions

Deliver energy reliability & resilience with guaranteed system-level uptime

Produce lower carbon, more efficient, locally generated energy

Stabilize energy costs over the long-term

Schneider solution

12MGW Solar Panel

Integrated Building Automation and Data Center Solution for the JFK Terminal One,

Advisory Services for Asset Monitoring and Real Time Data of Connected Devices

38%

Decrease in immediate greenhouse gas emissions over source energy

100%

Autonomy Airport operations during power disruptions

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Key facts and figures

2 to 3%
rail traffic growth per annum till 2030

Up to **€17 B** savings in maintenance costs globally

1.8 B
people travel by rail every day

+27.2%
CAGR YoY growth of E-Bus market (2019-2027)

Sources: United Nations, IATA, ITF

Carbon neutrality by **2050**

68%
of the world's population will be urban by 2050

43
megacities of more than 10 M inhabitants by 2030

€7.3 B stimulus package, France, Germany – 2020

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Solutions for rails & urban transportation

Infrastructure must transform to address capacity needs while reducing the carbon footprint

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Rail

High-speed | Main line | Commuter | Freight




Urban transportation

Metro | Light rail | Tramway | Buses




Reliable electrification

- **Power traction & systems** as well as passenger stations, tramways stops and tunnels along the tracks with automatic power restoration, and model digital twin
- **Modernize** aging electrical distribution infrastructure

Safety & control

- **Automation control** for tunnels and metro for safety in case of emergency
- Automation control system for passenger comfort in stations

Digitization

- Maintain and **manage centrally the electrical infrastructure**, passenger stations, tramways stops & tunnels facilities including digital services
- Break siloes and improve operator's effective collaboration with a **Unified Operation Center**
- Mitigate OT **cybersecurity** risks

Decarbonization

- **Electrify bus depot** & manage and maintain the installation
- Optimize **microgrids** for stations and depots

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Digitization can significantly improve Rail & Urban operations efficiency

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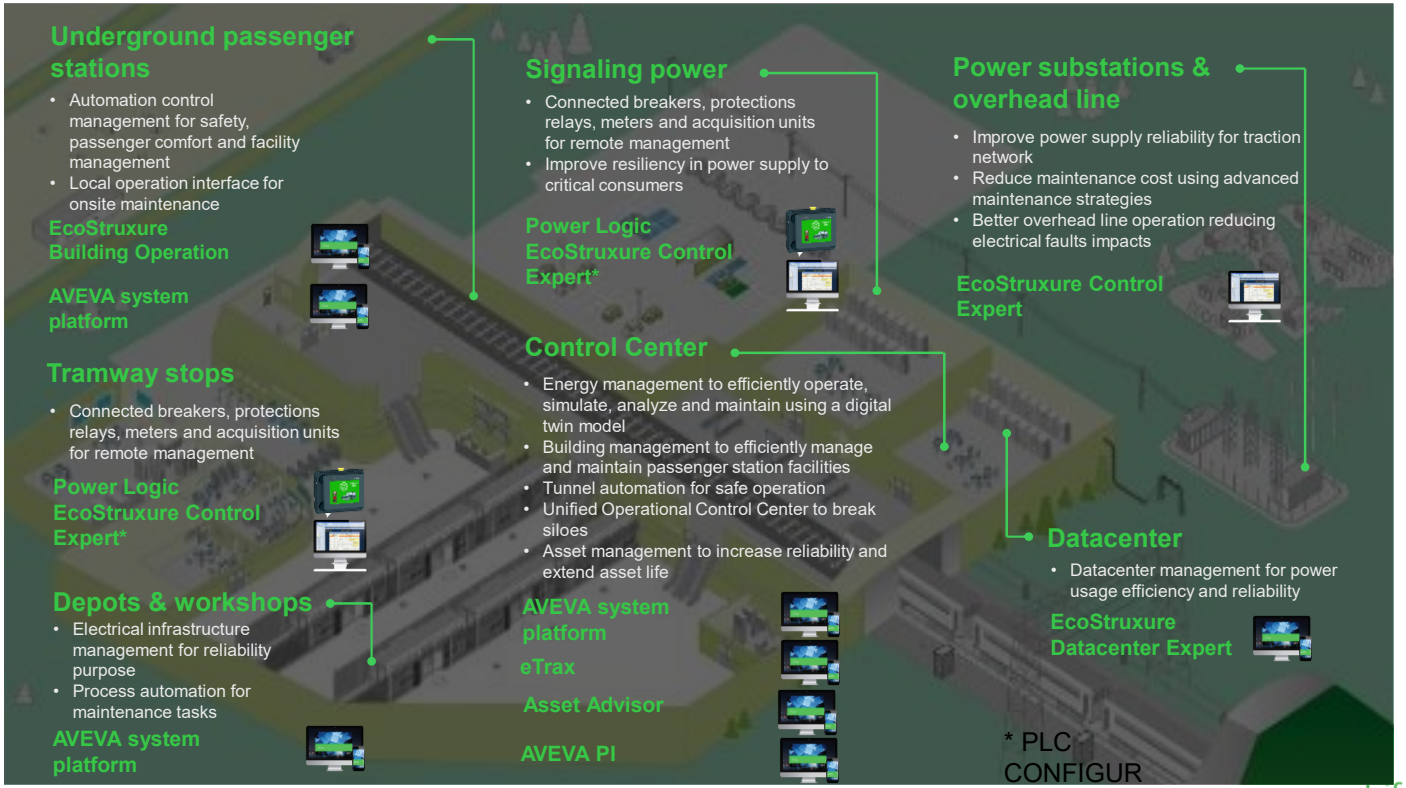

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ADIF Spain

5,000 trains every day on the Spanish railway

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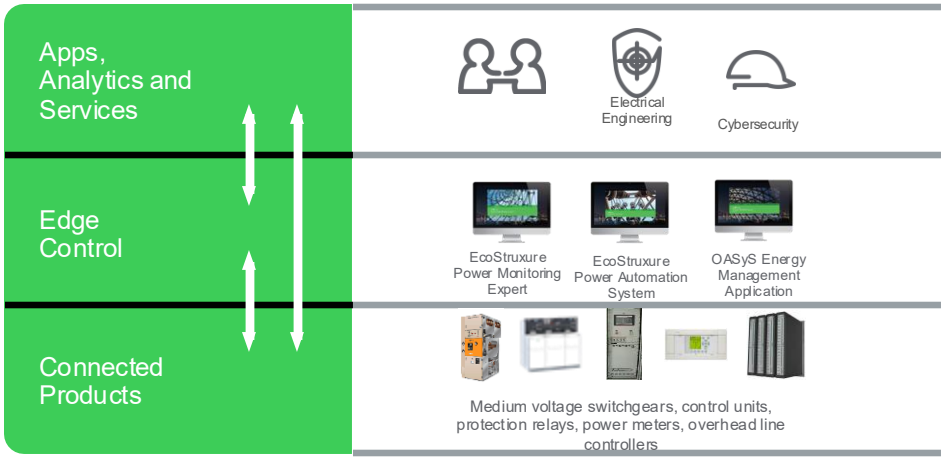
for Railway



Customer challenge

- Centrally manage 2500 high-speed rail network with more than 170 Electrical substation
- Central supervision of 4 areas of the country for mainlines

Schneider solution

- Real-time single view of 2,500 km high-speed national rail network, through integrated main and back-up control centers
- Optimized energy through integrated monitoring and energy management systems
- Maintenance services

1,000 cabinets covering the whole network ensuring reliable power supply

20%

Operational efficiency improvement

Up to 25%

Energy Consumption reduction

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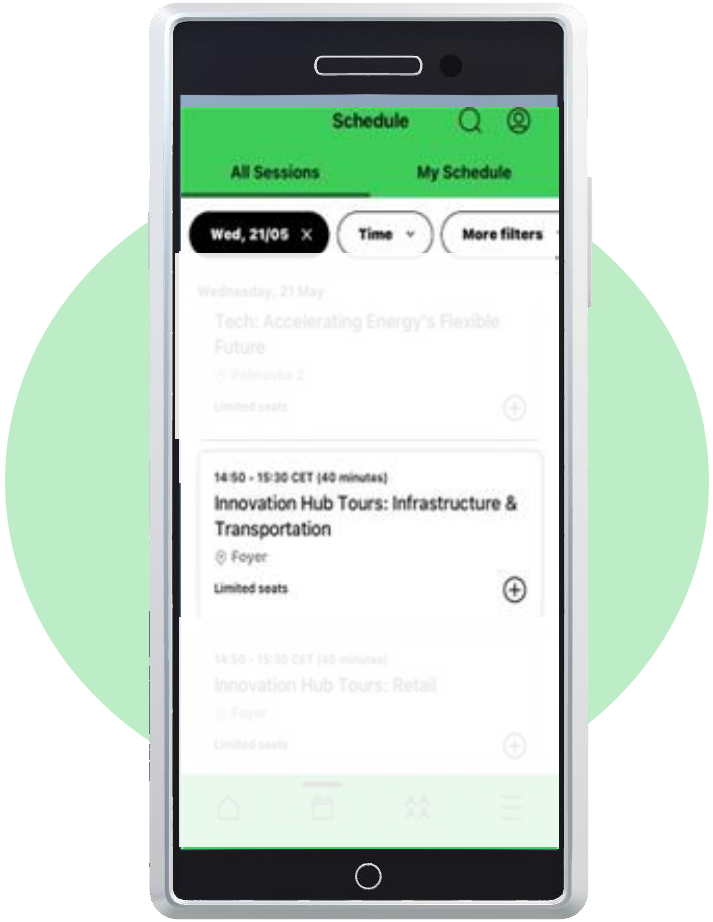
Open discussion



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Transportation Segment Innovation Hub Tour.

Sign up now to reserve your spot.

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Transportation specialization

Complete the form to learn more.

Register your interest & a member of Schneider Electric's Transportation Segment Team will be in touch soon.

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