

# Healthcare of the **FUTURE**

People-centric, Hyper-efficient, Resilient, Sustainable

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VP Power Products – Home & Distribution

June 8<sup>th</sup>, 2023

Life Is On | **Schneider**  
Electric

# 5 trends shaping the future of healthcare

## Surge in aging population

65+ population expected to reach 1.5 billion in 2050

Source: WHO, Global Health and Aging Report, 2015

## Increasing security threats

75% of healthcare organizations worldwide have experienced cyber attacks

Source: Ponemon Institute, 2019 Global Stat of Cybersecurity in Small and Medium-Sized Businesses, 2019

## Patient-centric care

Patient-centric care improves **quality and safety of care, quality of life** and **well-being** of patients

Source: BMC Health Services Research, The Importance of Patient-Centered care and Co-Creation of care for Satisfaction with Care and Physical and Social Well Being, 2019

## Shortage of healthcare workers

The world will be **short 12.9M healthcare workers** by 2035

Source: WHO, Human Resources for Health Report, 2016

## Net-zero ambitions

70% of the world economy has committed to **net-zero emissions** by 2050

Source: United Nations Secretary-General, Carbon Neutrality by 2050, the World's Most Urgent Mission, 2020





# Digitization & Electrification

Two enablers  
critical to **success**

The **new all-digital, all-electric world** gives healthcare facilities the structure to **adapt** to **challenges** and enable **healthcare of the future.**



# The foundation of healthcare of the future

## EcoStruxure™ for healthcare

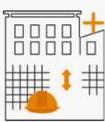
Schneider Electric's **IoT-enabled, future-ready platform.**



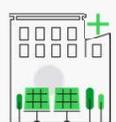
**More People-centric**



**More Hyper-efficient**



**More Resilient**



**More Sustainable**



# IoT-enabled future-ready platform

## EcoStruxure™ for Healthcare



**EcoStruxure for Healthcare** bringing together a variety of different operational, informational and clinical systems from across Schneider Electric's ecosystem of partners to deliver a future-ready healthcare facility.

-  Core ICP Software Systems
-  Core Integrated Systems
-  Corporate Alliances
-  Customer/CM Driven

# Enabling Healthcare of the Future

## EcoStruxure™ for Healthcare



### People-centric

Designed to be responsive to people & patients

- Safer healthcare facilities
- Healthy healthcare facilities
- Comforts and experience



### Hyper-efficient

Seamlessly controlled by end-to-end digital platform

Better decision making, impacting:

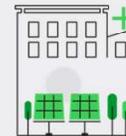
- People needs
- Asset efficiency
- Space resources
- Energy cost



### Resilient

Recover quickly and bounce back

- Remote operations
- Power reliability
- Cybersecurity
- Critical infrastructure and asset protection
- Flexible healthcare facilities



### Sustainable

Equipped with flexible energy assets and various electric sources

- Maximizing renewables
- Active energy management
- Positive energy healthcare facilities
- Sustainable retrofits



# People-Centric Healthcare Facilities

Improve **patient outcomes and staff well-being**; providing a **healing environment** that's **safe & comfortable**.

- Adverse events due to unsafe care is one of the 10 leading causes of death and disability in the world<sup>1</sup>
- Electricity is a leading cause of fires in hospital and has the biggest impact on property damage<sup>2</sup>
- Acoustic, thermal, indoor air & visual qualities impact patient healing & staff well-being<sup>3</sup>

<sup>1</sup>World Health Organization, Patient Safety Fact Sheet, 2019

<sup>2</sup>NFPA, Structure Fires in Health Care Facilities, 2017

<sup>3</sup>AnneMarie Eijkelenboom & Philomena M. Bluysen, Comfort & Health of Patients and Staff Related to the Physical Environment of Different Departments in Hospitals, 2019



# Enabling People-Centricity

For every €1 invested in thermal monitoring, €10 in potential equipment damage is avoided.

Source: Schneider Electric whitepaper, Beyond IR thermography: how continuous thermal monitoring improves performance and equipment protection



Thermal Monitoring



Solution Detail



Insulation Monitoring



Solution Detail



Building Operation



Solution Detail

Creating **safer & healthier** healthcare facilities that **protect** the **well-being** and **safety** of patients and healthcare professionals.

# Enabling People-Centricity

33%

Less patient complaints on Thermal comfort

Source: Schneider Electric customer reference captured from hospital in Sweden



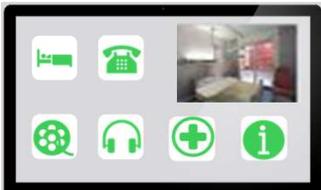
Connected Room Solution **NEW**



Solution Detail



Digital Infotainment



Solution Detail



Building Advisor



Solution Detail

Creating healthcare facilities that promote a **healing environment**, increase **patient control over environmental conditions** and improve **staff efficiency** and **satisfaction**.



# Hyper-Efficient Healthcare Facilities

Leverage technology, Big Data & process automation to **reduce operating costs**, **increase efficiency**, and support **compliance adherence**.

- Healthcare facilities are the 2<sup>nd</sup> most energy intensive buildings<sup>1</sup>
- Operations & maintenance represent 60-80% of the total facility life cycle costs<sup>2</sup>
- Hospitals are the most complex of building types<sup>2</sup>
- 52% of nurses time is spent on administrative tasks<sup>3</sup>

<sup>1</sup> American Hospital Association, Sustainability Roadmap for Hospitals, 2015

<sup>2</sup> Whole Building Design Guide, Operations & Maintenance planning, 2017

<sup>3</sup> NCBI, A Systematic Review of the Impact of Health Information Technology on Nurses' Time, 2020



# Enabling **Hyper-Efficiency**



**29%**

Reduction in unscheduled maintenance

Source: Schneider Electric customer reference captured from hospital in Sweden



**Electrical Assets Performance**



**Solution Detail**



**Clinical Workflow via Strategic Alliances**



**Solution Detail**



**Power Monitoring Expert**



**Solution Detail**

**Optimized use of Energy and maintenance** along with automated **compliance reports** & informed decision-making for facilities teams and building occupants.



# Resilient Healthcare Facilities

**Predict, prepare** and **protect against** downtime and equipment failure, ensuring **continuance of operations** and **patient safety**.

- 66% of USA hospitals experienced a power outage, with 12% having to close or relocate patients <sup>1</sup>
- A cybersecurity breach costs on average \$7.1M and can take 280 days to recover <sup>2</sup>
- In response to COVID19, healthcare systems have spent €500M on temporary structures<sup>3&4</sup>

<sup>1</sup> Health Facilities Management / ASHE 2018 Hospital Construction Survey

<sup>2</sup> Cost of a Data Breach Report, 2020 IBM Security

<sup>3</sup>The empty Nightingale hospitals show the cost of putting buildings before people, 2021, The Guardian

<sup>4</sup> The Federal Response to COVID-19, 2021, USASpending.gov



# Enabling Resiliency

**Downtime reduced by 32%**  
After implementing Schneider Electric Solution.

Source: Schneider Electric customer reference captured from hospital in France



**Power Quality & Compliance**



**Solution Detail**



**Reference Designs & Architectures**



**Solution Detail**

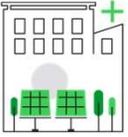


**Cybersecurity Services, Training & Patch Management**



**Solution Detail**

Prepare and enable infrastructure to quickly adapt to adverse events with **minimal loss**, **greater insight** into asset condition and **remote intervention** through **cyber-secure** facility systems with **integrated, IoT-enabled** analytics.



# Sustainable Healthcare Facilities

Reduce **carbon footprint** and **operating expenses** while **protecting public health** and the **environment**.

- 4.6% of worldwide greenhouse gas emissions generated by healthcare industry <sup>1</sup>
- Environmentally Preferable Purchasing can lead to a 20% revenue increase <sup>2</sup>
- Energy reduction programs can return savings over \$5.4 billion in savings over 5 years <sup>3</sup>

<sup>1</sup> Environmental Research, International comparison of health care carbon footprints, 2019

<sup>2</sup> EPA, Evaluation of the Environmentally Preferable Purchase Program, 2013

<sup>3</sup> Commonwealth Fund, U.S. Spends More on Health Care, 2012



# Enabling Sustainability

Up to 25% reduction  
In greenhouse gas  
emissions



EcoStruxure  
Resource Advisor



Solution Detail



Environmentally  
friendly & Energy  
Efficient Equipment

Green Premium - Five sustainable value propositions



Solution Detail



Microgrids



Solution Detail

Achieve **compliance**, **meet circularity requirements** and exceed your **sustainability goals** across the lifecycle of your assets through active energy management and reporting.

Source: Schneider Electric customer reference library

# The future starts now

Hospitals are where life's everyday and extraordinary moments take place.

We partner with healthcare customers to drive robust digital transformation and enable **healthcare of the future.**



# We drive **efficiency & sustainability** through life cycle digitalization in healthcare facilities and Infrastructure



Design



Build

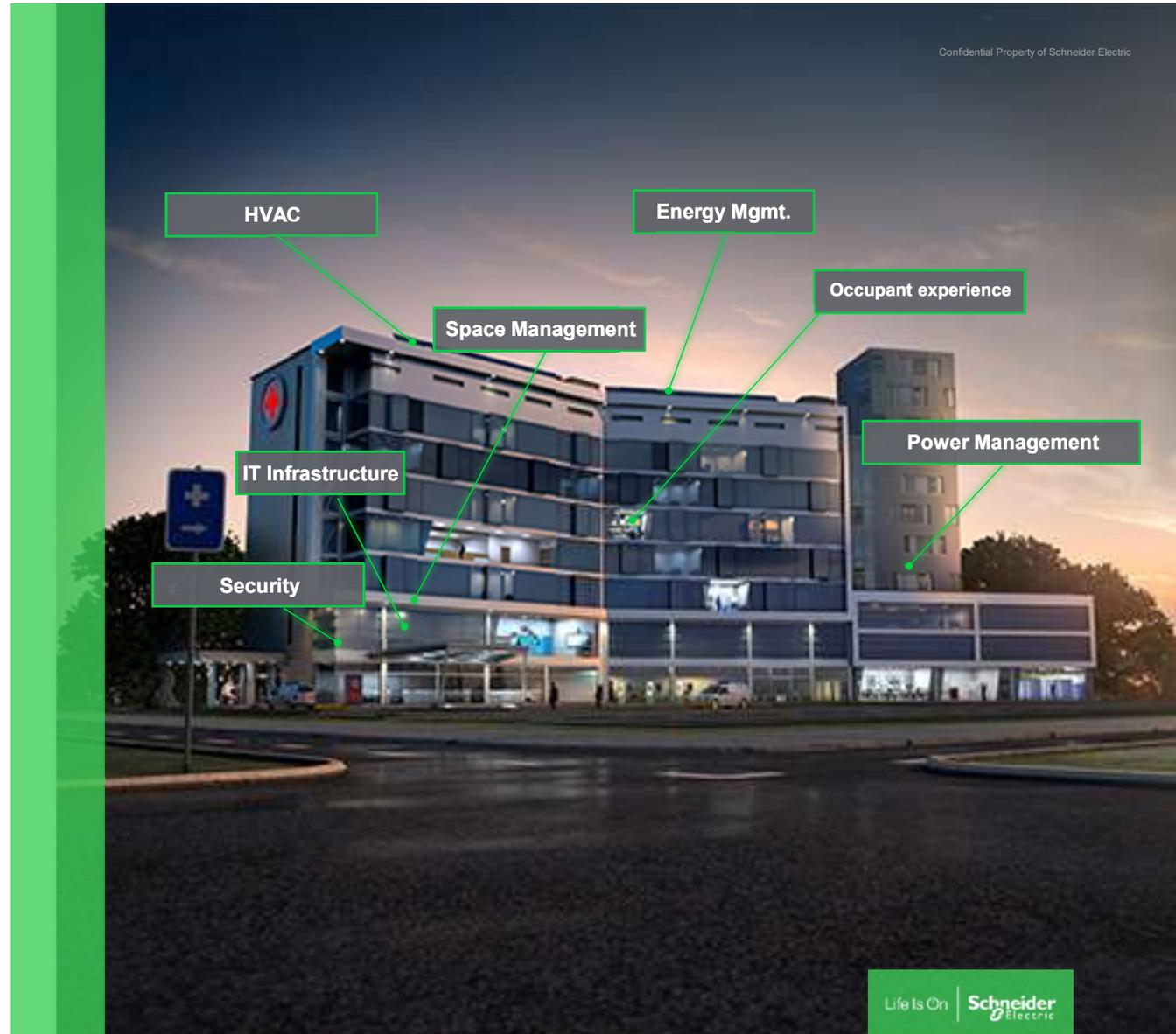


Operate & Maintain



Rebuilding the  
operate & maintain  
stage 

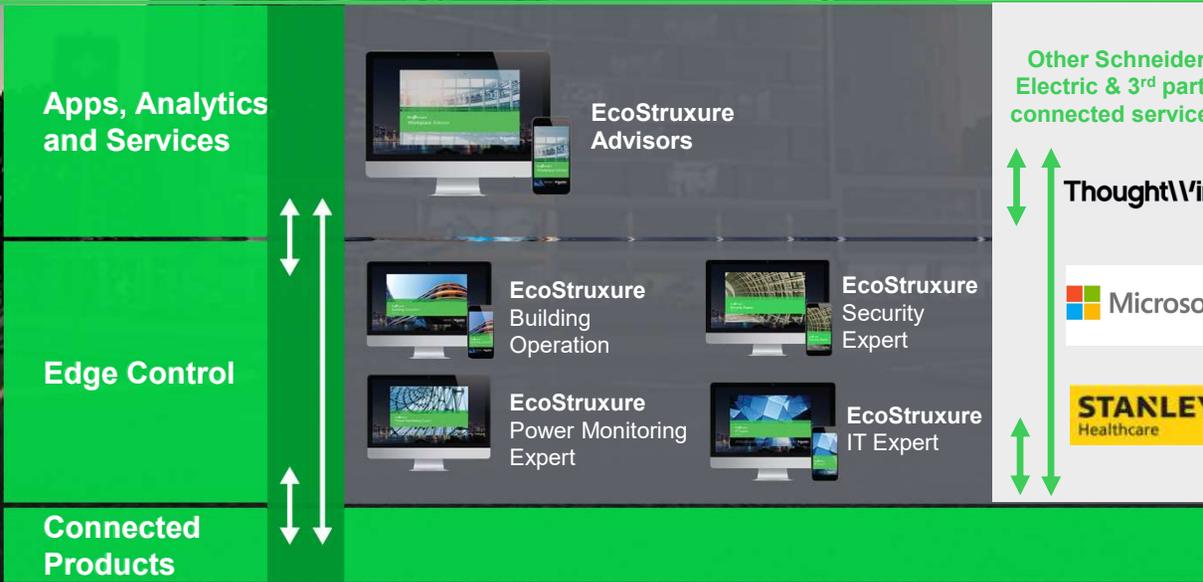
**Deep domain**  
expertise across  
all systems



# Rebuilding the operate & maintain stage



**Strategic Alliance  
partners** supporting  
deep domain  
expertise across all  
systems



# The hospital of the **future** is here now

Let's build it together



University of Rochester Medical Center, USA



Grand Medica, Russian Federation



South Australia Health & Medical Institute, Australia



Nemours Children's Hospital, USA



Moorfields Eye Hospital, UK



Penn Medicine Hospital, USA



Thank you.

# Q&A

# Solutions to enable People-Centricity

## Reducing electrical fire risk with continuous thermal monitoring



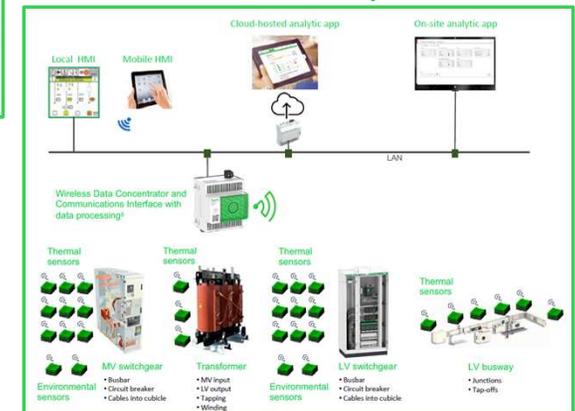
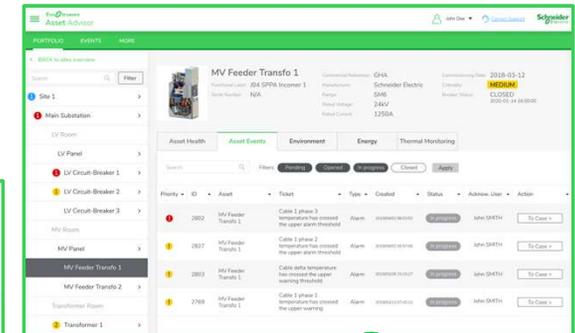
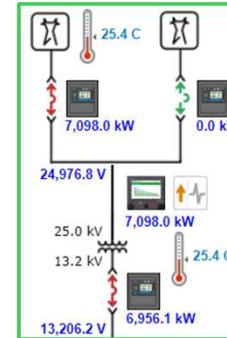
Electrical equipment failure or faults can be devastating in healthcare facilities, where many people have reduced mobility:

Visual inspection and staff intervention can help, but digital protection, monitoring, annunciation and reporting technologies are the most effective form of prevention.

### EcoStruxure Power digitizes Thermal Monitoring with:

- Smart [temperature and humidity sensors](#) to enable continuous thermal condition monitoring, prevents failure and protects staff and patients
- [EcoStruxure Power Monitoring Expert](#) for maximized visibility of your electrical infrastructure.

Take advantage of predictive analytics, remote notifications and maintenance recommendations with [EcoStruxure Asset Advisor](#)



Explore Digital Power Distribution Applications

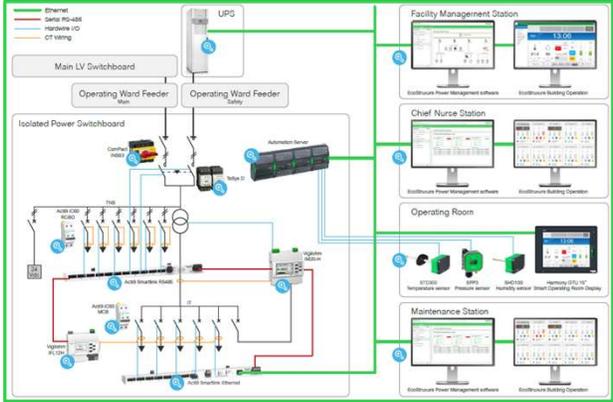
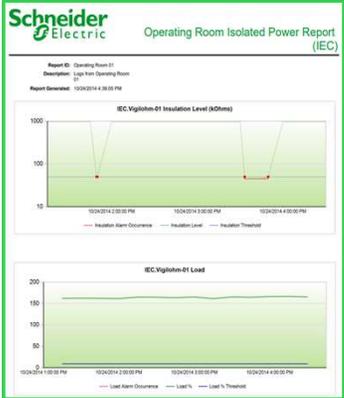
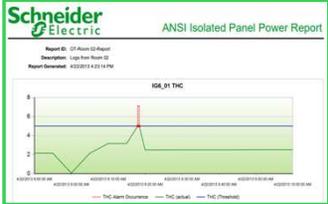
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# Solutions to enable People-Centricity



Reduce risks of electrical shocks with **insulation monitoring** in Operating rooms & ICUs

- In Operating rooms and ICUs, IT earthing systems are a must, to ensure power availability while protecting patients from electrical shocks.
- Ground insulation level is continuously monitored, and an alarm is triggered in the operating room or intensive care unit when a ground fault occurs, thanks to Line Insulation Monitoring equipment such as **Vigilohm Insulation Monitoring and Fault Location Devices**. Hospital staff must clear the fault to ensure continuity of service with the minimum level of risk.
- Seamless integration with **EcoStruxure Power Monitoring Expert** provide maintenance staff with the information necessary to resolve the issue as quickly as possible. Reporting provides a deeper understanding of the fault.



Explore Insulation Monitoring Solutions

Return to solution overview

# Solutions to enable People-Centricity

## Improve the Environment of Care with Building Operation



The building infrastructure is essential to help create and support an environment where patient care and medical practices can be delivered safely. The facility is a crucial component for the functioning of departments and the overall operation of the healthcare facility.

Managing this can be complicated and **EcoStruxure Building Operation** provides an integrated innovative IoT platform to help deliver:

- Control strategies for heating, ventilation and air conditioning systems
- Integration to utility, life safety and built environment systems for consolidated alarm management
- Integrated user interface to help monitor current situations with live interactive dashboards and advanced reporting



Explore Building Management Solutions

Return to solution overview

# Solutions to enable People-Centricity

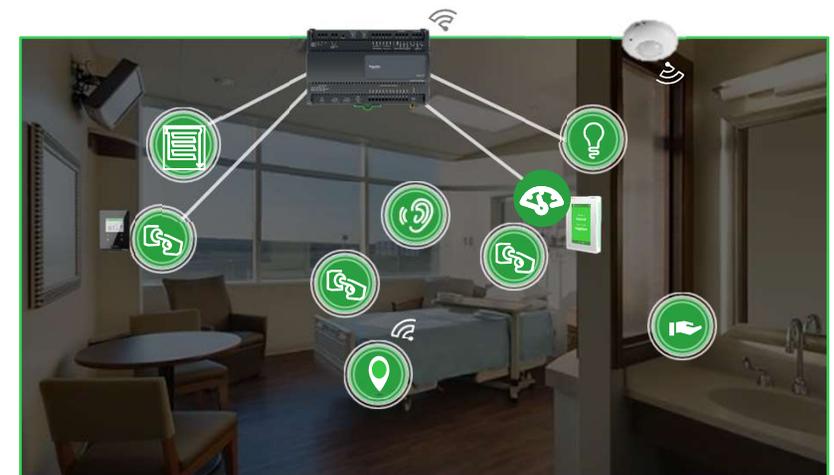
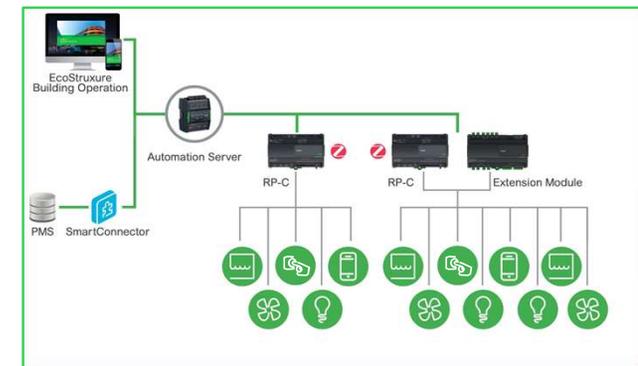
## Integrated IoT Hub for Connected Room Solutions



The [Connected Room Solutions](#) for Healthcare provides a comprehensive solution to enable safe and healthy environments with HVAC control, driving better patient and staff experiences with lighting shade and integration to a wide range of other environmental devices and systems for healthcare facilities.

### The solutions focus on the following areas of healthcare facilities:

- General Healthcare Spaces such as Examination, Consulting or Triage, Rooms, ICU, HCU, CCU
- Imaging and Diagnostics
- Outpatient Clinics
- Patient Rooms (Inpatient Care)
- Critical Environment such as Labs and Pharmacy, Surgical, and Isolation Rooms (AIIR and PE)



[Explore Connected Room Solutions](#)

[Return to solution overview](#)

# Solutions to enable People-Centricity

## Enhanced patient experience with Digital Infotainment



Put the patient in control with a digital, in-patient-room experience that integrates systems and increases patient access to important care information, education and entertainment.

### Key benefits for patients:

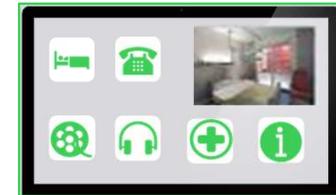
- Room temperature, lighting and window-shade control, increased privacy and access to care plan information and an integrated platform for television entertainment and education.

### Key benefits for clinicians:

- More time to focus on patient care, elevated efficiency and accuracy of patient care and visibility to all critical information on one screen.

### Key benefits for hospital administrators:

- Increased patient comfort and satisfaction, streamlined equipment purchasing and optimized space utilization via component integration.



Explore Digital Infotainment & Intelligent Patient Rooms

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# Solutions to enable People-Centricity

Improve patient environments and optimize operations with Building Advisor



**Building Advisor** helps simplify maintenance, improve comfort, optimize performance and extend asset life of equipment and systems.

## Improve patient safety & satisfaction:

- Identify faults in HVAC that lead to unhealthy Indoor air quality or contamination risk
- Reduce patient complaints due to comfort by 30% by improving indoor environment

## Optimize operations:

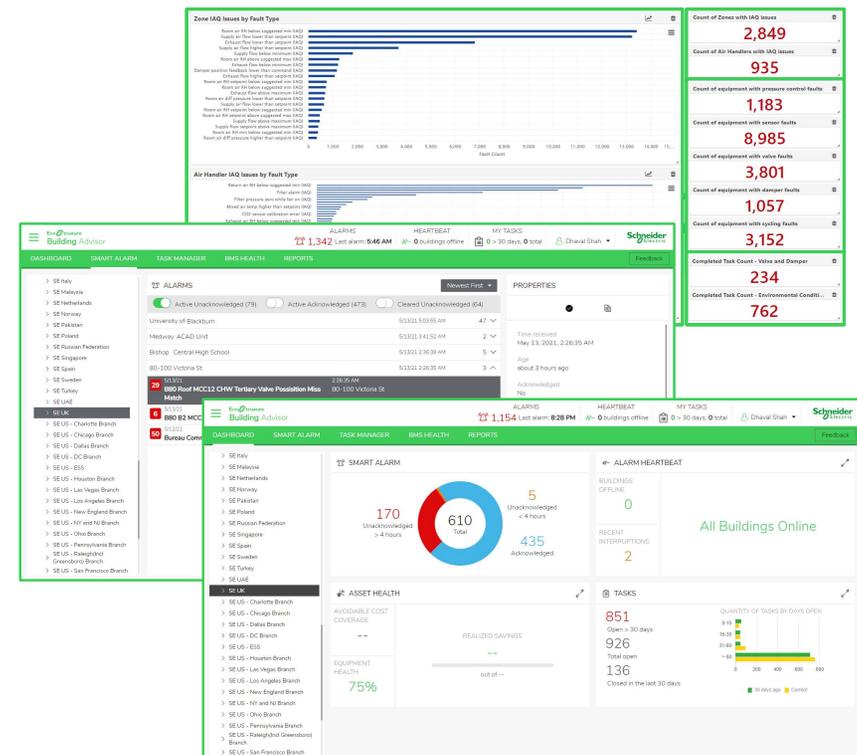
- Reduce on-site team's effort & skills needed to diagnose HVAC problems
- Detect issues before they escalate to critical failure causing disruptions

## Assist in compliance reporting (future):

- Provide data for quality audits such as the Joint Commission or DNV accreditation
- Support operational teams with specific dashboards to monitor deviations

## Achieve sustainability goals:

- Reduce energy consumption by up to 20% by optimizing HVAC
- Leverage Monitoring Based Commissioning to lower energy usage & achieve M&V



Explore Building Advisor

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# Solutions to enable **Hyper-Efficiency**

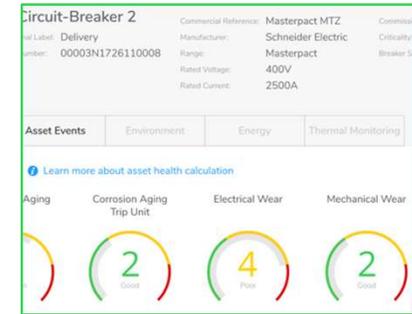
## Improve Maintenance Efficiency with **Electrical Assets Performance**



Maintaining critical electrical assets such as transformers, circuit breakers and relays is essential to avoid business disruptions and patient harm.

Preventative or predictive maintenance strategies use the power of digitization to reduce costs and improve maintenance efficiency.

- **Connecting electrical assets** such as **medium Voltage** and **Low Voltage** equipment, **Trihal** and **Minera** transformers, **MasterPact MTZ** circuit breakers enable data collection
- **Edge Control software** such as **EcoStruxure Power Monitoring Expert** provides on-site visibility to critical assets.
- **Remote digital service** with **EcoStruxure Asset Advisor** leverages asset diagnostics data to perform predictive analytics, with remote support and maintenance recommendations from a Schneider Electric expert..

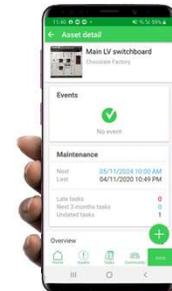


**Schneider Electric** Circuit Breaker Aging Report 3/23/2015

Breaker Aging and Wear Summary

Switchboard	Level	Breaker Name	Electrical Aging (%)	Electrical Wear (%)
Switchboard A1	Critical	Breaker A2	84.8	53.7
		Breaker A3	87.5	85.7
		Breaker A4	96.7	71.9
		Breaker A5	30.8	90.3
		Breaker A7	73.2	74.5
		Breaker A8	38.2	66.3
		Breaker A9	42.5	66.8
		Breaker A10	6.3	89.1
		Breaker A11	2.3	78.3
		Breaker A12	47.4	53.2
		Breaker A13	87.3	71.7
		Breaker A14	57.2	69.5
		Breaker A15	80.7	50.8
		Breaker A16	12.1	93.9
		Breaker A17	81.4	13.6
		Breaker A18	19.7	53.5
		Breaker A21	56.6	3.4
		Breaker A22	55.9	61.0
		Breaker A24	6.1	93.5
		Breaker A25	47.0	81.1
		Breaker A26	96.6	35.4
		Breaker A27	11.9	72.4
		Breaker A28	14.0	62.3
		Breaker A29	96.5	31.6
		Breaker A30	80.4	16.2
		Breaker A32	91.1	80.0
		Breaker A33	78.2	50.9
		Breaker A34	31.4	59.6
		Breaker A35	54.8	84.7
		Breaker A36	28.6	99.5
		Breaker A37	36.0	58.1

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Explore Electrical Asset Performance Solutions

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# Solutions to enable **Hyper-Efficiency**

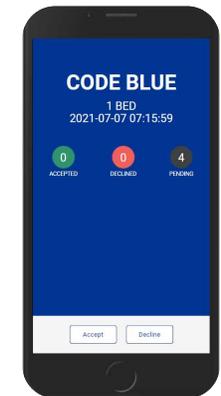
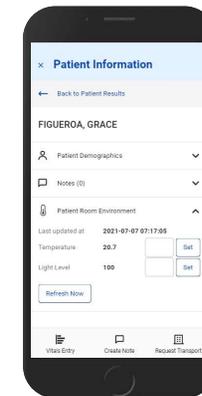
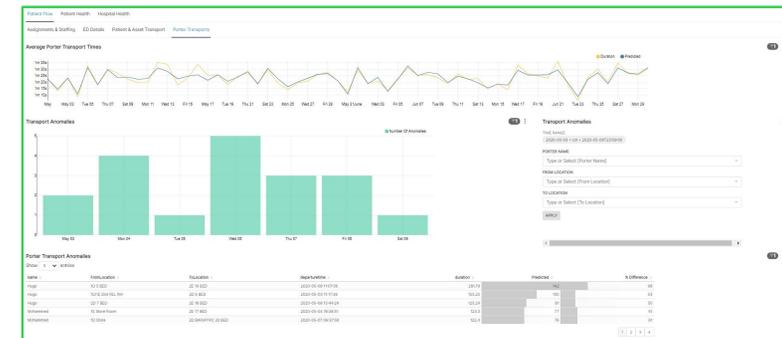
## Digitize Clinical Workflows via **Digital Twins** with **Strategic Alliances**



Delays in treatment can occur when nursing staff are occupied with administration tasks. With ThoughtWire's smart Digital Twin, the clinical environment can be optimized, and workflows orchestrated to delivery better patient care

- **Nerve Centre:** Orchestrates real-time information from patient, clinical and building systems to provide insights and analytics to improve clinical workflows and day-to-day operations.
- **Notification Centre:** Communicates nurse call, code events and facility alarms allowing users to respond with the necessary information to take immediate action – **100% reduction in broadcast of alerts and alarms.**
- **Early Warning:** Support clinicians' ability to keep patients safe by accurately predicting and preventing patient deterioration – **61% reduction in code blues.**
- **Patient and Transport Logistics:** Streamline workflow and transports activities through better coordination and orchestration of resources – **8min less per transport.**

# ThoughtWire



Explore ThoughtWire Applications

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# Solutions to enable Hyper-Efficiency

## Simplify Regulatory Compliance with Power Monitoring Expert



To make sure that backup power is always available when needed many jurisdictions, codes and standards, such as NFPA 99 and 110 in the US, or CSA Z32 and C282 in Canada, HAS in France legislate the testing procedures of the Backup Power System.

To simplify these regulatory compliance activities, we offer to automatize them with Power Monitoring Expert & EcoStruxure Backup Power Testing application.

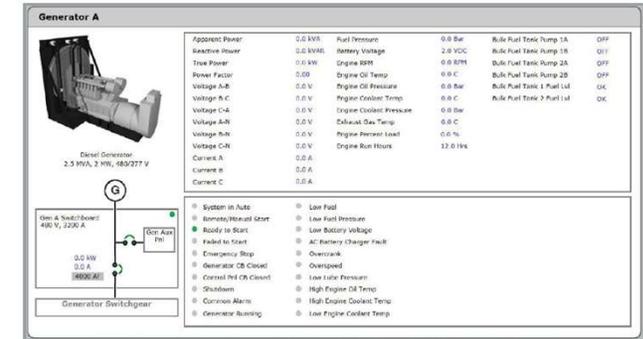
### The EcoStruxure™ Backup Power Testing application monitors & collects:

- Analog values and status of ATSS, generators, power control systems, load banks, and UPSs.
- Operating parameters and status of the backup power supply during an outage or during the test

Then Key legislated parameters are recorded and made available to hospital facility operators, maintenance staff and accreditation bodies.

Explore EcoStruxure Power Monitoring Expert

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EcoStruxure™ Power Monitoring Expert Equipment Diagram



# Solutions to enable Resiliency

## Solve Power Quality & Compliance issues with Power Advisor

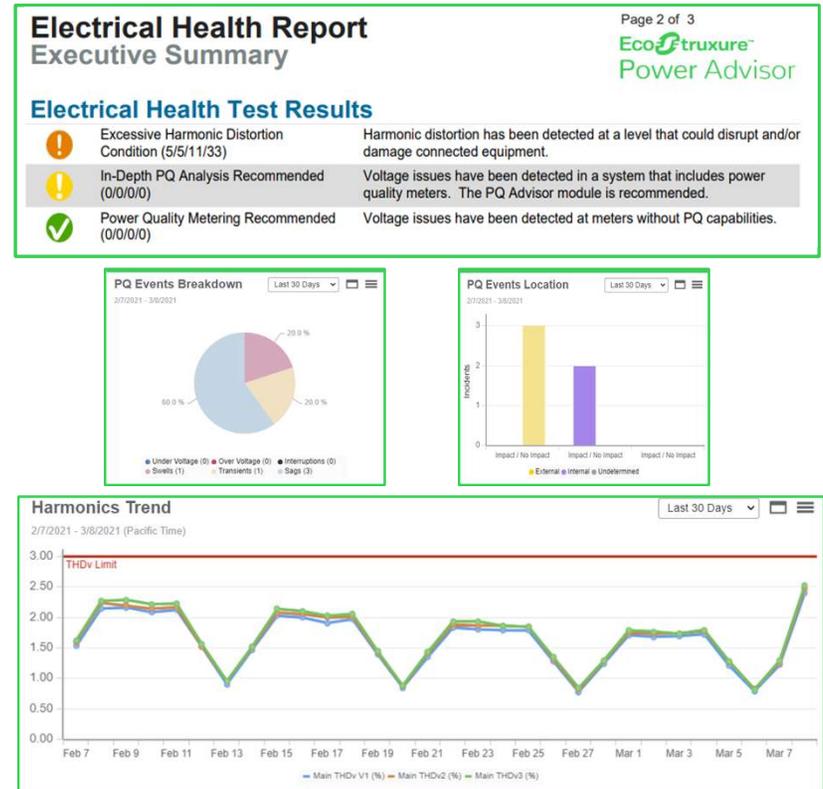


Power quality issues in hospitals can be the silent killer of electrical distribution reliability. To prevent this to happen here are a few actions one can do:

- Implement meters (like [PowerLogic metering](#) or Embedded metering in [Easergy Protection Relays](#) and [MasterPacT](#) MicroLogic control units) that can provide Power Quality information
- Connect them to [EcoStruxure Power Monitoring Expert](#), to get full visibility into system's power quality
- If you need help leverage [EcoStruxure Power Advisor](#) an optional digital service that provides in-depth analytics of the specific PQ conditions in the facility with expert recommendations to improve.
- To solve the issue and get piece of mind, install [Galaxy UPS](#) and [AccuSine](#) harmonics filters.

Explore EcoStruxure Power Advisor

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# Solutions to enable Resiliency

Comply with standards and best practices with Reference Designs & Architectures

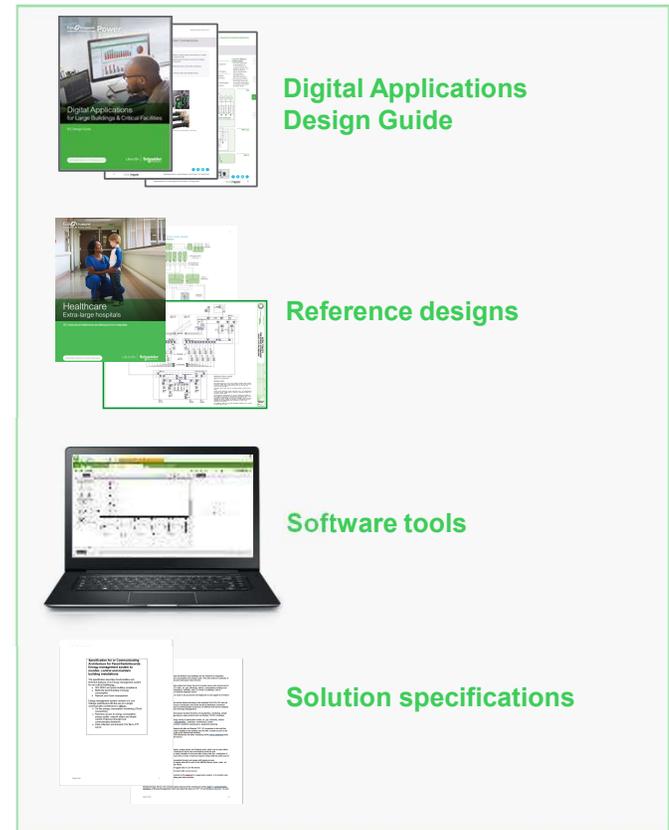


Healthcare design and construction is filled with complexity, with an array of services, many stakeholders and a high-regulated environment. EcoStruxure is more than a technology platform and helps connect people and technology to design and build healthcare facilities

- **Comply with standards:** Designing solutions that comply to IEC, NEMA and local standards while innovating and ready with a global network of experts in healthcare and infrastructure systems to support projects.
- **Specify and design efficiency:** Reference architectures with design recommendations for resilient hospital electrical infrastructure along with expert power system consulting for optimized electrical and digital system design.
- **Ensure high-quality project delivery:** Using proven tested reference designs to reduce risks and errors and enable on time and on budgets projects

[Explore Reference Designs and Architectures](#)

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# Solutions to enable Resiliency

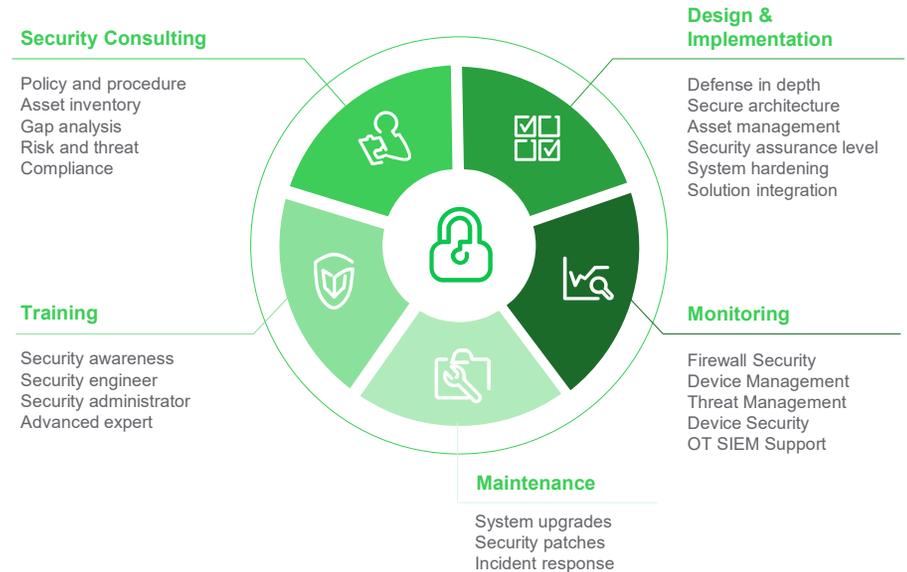
## Have Defense in Depth with Cybersecurity Services, Training & Patch Management



Schneider Electric applies a rigorous cybersecurity mindset, policies, and methodologies in the development of our products and the implementation of our solutions.

Skilled and certified professionals provide vendor-agnostic services to help assess risk, implement cyber specific solutions, and maintain defenses over time. The most critical cybersecurity solution elements are defined in four categories.

- **Permit:** Manage access to operations systems and information through network and physical controls.
- **Protect:** Implement specific controls as part of the operations systems for ongoing protection.
- **Detect:** Monitor the operating environment to detect and communicate threats.
- **Respond:** Develop procedures and systems to support rapid response to cyber incidents to contain and mitigate attacks.



[Explore Cyber Security Services](#)

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# Solutions to enable Sustainability

Move from data to action with Resource Advisor



[Resource Advisor](#) allows for efficient, enterprise-wide collection of facility data and gives it the active context required for improved decision-making

- **Resource insight:** Analyze and capture enterprise-wide data from 400+ streams impacting supply, demand, and sustainability in a centralized location to create a single, accurate, and verified data repository.
- **Actionable reporting:** Add a real dimension to raw data that empowers confident decision-making and inspires clear, concise action on plans and projects.
- **User community:** Resource Advisor helps you to enhance collaboration on resource and efficiency initiatives across your portfolio and business stakeholders.
- **System interoperability:** Resource Advisor integrates seamlessly to complement your existing systems.
- **Solution scalability:** Resource Advisor configures to your organization's needs today and is designed to evolve with your critical energy and sustainability challenges tomorrow, wherever they are — in any country, region, or around the globe.



Optimize energy procurement to identify errors and manage risk

Identify and track energy efficiency projects



Streamline sustainability reporting with one source of truth



[Explore Resource Advisor](#)

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# Solutions to enable Sustainability

Protect your environment with Environment friendly & Energy Efficient equipment



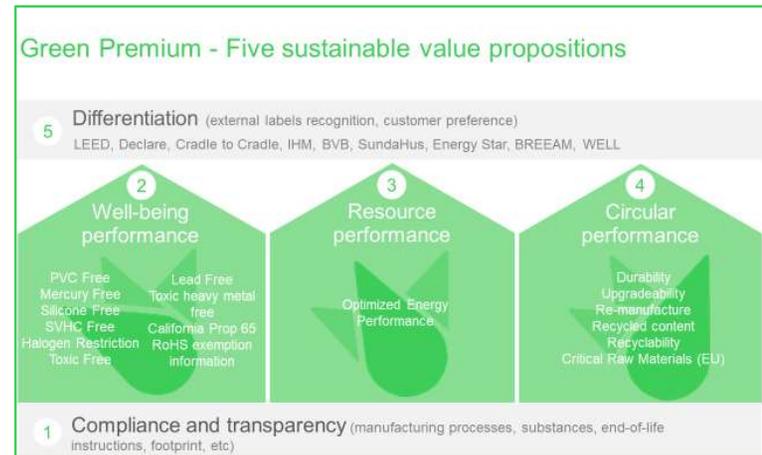
## As Healthcare staff, you are looking at:

- Preventing health issues for your community
- Protecting your organization financial health
- Reducing your footprint on the environment

The Green Premium database is a unique & transparent way to get access to all this information.

Evolving technology helps us develop more energy efficient products & equipment including:

- [Galaxy UPS](#) with EConversion mode, providing 99% efficiency
- [Trihal EcoDesign](#) Tier 2, providing an 18 months ROI when replacing old transformers
- [SMAirSet](#), the new MV cell where SF6 a highly potent GHG is replaced by pure air



[Explore Green Premium](#)

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# Solutions to enable Sustainability

## Maximize renewable energy with Microgrids

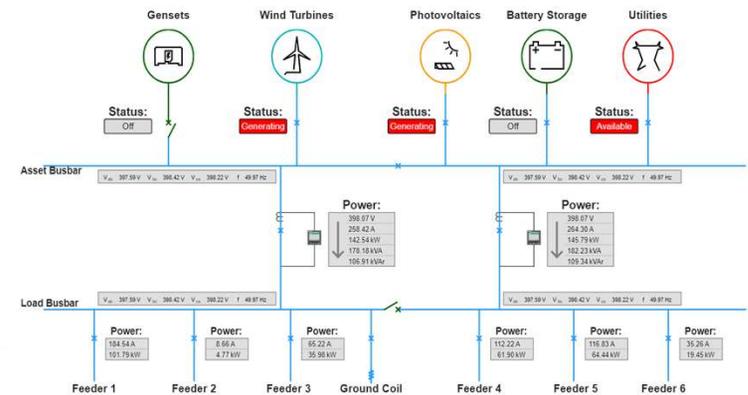


Managing the electrical infrastructure gets more complex with the integration of distributed energy resources. This requires more and more supervision, control and analytics to help facility teams to manage this complexity.

The microgrid solution integrates data from [PowerLogic](#) metering to provide inputs into optimal energy usage, [Easergy](#), [MasterPact](#) and other LV circuit breakers to provide protection and control to manage power supply.

Microgrid control is orchestrated by the [EcoStruxure Microgrid Operation](#) controller with supervision with [EcoStruxure Power Operation](#).

Additionally, microgrid optimization leverages analytics with the cloud-hosted [EcoStruxure Microgrid Advisor](#).



Explore EcoStruxure Microgrid Operation

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# Offer Appendix

**Energy & Sustainability Services**

**EcoStruxure Security Expert** (Coming soon)

**EcoStruxure IT Advisor** (Coming soon)

# Solutions to enable Sustainability

Framework to advance energy and sustainability strategy



At Schneider Electric we establish long-term partnerships to help our clients design an energy management strategy that delivers efficiency and sustains results over time.

## Digitization and Analytics

- Enterprise data management
- Onsite/remote measurement
- Standards reporting
- Analytics & benchmarking

## Sustainability Ambition

- Corporate commitments
- Decarbonization strategies
- Scope 1,2,3 optimization
- Financial enablement
- Incorporation

## Value Focused Resourcing

- Traditional energy sourcing
- Renewable energy sourcing
- Microgrid & onsite solutions
- Risk management

## Resource Efficient Operations

- Energy efficiency
- Carbon footprint reduction
- Process optimization
- Facility Modernization



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