In collaboration with

24/7

Schneider Learning Series

Digitizing Insight and Analytics – the Future Of Hospitals

1st October 2020

Life Is On Schneider Electric

bekerjasama dengan

24/7

Schneider Learning Series

Inovasi Teknologi Untuk Meningkatkan Resiliensi Di Rumah Sakit

1st October 2020

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Mega Trends In Healthcare

Aging Population

With the 60+ year old population expected to double by 2050, the patient population will also surge

Educated and demanding consumer

More than 50% of healthcare executives say patient satisfaction is a “top 5” concern

Staff shortages

(front line care and back off facilities)

The world will be short of 12.9 million health-care workers by 2035 - WHO

Digital Technology

Leveraging IoT is becoming standard practice in the healthcare industry

Challenging funding

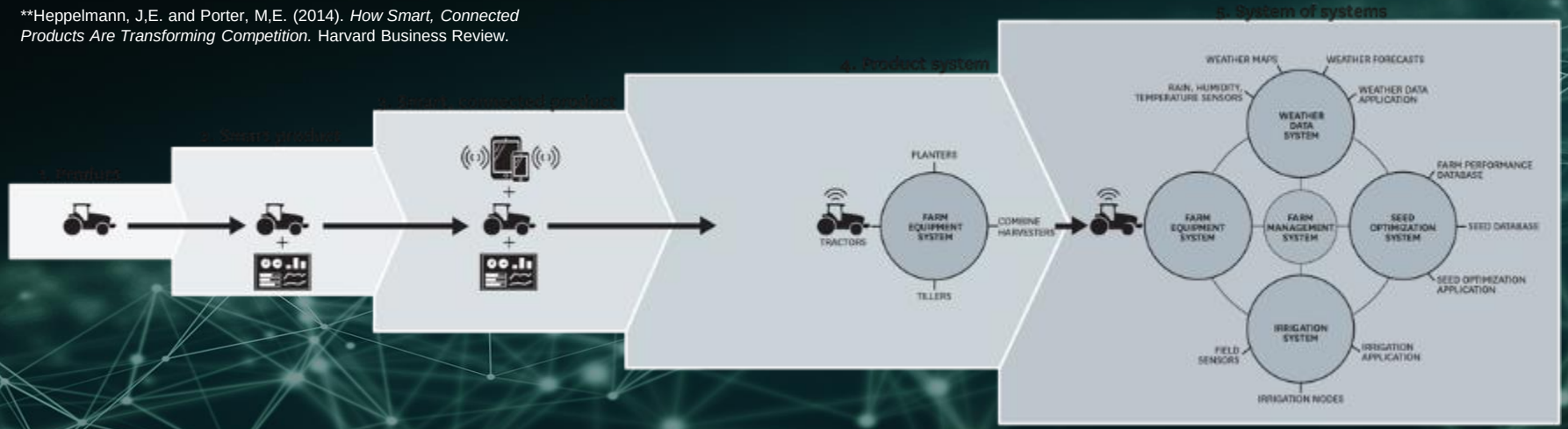
(private and public)

The traditional approaches for the construction of healthcare facilities are being challenged with new delivery models

Mega Trends In Healthcare

Digitization & IoT Transformation

**Heppelmann, J,E. and Porter, M,E. (2014). *How Smart, Connected Products Are Transforming Competition.* Harvard Business Review.




Windows 1.0 (1985)


Windows 3.1 (1992)


Windows 95 (1995)


Windows XP (2001)


Windows Vista (2006)


Windows 7 (2009)


Windows 8 (2012)

Windows 10 (2015)

Safe and Resilient Healthcare Facilities

Considerations during design and operations

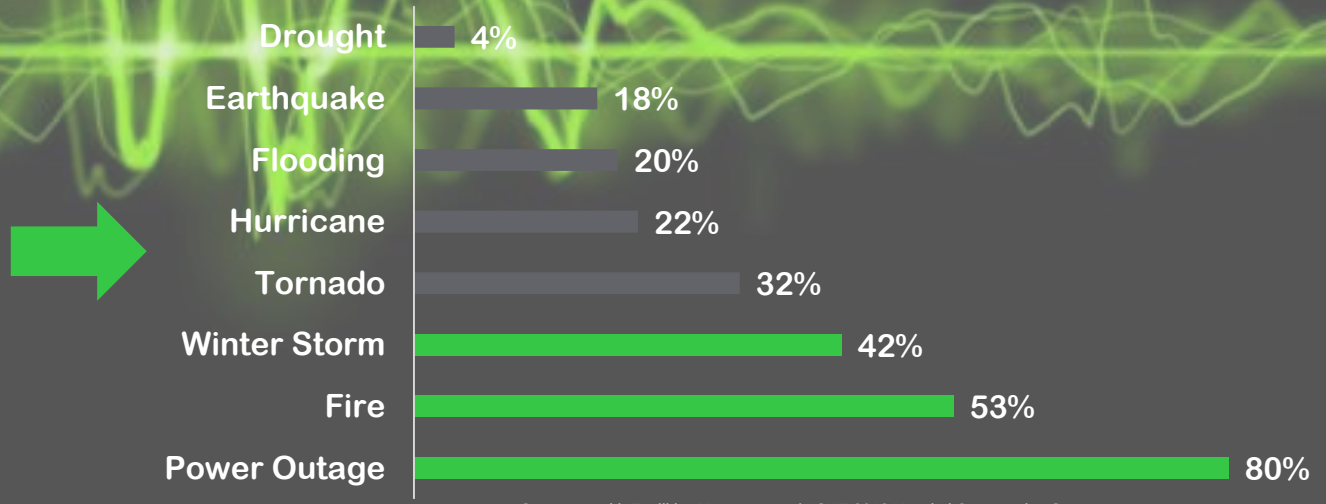
Continuity of Services

Pandemic Approach

1. Is power outage the biggest concern?

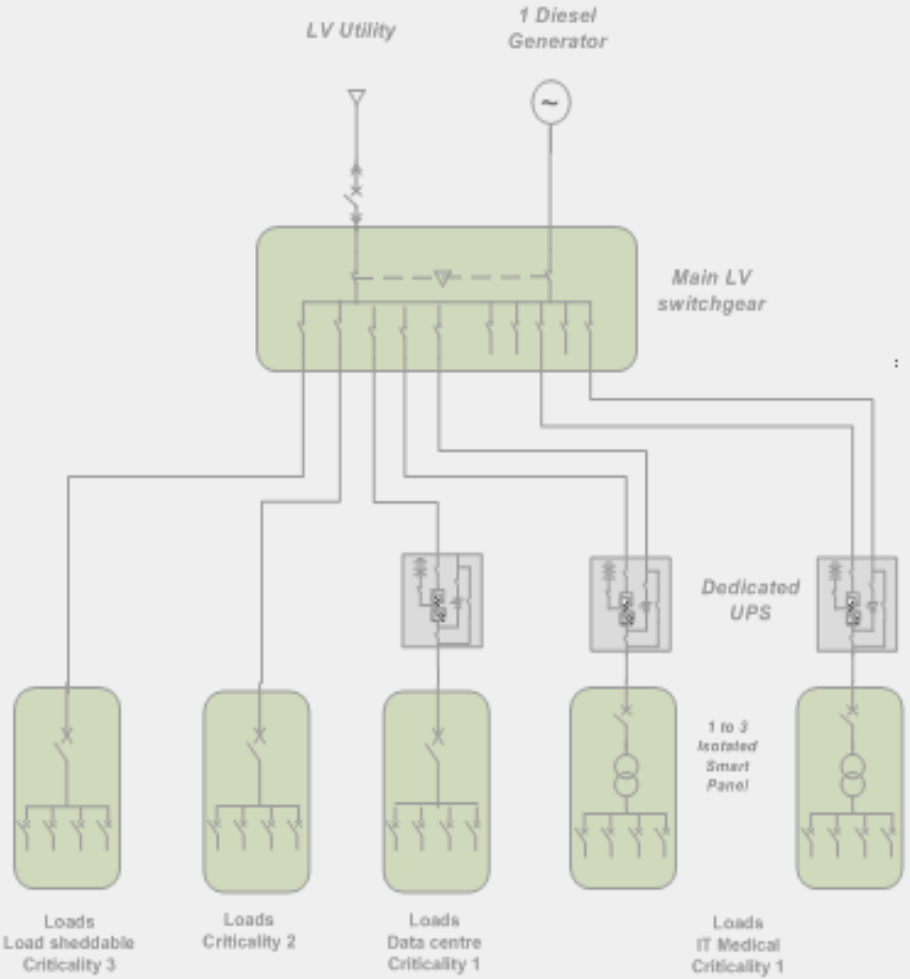
66% of USA hospitals experienced a **power outage** in the last 36 months, with **12%** having to **close or relocate** patients[1]

Priorities' when designing and building resiliency



Source: Health Facilities Management / ASHE 2018 Hospital Construction Survey

2. Impact of an outage



10 Things to consider

1 What are the core services that are needed to operate the hospital?

- Select life safety and essential areas to be covered by backup systems
- Design UPS on life support machines in areas of high dependency

2 How quick do you need to restore power?

- IEC requires less than 0.5 seconds
- NEMA within 10 seconds

10 Things to consider

3 How long do you need to operate as an ‘island’?

- Requirements normally recommend 48 to 96 hours
- New Royal Adelaide Hospital in Australia has enough fuel and water supply to operate for 7 days
- Facilities in the USA are designing facilities with 18 day capacity with full-power operations off the grid

4 Can you utilize renewable for energy and storage?

- Puerto Rico are building remote clinics with 100% capacity from sustainable sources (solar)
- Solar and energy storage complement backup systems
- Microgrids offer resilience, redundancy and sustainability

10 Things to consider

5 Locate critical infrastructure services away from flood risk areas – the basement!

- Texas suffered issues with clean water due to flooding of basement pump rooms during Harvey
- Design fuel tanks and MV/LV equipment on second floor to reduce risk of water damage – equipment that can operate in harsh environments
- Rehab clinic in Boston, MA has the first floor raised above the 500 year old flood elevation in preparation for future rises in water levels

6 Fire's are commonly caused from electrical faults

- Monitoring of bus bars for thermal temperatures and loading of circuits
- Evacuation is the last resort, defend in place
- Fire sprinkle and suppression system

10 Things to consider

7 The data center is a critical infrastructure

- Communications with other facilities is necessary to coordinate patients and services
- Access to patient health records is essential to prescribe the right treatment
- Cloud vs edge data center – disaster ready data bunkers

8 Thermal issues with arise in warm humid conditions

- Cooling will become critical for patient safety
- Essential to protect medical supplies

10 Things to consider

9 Test, test and check

- Most common reason for the generator not starting is due to batteries – check their health and functionality
- 2 day warning for Hurricane Harvey, this is not enough time to run through all the safety checks - automate some of the checks
- Condition based and preventable maintenance regimes to focus on high risk areas

10 Training and expertise with remote guidance

- Training and upskill local teams on how to respond
- Remote monitoring to support on site teams. UMRC NY avoid a transformer explosion with remote diagnostics

Conclusion

Resilience:

An organization's ability to cope with situations with minimal losses.

Dependability:

A system's capability to fulfil all operational performance requirements, involving the concepts of reliability, maintainability and availability

No man is an island unto himself and nor is a building, the infrastructure serving the hospital is just as critical

Transformation to digital hospitals

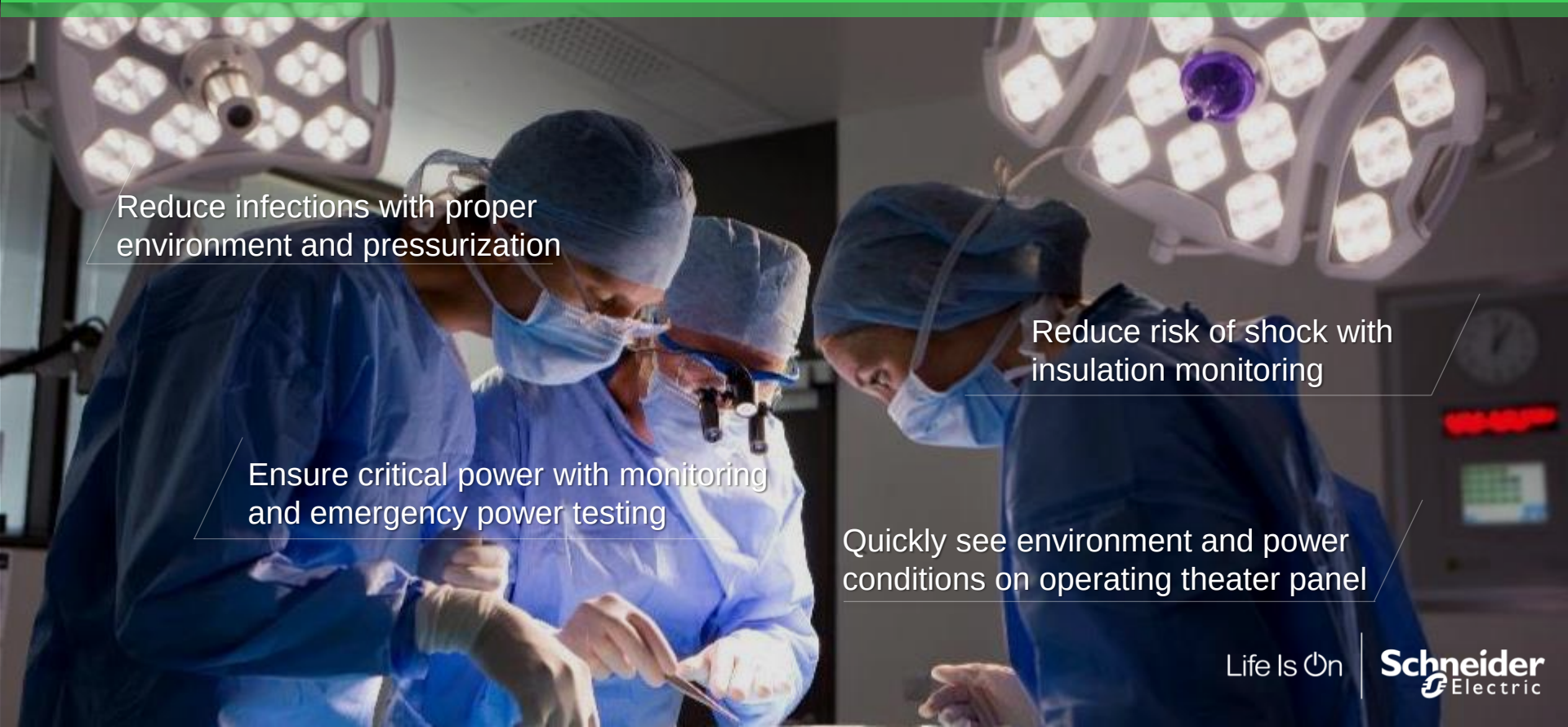
Need the right information to the right person, anytime, anywhere

Patient safety

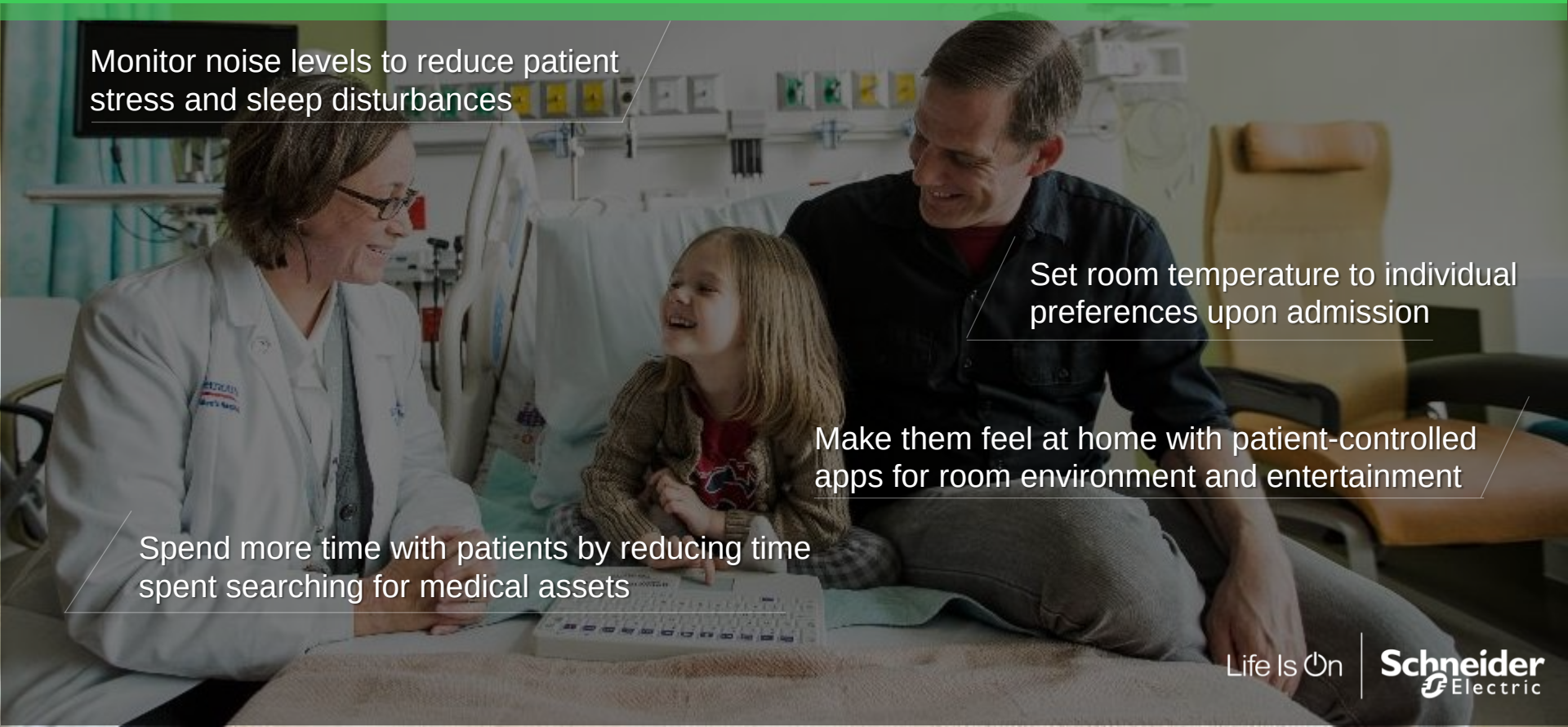
Patient experience

Operational efficiency

Ensure patient safety



Boost patient satisfaction



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Improve operational efficiency

Protect patient care and clinical communication with data center uptime

Reduce operating costs with management of traditional and sustainable energy

Avoid costly equipment downtime or even catastrophic failure with predictive analytics

Improve patient flow and staff productivity with real-time location system data

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…and more sustainable

Electricity consumption

60%
in buildings

- Self-generation
- Source management
- Electrical reliability
- Energy efficiency

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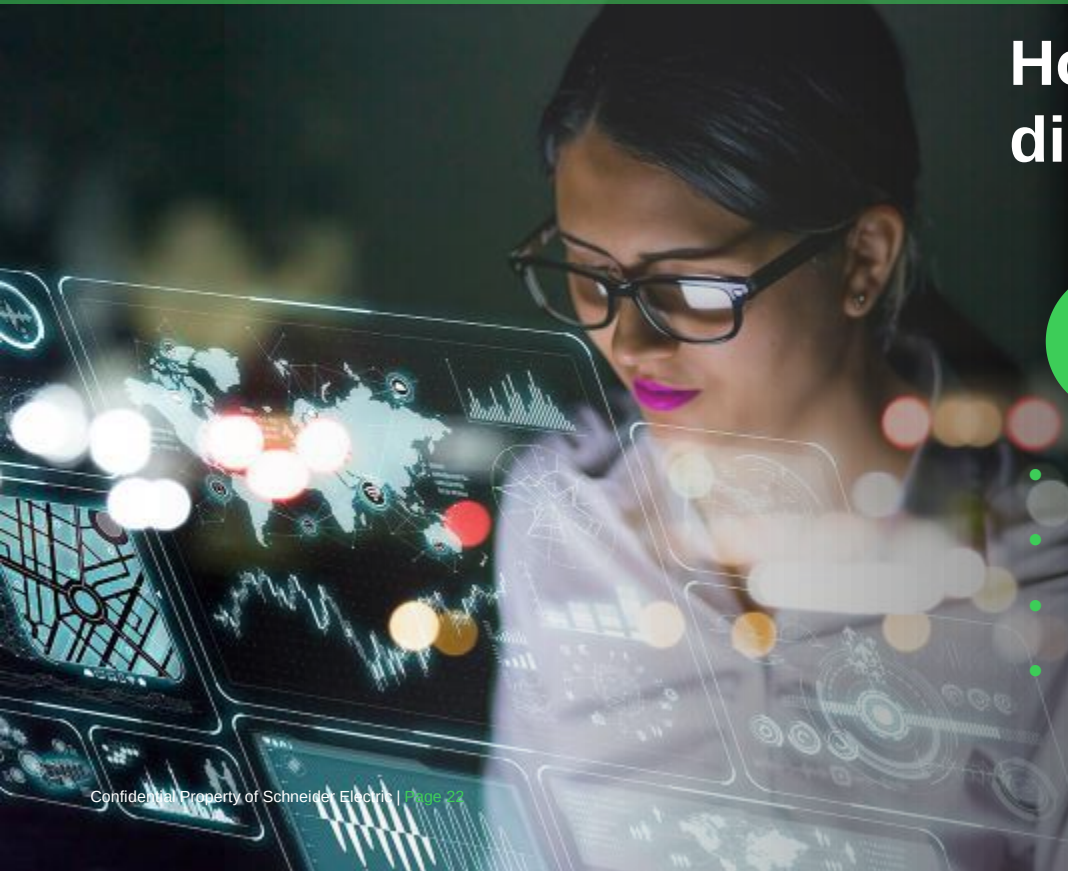
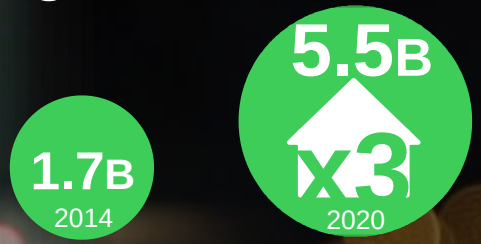
A new way of thinking is required
for hospital of the future

Hospitals need to become more connected…



Hospital infrastructure digitization



- Gathering data from many sources
- Structuring data
- Interpreting data with AI and analytics
- Using insights to solve real-world problems

EcoStruxure for Healthcare

- Connected System
- Data Collection
- Analysis
- Operation

EcoStruxure Building

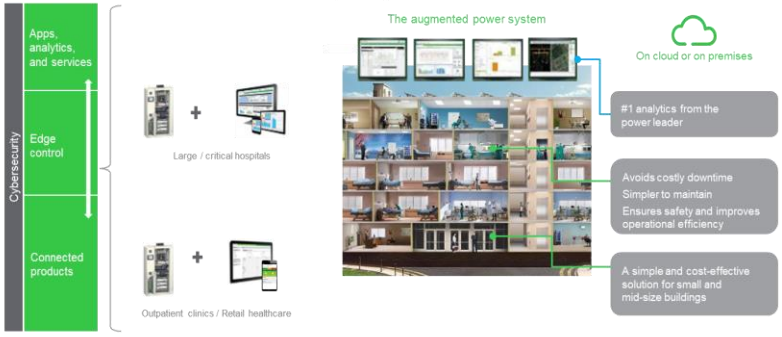
Innovation At Every Level

One global IP building management system platform harnessing the BIoT for buildings of the future

EcoStruxure Power

Innovation At Every Level

Power distribution redefined



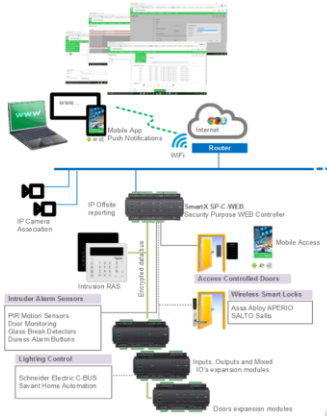
EcoStruxure Security

Innovation At Every Level

SmartX SP-C-WEB
Web Control Solution

Standalone, small buildings security

- User Experience:
  - Browser based, PC, Mobile devices
  - Mobile App delivers remote connectivity
  - Mobile ID for access control
- System Scale:
  - SP-C-WEB single controller set-up
  - 32 Doors, 32 Alarm Zones
  - 10,000 Users
  - 50,000 Events Reporting capacity
- Integrations:
  - Wireless locks APERIO, SALTO
  - Schneider Electric C-Bus lighting controls



EcoStruxure for Healthcare (Secure Power)

- Utilities Availability & Quality
- Operational Backup
- Data Storage

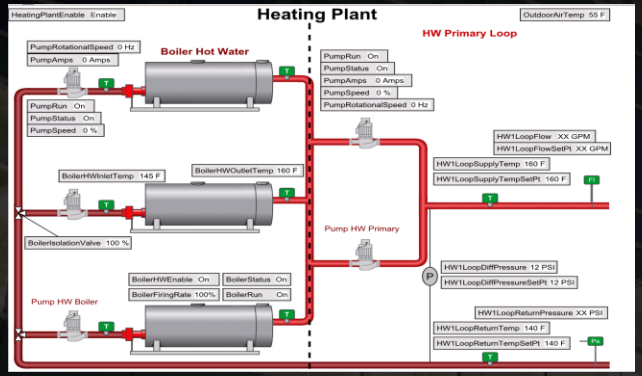
Uninterruptable Power Supply, UPS

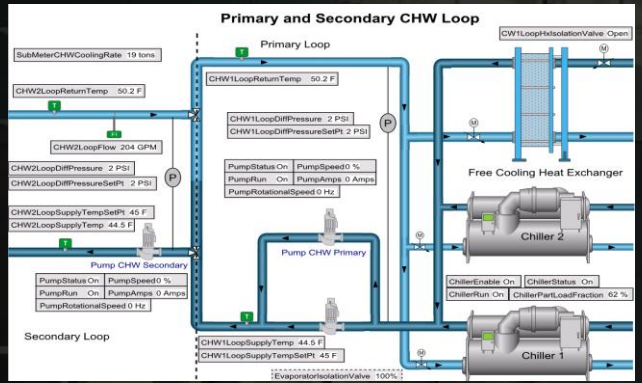
Cooling

Racks & Prefabs

Connecting Assets, Leveraging Data and Reducing energy

Connecting Assets





Polling & Distribution

5 minutes

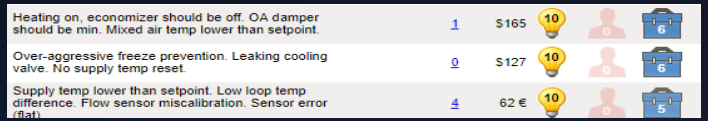
Cloud Analytics

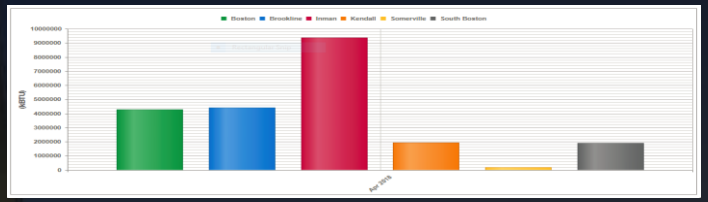
Desktop

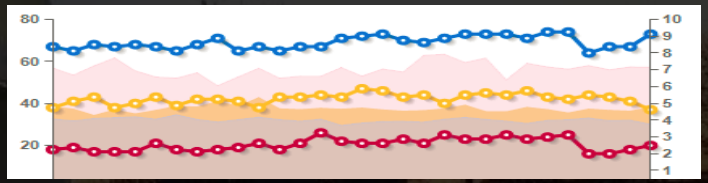
Mobile

Worldwide

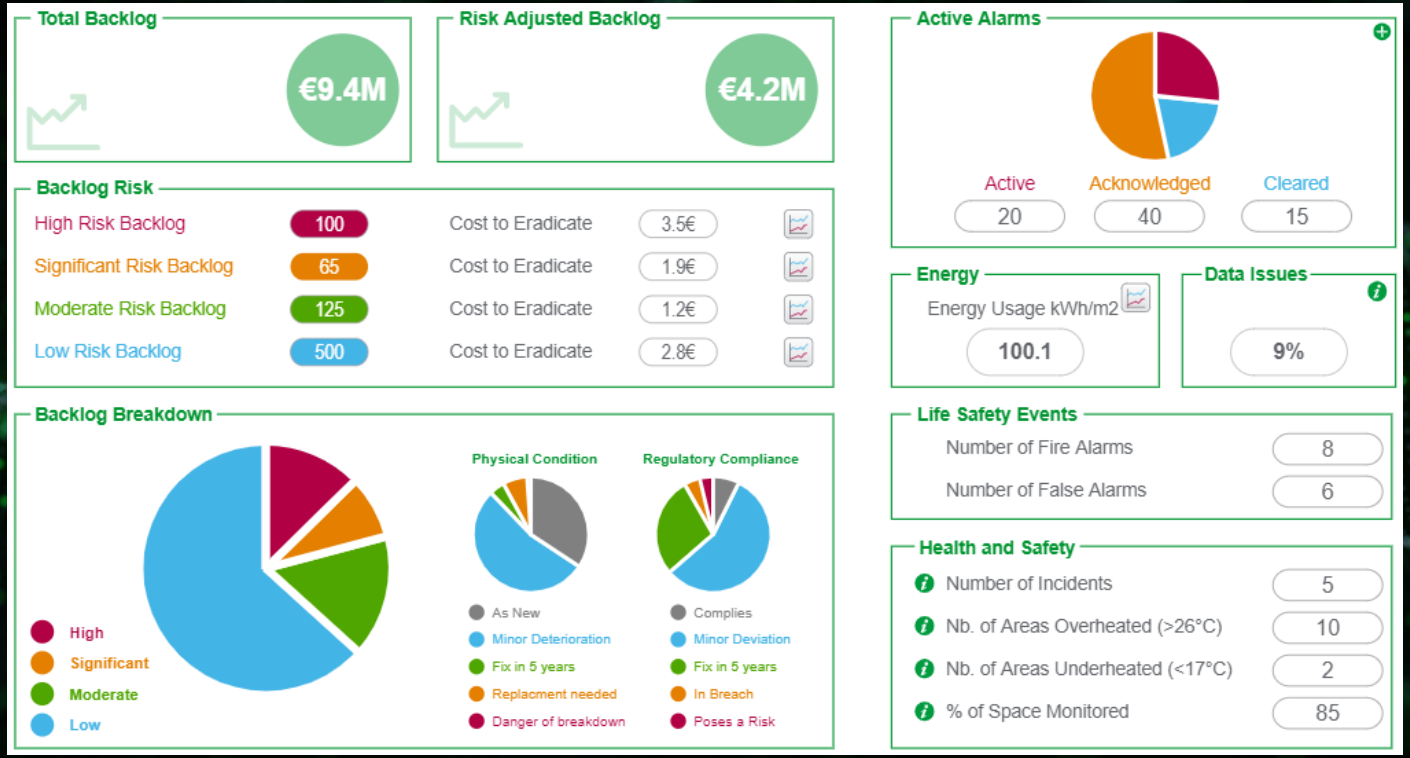
Leveraging Data





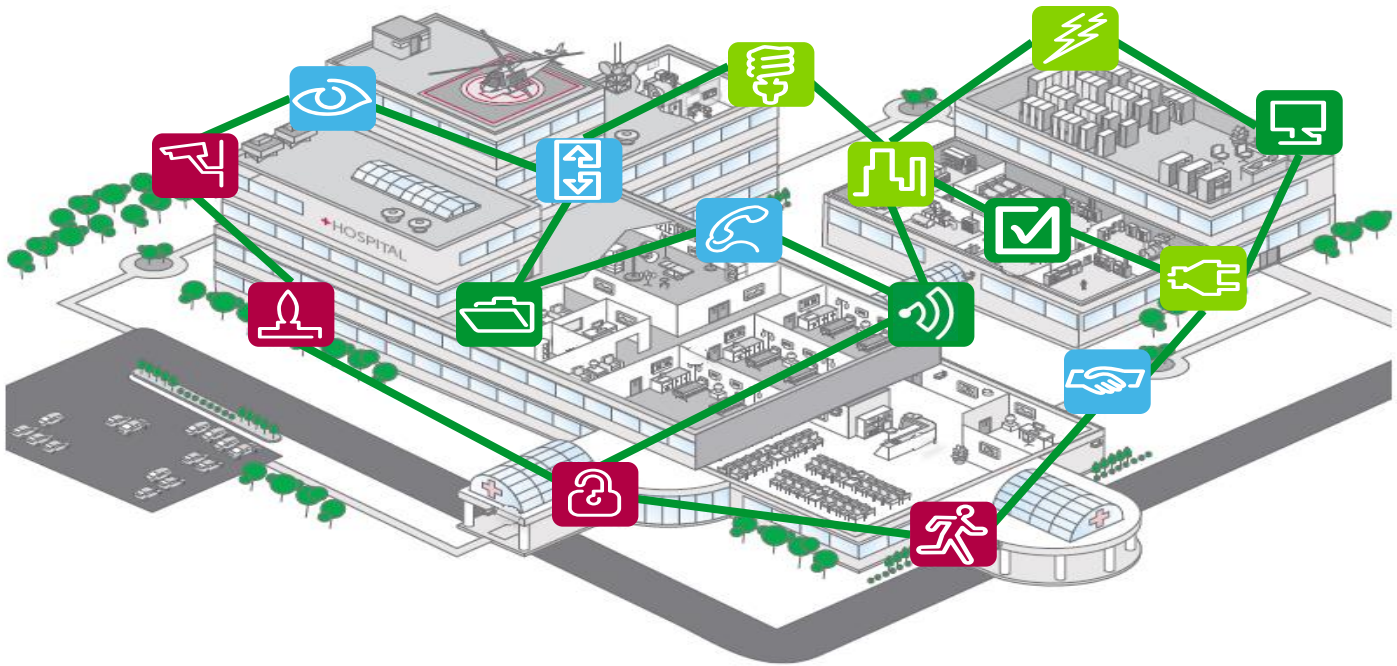


Example Facility Dashboard



Example Hospital Operations Dashboard

Integrated and Interoperable Infrastructure Approach



- Common Network Infrastructure
- Common User Interface Platform for ease of use and staff training
- Greater overall reliability
- Reduce capital & life cycle costs
- Improved Energy Efficiency
- Improved Patient Care
- Improved Staff Efficiency

Biometrics
Clinical
Elevator
Intercom
RTLS
Regulatory
Critical Power
Visitor Man

Fire Safety
CCTV
Lighting
Access Control
Energy
Intrusion Detection
BMS
White Space Management

Gain and Edge on your Competition

Power Monitoring Expert brings edge control to power distribution

Apps, Analytics & Services

Edge Control

Connected Products

Safe

Protect People and Assets

Reliable

Optimize Business continuity

Efficient

Maximize Lifecycle Efficiency

Compliant

Simplify Regulatory Compliance

Value Propositions

End User Value

Digitized Electrical Distribution Network

PME Helps Facilities Be More

SAFE

Protect People & Assets

- Avoid electrical fires
- Prevent electrical shock and ensure protection
- Recover from an outage and restore power safely

RELIABLE

Optimize Business Continuity

- Avoid disruption of business by preventing failure of Electrical Distribution
- Increase Electrical Asset & System Reliability and Lifetime

EFFICIENT

Maximize Lifecycle Efficiency

- Save money in design & deployment
- Save money by reducing energy spend
- Save money by optimizing maintenance

COMPLIANT

Simplify Regulatory Compliance

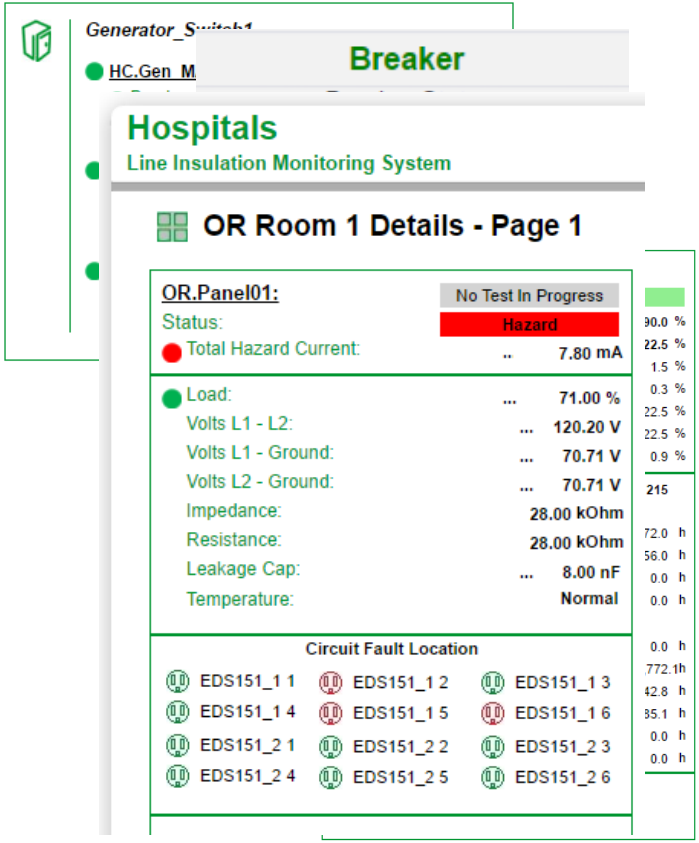
- Demonstrate commitment to sustainability
- Maintain compliance obligations

Safe

Protect people and assets

Keeping track of key electrical and operational parameters in your power network

- Ensuring proper breaker operation and fault isolation avoiding safety hazards
- Detecting abnormal conditions (e.g Temperature) that represent a risk to operations.
- Operate breakers remotely to minimize exposure to arc-flash risk
- Monitor and locate circuit insulation faults (e.g protect patient safety during operations)

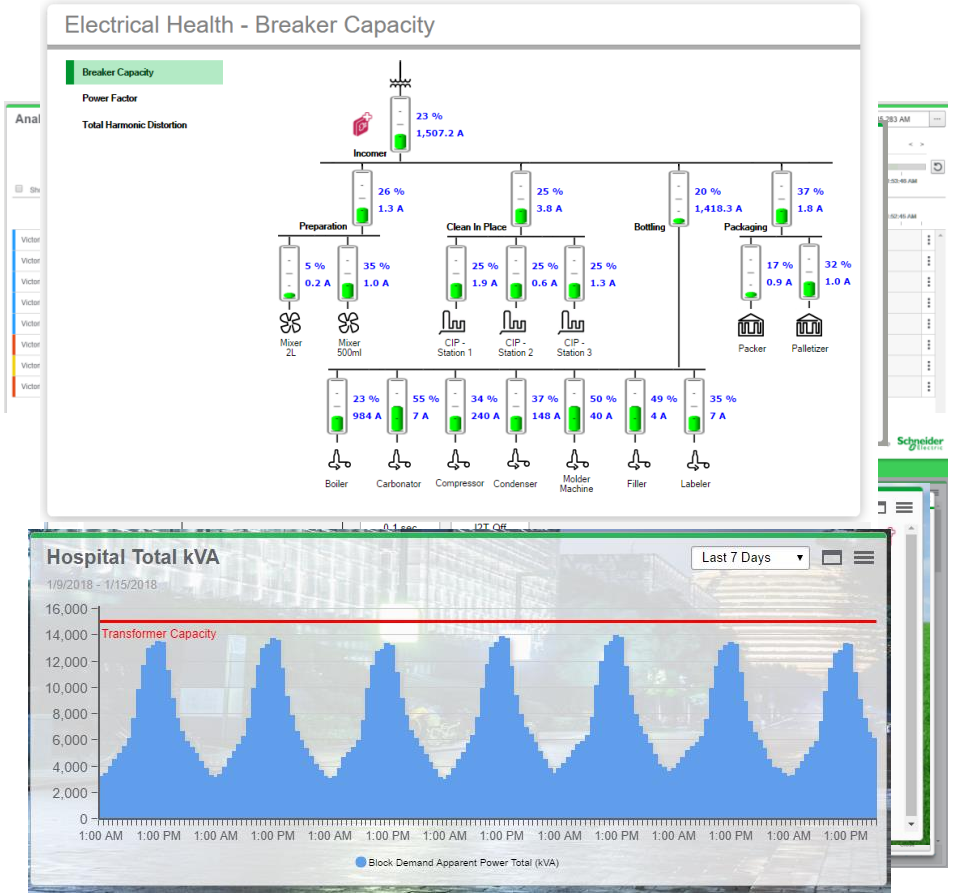


Reliable

Optimize business continuity

Simplified details of power distribution system are provided for facility people to ensure reliable operations:

- Understand the cause of events affecting your electrical system
- Identify patterns for power events to avoid or mitigate future occurrences
- Monitor protection settings to ensure proper isolation of faults to avoid system wide outages
- Track system capacity to avoid overloads and make sure backup power system is able to handle loads in case of an outage



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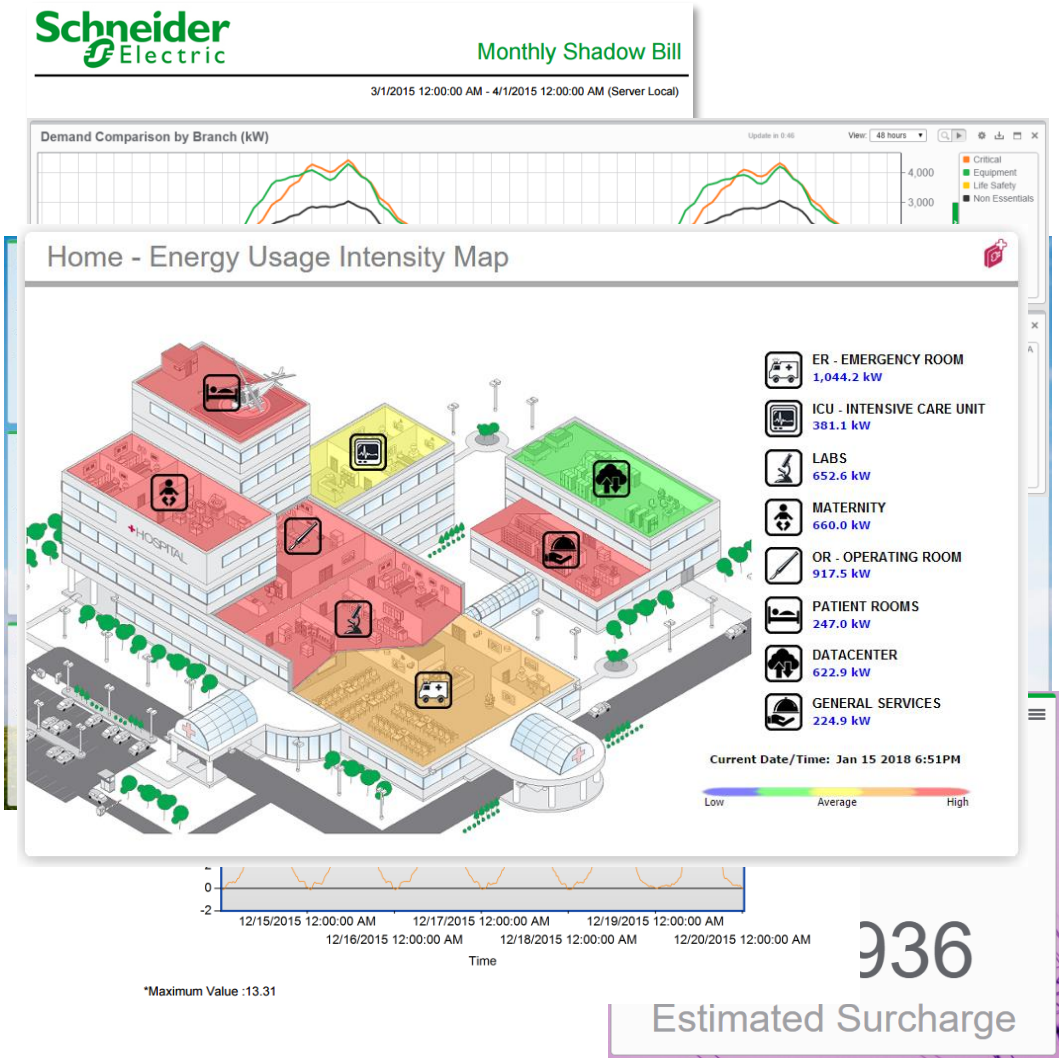
Efficient

Maximize lifecycle efficiency

Easy to deploy and maintain. Empowers users to actively improve efficiency by revealing opportunities and verifying savings

- Provide visibility to abnormal usage of energy and other utilities (WAGES)
- Avoid penalties and billing discrepancies due to peak demand, power factor and errors in utility bills
- Participate in demand response programs
- Create accountability by allocating costs to departments or processes

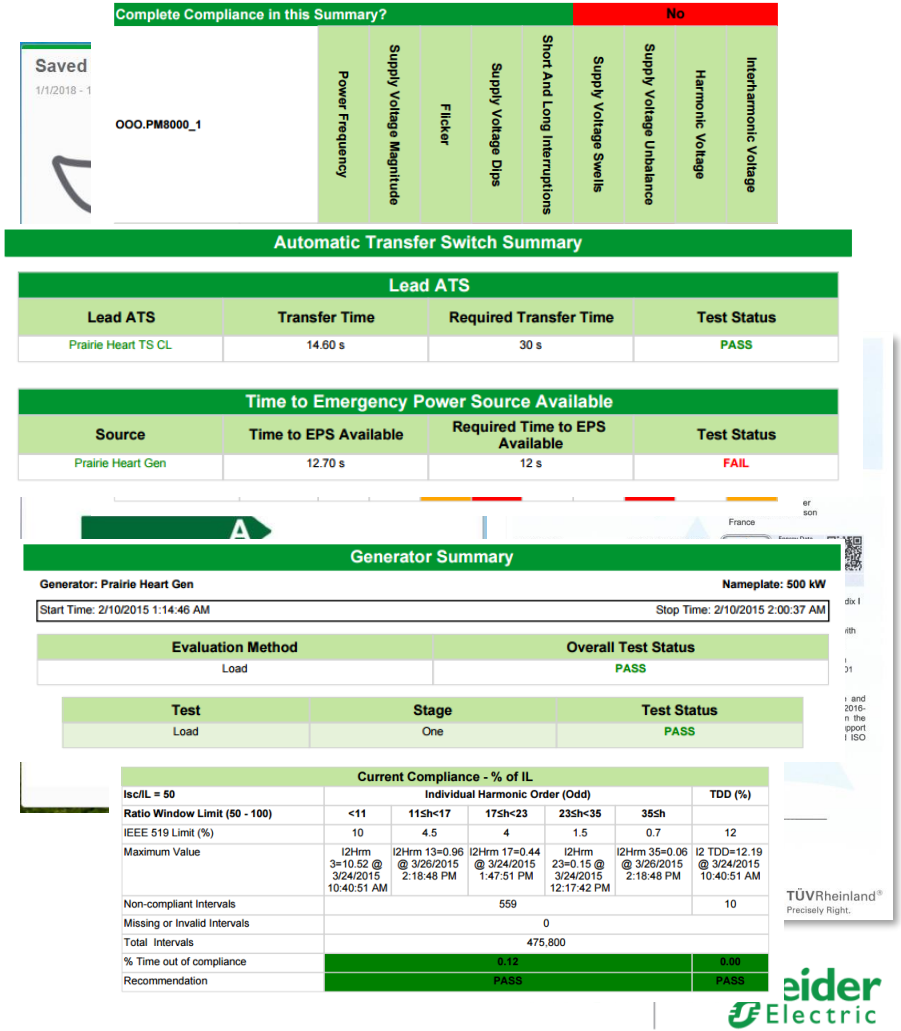


Compliant

Simplify regulatory compliance

The system enables regulatory compliance with common standards relevant to the operation of critical facilities

- Monitoring and reporting tools for energy efficiency and green building standards (ISO 50001, ISO 50002, ISO 50006, SEP, LEED, NABERS, etc)
- Verify utility/grid service and internal compliance to power quality standards (EN50160, IEEE519, ITIC, etc)
- Ensure regulatory compliance with backup power system testing in healthcare facilities (NFPA110 and others)



Complete Compliance in this Summary?										No
	Power Frequency	Supply Voltage Magnitude	Flicker	Supply Voltage Dips	Short And Long Interruptions	Supply Voltage Swells	Supply Voltage Unbalance	Harmonic Voltage	Interharmonic Voltage	
OOO.PM8000_1										

Automatic Transfer Switch Summary

Lead ATS

Lead ATS	Transfer Time	Required Transfer Time	Test Status
Prairie Heart TS CL	14.60 s	30 s	PASS

Time to Emergency Power Source Available

Source	Time to EPS Available	Required Time to EPS Available	Test Status
Prairie Heart Gen	12.70 s	12 s	FAIL

Generator Summary

Generator: Prairie Heart Gen — Nameplate: 500 kW

Start Time: 2/10/2015 1:14:46 AM — Stop Time: 2/10/2015 2:00:37 AM

Evaluation Method	Overall Test Status
Load	PASS

Test	Stage	Test Status
Load	One	PASS

Current Compliance - % of IL

Isc/IL = 50	Individual Harmonic Order (Odd)					TDD (%)
Ratio Window Limit (50 - 100)	<11	11≤h<17	17≤h<23	23≤h<35	35≤h	
IEEE 519 Limit (%)	10	4.5	4	1.5	0.7	12
Maximum Value	I2Hrm 3=10.52 @ 3/24/2015 10:40:51 AM	I2Hrm 13=0.96 @ 3/26/2015 2:18:48 PM	I2Hrm 17=0.44 @ 3/24/2015 1:47:51 PM	I2Hrm 23=0.15 @ 3/24/2015 12:17:42 PM	I2Hrm 35=0.06 @ 3/26/2015 2:18:48 PM	I2 TDD=12.19 @ 3/24/2015 10:40:51 AM
Non-compliant Intervals	559					10
Missing or Invalid Intervals	0					
Total Intervals	475,800					
% Time out of compliance	0.12					0.00
Recommendation	PASS					PASS

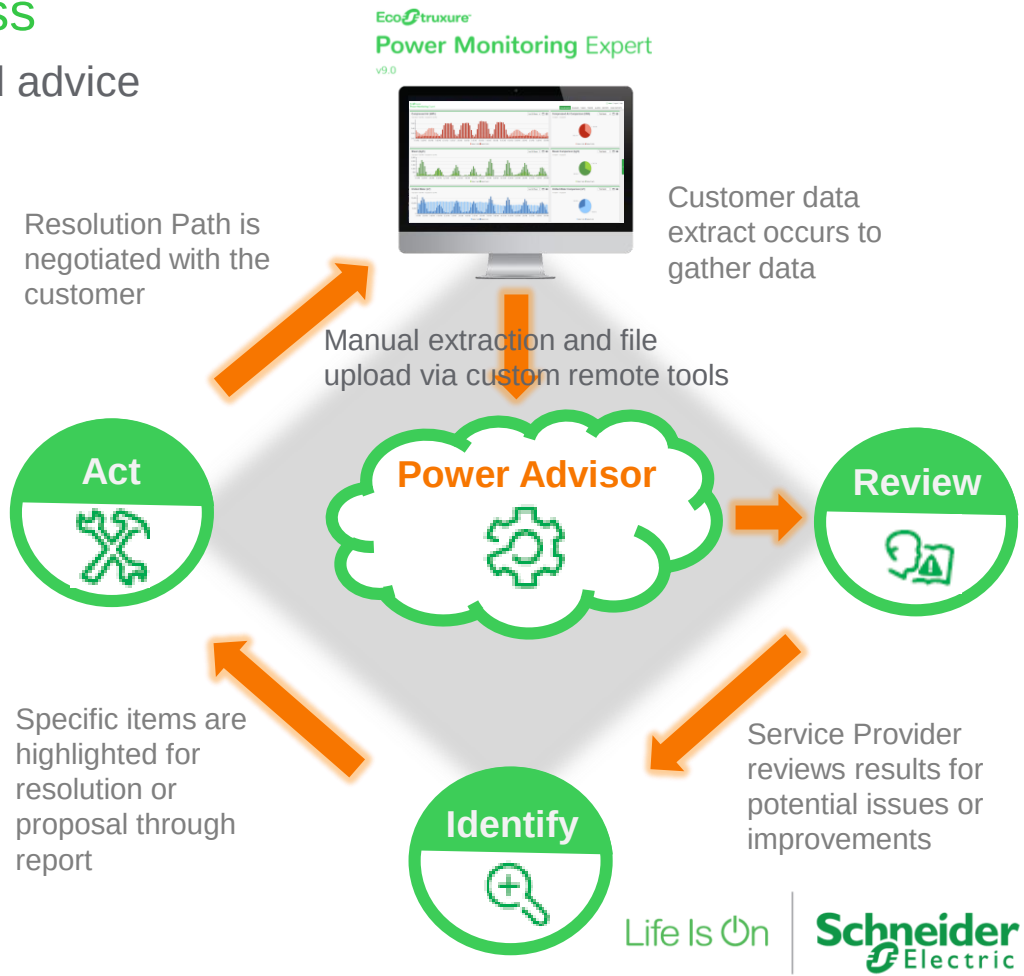
EcoStruxure Power Advisor Process

How customer information becomes trusted advice

1. **Review** all of the data obtained on the customer system for analysis

2. **Identify** problem points generated by the report

3. **Act** with the customer to provide a recommended solution and system improvement



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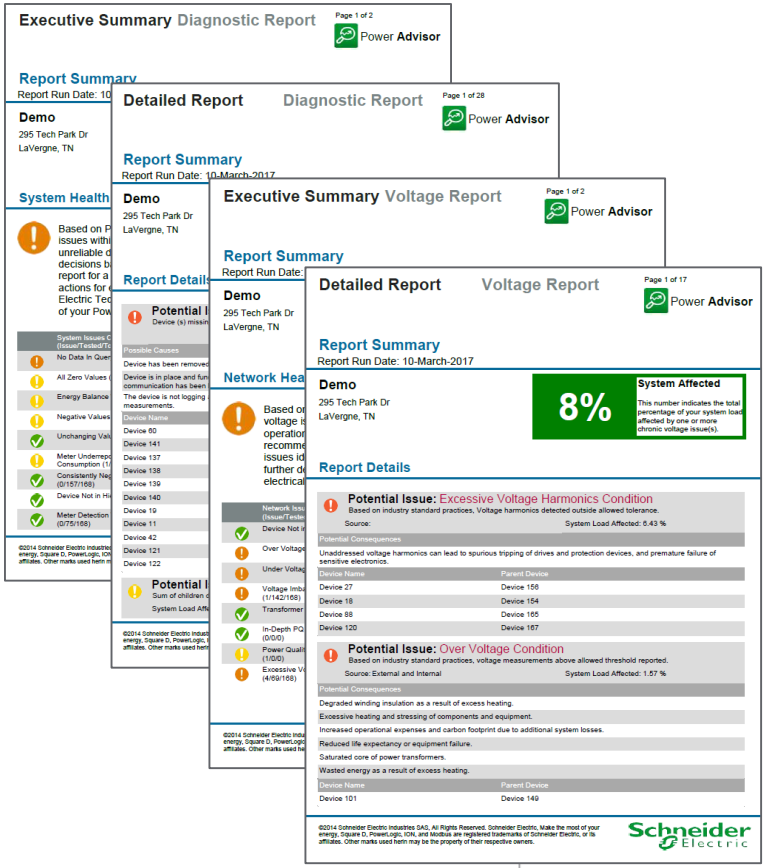
EcoStruxure Power Advisor

Introduction and Core Benefits

- Cloud based analytics and service tool
- Provides in depth analysis and assessment relating to system and network diagnostics
- Identifies potential issues such as:
  - Data Quality Issues (Gaps, Zero Values, Mismatched Intervals)
  - Unmetered loads / Obsolete metering
  - Energy Balance violations / Meters under reporting
  - Chronic power quality issues (ex. Voltage imbalance, harmonics)
- When used in conjunction with on-site maintenance it ensures highly focused productivity for on-site maintenance from identification of a problem to clear resolution.
- All results produced with actionable Executive and Detailed Reports



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World-class digital hospitals

Need the right information to the right person, anytime, anywhere

Patient safety

Patient experience

Operational efficiency

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