

Digital Energy Landscape

Presented by Yann Ackermann



1

Changing Energy Landscape

2

What is an EPMS

3

Software Demonstration



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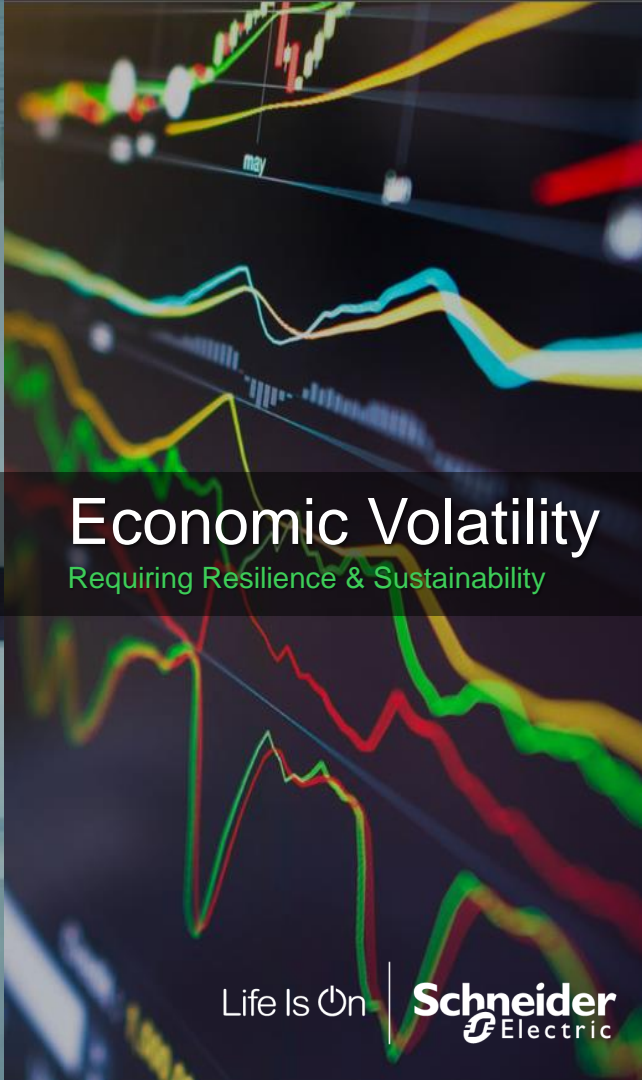
Climate events

Driving an energy transition



Global Health

Changing the way we work



Economic Volatility

Requiring Resilience & Sustainability

Life Is On

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The Energy Landscape is Changing



More Electrical Sources



More Electrical Loads



Electricity is a Must

50%

Renewable Generation by 2040 (BNEF)

30%

Electrical Vehicles of total stock by 2040
(BNEF)

+5000 TWH

Electric Heating by 2035 (IEA)

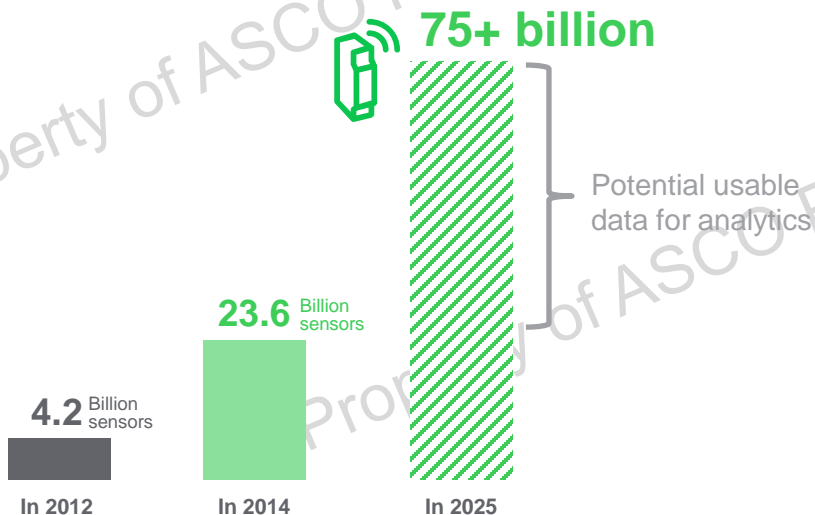
100%

Uptime expectation

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Meanwhile, we're experiencing new digital ways of working



75.44

billion connected devices by 2025.

Accenture

60-73%

of all data within an enterprise goes unused for analytics

Accenture

87%

of organizations with a sophisticated strategy and implementation of IoT see significant return on investment

2019 IoT Barometer

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Decarbonization is Growing in Importance to Our Customers

Net-zero commitments continue to rise, increasing pressure to act

140+

countries have proposed or committed to net-zero carbon emissions by 2050¹

63%

of Global Fortune 500 companies have emissions reduction targets²

96%

of companies with approved SBTi targets include Scope 3³

50%

of today's building stock will still be in use in 2050⁴

37%

buildings contribution to global GHG emissions⁴

¹ International Monetary Fund

² Fortune

³ SBTi Annual Progress Report, v 1.2 June 2022

⁴ IEA Energy Technology Perspectives, Note: When both the construction and use phases are taken into consideration, it contributes around 37% of today's global CO₂ emissions

Carbon Emissions in Buildings

~30%

Design & Build

Embodied carbon emissions relate to the building materials manufacturing, transport, installation, use, maintenance, and replacement / disposal.

~70%

Operate & Maintain

Operational carbon emissions relate to the energy consumed during the use phase of the building.

Energy Cost/Sustainability

Metering for a Sustainable Future

- New May 2023, great resource



1 in 5 of the largest 2000 publicly traded companies have committed to net zero emissions by 2050
~Harvard Business Review

51%

Commercial / industrial companies believe their business is becoming more dependent on clean, stable, reliable power

S&C Electric Company in collaboration with Frost & Sullivan
2020 State of Commercial & Industrial Power Reliability Report

30%

of global energy consumption comes from buildings and building construction sectors

IEA Topics
[Buildings](#)

15.8%

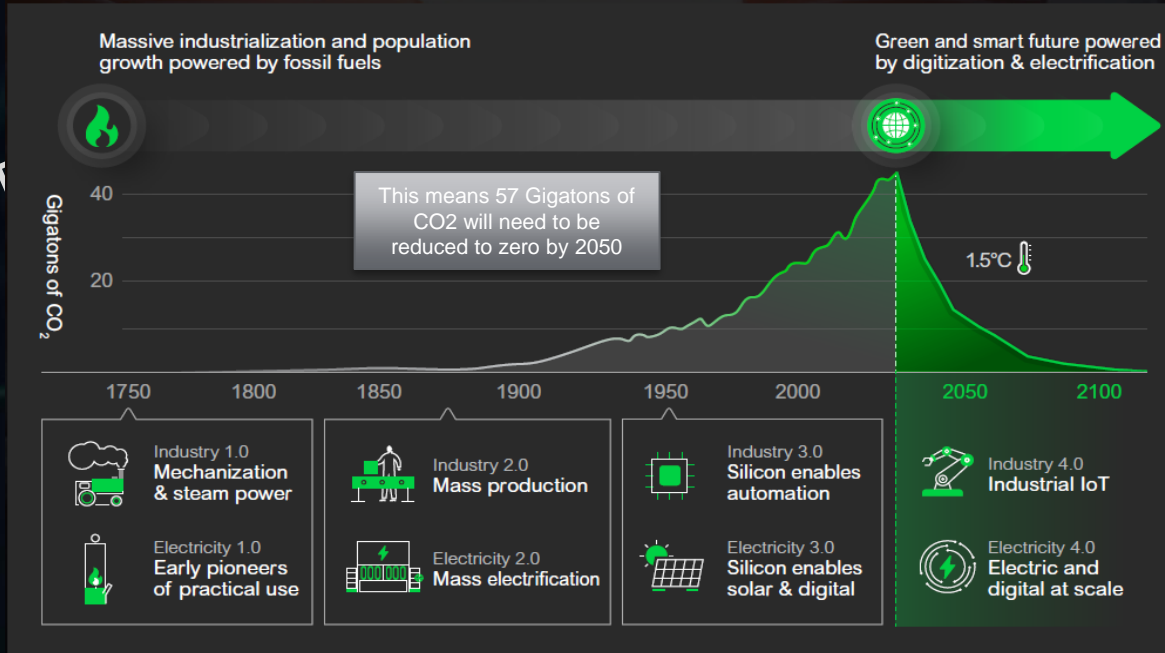
Increase in electricity price from 2021 to 2022

Bloomberg Article
[US Power Prices Rise Most in 41 Years as Inflation Endures](#)

50%

Final energy use is electricity by 2050 - up from 20% today

IEA Reports
[World Energy Outlook, 2021](#)



Decarbonize now or else...
New York (Law 97) & Boston (BERDO) have already implemented compliance requirements that will assess penalties by 2025 assessed

Our customers need solutions to their problems...

Safety

Nearly **25%** of non-residential fires are electrical in origin*

There are **5-10** arc flash events in the U.S. every day.*

Contact or exposure to electricity is the **sixth** leading cause of workplace fatalities.**

* NFPA – US Statistics

** Electrical Safety Foundation International (ESFI)

Downtime

Semiconductor:
up to 4.5M USD per event

Financial trading:
up to 7.1M USD per hour

Healthcare:
up to 1.2M USD per event

Data Centers:
up to 880K USD per event

Telecom:
up to 35K USD per minute

Steel works:
up to 410K USD per event

Glass industry:
up to 295K USD per event

Resilience

Power outages cost the US economy **\$100B** per year

Berkeley National Labs, Consequences of Power Quality – An Overview - 2011

Electrical interruptions caused by extreme weather have **doubled*** since 2003 in the US

At least 22 companies in Fortune 500 have announced plans to buy **100% renewable energy****

*<http://www.climatecentral.org/news/weather-related-blackouts-doubled-since-2003-report-11281>

** NY Times, 2018

Efficiency and Sustainability

Building owners report that green buildings - whether new or renovated - command a **7% increase** in asset value over traditional buildings

Dodge Analytics 2016

50% of solid waste in the United States is produced by the construction industry

World Economic Forum, The Boston Consulting Group

65% of surveyed Facility Managers observed payback of **2-5 years** for energy efficiency projects.*

FacilitiesNet.com

Energy Cost/Accuracy

\$123k

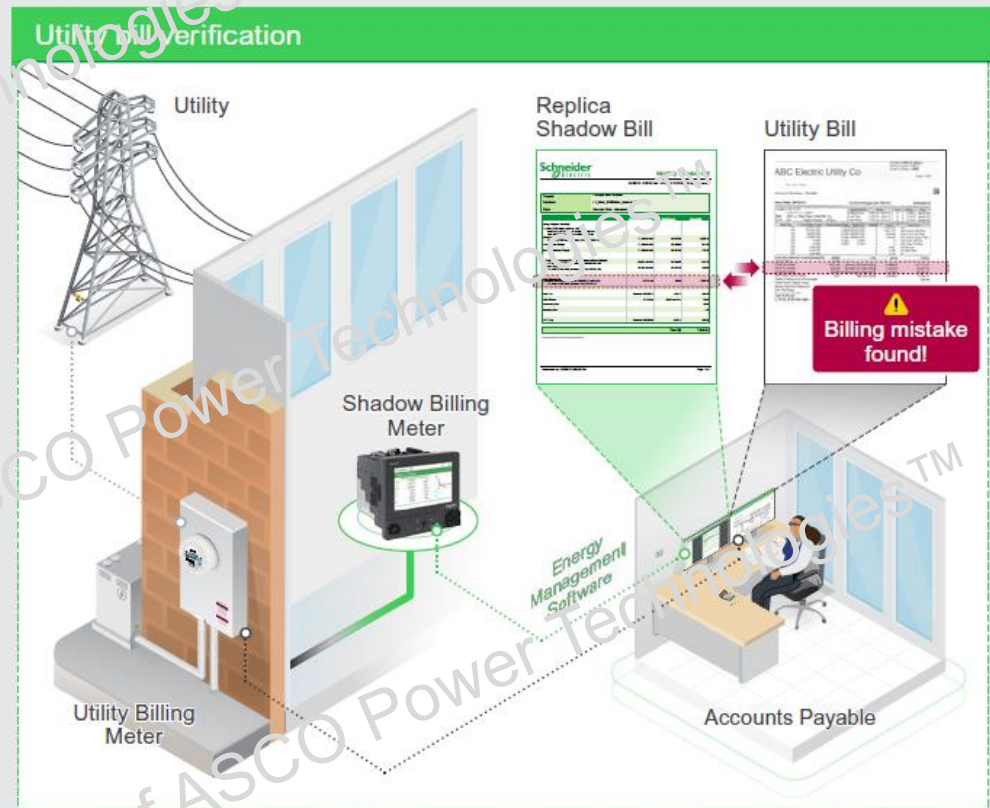
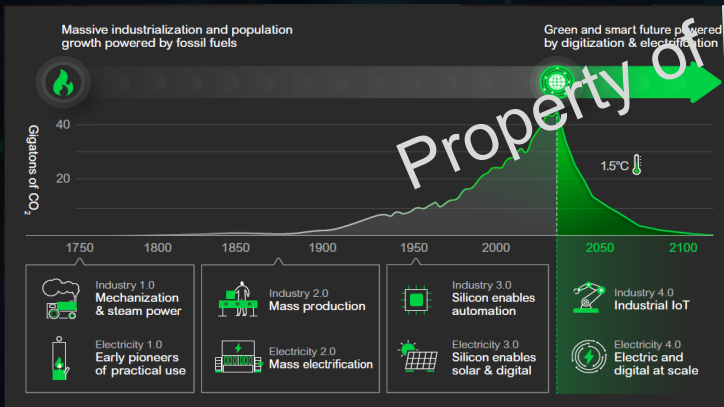
average cost of large-account billing errors

Wisconsin Public Service - Thousands of utility customer's wrongly billed

80%

of companies are overcharged on utility expenses.

National Utilities Refund



Reliability/Resiliency

20-30%

of backup power systems fail to start. Common causes include starter battery failure, low fuel levels, wet stacking, improper control settings.

Electric Power Research Institute (EPRI)

75%

of facilities have unrecognized power quality issues.

Results from a Schneider Electric study of more than 500 energy and power monitoring systems - 2017

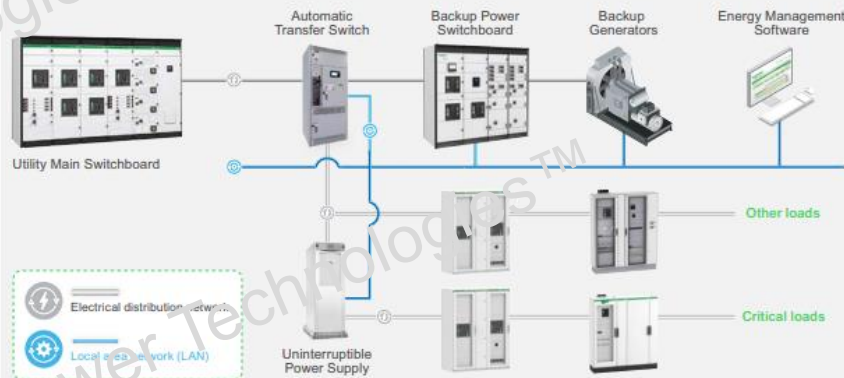
An overwhelming 82% of companies have experienced at least one unplanned downtime incident over the past three years. Most have suffered two or more.

-Forbes: "Unplanned Downtime Costs more than you think" Feb 2022

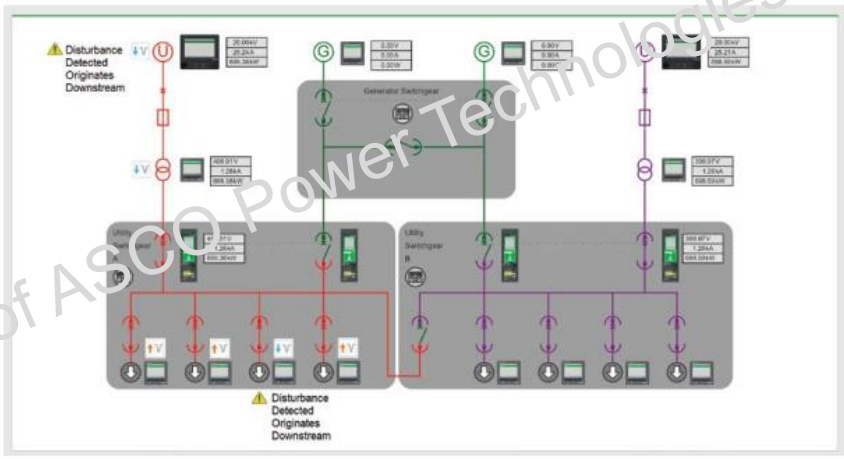
The average manufacturer confronts 800 hours of equipment downtime per year — more than 15 hours per week.... the average automotive manufacturer loses \$22,000 per minute when the production line stops.... Overall, unplanned downtime costs industrial manufacturers as much as \$50 billion a year.

-Forbes: "Unplanned Downtime Costs more than you think" Feb 2022

Backup power system architecture



Example of power quality disturbance monitoring using EPMS software





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EcoStruxure Power USA 2023

EcoStruxure
Innovation At Every Level

EcoStruxure™ Architecture



Flexible

to address the key challenges from safety, reliability, sustainability and cybersecurity

Scalable

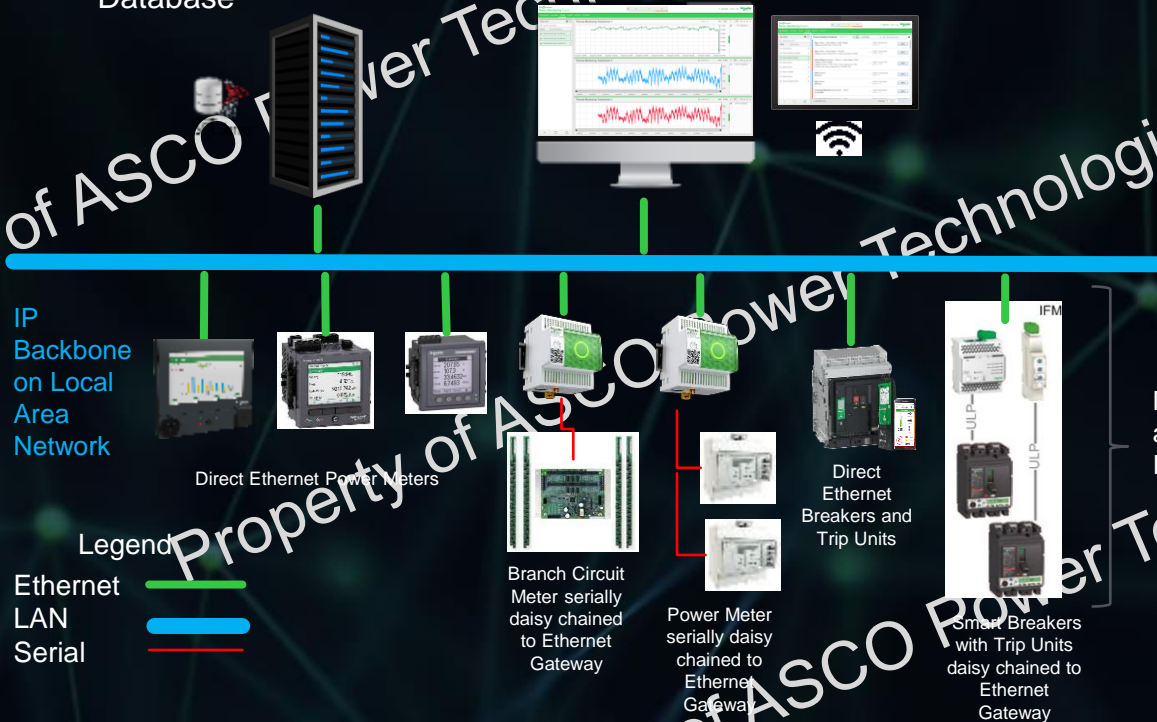
from small facilities to the largest electro-intensive facilities

Open

to 3rd party devices and to integration with other operational systems

Server(tower or rack):
SFWR Application +
Database

Client Access Licenses:
Main User Interface (Web based) (any
User computer or web based device)

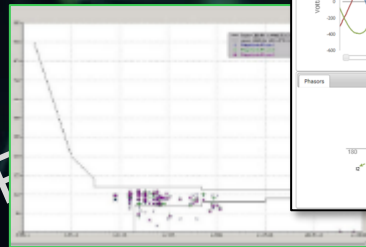


What an EPMS does, that a BAS or SCADA system doesn't

A BAS or SCADA is not a substitute for the EPMS

An EPMS is specifically adapted for electrical systems, to:

- Give real-time notification
- Interface with smart devices
- Perform forensics
- Monitor backup power availability
- Perform energy and power quality analysis



Typical PQ screens

..... to allow an owner to make informed decisions to expand capacity, reduce downtime, and reduce energy use, for a more efficient, predictable, reliable facility.

It can tell an owner if the facility is ready to respond to an outage, where an outage occurred so it can be quickly addressed; and why an outage occurred, to fix it so it won't happen again.

BAS or SCADA software, by itself, does not perform these functions.

What an EPMS does, that a BAS or SCADA system doesn't

- Figure 1: EPMS



Figure 2: BAS/SCADA



These pictures are the exact same picture but provide very different usable information

When the unexpected happens

"Why did the **breaker open**?"

"What is the **source**
of the **fault**?"

"Can we **document**
the **disturbance**
to the Utility?"

"What can I safely
re-energize?"

"Are we **back**
to **normal**?"

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EcoStruxure Power

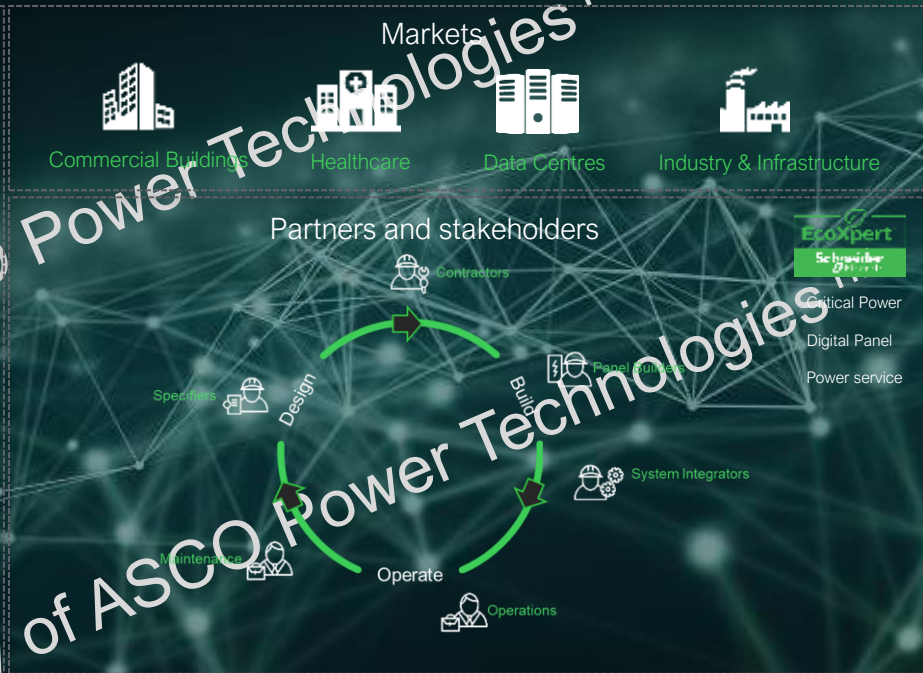
Enabling the digital transformation journey for power distribution

"EcoStruxure Power is more than just a connected IoT platform that digitizes and simplifies low and medium-voltage electrical distribution systems. It is the intersection of our technology with Schneider Electric's domain experience & expertise, supported by our connected energy management ecosystem of partners and industry experts. Together we are helping to realize the full potential of digitization to aid in the planning, designing, deployment, and operation of power distribution systems.."

With EcoStruxure Power we envision a world where Power is...



We believe this is possible by making power distribution...



Measure, Understand, Act

Crucial tenets of power management

> **MEASURE** and connect with world-class hardware

- > Stand-alone or embedded meters measure, collect, and deliver essential data from key distribution points
- > Data points include MV/LV switchgear, PQ conditioning equipment, and machines
- > Gateways and servers aggregate data and convey it to software

> **UNDERSTAND** using power management software

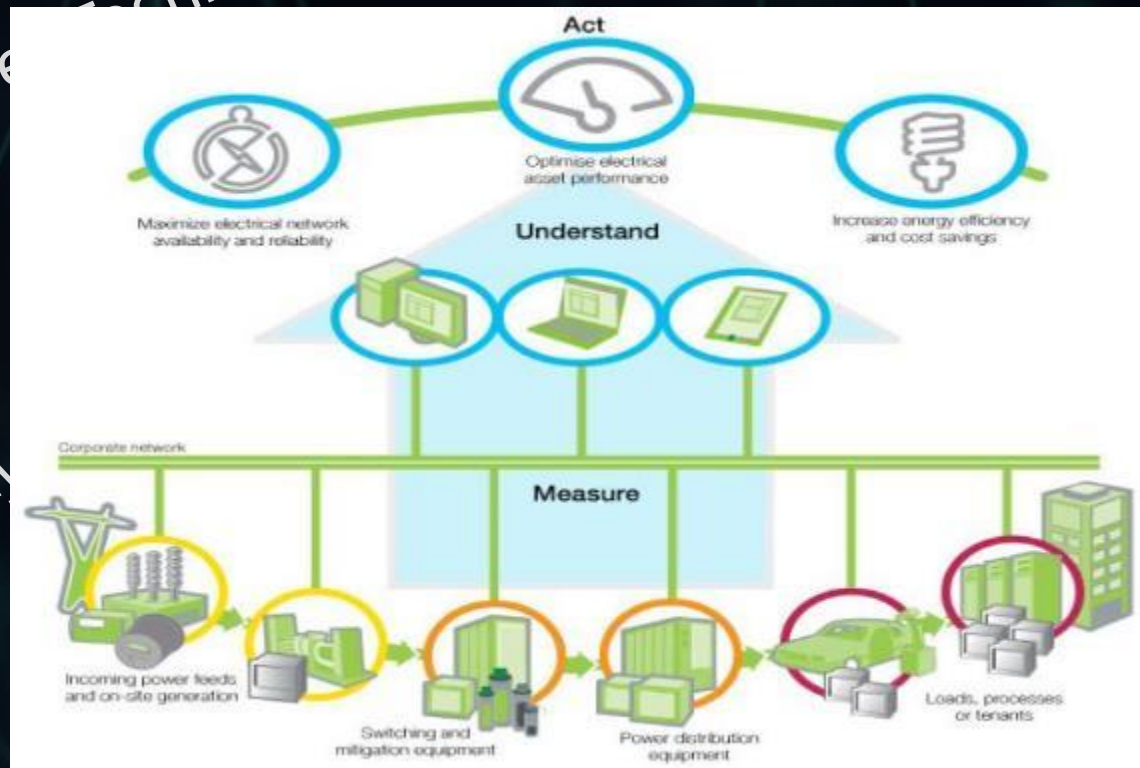
- > Access a supervisory interface that turns data into actionable information
- > Benchmark normal operations, monitor real-time conditions, isolate problems, and reveal trends

> **ACT** with tailored solutions to meet your needs

- > Make timelier, well-informed decisions based on valid, actionable information

Integrated solutions reveal more opportunities

We can connect all the data points in your organization, across systems, so you can understand what's happening and how to act whenever and wherever you need to



Act

Use actionable information to make timely, intelligent decisions

Optimize asset performance

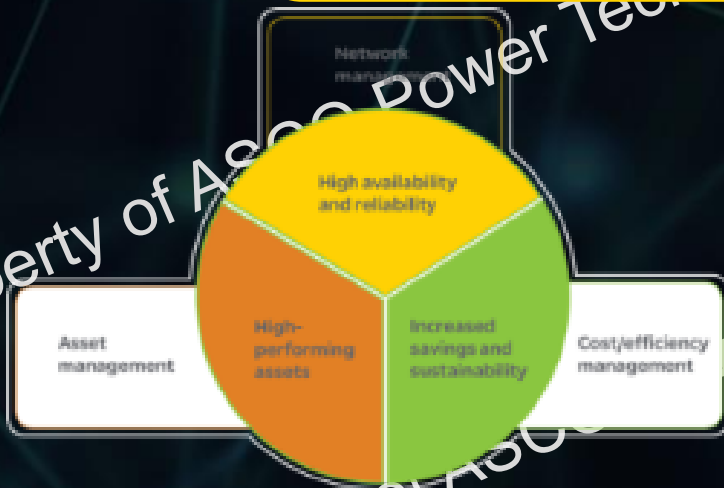
- > Leverage infrastructure and avoid overbuilding
- > Prolong asset life with proactive maintenance
- > Manage EPSS/backup power
- > Monitor and validate battery health

Maximize availability & reliability

- > Increase facility uptime
- > Verify reliable power equipment ops
- > Improve response to power issues
- > Ensure PQ/energy contract compliance
- > Network protection and control

Increase efficiency & cost savings

- > Identify billing discrepancies
- > Allocate costs/tenant billing
- > Reduce peak demand, PF penalties
- > Find opportunities, verify savings
- > Green standards compliance
- > Reduce rates with energy suppliers

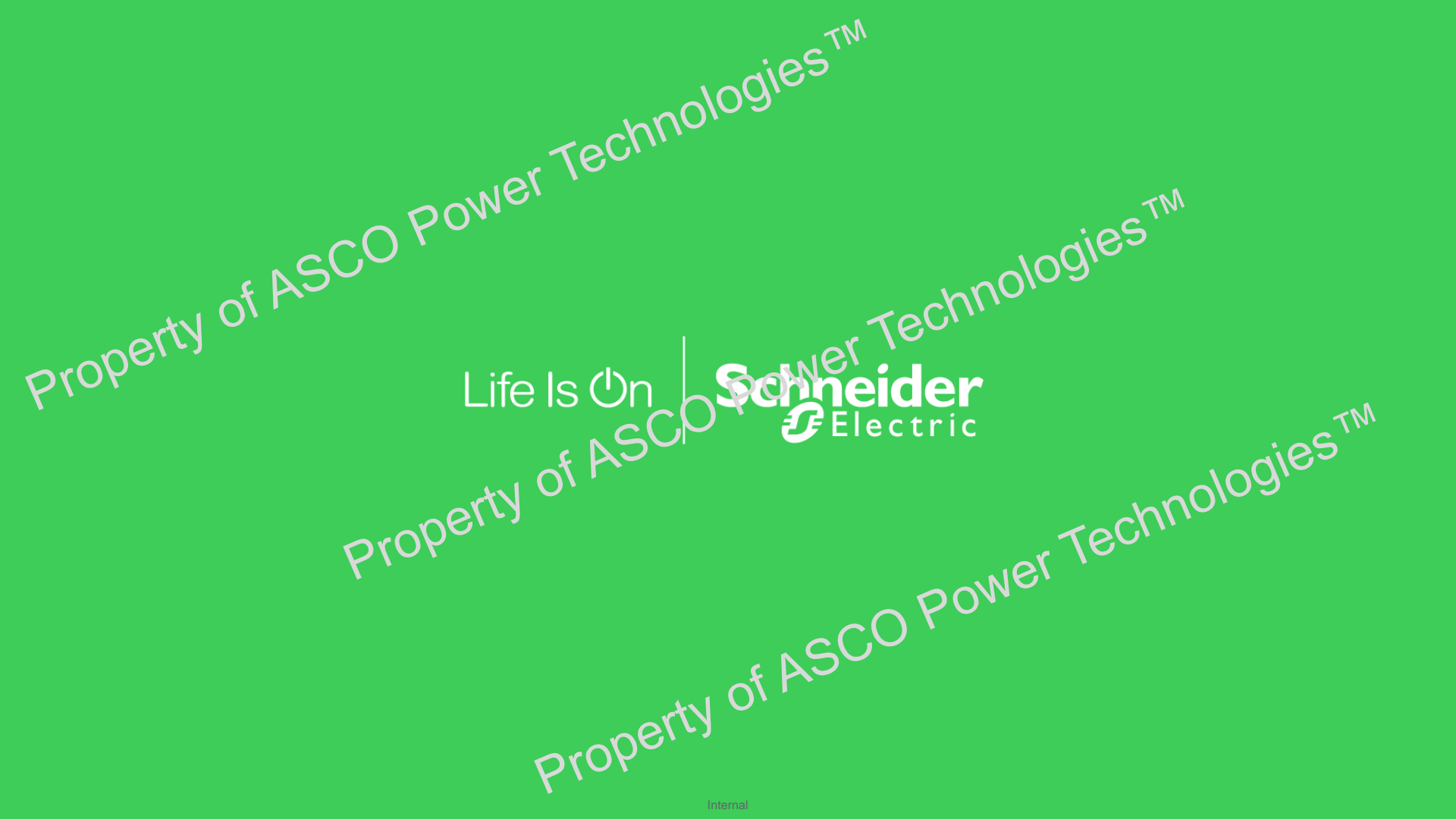




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