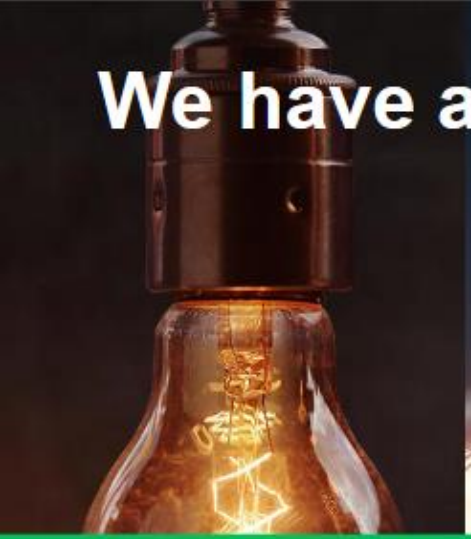
Digital Substation

Powered by EcoStruxure™ Substation Operation (PACiS)

Vetrivel Kuppusamy

We have an opportunity to co-create the future



More ELECTRIC

2X faster growth of electricity demand compared to energy demand by 2040

Source : IEA WEO 2014

More DIGITIZED

20X more incremental connected devices than connected people by 2020

Source : Cisco, Internet World Statistics

More DECARBONIZED

82% of the economic potential of energy efficiency in buildings and more than half in industry, remains untapped

Source : World Energy Outlook 2012, Internal Analysis

More DECENTRALIZED

70% of new capacity additions will be in Renewables by 2040

Source : BNEF

Life Is On | Schneider Electric

Power industry is facing unprecedented changes

By 2025, the traditional centralized model will be complemented by a world of distributed energy

New level of complexity:

- High network reinforcement needs due to distributed generation and soon EV
- Increasing TOTEX pressure
- Increasing risk of network instability requiring active management
- Transmission / Distribution requiring tight interaction
- Grid codes evolution

Digitization challenges:

- IT/OT integration and Data management are challenging stakes for most Utilities, amplified by new IoT capabilities
- Cyber Security regulatory framework to address increasing risks of cyber attacks targeting critical network assets

Power industry is facing unprecedented changes

Trends

60% overall electricity demand increase in 2050 compared to 2020

10X more increase connected devices than connected people by 2020

86% of Power Generation investments will be in zero-carbon fuels till 2040

12% of capacity from DG in 2025
65% of DG investments in distributed Solar PV

Challenges

Support growing electricity demand while decarbonizing electricity generation to avoid catastrophic climate change

In Power Generation leverage digitization to lower TCO
Extract value out of grid data to the benefit of the consumer
Mitigate cyber risks

Maximize renewable power injection while managing variability of solar and wind energy resources

Maximize DER rate while maintaining grid balance and avoiding massive CAPEX investments

EcoStruxure™
Innovation At Every Level

Architecture

Connected devices, real-time control & open software, analytics & services

Life Is On Schneider Electric

Digital Substation is the intelligent real time node of the Grid

becoming the data hub of the digital grid

A more intelligent, connected and participative electrical asset

Integration of new sensors for improved situational awareness

Information is now fully digitized as close as possible to its origin

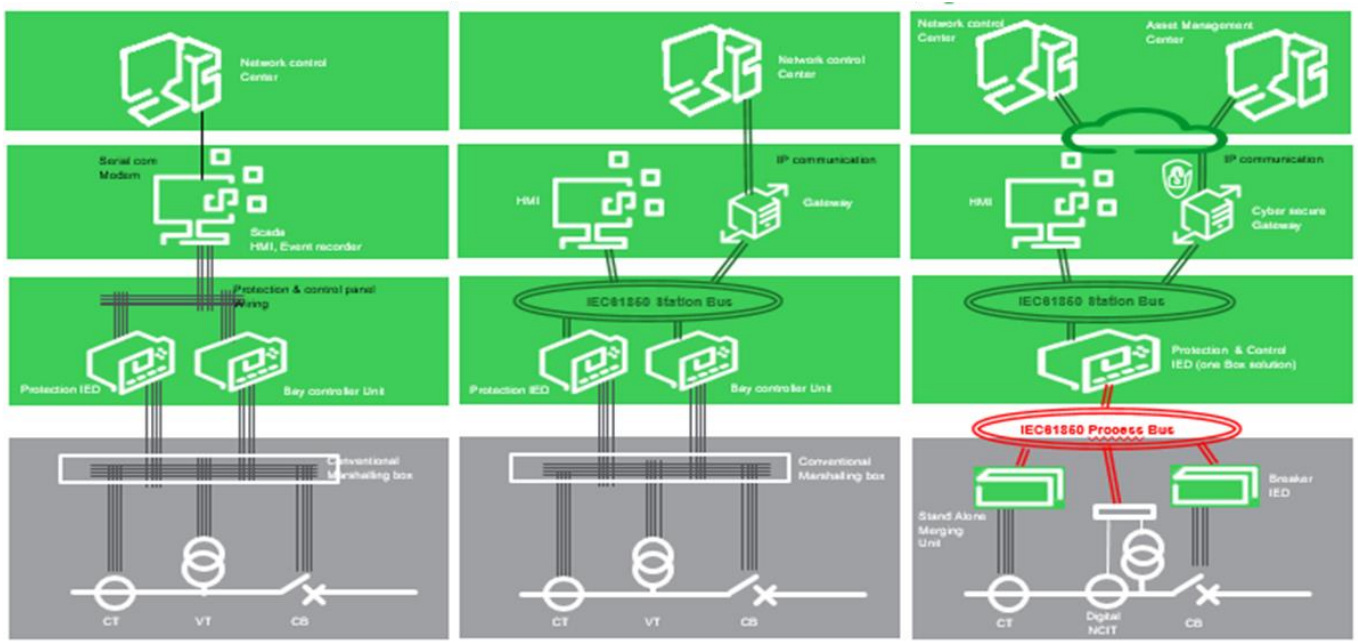
Optimized use of secondary equipment (Intelligent Electronic Devices)

Security is observed and required at all points

Participates to increase the overall power system reliability and availability

Life Is On Schneider Electric

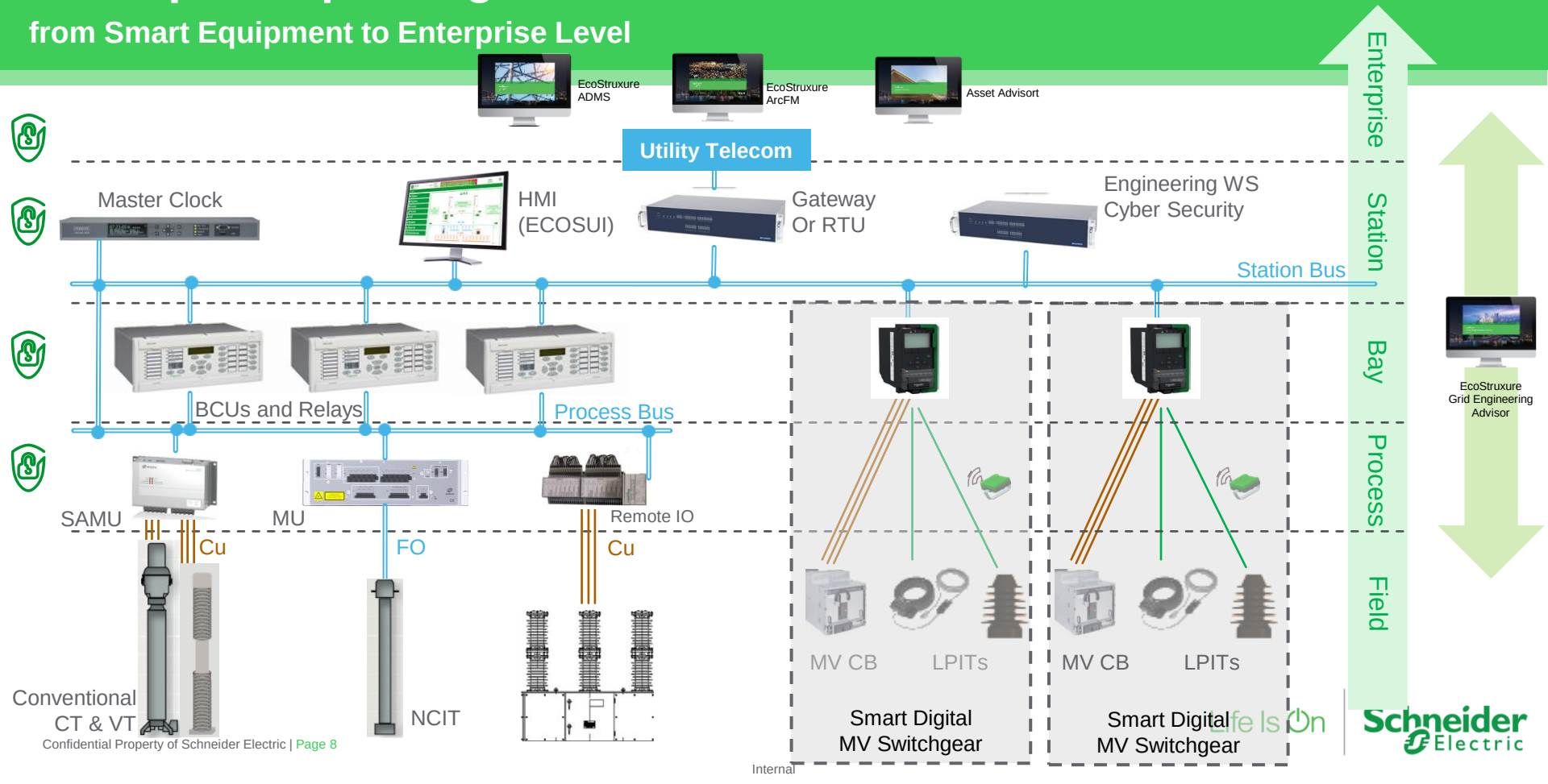
A new major milestone in the Substation Digitization journey



Life Is On Schneider Electric

A complete open Digital Architecture

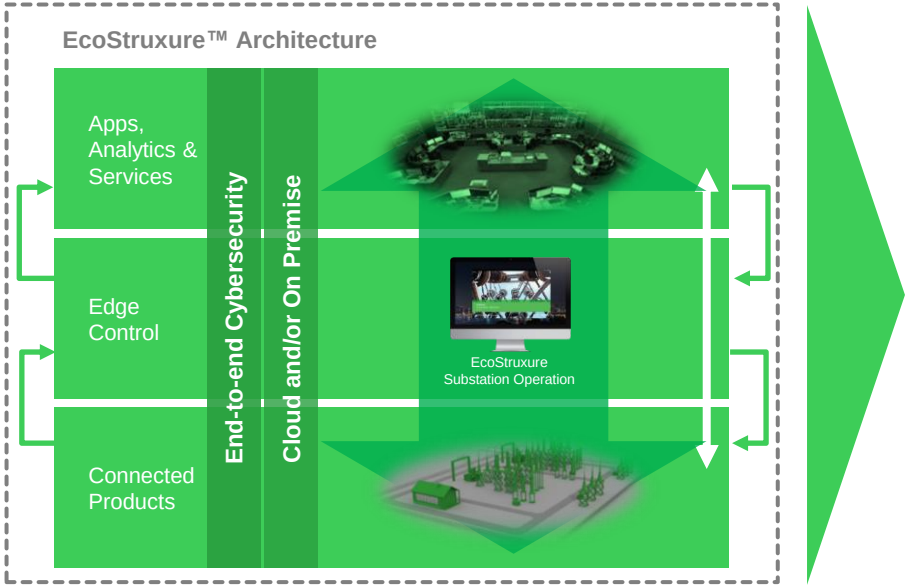
from Smart Equipment to Enterprise Level



Delivering value with an end-to-end solution

from Smart Equipments to Enterprise Level

Digital Transformation



Safety & Security
People safety – Resilience - Compliance

Efficiency
Reduced TCO – Operational Efficiency

Reliability
Availability - Quality of Supply

Digital Substation | safe, secure, efficient and reliable ready for the digital grid

Safety & Security
People safety – Resilience - Compliance

Protect your people and asset
100Y of experience and 1M+ delivered Relays
Arc Flash protection on MV switchgear
Secured control sequences

Ensure resilience
Secured architecture
Data protection & integrity
Dedicated security components
Product and system hardening
Authentification / Authorization

Demonstrate compliance
IEC62443-3-3 : system certified
Achilles level 1 certified IEDs (IEC62443-2-4)
Certified Cyber Security consultants
Certified R&D and delivery capabilities (ISO27000)

Efficiency
Reduced TCO – Operational Efficiency

Invest in future-proof with interoperability
IEC61850 ed.2 and companion standards
Standard communication protocols
Data integration with enterprise level

Optimize investments
Streamlined system and IED engineering
Process Bus
Smart sensors

Reduce maintenance costs
Condition Base Monitoring for Substation assets
Automation System administration tool
Mobile applications

Reliability
Availability - Quality of Supply

Increase network availability
Redundant architectures
Wide-area automation contribution

Secure the quality of supply
Regulation automation schemes
Volt/VAR optimization contribution
Accurate data with quality

Safety & Security | Cyber resilience and compliance

Your challenge

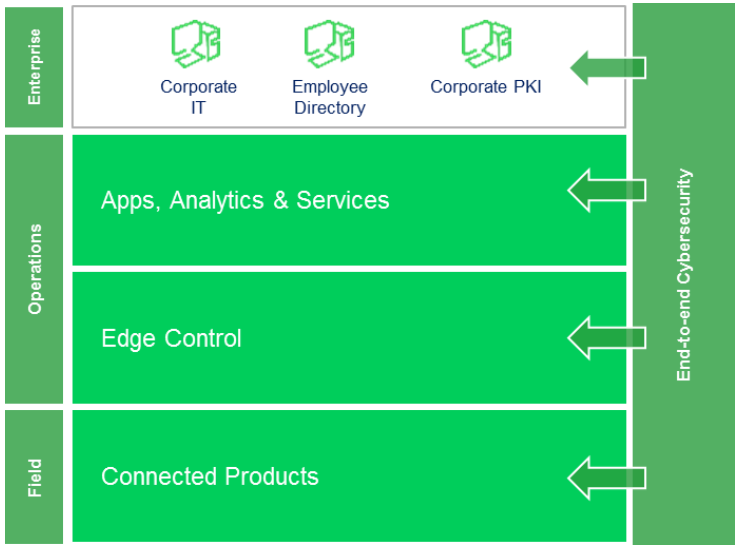
“I want to avoid my business to be disrupted by a cyber-attack and comply with the regulatory requirements in term of cyber-security”.

Our solution

EcoStruxure™ Substation Operation system architecture is secured by the use of dedicated security components, secured-by-design IEDs and the implementation of a role-based access control server for authorization/authentication, ensuring end-to-end security in compliance with international standards (IEC62443, IEC62351, NERC-CIP).
Associated patch management and disaster recovery services improve to maintain system security level over the lifecyle,

Your benefits

1. Meet relevant **regulations**
2. Avoid **fines and penalties**
3. Safeguard **image and reputation**
4. Build and apply your **security plan** from Enterprise level to field



Efficiency | Streamlined engineering, IEC61850 compliance & data integration

Your challenge

“I want to capitalize my company engineering knowledge by standardizing my engineering approach with IEC61850 and propagate this standardized design to project implementation regardless system and device vendors”.

Our solution

EcoStruxure™ Grid Engineering Advisor system engineering tool allows :

- to specify your application use cases according IEC61850 data modeling,
- to proceed to system integration as per IEC61850 top-down process,

thus acting as a System Specification Tool as well as System Configuration Tool.

Your benefits

1. **Vendor agnostic** tool complying with your device purchasing policy
2. Project execution **cost savings** (top-down, avoid re-work)
3. **Standardized** application engineering
4. **Capitalize knowledge** with re-usable engineering artefacts
5. Enables information **interoperability** with **Entreprise** level

EcoStruxure Grid Engineering Advisor

Efficiency | Process Bus

Your challenge

“I want to reduce my substation construction and refurbishment costs while improving my maintenance staff safety and efficiency without compromising my protection plan”.

Our solution HV

Easergy MiCOM HV relays and BCUs host a IEC61869 Process Bus interface to connect to field devices such as Merging Units, Stand-Alone Merging Units or Remote I/O.
EcoStruxure™ Substation Operation system integrates all these devices and brings consistency and security in your application context.

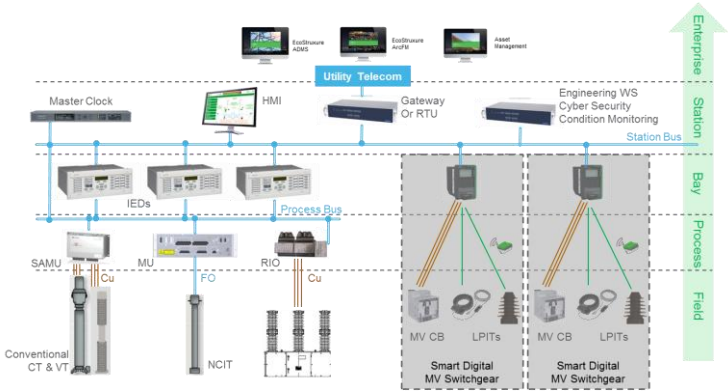
Our solution MV

Our Easergy C5 MV BCPUs host Process Bus interface to retreive the VT sample values sent by the Easergy C5 Merging Unit

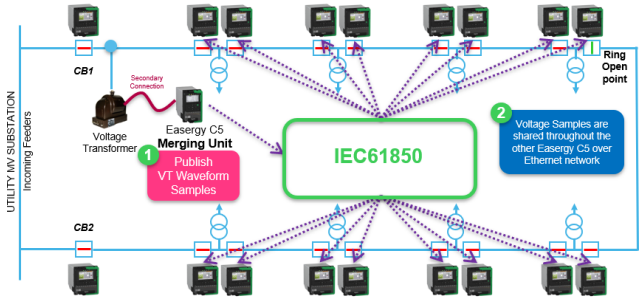
Your benefits

1. Up to **70%** cost savings in substation overall wiring
2. **Interoperability** powered by IEC61869 & IEC61850-9-2LE compliance.
3. **Easier maintenance** reducing connection points
4. **Improved safety** for maintenance operators by removing hazardous secondary currents and voltages,

HV



MV



Efficiency | Electrical Analytics and Reports Digital Substation

Your challenge

“I want to improve the grid robustness, while I reduce my operational costs by leveraging the big data archives and

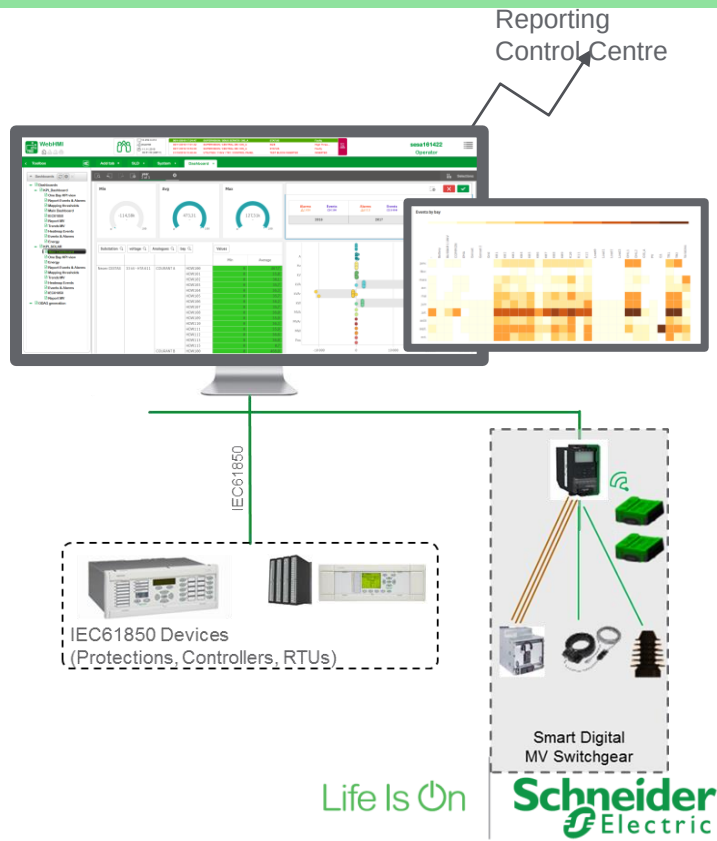
Our solution

EcoStruxure™ Substation Operation User Interface integrates an advanced ‘Analytics & Report“ application, helping to store 2 or 3 years of Substation data, analyse electrical operations and simplify the preparation of customized Dashboards and Reports.

It collects and store the data from any substation devices and simplify the Automatic transferred to the central Control Centre.

Your benefits

1. **Simplified architecture** maximizing use of available data
2. **Ease** the Electrical analysis with **Dashboards and Reports**
3. **Improve** network robustness and **identify** weak elements
4. Solution for **new systems** or **retrofit** of existing systems
5. **Prioritization** of maintenance actions
6. Decrease of **unplanned outages**



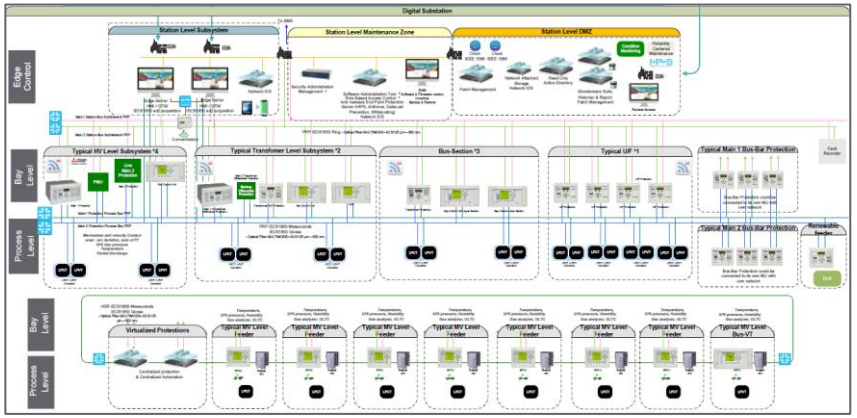
Reliability | Redundant architectures

Your challenge

“I want to deploy interoperable and highly available systems in order to maximize the overall grid management reliability”.

Our solution

Our EcoStruxure™ Substation Operation proposes redundancy at all critical levels with gateway redundancy to ensure Control Room / Substation continuous monitoring, Ethernet network redundancy using IEC62439-3 PRP and HSR at both Station and Process Bus to ensure 0ms communication disruption and zero-packet loss in an occurence of a Ethernet network failure.



Your benefits

1. Continuity of data transmission from field to grid operations
2. Increased availability, covering the N-1 fault scenario
3. Open and standard solutions ensuring multi-vendor interoperability
4. Scalable architectures ready for future expansions

Life Is On | Schneider Electric