Atom Expo – Sochi April 2019

Round Table: « Responsible consumption and production: Quality management in the supply chain in international nuclear projects"
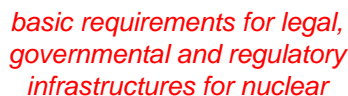
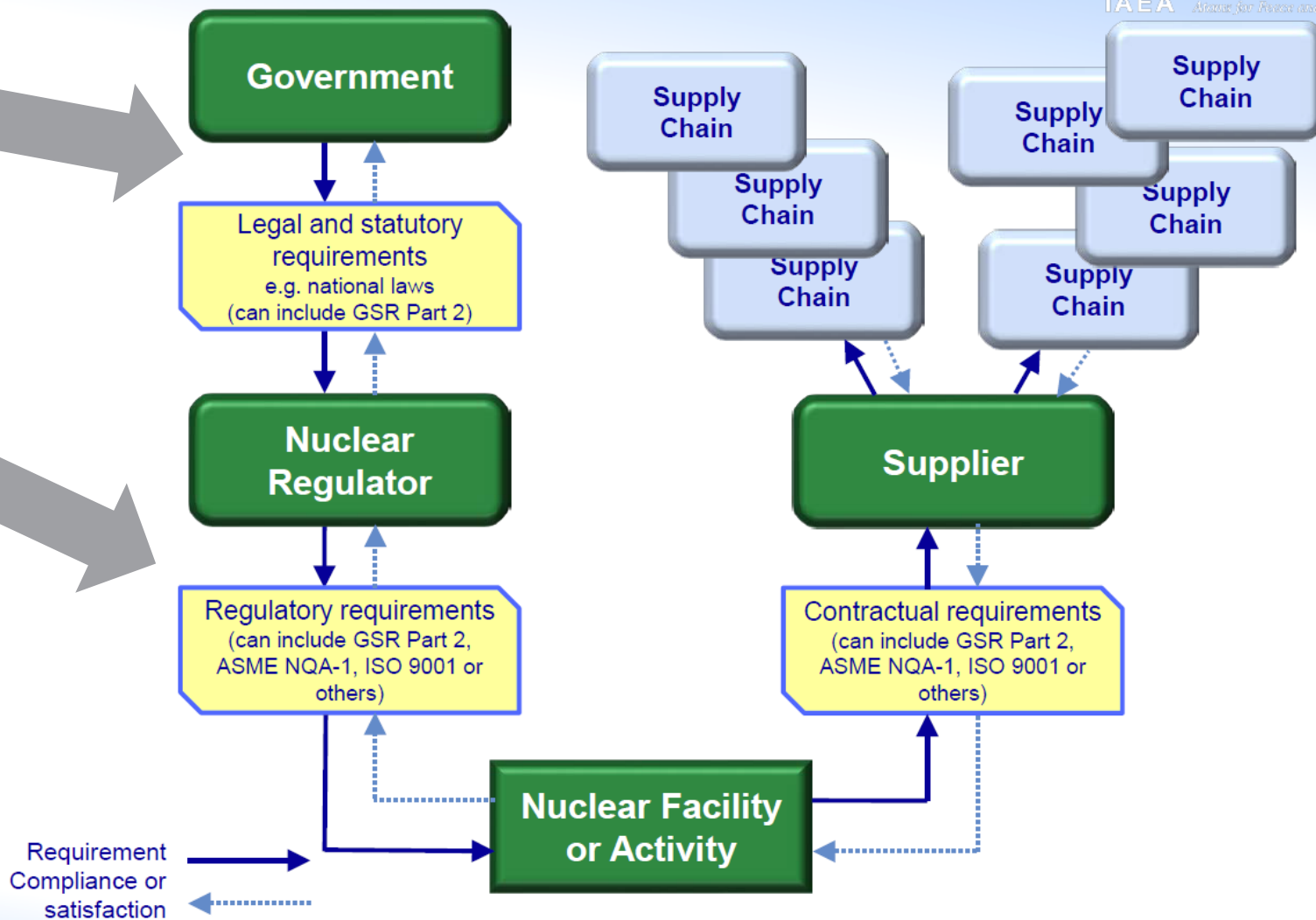# Schneider Electric Solutions for Nuclear Safety Applications
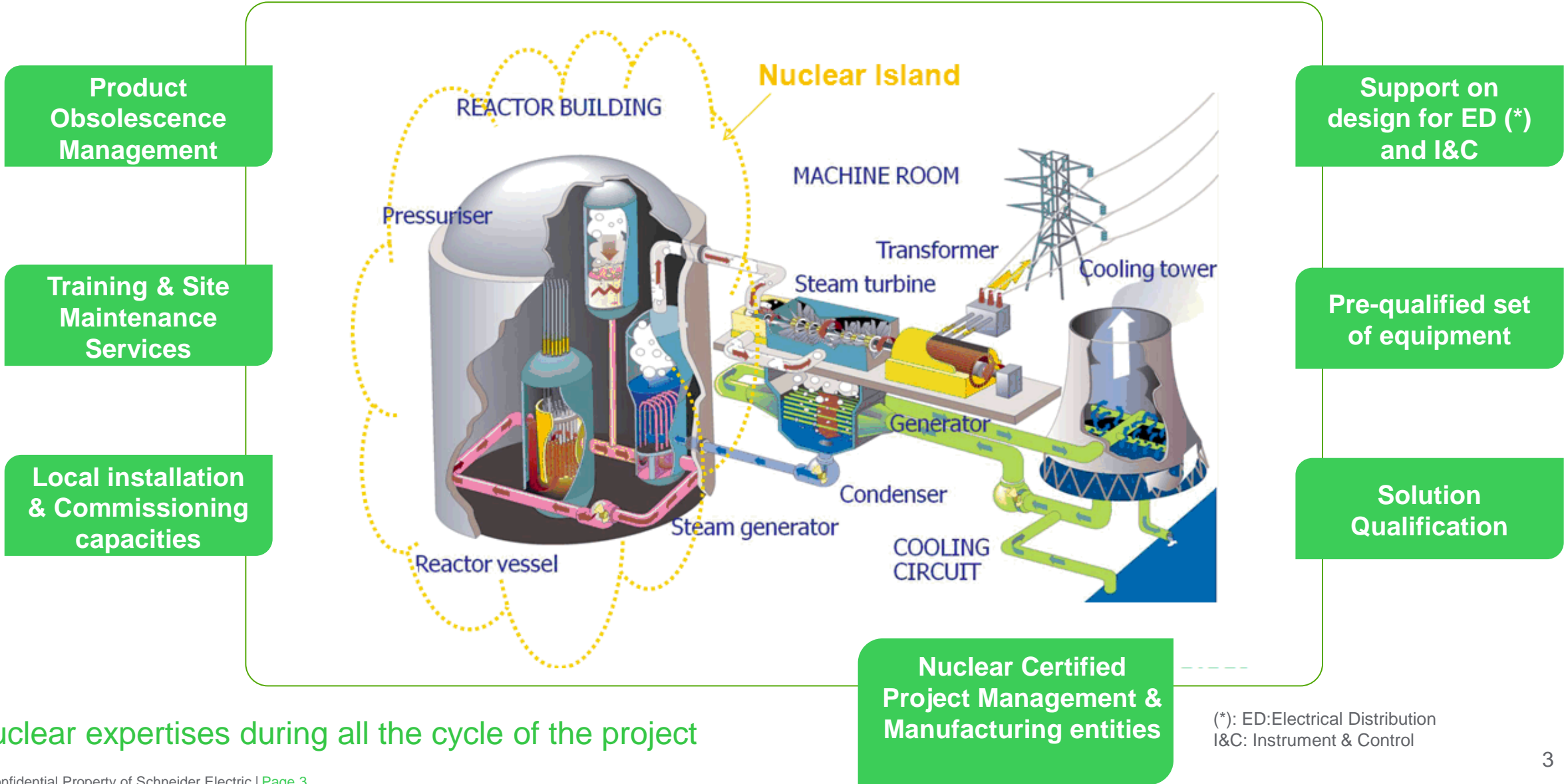
16 April 2019

Jacques LAEBENS – SOPL Nuclear

Schneider Electric

HOW DOES IT WORK IN PRACTICE ?

Nuclear is Highly Regulated

basic requirements for legal, governmental and regulatory infrastructures for nuclear

Government

Legal and statutory requirements
e.g. national laws
(can include GSR Part 2)

Nuclear Regulator

Regulatory requirements
(can include GSR Part 2, ASME NQA-1, ISO 9001 or others)

Requirement Compliance or satisfaction

Nuclear Facility or Activity

Supplier

Supply Chain
Supply Chain
Supply Chain
Supply Chain
Supply Chain
Supply Chain

Contractual requirements
(can include GSR Part 2, ASME NQA-1, ISO 9001 or others)

Example of the application of IAEA and quality management standards in the nuclear supply chain

IAEA
International Atomic Energy Agency

60 Years

Acting all along plant life

Product Obsolescence Management

Training & Site Maintenance Services

Local installation & Commissioning capacities

Support on design for ED (*) and I&C

Pre-qualified set of equipment

Solution Qualification

Nuclear Certified Project Management & Manufacturing entities

Nuclear Island

REACTOR BUILDING

Pressuriser

MACHINE ROOM

Transformer

Steam turbine

Cooling tower

Generator

Condenser

Steam generator

COOLING CIRCUIT

Reactor vessel

Nuclear expertises during all the cycle of the project

(*): ED:Electrical Distribution
I&C: Instrument & Control

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Thanks to a large portfolio of products offers

SSCC- Lifting Bridge

Motor Variable Speed Drive

SEPAM protection
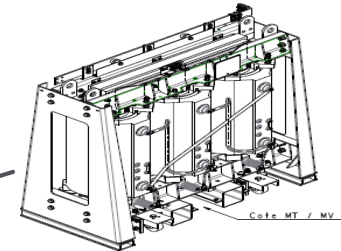
MV Circuit Breaker

MV SWITCHBOARD PIX H

MCSET

MV Contactor

Switch IAAR / LV CB

TRANSFORMERS

CONTAINMENT STRUCTURE

Steam Line

Switchyard

Cooling Towers

Control Rods

Steam Generator

Generator

Pump

Reactor

Turbine

Generator

Pump

Condensor

Reservoir

Cooling Water

REACTOR

Water
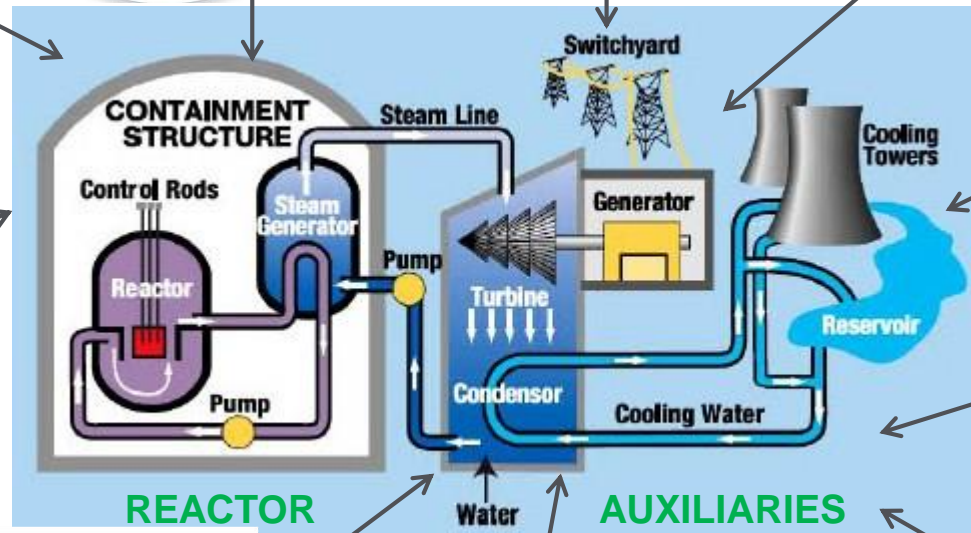
AUXILIARIES

LV SWITCHBOARD OKKEN

AUTOMATION

LV DRAWERS

DC chargers & INVERTER

LV CB

Schneider Electric Value Proposition

- Nuclear experienced dedicated teams and Supply Chain > Global Nuclear Project & Nuclear Quality Management
- Large scope of **COTS** Equipment (*) for the Nuclear Island > *From Electrical Distribution to Automation*
- Qualifications & Lab's > « *Required competencies and resources to qualify equipment as per each project requirements*»
- Project Management > *Ability to manage complex International projects*

(*) COTS: Commercial Off-The-Shelf
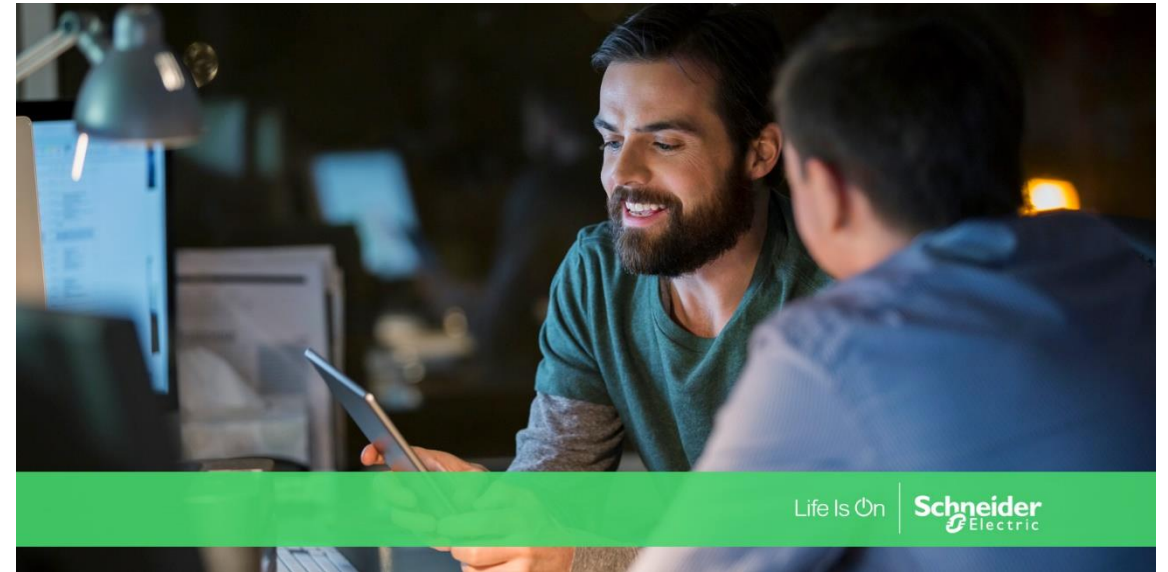
Schneider Electric
Nuclear Quality Management System

Nuclear Quality Requirements

ISO 19443 new standard (May 2018) future unique mandatory standard for Nuclear Operators & Nuclear safety Authorities

ISO 19443: 2018
Additional nuclear specific requirements to ISO 9001:2015 supplying products and services **I**mportant **T**o **N**uclear **S**afety (**ITNS**)

ISO 19443 complementary document to IAEA Nuclear safety standards

ISO 19443 is a "synthesis" standard based on the different national/regional standards

Customer Project

Customer

Requirements (project specific)

Nuclear segment Customer

Worldwide standard: ISO 19443

National/regional standards: SGAQ/RCCE, NSQ100, NQA-1 & 10 CFR 50 Appendix B

« Standard (Non Nuclear) » Customer

ISO 9001: 2015

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Schneider QMS

> Schneider Nuclear QMS based on mature & strong processes of Scheider QMS:

> Project execution: CPP (Customer Project Process)

> Product design & qualification : OCP (Offer Creation Process)

> Manufacturing: SPS (Schneider Production System)

> Supplier management :SSQM (Schneider Electric Supplier Quality Management)

> Customer support : CC (Customer Care)

> Non conformity management : I2P Issue To Prevention (I2P):

> CI (Continuous Improvement)
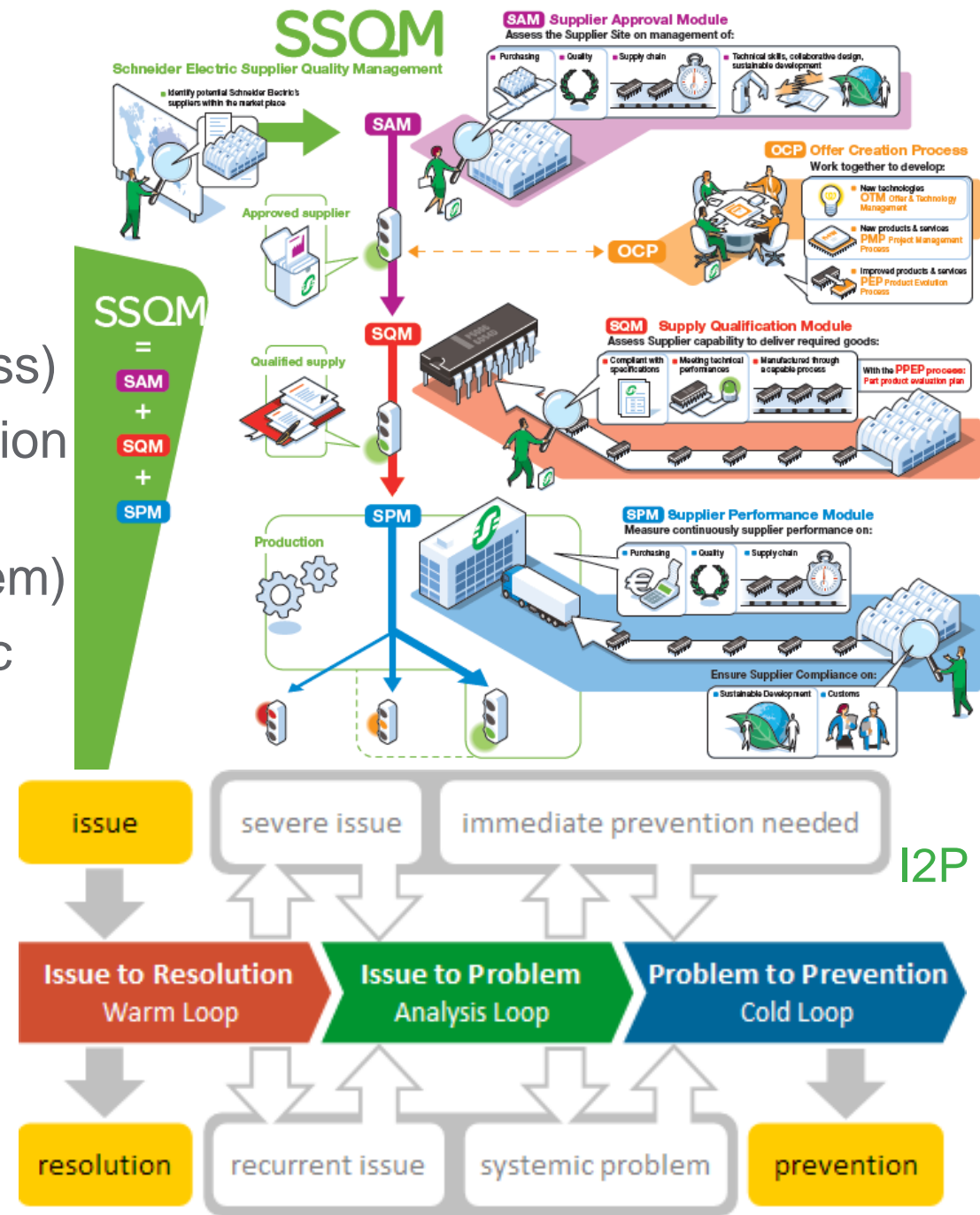
ISO 19443 vs ISO 9001

> **ISO 19443** is an « ISO 9001 + » in which Nuclear safety is identified as a strategic issue for the organization

⇒ Nuclear safety issue is translated in ISO 19443 § to reinforce ISO 9001 requirements (example: For ITNS items, monitoring and mesurement performed by competent persons different from those who performed the work)

- Nuclear specific requirements (from new "Nuclear" ISO 19443 §):

> **N**uclear **S**afety **C**ulture

> Determination of ITNS items and activities (**ITNS**= **I**mportant **T**o **N**uclear **S**afety)

> Graded approach to the application of quality requirements

> Provisions for **C**ounterfeit, **F**raudulent or **S**uspect (**CFS**) items

> Design and development verification and validation testing (Product qualification)

> Control of production equipment

> Monitoring and measurement activities

Regional Application Center Electrical Distribution EMEAS

Nuclear Safety Policy

Life Is On | Schneider Electric

Nuclear Safety Culture: A quality culture

Cornerstone of
Schneider Electric
« Nuclear QMS »

Attitude and behaviour

No Compromise!

Prudent and Rigorous Approach

Independence of Control and Inspections

Questioning & Non-Blaming Attitude

Communication

Respect for initial qualification

Documentation of Works

Quality Management System

Schneider Electric « Nuclear QMS »

Global

Schneider

All Entities: I2P & CI

Local

Execution Centers (CPP) ↔ Country (CC)

Plants (SPS & SSQM) ↔ LoB (OCP)

Schneider QMS

CPP | I2P/CI & CC | Global Schneider | SPS & SSQM | OCP

GCP regions | Operations regions | GSC regions | BUs

Local QMS (Execution Center, Country, Plant, LoB)

Schneider Electric Nuclear safety culture based on ISO 19443 principles

Schneider Nuclear entity: integration of ISO 19943 requirements in each local QMS
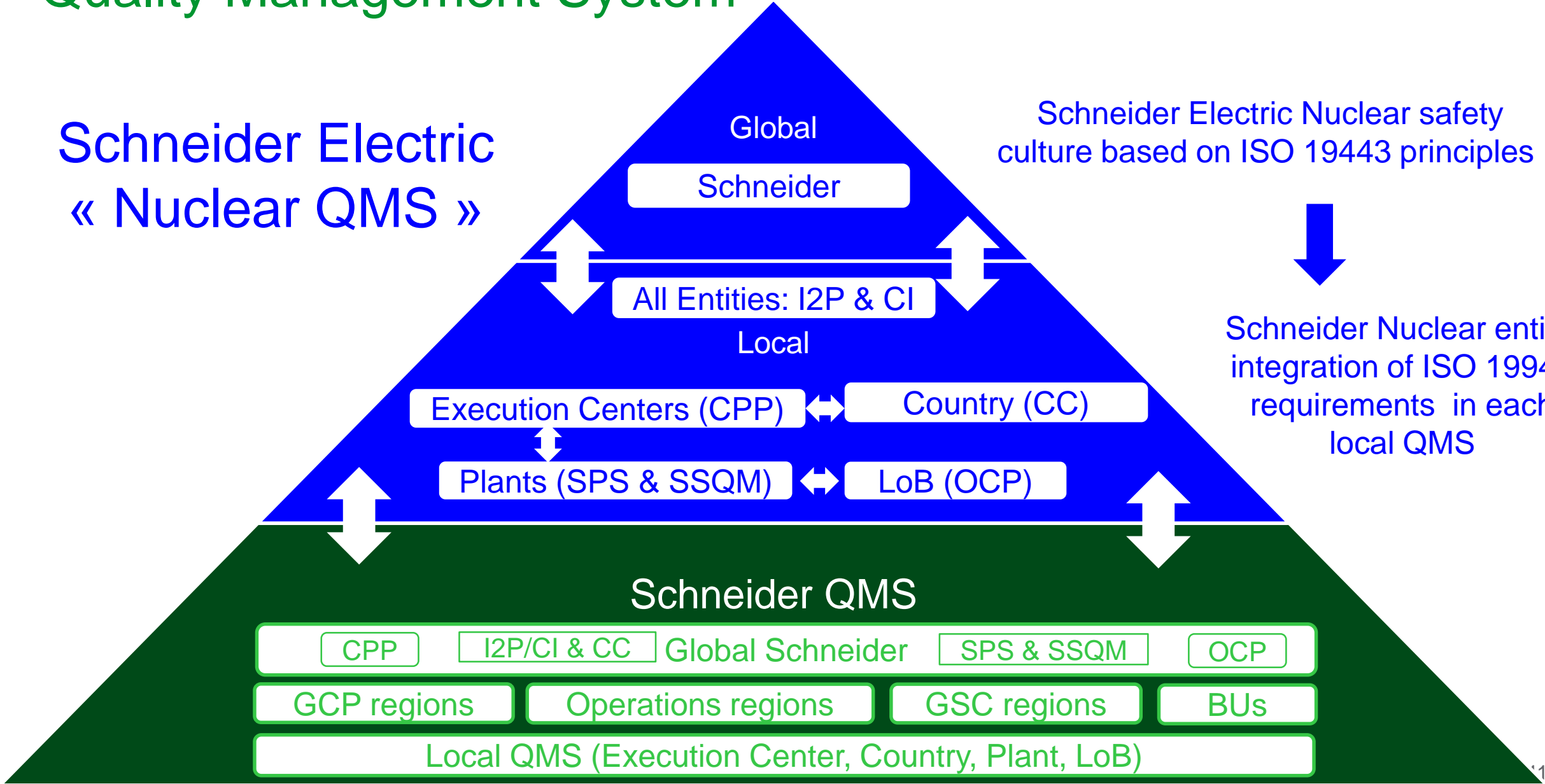
Schneider Electric QA System for Paks2

Project Requirements

- ISO 9001
- Country Nuclear Safety Code
- Project Specific NQA Requirements

Schneider Electric Project QMS

- Schneider QMS
  - ISO 9001
- ISO 19443 - Schneider Electric « Nuclear QMS »
- Project Specific Project Quality Plan
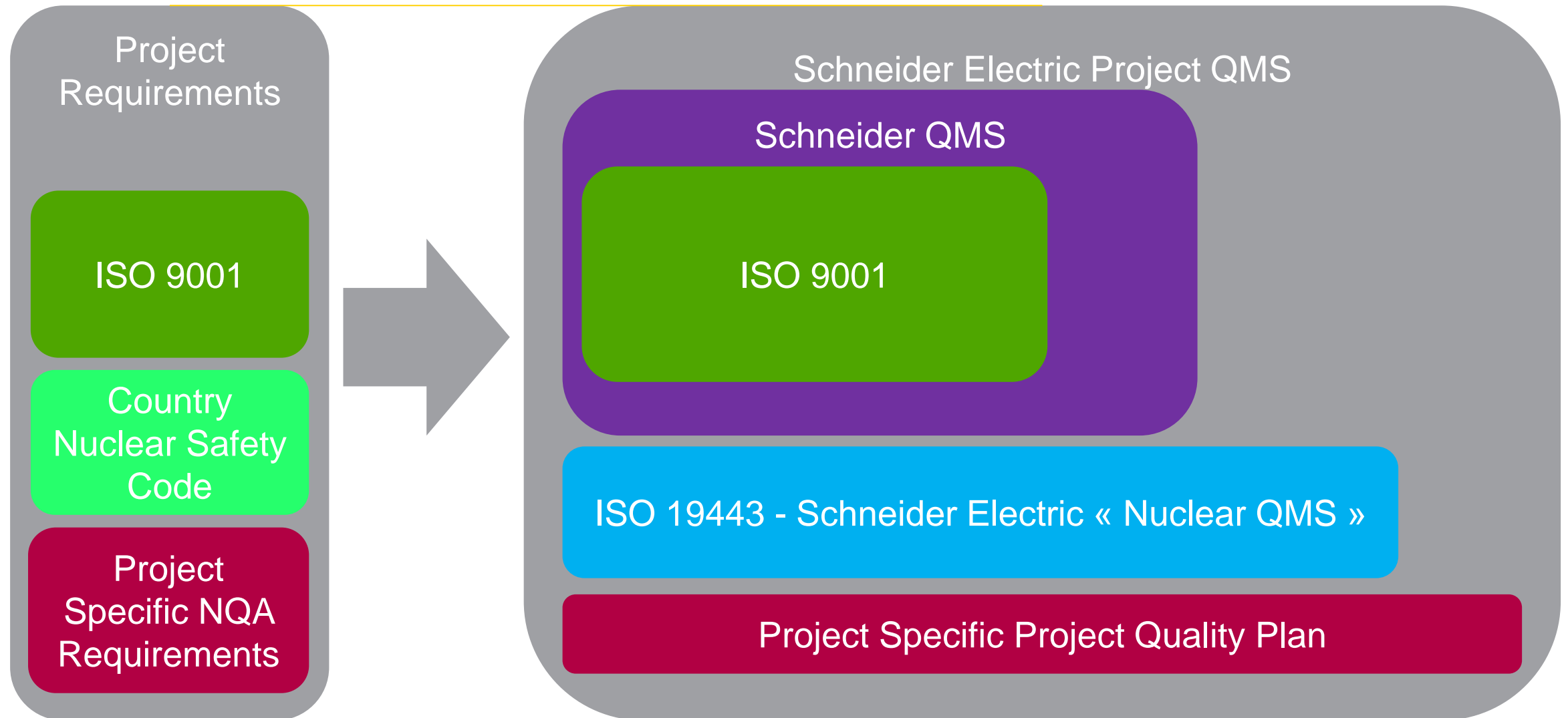
Entities accredited for Nuclear Safety Classified Equipment Manufacturing

Nuclear Quality Management System

> <u>Manufacturing Plants</u>:

  > EMT Grenoble - France: **PIX and MCSet** Medium Voltage Switchboards

  > France Transfo: Metz – France: **TRIHAL** Dry Type Transformers

  > SETBT Rennes – France: Low Voltage Switchboards

  > ECOFIT Grenoble – France: **Spare Parts** for NPP **Life Cycle Management**

  > CARROS – France C3 Class **M340** PLC and **Sepam** Prot. relay

  > **GUTOR** Wettingen - Switzerland: Rectifier and Inverters

> <u>Project Management Teams</u>:

  > **G**lobal **A**pplication **C**enter **Nuclear** & **N**avy Grenoble-France

  > **GUTOR** Wettingen - Switzerland: Rectifier and Inverters

> <u>Site Services Teams</u>:

  > Global Service Center Grenoble – France

  > Country Field Services (Limited countries)

These entities have been audited and approved by major Nuclear Operator and Contractors:
EDF, Electrabel, ENEL, NNB, KHNP, Westinghouse, CGN…

Some References

Worldwide references in Nuclear Power Plants

Retrofit of Pickering power plant
Canada
Ontario Power Generation

EPR UK
MV - UPS

Electrical Distribution
Belgium
ENGIE ELECTRABEL

MV Retrofit
Russie
6 Rosatom's nuclear power plants

UPS of Fitzpatrick power plant
USA
Entergy

Mochovce Nuclear Power Plant
Units 3 & 4 - Slovakia
Slovenské Elektrarne

EPR Flamanville nuclear power plant
France
EDF

Replacement of old circuit-breakers Uljin nuclear power plant
South Korea
KHNP

Diesel Ultime Secours Upgrade safety
nuclear power plants
France
EDF

Electrical & Automation systems for Kalpakkam NPP
India
Bhavini

Electrical distribution Ling Ao 2 NPP
China
CGNPC

LV & MV Retrofit of 58 nuclear power plants
France
EDF

Solution to supply 8 new nuclear reactors
complete safety and non-safety controls
China
Fuqing, Fangjiashan

Combustible nuclear GB2 & Comurex units
France
AREVA

Maintenance of equipment and Retrofit
South Africa
Eskom Koeberg

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Thank you!

Schneider Electric