

Procurement strategies for maintenance services

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7 & 8 April 2021

Remote ITER Business Meeting



Presentation outline

1. Introduction
2. ITER Context regarding current and future Operation
3. Global Maintenance Services Contract
4. Operation and Maintenance of Buildings Contract
5. Operation and Maintenance of Electrical Power Distribution Contract
6. CMMS used for the management of Maintenance activities
7. Schedule
8. Next steps



1. General Introduction

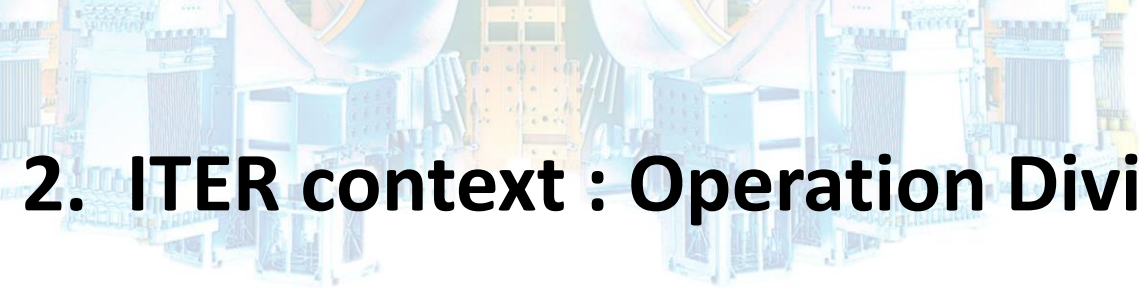
- This presentation covers all maintenance activities on ITER site for plant systems which have already been or will be turned over to Operations and Facility Management team before First Plasma.
- ITER has made the choice to subcontract the coordination, the preparation and the execution of Maintenance activities of conventional systems and components.
- The technical perimeter is split into 3 different parts corresponding to the 3 existing areas of responsibility.



1. Introduction : Maintenance purpose and process

The main objectives of Plant Maintenance is to ensure/manage the Legal compliance, the Safety and the Reliability (incl. addressing Availability, Maintainability and Inspectability aspects) of both ITER continuous and pulsed systems and, in that perspective:

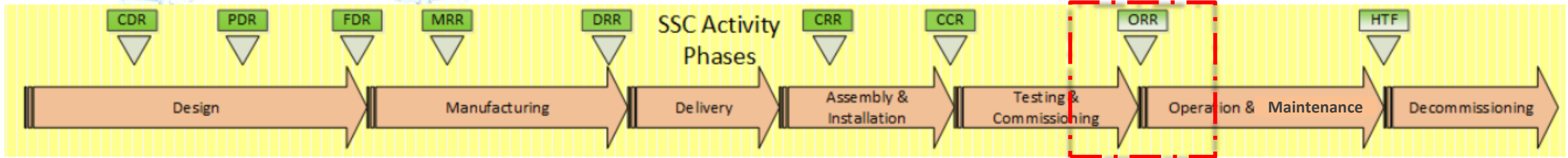
- Plan properly preventive maintenance and inspections
- Execute in due time planned activities
- React quickly and efficiently to unforeseen events (corrective maintenance)



2. ITER context : Operation Division (OPD) main roles

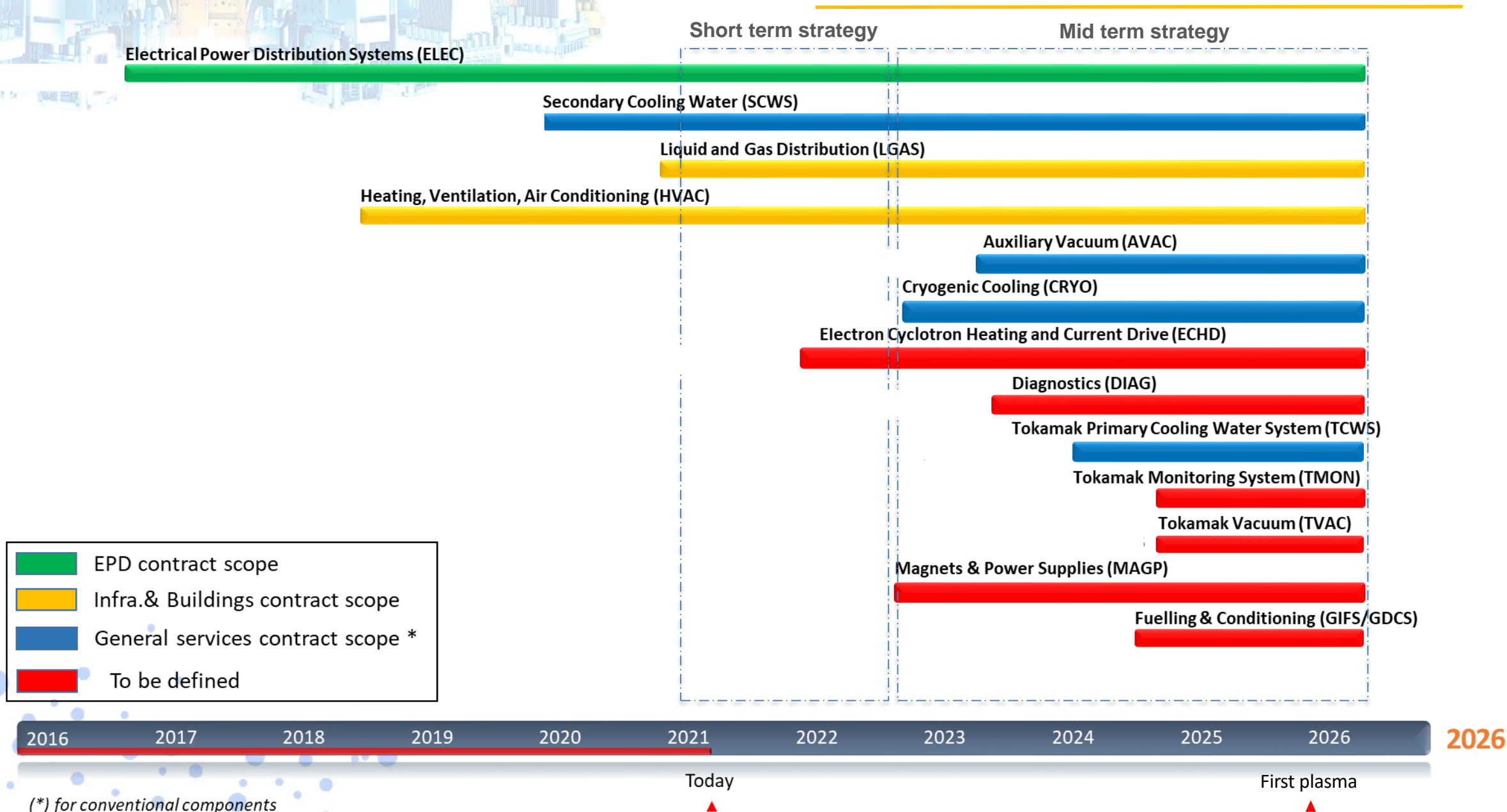
- OPD is responsible for commissioning and temporary Operation (incl. Maintenance) of all ITER systems excluding Infrastructure and buildings and I&C.
- OPD is also responsible to develop tools, procedures and define the strategy for the future operation (incl. Maintenance) of ITER Facility.
- OPD acts as process owner for the preservation of all ITER equipment.
- OPD / EPD operates and maintains the steady-state electrical distribution

2. ITER context: Systems handover to Operations current status



- Some plant systems have already been transferred to OPD for temporary Operation and Maintenance (e.g. Electrical Power Distribution network).
- Other systems have already been transferred to OPD for testing & commissioning (e.g. some Secondary Cooling Water Systems).
- After tests completion, commissioned systems will be progressively transferred to OPD Operation & Maintenance teams for the start of initial Operation and later for integrated commissioning.

2. Handover to Operation & Maintenance sequence (target schedule)



2. Staged approach Maintenance contracting strategy principle

SHORT TERM
(2021-2022)

MID TERM
(2023-2026)

**Target of this
presentation**

LONG TERM
(2026 onwards)

() out of scope of current contracting initiative*

2. Staged approach Maintenance contracting strategy principle

SHORT TERM

- **Scope:** Immediate fixed scope
- **Period:** 2021- 2022
- **Technical perimeter:** Electrical Power Distribution (SSEN/PPEN), Secondary Cooling Water System, Infrastructure and Buildings
- **Main Disciplines involved:** Electrical HV, Mechanical/Metal works, facility management (incl. HVAC, elec LV, ...)

2. Staged approach Maintenance contracting strategy principle

MID TERM

Target of this
presentation

- **Scope:** Progressive / ramp up scope in link with handover process
- **Period:** 2023 - 2026
- **Additional plant systems:** some new systems of Cooling Water, Cryoplant, ...
- **New Disciplines involved:** Instrumentation (incl. metrology and analyzers), Rotating equipment overhaul, ...

2. Staged approach Maintenance contracting strategy principle

LONG TERM

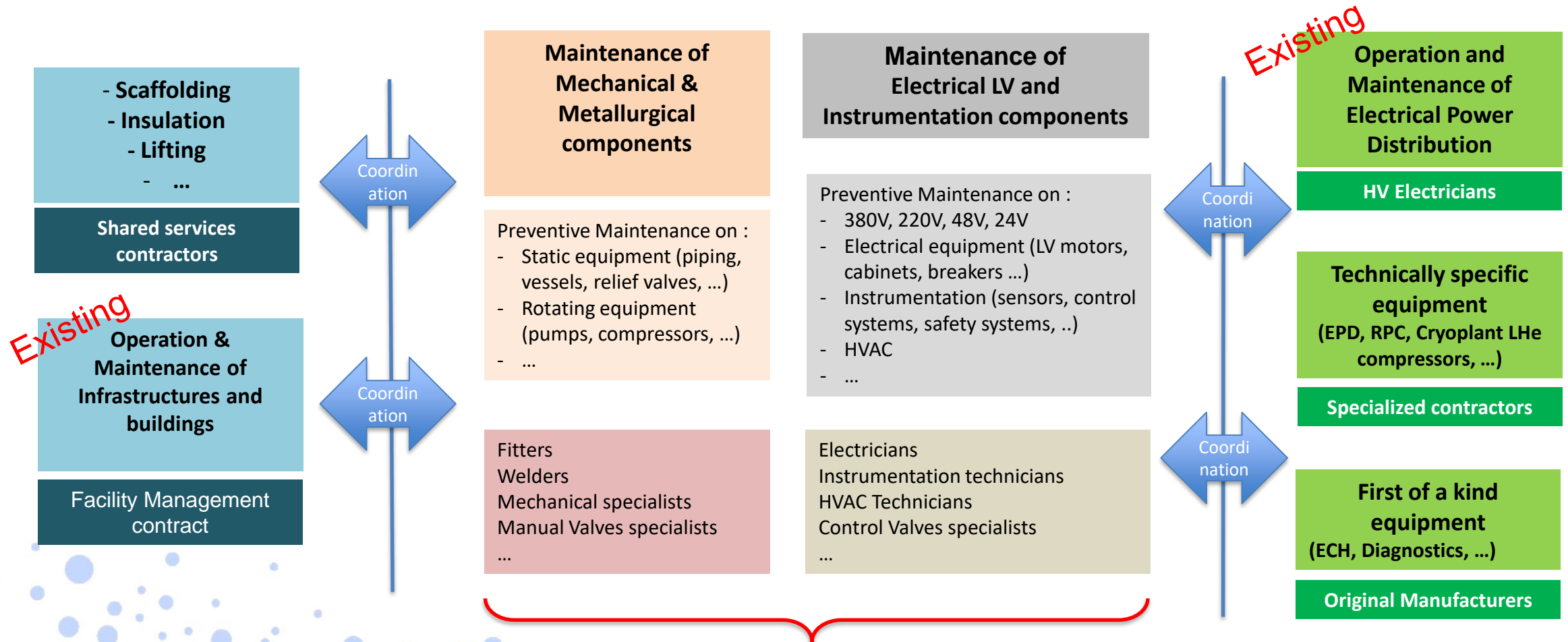
- **Scope:** Full scope
- **Period:** 2026 onwards (post First Plasma)
- **Additional Plant systems and activities:** Long Term Maintenance (LTM) preparation and execution coordination (Cryopant machinery and Tokamak complex outages)
- **New Disciplines involved:** plant outage management, pulsed Systems (pre-Nuclear) maintenance, ...

2. Main disciplines landscape

Non core activities

Core activities

Specialized activities



3. Global Maintenance Service Contract (GMSC) principles

- Maintenance of all components turned over to Operations
- Excluding design modifications / upgrades
- General coordination of all involved disciplines and contractors
- Coordination, supervision and receiving all the sub-contracted activities
- Based on obligation of results principle
- Strong incentive to propose any upgrade or modification in order to optimize components safety, reliability or integrity level or make maintenance in more efficient way

3. GMSC scope of work (1/2)

SCWS and Cryoplant maintainable components quantities *

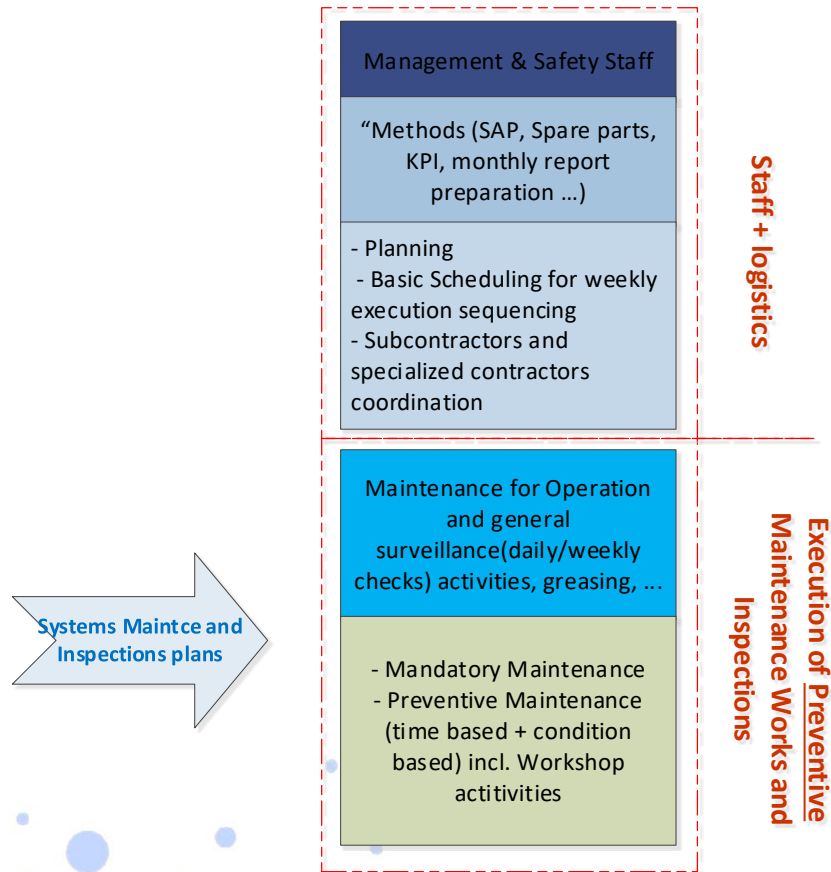
Mechanical/Metal	Rotating equipment	100 pumps
	Static equipment	250 heat exchangers
		250 vessels/tanks
	valves	9000 manual valves
		1000 safety valves

Elec LV / Instrumentation	Instrumentation / valves	900 control valves
		2500 sensors
	Electricity LV	100 variation frequency drives
		100 electrical motors
	Analyzers	50 analyzers

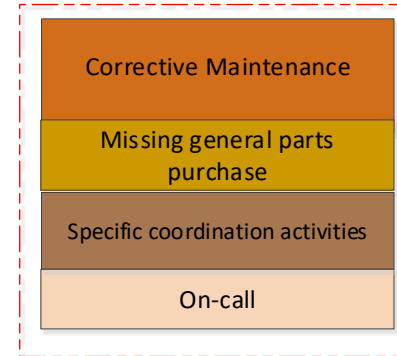
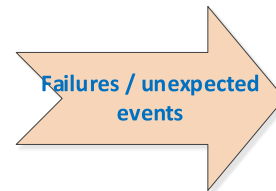
(*) Orders of magnitude at 2025-26 horizon

3. GMSC Scope of Work (2/2)

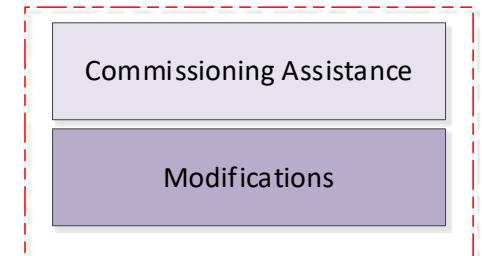
Fixed / Variable Scope



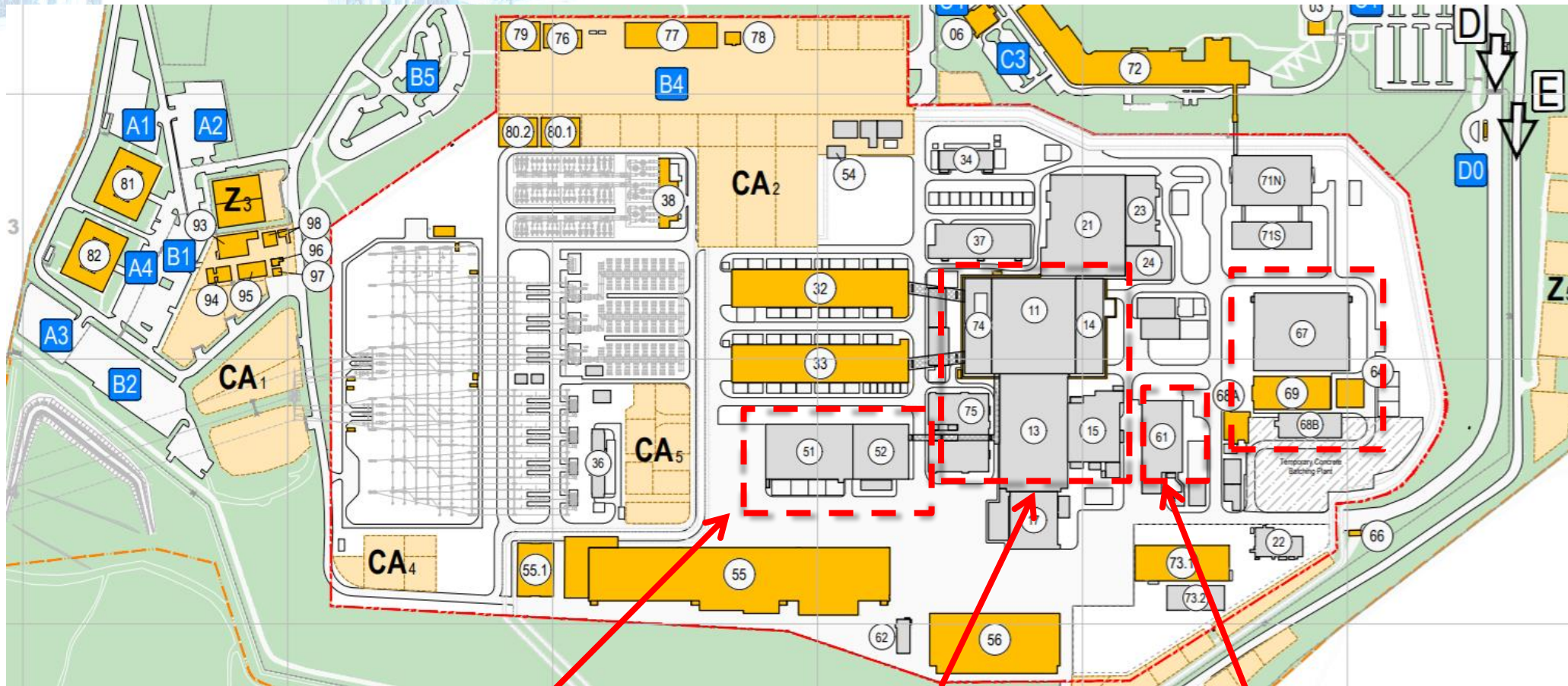
Variable Scope



Specific Orders



3. GMSC Geographical Perimeter



Cryoplant

Tokamak

Secondary Cooling
Water System

- Cooling water system
- Diagnostics
- ECHD
- ...

3. GMSC Procurement Options under review

Procurement Option 1

Non core activities

- Scaffolding
- Insulation
- Lifting
- ...

Shared services
contractors (tbd)

Coordi
nation

Mechanical & Metallurgy

- Preventive Maintenance on :
- Static equipment (piping, vessels, relief valves, ...)
 - Rotating equipment (pumps, compressors, ...)
 - ...

Fitters
Welders
Mechanical specialists
Manual Valves specialists
...

Electrical LV and Instrumentation

- Preventive Maintenance on :
- 380V, 220V, 48V, 24V
 - Electrical equipment (LV motors, cabinets, breakers ...)
 - Instrumentation (sensors, control systems, safety systems, ...)
 - HVAC
 - ...

Electricians
Instrumentation technicians
HVAC Technicians
Control Valves specialists
...

Non conventional / very specific components

Technically specific
equipment
(RPC, Cryoplant LHe
compressors, ...)

Specialized contractors

Coordi
nation

First of a kind
equipment
(ECH, Diagnostics, ...)

Original Manufacturers

Coordi
nation



3. GMSC Procurement Options under review (Option 1)

- **2 contracts covering Maintenance of all continuous plant systems conventional components:**
 - * one for Metal/Mechanical discipline
 - * one for Elec LV/Instrumentation discipline
- Some other contracts for specialties (e.g. Elec HV, CPS ...) to be tendered separately
- With central coordination and contract management by IO
- Contracting strategy for non core services to be defined

3. GMSC Procurement Options under review

Procurement Option 2

Non core activities

- Scaffolding
- Insulation
- Lifting
- ...

Shared services
contractors (tbd)

Coordination

Mechanical & Metallurgy

- Preventive Maintenance on :
- Static equipment (piping, vessels, relief valves, ...)
 - Rotating equipment (pumps, compressors, ...)
 - ...

Fitters
Welders
Mechanical specialists
Manual Valves specialists
...

Electrical LV and Instrumentation

- Preventive Maintenance on :
- 380V, 220V, 48V, 24V
 - Electrical equipment (LV motors, cabinets, breakers ...)
 - Instrumentation (sensors, control systems, safety systems, ...)
 - HVAC
 - ...

Electricians
Instrumentation technicians
HVAC Technicians
Control Valves specialists
...

Non conventional / very specific components

Technically specific
equipment
(RPC, Cryoplat LHe
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Specialized contractors

Coordination

First of a kind
equipment
(ECH, Diagnostics, ...)

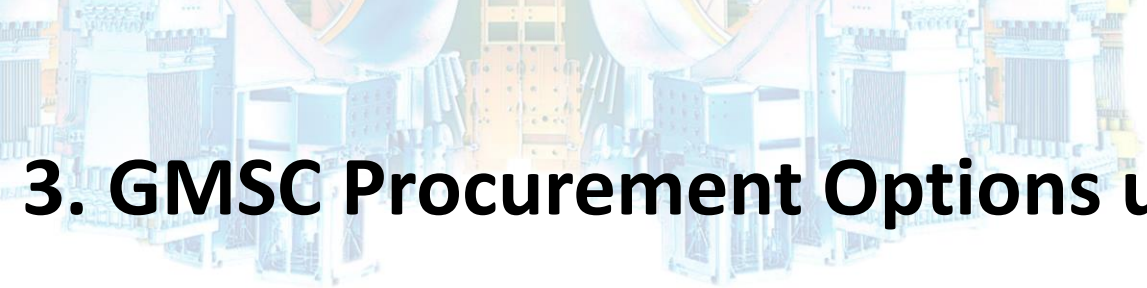
Original Manufacturers

Coordination



3. GMSC Procurement Options under review (Option 2)

- **Only 1 main contract** covering Maintenance of **all continuous plant systems conventional components** and **all disciplines** incl. centralized SHS and maintenance engineering/method coordination
- With central Master scheduling & coordination entity and contract management by IO
- Some other contracts for specialties (e.g. Elec HV, CPS ...) to be tendered separately.
- Contracting strategy for non core services to be defined.



3. GMSC Procurement Options under review

For both Options 1 and 2

- IO will place Framework Contract(s) where the volume will be discussed on annual basis.
- The scope of the Framework Contract(s) will include the activities in Slide 15.

4. Operation and Maintenance of Buildings, infrastructures & services

Scope of work definition

- 75 ha, ~35 buildings (Administrative, Warehouses, Technical)
- Areas under decree 92-158 and 94-1159
- **Technical scope part A - Buildings :**
 - Electrical Networks:
 - Other Networks :
 - Hydraulic (Water/ Gas)
 - HVAC systems (Chillers, heat Pumps, boilers, Air Handling Units)
 - Building structures,
 - Motorised doors and gates, Lifts
 - Handling Equipment
 - Site infrastructure
 - Transversal task (On-call service, Analysis and Reporting)

4. Operation and Maintenance of Buildings, infrastructures & services

- **Technical scope part B - Hydraulic networks and infrastructure**
 - Pressurised hydraulic and drainage networks
 - Sewage & Industrial Drainage treatment, Demineralized Water Production
 - Transversal tasks (On-call service, Pollution / flooding management)
- **Technical scope part C - Soft Facility services and Waste management**
 - Building Cleaning, Pest Control, Green areas, snow removal
 - General services (Ticket management, call centre, Consumables distribution, Office relocation, Vehicle fleet & key management)

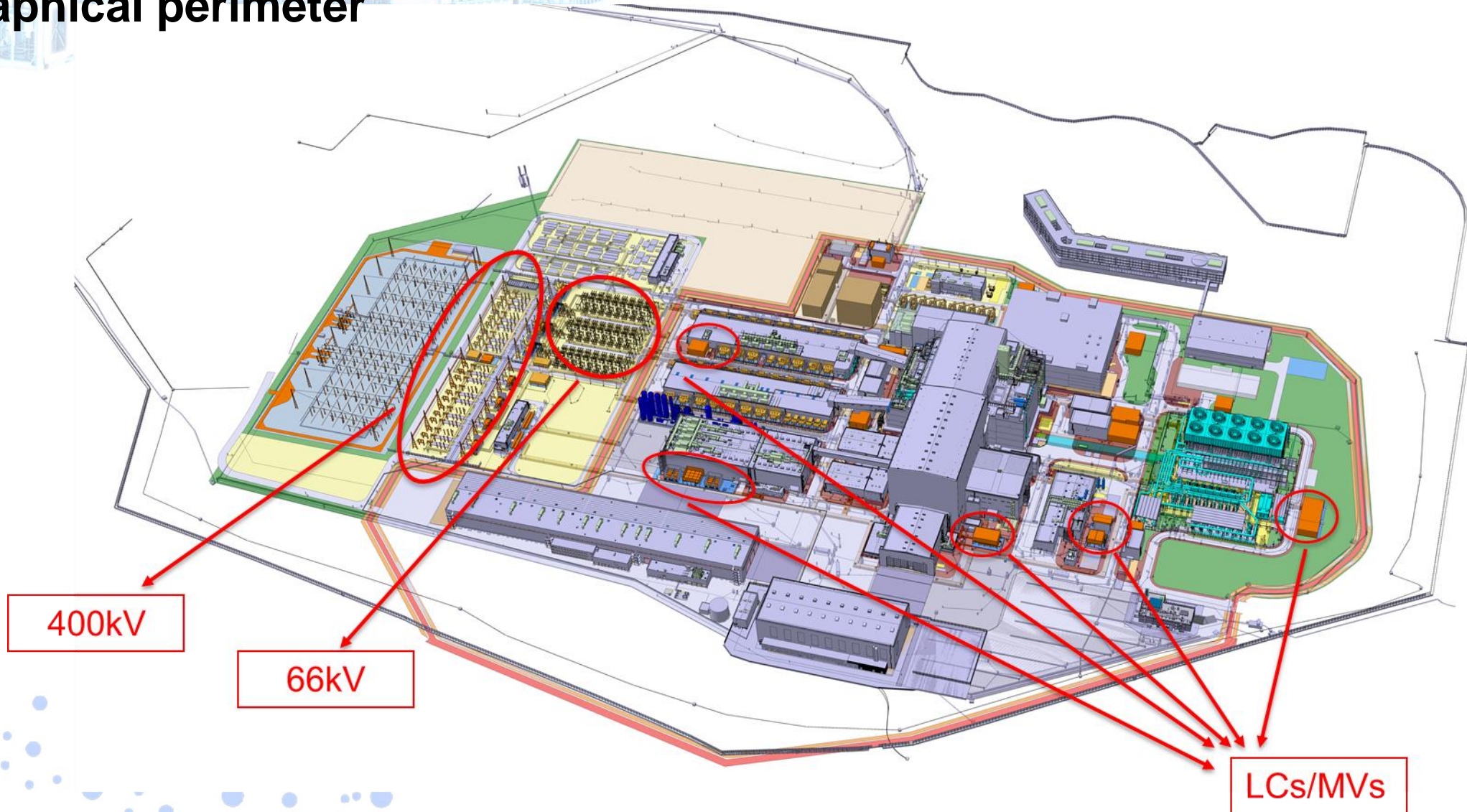


5. Operation and Maintenance of site electrical distribution

- Out of scale electrical distribution system
- 7 interfaces points with French grid at 400kV
- Two main distribution systems (SSEN and PPEN)
- Areas under decree 92-158 (outside de platform, 15kV distribution)
- Areas under decree 94-1159 (worksite platform)
- ICPE installations

5. Operation and Maintenance of site electrical distribution

Geographical perimeter



5. Quantitative Description of Steady State Electrical Network (SSEN)

- 4 bays at 400kV (Transformers 60MVA)
- 8 switchboards at 22kV with 80 feeders (primary distribution)
- 30 km of cables
- 10 Loads centres (22kV/400V)
 - More than 30 dry type transformers (1.6 or 2.5MVA)
- 6 MV switchboards (22kV/6.6kV)
 - 8 Transformers 35MVA / 4 transformers 7MVA
 - More than 180 cabinets (6.6kV, fuse contactors or breakers)
 - RPC system installed on each busbar
- 2 MV transformers 22kV/15kV 7MVA and associated switchboards
- Control & monitoring system based on IEC61850 and PLCs
- 15kV distribution
 - 20 Load centres (15kV/400V)
 - 20km of cables



5. Quantitative Description of Pulsed Power Electrical Network (PPEN)

- 3 bays at 400kV (300MVA transformers)
- 3 Busbar at 66kV with 30 feeders
 - Disconnectors
 - Breakers
 - Current Transformers
 - Potential Transformers
- 3 switchboards at 22kV with 45 feeders
- 40 km of cables 66kV
- 30 km of cables 22kV
- Complete control & monitoring based on IEC61850 protocol

5. Electrical Power distribution O&M contract Scope of Work

PPEN & SSEN

- Maintenance of HTB components
- Maintenance of HTA components
- Maintenance of LV components and infrastructures (HVAC, auxiliaries, etc..)
- Site infrastructure (Electrical galleries, manholes, substation fences and gates)
- Support to IO Electrical Operator responsible for HV manoeuvres
- Systems monitoring based on IEC61850 tools
- Transversal task:
 - On-call service, management of maintenance schedule, energy reporting, procedures
 - Documentation update
 - Regulatory control management, Synthesis, Analysis and Reporting
 - Support to permits to work management related to electrical systems
 - Systems monitoring based on IEC61850 tools and SIEMENS PLCs

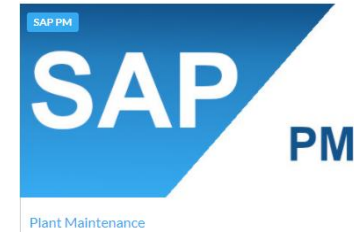
5. Electrical Power distribution O&M contract Scope of Work

15kV temporary work site distribution

- Maintenance of HTA components
- Maintenance of LV components and infrastructures (HVAC, auxiliaries, etc..)
- Site infrastructure (Electrical galleries, manholes, ...)
- Systems monitoring based on PLC system
- Transversal task:
 - On-call service, management of maintenance schedule, procedures
 - Regulatory control management, Synthesis, Analysis and Reporting
- Operator of 15kV loop
 - Loop configuration according the different needs
 - LOTO management
 - Energy management

6. CMMS used for the management of Maintenance activities

SAP PM functional scope implemented so far and then applicable to Maintenance work management process



Operation

- Work request workflow
- Corrective work orders
- Preventive maintenance plans
- Inspection
- Tools management
- Work Planning and Scheduling
- Workflow by roles
- Maintenance cost accounting
- Link to Document management

7. Schedule

- **Global Maintenance Services Contract(s) for Mid term period**
 - Request For Information (RFI) within one or two weeks after RIMB
 - Call For Tender (CFT) initiated in Q4 2021
 - **Operation and Maintenance of Infrastructures and Buildings Contract**
 - CFT initiated between Q3 2021 and Q3 2022
 - **Operation and Maintenance of Electrical Power Distribution Contract**
 - CFT initiated between Q3 2021 and Q3 2022
- Strategy on conflict of interest will be developed along with the procurement strategy for each contract**

8. Next steps

- Objective of RFI for GMSC :

Preferred Option 1 or 2 with justifications and values of the selected Option

- Contact : Yo Maeda (Yo.Maeda@iter.org) if you are interested in participating in RFI