FUSION FOR ENERGY

Quality Assurance and Nuclear Safety Essentials for SMEs

SME Day

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Fusion for Energy, Barcelona, Spain

Safety & Quality Unit

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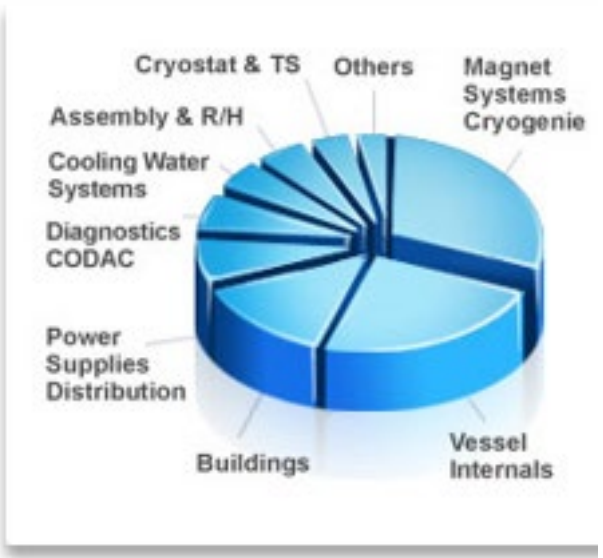
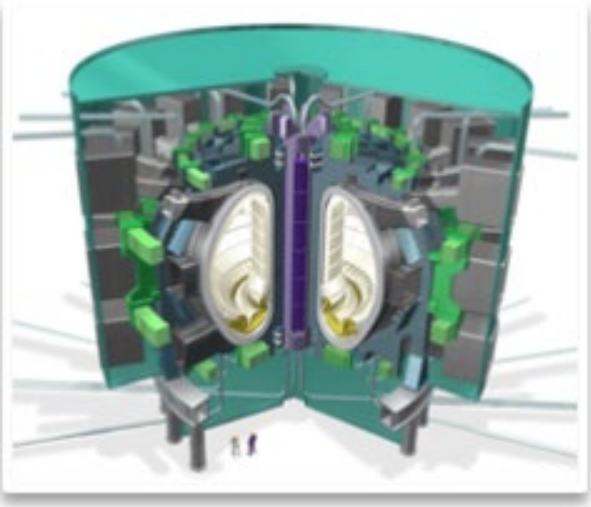
CONTENTS

F4E mission and vision

1. **Delivery of fusion projects (ITER, DONES, JT-60A, ...)**
2. **Development of fusion talent and knowledge**
3. **Development of EU supply chain**



Europe is the **main contributor** and provides about half of the components



F4E works with **EU industry, SMEs and esearch centers** to design and manufacture components

ITER project – Objectives

- ✓ Prove the scientific and technological viability of controlled fusion
- ✓ Demonstrate the safety characteristics of a fusion device

INB

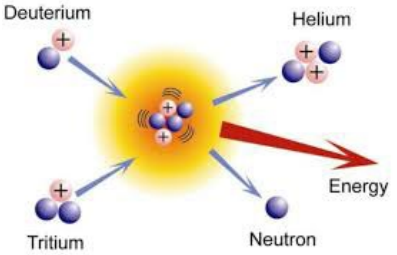
stands for

Installation Nucléaire de Base

asn

ITER will be the first fusion device to be licensed, designed and operated

in a nuclear environment.



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ITER: a nuclear project

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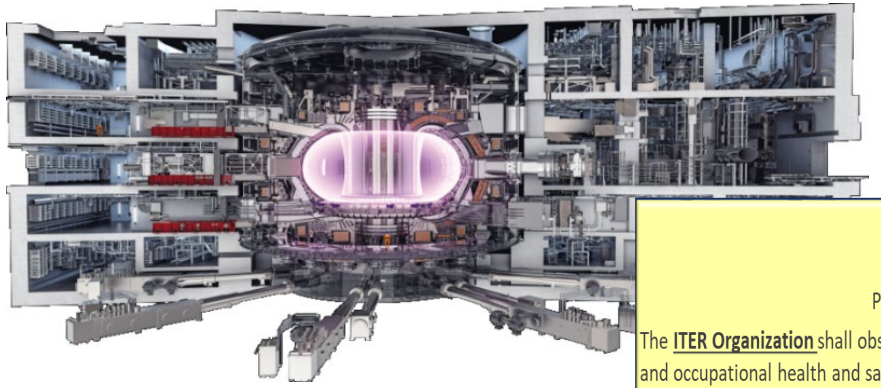
❶ ITER Agreement in 2007 – 7 partners
Article 14: ITER shall observe French law



ITER Agreement

Article 14

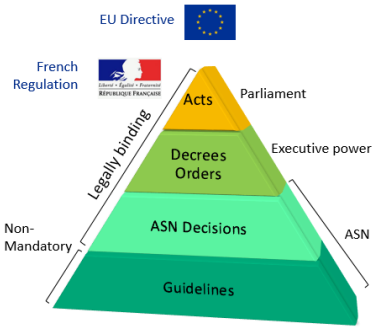
Public Health, Safety, Licensing and Environmental Protection

The **ITER Organization** shall observe **applicable national laws and regulations of the Host State** in the fields of public and occupational health and safety, **nuclear safety, radiation protection, licensing, nuclear substances, environmental protection** and protection from acts of malevolence.

❷ ITER is a nuclear installation under French Law
→ French regulator = ASN

INB
stands for
Installation Nucléaire de Base

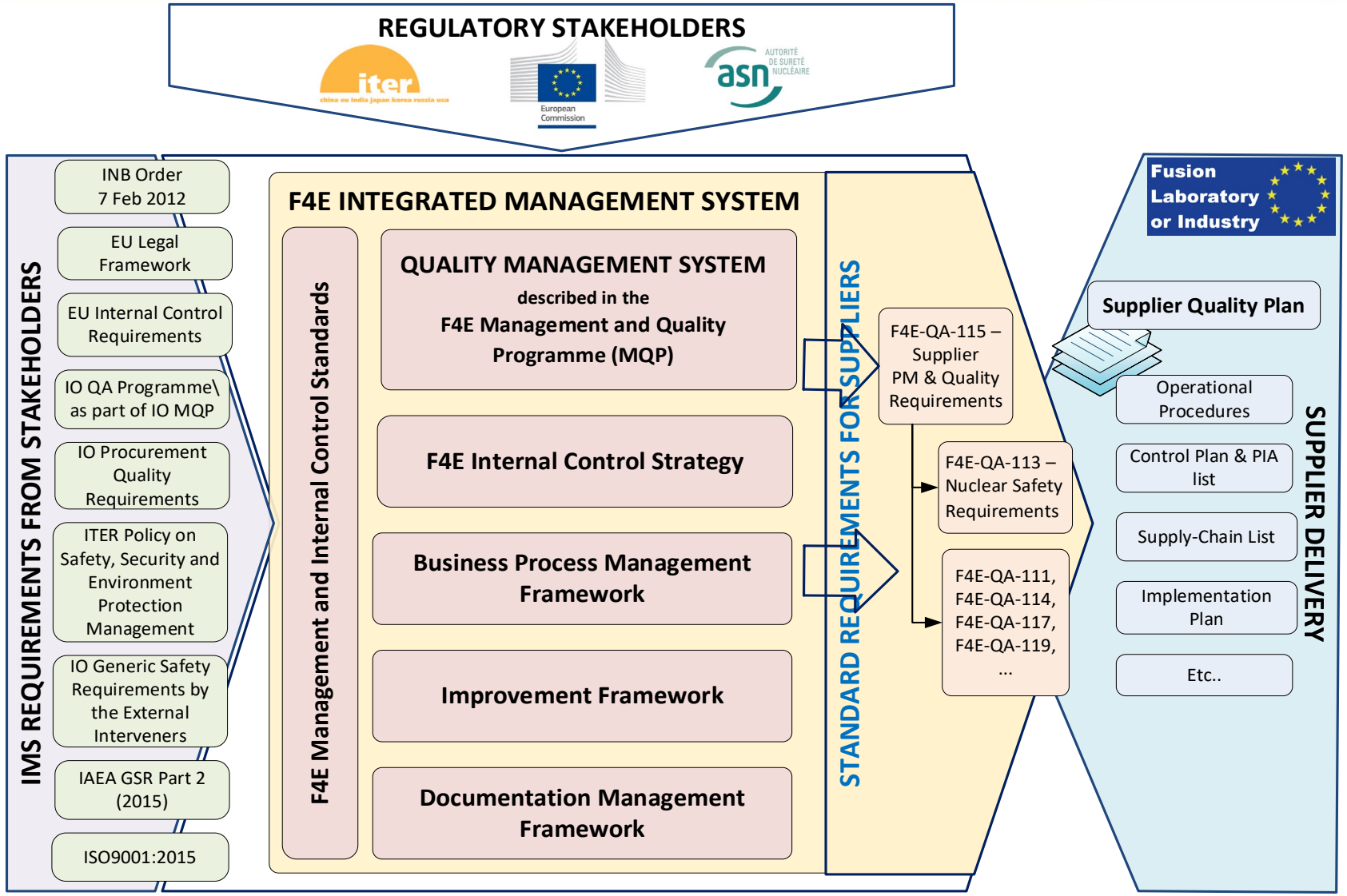
❸ French nuclear regulation is applicable to ITER Organization, Fusion for Energy and its chain of suppliers
(for systems and buildings with safety role)



F4E: what it is and what it is not

What F4E is	What F4E is not
External intervener	Nuclear operator
Procurement Agency	Engineering company Manufacturer
Publicly funded and European Organization	Private company

F4E Integrated Management System



Integrated Management System is the vehicle to receive, assess and convey the requirements into the supply chain.

Propagation of Requirements

Top Level
F4E QA Program for ITER Project

Procurement Arrangements (PA)
- **Annex A (Mgmt Specs)**
- **Annex B (Tech Specs)**

Procurement Arrangements (PA)
- **Project Management Plan**
- **Quality Plan**

Other Requirements:
- RCC-MR
- ASME VIII
- ITER Vacuum Handbook
- ESPN Order
- EU Regulations
- …

Public Procurement

Contract
- **Annex A (Mgmt Specs)**
- **Annex B (Tech Specs)**

INDUSTRY

Contracts

Supplier A | **Supplier B** | **Supplier C**

Subcontractor A1 | **Subcontractor A1** | **Subcontractor C1**

Subcontractor A1X | **Subcontractor A1Y**

Supply Chain shall demonstrate compliance with contractual requirements

F4E Contractors Compliance / Supplier monitoring

F4E

F4E Standard

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F4E-QA-115
Supplier PM&QA Requirements
Compliant with French Authority Regulations and ITER QA Program

Quality Class, NS Class,…

Contract Specification fitting to purpose

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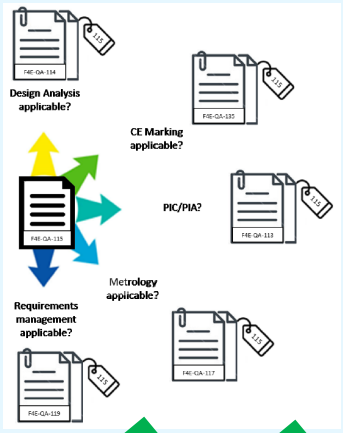
Contract Annex A
Compliant with French Authority Regulations and ITER QA Program



Plan Quality

Risks & Opportunities

Lessons Learned

Contractual Requirements

Suppliers

Contract implementation

Annex A deliverables:

- PQMP - Quality Plan
- Control Plans MIP and MCP
- Supply Chain Acc. Reg.
- Risk register
- Time schedule
- Configuration & Documentation list
- SQEP…etc.
- Subcontractors PQMP, MIPs,…

Independent control: QUALITY AUDIT

Supervision level 0: Continues monitoring

Supervision level 1: Quality Inspectors

Supervision level 2: Supplier onsite supervision

Supervision level 3: Product assessment

F4E Contracts - Quality Classification & Graded Approach

- Defining Quality Classes is a function of System Structure Component (SSCs) affecting quality, performance, cost or reliability of the ITER facility and classified as Nuclear Safety Important (PIC/SIC), Safety Relevant (SR) and Non Safety Related (NSR).

- Items may belong to one of Quality Classes (1, 2, 3 or 4) and the factors to be considered when assessing potential quality class are:
  - Failure Consequence Factors:
    - Functional & operational;
    - Environment, industrial safety and health;
    - Cost /Schedule Impacts
    - Compliance with applicable laws and regulation.
  - Failure Probability Factors:
    - Other Classifications (safety class, vacuum class, tritium class, seismic class etc.)
    - Design complexity;
    - Complexity of manufacturing process.

Example	QC1	QC2	QC3	QC4
Management Reqs	A	A	A	A
Design Requirements	A	A	PA	NA
…	A	PA	PA	NA
…	A	PA	NA	NA

Procurement and selection process

1/ Pre-procurement analysis to adapt selection criteria

All contracts

QA CRITERIA

STEP 1: Selection phase (assess tenderers capacity Y/N ?)
Criteria = Quality Management System

STEP 2: Award phase (QA=x% of total)
to assess the merits in relation to QA requirements

Only contracts with nuclear safety related activities

NS CRITERIA:

STEP 1: Selection phase (assess tenderers capacity Y/N ?)

3 possible technical capacity criteria
1. **Heritage / experience** in past projects
2. **Profiles** with nuclear safety expertise / competency
3. **Management system**

STEP 2: Award phase (NS=x% of total)
to assess the merits in relation to NS and QA requirements

Safety and quality management requirements
What does it entail to become a supplier for the ITER project?

The SQ Unit is here to provide support.

F4E supplier for the ITER Project

- Regulatory compliance and strong oversight
- High commitment to safety and quality
- Advanced quality assurance and testing/ qualification
- Extensive documentation and traceability
- Workforce training and qualification

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Thank you for your attention

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