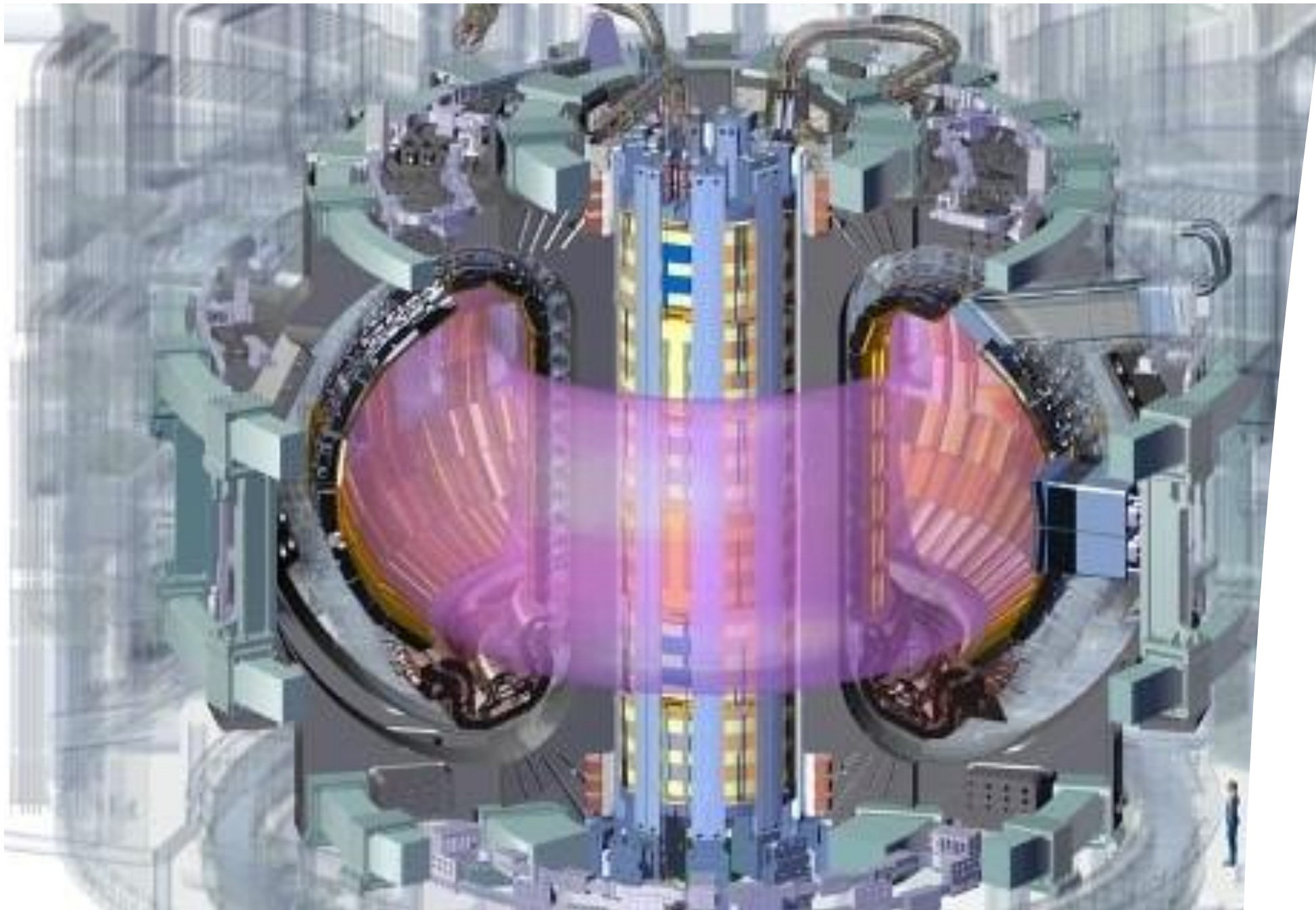


# THE ITER PROJECT

## *PROGRESS AMID CHALLENGES*

**Pietro Barabaschi**, ITER Director-General  
4<sup>th</sup> Forum Fusion Germany  
7 December 2023





## ITER's Mission

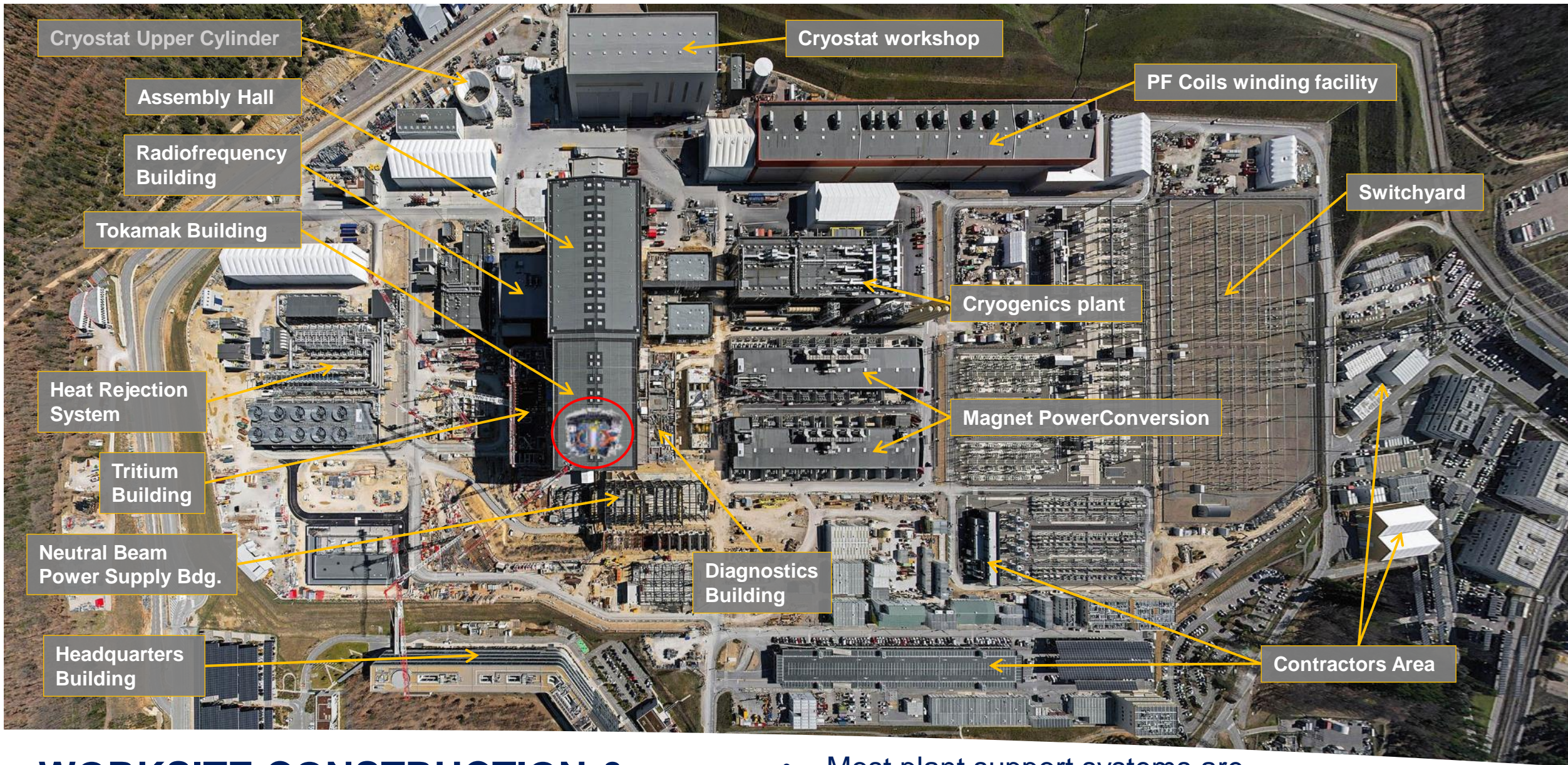
Scientific and technological feasibility of fusion

Burning plasma

Tritium breeding

$Q \geq 10$

To demonstrate the safety characteristics of a fusion plant



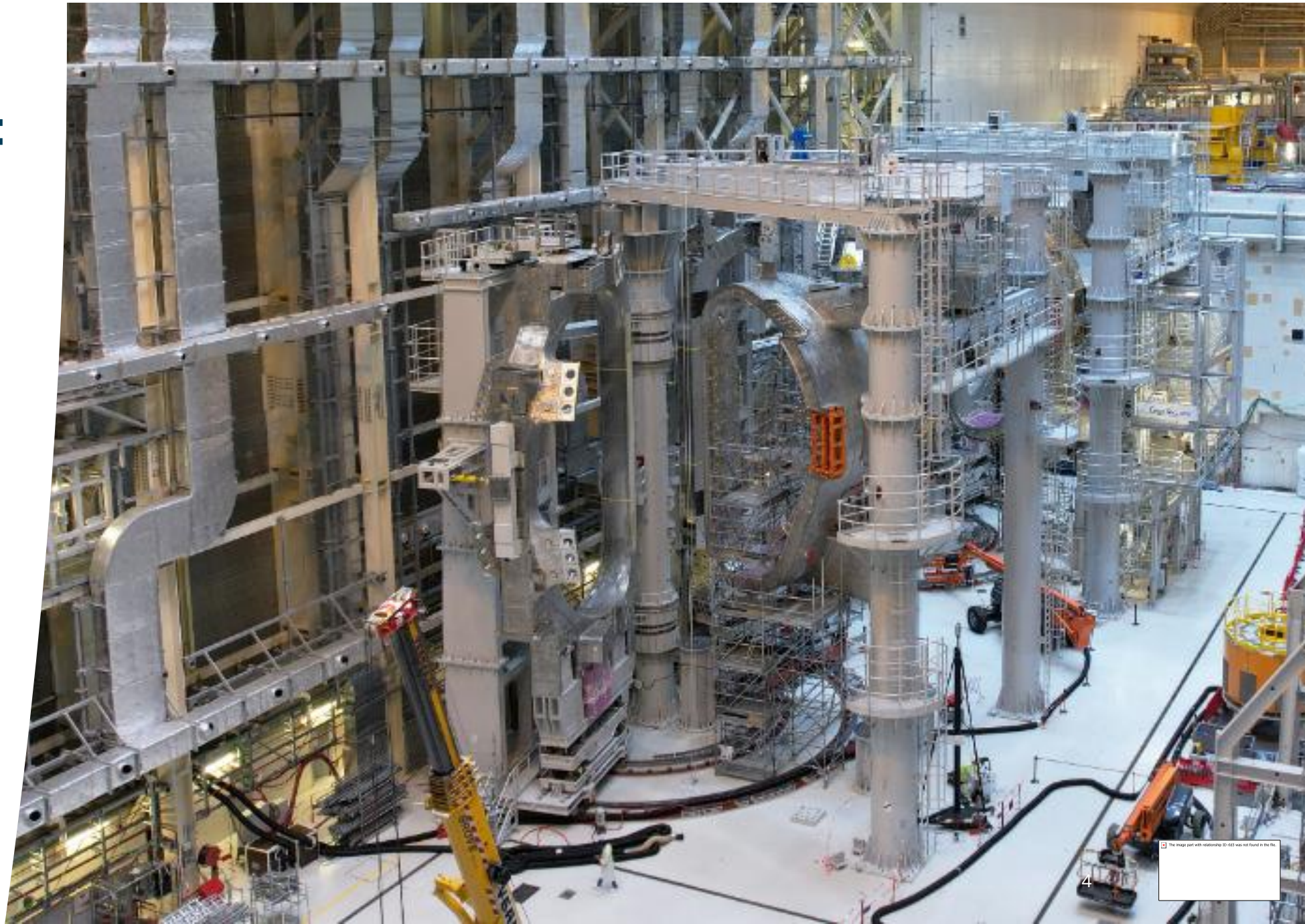
# WORKSITE CONSTRUCTION & COMMISSIONING HIGHLIGHTS

- Most plant support systems are operational or in commissioning.
- Civil works are **80% completed**.

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# ASSEMBLING THE MACHINE: *ITER Assembly Hall*

September 2023



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# TOROIDAL FIELD COILS

- 18 coils
- 41 gigajoules
- 11.8 Tesla

Each coil:

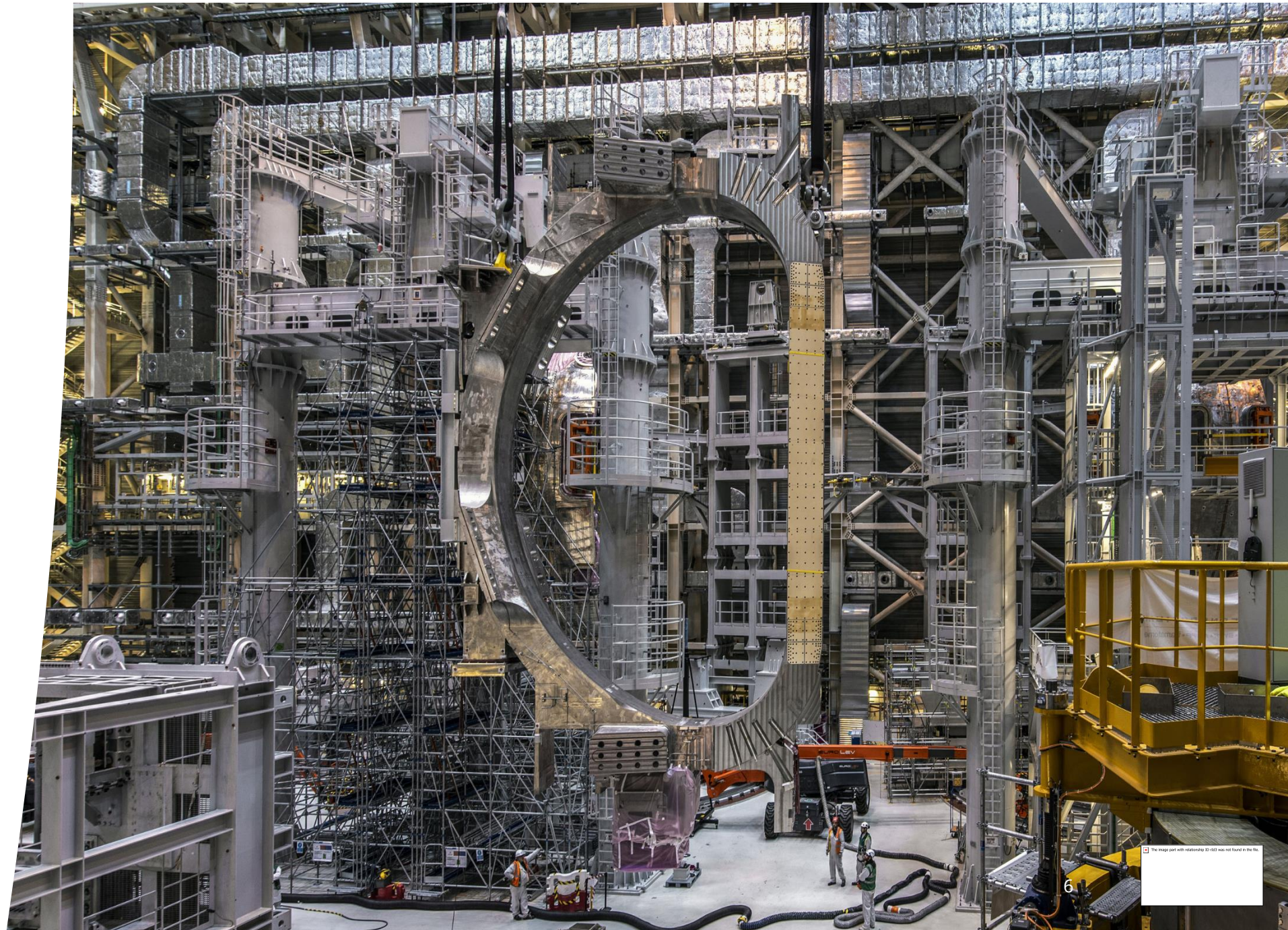
- 360 tonnes
- 9 x 17 metres

## Status:

Manufacturing of all 19 coils **completed**.

17 coils already onsite

#18 and #19 are in transport



# CRYOGENIC PLANT

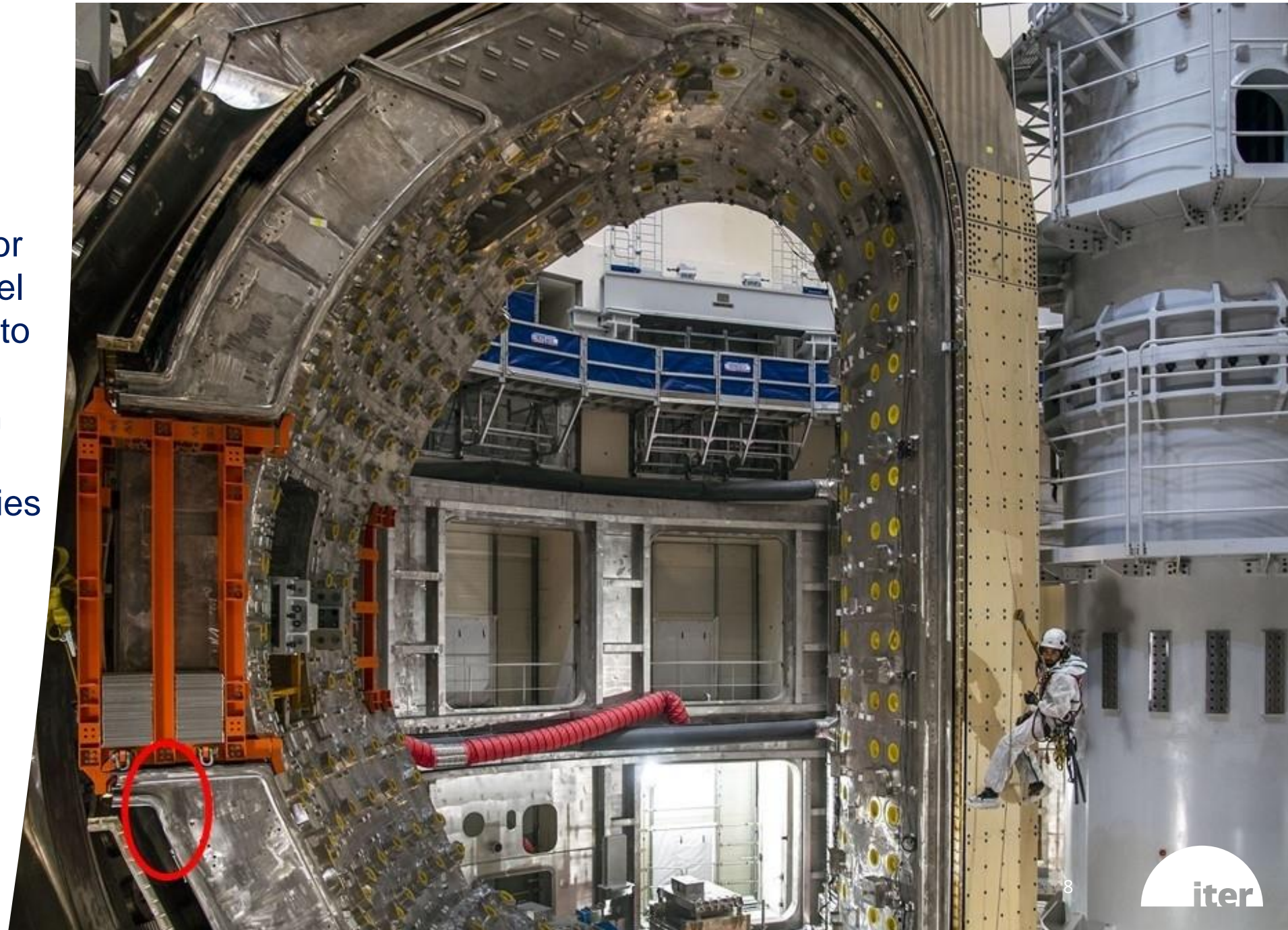
75kW @ 4 Kelvin

Equipment installation is **complete**, and has entered **pre-commissioning phase**.

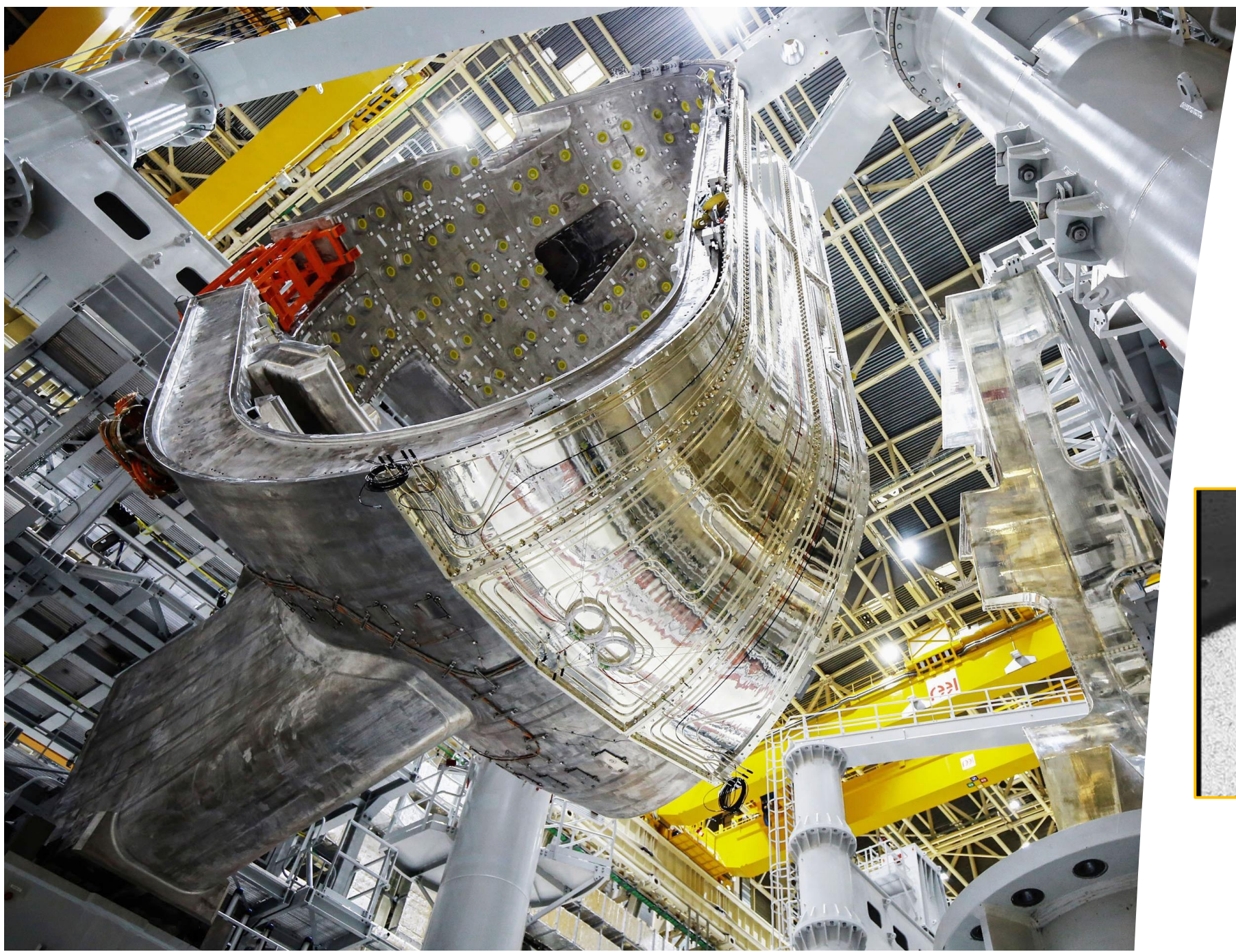


# CHALLENGES OF FIRST-OF-A-KIND COMPONENTS

... but the sector-to-sector welding of Vacuum Vessel sectors was reassessed to be too challenging to perform *in situ*, based on the previously identified geometric non-conformities in the field joints.

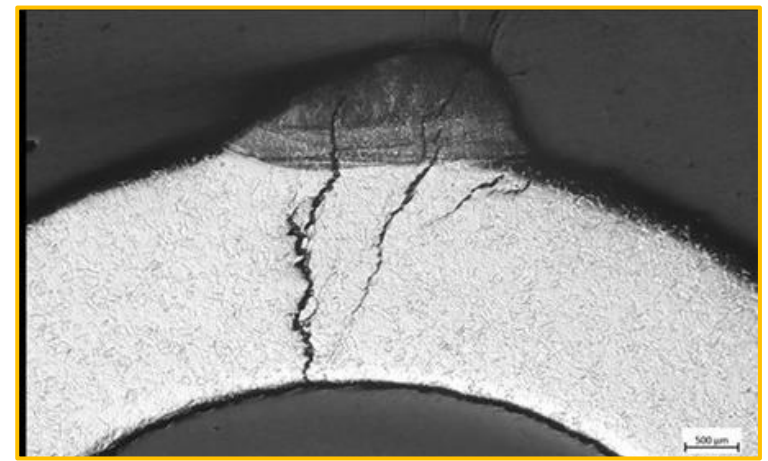






## CHALLENGES OF FIRST-OF-A-KIND COMPONENTS

Leakage was also identified in thermal shield cooling piping due to chloride stress corrosion.



## PREPARING AN UPDATED BASELINE by Mid-2024

The current ITER cost and schedule “baseline” was set in 2016. A review of the baseline is underway, and a new baseline proposal will be presented to the ITER Council in 2024.

Overall objective: to achieve  $Q=10$  as soon as possible, with a realistic plan that includes mitigation of risks where possible.



# GLOBAL FUSION R&D: A SHARED GOAL

100+ PUBLIC & PRIVATE PROJECTS

**National Ignition Facility, USA:**  
*Inertial confinement*



**Wendelstein 7-X, Germany:**  
*Stellarator*

**Commonwealth Fusion, SPARC, USA:**  
*Smaller tokamak*



**Tokamak Energy, UK:**  
*Spherical tokamak*

## THE “JOINT NARRATIVE”: re-articulating ITER’s mission

*...in the context of the global fusion innovation program*

- Many characterize the current state of fusion as a “competition” between public fusion R&D (e.g., ITER) and the emerging private sector initiatives.
- In reality, fusion development requires an innovation program – which, optimally, is a public-private collaboration.
- ITER remains essential at this program’s core: the convergent “national lab” for all involved, enabling repeatable experiments, long-term testing.
- The private sector offers small scale, agile, initiatives:
  - Enabling technologies (e.g., better Magnets)
  - Understanding of plasma physics (e.g., shape effects, burning plasma)
  - New materials resistant to 15MeV neutron irradiation
  - Foster innovation and exploration of new concept ideas (often with higher risk of failure)
- The need (extremely valuable): a platform for cross-fertilization.
- Our ambition is for ITER to serve as an “information hub” for global fusion R&D, breaking down research “silos” and consolidating knowledge to drive faster fusion success.



*Fusion development requires an innovation program – which, optimally, is a public-private collaboration.*





Thank you!

