Introduction to the ITER Project

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ITER Organization

ITER

Global challenge, global response

- 28 June 2005: The ITER Members unanimously agreed to build ITER on the site proposed by Europe
- 21 November 2006: The ITER Agreement is signed at the Élysée Palace, in Paris.
- ITER is the worlds largest fusion energy project and one of the largest scientific projects ever (20 bn+ €)

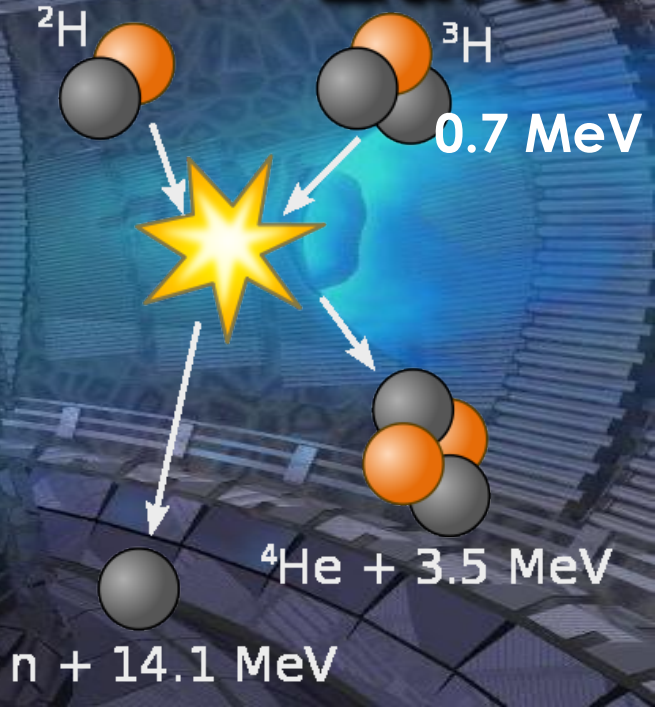
The seven ITER Members represent more than 50% of the world's population and about 85% of the global GDP

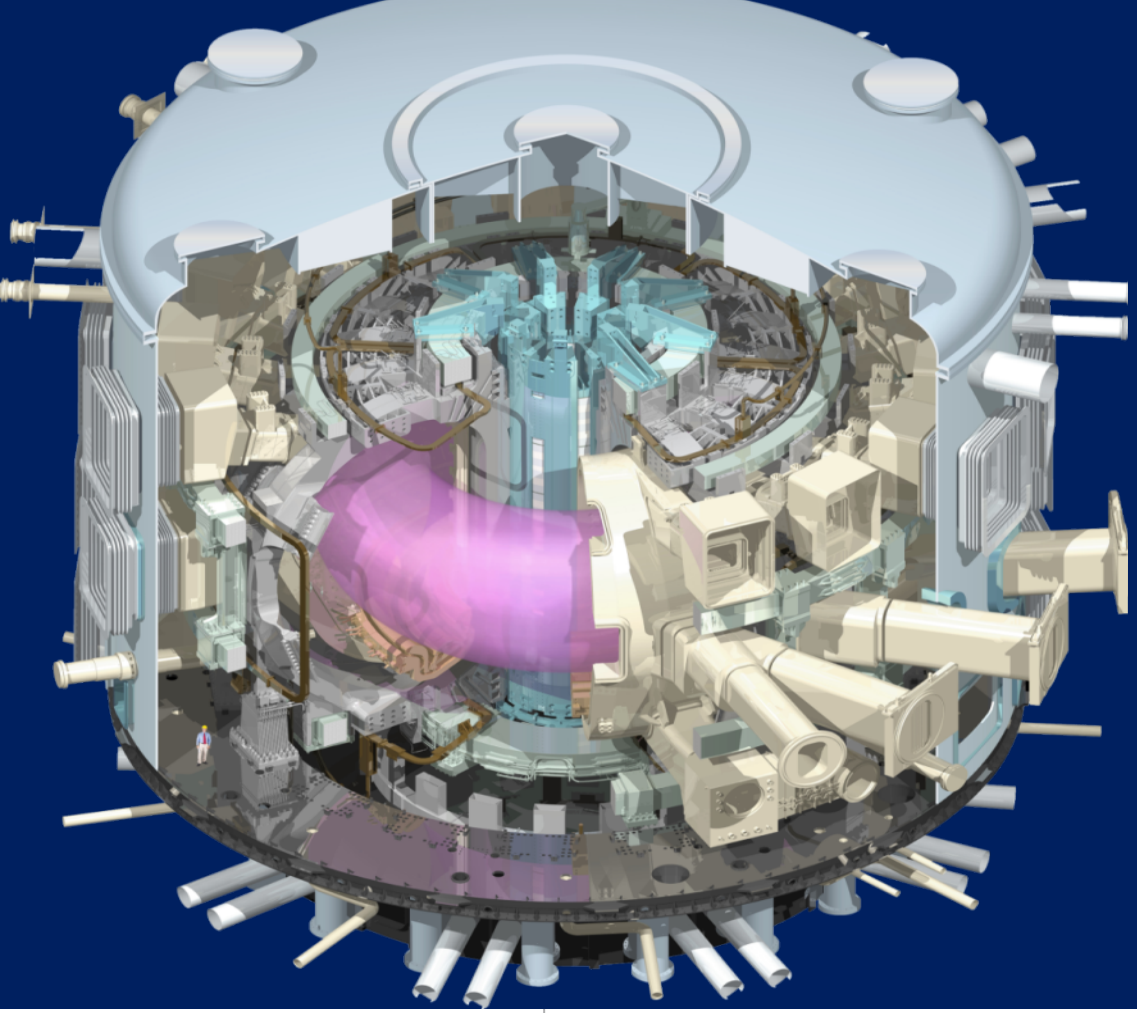
China EU India Japan Korea Russia USA

Fusion on Earth

- A plasma of Deuterium + Tritium (hydrogen isotopes) is heated to more than 150 million °C.
- The hot plasma is shaped and confined by strong magnetic fields.
- Helium nuclei sustain burning plasma.
- Neutrons transfer their energy to the Blanket.
- In a fusion power plant, conventional steam generator, turbine and alternator will transform the heat into electricity.

1 gram of fusion fuels = 8 tons of oil





ITER mission

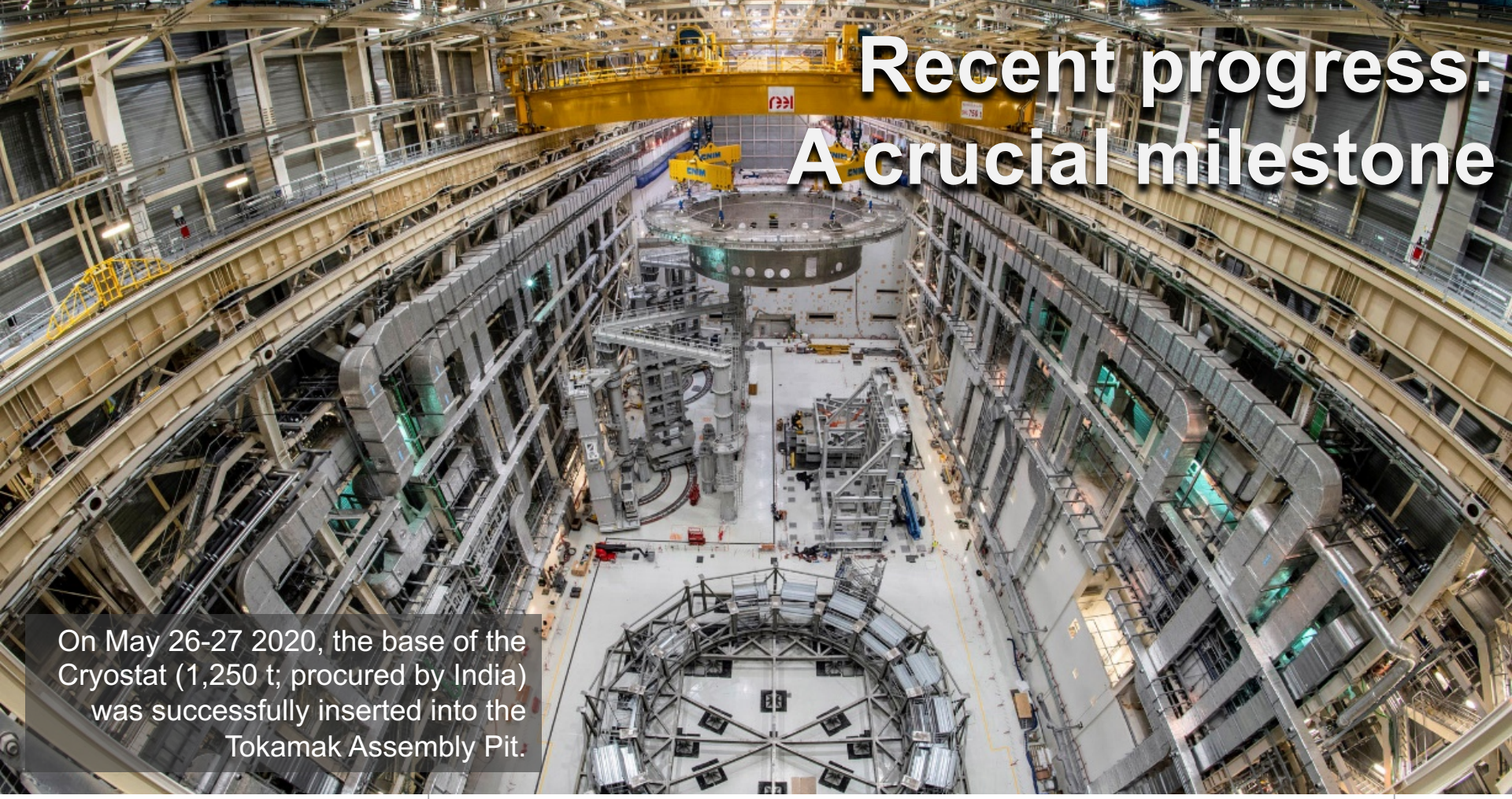
To demonstrate the scientific and technological feasibility of fusion power for peaceful purposes

ITER is the only magnetic fusion device under construction aimed to produce a burning plasma.

Input (heating power): 50 MW

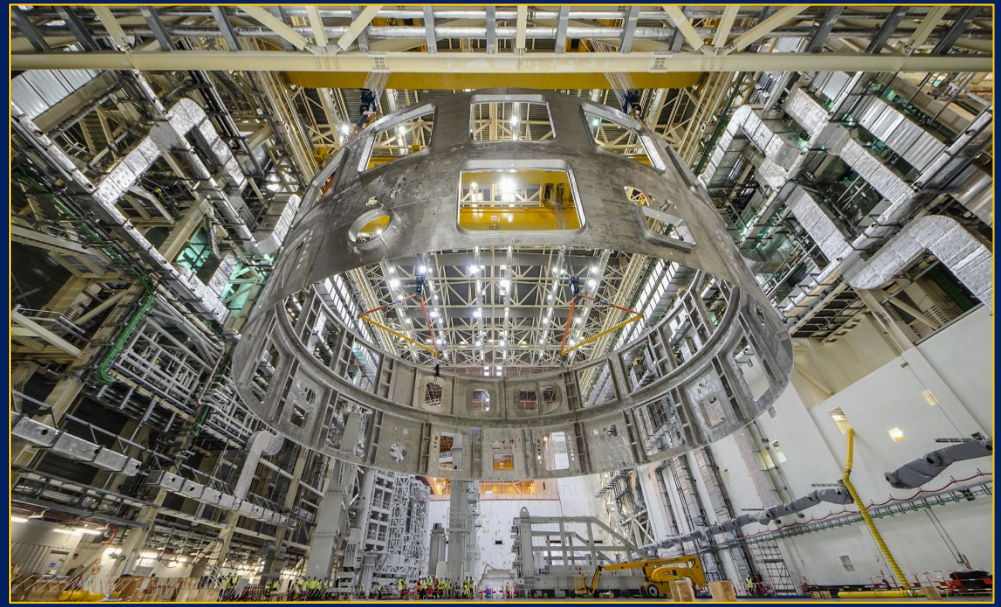
Output (fusion power): 500 MW

Recent progress: A crucial milestone



On May 26-27 2020, the base of the Cryostat (1,250 t; procured by India) was successfully inserted into the Tokamak Assembly Pit.

Recent progress: Lower cylinder insertion



Cryostat Lower Cylinder lift,
31 August 2020

Inserting the Cryostat Lower Cylinder into the Tokamak Pit.
Perfect fit with the Base
31 August 2020


ITER SDCC
Scientific Data & Computing Center

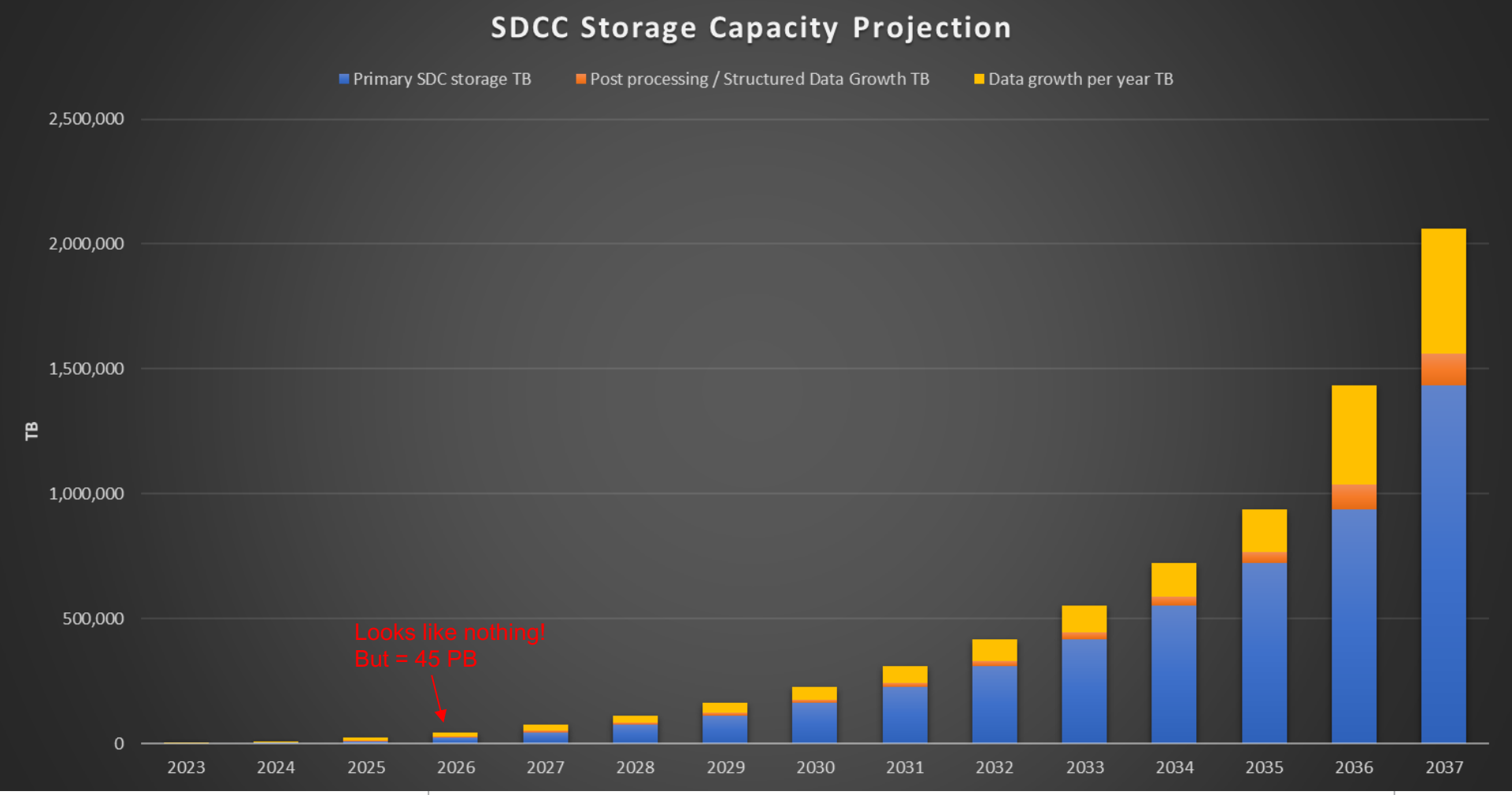
8. ITER SDCC Introduction

- Data is the fundamental deliverable of the ITER project and is its most valuable asset. Securing the engineering and scientific data on/off premises is a Project Requirement.

- The ITER Scientific Data & Computing Center will **store, secure, process and distribute** the vast amount of data produced by the project.

- **Total scientific data rate is expected around 50+ GB/sec, Total scientific archive capacity 90-2200 TB/day.** Data is expected to be in the **Exabyte scale** around 2035

- **The ITER Project Requirements state:**
  - **Scientific and plant data must be stored outside of the INB platform**
  - **Computing resources for data processing must be provided (but no "supercomputer" planned)**
  - **A separate archive must be provided >50 km from the primary storage**



10. Current ITER SDCC/HPC Status

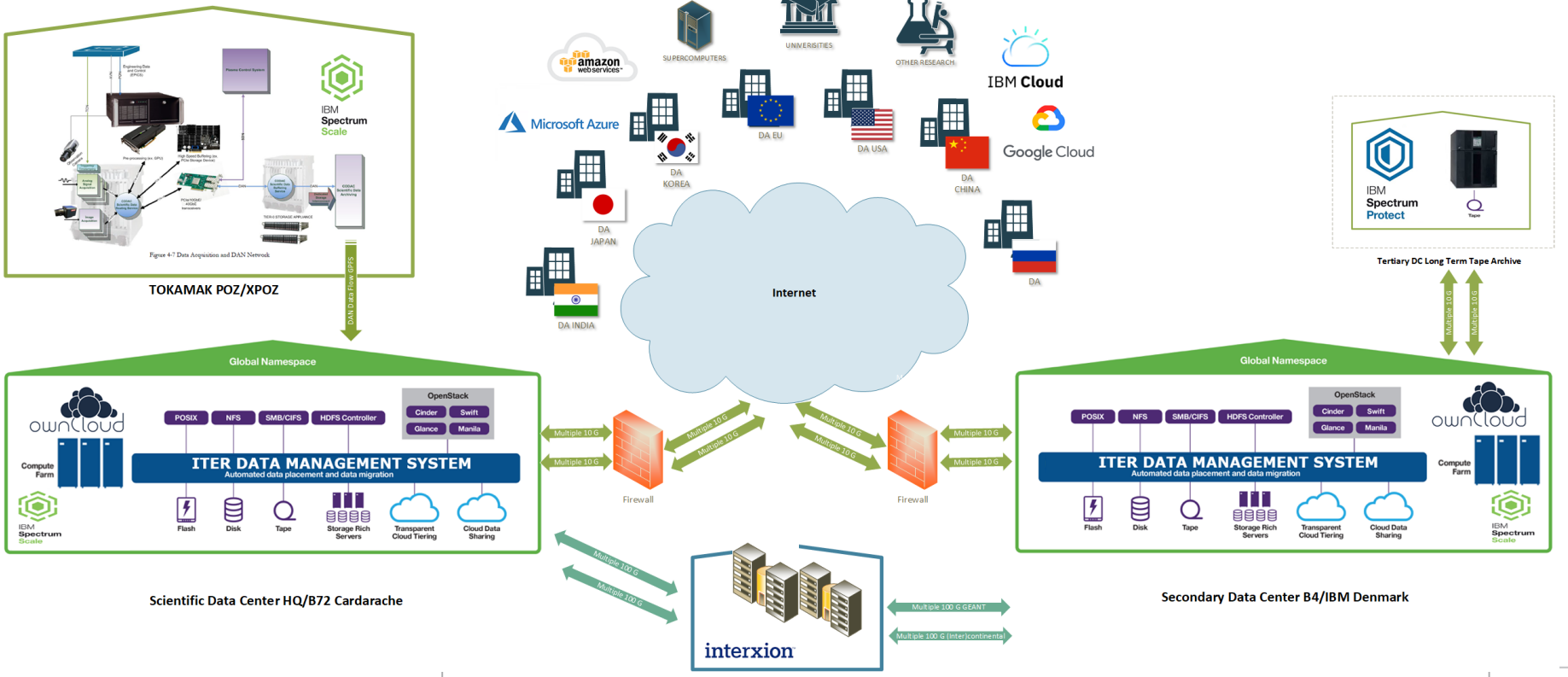
- ITER has several compute clusters to perform computation jobs in domains such as **Neutronics, Physics Modelling, Simulations and Analysis**

- The clusters currently consists of about 7000 cores. Total storage of the ITER project is currently around 4 PB.

- In 2019 ITER implemented a new **IBM Spectrum Scale Storage System** onsite for GPC, HPC and SDCC prototyping applications. The system is also replicating data to an offsite data-center for DR/archiving/distribution.

- The new storage platform has integration to a variety of cloud solutions and multiple protocol support.

11. ITER SDCC Prototype Data Management Overview



12. ITER SDCC Plan and Status

- The SDCC is currently being designed, and construction is to begin in 2022 and expected to finish in 2023. Operation is scheduled for early 2024.
- The overall design is done according to TIER 3 – data center standard (N+1)
- Ongoing projects include:
  - ITER global connectivity via Interxion Marseille -200/400 Gbit initial capacity, scalable to 3/6 Tbit
  - CODAC POZ/XPOZ/SDCC data storage test 2021 (Proof of concept, bandwidth and scalability beyond First Plasma needs)
  - Cloud HPC burst capacity and Cloud Storage Test for long term archive and data distribution – (how to distribute 2 PB of data daily to 7+ partners)
  - External archiving and backup (secondary DC)