L'esperimento DTT e le sue ricadute socio economiche

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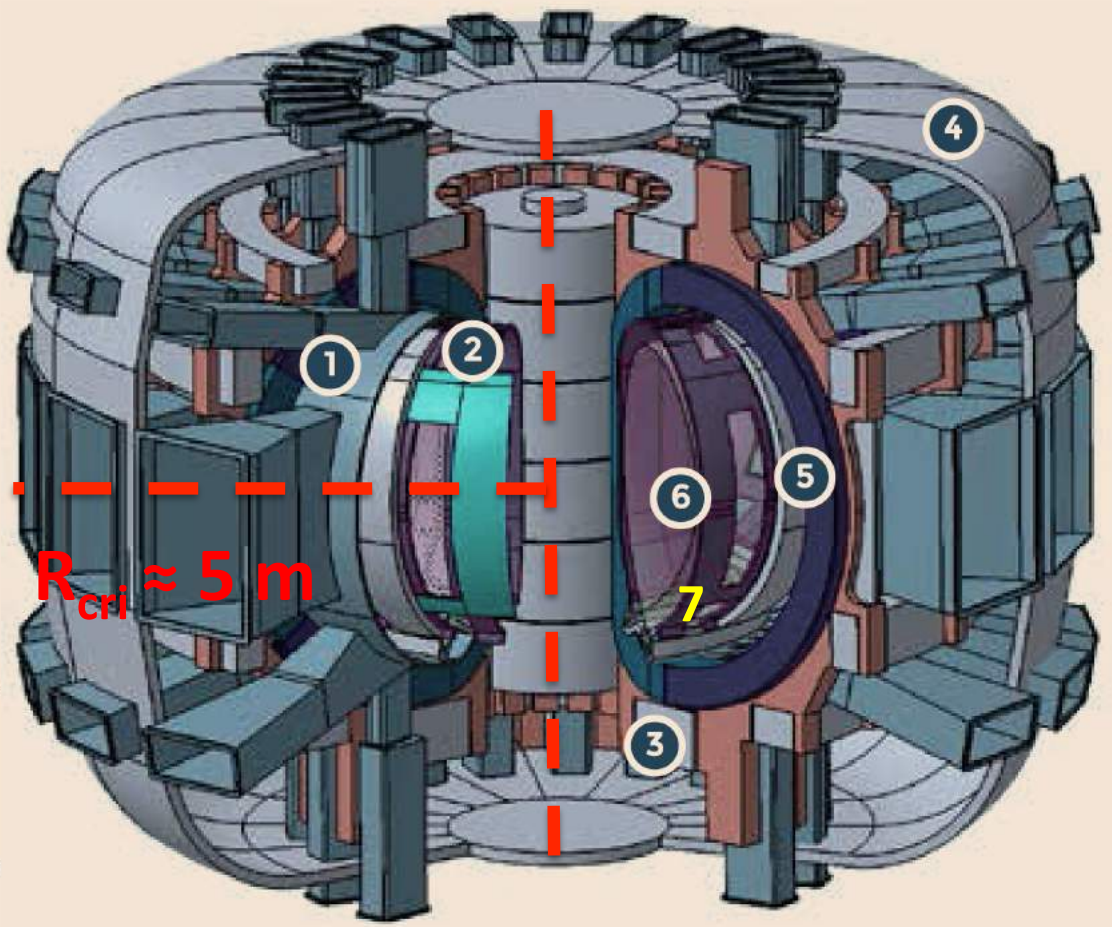
Divertor Tokamak Test Facility

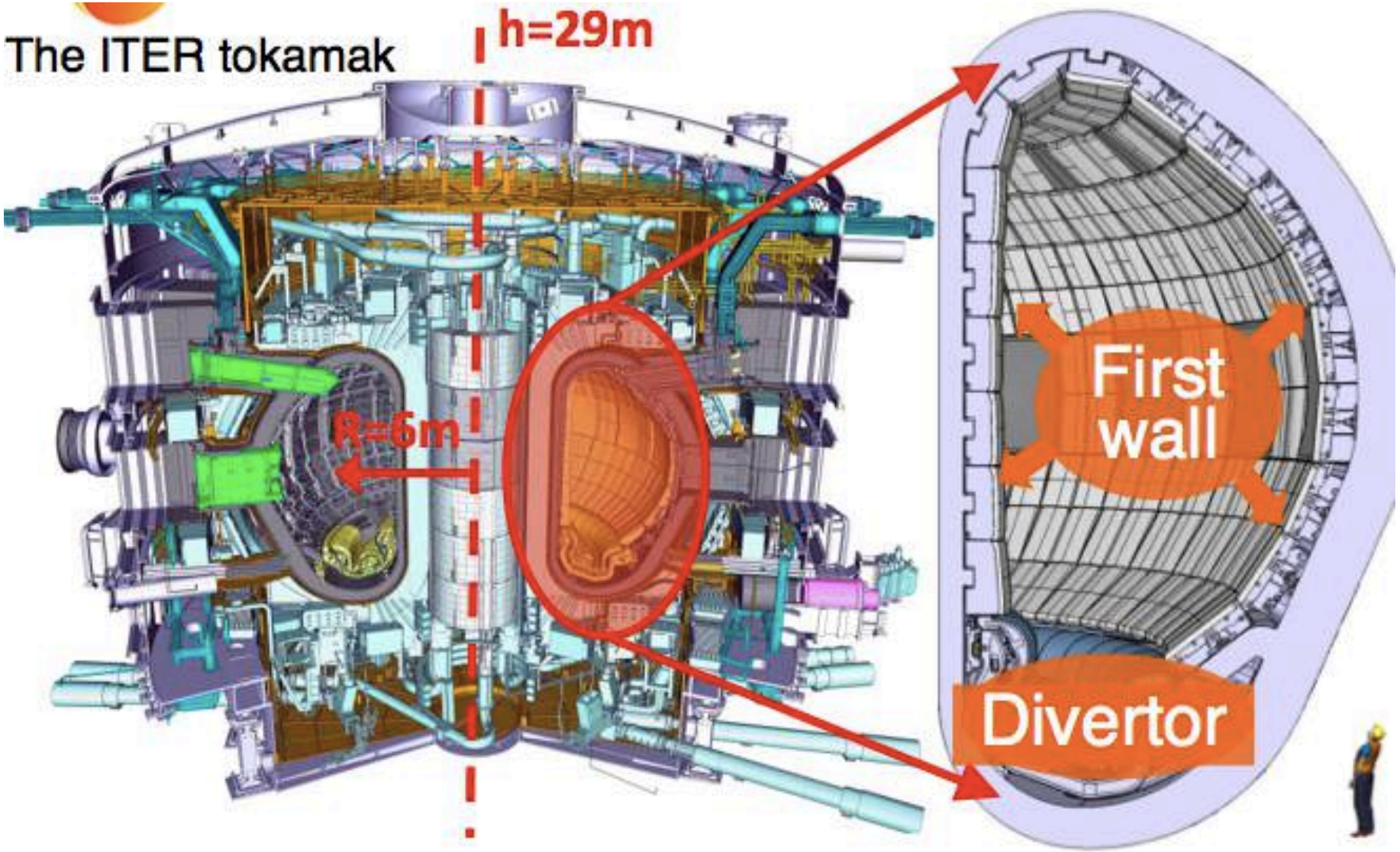
Il progetto della DTT

1. Camera del plasma
2. Prima parete
3. Magnete poloidale
4. Criostato
5. Magnete toroidale
6. Plasma
7. Divertore

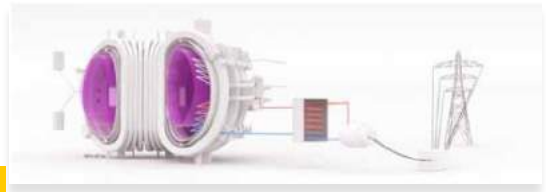


$H_{cri} \approx 8.5$ m

ITER



Roadmap towards fusion electricity



DTT – Power Exhaust

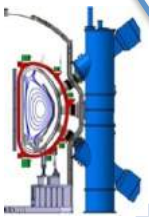
Fusion is plausible

Fusion is feasible

Fusion is practical, attractive

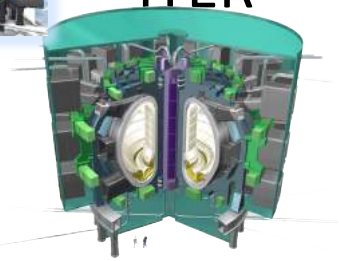
Power Plant

Fusion is commercially exploited

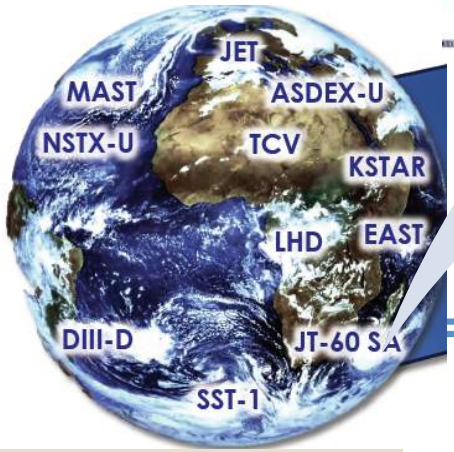


DEMO

ITER



JT-60SA



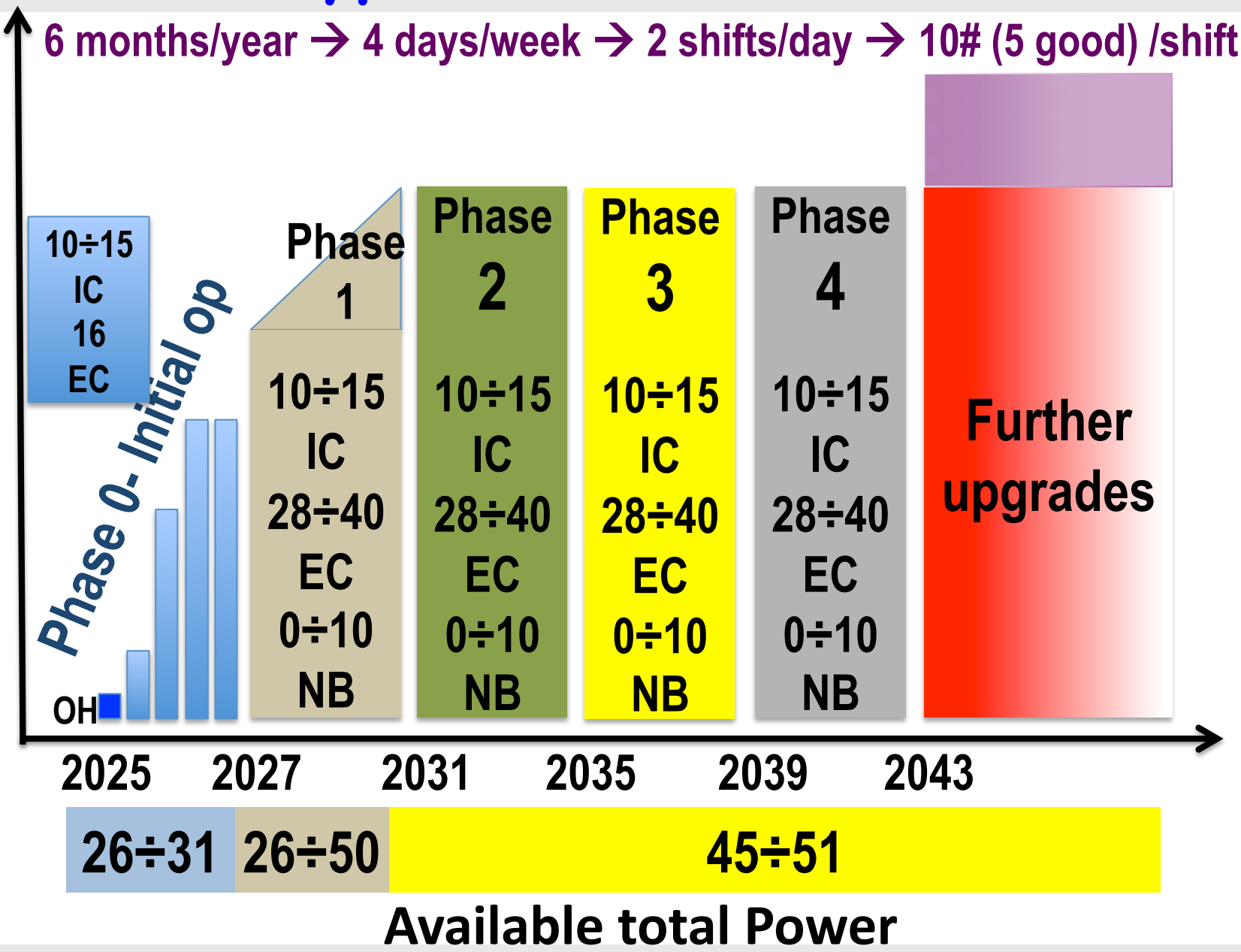
Fusion facilities around the world

~2020 Operation

~2025

~2050

An hypothetical DTT Time line



DTT: altissimo ritorno socio-economico

Nuovi Posti	Personale diretto	Indotto	Indotto Terziario	Totale per anno
Costruzione (7 anni)	120	150	350	620
Operazione (25 anni)	250	250	750	1250
Sperimentazione(25 anni)	150			150

In totale oltre 1500 posti di lavoro

Atteso un ritorno pari a un fattore 4 sull'investimento: 2 miliardi di euro

Benefits to industry

Technology	Technology Development /Innovation	Potential non fusion applications
Superconductivity Cables Coils	Advanced cable-in-conduit technology Cable design optimization Current quench detection Coil testing Instrumentation High temperature, high field superconducting coils	Medical imaging and diagnostics, Power Cables, Fault Current Limiters, Transformers, Energy Storage, Motor Generators, Magnetic Levitation, High Energy Physics, Filters, All-Digital Receivers, Sensors, Quantum Computing, High precision NMR spectroscopy, Magnetic Separators, Induction heaters
Materials	Joining techniques for innovative materials, Dynamics of liquid metals in the presence of magnetic fields, Chemical/mechanical compatibility of different materials, Plasma spray coatings for high temperature operation	New, low activation materials for nuclear industry High heat flux components for space industry
Robotics	Manipulators, sensors, activators, metrology tools (in-vessel viewing system, rad-hard sensors and actuators).	Robotics & Remote handling in hazardous environments (fire fighting, rescue operations, removing high-level nuclear contamination, reactor decommissioning, collapsing mines etc.). Drones, automotive industry
Controls	Real time, active feedback control system for plasma stability and plant protection, radiation hard sensors and fast actuators, fast computing, plasma diagnostic systems.	Monitoring and control of industrial processes

Socio-economic effect on the local /regional environment

Uno studio e' stato realizzato dall' Universita di Oxford [1] sui dati reali dell'esperimento Europeo che opera attualmente a Culham

Il costo del JET, attualizzato ad oggi, fu di circa 500 M€; e.g. simile a DTT

Lo studio fu effettuato usando i dati di un anno campione (1993)

I risultati furono:

1) J Glasson, J Weston, A Chadwick, The JET Project impact on local economy, Report of the Impact Assessment Unit, School of Planning, Oxford Brookes University, Oxford, February 1995

Socio-economic effect on the local /regional environment

- Circa il 20% delle spese annuali del JET (contratti ordini,… ed escludendo i salari) furoo spese localmente (circa 6M€/y). Circa 20÷25 compagnie locali presesero la maggior parte degli incassi.

- Circa il 25 di tutte le compagnie (anche internazionali) coinvolte nel JET assunsero personale locale; la maggior parte fu forza lavoro altamente qualificata. Circa il 90 % di tutto il personale convolto nel JET viveva nell'Oxfordshire, questo comporto un entrata per l'economia locale di circa 17-21M€/y

- Il totale delle spese nell'Oxfordshire fu di circa 25M€/y. Riportato ad oggi circa 45÷50M€/y, che su un totale di vita di circa 35 anni (come l'attuale JET), da un ritorno di circa un fattore 3÷3.5 SOLO per l'economia locale

1) J Glasson, J Weston, A Chadwick, The JET Project impact on local economy, Report of the Impact Assessment Unit, School of Planning, Oxford Brookes University, Oxford, February 1995

Summary

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a) DTT parameters selected to guarantee:

1. Studies of the Power exhaust in DEMO relevant regimes
2. Flexibility of the facility to allow testing all he present ideas plus possible new ones
3. INTEGRATION of the solution with the plasma performances

b) DTT AIMS to be a facility **OPEN to any international cooperation.**

c) Eventually we think that DTT MUST be part of a more general strategy, where, in the logic of the successful "step ladder" approach, smaller experiments will have the target to study and develop new ideas

d) We are now confident to be ready to start with the final machine design and to have the new facility ready in 7÷8 years form the actual starting point