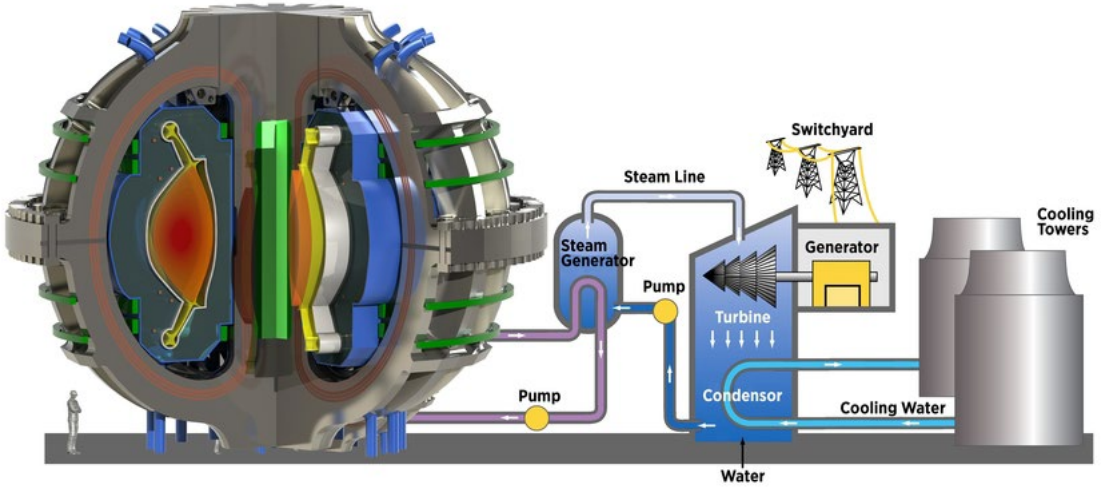
PPPL PRINCETON PLASMA PHYSICS LABORATORY

Getting to Fusion Electricity

Professor Steve Cowley, Director, Princeton Plasma Physics Lab.

October 11, 2022



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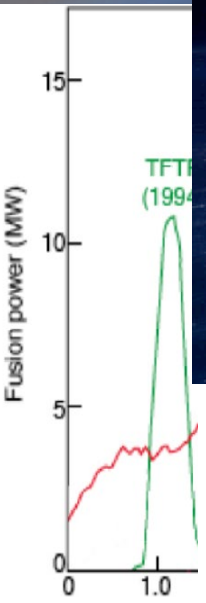
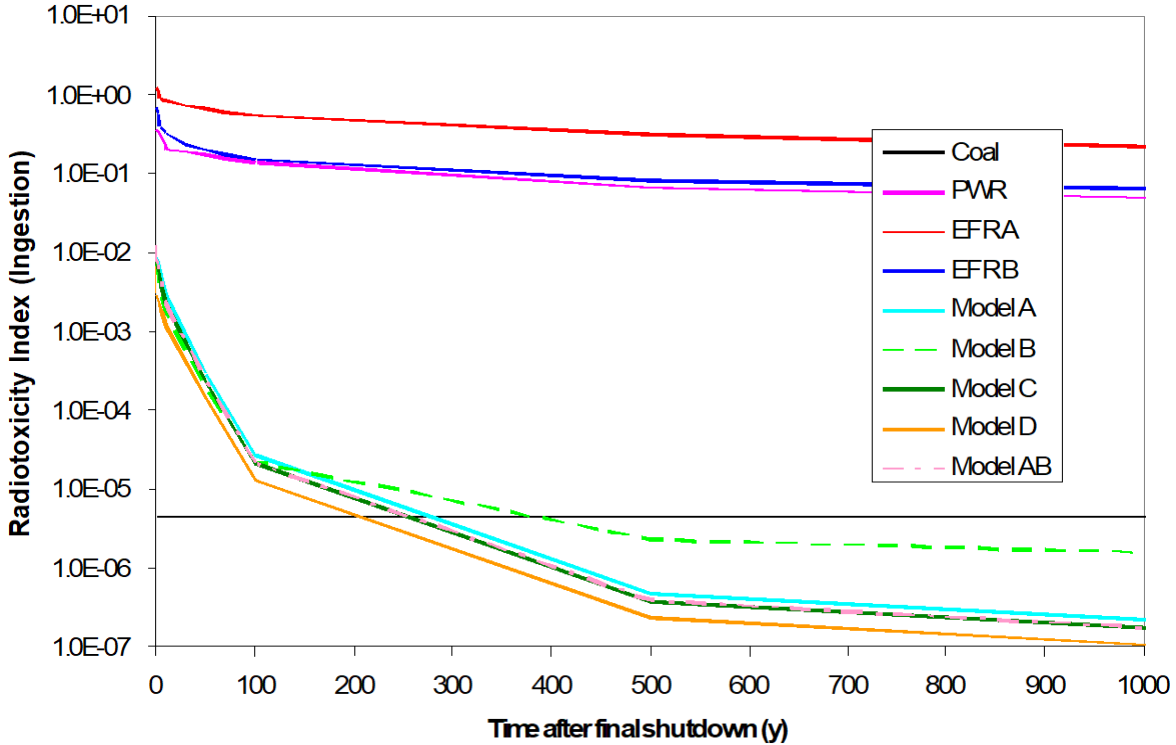
We can do Fusion.

December 21st 2022

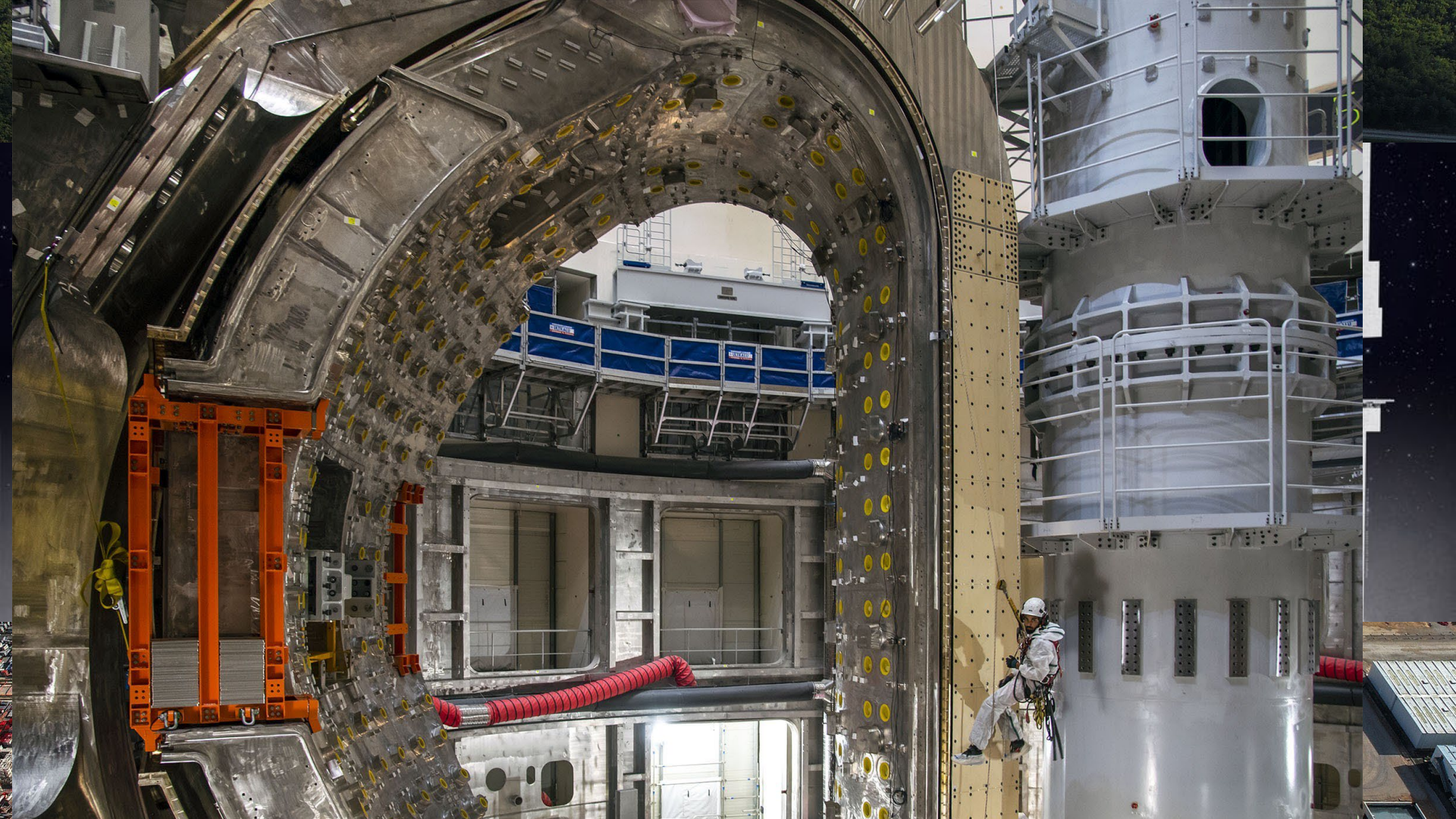


Potential Harm from Waste Materials

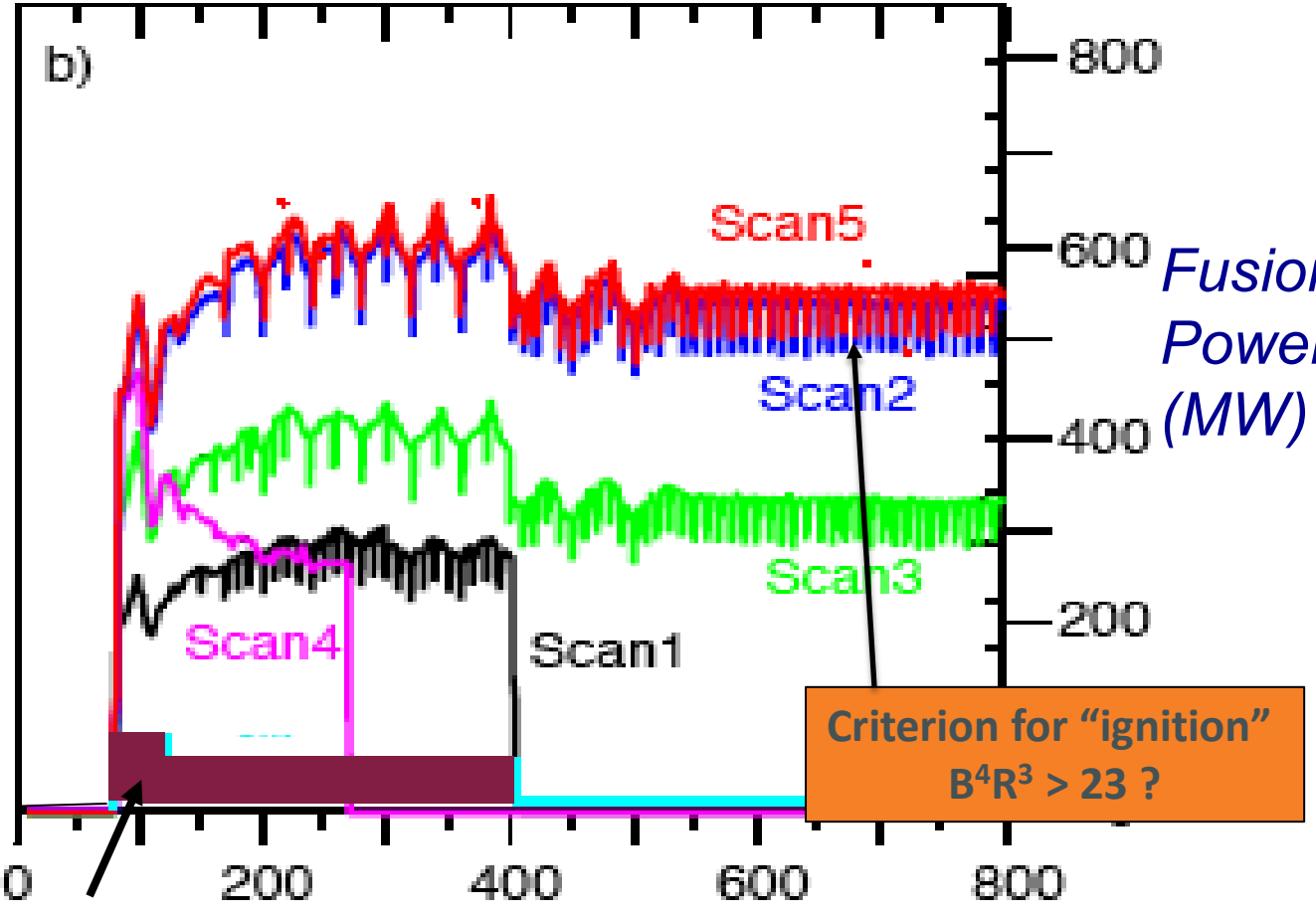


Radiological hazard from fusion materials decays rapidly, with half life of around 10 years.

Source: PPCS



Simulation by Bob Budny: Based on JET results from 2008-2013



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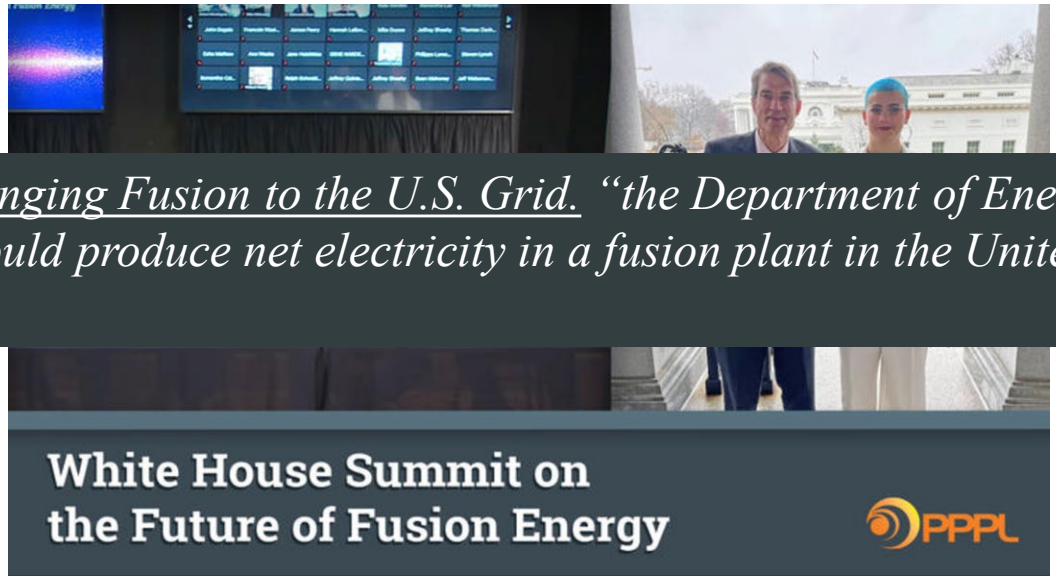
But can we make commercial fusion electricity?

US Decadal Strategy to Accelerate Fusion to Commercialization

"The DOE will launch an agency-wide initiative, coordinating across program offices, to develop a decadal strategy to accelerate the viability of commercial fusion energy in partnership with the private sector. The 2021 National Academies of Sciences, Engineering, and Medicine (NASEM) report 'Bringing Fusion to the U.S. Grid' serves as a guiding document for the new initiative." White House March 2022



Bringing Fusion to the U.S. Grid. *"the Department of Energy and the private sector should produce net electricity in a fusion plant in the United States in the 2035-2040 timeframe."*

Private Industry – investing in fusion

- $4.7B investment in fusion start-ups in two years.
- Start-ups in Europe, UK, Japan and US.
- Aggressive timelines.
- Vast array of ideas and concepts.

Conclusion

- Fusion is the perfect *“firm energy”* complement to renewable energy.
- 2021 was a year of great achievement in fusion research.
- Fusion has progressed to the point that it is prudent to be planning the first power stations.
- Innovation is still needed. Some stunning new innovations are in progress.