



PILOT PLANT HISTORICAL PERSPECTIVES

**Stephen O. Dean, President
Fusion Power Associates**

**Fusion Power Associates
44th Annual Meeting and Symposium
Pilot Plants for Fusion Power
December 19-20, 2023**

Pilot Plants for Fusion Power

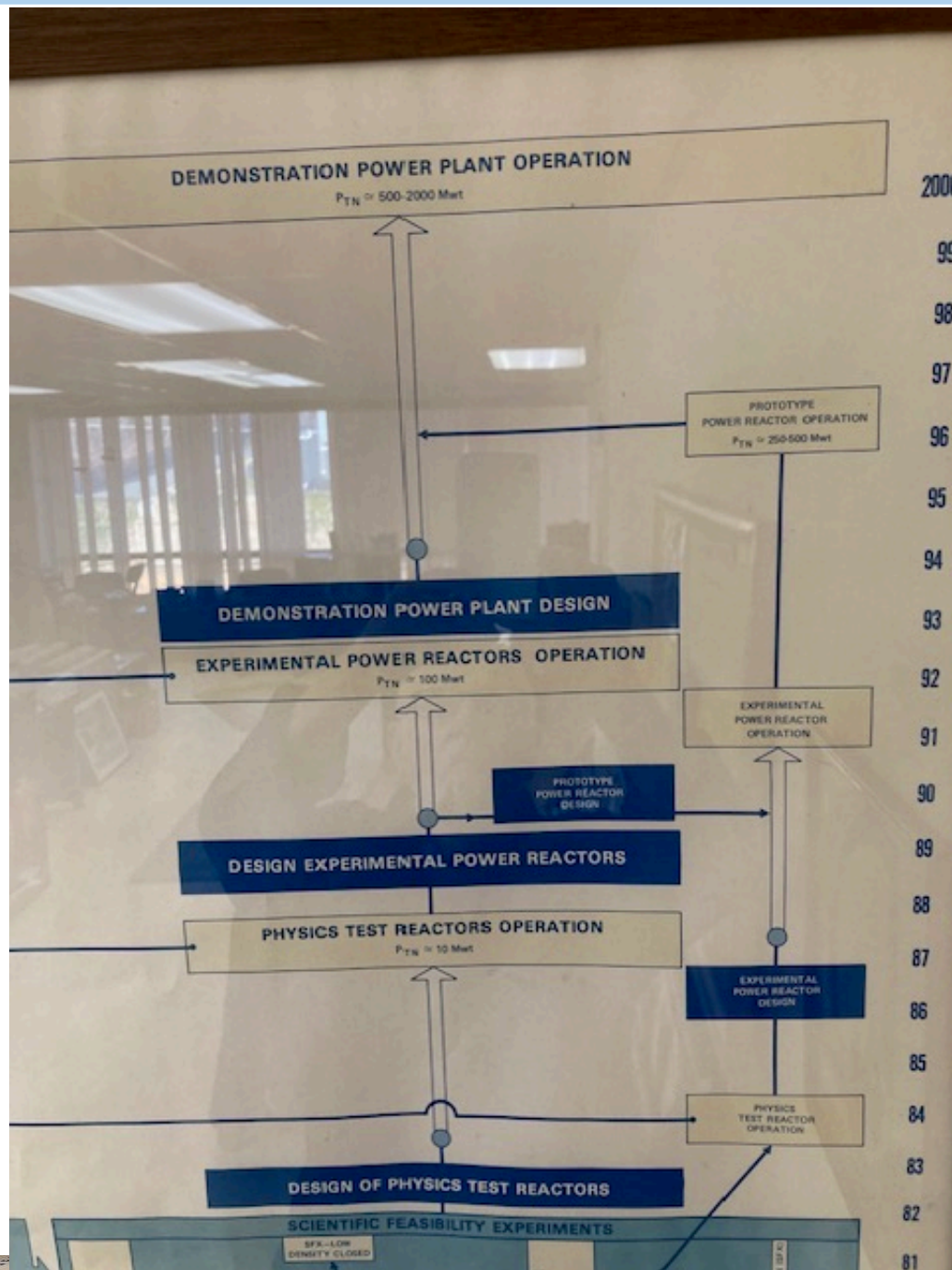
Historically, a **Demonstration Power Plant** (DEMO) has been the term used to describe the goal of fusion research.

Is a **Pilot Plant** viewed as different, or just another word to describe DEMO?

A 1972 Planning Chart, prepared by Bob Hirsch and myself shows a Demonstration Power Plant to operate in 2000, with the possibility of a “**Prototype Power Reactor**” operating in 1996

Assertion: Pilot Plant would proceed before some of the science and technology needed for Demo would be in hand.





FAST FORWARD (20 years to) TO 1991-92

In 1991, an **Accelerated Fusion Power Development Initiative** was proposed by:

Stephen O. Dean, Fusion Power Associates

Charles C. Baker, Oak Ridge National Laboratory

Daniel R. Cohn, MIT Plasma Science and Fusion Center

Susan D. Kinkead, Fusion Power Associates

Proposal to “construct and operate a **fusion pilot plant** that generates electricity” by 2005.

See email attachment and handout at this meeting



The proposed **Pilot Plant** to have the following characteristics:

- ◆ Minimal capital cost and minimal thermal power
- ◆ Net electrical power production of about 100 MW
- ◆ Operation at high availabilities (>50%) for prolonged periods
- ◆ A high (>10) ratio of fusion power generated to electrical power input
- ◆ Use of reduced activation materials consistent with project schedule



Publications 1991-92

Several papers were published including:

Pilot Plant: A Shortened Path to Fusion Power

IAEA Fourteenth International Fusion Conference, 1992.

Stephen O. Dean, **Fusion Power Associates**

C.C. Baker, John Galambos, Martin Peng, J. Sheffield, **ORNL**

Daniel Cohn, Leslie Bromberg, Emanuel Chaniotakis, **MIT**

D. Dautovich, Paul Gierszewski, W. Morison, **Ontario Hydro**

William R. Ellis, **Ebasco Services**

Boris Kodomtsev, **Kurchatov Institute, USSR**

(distributed to pre-registered attendees at this meeting)



FAST FORWARD (30 years) TO 2018-19

- At FPA 2019 Annual Meeting, **Michael Mauel** summarized the December 2018 NAS report “Burning Plasma Research” recommending, in part:
- “The U.S. should start a national program of accompanying research and technology leading to the construction of a **compact pilot plant** which produces electricity from fusion at the lowest-possible capital cost.”
- This recommendation was made 5 years ago



Slow Forward (1 year) to 2020

At the FPA 2020 Annual Meeting **Troy Carter** presented the results of a FESAC study on fusion Long Range Planning titled “Powering the Future”, stating in part:

“Now is the time to move aggressively toward the development of fusion energy. Recent advances point the way toward a unique US vision for fusion development, targeting a **fusion pilot plant** by the 2040s. Growth of a fusion energy industry is important for this vision and that industry is already seeded.”



Forward (another year) to 2021

At the FPA 2021 Annual Meeting **Richard Hawryluk** summarized another NAS report “Bringing Fusion to the U.S. Grid” stating:

“The Department of Energy and the private sector should produce net electricity in a **fusion pilot plant** in the United States in the 2035—2040 timeframe. Successful operation of a pilot plant in the 2035—2040 timeframe requires urgent investments by DOE and private industry — both to resolve the remaining technical and scientific issues, and to design, construct, and commission a pilot plant.”



Forward (another year) to 2022

At the FPA 2022 Annual Meeting DOE Under Secretary for Science & Innovation **Geraldine Richmond** stated, in part:

“OSTP and DOE started to work together just over a year ago to explore a ***Bold Decadal Vision for Commercial Fusion Energy***, which led to the White House Summit in March.

“Since the White House fusion event, DOE has worked hard to develop and launch the **Bold Decadal Vision for Commercial Fusion Energy.**”



QUOTABLE

**“If one approach to fusion can be proven,
there will be others.”**

Solomn J. Buchsbaum

Vice President, Bell Labs

Member PCAS

Member, AEC Fusion Standing Committee

1969



2023

**At this year's meeting we take stock of
progress on the path to a**

Fusion Pilot Plant

Previous FPA annual meeting presentations:

<https://fusionpower.org> and click on Annual Meetings

