

Role of Government vs. Industry in Nuclear Power Commercialization

Historical Lessons May Be More Applicable to Fusion than Fission Today

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Four Fission Technologies Reach Global Commercial Deployment

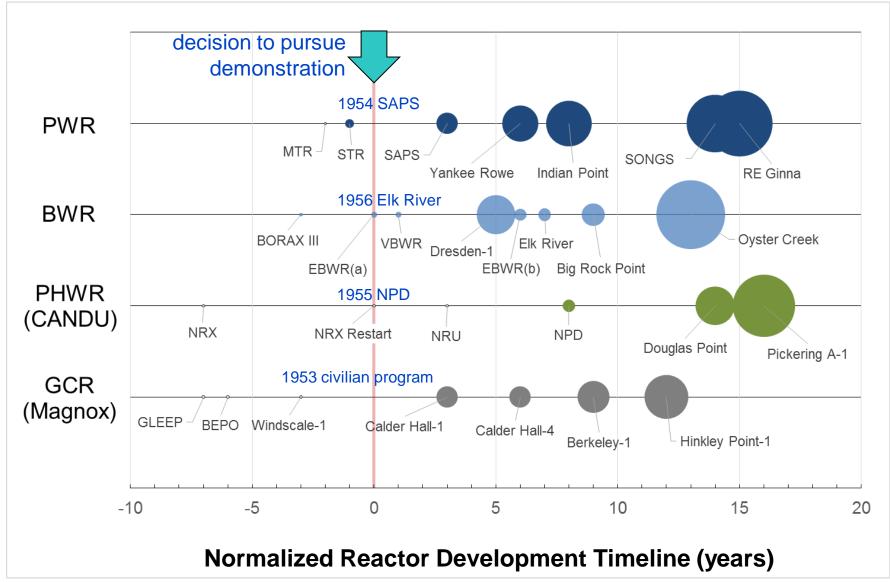
- Commercialization resulted from close government and private sector collaboration
- Government sponsorship of basic and applied R&D
- Government involvement continued well into commercial deployment (3 of 4 designs)
- Government support also extended to design and A/E firms to accelerate test and demo units
- Governments and private interests utilized a range of collaborative and financing vehicles
- Reactor capacity increased incrementally...and over a short timeframe



MAGNOX/AGRs



Commercialization Resulted From Progressive Scale-Up



Lead Times

- U.S. PWR → 15 yrs
- U.S. BWR → 13 yrs
- Canada CANDU → 16 yrs
- UK GCR → 12 yrs

Government and Industry Roles in Commercialization of Fission

(PWRs,	BWRs,	PHWRs	and	GCRs)
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Activity	Test Reactors	Small Demonstration Reactors	Large Demonstration Reactors	First Commercial Reactors
Site Acquisition				
Nuclear Island Owner				
Conventional Island Owner				
Pre-Construction R&D				
Post-Construction R&D				
Nuclear Island Design				
Conventional Island Design				
Fuel Design				
Fuel Fabrication and/or Supply				
Nuclear Island Operator				
Conventional Island Operator				
Nuclear Island Constructor				
Conventional Island Constructor				
Rate Assistance				

LEGEND				
	Predominately Government			
	Majority Government			
	Government and Industry			
	Majority Industry			
	Predominately Industry			
	Limited Data: Gov't & Industry			
	Insufficient Data			

Public – Private Partnerships Drove Nuclear Commercialization

U.S. AEC Cooperative Power Reactor Demonstration Program

Pre-CPRDP (1954)

Shippingport PWR

AEC owns nuclear island; utility owns conventional island, operates plant and pays AEC for steam.

First Round (1955)

- Yankee Rowe, PWR
- Hallam, Sodium-Graphite
- Enrico Fermi,
 Sodium Fast
 Breeder

AEC attempts to transfer more risk to commercial sector, with technical and financial burden borne primarily by industrial partners.

Twelve U.S. CPRDP-Era Demonstration Reactors (Plus Haddam Neck and San Onofre)

Second Round (1955)

- Elk River, BWR
- Piqua, Organic-Cooled and Moderated
- BONUS, Boiling Water, + Integral Nuclear Superheat
- La Crosse, BWR

AEC returns to SAPS model. AEC owns nuclear island, sponsors related R&D, pays for first core. Utility owns conventional island and operates entire facility.

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Third Round (1957)

- Big Rock Point, BWR
- Carolina-Virginia Tube Reactor, PHWR
- Pathfinder, BWR+ NuclearSuperheat
- Peach Bottom, Gas-Cooled, HTGR

AEC reverts back again to first round approach with emphasis on advanced designs.

Modified Third Round (1962)

- Haddam Neck, PWR
- San Onofre, PWR

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AEC continues third round with focus on larger (≥400 MWe) nuclear plants to demonstrate successful design, construction and operation for commercially viable baseload generation.



>50% U.S. Industry Investment in Non-LWR Demos!

USAEC Cooperative Power Reactor Demonstration Program

