EPRI Advanced Reactors Program Overview

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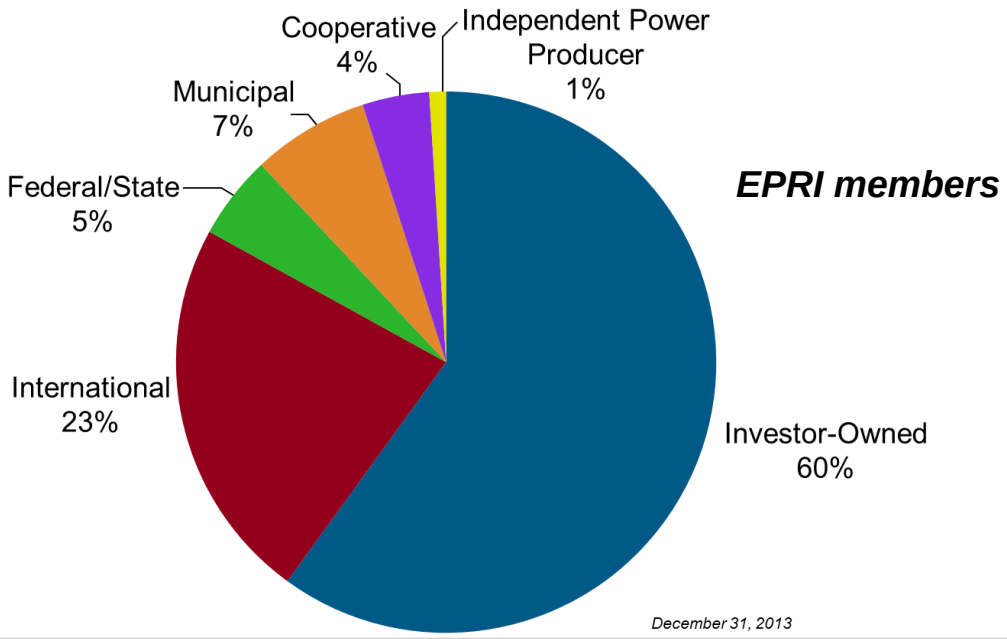
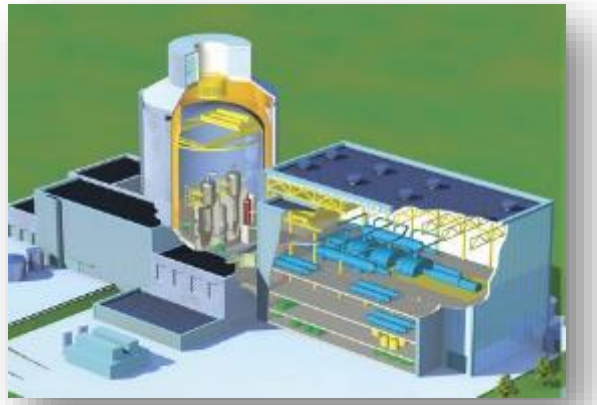
EPRI…Born in a Blackout

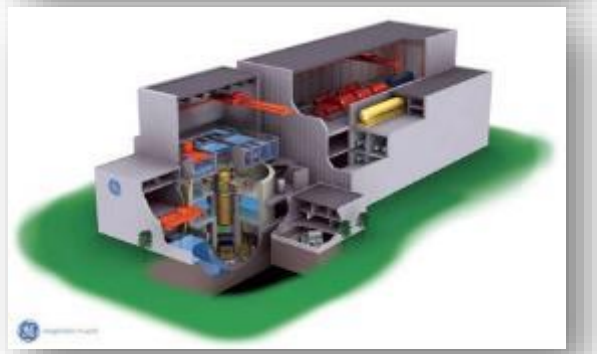
- Independent, nonprofit center for collaborative, public interest energy and environmental research
- International membership funds ~25% of EPRI research
  - **40% for nuclear sector**
- EPRI programs engage ~80% of nuclear operators worldwide
- EPRI members generate > 90% of the electricity in the U.S.
  - **100% of U.S. nuclear electricity**



Advanced Nuclear Technology (ANT) Program Overview

- **Accelerates and focuses work targeted at new plants**
  - Work not already being done in other areas of EPRI
- **Primary focus is on light water reactor designs**
  - Gen III, Gen III+, and light water Small Modular Reactor (SMR) designs
- **Increasing focus on longer term designs**
  - Advanced Reactor (Gen IV) and non-light water SMRs
- **Address Multiple Stakeholders**
  - Global Issues and Various Stages of Deployment
- **Target issues where EPRI can have an impact**
  - Clear value in our collaborative environment



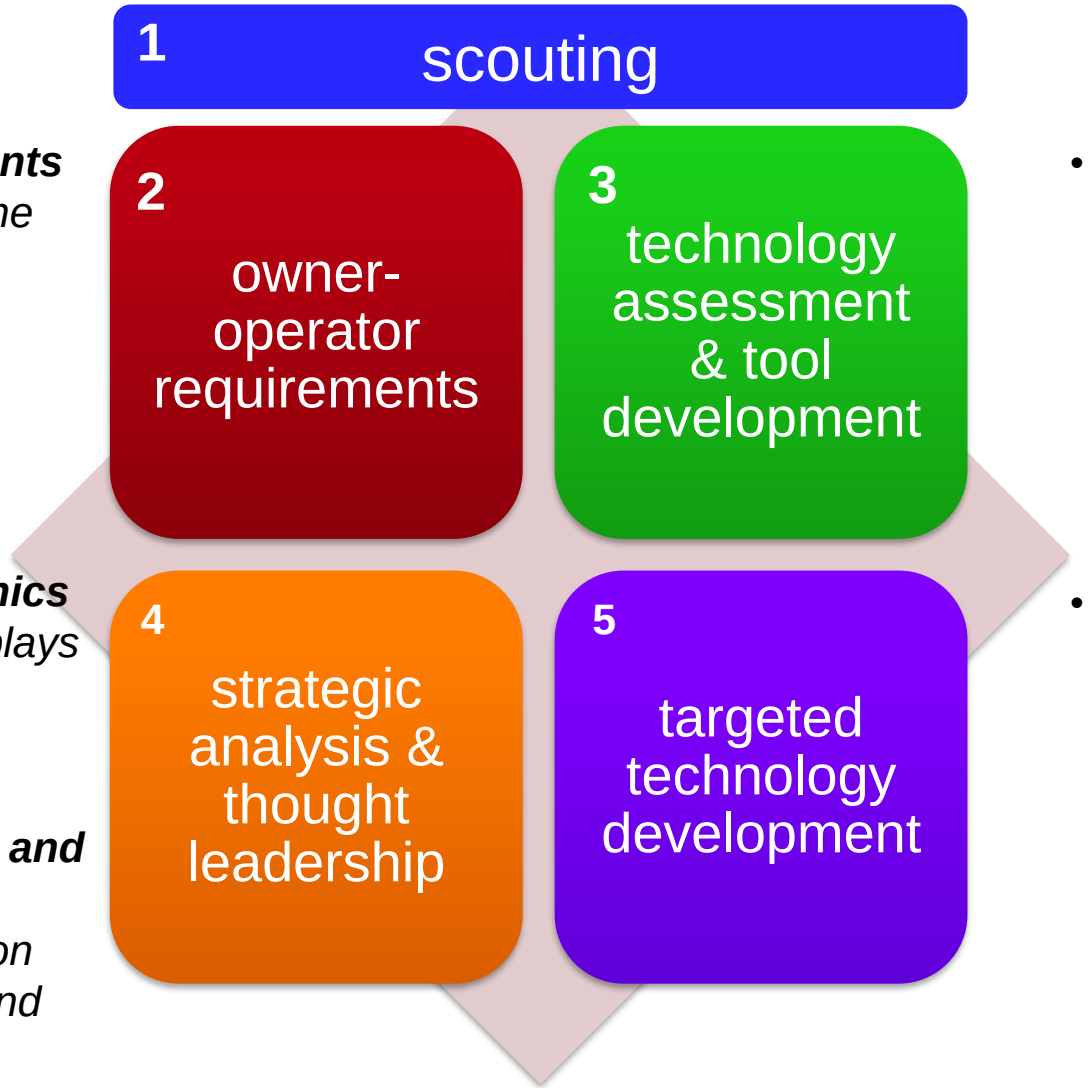


EPRI Advanced Reactor Strategic Program

- ***Owner-Operator Requirements Guide (ORG):*** *identify what the customer wants*

- ***Advanced Reactor Economics Study:*** *identify how nuclear plays in future energy markets*

- ***Public-Private Partnerships and Expanding Concept of Flexibility:*** *shape discourse on advanced nuclear valuation and commercialization*

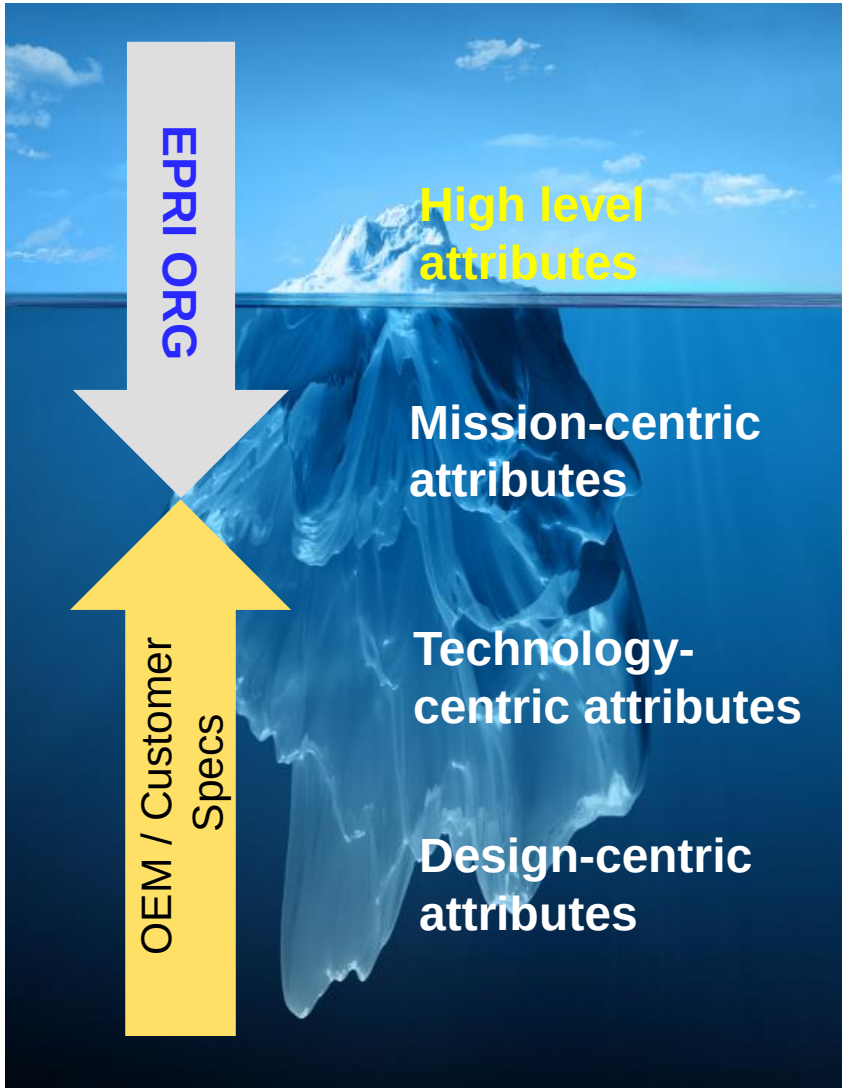


- ***PHA 2 PRA Guide (P2PG):*** *enhance design-to-license process via integration of safety analysis*

- ***Advanced Materials and Fabrication for Advanced Reactors:*** *introduce new materials and fabrication methods*

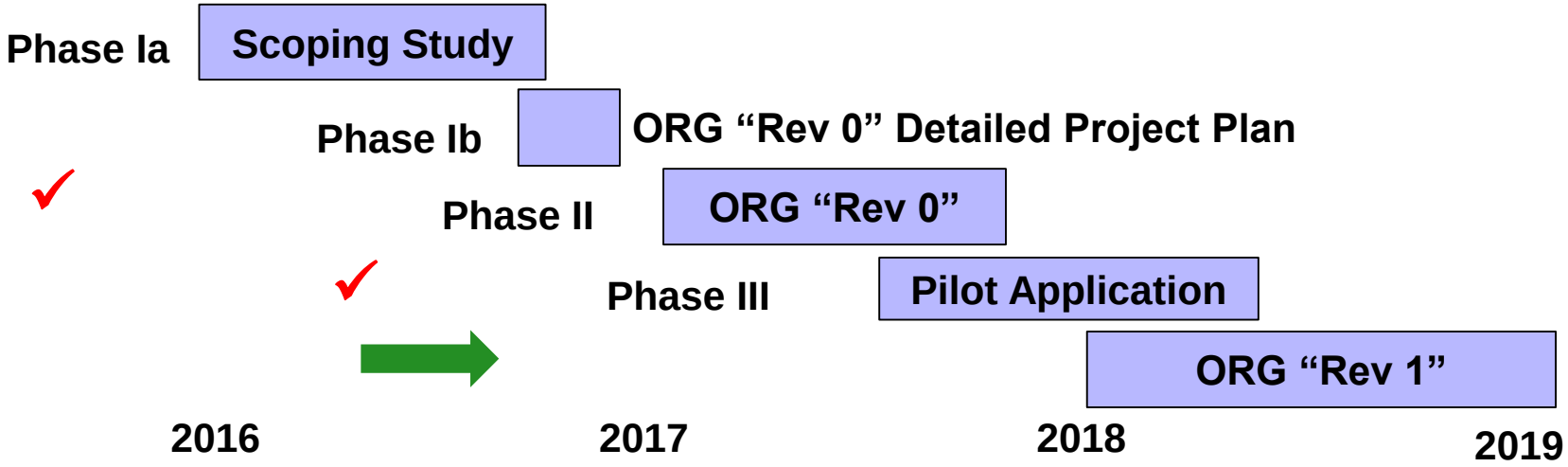
Owner-Operator Requirements Guide (ORG)

- Promote alignment of technology attributes with customer needs
- Standardize terms, attributes and requirements rather than prescribing them
- Facilitate communication with key stakeholders, including regulators
- **Technology inclusive and flexible framework for multiple missions and technologies**



ORG Progress and Future Steps

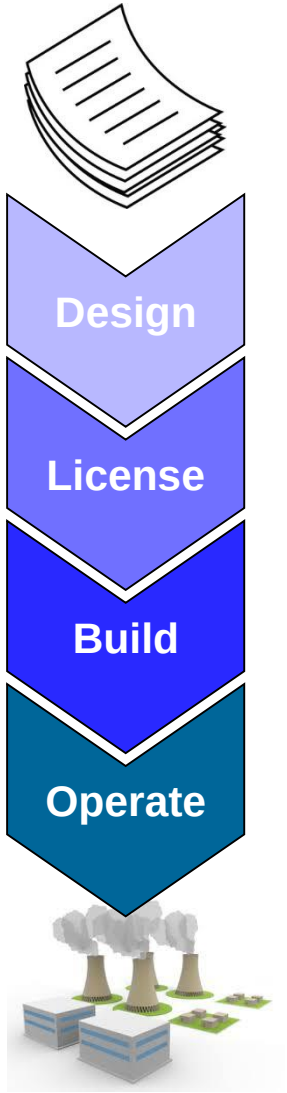
- Phase Ia: ORG Scoping Study (completed)
- Phase Ib: Project Plan (completed)
- **Phase II: Development of ORG "Rev 0" (underway)**
  - Two drafting / development /review workshops completed
  - "Rev 0" Draft ORG ready for pilot: October
- Phase III: Pilot Application with two developers (TerraPower, X-energy)



ORG "Rev 0" will be published March 30, 3018

“PHA to PRA” Project

- Assembly a “body of knowledge” on application of PHA and PRA methods relevant for advanced reactors
- Develop methodology for applying PHA and PRA methods to support design-license-build-operate lifecycle
- Demonstrate application of PHA-to-PRA approach with one or two use cases
- Pilot application to demonstrate utility of PHA-to-PRA
- Summary of PHA to PRA Methodology (use cases: July 2018)



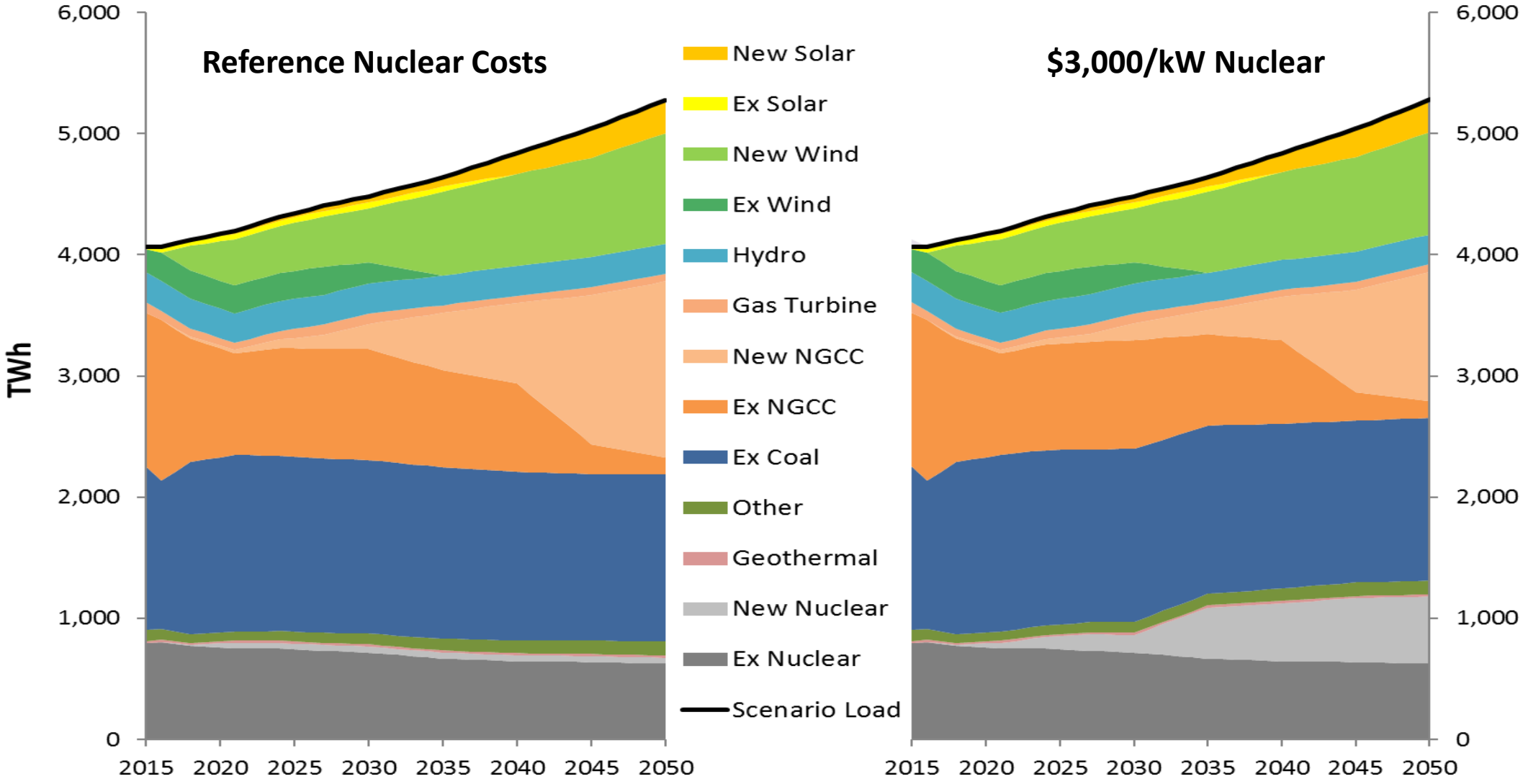
Project Capstone Report on the PHA to PRA methodology: March 2019

Expanding the Concept of Flexibility for Advanced Reactors

Attribute	Sub-Attribute	Benefits
Operational Flexibility	Maneuverability	Load following
	Compatibility with Hybrid Energy Systems and Polygeneration	Support economic operation with increasing penetration of intermittent generation, alternative missions
	Diversified Fuel Use	Economics and security of fuel supply
	Island Operation	Support grid restart, microgrid applications
Deployment Flexibility	Scalability	Ability to deploy at scale needed
	Siting	Ability to deploy where needed
	Constructability	Ability to deploy on schedule and on budget
Product Flexibility	Electricity	Traditional electricity generation mission
	Process Heat	Co- and polygeneration for superior economics
	Radioisotopes	Supply unique or high demand isotopes

Advanced Reactor Economics Study

Evolution of the Electric Sector Absent Further CO_2 Policy



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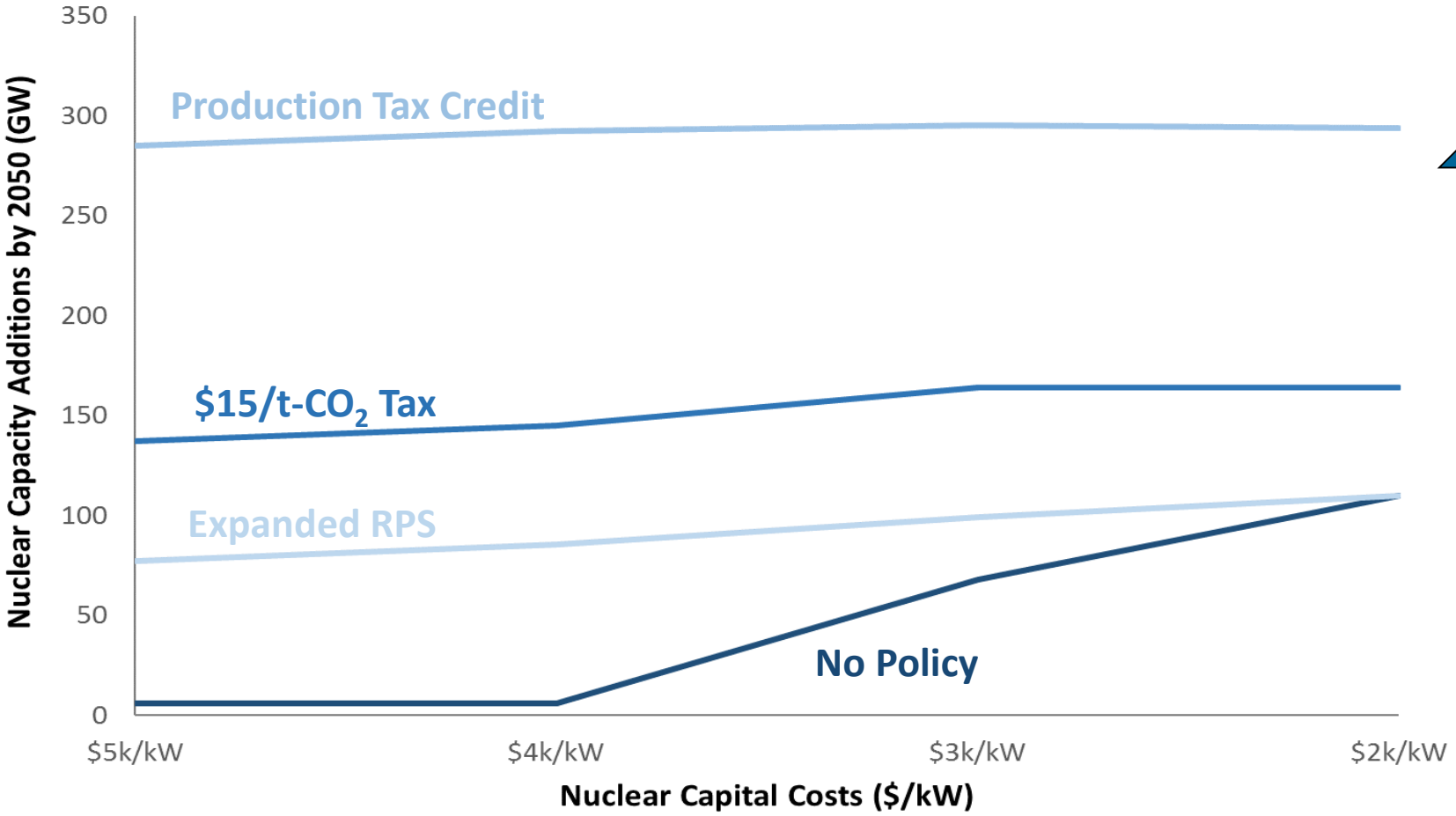
Offsetting Effects of Revenue vs. Cost for Deployment



Two main levers for improving market competitiveness: decrease costs and increase revenues

Unfavorable costs can be overcome through favorable policy intervention

White paper published for broader communication: Fall 2018

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Together…Shaping the Future of Electricity