SALT RIVER PROJECT AGRICULTURAL IMPROVEMENT AND POWER DISTRICT BOARD MEETING NOTICE AND AGENDA

JOINT MEETING OF THE BOARD OF DIRECTORS AND COUNCIL WORK STUDY SESSION

Monday, April 28, 2025, 9:30 AM

PERA Training and Conference Center
1 E. Continental Drive, Tempe, AZ 85288

Roll Call
Safety Minute

1. Call to Order.. PRESIDENT DAVID ROUSSEAU

2. New Nuclear: Industry Outlook and Perspectives .... TOM COOPER; ROBERT COWARD and DOUG HARDTMAYER, MPR ASSOCIATES, INC.; and CRAIG STOVER, ELECTRIC POWER RESEARCH INSTITUTE (EPRI)

   Informational presentation regarding the nuclear industry outlook and perspectives; different road maps utilities can consider to set the foundation for a viable pathway to new nuclear; and background on international and domestic nuclear energy trends, recent advances, technologies, project development, the steps to developing a nuclear project, and key strategic considerations.

3. Adjourn.. PRESIDENT DAVID ROUSSEAU

The Board may vote during the meeting to go into Executive Session, pursuant to A.R.S. §38-431.03 (A)(3), for the purpose of discussion or consultation for legal advice with legal counsel to the Committee on any of the matters listed on the agenda.

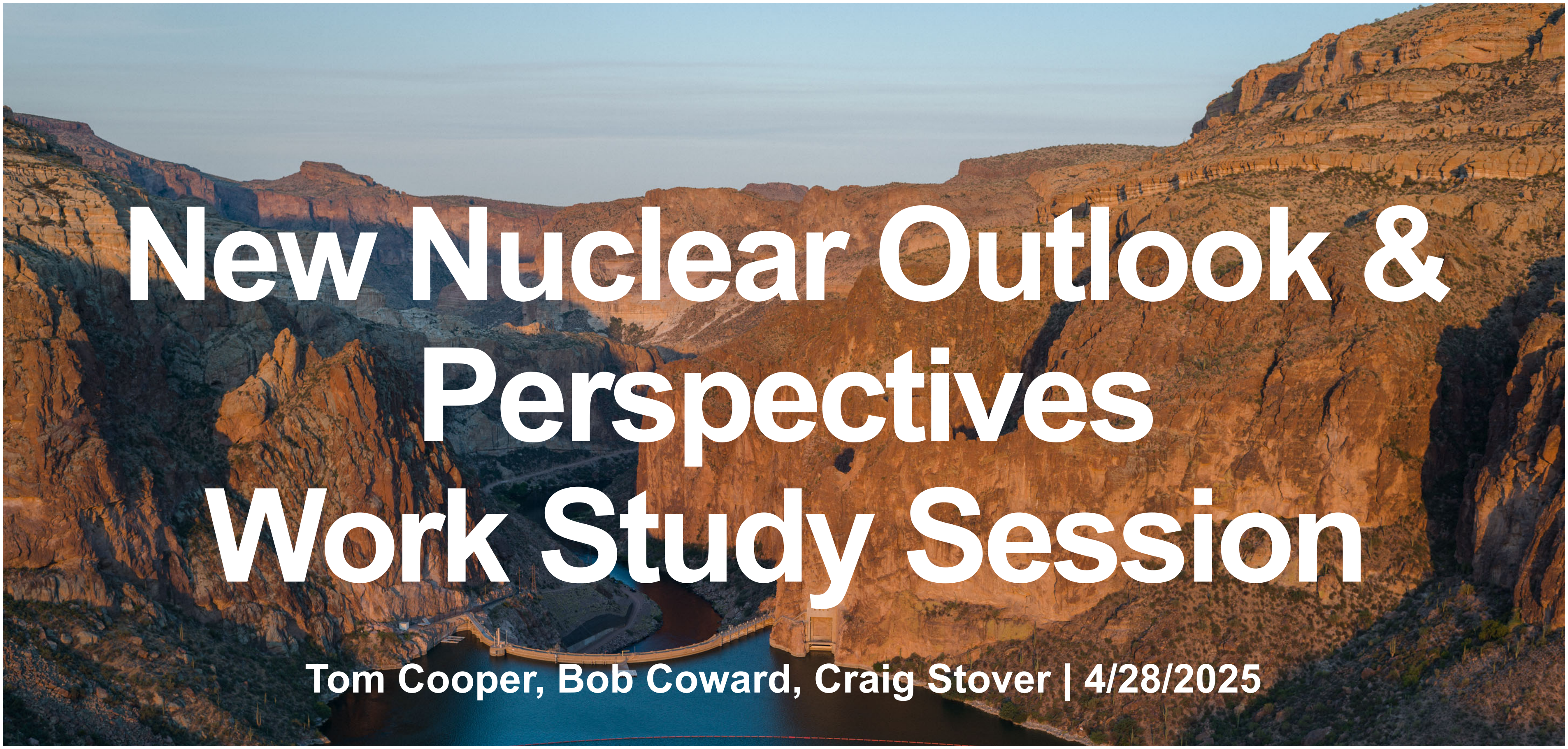
The Board may go into Closed Session, pursuant to A.R.S. §30-805(B), for records and proceedings relating to competitive activity, including trade secrets or privileged or confidential commercial or financial information.

Visitors: The public has the option to attend in-person or observe via Zoom and may receive teleconference information by contacting the Corporate Secretary's Office at (602) 236-4398. If attending in-person, all property in your possession, including purses, briefcases, packages, or containers, will be subject to inspection.

SRP®

NOTICE WILL BE SENT REGARDING THE NEXT JOINT MEETING OF THE BOARD OF DIRECTORS AND COUNCIL WORK STUDY SESSION

04/21/2025



New Nuclear Outlook & Perspectives Work Study Session

Tom Cooper, Bob Coward, Craig Stover | 4/28/2025

Agenda

Time	Topics	Presenter
10 min	Welcome and Overview of meeting Presenter Introductions	Tom Cooper (SRP)
20 min	Nuclear 101	Craig Stover (EPRI)
20 min	Global Perspective	Craig Stover (EPRI)
30 min	Current State of the Industry	Bob Coward (MPR)
20 min	Utility Specific Challenges	Bob Coward (MPR)
10 min	Looking Ahead & Key Takeaways Q&A and closing remarks	Tom Cooper (SRP)

Mission

SRP serves our customers and communities by providing reliable, affordable and sustainable water and energy.

SRP®

2050 Vision

A secure water and clean energy future empowers Arizona to thrive for generations to come.

Strategic Perspective

- Economic, policy, environmental, and technology trends require new future resource options.
- To make these options actionable, their development paths must be derisked.
- New nuclear checks a lot of resource need boxes, but deployment at scale is a significant challenge.
- Near-term industry-wide actions to derisk future investment in new nuclear are critical to addressing that challenge.
- Utility-level actions help develop critical mass interest that supports broader industry-wide initiatives.

Real Interest, Real Investment…Real Issues

TVA TENNESSEE VALLEY AUTHORITY

TVA, Bechtel, Sargent & Lundy and GE Hitachi Plan Initial Construction and Design for Potential Clinch River SMR

REUTERS®

First TerraPower advanced reactor on schedule but fuel a concern

UTILITY DIVE

Advanced reactors, interstate cooperation part of New York's nuclear future

Grist

Georgia's Vogtle plant could herald the beginning – or end – of a new nuclear era

POWER

UAMPS and NuScale Power Terminate SMR Nuclear Project

Speaker Introductions

Craig Stover, Senior Program Manager

EPRI – Advanced Nuclear Technology

Bob Coward, Principal Officer

MPR Associates

Advanced Nuclear Overview

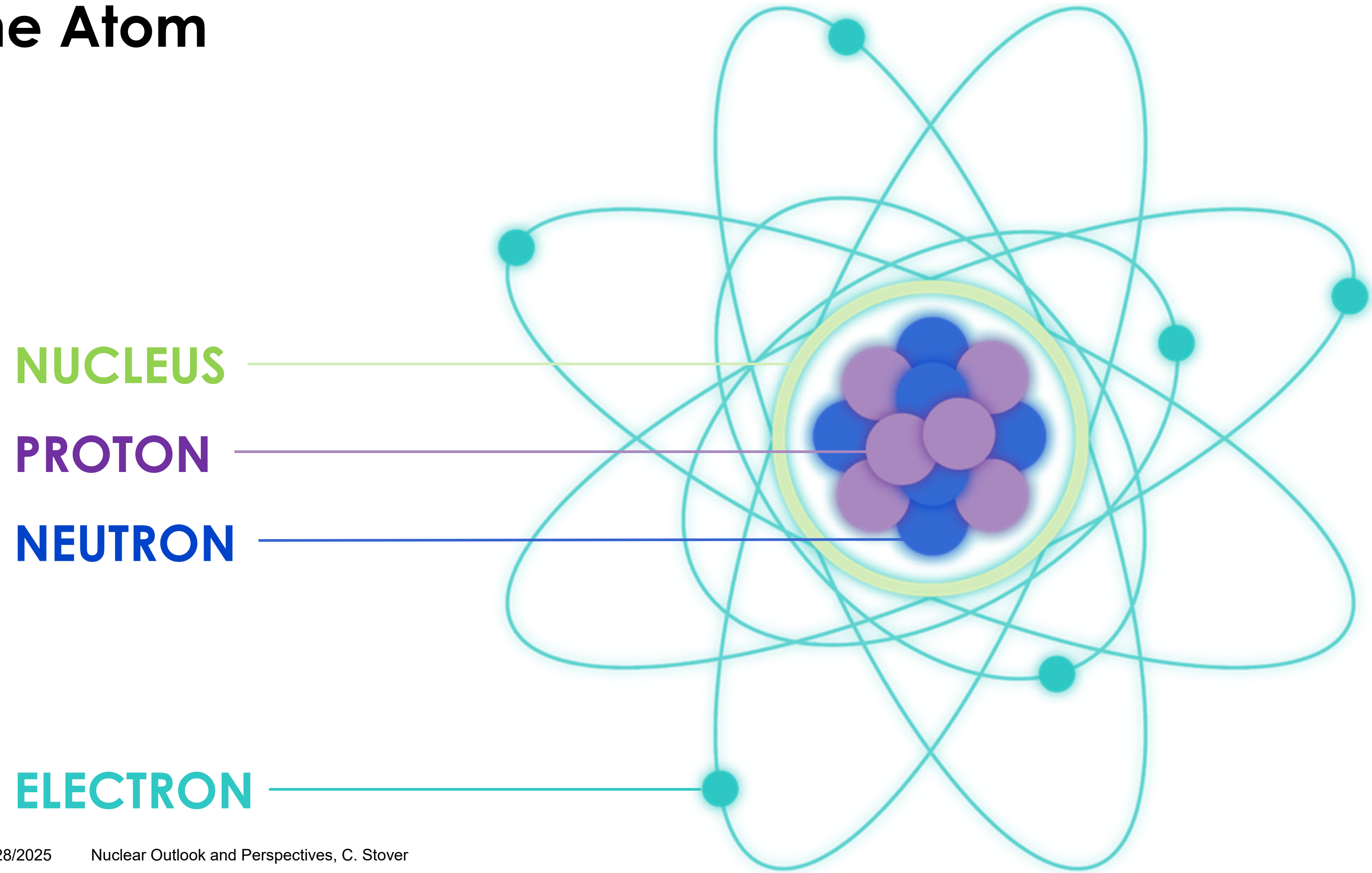
Craig Stover

Senior Program Manager

Advanced Nuclear Technology (ANT) Program

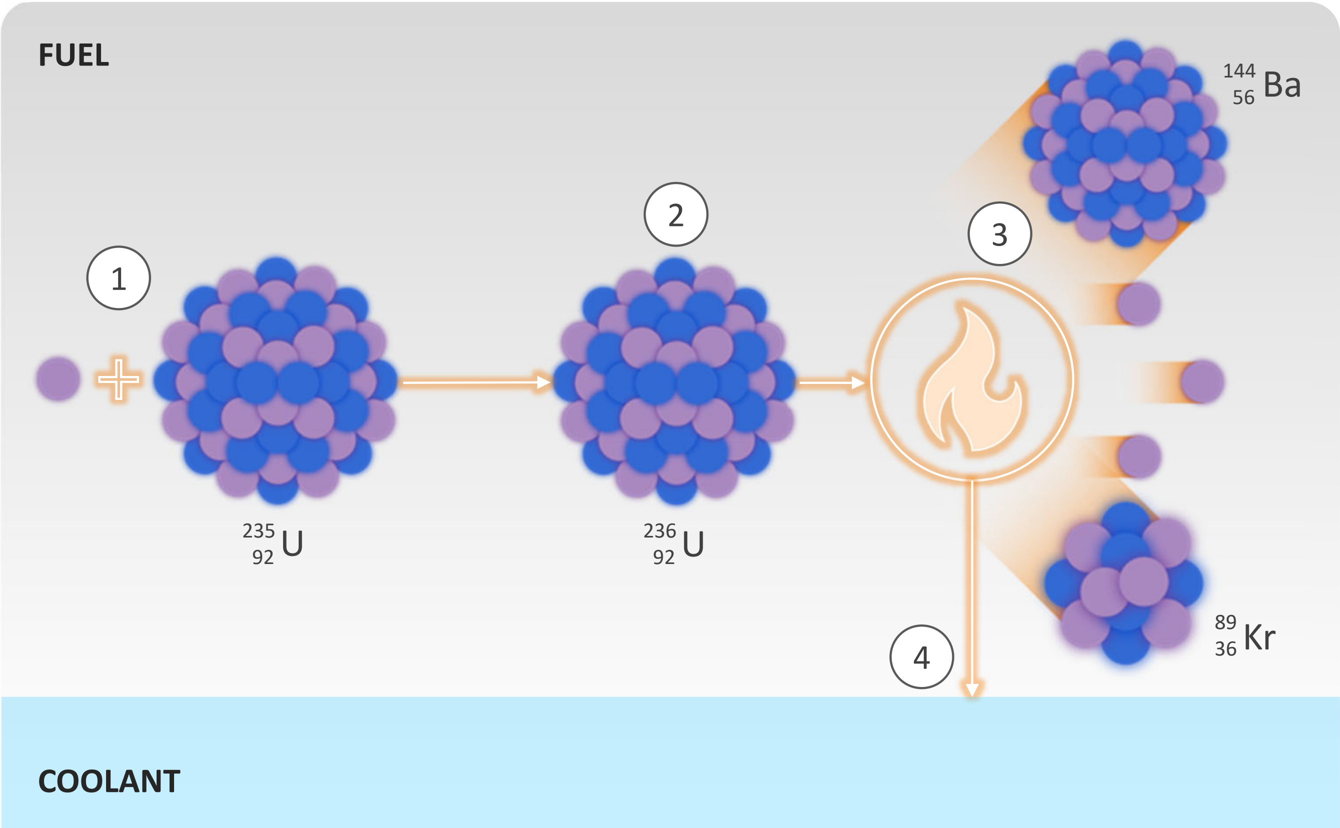
Introduction to Nuclear Energy

The Atom

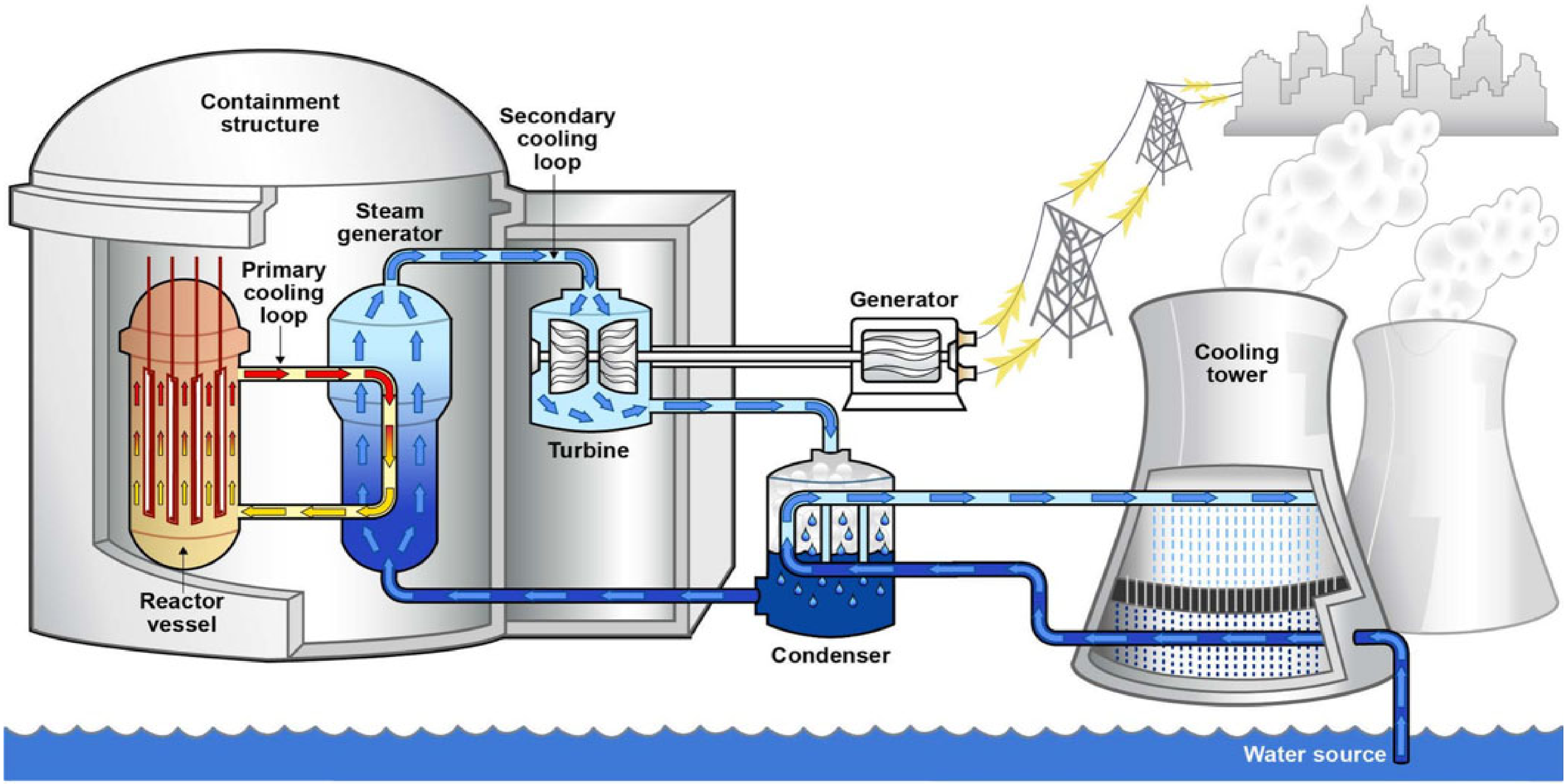


Fission

1. Neutron absorbed by target nucleus
2. Nucleus becomes unstable
3. Nucleus splits (fissions). Fission products and neutrons are released with high kinetic energy which creates heat
4. Heat is transferred to coolant



Production of Electricity from Nuclear

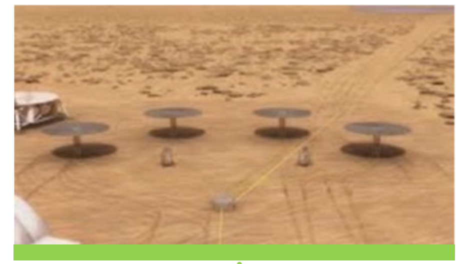


Sources: GAO illustration and analysis of Department of Energy and Nuclear Regulatory Commission documentation. | GAO-24-106326

Introduction to Advanced Nuclear

Read more on ant.epri.com

Evolution of Nuclear Power



GEN I & II → **GEN III / III+** → **Advanced Reactors (ARs)** → **Microreactors**

GEN I & II: Early demonstrations through GW-scale commercial fleets

GEN III / III+: Evolutionary designs

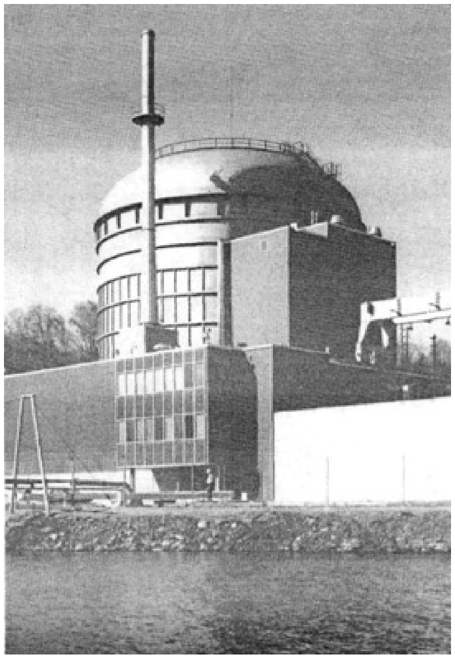
Advanced Reactors (ARs): Non-Light Water Reactors and Light-Water Small Modular Reactors

Microreactors: MWe-scale expands AR options

Unique Attributes of Advanced Reactors

Conventional Nuclear	Attributes	Advanced Nuclear
Predominantly Baseload	Generation Type	Baseload and Dispatchable
Predominantly operate 100% power	Flexibility	Ability to deploy at scale when needed
Ceramic UO2 Pellets	Fuel	Diversified fuel forms
Electricity	Energy forms	Electricity, Process Heat
Predominantly Water Cooled	Technology	Wide Variety of Technologies
Active Safety Systems	Safety	Inherent/Passive Safety Systems

Advanced Reactors Are Not Really ‘New’

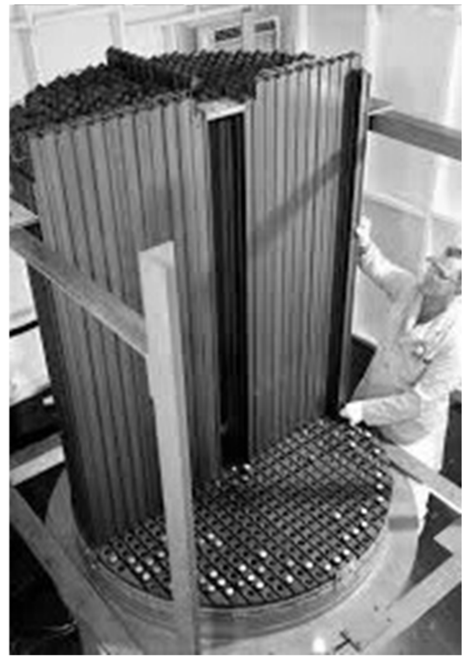


Peach Bottom 1

High Temperature Gas Reactor (HTGR)

Fermi 1

Sodium Cooled Fast Reactor (SFR)



Molten Salt Reactor Experiment

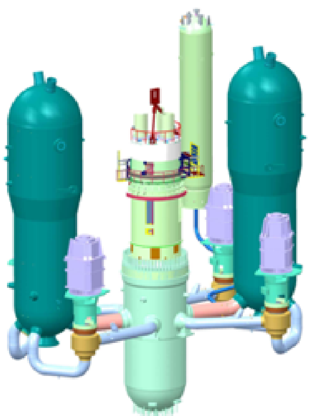
Molten Salt Reactor (MSR)

EBR 1

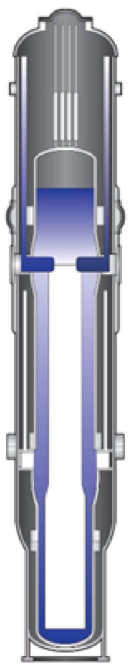
Sodium Fast Reactor (SFR)

New Reactor Options

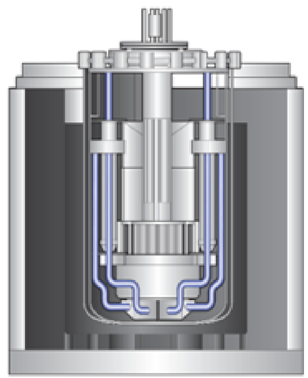
GigaWatt-scale Reactors



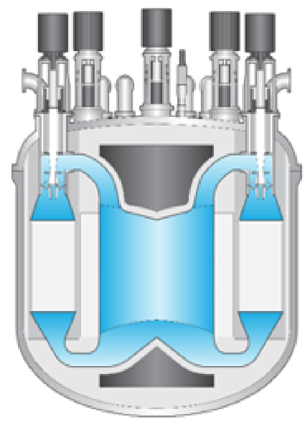
Water-cooled Small Modular Reactors



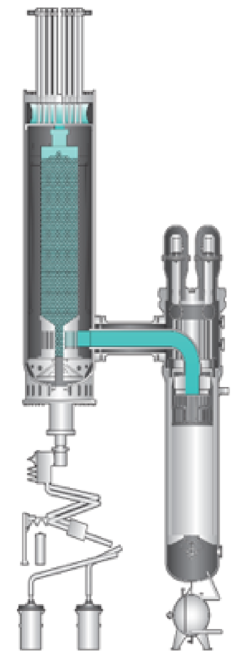
Fast Reactors



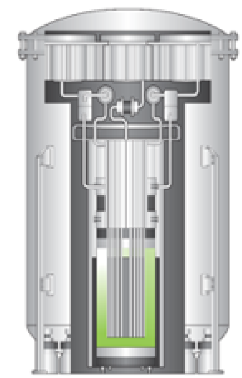
Molten Salt Reactors



High-temperature Gas-cooled Reactors



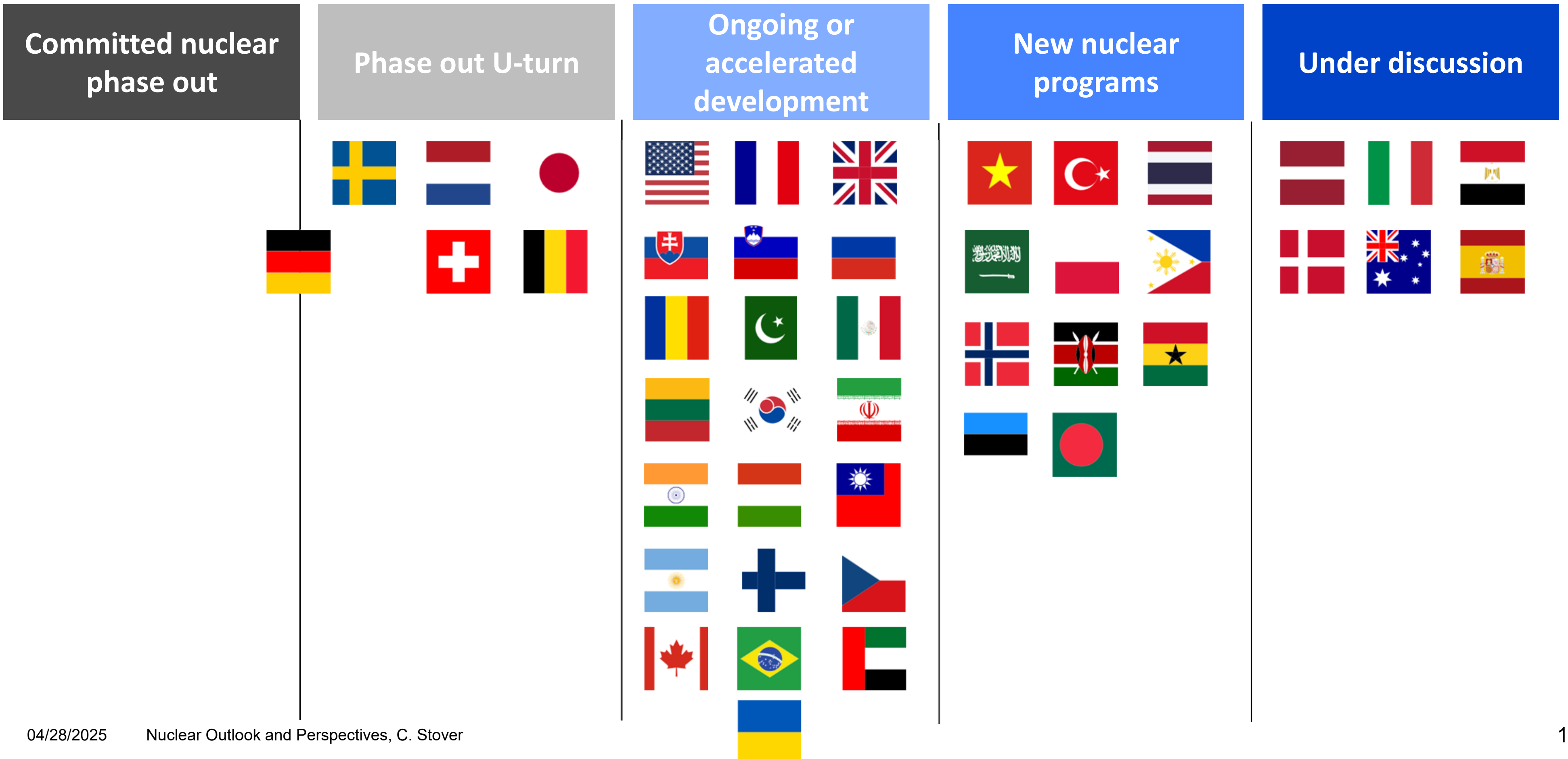
Microreactors



Global Progress of Nuclear Energy

Changing Policy Stances Towards Nuclear

A sample of national stances towards nuclear development



France Pursuing Multiple Pathways

- Preparing for buildout of additional large light-water reactors

Power reactors under construction and proposed

	Type	MWe gross	Construction start
Penly	EPR2	2x1650	2027?
Gravelines	EPR2	2x1650	-
Bugey	EPR2	2x1650	-

- 6 planned, additional proposed

- Designing NUWARD SMR for deployment throughout Europe

- Recently initiated a redesign for simplification

- Funding fast reactor development to close to fuel cycle

- Thorizon, NAAREA, newcleo, various fast reactors are progressing through design

UK New Nuclear Plans Advancing

UK's SMR selection process 'into final stage'

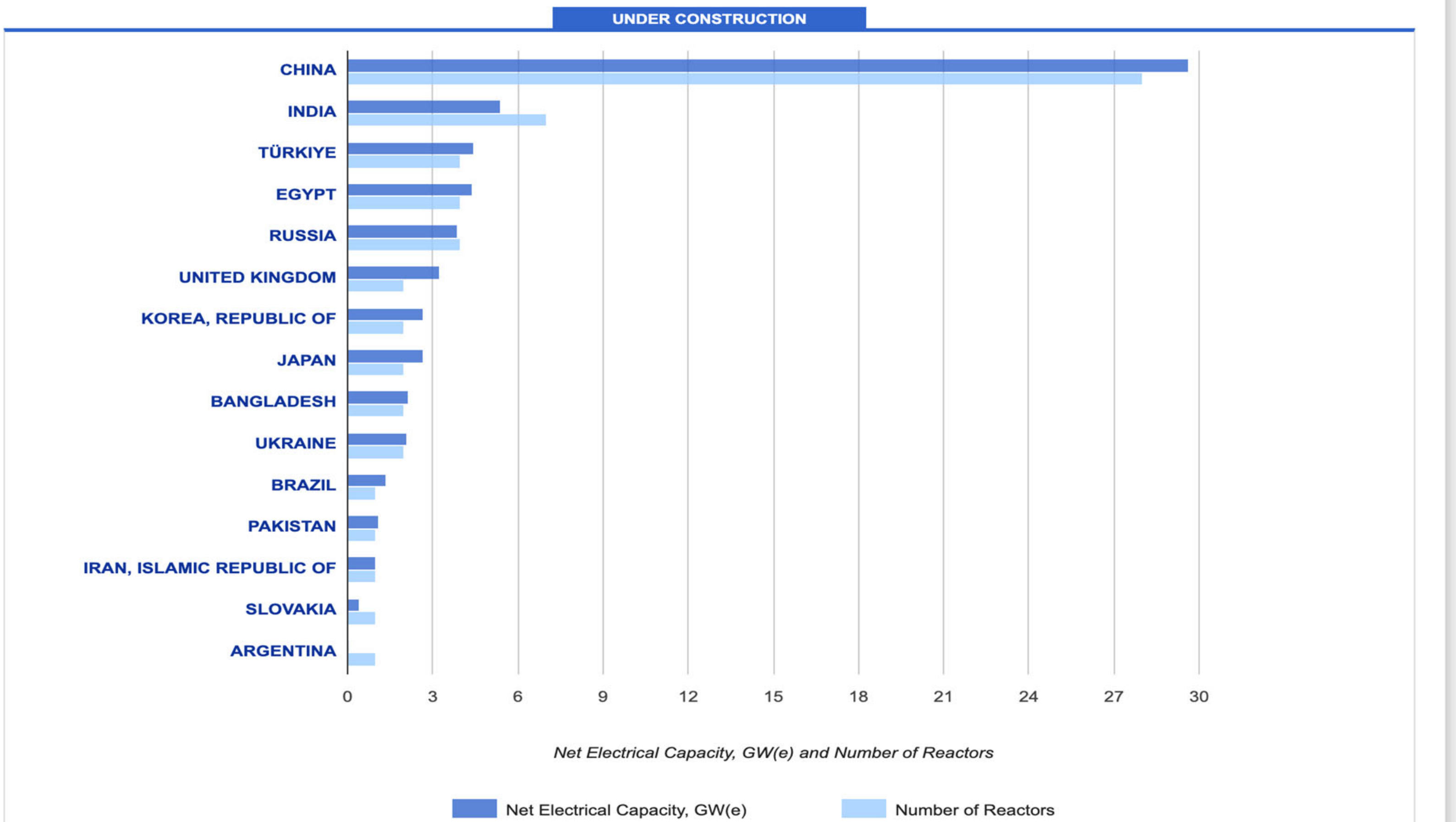
Friday, 28 February 2025

GE Hitachi, Holtec, Rolls-Royce SMR and Westinghouse have been issued with an Invitation to Submit Final Tenders, with Great British Nuclear saying it remains on track to select the chosen technology before the summer.

(Image: Composite of the bidders' proposed SMRs)

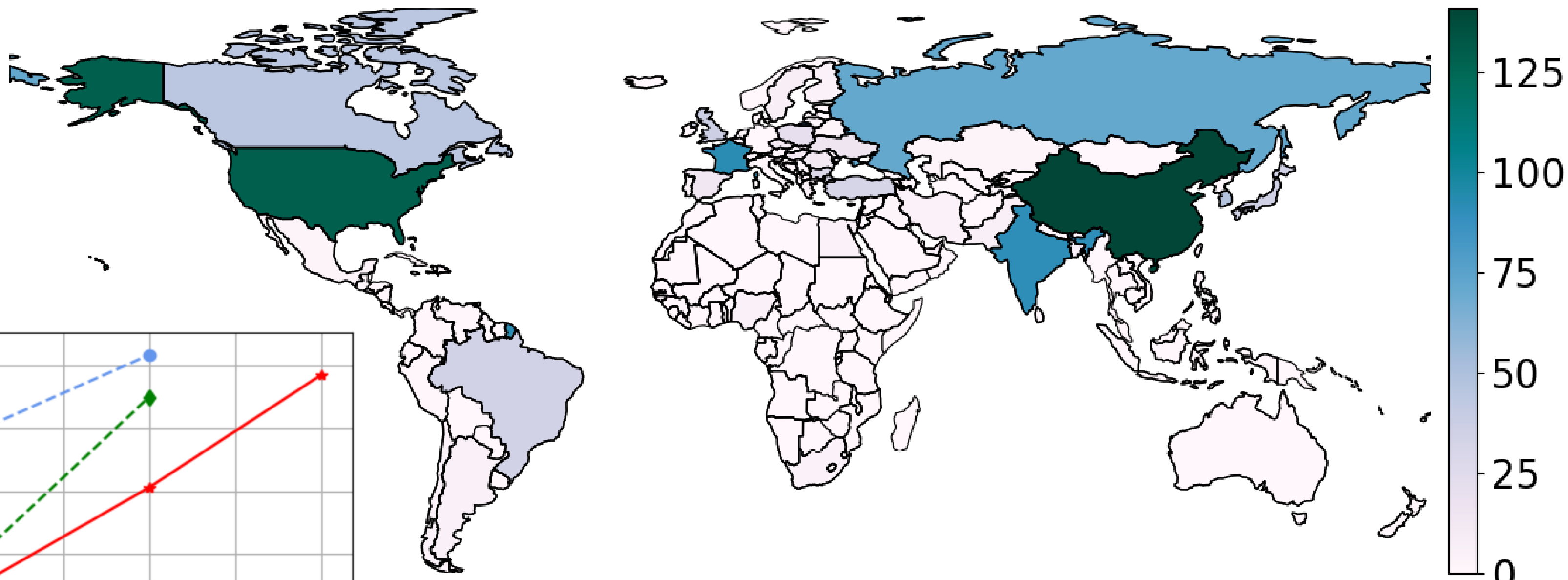
In addition to the SMR downselection, UK is funding High-Temperature Gas-Cooled (HTGR) development in the Advanced Modular Reactor (AMR) Program due to experience operating legacy gas reactors.

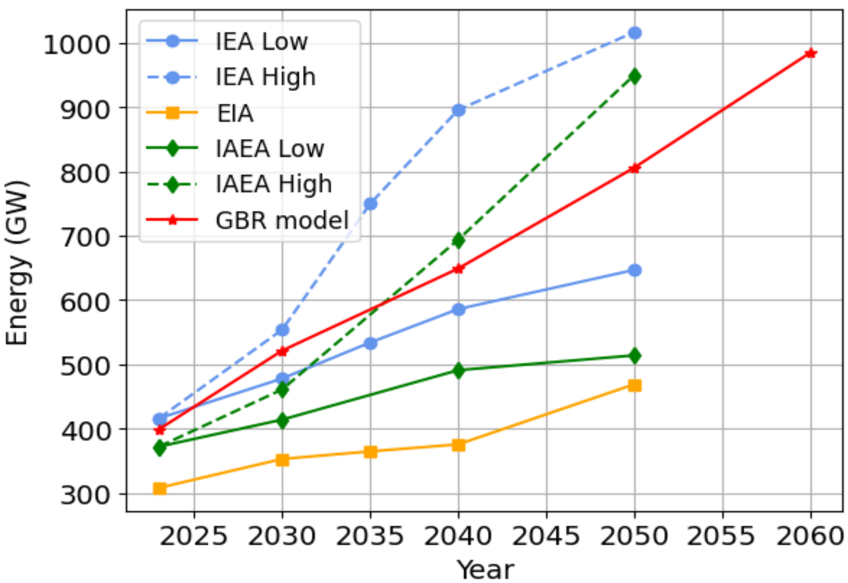
How much Nuclear Power is being Deployed?



As of 3/12/25

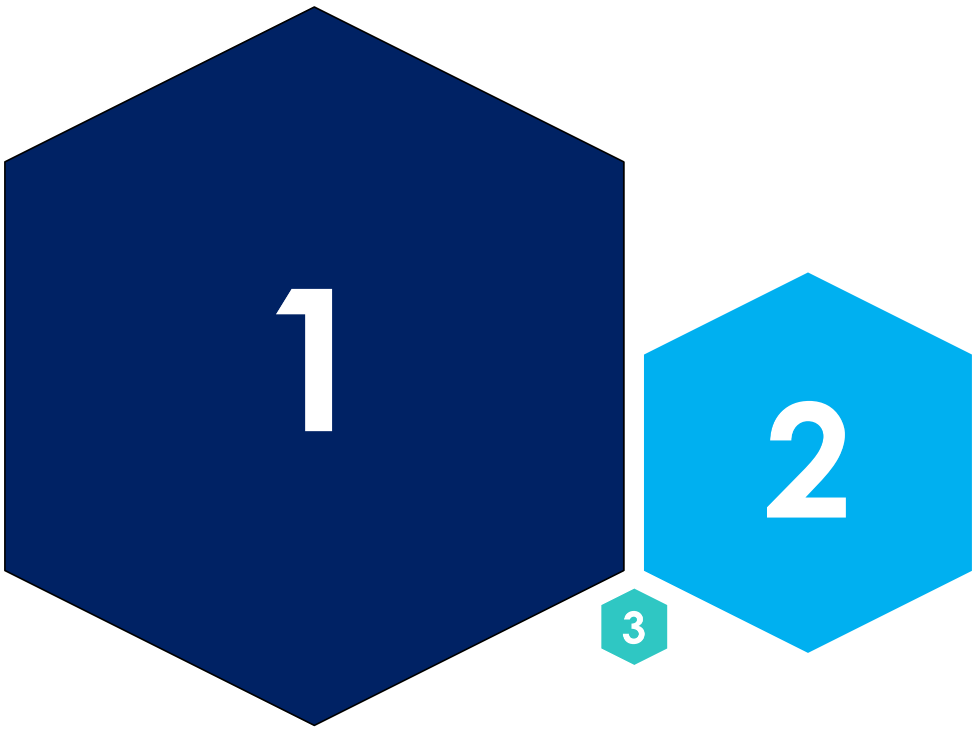
EPRI Model Estimates Regional Growth in Nuclear





IAEA – International Atomic Energy Agency
GBR – Gradient Boosted Regression Model
EIA – US Energy Information Administration
IEA – International Energy Agency

Reactor Size Comparisons



Commercial Power Reactor (~500 acres)

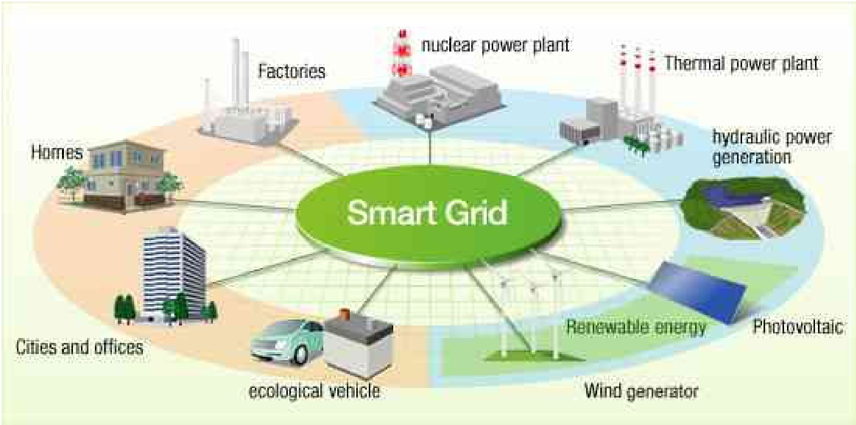
Small Reactor (~50 acres)

Microreactor (<1 acre)


Current State of the Industry

Opportunity and Need

- Many energy options (Nuclear, CCS, Hydrogen, Energy Storage, etc.) will be needed to decarbonize the grid and each has commercial challenges
- Aging infrastructure must be addressed in parallel with implementing new technology
- Advanced Nuclear technology (ANT) is widely considered a key opportunity to anchor and expand the future grid
- Balancing technology development, reliability, cost, safety, and other items will be critical



Given the need, how is the industry currently deploying nuclear?

Tennessee Valley Authority (Clinch River, TN)

- Tennessee Valley Authority (TVA) partnering General Electric Hitachi (GEH) for deployment of the GEH BWRX-300 technology
- In 2024, TVA partnered with GEH, Bechtel, and others for a Department of Energy Tier I FOA application
- Tennessee Senators recently criticized TVA's slow progress on new nuclear deployment

Owner	TVA
Off-taker	TVA
Developer(s)	TVA, Bechtel
Operator	TVA
Technology	GEH/BWRX-300
Plant Size	300 MW_e
Status	Construction Permit Application in preparation
Site	TVA Clinch River site, near Oak Ridge TN
Number of Units	1 planned, possibility for 2

DOW Chemical (Seadrift, TX)

- DOW Chemical and X-Energy have signed an agreement to deploy X-energy technology for electricity and process heat
- DOW has outlined specific commercial targets X-energy must meet to move to construction

Owner	DOW Chemical
Off-taker	DOW Chemical
Developer(s)	DOW Chemical
Operator	TBD
Technology	X-energy Xe-100
Plant Size	320 MW_e (total for 4 pack)
Status	Construction Permit Application Under Review
Site	DOW facility in Seadrift, TX
Number of Units	4

Energy Northwest/Amazon (Richland, WA)

- Amazon, Energy Northwest (EN) and X-energy have an agreement to deploy X-energy technology
- Amazon providing upfront funding for:
  - EN project development activities, and
  - X-energy to support technology and supply chain maturation.

Owner	Energy Northwest
Off-taker	Amazon
Developer(s)	Energy Northwest
Operator	Energy Northwest
Technology	Xe-100
Plant Size	320 MW_e (per four pack)
Status	Assessing Feasibility/ Early Planning
Site	EN's Columbia Generating Station
Number of Units	4 initially, potentially up to 12

Dominion (Mineral, VA)

- Dominion Energy issued a request for proposal (RFP) to SMR technology companies and developers
- Dominion has had an active early site permit at North Anna since 2007
- Dominion is the first large-scale, investor-owned utility to implement a non-traditional deployment model

Owner	TBD
Off-taker	Dominion
Developer(s)	TBD
Operator	Dominion
Technology	TBD
Plant Size	TBD
Status	Evaluating project proposals
Site	Dominion's North Anna Site
Number of Units	TBD

Kairos / Google (Location TBD)

- Kairos has partnered with Google to deliver their KP-FHR technology
- Under this agreement, Kairos will deliver the project, and Google will serve as the primary off-taker
- Kairos leveraging "Design, Build, Test" approach with smaller designs (e.g., "Hermes") initially, then scaling up to larger reactors

Owner	Kairos
Off-taker	Google
Developer(s)	Kairos
Operator	Kairos
Technology	Kairos KP-FHR
Plant Size	TBD
Status	Pilot Plant (Hermes) Under Construction
Site	Technology Campus on Oak Ridge National Lab Property
Number of Units	Hermes 1: 1 unit Hermes 2: 2 units

TerraPower / Natrium (Kemmerer, WY)

- TerraPower is deploying Natrium technology in Kemmerer, WY, to deliver power to PacifiCorp
- Natrium includes integrated thermal energy storage, enabling:
  - Operational flexibility and utility-scale energy storage
  - Separation between nuclear design aspects and commercial design aspects

Owner	TerraPower
Off-taker	PacifiCorp
Developer(s)	TerraPower/Bechtel
Operator	TerraPower
Technology	TerraPower Natrium
Plant Size	345 MW_e (Nominal)
Status	Construction Permit Application Under Review
Site	Greenfield site near Kemmerer, WY
Number of Units	1

Observations

- Momentum focused on non-traditional utility delivery models
- Many vendors for first of a kind projects are bringing capital for demonstration projects
- Outside Xe-100, no vendors have so far attracted follow-on US customers
- Wide array of different technologies shows first movers have differing views on optimal options as well as differing use cases
- Reactor technologies still pending design approval by NRC

	Project Announced	Team Defined	Const. Permit App Sub.	Const. Start	Operational
TVA/ Clinch River	✓	✓	○	○	○
DOW/ Seadrift	✓	✓	✓	○	○
EN/Columbia	✓	○	○	○	○
Dominion	✓	○	○	○	○
Kairos	✓	✓	○	○	○
TerraPower/ Kemmerer	✓	✓	✓	○	○

Why not more progress here?

Regarding Stakeholder Support

What does the public think regarding new nuclear?

Then…	Now
Historically, public opposition to new nuclear was more pronounced given concerns around safety and nuclear waste storage	The general public supports adding nuclear to the power mix, given its inherent benefits (reliability, sustainability, and economic benefits). As a result, nuclear power generally receives strong bi-partisan support

Public perception regarding nuclear has flipped, and the public is expecting the industry to deliver


Utility Specific
Challenges

What’s Holding Projects Back?

If the demand signal is so high, why aren’t more projects moving forward?

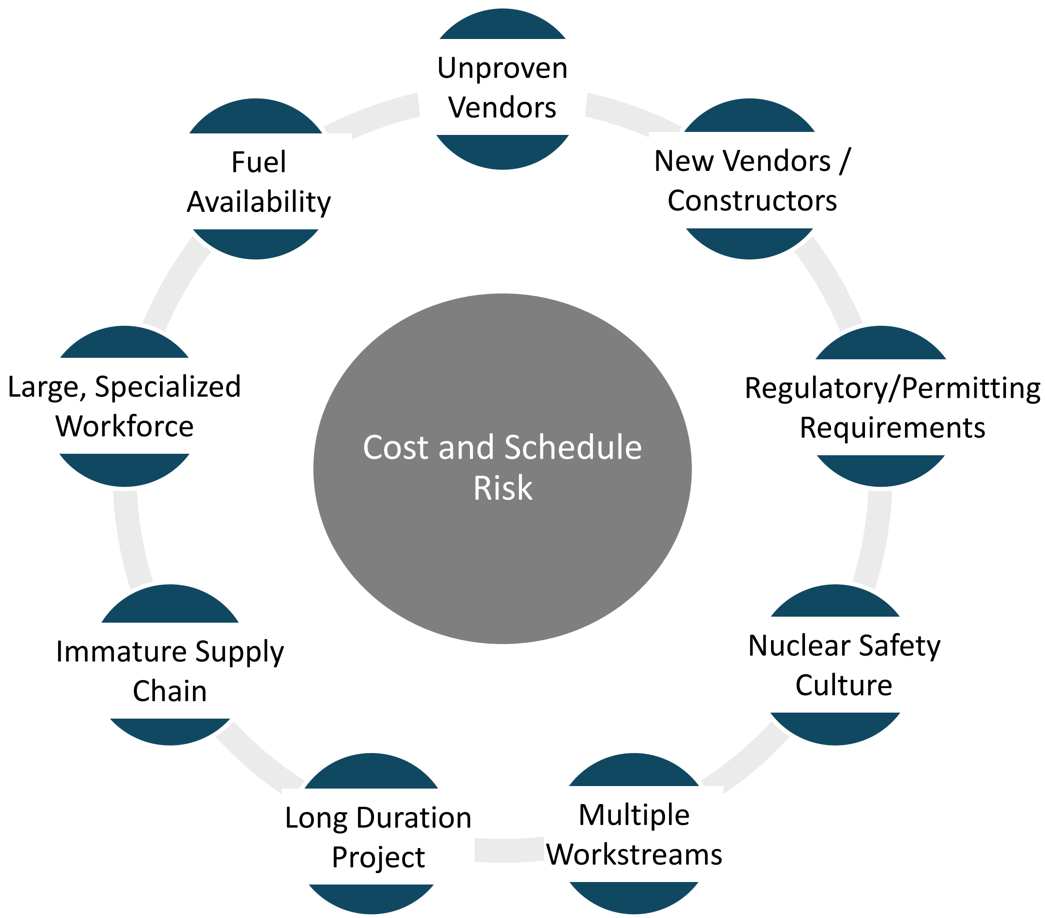
- Decision-makers have low confidence in nuclear deployment teams’ ability to deliver on time and budget, resulting in a credit downgrade
- The nuclear supply chain, has not yet convinced customers that a decision to purchase a nuclear power plant is not a company-viability or career-limiting decision

Customers want Increased deployment confidence

Suppliers need orders to demonstrate confidence

It’s all about cost and risk!

Cost and Schedule Uncertainty and Risk



A new nuclear power project is hard!

Cost and schedule risk are the cumulative effects of numerous underlying deployment challenges

What's Being Done to Address These Challenges?

Strategies for Nuclear Project Success

1. Clearly define commercial needs early
2. Complete design prior to construction
3. Define regulatory requirements and strategy early in project
4. Leverage inherent design benefits to reduce nuclear envelope
5. Closely manage new technology development
6. Learn and address operational lessons early
7. Establish a capable, effective, and aligned project management team
8. Engage the operator early
9. Avoid optimism biases
10. Equitably allocate risk to project team "best athlete"

Primary Mission of Industry Led Efforts

Industry first movers are and early projects are self-funding to enable progress and learnings from real projects. Additionally, some owners are considering pooling resources to enable project deployments.

Primary Mission of State/Federal Efforts

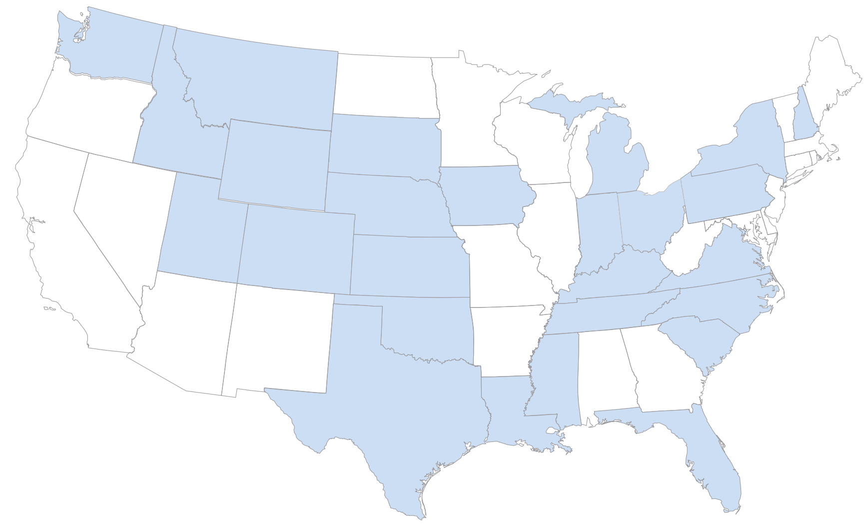
State and federal support is currently geared towards providing funding to enable faster progress and address critical deployment bottle necks, such as supply chain and fuel availability.

State Programs of Note

Multiple states have enacted pro-nuclear legislation and/or nuclear development authorities. Some notable programs/policies include:

- **Texas:** Numerous initiatives to promote nuclear power deployment and industry in the state
- **Utah:** Directs Office of Energy Development (OED) to create nuclear innovation hub (including new reactors) in the state
- **Virginia:** Multiple bills to enable SMR deployment
- **North Carolina:** Recently amended state law "least cost" language allowing utilities to include nuclear in IRP planning
- **New York**: State government collaborating with Constellation to potentially expand Nine Mile Point Generating capacity

States with Pro-New Nuclear Policy (*)

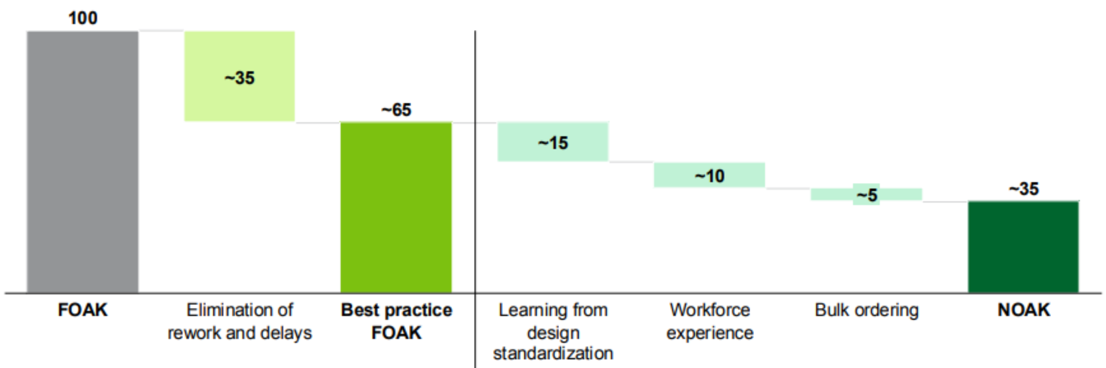


**States in blue denote state level policy enacted in previous 5 years that either 1) provides direct funding opportunities/ vehicles for new nuclear development, and or 2) amends legislation to promote new nuclear development*

Key Takeaways

- Uncertain nuclear project cost and schedules are the cumulative effects of multiple, interrelated project risks
- While industry is making progress to address first of a kind risks, someone needs to go first – and second!
- Managing nuclear project risk requires an understanding of how nuclear projects are different and how they are executed – and this can be done

Relative impact of FOAK to NOAK cost reduction levers on overnight capital costs, $/kW



Investing in pre-construction planning reduces costly rework and delays: ensuring design completion and constructor proficiency can reduce construction time and cost

Design standardization maximizes learning: multiple orders of a standardized design increase the ability to realize learning effects between projects

Taken from DOE Liftoff report – all values are relative estimates and have significant uncertainty
FOAK = First of a Kind, NOAK = Nth of a Kind

Nuclear projects can be done (and done successfully) with the right team, culture, vision, and plan

Potential Deployment Pathways

Potential Deployment Pathways

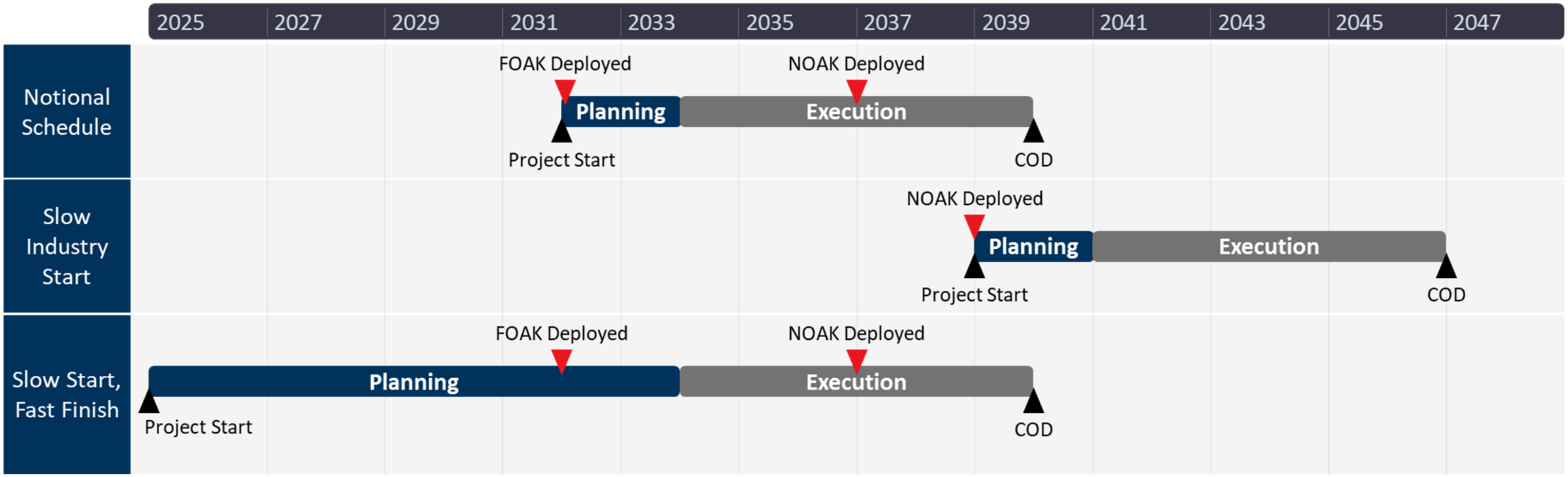
- The power industry overall and particularly the nuclear industry are constantly evolving
- While some owners are taking a posture in “going first”, many others are considering being “late-adopters” to allow first movers to address key risks
- The evolving marketplace is causing many late adopters to recognize the need to be able to accelerate or decelerate implementing a new nuclear deployment plan
- **Agility and strategy are important!**
- Any deployment plan must ensure stakeholder needs are prioritized by maintaining:
  - Reliability,
  - Low/manageable risk,
  - Affordability, and
  - Sustainability

Potential Deployment Plan Accelerators	Deployment Plan Decelerators
• Electricity Demand increases • Industry Succeeds at delivering NOAK/FOAK project benefits – FOAK delivered ahead of schedule – NOAK eliminates “nuclear” deployment risk • State/Federal Policy Incentives – Federal Funding – Tax Incentives – Future Policy • Favorable Financing	• Electricity Demand decreases • Industry fails to achieve NOAK/FOAK project benefits – FOAK/NOAK delivery delayed – NOAK Achieved, but hard to “get in queue” • Changes in State/Federal/Local Support • Unfavourable Financing

**FOAK = First of a Kind, NOAK = Nth of a Kind*

Example Deployment Scenarios

How could these accelerating/decelerating factors influence outcomes?



The eventual, implemented plan will be defined by how the accelerating/decelerating factors influence priorities and decision making

Project Phases

Phase	Project Initiation	Siting	Licensing	Site Preparation	Construction	SU/Comm
Primary Mission	Establish new nuclear program	Site qualification	Develop and submit COLA	Prep for nuclear construction	Complete facility	Startup the facility
Notional Cost	Hundreds of Thousands	Millions (+)	Tens of Millions (+)	Hundreds of Millions	Billions	Tens of millions
Notional Duration	--	--	2 to 4 Years	2.5 to 4 Years	3 to 5 Years	6 to 12 Months

By leveraging a graded deployment approach with best practices/lessons learned implemented, nuclear projects can be deployed successfully

Influenceable Risks by Late Adopters

Project Development	• Contractor Wherewithal • FOAK Deployment • **New to Nuclear Stakeholders** • **Subsequent Vendor Deployment**	• **Regulatory /Local Stakeholder support** • **Financial Certainty and Planning** • **Partnership Suitability**	• Industry Progress • **Integration with Other Capital Projects**
Siting	• **Interconnection Suitability** • **Land Acquisition Costs** • **Securing Water Rights**	• **Site Specific Engineering Costs** • **ESP Contractor Availability** • **PPE Misalignment**	• **Site Access/Use Challenges**
Licensing	• **NRC Delays** • NRC Inspections Impact	• **Application Prep Delays** • Design Changes	• Plant Staff Increases • Changing NRC Requirements
Technology Monitoring	• **Technology/Vendor Compatibility** • FOAK & FIAW Technology Challenges	• Plant Output • Reliability	• Resiliency • NOAK Benefits Underperform
EPC	• Design Changes as Eng Matures • Cost Increases as Eng Matures • 1st Time Contracting Relationships • First/Early Supply Chain Utilization	• Critical Vendor Performance • **Craft Availability** • Craft Productivity • Safety Conscious Work Environment	• Construction Quality • Schedule Extension • Start-Up/Commissioning Challenges
Operations	• O&M Team Engagement • Operator Training Program Extension	• **Fuel Sourcing/Pricing** • Outage Productivity	• **Staff Sustainability and Availability** • Utilization Rate

All "Interested in Nuclear" stakeholders can take action to de-risk future deployment projects and contribute to project success

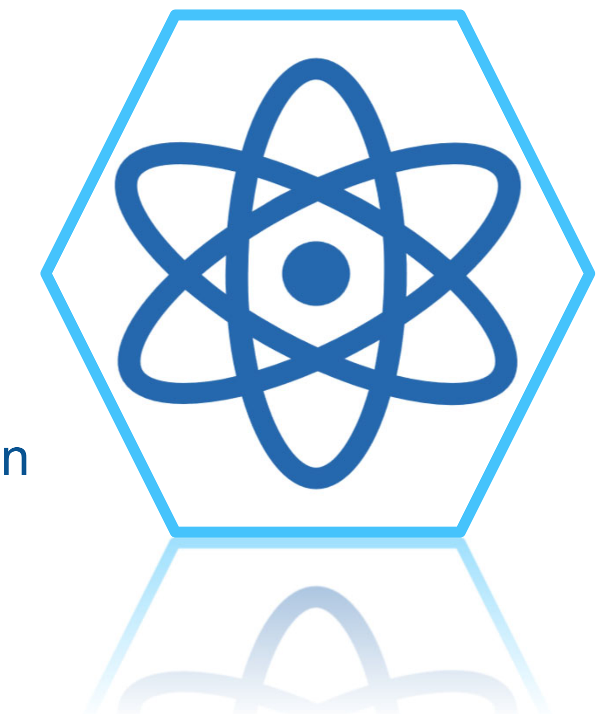
First of a kind projects
Any nuclear project

Looking Ahead

Tom Cooper | 4/28/2025

Why and Why Now?

- Technological diversity is foundational to any resilient resource strategy
- New nuclear represents a valuable option for a balanced resource portfolio
- To have a realistic chance at having a new nuclear resource by ~2040, deliberate planning actions must begin now



SRP Actions

2016-2018	Siting Evaluation – From 52 sites to 5
2022-2024	Gateway for Accelerated Innovation in Nuclear (GAIN) Coronado Generating Station Nuclear Feasibility Study
2024-2025	• Collaboration with APS and TEP • DOE grant application for Early Site Permit work submitted jointly with APS and TEP – Resubmitted in April 2025 • Finalize Roadmap for new nuclear development in late spring/early summer

FY26 Activities

Develop a guiding new nuclear program plan
Establish Governance Model
Conduct preliminary siting work in preparation for an Early Site Permit application process
Develop and begin implementing an External Stakeholder Engagement Strategy • Customers & Communities • Government Affairs • Industry
Develop and begin implementing a Technology Monitoring Strategy and Plan

Key Takeaways

- Advanced nuclear holds promise…and challenges.
- Globally, a significant number of new nuclear projects are underway.
- In the US there is a lot of "business by headlines," but substantive activity is happening.
- Nuclear would fill a resource need for SRP in the early 2040's.
- The time to get started derisking a potential future new nuclear project is now.