HITACHI

51st JAIF Annual Conference

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POWERING EVERYONE

Innovating for the next generation of reactors

David Sledzik
Senior Vice President, Sales & Commercial Operations
GE Hitachi Nuclear Energy

GE and Hitachi joint venture

Global BWR services and NPP

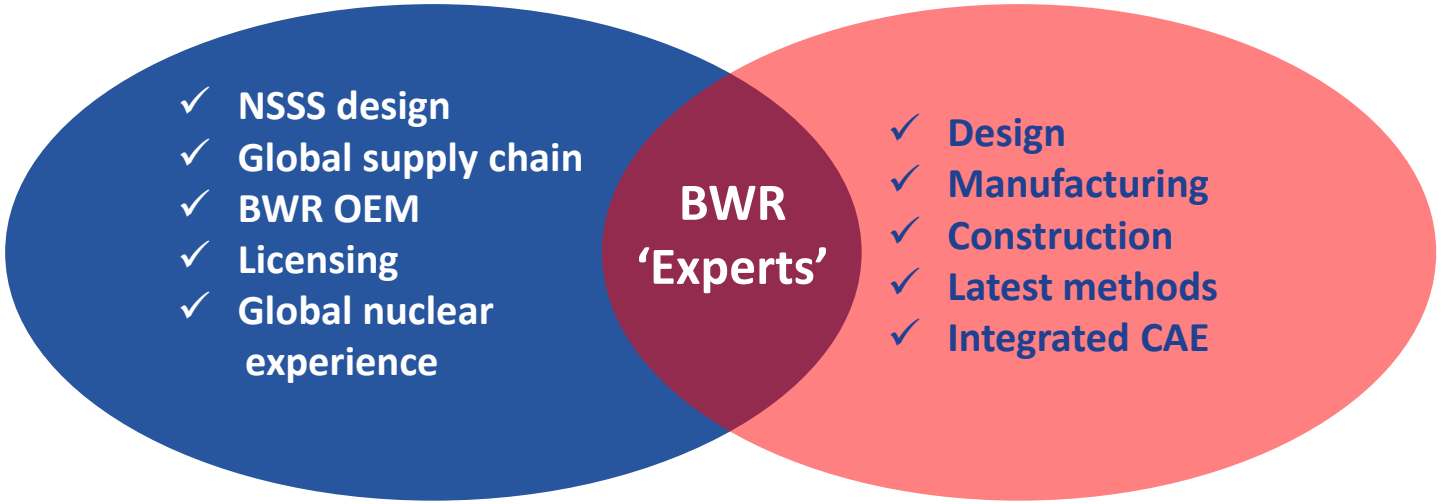
GE 60% HITACHI 40%

Japanese BWR services and NPP

HITACHI 80% GE 20%

- A 50+ year old technology relationship
- Over 40 years of nuclear partnership
- Synergies and complementary capabilities
- Partnering on the most advanced, operational reactors in the world today
- Joint-experience taken to next evolution of reactors

GE Hitachi Strengths



Hitachi GE Strengths

GE HITACHI

GE Hitachi Nuclear Energy & Global Nuclear Fuel

3 Business Units operating globally

Services

Fuels

Nuclear Plant Projects

Over 60 years of nuclear experience & innovation

1955 — GE Atomic Division established

1957 — Vallecitos BWR NRC License #1

1961 — EBR-II* begins operation, >30 yrs

1981 — PRISM* development commences

1996 — 1st ABWR built on time on budget

2007 — GE Hitachi Alliance Formation

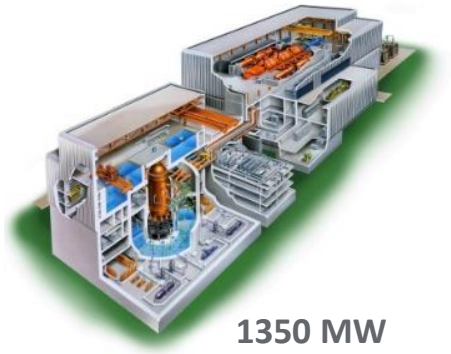
2014 — ESBWR NRC License

2017 — ABWR licensed in 4th country

** PRISM based on Argonne National Lab's EBR-II technology*

GEH Nuclear Plant Projects … continual innovation

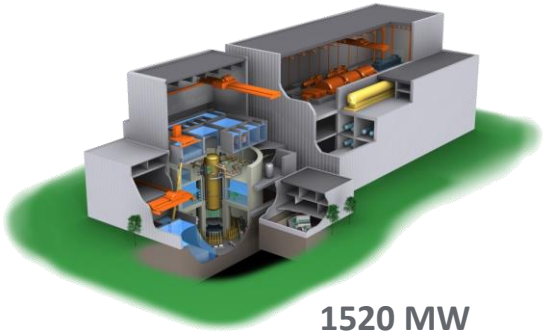
ABWR



1350 MW

Operational

ESBWR



1520 MW

Evolutionary

BWRX-300

(formerly VSBWR)

300 MW

Innovative SMR

PRISM

165 to 311 MW

Advanced Rx

Gen III **Gen III+** **Gen IV**

New Plant Services

Continuous experience

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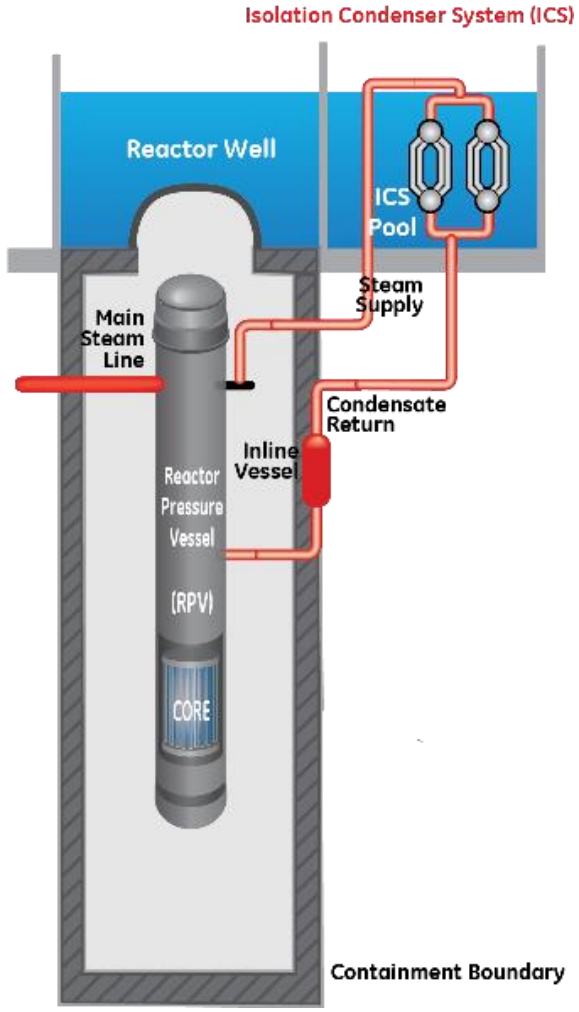
BWRX-300

Introducing BWR*X-300* …

- **10th generation** boiling water reactor
- **300 MWe** small modular reactor
- Very simplified … designed for no LOCA

Designing to become the most economical light water reactor



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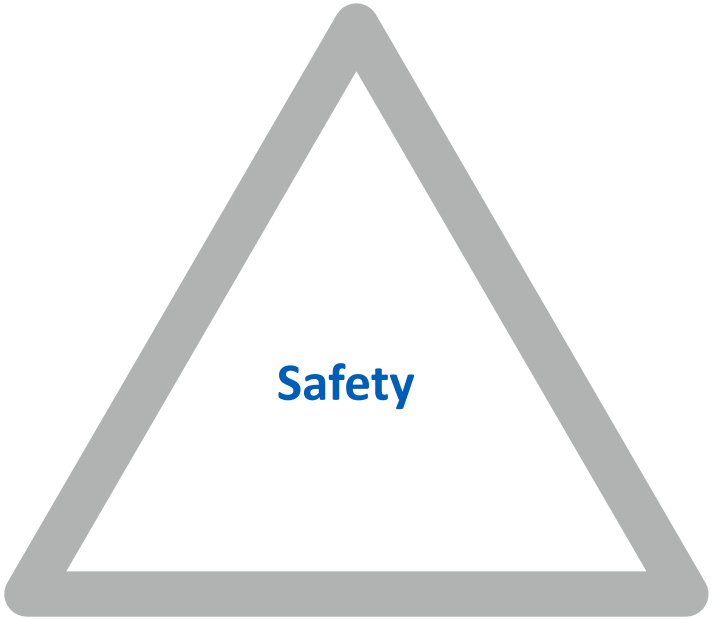
Patents Pending

In the near term … which SMR can offer all of these?

Gas-comparable LCOE
and lower capital cost



Proven components
Reactor design, fuel design and passive safety

Simplicity
Simpler to manufacture, construct, operate and maintain

BWRX-300 design goals

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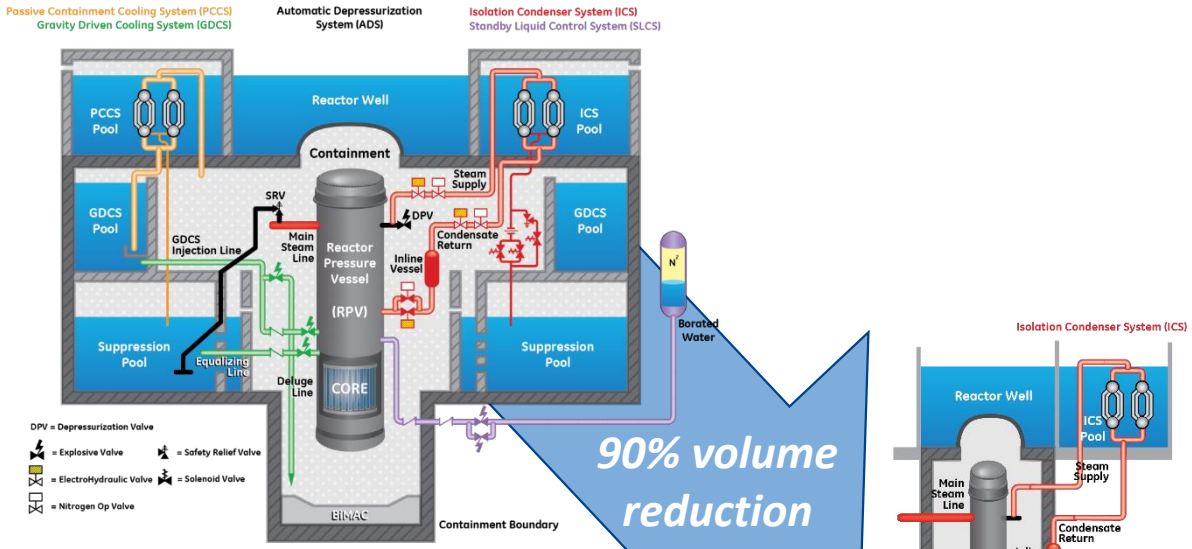
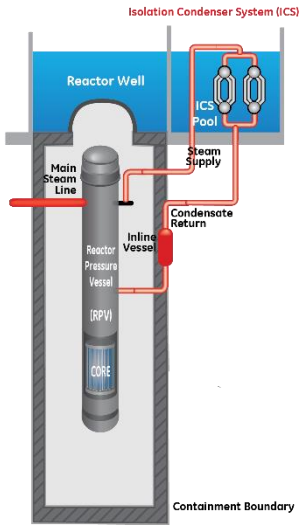
A dramatic reduction in scale and complexity vs ESBWR



ESBWR

161,000 m³

90% volume reduction



BWRX-300

15,500 m³

BWRX-300 design principles

- **300 MW Small Modular BWR**
- **Designed to eliminate LOCA**
- **Design-to-cost'** … think like a startup
- ESBWR design/licensing basis
- Underground/concrete security
- Natural circulation
- Isolation Condenser System cooling
- Small, dry containment
- Rethink control systems … passive controls
- Design for 'off-the-shelf' TI/BOP
- Goal of 75 onsite staff

Compared to ESBWR:
>50% building volume reduction/MW
>50% less concrete/MW

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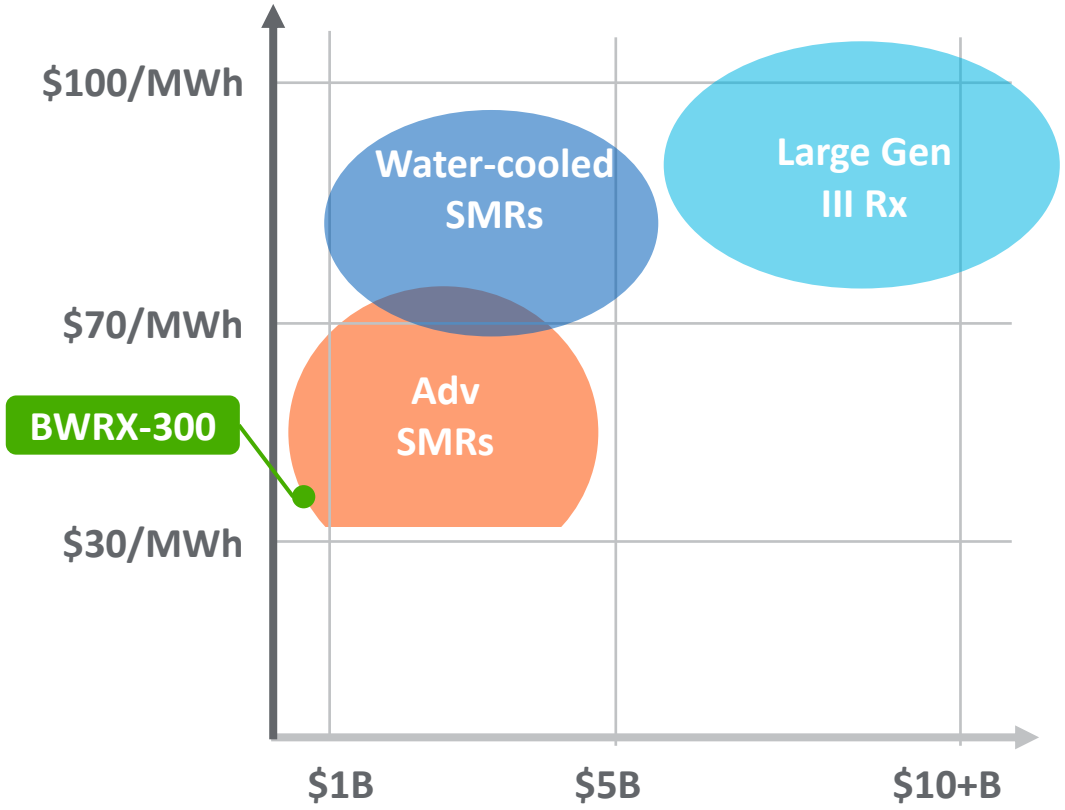
Patents Pending

BWRX-300 …
Targeting competitiveness with gas near term



	BWRX-300	Passive-safety large LWR
Key Design Basis	ESBWR	Developed
Fuel	Same	Proven
Passive Safety	Passive w/o DC power	3-7 days
Emergency Planning Zone (EPZ)	Site boundary	10 mi.
Capital Cost	60+% reduction /kW	$8+B
O&M	~75 staff <$16/MWh	599-1,000 staff
Security	Limited	Large security force (Gen II style)
Licensing	Limited testing required; using ESBWR basis	Complete
Detailed Design	~75% cost reduction	Complete
BOP	Small and simplified; 'off the shelf'	Custom, large components
Modularization	Simplified modularization	Complex

Simpler … Smarter … Lower cost *while utilizing ESBWR's 30+yr development basis*

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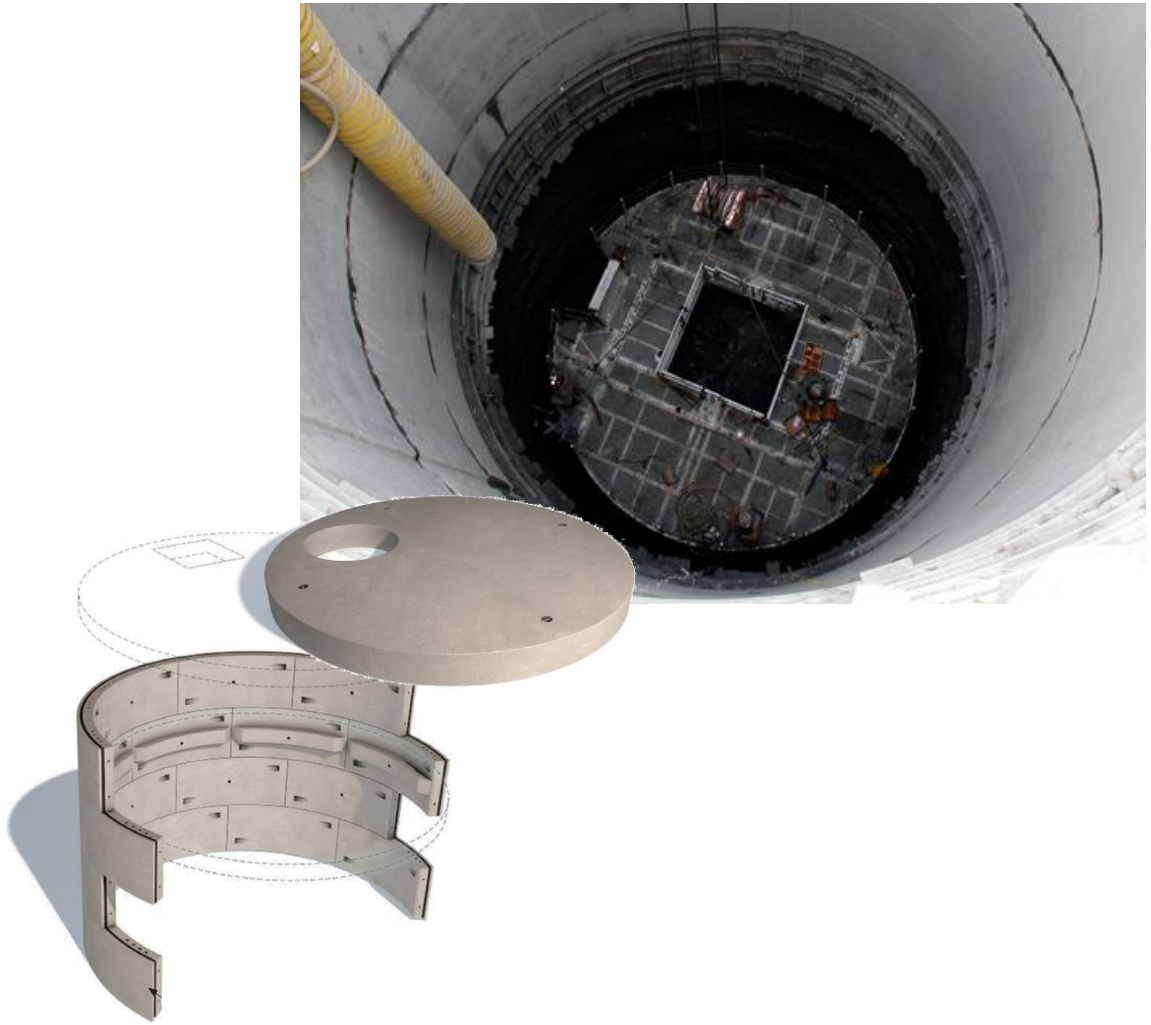
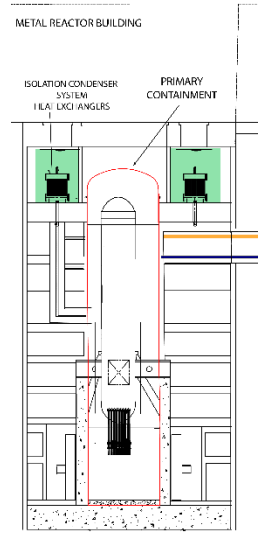
Simpler and more affordable to construct





Single large ~20 meter circular or square shaft

- Conventional blast/dig/pour … **~$4-6MM in 6 to 9 months**
- Leverage common construction techniques from other industries
- Earth provides natural protection from threats and lowers concrete volumes
- Power island ~ footprint of football pitch
- 900MWt size enables flexible water requirements … e.g. dry-cooling towers

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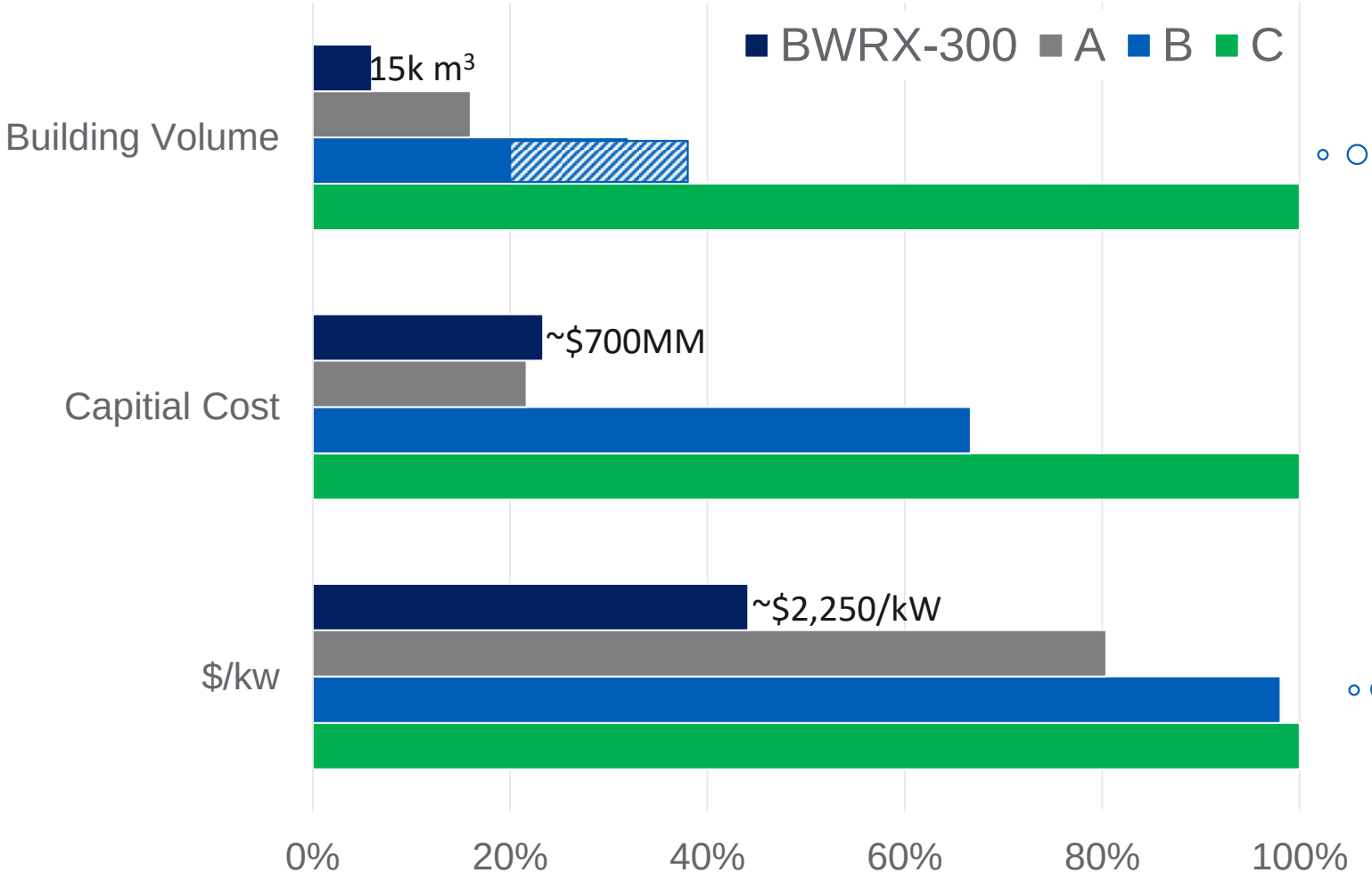
BWRX-300 comparisons to three PWR SMRs



- 90% less volume than C
- >50% less volume than A

40-50% less capital cost/kW

Sources: Public Information

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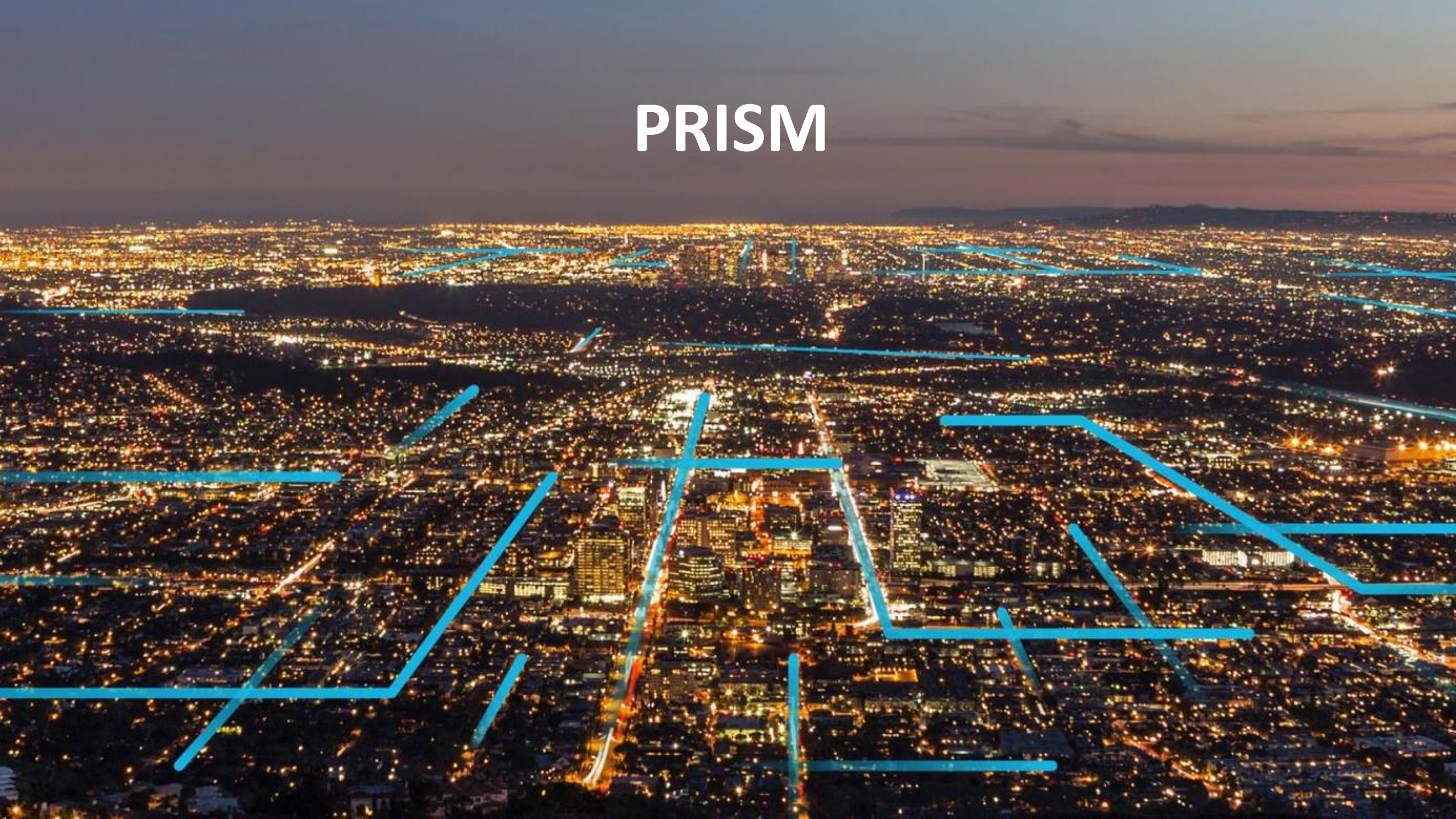
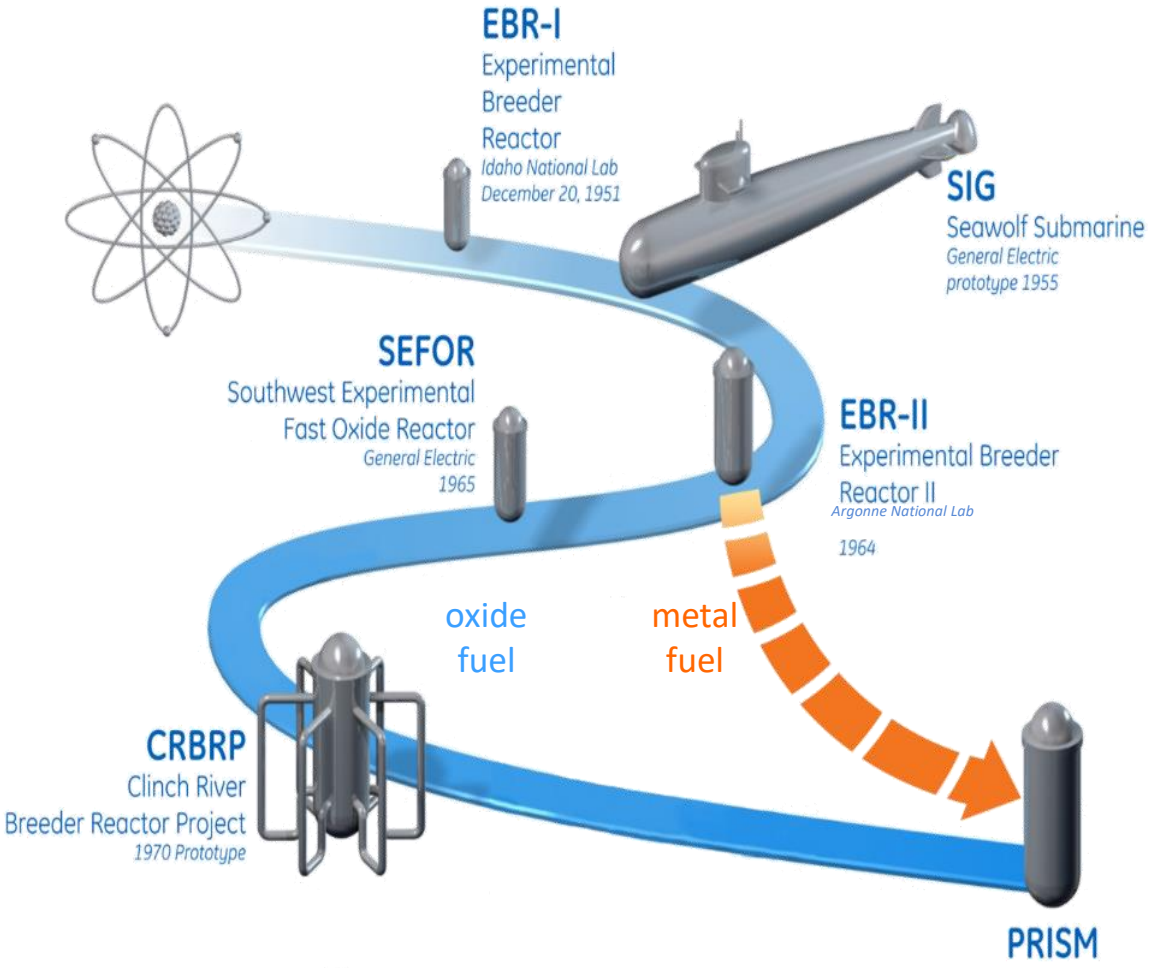
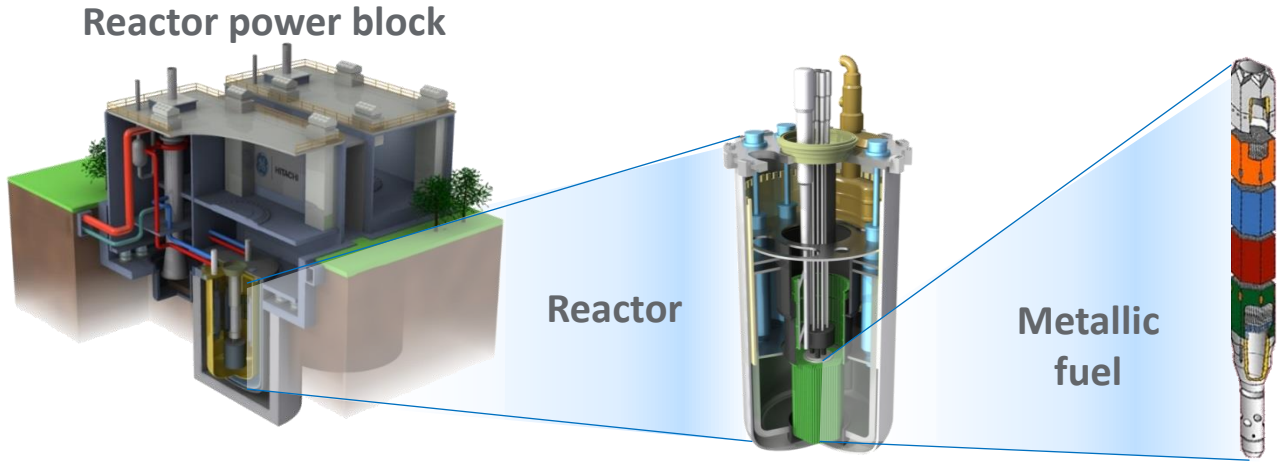

PRISM

GEH's sodium fast reactor solution … PRISM



- Sodium cooled fast reactor
- 165 and 311 MWe options
- Compact pool-type reactor
- Passive safety
- Metallic fuel … inherently safe
- Superheated steam … thermally efficiency
- Modular design
- Advanced Recycling Center applications … used nuclear fuel and Pu disposition



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PRISM … significant design and licensing complete

1987 - GEFR-00793 PSID
1994 - NUREG-1368 PSER for PRISM

NRC: "no obvious impediments to licensing"

2007 - PRISM informal DCD *(substantially)*
2009 - Docketed to support NRC training

Recognized for high technical quality during NRC training

1981-1984 GE Kickoff
Innovative design approaches

1985-1987 PRISM
DOE competitive liquid metal reactor concepts

1988 PRDA
DOE continuing trade studies

1984-1995 ALMR
- Large DOE effort
- Preliminary design
- Regulatory review
- Economics
- Utility advisory board
- Commercialization
- Tech development

1995-2002 S-PRISM
- Japan & Korea Improved economics
- Actinide burning scenarios

2007-2009 GNEP
- Demo reactor
- Actinide burning
- Commercial
- Best practices
- Advanced power conversion cycle

2012-2014 UK NDA Pu
Pu disposition concept … license, costs, fuel fab & disposal

2011-2015 DOE-NE
- PRISM electro magnetic pump
- PRISM PRA
- Test Rx evaluation

PSID	Preliminary Safety Information Document
PSER	Preapplication Safety Evaluation Report
DCD	Design Control Document
PRDA	Program Research & Development Announcement
ALMR	Advanced Liquid Metal Reactor program
GNEP	Global Nuclear Energy Partnership
NDA	UK Nuclear Decommissioning Authority

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GEH and ARC alliance … shared innovation

EBR II

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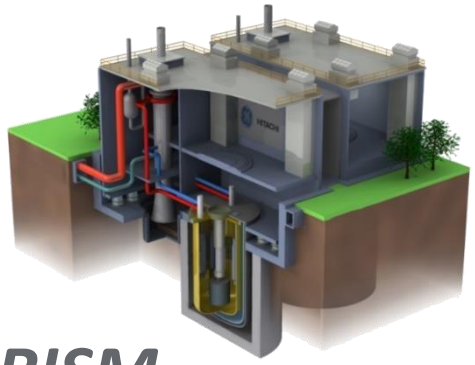


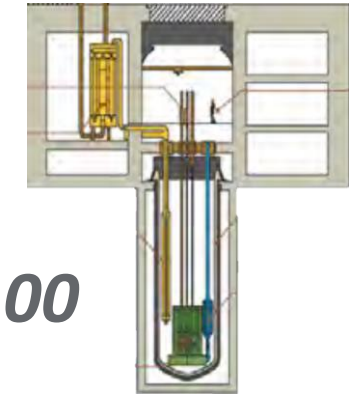
PRISM

- 60 years of experience & expertise deploying nuclear projects
- 60 years of sodium reactor experience
- Extensive programs, processes and infrastructure

- ✓Sodium coolant
- ✓Fast neutron
- ✓Small
- ✓Pool design
- ✓Metal fuel
- ✓Passive safety

Shared innovation & collaboration

ARC
ADVANCED REACTOR CONCEPTS, LLC



ARC-100

- 120 Man-Years senior level EBR-II experience
- ARC team member participated early PRISM reactor core design
- Start-up mentality and approach

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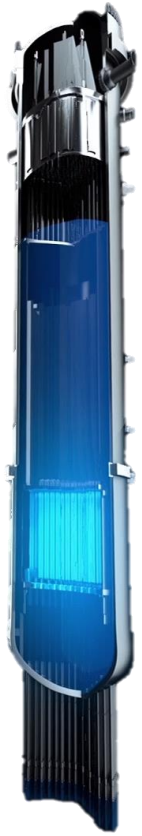
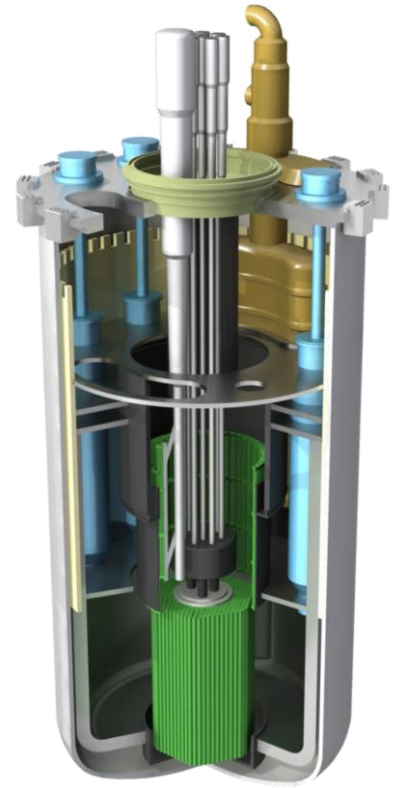
GE Hitachi … innovating for the next generation of reactors



- ✓ Experience & history
- ✓ Proven delivery model
- ✓ Technical competence
- ✓ Infrastructure
- ✓ Supportive services for industry



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Thank you