

BWRX300

# *Deep decarbonization with nuclear*

District Heating Seminar, Helsinki, Finland, March, 2019



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# Teaming for a deep decarbonization



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## **Dominion Energy invests in GE Hitachi SMR**

21 May 2018

Dominion Energy is to provide funding that could lead to commercialising the BWRX-300 small modular reactor (SMR), GE Hitachi Nuclear Energy (GEH) announced today.

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Exelon Generation



## **GEH receives federal funds for BWRX-300 development**

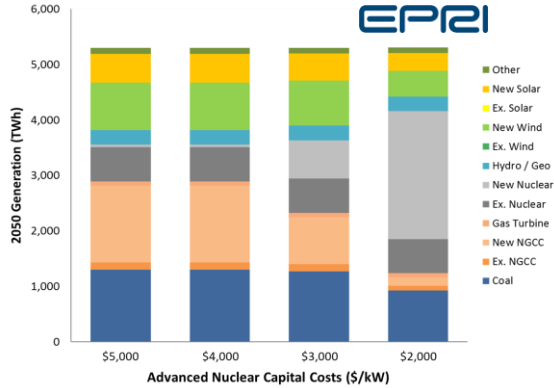
17 July 2018

GE Hitachi Nuclear Energy (GEH) is to receive USD1.9 million in funding from the US Department of Energy (DOE) to lead research into ways to efficiently building a power plant based on GE Hitachi's BWRX-300 small modular reactor. The research team includes Bechtel, Exelon, Hitachi-GE Nuclear Energy (HGNE) and the Massachusetts Institute of Technology (MIT).



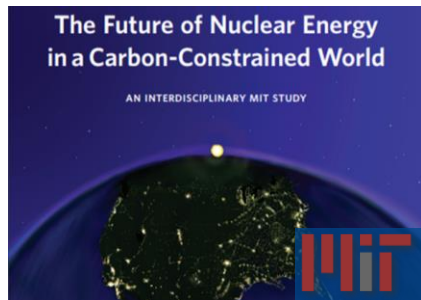
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# Institutional views for deep decarbonization



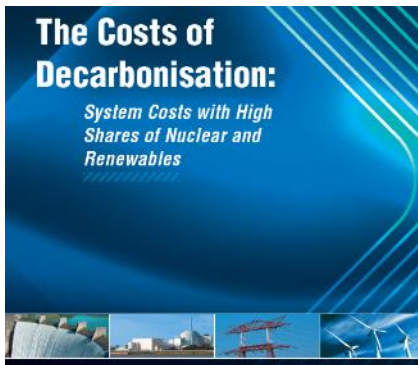
## What: EPRI Study:

- At <2500/kW, new nuclear starts to displace coal and natural gas decisively
- Based on US conditions – conditions would be market driven



## How: MIT Findings:

- Solve the construction risk
- Attain proven supply chain
- Optimize all areas of the CAPEX



## How: OECD/NEA Findings:

- Cost Effective low carbon requires variable renewable energy and nuclear (similar amounts)
- Nuclear power must evolve to meet future requirements
- OECD countries need to invest in decarbonized power sources, including nuclear, variable renewables, and hydro.

# Design features

## Competitive

Capital Cost: <\$1B total & <\$2,250/kW

LCOE: <\$35/MWh

## Construction Risk

Modular construction, pre-manufactured, underground containment, reduced need for complex concrete structures

Leverages other established industry technologies

## Supply chain

Key nuclear components are licensed GE Hitachi components

## Optimization

Fast deployment ... 1st COD before 2029

TI & BOP = off-the-shelf

Flexible Electricity/Heat/Cooling configuration



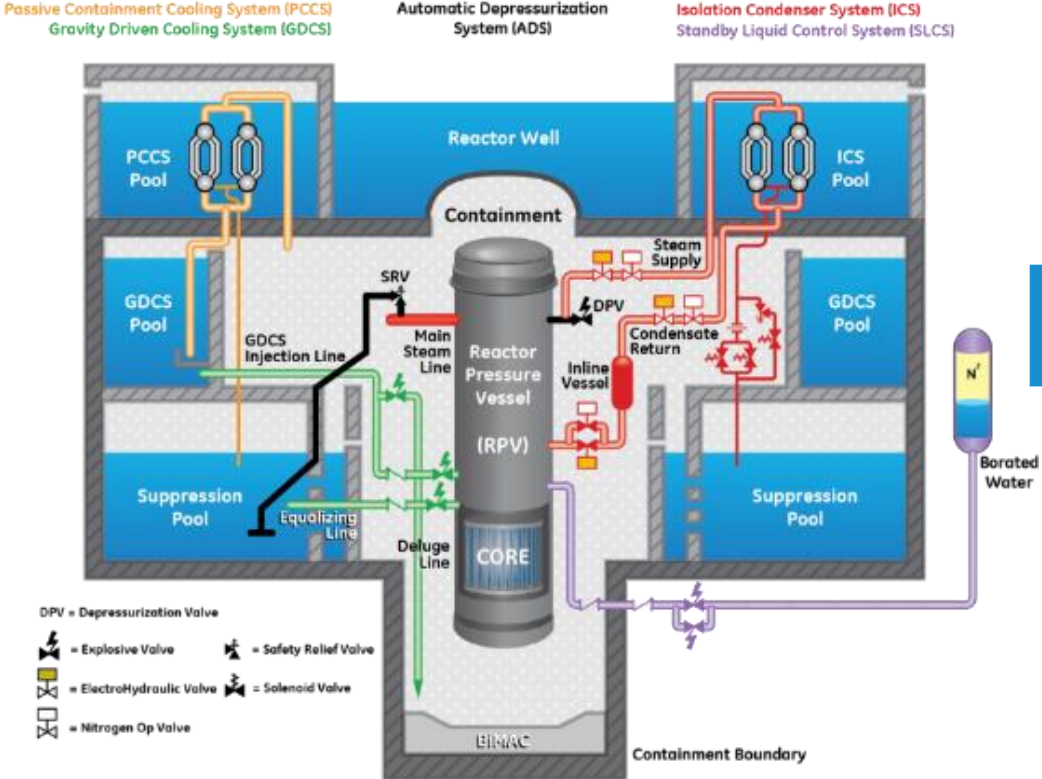
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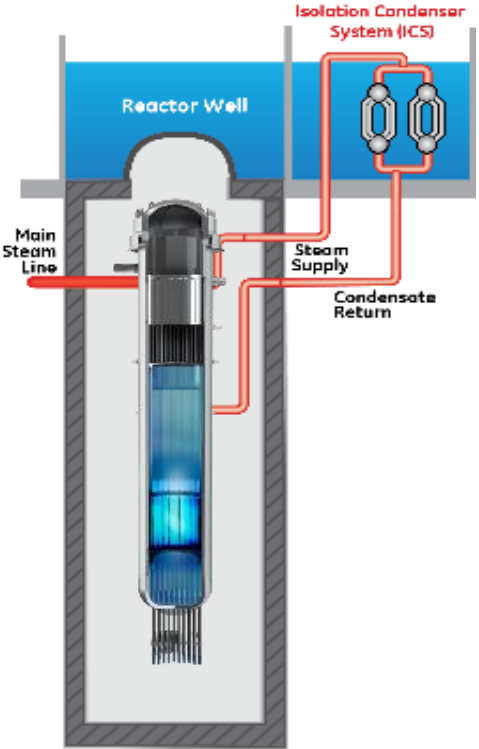


# Licensed pedigree, re-sized

## ESBWR



90% volume reduction





Finding: Successful nuclear builds tend to have the following attributes:

- a) Completion of needed portions of the design prior to start of construction
- b) Development of a proven supply chain for nuclear steam supply system (NSSS) components and a skilled labor workforce

**ESBWR design/licensing basis:**

Natural circulation ... Isolation  
Condenser System cooling ...  
codes & methods



**RPV:** material & fabrication ABWR / ESBWR

**Dryer:** ABWR / ESBWR / BWR6

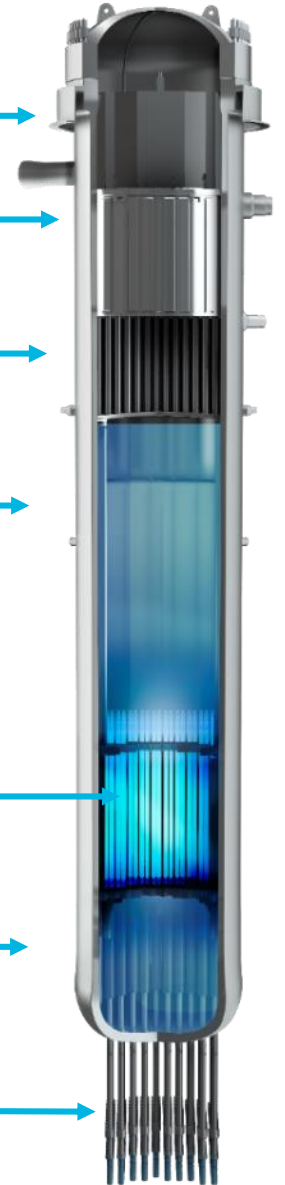
**Steam Separators:** ABWR / ESBWR / BWR6

**Chimney:** ESBWR and Dodewaard

**GNF2 Fuel:** 18,500+ bundles delivered  
(planned for ATF)

**Control Rod Blades:** ABWR

**FMCRDs:** ABWR / ESBWR



# Optimized structures

ESBWR  
161,000 m<sup>3</sup>



BWRX-300  
15,500 m<sup>3</sup>



- Mitigation of Large LOCAs ... eliminates many safety related Structures, Systems and Components
- Metal containment ... small, simple, robust
- Underground containment ... reduced security
- Conventional turbine building – simple construction
- Defense-in-depth driving design ... balanced level of redundancy and diversity



# BWRX300

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***Kiitos!***

March 2019



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