

# New nuclear build opportunities

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# RWE new generation projects in the UK

## > Renewables

- Rhyl Flats: 90 MW
- Gwynt-y-Mor: 750 MW
- Greater Gabbard: 500 MW (50% stake)

## > Coal fired

- Tilbury/Blyth (planning)

## > CCGT plants

- Staythorpe 1650 MW
- Pembroke 2000 MW

## > Nuclear

- 50:50 share of at least 6 GW by 2025

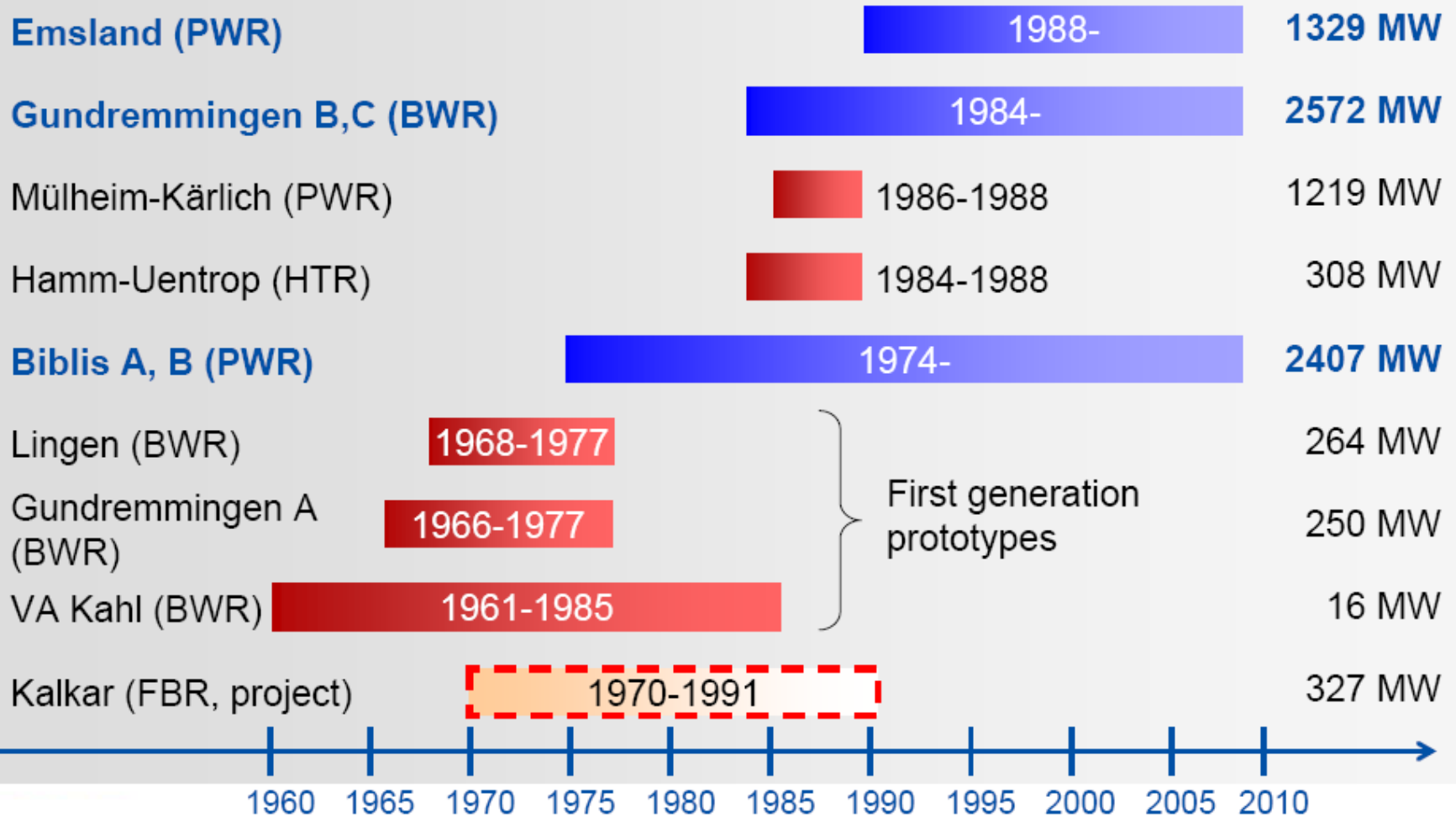


Pembroke aerial view

# RWE nuclear experience

Investment in new nuclear technologies, e.g. EPR, SWR 1000, EPP-program

since early 90s



# RWE's current and legacy nuclear installations

## Operating Nuclear Power Stations

## Decommissioning Projects

- Latest generation KONVOI PWR
- 1329 MW (net)
- Operating since 1988

### Emsland (87,5%)



- Germany's first PWR > 1000 MW
- 2407 MW (net)
- Operating since 1975

### Biblis A,B



- Latest generation BWR
- 2572 MW (net)
- Operating since 1985

### Gundremmingen B,C (75%)



### KWL Lingen

BWR  
264 MW  
1968-1977  
In safe enclosure



### THTR (33%)

HTR  
308 MW  
1984-1988  
In safe enclosure



### Mülheim-Kärlich

PWR  
1320 MW  
1986-1988  
Decommissioning ongoing



### VAK Kahl (80%)

BWR  
16 MW  
1961-1985  
Final stage of decommissioning



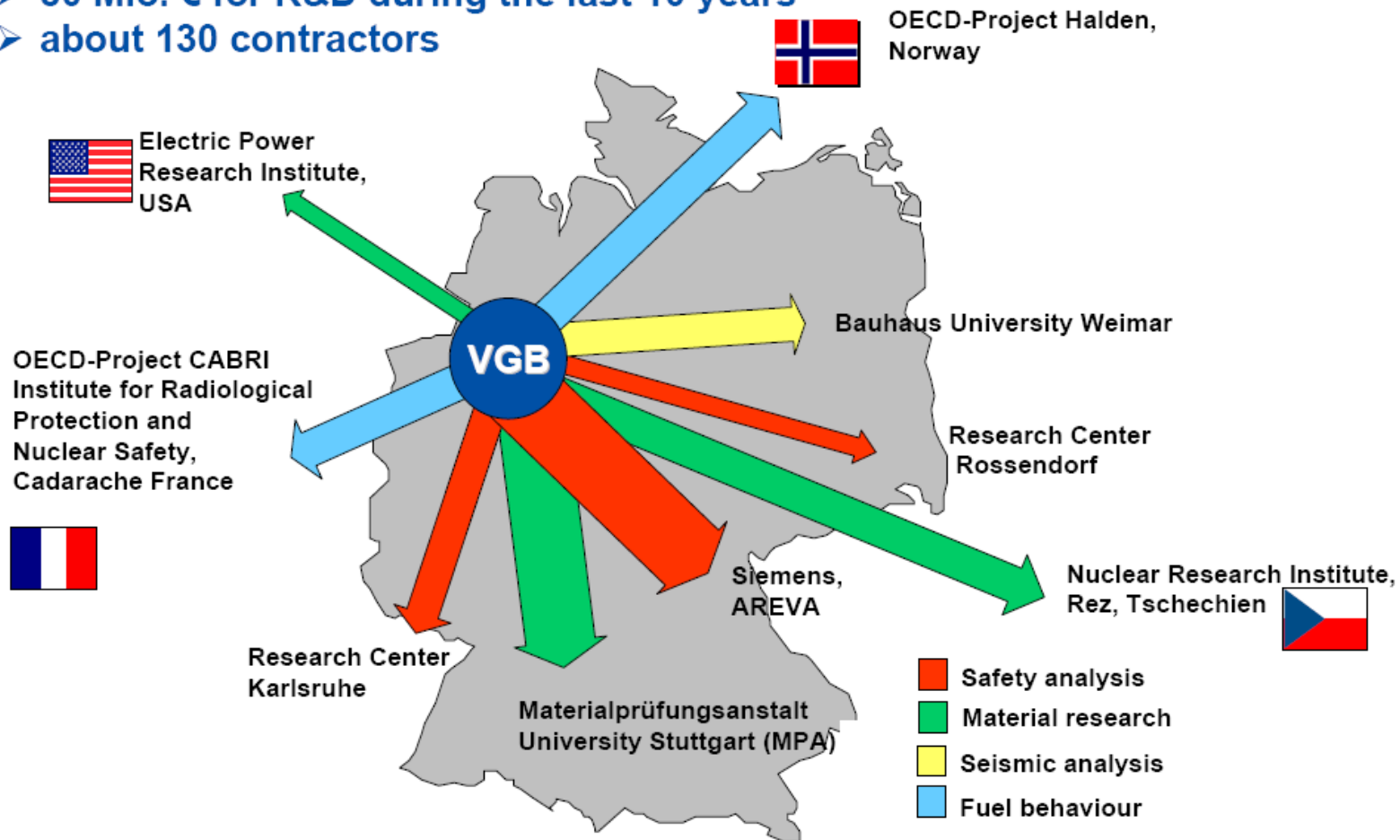
### Gundremmingen A (75%)

BWR  
250 MW  
1966-1977  
Decommissioned to further use

**Not included:** direct and indirect participations in GNS, NUKEM (until 2006), URENCO, Superphénix, Kalkar fast breeder reactor, German fuel element factories, Karlsruhe reprocessing plant

# RWE nuclear R&D activities

- in collaboration with other German NPP operators (under the umbrella of VGB Power Tech)
- 80 Mio. € for R&D during the last 10 years
- about 130 contractors



# The RWE E.On nuclear joint venture

- > Combined energy resource and expertise
- > Combined nuclear expertise
- > Combined financial strengths
- > 50/50 JV to develop at least 6 GW by 2025
- > JV's objective to:
  - Select a reactor vendor
  - consent and develop sites as soon as practicable
  - manage construction and commissioning of NPPs
  - operate each station over long term
  - decommission and restore the sites



# RWE nuclear development sites

## Sites

### ● Joint venture

Wylfa

- Wales; Isle of Anglesey
- NDA land + independent purchases

Oldbury

- Gloucestershire on the River Severn
- NDA land + independent purchases

### ● RWE npower

Cumbria

- Mid-Copeland site, 3km north of Sellafield.
- Southern Copeland site, west coast near Millom.

## Site Locations



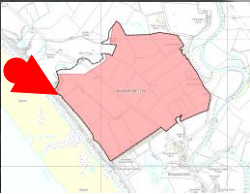
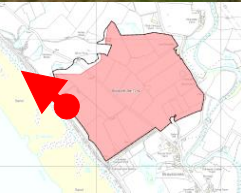
# Wylfa site – west of existing station, looking north



## Oldbury Site – looking east from existing flood defence



# Braystones



# Kirksanton



# Economic opportunities

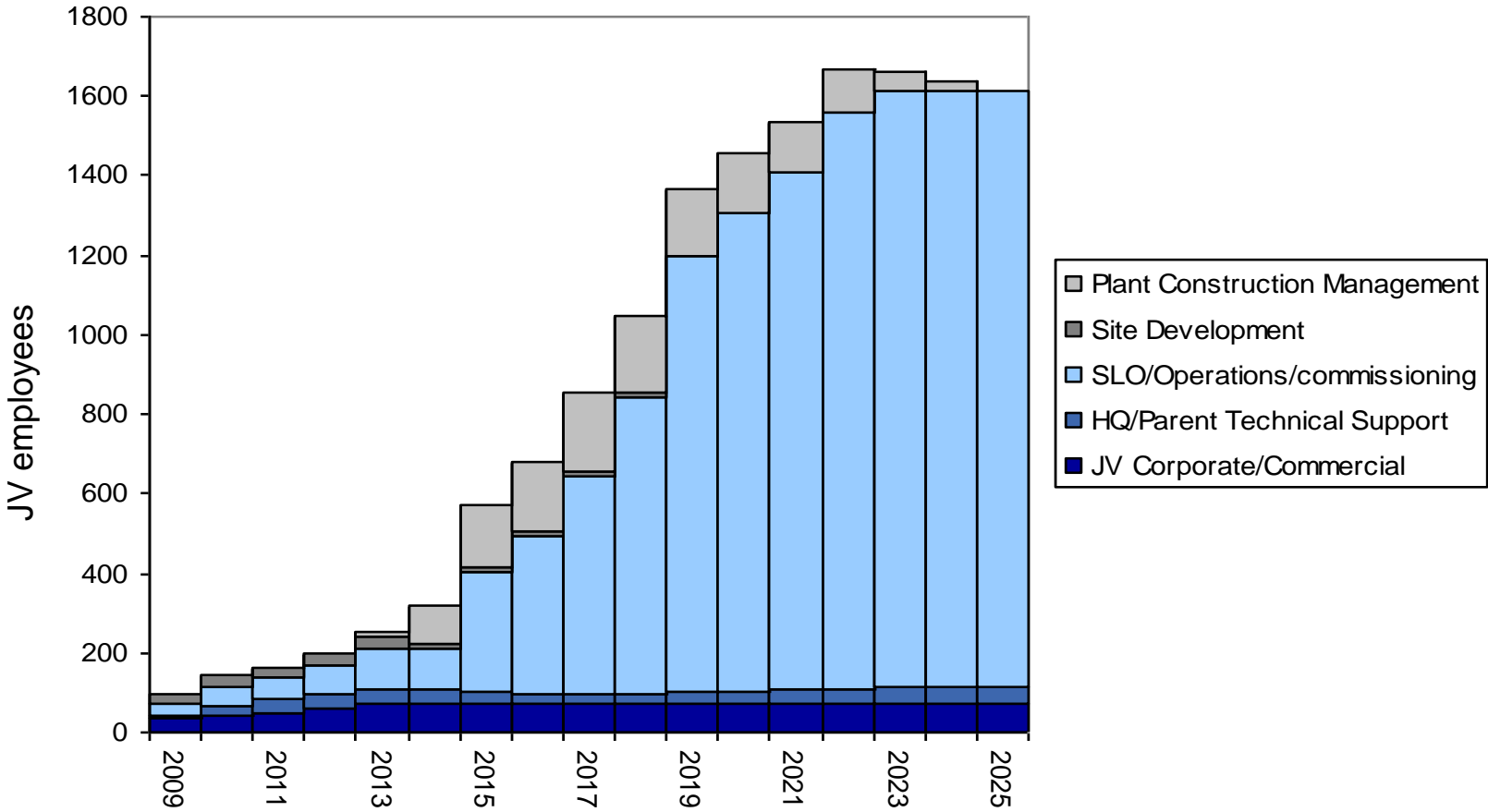
Each nuclear power station would provide significant economic opportunities:

- between 2000 and 3000 new jobs during construction;
  - around 1000 new jobs when operational;
  - creating hundreds of additional jobs in the community;
  - use local suppliers
- 
- Many millions of pounds of investment into the local economy every year
  - Continuity of employment for the skilled nuclear workforces for around 60 years
  - Extensive opportunities for future generations to develop skills, through apprenticeships and access to skilled employment

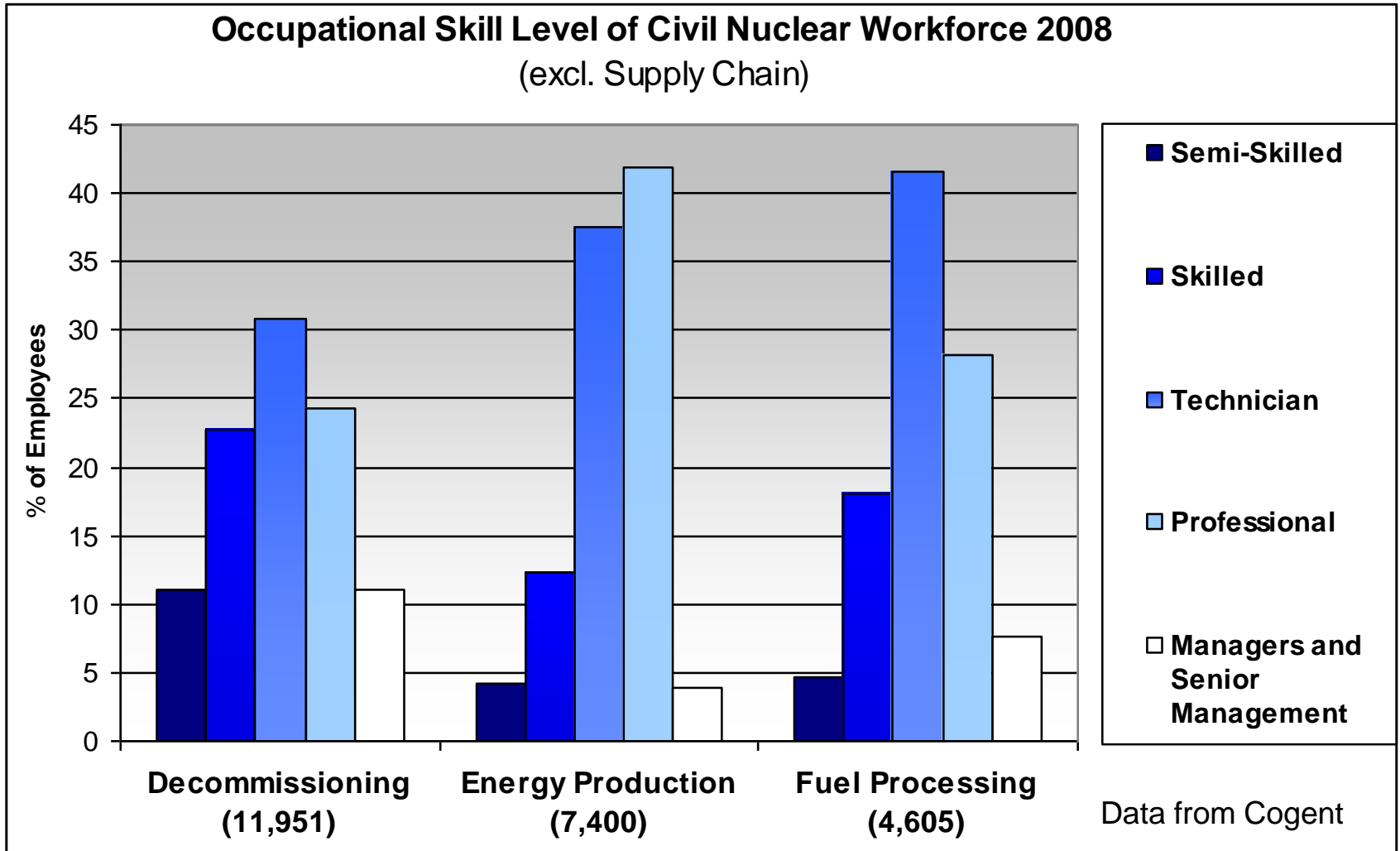


# JV nuclear new build resourcing timescales

Planned employment of over 1600 jobs with the potential for 2000 to 3000

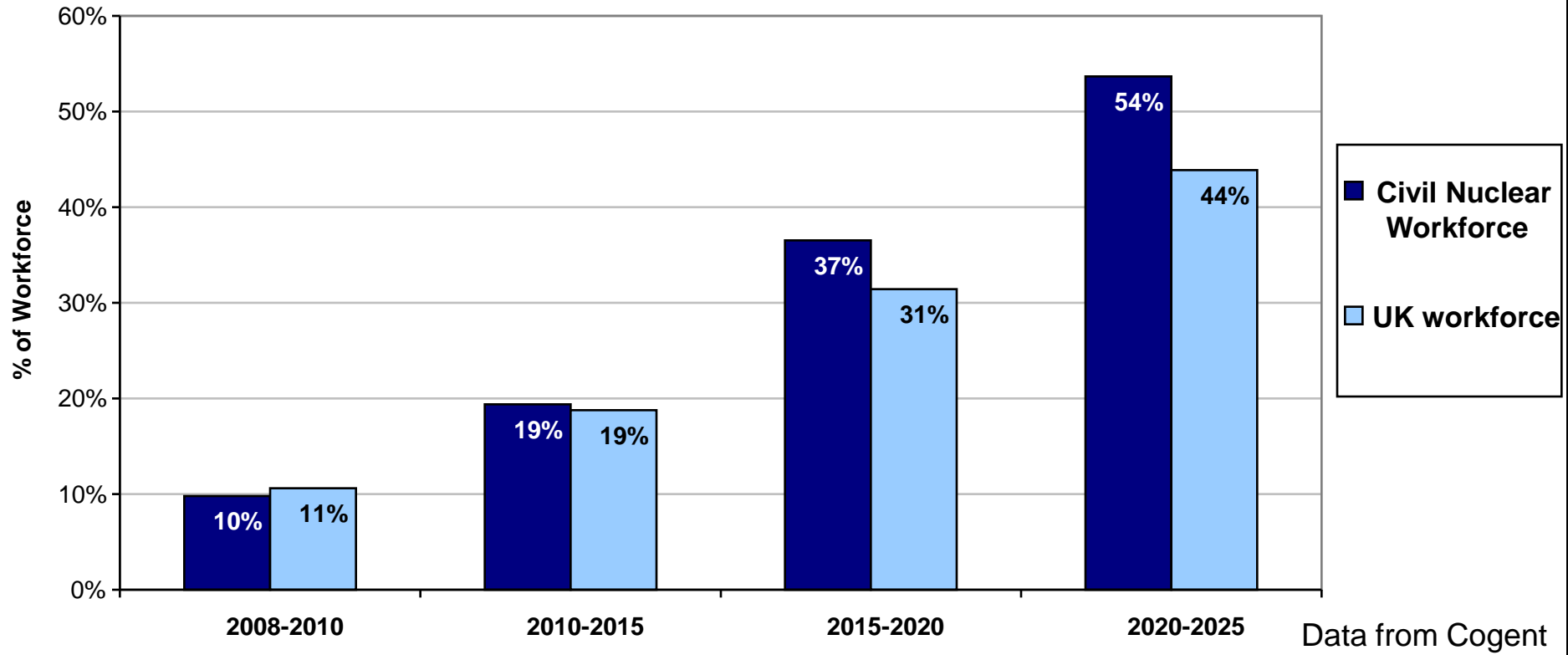


# Nuclear Workforce - Skill Profiles



# UK Nuclear Workforce Age Profile

## Retirement Profile Comparison 2008-2025



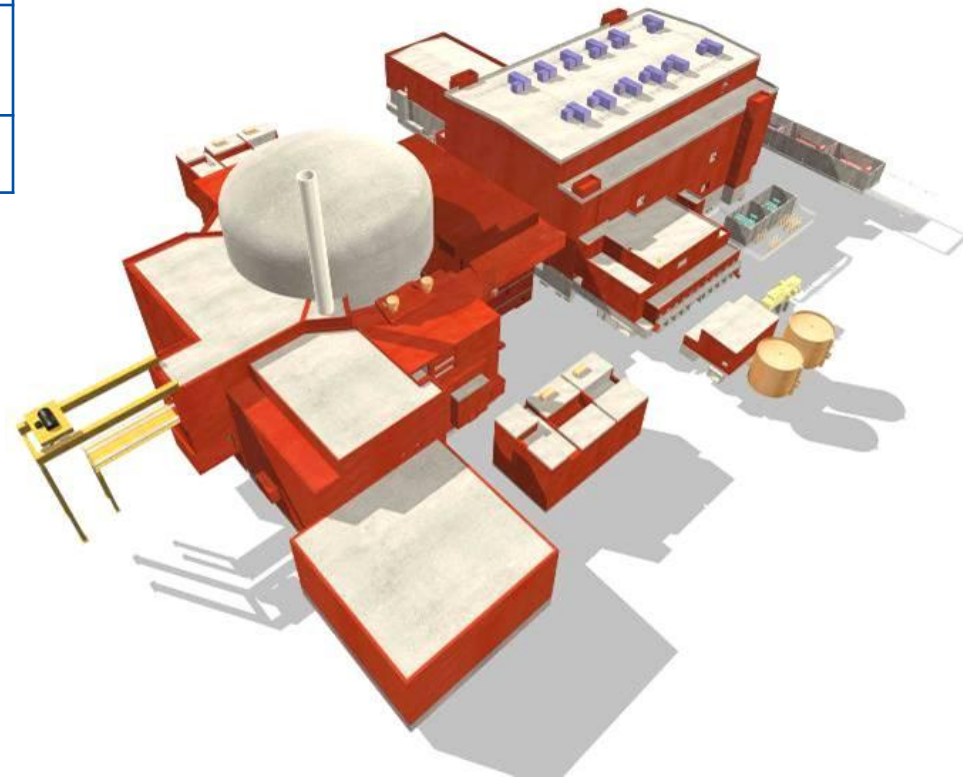
# Nuclear technology and supply chain

- The Joint venture is committed to using safe, reliable and efficient modern nuclear technology
- Technology providers being evaluated – choice not yet made. 2 candidates:
  - Westinghouse AP1000
  - AREVA EPR
- Both AREVA and Westinghouse investing heavily in UK supply chain development
- JV is looking at a variety of models for project delivery and risk management through contracting models and strategic partners.
- Once framework is in place, other suppliers and contractors will be procured.



# AREVA EPR

Reactor power	4500 MWt
Electrical power	1640 MWe
Primary loops	4
Operating life	60 years



# EPR Overview



*Olkiluoto 3 in April 2009*

## > **Safe**

- preventing core meltdown and mitigating its potential consequences
- active and passive safety systems
- enhanced protection against aircraft impact and earthquakes

## > **Enhanced competitiveness**

- unit power in the 1600 MWe range
- 36-37% overall efficiency depending on site conditions

## > **Proven**

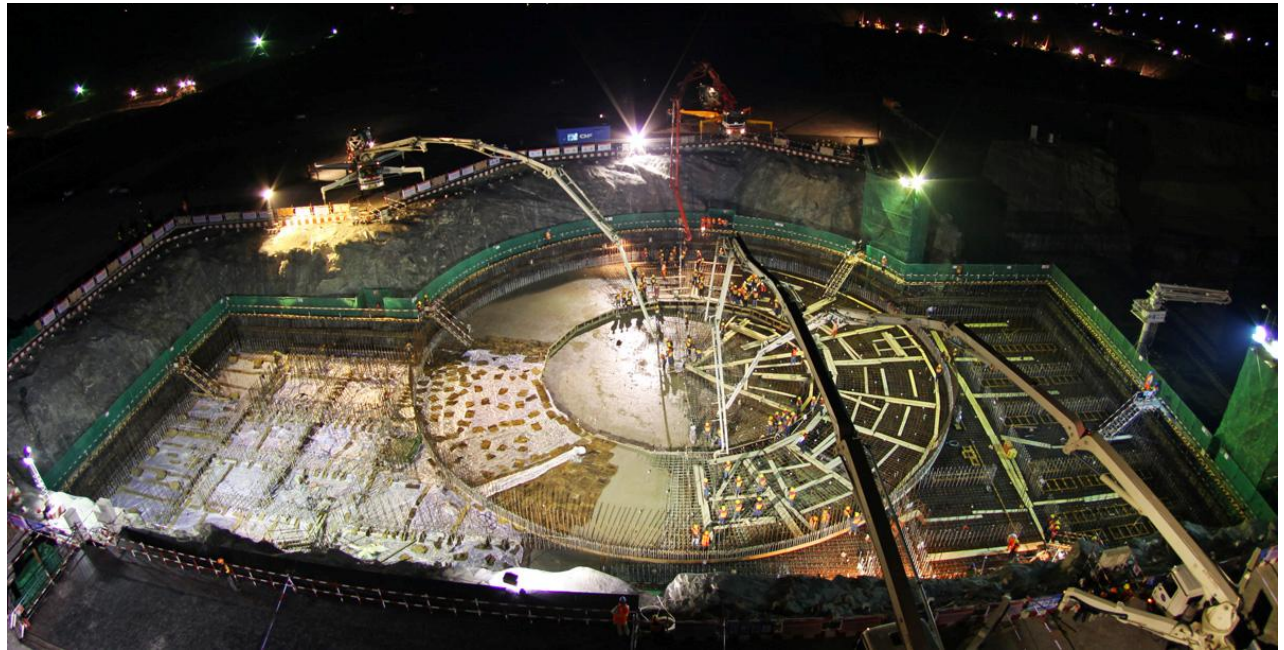
- based on existing N4 and Konvoi reactors in France and Germany
- under construction in Finland & France

# Westinghouse AP1000

Reactor power	3400 MWt
Electrical power	1117 MWe
Primary loops	2
Operating life	60 years



# AP1000 overview



*Sanmen base-mat night operations*

> **Safe**

- passive safety systems

> **Simple**

- passive safety simplifies design, operation and maintenance

> **Mature**

- builds on experience of operating Westinghouse plants
- Under construction at Sanmen. Construction to start at Haiyang (4 units in China). Further projects planned in the US

# Challenges for nuclear new build

- > Efficient planning and technology licensing processes
- > Effective resourcing of the nuclear regulator
- > Common standards and reference designs with the EU.
- > An agreed solution for the longer-term disposal of nuclear waste.
- > Strong support from key stakeholders to maintain the positive climate.
- > A predictable, long term, regulatory framework for energy

# Questions?