EDF Energy Planning for Decommissioning during Operation.

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WENRA Workshop on Regulatory Aspects of Decommissioning
5th to 7th November in Berlin and Greifswald
EDF Energy is the UK’s largest supplier and generator of low carbon electricity

- **PRESSURISED WATER REACTOR**
  - Commissioned: 1995
  - Lifetime expectation: 2035+

- **AGR NUCLEAR STATIONS**
  - 16 Advanced Gas-cooled Reactors
  - Lifetime expected: mid-2020s to 2030

- **COAL-FIRED STATION**
  - West Burton A commissioned 1977, 1980
  - Plant is now in decommissioning stage

- **GAS STORAGE SITES**
  - Total of 9 connected salt caverns
  - 4 commercially operational salt caverns

- **GAS STATION (CCGT)**
  - Commissioned: 2013
  - Lifetime: 2040+

- **BATTERY ENERGY STORAGE**
  - 498MW battery at West Burton B

- **WINDFARMS**
  - 33 operational onshore wind sites
  - 2 operational offshore wind sites

- **ELECTRIC VEHICLES**
  - Electric vehicle, smart charging and electricity supply offers for residential and business customers
  - Vehicle-to-Grid product also launched

- **SIZEWELL C**
  - Replica of Hinkley Point C
  - Lower construction costs and risks
  - Aim to begin construction in early 2020s

- **HINKLEY POINT C**
  - 25,000 new job opportunities created during construction
  - Powering 6 million homes
  - 9 million tonnes of CO2 will be avoided each year
  - £60 million a year invested into the local economy

- **CUSTOMERS**
  - 4.9m residential customer accounts
  - Largest supplier to British businesses with 219,000 B2B contracts
  - Biggest supplier of electricity by volume in GB
  - Acquired Intech – a large technical services provider – in 2017
  - Providing a range of Energy Services and efficiency advice to business and domestic customers

- **R&D ACTIVITIES**
  - Wide range of R&D projects across all areas of EDF Energy business, including:
    - Hydrogen to Heysham project, exploring hydrogen production from nuclear power
    - Local community peer-to-peer energy trading project in Brighton

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Decommissioning in the UK

- A Nuclear Liabilities Fund (NLF) provides arrangements for the funding of certain long-term costs for the decommissioning of the nuclear stations owned by EDF Energy.
- NLF helps to ensure that industry is able to meet its security and environmental responsibilities with regard to the waste management and decommissioning of nuclear power plants.
- EDFE makes quarterly payments to the NLF for each of its AGR stations (linked to RPI). Also a payment per tonne of uranium loaded at the PWR station, Sizewell B.
- EDF Energy is responsible for Decommissioning though the government has an option to take ownership of stations.
- Strategy in UK is Safe Store for the graphite reactors (but prompt site clearance for Sizewell B PWR power station).

Magnox Fleet

- Magnox fleet has 11 stations, all of which are in Decommissioning.
- Owned by Nuclear Decommissioning Authority.
- Follows Safe Store strategy
- One station has entered the care and maintenance period (Safe Store), others will follow.
- The Sellafield site houses the UK spent fuel management facilities.
Advanced Gas Reactor Future Phases & Timescales

Illustrative only
Decommissioning Phases

- **Preparation**
- **Transition**
  - To optimised defuelling and deconstruction work
- **Defuelling**
- **Decontamination (POCO)**
- **Deconstruction/Dismantling**
  - (of plant or systems)
- **Safestore & period of Care & Maintenance**
- **Final site clearance**

Timeline:
- **2015**
- **2017**
- **2022/3**
- **2026/7**
- **~2033**
- **~2090**
- **~2100**

- IAEA Definition
- **End of operations involvement**
Visualisation of Decommissioning Phases

T-5
(5 years before EoG)

Shutdown
(T=0)

Fuel Free Verification

Commence Care & Maintenance Period

Care & Maintenance

Site Re-establishment, Reactor & Reactor Building Dismantling, Site Monitoring & Clearance

Commence final dismantling (T+c80 years)

Complete
(T+c90 years)

Preparatory Work

Defuelling, Plant & Building Dismantling, Waste Management & Safestore Construction

Site Surveillance

Current Site Layout

Plant Dismantling Complete

Safestore Construction Complete

Site Layout During Surveillance

Reactor Dismantling in Progress

Site Cleared for Re-use
Context - End to End Defuelling Process – why defuelling takes years not days.

- Fuel Elements in reactor
- Fuelling Machine
- Station Ponds
- A2 Flask – 60te
- Receipt into Fuel Handling plant
- Sellafield Site
- DRS trains haul to Sellafield
- Flask onto rail network at stations

Colours indicate the Delivery Partners area of operation:
- EDF Energy
- Direct Rail Services
- Sellafield

THORP pond long term store
Dismantler

Station Ponds
DRS trains haul to Sellafield
Flask onto rail network at stations

EDF Energy
Direct Rail Services
Sellafield
Preparations for AGR Decommissioning

Mission
Prepare for and execute optimised AGR decommissioning, whilst supporting our people performance through transition

Strategic goals
- Zero harm
- Engaged and motivated people
- Value for Money
- 3½ years to defuel
- 12 years to care & maintenance

Strategic objectives
- Safety & regulatory leadership
- People change management
- Maintenance & outage scope optimisation
- Demonstrate value whilst ensuring full recovery of qualifying costs
- Defueling preparation
- Deconstruction & Waste management

Core enablers
- Strong nuclear safety culture
- Valued people
- Customer & operational focus
- Integrated preparation and delivery
- Performance through lead & learn
Preparations for Decommissioning: Regulatory Interactions

There are a number of regulatory bodies which permission decommissioning or activities required to support decommissioning including the Office for Nuclear Regulation (ONR), Environment Agency (EA) and Scottish Environment Protection Agency (SEPA).

Early engagement is essential to share the proposed strategy, arrangements, safety cases and decommissioning activities. It is important to demonstrate that risks are being managed As Low as Reasonable Practicable (ALARP) and in accordance with Best Available Technique (BAT)/Best Practicable Means (BPM).

There will be a programme of targeted regulatory interventions, designed to ensure that the licensee has suitable arrangements in place for decommissioning in order to progressively reduce the risks. ONR reviews licensees decommissioning arrangements and ensures that licensees adopt relevant good practice.
Thank You – Any Questions?