AREVA NP

4th MDEP conference on New Reactor Design Activities

Session 4:
Impact of MDEP interactions on safety of new reactor designs

MDEP and EPR Design/Licensing

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AREVA

Contents

- EPR reactors status
  - Design Review and Construction
  - Future plans or interest
- MDEP and EPR Design/Licensing
  - Successful examples of MDEP activity which benefit EPR OOG (EPR Operators Owners Group)
  - Comments on the MDEP overall goals

EPR reactors status

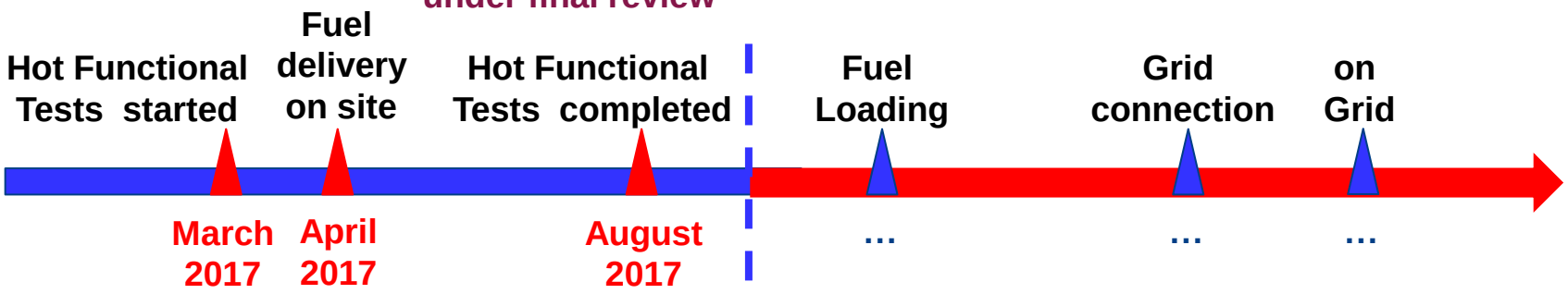
- **4 EPR under construction (last commissioning phase)**
  - **Finland:** **OLKILUOTO 3** **(OL3)**
  - **France:** **FLAMANVILLE 3** **(FA3)**
  - **China:** **TAISHAN 1&2** **(TSN1, TSN2)**
- **2 EPR starting construction**
  - **United Kingdom:** **HINKLEY POINT C 1&2** **(HPC1, HPC2)**

EPR reactors status

TAISHAN-1&2

- **TAISHAN-1**

Operating License Application file under final review



End March :

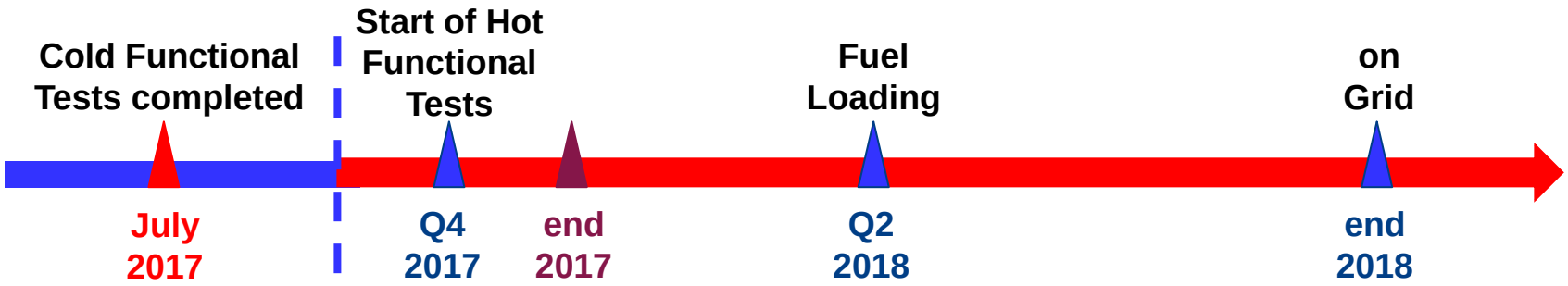
First Plant Only Test (FPOT)
on RPV-internals vibration with MDEP observers

- **TAISHAN-2: 1 year after TAISHAN-1**

EPR reactors status

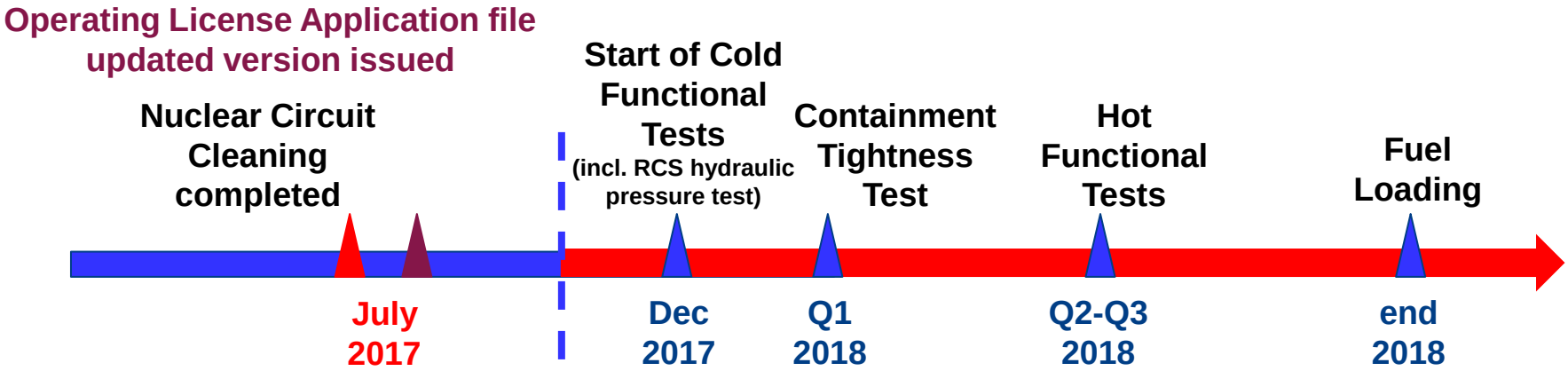
OLKILUOTO-3

Operating License Application file review completed



EPR reactors status

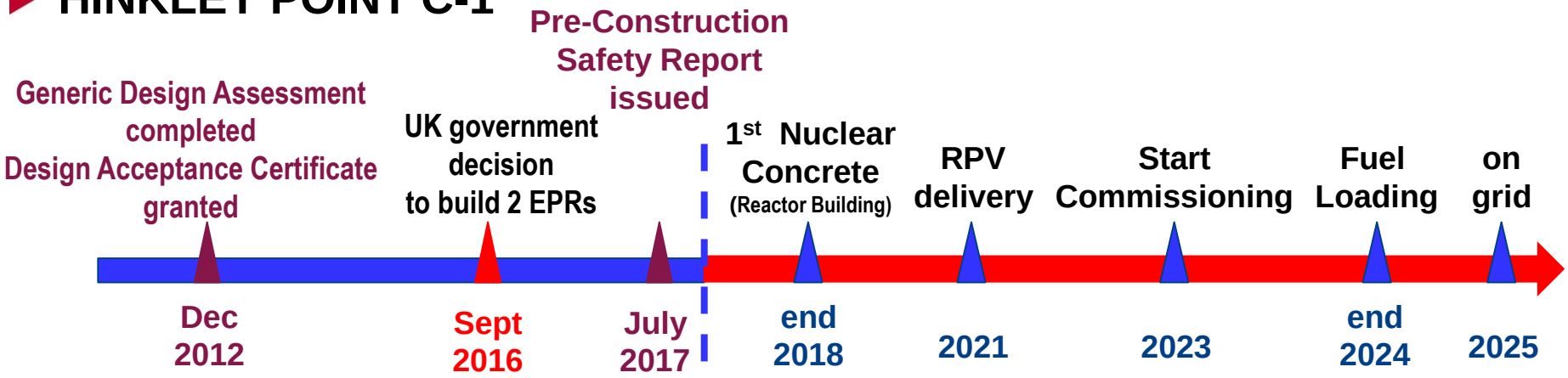
FLAMANVILLE-3



EPR reactors status

HINKLEY POINT C-1&2

HINKLEY POINT C-1



HINKLEY POINT C-2: 1 year after HPC-1

Future plans in other countries

The most advanced ones,

- **India:**
  - **Construction of 6 EPR reactors at the JAITAPUR site**
  - **General Framework Agreement for the project under preparation**
- **Turkey:**
  - **Construction of 4 ATMEA1 reactors (model developed by MHI/AREVA) at the SINOP site**
  - **Feasibility study on-going**

MDEP and EPR Design/Licensing

Successful examples of MDEP supporting Regulators to work together, which benefit EPR OOG:

- **Impact of the FUKUSHIMA DAIICHI NPP accident on EPR design**
- **Possibility to credit the "RPV-internals vibration tests" performed in the 1st EPR TAISHAN-1, as a First-Plant-Only-Test (no need to perform it in other EPRs)**

Impact of the FUKUSHIMA DAIICHI NNP accident on EPR design (1/2)

- **In 2012, MDEP/EPR OOG meetings on**
  - **EPR robustness to FKSH-like events**
- **Jan 2013, EPR OOG initiative to issue a "*position paper*" presenting the common approach elaborated between Vendor and Licensees on**
  - **the lessons learnt from the FKSH event, and**
  - **the consequences on EPR design.**

1. General approach, common to all EPR designs
2. Differences in the implementation, due to country-specific reasons (Regulator, Operator, site)
   OL3 in Finland, FA3 in France, TSN 1&2 in China, EPR in US, HPC 1&2 in UK

- **Jan 2013, MDEP/EPR OOG meeting**
  - **to exchange on the "*EPR OOG position paper*",**
  - **and on the preliminary draft of the "*MDEP Common Position*"**

Impact of the FUKUSHIMA DAIICHI NPP accident on EPR design (2/2)

- **Sept 2015, MDEP/EPR OOG meeting**
  - **to present the post-FKSH status in the different EPR designs, and**
  - **to exchange on the final draft of "*MDEP Common Position*"**

- **Oct 2015, "*MDEP Common Position*" issued**
  - **EPR generic design is robust against FKSH-like events,**
  - **provisions added to enhance protection against cliff-edge effect in case of *Long-Term-Loss-of-Electrical-Power*** (increased autonomy, connections to mobile means)

MDEP organization has facilitated the elaboration of a Common Position amongst Regulators, which was beneficial for the national licensing reviews.

"RPV-internals vibration tests" of 1st EPR TSN1 creditable as FPOT (1/2)

- **June 2013, MDEP/EPR OOG workshop on EPR Commissioning**
  - **EPR OOG informs MDEP of his interest for a limited list of First-Plant-Only-Tests (FPOT)**

    FPOT = Test performed only once in the 1st EPR, creditable in the other EPRs w/o performing it
    Reason = specific instrumentation, risky test…
    RPV-internals vibration tests = most important FPOT
  - **Need for acceptance by all Regulators**

- **Nov 2013, Oct/Nov 2015, MDEP/EPR OOG meetings on FPOT**
  - **EPR OOG provides detailed description of FPOT**
  - **EPR OOG presents the process for recognition of FPOT (transposition Report)**
  - **MDEP issues a "*Guidance for Licensees seeking to credit FPOT*"**
  - **EPR OOG comments on the *Guidance***

"RPV-internals vibration tests" of 1st EPR TSN1 creditable as FPOT (2/2)

- **Oct/Dec 2016, MDEP meeting with EPR OOG partially participating**
  - NNSA/TNPJVC/AREVA NP discuss preparation and status of the FPOT in TAISHAN-1 site
  - MDEP Regulators finalize the organization of their common witness in TAISHAN-1 site
- **27-31 March 2017**
  - Witness of part of the TSN1 "RPV-internals vibration" tests performed by AREVA NP / TNPJVC in presence of NNSA, by overseas Regulators STUK / ASN / ONR, with presence of overseas Licensees TVO / EDF / NNB

MDEP organization has been efficient to support Regulators to work together to permit the common witnessing of the TAISHAN-1 "RPV-internals vibration tests", which allows overseas Licensees to credit it as a FPOT

MDEP and EPR Design/Licensing

Comment on the MDEP overall goal :
. to increase multi-national cooperation

The enhanced communication between MDEP and EPR OOG is successful :

- in identifying and understanding EPR design differences
in identifying differences in national requirements/practices
⇨ Notice : major design differences result from different national regulatory requirements

- in providing direct exchanges between Vendor/Licensees/Regulators
⇨ better understanding of respective positions

- in elaborating some MDEP Common Positions
⇨ easier on new topics (e.g. post-FKSH)
⇨ Notice: difficult to harmonize different existing/historical practices

MDEP and EPR Design/Licensing

Comment on the MDEP overall goals:
. to enhance convergence of regulatory requirements and practices,
. to promote standardization of Designs

Today, even if high-level safety objectives are similar between countries, significant differences exist between national regulatory requirements/practices, which have an important impact on a Reactor design.

Typical examples:

- Digital I&C	e.g. reliability claims, “Non-computerized I&C” Back-up or not
- BP/LBB	e.g. credited or not
- Accident analyses	e.g. AOO with or without credit of Controls/Limitations
- Diversity	e.g. CCF evaluation
- Deterministic/Probabilistic	e.g. list of DBA and DEC events, number/nature of Failure(s) superposed

⇨ **Today, standardization of a NPP design is not possible**

⇨ **Need to actively promote the effort of harmonization btw countries (not superposition !)**

Other important : Need to rely on a stable set of requirements after granting the Construction License

Thank you for your attention