



## *Borssele NPP from 60 to 80 years*

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EPZ vision is to be operator of all NPP in Netherlands

### Nuclear Power Plant EPZ

- 1 reactor
- 1 hectare
- 485 MW
- 4.000 GWh
- 1.300.000 households



### Solar Park EPZ

- 62.000 panels
- 20 hectares
- 21 MW
- 25 GWh
- 8.000 households



### Wind Farm EPZ

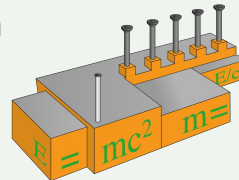
- 8 turbines
- 40 hectares
- 33 MW
- 70 GWh
- 23.000 households



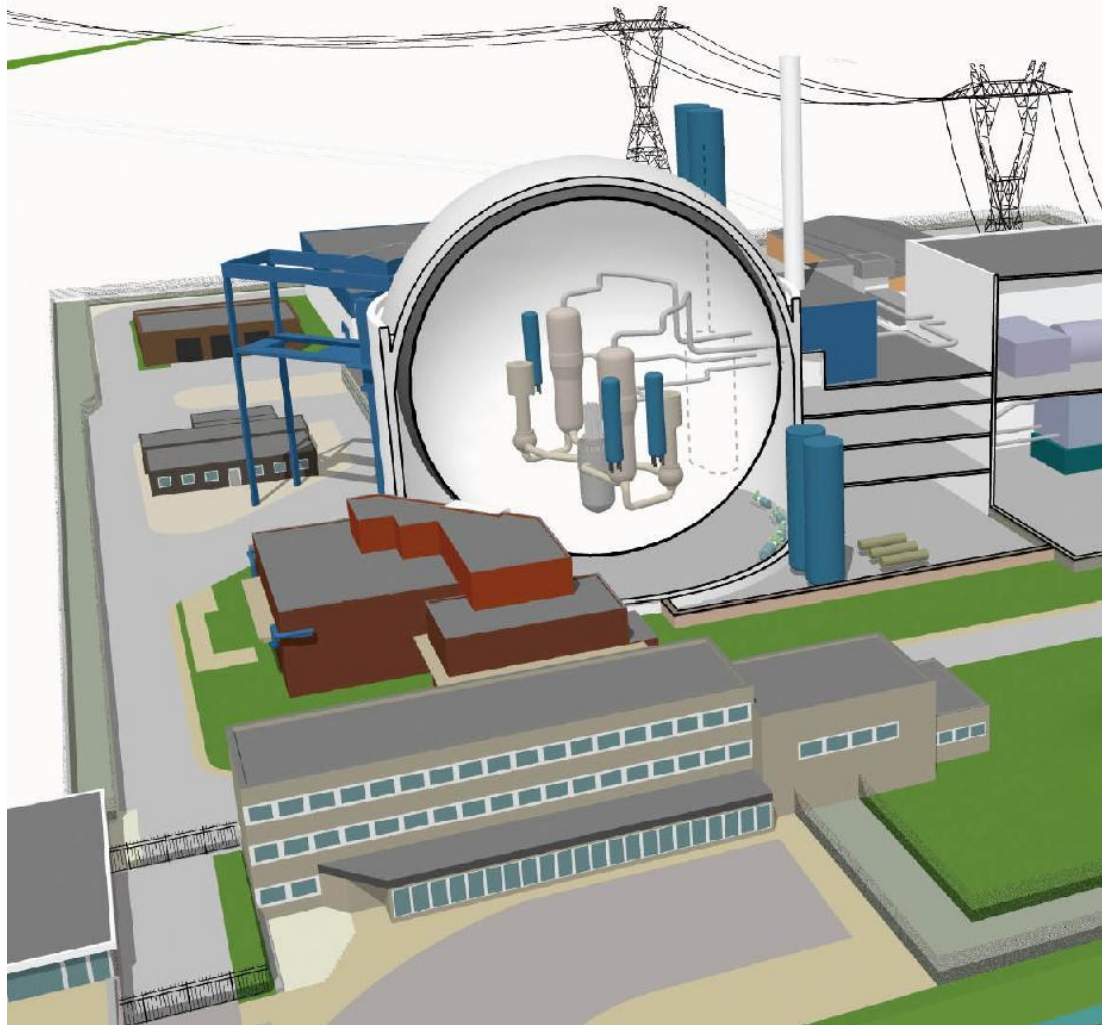
### Nuclear Waste Storage COVRA

All nuclear waste from 60 years electricity production.

**Reduction of 120.000.000 tons of CO<sub>2</sub>**



## Borssele NPP



2-loop PWR, designed and built by Siemens/KWU (Germany)

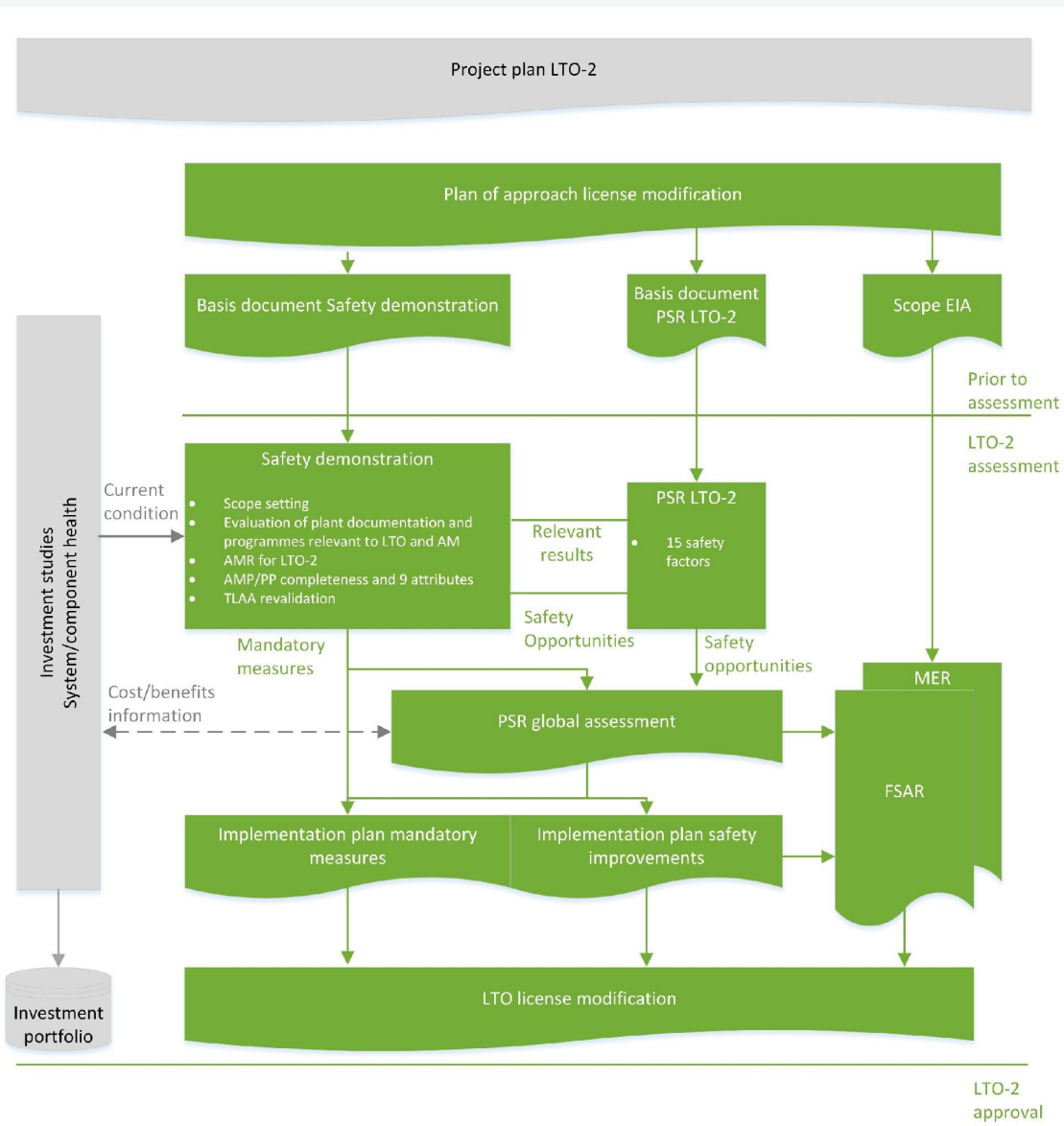
- Construction started in 1969
- Commercial operation since October 1973
- Design operating life: 40 years (2013)
- Original capacity 465 MWe, upgrade in 2006, to 512 MWe at same thermal power of 1365 MWth

PSR every 10 years: many safety upgrades carried out  
2006 Covenant to pursue LTO until end of 2033 (in law)

- 2012 LTO-license (design life extended to 60 years, but in principle license unlimited)



# Assessment approach



- Portfolio development: Mapping all installation risks and opportunities for LTO-2 and developing the best solutions. This includes necessary spare parts, planning, fuel strategy, and organization.

Internal and external Operating experience

- Safety demonstration: Demonstrating that the licensed safety level can be maintained by means of an effective management of ageing.

Pre-SALTO  
SSR 2/2 rev.1  
SSG48  
SVS26+all refs  
IGALL

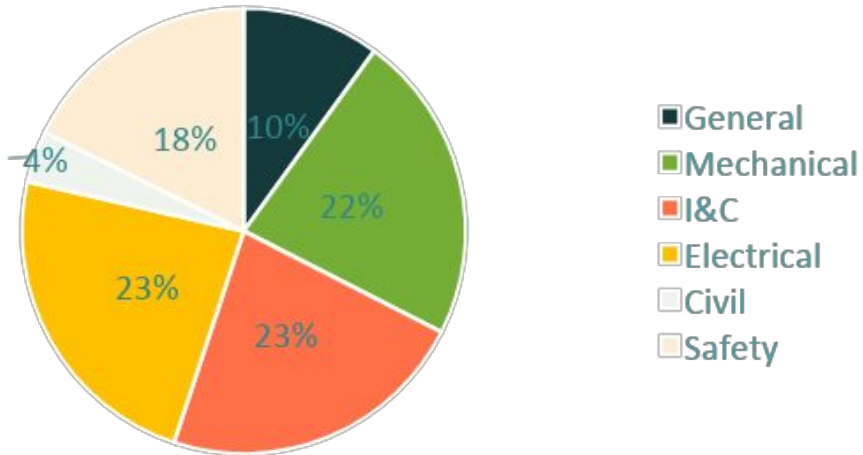
- Periodic Safety Review for LTO 2: Identifying reasonably practicable safety improvements for LTO-2.

SSR 2/2 rev.1  
SSG25 + all refs  
SRS121  
OECD/NEA  
LTO>60

- Environmental impact assessment.

# Some preliminary results of investment studies

By discipline



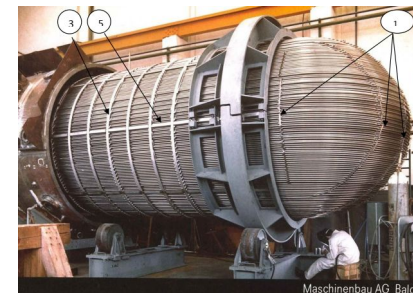
## Major projects expected

- I&C: Operational I&C, (parts of) reactor protection
- Mechanical: Radioactive waste treatment, parts for RPV
- Electrical: (LV/MV) motors, transformers, diesels
- Civil: Cooling water structures repairs
- Several safety improvements to (re)consider
- More than 90 topics for further study

## No showstoppers



ASTM paper RPV irradiation surveillance of the NPP Borssele for LTO to 80 years manuscript ID is STP-2025-0129



Incoloy 800 tube bundle, 4234 U-tubes

## *Key takeaways from the transition from LTO-1 to LTO-2*

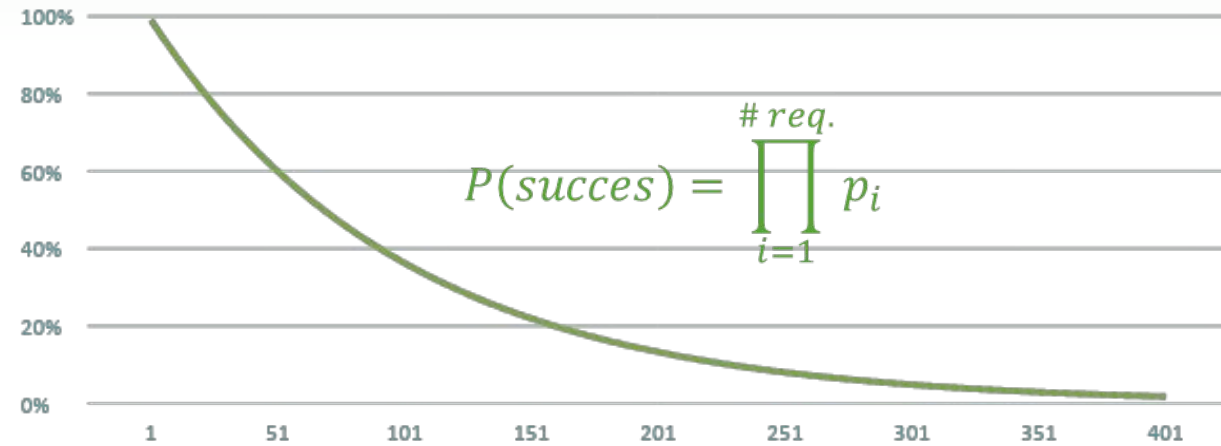
1. Robust design and plant programmes remain our foundation
2. Keeping ageing management living and in accordance with the latest IAEA guidelines is proving to be very challenging
3. Effort is inversely proportional to the quality and accessibility of documented information
4. Clarity on increasing regulatory requirements and liaison with the authorities is crucial
5. Obsolescence issues are (far) more urgent
  - German Phase out (Knowledge base, KTA, Supply chain, take overs, spares)
  - People who were present during construction have retired, which poses more challenges in finding the right information
  - Increase in regulations (E.g. environmental, obsolescence)
  - Older installation with many obsolete subcomponents
6. Risk management is surprisingly important and helpful
7. Everybody struggles with the same issues. “Connecting nuclear” through international cooperation (like pre-SALTO, benchmarks, working groups, strategic partnerships) is the way forward
8. Is our industry driving itself towards obsolescence?

# Is our industry driving itself towards obsolescence?

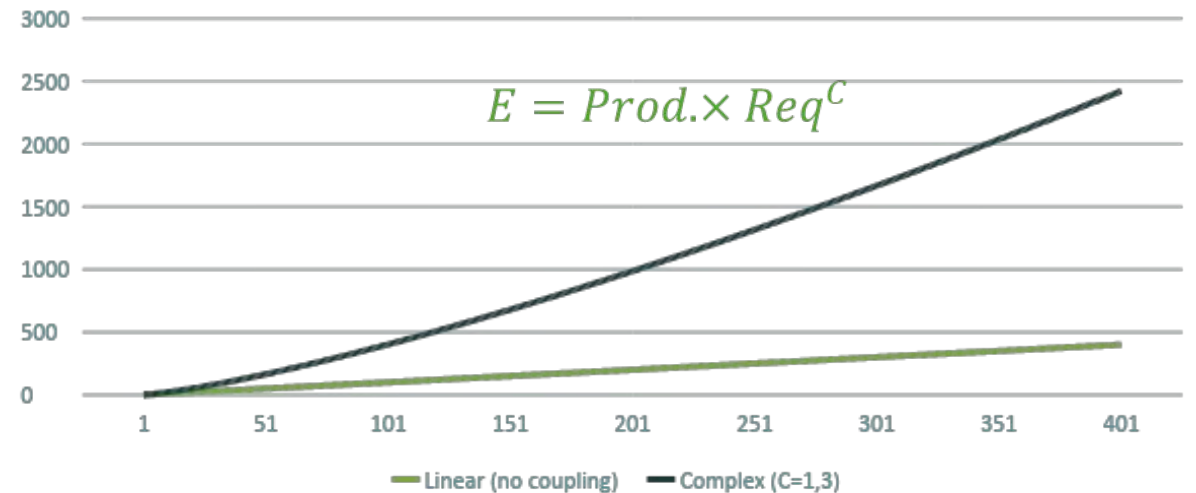
## Some examples

- Request for quotation from Borssele for replacing a rectifier set (400V AC / 24 DC) contains
  - 65 pages
  - 650 requirements
  - 800-1200 including referenced norms
- Actuator internal plastic device was obsolete and degraded. Solution was 3D printed in metal but this invalidated the certification of the actuator
- From 1990s to now
  - IAEA requirements have grown 5-10 fold
  - Operating license clauses have grown 2 to 4 fold

Probability of success at 99% quality level versus number of requirements



Level of effort versus number of requirements



## *What is necessary for LTO-2?*

- ✓ **Changes to the Nuclear Energy Act (Kew)**
- ✓ **New Borssele Covenant**
- ✓ **Feasibility studies**
- ✓ **License modification**
- ✓ **Investment decision by shareholders**





***100% positive energy***