

# LONG TERM OPERATION DOEL 1 & 2

Project LTO Doel 12

January 26, 2017

**ENGie**  
Electrabel

Verheyden Raf



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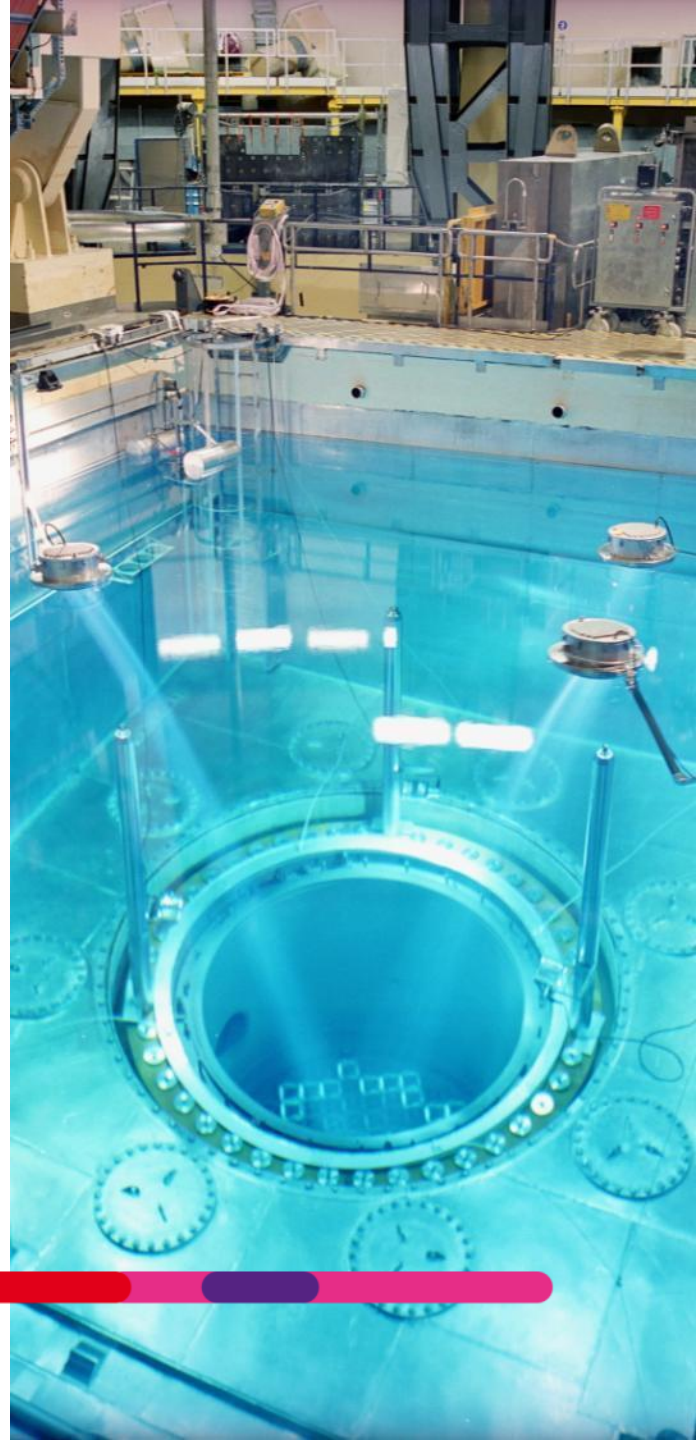
High Level Planning

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# 01

## Doel Nuclear Power Plant

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## Doel NPP, our site

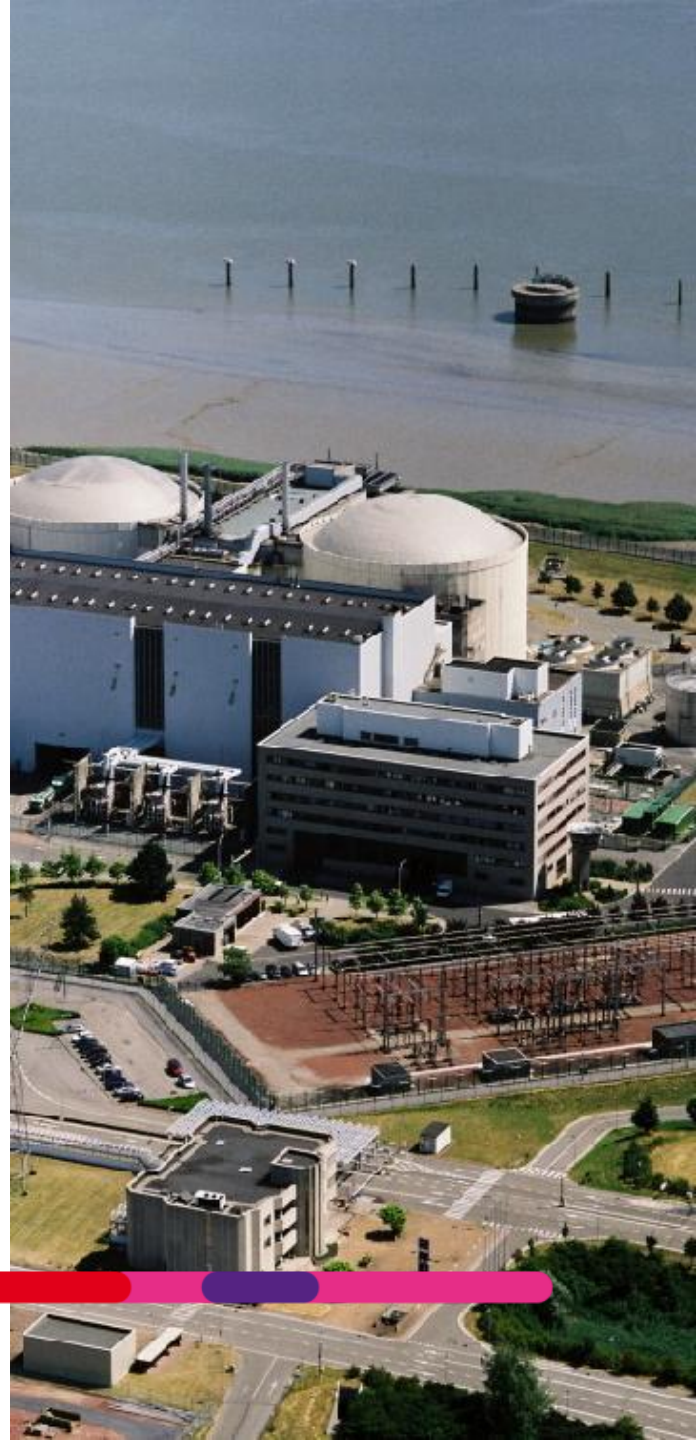


# Our nuclear safety strategy



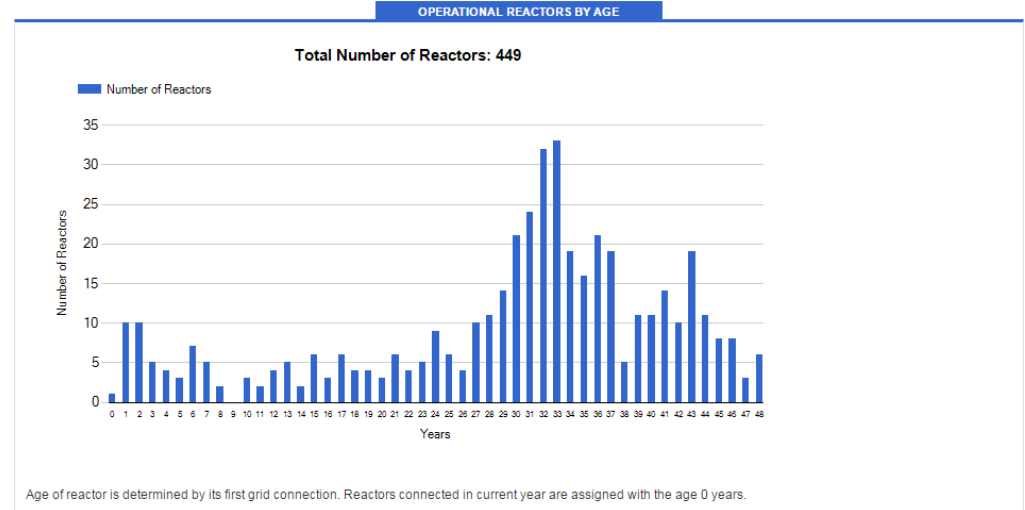
02

## Context of LTO Doel 12



## Context of LTO Doel 12

- Good Overall performance Doel 1 and 2
- No technical reason to stop operation after 40 years!
- Positive OSART review of Doel 1 & 2 by the International Atomic Energy Agency (IAEA) in 2010.
- Around the world:
  - 449 reactors in operation, 90 of which have reached the age of 40 years or more. These over 40 represent 62597 MW of capacity ( E.g. Borssele in the Netherlands, Beznau in Switzerland, Ringhals in Sweden and more than 30 nuclear power stations in the USA (source: IAEA website)
  - In the world as a whole, extending the operational lifetime of nuclear power stations to 60 or even 80 years is common practice.



Nevertheless: Doel 1 was disconnected from the grid on 15 February 2015 as required by law, while Doel 2 reached 40 years at midnight on 1 December 2015

# Context of LTO Doel 12

## ● 2009 – 2011:

- Political decision LTO D12 & Tihange 1 (2009)
- Federal Agency for Nuclear Control (FANC) strategic memo on LTO (September 2009)
- Preparation of technical LTO file (2009 – 2011)
- Positive OSART review Doel 1 & 2 (2010)
- Initial LTO file submitted (December 2011)

## ● 2012:

- Analysis by FANC/Bel V (April 2012)
- Scientific Council issues positive advise (June 2012)
- **Government's decision to shut down Doel 1 & 2 (July 2012)**
- Suspension of LTO project for Doel 1 & 2, launch of final shutdown project ( DSZ )



# Context of LTO Doel 12



- 2012- 2014

- Development final decommissioning project

- 2014 – 2016:

- FANC update strategic memo on LTO ( 22 September 2014)
- New government reconsiders LTO for Doel 1 & 2 (December 18, 2014)
- **Suspension of final shutdown project and reactivation of LTO project Doel 1 & 2**
- Three main green lights needed for LTO D12:
  - Amendment of the Nuclear Withdrawal Act
  - FANC's approval of the approach
  - Economic agreement between ENGIE Electrabel and the authorities



➡ December 23, 2016: last part of the required legislation approved by the parliament

## 2015 - Today



# Perception on nuclear and LTO Doel 12

- Political sensitive subject = interesting for media

## Actualité

### Berlin critique les centrales belges

La ministre allemande de l'Environnement va parler sécrètement avec l'Agence belge.

Ronald Linde

Correspondant en Allemagne

Les débranchements et redémarrages en série des centrales nucléaires de Tihange et Doel ébranlent l'opinion et exercent de plus en plus les critiques allemandes. La population allemande n'est pas convaincue que les centrales soient sûres et les autorités belges doivent prouver ses

«L'Allemagne», elle a conseillé de renouer «la confiance» aux réacteurs concernés. Walter Stumacher, responsable d'une initiative antinucléaire très active à Airo la Chapelle, elle s'oppose à moins de 10 kilomètres de Tihange, a affirmé que l'histoire et l'actualité des centrales sont véridiques, les opérateurs belges n'agissent pas pour protéger de réacteurs continuellement la technique, comme c'est le cas en Allemagne.

Ni l'industrie, ni les politiques

La ministre a souligné que Berlin n'a pas la possibilité de faire passer le fonctionnement de centrales étrangères dans d'autres pays. Tout comme l'Allemagne ne permet pas d'installation dans la zone de son territoire, elle ne peut pas dire aux pays voisins de fermer leurs centrales nucléaires.

«Les autorités doivent prendre très au sérieux les critiques des riverains allemands»

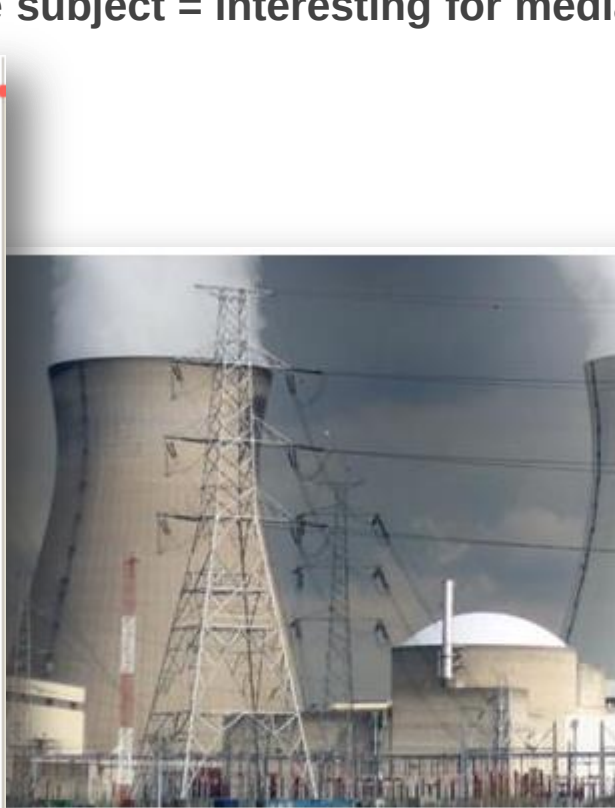


BARBARA HENDRICKS

Ministre de l'Environnement de l'Allemagne

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### Onrust in Nederland over Belgische kerncentrales

Op 19 JANUARI, 18:04 BINNENLAND

Duitsland stelt zich vragen over onze atoomveiligheid na recente problemen. **Vijf vragen** al beantwoord

### De kerncentrales rammelen voort

**DETER BALKENGE**

meer de bescherming wordt uitgesteld met 20 minuten. Dit kan tot ernstige problemen leiden. De Duitse regering heeft daarom besloten om de centrales te sluiten. Dit kan tot ernstige problemen leiden. De Duitse regering heeft daarom besloten om de centrales te sluiten.

**1. Welke kerncentrales dreigen er nu eigenlijk mee?**

De Duitse regering heeft daarom besloten om de centrales te sluiten. Dit kan tot ernstige problemen leiden. De Duitse regering heeft daarom besloten om de centrales te sluiten.

**3. Is de veiligheid in gevaar?**

De Duitse regering heeft daarom besloten om de centrales te sluiten. Dit kan tot ernstige problemen leiden. De Duitse regering heeft daarom besloten om de centrales te sluiten.

**2. Wat zijn de problemen bij Doel 1 en 2?**

De Duitse regering heeft daarom besloten om de centrales te sluiten. Dit kan tot ernstige problemen leiden. De Duitse regering heeft daarom besloten om de centrales te sluiten.

**4. Zal het licht uitvallen?**

De Duitse regering heeft daarom besloten om de centrales te sluiten. Dit kan tot ernstige problemen leiden. De Duitse regering heeft daarom besloten om de centrales te sluiten.

**5. Zijn onze centrales niet gewoonweg te oud?**

De Duitse regering heeft daarom besloten om de centrales te sluiten. Dit kan tot ernstige problemen leiden. De Duitse regering heeft daarom besloten om de centrales te sluiten.

Recherchen von WDR und SZ

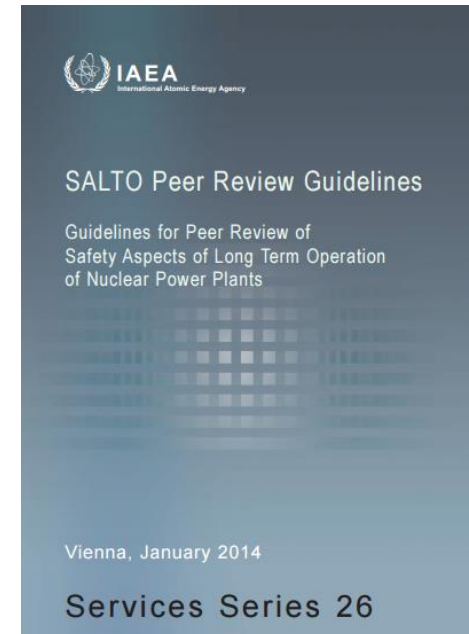
## Rissige Reactoren in Europa?

Stand: 24.11.2016 00:00 Uhr

# SALTO: Independent International Oversight LTO Doel 12



- Audits requested by FANC
- **SALTO** = **S**afety **A**spects of **L**ong **T**erm **O**peration
- By **IAEA** = **I**nternational **A**tom**E**nergy **A**gency
- A team of international experts should make an evaluation of progress for the activities relating to LTO
  - Area A - Organization and functions, current licensing basis (CLB), configuration/ modification management;
  - Area B - Scoping and screening, plant programs relevant to LTO;
  - Area C - Ageing management review, review of ageing management programs and revalidation of time limited ageing analyses for **mechanical components**;
  - Area D - Ageing management review, review of ageing management programs and revalidation of time limited ageing analyses for **electrical and I&C components**
  - Area E - Ageing management review, review of ageing management programs and revalidation of time limited ageing analyses for **civil structures**;
  - Area F - Human resources, competence and knowledge management for LTO.
- **Expert Mission: February 2016**
- **Full SALTO: February 2017**
- **SALTO Follow Up December 2018**



# 03

## Approach and Organizational Principles



# Approach

- FANC strategic memo Sept 2014: **“LTO-D12: Safety requirement reminder for LTO approval at Doel 1 and Doel 2 in case of amendment to the Nuclear Power Phase-out Act.”**
- Analysis of the Doel 1&2 projects from LTO (Long Term Operation) perspective instead of DSZ (Final Shutdown)
- Result had to be an action list containing at least:
  - LTO action plan approved in 2012
  - BEST action plan (BElgian Stress Test)
  - 4th PSR (Periodic Safety Review)
  - Inspection programs (such as reactor vessels D1 and D2)
  - The scheduled, planned and/or completed actions since July 2012

# Approach: analysis of 13 packages

- **LTO file 2012 (1-5)**

- LTO Ageing Mechanical, LTO Ageing Electrical and I&C, LTO Ageing Civil Engineering
- LTO Design
- LTO Preconditions, Competence Management, Knowledge and Behaviour

- **BEST project (6)**

- **4th PSR (7)**

- **Extra inspections (8)**

- **Other projects (9-13)**

- Modifications
- Doel NPP projects, Electrabel Corporate projects
- Non-conformance reports
- Delta 2012 – 2015 as a consequence of operation in perspective of shutdown rather than LTO

# Organizational principles

- **Important partners for the success of the project:**

- **ALL INTERNAL AND EXTERNAL EMPLOYEES OF DOEL NPP**
- ENGIE Electrabel and Tractebel as professional organizations with a lot of nuclear expertise
- Tihange NPP and other power plants with LTO experience

- **Basic principles of LTO organization**

- A Doel NPP project as a tool for action execution
- All actions on **the integrated action list (GAL)** are distributed into projects
- A project is led by a project leader who owns the project
- Programme LTO-D12 = sum of projects = sum of all GAL actions
- Projects to be executed in accordance with Doel NPP processes on project and change management
- Projects are brought together into **portfolios**
- A portfolio is led by a portfolio manager
- At programme level SPOC's (Single Point of Contact) have been appointed to communicate with other departments and services

# Organizational principles

## ● 10 Portfolios: (209 projects)

### — T0

- All projects and parts of projects due before T0
- Portfolio manager: Paul Meulemans

### — FIRE (13)

- All projects relating to fire safety and fire protection
- Portfolio manager: Geert De Koker
- Projects: New FE-pump station, improving physical compartmentalization, FPSA, FHA,,...

### — EMS (17)

- All projects related to specialist EMS (European Maintenance Services).
- Portfolio manager: Frank Minne
- Projects: Turbines and large transformers, surge arrestors, bushbars, ...



# Portfolio fire (10)

## Geert De Koker



| FIRE  |                                           |                          |
|-------|-------------------------------------------|--------------------------|
| P0481 | ADU- Verbeteren fysische scheiding        | Vernimmen Erik           |
| P0419 | ADU - Nieuw FE pompstation/reservoir D12  | Poelmans Jean            |
| P0891 | FHA D12                                   | Henry François-Alexandre |
| P0209 | Upgrading FE-kring MAZ/GNH/GEH            | Weekers Wouter           |
| P0892 | Fire PSA D12                              | Idink Herbert            |
| P0610 | Inspecties op branddeuren                 | Vernimmen Erik           |
| P0879 | Implementatie Brandinspectie gebouwen D12 | Bongaerts Nicolas        |
| P0613 | ADU- Verbeteren brandbeveiliging MAZ      | Weekers Wouter           |
| P0028 | Compartimentering MAZ-GEH D12 B9          | Idink Herbert            |
| P0662 | Fysische scheiding MAZ D12-CGA            | Idink Herbert            |
| P0669 | Real. GTJH/J4 test/verv sprinklers D12    | De Schepper Bart         |
| P0677 | Vervolg Energieia Fire kabelgalerijen     | Idink Herbert            |
| P0182 | Modernisering branddetectie D12 J4        | Merchier Dirk            |

## Portfolio EMS (17)

Frank Minne



| EMS   |                                        |                    |
|-------|----------------------------------------|--------------------|
| P0235 | Retrofit turbine D1 en D2              | Germeau Tanguy     |
| P0500 | Vervanging hoofdtransformatoren D12    | Geenard Gijs       |
| P0612 | ADU- Vervangen MS afblaaskleppen       | Aerssens Tim       |
| P0497 | Aankoop reserve stator alternator D12  | van Cotthem Jeroen |
| P0335 | Vervanging huistransformatoren D12     | Geenard Gijs       |
| P0807 | Brabo tranformator                     | Debrue François    |
| P0546 | Nieuwe beveiligingen alternator D12    | Geenard Gijs       |
| P0882 | Vervangen HS-materiaal post 150kV      | Debrue François    |
| P0881 | Vervangen HS-materiaal post 380kV      | Debrue François    |
| P0785 | Renovatatie machinezaalbrug 140T D0    | Elewaut Bart       |
| P0549 | Renovatatie stoombypass turbine        | Aerssens Tim       |
| P0560 | Reiniging smeeroliekoelers turbine     | Germeau Tanguy     |
| P0907 | Vervangen bushings op transfos 150kV   | Geenard Gijs       |
| P0636 | Vervanging/refurbishing 150 kV HS mat. | Debrue François    |
| P0605 | Vervanging hulptrafos HS-posten        | Vermeirssen Paul   |
| P0555 | Vervanging surge arresters 380kV       | Geenard Gijs       |
| P0561 | Refurbishment 18kV busbars D12         | Geenard Gijs       |

# Organizational principles

## • Portfolios:

### — MULTI (21)

- All multidisciplinary projects, mainly ADU's
- Portfolio manager: Jan Defloor
- Projects: Filtered Containment Venting System, new RW refilling, deduplication RJ, ...



### — ELEK, I&C, KABCON (66)

- All projects related to electric and I&C cables and connections
- Portfolio manager: Hugo De Backer
- Project: Teleperm GNS Replacement, replacement and renovation of electrical switch boards, ...



### — BB (17)

- All projects related to civil engineering
- Portfolio manager: Geert De Koker
- Projects: Renovation RW cooling towers, water intake repairs, extensive inspectoin program, ...



# Portfolio Multi (21)

## Jan Defloor



|       |                                                                          |                       |
|-------|--------------------------------------------------------------------------|-----------------------|
| P0421 | ADU - Containment Filtered Venting System D12                            | Arkell David          |
| P0501 | Realisaties PSRII Doel12                                                 | Adriaenssens Dirk     |
| P0422 | ADU- Nieuwe RW-bijvulling uit Schelde                                    | Beirnaert Dirk        |
| P0423 | ADU - Ontdubbel SC1-afsluiters D12                                       | Schoenaers Rajesh     |
| P0628 | ADU- Ontdubbel RJ-pompen D12                                             | Thierens Danny        |
| P0144 | ADU - Conforme waterdichte kamers D12                                    | Thierens Danny        |
| P0874 | Vervangen koelgroepen KZ en GNS                                          | Lannoo Philippe       |
| P0018 | Betere redundantie EI -compressoren                                      | Beirnaert Dirk        |
| P0693 | ADU - Motoriseer SC-afsluiters D12                                       | Cornelis Dries        |
| P0446 | Vervanging compressoren TUR D12                                          | Joosen Erwin          |
| P0249 | Nieuwe RI installatie Doel 12                                            | Beirnaert Dirk        |
| P0166 | ADU - Geklasseerde CC-bijvulling D12                                     | Lannoo Philippe       |
| P0614 | ADU- Ontdubbel register in 3 buis VE-TUR                                 | Bracke Jan            |
| P0624 | ADU- Ontdubbel LWF-afsluiters D12                                        | Demeyere Dimitri      |
| P0293 | FC-servos VE-kleppen 6buis VE-TUR-D12                                    | Goossens Karolien     |
| P0187 | Verhogen bedrijfszekerheid IA compr. D12                                 | Joosen Erwin          |
| P0564 | Voorzien van wisselstukken voor obsoleete vlinderkleppen Tot. Demin. D12 | Goossens Karolien     |
| P0838 | LTO - Betere redundantie 1/2CV74 - WOWW                                  | van den Boogaert Paul |
| P0929 | Residu P0402 Barseback-filters D12                                       | BRACKE JAN            |
| P0165 | Bijkomende MW/TW tank                                                    | Van Eyndhoven Joris   |
| P0286 | Samenvoegen revisies D1 en D2                                            | Verheyden Raf         |

# Portfolio E I&C (66) (1)

# Hugo De Backer



|       |                                                    |                 |       |                                          |                     |
|-------|----------------------------------------------------|-----------------|-------|------------------------------------------|---------------------|
| P0224 | LTO - vervangen vitale 380V-borden D12             | Devos Sigurd    | P0377 | Vervanging Teleperm ME in GNS            | Van den Eynde Ief   |
| P0226 | LTO - Vervanging 60V-110V DC-borden D12            | Devos Sigurd    | P0374 | Vervanging SIP                           | Van Vossel Arthur   |
| P0650 | LTO-Refurbishment 6kV 1E motoren D12               | Herteleer Bjorn | P0428 | Vervanging AK alarmen GEH D12            | DE RIDDER Pascal    |
| P0860 | OPTIMOV D12                                        | Herteleer Bjorn | P0648 | Upgrade sturing pneumatische afsluiters  | Meykens Patrick     |
| P0391 | Kwalificatie 1E 6kV-borden D12                     | Devos Sigurd    | P0380 | Vernieuwing procescomputer DIMOS         | De Ridder Pascal    |
| P0567 | Refurbishment N1E 6kV motoren D12                  | Herteleer Bjorn | P0368 | Vervanging Solid State Devices MEP10     | Gorleer Eric        |
| P0601 | LTO - kwalificatie en vervanging 1E servos MOV D12 | Herteleer Bjorn | P0376 | Vervangen kabels en test-trolley SIN D12 | Rohan Alain         |
| P0649 | LTO - Vervangen laagspanningsmotoren 1E            | Herteleer Bjorn | P0647 | LTO-Vervangen 1E transmitters D12        | Amri Khalid         |
| P0225 | LTO - Vervang. 220V-borden verzekerde voeding D12  | DEVOS SIGURD    | P0922 | RSQ documentatie acties I&C              | Vermeulen Stefaan   |
| P0393 | Vervangen 1E beveiligingen 6kV-380V D12            | Devos Sigurd    | P0908 | Aanpassingen SPS ikv LTO                 | Van den Eynde Ief   |
| P0921 | RSQ documentatie acties Elektrisch excl. KABCON    | Herteleer Bjorn | P0629 | ADU- GNS-functie voor AFW-turbopompen    | Mathieu Thierry     |
| P0621 | ADU- Niet conventionele voeding 380V D12           | Guisez Xavier   | P0627 | ADU- Automatische start EF bij D12       | Mathieu Thierry     |
| P0931 | LTO vervanging van gelijk-en wisselrichters D12    | De Win Dirk     | P0854 | Vernieuwen spoelen CR sturing            | De Loose Seppe      |
| P0227 | Vervanging scrambrekers D12                        | De Win Dirk     | P0545 | Nieuwe niet-QA schrijvers KZ en SIMU D12 | Beckers Jann        |
| P0483 | ADU - Splitsen voedingen 110V en 60V DC            | DE WIN DIRK     | P0474 | Vervanging sturing EW en BD totaal demin | Van Der Hoeck Gabor |
| P0668 | Vervanging batterijen i.k.v. LTO                   | Herteleer Bjorn | P0641 | Nieuwe QA schrijvers controlezaal        | Beckers Jann        |
| P0602 | Verv. bedieningskast spanningsreg T01&2Z           | Herteleer Bjorn | P0571 | Vervanging regelingen CV-pompen          | Merchier Dirk       |
| P0569 | LTO - acties N1E 380V borden D12                   | Devos Sigurd    | P0373 | Relais vervangen/conform maken           | Rillaert eric       |

# Portfolio E I&C (66) (2)

## Hugo De Backer



|       |                                                   |                    |       |                                          |                   |
|-------|---------------------------------------------------|--------------------|-------|------------------------------------------|-------------------|
| P0599 | LTO - retrofit aankomstschakelaars BE-borden GNS  | Devos Sigurd       | P0603 | Verv niet-gekwat 1E analoge switchen     | Meykens Patrick   |
| P0306 | Renovatie verlichtingsarmaturen                   | Elewaut Bart       | P0520 | Vervangen boorzuurmeters D12             | Merchier Dirk     |
| P0456 | Vervangen asafdichting 1EA-motoren D12            | Elewaut Bart       | P0372 | Aanduiders en bedieningsmodules 1e niv.  | Rillaert Eric     |
| P0570 | LTO - onderhoud niet-vitale 6kV-borden D12        | Devos Sigurd       | P0476 | Toxische gasmetingen VP 1GTJH D12        | VAN VOSSEL Arthur |
| P0635 | LTO - Inspectie borden-schakelaars-zekeringen D12 | Devos Sigurd       | P0563 | Vervangen pneum. regelingen waterpost    | Heyrman Dirk      |
| P0388 | Verwarmingsbatterij ventilatie GNH D12            | Merchier Dirk      | P0579 | Vervangen dempers BEP/MEP/PRP D12        | Rohan Alain       |
| P0744 | BEST-Bliksembeveiliging D12                       | Vermeirssen Paul   | P0626 | ADU-RWSTs D12 parallel uitbaten          | Rohan Alain       |
| P0844 | LTO-D12 Implementatie van AMPs domein E- I&C      | De Schrijver Ph    | P0550 | Vervangen N-QA transmitter H&B           | Claes Arne        |
| P0843 | RSQ documentatie acties LTO E+I&C                 | Van Eynde Wouter   | P0584 | Toevoegen waterstof- en flowdetectie     | Willems Jolan     |
| P0846 | Implementatie EIC-maintenance acties D12          | Van Eynde Wouter   | P0622 | ADU- Grendel in automatisme CC-bypass    | Verhaegen Jimmy   |
| P0912 | LTO-D12 KABCON                                    | VEEKENS MARC       | P0510 | Vervangen peilmeting voor halfbeen D12   | Willems Jolan     |
| P0580 | Acties SFP/Niet SFP bruggen GTJH-A4               | Ceulemans koen     | P0809 | Ultiem Satelliet Comm.systeem            | Hannes Frits      |
| P0847 | Studie en justificatie incore TCs D12             | Rohan Alain        | P0471 | Vervanging standaanduiding Sebim kleppen | Claes Arne        |
| P0850 | Inspectie en vervanging instrumentation           | Jacobs Eric        | P0661 | Vervanging Teleperm ME GNS-Diesels       | Van den Eynde Ief |
| P0543 | Vervanging I&C Gestra's                           | Van Gyseghem Frank | P0589 | Verv. Kraus&Naimer testschakelaars D12   | Amri Khalid       |

## Portfolio BB (17)

Geert De Koker



### BB

|       |                                          |                    |
|-------|------------------------------------------|--------------------|
| P0313 | Vernieuwing gevelbeplating MAZ D12       | Mellemans Johan    |
| P0866 | Betonrenovatie inw lokalen GNH D12       | Franken Pieter     |
| P0659 | Renovatie RW koeltoren Doel 12           | Bongaerts Nicolas  |
| P0872 | Herstellen coating buitenwand RGB        | Custers Joseph     |
| P0120 | Stabilisatie Scheldeoever rond watervang | Bongaerts Nicolas  |
| P0867 | Gevelrenovatie GNH D12                   | rillaerts liesbeth |
| P0480 | D12-LTO - Verbet. lek dichtheid KZ.      | Custers Joseph     |
| P0919 | Bouwkundige voegen GNH-BAR-MW-OVG D12    | Custers Joseph     |
| P0870 | D12-LTO- Inspectie progr. bouw.          | Cobbaert Johan     |
| P0559 | Herstellingswerken watervang D12         | Bongaerts Nicolas  |
| P0864 | Gevelrenovatie BAR D12                   | Cobbaert Johan     |
| P0868 | Renovatie schouwen D12 - RGB en GNH      | Bongaerts Nicolas  |
| P0920 | LTO D12 - Verankeringen galerijen/daken  | Custers Joseph     |
| P0869 | Vervangen roofing daken GNS en GMH D12   | Custers Joseph     |
| P0918 | LTO D12 - Gevelrenovatie & fundering GNS | Custers Joseph     |
| P0873 | Vervanging dichtingen CW                 | Bongaerts Nicolas  |
| P0865 | Herstellen/renovatie sokkel condensor MA | Bongaerts Nicolas  |

# Organizational principles

## • Portfolios:

### — MECH (40)

- All mechanical projects ( some ADU and BEST)
- Portfolio manager: Paul Meulemans
- Projects: Redundant FW non-return valves, Reactor vessel head, TW for RW cooling towers, ...



### — LIC/WIJZ/NCR (12)

- All projects related to Licensing
- Portfolio manager: Kathleen De Wolf
- Polarity separation, flooding PSA, ...



### — RM (4)

- All projects related to Radiation Monitoring
- Portfolio manager: Paul Meulemans
- Replacement op several systems



# Portfolio Mech (40)

# Paul Meulemans



|       |                                           |                  |       |                                          |                       |
|-------|-------------------------------------------|------------------|-------|------------------------------------------|-----------------------|
| P0414 | Herstelling reactordeksels Doel1 en Doel2 | Thierens Danny   | P0623 | ADU- Garandeer TW voor RW-koeltorens     | Dupon Robin           |
| P0927 | Seisme conformiteit D12 met WENRA         | Pochet Guillaume | P0853 | Vernieuwen pijpenbundel DW-ontgasser     | van den Boogaert Paul |
| P0415 | Vervanging split-pins D1 en 2             | Vissers Stief    | P0902 | Renovatie waterkamers condensors D12     | Voets Willem          |
| P0164 | Redundante FW terugslagkleppen            | Demeyere Dimitri | P0619 | LTO Ageing - Inspectie FW Baffle Boxes   | De Wolf Kathleen      |
| P0596 | LTO Ageing - Inspectie Internals RC kuip  | Martens Dirk     | P0482 | ADU- Voorkom wateroverlast RW-kelder     | PIROTTE TOM           |
| P0625 | ADU-Herconfigureer LWA in GNH             | Vissers Stief    | P0877 | 2de renovatie neutralisatiebak SDOR61    | Brantegem Steven      |
| P0399 | Upgrade polaire brug D1 en D2             | Dupon Robin      | P0534 | Studie toestand CV-pompen D12            | Vissers Stief         |
| P0924 | Renovatie RW-leidingen Doel 12            | Dupon Robin      | P0666 | GTJH D5 ontdebellen LWK terugslagkleppen | Goossens Karolien     |
| P0410 | Renovatie ondergrondse leidingen Doel 12  | Pirotte Tom      | P0595 | LTO Ageing - Eénmalige inspecties MEC    | Otte Luc              |
| P0541 | Renovatie draaiende zeef D2               | Vreven Kasper    | P0837 | Vernieuwen coating AFW-tanks             | Brantegem Steven      |
| P0576 | Post-LOCA pH-correctiesysteem SUMP D12    | De Koster Wim    | P0839 | Vervanging 1/2 CC097 thermische barriere | Burm Matthias         |
| P0591 | LTO Ageing - Opvolging TLAAs met CUF>1    | De Wolf Kathleen | P0836 | Nieuwe VKs SI-accus                      | Burm Matthias         |
| P0901 | Aankoop 13 nieuwe controlestaven          | Vandemaele Jos   | P0586 | studie realisatiefase B7 D12             | Wellens Guy           |
| P0145 | AlOH3 Poeder RC reactor penetraties       | Meulemans Paul   | P0593 | RCM - aanpassen van MPs ikv LTO          | Van Eynde Wouter      |
| P0611 | Baseline inspections                      | Otte Luc         | P0840 | Nieuwe overdrukstudies VK SG             | Adriaenssens Dirk     |
| P0291 | Vervanging FW-/MS-veerdozen BAR D12       | Paul Andy        | P0495 | Ontdebellen CC voeding koelers SC kelder | Beirnaert Dirk        |
| P0856 | BEST alternatieve water supply primair    | Lannoo Philippe  | P0862 | Preconditie TLAAs                        | De Wolf Kathleen      |
| P0855 | BEST-Alternatieve watersupply SGn D12     | Pirotte Tom      | P0665 | Inspectie Baffle Bolts D12               | Vissers Stief         |
| P0617 | ADU- seismisch maken R11                  | Vissers Stief    | P0551 | Vervanging AS ontspanstation in GNH      | Meulemans Paul        |
| P0252 | Interne overstrooming - GTJH B5           | Wellens Guy      | P0336 | Herstelling lek aan meetvinger RC2P1A    | Minne Alain           |

# Portfolio LIC/WIJZ/NCR (12)

Peter Devolder



| LIC   |                                        |                 |
|-------|----------------------------------------|-----------------|
| P0926 | BEST-acties LTO-D12                    | Devolder Peter  |
| P0894 | Cable routing data collect D12         | Devolder Peter  |
| P0893 | Flooding PSA D12                       | Cambier Sophie  |
| P0884 | Scheiding elektrische polariteiten D12 | Wellens Guy     |
| P0923 | Aanpassing Simulator tgv LTO D12       | Bonneux Tom     |
| P0517 | Investerings BEST                      | Franckaert Luc  |
| P0692 | ADU - Update EC-concept D12            | Devolder Peter  |
| P0857 | Nieuwe p-T curves in Tech Spec         | Otte Luc        |
| P0863 | LTO - competentie management           | Declercq Annick |
| P0694 | ADU - Uitbreiding Scramtesten D12      | Meulemans Paul  |
|       |                                        |                 |
| WIJZ  |                                        |                 |
| P0851 | Installatiewijzigingen D12 ikv LTO     | Devolder Peter  |
| P0852 | Oplossen openstaande NCRs ikv LTO      | Devolder Peter  |

## Portfolio RM (4)

## Paul Meulemans



| RM    |                                      |              |
|-------|--------------------------------------|--------------|
| P0385 | Vervanging 1E RM-ketens TK240 H&B    | Beckers Jann |
| P0161 | Renovatie RM40/46                    | Beckers Jann |
| P0558 | Vervanging RM-ketens sec. lozing D12 | Beckers Jann |
| P0050 | Vervangen dosimetriesysteem          | Slock Lionel |

# Employment and LTO Doel 12

- **Impact on employment in the region:**

- 470 jobs are being retained (Electrabel, Tractebel and other)
- 340 jobs created over a period of 4 years
- Doel NPP 280 external vacancies since beginning of 2015
  - Replace employees leaving
  - New (project) positions
  - Current status :
    - 237 recruited ( still 43to go)
    - External work preparers: 33 hired



# 04

## Scope and High Level Planning



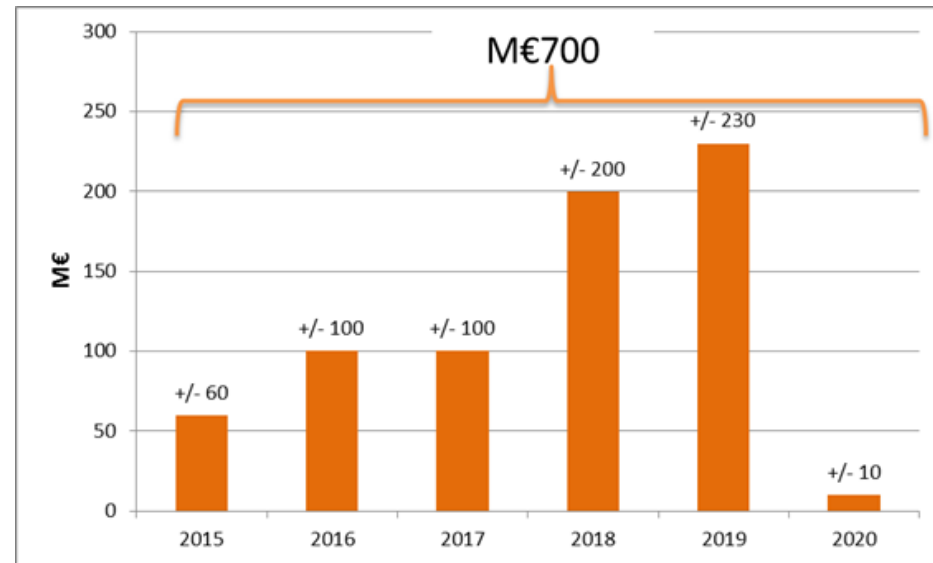
# Main investments LTO D12 projects

## ● Investments up until 2019:

— The total investment amounts to 700 million euros

— The main investments include among others the following:

- Upgrading the design
- Retrofitting or replacing the turbines
- Replacing the main transformers
- Installation of filtered containment venting system
- Improving the fire detection and extinguishing systems
- Modernising the electrical systems
- Inspection and possible replacement of mechanical components in primary circuit
- Modernising the control systems
- Civil engineering projects



# High Level Planning LTO D12 Projects

- **General time frame**

- The 2018 and 2019 outages are the focal points
- Basic requirements (general and specific)
  - Guaranteeing nuclear safety
  - Remain in accordance with the Doel 1 and Doel 2 Safety Report
  - Avoid the risk of common mode failure of safety equipment
  - Manage technical complexity (for example, parallel actions and interference)

- **Report transparently towards authorities about programme modifications through periodic consultation**

- **2015**

- Stop Doel 1 (15/2/15..... 30/12/15)
- Short stop D2 (weeks) April/May 2015
- Longer stop D2 (23/10/15- 24/12/15)

- **2016**

- Short stop D1 (weeks) - summer
- Medium length stop D2 (months) - spring

- **2017**

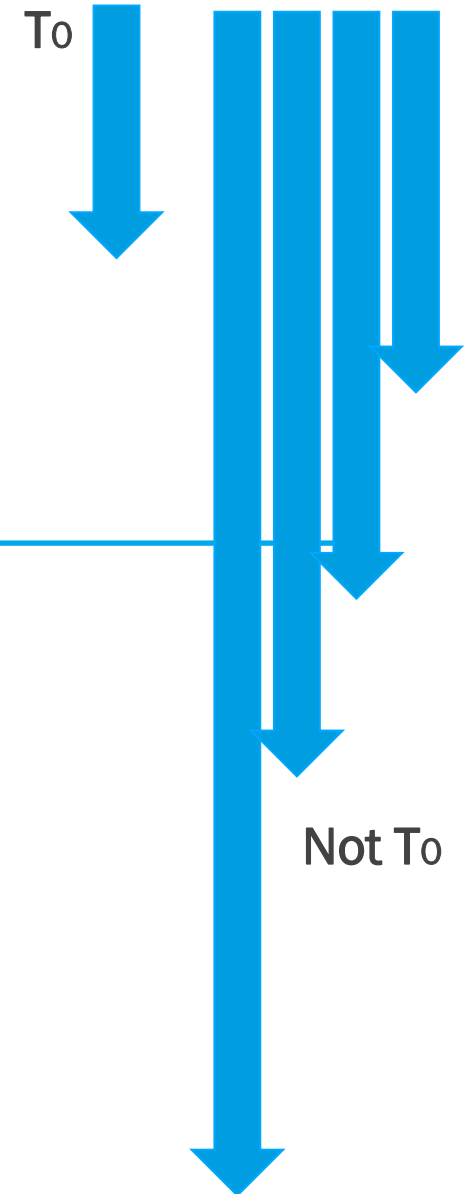
- Short stop D1 (weeks) - summer
- Short stop D2 (weeks) - spring

- **2018**

- Long stop D1 (months) - summer
- Long stop D2 (months) - summer/parallel to D1

- **2019**

- Long stop D1 (months) - summer
- Long stop D2 (months) - summer/parallel to D1





**LTO**  
**DOEL 12**  
VERANTWOORD VEILIG VERDER

LTO Doel 1 & 2:  
Safe from the first day on!  
Safe by continuous improvement for the next 10 years!

Questions?

