23rd REFORM Group Meeting

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Nuclear winter in Belgium

Update of a talk at the Heinrich Böll Stiftung – The Greens conference 'Nuclear Power: Asset or Barrier for the Energy Transition?' Brussels, February 5, 2019

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Research motto:
Prefer to speak true words receiving blame,
above deceiving advice in soliciting praise.

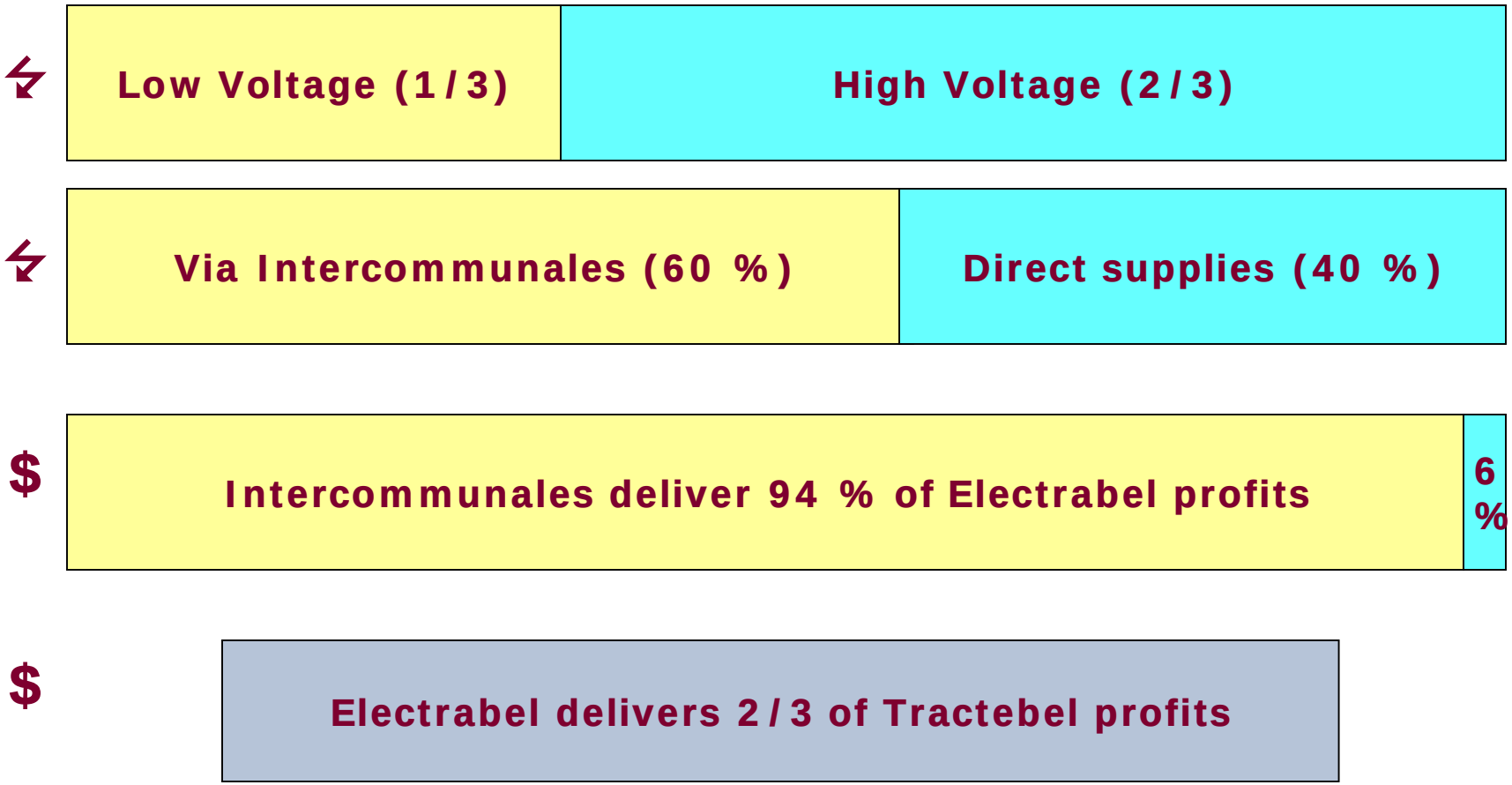
Overview

1. Historical visit to Belgium's energy & nuclear activities since WW2
2. Part 1) Belgian captive customers: cash cows for power companies
3. Part 2) French partners swallow Belgian electricity & gas assets
4. Belgium deeply submerged in the nuclear quagmire
5. Two FAQs:
   * Why so many operational stops of the NP plants in Belgium?
   * Why do ENGIE & EDF extend the lifetime of three 40 years old reactors (causing problems + considerable costs)?
6. Expectations for the year 2025
7. Few considerations

Historical visit to Belgium's power & nuclear activities since WW2 - Part 1

- **1945: power plants coal fired (largest plant ≈ 40MW) – most big industries generate own power**
  Belgium delivered Congolese Uranium for Manhattan project
- **1952: ° CEN/SCK nuclear research center Mol – cover full nuclear cycle from mining to reprocessing + geological storage**
- **1955 ° Control Committee for Electricity + Gas in 1966. Textbook example of captured regulator:**
  - **New social contract Employers (FBE/VBO) & Employees (recognized Trade Unions)**
  - **Role of the government minimized (observers in CCEG)**
  - **Low prices for big industry (growth, employment)**
  - **Guaranteed high returns for electricity companies (generation, distribution); certain access to capital market for investments, e.g. depreciation of NPs over first 20 years life by kWh price increase**
  - **Best salaries & statutes for staff and workers in the el.& gas sector**
  - **Bill of the compromise paid by captive customers**

Draining cash from Belgian electricity users
Shares in Electricity flows ⚡ & Profits $
(Source: Lecture Belgian Parliament January 26, 1999)



Historical visit to Belgium's power & nuclear activities since WW2 – Part 2

- 1952-1975: Building NPs or other nuclear facilities decided by atomic interests, rubberstamped by the CCEG & government
- 1975: Study Commission technocratic report supports new construction of 1300MW NPs, one for every year after 1985
- 1980: Law imposes modest hearings on power expansion plans
  - 1981 & 1982: plan for +1300MW NP series building uphold
  - 1984: Belgium participates 25% in CHOOZ B1 & B2 1450MW NPs + announces DOEL5 1300MW NP
  - 1988: Nuclear moratorium (Chernobyl, surplus gas import, criticism)
- 1990s: Paris decides – continues rent harvesting for SUEZ cash
- 1999: new electricity law (unbundling, liberalization: EU 1996)
- 2003-Law: NPs phase out at 40 year life; 'force majeure' article
- 2003-2019: zigzag policy "respect/change" phase-out law

Belgian* atomic powergen equipment

Name	Location	Capacity (upgraded)		Lifetime	
		MWe	Belgian %	Start	Stop (planned)
BR3	Belgium	11	100	1962	1987
CHOOZ A	France	310	50	1967	1991
DOEL I	Belgium	392 (433)	100	1974	**(2024)**
DOEL II	Belgium	392 (433)	100	1975	**(2025)**
TIHANGE I	Belgium	931 (962)	66.4	1975	***(2025)***
TRICASTIN I	France	915	12.5	1980	?
TRICASTIN II	France	915	12.5	1980	?
TRICASTIN III	France	915	12.5	1981	?
TRICASTIN IV	France	915	12.5	1981	?
DOEL III	Belgium	970 (1006)	100	1982	(2022)
TIHANGE II	Belgium	930 (1008)	100	1983	(2023)
DOEL IV	Belgium	1001 (1039)	100	1985	(2025)
TIHANGE III	Belgium	1015	100	1986	(2025)
SUPERPHENIX	France	1200	2.4	1986	1998
KALKAR	Germany	282	15	Cancelled	-
CHOOZ B1	France	1455 (1500)	25	1996	?
CHOOZ B2	France	1455 (1500)	25	1997	?

*Since ELECTRABEL is taken over by GDF-SUEZ and SPE by EDF, all Belgian nuclear power plants are controlled by French companies

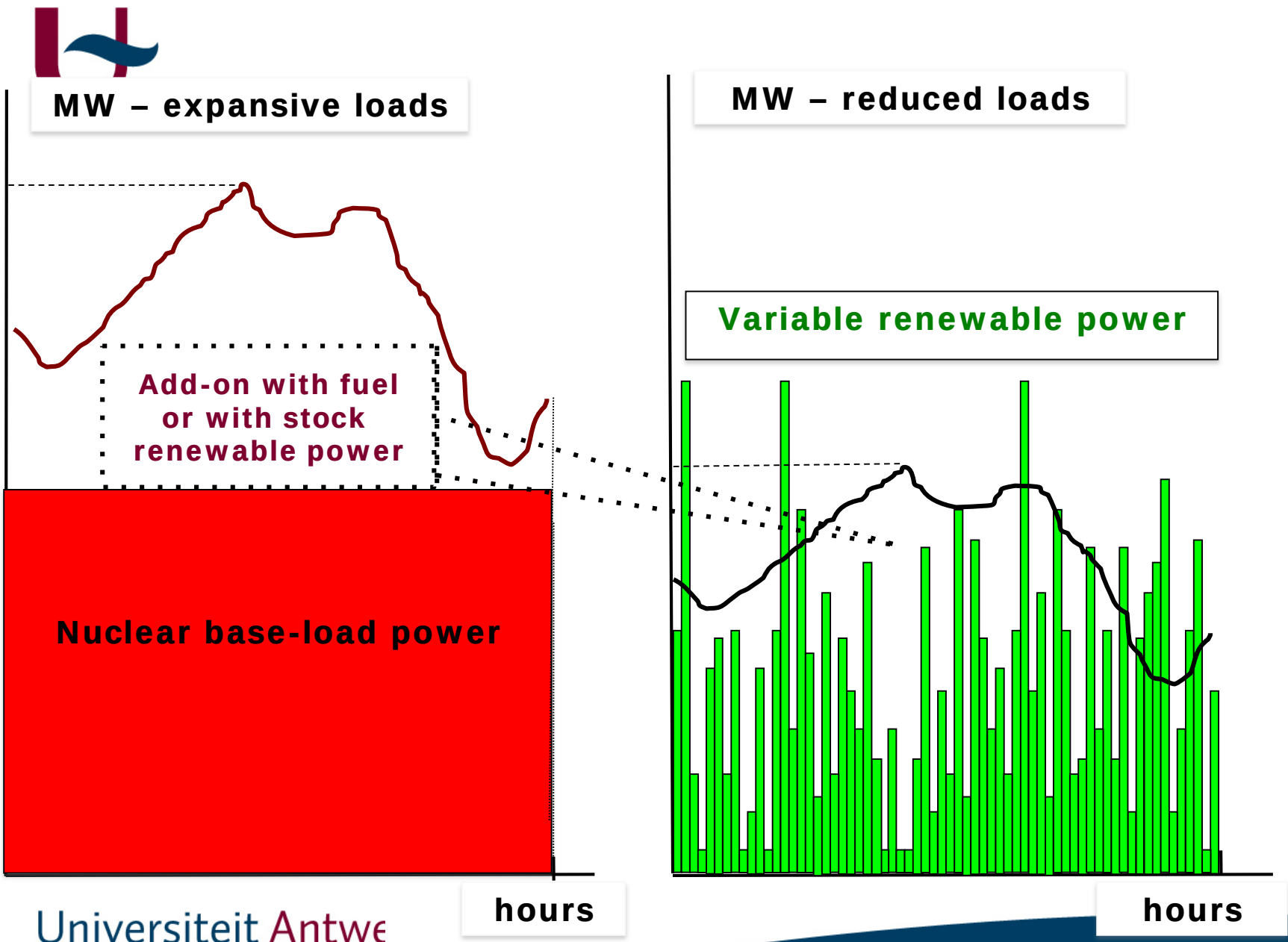
FAQ1: Why so many stops of the NPs in Belgium?

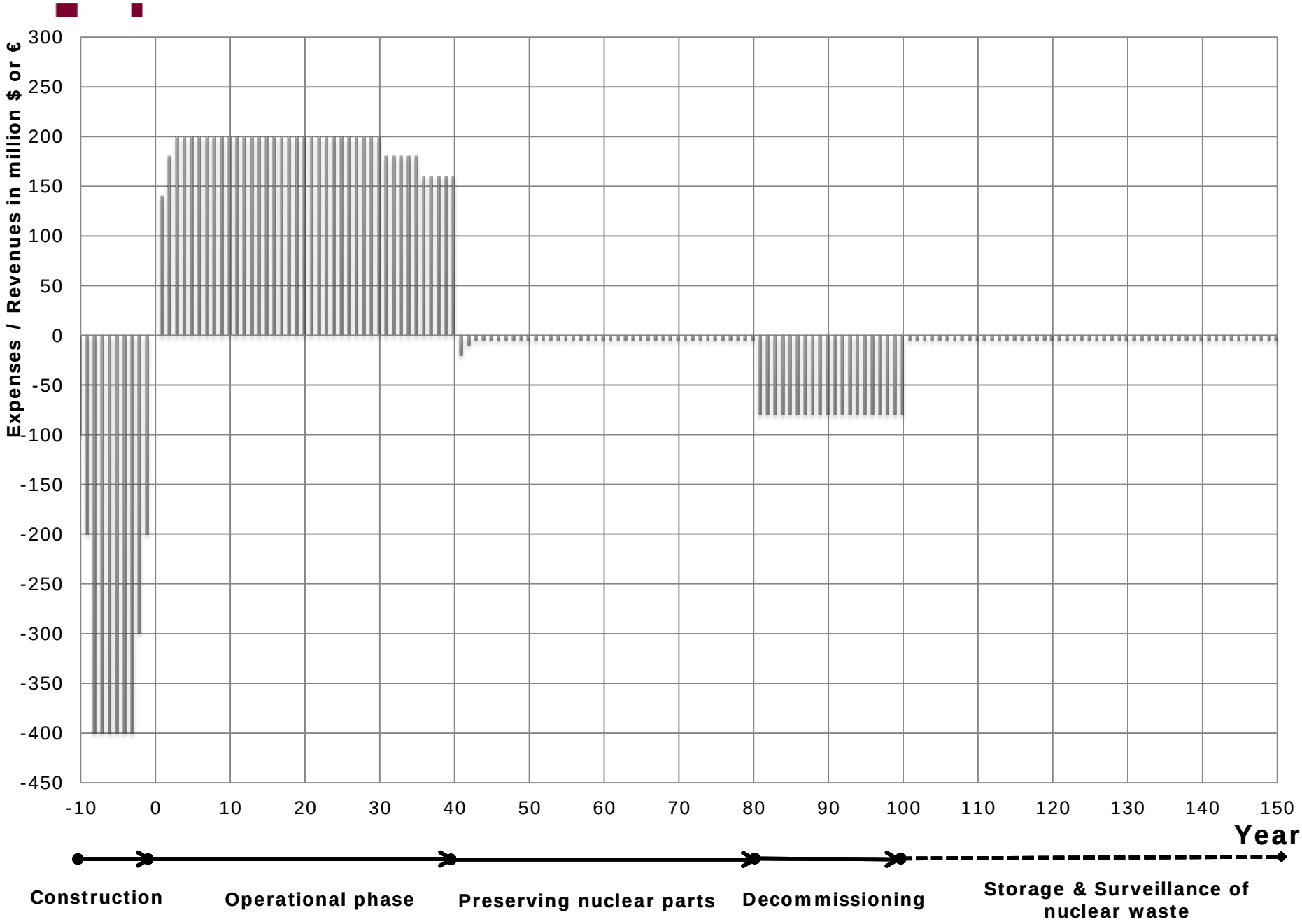
- Belgian NPs are already old: more failures, more maintenance
- By draining enormous rents (billions EUR) from ELECTRABEL to the SUEZ conglomerate, less money was invested in the Belgian electricity sector
- After decades of collusion among nuclear regulator & plant owners, FANC (Federal Agency Nuclear Control) evolved to a more independent institute, applying rules more strictly
- ENGIE has become more risk-averse in nuclear matters. ENGIE really wants to avoid a serious accident en sees no future in new NPs
- EDF less bullish than before (⇔ Hinkley Point C project)

Frequent stops and problem care provide more relief than do deception and covering-up problems and failures

FAQ2: Why do ENGIE & EDF extend the lifetime of three 40 years old reactors (causing problems + considerable costs)?

- As long as some money can be reaped, investors continue to extort equipment
- Keeping the capacity on the billboard hides the shortage of investments over the last three decades (cash drain to SUEZ)
- Keeping nuclear plants alive **holds place in the electric load diagram for large-scale supplies**, precluding the call on new distributed supplies (household PV, cooperative wind, …)
- Postponing closure means postponing the abyss of an eternal future of costs without any income
- Psychologically, the generation devoting their life to the 'nuclear dream' cannot face the real nightmare of nuclear power


MW – expansive loads
Add-on with fuel or with stock renewable power
Nuclear base-load power
hours
MW – reduced loads
Variable renewable power
hours


Expenses / Revenues in million $ or €
300
250
200
150
100
50
0
-50
-100
-150
-200
-250
-300
-350
-400
-450
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Year
Construction
Operational phase
Preserving nuclear parts
Decommissioning
Storage & Surveillance of nuclear waste

Expectations for the year 2025

- **Likely 5 NPs ending power generation**
  > Doel 1, Doel 2, Tihange 1 because of 50 year age [1828 MW]
  > Doel 3, Tihange 2 because of the vessel cracks [2014 MW]

- **Likely 2 NPs get life-extension (from 40 to 50 years)**
  > Doel 4 and Tihange 3 [2054 MW]
  - **Rightwing parties reign Flemish government + largest federal weight**
  - **Neo-modernist discourse influence grows: 'ignorance as an asset'**
  - **Administrative & regulatory capacity in Belgium is poor (i.e. public interest is not defended, imposed)**
  - **Grassroot protest active, but of limited size & impact**

  - **Antwerp chemical industry (BASF, INEOS, …) are pro life extension**
  - **Fits the energy transition pace of ENGIE (+EDF)**
  - **New chair of ENGIE's board (J. Thijs) states publicly (Oct.2019): 3 NPs should be allowed 20 years life extension**

Few considerations

- **My points of view**
  - The 2003 phase-out law holds a 'force majeure' close: every life-extension should be assessed on 'force majeure' evidence
  - Impose conditions for every allowed life extension, such as:
    - Prior impact assessments (environmental, sustainability)
    - Guarantee future merit-order: wind, PV always priority over NPs
    - Risks, damages, losses of nuclear operations, accidents … on the account of ENGIE, EDF and big industry lobbying for life extension

- **Belgium's best decisions are 'not to decide'**
  - Opaque infighting in a labyrinth of institutes, councils, lobbyists, etc.
  - ⇔ the Netherlands 'broad societal debates' allow the construction of 3 large-scale coal plants (RWE, E.ON, ENGIE), commissioned 2015/16

What is the best?