

# LTO... and beyond ?

## A Civil Society view on Energy (Electricity) Policy

BNS Evening Lecture

25 June 2026

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weCARE partners

# SUMMARY

After presenting results of a **simulation** made by 100TWh to evaluate the **cost of the Belgian phase-out**, the discussion will focus on “**what’s next**”

In an economically difficult environment where **Europe is losing competitiveness**, the new central pillars are **affordability** and **reliability** of electricity supply.

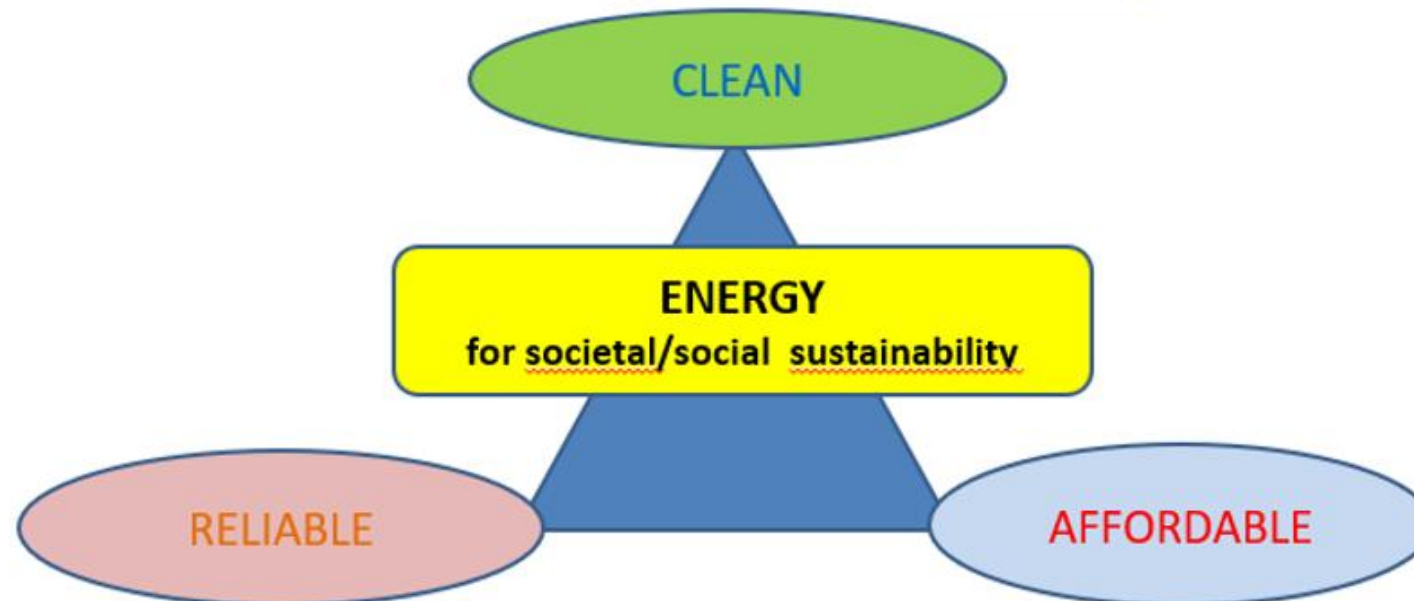
**Inputs** from recent analysis are leading to **rethinking the cost of electricity** in the framework of the evolution of **Energy Policies**,

Key questions for reflexion: **From LCOE to Full System Cost**. Who pays for **intermittency costs** ? Is the **electricity market design** fit for purpose ?



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**Beyond CO2... Global Challenges**  
**A better Triangle for Energy Policy –**  
**weCARE** <https://www.wecareeu.org>



A close-up of a lightbulb with a globe inside, symbolizing energy and sustainability.

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## **Energy / Electricity Strategy**

From « **Data** » to  
« **Rethinking the cost of electricity** »  
and « **Policies** »

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## Energy / Electricity Strategy

« **Data** »

# SIMELSP3

(dev. by Henri Prévot &  
applied by 100TWh)

## Assumptions & results BE 2025

### Assumptions

- **Capacities** : Nuke 2 and 6 GW; PV Solar 10.5 GW; OnShore Wind 3.1 GW; OffShore Wind 2.2 GW; Storage power 1.2 GW – energy 6 GWh;
- Hourly climate and elec consumption **profiles** y 2024 and consumption 85 TWh & Min dispatchable cap. for stability 5 GW
- **Investments** : nuke LTO 20y 1000 EUR/kW  
PV 1150 EUR/630/kW, OnShore Wind 1350 EUR/kW, OffShore Wind 3160 EUR/kW, **CO<sub>2</sub>** 60 EUR/t, **Gas** 50 EUR/MWh

### Results – cost of elec with Discount Rate 4,5% (9%)

- 2 GW nuke **128 EUR/MWh (150)** + need 44 TWh gas/import
- 6 GW nuke **90 EUR/MWh (115)** + need 17 TWh gas/import

# Cost Nuclear Phase-Out by



*Andreas Tirez*

- Keeping **D1/2 & T1**, electricity price : **- 9.5 EUR/MWh = - 760 MEUR/y**
- Keeping **also D3 T2** : **- 19.5 EUR/MWh = - 1.6 BEUR/y**
- Per ENGIE, **LTO D4 T3** is 800-1000 MEUR per reactor – **CfD 90 EUR/MWh**
- « **Good Planning** » for 20 years : **60 EUR/MWh** (70 EUR/MWh if investment doubled)
- **Safety** levels – to be seen with **FANC**
- **Offshore Wind around 190 EUR/MWh** assuming all costs (grids, backup, subsidies,...)
- **Nuke LTO: cheaper, very low CO<sub>2</sub>, independence**

# 2035 price perspective by A U R R A Berlin Inst. ENERGY RESEARCH

Regardless of domestic nuclear and off shore wind policy, **baseload power prices** in Belgium in 2035 are impacted by **less than 6 %**

Even with 5,8 GW of offshore wind and 4 GW of nuclear capacity, **Belgium will import almost 10% of its power demand in 2035**, mainly from France

**HENCE,**

For the future, **Belgium's power prices will depend as much on decisions made in the capitals of neighbouring countries as those made in Brussels.**

**BUT...**

*Will French nuclear availability remain high?*

*Will Dutch offshore wind come online as planned?*

*Will industrial power demand in Germany recover as expected?*

*Will neighbouring countries keep their interconnectors running at full capacity?*

# VITO | EnergyVille 2050 perspective

- **Offshore Wind, CCS and Green molecules** for Carbon neutrality in 2050 will reduce dependence to foreign energy from **75% today to 40% in 2050**. Acceleration is needed
- Government decisions of **delaying Offshore Wind** (P Elisabeth 3,5 GW in 2030 + connection island) **and HV Ventilis/Boucle du Hainaut** result in **missing 12TWh** (→ more gaz, more imports, and **electricity prices 4 to 7% higher**)
- **20 y LTO for D4 T3 helps**. No « other » nuclear considered before 2040/2045
- Without **large CO<sub>2</sub> transport and storage capacities** (cement, steel, petrochem, agro), **annual energy system cost of 3,5 BEUR more/y in 2050**
- Targetting **95% CO<sub>2</sub> reduction** vs 100% **reduces cost 1,7 BEUR per year** and **90% reduction** leads to **import dependence of 45% instead of 40% for neutrality**

# FR Court of Auditor

## on cost of PV and impact in CO<sub>2</sub> reduction...

- In FR, the % of RES in electricity produced increased from **18 to 27% between 2016 and 2024**. Subsidies are paying **42%**
- The number of « subsidised » contracts for PV in the same period have doubled from 360.000 to 755.000, for a cost of **26 BEUR**
- Considering a **remuneration guaranty for 20 years**, this will cost **87 BEUR**
- **With basically no impact in CO<sub>2</sub> reduction** due to the already very low footprint of electricity in France (75% nuclear)

# Cost of Wind Offshore – FR Rex



- 2026 RTE LCOE Wind Offshore fixed **74 EUR/MWh** (floating 104)
- + « Renegotiated supplier buyback price» avg **95 EUR/MWh**
- + **Investment connection costs** to network (37 BEUR for 53 TWh per y x 25 y) = **28 EUR/MWh**
- + **CRE Subsidies** 586 MEUR 2025 (5,7 TWh) and 922 MEUR 2026 (6 TWh)... + **103 EUR/MWh 2025 and 154 EUR/MWh 2026**
- + **lost revenues for EDF**: 2025 13,7 BEUR for 82 TWh; 2026 17 BEUR for 85 TWh. So **74 EUR/MWh in 2025 and 76 in 2026**
- **TOTAL COST OF Fixed Wind Offshore : 374 EUR/MWh in 2025 and 428 EUR/MWh estimated in 2026. AND not considering externalities except the loss for EDF**
- *This is 5x Nuclear and 10x large hydro...*

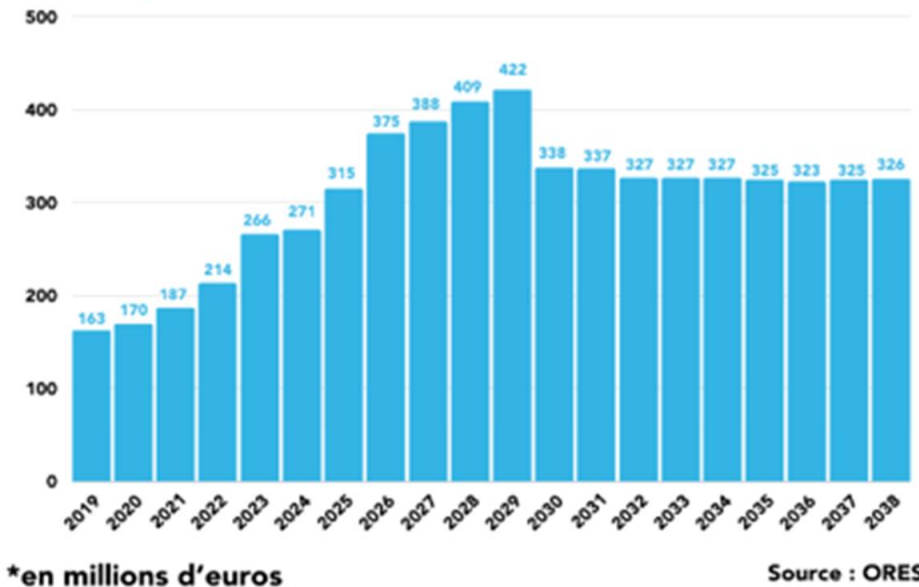
# Cost of Wind Offshore – in BE ?

- **CREG** (May 2026): « **Cost of Nuclear is estimated 1/3 of Wind Offshore in North Sea... who wants to pay?** »
- **Subsidies** for BE Wind Offshore was 600 MEUR in 2025... for a production of 7 TWh equivalent to 1 NPP, meaning **12 BEUR over 20 y ... for « 1 GW »**
- 600 MEUR subsidies for 7 MWh/y = 85,7 EUR/MWh making the total cost at **170 EUR/MWh** with **subsidies hidden in the electricity bills**
- + To add the estimated addition of **40** EUR/MWh for the « energy Island »
- + In addition more offshore wind needs alternatives : **CRMs hidden in ELIA networks tariffs** (hundred millions of EURs per year)
- Noting that the operation budget of ELIA has largely increased over the last years – and **1,5 BEUR foreseen in 2026 eg for grid adaptation for Wind Offshore**

# Cost of Distribution Grid adaptation BE ?

- ORES serves 3/4 Wallonia = 3 Billion people : 1/4 Belgium
- Historical **170 MEUR/y**
- Future **420/320 MEUR/y**
- Total « additional » cost due to adaptation for 20 years of the order of **3 BEUR**
- **12 BEUR for Belgium for 20 yrs**

Évolution des investissements dans le réseau électrique de 2019 à 2038\*



# Universities experts

*Adel El Gammal*, professeur de géopolitique d'énergie, ULB

"Il faut **transitionner le plus rapidement possible** vers des énergies locales". Le renouvelable apparaît comme une priorité, tout comme, "*dans une certaine mesure*", le nucléaire. « **La suffisance énergétique** (capacité d'un pays, d'une région ou d'un bâtiment à subvenir à ses propres besoins en énergie grâce à ses ressources locales, sans dépendre d'importations), doit devenir **un pilier des politiques publiques**, au même titre que la transition » vers des énergies décarbonées.

*Francesco Contino*, professeur de l'UCLouvain

"Le nucléaire, ce n'est pas un 'game changer' ni une solution magique". "Ça peut aider, clairement. Sans se désinvestir dans le renouvelable". Et déjà en 2012: « je militais pour la sobriété car l'efficacité énergétique ne suffit pas »

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## Energy / Electricity Strategy

« **Rethinking the cost of electricity** »

# Rethinking Cost of Electricity (1) *Dr L Schernikau April 2026*

- In **April 2026** the **German Minister for Economic Affairs and Energy** *Ms Katherina Reiche* stated that: ***“An energy transition that ignores system costs will ruin a country, that it pretends to save”***
- The **IEA** also confirmed **“Data centers require highly reliable peak-power”**
- **Electrification relying on Wind and Solar technologies is the most expensive**
- **OECD** and Europe’s **UNECE** (*UN Economic Commission for Europe*) on the cost of electricity:
  - “LCOE of VRE resource is relatively low and the non-VRE has a relatively high LCOE **but the same full system cost in a cost optimized electricity system.**”
  - **“A higher share of VRE such as Wind and Solar PV always increases system costs.”**
  - “VREs impose such **technical externalities or social costs...**”
  - “The deployment of **VRE resources directly reduce the natural or intrinsic system inertia**, and thus the overall dynamic robustness of the system.”

# Rethinking Cost of Electricity (2)

## Is LCOE the right metrics ?

- **LCOE = Levelized Cost Of Electricity** most widely used, relevant for dispatchable power, focuses solely on plant-level costs, *not other system costs as balancing, network integration, transmission, backup, or storage costs, etc*

*Other metrics that could for instance be considered:*

- **FCOE = Full Cost of Electricity** the **full cost** of electricity to society or an entire nation, next to all storage, backup, transmission and network integration, it also incorporates the true raw materials, embedded energy, net-energy returns of the system, environmental cost, disposal costs
- **LFSCOE = Levelized Full System Cost Of Electricity** allocates all system integration costs to each technology individually; one by one

# Preliminary Report – 17 June 2026

To be further analyzed

- Dispatchable generation **Nuclear New Build's** LCOE (**72-111 EUR/MWh**) usually viewed as highly competitive against **coal-fired** (**282 EUR/MWh**) and **CCGT** (**200 EUR/MWh**) PP with only **hydropower** (**48 EUR/MWh**) showing a lower LCOE
- *Compared to renewable sources, NNB is not perceived as competitive when an LCOE-only approach is adopted ! ... need to consider system cost*
- **LTO NPPs**, are, however, competitive against all vRES : **34-39 EUR/MWh** for 10-year LTO and **30-36 EUR/MWh** for 20-year LTO

# LFSCOPE – Idel/Bank of America

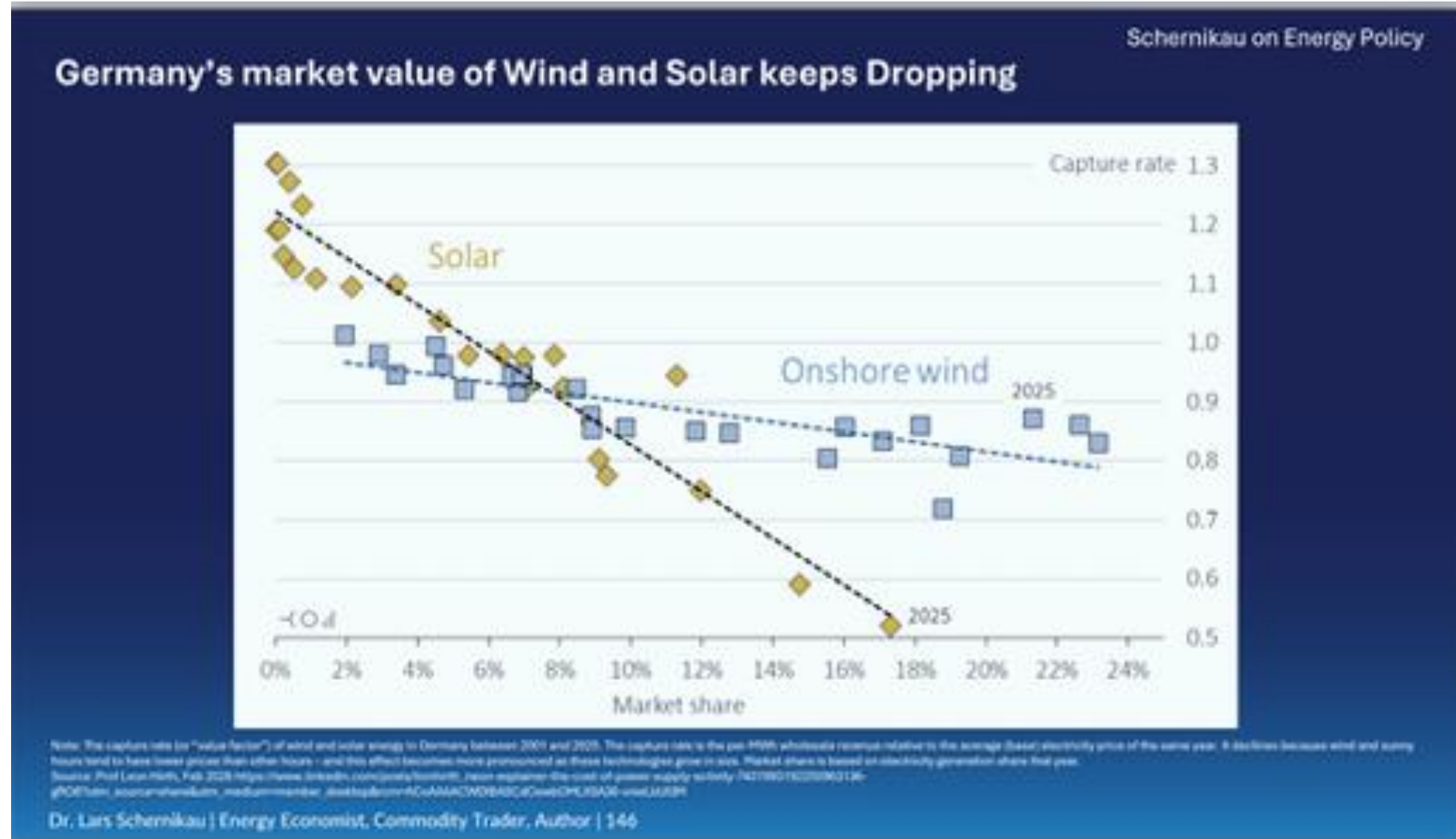
Table 3: Comparison of LCOE and LFSCOPE

| Technology     | LCOE<br>[USD/MWh] | LFSCOPE              |                    |
|----------------|-------------------|----------------------|--------------------|
|                |                   | Germany<br>[USD/MWh] | Texas<br>[USD/MWh] |
| Biomass        | 95                | 104                  | 117                |
| Coal (USC)     | 76                | 78                   | 90                 |
| Natural Gas CC | 38                | 35                   | 40                 |
| Natural Gas CT | 67                | 39                   | 42                 |
| Nuclear        | 82                | 106                  | 122                |
| Solar PV       | 36                | 1548                 | 413                |
| Wind           | 40                | 504                  | 291                |

# Rethinking Cost of Electricity (3)

- When any technology decreases the system efficiency **it should be held responsible for it !**
- Wind and Solar electricity cost increases the more in the system
- **Capture rate** = *the yearly average price a generator actually earns  $\div$  the yearly average market price*. **As Wind/Solar share increases, their capture rates fall.** This is known as the **cannibalization effect** or price cannibalization.
- **Capture rates do not include subsidies and ignore all system costs.** Capture rates do NOT give you the FCOE
- **Subsidies decouple investment from market value.** This leads to **overproduction and more subsidies required**

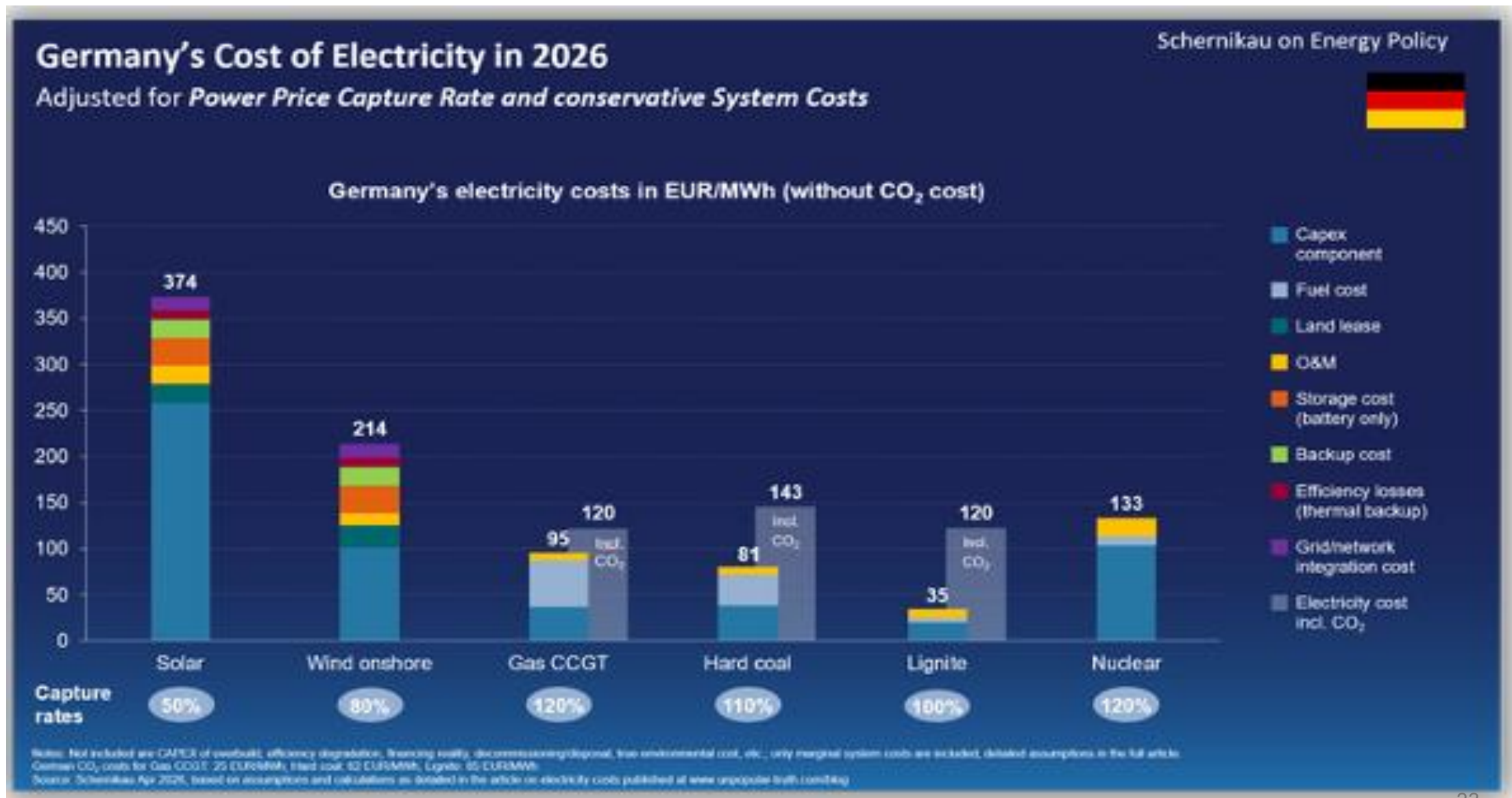
# Rethinking Cost of Electricity



# Rethinking Cost of Electricity (4)

- **Grid ready usable electricity** has five costly main characteristics (*voltage, frequency, phase, current, short circuit level*)
- None of those characteristics are provided by Wind turbines or Solar panels without **additional ancillary systems** each with a cost or “system costs” to be considered
- Large, heavy mass, synchronously rotating generators supply those characteristics, that maintain **grid stability**
- Less of those and more “digital generators” such as Wind, Solar, and Batteries, reduces fault level and system strength

# Rethinking Cost of Electricity (5)



# Rethinking Cost of Electricity (6)

- **OECD and UNECE now admit that as the share of wind and solar increases, complexity and total system costs rise**
- **Germany** is a wonderful real-world example. **Despite massive investment in Wind and Solar capacity, now far exceeding peak demand, total system costs remain high and continue increasing and according to Chancellor Merz in early 2026, Germany still “*lacks sufficient electricity generation capacity*”**
- The central takeaway is simple and overlooked. **Electricity is not just about producing kWh, but rather about delivering peak power service, reliable, grid-ready power at all times 24/7/365**
- As said previously by **Minister Ms Katherina Reiche** : **“*An “energy transition” that ignores system costs will ruin a country, that it pretends to save...*”**

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## Energy / Electricity Strategy

### « **Policies** »

# Two extremes : France vs Germany

## Electricity 2022 - *order of magnitude*

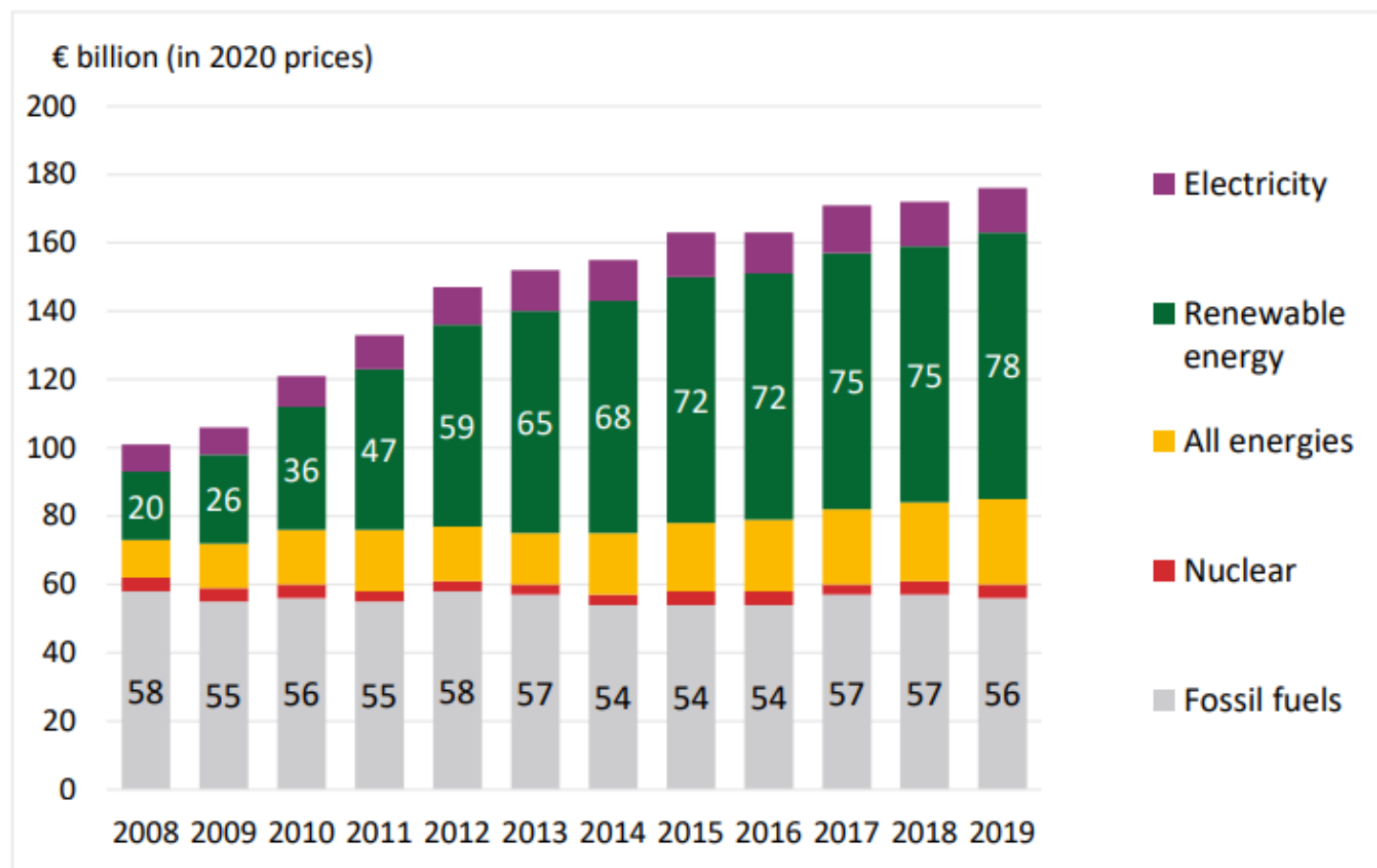
- **Germany:** Elec gen 550 TWh, 250 TWh by RES, 150 GWe installed **RES, 385 gr CO<sub>2</sub>/kWh, 500 BEUR** over 20 years in subsidies for RES + **150 BEUR** spent for grids (+ DE Court of Auditors need **450 BEUR** more for the grid) **total cost 1.100 BEUR...**
- **France:** Elec gen 450 TWh, 350 TWh by Nuclear (bad year), 60 GWe installed Nuclear, **50 gr CO<sub>2</sub>/kWh, 50 BEUR** for grand carénage for LTO +20 years...
- Yes, but **New Build** ? Let's say 11 BEUR for 1 GW installed ... **1.100 BEUR represent about 100 GW... = 5 x the historic nuclear in Germany** (21 GW – 30% electricity)

**Chancellor Merz 2025:** *Energiewende, DE made a serious strategic mistake by closing its nuclear fleet...* UvdL followed on 10 March 2026 for the EU

# Energy Subsidies in EU

## European Court of Auditors 2022

**Figure 10 – Energy subsidies by category between 2008 and 2019**



Source: ECA based on the *Study on energy subsidies and other government interventions in the European Union*, October 2021.

# EPS 2025 Position paper on Energy Electricity Prices

| Country        | Residential (\$/kWh) | Business (\$/kWh) | vs. World Average |
|----------------|----------------------|-------------------|-------------------|
| United States  | ~\$0.15-0.16         | ~\$0.12           | Near average      |
| China          | ~\$0.08              | ~\$0.09           | ~50% below        |
| Japan          | ~\$0.25-0.28         | ~\$0.18           | +50-65% above     |
| Germany        | ~\$0.41              | ~\$0.24           | +140% above       |
| India          | ~\$0.08-0.10         | ~\$0.10-0.12      | ~40-50% below     |
| Brazil         | ~\$0.12-0.14         | ~\$0.10           | ~20% below        |
| United Kingdom | ~\$0.35-0.40         | ~\$0.28           | +100%+ above      |
| France         | ~\$0.26              | ~\$0.18           | +50% above        |
| Canada         | ~\$0.12              | ~\$0.10           | ~30% below        |
| Australia      | ~\$0.25-0.30         | ~\$0.18           | +50-75% above     |



**What about  
European industry  
competitiveness ?**

<https://www.globalelectricity.org/electricity-prices-by-country/>

Data compiled from multiple sources including GlobalPetrolPrices, Eurostat, and EIA

# EU Energy/Climate Policy: Hot Files...

- **EMR** adopted PPAs, CfDs, CRMs,... 2024
- **NZIA** adopted by Council and Parliament with nuclear included 2024
- **Clean Industrial Deal** for re-industrialisation of Europe
- **Industrial Accelerator Act** from 14 to 20% EU made products by 2030
- **Affordable Energy Action Plan** 10 specific measures
- **Grid Package** ia corridors and interconnexions target 15% of capacities
- **Next Multiannual Financial Framework** : Commission Proposal 2 TEUR for 7 years
- ...

# EU Energy/Climate Policy

## Today's mood in Brussels « Energy » circles

- Need to accelerate decarbonisation
- Need to electrify towards +50% in 2050 – **but users require affordable and reliable system !**
- Need to push forward with the deployment of Renewables
- Therefore : Need to overcome the limits of Renewables Intermittency
  - by **more grids** – transmission and distribution
  - by **storage**
  - by **flexibility of production and demand**
- **Nuclear... YES but ??? Too late and too expensive ???**

# EU Energy/Climate Policy

## Today's mood in Brussels « Nuclear » circles

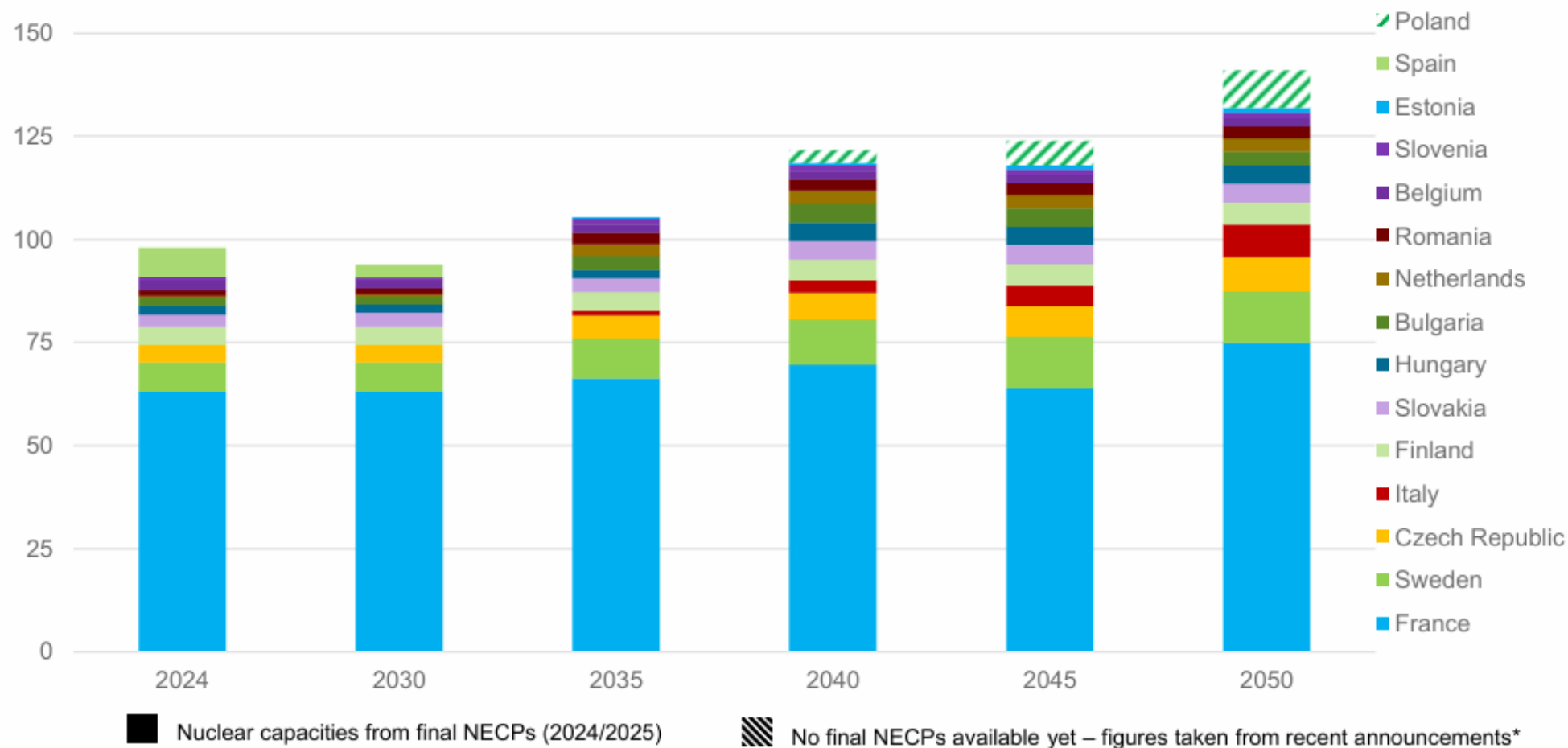
- « new recent pro-nuclear move » with creation of **pro-Nuclear Groups**
  - Alliance of **pro-nuclear Member States**,
  - Group of **pro-nuclear MEPs**,
  - **Pro-Nuclear Business Alliance**
- **NuclearEurope Compass Lexicon Report** on nuclear development impact for the climate and the economy ([see hereafter](#))
- **Nuclear Summit in Paris** – Speech of **UvdL** – « *Sidelining nuclear was a strategic mistake* »... (following DE Chancellor [Merz](#)...)
- **Publication of the PINC 10 March 2026**
- **Strong EC/EU Political Support for the European SMR Alliance**

# PINC - 10 March 2026

(Commission's Nuclear Illustrative Programme)

- **144 GW** installed nuclear capacity **by 2050** (Large reactors LTO and NBB base-case of ~ **109 GW** and SMRs: forecast between 17 and 53 GW ~ **35 GW**)
- Acknowledges nuclear's role in **EU's energy sovereignty**, 24/7 electricity supply, and **reduced reliance on third-country suppliers**
- **Investment** needs (**241 BEUR**), evaluates **financial models**, stresses market failure and long construction periods. **Financing mechanisms** evaluated : CfDs, PPAs, and the RAB model
- **Level Playing Field and Policy**

## National Energy and Climate Plans (NECPs) – EU nuclear installed capacity (GW)



\* For the below Member States who didn't present the final NECPs yet, the figures are from the recent announcements:

Poland – [Polish Ministry of Industry](#) (24 June 2025)



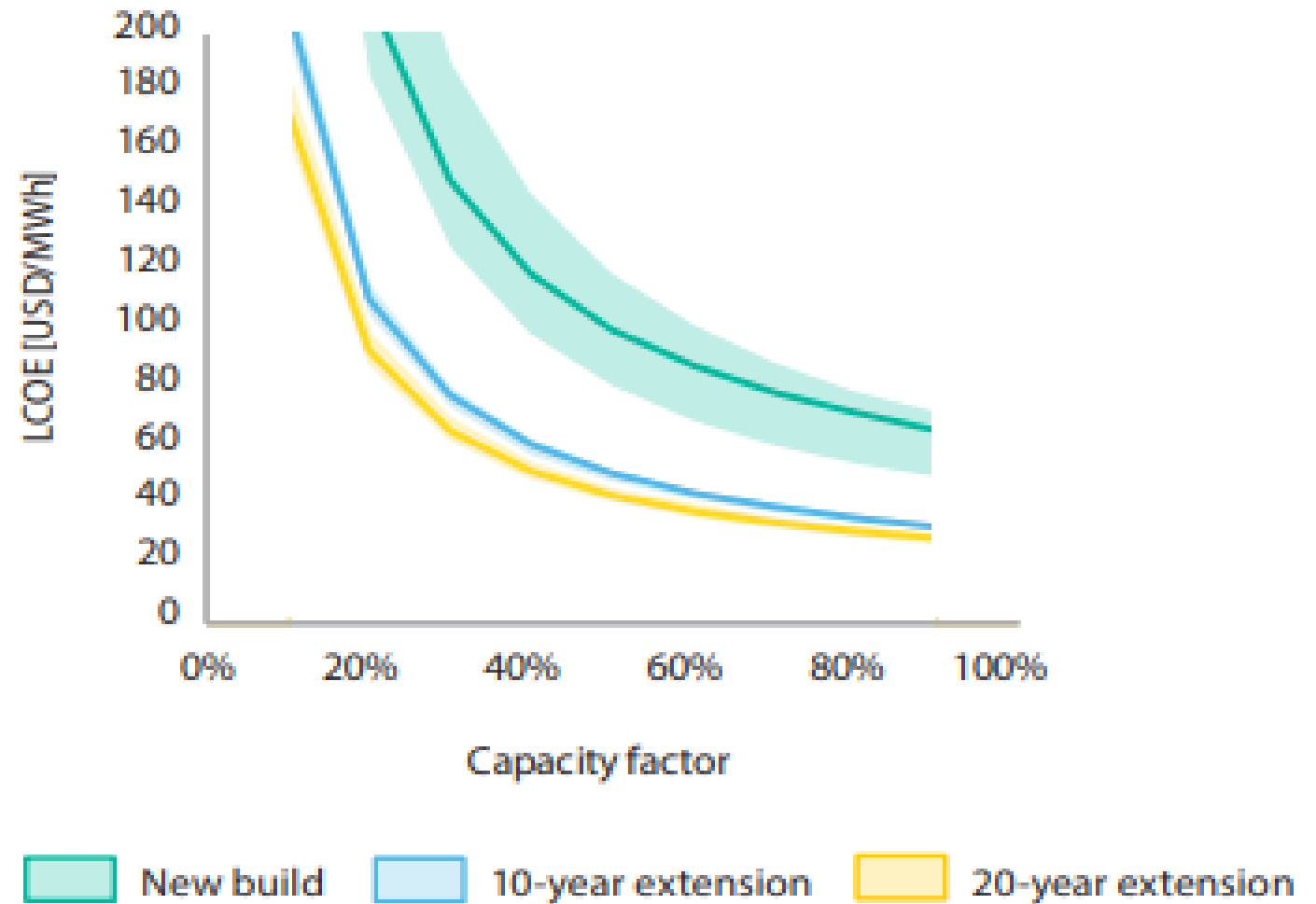
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## Energy / Electricity Strategy

YES but ... **what beyond LTO...** which Policy?

- From LCOE to full System Costs
- Who pays for intermittency costs ?
- Need for a deep reform of the Electricity Market

Levelized Cost  
of Electricity  
LCOE  
IEA NEA PCGE  
2020  
NUCLEAR



Note: Values at 7% discount rate. Lines indicate median values, areas the 50% central region.

High shares of intermittent renewables kill the economics of capital intensive dispatchable sources

## Lessons of the NEA system cost study (2019)

Report NEA 7299/2019: **The Cost of Decarbonisation: System Costs with High Shares of Nuclear and Renewables... (Electricity)**

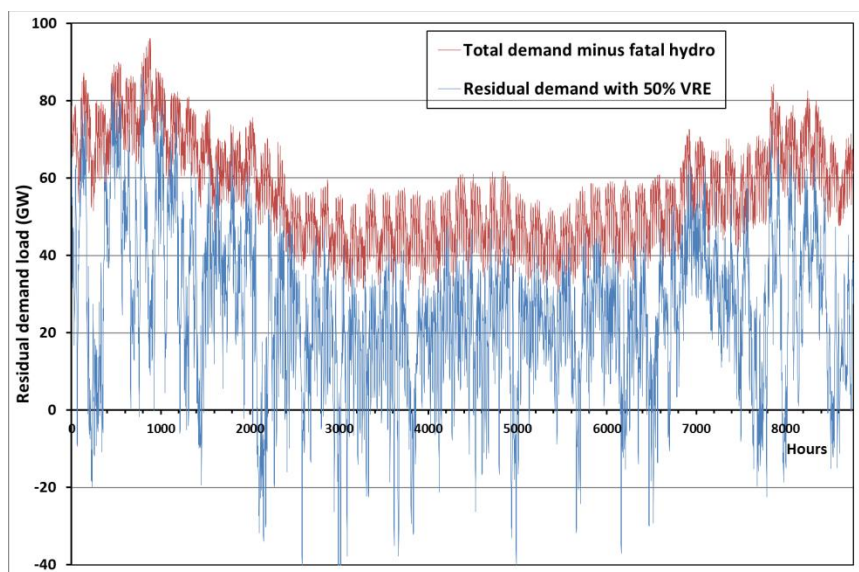
- Comparison between low carbon electricity mixes
- Carbon constraint cost of **50g per kWh** (limiting Gas)
- Objective to keep the rise of global mean temperatures below **2°C**

**A higher share of VRE and a lower share of Nuclear imply:**

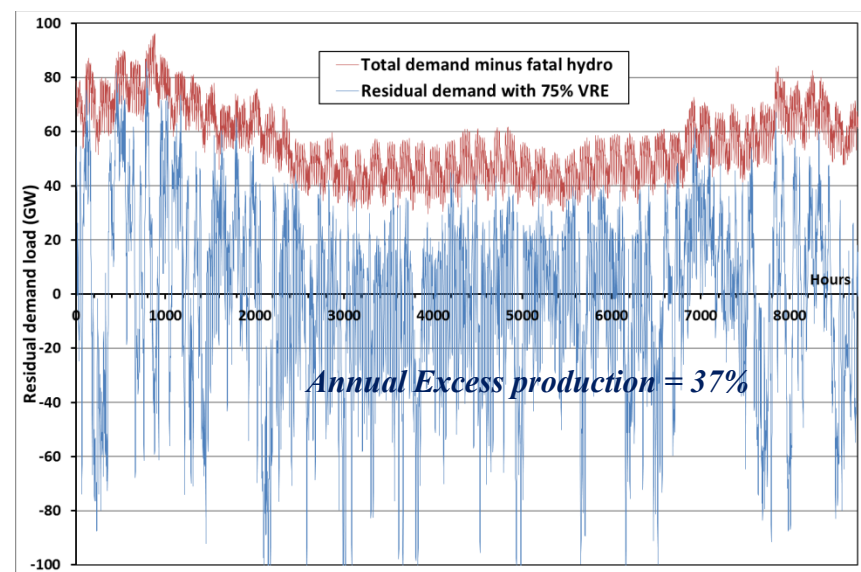
- 1. Higher system costs (up to USD 50/ MWh<sub>VRE</sub>) as energy value of VRE declines**
- 2. Higher overall costs, even if VRE costs will decline with time**
- 3. Considerably higher capacity** (with implications for land-use, externalities etc.)
- 4. Higher price volatility** (up to 3 750 h of zero prices, comp. by prices > USD 100 per MWh)
- 5. Higher technical stress for residual system (Nuclear, Gas) due to ramping and cycling**

## High VRE share de-structures the remainder of the system II

### 50% Variable Renewables



### 75% Variable Renewables



Residual demand for dispatchable thermal operators loses its characteristic daily, weekly and seasonal patterns and becomes more volatile and unpredictable.

## Global System Approach: NEA « System Costs »

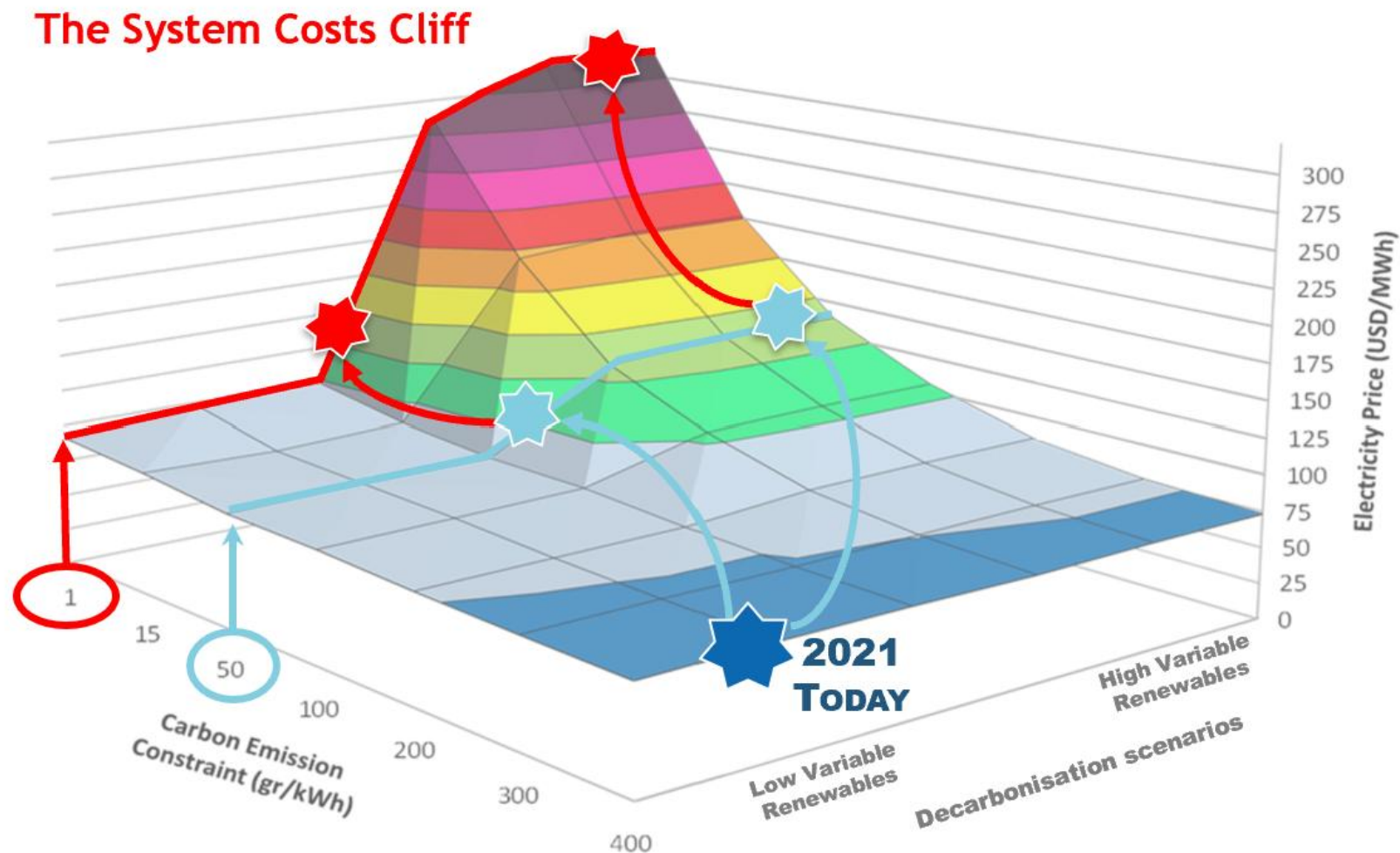
### Main Conclusions

- Going from 0 to 75% VRE multiplies the necessary installed capacity by 3
- With 75% VRE System costs are increased by 50 USD/MWh
- More VRE means more volatility in electricity prices (at 75% 4 000 hrs negative prices) and discourage investment
- Market value of VRE reduces with increasing shares (more for solar than wind), also discouraging investment

*... there seems to be an « economic » upper limit for VRE of the order of 30 to 40%...*

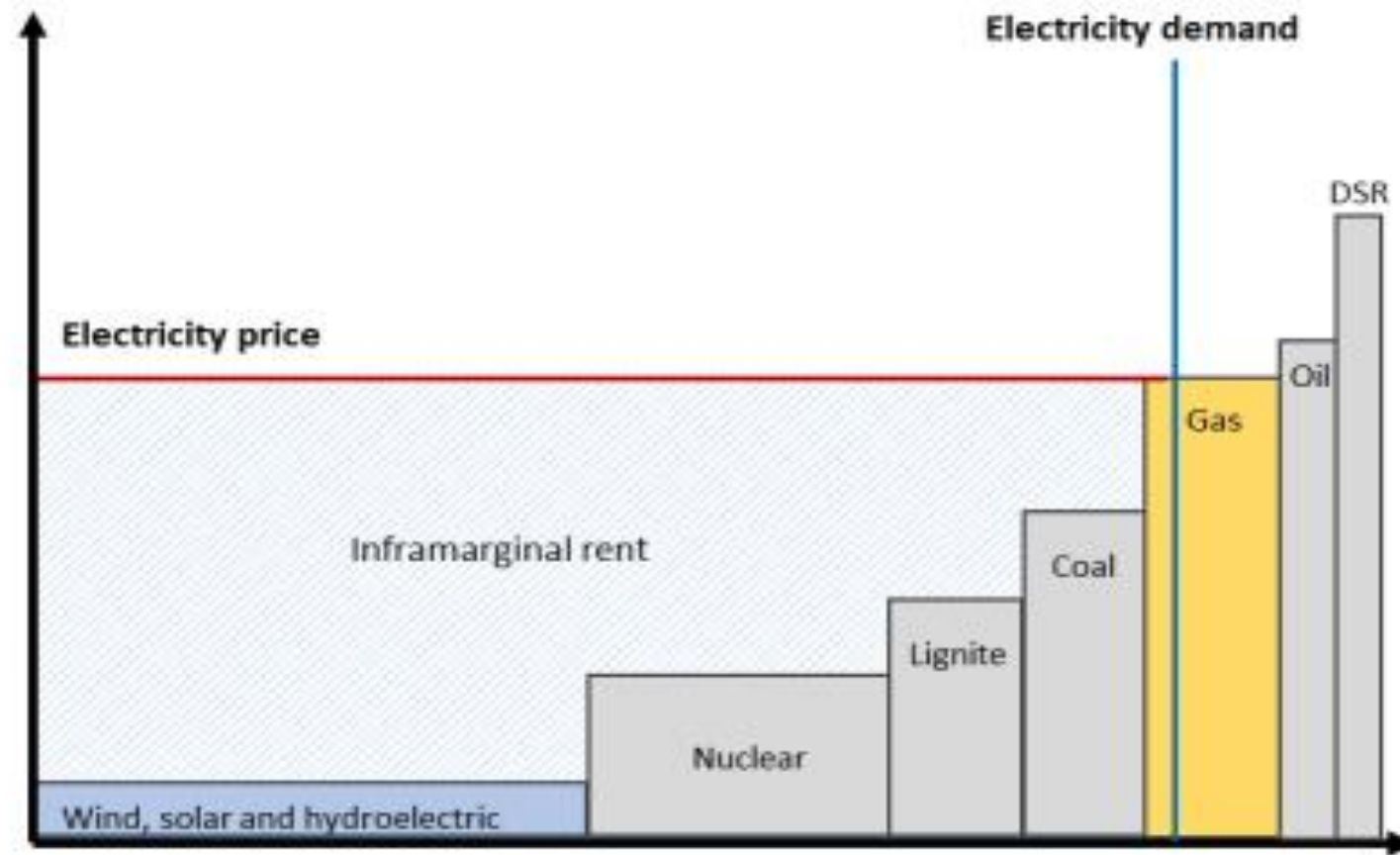
## Charting a Path to Net-Zero Electricity

More we go to decarbonization, below 50gr/kWh, more renewables in the system leads to escalating costs per cannibalisation

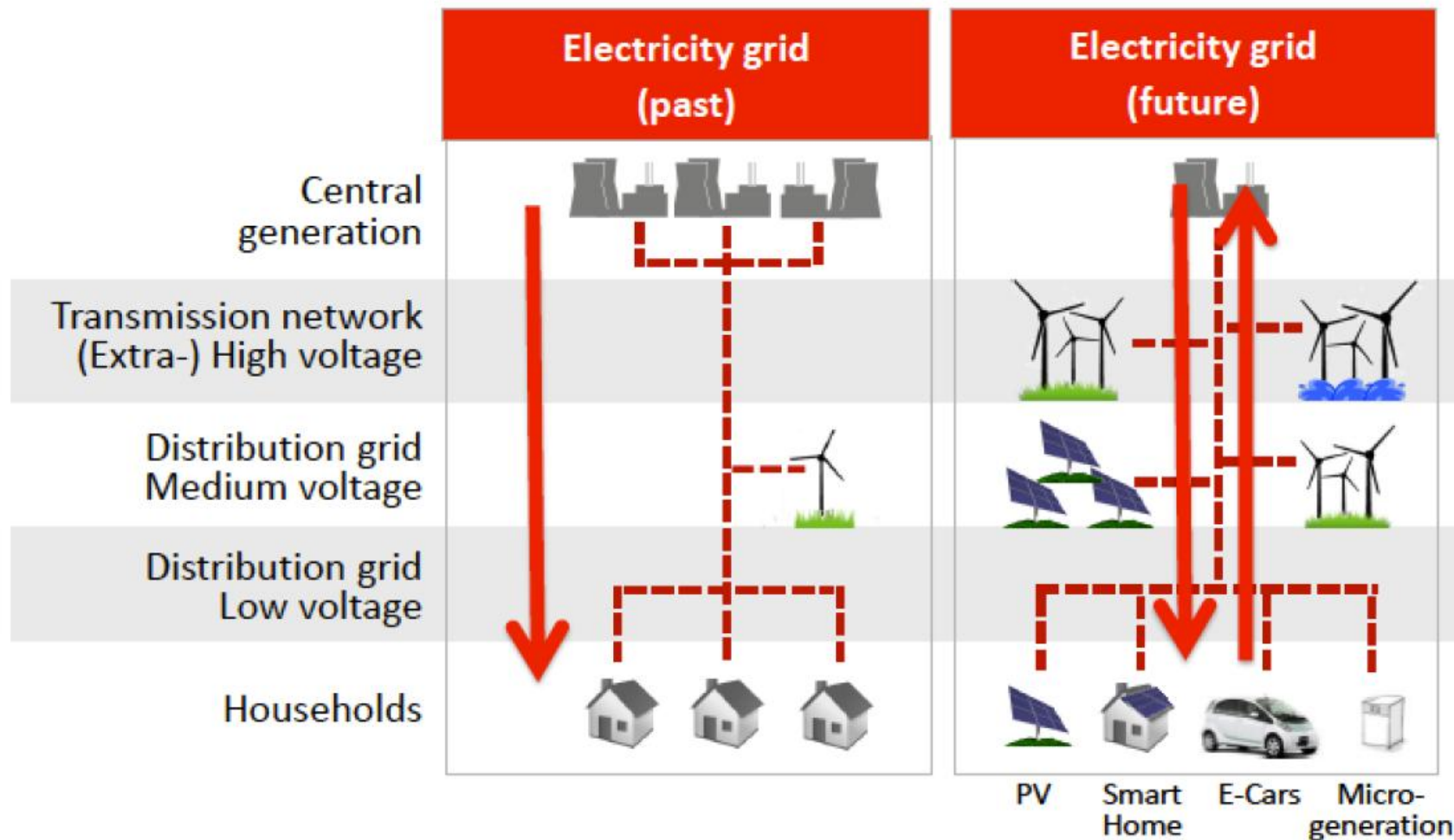


# Market Operation : Merit Order : Marginal Cost

**Figure 2** – Simplified merit order supply demand stack



Source: EC JRC



**Fig. 1.3. Changing Structure of the Electricity Grid [J. Specht, E.ON, August 2014]**

VRE disturbed the marginal cost system because all system costs were not taken into account. Hence, if one wants to keep the merit order, total cost of the reliable (dispatchable) delivery to the consumer needs to be taken into account, otherwise VRE are given the priority.

# Market Operation : Merit Order : Marginal Cost

**YES but with more and more vRES ???**

**Who will pay for the costs of intermittency ?**

i.e. profile costs, balancing costs, ancillary services costs, grid integration costs, flexibility costs ?

**Is Technology neutrality a reality ???**

**WNA 2026**

- Adding base-load units such as NPP adds grid-level system costs for nuclear power capacity addition estimated at a negligible **1 to 3 EUR/MWh**
- Whereas integrating vRES leads to higher system costs, which can reach **43 EUR/MWh** due to the need to maintain system adequacy, variable generation, decentralised deployment.

# Here we go BUT...

- Electrification – 50-60% in 2050 vs 25% today
- more vRES needed to decarbonise electricity
- more Storage – STEPS, Batteries
- more Flexibility by other dispatchable sources (like Nuclear)
- more Demand Side Management
- more Grids – Transmission (15% interconnexions) and Distribution
- Direct costs (coupled or uncoupled ? : Wind/Solar + Batteries)
- Indirect costs (forcing flexibility and system services by non vRES)
- « Biases » to the Market: PPAs, CfDs, CRMs,...
- Increased security and stability issues (ia Spanish Blackout 2025)

## EC Solutions

## Issues

**Need for more TECHNICAL AND ECONOMIC OPTIMISATION for Clean, Affordable and Reliable/Secure Electricity Supply – for the benefit of society – households and enterprises with visibility on the long term**

# Elements for a Deep Electricity Market Reform

## weCARE views

- Electricity is a **common good** and the **Public Service nature** of electricity should be recognised
- **EC** seems OK to tackle some flaws of the market design like CfD and PPAs, but enough for investors ? ,
- Creating multiple connected markets: electricity, capacity, storage, hydrogen, CO<sub>2</sub>,... is unmanageable
- Put the **final consumer at the centre** of the interest: electricity must be the **cleanest** (very low carbon: nuclear and RES), **cheapest, fully reliable in supply when needed**
- **Cheapest and Reliable** = the **price paid by the final consumer must reflect the true costs**, not only the marginal cost, in a **simple** way. **This true cost should define the merit order** (if maintained). The actual Merit Order (marginal cost only) gives undue advantage to RES !  
**Make sure all low carbon sources enter the market on equal footing = be dispatchable.**

# weCARE views for Electricity

- At present time of crisis (climate, energy, social – societal) let's avoid to miss the “chance” :  
***Need for a much deeper electricity system (market?) reform***
- Providing the lowest price reflecting the ***true costs*** (full costs) in a clear and simple way for the final consumers
- Seeking ***Societal Sustainability***: electricity must also be **clean** and **reliable** in supply
- Such reform should not be one more case of application of the Green dogma. One needs a ***balance between on one side Nuclear and on the other side RES (limited) with their solution to intermittency (backpack)***
- Each MS has the right to decide its mix and the electricity market reform (as well as other EU policies) *must* be such that this right is reinforced, *respecting the Art 194.2 of the Treaty*
- At EU level, it shall be recognised that ***nuclear and intermittent renewables may be complementary*** but ***somewhat incompatible***... risk for the EU cohesion...