



Denis Aelbrecht

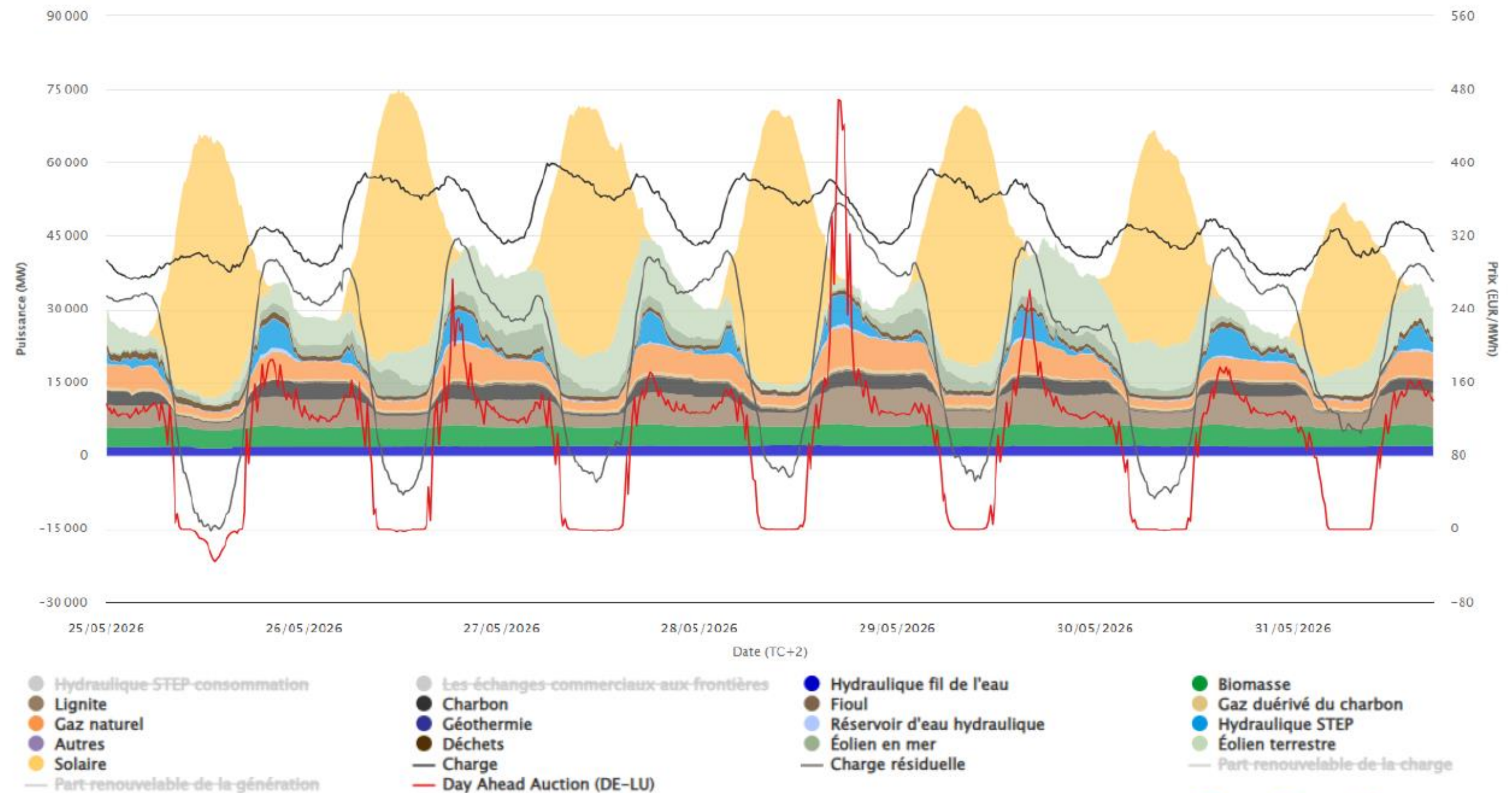
ETIP HYDROPOWER Governing Board
Chair and Fellow Expert (EDF Hydro)

Hydropower and Europe Energy security and grid stability

... Through examples illustrating the strategic role of Hydropower to secure and stabilize the electric power system in Europe

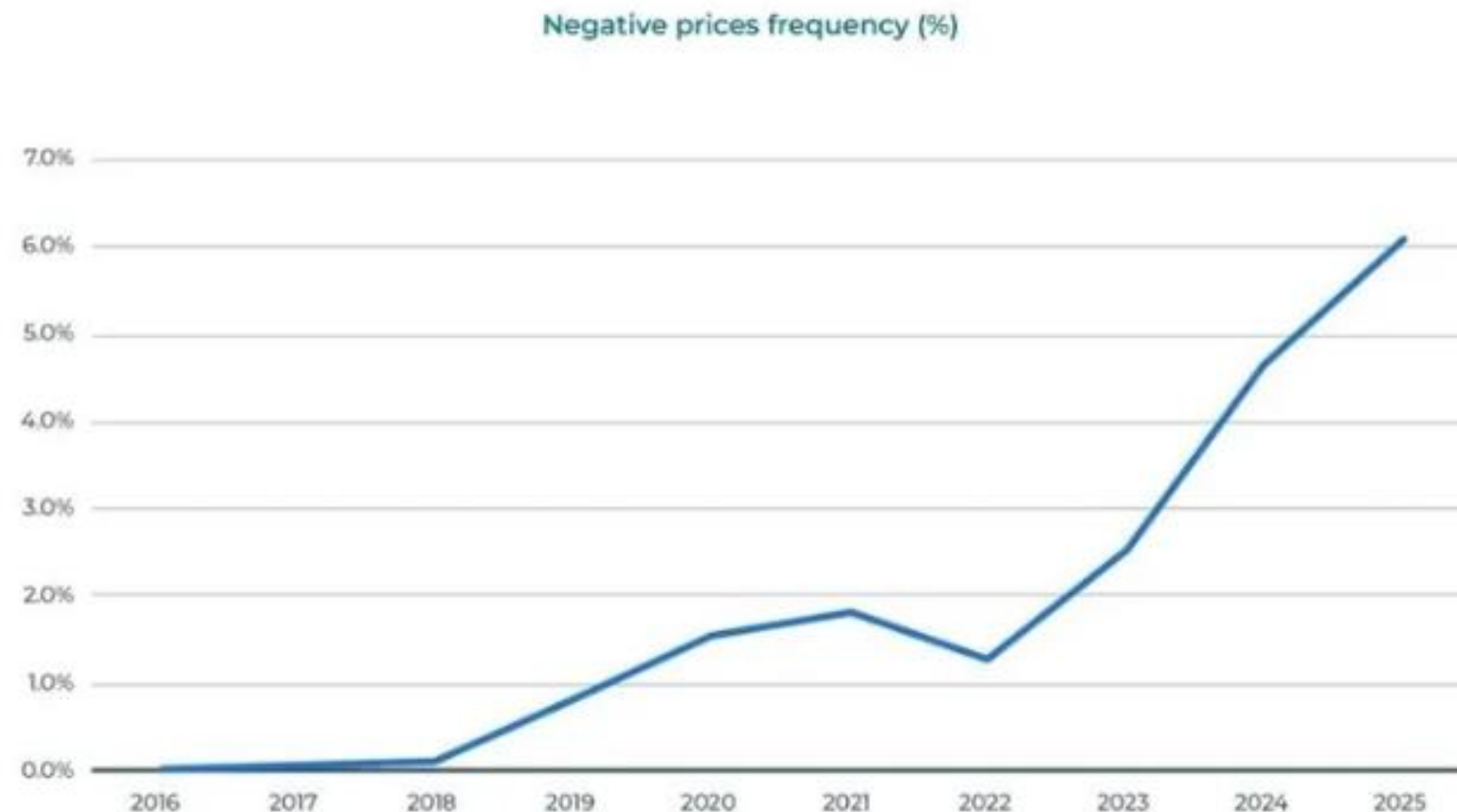
Satisfying a highly variable residual demand – Germany, May 2026

- ❁ Solar PV power generation very high
- ❁ Residual demand becomes **negative** almost every day
- ❁ Flexible power generation to meet residual demand is ensured by:
 - ❁ Pumped Storage Hydro
 - ❁ Gas
 - ❁ Coal and lignite
- ❁ Day ahead auction price: comes at 0 or negative every day



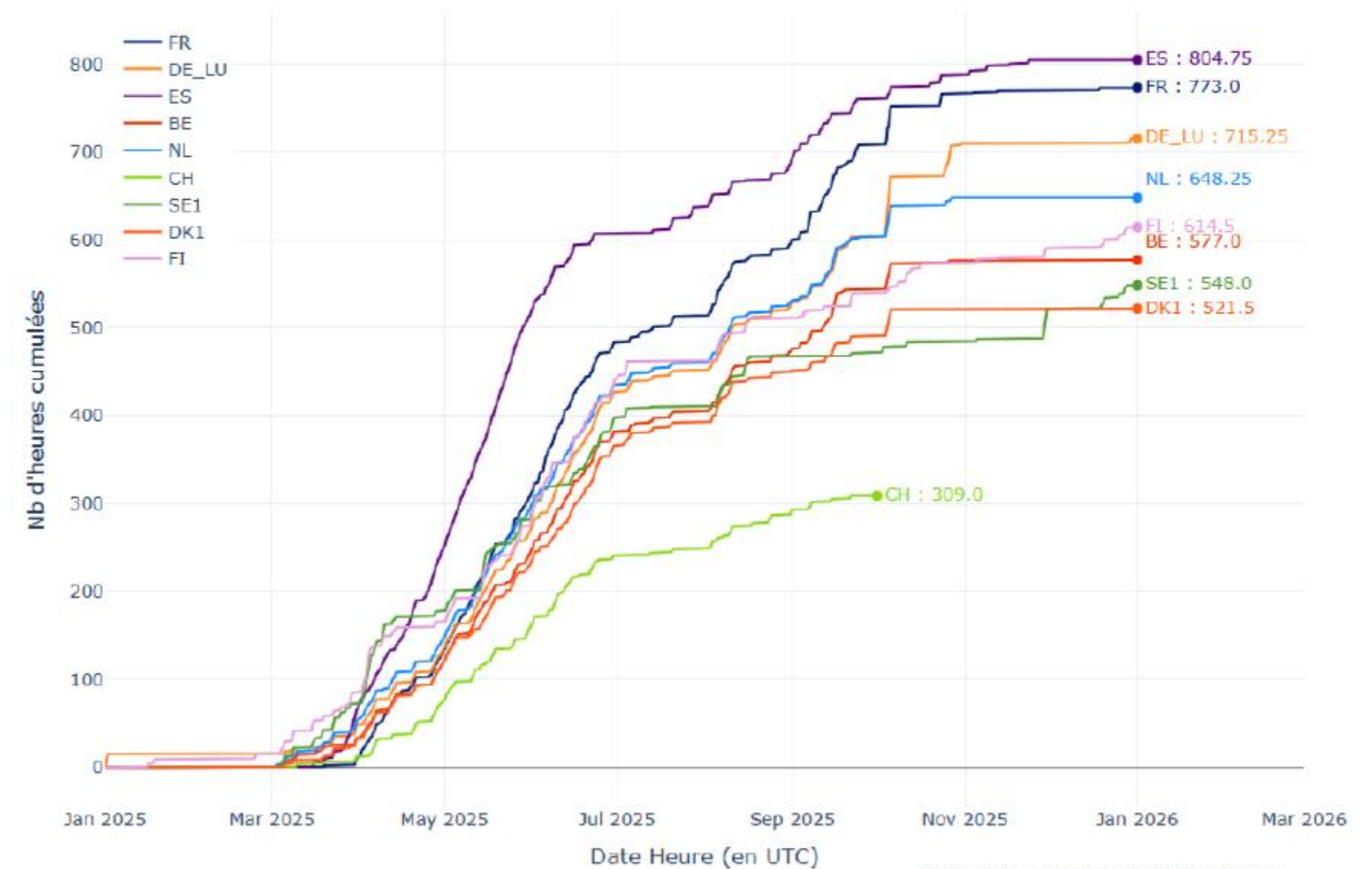
Source : [Energy-Charts.info](https://energy-charts.info)

Negative spot market prices – a durable trend?



Des prix de plus en plus souvent négatifs. © Elia

Belgium: frequency of negative prices from 2016-2025



© EDF R&D 2026, Graph avec données ENTSD E Transparency

Europe: evolution of number of hours with zero or negative power prices in 2025

Source: EDF-R&D

Record of negative spot market day-ahead price: May 1st, 2026



Hydropower blackstart capacity: restoring from Blackout

– Spain, April 28-29, 2025

✿ Main restoration resources :

✿ Spanish Hydro

✿ Spanish Pumped-Storage Hydro

✿ Spanish Combined cycle

✿ Import from Portugal (incl. Hydro)

✿ Import from France (incl. Hydro)

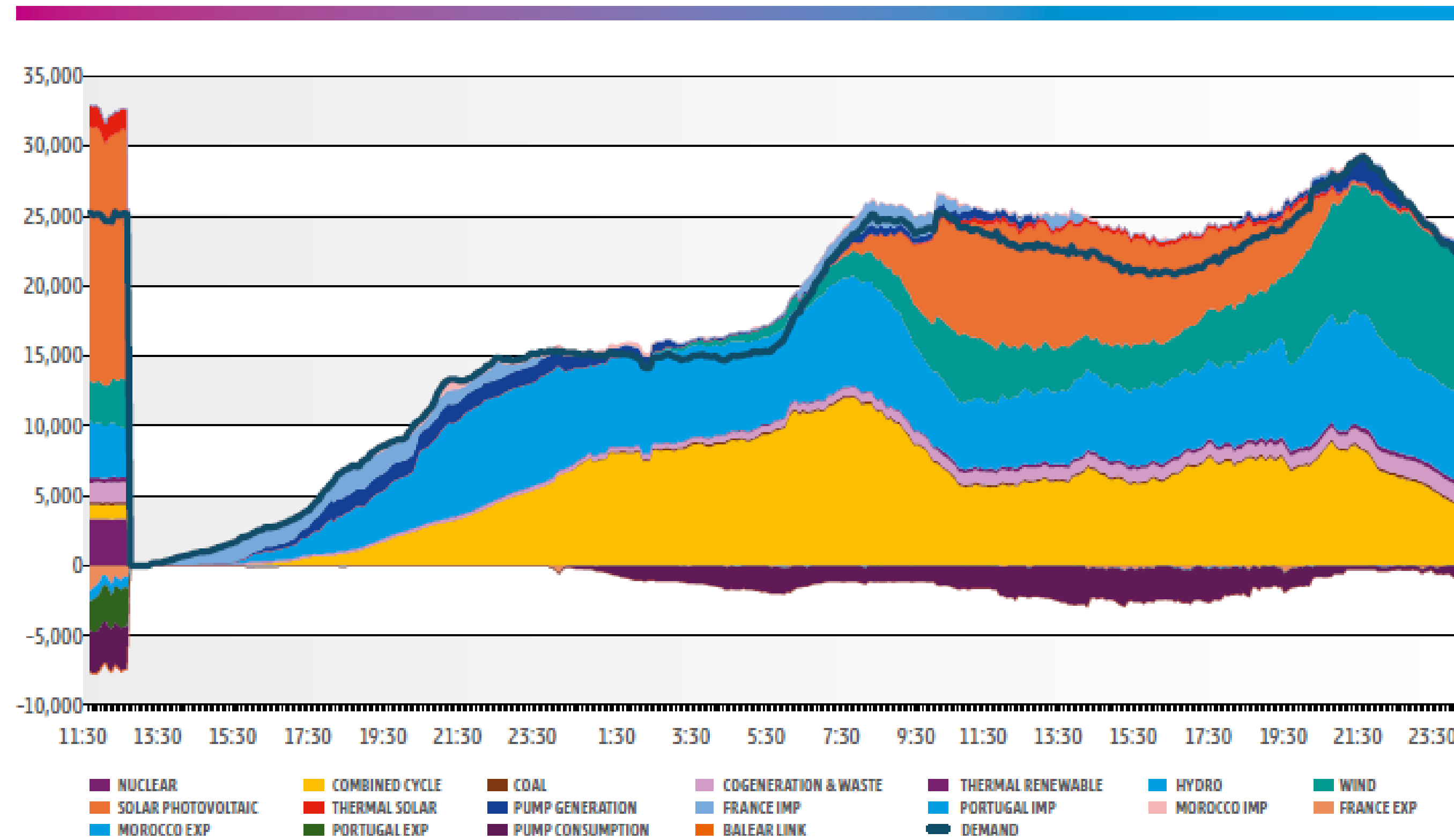


Figure 4-25: Evolution of generation and load of the Spanish system until the end of 29 April - Red Eléctrica

Source : ENTSO-E (2026)

Hydropower and the Digitalisation / AI Revolution

Hydropower and the Digitalisation / AI Revolution

✿ Generation performance

- Inflows prediction, Flexibility optimization with digital clones, ...

✿ O&M

- Digital mobile tools for daily operator activities; digital monitoring of equipment and assets; ...

✿ Dam safety and Climate resilience

- Surveillance of Dam safety parameters; digital monitoring of natural hazards (floods, landslides)

✿ Environment integration

- Fish pass performance with digital tracking and automatic visual identification/counting

✿ Engineering and design

- AI-based technology to accelerate design procedure