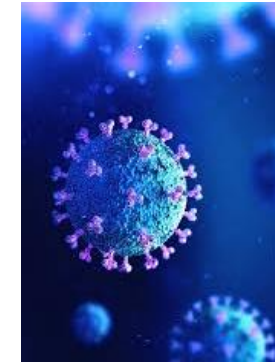


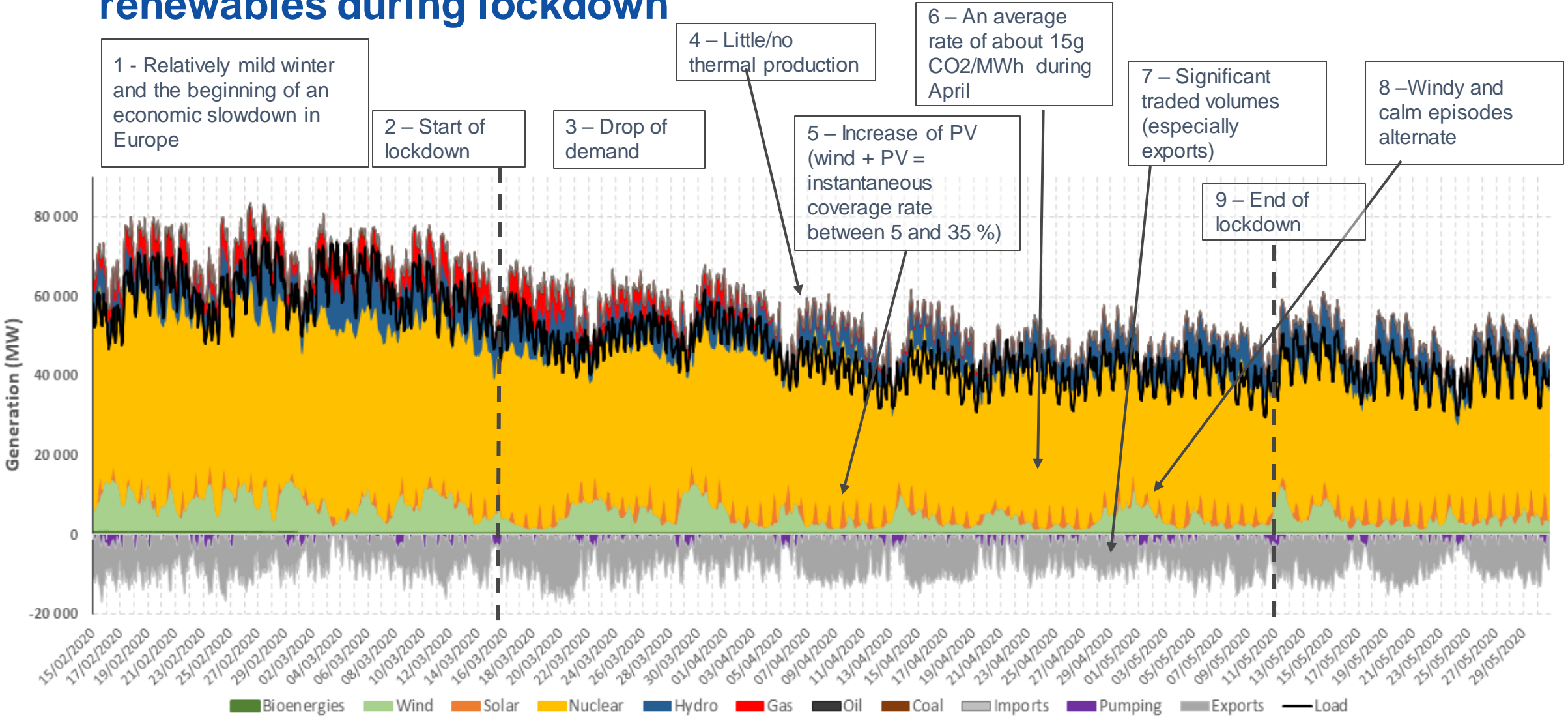
EMP-E meeting

Modelling the French power system during COVID-19: Cascading effects from stay-at-home regulations

Clémence ALASSEUR (EDF R&D)
06/10/2020



A very low carbon energy production and a high penetration of renewables during lockdown



source : RTE éCO2mix



Low market prices and higher frequency of negative power spot prices

□ Low commodity prices

- Abundant supply and low demand
- Merit order: gas comes first before coal for power generation

□ Short-term power markets

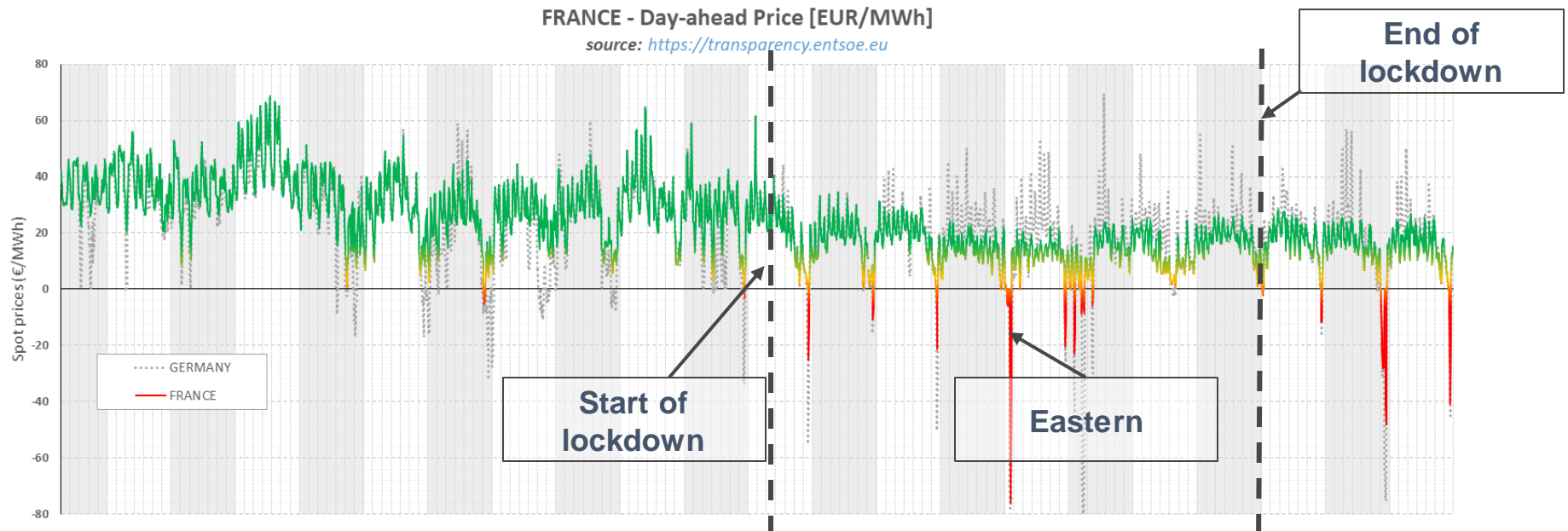
- Very low prices, often lower than 20 €/MWh,
- **Negative prices**, previously rare, **have become weekly** (every WE, even during the week)
- The volatility of the spread between intraday and spot prices increased

□ Rationality of negative spot prices

- Dynamic constraints of thermal power plants
- Remuneration mechanisms of renewable: feed in tariff / feed in premium

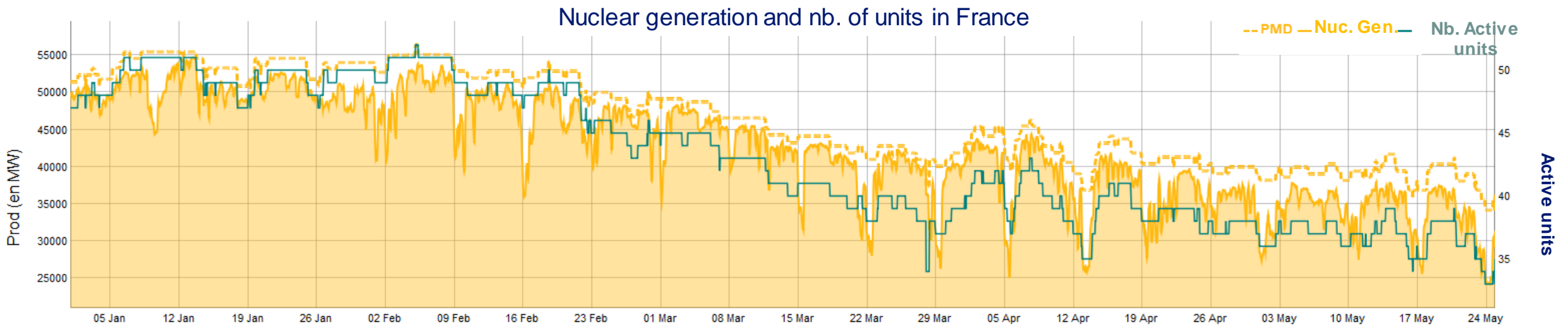
□ Crisis reveals a tension on downward flexibility margin

source : ENTSOE
Transparency



Nuclear power ensured most of the supply-demand balance

- **Flexibility of nuclear production to compensate fluctuations in renewable production and electricity demand**
 - First source of flexibility for the French power system (RTE)
- **Production assured over the 2 months of crisis**
 - In spite of the strong constraints of modulations encountered and an exploitation of the units complicated by sanitary measures.
 - A historical minimum was reached during this period.



source : ENTSOE Transparency

Summary

Short-term effects implied by COVID crisis, associated lockdown (very low demand) and conjunction of good weather conditions

- production was decarbonized and was mainly based on wind, PV, hydro and nuclear
- Nuclear achieved most of the required flexibility
- Spot market prices were very low, reinforced by low commodity prices

- Other effects were recorderd grid operation, congestion, interconnection flows...

Propagation to mid-term horizon

- Maintenance and new capacity programs were delayed and impacted the production capacity at mid-term
- Demand is bound to stay below its pre-crisis anticipated level for several months