Why integrate power systems?

Lessons from Electricity Security Across Borders

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Long Beach, CA, August 20, 2018

IEA

Some context: introducing the Electricity Security Action Plan 2.0

ESAP 1.0

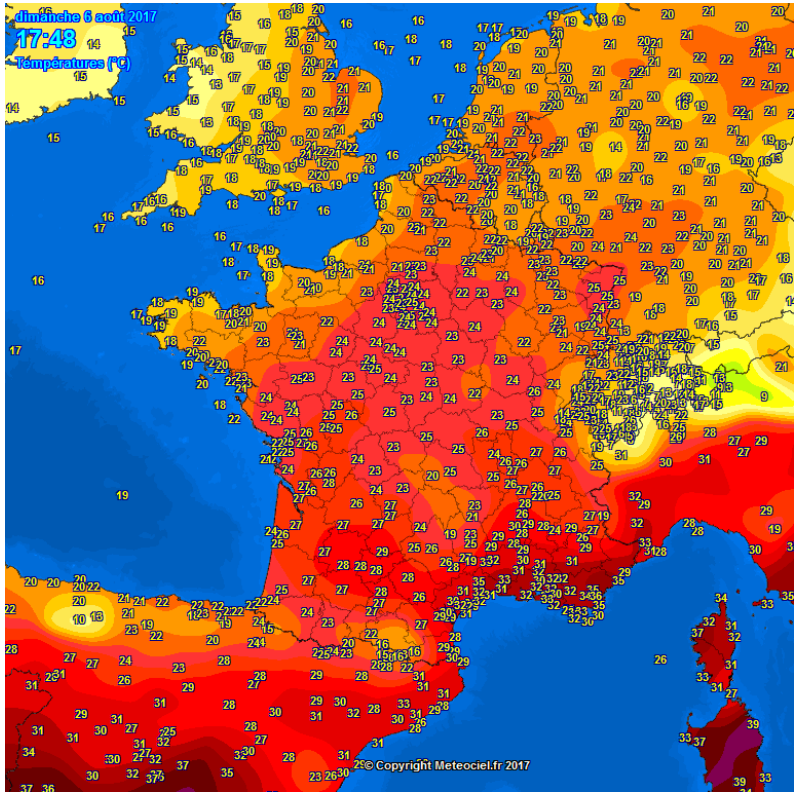
- IEA Ministerial 2011 called for work on **electricity security in a context of higher VRE shares in power systems**
- Key outputs since then include:
  - Creation of the Advisory Panel in 2015 (8 meetings and other related workshops);
  - Publication of several insights papers and **Re-powering Markets** the first IEA official publication on electricity market design
  - Country support: Thailand Electricity Security Assessment; contributed to Australia's Finkel review.

ESAP 2.0

- In 2017 the IEA's mandate on electricity security was re-affirmed and expanded
- ESAP 2.0 seeks to examine:
  - How to **maintain electricity security** in an environment of **rapidly expanding VRE** and, in some jurisdictions, **earlier than expected exits of existing capacity**
- Many jurisdictions (both IEA members and non-members) see the opportunity for, and challenges associated with, cross-border power system integration
  - It is therefore a key component of ESAP 2.0

Case study: extreme temperatures in France

August 6, 2017, 17:48



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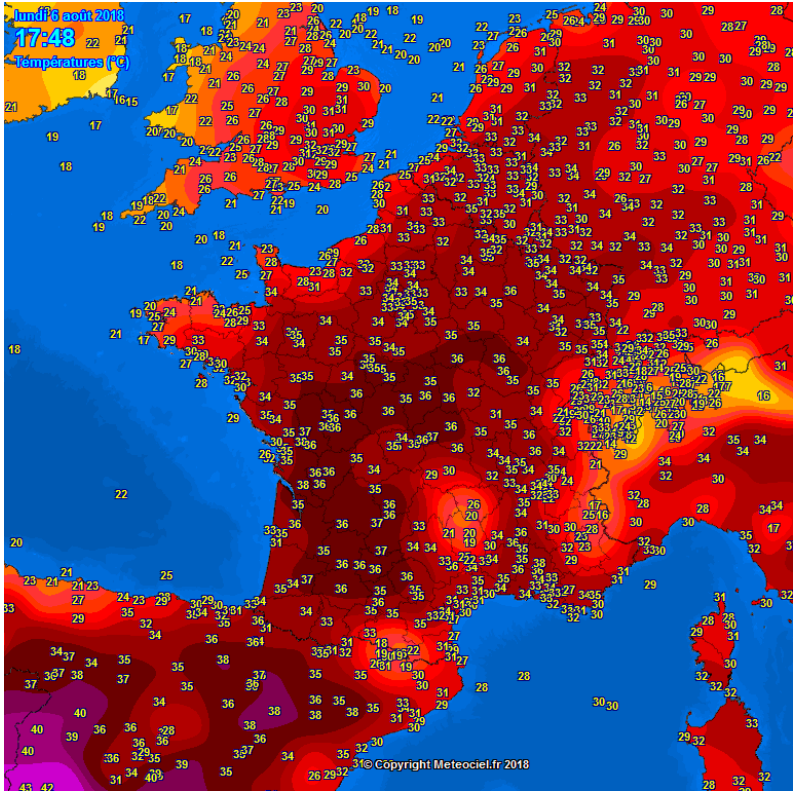
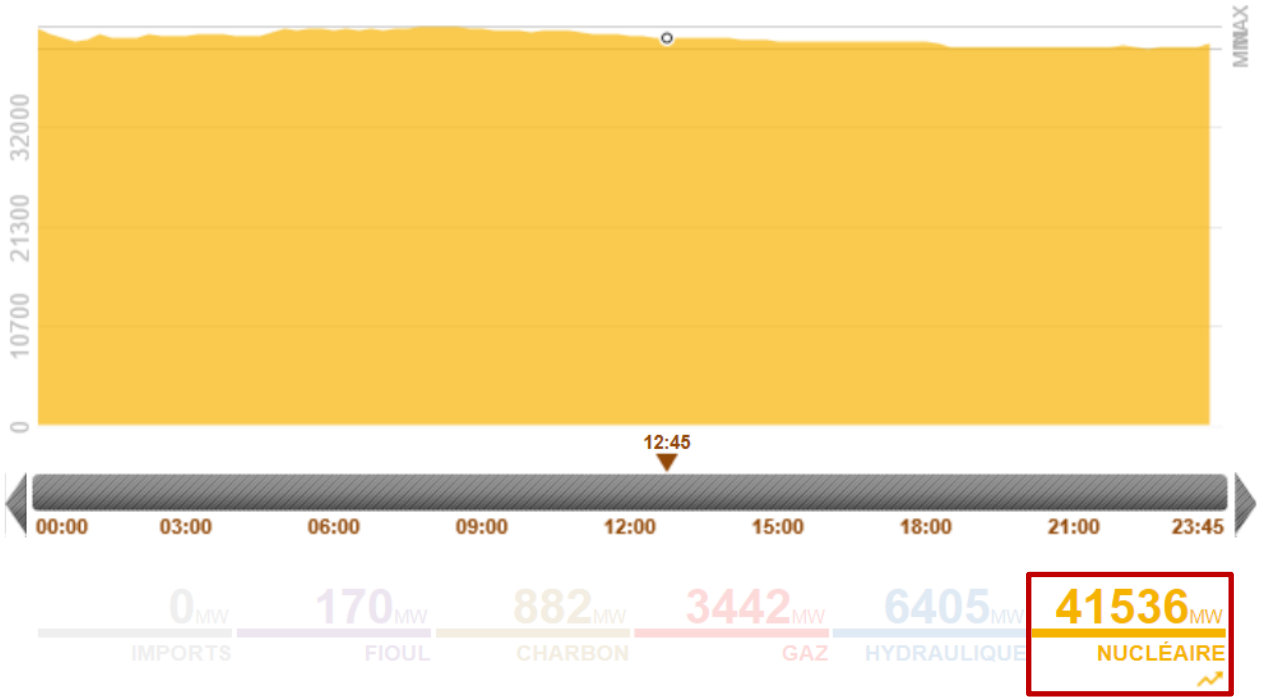


Nuclear in France on a typical summer day

Nuclear production, August 1, 2018

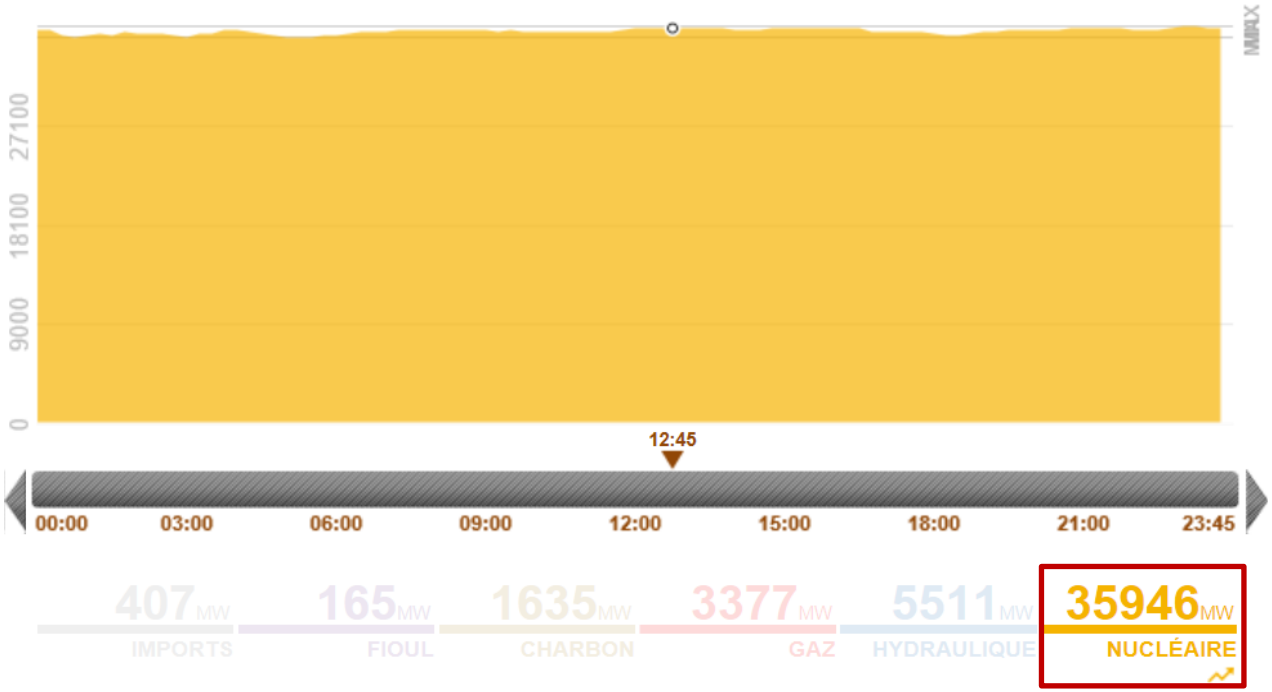


Source: RTE

Because demand is lower, nuclear plant maintenance is often scheduled for the summer months.

Nuclear in France after a period of extremely high temperatures

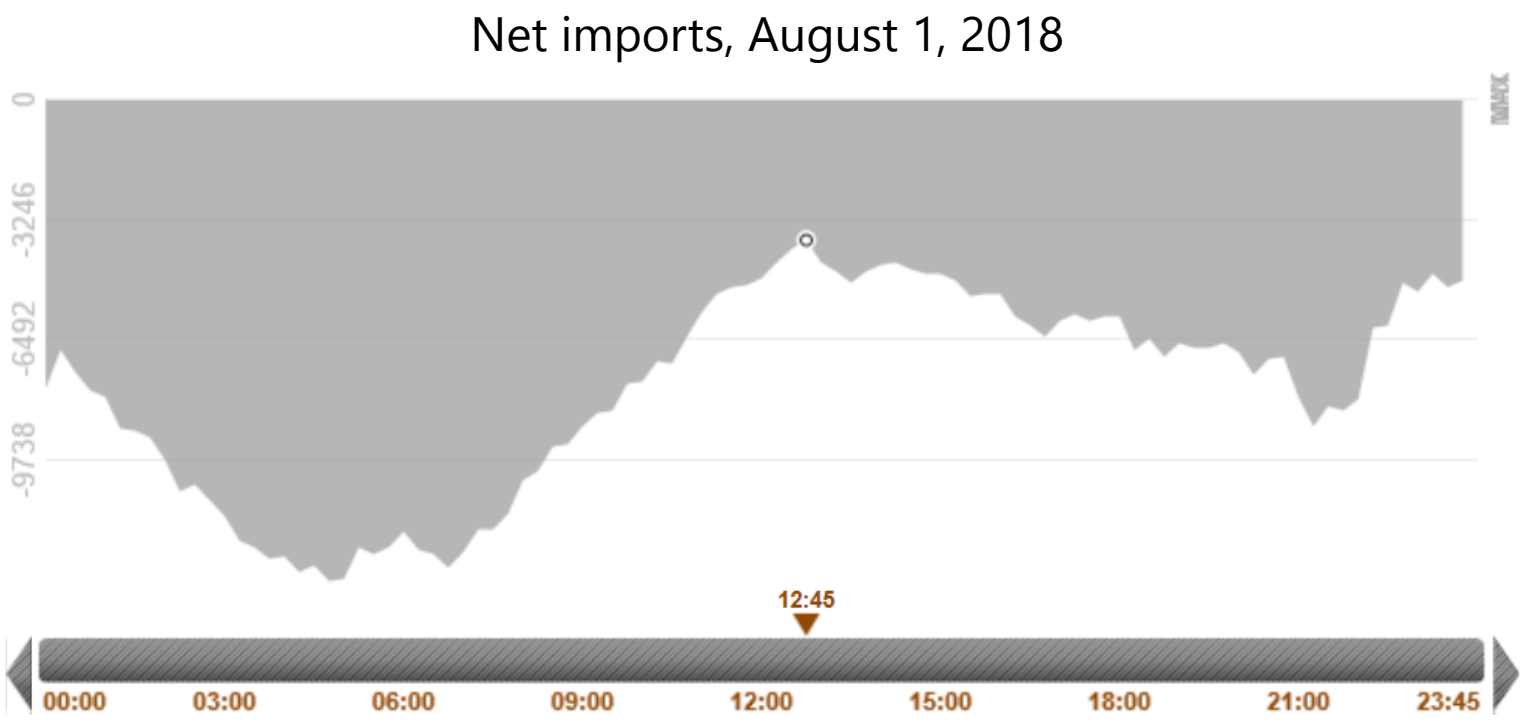
Nuclear production, August 6, 2018



Source: RTE

Due to the unusually high temperatures, 5.5 GW of nuclear power was forced to shutdown.

From net exporter…

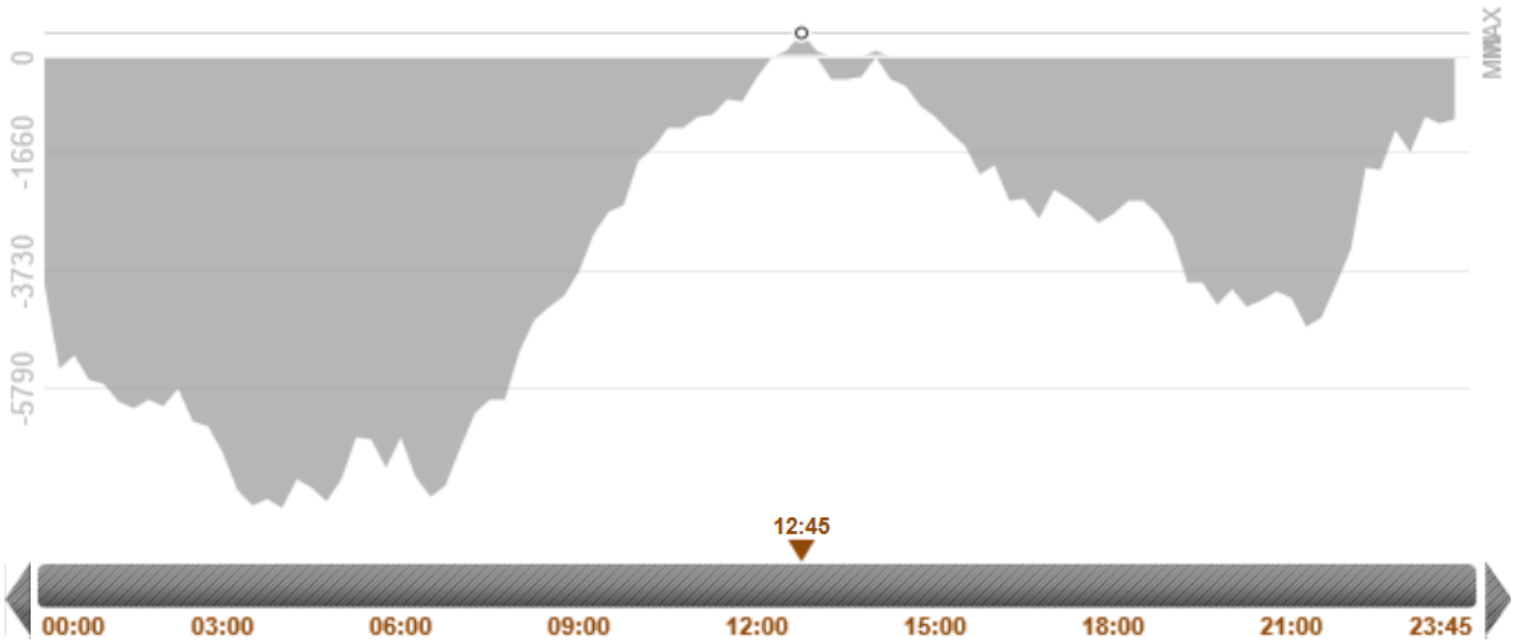


Source: RTE

In August, France is nearly always a net exporter of electricity

…to net importer

Net imports, August 6, 2018



Source: RTE

While net imports were, at their peak, small (407 MW), the fact that France was a net importer during the summer is highly unusual.

Why do we care?

- Though France became a net importer, it was for a short time and quantities were limited – so what does it matter?

- Trade between European countries is determined entirely by economics (i.e. price differentials)

	France	Germany/Austria	Switzerland	UK
August 1	58.22	58.22	58.02	**60.02**
August 6	**62.36**	**62.36**	63.34	61.13

Source: EpexSpot, Nord Pool Spot

- A number of EU countries have introduced capacity products but, at present, there is no way to trade capacity across borders.

Electricity Security Across Borders: a few key messages

- While the economic benefits of cross-border power system integration are well recognized, the security implications remain under considered
  - As a result, jurisdictions continue to work under the assumption that imported power is inherently less secure than that from domestic/local resources

- Integration efforts are more successful when there is active i**nformation sharing** and **close coordination of long-term planning**
  - Key elements include regular joint planning exercises and data harmonisation, coordinated by a single (central) entity

- Increasing cross-border integration combined with increasing renewables deployment is leading to increasing pressure to centralize power system operations
  - At a minimum, increased data sharing (especially **closer to real-time**) is required.

- Cross-border power system integration must adapt to **heterogeneous preferences**
  - While it may be more optimal to have coherent, consistent policy and regulatory frameworks across all interconnected jurisdictions, in practice these will always remain divergent

Next steps: 2018 ESAB publication

- Later this year the IEA will be releasing an Electricity Security Across Borders publication
  - Drawing on a wide range of case studies and workshops (like this one!)

- Key elements of focus:
  - Drivers of, and obstacles to, power system integration
    - **Economics, security, renewables integration**
  - Governance
    - **Institutions**, legal issues, **market frameworks**
  - Resource adequacy (i.e. long-term coordination)
    - Developing interconnectors, allocating interconnector capacity, **regional planning**, cross-border implications of local policies, **capacity trading**
  - System security (i.e. short-term coordination)
    - **Energy trading, real-time operations,** reliability standards

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