



European
Commission



EU electricity markets in January-February 2017

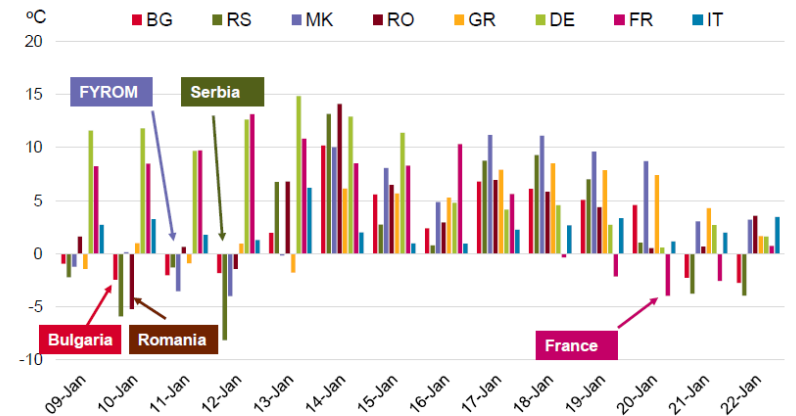
Context

- Study announced at ECG on 14 February 2017
- **Objective** to better understand context and impact of measures taken during the cold spell, and draw lesson for the future
- **Today's presentation** contains initial results of the study
- **Data collection** based on ENTSO-E data and information received from Member States and Energy Community Contracting Parties
- Study prepared by S&P Global Platts at the request of and in close collaboration with DG Energy

Scene setter

- **Severe weather conditions**
 - 1-in-20 or worse in 1st and 2nd week in some countries
 - Below average temperatures in W3
- **Generation availability**
 - Low availability of fossil / hydro generation (BG, RO)
 - Low availability of nuclear / hydro (FR)

2017 Minimum Temperatures as a Difference From 1-in-20 Minimum Daily Temperatures: W 2-3

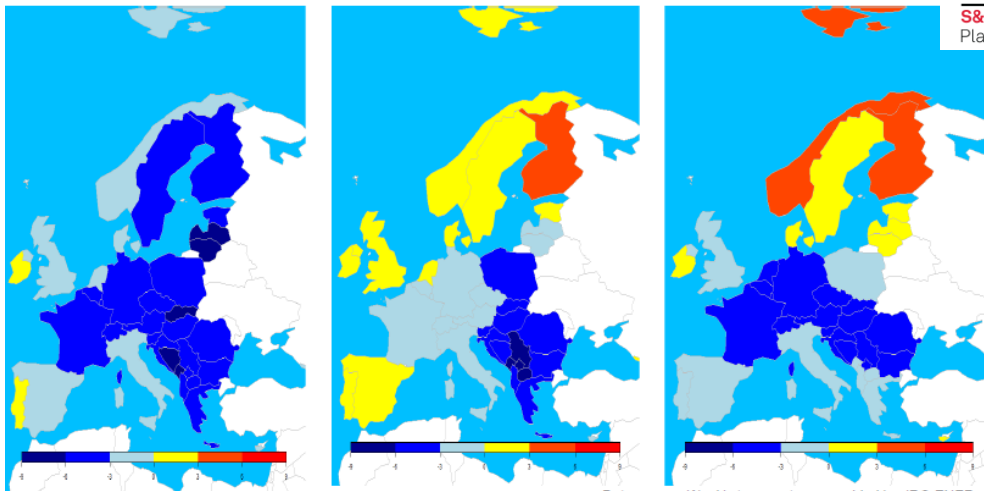


Data source: Weekly temperatures provided by JRC-ENER

Week 1

Week 2

Week 3



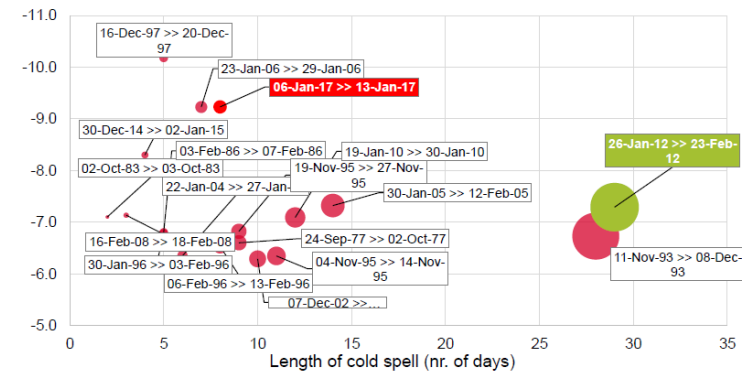
Data source: Weekly temperatures provided by JRC-ENER

Bulgaria (1/4)

• Situation

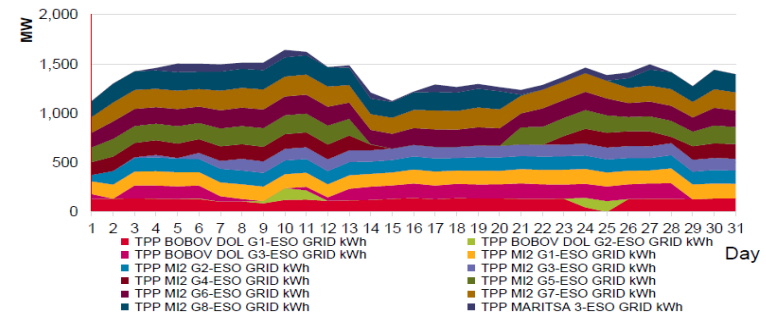
- Temperatures below 1-in-20 (W1 and W2)
- High-share of residential customers in BG
- Unavailability of coal/lignite and low hydro availability
- Neighbouring MS preparing or executing export bans (EL, RO)
- Day-ahead prices peaked to €125.9/MWh before export ban

Bulgaria: Cold Spells in an Historical Context*: Cold Spell Severe, but Short



Data source: Weekly and daily temperatures provided by JRC-ENER

Daily Profile of Lignite Units Reported to be Impacted by Fuel Supply Availability in Jan. 2017 (Daily Averages)



Data from Bulgaria TSO, "Actual Generation Output in Transmission Grid"

Bulgaria (2/4)

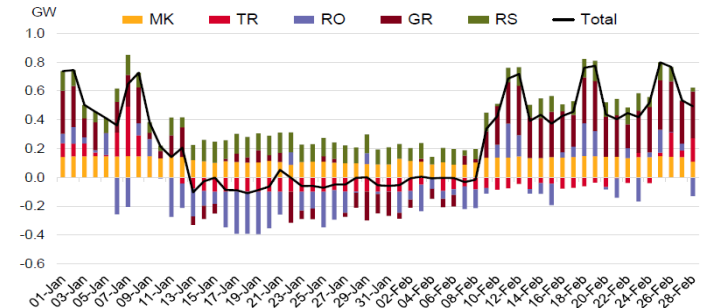
• Measures taken

- Activation of cold reserve (100%), usage (92%)
- Technical load shaving measures
- Reduction of secondary control reserve by TSO
- Volumes shifted from liberalised to regulated market
- Export ban from 13 Jan – 8 Feb (by Ministry of Energy)

• Market dynamics (during export ban)

- Day-ahead prices didn't reflect scarcity
- At times, BG market even oversupplied
- Day-ahead prices drop below their neighbours – negative spread €35/MWh (RO) and €32.7/MWh (EL)

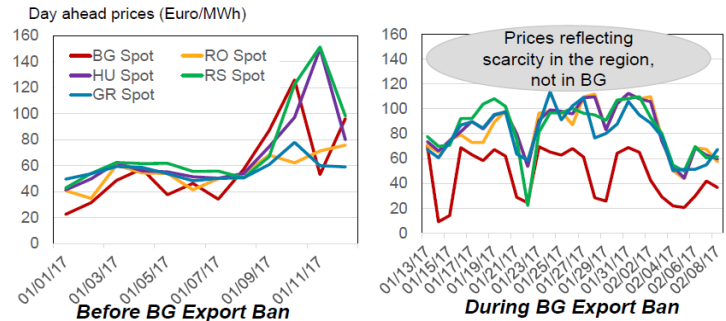
Commercial Flows Between Bulgaria and Neighbor Countries



Data Source: ENTSO-E Scheduled Commercial Exchanges

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Day Ahead Power Prices in South-East Europe: Bulgarian Prices Diverge As Export Ban Implemented



Data Source: Power Exchange Prices

S&P Global
Platts

Bulgaria (3/4)

• Cooperation & information sharing

- (Ad hoc) operational TSO cooperation with limited results (some emergency help received from Serbia and Turkey between 17 and 20 January)
- Emergency agreements were not effective/cancelled in advance
- No cooperation at MS-level

Bulgarian Export Potential and Losses from Sales to EU Member Countries During the Export Ban (Jan 13 to Feb. 8)

BG border with	Export NTC (Avg. MW)	Export flows (Avg. MW)	Max Export Potentially lost (Avg. MW)	Avg. Price in the Region (Euro/MWh)*	Max Loss from the Ban (Million Euro/Day)
RO	300	56	244	80	0.47
GR	315	73	242	80	0.46
MK	150	107	43	80	0.08
RS	150	131	19	80	0.04
Total	915	367	548	80	1.05

*It assumes the average day ahead HU price (Jan. 13-Feb. 8) minus the average day ahead spread HU-BG recorded during 2016 (€4/MWh)

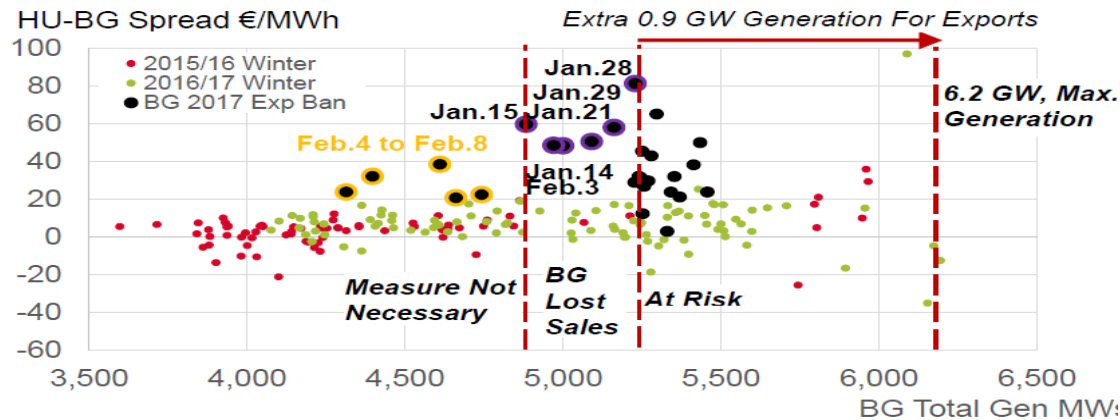
Data Source: ENTSO-E Scheduled Commercial Exchanges; ENTSO-E Day Ahead NTC

Bulgaria (4/4)

• Effects of the export ban

- Export ban for 27 days regardless of market situation
- Undermined confidence in markets in the region
- Lost export opportunities for BG generators (roughly €27 million)
- Spill-over effects to neighbouring markets
(higher prices in RO, EL, RS)

Export Ban Generally Distortive of Bulgarian-Hungarian Price Spread



Data Source: EFET Power Exchange Prices;
Actual Generation Output in Transmission Grid provided by BG TSO

Greece (1/2)

• Situation

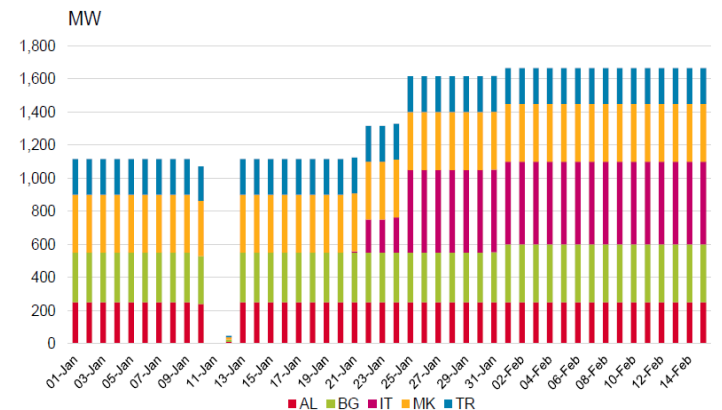
Combination of factors:

- Severe weather conditions in W2 (1-in-20)
- Alert level in gas market (gas is > 30% of generation mix)
- Tight system, imports from BG before the export ban

• Measures taken

- DSM response - interruptible customers instructed to reduce load (577 MW)
- Lignite mines maximised production (preventing their contracted DSM response)
- Gas-fired units instructed to switch to diesel (partial success)
- As a result, re-dispatching measures for gas units
- Curtailment of exports on 11 and 12 January, whereby doubtful if system security needs justified it on 12 January

Greek Reported Export NTC Cut On Jan. 11/12



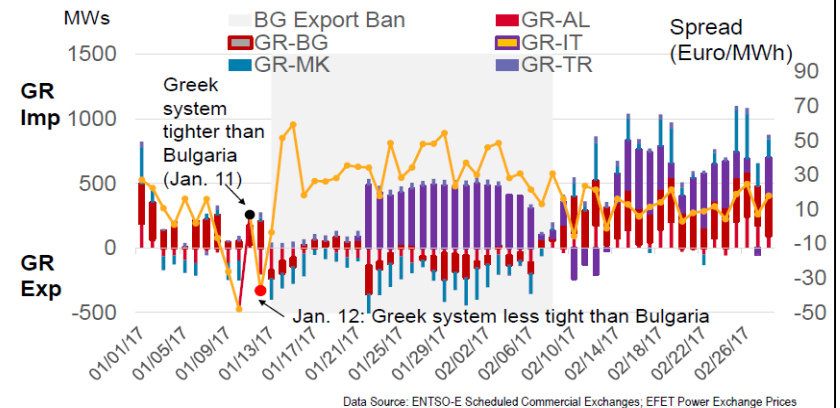
Data Source: ENTSO-E Day Ahead NTC

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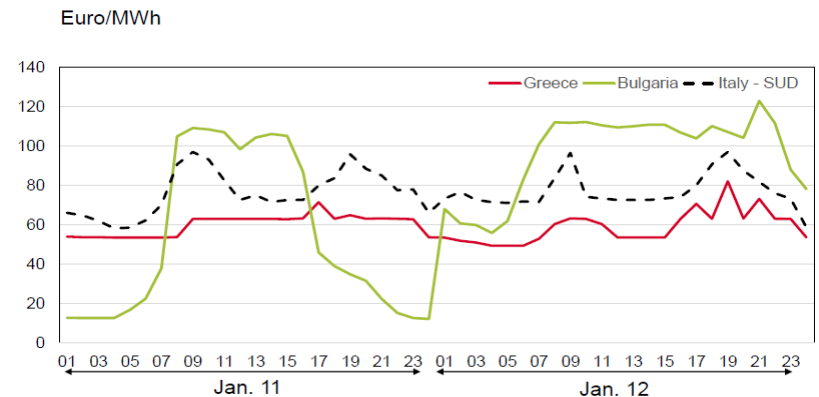
Greece (2/2)

- **Market dynamics during export ban**
 - Day-ahead prices not reflecting scarcity
 - Greek market settling below BG (12/1)
 - Prices didn't react to load reduction (12/1) or switching to (more expensive) oil (11-12/1)
- **Regional cooperation**
 - Emergency electricity requested from neighboring TSOs but not received
 - Interconnection with IT not functioning

Greece Imp/Exp Flow Vs. Price Spread with BG (Commercial)



Hourly Prices Jan. 11/Jan. 12: Greek Prices Not Reflecting Scarcity



Romania (1/2)

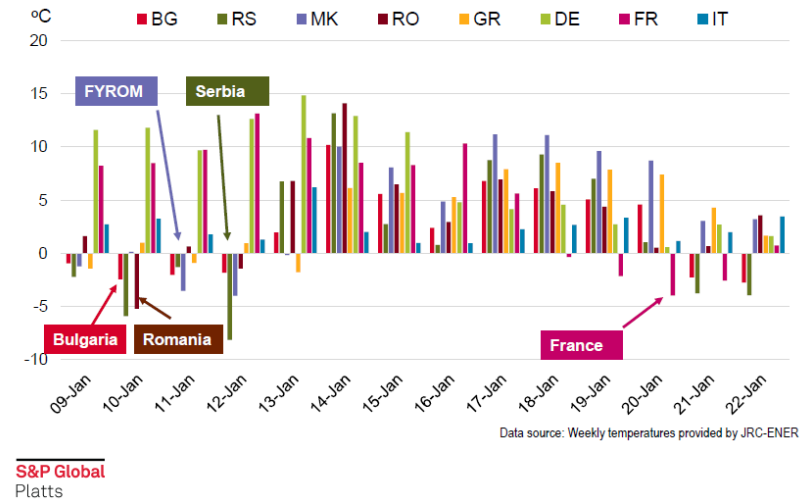
• Situation

- Temperatures below 1-in-20 (W2)
- Duration of lowest temperatures : 4 days
- Highest electricity demand since 2001 (TSO)
- Lower levels of hydro, unavailability of RES
- Coal transport problems

• Measures

- On 13/01 Ministry empowered TSO to take non-market measures:
 - export bans (not implemented),
 - cancelling export contracts,
 - load shedding
- Programmed outage cancelling
- Switching from gas to HFO fuel

2017 Minimum Temperatures as a Difference From 1-in-20 Minimum Daily Temperatures: W 2-3



Romania (2/2)

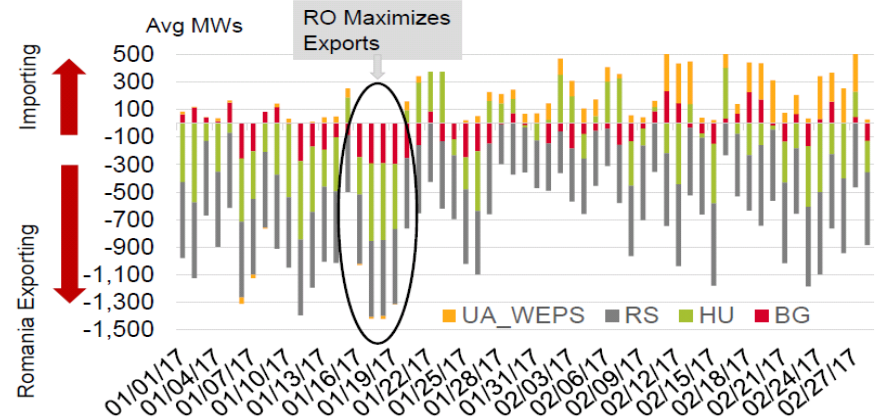
- **Market dynamics**

- RO market priced above BG during the (BG) export ban (relatively high daily losses)
- In W3 RO maximised exports

- **Regional cooperation**

- Unilateral announcement to neighbours that emergency exchange in kind not allowed
- RO didn't request emergency supplies

Romania Commercial Exports Maximized During Week 3



Data Source: ENTSO-E Scheduled Commercial Exchanges

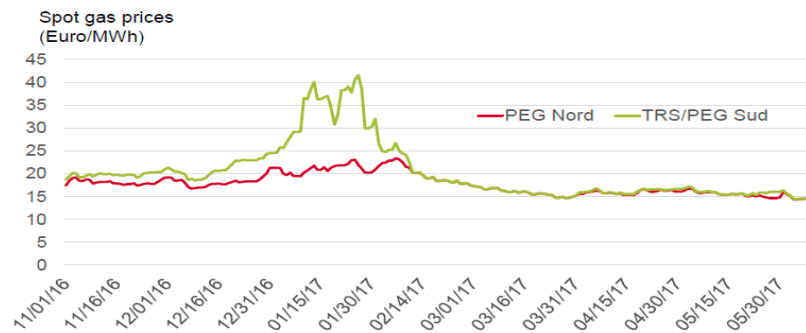
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France (1/2)

• Situation

- High demand in W-3 and W-4
- Low generation availability (nuclear, hydro)
- Higher prices in Southern France

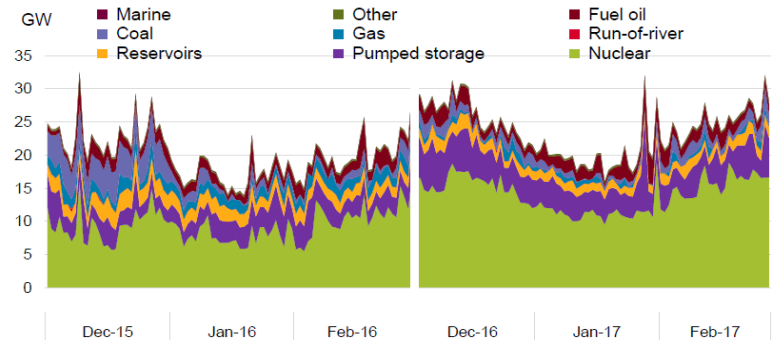
Gas Price in Southern France Carrying a Large Premium on the Northern Price in January 2017



Data Source: Powernext

S&P Global
Platts

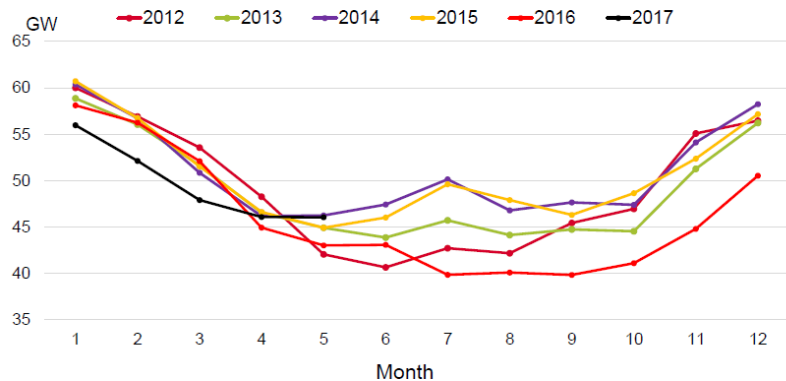
Unavailability of French Nuclear and Pumped Storage Significantly Higher Y/Y in Winter 2016



Data Source: RTE France

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French Nuclear Availability in Winter 2016/17 At Multi-year Lows



Data Source: RTE France

S&P Global
Platts

France (2/2)

• Measures taken

- Increasing import capacity from ES and CH
- Delayed reactors maintenance
- Curtailment of export capacity to ES in peak hours (14-20 Jan) to 'remain within safety limits'

• Regional cooperation

- Intensive daily cooperation with neighbouring TSOs / CORESO
- Activation of two emergency assistance agreements (IT, BE)

Actions Taken by France to Increase Import Capacity

Date	Hours	Interconnector	Amount
17-18 Jan. 2017	H6-H24	Spain	Increase from 1,800 to 2,050 MW
19 Jan. 2017	H6-H24	Spain	Increase from 1,800 to 2,050 MW in H6 - H15 and to 2,500 MW H15 to H24
19 Jan. 2017	18h-22h	Switzerland	Increase from 1,100 to 2,200 MW
20 Jan. 2017	0h-24h	Spain	Increase from 1,800 to 2,500 MW
20 Jan. 2017	18h-22h	Switzerland	Increase from 1,100 to 1,600 MW

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France's Ability to Withstand Cold Spell Weakened by Lower Installed/Available Capacity

	Installed Jan. 1, 2012	Historical Max 8 Feb. 2012	Installed Jan. 1, 2017	20-Jan-17	25-Jan-17
Price		€220/MWh		€122/MWh	€206/MWh
Time		7 PM		10 AM	9:00 AM
Demand		101.65		93.7	89.6
Fuel oil	10.4	5.5	7.1	4.0	2.5
Coal	7.9	5.1	3	2.6	2.3
Gas	11.7	8	11.7	9.3	9.1
Nuclear	63.1	59.4	63.1	55.6	56.6
Wind	6.6	1.7	11.7	2.7	1.2
Solar	2.2	0	6.7	0.5	0.1
Hydro	25.4	13.771	25.4	13.7	12.7
Other	1.3	0.6	1.9	0.9	0.8
Imports		7.9		4.2	4.3
UK		2		1	1
Spain		1		2.3	2.2
Italy		0.9		-1.3	0.2
Switzerland		-0.4		0.8	1.4
Belgium/Germany		4.4		1.3	0.3
Adj		-0.2		0.1	-0.8

Data Source: RTE France and EPEX Spot

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Italy

• Situation

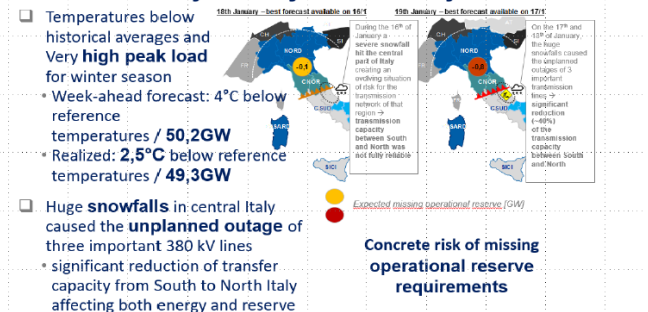
- Difficult climate conditions (heavy snowfalls in central Italy)
- Outage of 380 kV lines reducing S-M capacity
- Issue of operational security in the North of Italy

• Measures taken

- Hourly curtailment of export capacities to FR on 18-19 January

Unplanned Outage of Transmission Lines Tightened the Nord Zone

Italian context: Tuesday January 17th => Friday 20th

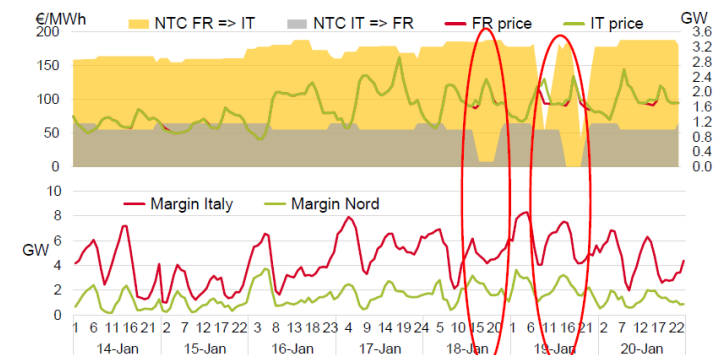


Inter-TSO cooperation – January 2017 cold wave

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Curtailments of FR-IT and IT-FR NTCs



Data Source: ENTSO-E Physical and Scheduled Commercial Exchanges

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Preliminary lessons learnt

- 1. Need to conduct a diagnosis** of possible crisis events at regional level – regular assessments (closer to real time); aligned methodology and tools; holistic approach (e.g. links with gas, lignite, etc.)
- 2. Transparent planning** - identify in advance possible measures, as well as roles and responsibilities
- 3. More regional cooperation** – agree in advance on how to help each other in crisis situations
- 4. Better information - sharing** at all levels (technical/political, national/regional/ European, also need to inform stakeholders)
- 5. Trust markets** - let markets deliver, even in tight situations, e.g. positive role of demand response & imports. Less mature markets are less likely to deliver and are less resistant to system stress
- 6. Non-market measures** such as export bans come at a high cost! They can only be introduced as a measure of last resort (& linked to reasons of system security) & need to be strictly proportionate.

Thank you for attention