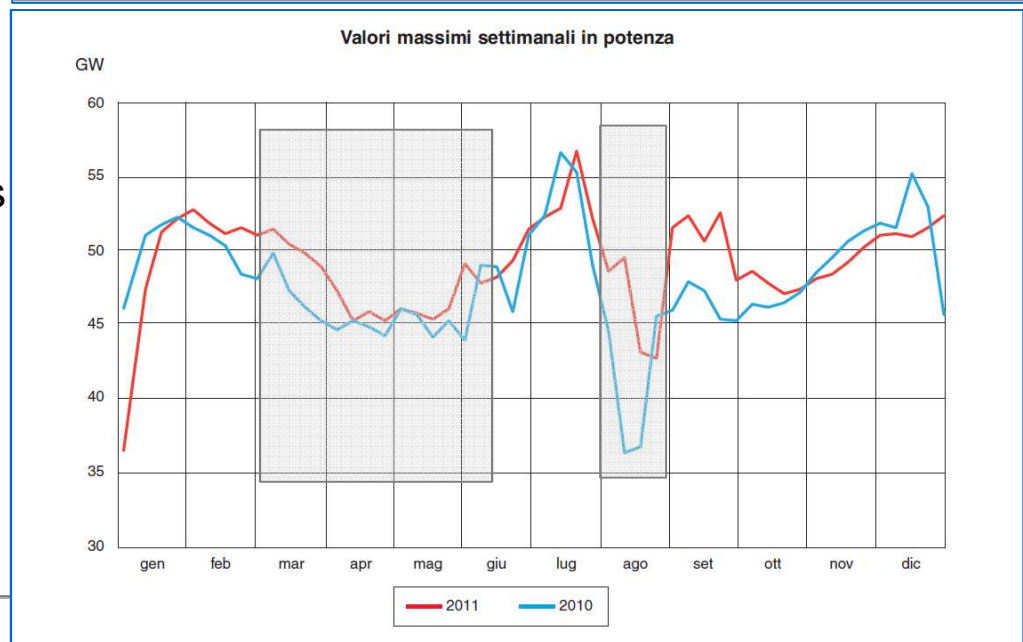
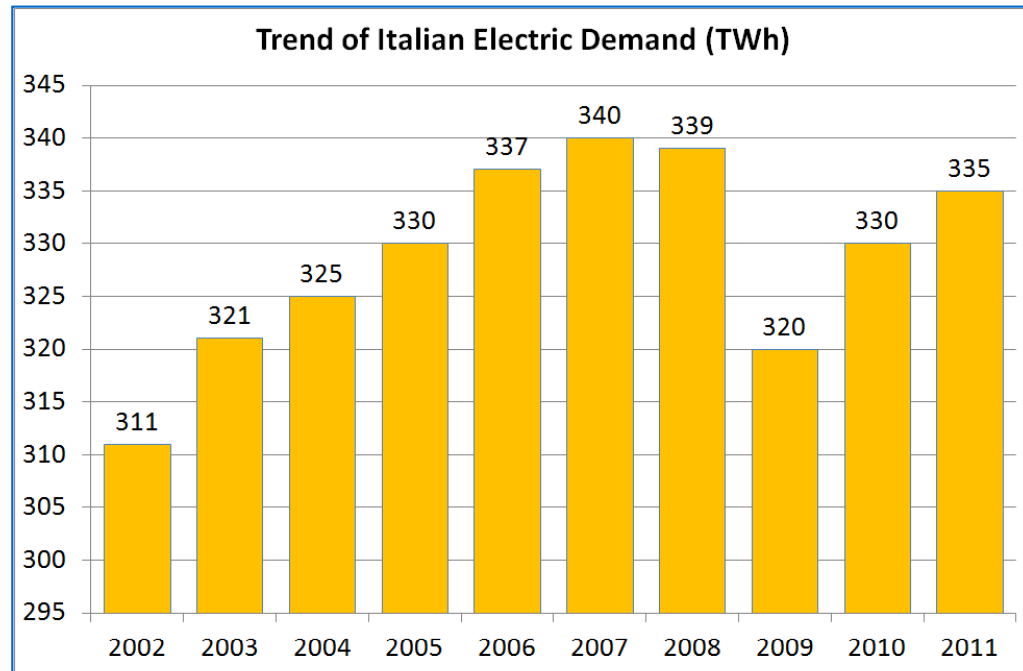

Review of the Italian Ancillary Service and Balancing Market

Context: facts about the Italian Electric System – the electric demand

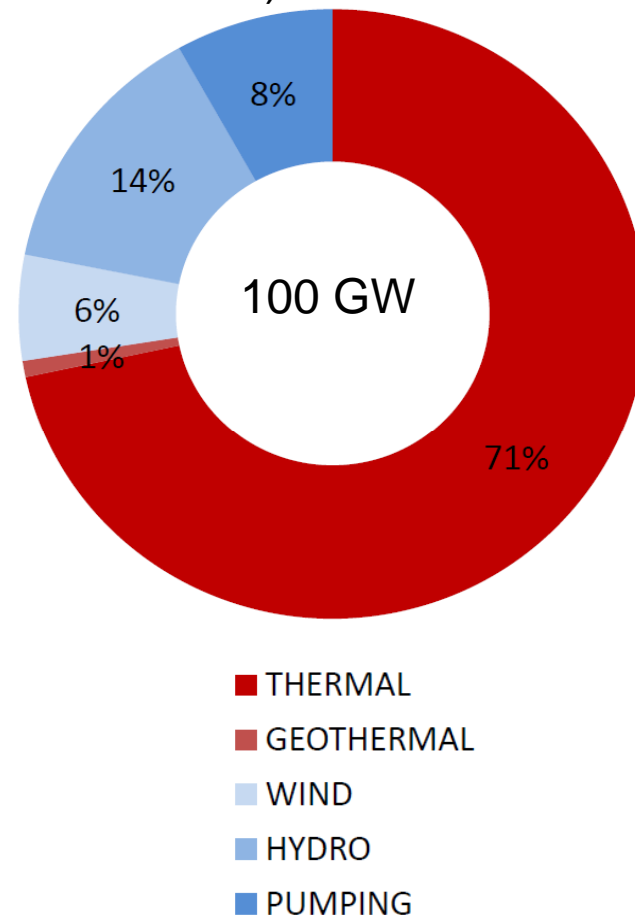
- 2011 electric demand
 - 335 TWh total energy
 - 56 GW peak power
- Demand still below the values ante-2008 worldwide financial crisis
 - 2007 peak power 57 GW
- Significant seasonality of electric demand
 - Winter and summer peak
 - Summer peak getting higher
 - Prolonged low demand periods
 - Spring
 - August



Context : facts about the Italian Electric System – the production mix

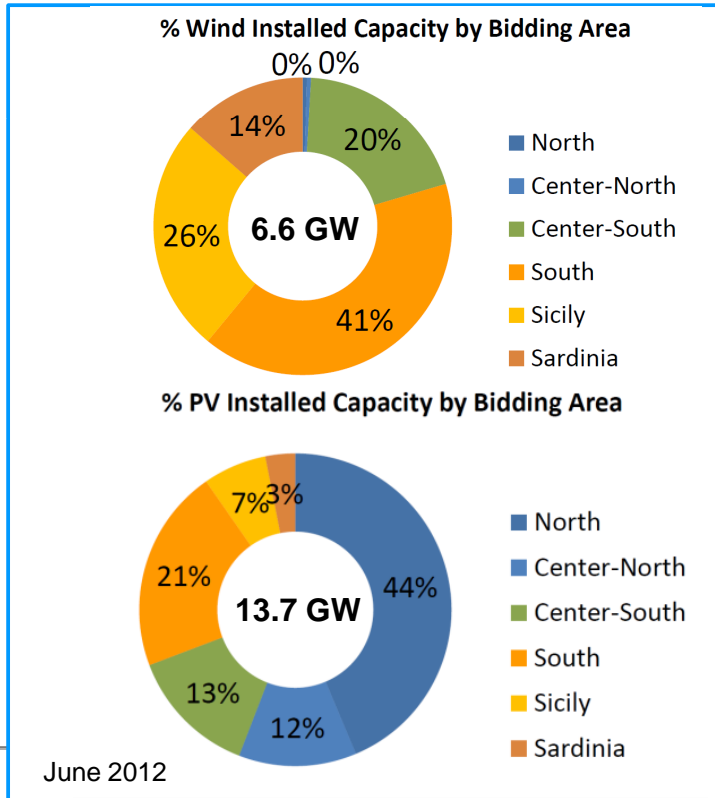
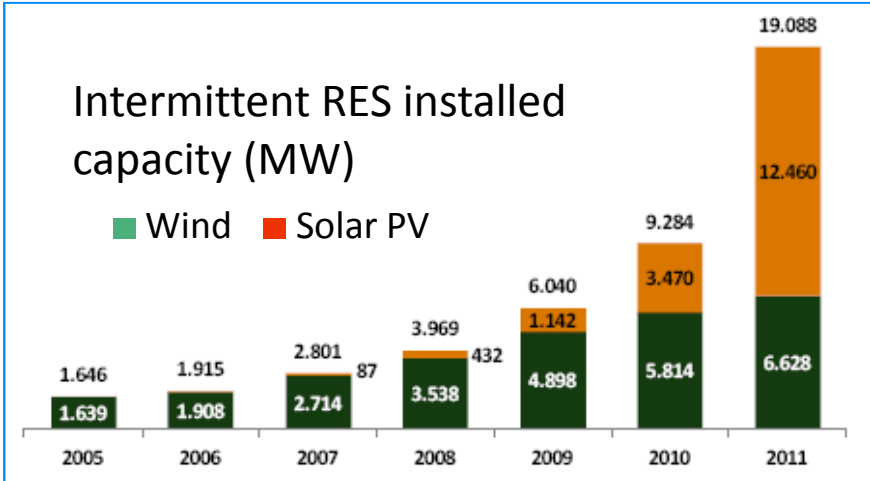
- Registered power capacity is around 100 GW (plants > 10 MVA, 2010 data)
 - Peak demand is 54% of registered capacity
 - +22 GW from 2002 to 2011
 - 38% North
 - 43% South
- 71% of the capacity >10 MVA from thermoelectric plants
 - 60% of the thermoelectric capacity from CCGT
 - 64% of production from CCGT
 - Good efficiency
 - Low environmental impact
 - Strongly sensitive to gas availability
- Concentration of power plants in some restricted geographic areas

Production Capacity Mix 2010
(UP >10 MVA)



Context : facts about the Italian Electric System – Rise of Intermittent RES

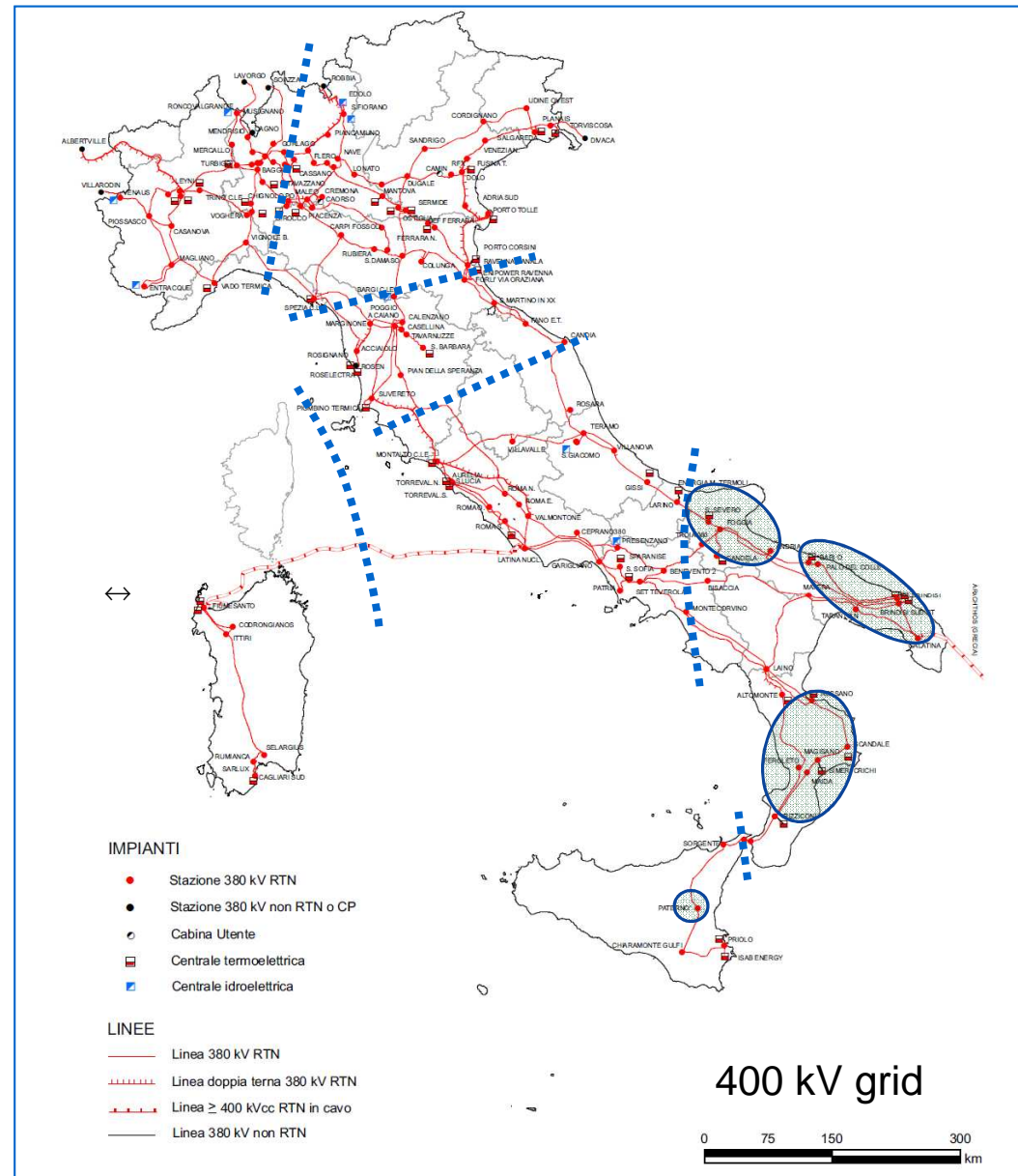
- Huge increase of wind and solar PV installed capacity in recent years in Italy
- Wind power mostly localized in Sicily, Sardinia and in Southern Italy
 - Significant share of the overall production of islands during wind production peaks, up to about 60% in Sicily
 - 9.6 GW installed capacity forecast in the short-medium term
- Solar PV boosted by law financial incentives (about 15.6 GW installed capacity by half of September 2012)
 - About half of the installed capacity currently localized in Northern Italy
 - 23 GW installed capacity forecast in the short-medium term



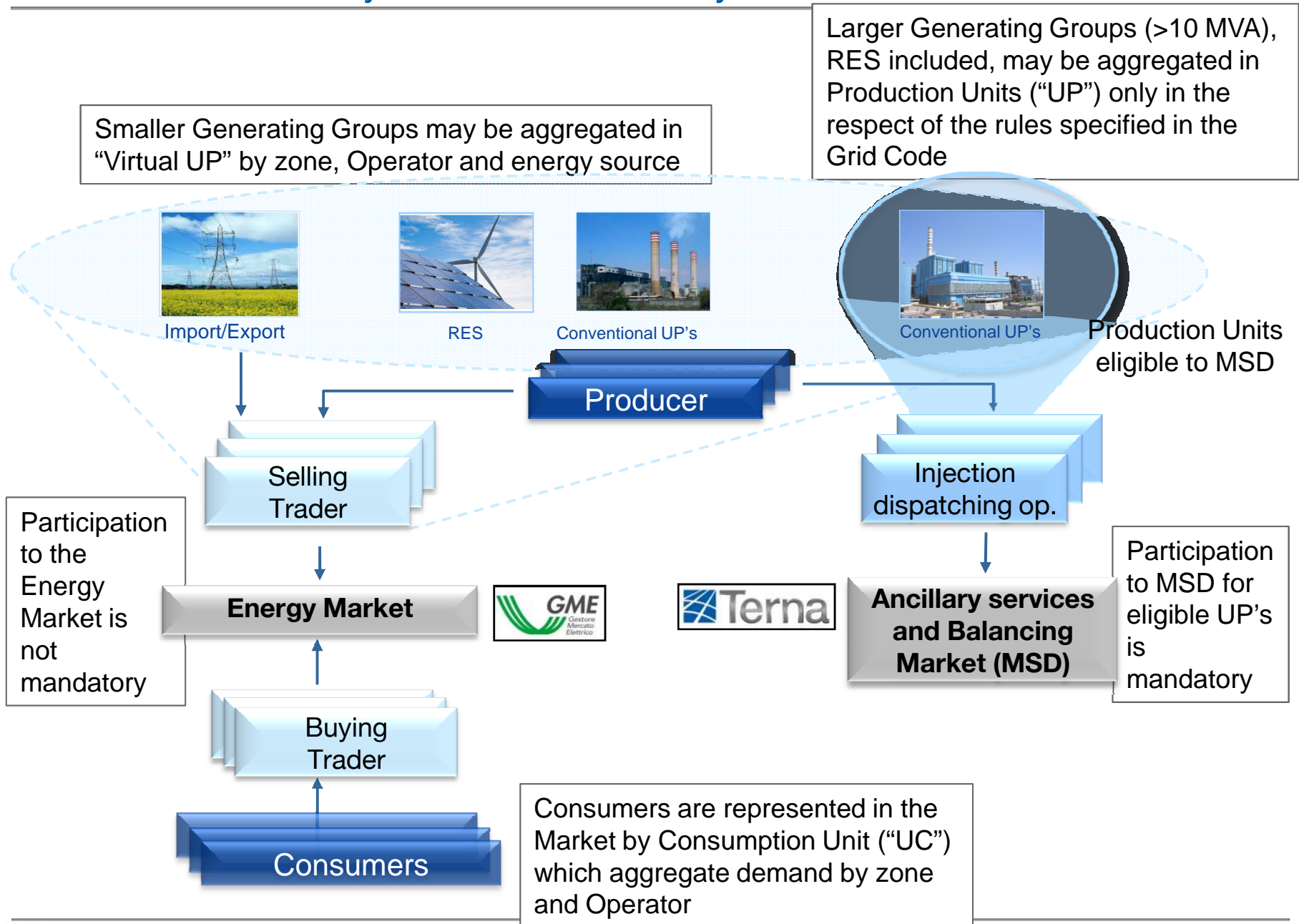
Context : facts about the Italian Electric System – the grid

- Over 63.500 km of EHV and HV lines
 - Strongly meshed in the northern area
 - Much less in the central-southern part

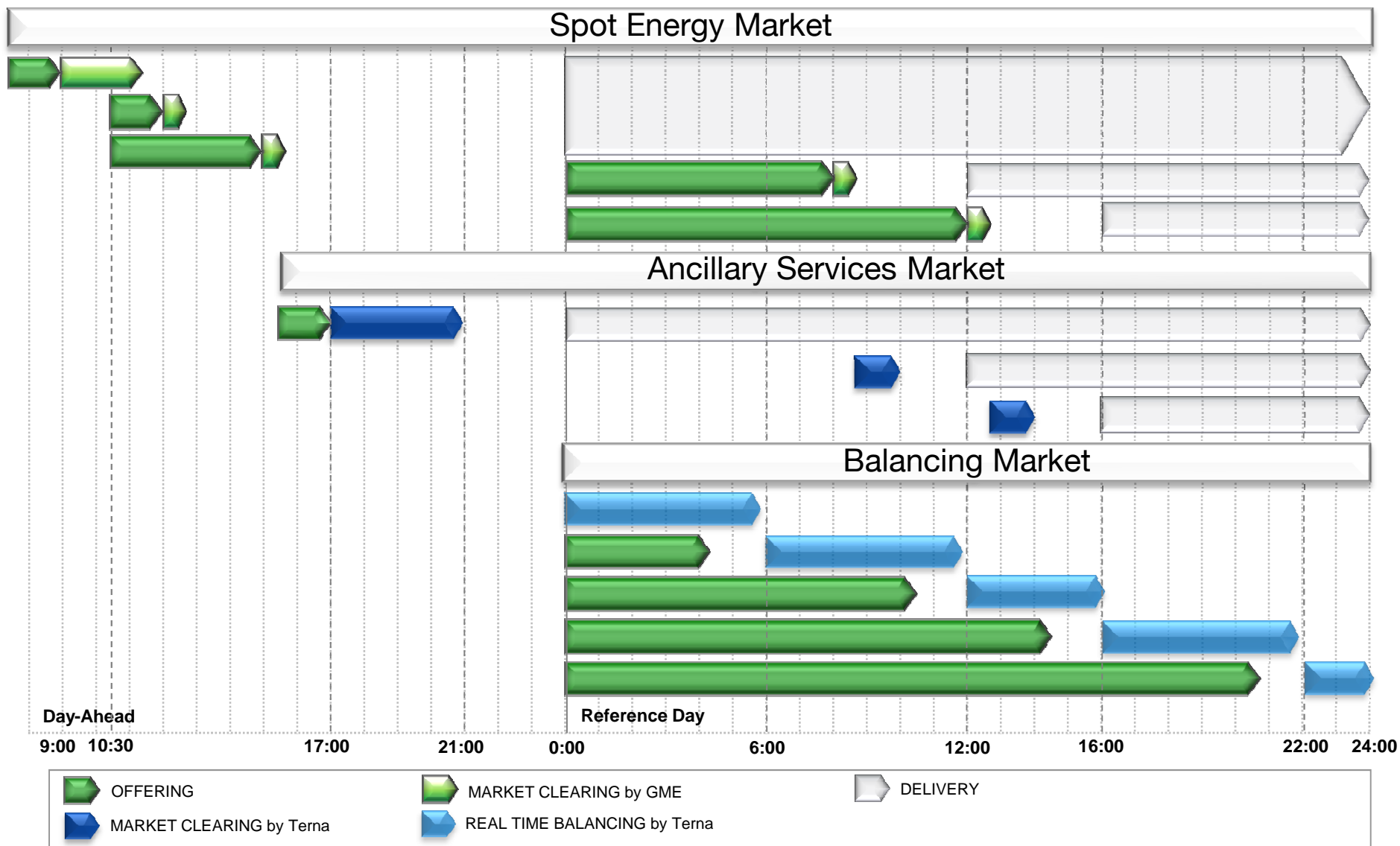
- Some sections of the 400/220 kV grid are frequently constrained
 - North West → North East
 - South → Center South
 - Center North ↔ North



The Italian Electricity Market: Market Players



The Italian Electricity Market: Timeline



Key market design features

Issue	Item	Energy Market	Ancillary Service and Balancing Market (MSD)	Settlement of Imbalances	Notes
System Secure Operation	Schedules by	Single UP/UC	Single UP	Single UP/UC	
	Congestion Management	Yes Market Split Model	- Yes - Offer/Bid Selection on Nodal Basis		<i>10 National Bidding Areas</i>
	Reserve Procurement		- Zonal Requirements - Zonal + Nodal Constraints		<i>Spot Market – 3 times a day</i>
	Balancing		Nodal Constraints on Bid Selection		<i>Every 15 minutes</i>
Imbalance Minimisation	Feasibility of schedules	2 Adjustment Market Sessions on day ahead after MGP	- Detailed description of UP technical data - 15' Binding Schedules		<i>Day Ahead Market (MGP) Gate Closure: 9:15 D-1</i>
	Flexibility	2 Intraday sessions (13-24 and 17-24)	1 MSD session after each Intraday session		<i>Gate closure about 3 hours ahead real time</i>
Cost reflectiveness			- Inc/Dec Offers with multiple steps (€/MWh) - Specific Bid/Offer for FRR usage (€/MWh) - Specific Offer (€) for thermal UP startup	Dual Pricing Mechanism	<i>No capacity (€/MW) payment</i>

Key market design features: Reserve traded products

○ Primary Reserve (FCR)

- 100% within 30 s, automatic activation
- Each UP must make available 1.5% maximum power (10% in the islands) as a part of connection obligations

Out of the market

○ Secondary Reserve (FRR)

- 100% within 15 min, automatic activation
- Sized according to ENTSO-E Policy 1
 - Volume increase at load ramps or schedule discontinuities

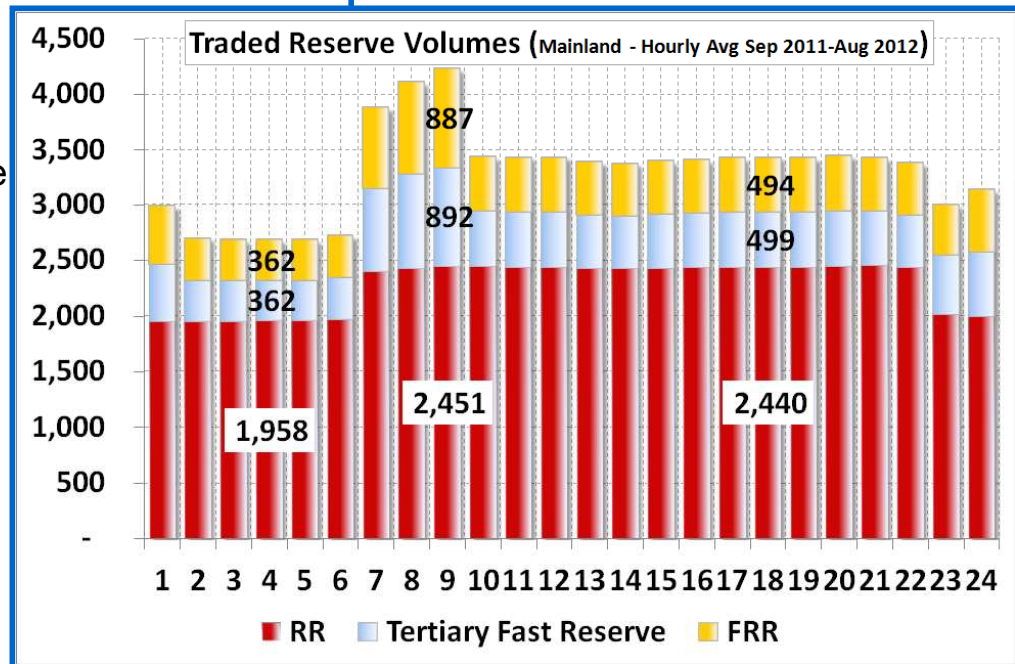
○ Tertiary Fast Reserve

- 100% within 15 min, manual activation
- Required volume at least as large as FRR

○ Tertiary Replacement Reserve (RR)

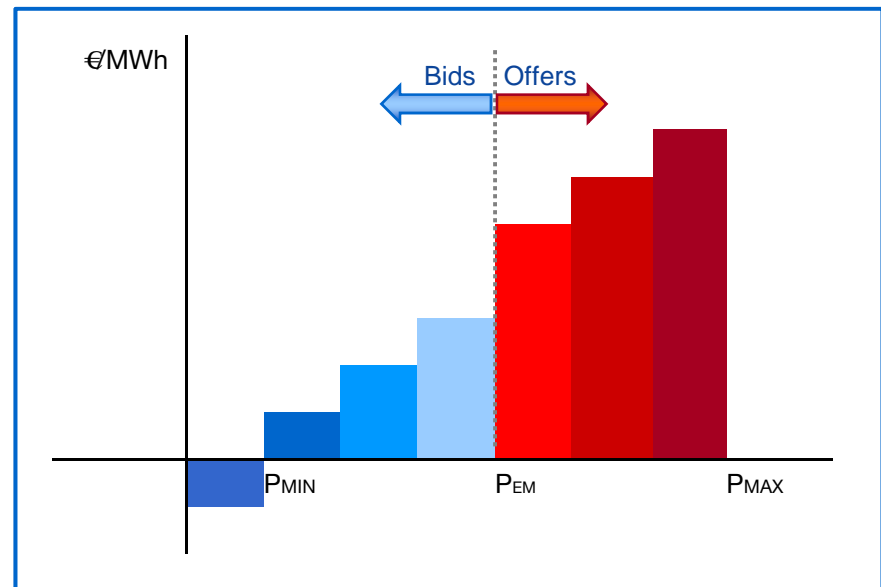
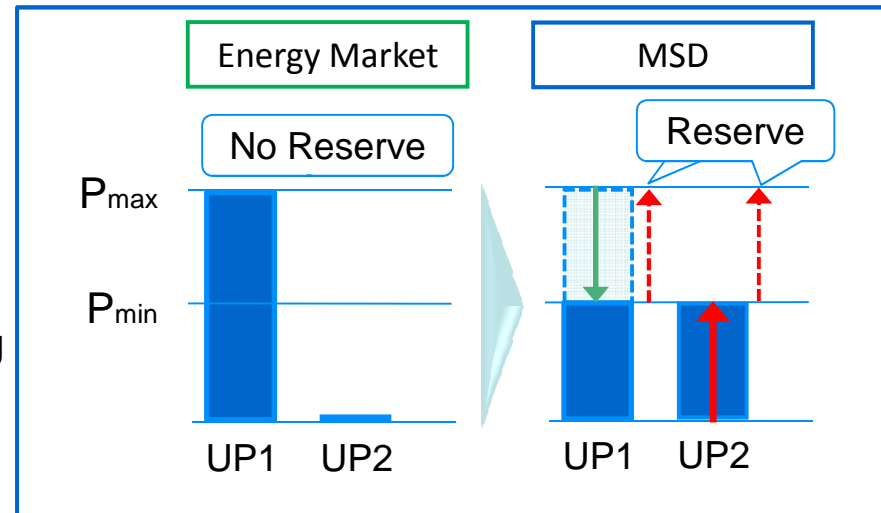
- 100% within 120 min, manual activation
- No energy limitations
- Sized according to multiple generation failures and Load/RES forecast uncertainty

Products traded on the market

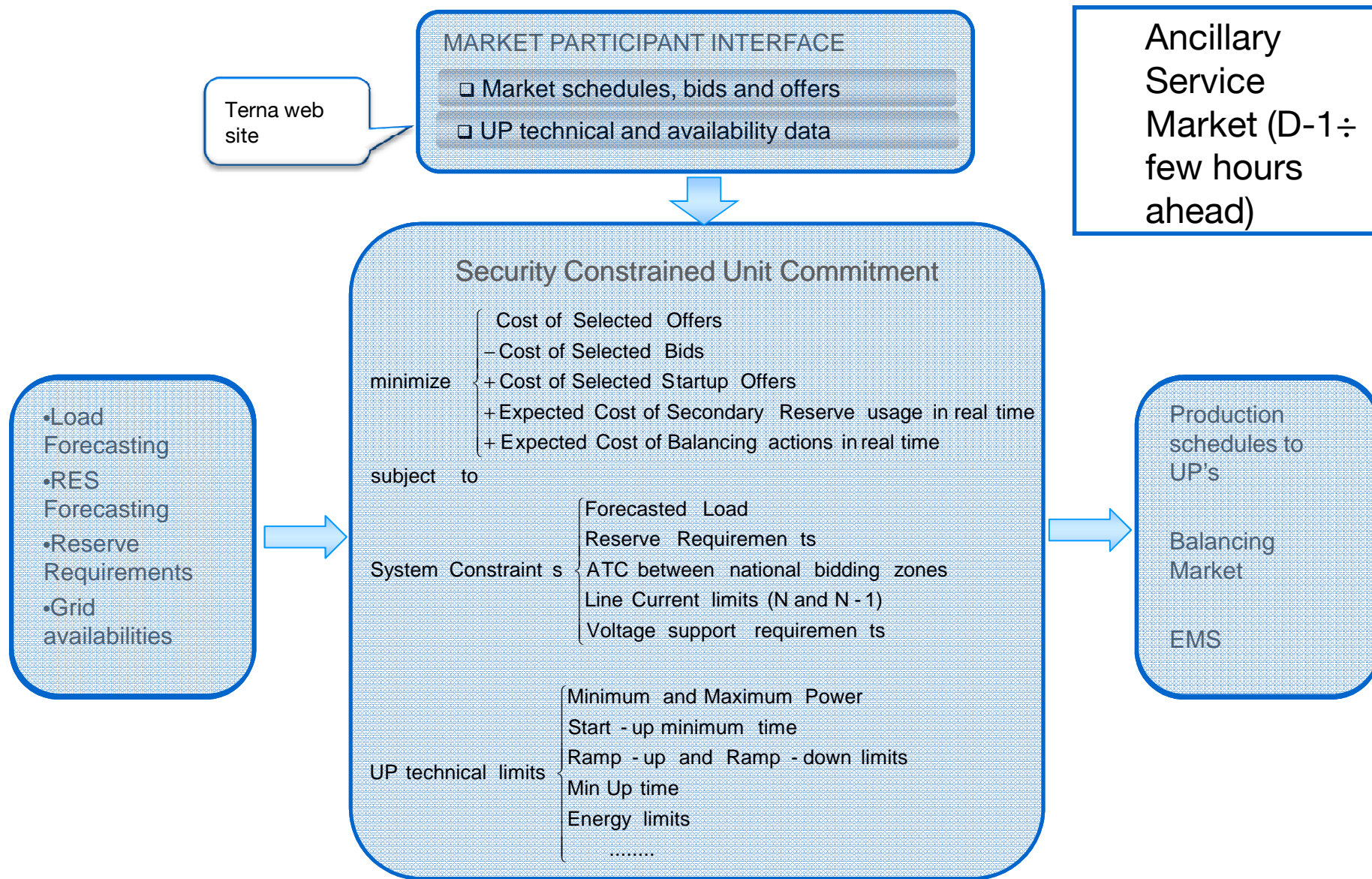


Key market design features : Reserve procurement

- Reserve procurement (upward/downward)
 - Commitment/Shutdown of thermal UP not dispatched on the Energy Market
 - Reservation of available margins on UP in service on the Energy Market
 - Reserve is procured on specific UP considering grid constraints
- No capacity payment considered in MSD bids/offers (€/MW)
 - Energy transactions paid as bid (€/MWh)
 - Fixed payment for thermal UP startup (€)
- In the current design there is no other opportunity for market players after Ancillary Service and Balancing Market
 - → No opportunity costs → No capacity payments

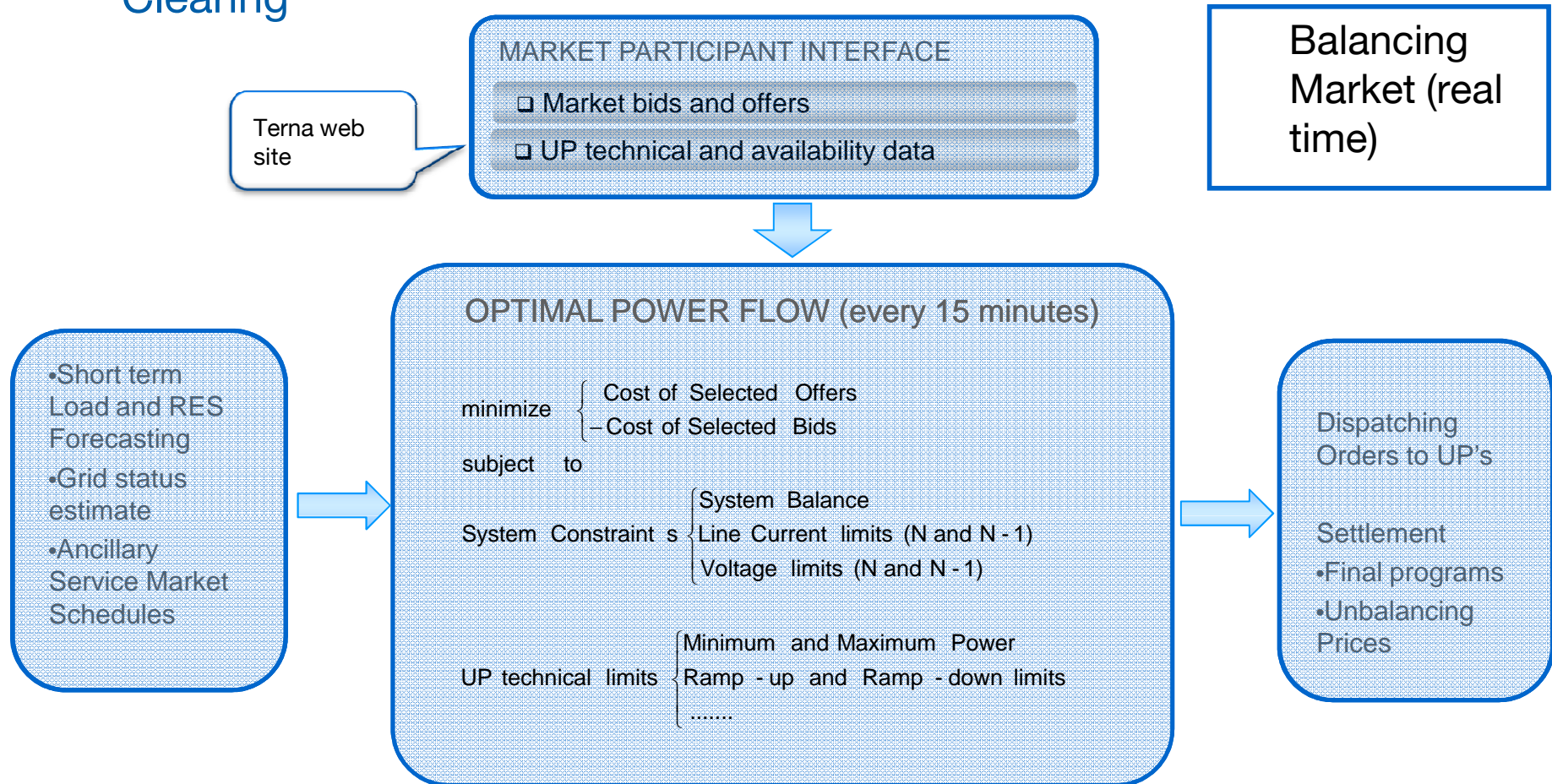


Key market design features : Ancillary Service Bids and Offers Clearing



Key market design features : Balancing Market - Bids and Offers

Clearing



- The process is automatically executed every 15' supervised by control room operators
- Dispatching orders are communicated to UP's through encrypted web communication
- Large number of dispatching orders issued to eligible UP's (about 700-1000 orders a day)

Review of the Italian Ancillary Service and Balancing Market

- Questions?

- Thank you for your attention