



Enabling the marketing of RES producers in Italy

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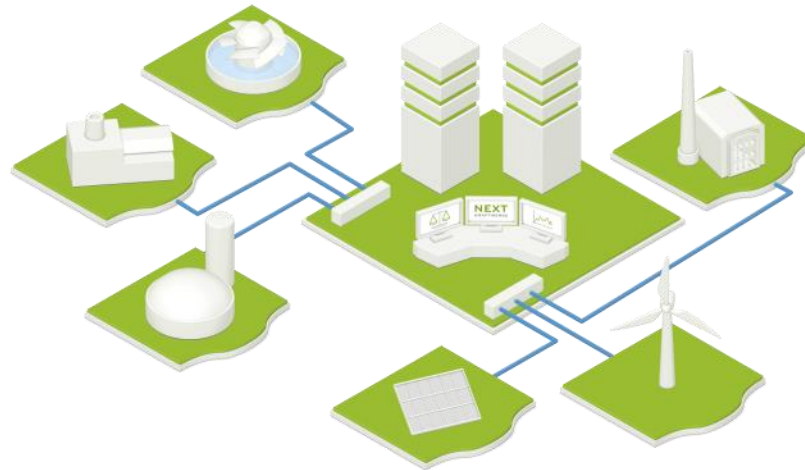
*Aggregators as enablers of prosumers participation in the
energy market*



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Increasing reliability in renewables

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The Virtual Power Plant - a cluster of networked power plants

- Aggregating decentralized assets as a cluster
- Automated control of the cluster with elaborate algorithms
- Harmonizing production and consumption
- Balancing forecast deviation
- Reducing fluctuation in the power grid

Company Information

NEXT
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TECHNOLOGY

- Monitoring and Control system for all connected assets
- Next Box: Interface for providing a standardized connection for a large range of different assets

BUSINESS CASE

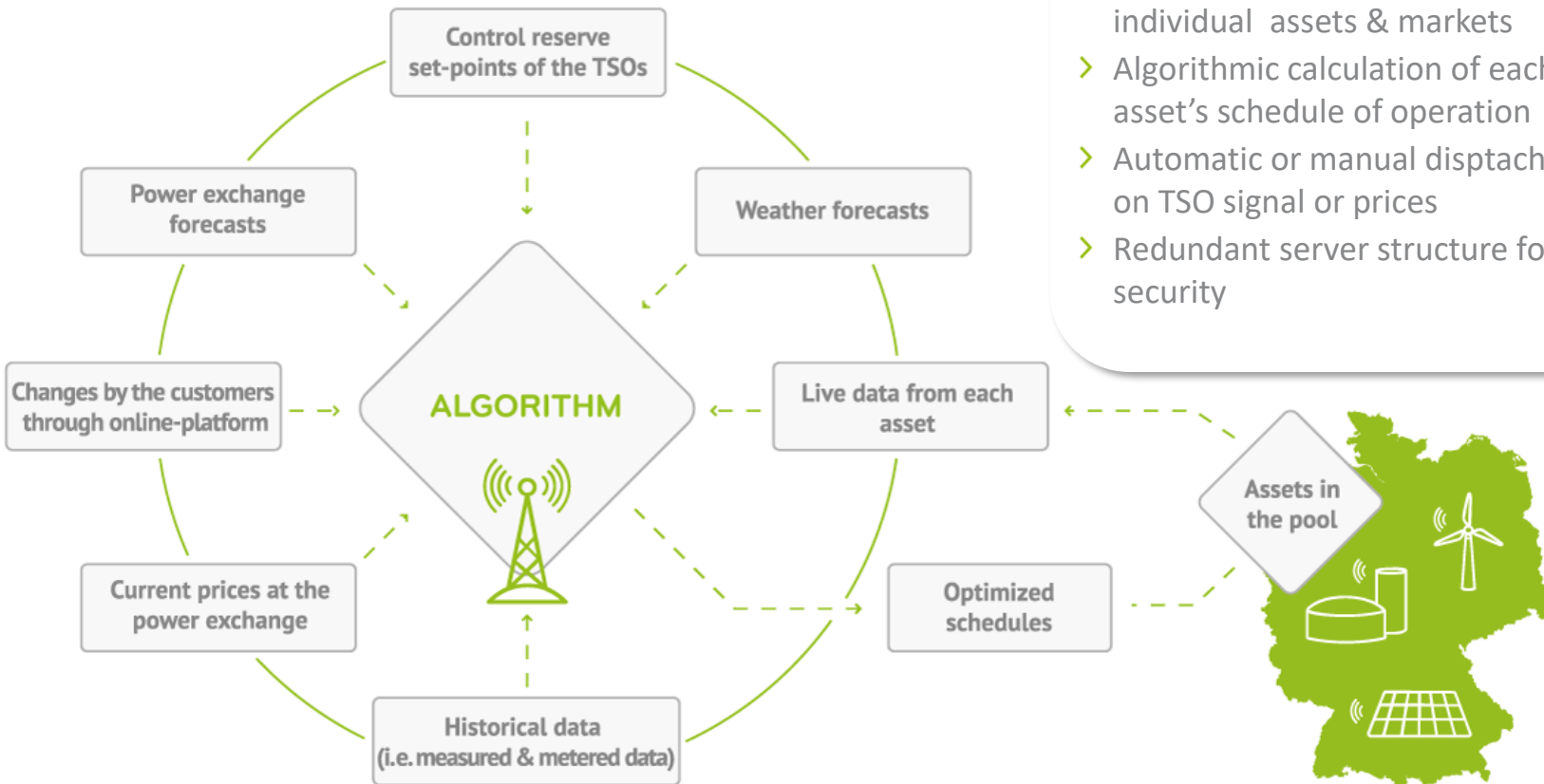
- Providing VPP: market access to the European energy markets for third parties
 - Forecasting
 - Energy Trading
 - Supply
 - Balancing
 - Market access
 - VPP as a Service

KEY FACTS

- Founded in 2009
- Portfolio > 5,4 GW
- team of more than 130 energy market experts

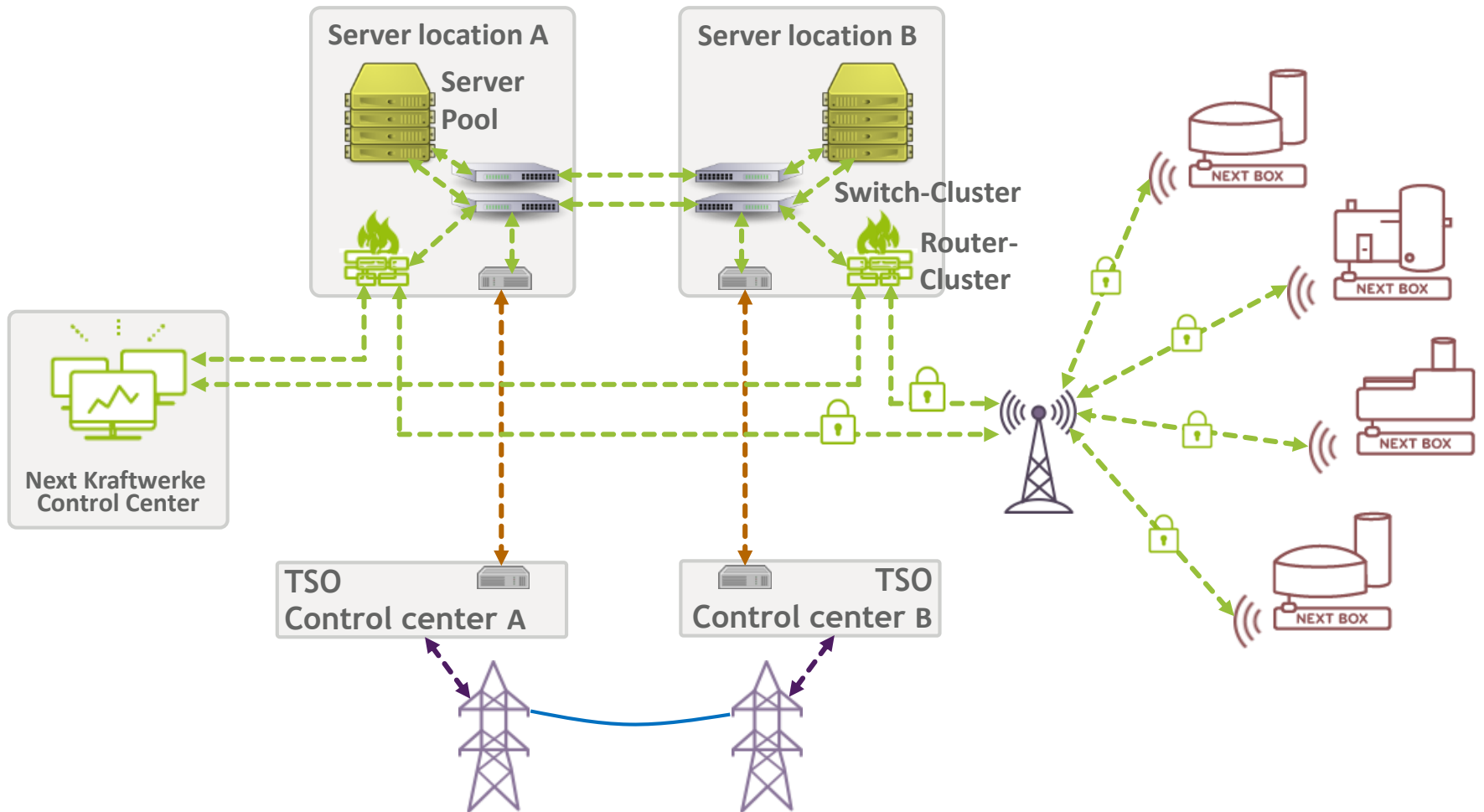


The Control system



- Facilitating M2M-communication between individual assets & markets
- Algorithmic calculation of each individual asset's schedule of operation
- Automatic or manual dispatch of assets, based on TSO signal or prices
- Redundant server structure for maximum security

The Control system



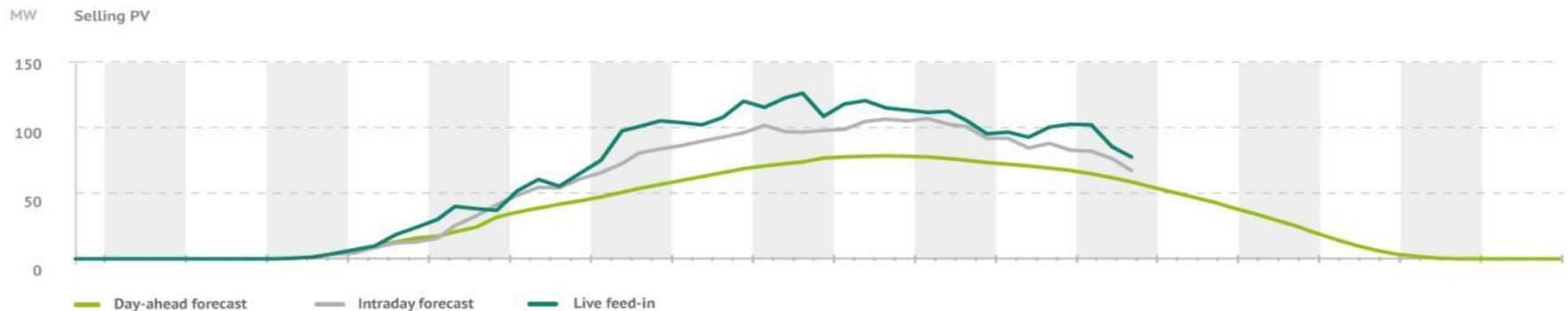
Our products: Trading of RES

– Overview

- Forecast and trading of each asset's produced power on the EPEX spot (in 15-minute intervals)
- 24/7 correction of forecast deviation by our power traders

Benefits

- Higher reliability for integrating renewable energies into the power markets, fewer shortfalls within the power system
- Owner pays a fee for worry-free trading



Our products: Balancing Services

– Overview

- › As a cluster, assets execute the TSO/Frequency signal within seconds
- › Balancing services provided mFRR/aFRR/FCR

Benefits

- › Our Next Pool stabilizes grid frequency and prevents blackouts
- › The revenue is split between the asset owner and Next Kraftwerke



Italian market

MARKET STRUCTURE

- **Relevant market actors & stakeholders**
- **TERNA:** Transmission System Operator
- **GME:** Electricity market operator and platform for Ancillary Service & Congestion Market
- **GSE:** Public market actor coordinating market access and subsidies for RES
- **AEGGSI:** Italian Regulatory Authority for Electricity and Gas

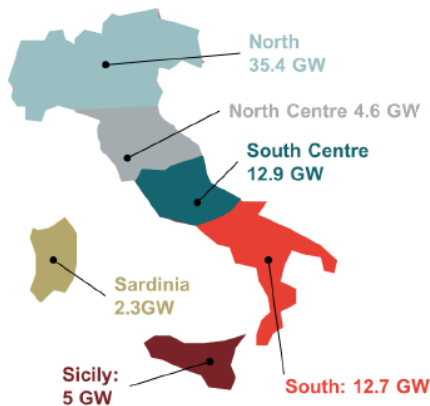


Figure 1: Bidding zones and generation capacity in Italy (2014, source: GME)

- **Day-Ahead Market (MPG)**
 - Auction market, based on hourly block products
 - 1 session, from 8 a.m. on D-9 until 12 p.m. D-1
 - Supply offers are valued according to price zones, demand bids according to average (PUN)
- **Intra-Day Market (MI)**
 - Modification of MGP bids
 - 7 sessions (MD1 – MD7), between 12:55 p.m. D-1 and 3.45 a.m. D

Italian market

Ancillary service /Dispatch Market

- MSD: Reserve capacity for balancing/solving congestion
- MB: Real time balancing

Market timeline	Legend: Offer submission	Traded hours																							
		D-9 ... D-2 ... D-1	D																						
results		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Day Ahead																									
MGP	12:55 D-1	08:00 (D-9) - 12:00 (D-1)																							
Intra-day																									
MI1	15:30 D-1	12:55 - 15:00 (D-1)																							
MI2	17:30 D-1	12:55 - 16:30 (D-1)																							
MI3	00:15 D													17:30 (D-1) - 23:45 (D-1); traded hours: 4-24											
MI4	04:15 D													17:30 (D-1) - 03:45 (D-1); traded hours: 8-24											
MI5	08:15 D													17:30 (D-1) - 07:45 (D); traded hours: 12-24											
MI6	11:45 D													17:30 (D-1) - 11:15 (D); traded hours: 16-24											
MI7	16:15 D													17:30 (D-1) - 15:45 (D); traded hours: 20-24											
MSD ex-ante & MB																									
MSD1	21:45 D-1	12:55 - 17:30 (D-1)																							
MSD2	02:15 D																								
MSD3	06:15 D																								
MSD4	10:15 D																								
MSD5	14:15 D																								
MSD6	18:15 D																								
MB1																									
MB2														22:30 (D-1) - 03:00 (D); h4-8											
MB3														22:30 (D-1) - 07:00 (D); h8-12											
MB4														22:30 (D-1) -11:00 (D); h12-16											
MB5														22:30 (D-1) -15:00 (D); h16-20											
MB6														22:30 (D-1) -19:00 (D); h20-24											

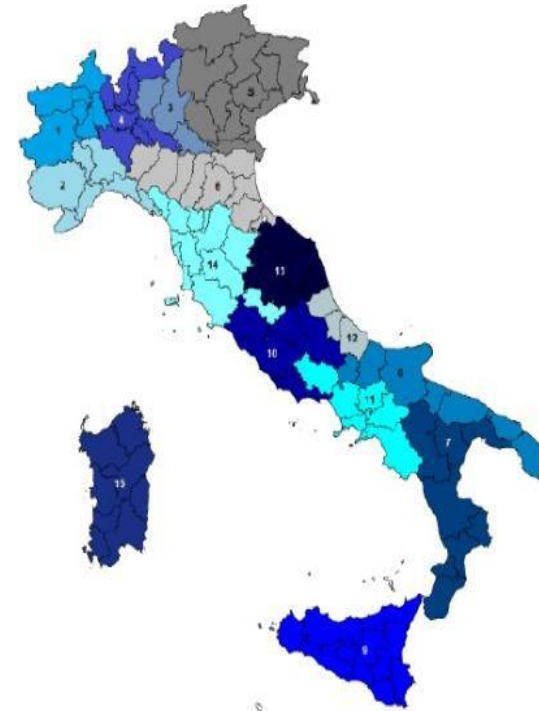
Applying the BM of Next's VPP in Italy

- No continuous intraday trading
- 6 pricing zones
- Central Dispatch Model (vs. Self-Dispatch Model)
- Various schemes subsidies exist in parallel (FIP, FIT..)
- Small aggregation perimeter
- Interaction between balancing and solving congestion within one market

(17) 'self-dispatching model' means a scheduling and dispatching model where the generation schedules and consumption schedules as well as dispatching of power generating facilities and demand facilities are determined by the scheduling agents of those facilities;

(18) 'central dispatching model' means a scheduling and dispatching model where the generation schedules and consumption schedules as well as dispatching of power generating facilities and demand facilities, in reference to dispatchable facilities, are determined by a TSO within the integrated scheduling process;

(19) 'integrated scheduling process' means an iterative process that uses at least integrated scheduling process bids that contain commercial data, complex technical data of individual power generating facilities or demand facilities and explicitly includes the start-up characteristics, the latest control area adequacy analysis and the operational security limits as an input to the process;



Source: Terna

Source: Regulation on establishing a guideline on electricity balancing

Summary and Outlook

- The infrastructure of a VPP provides technical tools for better grid integration of renewables
 - Forecasting data
 - Controlling and monitoring of aggregated assets
- Business Case Italy
 - Integrating Renewables: Trading and Balancing services
 - Balancing/Dispatch market opening process ongoing
 - Challenging market differences compared to markets where Next is already active in
 - New innovative services possible



Thank you
