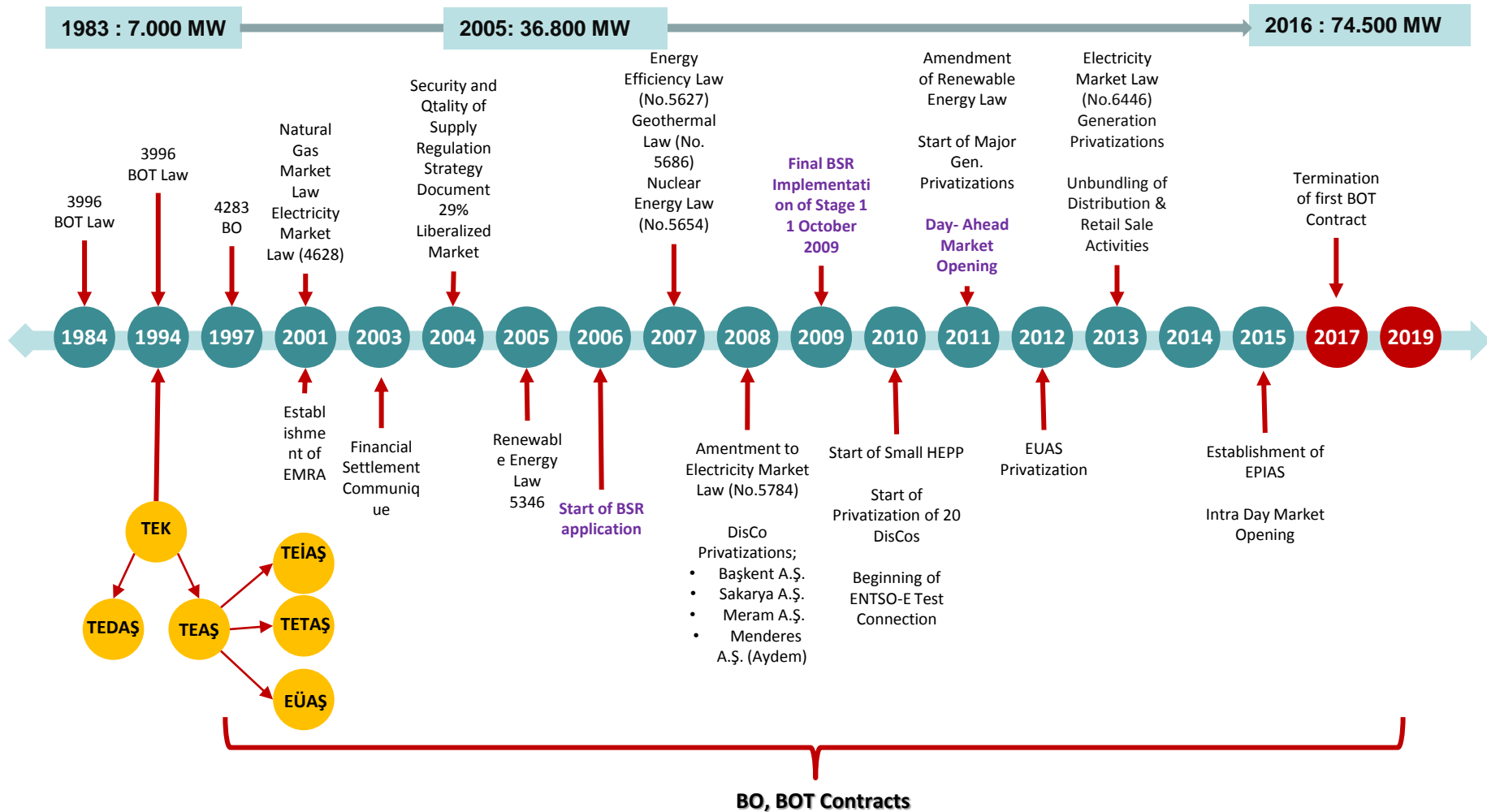




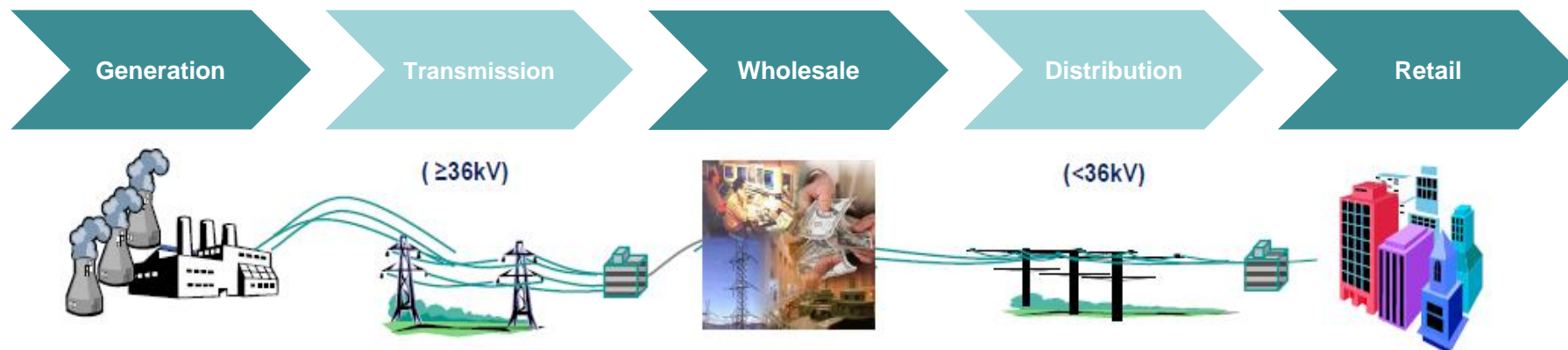
Turkish Electricity Market At A Glance

15.06.2016

Turkish Electricity Market Reform Milestones



Electricity Market Value Chain



2015

259 TWh

Transmission Losses
(~2.5 %)

Import 7,4, TWh
Export 3,1 TWh
Net 4,3 TWh

Distribution Theft & Losses
(~15 %)

- ❑ 74.626 MW installed capacity as of April 2016;
 - SOE: 40 %
 - IPP: 60%

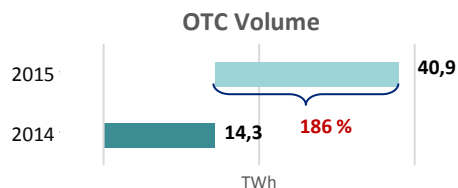
- ❑ 36.824 MW installed capacity as of 2005;
 - SOE : 86 %
 - IPP: 14 %

- ❑ Naturally state-owned monopoly
 - National Load Dispatch Center (system operator) is part of TEİAŞ(state).

- ❑ Turkey is composed of 21 different distribution regions.

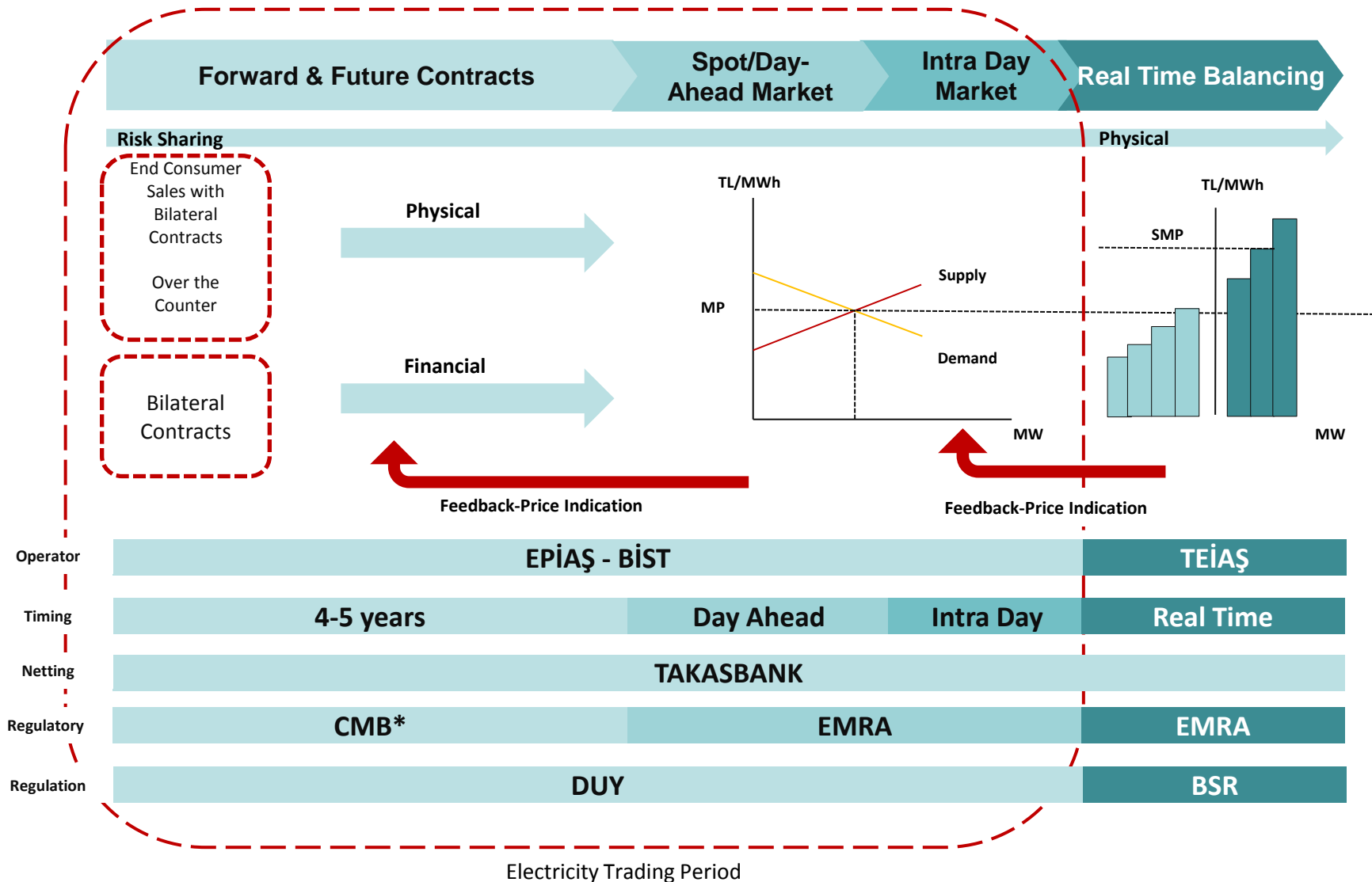
- ❑ All regions have been recently privatized.

- ❑ Eligibility limit is currently set as 4 MWh/year and expected to gradually decrease to zero.



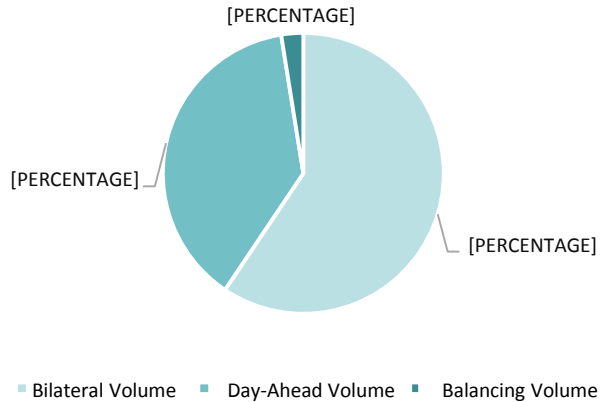
Regulated
Competitive

Energy Trading Mechanism

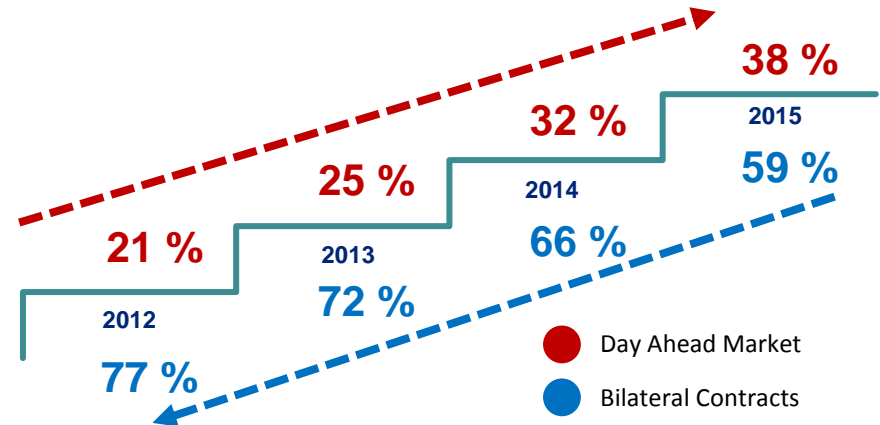


Day-Ahead Market

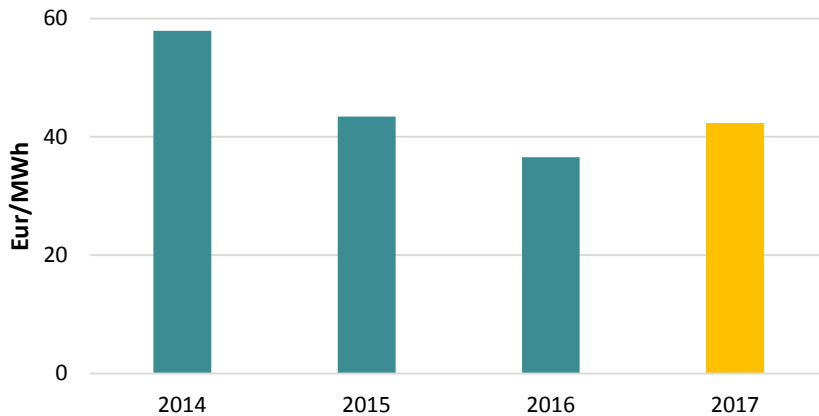
Day Ahead Market Volumes (2015)



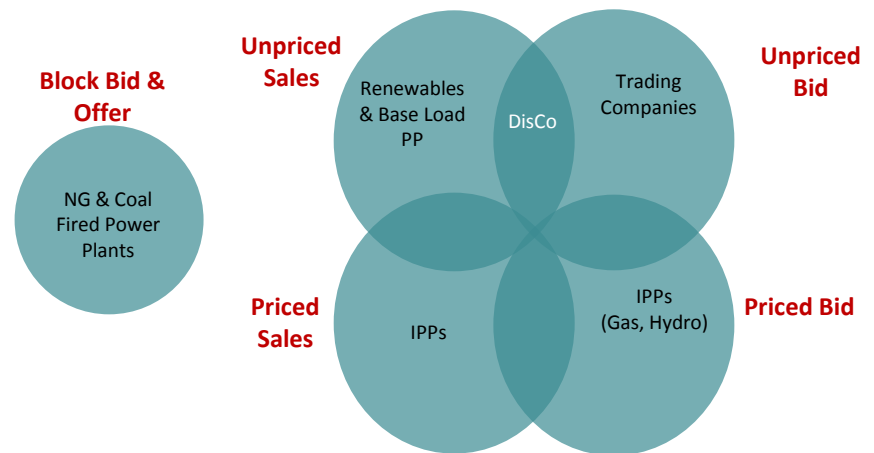
Evolution of Day Ahead Market Volume



Evolution of Market Price

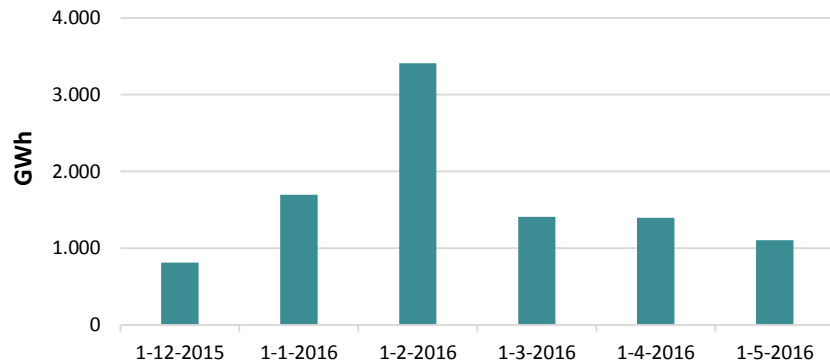


Types of Bid and Offer



OTC & Exchange Market

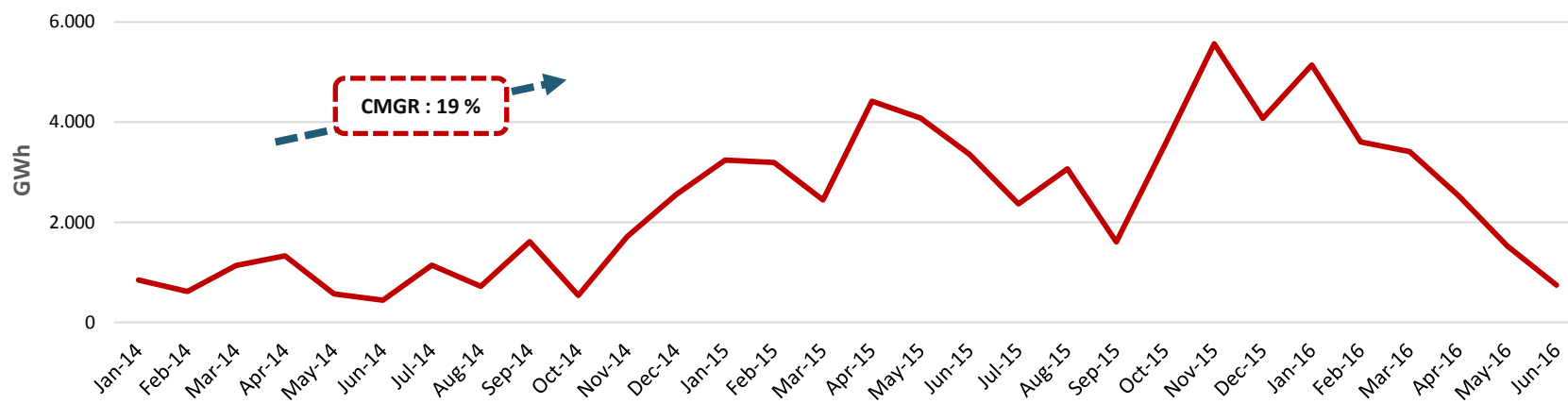
Exchange Market Volume Evolution Since Dec. 15



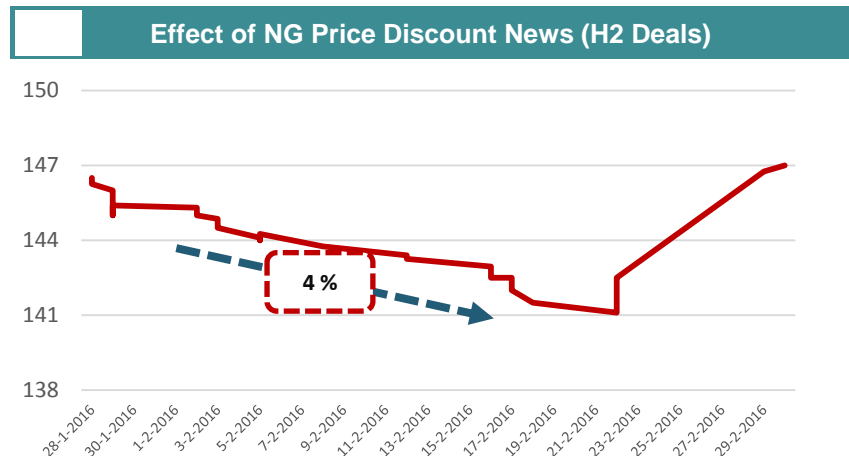
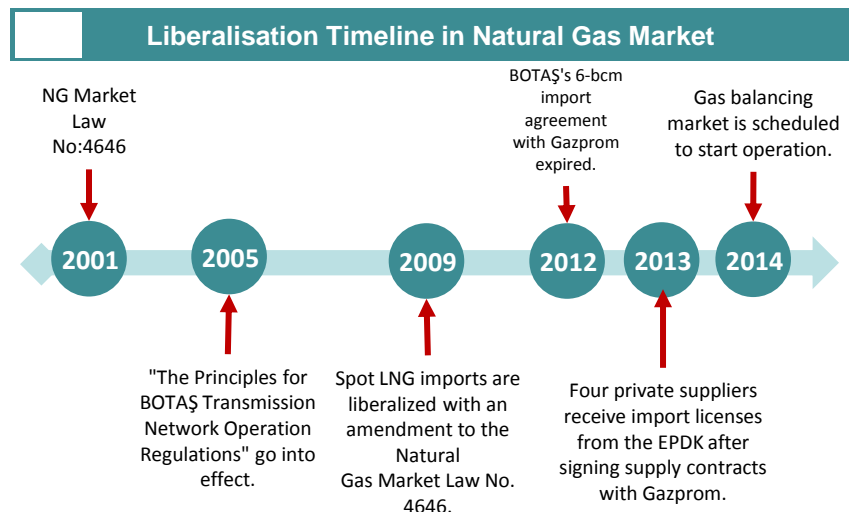
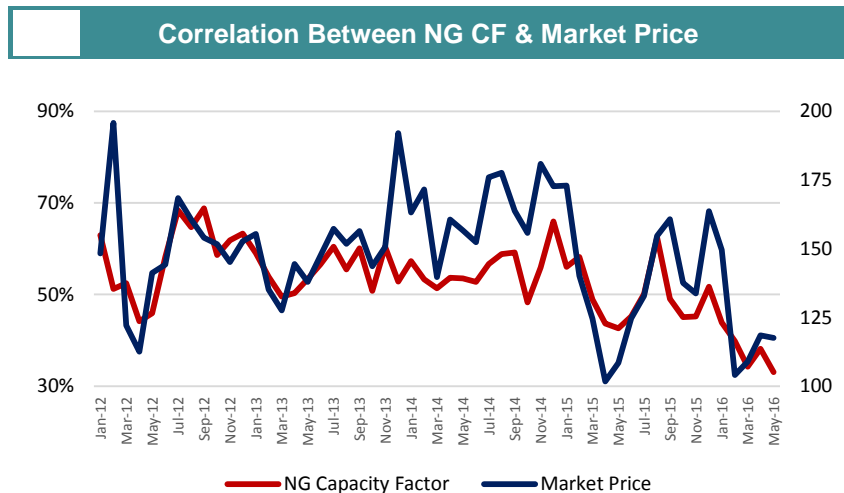
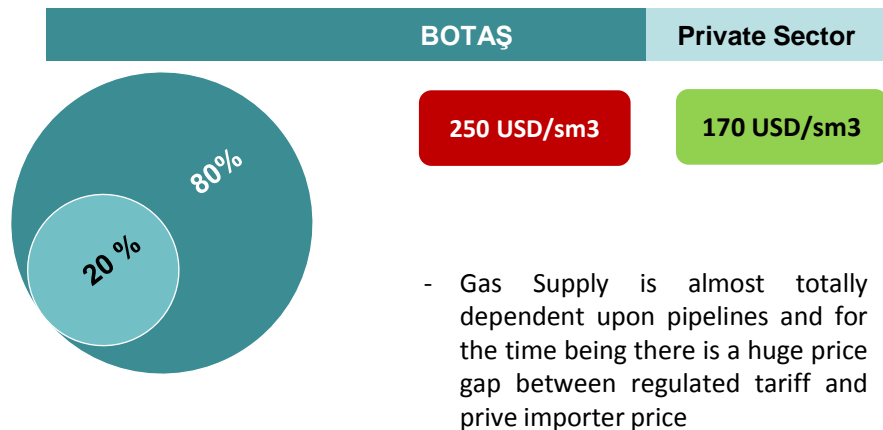
Exchange & OTC Market Expectations

- Introduction of new regulations will allow for central market clearing thus eliminating counterparty risks, which is one of the biggest problems currently in our market.
- After market clearing, procedures such as collateral netting will be used which will bring energy trading costs down and in return drive trading volumes higher.
- With the venture between Borsa İstanbul and Nasdaq expected market improvements include recalculation of collateral on a daily basis, the introduction of cascading products (quarterly, half, year) and improving collateral netting.

OTC Trading Volume Evolution Since Jan.14

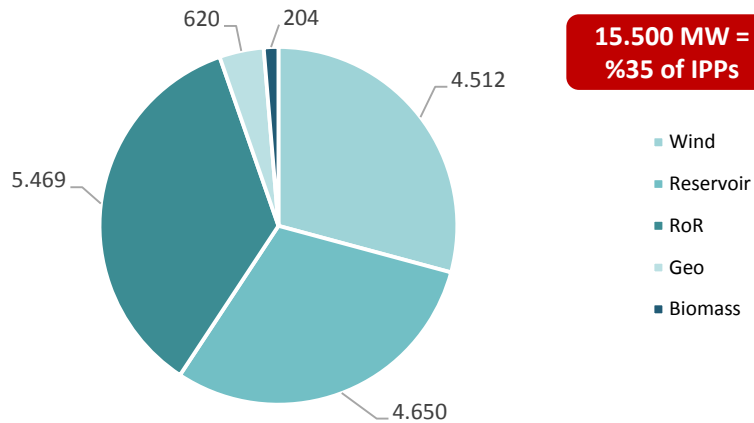


Natural Gas Market

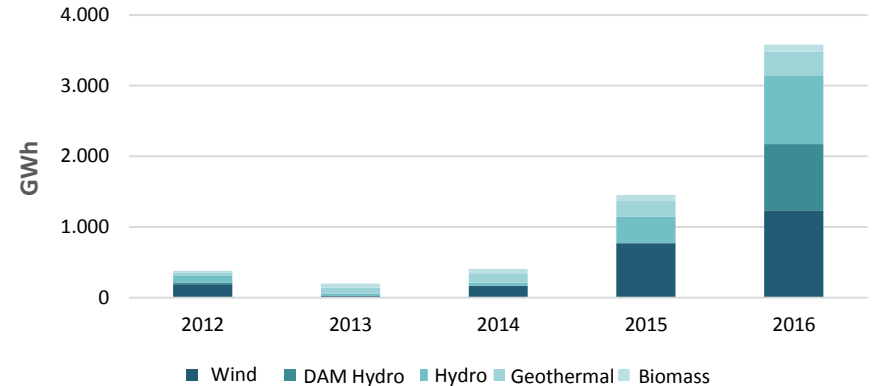


Renewable Energy Market

Capacity By Source



Renew. Generation using Feed-In Tariff as of May

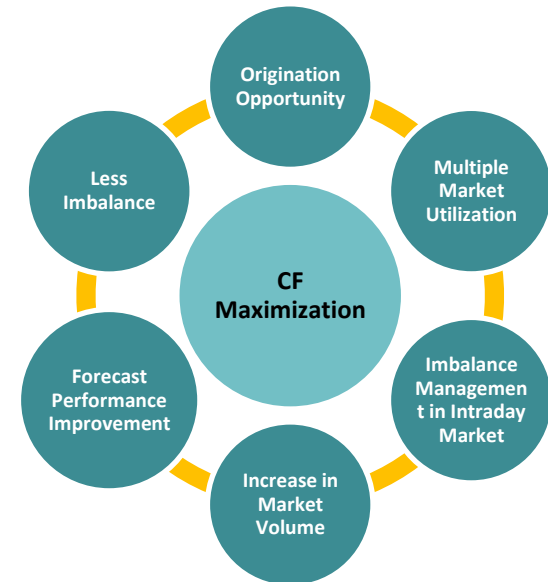


Renewable Pricing Mechanism

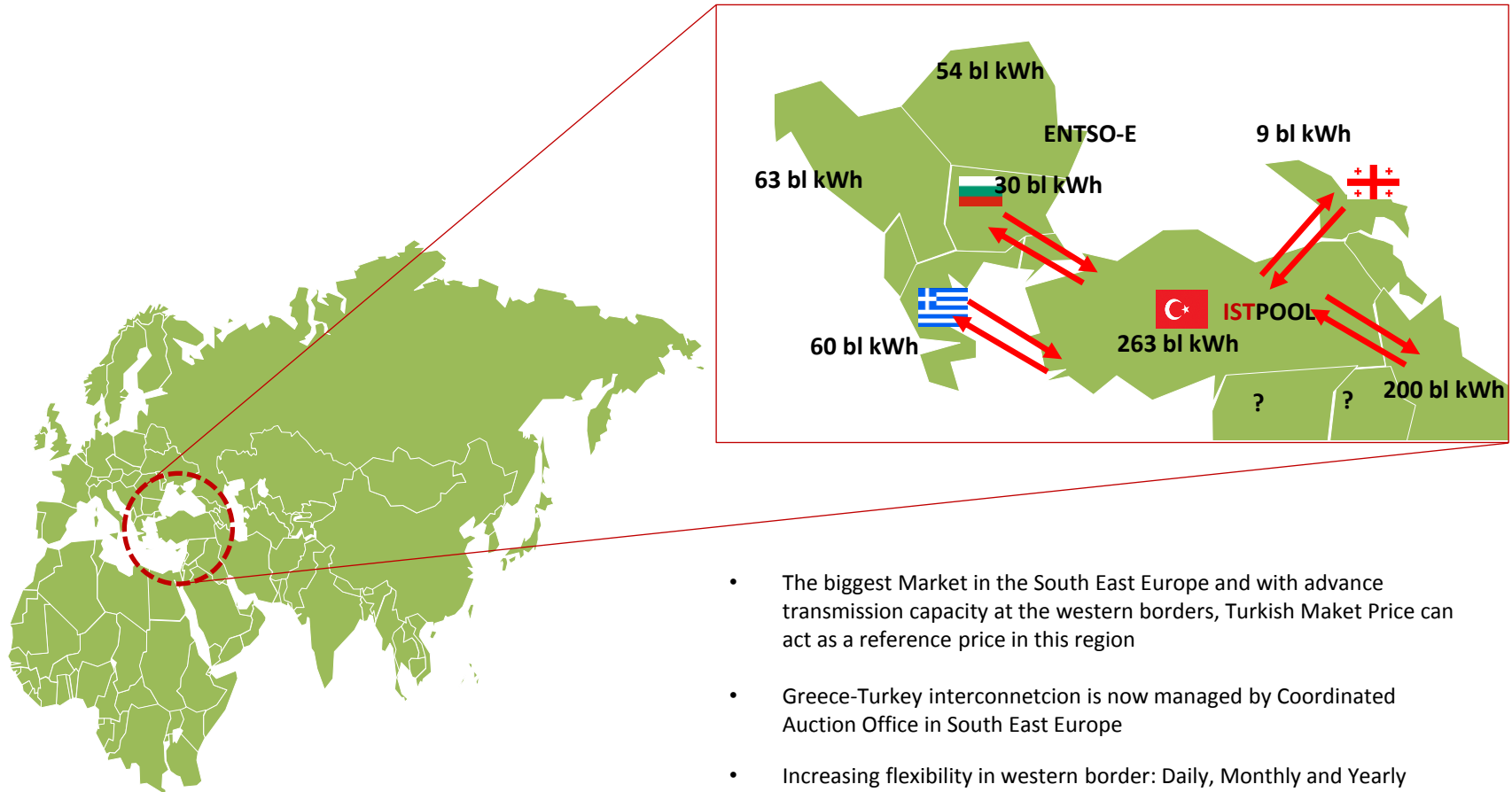
Feed in Tariff



Market Price + Feed
in Premium



Regional Energy Hub



- The biggest Market in the South East Europe and with advance transmission capacity at the western borders, Turkish Market Price can act as a reference price in this region
- Greece-Turkey interconnection is now managed by Coordinated Auction Office in South East Europe
- Increasing flexibility in western border: Daily, Monthly and Yearly Explicit Auctions

Regional Energy Hub

Georgia

- Abundance of hydro resources in Georgia provide competitive advantage in terms of generation cost.
 - In the summer, while Turkey suffers from electricity shortage and therefore high prices, Georgia has generation surplus.
- 2 transmission lines : Hopa –Batumi (only for emergency situations)
Borcka – Akhaltsikhe (2 x 350 MW)

Month	Georgia -> Turkey Net Transmission Capacity	Turkey -> Georgia Net Transmission Capacity	Georgia -> Turkey Available Capacity for Electricity Transmission
January 2016	700 MW	700 MW	700 MW
February 2016	700 MW	700 MW	615 MW
March 2016	350 MW	700 MW	205 MW
April 2016	100 MW	700 MW	0 MW
May.16	100 MW	700 MW	100 MW
June 2016	200 MW	700 MW	200 MW
July 2016	700 MW	700 MW	700 MW
August 2016	700 MW	700 MW	700 MW
September 2016	700 MW	700 MW	700 MW
October 2016	700 MW	700 MW	700 MW
November 2016	700 MW	700 MW	700 MW
December 2016	700 MW	700 MW	700 MW

*Monthly net Transmission and available capacity for Borcka – Akhaltsikhe line

Iran

- 2 transmission lines: Doğubeyazıt – Bazargan (40 MW)
Başkale - Khoy (450 MW)
- Current import/export method used is *Isolated Region Method*
- Directed Unit Method* will be used once net transmission capacity is determined.

Month	Doğubeyazıt – Bazargan (TR) (IR)	Başkale – Khoy (TR) (IR)	Iran -> Turkey Total Available Capacity for Electricity Transmission
January 2016	40 MW	450 MW	490 MW
February 2016	40 MW	450 MW	490 MW
March 2016	40 MW	450 MW	490 MW
April 2016	0 MW	0 MW	0 MW
May.16	0 MW	0 MW	0 MW
June 2016	0 MW	0 MW	0 MW
July 2016	40 MW	250 MW	290 MW
August 2016	40 MW	250 MW	290 MW
September 2016	40 MW	300 MW	340 MW
October 2016	40 MW	300 MW	340 MW
November 2016	40 MW	450 MW	490 MW
December 2016	40 MW	450 MW	490 MW

*Monthly available capacities for Doğubeyazıt – Bazargan and Başkale – Khoy lines



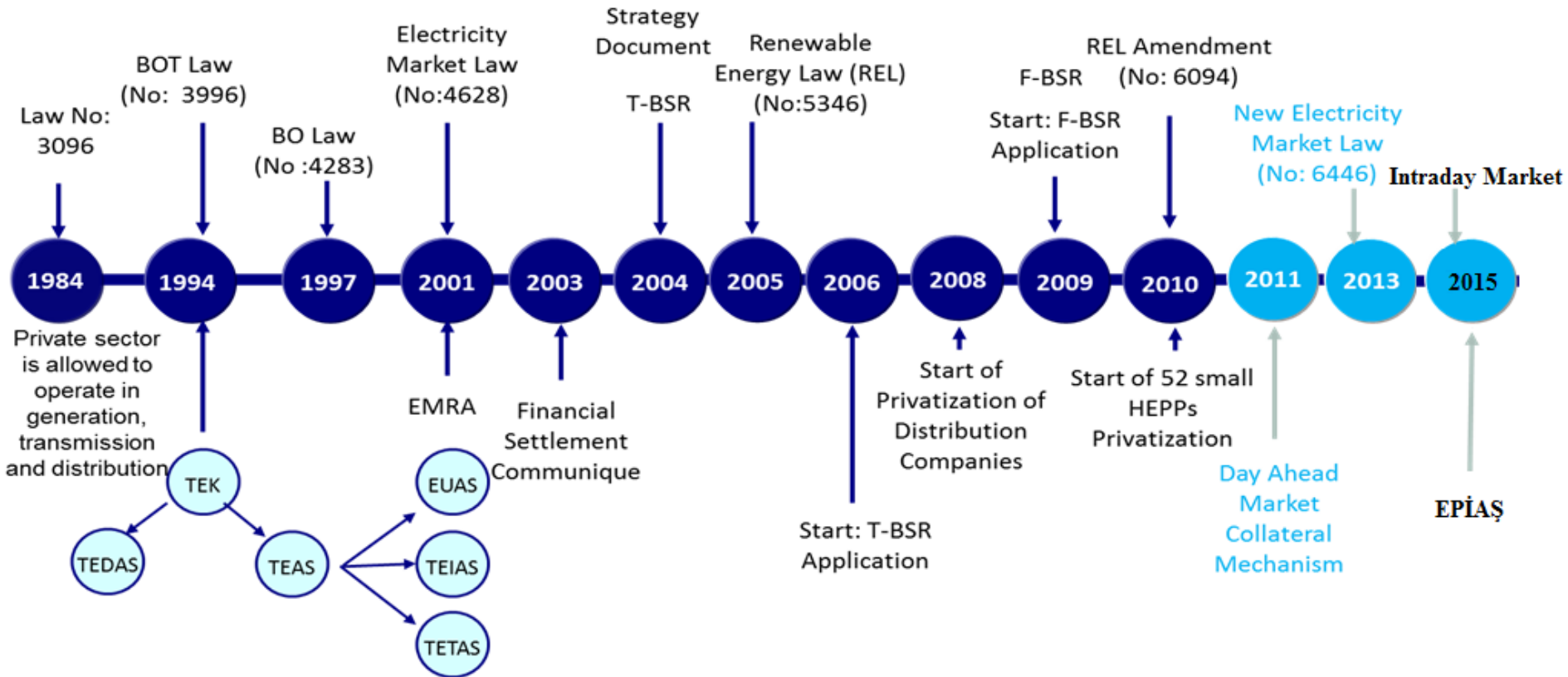
THANK YOU

Energy Trading I the Turkish Electricity Market:

Recent Developments

İbrahim Etem ERTEN

Liberalization in Turkey



Recent Developments in Turkey

- Intra-Day market become operational July 2015
- September 2015 **EPİAŞ** started its operations
 - Market operator for DAM and IDM
 - Market settler for BPM and Ancillary SM
 - Calculate Collateral requirements
 - Manage customer switching operations

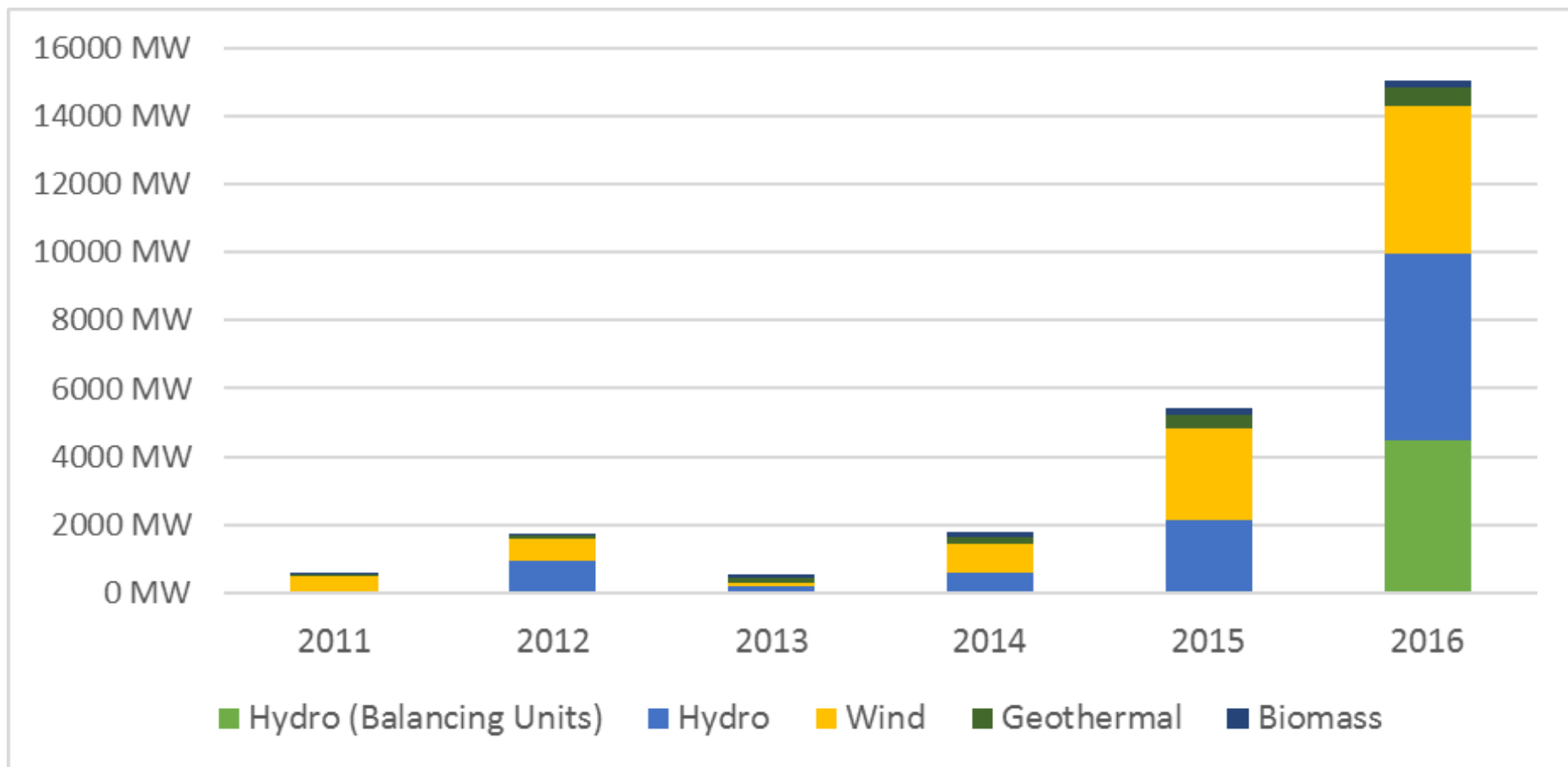
Recent Developments in Turkey

- Renewable Support Mechanism (RESSuM) changed drastically (May 2016)
- New DAM algorithm (in house software) (June 2016)
- Transparency Platform (2016)
- Eligible Consumer Portal (late 2016)

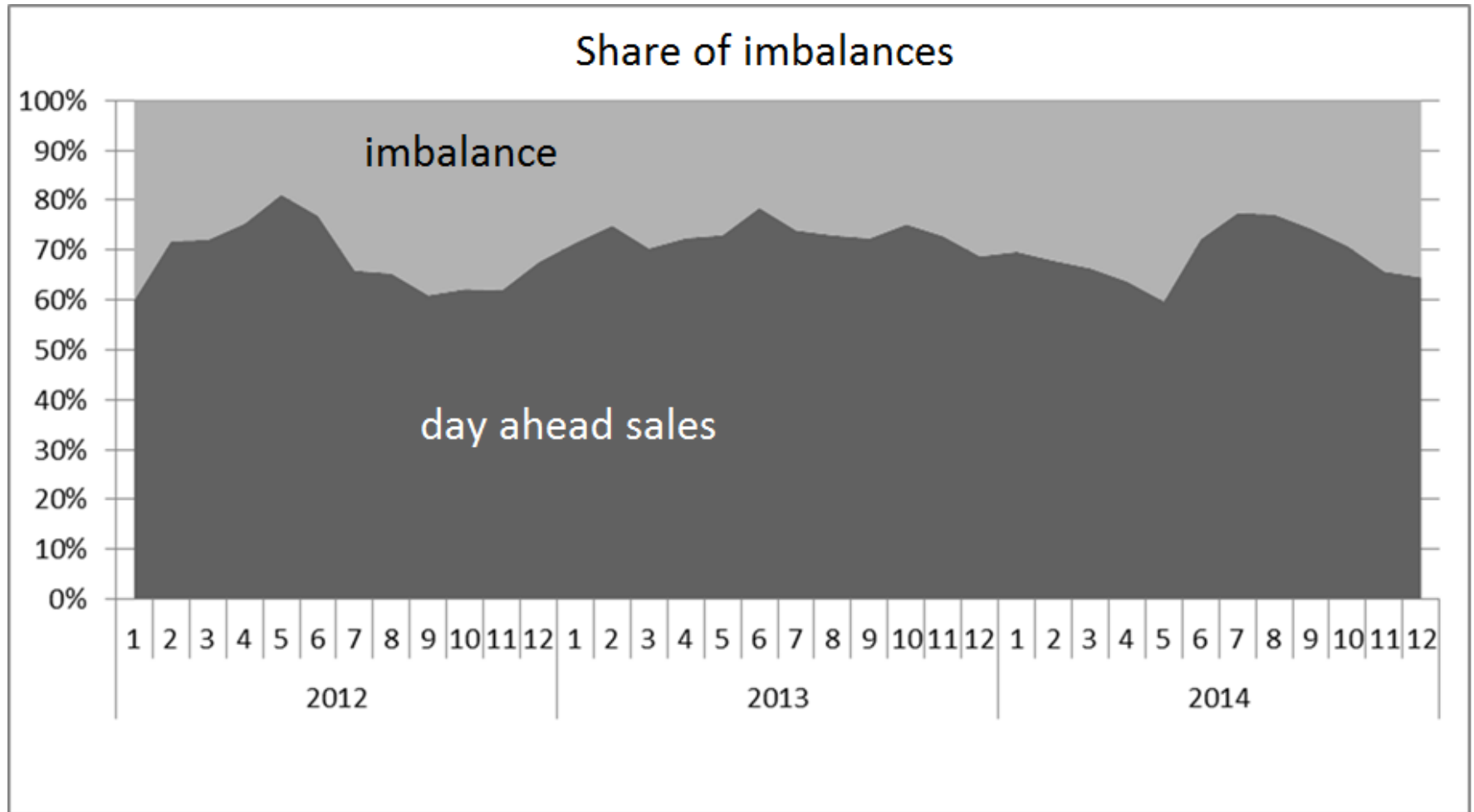
Renewable Support Mechanism (RESSuM)

- 15.286 MW application for FiT
- 4387 MW hyro-generation above 30 MW
- 2.055 MW new renewable generation introduced to the market in 2015

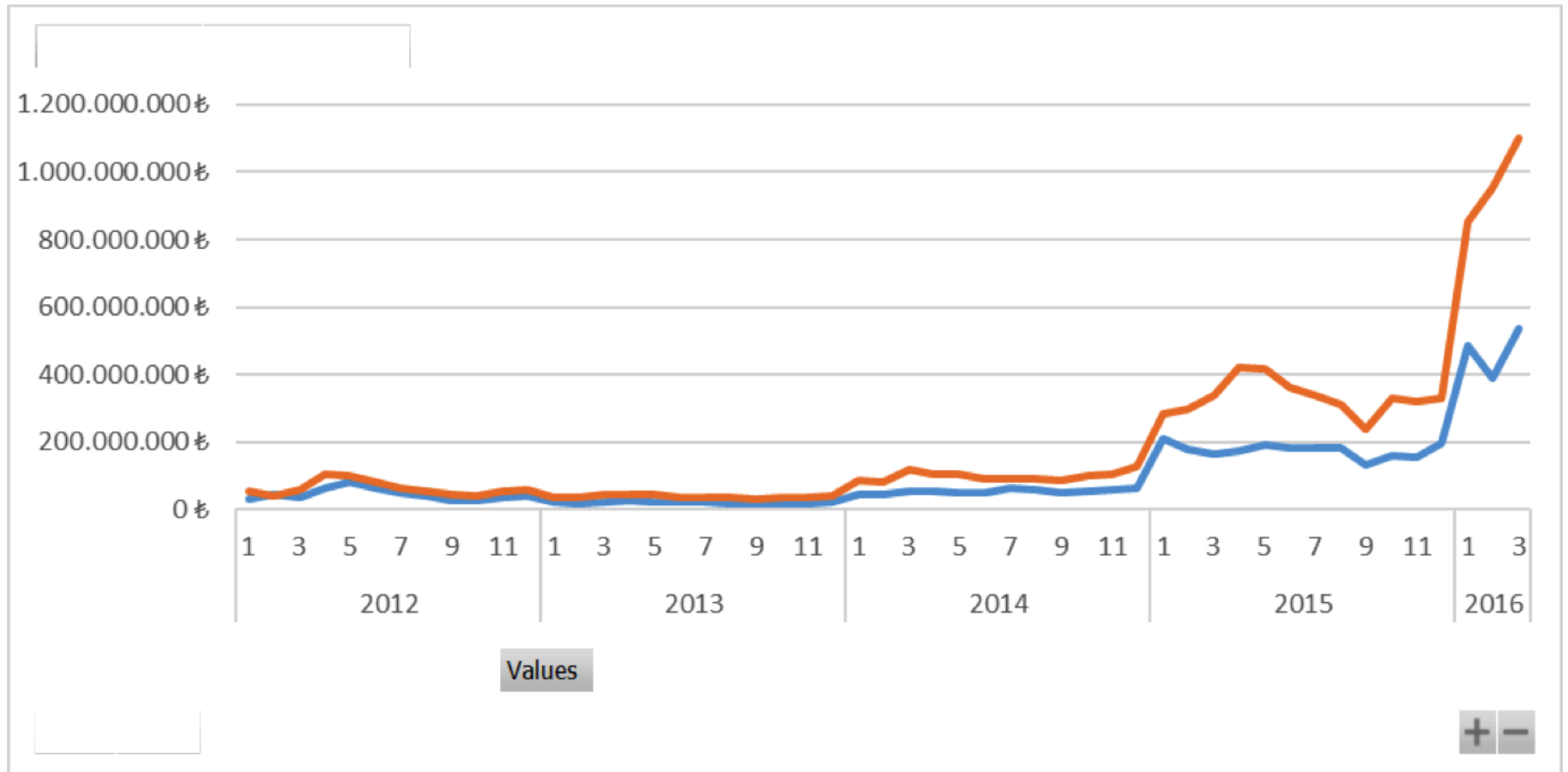
RESSuM



RESSuM Imbalances

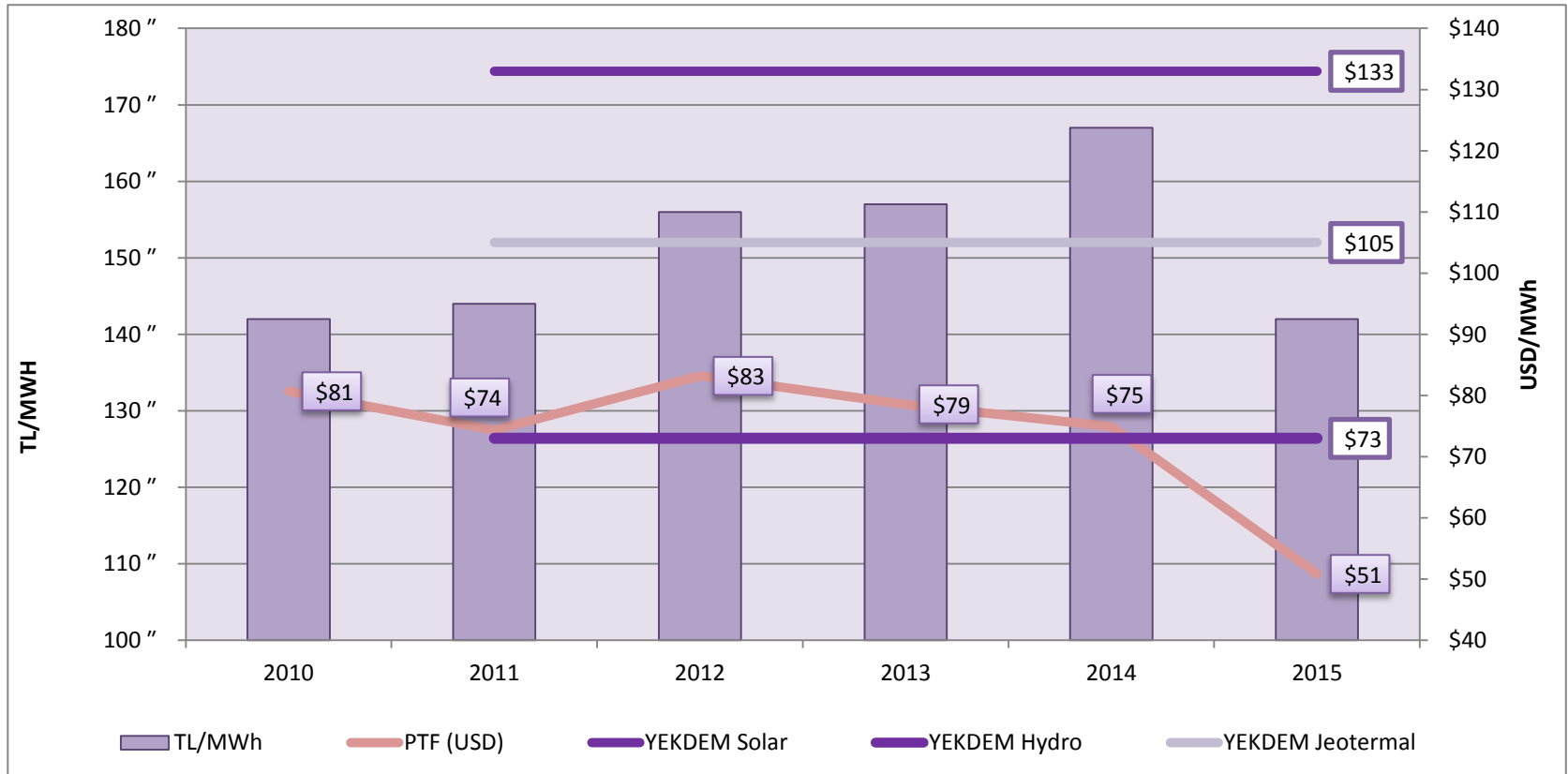


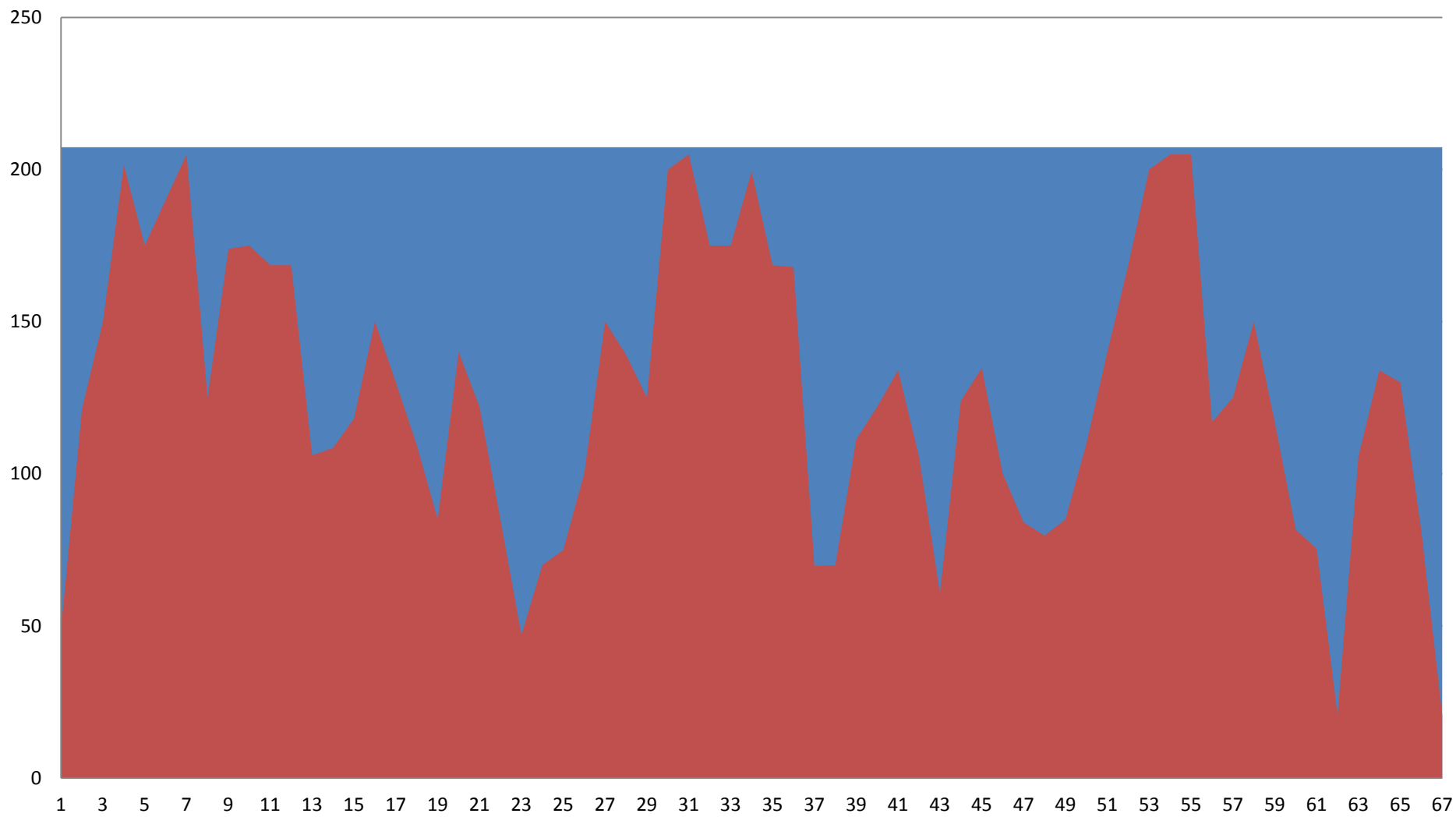
RESSuM Costs



Cost vs Revenue of the Virtual Generation Company called RESSuM (YEKDEM)

MCP (PTF) vs FiT





■ 7,3 Dolar Cent ■ PTF*0,98

Ancillary Services Markets (ASM)

Regulation will be changed head to foot

- **Primary reserve procurement**
- **Secondary reserve procurement**
- **Change in test requirements**
- **Introduction of Demand Response to ASM**

IS

RG Continental Europe

RG Nordic

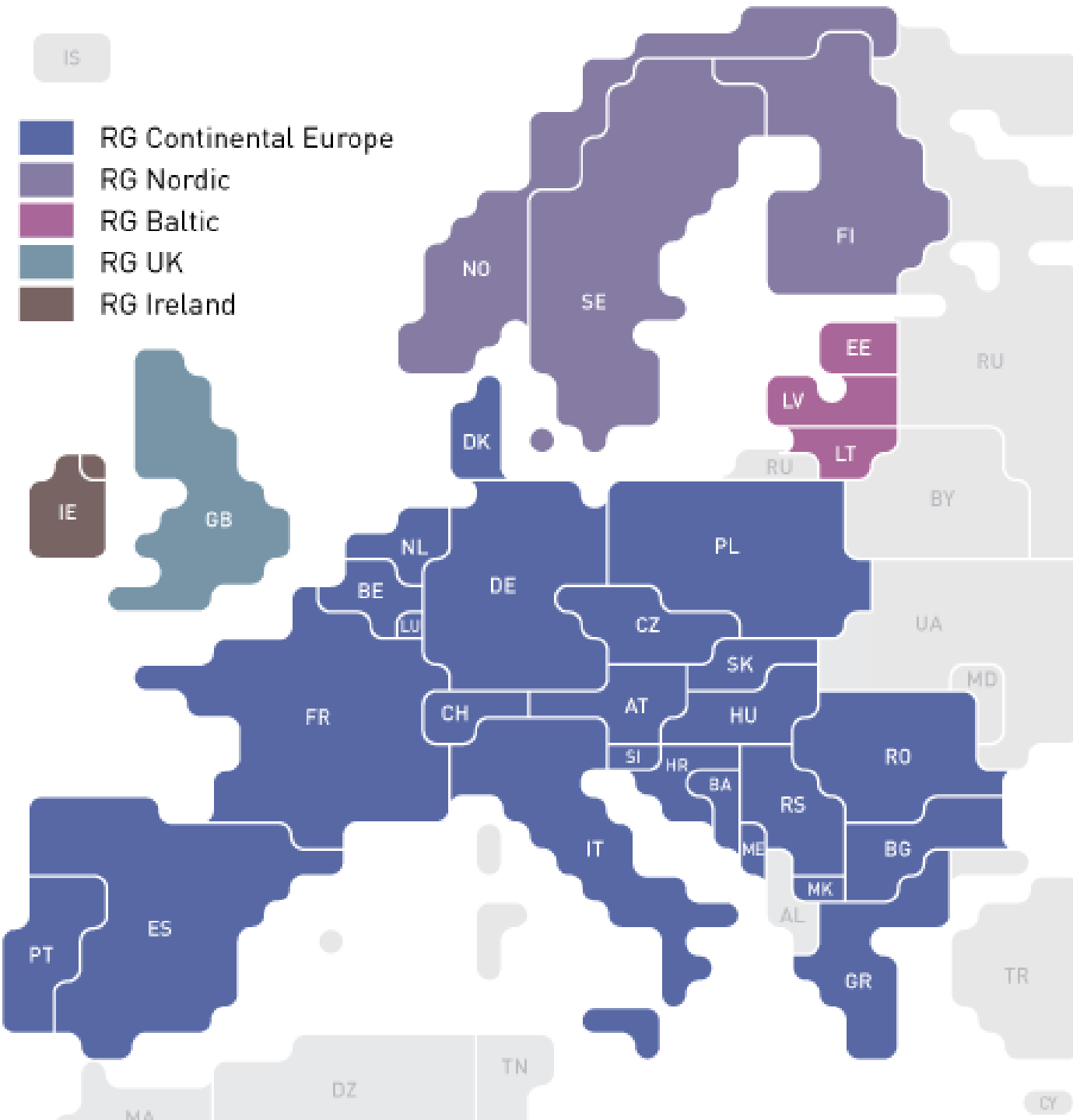
RG Baltic

RG UK

RG Ireland

ENTSO-E

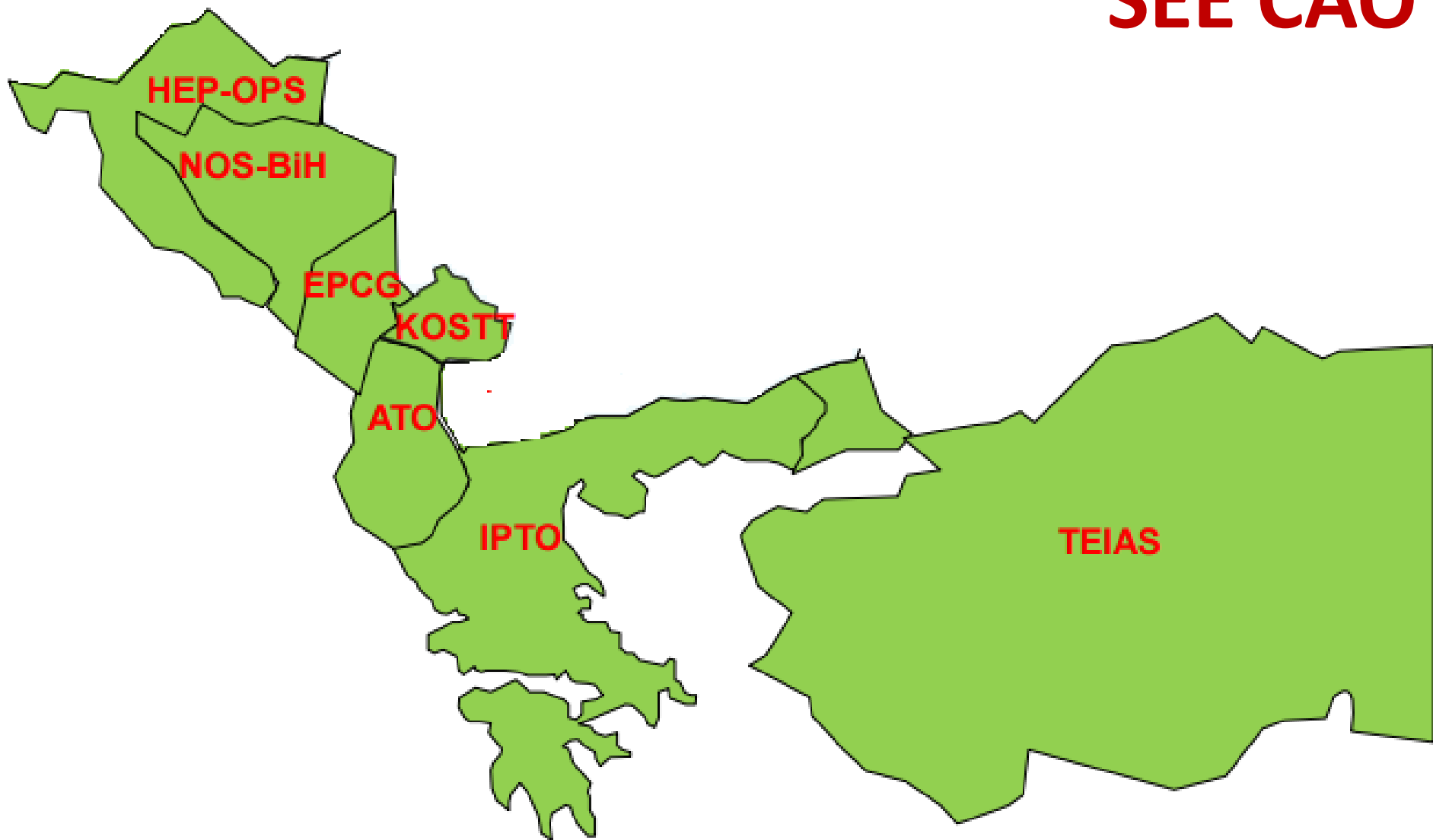
- 41 TSOs from 34 countries
- Turkish grid operator, TEIAS, joins ENTSO-E as observer member 14/01/2016



Turkey's ENTSO-E History

- **September 4, 2013 ENTSO-E stated success of trial operations and approved further arrangements for permanent synchronous operation.**
- **April 15, 2015 Turkey and ENTSO-E has signed the 10 year «Long Term Agreement»**
- **14 January 2016 TEIAS signed an agreement to become the first observer member of ENTSO-E**

SEE CAO



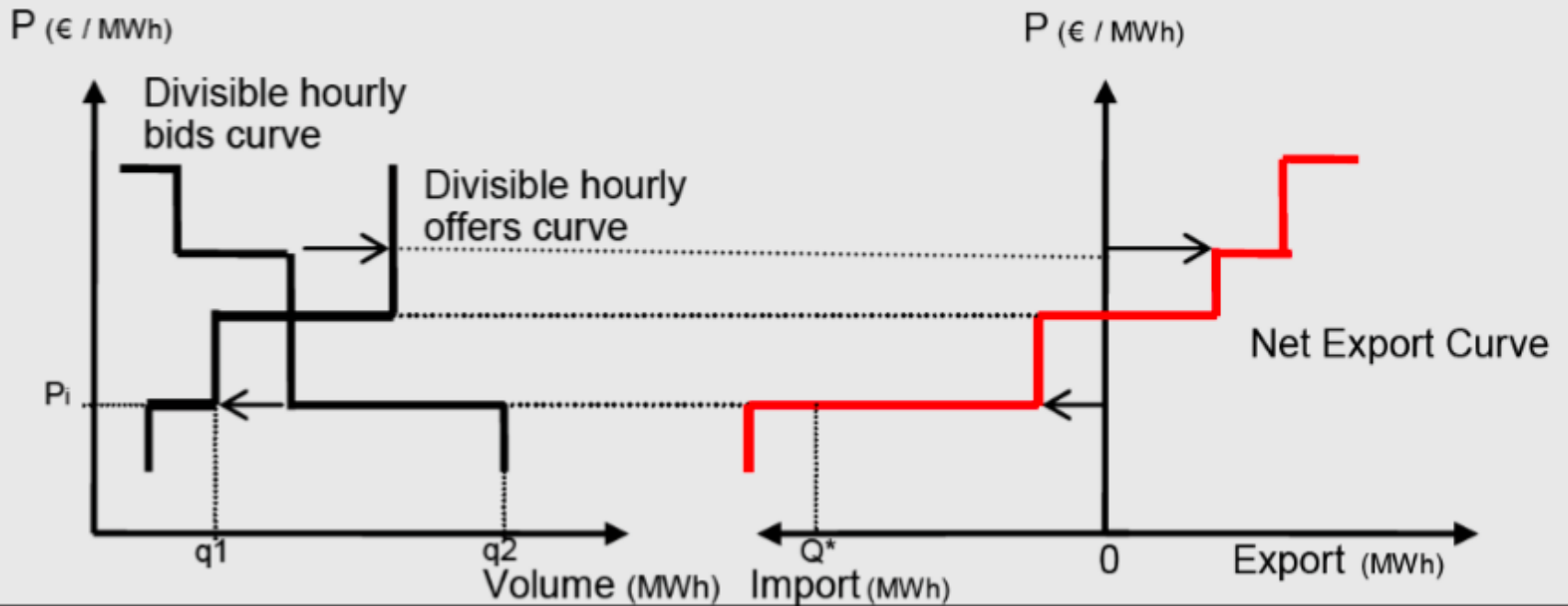
- Turkish TSO (TEİAS) is one of the shareholders of Project Team Company (PTC) which was responsible to establish SEE CAO
- GR-TR, with monthly auctions launched on 15 September for October 2015, after which, the daily auctions took place on 30 September.

- 400 kV transmission line (Akhaltsikhe (Georgia) – Borçka (Turkey)) together with a DC back-to-back station at Georgian side. **700 MW capacity** when there is no congestion in Turkey or Georgia.
- According to the provisions of the Cross Border Trade Agreement and the Interconnection Operation Agreement the **exporter carry out capacity allocation**.
- Construction of a new 154 kV transmission line (Batumi (Georgia)–Muratlı (Turkey)) together with a DC back-to-back station at Georgian side are foreseen.

Wide range of possibilities:

- Coordinated auctions
- PX node
- Implicit model / Market Coupling
 - Volume Coupling?

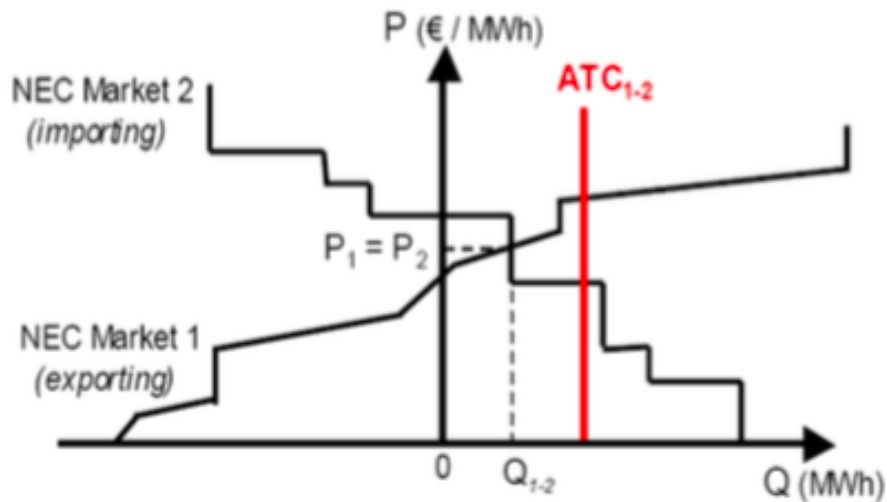
Volume Coupling



Volume Coupling

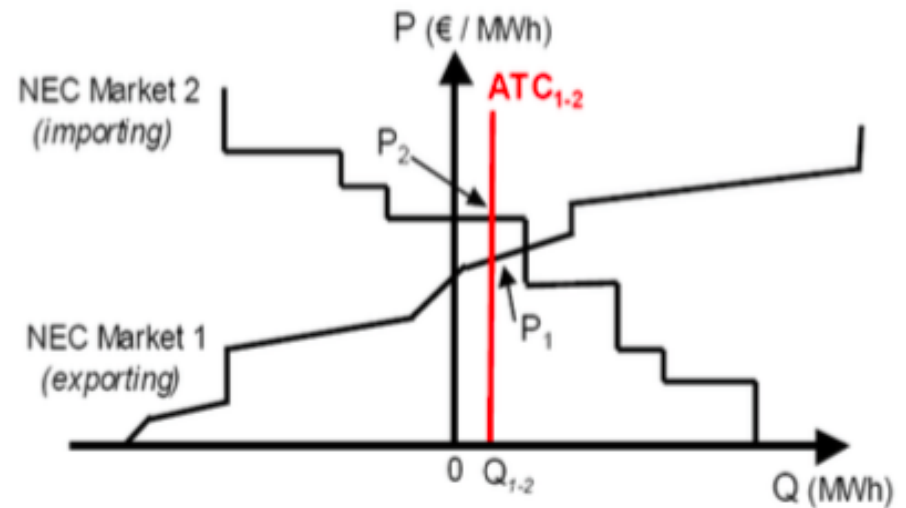
Non congested situation

($ATC_{1,2} > flow_{1,2}(Q_{1,2})$)



Congested situation

($ATC_{1,2}$ limits $flow_{1,2}(Q_{1,2})$)



Energy Exchange vs OTC

EMRA does not have jurisdiction over OTC markets

Need for REMIT style primary legislation

EMRA's perspective: focus on healthy formation of DAM price and work on preparation of REMIT style regulation for future