ΡΥΘΜΙΣΤΙΚΗ ΑΡΧΗ ΕΝΕΡΓΕΙΑΣ
REGULATORY AUTHORITY FOR ENERGY

Reforming the Greek Electricity Market:

Key Issues and Challenges

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Athens, 25-26 October 2016

Reforms in Progress

Electricity Market:

- Target Model Implementation
- NOME auctions
- Auction-based Capacity Mechanism
- Transitory Flexibility Mechanism (from 1.5.2016, for 1 year)
- Commitments under the Flexibility Mechanism, e.g. hydro-pricing methodology

Gas Sector:

- Structural changes - Unbundling of distribution and supply
- Distribution Tariffs derived for the first time, Distribution Code to be issued
- Amendment of Network Code, Revision of Transmission Tariff Regulation

Electricity Markets: Challenges at EU Level

- Impact of RES

  RES suppress SMP and displace conventional production,

  while requiring flexible systems -> Viability of gas plants?

- More than 20 GW of gas plants mothballed in Europe

- Even if capacity surplus exists, this could be temporary and fragile

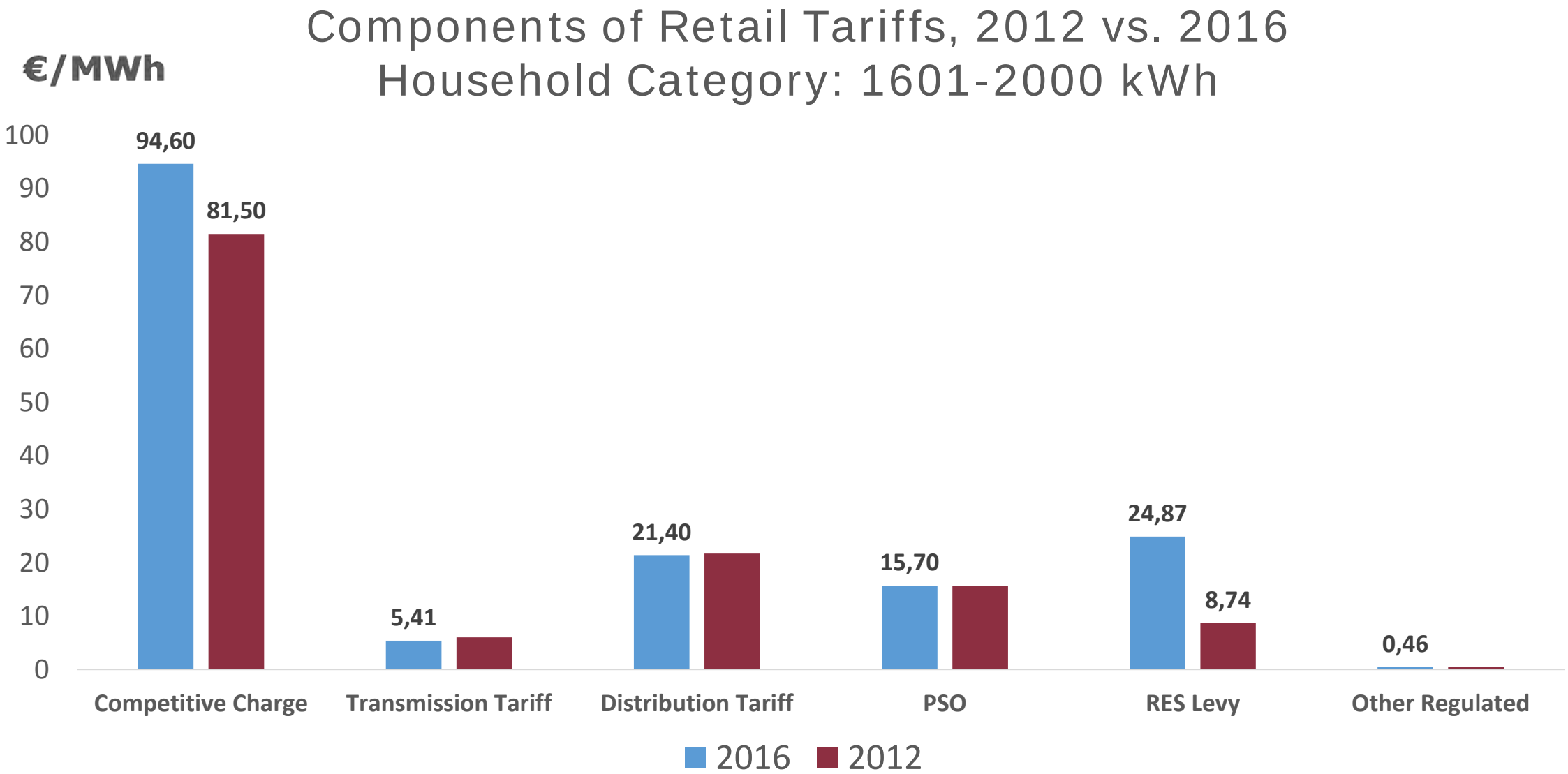
- Transition to feed-in-premium and RES auctions

  In parallel, more ambitious environmental targets for 2030

- Higher overall costs, often distributed across stagnating demand

- Storage: Crucial. Still, needs to make its business case, barriers
- Retail prices irresponsive to wholesale price drops

Household bills not reflecting the expected effects of market restructuring yet



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Specificities and Dynamics of the Greek Electricity Market

Key Facts and Challenges

- Market Structure

  PPC - Dominant player in both wholesale and retail

  79% of conventional capacity, 88% retail share

  77% of conventional production (August 2016),

  53% of DAS volume (RES included, without cross-border flows)

- Incentives for new capacity, to address anticipated capacity shortage

  Capacity payments over 2006 - 2014

  2500 MW by IPPs (6 CCGT, 1 OCGT)

  New capacity by PPC

- Generation Mix: Well-balanced across lignite, gas, hydro, renewables

Key Facts and Challenges

- Asymmetries
  Portfolio of Lignite and Hydro assets: PPC Only
  More flexible (Multi-shaft) CCGT: PPC Only

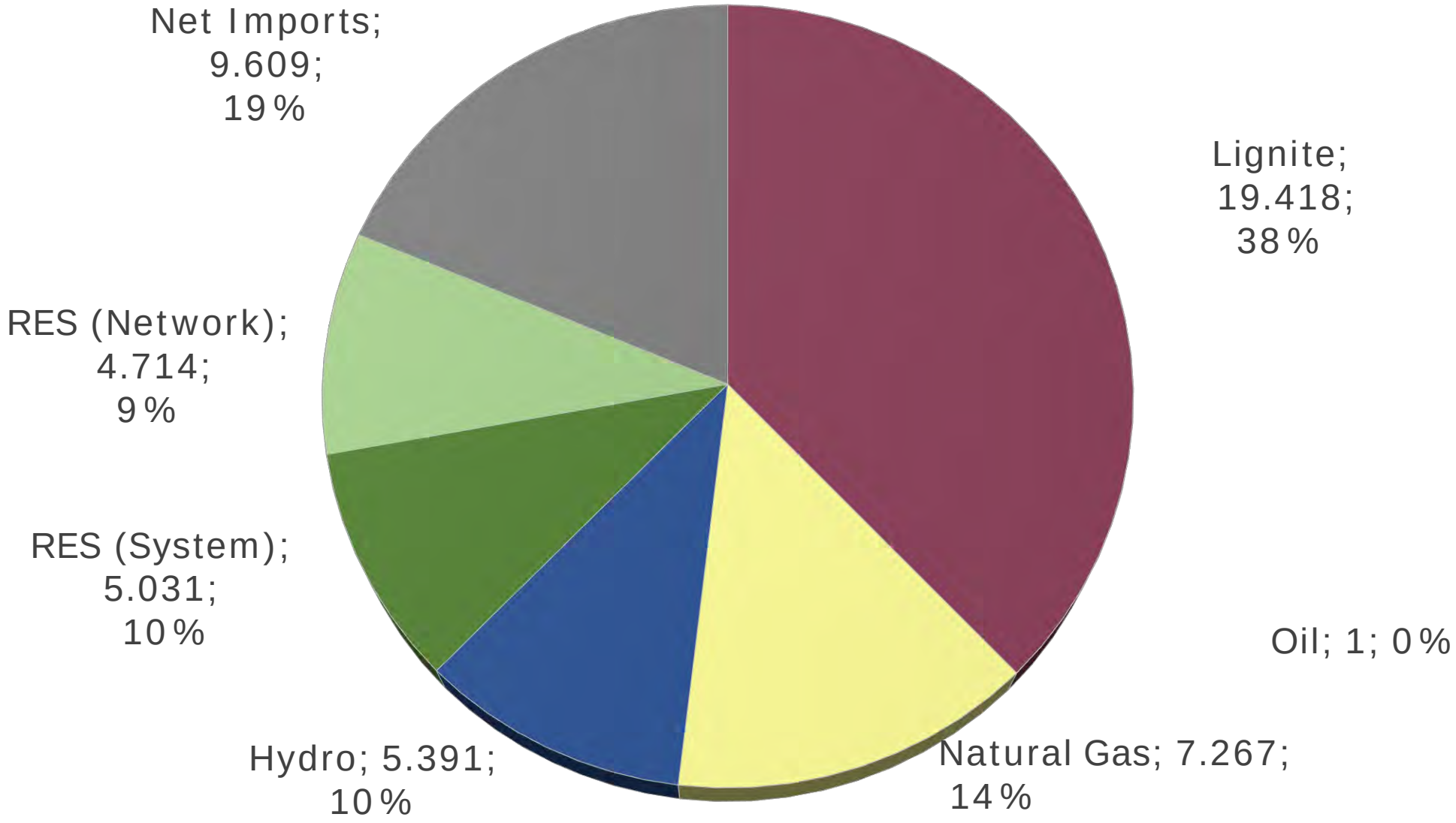
- Intense competition among CCGT units
  Reflected on the dynamics of bidding and technical parameters

- Fuel Competition
  Lignite vs. Gas (impact of falling oil prices)
  Emerging since October 2015

- Mandatory quantities -> Reduce the competitive segment of demand
  Hydro, RES, Commissioning units

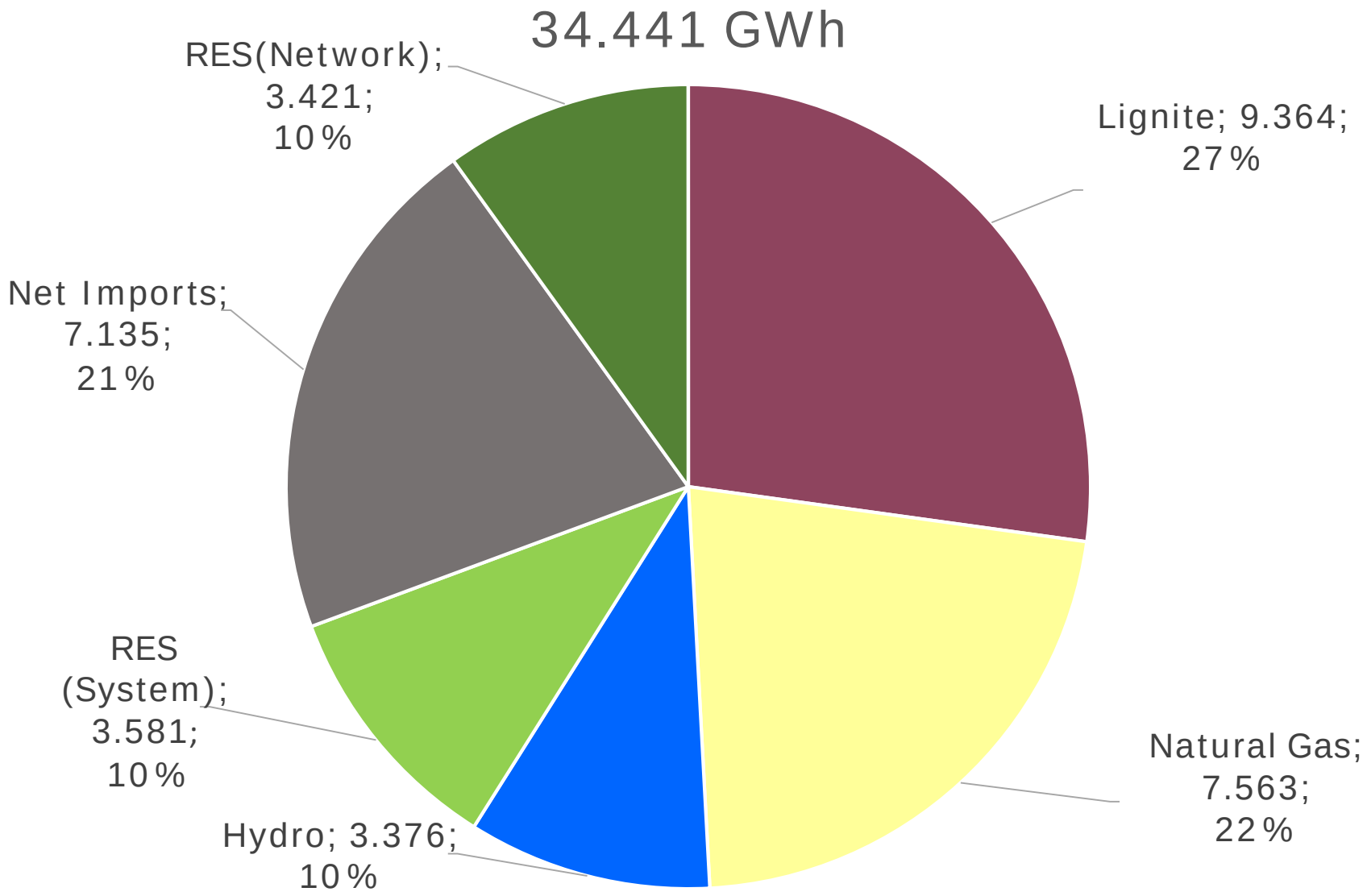
Energy Mix (GWh), 2015

51.430 GWh

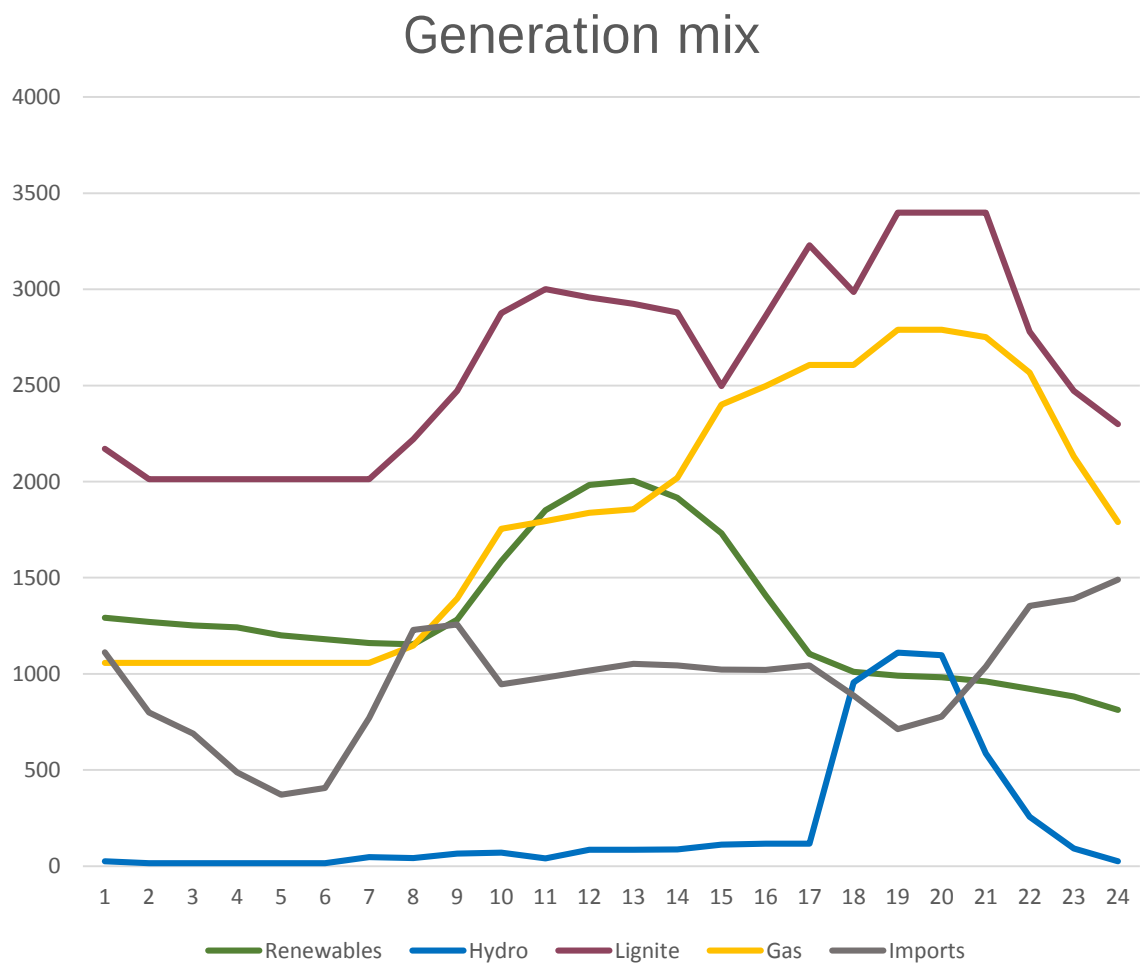


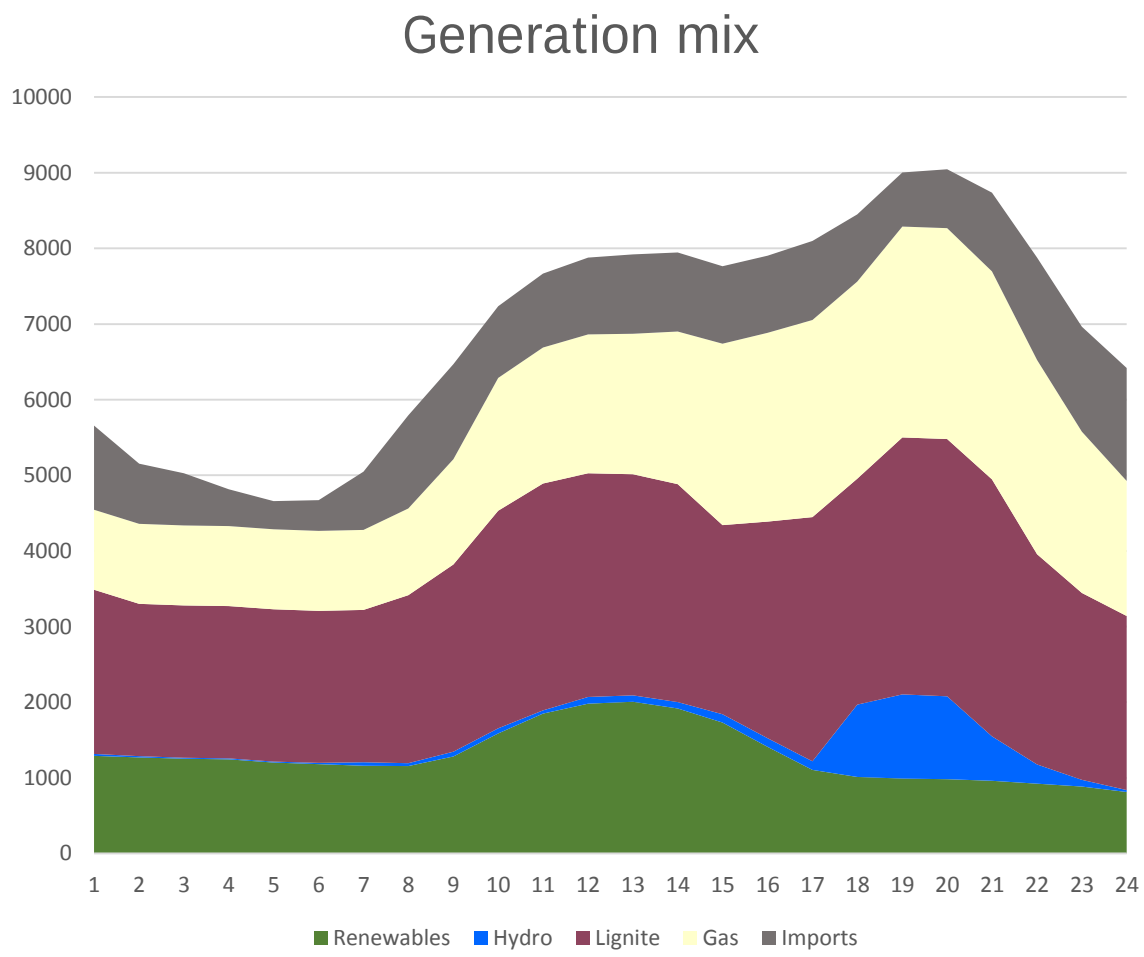
Impact of Oil Prices

Energy Mix (GWh), January - August 2016



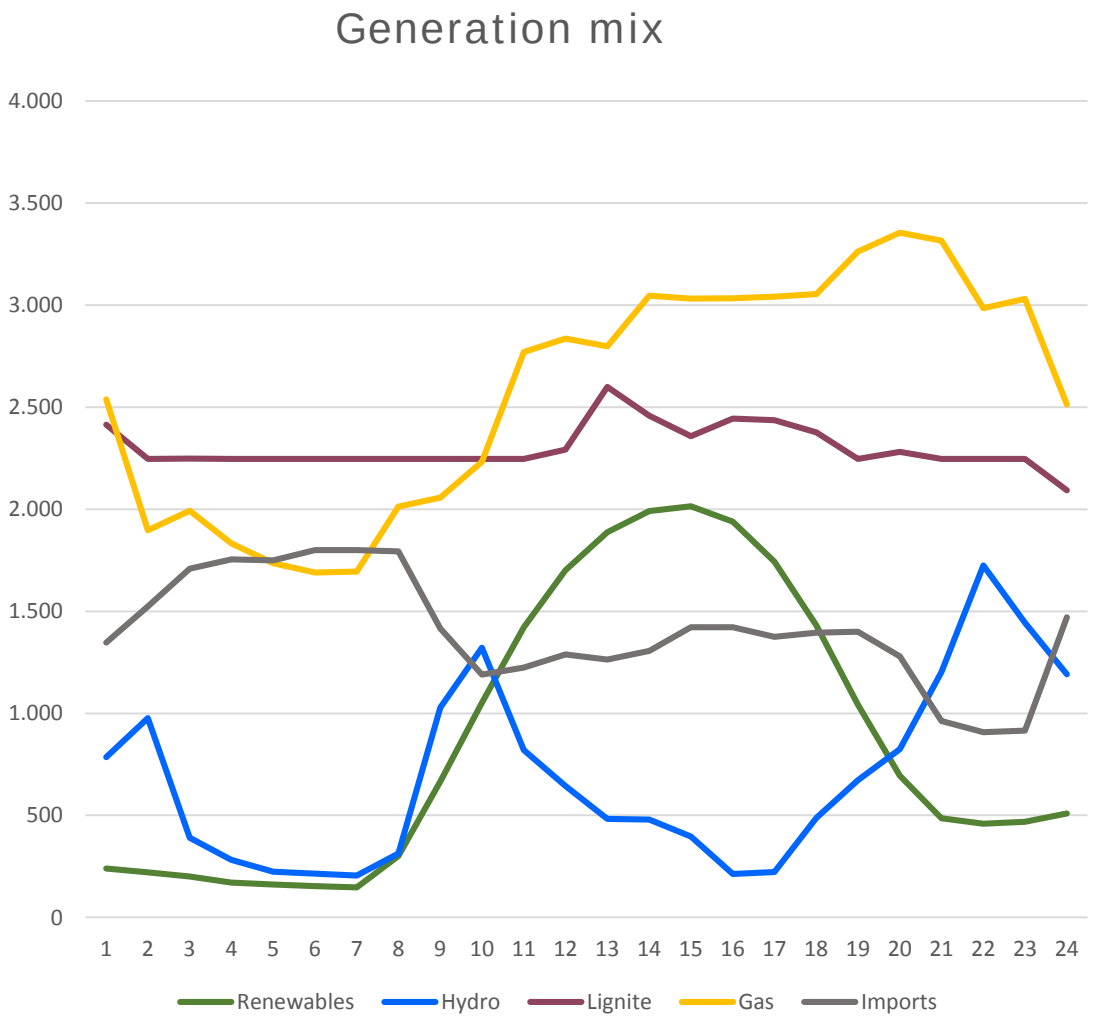
Winter Demand Peak - 31.12.2015

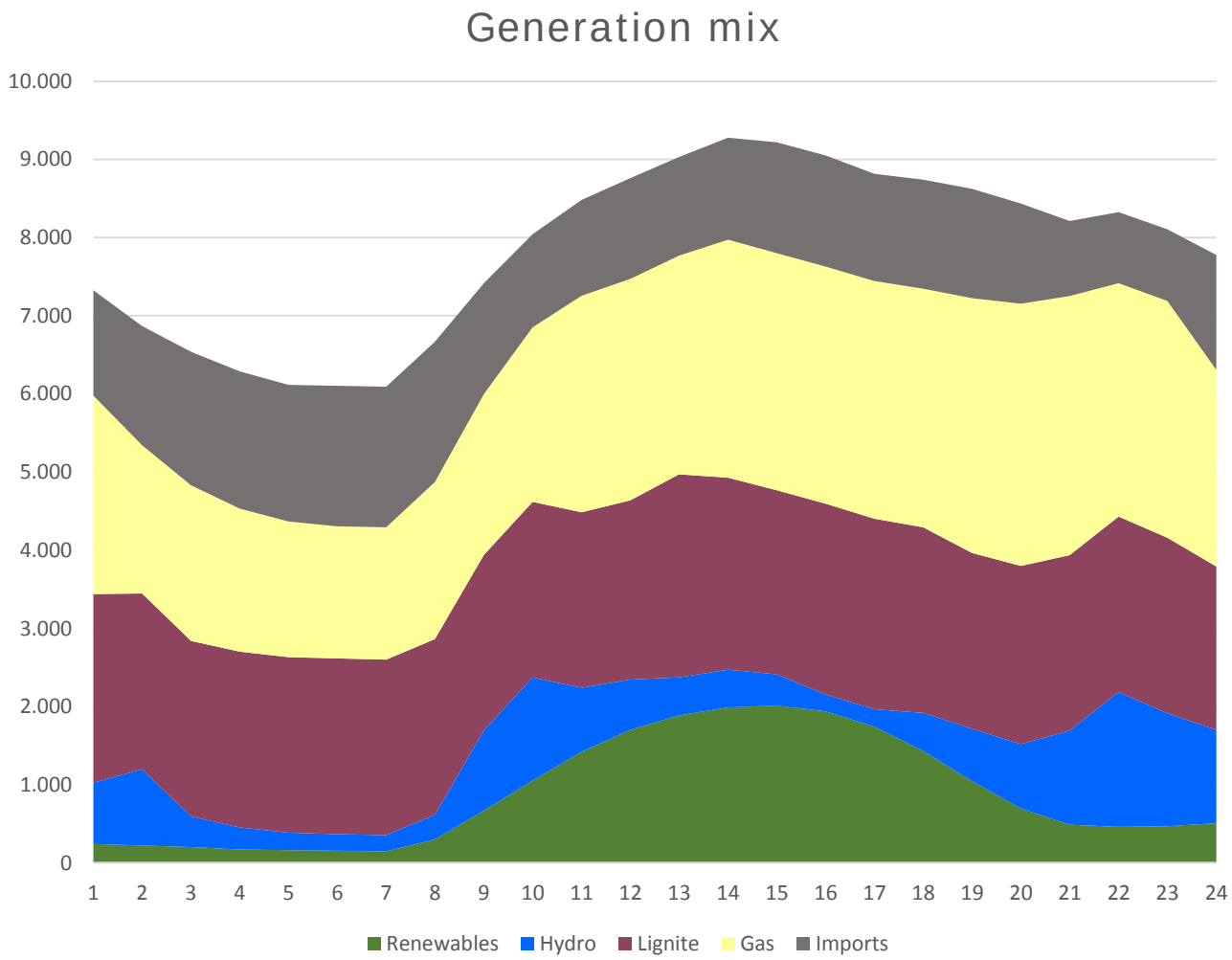




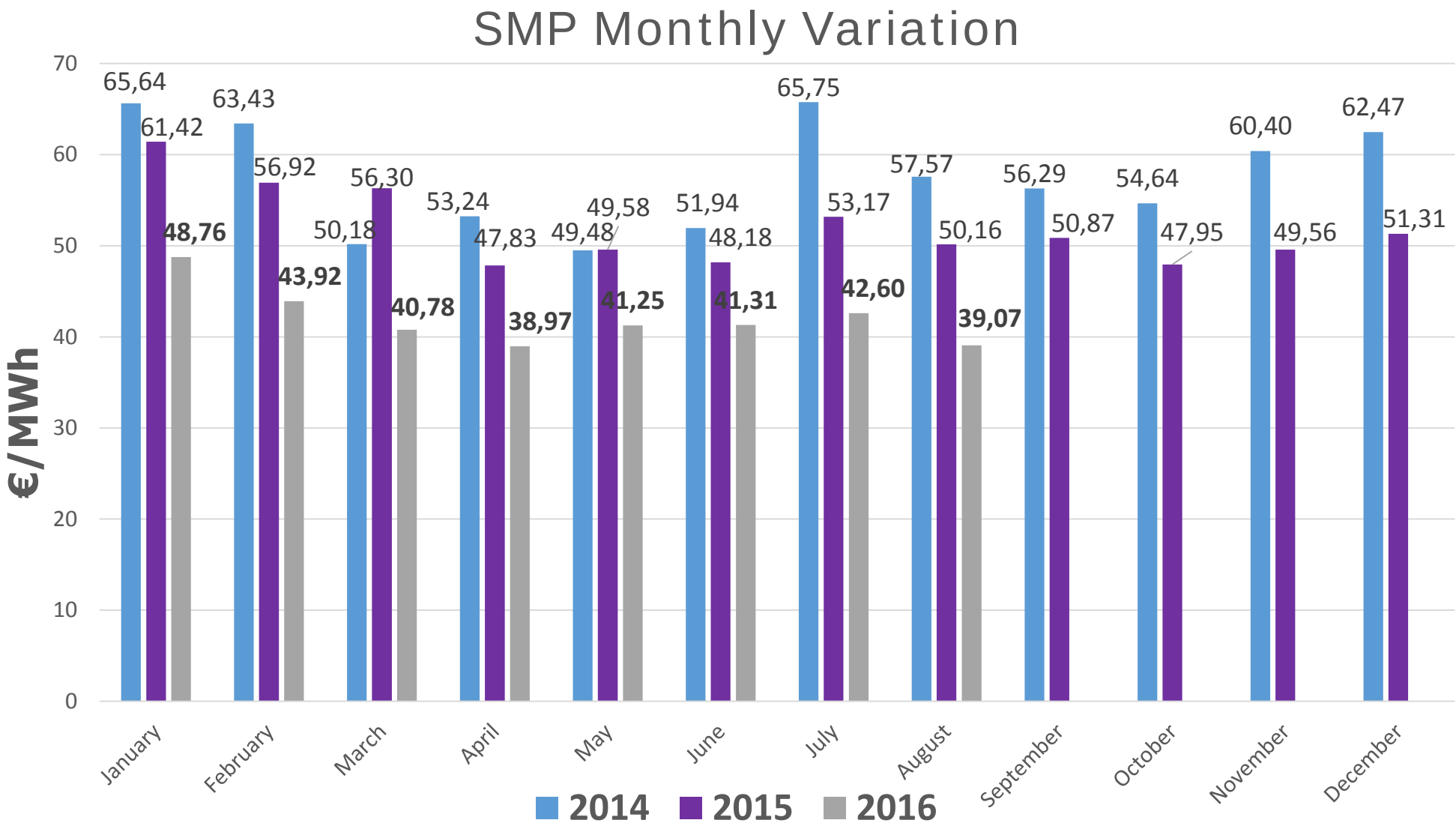
Impact of Oil Prices

Summer Demand Peak - 15.07.2016

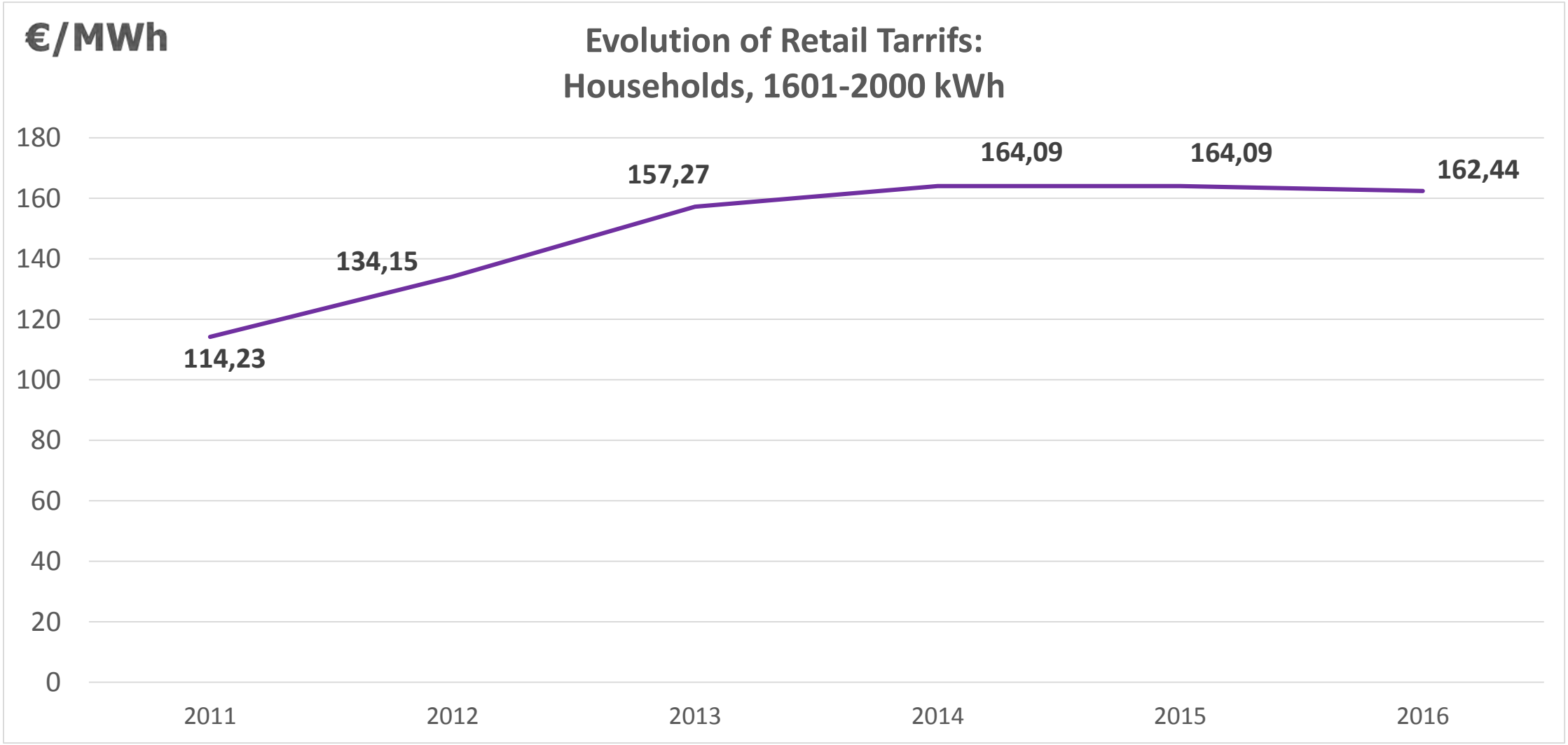




Dynamics of Wholesale Prices



Consumers not seeing the effect of wholesale price drop



NOME Auctions

- To enhance competition in retail market
- Remedy for asymmetry due to PPC's exclusive access to lignite and hydro plants
- Similar to French paradigm, different from previous proposals
- Concept: Hypothetical, baseload product (mix of lignite and hydro)
  RAE derives variable cost, as outlined in law
  This product is auctioned to alternative suppliers
- Target: 50% decrease in PPC's market share by 2020
  Annual targets, implications if not reached

NOME Auctions

- RAE proposed the reserve price, which was adopted at a ministerial decision
- RAE approves quantities, products, auctions schedule
- 1st auction: 25th October 2016, 1-year product, 460 MW, physical delivery from December onwards
- To deter abusive practices:
  Limit on the auction quantity per participant?
  Limit on exported NOME quantities?
  Traders: facilitators in the secondary market
- Emphasis on monitoring vs. apriori constraints
- Benefits should be balanced across consumer categories

NOME Auctions - Challenges

- Dual economic incentive: price security and discount on SMP
- Inevitably, uncertainty about the underlying competitive advantage
- Reference data used in calculations substantially different from current values (e.g. CO2 prices)
- Frequency of reserve price revisions: Crucial
- 1st Impact Assessment by RAE: July 2017
- In-depth monitoring of retail market
  Competitive prices and revenue per consumer category
  Compliance of terms and conditions of retail contracts with Supply Code
  Development of new products

Why consumers do not switch? Commercial Barriers - CEER Report

- Switching rate: 6.3% (EU level) but 31% in Portugal
- Consumers' misperception about insufficient gain
  e.g. in Netherlands: perceived annual gain 85 € vs. realized gain 147 €
- Lack of complete, understandable and comparable information -> Guidelines on price comparison tools
- Vague conditions, unjustified termination fees, value added services difficult to assess
- Misperception about complexity of switching process
- Inertia / loyalty rather than satisfaction
- Broad customers' distrust to the energy markets
- Complexity of bills, substantial regulated component

Utilities' Distrust about competition effects

Consumers' Distrust about collusive practices
and excessive profits

Auction-based Capacity Mechanism (I)

- Previously, the capacity scheme was administratively set (570 mil. € in 2014)
- DG Comp: Transitional flexibility payments (45000 €/MW, max budget 220 mil. €) for 1 year vs. the alternative of 25000 €/MW for 2.5 years
- RAE assessed the counter-factual scenario and issued decisions for 30 plants (175 mil)
- Security of Supply

  Deter plant mothballing due to RES impact. Lignite plants retirements.
- Key principle: Price coverage for consumers until competition intensifies,

  given the price cap adjustment and limited hedging tools
- Currently, a proposal to DG Comp for Reliability Options, similarly to Italy and Ireland
- Auction winners: capacity obligation + implicit cap on their market revenues

Auction-based Capacity Mechanism (II)

- TSO's Generation Adequacy study:
  Security of supply risk in 2020, or earlier,
  reflecting the decommissioning of 5 lignite plants due to environmental constraints
- 3-year ahead auction for 2020, including new capacity
- Annual auctions for intermediate years
- Crucial parameters:
  - Participation of Demand-response and RES
  - Interconnections
    Initially, derating with methodology similar to UK
- Define Demand Curve - Specify rules for market power mitigation
- Study of flexibility requirements is expected by the TSO (JRC technical assistance)

In-depth Assessments by DG Comp
The Italian Case

- Italian regulator, September 2013 : "Italy will launch a capacity market to subsidise fossil-fuelled back-up electricity generation as of 2017".
- The TSO should hold the first auctions to strike option contracts with electricity generators within 2013, as the capacity mechanism proposal requires a four-year lead time between the auctions and the contracts coming into force."
- TSO: 12 plants totalling 3.2 GW were switched off in 2012, while 5 additional plants of 1.3 GW would follow.
- The regulator ruled out any interim lifeline for conventional power plants.
- 3 years later, no auction has been conducted yet.

In-depth Assessments by DG Comp
The French Case

- EPEX, January 2016: "The launch of an organised market for French electricity capacity certificates will not go ahead before the conclusion of the EC investigation".

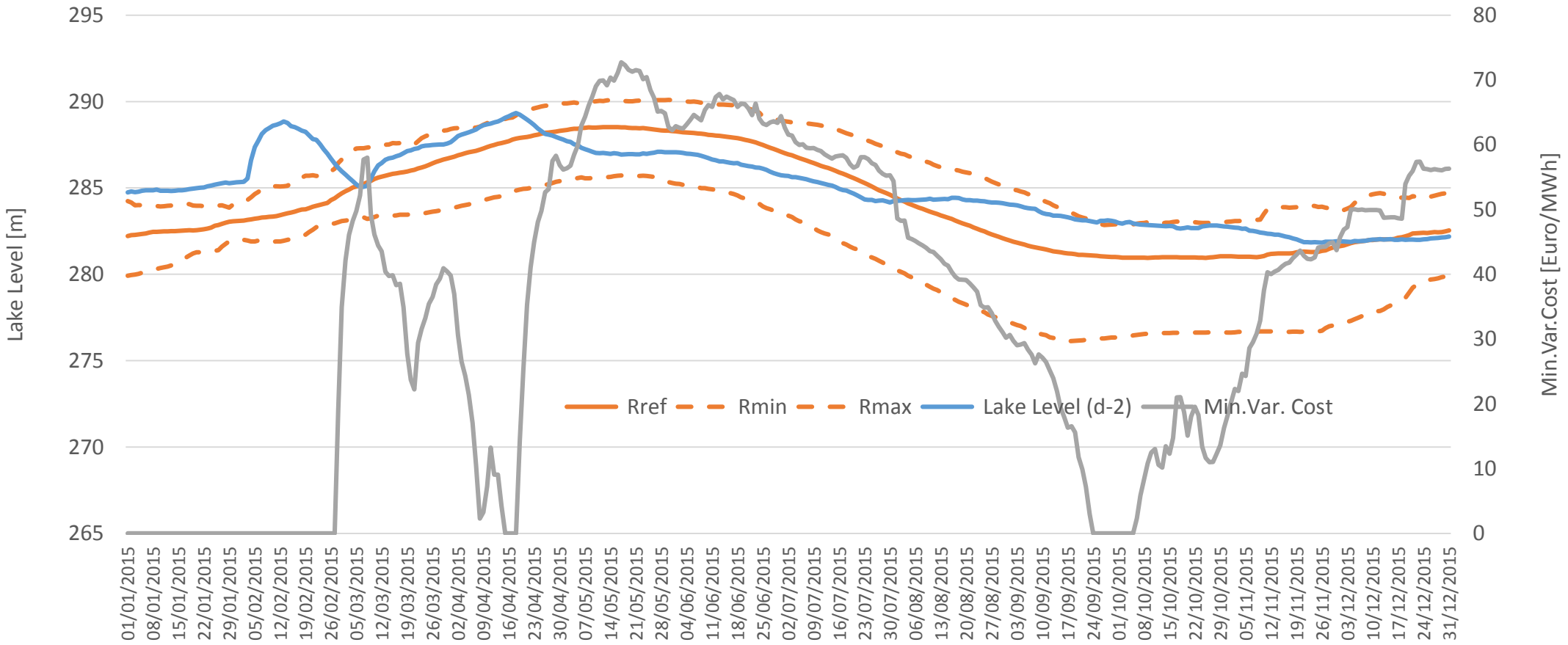
- EPEX had planned to launch the platform in February 2016, in order to establish a price signal for capacity, ahead of the mechanism's first year of delivery in 2017.

- DG Comp: "We cannot prejudge the outcome nor the timing of a decision".
- The investigation was launched in November 2015. The regulator's decision was published in May 2015.

- Analysts: "The market should have been trading significantly in advance of the first year of delivery but there haven't been any trades on the OTC market either. There is too much uncertainty for that."

- French government:"At first, we though the investigation was simply a matter of process, with the commission saying that it should have been notified, but it now seems they are challenging parts of the mechanism's design. This would take months and the probability of 2017 now looks really low".

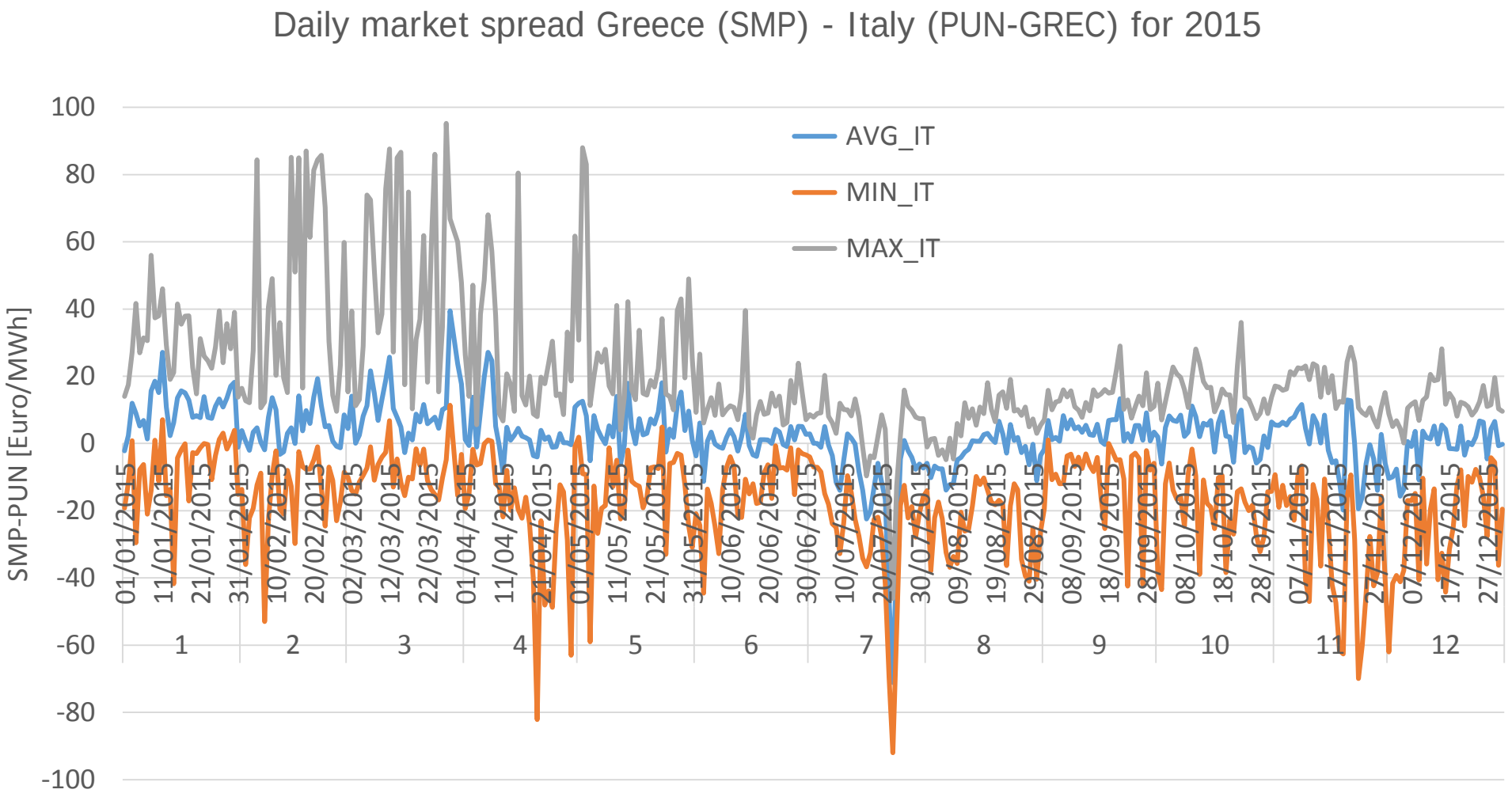
Hydro Pricing Methodology – from 1 October 2016 onwards Example



Transition to Target Model

- Target Model Implementation: January 2018
  Day-ahead, intra-day, balancing and forward markets
- Market Coupling with Italy (initially)
- Technical Assistance (JRC)
  7 Key Deliverables on: Market and Grid Codes, IT platforms, Credit and Clearing, Regulatory measures (e.g. hedging ratio)
- Current status:
  - Legislation in place (following RAE's Proposal to Ministry)
  - High-level market design: almost finalized
- Next step
  Guidelines to be issued by RAE to the Market and System Operators

Market Spread with Italy, 2015



Expectations

- Expand the market both in geographical scope and time horizon
- Efficiency gains from cross-border flows
- Reduce market power potential
- Hedging for suppliers
- Value of flexibility to be reflected
- Impact assessment on-going

What challenges do Regulators face?

Regulatory Challenges at EU Level

- Energy regulation gets inevitably more complex
- Compliance with Network Codes
- Harmonisation, while allowing for regional specificities
- Emphasis on market-based solutions, but some policies may distort markets
- Regional scope vs. national perspective
  - Market Coupling, Capacity Schemes
- Compatibility with State-Aid Guideliness (EEAG)

Regulatory Challenges at EU Level

- Transparency requirements (REMIT)

  Huge potential for detecting manipulation - Huge databases

- Regulators beyond conventional fields

  - Regulatory over-sight of new entities, such as NEMOs (market coupling)

- Interaction with Regulation of Financial Markets

- Given all these challenges, ACER's role is crucial

- Energy Regulators Forum: recently established to facilitate decision-making

  e.g. 12 decisions, relating to CACM provisions, same for all regulators

Consensus but also Diverging Views

- Harmonisation of Gas Transmission Tariffs ->

  ACER Board of Regulators (BoR) did not reach a decision -> referral to EC

- Internal Electricity Market:

  - What are the right bidding zones?

    Dispute over Austrian - German border -> referral to EC -> ACER

  - Delay in intra-day coupling

  - Sensitivity to parameters of flow-based methodology

- On 26.9.2016, ERF approved the required amendment of the Market Coupling Operations Plan

  Cost-sharing: key issue

Supplementary Material

Success Stories on Regulators' Co-operation
The TAP pipeline

11.2013 – Approval of Tariff Code by the 3 NRAs (Greece, Italy, Albania)

02.2014 – Approval of the Regulatory Compliance Programme

03.2014 – Launch of Binding Phase of the Market Test

06.2015 - Work on TAP Network Code started

04.2016 – NRAs certified TAP as an ITO

05.2016 – Construction stage started

2020 – Commercial operation to start

The IGB pipeline

- 11.2012 - ICGB submitted an application to the Greek and Bulgarian regulators for exemption from
    - Unbundling provisions
    - Regulated tariffs on the forward and reverse flow capacity
    - Third-party access on the forward flow capacity
- 3 bcm/year expandable to 5 bcm/year
- Estimated construction cost: € 220m

  € 45m secured from EEPR.

The IGB pipeline - Regulatory Timeline

- 05.2013 - 09.2014 - First Market Test. Terminated by sponsors
- 11.2015 - Regulators issued revised Guidelines for non-binding phase (EoI)
- 12.2015 - 4.2016 - EoI Phase was conducted
  - 9 companies expressed interest
  - up to 4.4 bcm/year forward flow, 1 bcm/year reverse flow
- 07.2016 - Regulators issued Bidding-phase Guidelines
- Bidding-Phase is on-going, until October 31st.
- Expected commercial operation: 2H 2018

Interconnection Agreement (BG - GR)

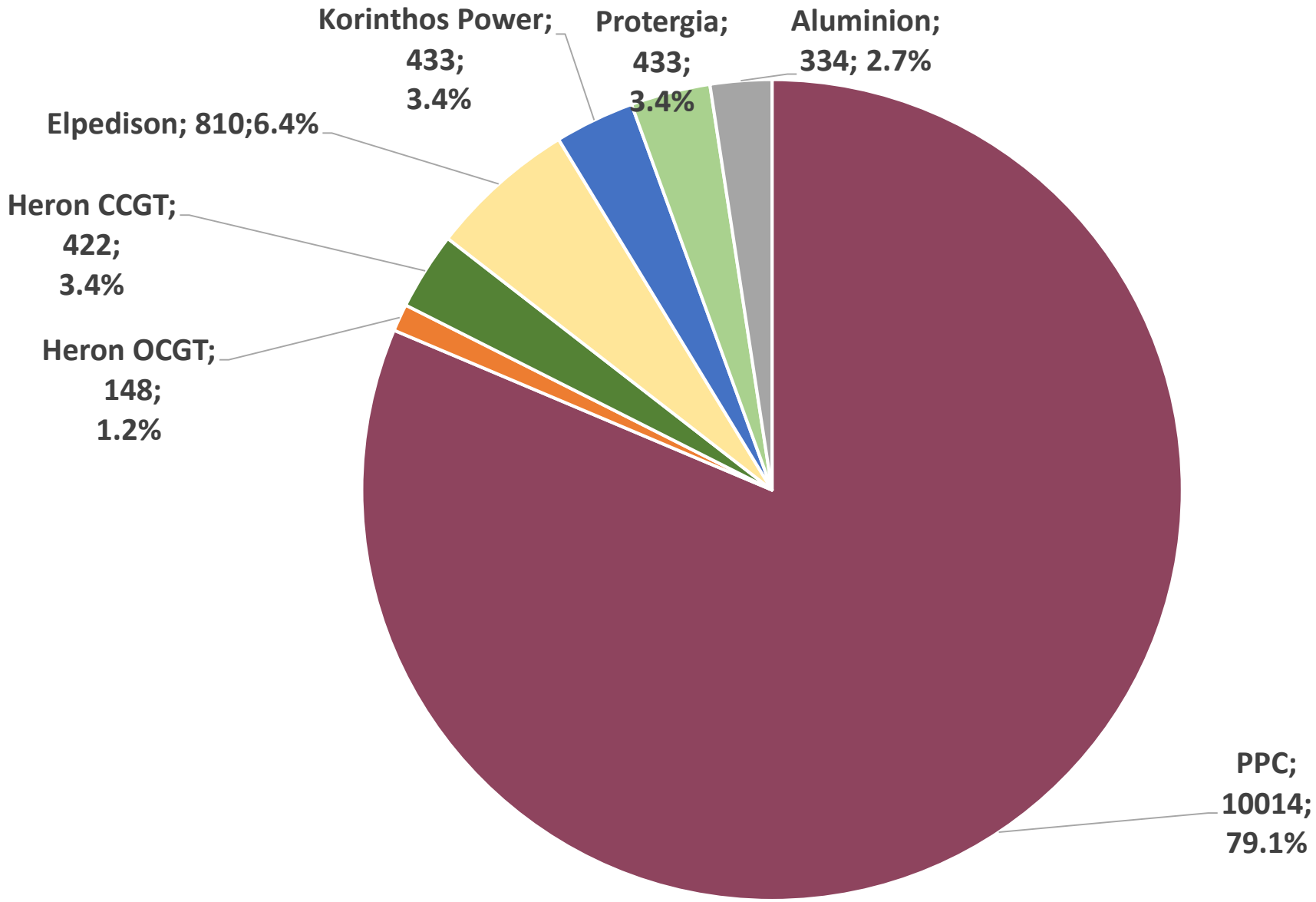
- Signed in June 2016 between the TSOs of Greece and Bulgaria
- Active support of RAE and EWRC and guidance by EC
- Enabled commercial gas flow from Greece to Bulgaria from 1.7.2016
- EC: " *A crucial step towards implementing EU rules on one of the last cross-border points in Europe where historic transit arrangements, tailored to a single company, prevailed* "
- Bundled products to be offered for forward or reverse direction via the RBP platform

Old quotes. Relevant for the Energy Transition?

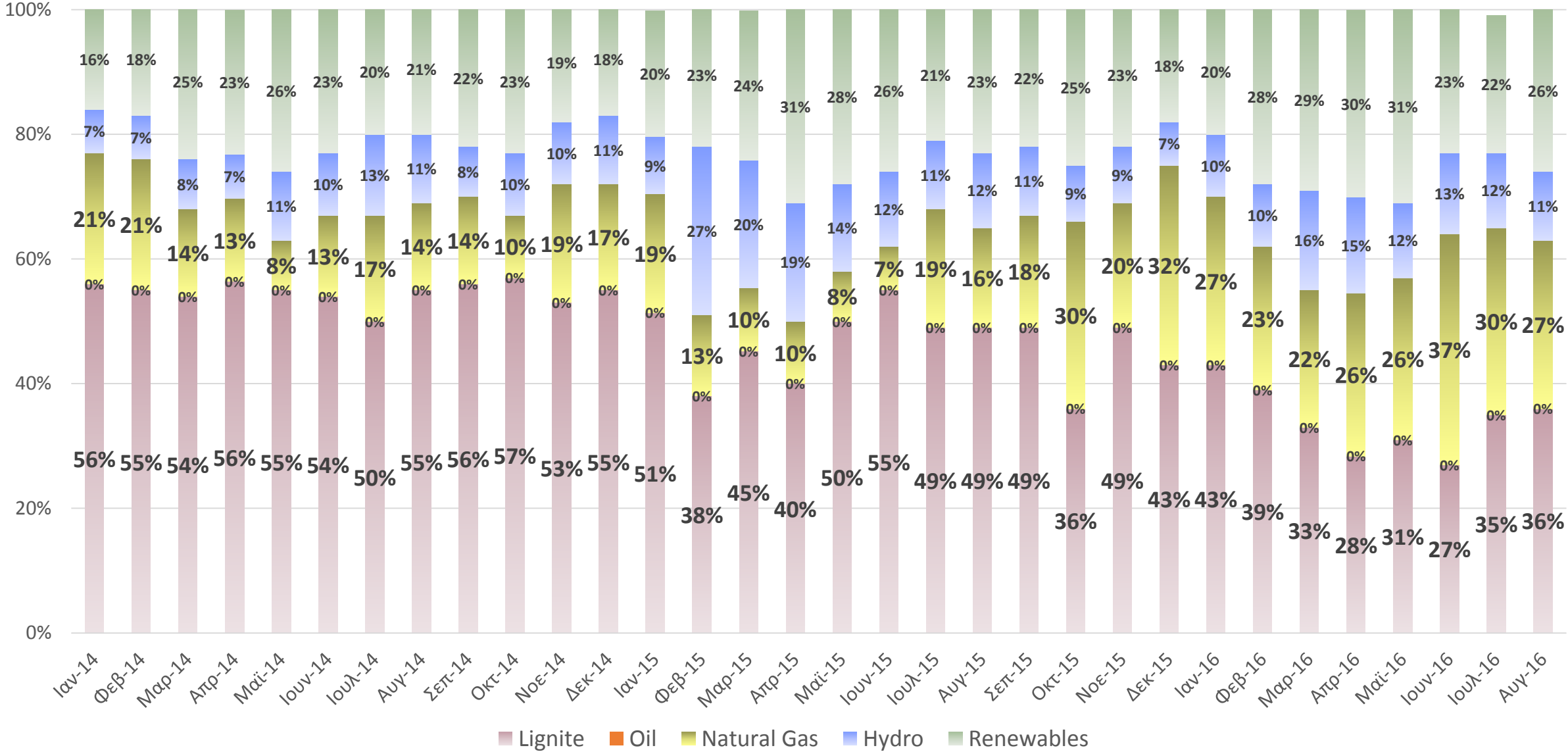
- "If you wish to create tension, simply try to change something"
- "Out of discord comes the fairest *harmony"*
- "The only constant is change"
- "Everything rests by changing"

Thank you for your attention

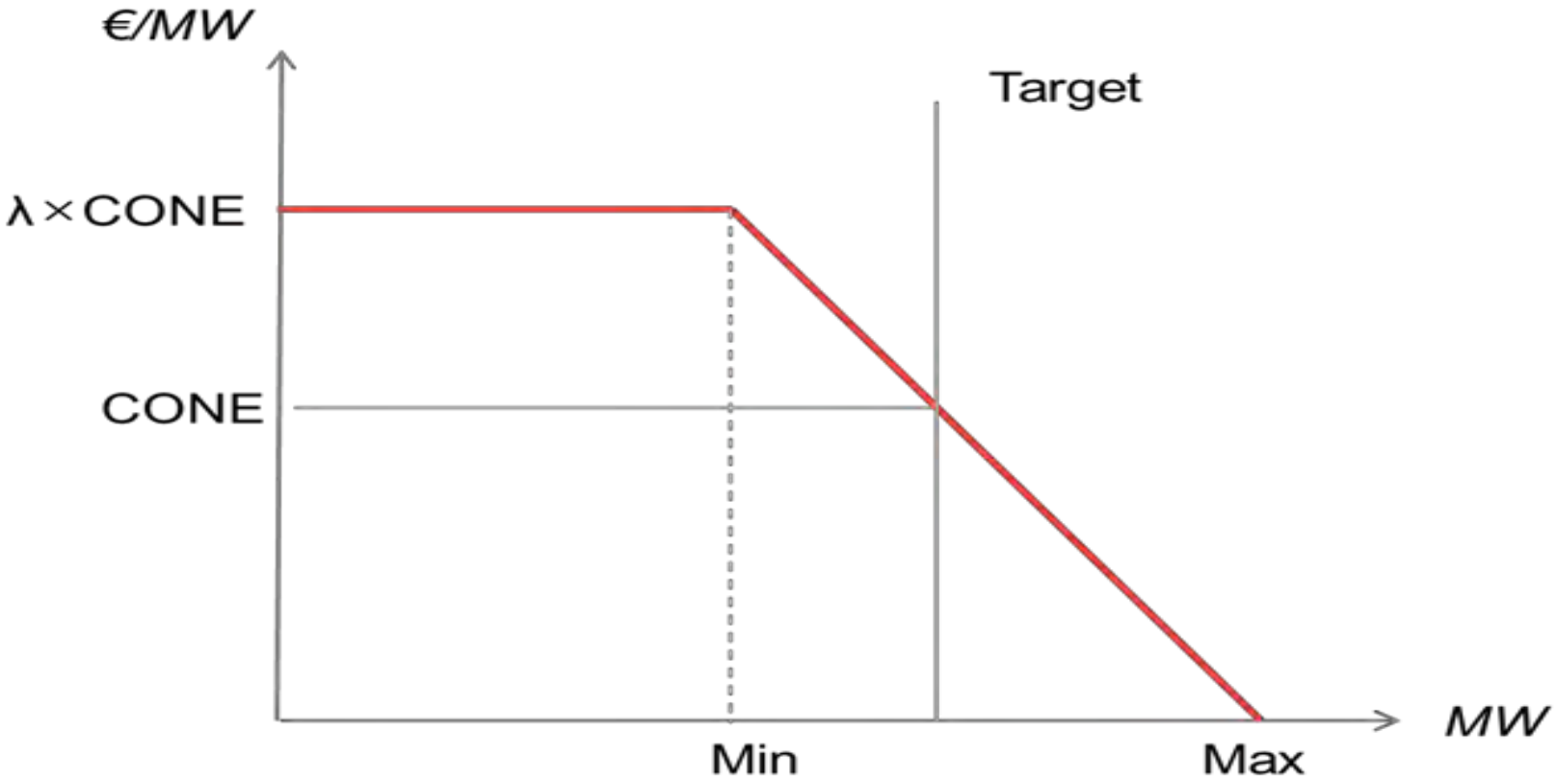
Market Shares in Conventional Installed Capacity (MW)



Fuel Market Shares, Jan 2014 - Aug 2016



Demand Curve



Min : set by requirements in wet winter scenario
Max : set by requirements in dry winter scenario