



ESCUELA TÉCNICA SUPERIOR DE INGENIERÍA
INSTITUTO DE INVESTIGACIÓN TECNOLÓGICA



Critical Analysis of the “New” Italian Capacity Remuneration Mechanism

**Paolo Mastropietro, Fulvio Fontini,
Pablo Rodilla, Carlos Batlle**

2nd AIEE Energy Symposium, LUMSA University, Rome

Friday, 3 November 2017

Contents

- Introduction
 - Capacity Remuneration Mechanisms: current trends
 - The Italian context
- The Italian CRM design
 - Reliability product
 - Procurement process
- Critical analysis
 - Variable renewable participation
 - Lag period and contract duration
 - Underperformance penalties
 - Compatibility with EU guidelines



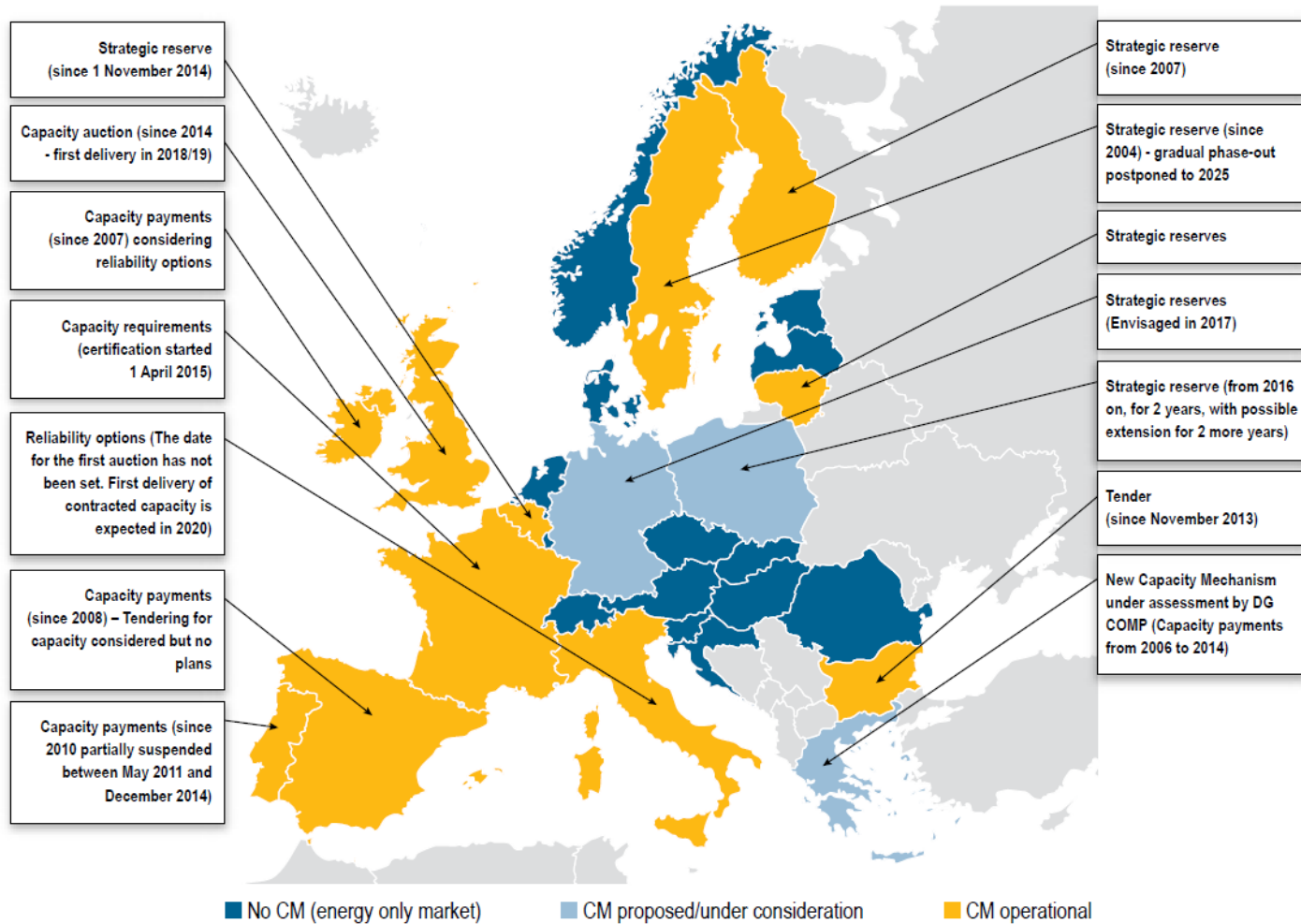
Contents

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 - Capacity Remuneration Mechanisms: current trends
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- The Italian CRM design
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 - Procurement process
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Capacity remuneration mechanisms: current trends

The CRM “momentum” in Europe



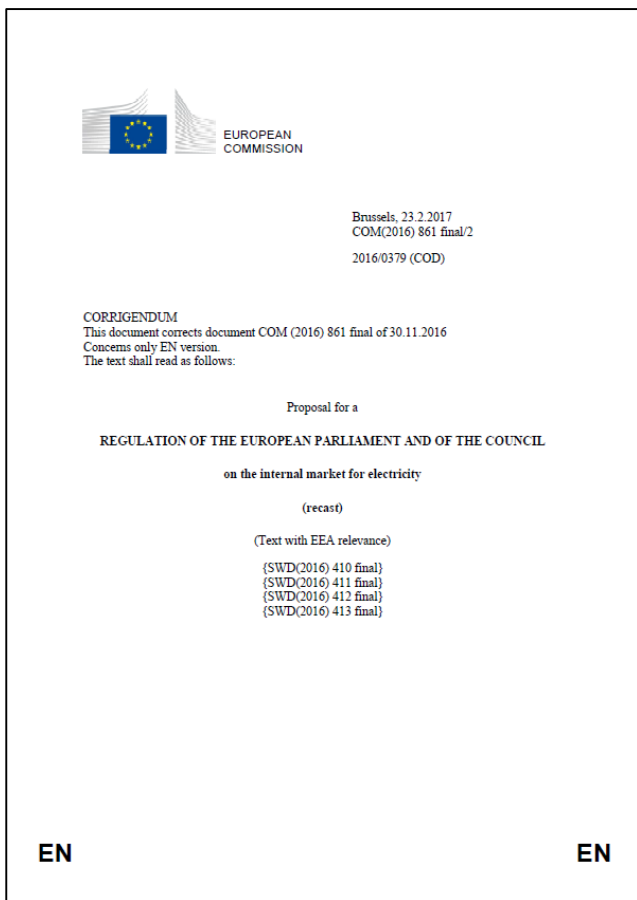
ACER/CEER, 2016. Annual Report on the Results of Monitoring the Internal Electricity Markets in 2015



Capacity remuneration mechanisms: current trends

CRMs in the Clean Energy Package

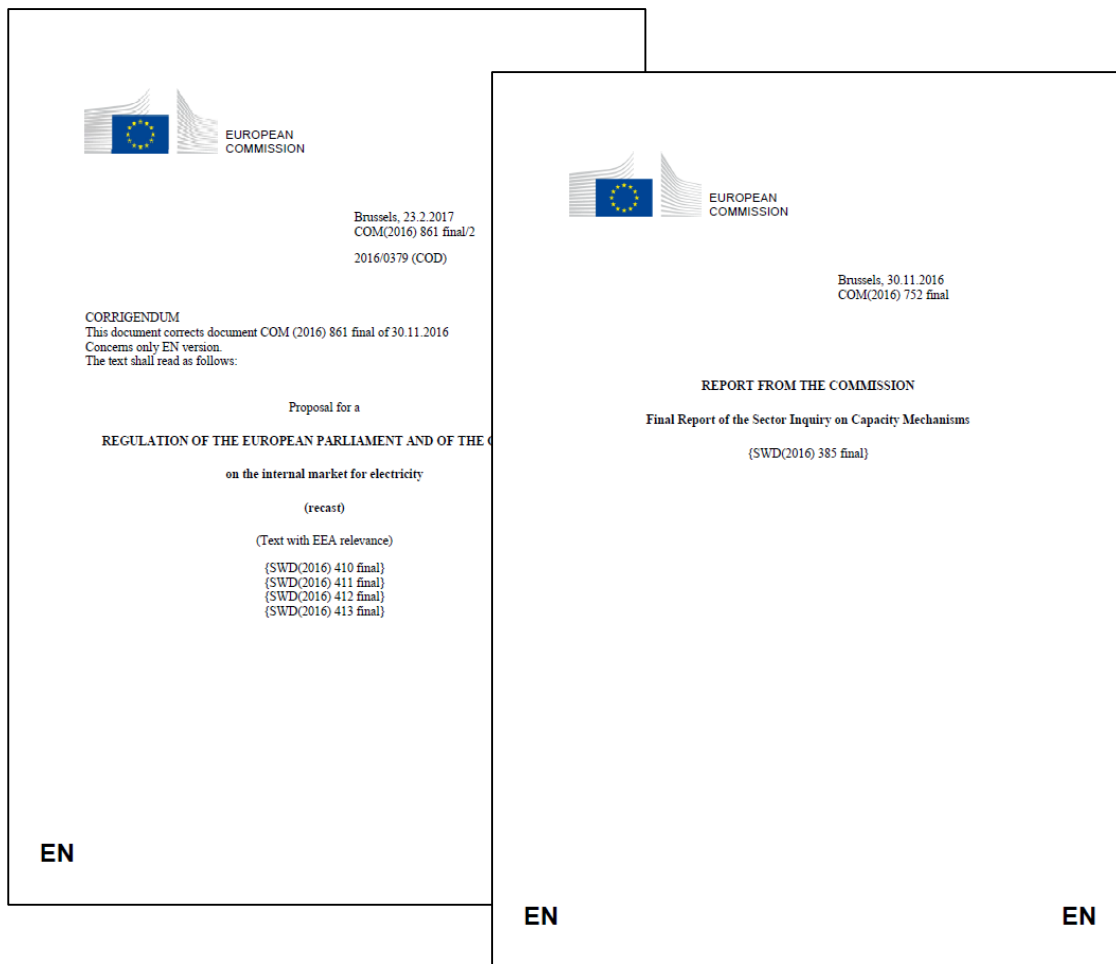
- Many documents released on CRMs in November 2016



Capacity remuneration mechanisms: current trends

CRMs in the Clean Energy Package

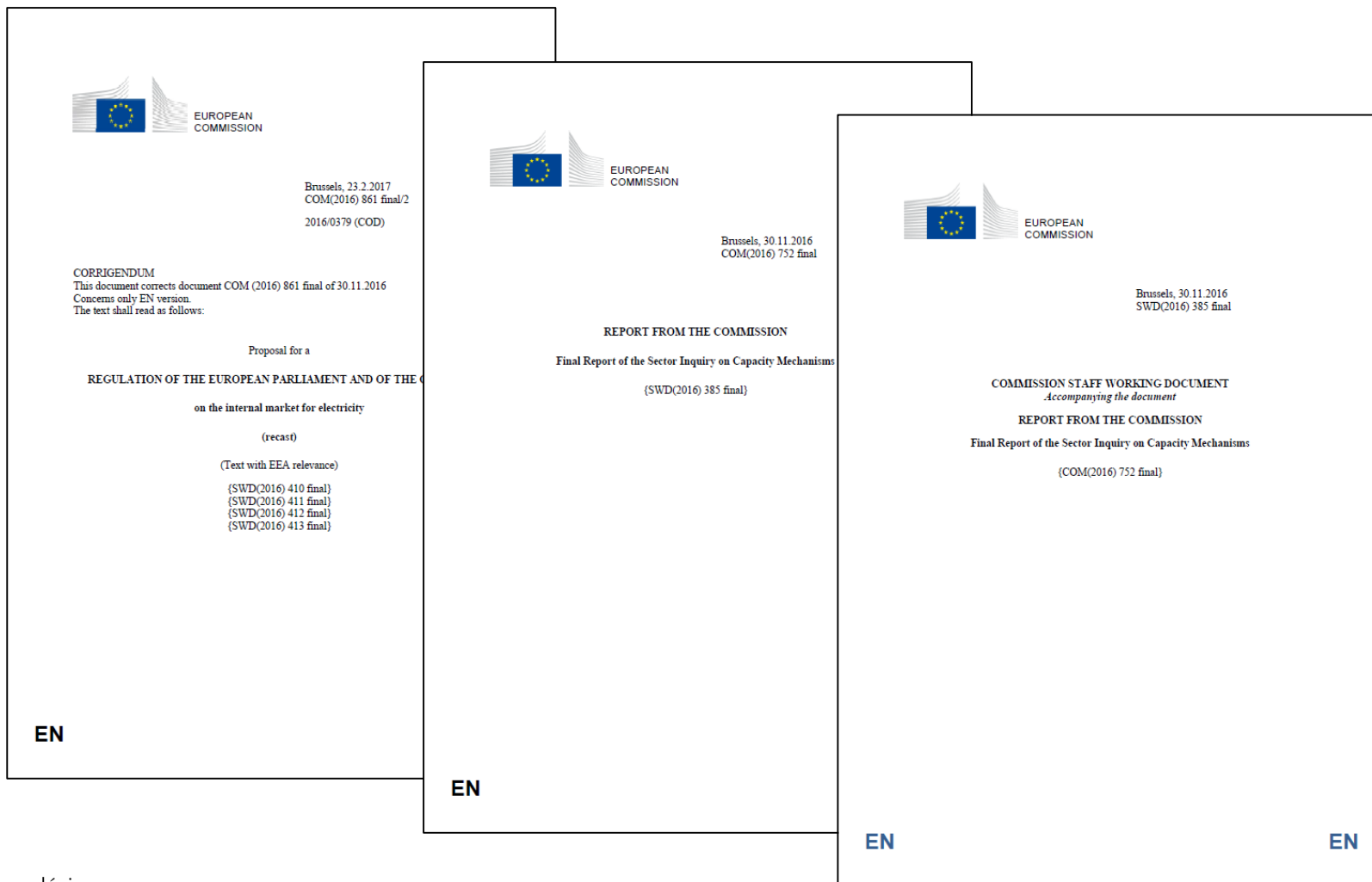
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Capacity remuneration mechanisms: current trends

CRMs in the Clean Energy Package

- Many documents released on CRMs in November 2016



Capacity remuneration mechanisms: current trends

CRMs in the Clean Energy Package

- Many documents released on CRMs in November 2016
 - “A rigorous adequacy assessment, taking into account the regional adequacy situation and based on a well-defined economic reliability standard, is crucial for identifying risks to security of supply and determining the necessary size of any capacity mechanism”.
 - “The sector inquiry demonstrates that capacity mechanisms should be open to all types of potential capacity providers and feature a competitive price-setting process to ensure that competition minimises the price paid for capacity. Competition between capacity providers should be as large as possible and special attention should be given to new entry”.
 - “Market-wide capacity mechanisms should be open to explicit cross-border participation to ensure incentives for continued investment in interconnection and to reduce the long-term costs of EU security of supply”.



Capacity remuneration mechanisms: current trends

CRMs in the Clean Energy Package

- Many documents released on CRMs in November 2016
- CRMs must already comply with EU legislation on State Aid
 - British capacity market (Commission Decision SA.35980)
 - German network reserve (SA.42955)
 - French capacity market (SA.39621)

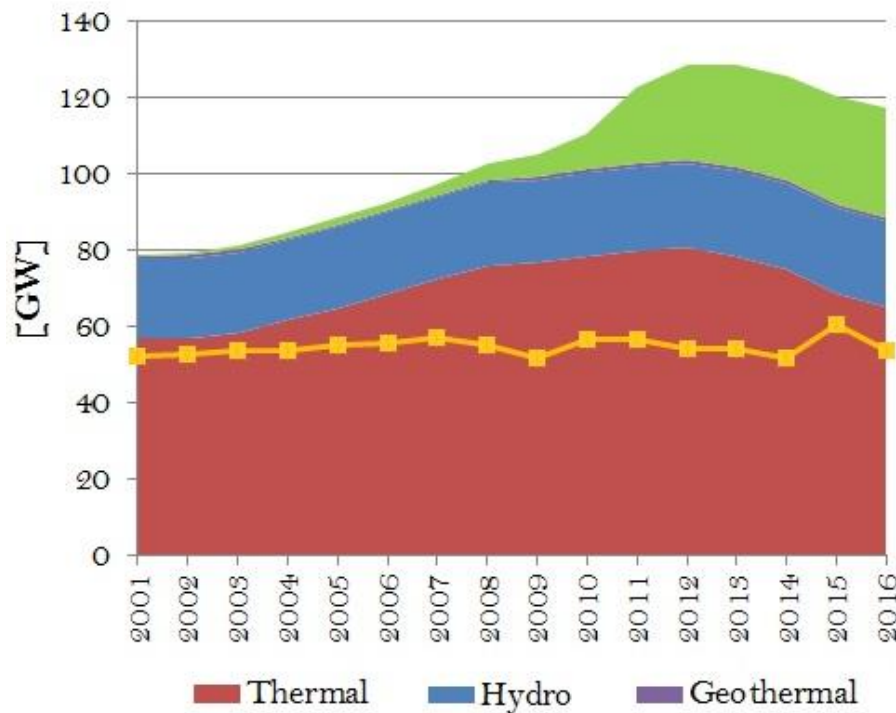


The Italian context

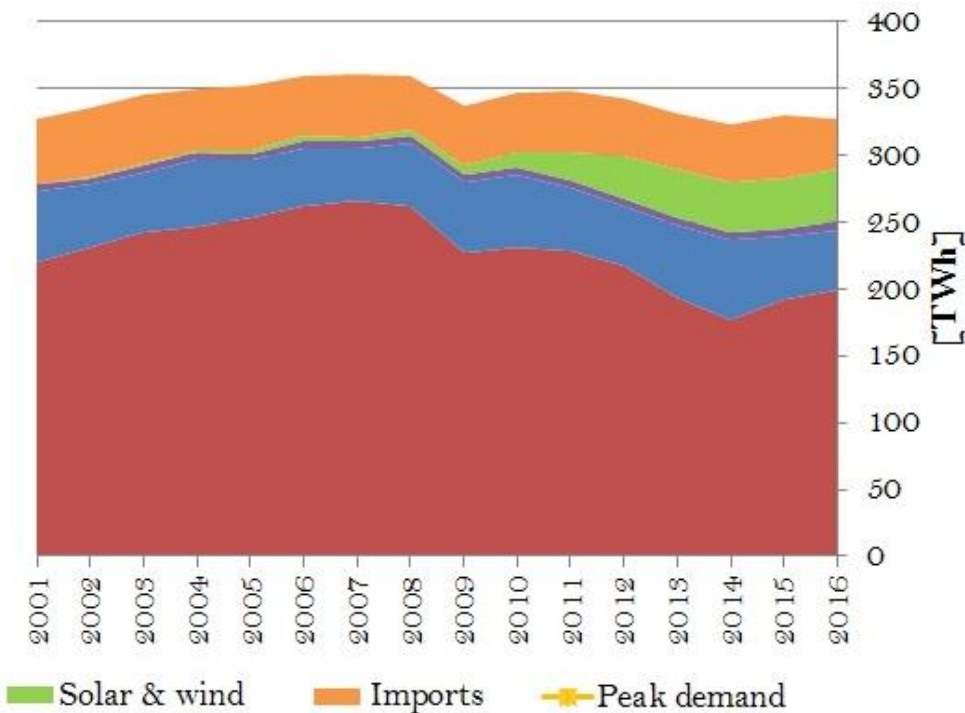
Power sector evolution



Installed capacity and peak demand

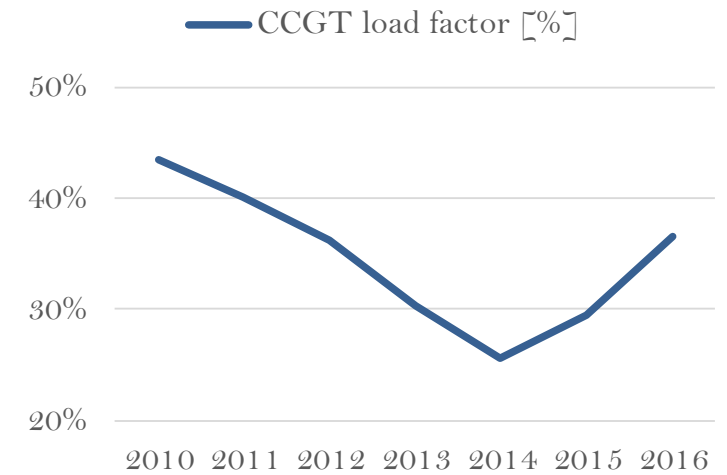
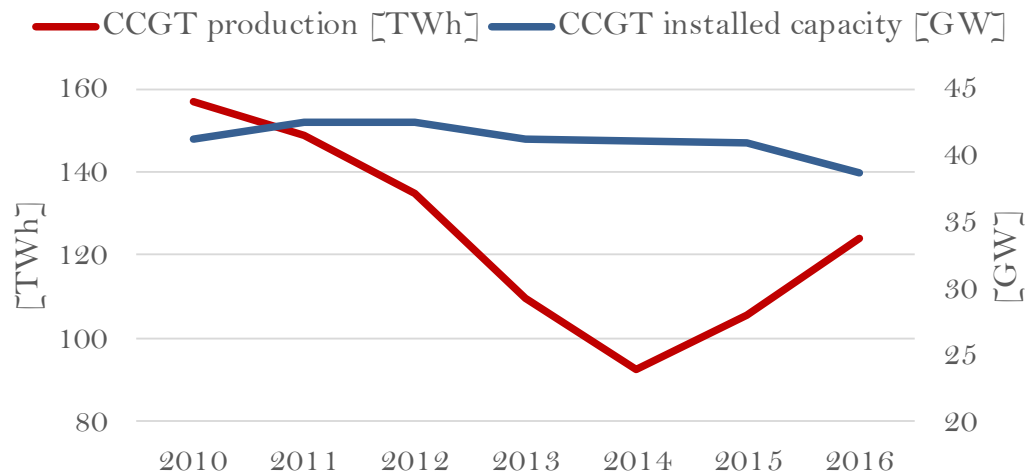


Demand coverage



The Italian context

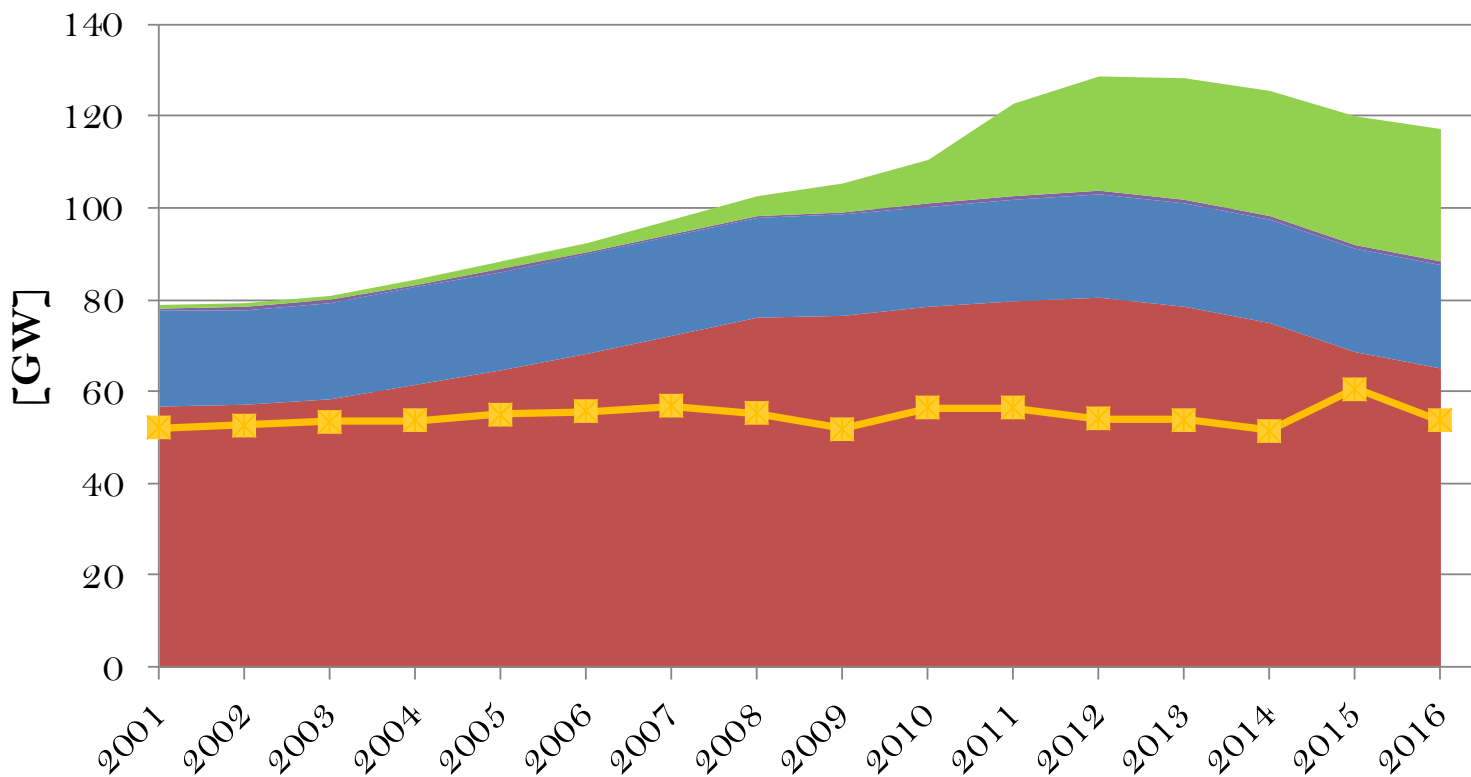
Impact on CCGT viability



The Italian context

Regulatory evolution on system adequacy

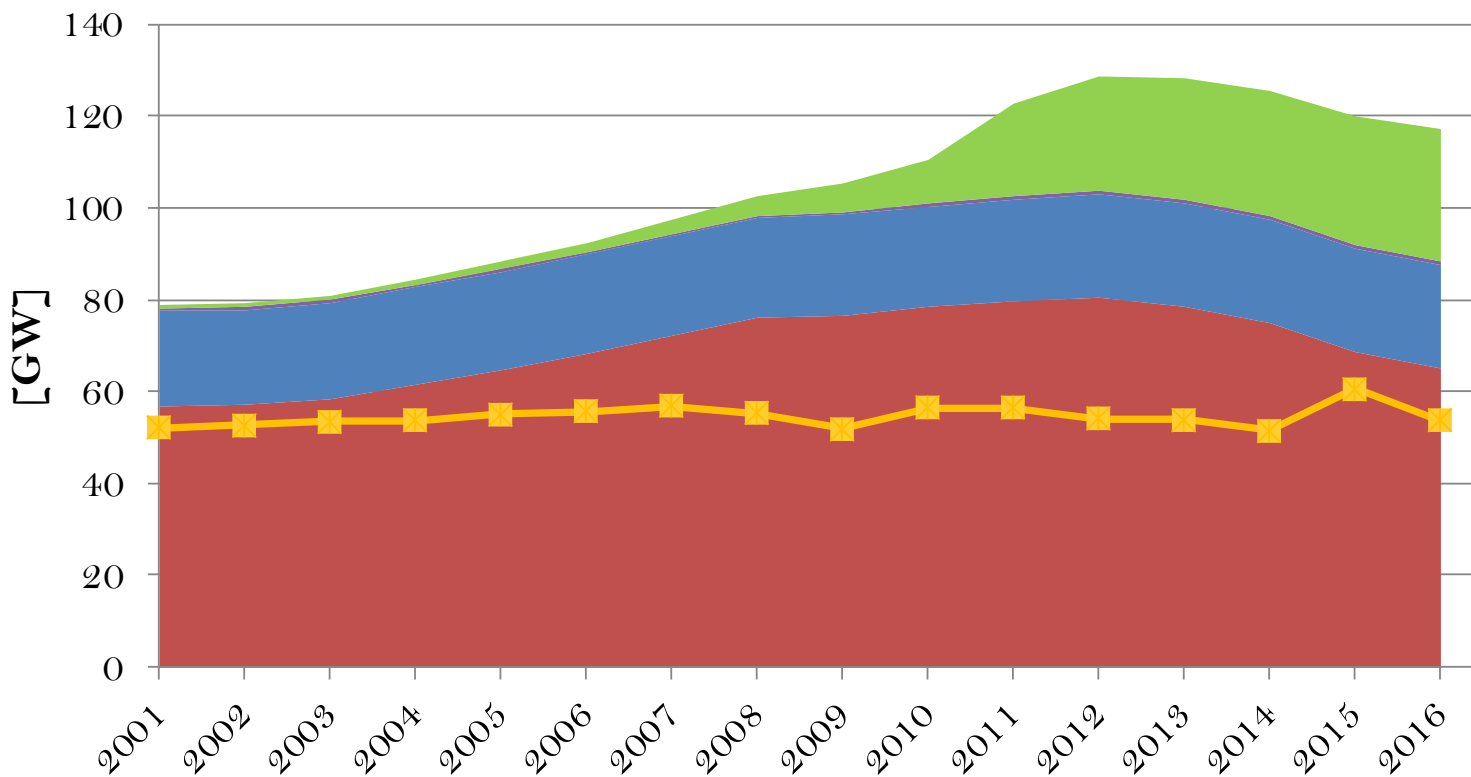
Installed capacity and peak demand



The Italian context

Regulatory evolution on system adequacy

Installed capacity and peak demand



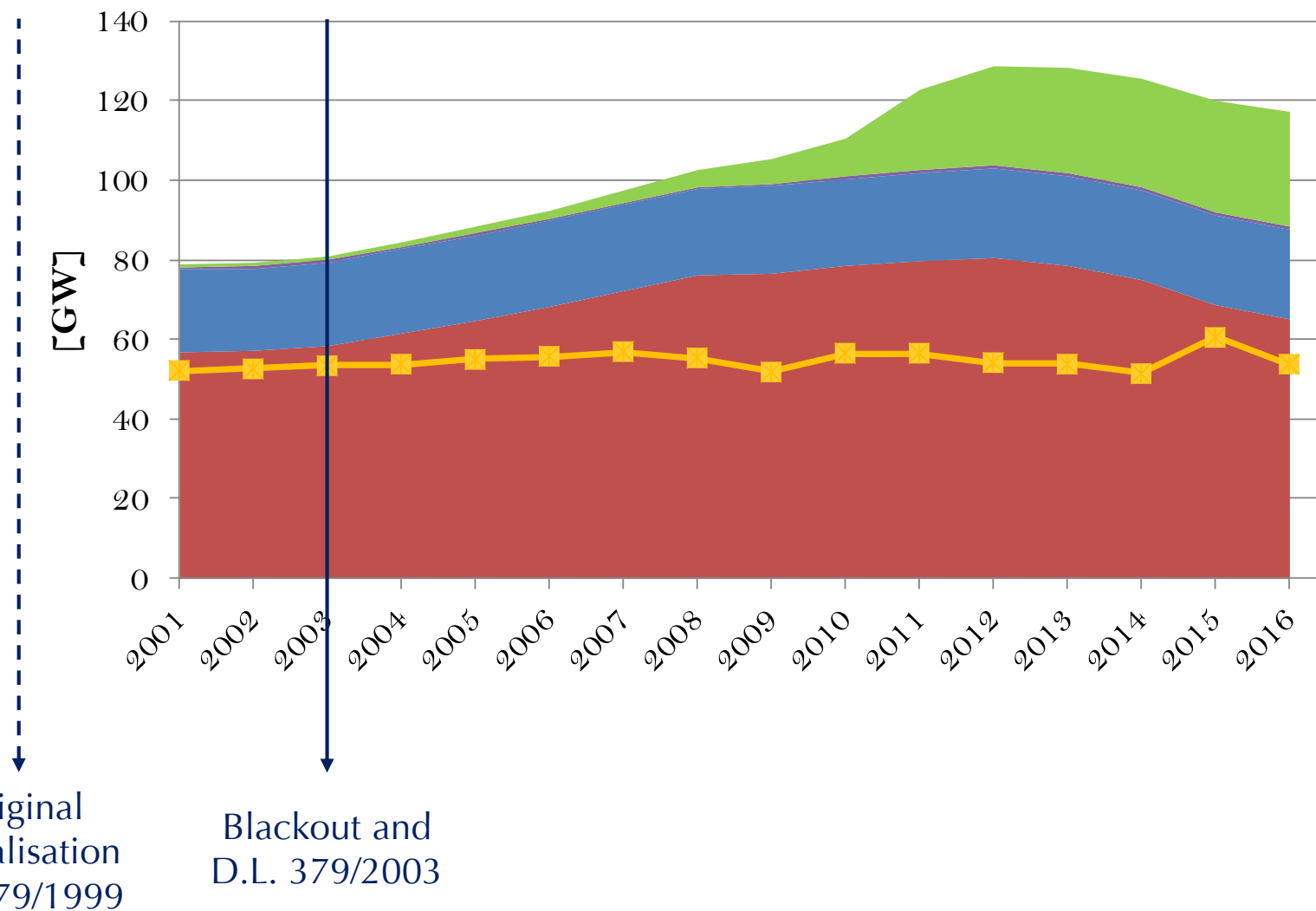
Original
liberalisation
D.L. 79/1999



The Italian context

Regulatory evolution on system adequacy

Installed capacity and peak demand



Original liberalisation
D.L. 79/1999

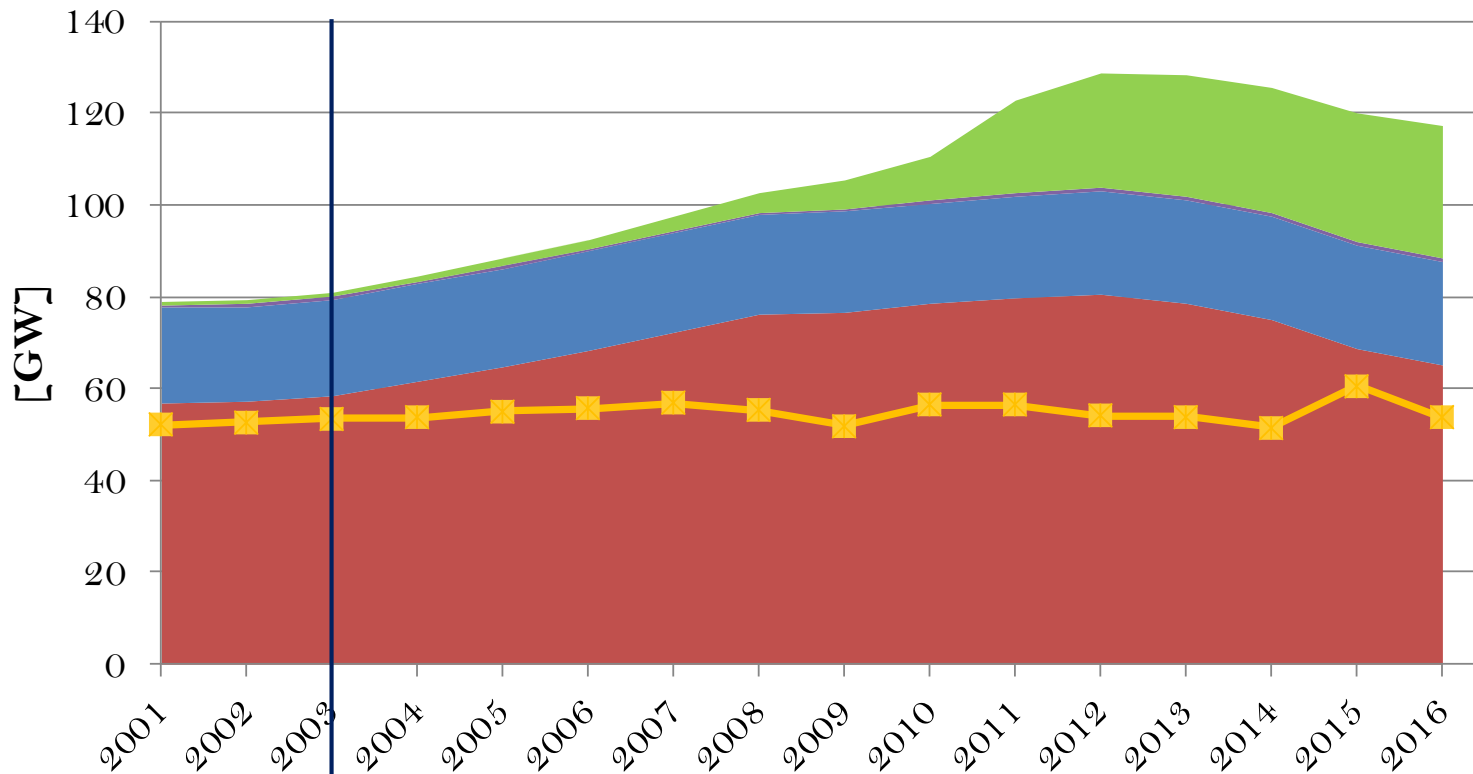
Blackout and
D.L. 379/2003



The Italian context

Regulatory evolution on system adequacy

Installed capacity and peak demand



Original liberalisation
D.L. 79/1999

Blackout and
D.L. 379/2003

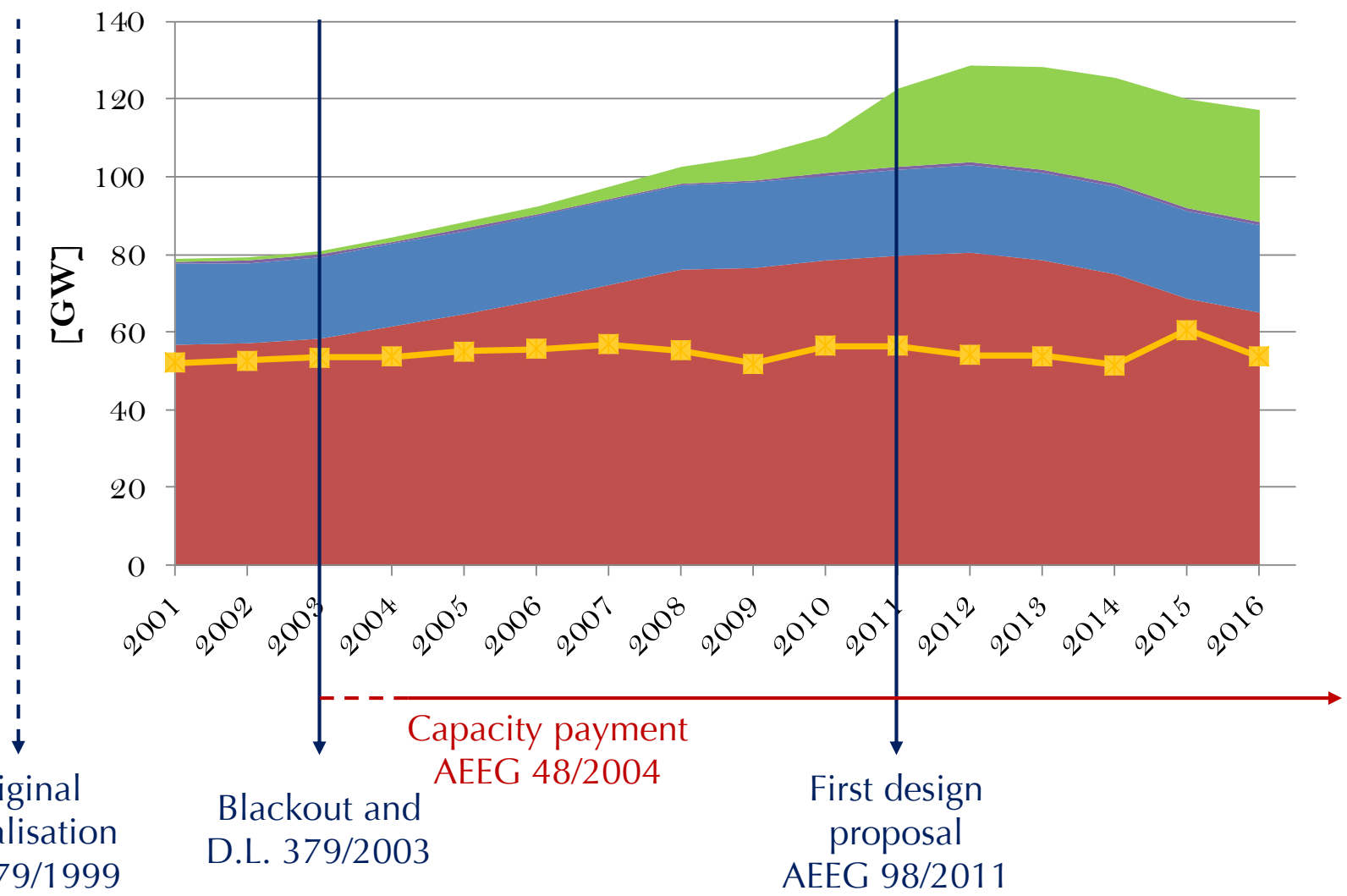
Capacity payment
AEEG 48/2004



The Italian context

Regulatory evolution on system adequacy

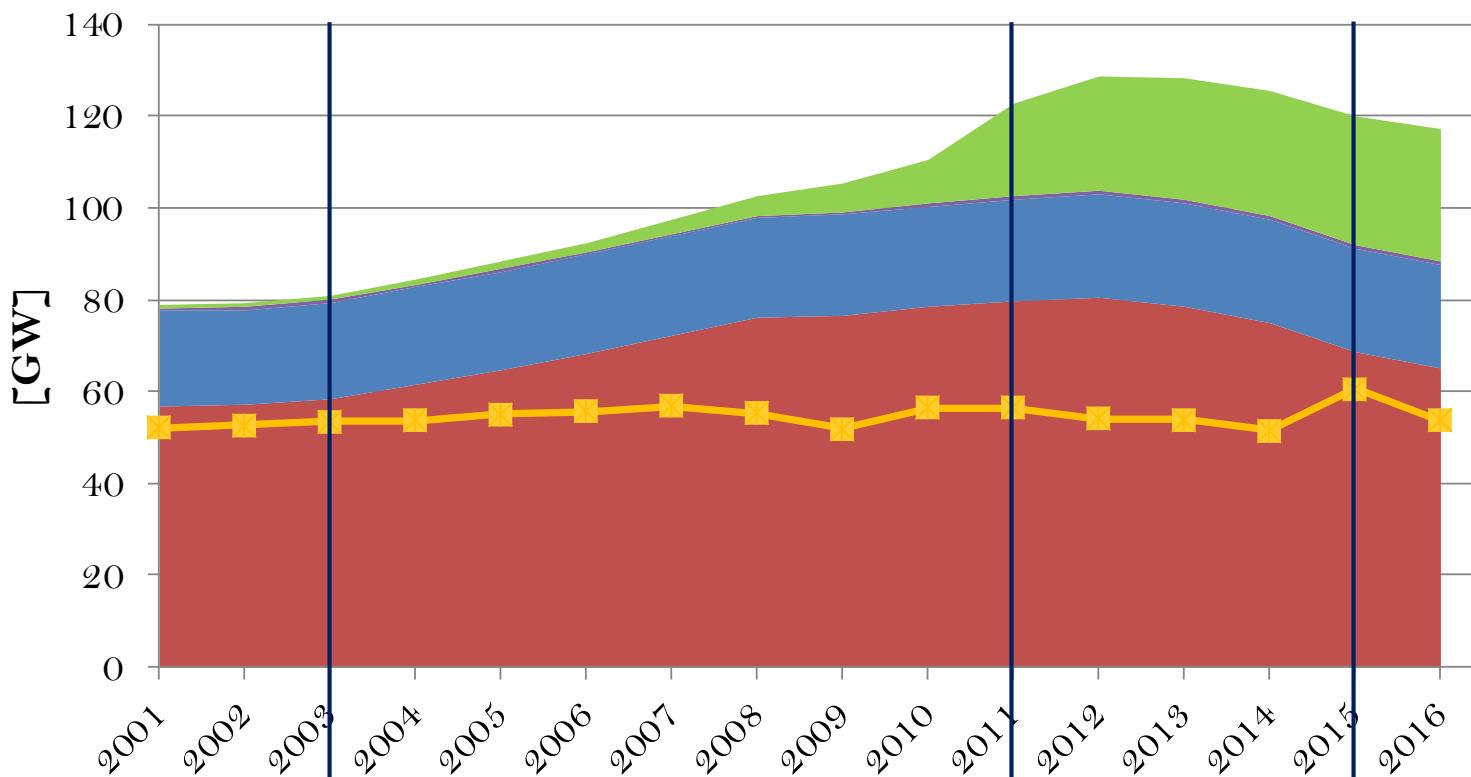
Installed capacity and peak demand



The Italian context

Regulatory evolution on system adequacy

Installed capacity and peak demand



Original liberalisation
D.L. 79/1999

Blackout and
D.L. 379/2003

Capacity payment
AEEG 48/2004

First design
proposal
AEEG 98/2011

Process acceleration
AEEGSI 95/2015



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The Italian CRM design

Reliability product

- Reliability option which can be activated in two different reference markets, namely, the day-ahead market (MGP in Italy) and the balancing market (MSD in Italy)



The Italian CRM design Reliability product

CRM
commitment



The Italian CRM design Reliability product

CRM
commitment

MGP
dispatch



The Italian CRM design Reliability product

**CRM
commitment**



The Italian CRM design Reliability product

**CRM
commitment**

MSD dispatch

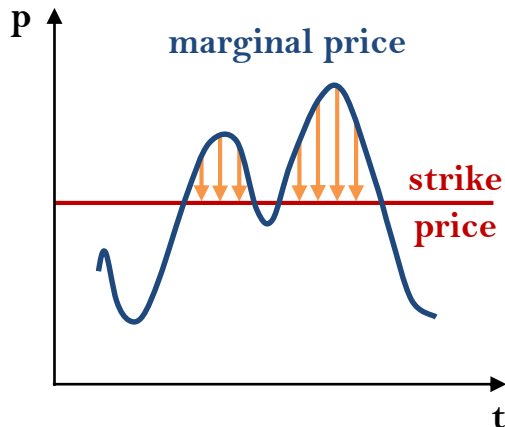


The Italian CRM design

Reliability product

Settlement
on MGP

pay-as-cleared



CRM
commitment

MSD dispatch



option settlements

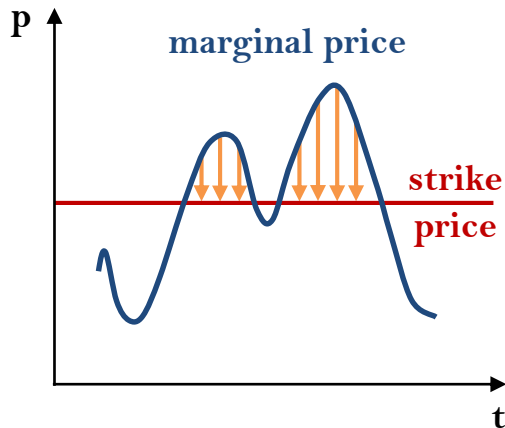


The Italian CRM design

Reliability product

Settlement
on MGP

pay-as-cleared



CRM
commitment

MSD dispatch



Settlement
on MSD

pay-as-bid

bid from the agent

strike price

option settlements



The Italian CRM design

Reliability product

Committed capacity

Reference price

Offered and accepted in the MGP

MGP marginal price

Offered and accepted in the MSD

MSD bid (by the agent)

Offered in the MSD at a price lower than strike price and not accepted

strike price

Offered in the MSD at a price higher than strike price and not accepted

$\max(\text{MGP}, \text{MSD last-accepted bid})_{\text{zone}}$

Not offered either in the MGP or in the MSD out of scarcity conditions

$\max(\text{MGP}, \text{MSD last-accepted bid})_{\text{zone}}$

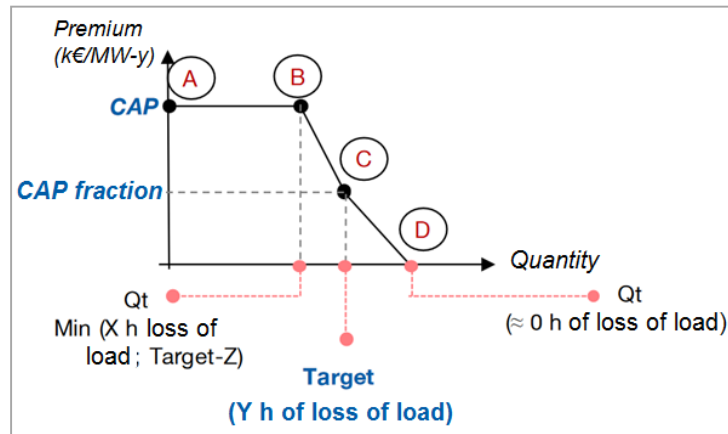
Not offered either in the MGP or in the MSD during scarcity conditions

VOLL



The Italian CRM design Procurement process

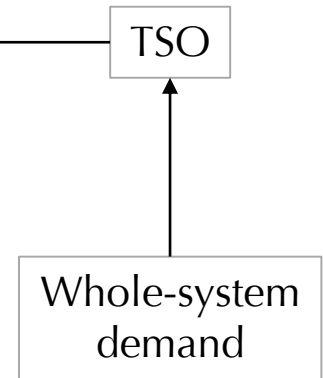
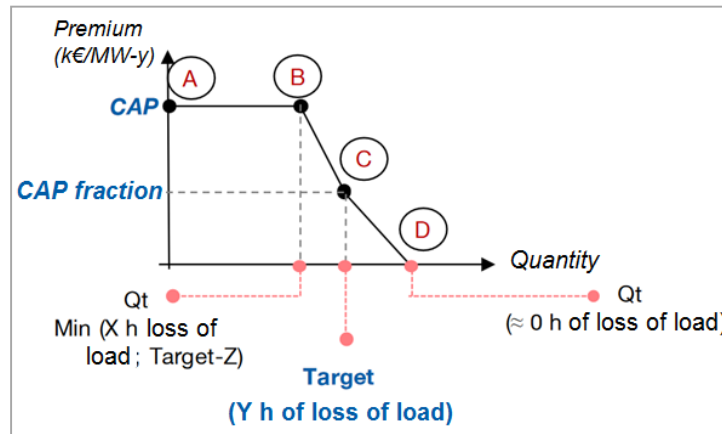
“Technology-neutral” auctions



The Italian CRM design Procurement process

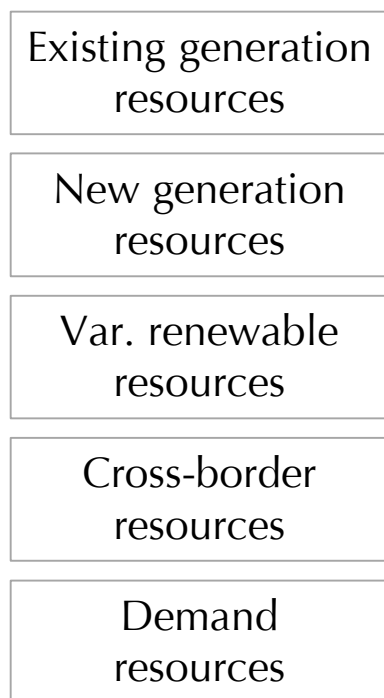
Buying side

“Technology-neutral” auctions



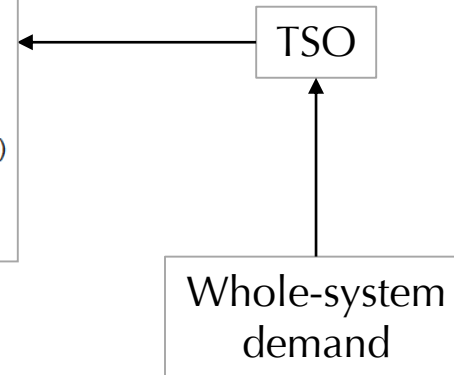
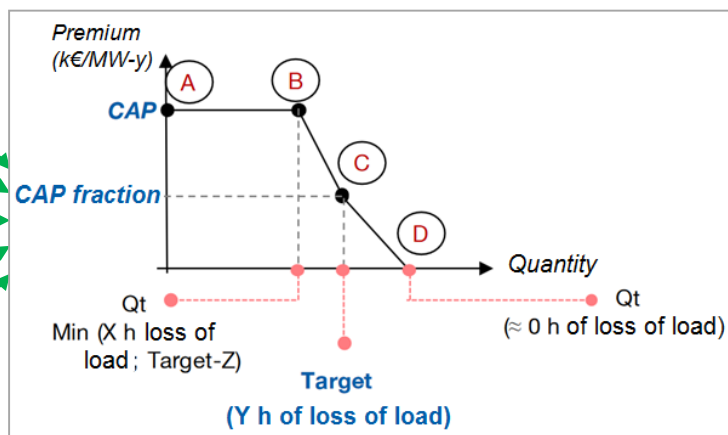
The Italian CRM design Procurement process

Selling side



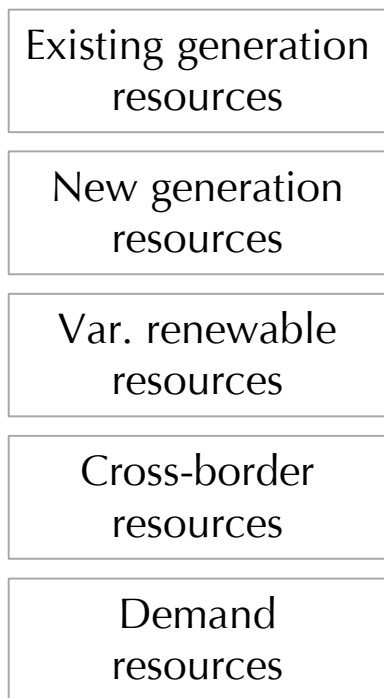
Buying side

“Technology-neutral” auctions

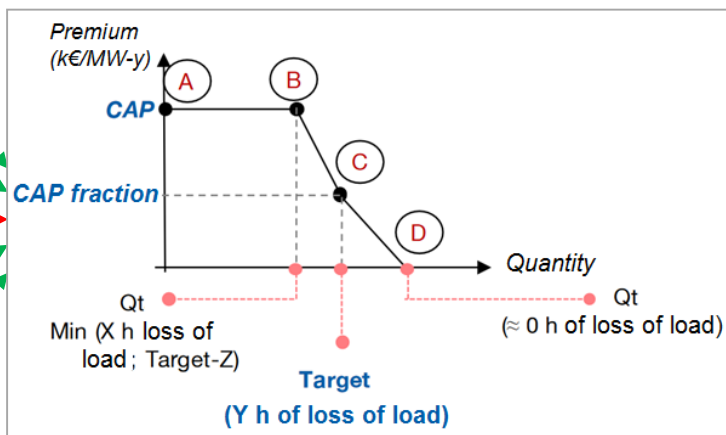


The Italian CRM design Procurement process

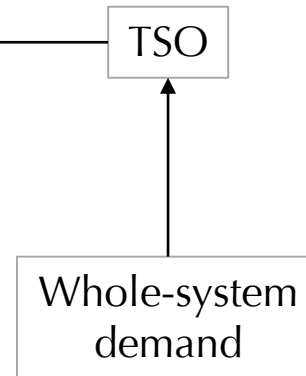
Selling side



“Technology-neutral” auctions

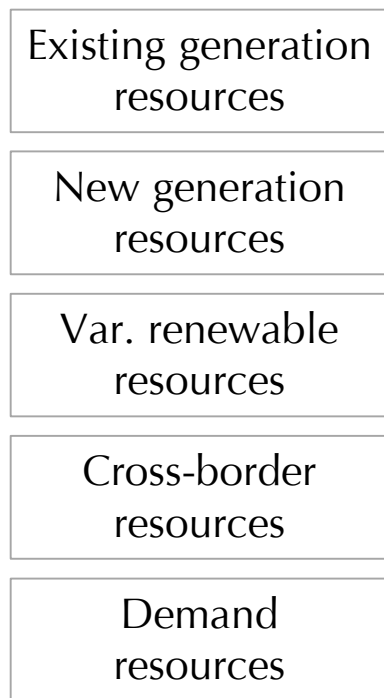


Buying side

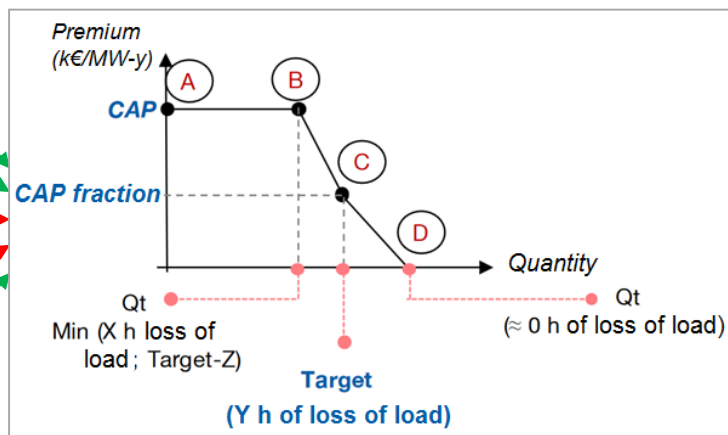


The Italian CRM design Procurement process

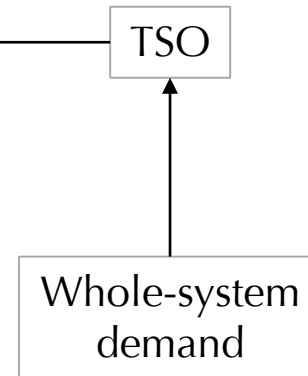
Selling side



“Technology-neutral” auctions

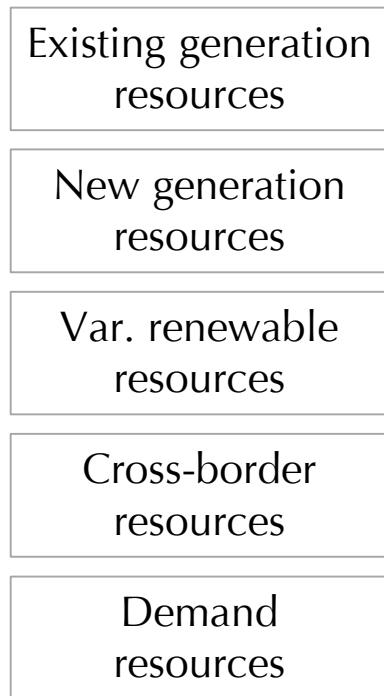


Buying side

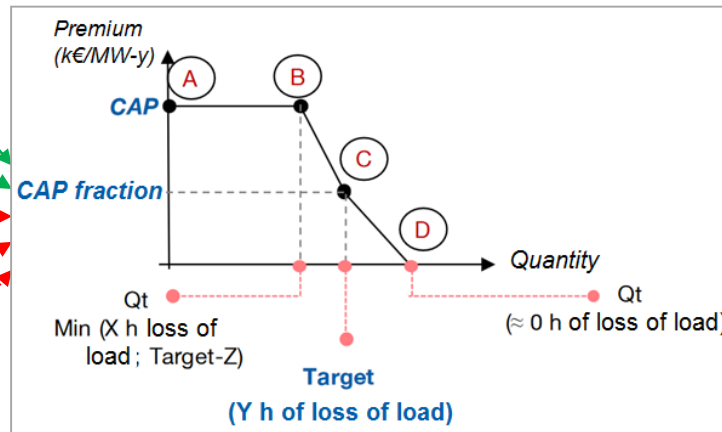


The Italian CRM design Procurement process

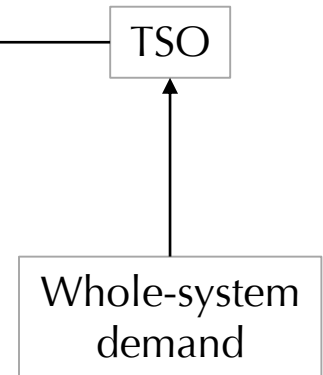
Selling side



“Technology-neutral” auctions

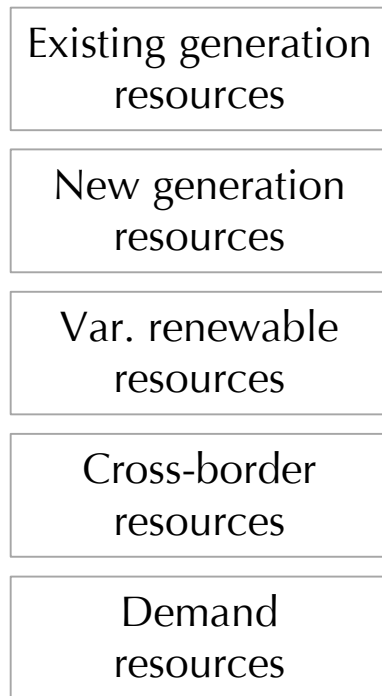


Buying side

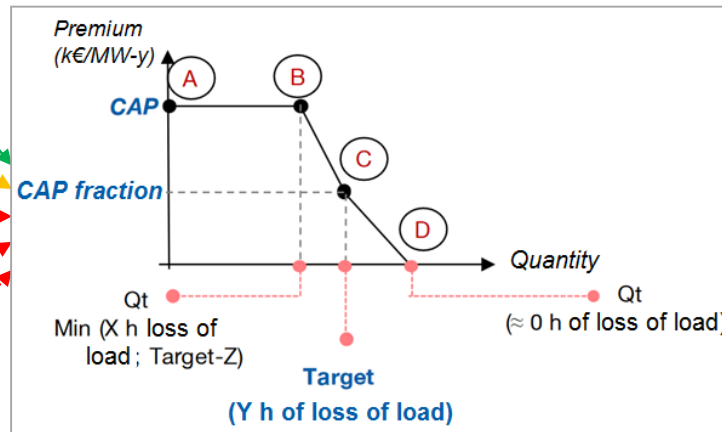


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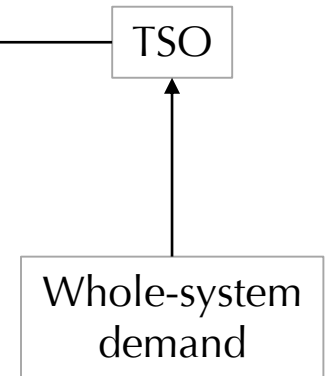
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“Technology-neutral” auctions

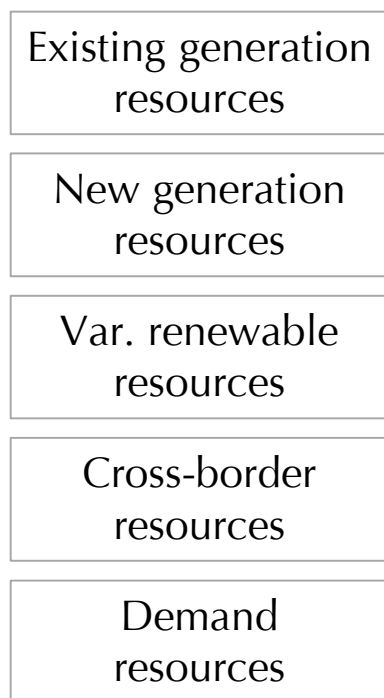


Buying side

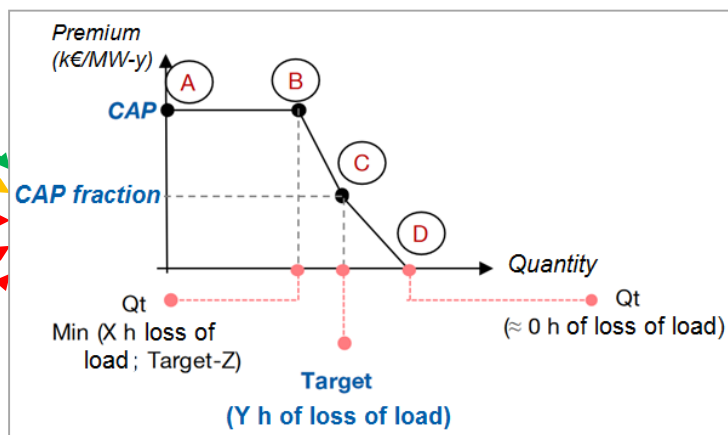


The Italian CRM design Procurement process

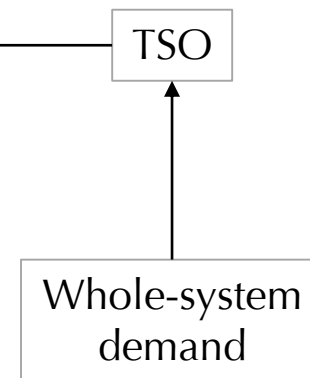
Selling side



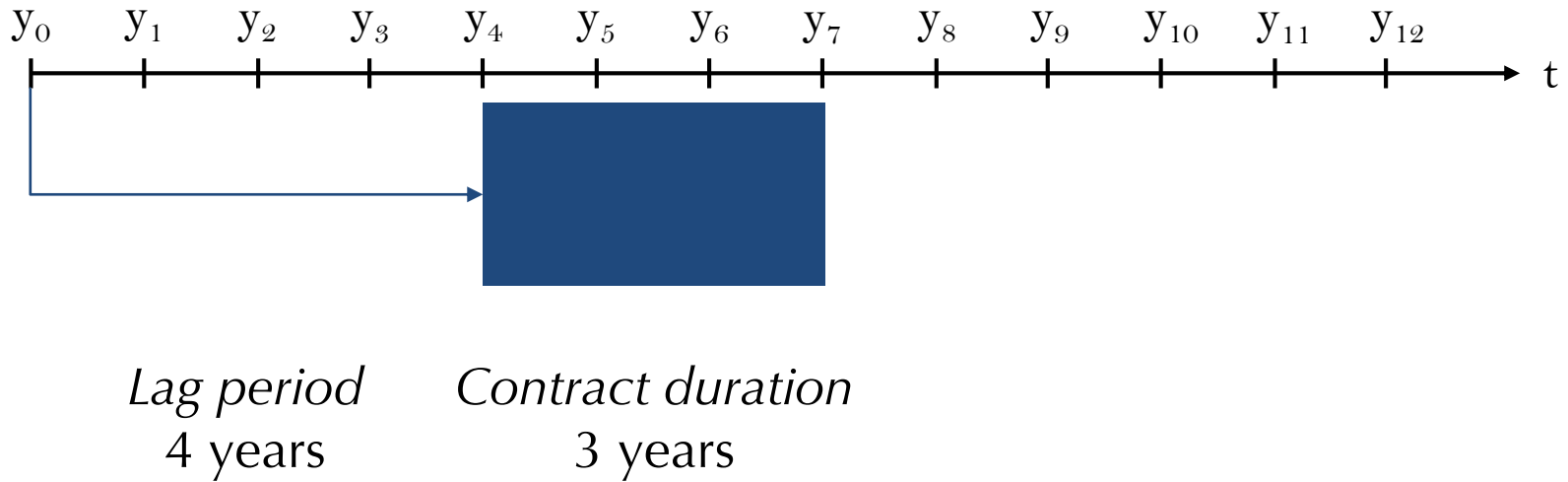
“Technology-neutral (?)” auctions



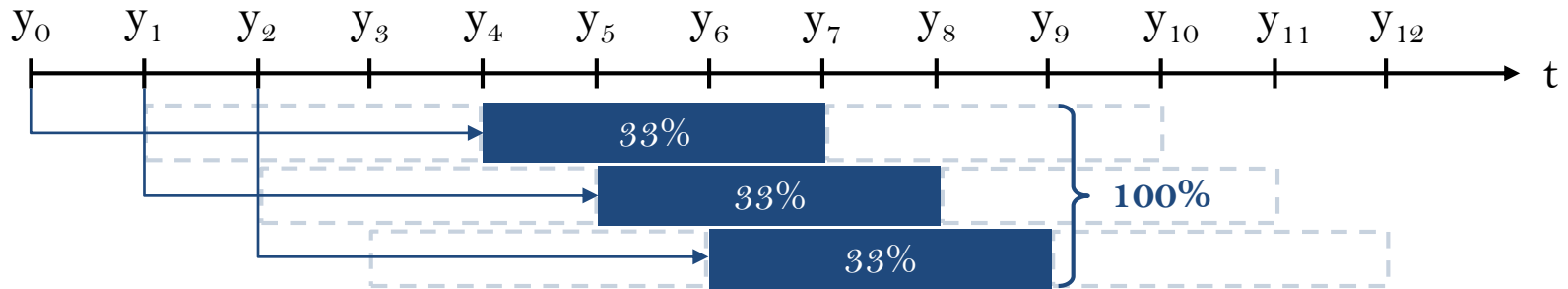
Buying side



The Italian CRM design Procurement process

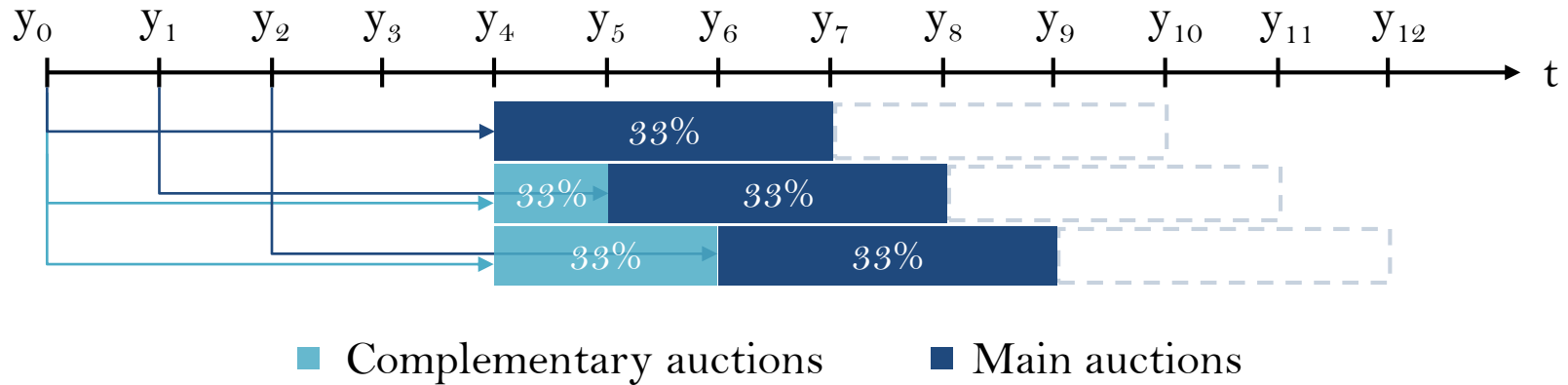


The Italian CRM design Procurement process

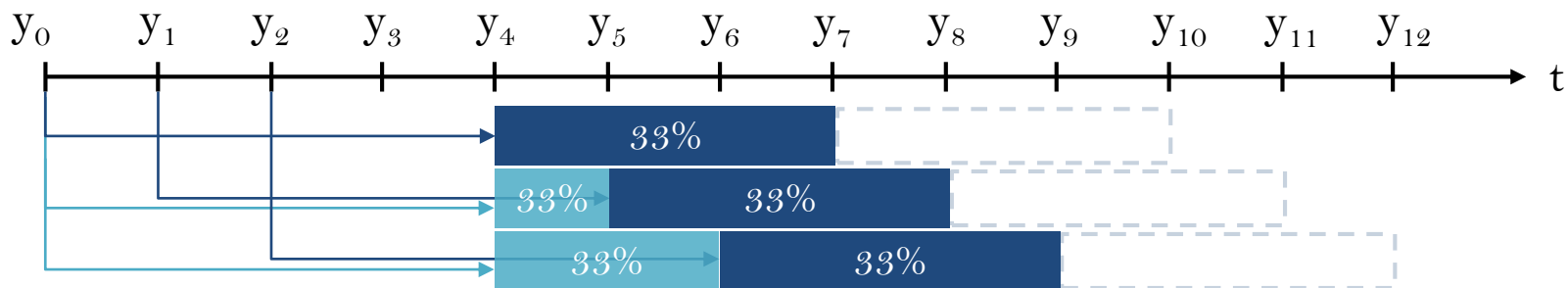


The Italian CRM design

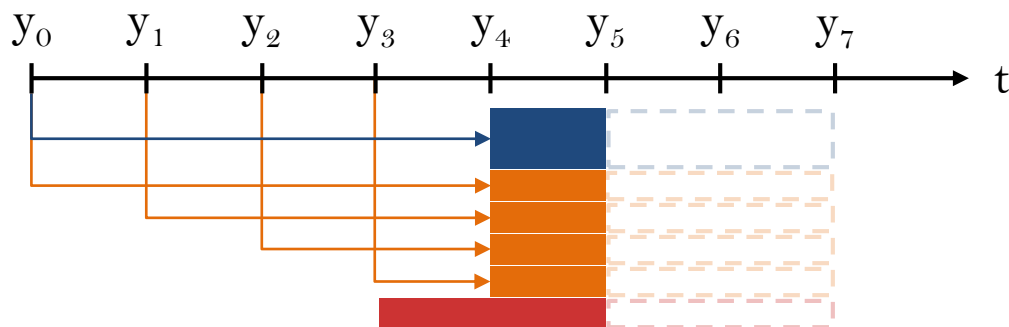
Procurement process



The Italian CRM design Procurement process



■ Complementary auctions ■ Main auctions



■ Delivery year (main and complementary auctions)
 ■ Adjustment auctions ■ Secondary market



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Critical analysis

Variable renewable participation

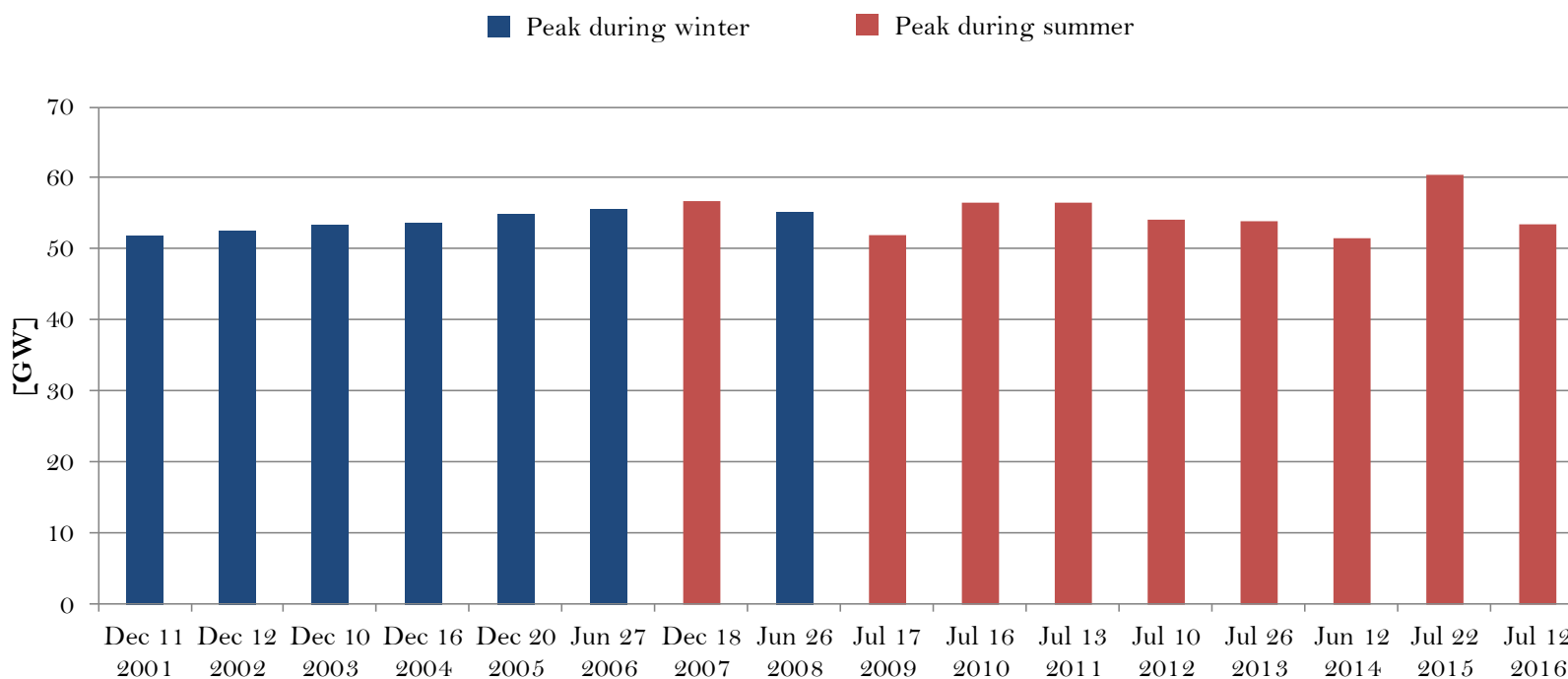
- Variable renewable technologies are excluded, at least for the time being, from the Italian CRM (not qualified for the MSD and receiving an incentive)



Critical analysis

Variable renewable participation

- Variable renewable technologies are excluded, at least for the time being, from the Italian CRM (not qualified for the MSD and receiving an incentive)
- Solar PV power could contribute covering peak demand in a country with a summer peak related to air conditioning



Critical analysis

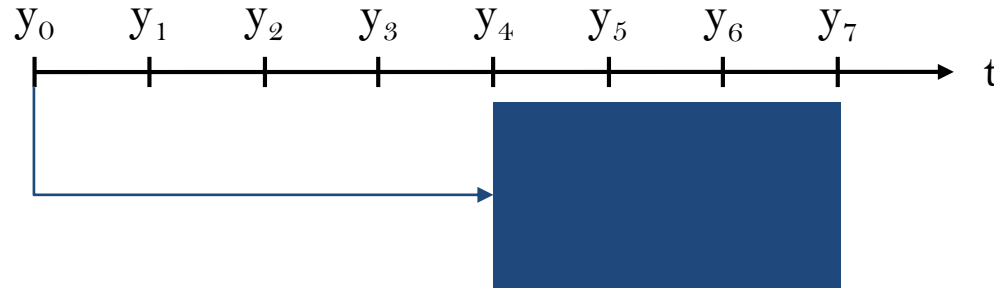
Variable renewable participation

- Variable renewable technologies are excluded, at least for the time being, from the Italian CRM (not qualified for the MSD and receiving an incentive)
- Solar PV power could contribute covering peak demand in a country with a summer peak related to air conditioning
- PJM, with a similar peak-demand behaviour, recognises to solar PV a firm capacity equal to 38% of their installed capacity, higher than typical load factors for this technology



Critical analysis

Lag period and contract duration



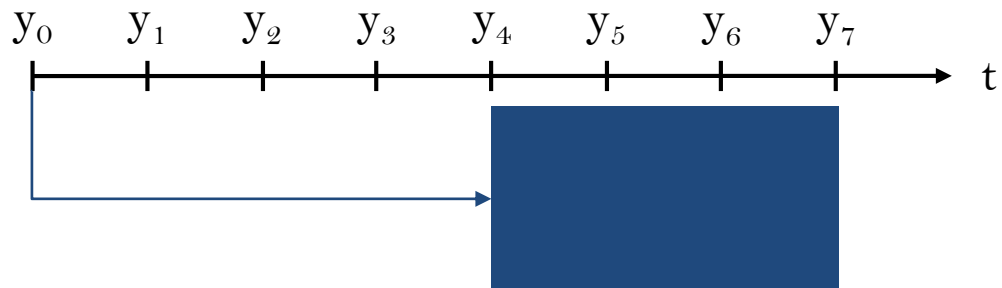
Lag period
4 years

Contract duration
3 years



Critical analysis

Lag period and contract duration



Lag period
4 years

Contract duration
3 years

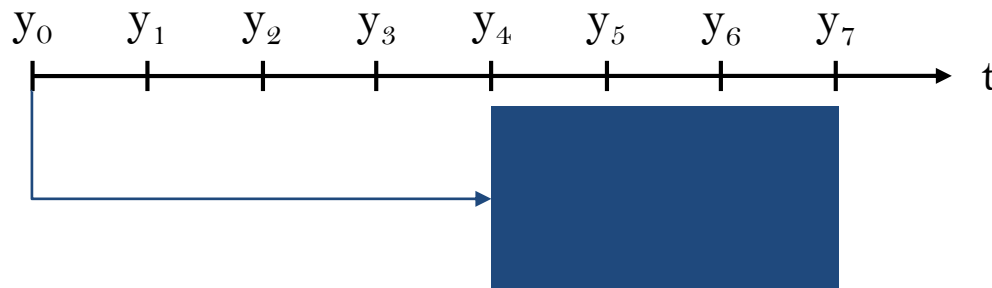
Lag period – construction time
*Long lag periods are necessary
for new entrants*

Contract duration – risk hedging
*Long contract durations
favour new entrants*



Critical analysis

Lag period and contract duration

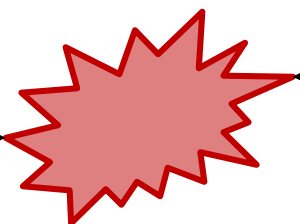


Lag period
4 years

Contract duration
3 years

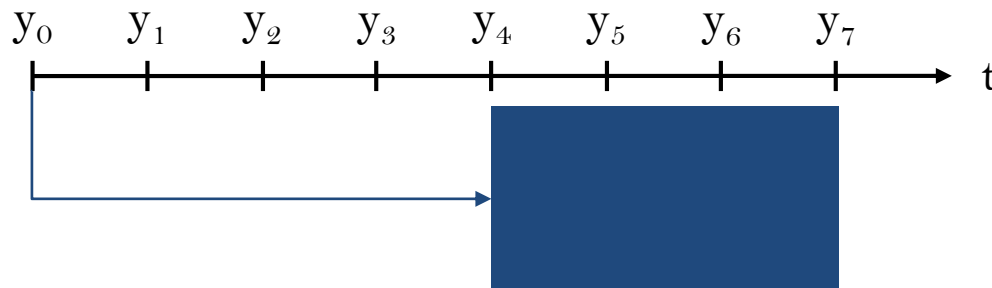
Lag period – construction time
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Contract duration – risk hedging
*Long contract durations
favour new entrants*



Critical analysis

Lag period and contract duration



Lag period
4 years

Contract duration
3 years

Lag period – construction time
*Long lag periods are necessary
for new entrants*

Contract duration – risk hedging
*Long contract durations
favour new entrants*

According to data from the relevant Ministry,
The average construction time is **5.2 years**



Critical analysis

Underperformance penalties

- Many CRM designs consider high underperformance penalties
 - Pay-for-performance principle in the United States
 - ISO New England 5 455 \$/MWh
 - PJM 3 625 \$/MWh
 - Administrative scarcity pricing (ASP) in Ireland
 - Full ASP 11 018 €/MWh
- The Italian mechanism does not rely on explicit penalties and no modification to scarcity pricing is considered
- Not negative *per se*, but not aligned with international experiences



Critical analysis

Compatibility with EU guidelines

- Significant decommissions of thermal plants, but the overcapacity is still significant; new CCGTs are mothballing, but can be connected rapidly
- Bias towards existing generation
 - Short contract durations (no different durations for new entrants)
 - Cross-border participation considered implicitly
 - Demand participation considered implicitly
 - Price floor applying only to existing resources
- 713/2016/R/EEL, removal of price floor and longer contract durations for new entrants



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