ERSE
ENTIDADE REGULADORA
DOS SERVIÇOS ENERGÉTICOS

The democratization process of the energy system towards decarbonisation, decentralization and digitalisation, leaving no one behind

Energy for Sustainability Initiative (EfS-UC), Universidade de Coimbra

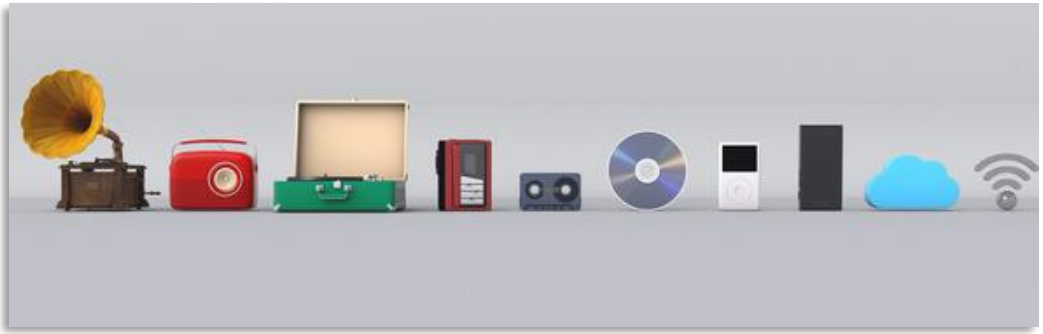
29 May 2020


1. Setting the scene
2. Past: the evolution of the energy sector
3. Present: achieving an internal energy market
4. Future: delivering the energy transition

1. Setting the scene

1. Setting the scene

Understanding the evolution of energy and society…



1. Setting the scene
2. Past: the evolution of the energy sector
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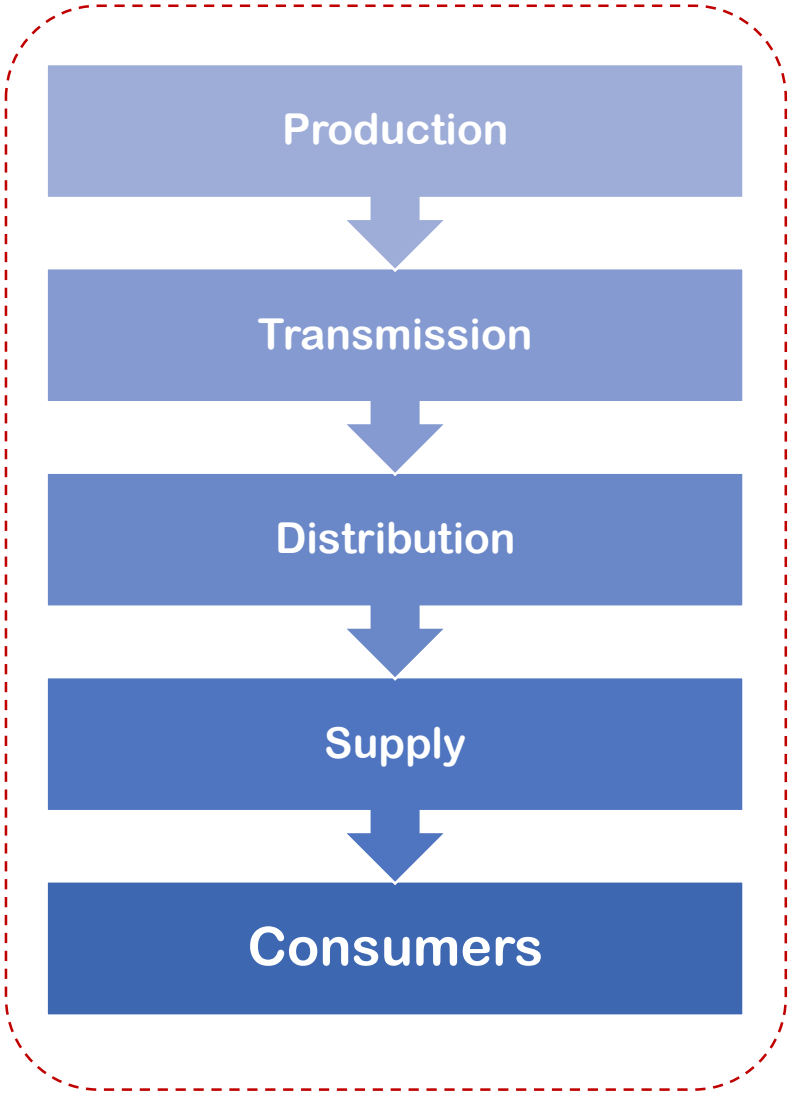
2. Past: Evolution of the electricity sector

Vertical and horizontal integration of the electricity sector

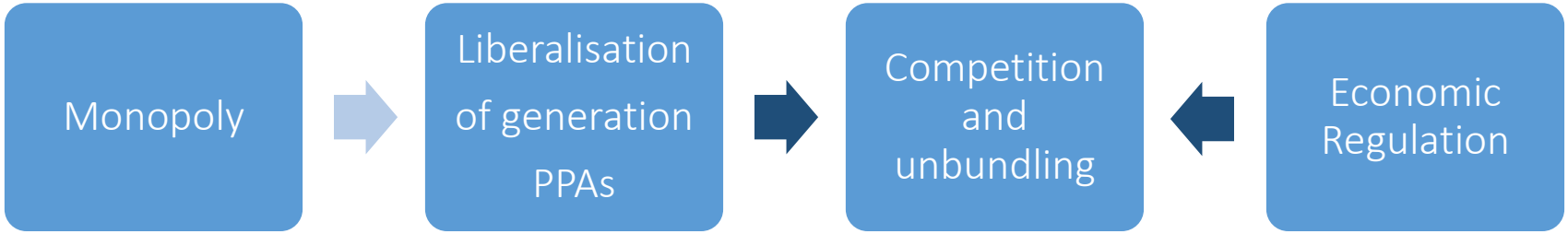


- Vertically and horizontally integrated
- Monopoly
- Public company
- No alternative or right to choose supplier

2. Past: Evolution of the electricity sector

Monopoly – structure of the sector before liberalisation:

- Network industry
- Exclusivity rights
- Horizontal segmentation
- Vertical integration of networks and supply

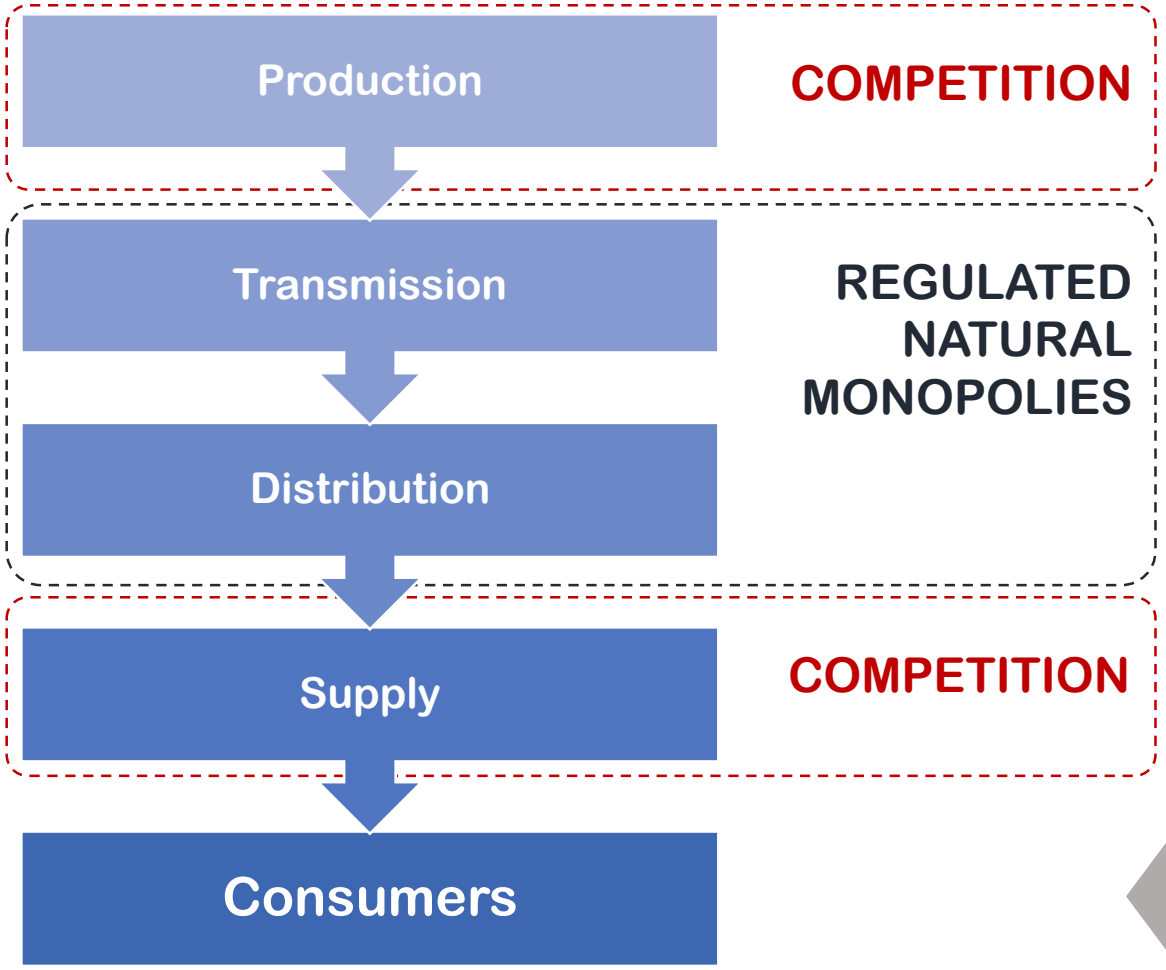


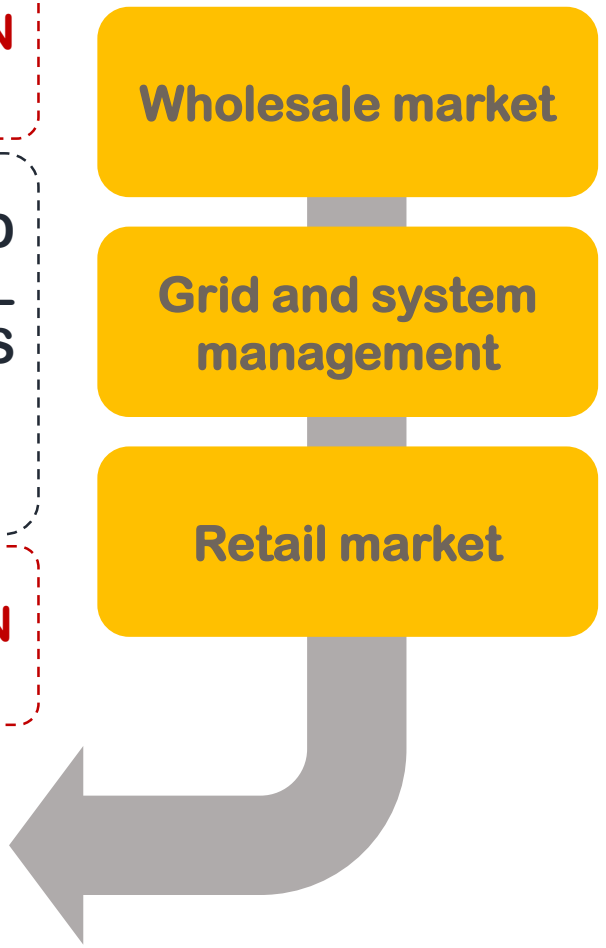
Liberalisation – structure of a liberalised market:

– Privatisation of energy sector assets belonging to the State
– Introduction of competition through structural changes to the organization of the energy sector
– Creation of independent sectorial regulatory authorities

2. Past: Evolution of the electricity sector

Separation of competitive and monopoly activities





2. Past: Evolution of the electricity sector

The role of regulation

- **Oversee** the functioning of the market
- Monitor **competition**
- Ensure **transparent and non-discriminatory access** to the networks for all actors (through regulatory rules on access to and use of the infrastructure)
- Ensure appropriate network use tariffs (natural monopoly characterised by marginal costs lower than the average costs requires the intervention of independent regulation
- Promote the **interests of consumers** as regards prices, quality, security of supply, information, possibility to choose supplier
  - *Balanced **commercial arrangements** with customers*
  - ***Pre-contractual and contractual** information*
  - *Information on **switching supplier***

2. Past: Evolution of the electricity sector

ERSE's evolution since its establishment

1996
- Founding committee (President et 2 Members, appointed by Council of Ministers)
- Preparation of ERSE Statutes, internal rules ....
- Costs of Committee supported by the transmission system operator

1997
- Establishment of ERSE – **electricity** regulator for continental Portugal, following approval of its Statutes by the Government
- Regulator's annual budget funded by the TSO and included in its allowed revenues

1998
- ERSE approves its first codes, including tariff methodology and 1999 tariffs

1999
- First regulated tariffs for electricity

2002
- ERSE responsibilities extended to electricity in Azores and Madeira

2003
- ERSE responsibilities extended to **natural gas**

2006
- First regulated tariffs for natural gas

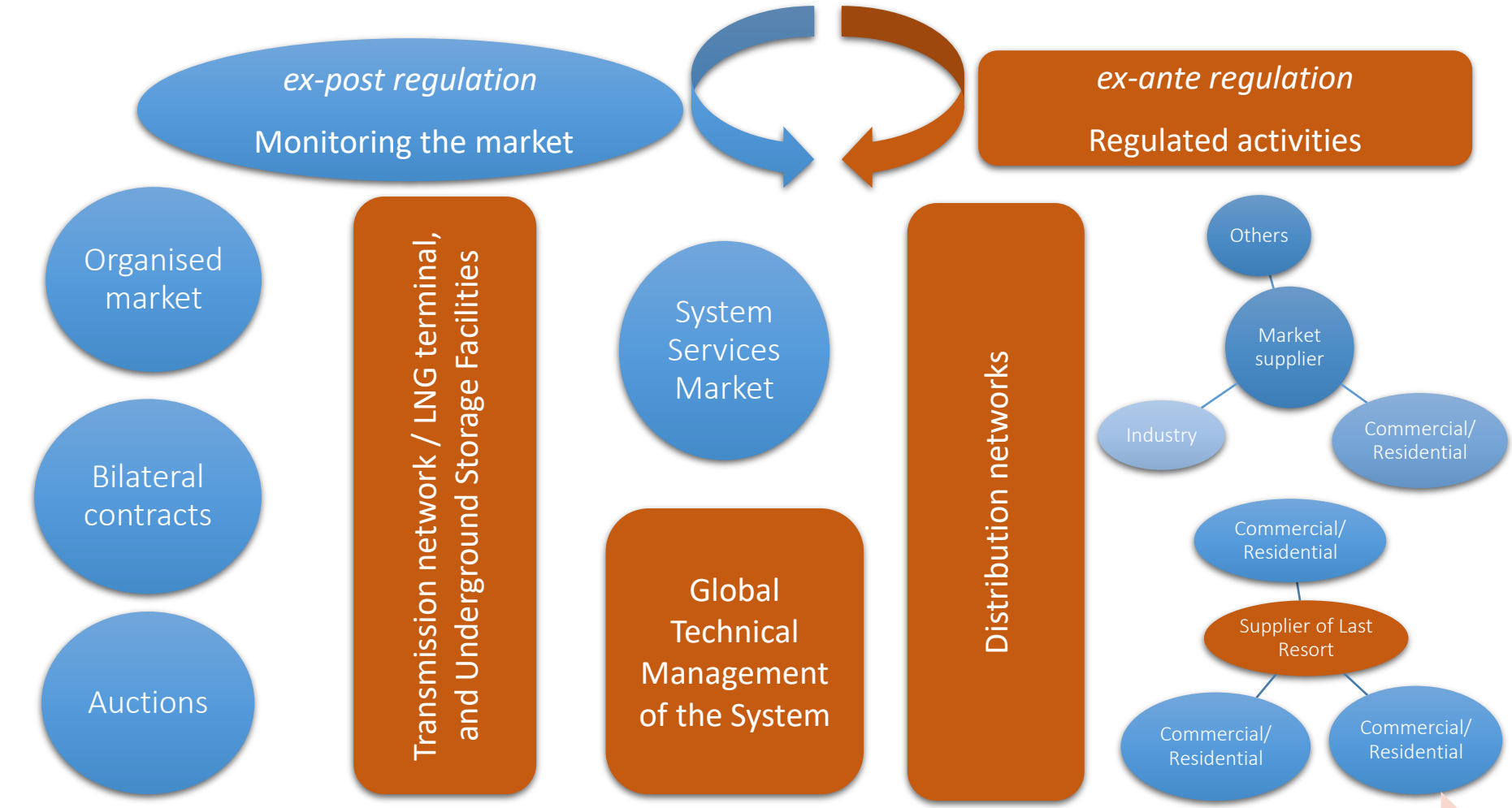
2010
- ERSE responsibilities extended to **electro-mobility**

2013
- ERSE gains enforcement and sanctioning regime

2018
- ERSE responsibilities extended to **oil-derived fuels and biofuels**

3. Present: achieving an internal energy market

Energy sector (electricity and natural gas) - regulated activities



3. Present: achieving an internal energy market

The Power of Choice

&

Challenges to simplify this exercise by the consumer

3. Present: achieving an internal energy market

For the generation and supply companies and for the network operators and system management we developed a very complex system.

This complexity enabled to offer a simplified environment to the consumers namely regarding supplier switching

2. Past: Evolution of the electricity sector

ERSE's evolution since its establishment

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1. Setting the scene
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2. Past: Evolution of the electricity sector

Liberalisation

- Creation of competitive market for electricity
- Breakup of monopolised supply such that each consumer can select his/her provider
- Separation of network management from generation
- Separation of direct supply from the generation of electricity
- Creation of an incentive structure to set market prices in monopolistic competition
- Privatisation of state-owned assets

Towards the EU Single Energy Market

1st Package
First common rules for the internal market and liberalisation

2nd Package
Speeding up liberalisation and market integration

3rd Package
EU-wide Institutional and Regulatory Framework

Package on Delivering Clean Energy for all Europeans

3. Present: achieving an internal energy market

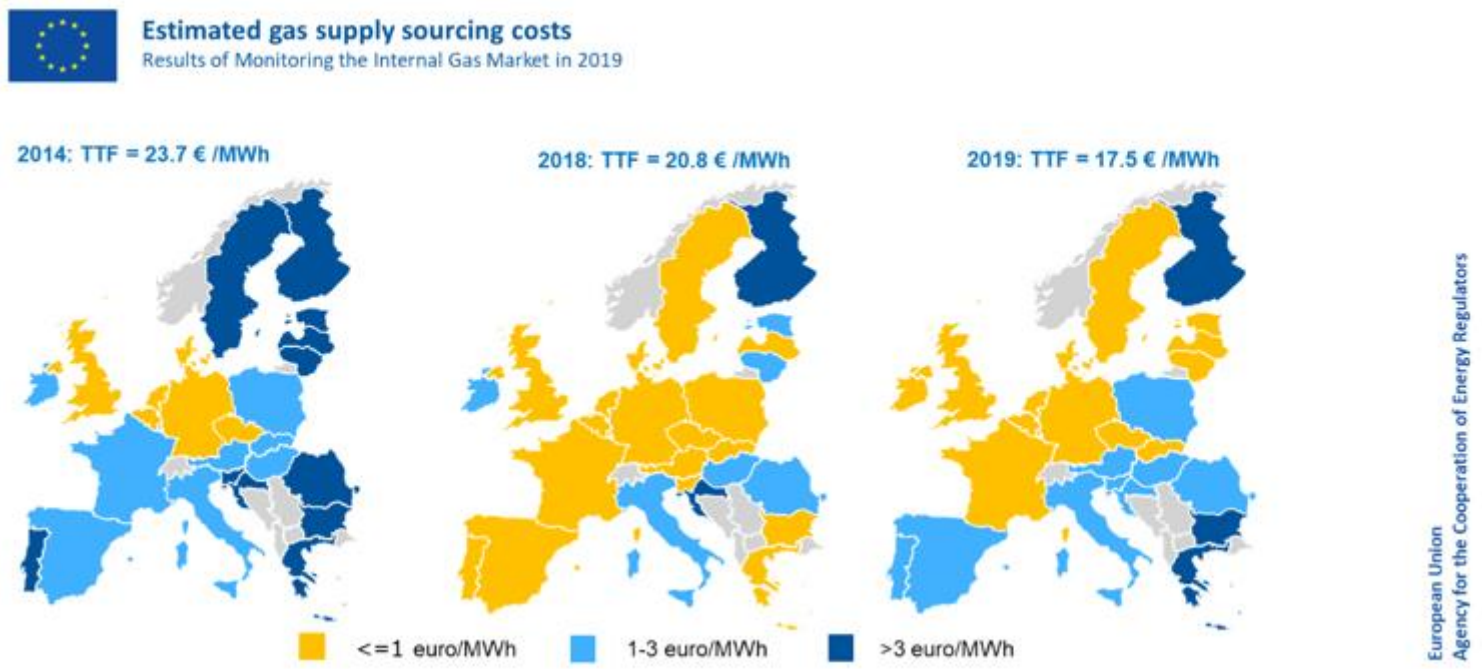
Objectives of the 3rd Energy Package

- Promote well-functioning markets and create an Internal Energy Market for electricity and gas
- Improve efficient price formation and increase quality of service and security of supply

1. Creation of **new European level bodies** (like the Agency for the Cooperation of Energy Regulators (**ACER**) and the Network of Transmission System Operators (**ENTSOs**)
2. Strengthening of **regulatory powers and independence**
3. Separation (**unbundling**) of the transmission network operators
4. Development of European **10-year network development plans**
5. **Integration and coupling** of regional wholesale markets
6. **Harmonisation of rules**, through development of European **network codes** on issues like capacity allocation, congestion management, balancing and tariff structures for (gas) networks
7. Strengthening of **consumer rights**

3. Present: achieving an internal energy market

- Gas supply sourcing costs in most EU Member States (MSs) fell by more than 3 euros/MWh in 2019 compared with 2018
- Record deliveries of LNG driven by international gas market dynamics, robust pipeline imports from Russia and Norway, and gas storages that had already been well stocked at the beginning of the injection season were some of the major contributing factors to EU hub's spot prices dropping to ten years' lows in 2019.
- Convergence in sourcing cost remained robust in 2019 among the majority of MSs.



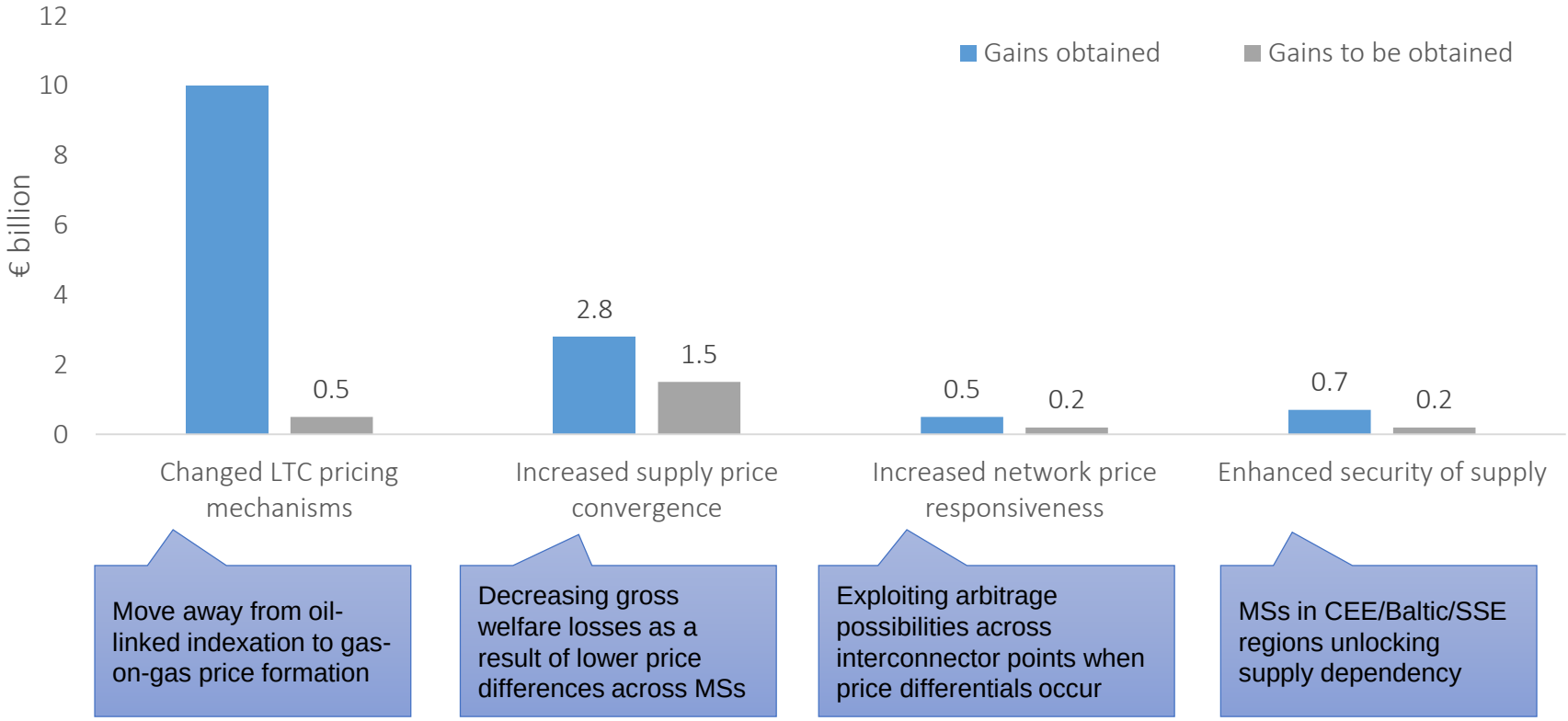
In 2020, sourcing costs are likely to again fall, with the economic slowdown caused by the Coronavirus health crises depressing energy demand and prices.

Source: ACER calculation based on Eurostat Comext, ICIS and NRAs

3. Present: achieving an internal energy market

EU gas consumers saw tangible benefits from better functioning wholesale markets and could gain even more

Estimation of annual welfare gains since 2013 in billion euros for selected categories



The estimated gains of the various categories can not be summed up because they are interrelated

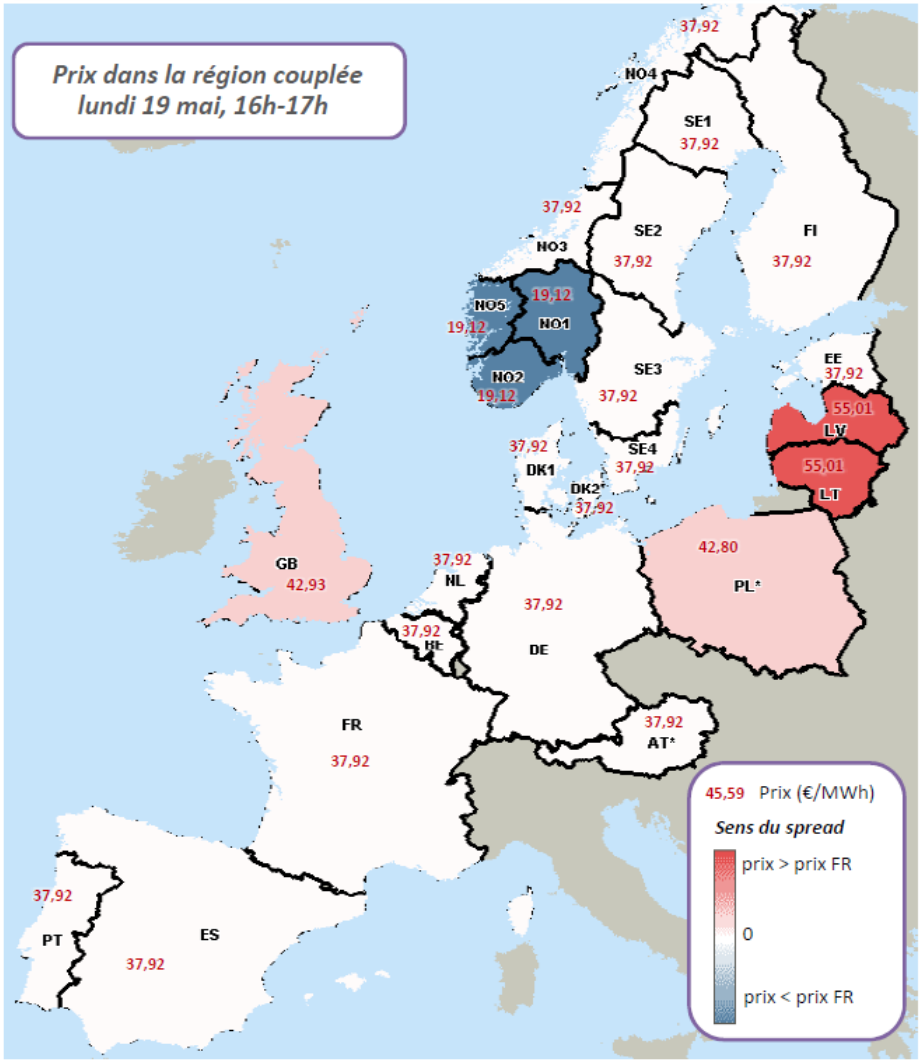
Source: ACER calculations

3. Present: achieving an internal energy market

European Internal Energy Market: equal price from Portugal to Finland at the wholesale electricity market

REGIONAL DAY AHEAD IMPLICIT AUCTIONS	
Europe (NWE+SWE)	Price coupling
Poland	Poland price coupled within NWE through SwePol-link
Ireland and Northern Ireland	All Island market, single price zone
Italy - Slovenia	Price coupling
Czech – Slovak - Hungary	Price coupling

Source: APX, updated by Matti Supponen

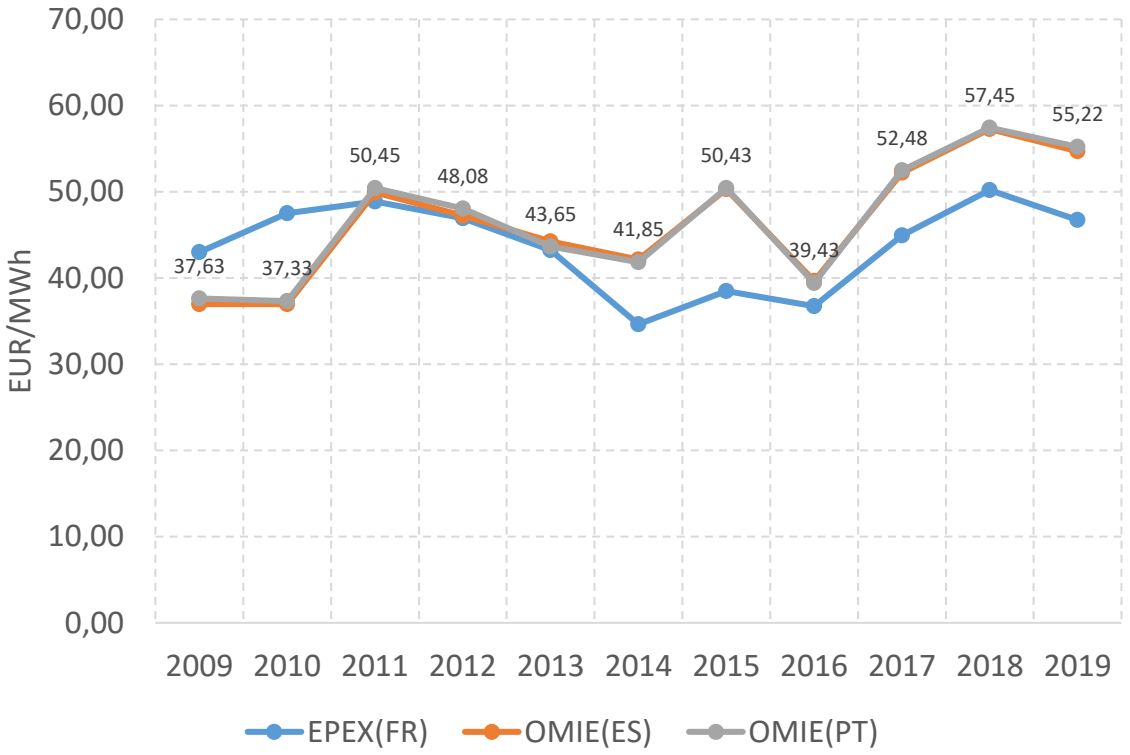


19 May 2014, 16:00-17:00 CET: for the first time, it took place an European coupling of the prices of the various European wholesale electricity markets.

Equal price from Portugal to Finland of the daily wholesale market

3. Present: achieving an internal energy market

Wholesale Prices on MIBEL (Day-Ahead)

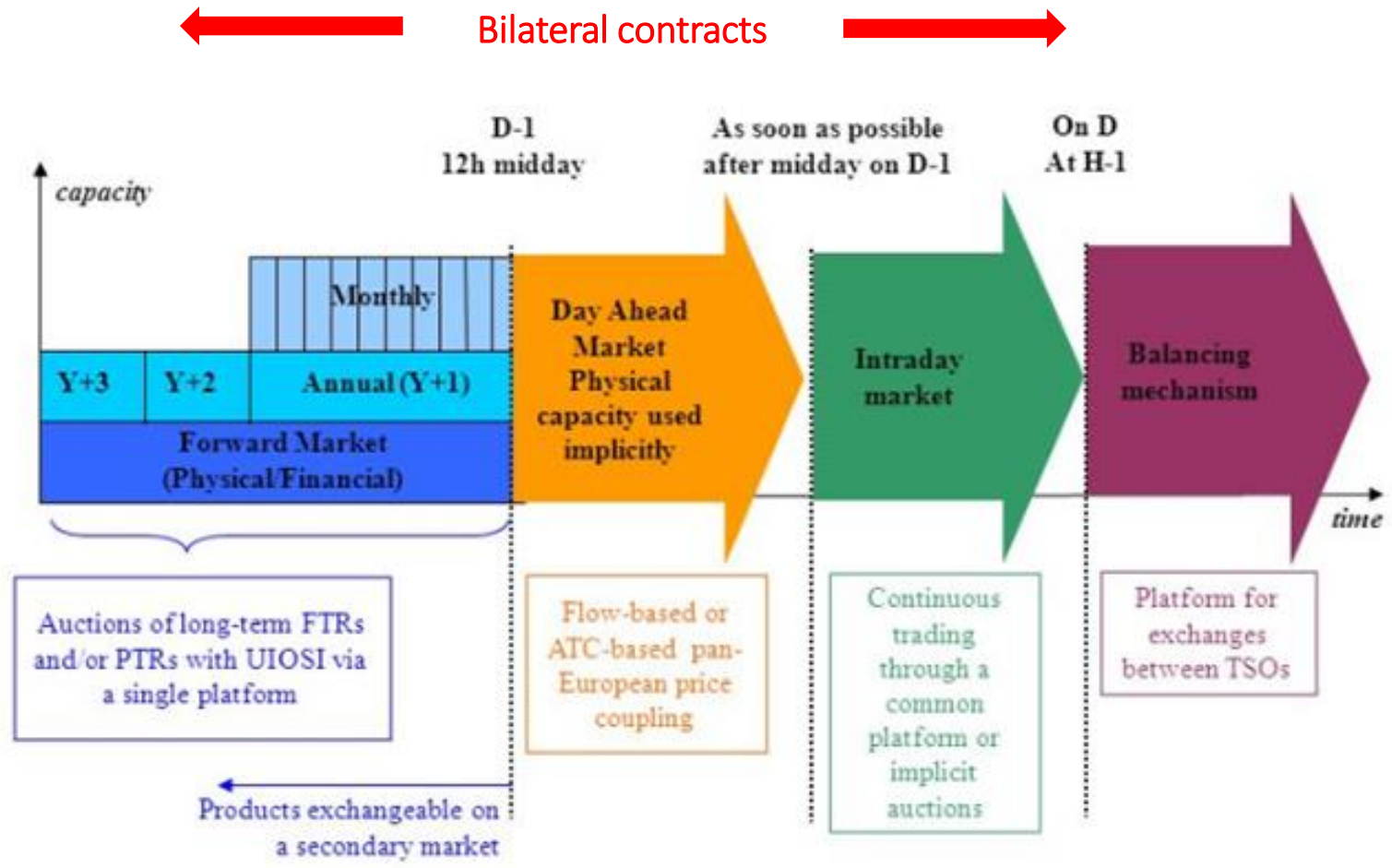


- The day-ahead prices in Portugal and Spain are quite similar (highly correlated: 99%)
- However, during the period under analysis, the correlation between the day ahead prices in Spain and France is lower (34%).

Source: Thomson Reuters (2019 data until 12 April)

3. Present: achieving an internal energy market

How does the EU-wide Target Model for Electricity Market work?



FTR –Financial Transmission Rights
PTR –Physical Transmission Rights
UIOSI –Use It or Sell It

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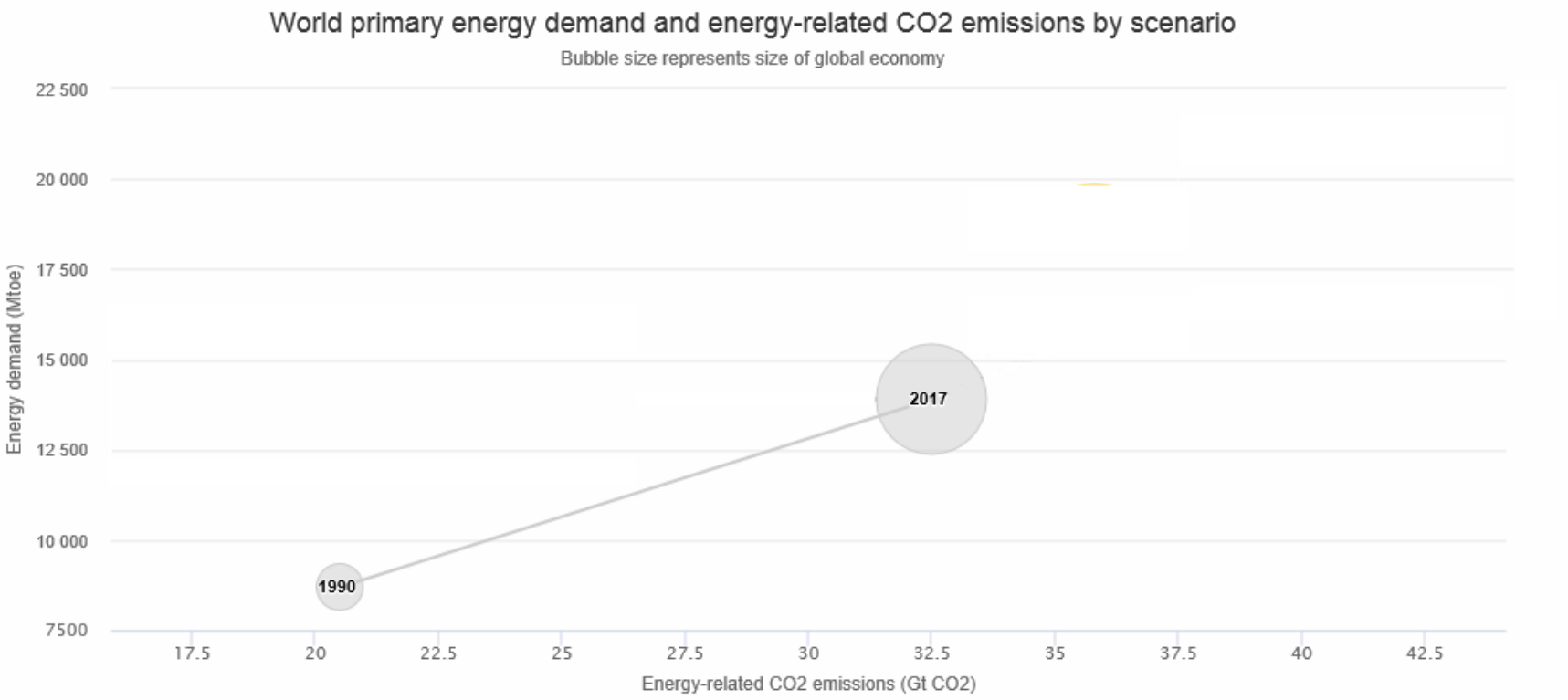
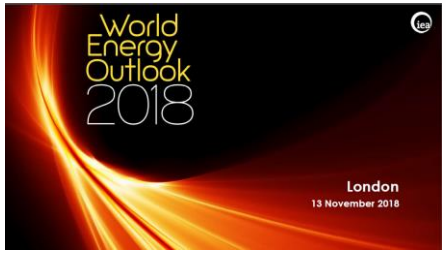
The Future
NEXT EXIT

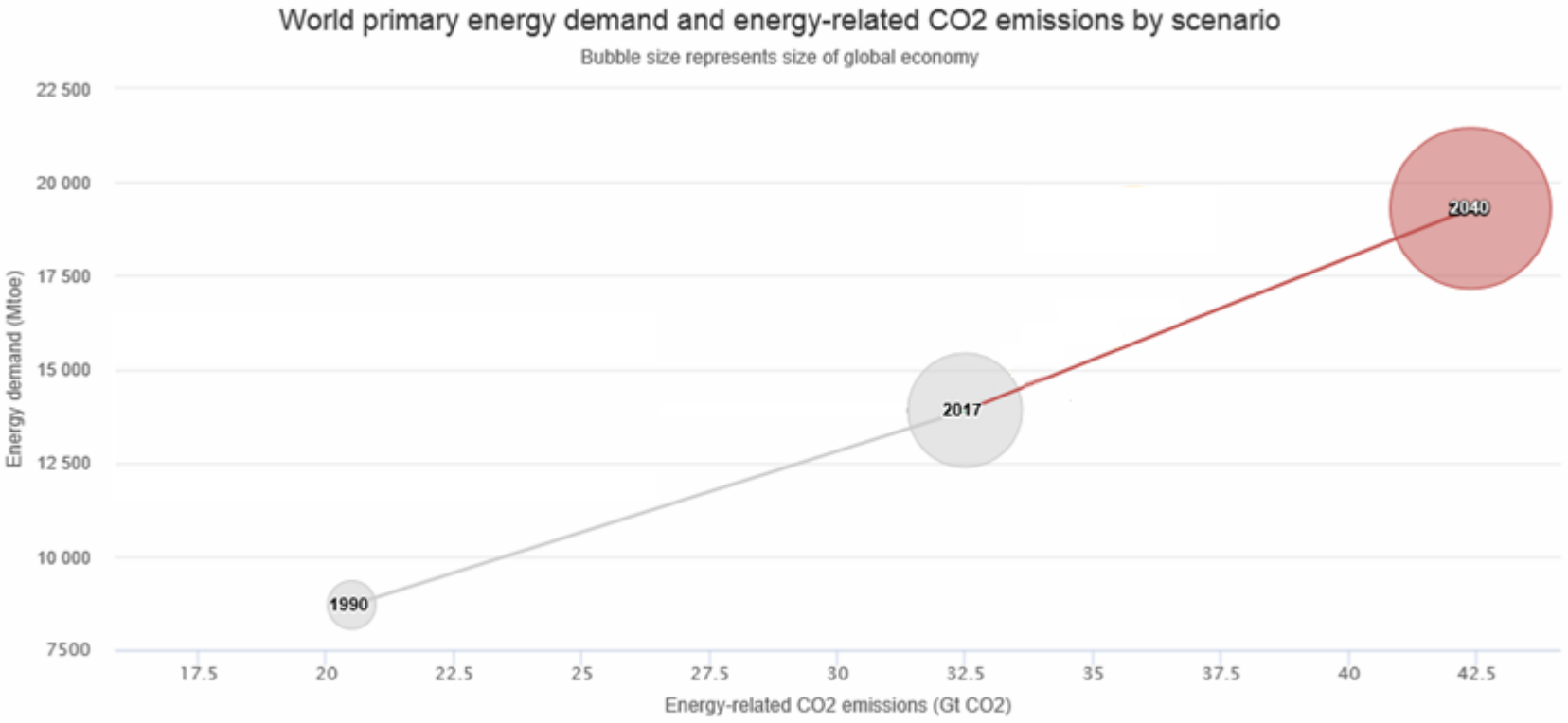
4. Future: delivering the energy transition

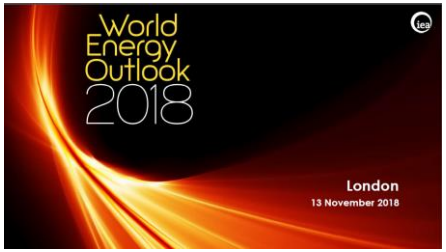


Fonte: https://www.iea.org/weo2018/scenarios/#topBanner



4. Future: delivering the energy transition





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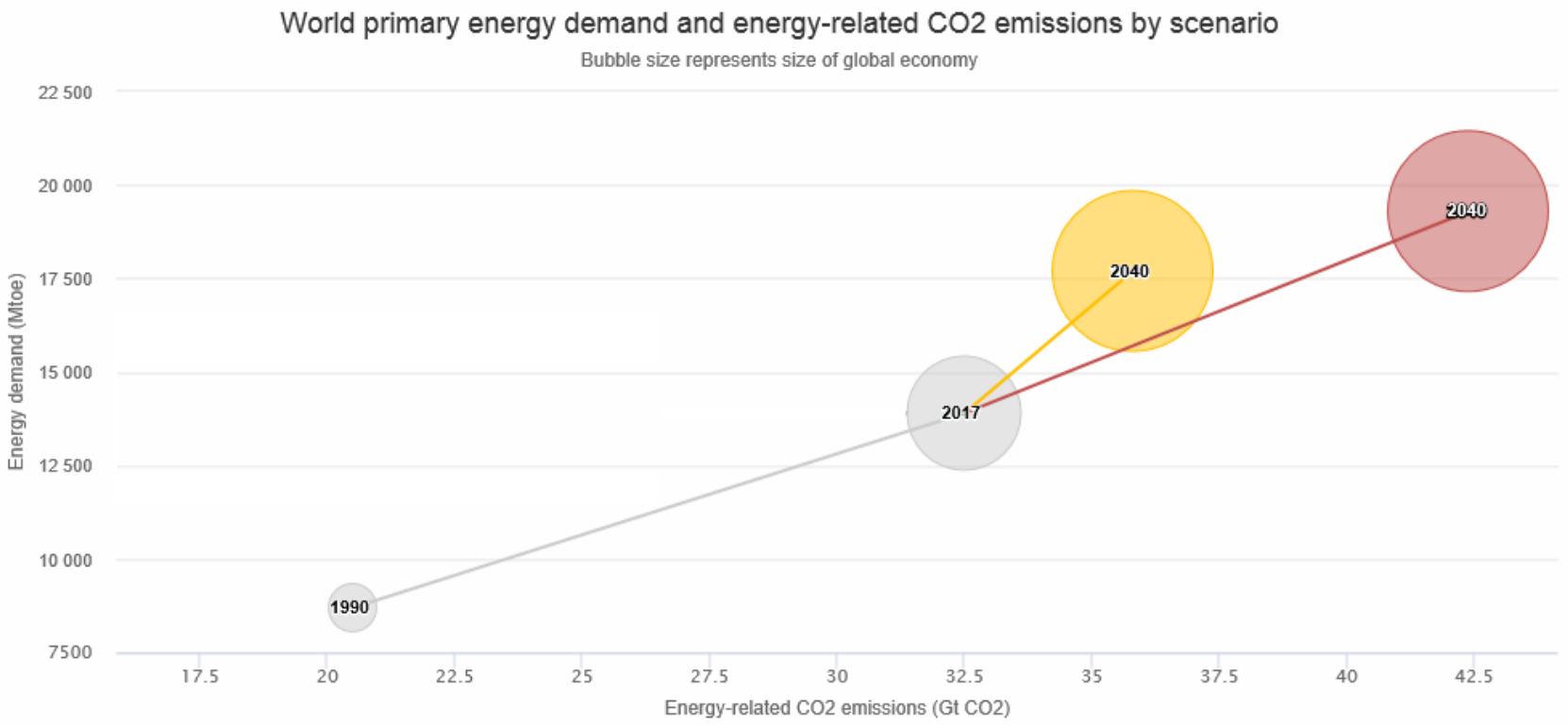

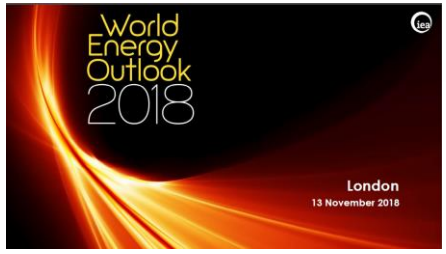

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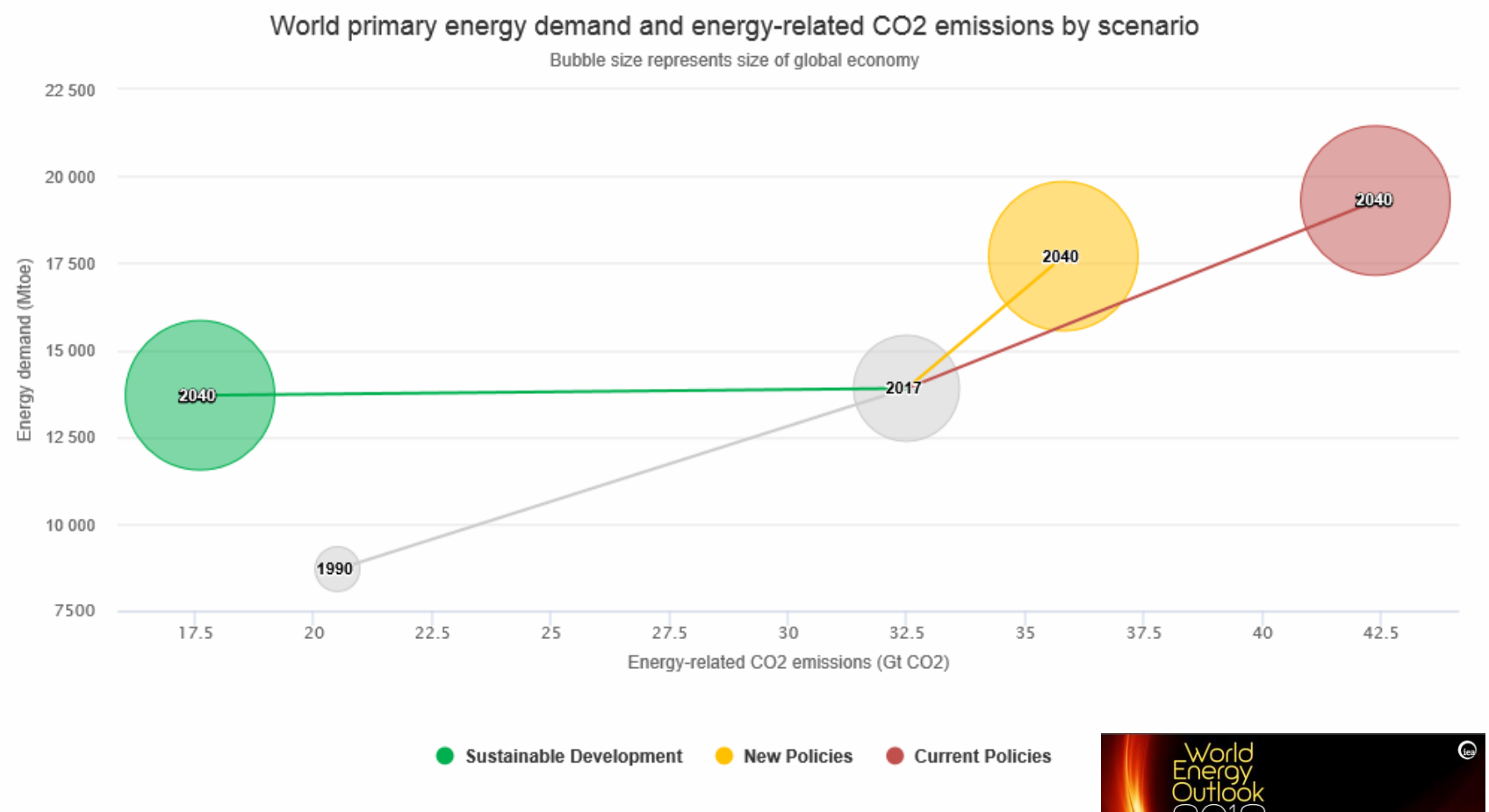

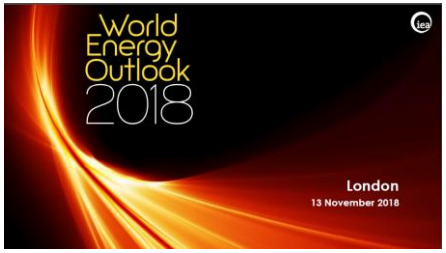

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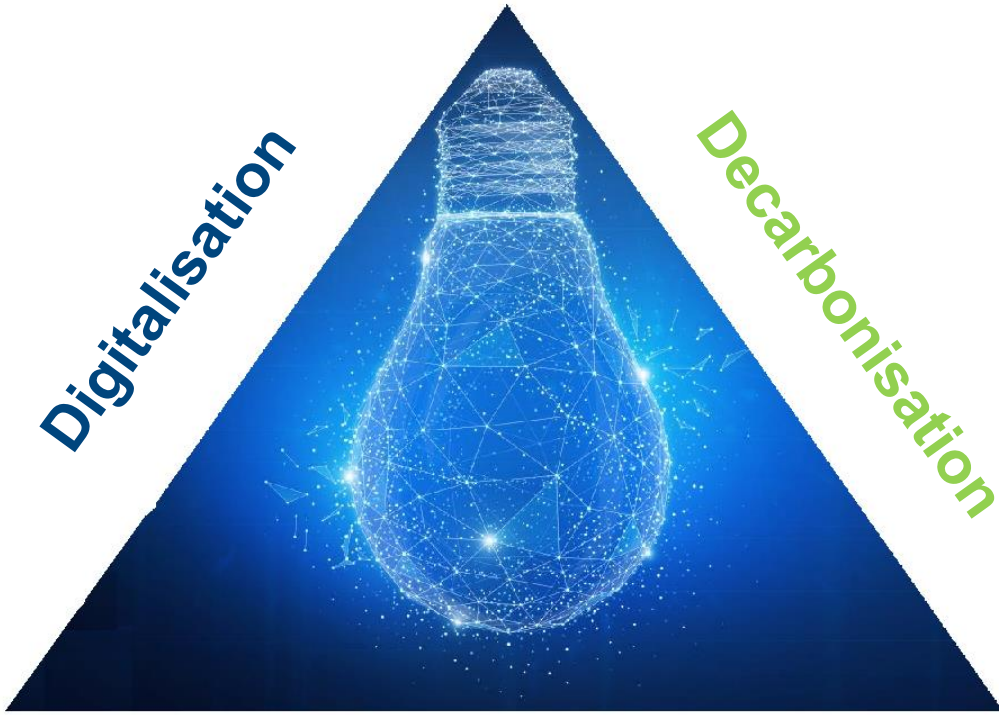
4. Future: delivering the energy transition



4. Future: delivering the energy transition

Security of supply

Social Sustainability

Economic Sustainability

4. Future: delivering the energy transition

"Clean energy for all Europeans" Package implements the EU Energy Union Strategy (2021-2030)

Dimensions and goals of the Energy Union

Putting energy efficiency first, as it is the easiest way of saving money for consumers and reducing GHG emissions		Energy Efficiency
Security, solidarity and trust: diversify European energy sources and guarantee security of supply at all times	Security of Supply	
An internal energy market fully integrated		Internal Energy Market
Ambitious emission reduction targets, EU ETS, renewable energies, Integrated National Energy and Climate Plan…	Climate action Decarbonisation	
Support the investigation and innovation of clean energy technologies with low carbon emissions		Research, innovation and competitiveness

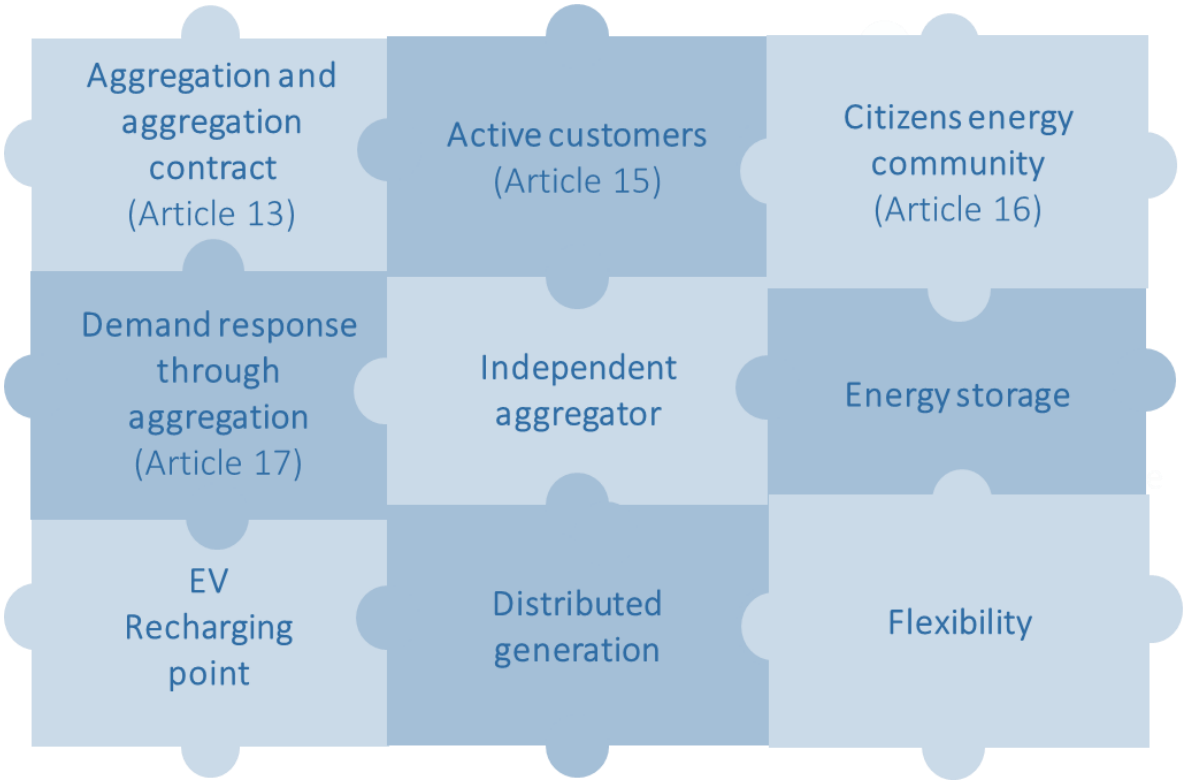
- Reduction of GHG emissions: 40%
- Energy efficiency: 32,5%
- Renewable energy penetration: 32%
- Electrical Interconnections: 15%

The **protection and empowerment of consumers** is a main topic of this Legislative Package

4. Future: delivering the energy transition

Clean Energy Package: some new (or recast) concepts

Directive (EU) 2019/994 on common rules **for the internal market for electricity** and amending Directive 2012/27/EU (recast)



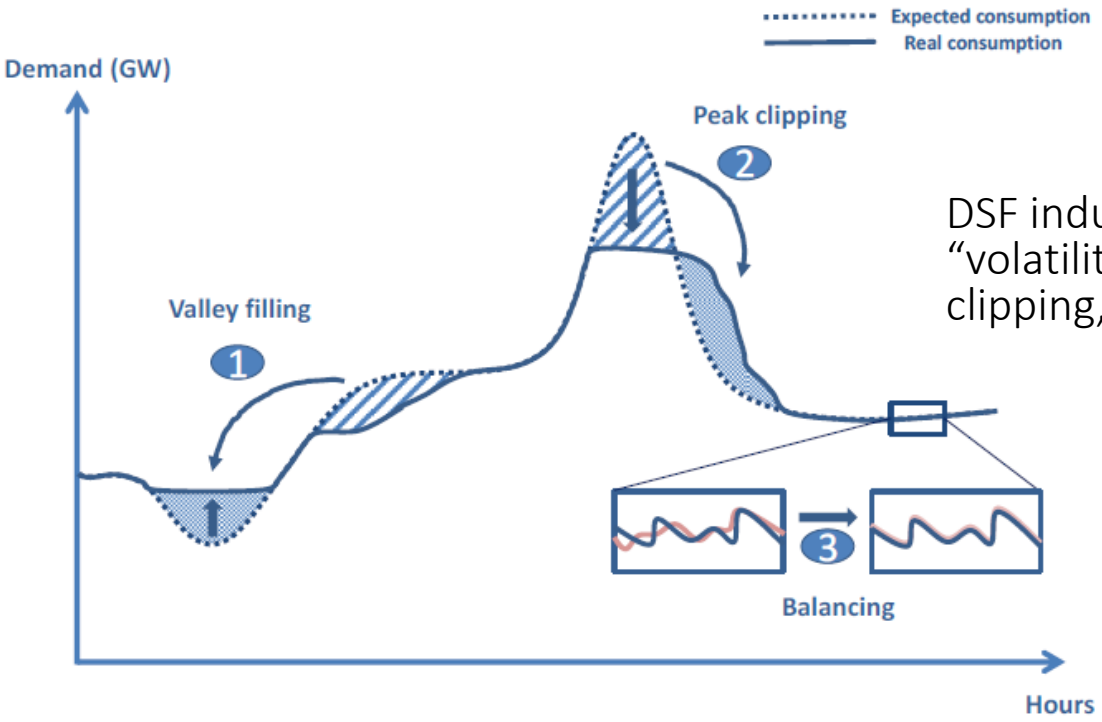
- The Clean Energy Package introduces a **formal framework for active consumers.** From the **regulatory perspective**, Demand Side Flexibility is a **priority**
- One way to achieve this is trough the adoption of "smart tariffs" (**ToU and dynamic tariffs**) and **incentive schemes to promote efficiency** on consumption

4. Future: delivering the energy transition

Flexibility: the concept

Flexibility = **the ability** of the electricity system **to respond to fluctuations of supply and demand** while, at the same time, **maintaining system reliability**.

Flexibility is **the modification of** generation injection and/or **consumption patterns** in reaction to an external signal (price signal or activation) **in order to provide a service within the energy system**.



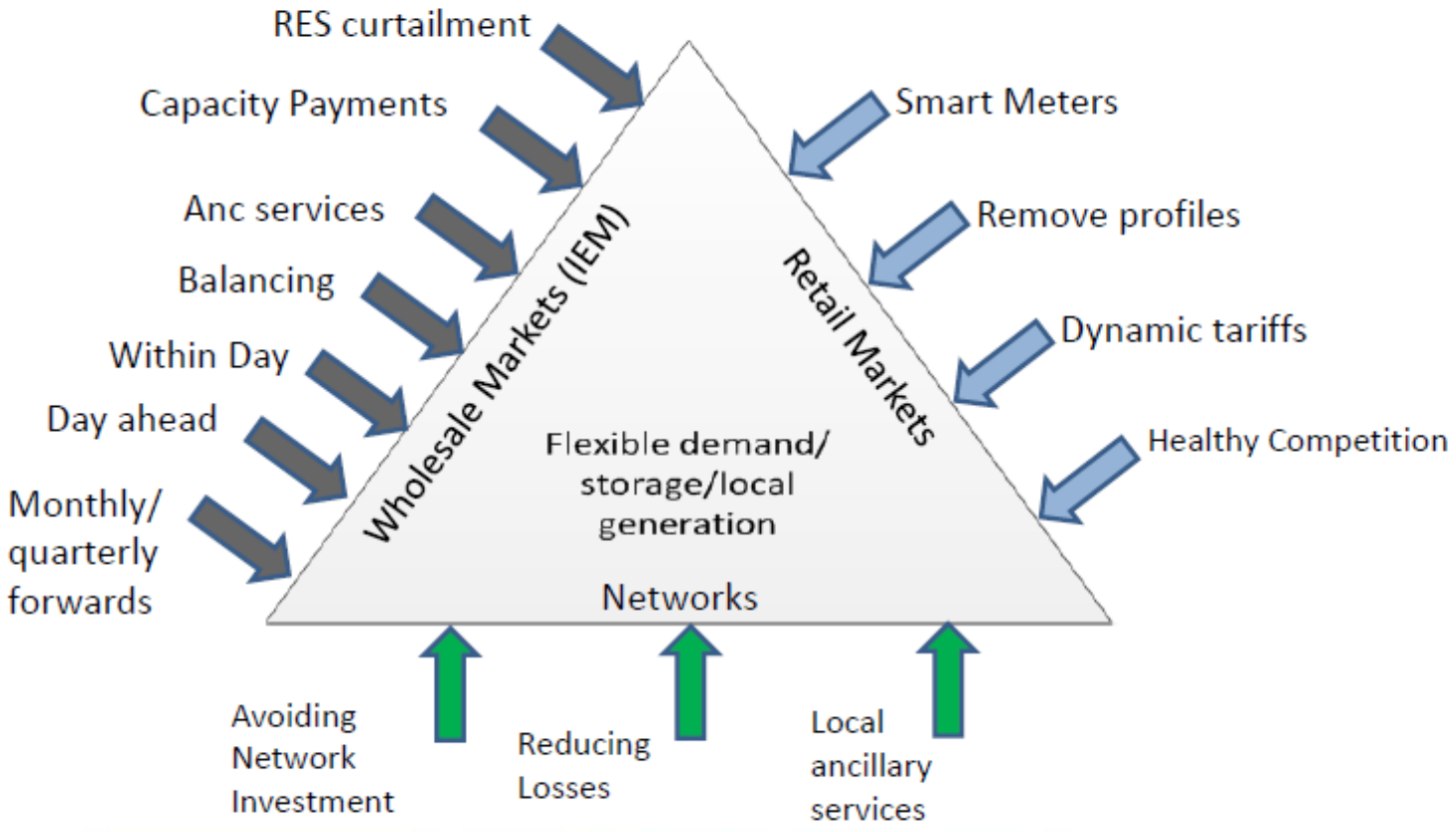
DSF induces less volume "volatility": valley filling, peak clipping, balancing…

Source: "Ceer Advice on Ensuring Market and Regulatory Arrangements help deliver Demand-Side Flexibility, CEER, June 2014

4. Future: delivering the energy transition

CEP keep focus on the development of the Internal Energy Market

Drivers for the use of flexibility



4. Future: delivering the energy transition

Time of great change, towards a more democratic model….

Renewables

Eficiency

Cogeneration

Networks

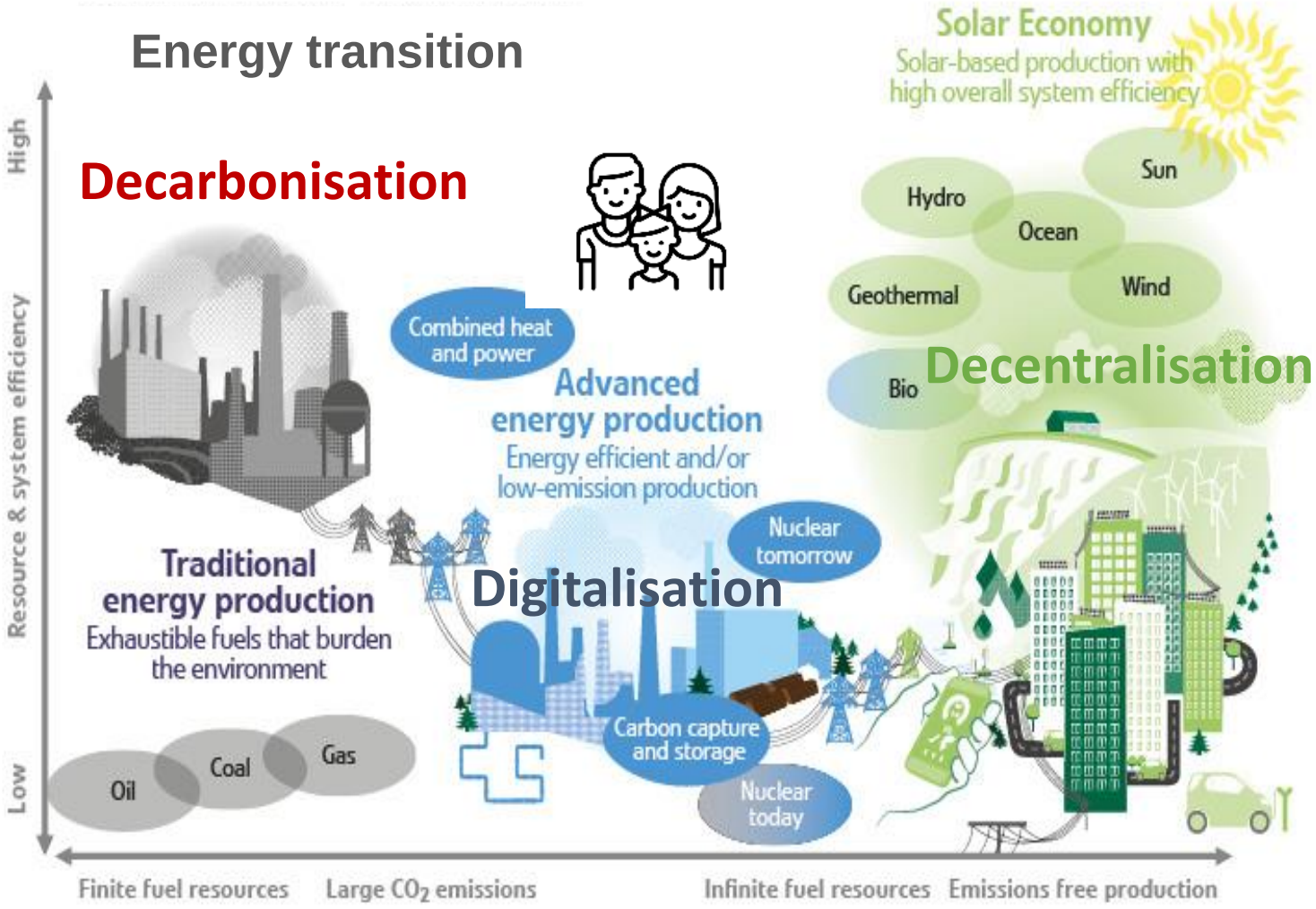
Storage

Consumers

Buildings

Cities

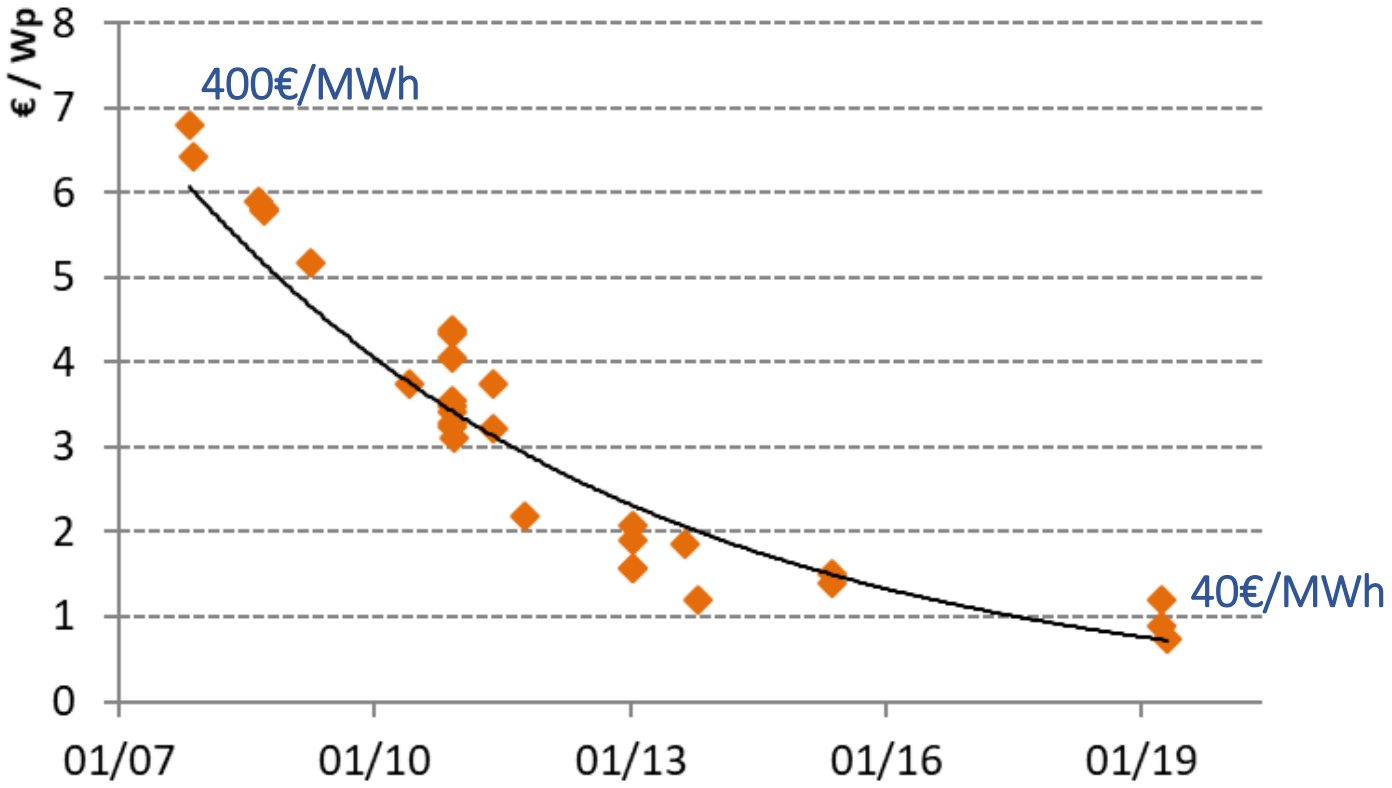
Mobility



Source: Fundação para a Ciência e a Tecnologia, PT

4. Future: delivering the energy transition

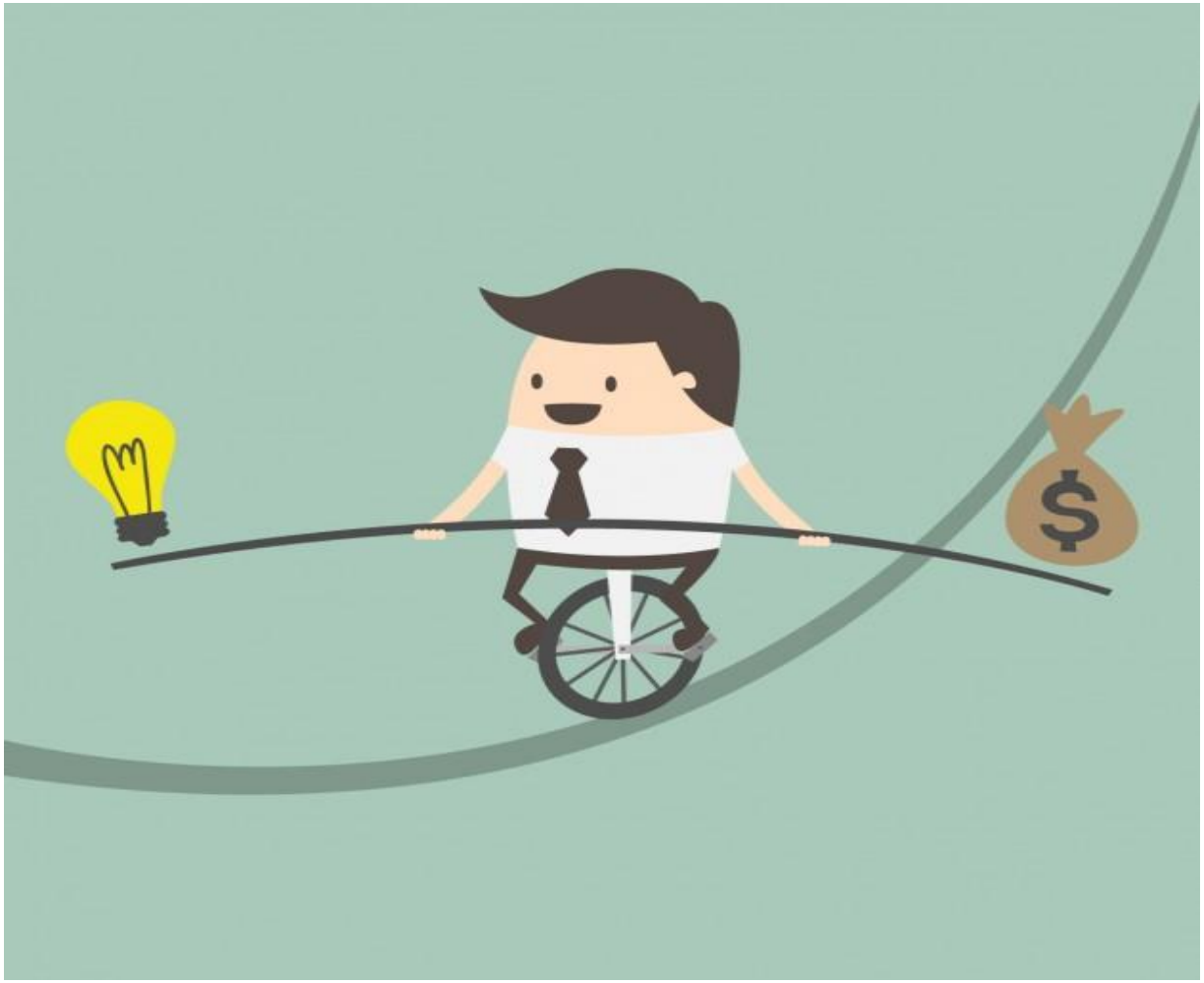
Evolution of the investments costs for photovoltaic installations



4. Future: delivering the energy transition

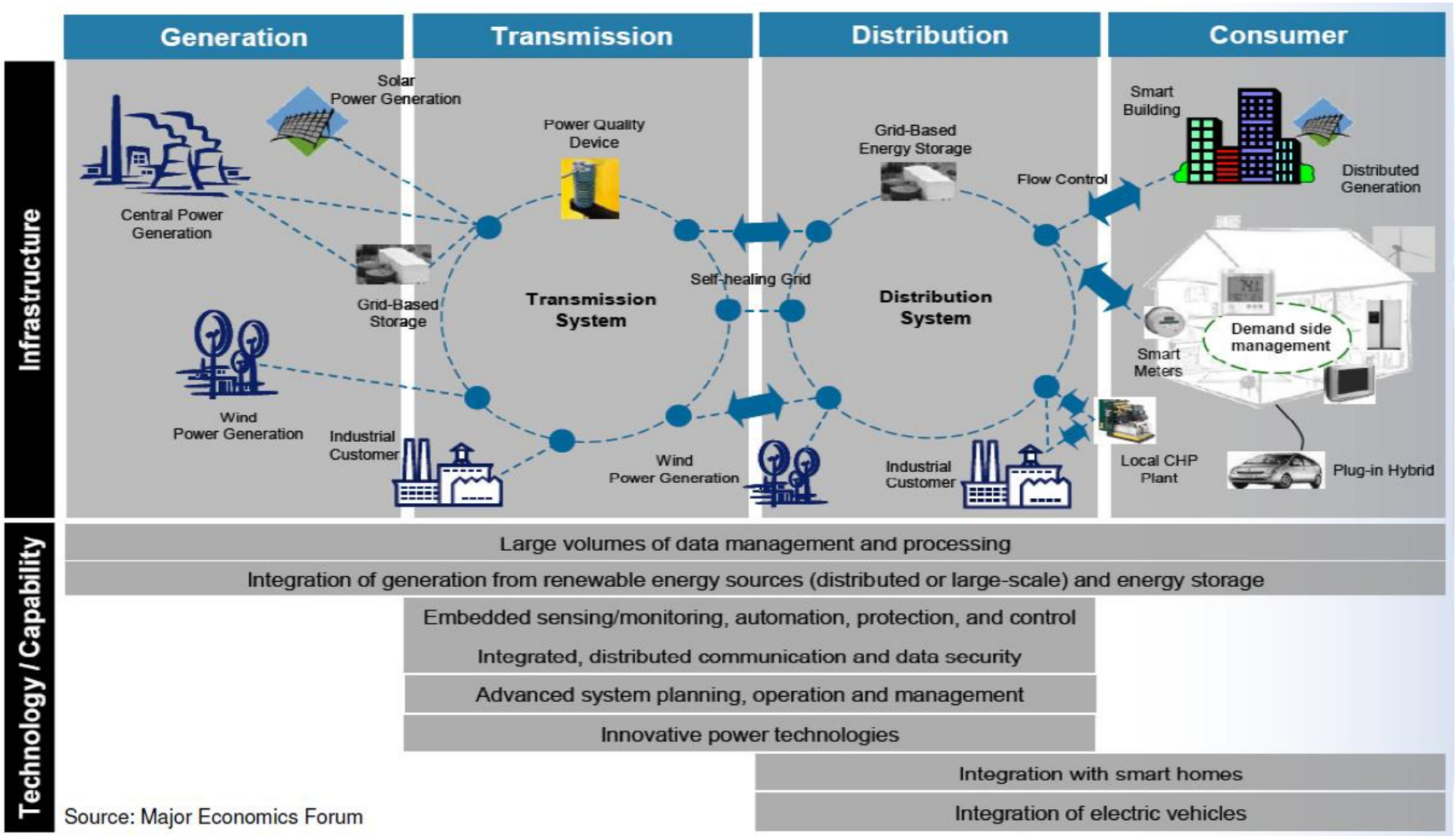
Change thats bring value for money

ensuring a decarbonisation process at least cost for consumers



4. Future: delivering the energy transition

Smart Grids - Definition



Source: Major Economics Forum

4. Future: delivering the energy transition

European Union Energy Strategy and Energy Union

THE FUTURE OF THE ENERGY SYSTEM WILL BE DIFFERENT

2015

Paris Agreement

2030

50% of electricity generated by renewable sources

2050

Fully decarbonised electricity and cleaner transports

UNIQUE CHANCE TO MODERNIZE OUR ECONOMY

Stimulate Investment

Create Employment and Growth

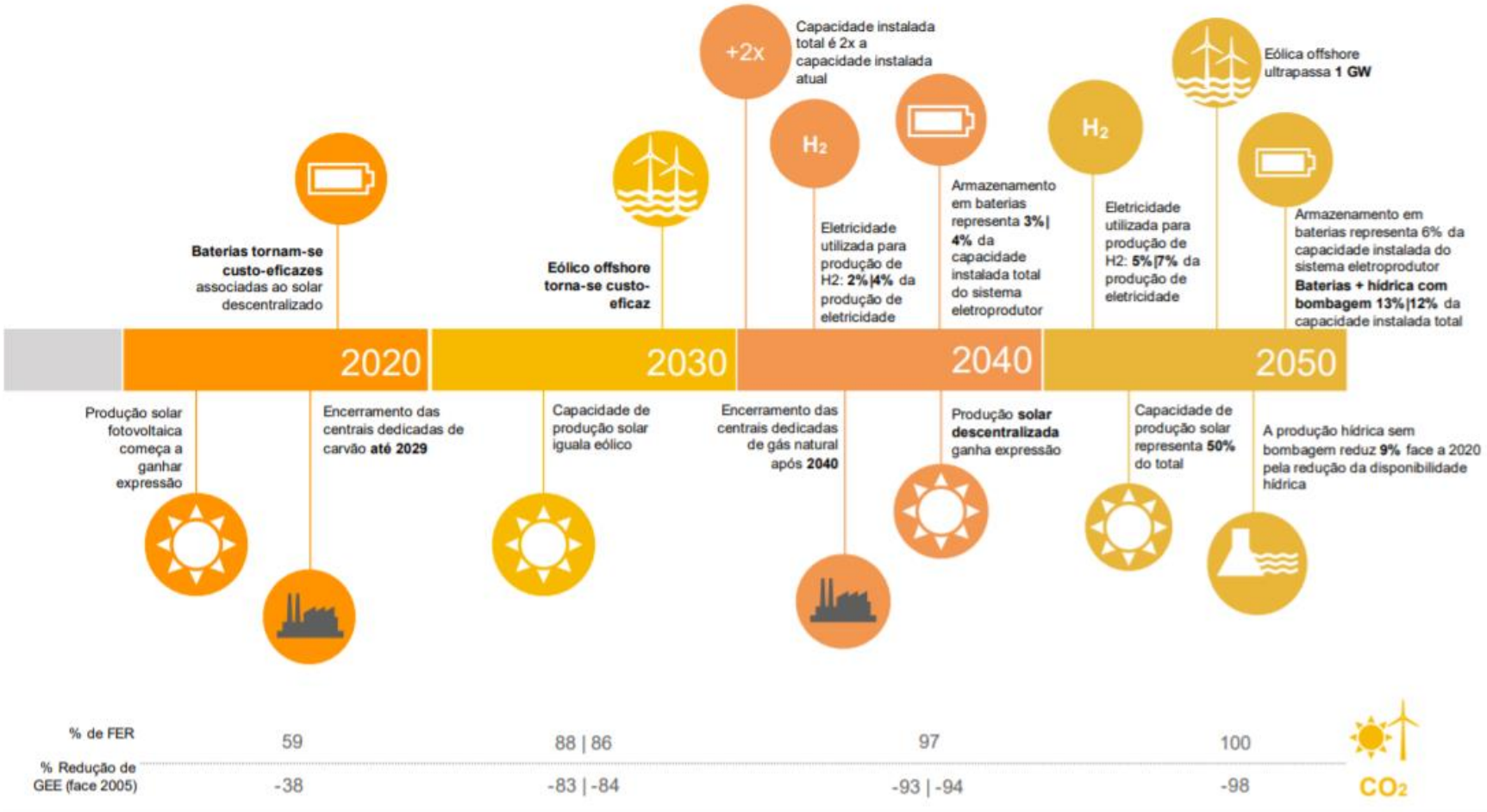
Ensure Energy Supply

Accelerate decarbonisation

Give More power to consumers

4. Future: delivering the energy transition

2050 Roadmap for carbon neutrality in Portugal



4. Future: delivering the energy transition

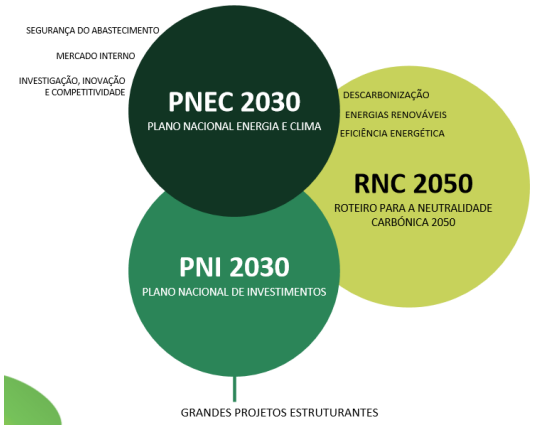
Integrated National Energy and Climate Plan (PNEC 2030)

	RESULTADOS 2016	META 2020	META 2030
EMISSÕES GEE 2030[1]	-22%	-18% a -23%	-45% a -55%
EFICIÊNCIA ENERGÉTICA[2]	23%	25%	35%
RENOVÁVEIS	28,5%	31%	47%
RENOVÁVEIS NOS TRANSPORTES	7,5%	10%	20%
INTERLIGAÇÕES ELÉTRICAS	8%	10%	15%

(1) sem LULUCF, face a 2005; (2) Redução no consumo de energia primária sem usos não energéticos. Por comparação com as projeções do modelo PRIMES de 2007

PNEC 2030: in order to achieve carbon neutrality by 2050 and in line with EU targets, ambitious targets are set for Portugal for the 2030 horizon.

PNEC is being built in coordination and articulation with the 2050 Carbon Neutrality Roadmap and the 2030 National Investment Plan



Source: "Apresentação do Plano Nacional Integrado Energia e Clima (Lisboa, 28 de janeiro de 2019)", https://www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=0eada7c4-4f17-4d13-a879-6700f302b7e, Consultado em 25/06/2019

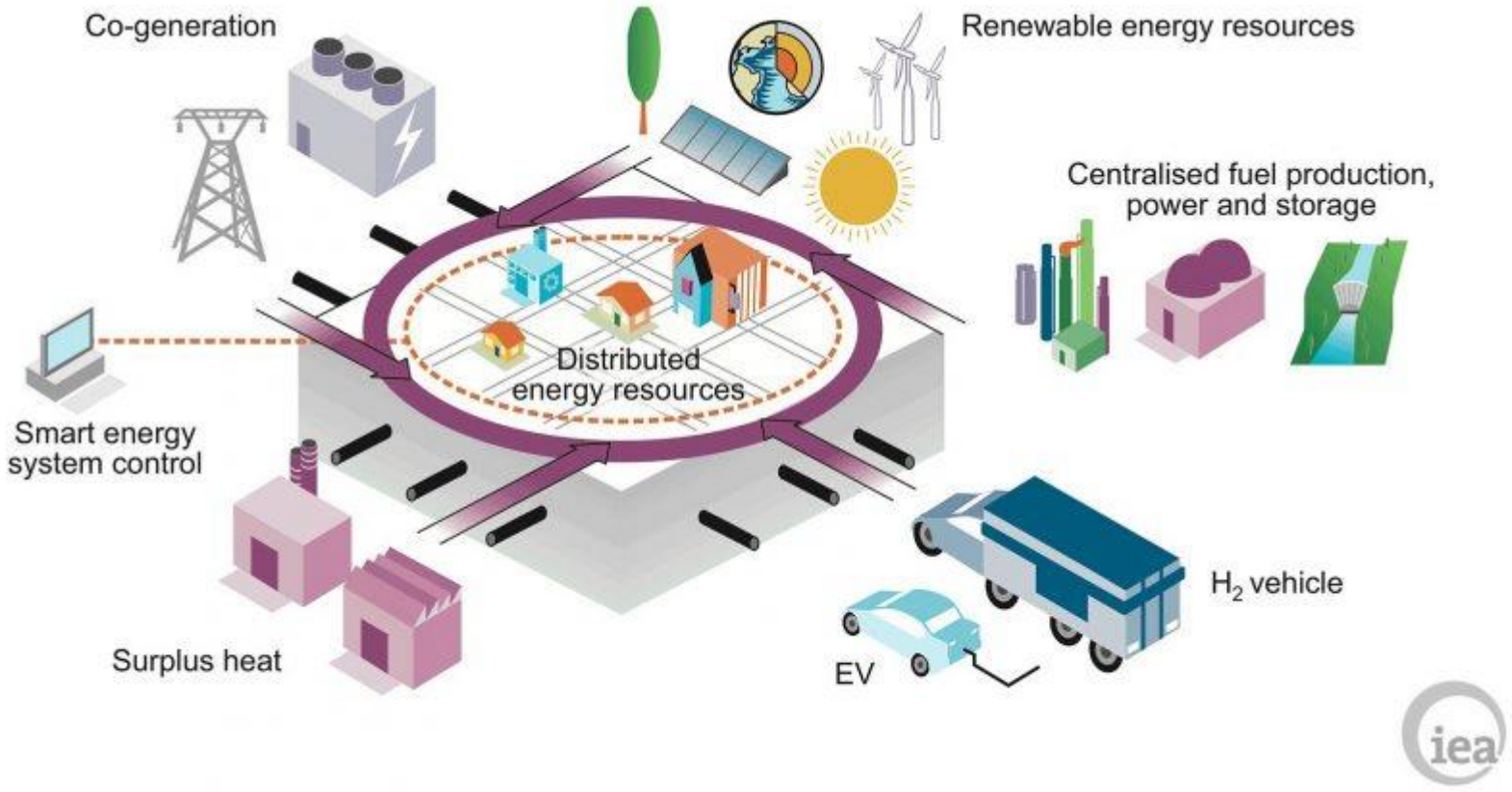
4. Future: delivering the energy transition

- European Climate Law
- Communication on EU Industrial Strategy
- Single Market Enforcement Action Plan and Single Market Barriers Report
- Review of the TEN-E Regulation
- **Strategy for smart sector integration**
- Offshore wind strategy
- European Industrial Strategy Package - Clean Hydrogen Alliance
- Comprehensive strategy for sustainable and smart mobility
- Guidance for MS to address energy poverty
- Proposal for revising all relevant legislative measures to deliver on the
- increased EGD ambition (EED; RED, ETS etc.)
- Climate Pact (to empower citizens, cities, etc. local communities to contribute to the energy and climate transition and share experiences on their efforts
- Regulation/Directive and Communication on empowering the consumer for the green transition
- Taxonomy – green financing
- Review of State Aid Guidelines

The European Green Deal (EGD)

4. Future: delivering the energy transition

Energy System Integration

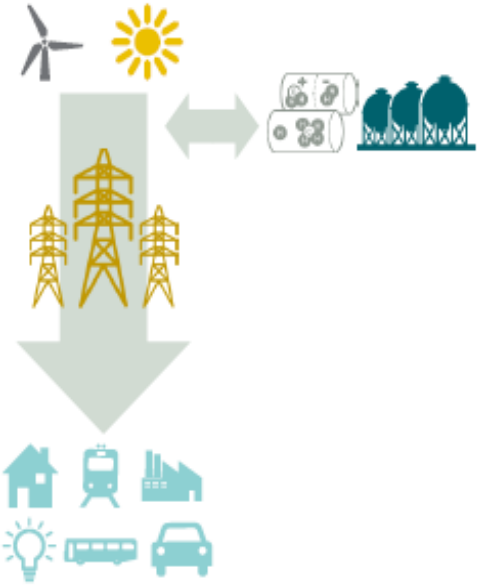


We consider 3 scenarios with varying degrees of use of gas infrastructure. 95% emissions reduction target for 2050 will be achieved in all of them

Electricity only

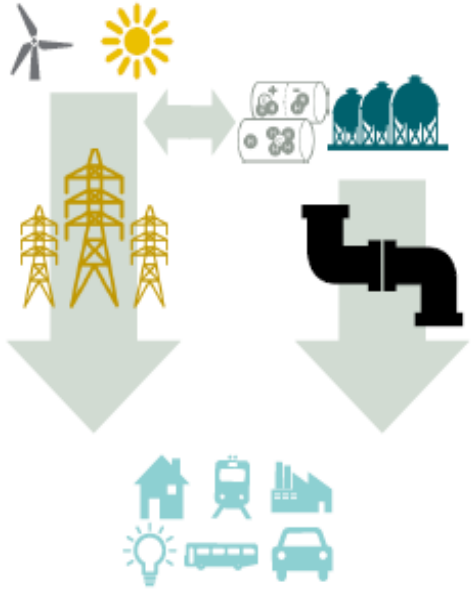
- End applications primarily directly electrified (e.g. electric vehicles, HP, direct heating)
- No gas-based end applications
- No Power-to-Gas
- Electricity networks alone combine power generation and end energy use

Electricity and gas storage



- End applications primarily directly electrified (e.g. electric vehicles, HP, direct heating)
- No gas-based end applications
- Possibility of "Power-to-Gas-to-Power" for seasonal storage
- Electricity networks alone combine power generation and end energy use

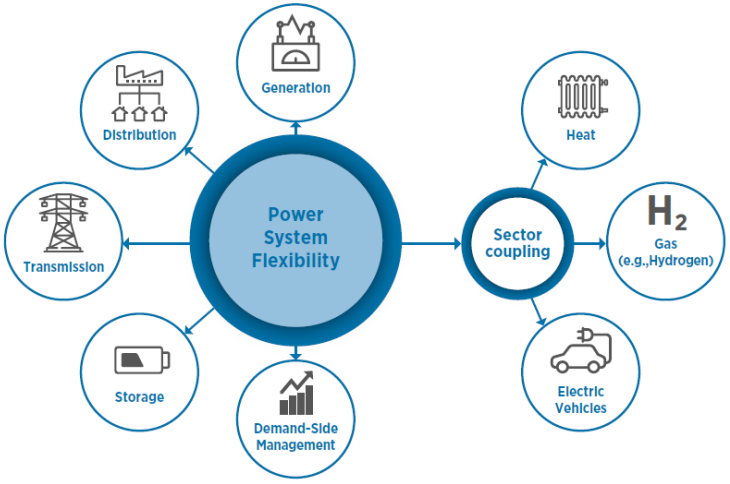
Electricity and green gas

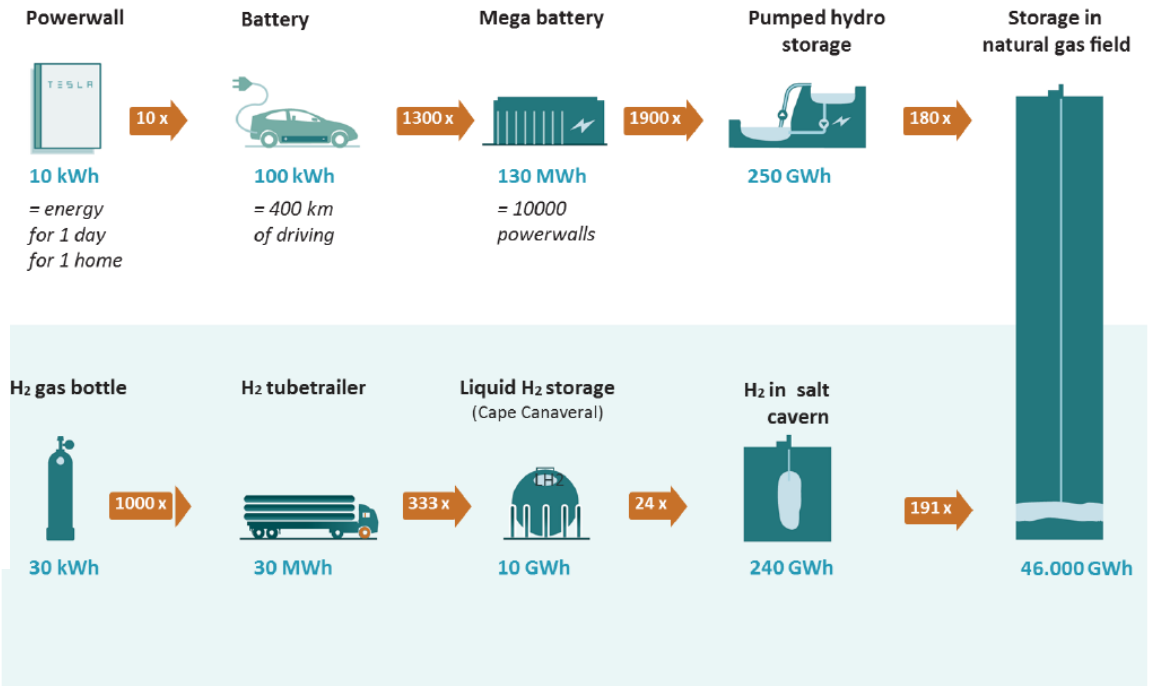


- End applications partly directly electrified, partly based on green gas
- "Power-to-Gas " in Germany for the production of green gas
- (Existing) gas infrastructure parallel to the power grid

4. Future: delivering the energy transition

Future role of gas: flexibility





The potential gas contribution to flexibility

In a decarbonised and decentralised system, all elements and energy vectors need to work together seamlessly

Sector coupling

Integrated energy system

Multiple sources of flexibility

Sources: IRENA: Report on future of solar photovoltaic, Nov. 2019
Gasunie, 34th Madrid Forum 2019

2. Past: Evolution of the electricity sector

ERSE's evolution since its establishment

1996	• Founding committee (President et 2 Members, appointed by Council of Ministers) • Preparation of ERSE Statutes, internal rules .... • Costs of Committee supported by the transmission system operator
1997	• Establishment of ERSE – **electricity** regulator for continental Portugal, following approval of its Statutes by the Government • Regulator's annual budget funded by the TSO and included in its allowed revenues
1998	• ERSE approves its first codes, including tariff methodology and 1999 tariffs
1999	• First regulated tariffs for electricity
2002	• ERSE responsibilities extended to electricity in Azores and Madeira
2003	• ERSE responsibilities extended to **natural gas**
2006	• First regulated tariffs for electricity
2010	• ERSE responsibilities extended to **electro-mobility**
2013	• ERSE gains enforcement and sanctioning regime
2018	• ERSE responsibilities extended to **oil-derived fuels and biofuels**

4. Future: delivering the energy transition

The role of regulation

Boost wholesale market **flexibility** and provide **clear price signals** to facilitate the continuing penetration of renewable energies and ensure investments

Enable **active consumer participation** and ensure that **consumers are protected and benefit** from progress in energy technologies

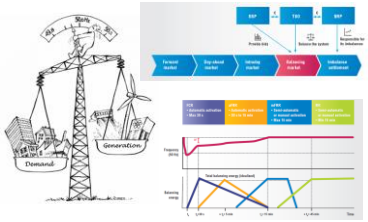
Promote **regional cooperation** and provide a truly **European dimension to security of supply**

4. Future: delivering the energy transition

Promoting Dynamic Regulation: sandboxes (pilot projects)

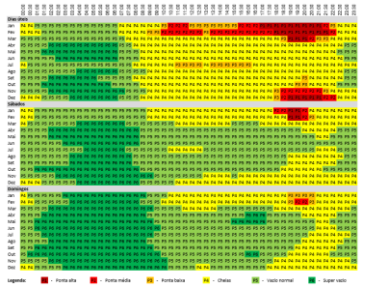
A way for allowing the development of all the new concepts of the Clean Energy Package

First applications of the Regulatory Pilot Projects concept in Portugal:



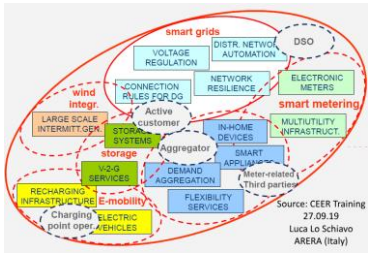
Pilot Project 2019 **"Participation of the Demand Response in the Portuguese Balancing Market"**

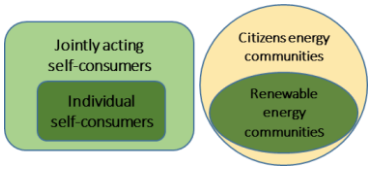
Pilot Project 2018/2019 on "**Access Tariffs**"



Pilot Projects at the **"Electric Mobility Regulation",** which has been recently approved by ERSE

Pilot Projects at the **"Regulation on Services at Smart Electricity Distribution Networks"**





Perspective of Pilot Projects on **"Jointly acting renewables self-consumers" and "Energy communities"**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