asociación iberoamericana de entidades reguladoras de la energía
associaçao iberoamericana de entidades reguladoras da energia

VII ARIAE-CEER MEETING

Council of European Energy Regulators

Session III: Renewables: Auctions, Self-consumption and Integration in the network

Case study: Spain

Punta Cana 9.05.2019

Luis Jesús Sánchez de Tembleque

Energy Division of the National Markets and Competition Commission (CNMC)

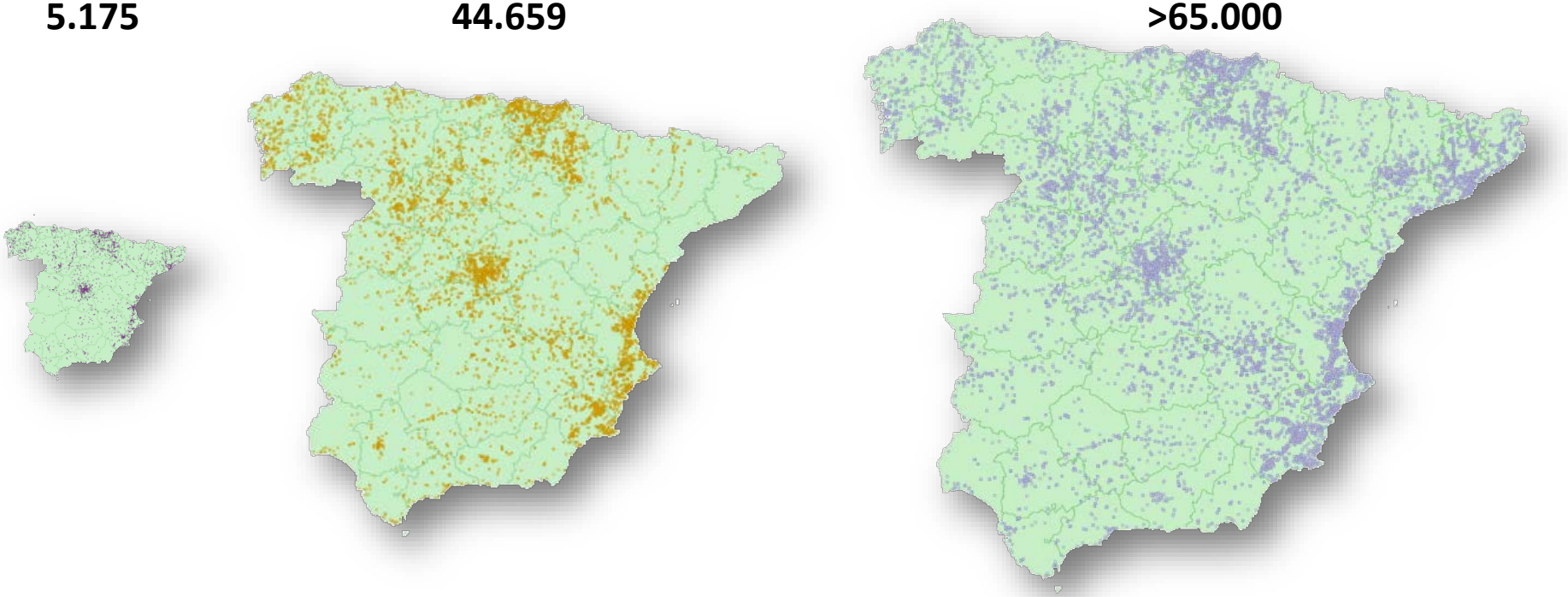
Case study: Spain

Evolution of distributed generation (DG)

2004
5.175

2008
44.659

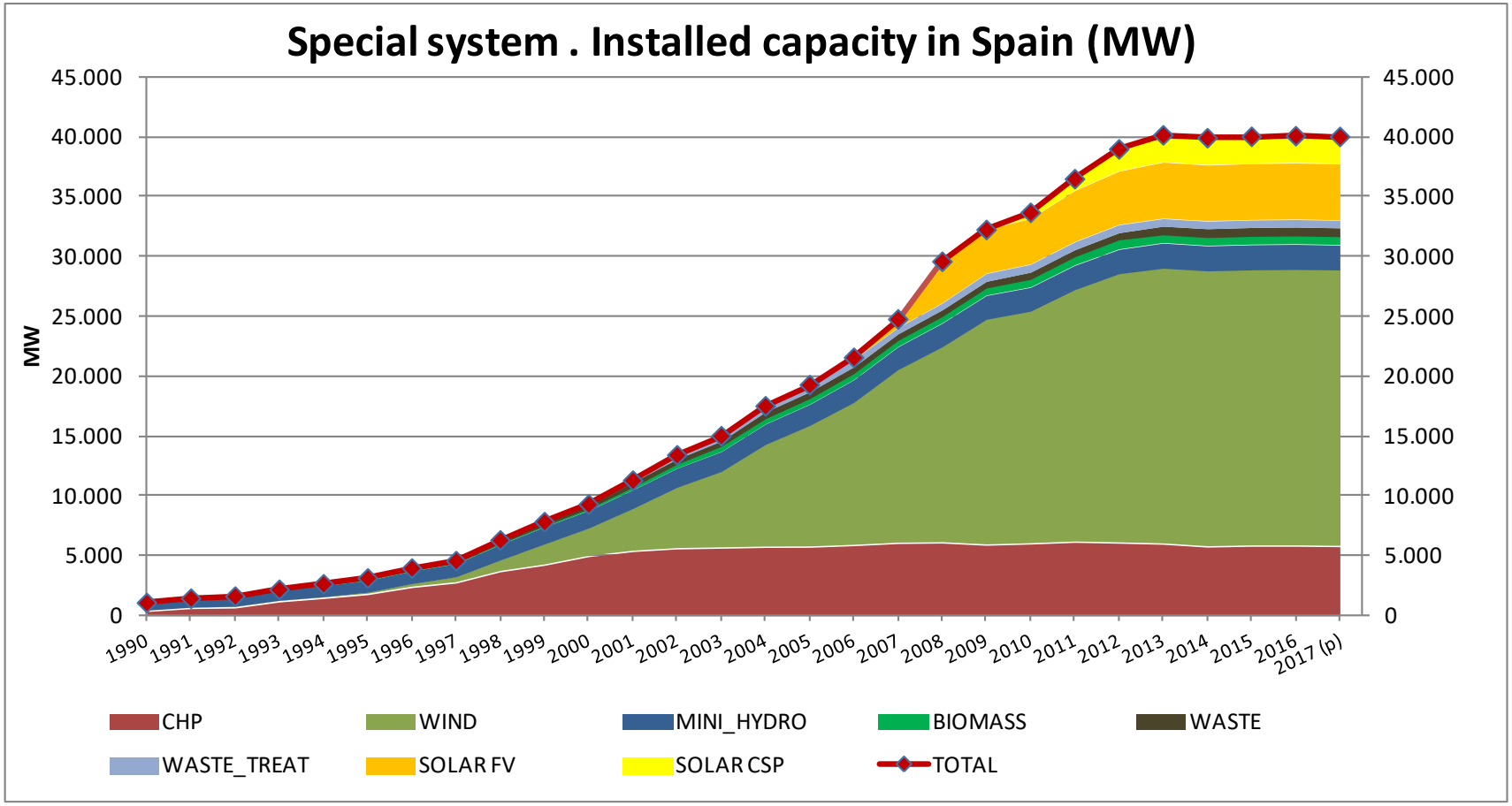
2013 (2019)
>65.000



Circular 1/2011, de la CNE, de petición de información del ejercicio 2010 a remitir por las empresas distribuidoras de energía eléctrica a la CNE para el establecimiento de la retribución a la actividad de distribución y supervisión de la misma
https://sede.cne.gob.es/web/guest/circular-1/2011
Boletín mensual de la CNE de Información Estadística sobre las Ventas de Energía del Régimen Especial
http://www.cne.es/cne/Publicaciones?id_nodo=143&accion=1&soloUltimo=si&sIdCat=10&keyword=&auditoria=F

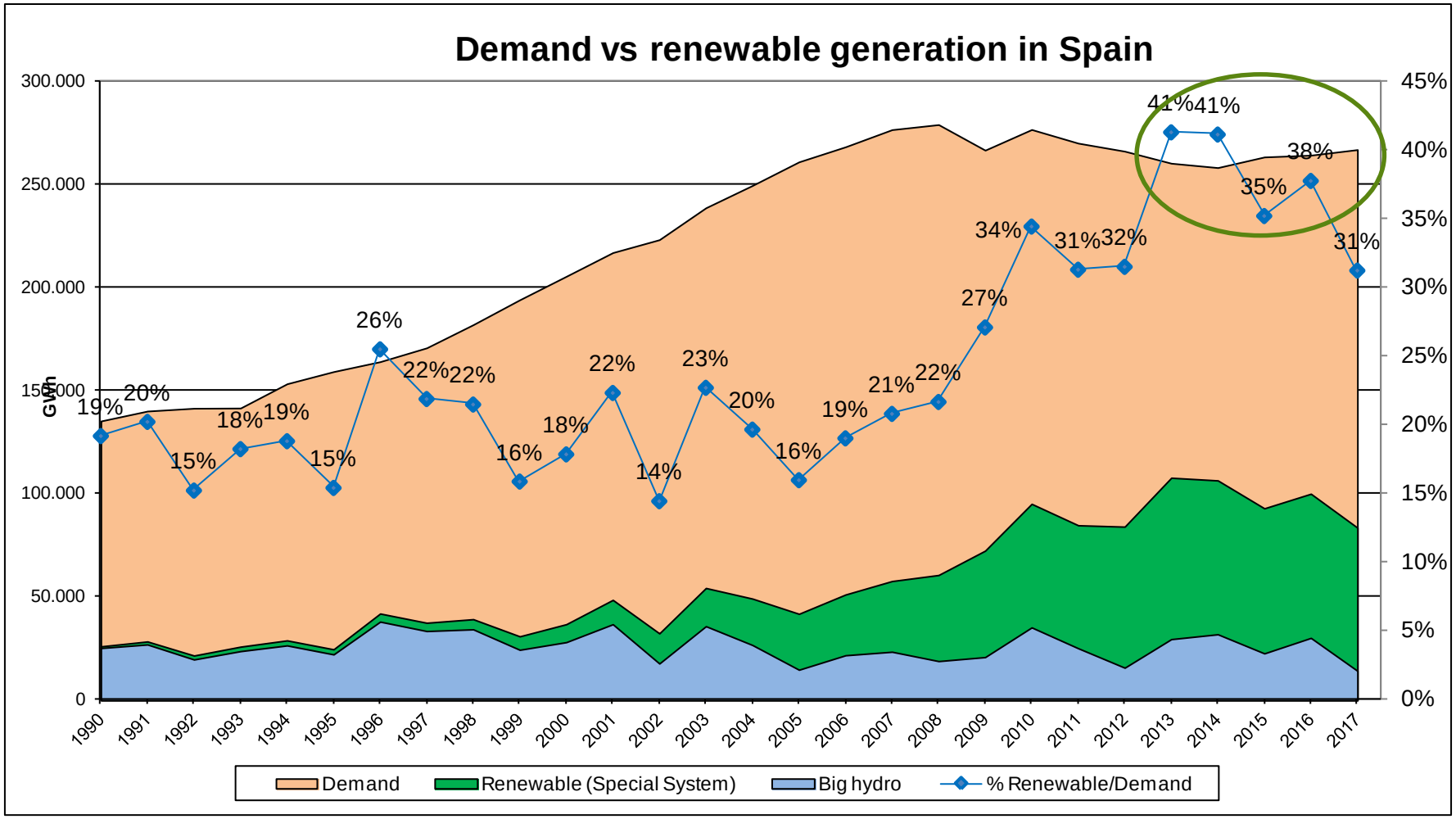
Case study: Spain

Evolution of distributed generation (DG)



Case study: Spain

Evolution of share of RES in the power system



Case study: Spain

Capacity installed

Potencia instalada 2017: **108.000 MW**

Demanda máxima energía horaria peninsular **44.876 MW** (17dic 2007)

Case study: Spain

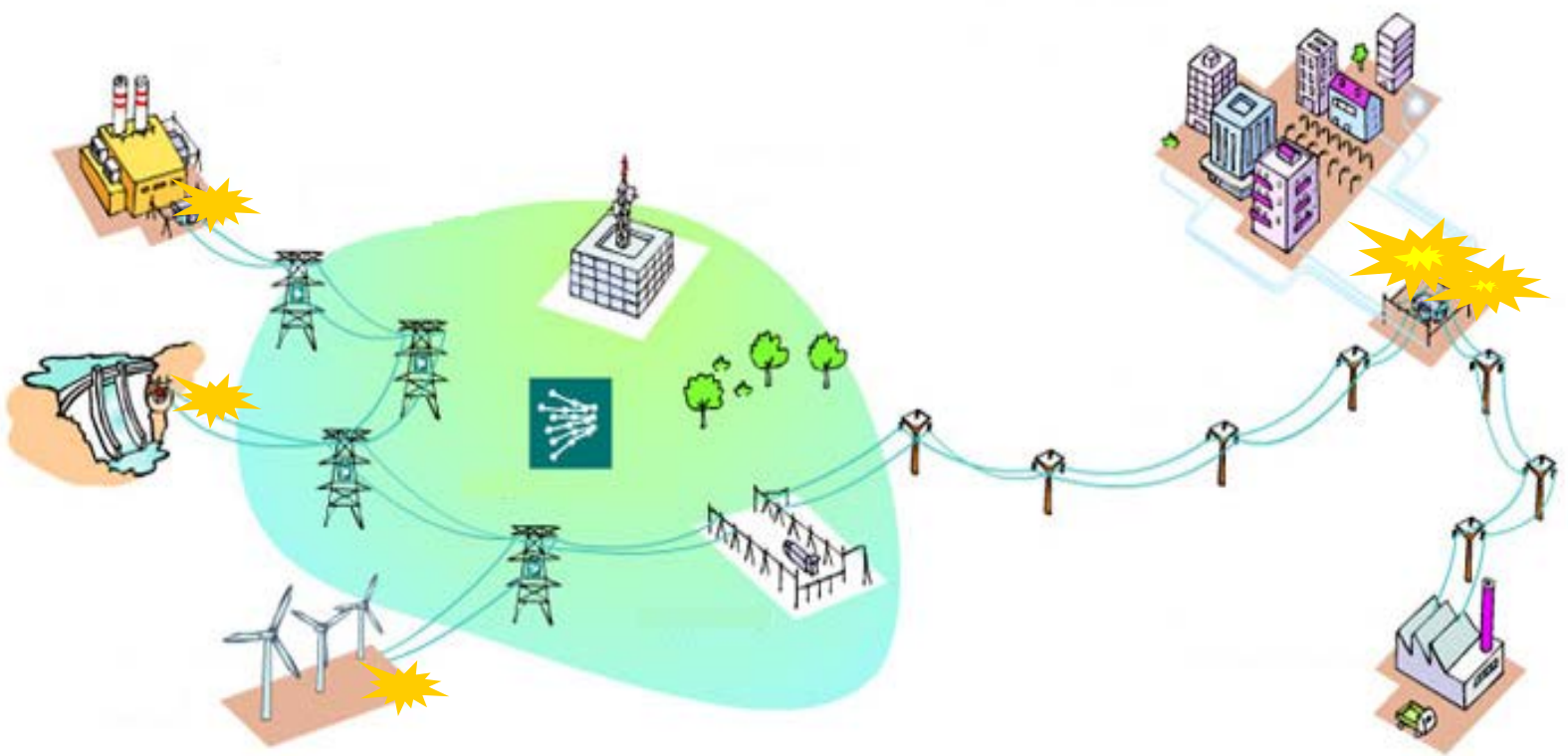
Main regulations

1. Access and connection regulation
2. Juridical regulation
3. Technical regulation
4. Economic regulation
5. Self-consumption regulation
6. Guarantee of origin and labeled regulation

1. Access and connection regulation

Third party access to the networks (TPA principle)

The use for the generators/consumers of the transmission and distribution networks are liberalized, through the open access to third party networks (**TPA principle**). But they must pay a regulated tariff.



Production Transmission Distribution Retail

2. Juridical regulation

Freedom of business installation and free competition

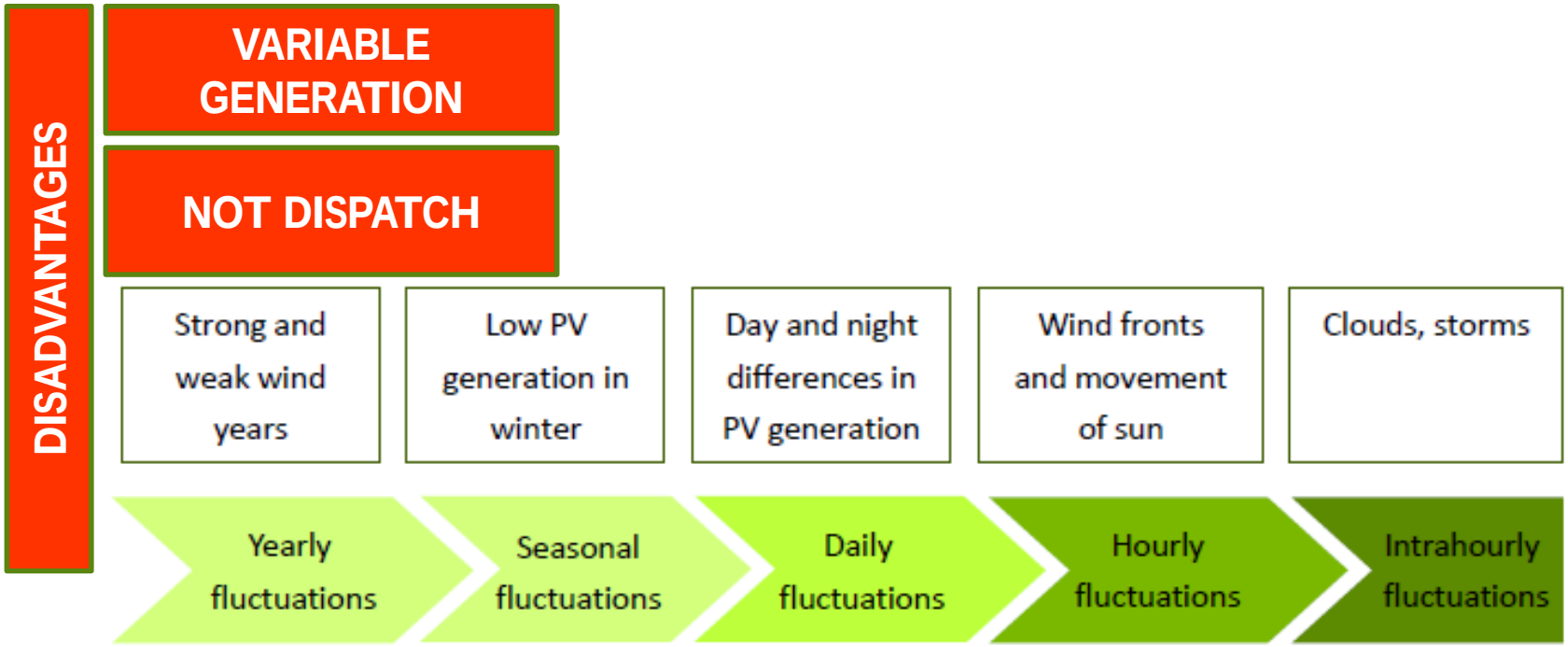
The right to **free installation** and **contract** for liberalized activities – generation facilities and retailers-**, but…** with an **authorization procedure**:

1. Legal capacity
2. Technical capacity
3. Economic capacity
4. Other permissions: environmental, industrial safety, management of the territory, etc.

The performance of liberalized activities within the **principle of free competition**: Wholesale and Retail trade markets

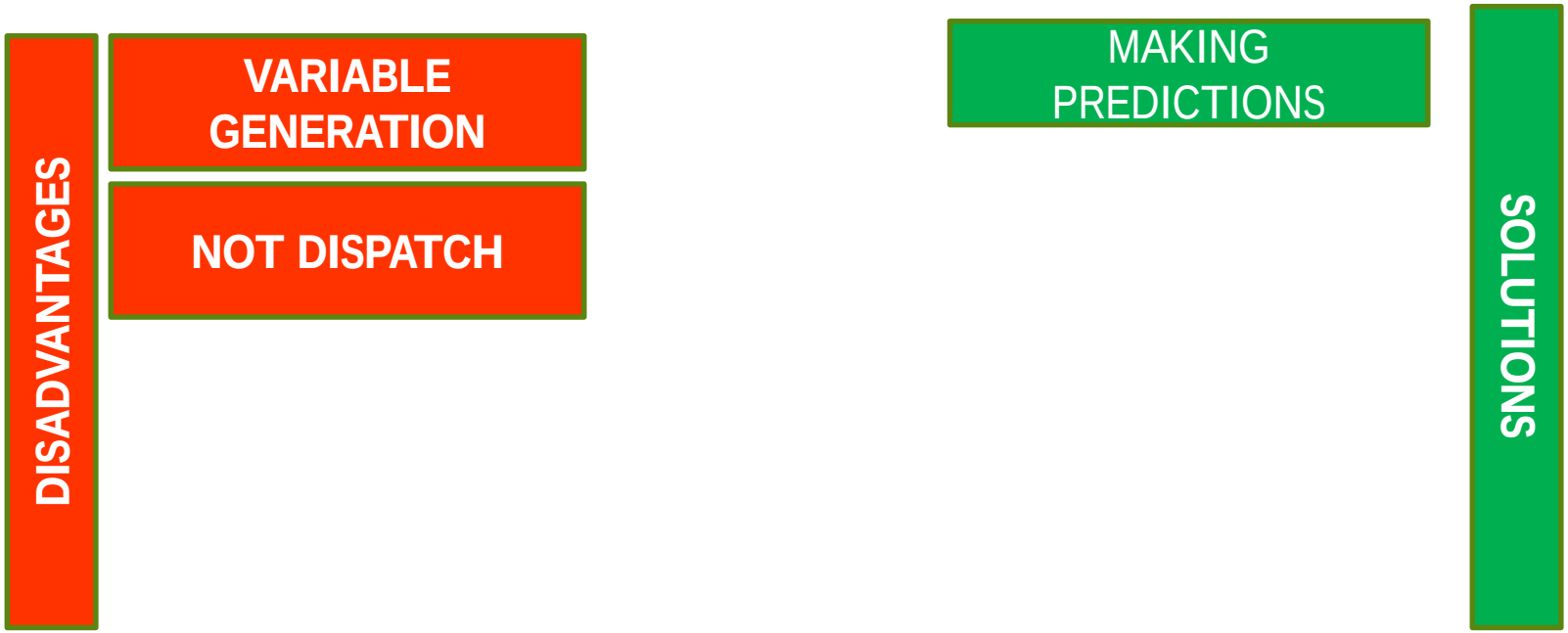
3 Technical regulation

Problems of distributed generation (DG) in a quasi isolated system



3 Technical regulation

Problems of distributed generation (DG) and regulatory solutions

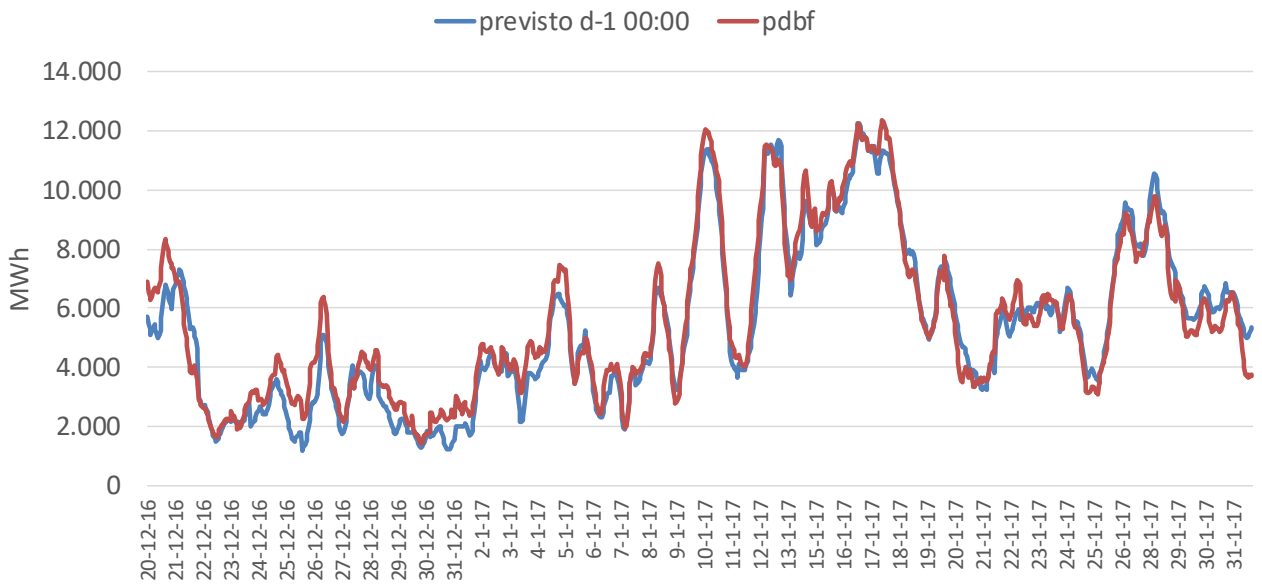


3 Technical regulation

Solution 1.- Making predictions of generation and fulfill them

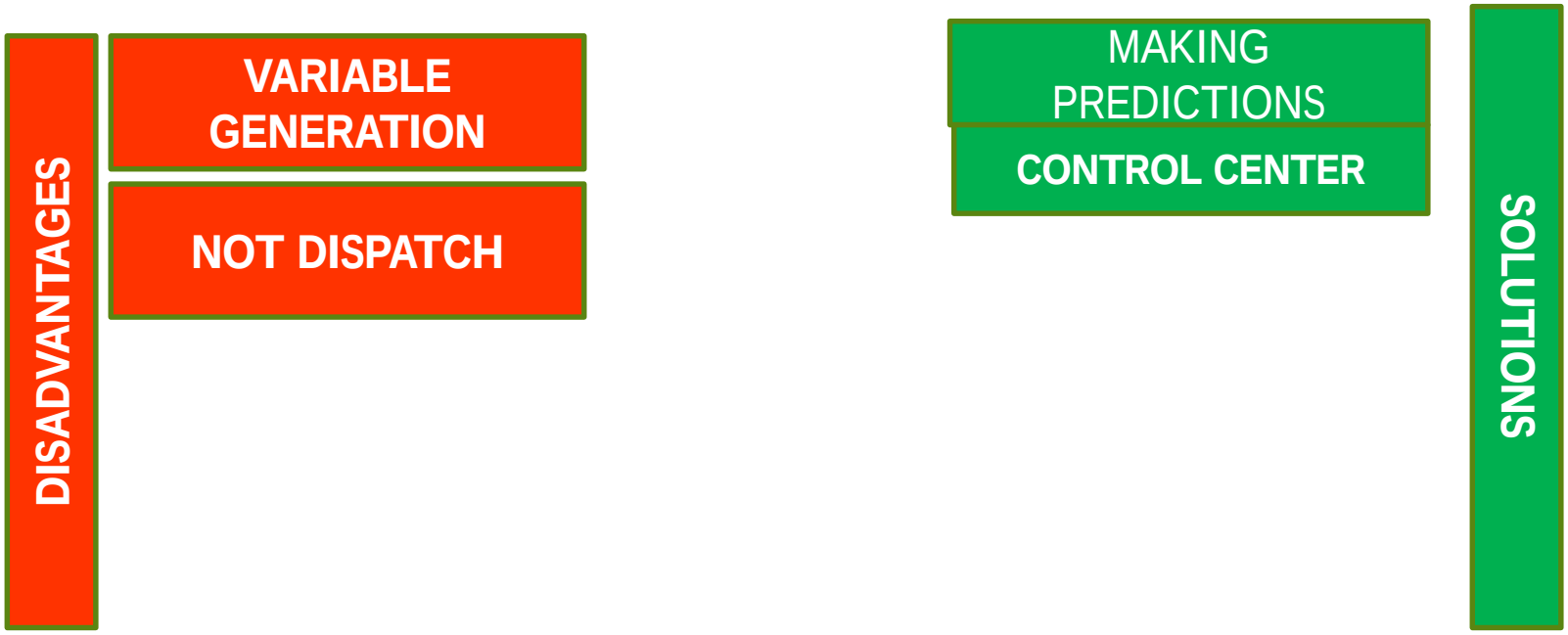
1. Obligation of **market participation**: deviations between forecast and real production are penalized (facilities > 15 kW)
2. **Representative** (new agent which brings together several facilities: it is only important the net deviation in the markets daily and intradaily)
3. To development of **forecasting tools**

- TSO (REE) developed on 2004 the SIPREOLICO model, for make a global forecast of wind generation: E.g. prediction vs. real



3 Technical regulation

Problems of distributed generation (DG) and regulatory solutions



3 Technical regulation

Solution 2.- Control Center

Control Center Renewable Energies (CECRE):

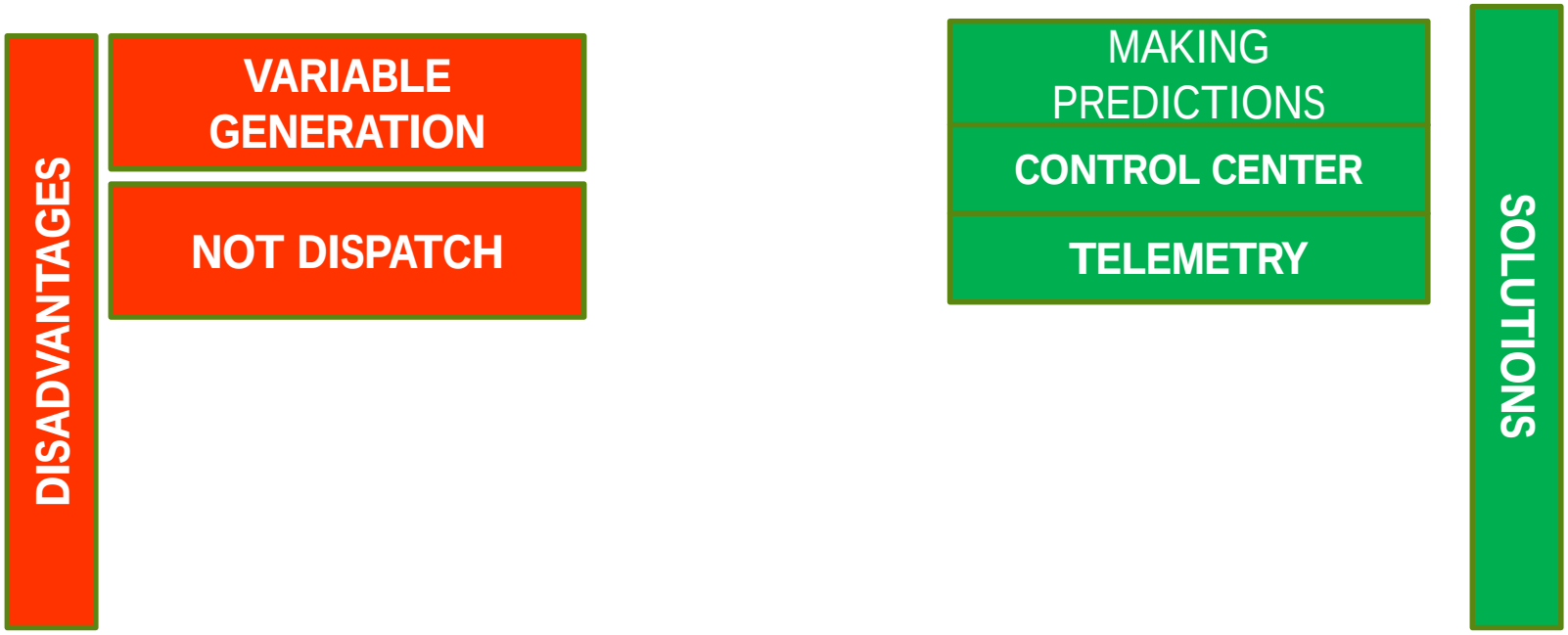
Control Center of the TSO where it receive the information in real time from 30-40 private Control Centers that group RES facilities, which must follow orders of the TSO

RES > 5 MW: Obligation to belong to a private Control Center

- RES facilities grouped by connection point
- Voluntary **participation in AA.SS** (habilitation TSO if > 10 MW)

3 Technical regulation

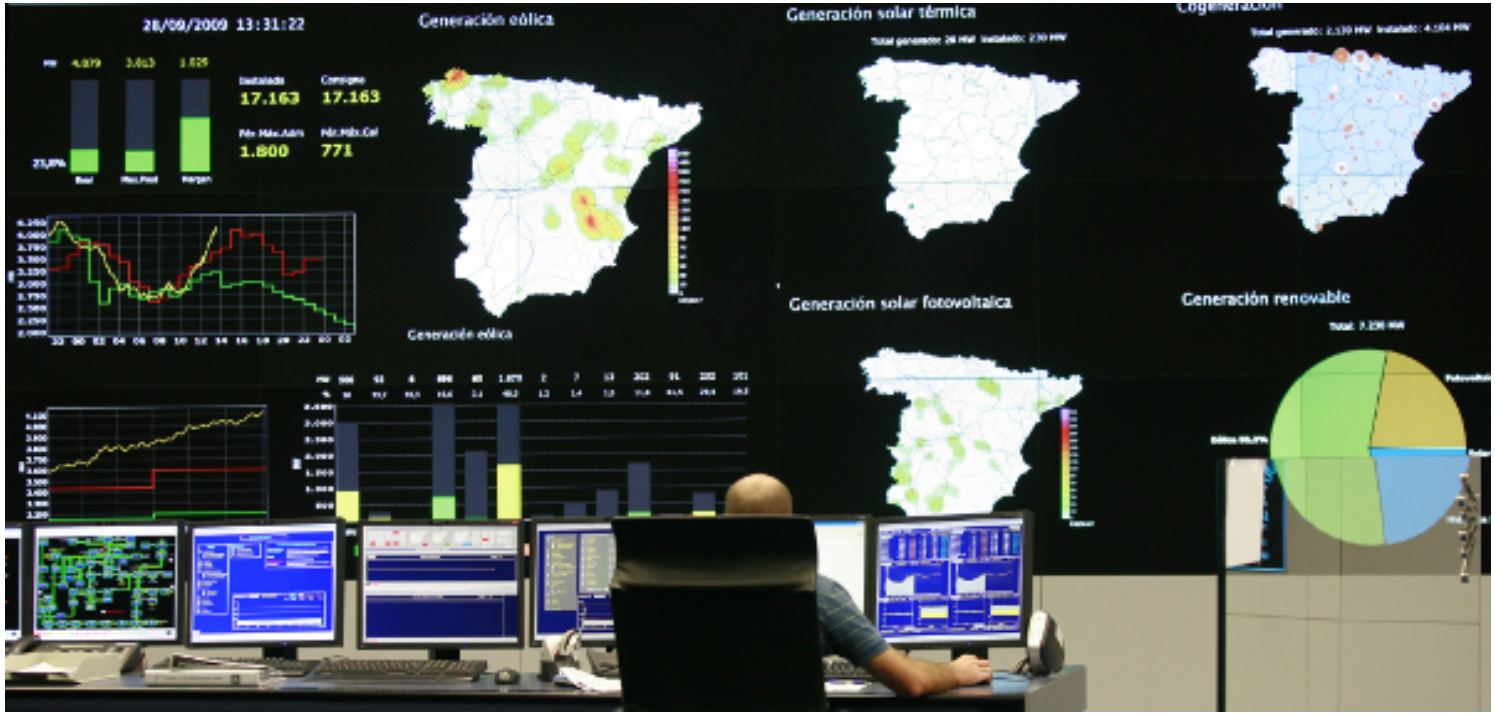
Problems of distributed generation (DG) and regulatory solutions



3 Technical regulation

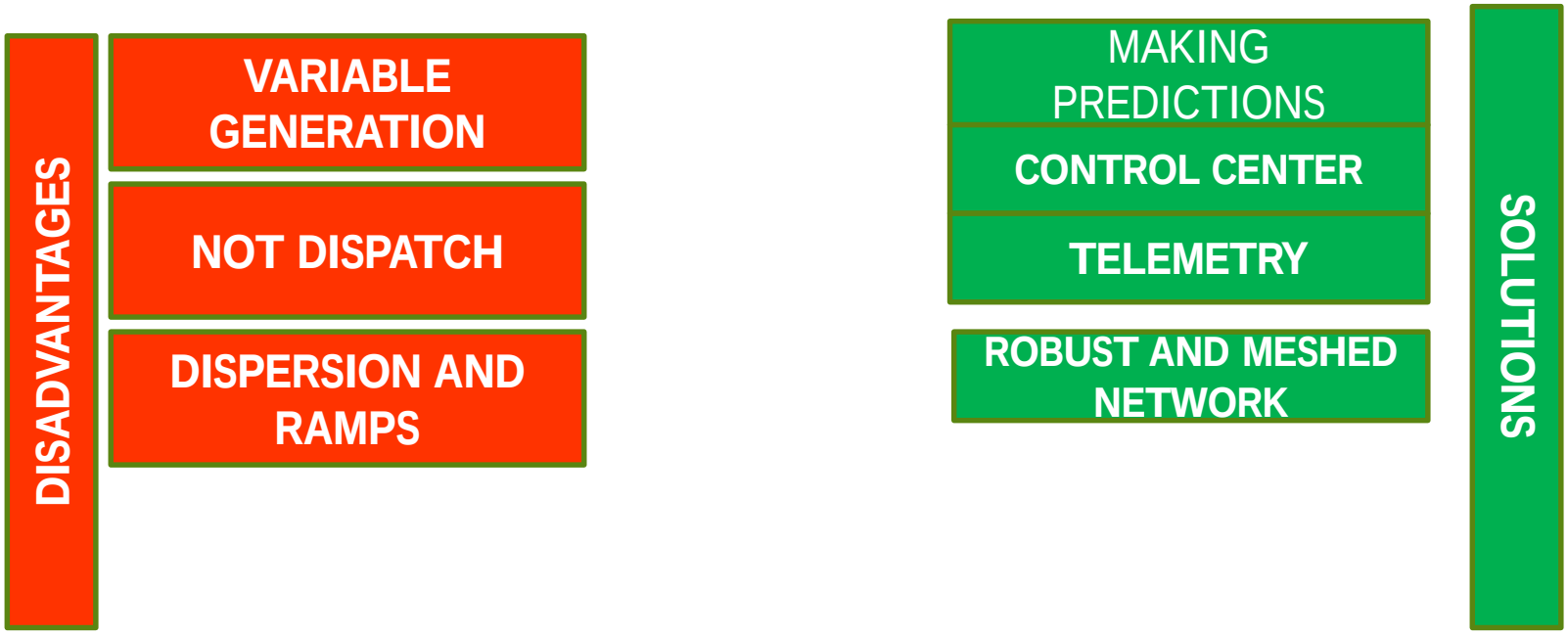
Solution 3.- Telemetry

RES > 1 MW: Obligation to send to CECRE energy measures (active and reactive) **in real time**



3 Technical regulation

Problems of distributed generation (DG) and regulatory solutions



3 Technical regulation

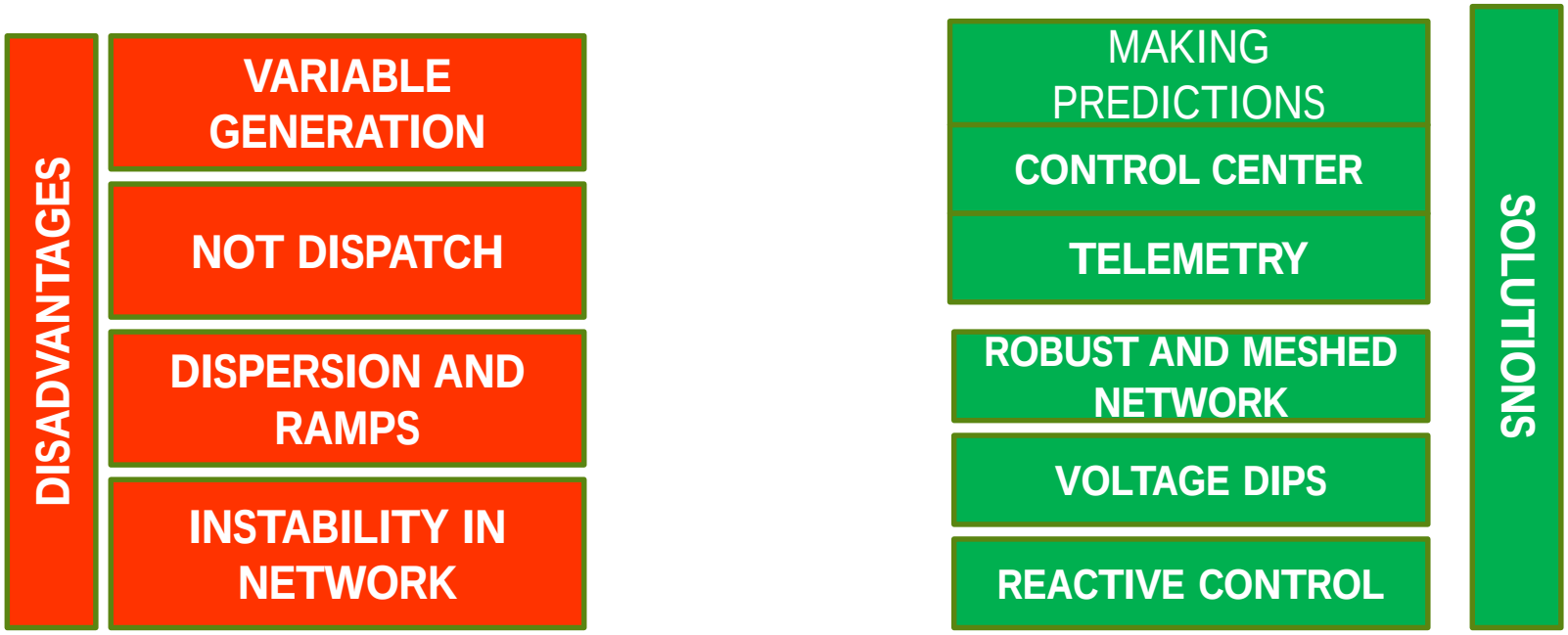
Solution 4.-Robust and meshed transportation network

Robust and meshed transportation network

1. It includes 400 kV and 220 kV, and international connections
2. Network robust and meshed without significant structural congestions
3. Average load line: 20%; load transformer: 35%
4. Average technical losses: 2,10%
   Availability index: 98% (incentive/penalty > 97%)
5. But, limited capacity for interconnection with France

3 Technical regulation

Problems of distributed generation (DG) and regulatory solutions

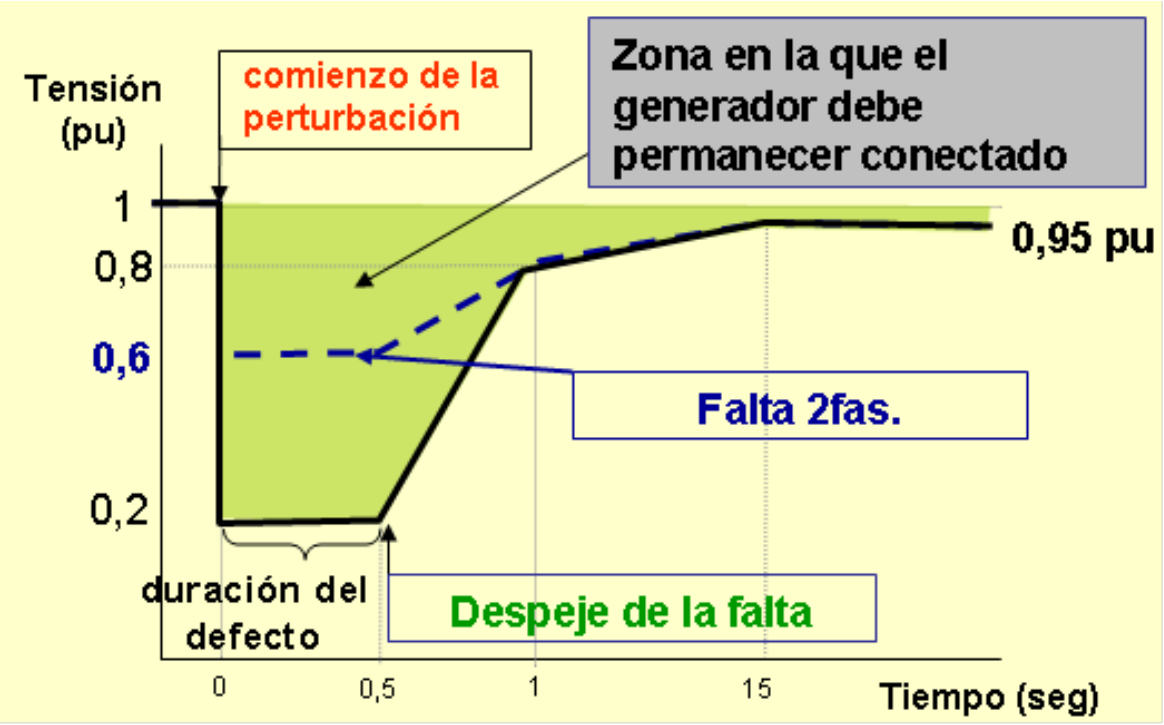


3 Technical regulation

Solution 5.- Withstand voltage dips

Operation Procedure 12.3

Wind and PV facilities > 2 MW must to withstand voltage dips



3 Technical regulation

Solution 6.- Reactive Control

Operation Procedure 7.5 of power factor

Royal Decree Law 9/2013:

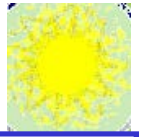
1. Mandatory range: 0,98 inductive - 0,98 capacitive
2. Facilities with P > 5 MW must follow the instructions of the system operator (TSO), in a range 0,95 inductive - 0,95 capacitive

E.g, in 2013, TSO gave special instructions 20 times, which involved about 1.300 facilities

4 Economic regulation

Former economic regulation 1998-2013

SPECIAL SYSTEM



- Generators ≤ 50MW that use:

cogeneration
renewable energy
wastes

- The energy produced can be incorporated into grid (priority **dispatching)**
- Payments:
  - *a **fix tariff** (guaranteed purchase)*
  - *a **premium** in addition to the market price*

ORDINARY SYSTEM

- Other generators
- Is obliged to participate in the market if > 50MW
- Payments: market price

Feed-in tariff or Feed-in Premium

4 Economical regulation

New regulation (existing facilities) 2014 ….

The concept of **reasonable profit**, defined as **profitability of the project before taxes (Internal Rate of Return IRR),** which shall be equal to the yield in the secondary market of the Obligations of the State to ten years, more a suitable differential.

7,4%

- **E…s:** IRR = Obligations of the State to ten years more 3… (1st regulated period).

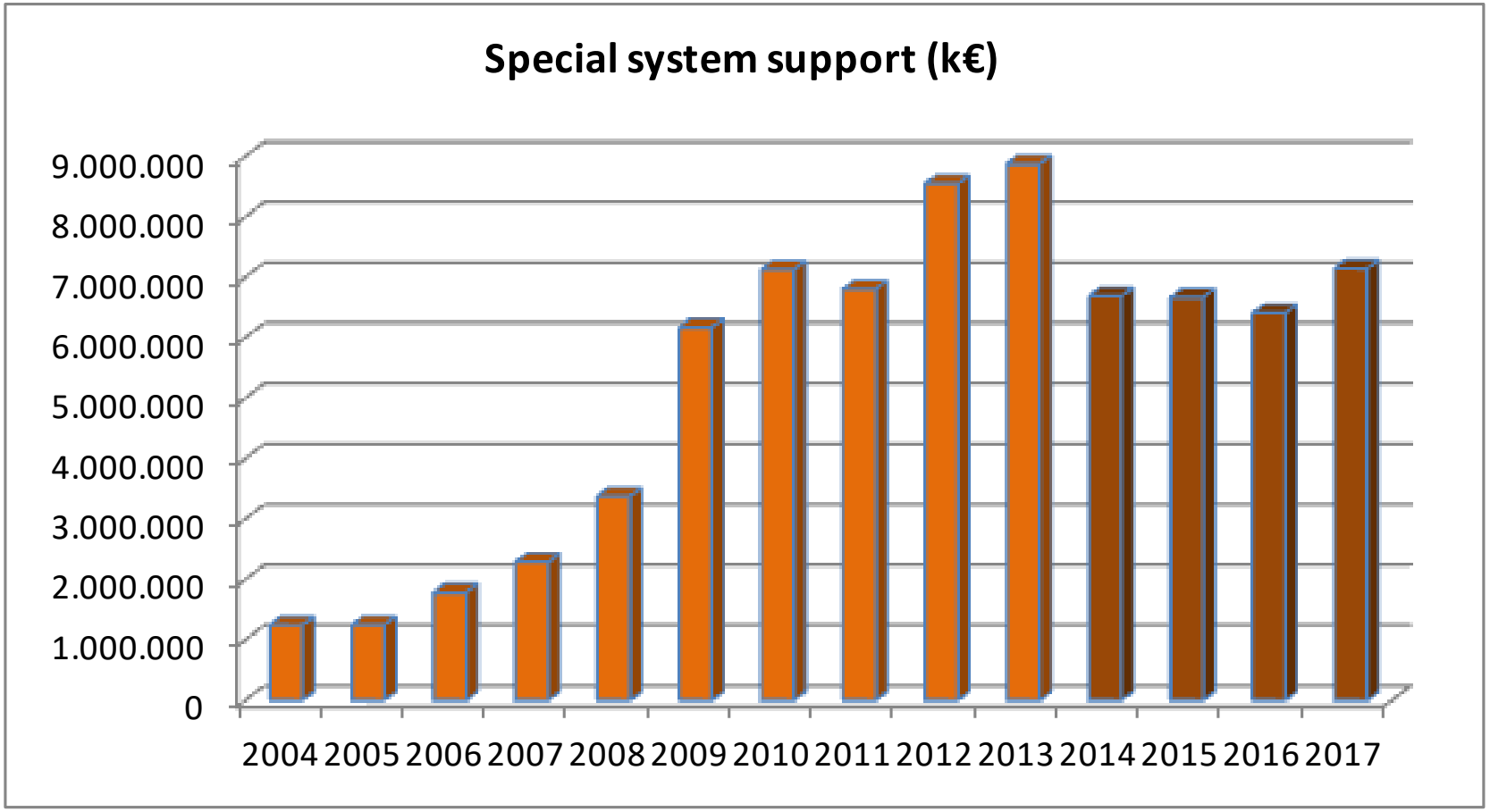
1.500

- **Standard installations** are considered for the calculation of the economic incentive every **regulatory period** (6 years), with review of parameters to obtain a reasonable profitability

The remuneration regime will be based on their **market participation**, completed with a **economic incentive to investment (Re)** to obtain a reasonable profit (€/MW).In your case, also a **economic incentive to operation (Ro)** covering operational costs (OPEX): €/MWh

4 Economical regulation

Evolution of total premium



4 Economical regulation

New regulation (new facilities): Auctions for new facilities

		Wind	Solar PV	Biomass/ Other	TOTAL
1st Auction: 14/01/2016	**Capacity (MW)**	500	-	200	700
	Support (€/MW)	0	0	0 (1)	
2nd Auction: 17/05/2017	**Capacity (MW)**	2.980	1	19	3.000
	Support (€/MW)	0	0	0	
3rd Auction: 26/07/2017	**Capacity (MW)**	1.128	3.909	-	5.037
	Support (€/MW)	0	0	-	
TOTAL	**Capacity (MW)**	**4.608**	**3.910**	**219**	**8.737**

Results: zero economic incentive
Remuneration: market price

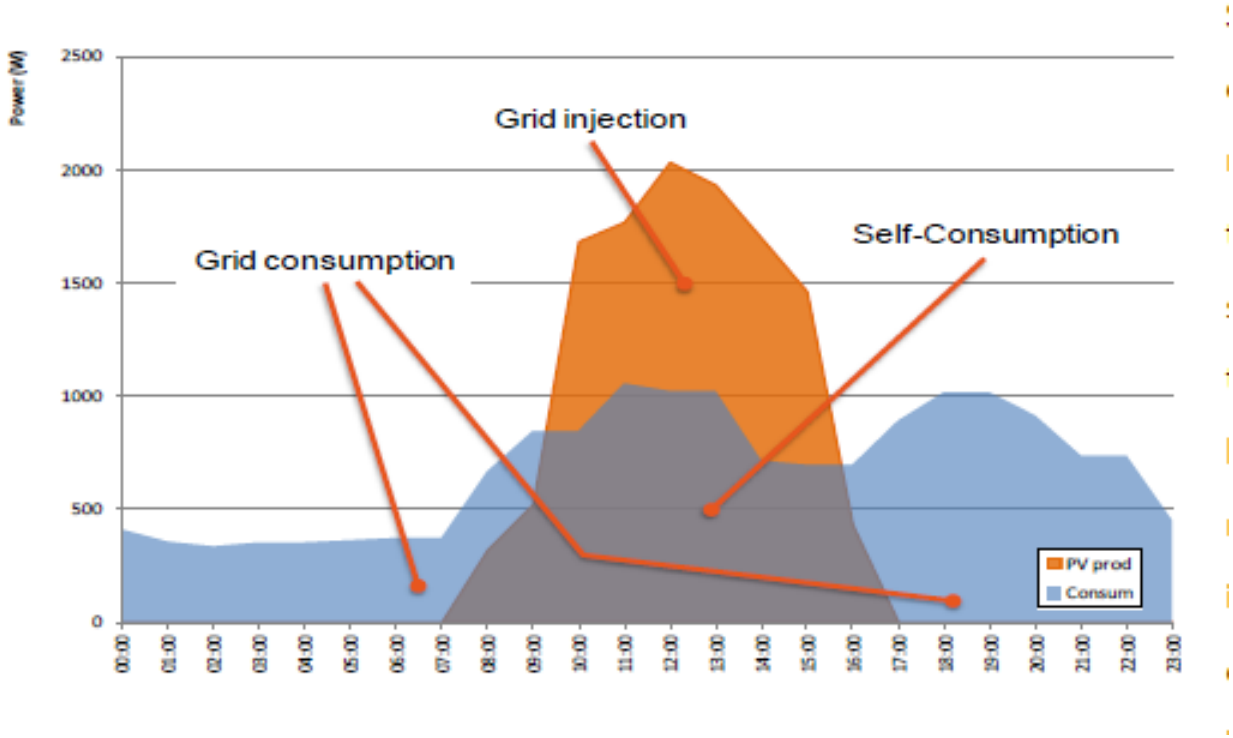
(1) Ministerial Order IET/2212/2015 sets a operation incentive for Biomass plants of 53,292 €/MWh

5 Self-consumption regulation

New regulation

Net metering vs. Net billing

Balance of power vs. Economic balace



5 Self-consumption regulation

New regulation

DIRECTIVE (EU) 2018/2001, of 11 December

Renewables self-consumer (RSC): It generates renewable electricity for its own consumption, and who may store or sell self-generated renewable electricity (those activities do not constitute its primary commercial or professional activity)

Renewable energy community (REC): jointly acting as renewables self-consumers. It is a group of at least two jointly acting renewables self-consumers who are located in the same building or multi-apartment block

Member States may apply non-discriminatory and proportionate **charges and fees**

5 Self-consumption regulation

New regulation

Law 23/2013, and RD Law 15/2018

Self-consumption (SC):

1. **Supply with self-consumption without surplus**. Consumer with installation of generation, not registered, for own consumption, connected to the internal network. A single subject, the consumer.

2. **Supply with self-consumption with surplus**. Consumer associated with a production plant, registered, connected to the internal network. Sale of surplus. Two subjects, the consumer and the producer.

The **access tariff** are removed by the self-consumed energy (*tax to the Sun*)

It allows **shared consumption** (with ot whitout the network)

New role of the **Suppliers**: retail (purchase and sell electricity), efficiency (ESCO Energy Service Companies), recharge (Manager Recharge EV), representative od RES (Representative storage and sell RES in the market)

6 Guarantee of origin regulation

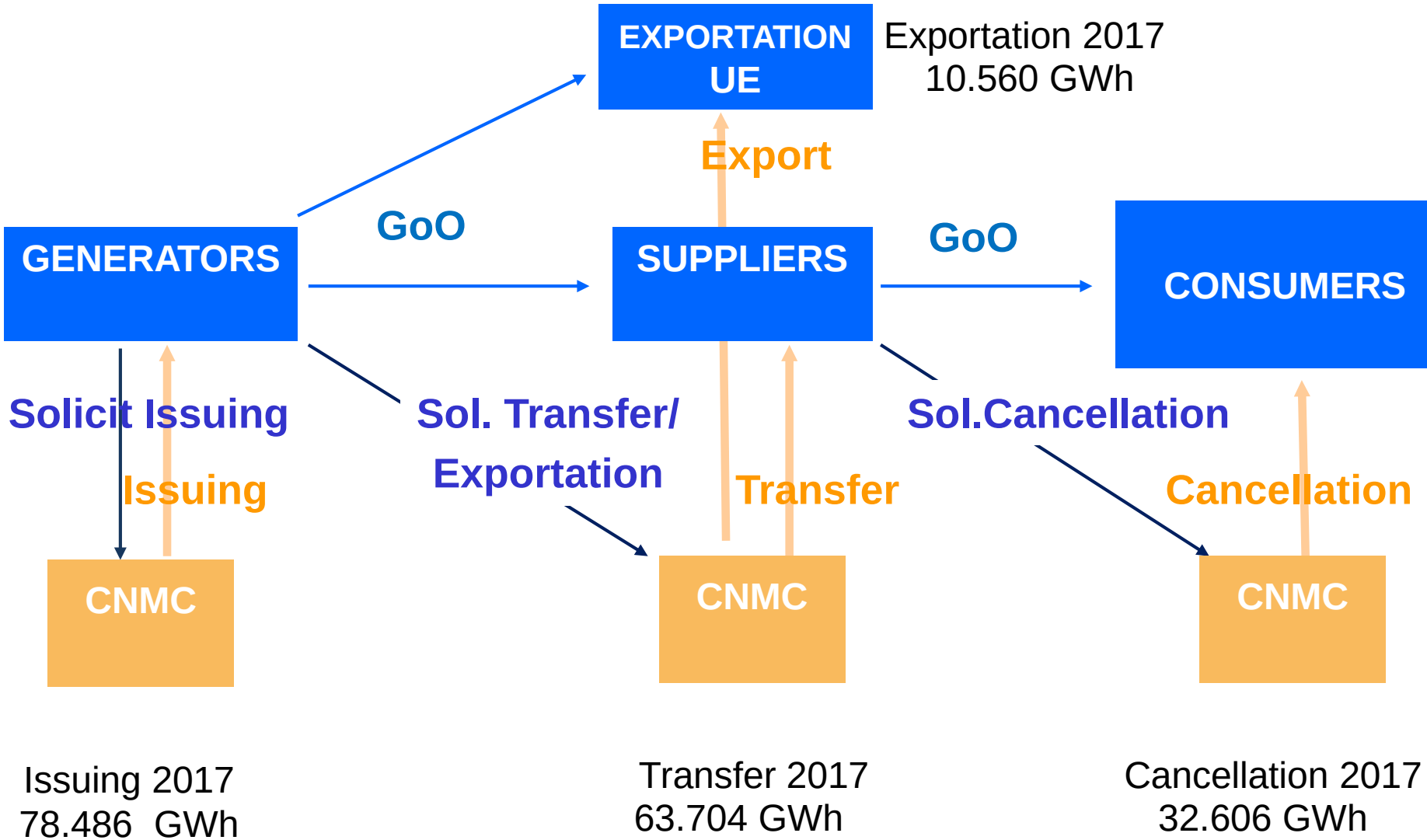
Equivalences

There are tree kind of generators

- **Pure renewable: 1 MWh = 1 GO**
  - ⇨ Wind, PV, minihydro, etc
- **Mix renewable: 1 MWh >= x GO**
  - ⇨Biomass, CSP, etc
    - x (equivalent to renewable energy taking without fossil fuels)
- **Cogeneration: 1 MWh >= y GO**
  - ⇨High efficiency cogeneration
    - y (equal to electricity of Cogeneration, according its energy efficiency)

6 Guarantee of origin regulation

System Annotations in Count: Web Page CNMC



6 Guarantee of origin regulation

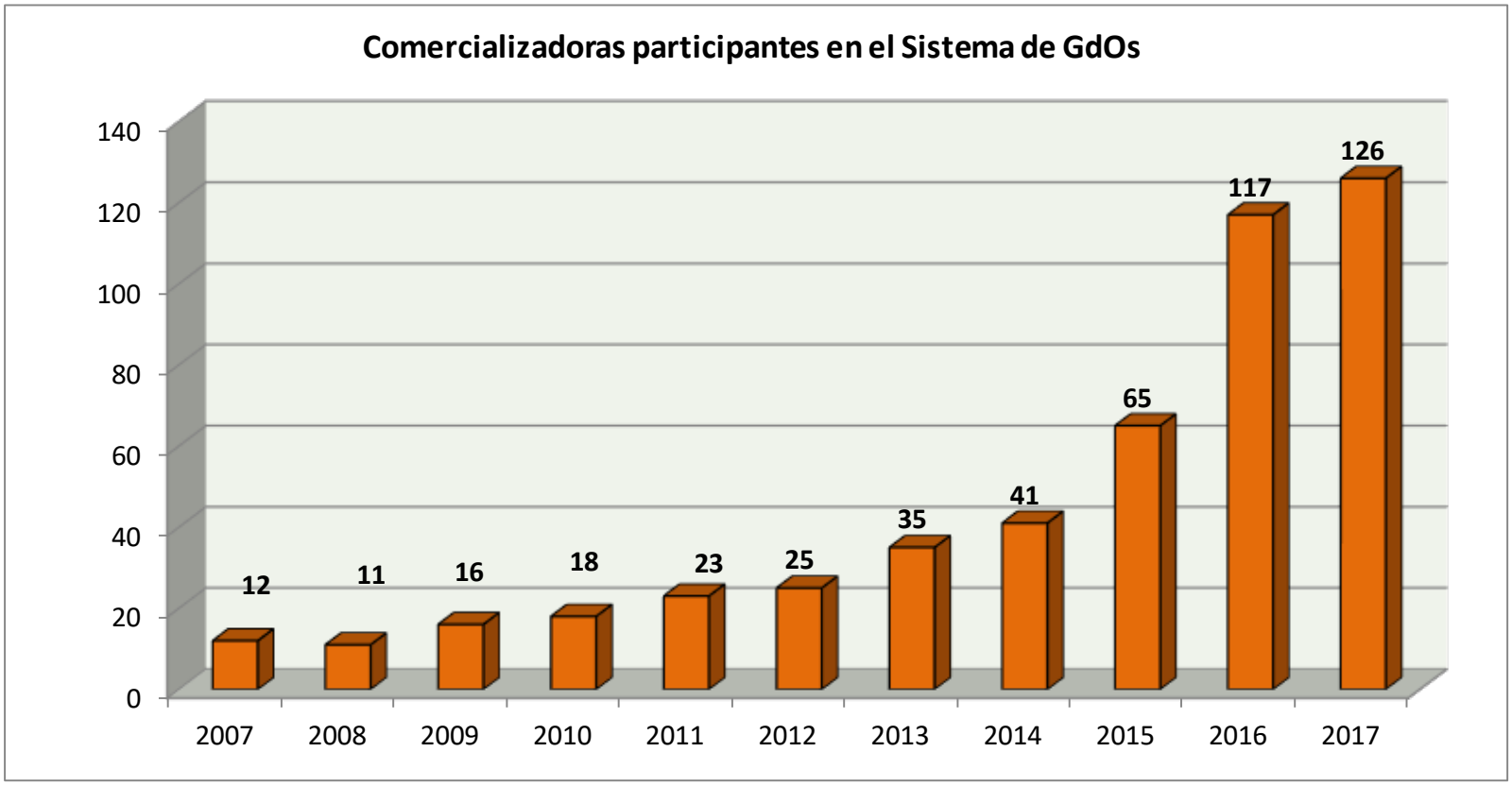
Participation of the agents (generators and suppliers)

GENERATORS

6 Guarantee of origin regulation

Participation of the agents (generators and suppliers)

SUPPLIERS



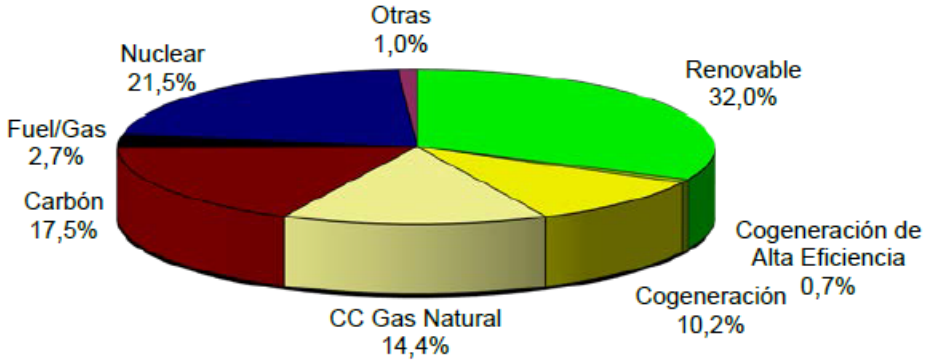
6 Guarantee of origin and labeled regulations

Origin of the mix of generation and origin of the mix the electricity retailed (last year)

2017

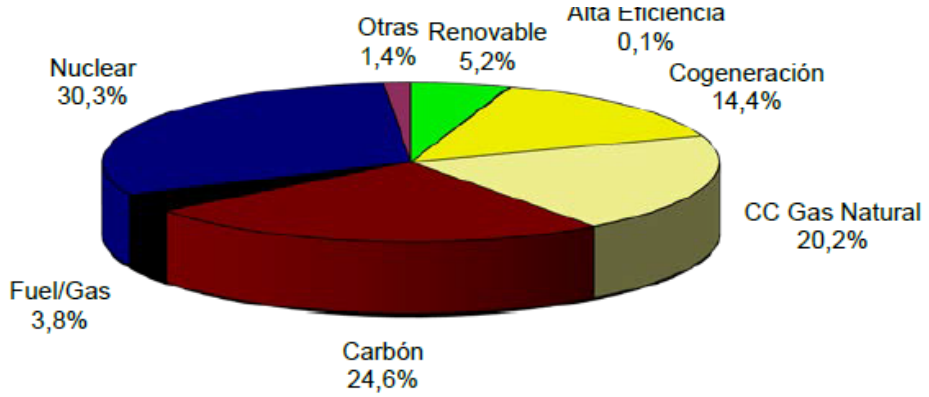
MIX ENERGIA	MIX PRODUCCIÓN	MIX COMERCIALIZADORA GENÉRICA
	%	%
Renovables	32,0%	5,2%
Cogeneración de Alta Eficiencia	0,7%	0,1%
Cogeneración	10,2%	14,4%
CC Gas Natural	14,4%	20,2%
Carbón	17,5%	24,6%
Fuel/Gas	2,7%	3,8%
Nuclear	21,5%	30,3%
Otras	1,0%	1,4%
EMISIONES DE DIOXIDO DE CARBONO kg de dióxido de carbono por kWh	**0,31** D	**0,43** F
RESIDUOS RADIACTIVOS AA Miligramos por kWh	**0,54** D	**0,76** F

MIX OF GENERATION



MIX RETAILED

(supplier without participation in GO mechanism)

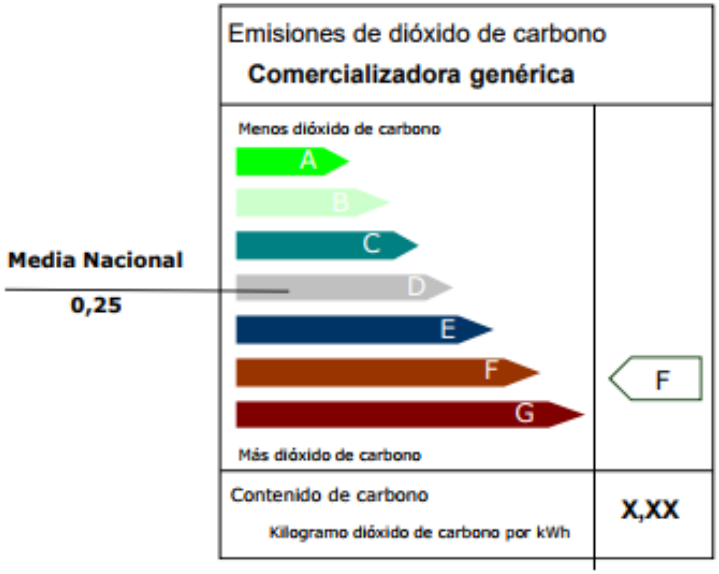


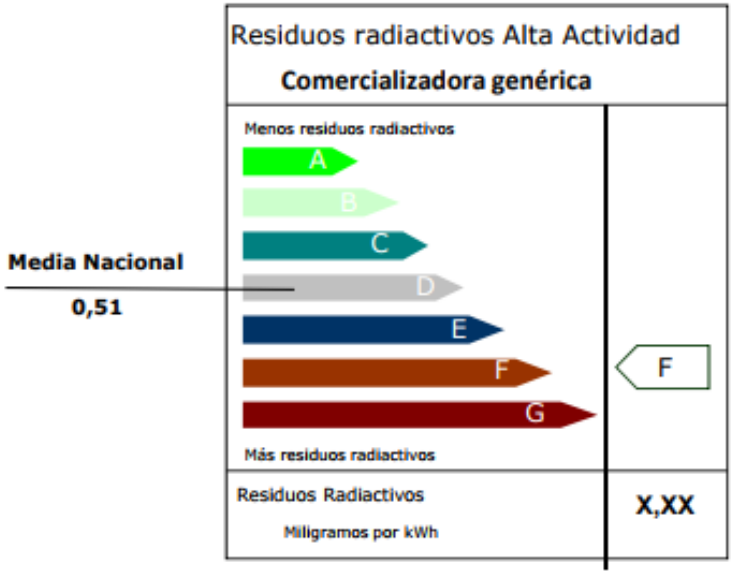
6 Guarantee of origin and labeled regulations

Environmental impact (at least CO2 emissions and radioactive wastes of this mix)

Impacto medioambiental

El impacto ambiental de su electricidad depende de las fuentes energéticas utilizadas para su generación.
En una escala de A a G donde A indica el mínimo impacto ambiental y G el máximo, y que el valor medio nacional corresponde al nivel D, la energía comercializada por su "Comercializadora genérica" tiene los siguientes valores:





Many thanks

http://www.cnmc.es

Luis Jesús Sánchez de Tembleque
(luisjesus.sanchez@cnmc.es)