

RED
ELÉCTRICA
DE ESPAÑA

Integration of DSM, Distributed Generation, Renewable Energy sources and Energy Storages Issues in the Spanish system

IEA DSM agreement

Task XVII Petten
Workshop
July 9th 2008
Carlos Madina,
Labein

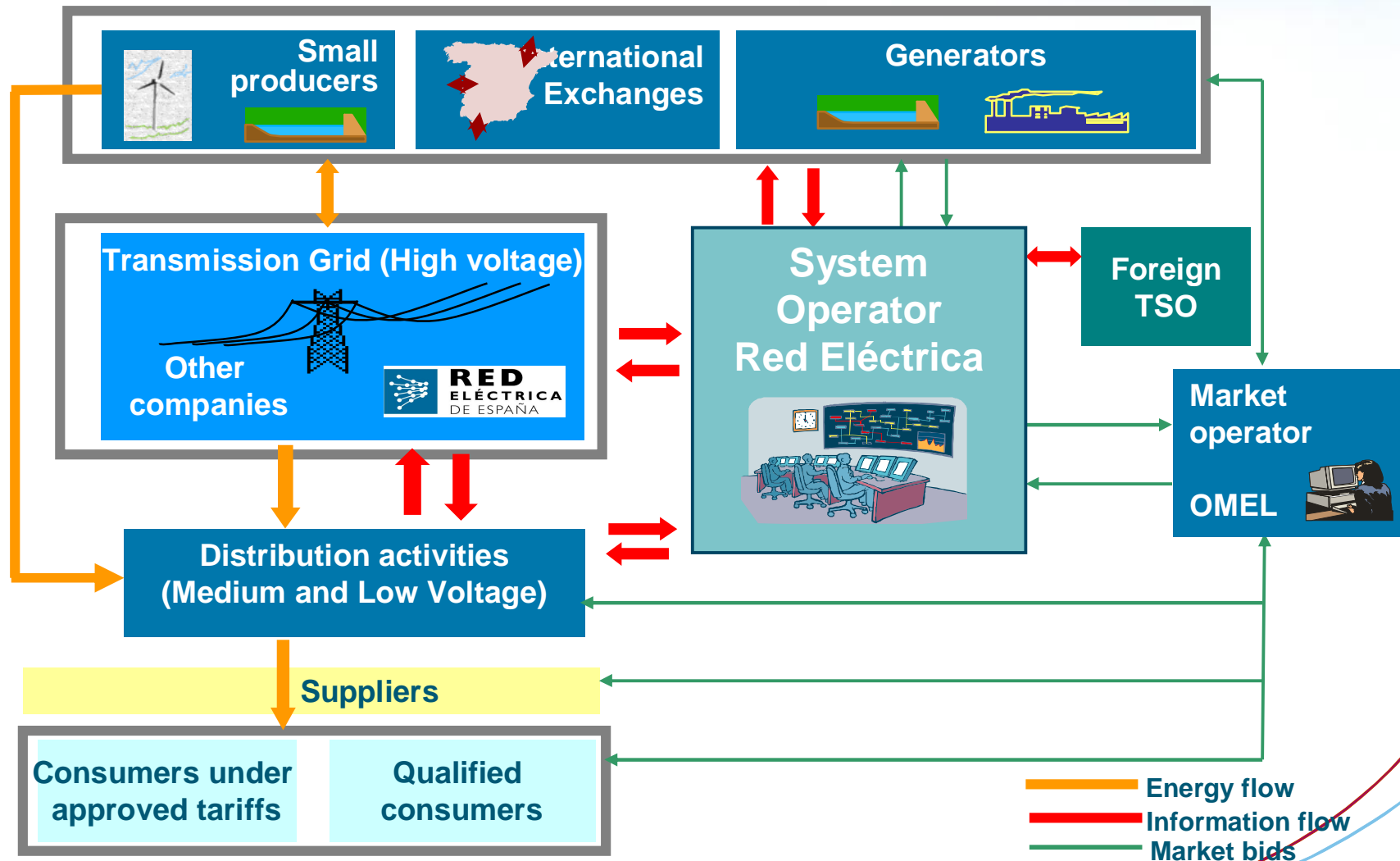
Demand side management
department





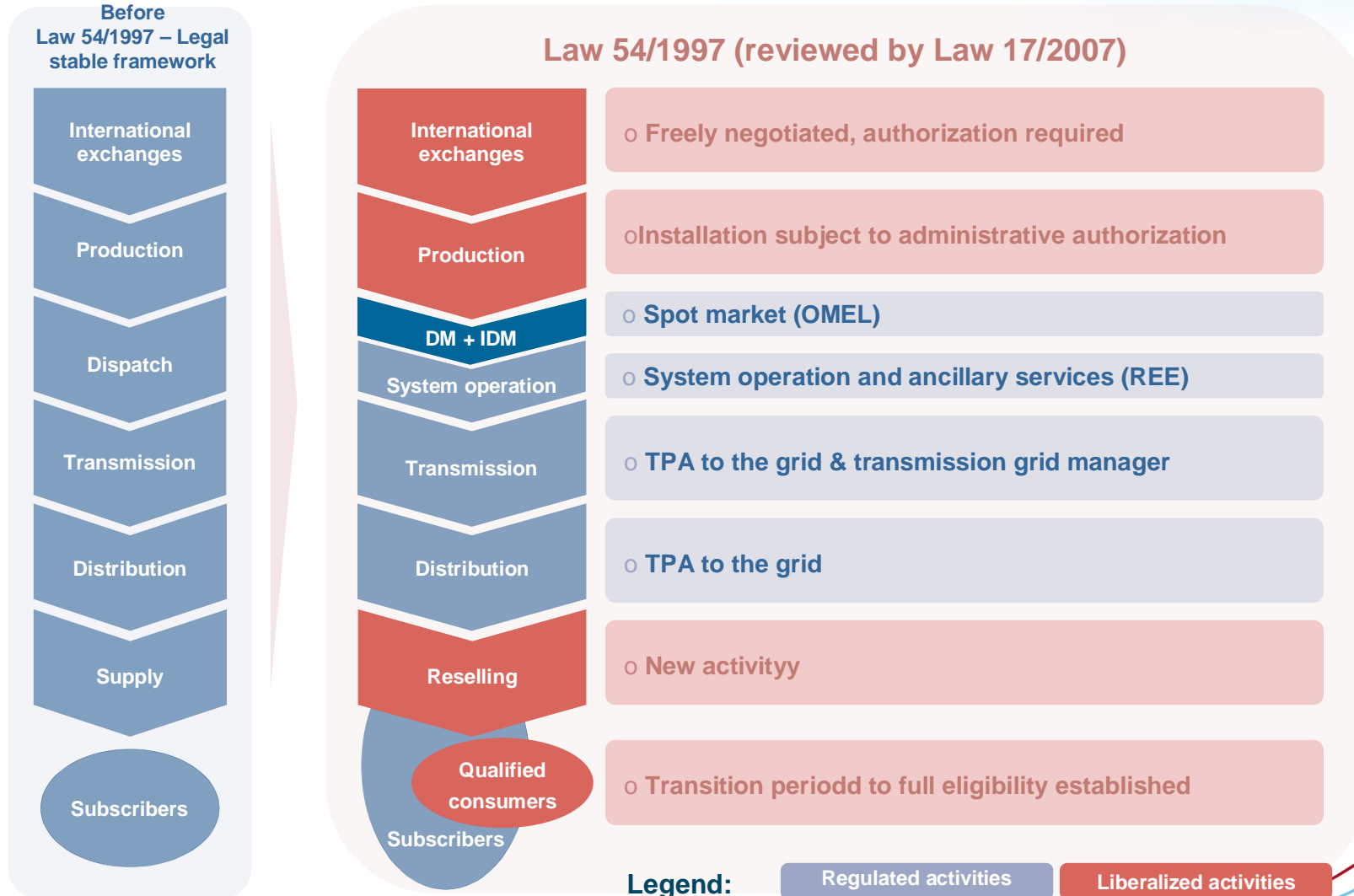
RED ELÉCTRICA DE ESPAÑA

The Spanish electricity system



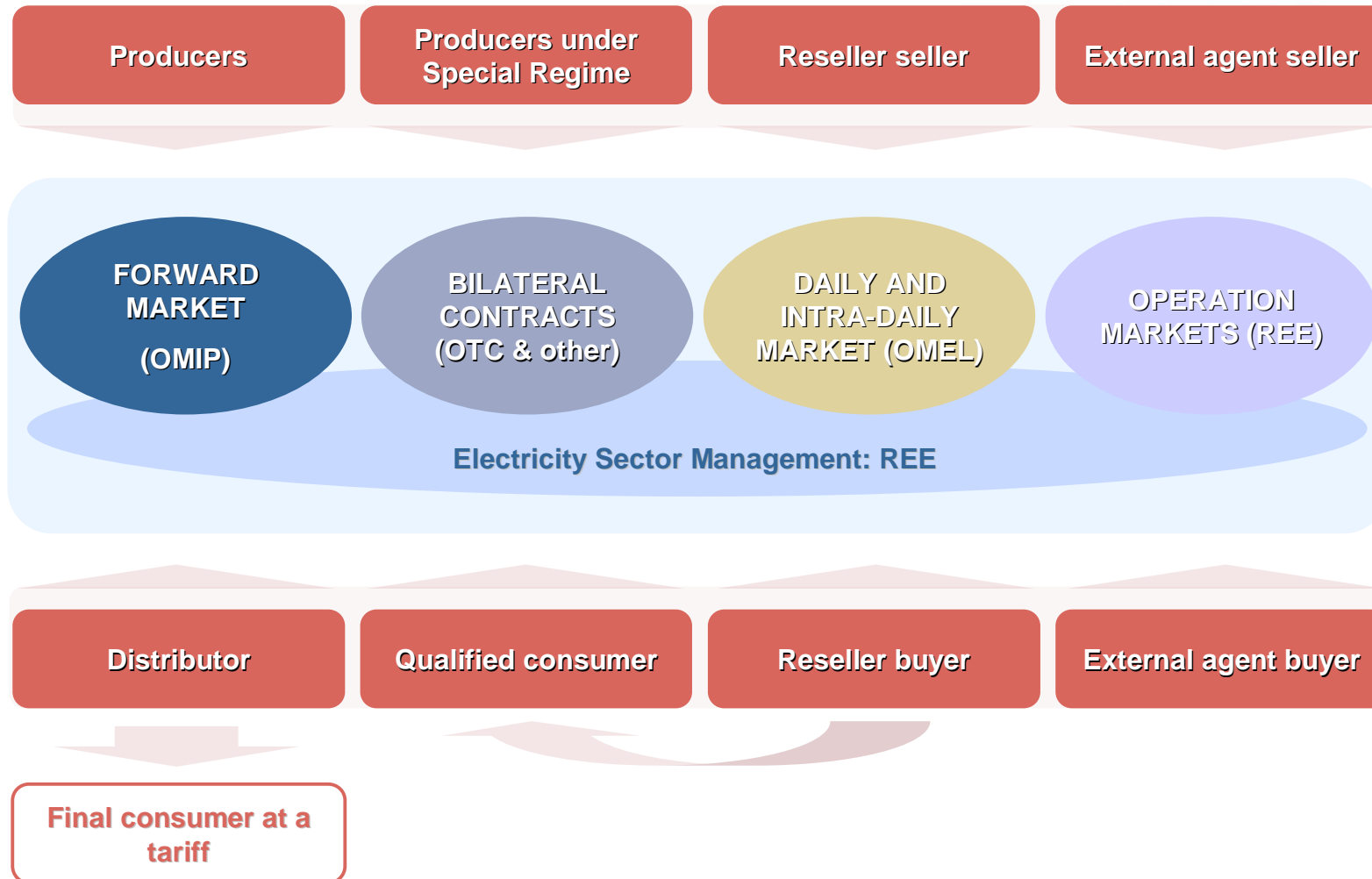


The activities according to Law 54/1997



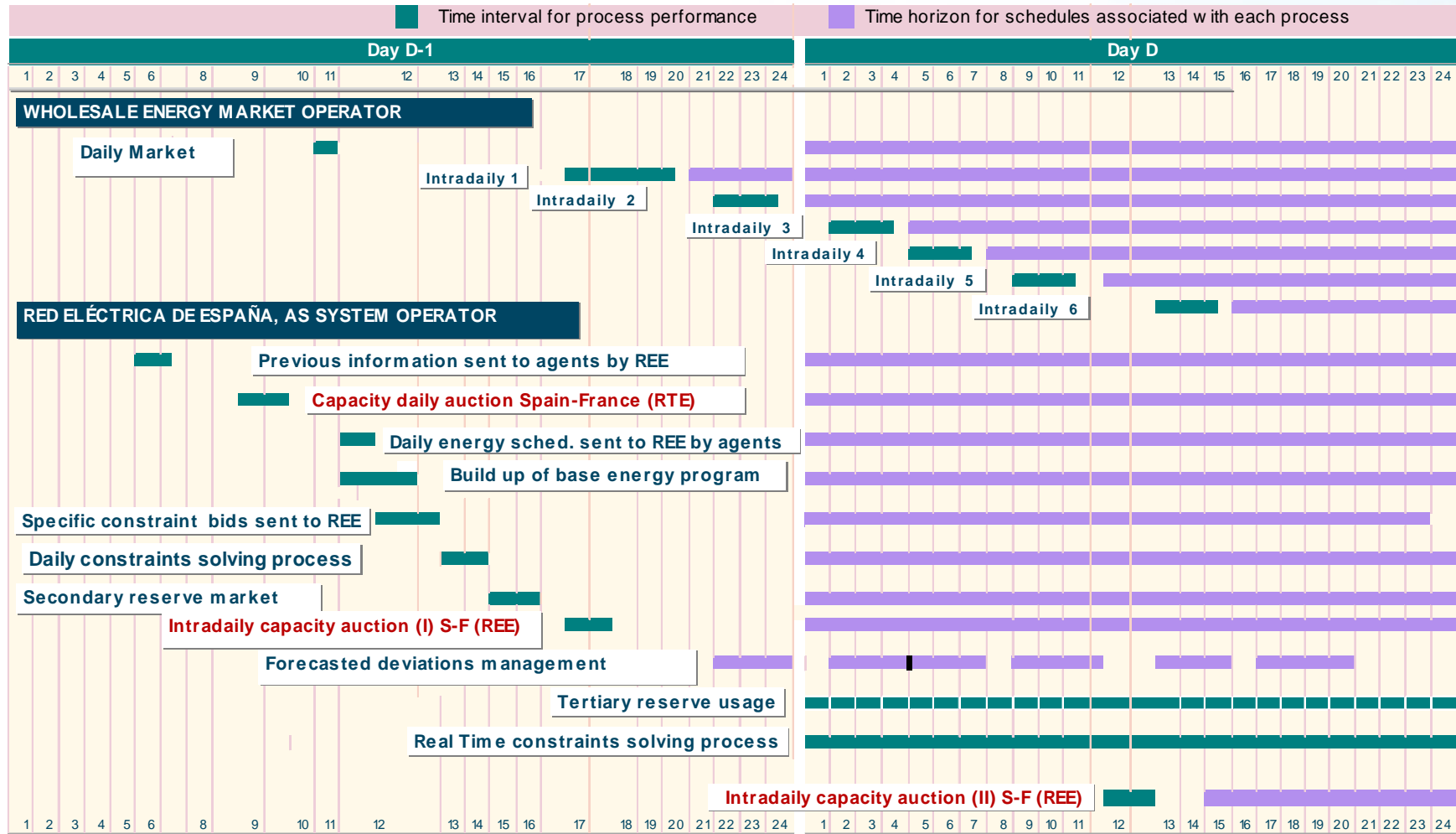


General scheme of the electricity market





Scheduling Scheme



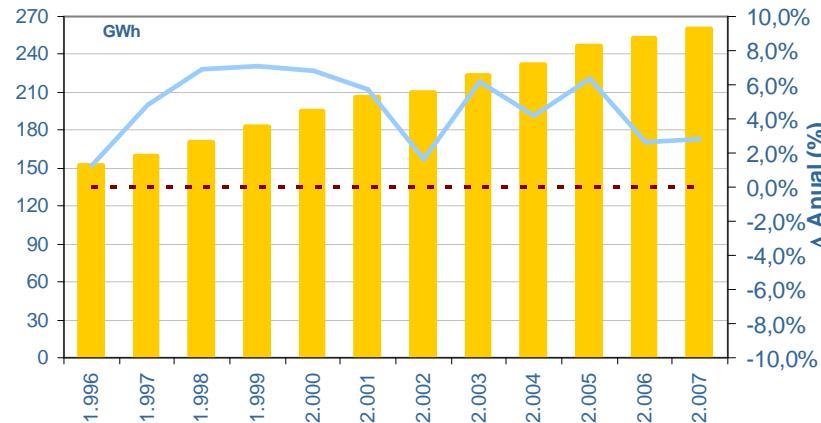


Electricity demand behavior

1

Sustained growth

Demand evolution 1996-2007

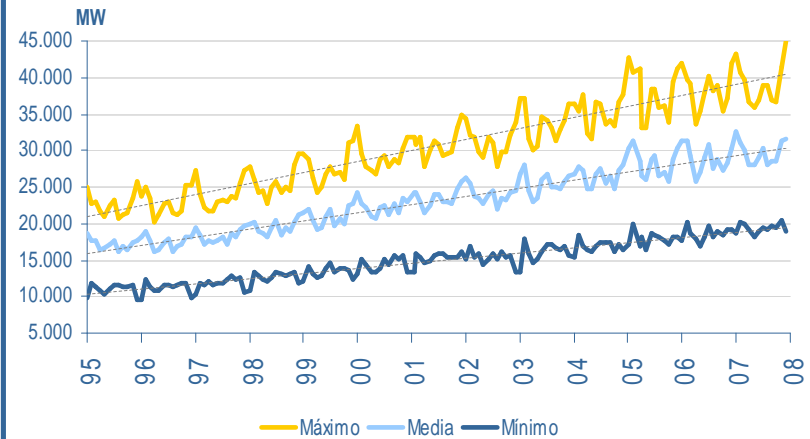


Average year-to-year growth of 5% since 1996

2

Peak demand growth

Monthly peak evolution

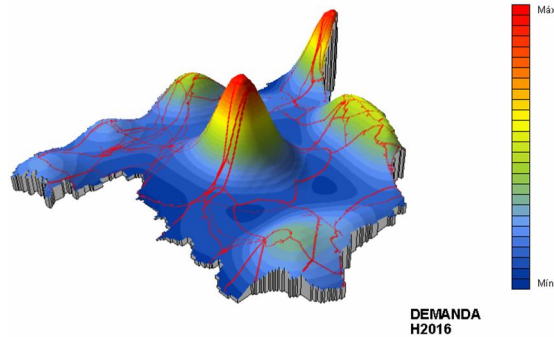


Peak demand growth is higher than average demand increase

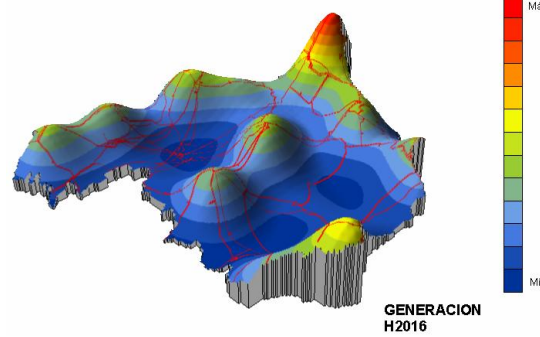


Increasing need for infrastructure. Geographic vision

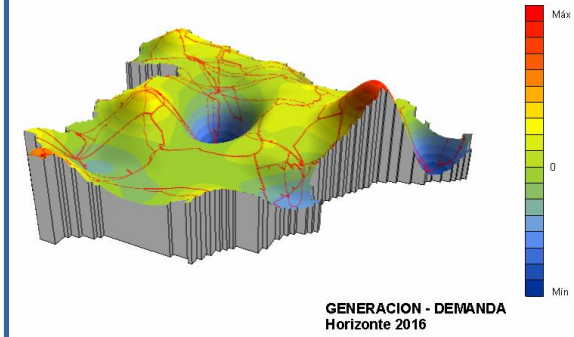
1



Demand



Generation



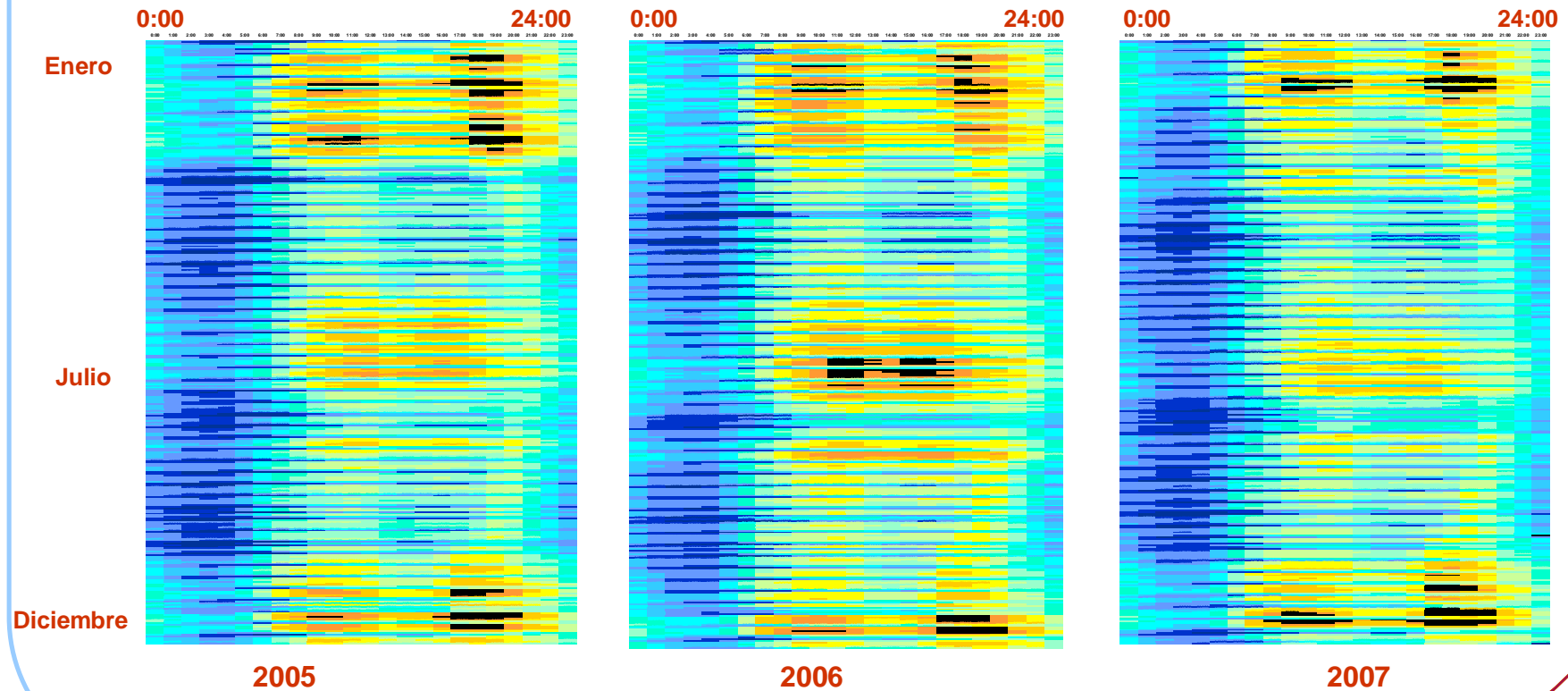
Generation - Demand

Geographically unbalanced growth in generation and demand, which requires new infrastructure → Difficult development



Demand behavior

Black lines represent the 120 h peak hours in 2005, 2006 and 2007





Policies for DG, RES, DR/DSM

DG/RES: Royal Decree 661/2007 for Special Regime

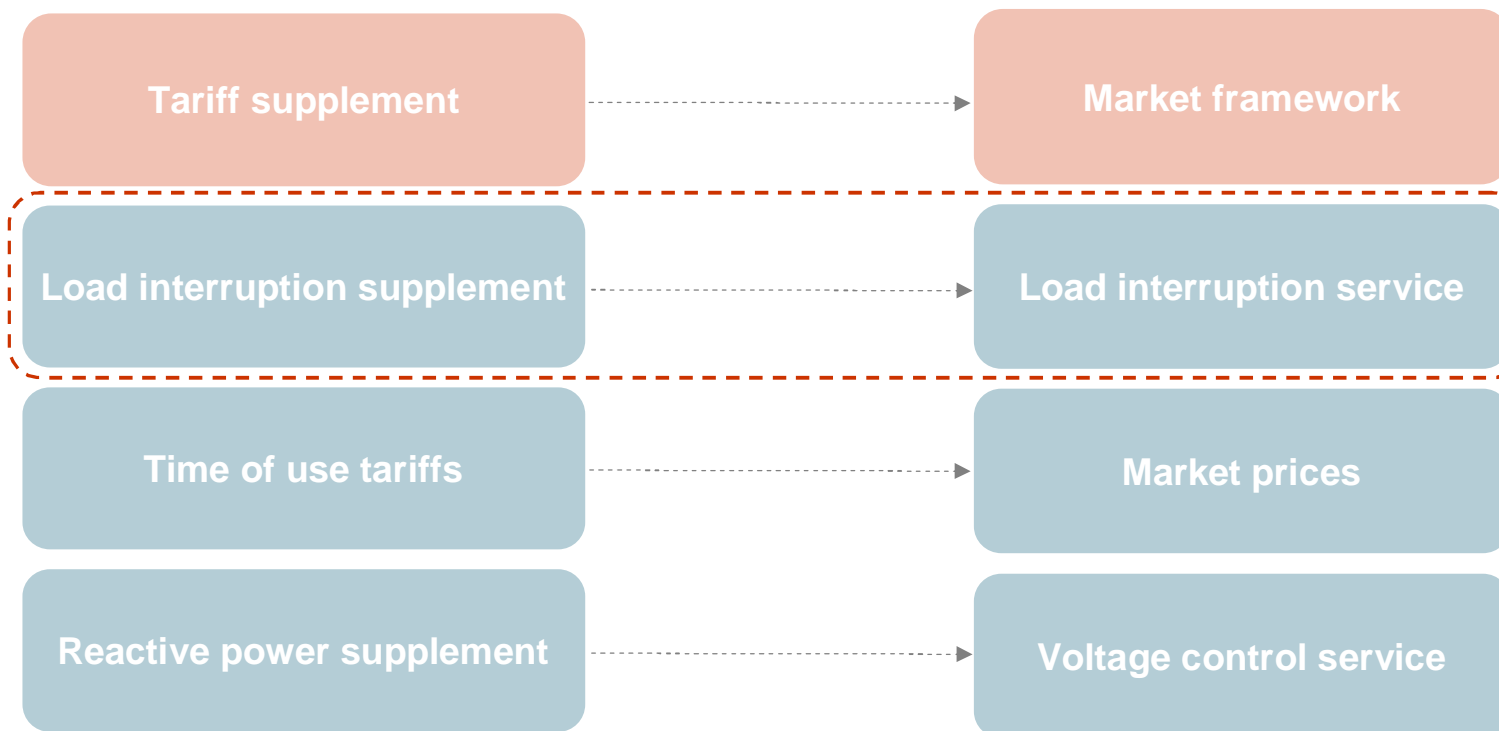
- RES, CHP & Waste up to 50 MW
- Establishes administrative procedures to be followed to install the facility
- Provides two options to sell electricity: guaranteed price / premium
- Offers incentives for frequency control
- Offers higher payment for most efficient CHP plants

DR/DSM: Smart metering down to household consumers

Policies for DR/DSM

From a tariff supplement...

... to a operation service





Interruptibility service



19 of November of 2007

✓ Interruptibility "C" used from 17:40 to 20:40 h & from 17:45 to 20:45

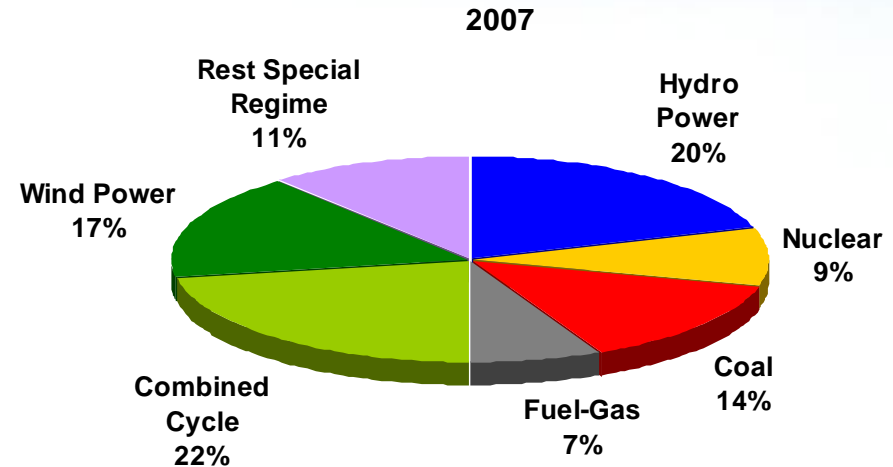
✓ Interruptibility "C" used from 19:00 to 22:00 h & from 19:05 to 22:05

Power reduction from big consumers down to previously agreed values and with a determined warning time, as a request of the TSO or the DSOs

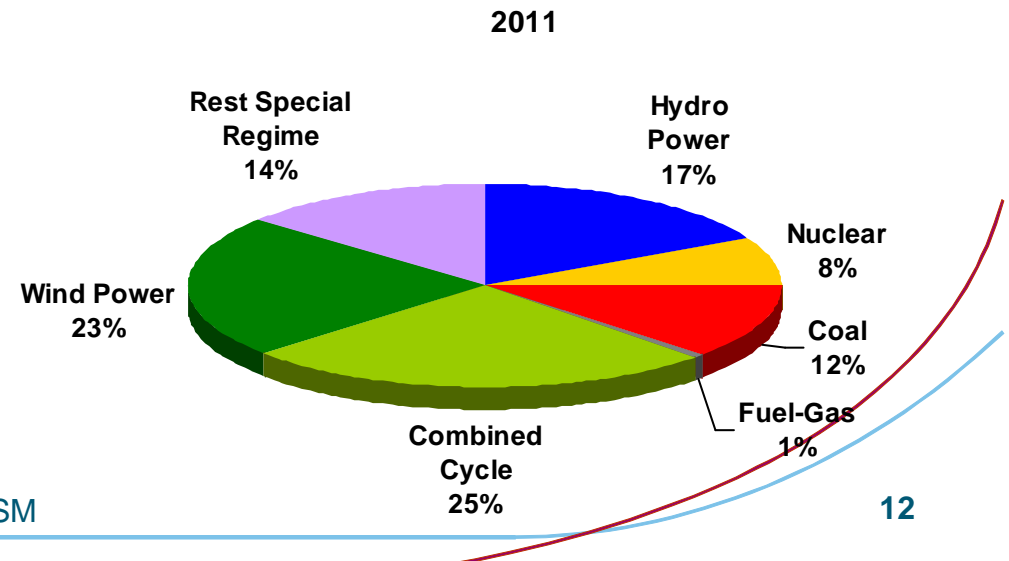


Status and target for DG, RES, DR/DSM

System Installed capacity August 2007 (MW): Total: 82,689 MW
Record peak demand: 44,880 MW



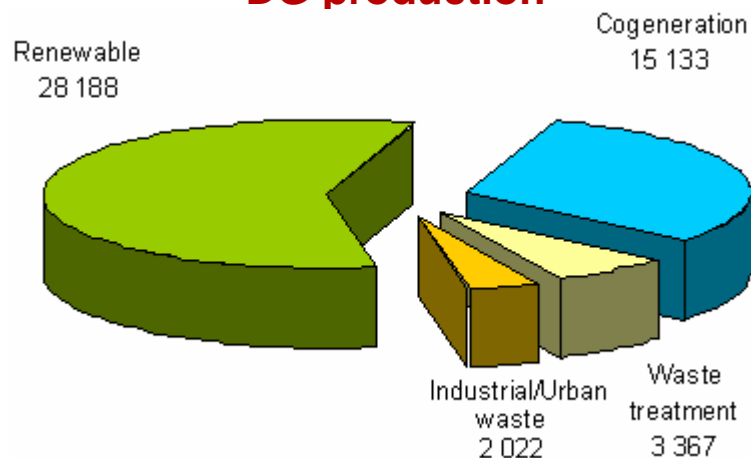
System Installed capacity 2011 (MW): Total: 96,626 MW



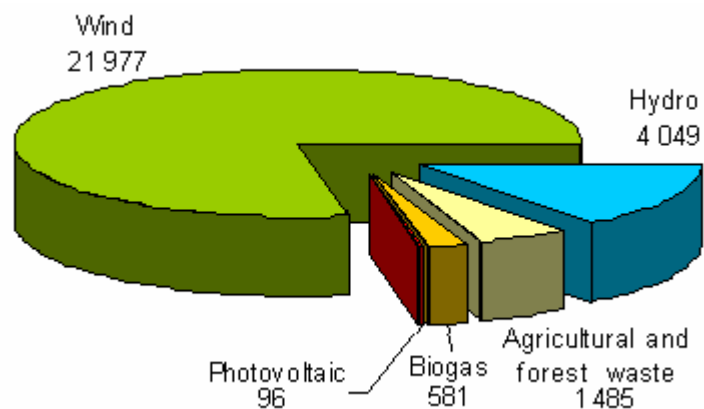


Produced Energy DG 2006

DG production



Renewable

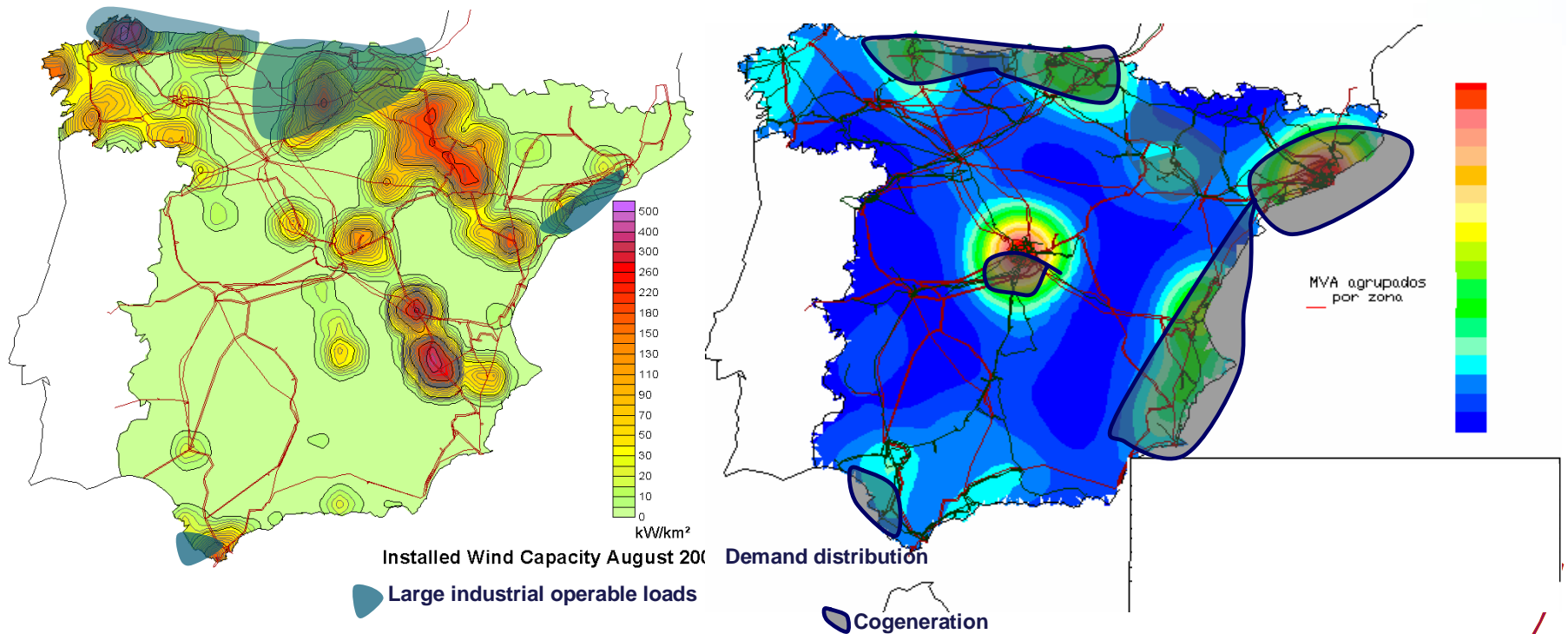


Distributed Generation	Energy (GWh)	%
Renewable	28 188	10.8
Cogeneration	15 133	5.8
Waste Treatment (natural gas)	3 367	1.3
Industrial/Urban Waste	2 022	0.8
Total	48 711	18.6

Renewable	Energy (GWh)	%
Wind	21 977	8.4
Hydro	4 049	1.5
Agricultural and Forest Waste	1 485	0.6
Biogas	581	0.2
Photovoltaic	96	0.04
Total	28 188	10.8



Geographic distribution of wind, CHP and RD and demand





DG Access

Network Access

- **Transmission network.** Clearly established rules.
- **Distribution network.** Each DSO applies his own rules. Only common rules for PV – LV.

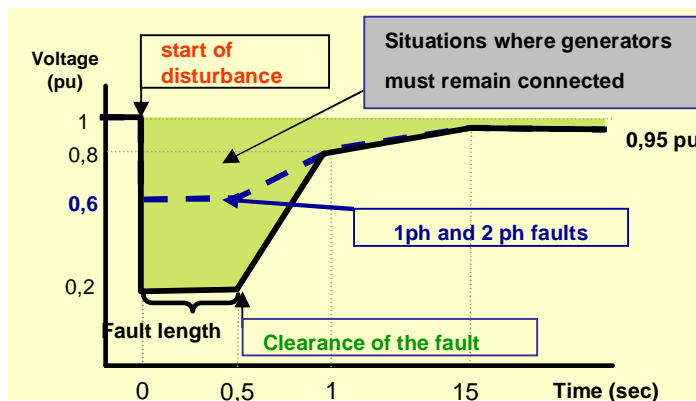
Market Access

- **Wholesale market (1 MW)**
- **Ancillary services**



Network Access.Voltage Dip Generation Tripping 01/06/05-31/05/07

Operational Procedure 12.3



- New wind turbines installed (1/1/2008)
- Already installed wind turbines: deadline for compliance 1/1/2010

Real Time Risk Assesment

3-phase fault in SE 400 kV MUDARRA

