

# 2010

## The Spanish electricity system

### Summary



RED ELÉCTRICA DE ESPAÑA

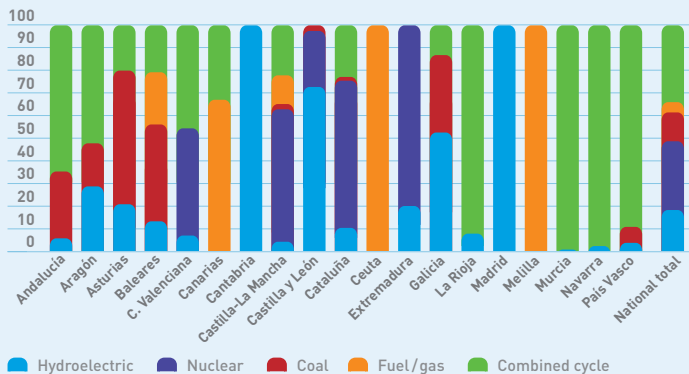
## Electrical power balance (GWh)

|                               | Andalucía     | Aragón        | Asturias      | Baleares     | C. Valenciana | Canarias     | Cantabria    | Castilla-La Mancha | Castilla y León | Cataluña      |
|-------------------------------|---------------|---------------|---------------|--------------|---------------|--------------|--------------|--------------------|-----------------|---------------|
| Hydroelectric                 | 1,560         | 3,106         | 1,919         | -            | 1,450         | 0            | 533          | 697                | 11,584          | 4,165         |
| Nuclear                       | 0             | 0             | 0             | -            | 9,549         | -            | 0            | 8,243              | 3,830           | 24,909        |
| Coal                          | 7,489         | 1,948         | 5,289         | 3,381        | 0             | -            | 0            | 255                | 301             | 516           |
| Fuel/gas (1) (2)              | 0             | 0             | 0             | 1,371        | 0             | 5,900        | 0            | 1,765              | 0               | 60            |
| Combined cycle                | 16,136        | 5,398         | 1,777         | 1,196        | 9,212         | 2,795        | 0            | 3,063              | 0               | 8,530         |
| <b>Ordinary regime</b>        | <b>25,185</b> | <b>10,452</b> | <b>8,985</b>  | <b>5,948</b> | <b>20,211</b> | <b>8,695</b> | <b>533</b>   | <b>14,023</b>      | <b>15,715</b>   | <b>38,180</b> |
| - Generation consumption      | -821          | -364          | -470          | -377         | -606          | -487         | -7           | -919               | -379            | -1,480        |
| <b>Special regime</b>         | <b>13,358</b> | <b>9,053</b>  | <b>2,241</b>  | <b>269</b>   | <b>4,472</b>  | <b>686</b>   | <b>1,877</b> | <b>11,572</b>      | <b>12,809</b>   | <b>8,463</b>  |
| <b>Net production</b>         | <b>37,721</b> | <b>19,142</b> | <b>10,756</b> | <b>5,840</b> | <b>24,077</b> | <b>8,894</b> | <b>2,402</b> | <b>24,676</b>      | <b>28,145</b>   | <b>45,163</b> |
| - Pump storage consumption    | -546          | -311          | -48           | -            | -1,185        | -            | -636         | -146               | -863            | -494          |
| + International exchanges (3) | 884           | -8,686        | -18           | -            | 4,679         | -            | 3,002        | -11,961            | -12,684         | 5,545         |
| <b>Demand 2010</b>            | <b>38,059</b> | <b>10,145</b> | <b>10,691</b> | <b>5,840</b> | <b>27,572</b> | <b>8,894</b> | <b>4,768</b> | <b>12,568</b>      | <b>14,598</b>   | <b>50,214</b> |
| Demand 2009                   | 37,243        | 9,858         | 10,293        | 5,991        | 26,865        | 9,103        | 4,598        | 12,313             | 13,949          | 48,422        |
| % 10/09                       | 2.2           | 2.9           | 3.9           | -2.5         | 2.6           | -2.3         | 3.7          | 2.1                | 4.7             | 3.7           |

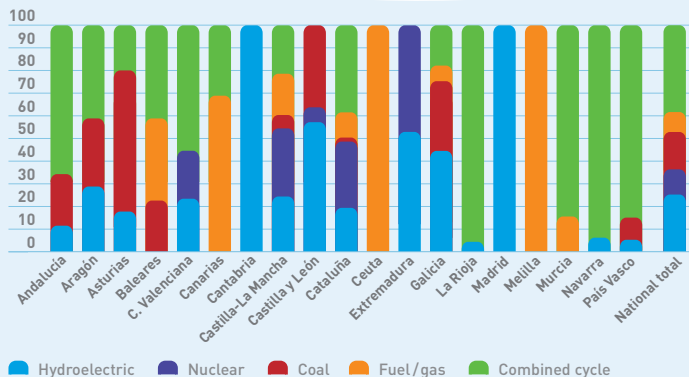
|                               | Ceuta      | Extremadura   | Galicia       | La Rioja     | Madrid        | Melilla    | Murcia       | Navarra      | País Vasco    | Total          |
|-------------------------------|------------|---------------|---------------|--------------|---------------|------------|--------------|--------------|---------------|----------------|
| Hydroelectric                 | -          | 4,049         | 9,002         | 115          | 54            | -          | 79           | 75           | 265           | 38,653         |
| Nuclear                       | -          | 15,460        | 0             | 0            | 0             | -          | 0            | 0            | 0             | 61,990         |
| Coal                          | -          | 0             | 5,811         | 0            | 0             | -          | 0            | 0            | 487           | 25,478         |
| Fuel/gas (1) (2)              | 238        | 0             | 0             | 0            | 0             | 219        | 0            | 0            | 0             | 9,553          |
| Combined cycle                | -          | 0             | 2,191         | 1,306        | 0             | -          | 7,410        | 3,508        | 6,072         | 68,595         |
| <b>Ordinary regime</b>        | <b>238</b> | <b>19,509</b> | <b>17,005</b> | <b>1,422</b> | <b>54</b>     | <b>219</b> | <b>7,488</b> | <b>3,583</b> | <b>6,825</b>  | <b>204,270</b> |
| - Generation consumption      | -21        | -625          | -488          | -40          | -1            | -14        | -260         | -83          | -130          | -7,572         |
| <b>Special regime</b>         | <b>0</b>   | <b>1,163</b>  | <b>12,732</b> | <b>1,419</b> | <b>1,584</b>  | <b>8</b>   | <b>2,544</b> | <b>4,465</b> | <b>3,151</b>  | <b>91,866</b>  |
| <b>Net production</b>         | <b>218</b> | <b>20,046</b> | <b>29,250</b> | <b>2,801</b> | <b>1,637</b>  | <b>214</b> | <b>9,772</b> | <b>7,965</b> | <b>9,846</b>  | <b>288,563</b> |
| - Pump storage consumption    | -          | -77           | -152          | 0            | 0             | -          | 0            | 0            | 0             | -4,458         |
| + International exchanges (3) | -          | -15,328       | -8,366        | -1,036       | 29,237        | -          | -1,730       | -2,768       | 10,896        | -8,333         |
| <b>Demand 2010</b>            | <b>218</b> | <b>4,641</b>  | <b>20,731</b> | <b>1,766</b> | <b>30,874</b> | <b>214</b> | <b>8,043</b> | <b>5,198</b> | <b>20,742</b> | <b>275,773</b> |
| Demand 2009                   | 212        | 4,483         | 20,006        | 1,713        | 29,817        | 206        | 7,832        | 4,945        | 19,864        | 267,711        |
| % 10/09                       | 2.8        | 3.5           | 3.6           | 3.1          | 3.5           | 3.6        | 2.7          | 5.1          | 4.4           | 3.0            |

(1) Includes GICC (Elcogás). (2) Generation by auxiliary units is included in the Canary Island electricity system. (3) Provisional value. Includes values corresponding to regional and international energy exchange. Positive values indicate import exchanges and negative values are export exchanges.

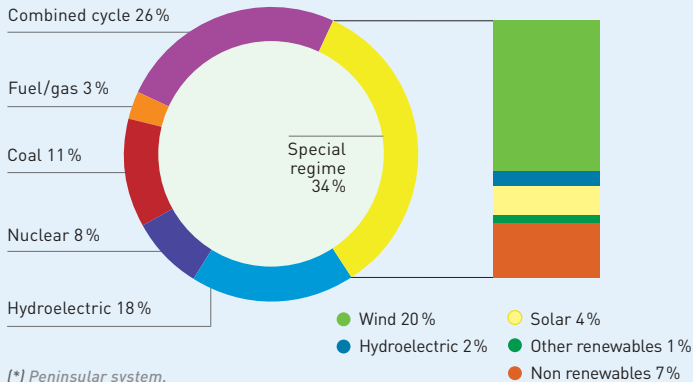
## Structure of ordinary regime production by power station type (%)



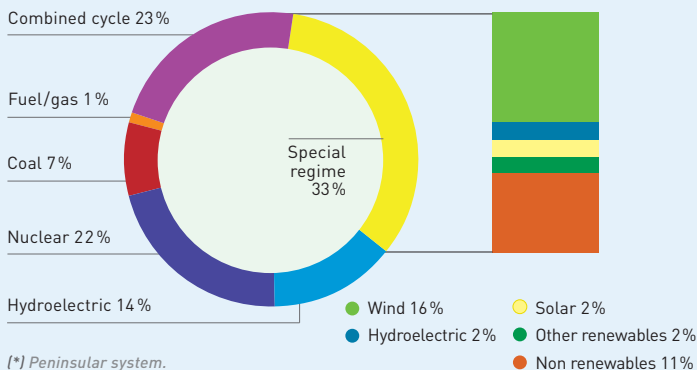
## Structure of ordinary regime installed capacity by power station type (%)



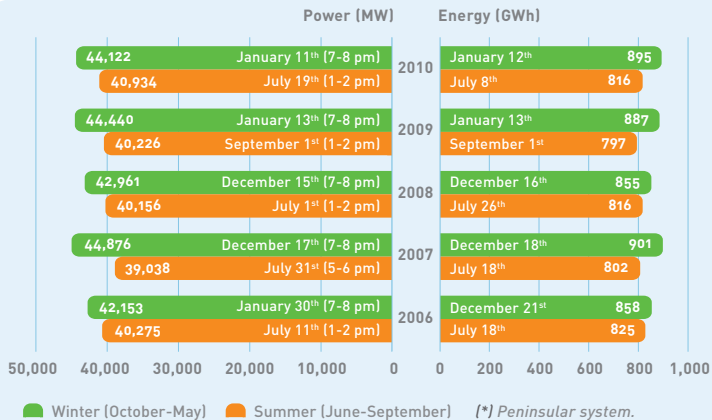
## Installed capacity as on 31.12.2010 (\*)



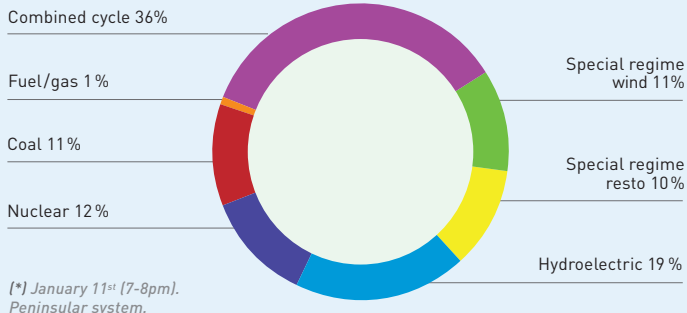
## Annual demand coverage of electrical energy (\*)



## Peak average hourly demand and daily energy (\*)



## Coverage of annual peak power demand 44,122 MW (\*)

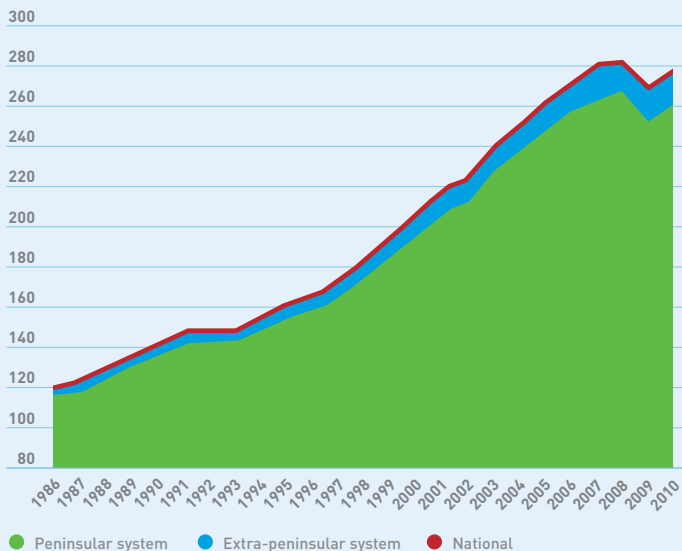


## Annual evolution of Spanish peninsula demand and GDP

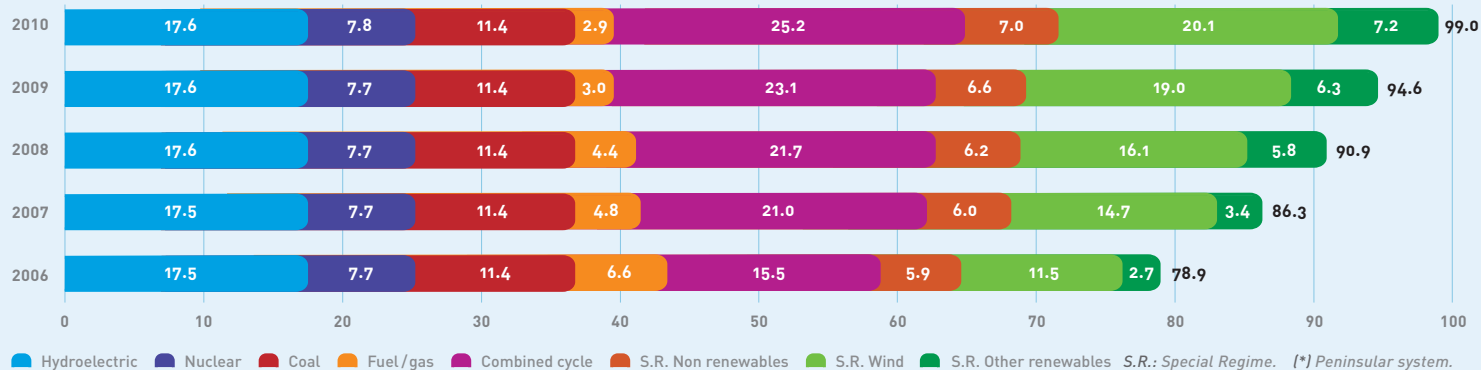
|      | Demand (GWh) | Δ Demand | Δ Demand (*) (by economic activity) | GDP  |
|------|--------------|----------|-------------------------------------|------|
| 2006 | 255,022      | 3.1      | 4.1                                 | 3.9  |
| 2007 | 262,436      | 2.9      | 4.2                                 | 3.6  |
| 2008 | 265,206      | 1.1      | 0.7                                 | 0.9  |
| 2009 | 252,201      | -4.9     | -4.9                                | -3.7 |
| 2010 | 260,609      | 3.3      | 2.9                                 | -0.1 |

(\*) After factoring in the effects of seasonal and working patterns.

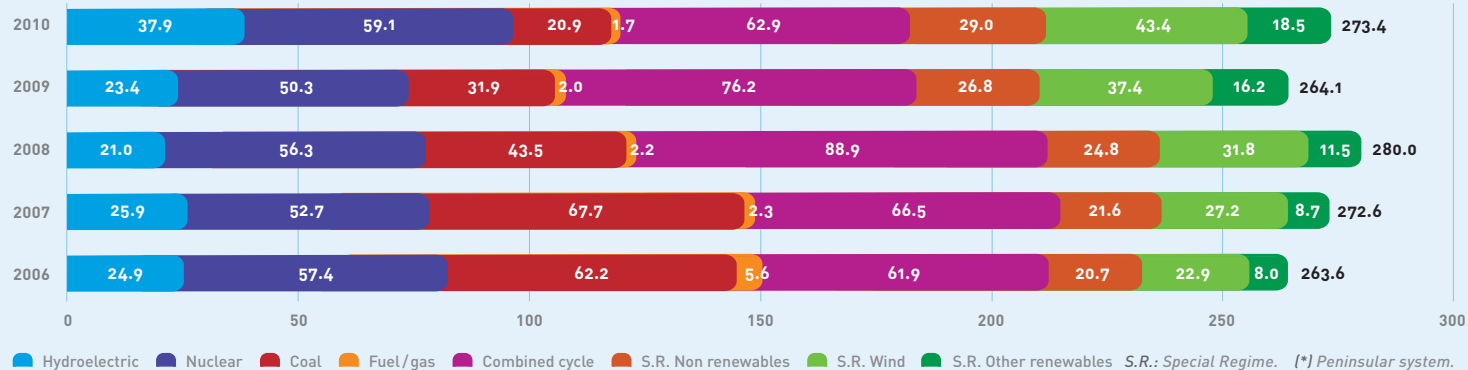
## Evolution of electrical energy demand (TWh)



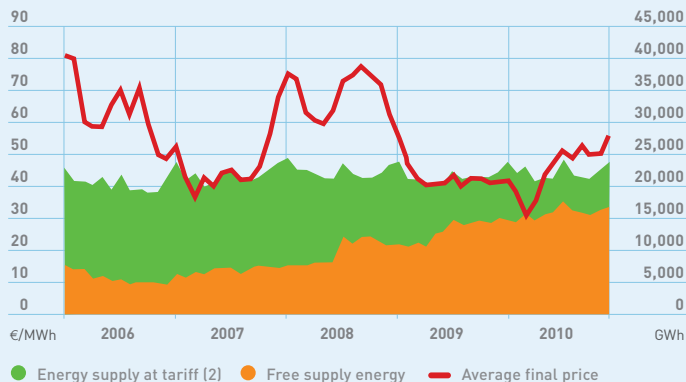
## Annual evolution of installed power (\*) (GW)



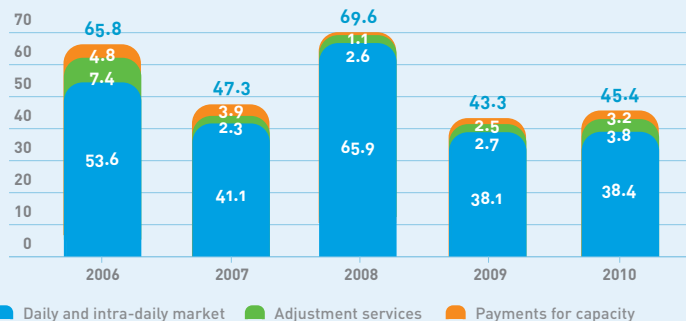
## Annual evolution of the net production structure (\*) (TWh)



## Evolution of monthly energy and prices in the electricity market (1)



## Evolution of the components of the electricity market average final price (€/MWh)



## Managed energy in the system adjustment services (GWh)

|  | 2009     |          | 2010     |          | % 10/09  |          |
|--|----------|----------|----------|----------|----------|----------|
|  | Increase | Decrease | Increase | Decrease | Increase | Decrease |
| Technical restrictions<br>(PBF - Basic<br>Functioning Program) (1) | 9,475    | 707      | 12,509   | 447      | 32.0     | -36.8    |
| Secondary regulation<br>band (2)                                   | 718      | 526      | 727      | 531      | 1.4      | 0.9      |
| Secondary<br>regulation  | 1,072    | 1,406    | 1,165    | 1,724    | 8.7      | 22.6     |
| Tertiary<br>regulation   | 2,238    | 3,287    | 2,726    | 2,983    | 21.8     | -9.3     |
| Deviation<br>management  | 1,253    | 3,018    | 2,198    | 2,675    | 75.4     | -11.4    |
| Restrictions<br>in real time                                       | 821      | 640      | 887      | 901      | 8.0      | 40.8     |

(1) Increased or reduced energy in phase 1 of the restrictions (Resolution of 24 May 2006).

(2) Average hourly power (MW).

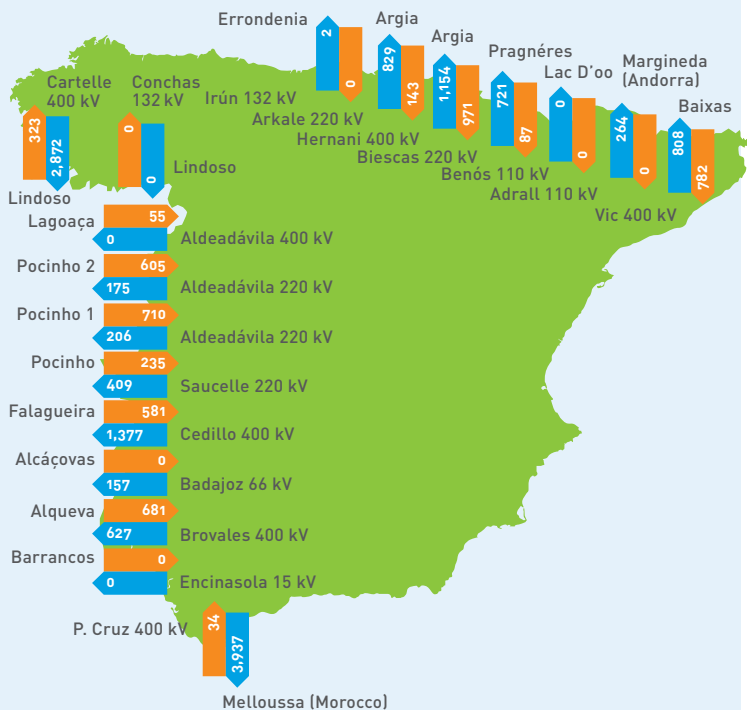
## Adjusted average price in the system adjustment (€/MWh)

|  | 2009     |          | 2010     |          | % 10/09  |          |
|--|----------|----------|----------|----------|----------|----------|
|  | Increase | Decrease | Increase | Decrease | Increase | Decrease |
| Technical restrictions<br>(PBF - Basic<br>Functioning Program) (1) | 78.2     | 38.6     | 80.5     | 45.7     | 2.9      | 18.4     |
| Secondary regulation<br>band (2)                                   | 12.0     |          | 14.7     |          | 22.6     |          |
| Secondary<br>regulation  | 39.9     | 27.1     | 40.4     | 24.7     | 1.3      | -8.9     |
| Tertiary<br>regulation   | 49.3     | 22.6     | 50.4     | 17.9     | 2.3      | -20.9    |
| Deviation<br>management  | 44.8     | 24.9     | 51.0     | 20.7     | 13.9     | -16.8    |
| Restrictions<br>in real time                                       | 116.7    | 11.7     | 104.5    | 9.7      | -10.5    | -16.8    |

(1) Increased or reduced energy in phase 1 of the restrictions (Resolution of 24 May 2006).

(2) Average hourly power (€/MW).

## Physical international exchanges of electrical energy (GWh)



## Physical international exchanges by interconnection (GWh)

|              | Input        |              | Output        |               | Balance (1)   |               |
|--------------|--------------|--------------|---------------|---------------|---------------|---------------|
|              | 2009         | 2010         | 2009          | 2010          | 2009          | 2010          |
| France       | 3,942        | 1,983        | 2,352         | 3,514         | 1,590         | -1,531        |
| Portugal     | 2,820        | 3,189        | 7,609         | 5,823         | -4,789        | -2,634        |
| Andorra      | 0            | 0            | 299           | 264           | -299          | -264          |
| Marocco      | 8            | 34           | 4,596         | 3,937         | -4,588        | -3,903        |
| <b>Total</b> | <b>6,771</b> | <b>5,206</b> | <b>14,857</b> | <b>13,539</b> | <b>-8,086</b> | <b>-8,333</b> |

(1) Positive values indicate import exchanges and negative values are export exchanges.

## Evolution of physical balances of International exchanges (GWh)



## Evolution of the transmission and transforming system (\*)

|                            |                 | 2006          | 2007          | 2008          | 2009          | 2010          |
|----------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| km of circuit a 400 kV     | Red Eléctrica   | 17,005        | 17,134        | 17,686        | 17,977        | 18,765        |
|                            | Other companies | 38            | 38            | 38            | 38            | 0             |
|                            | <b>Total</b>    | <b>17,042</b> | <b>17,172</b> | <b>17,724</b> | <b>18,015</b> | <b>18,765</b> |
| km of circuit a 220 kV     | Red Eléctrica   | 16,420        | 16,457        | 16,558        | 16,698        | 17,004        |
|                            | Other companies | 271           | 275           | 307           | 322           | 107           |
|                            | <b>Total</b>    | <b>16,690</b> | <b>16,732</b> | <b>16,865</b> | <b>17,020</b> | <b>17,110</b> |
| Transformer capacity (MVA) | Red Eléctrica   | 56,072        | 58,522        | 62,922        | 66,322        | 69,122        |
|                            | Other companies | 800           | 800           | 800           | 800           | 0             |
|                            | <b>Total</b>    | <b>56,872</b> | <b>59,322</b> | <b>63,722</b> | <b>67,122</b> | <b>69,122</b> |

(\*) Peninsular system.

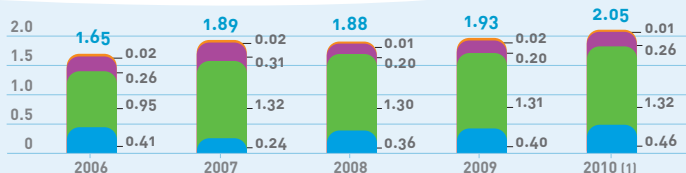
## Quality of the transmission grid (\*)

|      | ENS (MWh)     |                     |       | TIM (minutes) |                     |       |
|------|---------------|---------------------|-------|---------------|---------------------|-------|
|      | Red Eléctrica | Other companies (1) | Total | Red Eléctrica | Other companies (1) | Total |
| 2006 | 870           | 65                  | 936   | 1.82          | 0.14                | 1.95  |
| 2007 | 552           | 205                 | 757   | 1.11          | 0.41                | 1.52  |
| 2008 | 574           | 0                   | 574   | 1.15          | 0.00                | 1.15  |
| 2009 | 437           | 0                   | 437   | 0.91          | 0.00                | 0.91  |
| 2010 | 1,552         | 18                  | 1,570 | 3.14          | 0.04                | 3.17  |

ENS: Non-supplied energy. TIM: Average interruption time. (\*) Peninsular system.

(1) Data corresponding to 0.9% of the transmission grid in the years 2006 to 2009 and 0.3 in 2010.

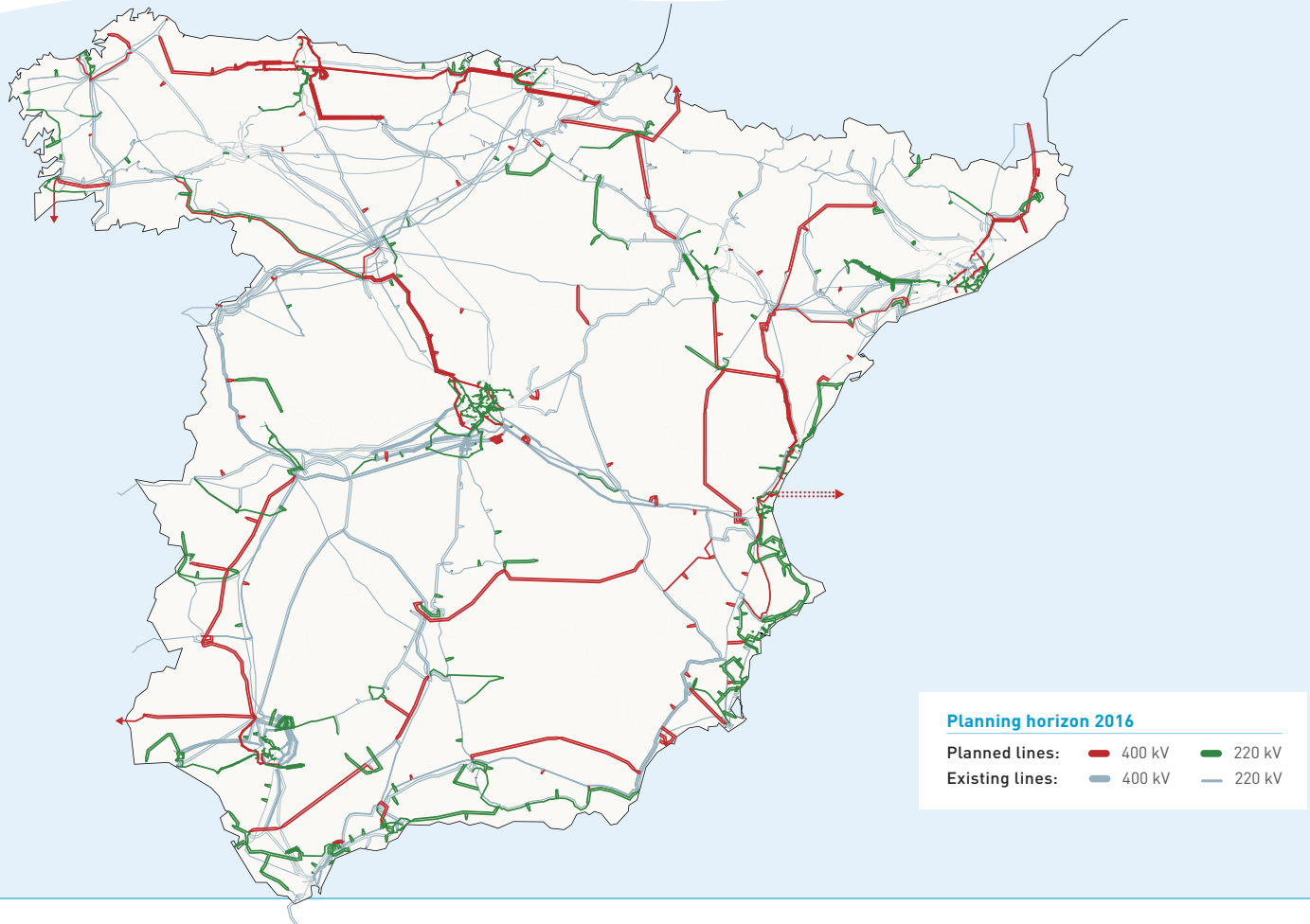
## Annual evolution of the non-availability rate of the transmission grid (\*) (%)



Note: Classification according to RD 1955/2000. (1) Provisional data pending audit.

(\*) Peninsular system.

## Electricity transmission grid planning

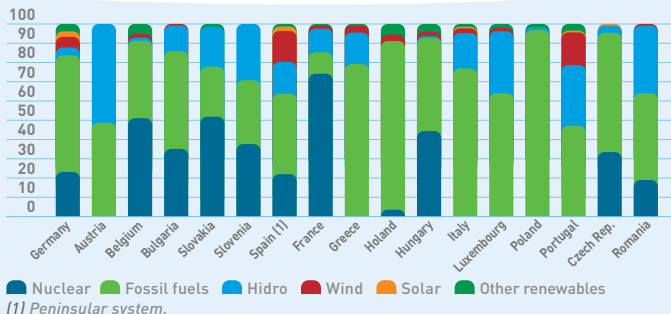


## Electrical energy demand and consumption per capita of the countries of the European Union members of the Continental Europe (ENTSO-E)

|                 | Demand (TWh)   |            | Consumption per capita (kWh/hab.) |            |
|-----------------|----------------|------------|-----------------------------------|------------|
|                 | 2010           | % 10/09    | 2010                              | % 10/09    |
| Alemania        | 548.2          | 4.1        | 6,702                             | 4.3        |
| Austria         | 67.3           | 2.6        | 8,038                             | 2.3        |
| Bélgica         | 88.6           | 5.7        | 8,175                             | 4.9        |
| Bulgaria        | 31.5           | -3.2       | 4,170                             | -2.6       |
| Eslovaquia      | 26.6           | 4.7        | 4,910                             | 4.5        |
| Eslovenia       | 12.2           | 8.0        | 5,983                             | 7.3        |
| España (1)      | 260.6          | 3.3        | 5,667                             | 3.0        |
| Francia         | 513.3          | 5.5        | 7,931                             | 5.0        |
| Grecia          | 53.6           | 0.1        | 4,737                             | -0.3       |
| Holanda         | 116.5          | 3.1        | 7,026                             | 2.6        |
| Hungría         | 39.0           | 2.5        | 3,892                             | 2.7        |
| Italia          | 326.2          | 1.8        | 5,405                             | 1.3        |
| Luxemburgo      | 6.7            | 8.0        | 13,325                            | 6.1        |
| Polonia         | 143.6          | 4.9        | 3,761                             | 4.8        |
| Portugal        | 53.8           | 4.7        | 5,059                             | 4.6        |
| República Checa | 64.0           | 3.9        | 6,093                             | 3.5        |
| Rumania         | 53.4           | 5.4        | 2,486                             | 5.6        |
| <b>Total</b>    | <b>2,405.1</b> | <b>3.9</b> | <b>5,920</b>                      | <b>3.6</b> |

Source: ENTSO-E. Consumption per capita = Total consumption / Total population.  
Population data: Eurostat. (1) Spanish peninsula demand.

## Structure of the net total production of the countries of the European Union members of the Continental Europe (ENTSO-E) (%)





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