Italy
Country Situation

Giancarlo Scorsoni
Contents

- General information
- Electricity system features
- Electricity sector organization
- Power market
- Renewable source, CHP end energy efficiency incentivizing
Economic background

Population

60 Millions

GDP

1 535 GEUR 2007

per capita

25 580 EUR

Area

300 000 Km²

per capita

200 inhab/km²
### Energy & Electricity

<table>
<thead>
<tr>
<th></th>
<th>Energy demand</th>
<th>Electricity demand</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>195 Mtoe</td>
<td>340 TWh</td>
</tr>
<tr>
<td><strong>per capita</strong></td>
<td>3.2 toe</td>
<td>5 670 kWh</td>
</tr>
<tr>
<td><strong>CO2 emissions</strong></td>
<td>470 Mt</td>
<td>137 Mt</td>
</tr>
<tr>
<td><strong>per capita</strong></td>
<td>7.8 ton</td>
<td></td>
</tr>
</tbody>
</table>

#### Dependence on imports
- Hydrocarbons: 78%
- CO2 emissions: 55% (62% of generation)

**Energy demand per capita:** 670 kWh

**CO2 emissions per capita:** 7.8 ton
Electricity balance 2007 (TWh)

<table>
<thead>
<tr>
<th>Generation</th>
<th>+ Imp(+)/Exp(-)</th>
<th>= Final consumption</th>
<th>+ Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>301</td>
<td>46</td>
<td>7</td>
<td>294</td>
</tr>
</tbody>
</table>

**Generation by source (TWh)**
- Hydro: 33
- Geothermal: 5
- Wind: 4
- Solar: 0
- Biom. & Waste: 7
- Oil: 33
- Gas: 168
- Coal: 46

**Final Consumption by sector (TWh)**
- Industry: 156
- Residential: 67
- Tertiary: 90
- Agriculture: 6
## Evolution of demand and load

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<tbody>
<tr>
<td><strong>Total Demand (TWh)</strong></td>
<td>180.3</td>
<td>235.1</td>
<td>298.5</td>
<td>330.4</td>
<td>337.5</td>
<td>339.8</td>
<td>360.2</td>
<td>407.4</td>
<td>450.1</td>
<td>498.2</td>
<td>550.0</td>
</tr>
<tr>
<td><strong>Peak Demand (GW)</strong></td>
<td>31.4</td>
<td>40.5</td>
<td>49.019</td>
<td>55.0</td>
<td>55.6</td>
<td>56.8</td>
<td>61.2</td>
<td>69.1</td>
<td>75.9</td>
<td>83.0</td>
<td>90.9</td>
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<tr>
<td><strong>Date of Peak Demand</strong></td>
<td>Dec-Jan</td>
<td>Dec-Jan</td>
<td>Dec-Jan</td>
<td>Dec-Jan</td>
<td>Jun-Jul</td>
<td>Dec-Jan</td>
<td>Jun-Jul</td>
<td>Jun-Jul</td>
<td>Jun-Jul</td>
<td>Jun-Jul</td>
<td>Jun-Jul</td>
</tr>
<tr>
<td><strong>Use factor of Peak Demand (h/a)</strong></td>
<td>5 740</td>
<td>5 800</td>
<td>6 090</td>
<td>6 010</td>
<td>6 070</td>
<td>5 980</td>
<td>5 890</td>
<td>5 900</td>
<td>5 930</td>
<td>6 000</td>
<td>6 050</td>
</tr>
</tbody>
</table>

(*) Connected System

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<**G.S.**>
Yearly hourly load curve (2007)
Balance supply-load on the peak day

18-12-2007 Ore 17:00
56,8 GW

<GS>
Max and min load days
Load duration curves

<G.S.>
### Distributed generation (2007)

<table>
<thead>
<tr>
<th>Technology</th>
<th>No</th>
<th>Capacity (MW)</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>1 949</td>
<td>4 138</td>
<td>Up to 20 MW</td>
</tr>
<tr>
<td>Wind</td>
<td>203</td>
<td>2 714</td>
<td>Up to ? MW</td>
</tr>
<tr>
<td>Sun</td>
<td>7 647</td>
<td>87</td>
<td>Up to ? MW</td>
</tr>
</tbody>
</table>

**Thermal**

- **Only Power**
  - Internal combustion: 607, 538
  - Gas turbine: 15, 71
  - Steam turbine: 63, 408
  - Combined cycle: 2, 26
  - Others: 33, 205
  - **Total DG**: 720, 1 248

- **CHP**
  - Internal combustion: 513, 745
  - Gas turbine: 159, 719
  - Steam turbine: 261, 1 420
  - Combined cycle: 53, 423
  - **Total CHP DG**: 986, 3 307

- **Total thermal DG**: 1 706, 4 555

*Thermal DG/Thermal* 85% 7%
# Distributed generation (2007)

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<tr>
<td>Sun</td>
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<td>87</td>
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<td><strong>Thermal</strong></td>
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<tr>
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<tr>
<td>Gas turbine</td>
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<td>71</td>
<td></td>
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<tr>
<td>Steam turbine</td>
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<td>408</td>
<td></td>
</tr>
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<td><strong>Total CHP DG</strong></td>
<td>986</td>
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<tr>
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<td>1 706</td>
<td>4 555</td>
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<tr>
<td><strong>Thermal DG/Thermal</strong></td>
<td>85%</td>
<td>7%</td>
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Italian Electricity Industry
Players and Regulators

**Italian Independent Regulator**
(Authority for Electricity And Gas – AEG)

- **GENERATION**
  - Enel, Edison, Edipower, Endesa Italy, ENI, Tirreno Power, other IPPs. GSE (Virtual Power Producer)

- **TRASMISSION**
  - ISO:
    - TERNA
  - Grid ownership:
    - TERNA 94%
    - Others 6%

- **ELECTRICITY MARKET**
  - Power exchange:
    - GME
  - Bilateral contracts
    - ACQUIRENTE UNICO
      (Single Buyer for capt. customers)
    - Traders

- **DISTRIBUTION**
  - Enel, Acea, A2A, HERA, other municipal utilities,

- **CUSTOMERS**
  - Eligible customers and non-optioning customers
    (residential end-users)
Organisation of the Italian Electricity Market as spring 2008

Electricity producers

Bilateral contracts
- Power

Power Exchange
- Power
- Resources for dispatching

Wholesale customers
- (Supply contracts)

Retailers
- (Supply contracts)

Switching customers

Single Buyer
- (Acquirente Unico – AU)

Distributors
- (Tariffs)

Non-optioning customers

TERNA (TSO)
Wholesale prices

Italian Power Exchange
Monthly average National Price - PUN
(€/MWh)

Exchange starting date: April 204

<table>
<thead>
<tr>
<th>Month</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
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<td>48</td>
<td>44</td>
<td>62</td>
<td>61</td>
<td>49</td>
<td>54</td>
<td>50</td>
<td>47</td>
<td>47</td>
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<tr>
<td>2005</td>
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<td>60</td>
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<td>49</td>
<td>47</td>
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<td>65</td>
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<td>74</td>
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<tr>
<td>2007</td>
<td>76</td>
<td>70</td>
<td>61</td>
<td>56</td>
<td>63</td>
<td>67</td>
<td>84</td>
<td>63</td>
<td>70</td>
<td>70</td>
<td>91</td>
<td>81</td>
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</tbody>
</table>

Source: GME

<G.S.>
Day vs day&night mean prices

Source: GME
Incentivizing schemes for RE-E

- Feed in-tariffs for RE-E (and quasi RE-E) for plants listed eligible within 1 April 1999
- Quotas & TGCs for RE-E plants commissioned after 1 April 1999 (subjected to frequent upgrading)
- Fixed premium for PV-E green value
- Global tariff (green value + brown value) for RE-E plants < than 1 MW (wind farms < than 200 kW; biomasses: only local) on producer choose
- Brown value for RE-E paid by GSE on producer choose @ power market prices
- Net-metering in place for RE-E up to 200 kW size devices
Fixed premium for PV generation

PV Producer

Premium x kWhs

Green value

Market

Prices x kWhs

power

GSE

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## Base premium tariffs for PV green value

**Grid connection year**

<table>
<thead>
<tr>
<th>Size</th>
<th>Built-in</th>
<th>No</th>
<th>Partially</th>
<th>Full</th>
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</thead>
<tbody>
<tr>
<td>1-3 kW</td>
<td></td>
<td>400</td>
<td>440</td>
<td>490</td>
</tr>
<tr>
<td>3-20 kW</td>
<td></td>
<td>380</td>
<td>420</td>
<td>460</td>
</tr>
<tr>
<td>&gt;20 kW</td>
<td></td>
<td>360</td>
<td>400</td>
<td>440</td>
</tr>
</tbody>
</table>

**Base tariffs for grid connection in the 2007-2010 (EUR/MWh)**

- **Constant tariffs for 20 years from grid connection**
  - (e.g. 2008 PV device achieves 440 EUR/MWh per 20 years)

- **2010 PV device gets 420*(1-2%) = 411.6 EUR/MWh per 20 years**

**Plant connected**

- 2007
- 2008
- 2009
- 2010
No monetary incentives, other than High efficiency sets listed for White Certificates

Priority of access

Net metering for CHP plants less than 200 kW
Energy efficiency incentivizing

- White certificates (*reserved to suppliers and ESCOs*)
  - *Power and gas distributors obliged to get efficiency targets*
  - *Obligation is fulfilled by tradable white certificates*
  - *Three types of certificates:*
    - *Electricity savings by power distributors and ESCOs*
    - *Gas savings by gas distributors and ESCOs*
    - *Primary energy savings by utilities and ESCOs*

- Income tax rebates (*reserved to individuals and firms*)
  55% of installed costs returned via income tax rebates
  *(Applicable to solar heating, condensing boilers, heat pumps, building insulation, …….)*
Options to meet the 2020 UE RE target

Renewable share of final energy consumption (Italy case)

- 5% in 2005
- 12% in 2020
- 17% in 2020

- Biofuels
- Cooling + heating from RE
- RE-E
- Efficiency gains
GSE, owned by the Italian Government, plays a central role in promoting and incentivizing RE sources in Italy.

As virtual producer, GSE puts on the energy market yearly about 60 TWh (Italy: 300 TWh), of which 20 TWh from RE sources (Italy: 50 TWh)

The wind power short-term forecasting implementation started in 2007. The forecasting activity for energy bidding from January 2008. At the moment, 1300 MW (40 plants) are scheduled by the GSE forecast models

The short term wind power forecasting is part of a large project, aiming at forecasting the random (not programmable) RE-E (wind, solar and run of rivers). The PV solar module is under test, in use in September. The run of river module is expected ready for use at the end of 2008