AGENDA

01 Main Features of the Italian energy market

02 Wholesale power market

03 Weather

04 Market prices and margins
The Italian market stands 4th in the European electricity market ranking, and 3rd in the European gas market ranking.

The Italian electricity demand in 2016 is roughly at the same level as in 2014, with a -2.1% reduction y/y.

The Italian gas demand in 2016 stands below 2013 level (-2.1 bcm according to preliminary 2016 data).

Source: IHS Cera, Snam Rete Gas and Terna.
* Power demand data do not include losses.
Electricity demand in 2015 increased by 2% y/y, mainly due to the high summer temperature. In 2016 electricity demand decreased to the 2014 level (minimum level since 2001).
In 2015 an increase in consumption y/y was registered in every sector excepted the industrial one.

GDP in 2015 increased by 0.8% after the recession begun in 2008 (in this period, GDP was positive only in 2010 and 2011).

Despite the increase, the 2015 consumption was 7% lower than in 2008.

- Gross Domestic Product at market prices; base: 2010

Source: AEEGSI 2016 annual report, Terna, Eurostat
**ITALIAN ELECTRICITY DEMAND**  
**LIBERALIZED AND REGULATED MARKETS**

**Breakdown by market - 2015**

- **Regulated; 24%**
- **Liberalized; 76%**

**REGULATED MARKET**

- **AU (Acquirente Unico – Single Buyer):** State-owned body responsible for the electricity supply to the regulated market.

- **AU** sources electricity on the wholesale forward market and on the spot power exchange.

* Sales to wholesalers and resellers not included.

Source: AEEGSI 2016 annual report
ITALIAN GAS CONSUMPTION
DEMAND BY SECTOR AND RECENT TRENDS

- Improving gas consumption in 2016 (69.7 bcm, est.) with a significant contribution from thermoeletric (+2.3 bcm, est.) and industrial (+0.5 bcm, est.) segments.

Source: Snam Rete Gas
2015 recorded an increase y/y in the relative importance of conventional thermal generation (to 62%, mainly thanks to CCGTs), also due to high summer temperatures and to lower hydro production. Despite this, the conventional thermo generation share was lower than in the years up to 2012.

- Steady increase in the renewables production share.

- Preliminary data on 2016 show an increase in thermo generation thanks to the reduction in imports and hydro

* Renewables include PV, wind, geothermal and biomass production

Source: Terna and AEEGSI annual report 2016
The national incumbent is still the main player, with a 25.7% market share, rather stable (27% in 2014).

The first 6 operators produce nearly 50% of the Italian power generation.

EPH is a new entrant in the Italian market (it bought thermo plants from E.On).

A2A (including Edipower) is the fourth player.
Due to overcapacity, investments in conventional thermoelectric plants have halted in the last years and some of the least efficient plants were closed: in 2015, thermo capacity was 6 GW lower than in 2014 and further closures occurred in 2016.

Additional renewable capacity, subsidized by tariffs, has been installed; due to the reduction in the incentives, the increase in FV and wind capacity slowed down.

The drop in electricity consumption and the simultaneous investment in new (mainly renewable) production plants caused the recent system overcapacity. A reversion in this trend arose in 2016 and at the beginning of 2017, when the French nuclear outages (combined to high French demand) caused a reduction in Italian imports, with a need for strong domestic production.

In July 2015 there was the historical peak in power demand (the previous was in December 2007). According to Assoelettrica, the reserve margin in peak demand hours in 2015 was about 19%, compared to more than 45% in the previous two years.

Source: Terna, Assoelettrica
Hydroelectric production share among renewable production has decreased, due to the increase in other sources of production (mainly FV and wind). Moreover, in 2016 precipitations were very low.

The increase in FV and wind production has slowed down, due to lower incentives. Despite this, in 2016, the sum of PV and wind production accounted for nearly 40% of the whole renewables production and nearly 15% of total Italian power production.

Source: Terna (2016 data are preliminary)
DISTRIBUTED GENERATION IN 2014
DG REPRESENTS ABOUT 23% OF NATIONAL PRODUCTION

- Distributed Generation (DG) is the total amount of power plants connected to the distribution system.
- In 2014 the energy gross production of DG amounted to 64.3 TWh, about 23% of national production, through around 657,000 plants.
- Nearly 40% of the energy comes from new renewable sources (solar and wind).

Source: AEEGSI
In the last two years, FV and wind capacity growth slowed down due to the reduction in incentives. The other renewables sources capacity is rather stable. Nevertheless, renewable capacity is still on a growing trend.

- The annual cost for non FV renewable production incentives in 2016 was 5.58 billion euros

Source: Terna, GSE
Strong reduction in net imports in 2016, mainly since September, due to the French nuclear plants outages: the market registered a reduction in import to Italy from France and Switzerland and an increase in export to these countries.

New Montenegro-Italy and France-Italy interconnections are expected to be commissioned by Terna in 2019 (an interconnection Italy-Austria is also expected, but without an official deadline).

Market coupling was launched in 2011 on the Italian-Slovenian border and in February 2015 on the Italian-Austrian and Italian-French borders. Import and export to and from Switzerland are still based on auctions.

Source: Terna ; GME
Interconnection capacities are allocated to the market participants through explicit auctions and through long-term contracts.

The gas in the pipelines is normally in-flowed (except Gorizia).

Source: MSE Statistics; Snam Rete Gas, Stogit, Edison Stocaggio data
In the “Consultazione al Piano di Sviluppo 2017”, Terna shows a “Baseline Scenario” with a 0.4%/year increase in the electric demand. Demand foreseen in 2030: 329 TWh.

In the “Development Scenario”, a 0.9%/year increase in the electric demand is assumed. Demand foreseen in 2024: 354 TWh.

In the “Piano di Sviluppo 2016” Terna foresees an increase in the peak demand just in the Development Scenario.

<table>
<thead>
<tr>
<th>Year</th>
<th>Development scenario</th>
<th>Baseline Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>59,353</td>
<td>59,353</td>
</tr>
<tr>
<td>2020</td>
<td>62/65</td>
<td>55/60</td>
</tr>
<tr>
<td>2025</td>
<td>63/69</td>
<td>56/60</td>
</tr>
</tbody>
</table>

Source: Terna
In December 2016, the latest auctions were held for the incentivization of renewable production from plants > 5 MW.

The results show a strong competition in the on-shore wind sector, where the MW offered were nearly 250% the MW auctioned. In this auction, the winner plants bidded a 40% discounts compared to the basis incentive: than means a 66 €/MWh remuneration for the energy produced.

The other auctions (off-shore wind, bioenergy, geothermo, thermodynamic FV) registered one participant each, with a capacity equal or lower than the auctioned one.

Source: GSE
AGENDA

01 Main Features of the Italian energy market

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ANCILLARY SERVICE POWER MARKET (MSD)

- Terna (the Italian TSO) procures through the Ancillary Service Market (MSD) the resources for the balance of the power system and to solve the **inter-zonal congestions**.

- The MSD is cleared through a *pay as bid* algorithm. Terna is the **central counterparty** which accepts bids/offers from market participants related to different reserve and balancing services.

- The market is divided into:
  - «**ex-ante MSD**»: 4 sub-sessions, where Terna trades energy and balancing services in order to release congestions and to create reserve margins (secondary and tertiary reserve);
  - «**Balancing Market**» (MB): 5 sub-sessions, where Terna trades real-time balancing services to restore secondary/tertiary reserve and to maintain the balance of the grid.

- Each plant admitted to the market must provide bids and offers for each of the following services:
  - Secondary Reserve;
  - Tertiary Reserve;
  - Start-up;
  - Shut-down;
  - Change of plant configuration.

- In the last years, the needs for Upward services has remained fairly stable, while Terna has increased the volumes it has sold on the MSD markets (downward volumes); this has reduced the delta among Downward and Upward volumes after the peak observed in 2014.
The incumbent is still the main player in the market.

Besides A2A and Acea, competition is spread across several small players.

Most distributors are pretty small, with very local distribution network and few customers.
The incumbent is still the main player in the market.

Competition is spread across several small players.

Most distributors are pretty small, with the largest part within the 5 to 50 thousands customers served range.
### Italian Temperatures, Precipitations and Wind

#### 2016 Temperatures Lower Than in 2015 in Summer

<table>
<thead>
<tr>
<th></th>
<th>Temperature</th>
<th>Precipitations</th>
<th>Wind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 10-YR Average</td>
<td>7,7</td>
<td>184,5</td>
<td>6,7</td>
</tr>
<tr>
<td>Q2 10-YR Average</td>
<td>17,3</td>
<td>160,4</td>
<td>6,2</td>
</tr>
<tr>
<td>Q3 10-YR Average</td>
<td>22,9</td>
<td>133,5</td>
<td>5,8</td>
</tr>
<tr>
<td>Q4 10-YR Average</td>
<td>11,7</td>
<td>204,0</td>
<td>6,0</td>
</tr>
<tr>
<td>10-YR Average</td>
<td><strong>14,9</strong></td>
<td><strong>170,3</strong></td>
<td><strong>6,2</strong></td>
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<th>Wind</th>
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<tr>
<td>Q1 2015</td>
<td>8,0</td>
<td>164,5</td>
<td>7,1</td>
</tr>
<tr>
<td>Q2 2015</td>
<td>17,5</td>
<td>107,4</td>
<td>6,2</td>
</tr>
<tr>
<td>Q3 2015</td>
<td>23,9</td>
<td>110,5</td>
<td>5,7</td>
</tr>
<tr>
<td>Q4 2015</td>
<td>12,2</td>
<td>118,8</td>
<td>5,0</td>
</tr>
<tr>
<td>2015</td>
<td><strong>15,4</strong></td>
<td><strong>124,7</strong></td>
<td><strong>6,0</strong></td>
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</tbody>
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<td>5,7</td>
</tr>
<tr>
<td>Q4 2016</td>
<td>11,8</td>
<td>167,9</td>
<td>5,9</td>
</tr>
<tr>
<td>2016</td>
<td><strong>15,2</strong></td>
<td><strong>163,4</strong></td>
<td><strong>6,3</strong></td>
</tr>
</tbody>
</table>

- Temperatures in 2016 in Italy were slightly lower than in 2015 (lower in Summer, higher in Winter), but higher than the historical average.
- Year 2016 is the third consecutive hottest year on record (since 1880), in terms of global temperatures.
- Precipitations in 2016 were higher than in 2015, but lower than the historical average, especially in Q4.
- Wind in 2016 was higher than in 2015.

Source: Bloomberg. Temperatures are the average temperature (usually of the high and low) that was observed between 7am and 7pm local. Precipitations include rainfall and the liquid equivalent of snow and sleet (measurement: Integer in 100th millimeters). Wind Speed is the average sustained winds which does not include wind gust. Bloomberg data are subject to ex-post adjustments.
AGENDA

01 Main Features of the Italian energy market

02 Wholesale power market

03 Weather

04 Market prices and margins
2016 and 2015 have similar shapes, even if 2015 have higher values on the negative side of the curve.

The difference among 2016-15 shape and 2008’s is quite straightforward: 2008 shows a significantly higher variance of price distribution around the mean.

The difference between peak and base load prices has strongly decreased in the last years.

Peak Load prices decrease more than base load prices over the time, driven by strong increase in renewable capacity, especially solar capacity that produce mostly during peak hours.
In 2015, Italian forward electricity volumes were 2 times those exchanged on spot markets. Forward volumes have increased by some 150% y-o-y.

Volumes traded OTC in markets different from the MTE (Mercato a Termine, managed by the Italian NEMO GME) have boomed in 2014 and in 2015.

Source: GME
- Italian prices higher than European prices.
- Trend of heavy decrease in prices since 2008 due to generation overcapacity.
- After 2013, commodities prices decline and RES installation helped easing pressure on power prices.

- CCGT is still the main marginal technology.
- Increase in the marginality of import/market coupling, due to the higher French and Swiss prices in the second part of 2016.
- The difference between coal plants and CCGTs prices (in the hours in which they are marginal) narrowed, due to the increased gas competitiveness.
In 2016 we observed a continuation of the declining trend of Sicily CCT, which declined steadily from the peak of 2013-2014.

Overall, we can observe a clear reduction of prices variation in 2016 if compared to previous years.

\[ \text{CCT} = \text{Zonal Price} - \text{PUN} \]

Source: Gestore Mercato Elettrico (GME), Terna
ITALIAN SPOT GAS MARKET
WEAKER WHOLESALE PRICES IN 2016

- In 2016 the average PB-Gas (MI-GAS from October 2016) price settled at 15.9 €/MWh. Meanwhile the PB-Gas (MI-GAS from October 2016) vs. TTF spread narrowed to 1.9 €/MWh (-0.7 €/MWh on a year-on-year basis).

<table>
<thead>
<tr>
<th></th>
<th>€/MWh</th>
<th>PB-Gas (MI-GAS from Oct-16)</th>
<th>TTF</th>
<th>PB-Gas (MIGAS) / TTF Spread</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2015</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1</td>
<td>24.6</td>
<td>21.2</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>22.7</td>
<td>21.0</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>22.6</td>
<td>19.9</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>19.8</td>
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<td>19.0</td>
<td>17.1</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td><strong>Year-16</strong></td>
<td></td>
<td>15.9</td>
<td>14.0</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>2016 vs. 2015</strong></td>
<td></td>
<td>-6.5</td>
<td>-5.8</td>
<td>-0.7</td>
</tr>
</tbody>
</table>

PB-Gas (MI-GAS) 2016 vs. 2015
In 2015, the bullish trend was largely driven by the sentiment linked to the COP21 in December, reaching more than 8.5 €/ton that month.

Once that effect vanished (with no immediate implications), the price dipped to under 5 €/ton at the beginning of 2016. Prices then rebounded to 6.8 €/ton, and sharply dropped after the Brexit referendum (23rd June). In the second half of 2016, prices moved in a range from slightly under 4 €/ton to 6.5 €/ton.
**CLEAN SPARK AND DARK SPREAD**

**INCREASE IN CSS, DECLINE IN CDS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Year Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>-4.4</td>
<td>-5.6</td>
<td>4.0</td>
<td>3.5</td>
<td>-0.6</td>
</tr>
<tr>
<td>2016</td>
<td>1.5</td>
<td>-2.6</td>
<td>4.4</td>
<td>8.6</td>
<td>3.0</td>
</tr>
</tbody>
</table>

| Year 2016-2015 | 3.5 | 2.4 | -8.6 |

- Increase in CCGTs’ margin in 2016, due to lower gas prices: CPSS were higher in 2015 only in Summer, due to the high temperatures. In both years, CSS showed an increase during the last months.
- In 2016, CDS registered a decrease, due to lower power prices.

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Clean Spark Spread: PUN (BL/PL) – gas PSV cost (eff. 51%) – EUA cost – CV cost (up to 2014) - variable transport costs

Clean Dark Spread: PUN BL – coal cost (API2 + spread MED + variable transport costs - eff. 35%) – EUA cost – CV cost (up to 2014)
Biogas is a naturally occurring gas which is produced by the anaerobic digestion of organic matter (agricultural residues, energy crops, sewage sludge, separated household waste and organic industrial waste).

Biomethane can be either upgraded biogas from anaerobic digestion or cleaned syngas from gasification of biomass.

Italy represents the 2nd Country in Europe for the number of biogas production plants installed (after Germany, European Biogas Association data).

The Italian Government, in its public consultation launched on the 14/12/2016 regarding the Decree Draft on biomethane use, fixed a national target for biomethane production at 1.1 bcm/y by 2022.

17,240 biogas plants in Europe (31/12/2014)
Total installed capacity of 8,293 Mwel
(European Biogas Association data)

367 biomethane AD plants in Europe (31/12/2014)
Total upgrading capacity 310 thousands cm/h of raw biogas
(European Biogas Association data)
According to the E-Mobility Report by Milan Politecnico, Italy represents only 1% of electric cars sales in Europe, with only around 8,000 electric cars sold since 2012.

In Italy, electric cars sales have a 0.1% market share, one of the lowest in Europe.

The potential growth should lead to a number of electric cars in Italy between 70,000 and 130,000 in 2020, with a very limited impact on power demand (between 150 and 280 GWh/y)