Sectoral Approaches - Enel Presentation

Eliano Russo
Generation and Energy Management Division

Paris – 2007, 9th October
Overview

- ETS Trial Phase – what could be improved
- Italian overview
- Enel actions
- A new possible approach
Italian efficiency

Italy’s current high energy and emission efficiency levels make emissions reduction a very hard task

(*) Koe per $USA 1995
(**) Kg CO₂ per $USA
Examples of CO₂ abatement costs in 5 European countries

The Italian marginal CO₂ reduction cost is double the value of other main EU countries
Some lessons learned from the EU ETS trial period (1)
Comparison between allocated allowances and CO₂ emissions in 2006 (%)

<table>
<thead>
<tr>
<th>Country</th>
<th>Allocated Allowances</th>
<th>CO₂ Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTU</td>
<td>38,4</td>
<td></td>
</tr>
<tr>
<td>EST</td>
<td>33,5</td>
<td></td>
</tr>
<tr>
<td>LVA</td>
<td>27,5</td>
<td></td>
</tr>
<tr>
<td>FRA</td>
<td>17,7</td>
<td></td>
</tr>
<tr>
<td>SVK</td>
<td>16,2</td>
<td></td>
</tr>
<tr>
<td>LUX</td>
<td>16,0</td>
<td></td>
</tr>
<tr>
<td>HUN</td>
<td>14,6</td>
<td></td>
</tr>
<tr>
<td>CZE</td>
<td>13,7</td>
<td></td>
</tr>
<tr>
<td>POL</td>
<td>11,9</td>
<td></td>
</tr>
<tr>
<td>SWE</td>
<td>11,6</td>
<td></td>
</tr>
<tr>
<td>NLD</td>
<td>11,2</td>
<td></td>
</tr>
<tr>
<td>PRT</td>
<td>10,4</td>
<td></td>
</tr>
<tr>
<td>BEL</td>
<td>8,6</td>
<td></td>
</tr>
<tr>
<td>DEU</td>
<td>3,7</td>
<td></td>
</tr>
<tr>
<td>GRC</td>
<td>1,7</td>
<td></td>
</tr>
<tr>
<td>AUT</td>
<td>0,0</td>
<td></td>
</tr>
<tr>
<td>FIN</td>
<td>0,0</td>
<td></td>
</tr>
<tr>
<td>SVN</td>
<td>4,9</td>
<td></td>
</tr>
<tr>
<td>ESP</td>
<td>7,9</td>
<td></td>
</tr>
<tr>
<td>ITA</td>
<td>15,9</td>
<td></td>
</tr>
<tr>
<td>IRL</td>
<td>15,7</td>
<td></td>
</tr>
<tr>
<td>GBR</td>
<td>0,6</td>
<td></td>
</tr>
<tr>
<td>DNK</td>
<td>0,0</td>
<td></td>
</tr>
</tbody>
</table>

Allocations across countries reflect non-homogeneity of an irrational Burden Sharing Agreement.
Some lessons learned from the EU ETS trial period (2)
Sectoral difference between allocated allowances and CO2 emissions in 2006 (%)
Some lessons learned from the EU ETS trial period (3)
Coal generators (2005)

The criteria adopted in different NAPs penalized some operators independently from their environmental performance.
CO₂ Emission Trading Scheme: trial period

- 2005-2006 already hedged through EUAs Acquired on the market
- 2007 expected shortage already largely hedged

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic G&amp;EM</th>
<th>International</th>
<th>Cumulated shortage 2005-06</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>11.4</td>
<td>0.7</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>2.1</td>
<td></td>
<td>19.4</td>
</tr>
</tbody>
</table>
EU, Italian and Enel generation mix

Fuel Mix in 2004 (%)

- **Enel’s target**
  - keep open nuclear option
  - increase clean coal generation
  - develop renewables
  - eliminating fuel oil
  - NG only in high efficiency CCGT

<table>
<thead>
<tr>
<th></th>
<th>EU 25</th>
<th>Italy</th>
<th>Enel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear</td>
<td>4%</td>
<td>39%</td>
<td>29%</td>
</tr>
<tr>
<td>Fuel oil and Gas (no CCGT)</td>
<td>31%</td>
<td>27%</td>
<td>19%</td>
</tr>
<tr>
<td>Gas CCGT</td>
<td>31%</td>
<td>15%</td>
<td>25%</td>
</tr>
<tr>
<td>Coal</td>
<td>14%</td>
<td>19%</td>
<td>27%</td>
</tr>
<tr>
<td>Renewables</td>
<td>20%</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

- **Enel**
  - 29% Fuel oil and Gas (no CCGT)
  - 27% Coal
  - 29% Renewables
CO₂ Emission Trading Scheme: 2008-2012

**Variable cost¹ @CO₂ = 20 €/ton**

<table>
<thead>
<tr>
<th>Fuel Cost²</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>15</td>
</tr>
<tr>
<td>22</td>
<td>48</td>
</tr>
</tbody>
</table>

**Italian NAP**
- Based on 2005 production
- Best available technology benchmark differentiated by fuel
- Coal allowances partially sold
- CERs 15% limit

**Sourcing initiatives**
- More than 40 ERPAs signed for a global potential amount of 16 Mtons/yrs (single digit price)
- Further initiatives under negotiation

**No major impact on Enel’s strategy**

---

1. €/MWh
2. Based on 2007 fuel costs
Balanced targets
- Adopt a bottom-up approach based on benchmarks differentiated by fuel and technology

Security of supply
- The EU ETS should be compatible with an appropriate diversification of the energy mix

Predictability of regulatory framework
- Make the allocation period longer (10 years)
- Earlier decisions on allocations (5 years)

Inclusion of other sectors
- Reduce overall costs
- Select available options
- Evaluate possible alternative policies
What should the European Union do?

- **External competitiveness**
  - Maintain its leadership, but give up the unilateral approach
  - Be prepared to adjust policies and measures to the post 2012 architecture resulting from international negotiation

- **Internal fair competition**
  - Individual targets to be identified at sectoral level based on technology and fuel

Carefully review the EU-ETS Directive
**Enel commitment to reduce CO2 emissions**

Voluntary agreement signed with the Italian Minister of Environment in 2000

---

*Enel committed itself to reduce its specific emission to 510 g CO$_2$/kWh by 2006 [*- 20% with respect to 1990]*

---

**Average CO$_2$ specific emission per technology**

- Oil Plant: 740 gCO$_2$/kWh
- CCGT Plant: 360 gCO$_2$/kWh
- New Coal Plant: 770 gCO$_2$/kWh

**Enel specific emission trend**

- 1990: 636 gCO$_2$/kWh
- 2003: 519 gCO$_2$/kWh
- 2006: <500 gCO$_2$/kWh
- 2008: <500 gCO$_2$/kWh

Target (510)

---

Overall conversion plan to achieve emission reduction (target exceeded) and fuel diversification (using most efficient technologies)
Enel’s actions for combating climate change

1. Energy Efficiency
   - “Smart consumption”
   - Distribution of low consumption bulbs
   - Promotion of high efficiency electric devices
   - Efficiency of electric public lighting

2. Renewable
   - Invested 1.1 € Billion for the period 2003-06
   - Further planned investments for 1.6 € Billion for next 5 years

3. Conversion thermoelectric plants
   - Conversion Plan of thermoelectric plants from oil to high efficiency combined cycle gas and to clean coal

4. CDM
   - Sponsorship for industrial projects with the objective to reduce greenhouse gases according to Kyoto Protocol procedures in developing countries

5. Research & Development
   - Forefront research activities for electric generation from solar and hydrogen
   - Research activities on “carbon sequestration” technologies

- Target 2009:
  - Avoided CO2 emissions for more than 4 Mton/year
- Target 2009:
  - 3 TWh of Green Certificates = 2 Mton of avoided CO2 emissions
- Currently activities for more than 15 Mton/year
- A firm and persevering effort
### Enel CO2 reduction projects in developing countries

**Clean Development Mechanism projects signed or under negotiation by Enel**

#### Contracts already signed
- **Guatemala**: 2 hydro projects
- **China**: > 45 renewable energy projects, 3 HFC-23 projects
- **India**: 2 HFC-23 projects

#### Deals already closed

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>5 -6</td>
<td>&gt;15</td>
<td>&gt;15</td>
<td>&gt;15</td>
<td>&gt;15</td>
<td>&gt;15</td>
</tr>
</tbody>
</table>

#### Contracts under negotiation

**Countries**: China, India, Brazil  
**Projects**: more than 10 Renewable, 10 Iron & Steel (Energy efficiency), 4 Chemicals, 1 Coal Mine Methane.
CDM & JI – Present situation

4th October 2007

Mton CO2 eq. (up to 2012)

- Point Carbon Database
- UNFCCC web site for comments
- Registered by Executive Board or Supervisory Committee

- PDDs: 2952 (3068 projects)
- Commented: 2320 (2544 projects)
- EB/SC: 1086 (805 projects)
- Issued: 83 (252 projects)

- Overall CERs market dimension is equal to 168 Mton CO2e/year;
- 56% of the volumes generated by only 29 projects.

- HFC-23: 41.3% 16 projects
- N2O: 14.8% 13 projects
- Landfill: 9.8% 57 projects
- Renewables: 17.5% 439 projects
- Others: 16.7% 280 projects

Source: Point Carbon and UNFCCC
IEA Reference Scenario
Energy-Related CO₂ Emissions by Fuel

Half of the projected increase in emissions comes from new power stations, mainly using coal located in China and India.

Increase of 14.3 Gt (55%)
The basis for a new approach

- Very high emissions per product unit in developing countries

- Bringing all countries to the level of most efficient countries represents an enormous reduction potential

These elements suggest a more flexible and less expensive approach may be possible
Potential of best available existing technologies in the power sector

- Emissions per unit output from coal-fired thermal power generation vary widely.

- Bringing Chinese coal generation fleet to BAT could avoid over 800 million tons of CO₂/year by 2020.

- Bringing Indian coal generation fleet to BAT could avoid an additional 300 million tons of CO₂/year by 2020.
A new global approach to climate change

- Involvement of all countries including the USA and Developing Countries
- More incentives
- Less sanctions
- No constraints to development

Targets must be based on technological potential

- Set targets on a long term basis
- Short term: exploit best available technologies (deployment)
- Long term: promote new technologies (development)

Improve cooperation

- Private-public partnership
- Financial tools
- Regulatory frameworks to stimulate investments
Promotion of a new approach for post-2012

Present Approach

- Top-down assignment of absolute caps
- Strict “cap and trade” model, only applied to few countries
- Insufficient results in terms of global emissions reduction
- High implementation costs for certain countries
- Flexible mechanisms still requiring strong political, financial and organizational efforts

A New, More Efficient Approach

A new method capable of reconciling:

- **Economic Efficiency**: reducing emissions where it is less costly
- **Effectiveness**: producing significant results in terms of emissions reduction
- **Inclusiveness**: involving all countries, through objectives differentiated on the basis of economic and social contexts
- **Equity**: in targets allocation among sectors and countries
- Flexibility and easy implementation
- Incentives to the adoption of innovative technologies

Enel is working with several other interested parties to define the new approach