

# Italy

## GOVERNMENTAL PROGRAMS AND STRATEGIES

The Italian government recognises the huge challenge of meeting Italy's Kyoto Protocol commitments (existing gap 97 Mt CO<sub>2</sub>/yr) while satisfying an ever-increasing energy demand. To address this, the Italian energy policy foresees a number of measures, including CCS.

A number of National projects and programmes will be supported by National Government, Ministry of Economic Development, Ministry of Research and Regional Governments<sup>200</sup>. The 3-year Energy R&D National Programmes with a funding of 150 Meuro includes funding for 2 CO<sub>2</sub> Separation & Capture programmes; "quantifying existing potential capacity to storage CO<sub>2</sub> over time" and "ECBM Site-Tests in Sardinia (Sulcis Area)".

The Ministry of Economic Development has set up in 2003 a National Committee in order to coordinate the Italian participation to all the international initiatives on Zero Emissions.

Italy is furthermore active in various international forums, such as Carbon Sequestration Leadership Forum (CSLF); European Technology Platform on ZEP; IEA (CERT & WPPF) and International Partnership on Hydrogen Economy. In addition to participation in various EU FP6 and FP7 projects.

## CCS TECHNOLOGY COMPANIES AND INSTITUTES IN ITALY

Company/association	Web site	Relevant business/technology
ENEA - National Agency for New Technologies, Energy and the Environment	<a href="http://www.enea.it/com/inql/default.htm">www.enea.it/com/inql/default.htm</a>	The Department of Technologies for Energy, Renewable Sources and Energy Conservation focuses its operations on two areas: increasing energy efficiency and achieving a low-carbon economy. See below.
ENEL	<a href="http://www.enel.it">www.enel.it</a>	The largest power company in Italy is engaged in several projects related to CCS; including the Zero Emission Power and oxy-coal combustion demo.
ENI	<a href="http://www.eni.it">www.eni.it</a>	Eni is the leading Italian oil and gas company. Their engagement in CCS is mainly through their participation on the CO <sub>2</sub> Capture Project (CCP) <sup>201</sup> together with 7 other leading energy companies world wide (BP, ChevronTexaco, Hydro, EnCana, Shell, Statoil and Suncor), plus US DOE and EU.
CNR - The National Research Council	<a href="http://www.cnr.it">www.cnr.it</a>	Research relevant to CCS mainly on biological and environmental impact of storage.
CESI RICERCA	<a href="http://www.cesiricerca.it/default_e.asp">www.cesiricerca.it/default_e.asp</a>	Public research Company in the electro-energy sector. Owned 51% by ENEL.
ANSALDO	<a href="http://www.ansaldoenergia.it">www.ansaldoenergia.it</a>	Ansaldo is an Italian manufacturing company specializing in power plants. Their focus on CCS technology is towards development of low fuel gas turbines and use of fuel cells in a CCS combined system. With Sotacarbo <sup>202</sup> research centre, Ansaldo has proposed the COHYGEN project, which is Sulcis coal syngas production with CO <sub>2</sub> and H <sub>2</sub> separation.
SOTACARBO	<a href="http://www.sotacarbo.it">www.sotacarbo.it</a>	Sotacarbo is a limited company established in 1987 which aims to develop new and advanced clean coal technologies. It has represented Italy in the international organization IEA The Clean Coal Centre.
INGV	<a href="http://www.ingv.it">www.ingv.it</a>	National Institute for Geophysics and Vulcanology.
CARBOSULCIS		Public mining company in Sardinia, doing study of underground storage. Carbosulcis is working at a

<sup>200</sup> Marcello Capra, Ministry of Economic Development: Presentation at "Clean coal technologies" at the British Embassy in Rome, Dec. 13, 2006

<sup>201</sup> [www.co2captureproject.org](http://www.co2captureproject.org)

<sup>202</sup> [www.sotacarbo.it](http://www.sotacarbo.it)

		project for CCS by Enhanced Coal Bed Methane (ECBM) Technology. Partner with Sotacarbo and INGV.
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## CCS INITIATIVES IN ITALY

### Enel<sup>203</sup> projects

Enel – the largest power company in Italy, is engaged in two projects related to CCS;

#### Enel CCS1 (post-combustion)<sup>204</sup>

This objective of this project is To retrofit one 660 MWe coal fired unit in Brindisi with CO<sub>2</sub> capture equipment and start CO<sub>2</sub> underground storage by 2012. The pilot capture plant is under construction in 2008 and planned in operation from 2009.

The pilot plant will capture 2,25 ton CO<sub>2</sub>/hr using MEA absorption post-combustion.

Phase 3 in the project is to select a suitable storage site in Italy. A 2 year storage feasibility studies are conducted in collaboration with the National Institute of Geology and Vulcanology (INGV).

Phase 4 is based on experience gained with the pilot project. Enel will then build a demo plant of this technology at the USC pulverized coal power station, currently under construction. About 600,000 Nm<sup>3</sup>/h of flue gases from one unit will be processed and the concentrated CO<sub>2</sub> flow transported and stored in an underground reservoir. The demo plant is expected to be ready by 2012.

The capture rate will be in the order of 1 to 1,5 million ton CO<sub>2</sub>/year.

#### Enel CCS2 (oxy-fuel)

The project goal is to build by 2012 a small (35-70 MWe) zero emission coal fired power plant based on a pressurized oxy-combustion technology already proved at pilot scale.

Enel has signed a cooperation agreement on oxy-combustion technology with ENEA and ITEA. ITEA has patented an innovative process called ISOTHERM that has already been tested on a pilot scale for over 4000 hours. The partners will finish a feasibility study for a coal-fired power plant in 2007, with a 50 MWth plant planned for 2009. A small demo plant (35-70 MWe) should be ready by 2012.

### Italian National Agency for New Technologies, Energy and the Environment (ENEA)<sup>205</sup>

ENEA has a wide range of research programmes related to energy and environment; including CCS activities such as "Clean coal/Zero emission Coal Technologies" and the proposed ZECOMIX test platform.

ZECOMIX<sup>206 207</sup> is proposing a project for coal gasification for H<sub>2</sub> and power generation with CO<sub>2</sub> separation. It consist of three main components:

- ▶ H<sub>2</sub> production by advanced coal gasification process (ZEC)
- ▶ Power production through high efficiency H<sub>2</sub>-O<sub>2</sub> cycle with gas turbine (ZECOTECH)
- ▶ CO<sub>2</sub> capture and storage.

### L'Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS)<sup>208</sup>

OGS operates as national reference for coordinating the Italian participation in entities, projects and international research initiatives in the fields of oceanography and experimental geophysics, including studies, applied research and technological development in the field of exploration, exploitation and storage of geo-energy and energy residues, as CO<sub>2</sub>, on land and at sea, in Italy and abroad.

<sup>203</sup> [www.enel.it](http://www.enel.it)

<sup>204</sup> [www.zero-emissionplatform.eu/website/docs/GA2/conti%20barbucci.pdf](http://www.zero-emissionplatform.eu/website/docs/GA2/conti%20barbucci.pdf)

<sup>205</sup> [www.enea.it](http://www.enea.it)

<sup>206</sup> [www.iea-coal.org.uk/publishor/system/component\\_view.asp?LogDocId=81293&PhyDocId=5682](http://www.iea-coal.org.uk/publishor/system/component_view.asp?LogDocId=81293&PhyDocId=5682)

<sup>207</sup> [www.aidic.it/H2www/webpapers/30%20Calabro'.doc](http://www.aidic.it/H2www/webpapers/30%20Calabro'.doc)

<sup>208</sup> [www.ogs.trieste.it](http://www.ogs.trieste.it)

OGS is partially funded by the Italian Government according to a Three-Years Plan of Activity. In the actual one, the following researches, related to the geological confinement of CO<sub>2</sub>, are funded:

numerical 3D modeling for the CO<sub>2</sub> confinement and its implementation on massive parallel computers;

theory and modeling of seismic waves propagations, with application to the geologic confinement of CO<sub>2</sub>;

evaluation of content and stability of CO<sub>2</sub> hydrates in geologic formations in the offshore;

tomographic evaluation of Q factor and anisotropy parameters, with application to the monitoring of re-injected CO<sub>2</sub> fate.

OGS is the co-ordinator of the Italian Project "Geological sequestration of CO<sub>2</sub> and development of the related technologies" , involving OGS, ENEA, ENI-Agip, Aquater, CNR, URS and other 13 universities.

## CO<sub>2</sub> GeoNet

Universita di Roma "La Sapienza" and OGS participates in the European Networks of Excellence CO<sub>2</sub>GeoNet<sup>209</sup> together with 11 other institutes to study underground CO<sub>2</sub> storage.

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<sup>209</sup> [www.co2geonet.com/home.aspx](http://www.co2geonet.com/home.aspx)