WIND ENERGY
Wind farm

BOLOGNA
(Italy)

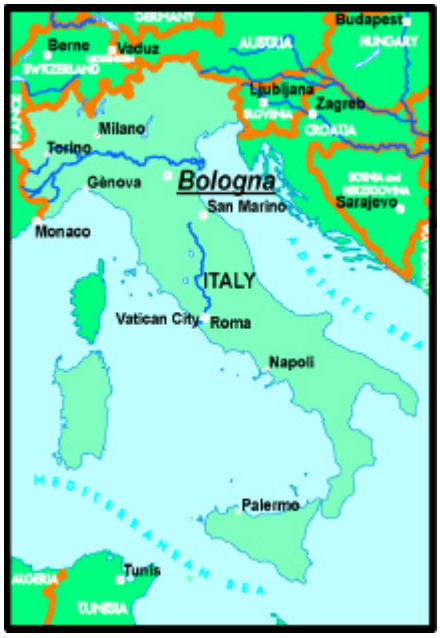
Wind energy is not the first form of renewable energy for cities to come to mind. Only few towns and cities have enough space to build large wind farms on their territories. Small-scale wind power facilities are more common in towns and cities that initially conducted feasibility studies. The city of Bologna has recently taken part in a large wind farm project, located on the slopes of Monte Galletto, about 20 kilometres from the city. The project is based on a partnership between the municipality and local stakeholders.

THE CITY

Bologna is the capital city of the Emilia Romagna Region and is home to 400,000 inhabitants. The city holds a strategic position in Italy as it is situated at the junction of main trunk roads and railway lines. Bologna's historical centre, one of the best preserved in Europe, boasts a number of old palaces and churches, a testimony to the cultural influence of the city in past centuries (the very first University to be founded was established in Bologna in the 11th century). Bologna has one of the most modern fair grounds in Italy and the main industries are mechanical engineering and food processing industry.

Climatic data:

Average wind speed (Monte Galletto): 6.8 m/sec
Mean annual temperature: 14 °C



CONTEXT

The city has a significant record of environmental policies in the field of energy programming and greenhouse gas emissions control. In 1981, the Municipality and AGIP (the National Italian Oil Company) carried out an important survey on energy consumption called BEST (Bologna Energy Study). Since 1990 the city has been an active member of the international Urban CO_2 Reduction Project, co-ordinated by ICLEI, which aims to promote effective policies for the reduction of energy consumption and greenhouse gas emissions at the local level.

By participating in the Urban CO_2 Reduction Project the Municipality has committed itself to working closely with the Bologna community to reduce CO_2 emissions by adopting measures that take account of current situation and set objectives that are reasonably attainable by 2005.

The project was reviewed in 1999 in order to assess the impact of the policies carried out so far and to further link CO_2 reduction strategies to other aspects of city development.

The initial objective pursued by the Municipality of Bologna, which is the objective it proposes today to the whole city community, is to work towards stabilising, as a first step, and then reducing energy consumption. This should be achieved through the dissemination of

innovative energy saving technologies and increased use of renewable energy sources, in compliance with the European Commission's directives on sustainable development.

In 2000 Bologna signed the RES Partnership Campaign for Take-Off with the European Commission. The campaign forms an integral part of the Community strategy and action plan for renewable energy sources by 2010, which include an indicative target of 12% for the contribution of RES to the European Union's gross energy consumption. It will run until 2003 and will act as a catalyst for the development of key RES sectors, sending clear signals for greater use of RES and encouraging investment.

Today Bologna, via its municipal energy agency Seabo, produces more than 5% of the electricity it consumes. All the electricity generated is from renewable sources (hydraulic, wind, waste combustion) or from cogenerative processes and most of it comes from the wind farm on Monte Galletto.

EXPERIENCE OF BOLOGNA

In the early 90's, Emilia Romagna Region, in collaboration with Riva Calzoni (local engineering firm) and ENEA (National Italian Association for Energy and Environment), initiated a report on the feasible implementation of wind power in the region. The "Wind to Energy" report was included in the 1992 Emilia Romagna Regional Energy Plan. The Monte Galletto site was selected after Legambiente and the Municipality of San Benedetto Val di Sambrogave gave a favourable opinion.

In 1995 Riva Calzoni SpA planned the construction of a 3.5 MW wind farm at Monte Galletto composed of 10 medium-sized turbines.

In March 1995 a protocol was signed between Seabo, Riva Calzoni SpA, the Municipality of San Benedetto Val di Sambro, Istituto Ambiente Italia and the Municipality of Bologna. The protocol was subsequently extended to integrate the Emilia Romagna Region and the Province of Bologna.

In 1998, Seabo SpA, Riva Calzoni, Sistemi di Energia and Tutto Servizi launched a joint venture called Parco Eolico San Benedetto Srl.

The wind farm is located on the slopes of Monte Galletto at an altitude of 950 m. The site was chosen after feasibility studies were carried out. The environmental impact of the project was also assessed: visual impact of the wind turbines, reflection from the rotors and historical and archaeological heritage of the site.

Single-rotor turbines were preferred to other turbines for their higher performance, better environmental impact and 40% weight saving. The conic-shaped tower is 40 m high and the generator is designed to operate unmanned at wind speeds comprised between 5 and 22 m/s. In case of stormy weather or electric blackout, the automatic control system reduces the power and speed of the rotor using aerodynamics. No mechanical brake is necessary to stop the machine.

The Monte Galletto wind farm, with its 10 turbines, produces about 6,000 MWh/y, enough to meet the needs of 3,000 households. The plant is connected to the national grid and the electricity is sold to ENEL (National Italian Electric Company).

The farm makes it possible to save the equivalent of 1,500 m^3 of oil, which corresponds to savings on emissions estimated at 5,000 tons for CO_2, 8 tons for SO_2, 16 tons for NO_x and 400 tons for ash.

The project was financed by Seabo and Riva Calzoni, which designed and manufactured the wind turbines. Total investment costs are estimated at 3,7 million Euro, 27% of which were co-financed under the Thermie programme.

Other experiences of Bologna in renewables

In the early 90s, the new Italian legislation on rational energy use and renewable energy encouraged Seabo and the Municipality of Bologna to launch into the production of energy from renewable sources. Bologna has a district heating network connected to several methane fuelled CHP units as well as a CHP unit fired by solid waste called Frullo.

The Frullo plant is located 11 km away from Bologna and is the main regional solid waste incinerating plant. The plant started operation in 1973 and processes about 138,000 tons of solid waste yearly. Thanks to the CHP unit, the plant generates 40,000 MWh/y of electricity and 65 MWh/y of thermal energy and contributes to saving 16,000 m^3 of oil per year. The plant will undergo retrofitting works in a near future and will then be able to produce up to 130.000 MWh/y of electricity.

The Cavaticcio hydropower plant is another example of renewable energy implementation. Commissioned in 1994, the plant is located in the centre of Bologna. It was built beneath street level where the Cavaticcio canal falls into the Navile canal, 14 m below. Maximum power production is 1,890 kW, with a maximum flow rate of 15 m^3/s. Annual power output is estimated at 1,600 MWh/a.

EVALUATION AND OUTLOOK

The opening of the wind farm in 1999 represented for the Municipality of Bologna an important step towards diversifying its energy supply, increasing the use of renewable sources and achieving sustainable development. Thanks to the joint action of public entities and private companies Bologna is able to produce “clean” energy from wind while contributing to meeting regional demand.
The energy generated by the wind farm produces no CO_2, SO_2, NO_x emissions nor volatile matters.

FURTHER INFORMATION

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