

# SOLAR ENERGY

## Installations on public buildings

# ROMA

(Italy)

Although the quality of the equipment and the efficiency of photovoltaic and thermal solar systems have improved greatly in recent years, this type of energy production has not achieved yet a significant share of the market in Europe. However, thanks to energy and climate protection action plans implemented by some local authorities, there are now good examples of photovoltaic and solar thermal applications at the local level. The Municipality of Roma, in collaboration with ROMAENERGIA - Rome Local Energy Agency - as technical consultant, imposes the use of such technologies on the different buildings of the city and intends to develop solar systems in several schools to serve as an educational example.

## THE CITY

The capital city of Italy and its region, Rome is located alongside the river Tiber, about 25 kilometres from the Tyrrhenian sea. The town has about 2 800 000 inhabitants. Contrary to most other modern capitals, the city's land, which covers 1285 km<sup>2</sup>, is not entirely urbanised. The Vatican City and its possessions constitute a non-Italian enclave. Rome has a working population of about 1 000 000 of which 2% are employed in agriculture, only 23% in industry, and 75% in the tertiary sector. With 3 000 000 visitors per year, tourism is an activity of significant importance.

### Climatic data:

Annual solar radiation: 1612 kWh/m<sup>2</sup>

Annual mean temperature: 15.7 C°



## CONTEXT

In Roma, the local energy agency "ROMAENERGIA" aims to set up a framework of political commitments and programmes so as to mobilise the city's operational and financial resources towards achieving sustainable development. The Agency acts as a technical consultant for projects submitted under Call for Proposals launched by the Italian Ministry for the Environment or by the Latium Region. These proposals concern two areas: PV roofs and solar thermal. The City Council (composed of the City Mayor and 19 Deputy Mayors) approved a document that identifies main priority areas in the field of renewable energy and energy efficiency. For the first time, a document including all the sectors concerned by sustainable energy development was voted by the City Government, and even more important, the document was proposed to the vote of the Council by all the Deputy Mayors concerned with energy: Environment, Town Planning, Public Works, Peripheral Zones Development and Citizens' Participation.

# EXPERIENCE OF ROMA

The projects, developed throughout the city and its surroundings, are part of the national 'Photovoltaic Roofs' and 'Solar Thermal' programmes. These programmes are developed by the Italian Ministry for the Environment and by the Latium Region. The 'Photovoltaic Roofs' Programme makes financial contributions available up to 75% of investment costs, whereas grants under the 'Solar Thermal' Programme are limited to 30%.

In the '**Photovoltaic Roofs' Programme**, the nominal capacity of each installation ranges between 1 and 20 kW<sub>p</sub> and the photovoltaic systems are connected to the low voltage mains. The projects, which have been positively evaluated by either the Italian Ministry or the Region, concern public buildings and private installations:

- Casale Alba 3, a large old cottage, located within the Urban Regional Park of Aguzzano, with an installed capacity of 4.2 kW<sub>p</sub>



- The Province of Roma installed several photovoltaic systems on schools, following a proposal from RomaEnergia. This specific programme called 'Solar energy at school' is intended to serve educational purposes. Two types of panels will be installed. Each installation produces 1 kW<sub>p</sub> and 5 in total were installed on the following buildings: Pasteur and Keplero Scientific High Schools, IPSIA Cattaneo, IPSIA Sisto V and IPSIA A. Diaz (IPSIA is the abbreviation for State Professional Institute for Industry and Handicraft in Italy). 3 of these installations were positively evaluated by the Ministry of the Environment and are waiting for financial support from the Latium Region; the remaining 2 are under examination by the Latium Region.
- Photovoltaic system integrated in the roof of a greenhouse in Semenzaio di San Sisto. Installed capacity amounts to 3 kW<sub>p</sub> and the photovoltaic modules are made of semitransparent amorphous silicium. The installation of a second photovoltaic roof to produce 10 kW<sub>p</sub> at the same location but on another building is under consideration,
- So called "ex Snia-Viscosa" Cultural Centre, with an installed capacity of 10 kW<sub>p</sub> (under evaluation),
- Two photovoltaic systems in the Lombardo Radice school building, the first one integrated in the facade, the other one installed on the roof. Total output for the two systems is 6.2 kW<sub>p</sub> (under evaluation),

- Photovoltaic grid connected public lighting system proposed by the consortium 'Le Cerquette Grandi', on behalf of the City of Roma Department for the Development of Peripheral Zones. The system consists of 160 street lighting masts and high efficiency lamps, each one fitted with a couple of photovoltaic modules and a mini-inverter, with a total output of 20 kW<sub>p</sub>.

The '**Solar Thermal Programme**' consists of three projects developed for public sports centres owned by the City of Roma. In these projects, thermal energy is used to produce domestic hot water and to heat the pools of the centres. The economic and energy features of the three projects are summarised below.

Technical data	Centre Tiburino South	Centre Ponte di Nona	Centre Parco Madonnetta
Location and size (green area)	5 <sup>th</sup> district, 103 900 m <sup>2</sup>	8 <sup>th</sup> district, 104 000 m <sup>2</sup>	13 <sup>th</sup> district, 180 000 m <sup>2</sup>
Collector surface (m <sup>2</sup> )	220	115	220
Orientation and inclination	52°south - 45°.	52°south - 45	20°south - 45°.

Energy	Centre Tiburino South	Centre Ponte di Nona	Centre Parco Madonnetta
Primary Energy required by a traditional hot water system [MWh/a]	314	215	500
Solar Energy produced [kWh/(m <sup>2</sup> *a)]	672	742	715
Saved Primary Energy (total in [MWh/a] and [%])	160 ( 51%)	95 (44%)	175 (34%)
Emissions reduction [tons CO <sub>2</sub> per year]	32	19	35

Economic benefits	Centre Tiburino South	Centre Ponte di Nona	Centre Parco Madonnetta
Energy expenses [€/a]	20 800	14 270	34 060
Savings [€/a]	9 500 ( 40%)	5 750 (40%)	10 500 (31%)
Investment [€]	92 200	49 400	92 200
Payback time [years]	10,9	9,5	9,4
Specific solar energy cost [€/(kWh*a)]	0,028	0,026	0,026
Specific gas energy cost [€/(kWh*a)]	0,067	0,067	0,067

# EVALUATION AND OUTLOOK

Solar energy has not yet succeeded in penetrating the energy market in Roma. But if all the above mentioned projects are carried through in the next two years, this would mean a real take-off. For the Municipality of Rome, ROMAENERGIA is an indispensable tool in implementing the city's political commitments and solar programme, especially the new Environmental Action Plan for Energy, adopted by the Municipality on last 15<sup>th</sup> July.

The projects ROMAENERGIA is currently involved in are the following:

- **Technical advice** on the use of renewable energy sources directed towards public agencies, private companies and citizens. The actions developed by the Agency include, as detailed above, the Photovoltaic Roofs Programme (the project at Casale Alba has been completed while the others are waiting for a decision to be made as to public financing) and the Solar Thermal Programme (due to start in 2003). Two other projects for Solar Thermal systems (total collector surface of 500 m<sup>2</sup>) are under evaluation.
- **Organisation of meetings and seminars** directed towards experts and decision makers in the field of renewable energies. ROMAENERGIA also promotes meetings aimed at citizens and students, e.g. the annual Sun Day.
- **Training courses for designers and installers** in cooperation with the Municipality of Rome and Photovoltaic Associations. A first course took place in December 2001.
- **Dissemination of information and materials** on RES and RUE, through the web site and at meetings.
- **'Solar Energy at School' Programme** directed towards high school students. This programme concerned 6 high schools in 2001-2002 and was a big success. It will be repeated in 2003.

## FURTHER INFORMATION

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