SOLAR ENERGY IN ITALY

A Profile of Renewable Energy Activity in Its National Context

by Carol A. Shea

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by Carol A. Shea

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Foreword

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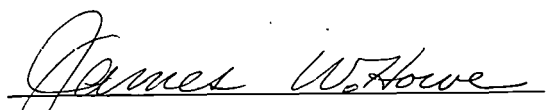
This document was prepared as part of Task Number 4330, the Information Task of SERI's International Division, G. L. Case, editor, in cooperation with the Solar Energy Information Data Bank (September 1980). The report is one of a series and reflects the most thorough effort to gather information on solar energy activities in other countries. It cannot be considered inclusive and further information is welcomed. It was prepared for the administrative use of the U.S. Department of Energy and is subject to frequent updating. For futher information contact SERI's International Division at (303) 231-1839.

Approved for:

SOLAR ENERGY RESEARCH INSTITUTE



James W. Howe, Manager
International Division

Table of Contents

Table of Contents (concluded)

Table

Nomenclature

AGIP	Azienda Generale Italiana dei Petroli (National Oil Company)
ALITALIA	Aerolinee Italiane Internazionali (Italian Air Lines)
CESI	Centro Electtrotecnico Esperimentale Italiano (Italian Experimental Electrotechnical Center)
CGIL	Confederazione Generale Italiana del Lavoro (General Confederation of Italian Workers)—communist dominated
CIPE	Comitato Interministeriale Politica Economica (Interministerial Economic Planning Committee)
CISE	Centro Informazioni Studi Esperienze (Center of Information, Studies and Experiments)
CISL	Confederazione Italiana Sindacati Lavatori (Italian Confederation of Worker Trade Unions) — Christian Democratic oriented
CNEN	Comitato Nazionale per l'Energia Nucleare (National Committee for Nuclear Energy)
CNR	Consiglio Nazionale delle Ricerche (National Research Council)
CRAIES	Centro Ricerche Applicazione d'Impiego di Energia Solare (Center of Applied Research for the Use of Solar Energy)
DOE	U.S. Department of Energy
EC	European Communities, formerly EEC
ENEL	Ente Nazionale per l'Energia Elettrica (The National Electric Company)
ENI	Ente Nazionale Idrocarburi (National Hydrocarbon Corporation)
IEA	International Energy Agency
IRI	Istituto per la Ricostruzione Industriale (National Institute for Industrial Reconstruction)
ISMES	Istituto Esperimentale Modelli e Strutture S.p.A. (Experimental Models and Structures Institute)
MOU	Memorandum of Understanding
RAI	Radio Audizione Italiane (Italian Broadcasting Corporation)
UIL	Unione Italiana del Lavoro (Italian Workers Union)— social democratic oriented

Country Overview

The Italian Republic includes the peninsula of Italy and the islands of Sardinia, Sicily, Pantelleria, and the Eolian group. Though mountainous, with limited cultivable land in the Po valley and along the narrow southern coastal belts, Italy is a major grain, fruit, and vegetable producer. The climate is generally Mediterranean in the southern lowlands with cooler temperatures and wetter conditions in the northern regions and at higher elevations. Italy's sunny climate provides excellent potential for solar applications.

While Italy has small deposits of coal, uranium, and oil, moderate supplies of natural gas do exist. Hydropower has also been widely exploited. With the world's oldest operating well located in Larderello, Italy leads Europe in geothermal energy utilization.

The scientific and industrial sectors have shown much interest in the development of solar and other alternative energy technologies. Ente Nazionale Idrocarburi (ENI), National Hydrocarbon Corporation, is committed to commercialization of solar energy equipment. Nonetheless, the lack of a strong infrastructure to coordinate efforts and provide financial assistance for industries and researchers has, in the past, limited solar development. The government realizes the necessity of developing all sources of energy and has revised the National Energy Plan to include alternative energy technologies and mandatory energy conservation measures.

Energy Summary

Current Energy Sources

- Coal (few major deposits have low Btu value, high sulfur and ash content)
- Geothermal (excellent potential; Italy currently uses more geothermal energy for power than any other country)
- Hydropower (most sources currently being exploited; provided 33% of all electricity produced in 1977) [Figures calculated from *The Statesman's Year Book, 1979*]
- Lignite (minor deposits in Sardinia)
- Natural Gas (reserves in the Po valley; some offshore deposits in the Adriatic)
- Nuclear Energy (small reserves of uranium oxide north of Viterbo and in the Alps)
- Petroleum (limited reserves in Sicily, the Po valley, and offshore in the Adriatic)
- Solar Energy (research in many areas, especially low- and medium-temperature applications, photovoltaics, bioconversion, wind)

See also: Solar Applications, Indigenous Energy Sources, Imported Energy Sources, and International Projects.

Solar Activities

- CIPE, Comitato Interministeriale Politica Economica (Interministerial Economic Planning Committee), determines funding for solar research and development.
- CNR, Consiglio Nazionale delle Ricerche (National Research Council), coordinates basic research and development efforts among universities.
- CNEN, Comitato Nationale per l'Energia Nucleare (National Committee for Nuclear Energy), works with industry in the development of solar applications.
- ENI and ENEL, Ente Nazionale per l'Energia Elettrica (The National Electric Company), are state-owned energy companies involved in solar commercialization activities.
- IRI, Istituto per la Ricostruzione Industriale (National Institute for Industrial Reconstruction), the largest state holding company; controls a significant portion of Italian industry, including many solar companies.
- Italy participates in European Communities (EC) and International Energy Agency (IEA) solar projects. EC and ENEL have jointly funded a "power tower" in Sicily, the world's first solar thermal electricity plant, scheduled for completion in late 1980.
- More than 40 manufacturers of solar energy equipment and over 20 companies are involved in solar technology, consultation, and systems design, competing in both domestic and international markets.

See also: International Contacts, International Projects, and International Manufacturers.

Solar Applications

- Active Solar Thermal: space heating/cooling, desalination, electricity production, agricultural and industrial process heat, refrigeration, and storage systems.
- Bioconversion: methane production.
- Passive Solar Thermal: heating of single and multifamily dwellings, commercial buildings, design, and performance analysis.
- Photovoltaics: cell manufacture and electricity production.
- Wind: electricity production.

See also: International Projects.

Areas for Cooperation

A Memorandum of Understanding (MOU) with the United States was signed 17 October 1979 that provides for bilateral energy cooperation including solar projects in: photovoltaics and solar thermal power production, component and device testing, assessment of central receivers, design and testing of passive solar systems, and solar energy information exchange. Italy's government recognizes the necessity of developing solar technologies and is participating in the solar programs of various international organizations (i.e., EC, IEA). Italy's solar industry is willing to cooperate with U.S. companies in joint ventures, licensing, and royalty agreements. These firms have advanced marketing techniques, which in partnership with U.S. companies, could aid the penetration of international markets, particularly in North Africa.

See also: International Agreements, and International Contacts.

The Italian Republic
Geopolitical, Economic, and Cultural Aspects

Population Demography*

AREA AND DENSITY OF ITALY'S POPULATION

Place	Area (km^2)	Population† (In millions)	Population Density‡ (km^2)
ITALY	301,226	56.6	187.9
Campania	13,600	5.38	395.6
Naples		1.23	
Lazio	17,200	5.0	290.7
Rome		2.9	
Lombardia	23,800	8.91	372.8
Milan		1.71	
Piemonte	25,400	4.54	178.7
Turin		1.18	

*Data drawn from: *The Statesman's Year Book, 1979; The Europa Year Book, 1979.*

†December 1977, unless otherwise specified.

‡Population Distribution: 67% Urban (1975) [*Deadline Data* 1979].

Government Structure

Italy is a republic with a multiparty, bicameral parliament comprised of a lower house, the Chamber of Deputies, and the Senate. The president is the constitutional Head of State, elected for a term of seven years, who affirms the Parliament's choice of prime minister as the head of the Council of Ministers and as the chief executive officer. The judiciary branch enforces the constitution. The country is divided into 20 regions, 5 of which (Sicily, Sardinia, Trentino-Alto Adige, Friuli-Venezia Giulia, and Val d'Aosta) have a large degree of autonomy.

The Executive

Sandro Pertini, President
Francesco Cossiga, Prime Minister

The Diplomatic Register

Paolo Ponsa Cedronio, Ambassador
Embassy of Italy
1601 Fuller Street, NW
Washington, D.C. 20009
(202) 234-1935

Foreign Consulates

Italian consulates in: Boston, Chicago, Los Angeles, New Orleans, New York, Philadelphia, and San Francisco.

United States Representation

Richard Gardner, Ambassador
American Embassy
Via Veneto 119
Roma
ITALY

United States Consulates

Florence, Genoa, Milan, Naples, Palermo, Trieste, and Turin.

Institutions

General

A five-day workweek is generally observed, with government offices operating six days a week from 8 a.m. to 2 p.m. Italian time is one hour later than Greenwich Mean Time. Holidays include January 1 (New Year), Easter Monday, April 25 (Liberation of Italy), May 1 (Labor Day), August 15 (Assumption), November 1 (All Saints), December 8 (Immaculate Conception), December 25 (Christmas), and December 26 (St. Stephen's). Most offices are closed during August.

Education

Education is free and compulsory between ages 6 and 14. There are 38 universities and a total of 288 institutions of higher learning. [*Deadline Data* 1979; *Europa Year Book, 1979.*]

Labor

Twenty-five percent of the labor force is unionized. CGIL, the Confederazione Generale Italiana del Lavoro (General Confederation of Italian Workers), a union with left-wing political views, has about 45% of all union members. Forty percent belong to CISL, the Confederazione Italiana Sindacati Liberi (Italian Confederation of Worker Trade Unions), a moderate union of Christian Democrat supporters, and the remainder belong to UIL, the Unione Italiana del Lavoro (Italian Workers Union), a moderate social democratic group, and other smaller trade unions. [*Countries of the World* 1977.]

Language

Italian is the official language. French and German are spoken in some northern provinces.

Political Parties

Italy's largest political parties are the Christian Democrat and the Communist Party of Italy. Others are the Italian Socialist, Democratic Socialist, Liberal Party of Italy, Italian Social Movement, Republican Party, Radicals, and Proletarian Democrats.

Religion

Roman Catholicism, practiced by 99% of the population, is the official state religion. [*Countries of the World* 1977.]

Economy *

While the Italian economy operates largely through private enterprise, some industries such as ENI, ENEL, and IRI are government-owned holding companies. Azienda Generale Italiana dei Petroli (AGIP), the national oil company and a subsidiary of ENI, has a solar energy division involved in research and development. ENEL's solar program is concentrated at three major research centers: CISE, Centro Informazioni Studi Esperienze (Center of Information, Studies and Experiments); CESI, Centro Elettrotecnico Esperimentale Italiano (Italian Experimental Electrotechnical Center); and ISMES, Istituto Esperimentale Modelli e Strutture S.p.A. (Experimental Models and Structures Institute).

IRI controls most of the transportation and communication systems including the national airline, ALITALIA (Aerolinee Italiane Internazionali), the national highways and transit systems, and radio and television networks. Major banks and many engineering and manufacturing firms also fall under IRI's authority. Finmeccanica, a consortium of solar energy designers and manufacturers, is a subsidiary of IRI.

Economic emphasis has shifted from agriculture. In 1953, agriculture accounted for 25% of total GDP but had dropped to 7.9% by 1976. Manufacturing and mining have increased in importance to 34% in 1976. Trade is primarily within the EC system and with Eastern European nations.

See also: Industry, Agriculture, Architecture, and Communications.

Currency

Italian Lira

Exchange Rate

US$ 1.00 = 846L (01 May 1980)

Gross Domestic Product

US$ 262.1 billion (1978) [*OECD Economic Surveys* 1980]

Gross Domestic Product per Capita

US$ 4,590 (1978) [*OECD Economic Surveys* 1980]

Principal Trading Partners and Products**

Imports in 1977

OPEC 19.0%; West Germany 16.7%; France 13.9%; USA 6.9%; Netherlands 4.1%; United Kingdom 3.7%; Belgium-Luxembourg 3.3%; (crude oil, mechanical and electrical equipment, food stuffs, metals, wood, and cotton).

*Data from: Argonne National Laboratory 1979; *Worldmark Encyclopedia* 1976; Keefe et al. 1977; personal communications with George Irani and William Zangi of the Office of the Italian Trade Commissioner and Gianni Silvestrini of Lawrence Livermore Laboratories.

**Data from: *The Statesman's Year Book, 1979; OECD Economic Surveys* 1979; *Deadline Data* 1979.

Exports in 1977
West Germany 18.6%; France 14.3%; OPEC 12.8%; United Kingdom 5.3%; Netherlands 3.8%; Belgium-Luxembourg 3.5%; USA 6.7%; (machinery, textiles, fruit and vegetables, chemicals, and footwear).

Industry

Italy has few mineral resources and must import raw materials and fuel. Nonetheless, industrial production has continued to expand. The largest firms manufacture automobile, rubber, chemical, and textile goods. Other major industries include steel, metal products, and petroleum refining. Northern Italy supports most of this activity, although the government continues efforts to attract industry to southern Italy. [*Worldmark Encyclopedia* 1976; personal communication with George Irani of the Office of the Italian Trade Commission.]

The national government currently does not subsidize solar equipment manufacturers, although some regions, such as Tuscany, have begun programs encouraging research and development. Even though there are many solar manufacturers, very few engage exclusively in solar activities, and for most, production of solar energy equipment remains a sideline. [Energy Systems International 1978.]

See also: International Contacts, and International Manufacturers.

Agriculture*

Agriculture's role in the economy has declined since the late 1880s. After World War II, government-enacted land reform measures redistributed large estate farms to smaller holdings, and farmers were given fertilizer, seed, and technical assistance. Agriculture became increasingly mechanized and production rates rose, although not enough to achieve agricultural self-sufficiency. The "Green Plan" (1966-70), introduced to assist the economically faltering agricultural sector, established marketing cooperatives to aid farmers with processing, refrigeration, and transportation problems. Efforts to modernize agricultural practice have been partially successful.

Although wheat is the major crop, 10% of consumption must be imported. In contrast, fruit and vegetable exports totaled US$ 1.408 million in 1976. Italy is the world's largest producer of wine and is second only to Spain in production and export of olive oil. Other crops include: sugar beets, potatoes, corn, tomatoes, citrus fruits, and tobacco. Meat must be imported since livestock production (primarily sheep) is less than 10% of the EC total. Although the world's fourth largest producer of cheese, Italy must import dairy products, especially nonfat dry milk. Solar applications in crop drying and irrigation appear promising, and some companies (such as Zanussi) already manufacture collectors for grain drying.

Communications

- In 1976, the road network reached 291,864 km including 144,282 km of primary and secondary roads. An autostrada (interstate system) is being expanded which, upon completion, will total 6,146 km. [*Europa Year Book, 1979.*]
- 20,122 km of railways (government owned, mostly electrified) provide service to all regions and link Italy with surrounding countries. [*The Statesman's Year Book, 1979.*]
- ALITALIA provides service to Italy's 23 international airports and operates worldwide flights. Southern routes link the islands to the mainland. Four other airlines provide only domestic service. [*Europa Year Book, 1979.*]

*Data from: Keefe et al. 1977; *European Marketing Data and Statistics, 1978/1979; Worldmark Encyclopedia* 1976.

- Italy has five excellent natural harbors: Genoa, Venice, Naples, Palermo, and Trieste. Ships carry two-thirds of Italy's trade. Navigable rivers and canals (2,237 km) are of secondary importance. [*The Statesman's Year Book, 1979.*]
- Although the Italian telecommunications system is primarily government owned and operated, many private companies do operate and laws grant radio and television networks measured autonomy. Radio Audizione Italiane (RAI) radio network, the Italian Broadcasting Corporation, has 1,570 transmitters and over 13 million receivers. RAI-TV, with two channels and 603 transmitters, broadcasts to more than 12.5 million households. Over 16 million telephones were in service as of 1977. Two wireless services, Italradio and Italcable, operate through the government postal and telegraph service. There are 72 daily and 430 weekly newspapers, and over 4,000 periodicals published. [*The Statesman's Year Book, 1979; Worldmark Encyclopedia* 1976.]

Architecture*

The construction industry, composed of many small companies, employs approximately 9.9% of the work force (1977). As a consequence of rural-to-urban migration, adequate, low-cost housing meets only 80% of the demand. Though building has averaged 200,000 to 300,000 units per year, these are generally middle-class and luxury homes that do not ease the shortage among the working-class residents.

The south-facing windows and balconies employed extensively in Italian architecture take advantage of winter sun. These balconies, along with shutters and other coverings that can be raised or tilted, act as shading devices during the hot summer months. North walls are usually solid in the northern regions, but in the south and the Po valley areas with higher summer temperatures, north windows increase ventilation and dissipate internal heat. Vented walls are used primarily in barns for grain drying but are also found in other outdoor buildings and some houses.

Physical Geography

In general, Italy is a rugged, mountainous country except in the northern Po valley, narrow coastal belts, and the Plain of Puglia (southern tip of the peninsula). The two major mountain systems are the Alps in the north (with peaks of more than 4500 m) and the Apennines (including the Gran Sasso, 2914 m). The Po valley and the Plain of Puglia are important agricultural areas. Soils vary regionally, but the most common type is brown podzol (leached, low fertility). Red earth, "terra rosa," is found in both northern and southern Italy.

Water supply is abundant, particularly in the north with Alpine lakes and streams draining into the Po and Adige River systems. Central Italy's major rivers (Volturno, Tiber, and Arno) flow into the Tyrrhenian Sea and are complex systems subject to seasonal flooding in the deforested lowlands. Many rivers farther south are dry in the hot summers. Lakes, especially in the Alps and Apennines, are important sources of hydroelectric power.

Vegetation includes coniferous forest in the mountains; broadleaf deciduous, evergreen, and shrubs in lower elevations. In some areas, where original forests have been destroyed, thickets have grown that may prove to be a valuable fuel source.

While Italy has few natural resources, mining does provide some required minerals such as bauxite, pyrite, asbestos, lead, zinc, and mercury. Sardinian low-grade coal and Sicilian sulfur deposits are also mined. Natural gas and oil deposits are exploited in the Po Basin and Sicily.

*Data from: Europa Year Book, 1979; Keefe et al. 1977.

Climate*

Generally classified as Mediterranean, Italy's temperatures vary annually 11°-19°C. Winters are cool and wet with colder temperatures and snow in the north and in the mountains. Most rain occurs in the fall and spring with the yearly precipitation averaging between 50 cm in the south and 150 cm in the north and mountain regions. Summers are generally warm and dry with higher temperatures recorded in the southern lowlands.

Climatic Sample

Sunlight averages 1640 h/yr in the north and 2350 h/yr in the South. Sicily has the highest insolation levels in Europe, and in June, Marsala averages 26 MJ/m²/d. Insolation values vary seasonally, with the highest values recorded during warm, dry summer months. Some monthly averages for Italy are (in MJ/m²/d): March 12.18; June 22.84; September 15.80; December 4.64.

For complete solar-related climatic data on Italy contact SERI's International Division at (303) 231-1839.

The Energy Profile

Energy Policy Objectives

A National Energy Plan, revised in 1978, outlined the government's energy strategies. Nuclear power will be important by 1980, but siting problems are a major constraint. Italy seeks additional petroleum and natural gas suppliers and hopes to improve refining capabilities. Mandatory conservation measures have been recommended to Parliament. Biomass, solar, wind, hydro, and geothermal power will be increasingly important in the future. Solar energy is expected to supply only 2% of energy needs by the year 2000. [Argonne National Laboratory 1979.]

Government Energy Structure

- Energy policy is determined by the Ministry of Industry.
- The key coordinator for all of the energy activities is CIPE. This committee does not establish energy policy, but rather, acts as a liaison between decision makers of the various ministries and committees. [Argonne National Laboratory 1979.]

See also: International Contacts.

Organizations for Implementation**

- ENI controls the petroleum and natural gas companies whose subsidiaries conduct solar energy research and development.
- ENEL, the main electricity producer, also does solar energy research and development.

*Data from: Energy Systems International 1978; Howell and Bereny 1979.

**Data from: Argonne National Laboratory 1979; personal communication with Vittorio Jucker of Azienda Generale Italiana dei Petroli and Ugo Farinelli of Comitato Nazionale per l'Energia Nucleare.

- CNEN, the agency responsible for nuclear research and regulation, has been investigating solar energy. In 1980, Parliament allocated approximately US$ 23 million for CNEN's solar energy and energy conservation projects. CIPE has approved CNEN's five-year plan (1980-84) including about US$ 420 million for renewable energy and energy conservation programs. The plan awaits Parliamentary approval.
- CNR sponsors research and conservation projects.
- IRI coordinates its subsidiaries' solar energy research and development activities.

See also: International Contacts.

Indigenous Energy Sources

Coal

Italy's coal resources are meager and of low quality. Lignite (1.9 million tonnes in 1978) is produced in two mines near Perugia. Coal mines in Sardinia have been reactivated, although the coal has a low Btu value and a high sulfur and ash content. Coal met 8% of the total energy requirements in 1975, mostly through imports. [*Minerals Year Book, 1976*; Argonne National Laboratory 1979.]

Geothermal

The world's oldest operating geothermal well is at Larderello. A field in Cesano, north of Rome, will be exploited (using a new prototype generator) as part of an IEA project. Geothermal (steam, water, hot rocks) currently supplies 1% of the electricity demand and is expected to increase to about 2% by the the 1980s. [Simeons 1978.]

Hydroelectric

In 1977, hydroelectric production met one-third of the total electricity demand. Most available resources are currently being utilized. [*The Statesman's Year Book, 1979.*]

Natural Gas

In 1978 domestic natural gas provided about 50% of the demand (production was approximately 13.7 billion m^3). Total reserves of natural gas, found in the Malossa oil and gas field of the Po valley, were estimated to be 207 billion m^3 (1977). Exploration is to be expanded in Calabria and the offshore Adriatic and is expected to meet 75% of demand by 1990. Nonetheless, imports are expected to rise. [Personal communications with the Commercial Office, Italian Embassy, and Ugo Farinelli of Comitato Nazionale per l'Energia Nucleare.]

Nuclear

In 1979 nuclear energy supplied less than 1% of the total primary energy. Since small domestic uranium reserves cannot meet demand, importation is necessary if nuclear energy is to supply a projected 8% of the total energy needs in 1990. [Personal communication with Ugo Farinelli of Comitato Nazionale per l'Energia Nucleare.]

Petroleum

Oil meets 75% of the total energy demand. Total production in 1977 was 7.92 million bbl and reserves were estimated at 485 million bbl. Production in the Malossa field, which began in 1973, provides up to 60 thousand bbl/d of high grade oil. In 1978 a new field was discovered near Modena, also in the Po valley. The region comprising Ragusa, Gela, and Fontanarossa, in Sicily, accounted for 59% of 1977 domestic petroleum production. Exploration continues off

Sicily's shore and in the Ionian and Adriatic Seas. Ninety-eight percent of all oil consumed continues to be imported. [Parent 1979; personal communication with Ugo Farinelli of Comitato Nazionale per l'Energia Nucleare; *Deadline Data* 1979; *The Role of Foreign Governments in the Energy Industries* 1977; Brasseur 1979; *The Statesman's Year Book, 1979.*]

Solar Energy

Italy has excellent potential for solar energy utilization. Most of the solar industry's emphasis is on low-temperature applications, especially water heating equipment. Some companies are considering agricultural and industrial process heat, photovoltaics, bioconversion, and wind.

Imported Energy Sources*

Coal

In 1978, 17.6 million tonnes of coal were imported. Most coal currently goes directly to coking furnaces. The government hopes to expand the use of coal for energy, and new sources of supply must be established. A program to build the necessary infrastructures (ports, ground and canal transportation, ash disposal, etc.) has been developed to permit more efficient handling of increased imports.

Natural Gas

In 1978, 551 TJ were imported from Libya, the Soviet Union, and the Netherlands. A trans-Mediterranean pipeline that should increase availability of natural gas by nearly 40% is being constructed to bring gas from Algerian fields to Sicily and southern Italy.

Petroleum

Although Italy has Europe's largest refining capacity, most of the required oil is imported. Approximately 120 million tonnes were imported in 1979, 20 million of which were reexported after refining.

Solar Energy Research and Development

The Italian government recognized the need to expand solar research and development and in 1975 developed a five-year program outlining a budget and areas of emphasis. In 1978, about US$ 6.8 million was allocated for research in photovoltaics, biochemical conversion, and low-temperature applications. Funding is provided by the Ministries of Industry and of Scientific Research as well as by CNR. [International Energy Agency 1979b, p. 84.]

Legislation promoting the development of renewables has been proposed. The government hopes to develop the photovoltaics industry and to centralize research on low-cost solar cells. Through 50% EC funding, Italy will have Europe's first completed "power tower." In the past, the lack of a coordinating infrastructure has been a major constraint in Italy's solar research and development. CNR and CNEN will cooperate to create a more effective government role in research and development. CNR will be involved primarily with university projects while CNEN will work with industry to assist in development and commercialization activities.

*Data from: Brasseur 1979; personal communication with Ugo Farinelli of Comitato Nazionale per l'Energia Nucleare.

Many universities, technical institutes, and industrial laboratories are engaged in projects in space heating and cooling, domestic water heating, agricultural applications, electricity generation (photovoltaics and wind), industrial process heat, bioconversion, greenhouses, concentrating collectors, and total energy systems. Meteorological data collection, component testing, and storage problems receive special emphasis.

Solar Energy Organizations

- CRAIES, Centro Ricerche Applicazione d'Impiego di Energia Solare (Center of Applied Research for the Use of Solar Energy)
- CNEN
- CNR
- ENI
- ENEL
- IRI

Solar Energy Related Legislation and Administrative Policies

- National Energy Plan, 1978
- Law 373 regulates design and operation of buildings and their heating systems, setting limits on maximum temperatures allowed for water and space heating.
- Laws have been passed to encourage use of new energy technologies in industrial retrofit and in a 10-year residential building activities program. The passive project within the U.S./Italian cooperative program is an extension of this plan.

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International Agreements

United States/Italy (January 1980 - December 1982)

This U.S.-Italian Joint Solar Energy Program forms the largest part of the recently signed (17 Oct. 1979) Memorandum of Understanding (MOU) for energy cooperation. The program includes seven solar energy projects: a) Parallel Solar Thermal and Photovoltaic Systems Field Experiment Totaling 49 kW; b) Testing and Characterization of Components, Devices, and Materials; c) Utility Applications Study of Solar Central Receiver Technology; d) Small Photovoltaic System Field Experiment (5 kW); e) Research and Development Exchange in Photovoltaics; f) Design and Testing of Passive Solar Systems; and g) Solar Energy Information Exchange. The Program will involve collaboration between the U.S. Department of Energy (DOE) and the Italian Ministry of Industry. It will include a means of joint procurement and monitoring of solar equipment for power production, exchange of scientists, joint testing of materials and components, and technical data exchange. Specialist teams from each country will visit the other's solar facilities. Seminars will be organized on agreed topics. Budget information for individual projects is not available; however, the entire budget is US$ 4.5 million, to be shared in approximately equal amounts.

See also: IDINPRO 00231, 00234, 00235, 00236, 00237, 00238, 00267, 00268, 00269, 00270, 00271.

European Communities (EC)/Italy (Plant to be operable in 1981)

A 1-MW power tower, comprised of a central receiver situated on top of a tower, collects reflected radiation from a field of heliostats. The objectives of the project are to demonstrate feasibility, to optimize operations, to minimize costs, and to investigate export opportunities for this type of plant. The heliostat field with centralized suntracking and monitoring systems was supplied by Messerschmitt Bolkow Blohm—MBB (Federal Republic of Germany) and Cethel (France). The steel tower that supports the receiver was also supplied by MBB. The receiver, based on design work of the late Giovanni Francia (University of Genoa, Italy), was provided by Ansaldo (Italy) as was the steam cycle system including turbine, condenser, water storage tank pumps, etc. Cethel provided the molten salt storage system and most of the electrical system. The plant will produce 1-MW of electrical energy and will be connected to a grid.

See also: IDINPRO 00230.

International Energy Agency (IEA)/Italy (1977-1983)

Italy is a participant in this project located in Almeria, Spain. The project's objective is to demonstrate the feasibility of small, central station electricity generation from a solar heat source. Two engineering concepts have been selected for a comparative study of system performance, reliability, and economics at the same site. One system is a central receiver with a sun tracking mirror array that focuses solar radiation onto a small, centrally located receiver on top of a tower. The heat produced is transferred to a liquid metal that produces steam in a heat exchanger to power a conventional, 500-kW_e steam engine. The second system has a distributed collector array in which solar radiation falls on a large number of parabolic troughs and is concentrated on pipework containing a special grade oil. The fluid transfers its heat to a conventional 500-kW_e steam turbine. The collector field will be divided into two subsystems to facilitate comparison of United States and European designs on the basis of performance and cost. The two systems will be linked to the Spanish electrical grid. The estimated project cost is US$ 39 million. [International Energy Agency 1979a.]

See also: IDINPRO 00274.

International Energy Agency (IEA)/Italy (1977-1979)

Italy participated in the Programme to Develop and Test Solar Heating and Cooling Systems. Five tasks were identified: a) Investigation of the Performance of Solar Heating and Cooling Systems, b) Coordination of Research and Development on Solar Heating and Cooling Components, c) Performance Testing of Solar Collectors, d) Development of an Insolation Handbook and Instrumentation Package, and e) Use of Existing Meteorological Information for Solar Applications. A lead country or Operating Agent was selected for each task. The multilateral program coordinated various national programs in the field of solar heating and cooling in an attempt to standardize test and development methods. [International Energy Agency 1979a, pp. 74-78.]

See also: IDINPRO 00275, 00276, 00277, 00278, 00279, 00280.

International Energy Agency (IEA)/Italy (1977-1979)

Italy is one of the Operating Agents (along with EC, the Federal Republic of Germany, and the United States) for a research project designed to develop hydrogen production from water. Laboratories were established at the EC Joint Research Centre in Ispra, Italy, and in the United States to investigate thermochemical processes involved in hydrogen production.

Market assessments for hydrogen for the period 1985-2025 were completed by participating countries using a common set of assumptions that permitted comparison. Reports of the individual participants as well as an overall report of the project should be issued during 1980.

See also: IDINPRO 00281.

NATO Committee on the Challenges of Modern Society (CCMS)/Italy (1973-1980)

The Solar Energy Pilot Study (1973-1978) has just completed a two-year follow-up stage. The initial objective of the project was to encourage cost-effective and practical application of solar energy to heating and cooling of buildings. NATO and non-NATO countries participated in the international cooperative effort that included: 1) information exchange on national solar heating and cooling programs in the participating countries, and 2) solar heating and cooling projects, especially performance results. Special working groups were established, and meetings were held to monitor progress of the study.

See also: IDINPRO 00282.

The International Contacts Data Base

The ongoing International Contacts Data Base (ICON) development task, begun in January 1979, maintains approximately 2,444 international contacts as of October 1980. This multi-use file contains information on foreign individuals and organizations active in solar energy. These participants have been cited in professional journals or have visited the Solar Energy Research Institute since August 1978 and are associated with activities in governmental energy departments, business and industry, universities and research institutes, and regional quasigovernmental organizations. The records, which can be searched across several variables, include organizational affiliation, address, position, interests, and memberships. The format presented contains the organization name, its departmental divisions, addresses, and the names and professional interests of individuals affiliated with these organizations as of June 1980. While these records are updated as frequently as possible, THE INFORMATION CONTAINED NONETHELESS CHANGES RAPIDLY. More complete records may be obtained by contacting SERI International Division (303) 231-1839.

Independent Contacts

Abrami, A.
Via Machiavelli, 5
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Solar energy conversion.

Costanzo, Giovanni
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Castrovillari (Cosenza)
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Natural convection passively heated solar design; Computer simulation of convective heat transfer.

Guerra, G. P.
Via Girardini, 2
Udine
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Solar energy conversion.

Loschi, Fabrizio
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33100 Udine
ITALY

53303

Papasogli, G.
Via Landino, 5
Firenze
ITALY
Design and construction of passive solar architecture; Multi-family housing thermal design.

Storelli, Vittorio
Via Crispi, 72
80121 Napoli
ITALY
Solar devices.

Tanzi, M.
Via Landino, 5
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ITALY
Research and construction of passive solar architecture; Multi-family housing design.

Timavozo, D.
Roma 00795
ITALY
Passive solar heating and cooling.

Torrisi, G.
Via Etna, 171
95030 Mascalucia
Catania
ITALY
Solar energy conversion.

Vianello, Vinicio
Industrial Designer
Mestre del rio Storto, 3
30170 Venezia
ITALY
Photovoltaic lamps for remote locations.

Aerimpianti S.p.A.

Via Bergamo, 21
20135 Milano
ITALY
Designs and installs space heating/cooling, refrigeration, and domestic water heating systems.
(02) 54971

Aeritalia S.p.A. (AERITALIA)

Piazzale Tecchio, 51
80125 Napoli
ITALY
Concentrating collectors; Parabolic collectors; *Wind turbines.*

Agea s.r.l. (AGEA)

Piazzale Bossi, 4
Milano
ITALY
Focusing solar collectors; Flat plate collectors.
(02) 879774
(02) 867449

Alcan Angeletti & Ciucani S.p.A.

Corso Como, 15
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ITALY
Solar collectors; Solar water heating; Solar domestic water heating.
(02) 6297

Colapenna,
Solar space heating; Solar water heating; Solar process heat.
(02) 6297

Alsco Malugani S.p.A.

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20159 Milano
ITALY
Solar space heating; Solar water heating; Air collectors; Focusing collectors; Solar process heat.
(02) 6972

Colaiemma, Paolo
Solar space cooling; Solar space heating; Solar water heating.
(02) 6972

American Consulate General, Genoa

Banca d'America ed'Italia Building
Piazza Portello, 6
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ITALY

Arreghini, Gianfranco

American Embassy
Economic and Commercial Affairs

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Calingaert, Michael
Minister Counselor
U.S. solar exports.

Science Office
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Bracchetti, Danillo
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(06) 4674

Scientific and Technological Affairs
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Serwer, Daniel
Scientific Attache
International scientific agreements.
(06) 4674

Anic S.p.A.
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Current commutators; Flat plate collectors; Solar space heating; Heat storage.

Ansaldo Meccanico Nucleare S.p.A. (AMN)
Via G. d'Annunzio, 113
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ITALY

Milvio, Danicle
President and Administrator
Engineer, consultant in solar energy projects.

Ansaldo S.p.A.
Via Pacinotti, 20
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16151 Genova
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Manufacturer of photovoltaic equipment; Semiconductors; Thermal power plants.
(010) 4103

Barutti, Aventino
Photovoltaics; Solar thermal power plants.
(21) 7095

Francia, Giovanni
Parabolic trough collectors; Central receivers.
(010) 4103

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Tuardich, Lionello
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(010) 4103

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Simonetti, Sergio
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Solar thermal conversion; Photovoltaic conversion.
(010) 4103

Energia Solare
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Sampierdarena
16151 Genova
ITALY

Giuffrida, Vicenzo
Parabolic trough collectors; Central receivers.
(010) 4103

Center for Studies on Energy Information System
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Sampierdarena
16151 Genova
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De Conca, Vincenzo
(010) 4103

Industrial Plant Division Solar Energy Department
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Floris, Romano
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Parabolic trough collectors; Photovoltaic conversion; Solar thermal power plants.
(010)4103

Semiconduttori Direzione Ricerca e Sviluppo

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Concentrating cells; Grid optimization; Semiconductors.
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Azienda per il Risparmio Energetico S.p.A. (APRE)

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d'Alessandro, Giulio
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U.S./Italian solar program.
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(06) 6795098

Azienda Generale Italiana dei Petroli S.p.A. (AGIP) National Oil Company

Piazza Enrico Mattei, 1
00144 Roma
ITALY
Theoretical and experimental research studies of space heating/cooling; Water heating; Process heat for agricultural and industrial applications; Desalination of sea water.
(06) 59001

F.O.R.E.

Via del Giorgione, 59
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ITALY

Pistone, Gabriella
U.S./Italian solar program.

Foreign Branch Documentation Center

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Leone, Wilma
Responsible for the Documentation Center.
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ASSORENI

Monterotondo
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Nencini, Giuliano
Photovoltaics research.

Banca D'America ed'Italia

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ITALY

di Benedetti, Guido
Funding of solar projects.
284141

Centro Informazioni Studi Esperienze (CISE) Center for Information Studies and Experiments

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ITALY

Fanetti, Ezio
Photovoltaic conversion.

Centro Ricerche Applicate Energia Solare (CRAES) Center for Applied Solar Energy Research

c/o AGSM
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Braggion, Damiano
Physicist
Flat plate and focusing collector development and testing.
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Cherubini, Gino
(045) 590633

Centro Studi Energia (CESEN) Center for Energy Studies

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ITALY

de Leonardis, Renato
President
Energy research and development.
(010) 586241

Centro Studi Galileo

Via Alessandria, 10-12
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Alessandria
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Buoni, Enrico
Organize courses for local experts on solar and other alternative energy sources.

Colletori Solari Castiglione

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46043 Castiglione
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ITALY

Solar space heating.

Comitato Nazionale per l'Energia (Nucleare (CNEN)
National Committee for Nuclear Energy

Viale Regina Margherita, 125
00198 Roma
ITALY

Farinelli, Ugo
U.S./Italian solar program; Photovoltaic conversion, testing, and demonstration; High and medium temperature solar thermal power conversion systems; Bioconversion; Wind energy; Systems economics; Social impacts.

Paretti, Claudio
U.S./Italian solar program.

Dipartimento Ricerca Tecnologica di Base

C.S.N. Casaccia
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Pinchera, Giancarlo
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Health, environmental, and socioeconomic effects of solar and other energy sources; Coordinator of Italian LMFBR Safety Research Program; Italian representative in the Safety Working Group of EEC Fast Reactor Coordinating Committee.

Studi Economici

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Venditti, Paolo
Director

Consiglio Nazionale delle Ricerche (CNR)
National Research Council

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Coordinates energy research and conservation projects.
(06)865193

Quagliarello, E.
President
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Istituto di Fisica

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Lavagnini, A.
Global radiation.

Istituto Fisica Atmosfera

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Guerrini, A.
Global radiation.
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Vivona, Franco M.
Head of Research
Meteorological and climatological data; Installation of radiation station network.
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Laboratorio LAMEL

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ITALY

Soncini, G.
Photovoltaic conversion; Ion implanted silicon solar cells; Laser annealing; Electron annealing.

Zignani, F.
Photovoltaic conversion; Ion implanted silicon solar cells; Laser annealing; Electron annealing.

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Casella Postale 27
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Pallottino, Giovanni V.
Experiments on solar panels.

Latef
Padova
ITALY

Boldrin, Bruno
Cooling; Desalination.

Scalabrin, G.
Solar cooling; Desalination.

Progetto Finalizzato Energetica
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Research and development in active and passive solar systems; Photovoltaics; Management of research projects.
(06) 865493

Elias, Giacomo
Administration of research and development in passive solar construction and techniques; Performance testing.
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Fedi, Publio
Direttore
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Visentin, Roberto
Head, Solar Energy Project
Parabolic trough collectors; Total energy systems; Design methods for passive solar architecture.
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Solar space heating and cooling.

Controlcei
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Firenze
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Provided funding for passive solar research and construction at "Helios 78".

Costruzioni Termo Meccaniche S.p.A. (CTM)
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Treviso
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Solar space heating; Solar space cooling; Heat storage; Flat plate collectors; Solar water heating; Domestic solar water heating; Heat exchangers.
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(0422) 710103

Pola,
Flat plate collectors; Solar space heating.
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Energia Solare Solar Energy

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Editor of solar energy journal.
630351

Energy Research Group s.r.l. (ERG)

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Ente Nazionale per l'Energia Elettrica (ENEL) National Electric Company

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Government-owned electric company; Thermal and photovoltaic conversion; Solar space heating; Solar domestic water heating.
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Parrini,
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Centro Ricerca Termica e Nucleare

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Environmental impacts and land use.

Direzione Ricerche e Studi

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Energy planning; Electricity production.

Gruppo per le Ricerche Commerciali e della Programmazione

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Conversion of urban solid waste to methane.

Ente Nazionale Idrocarburi (ENI) National Hydrocarbon Corporation

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59002 1

Volpi,
Solar energy conversion.

Centro Ricerche, Centro Nuovi Prodotti

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Missoni, Giorgio
CdS cells; Chemical vapor deposition.

Division for Planning and Development

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Solar energy; Energy end uses in Italy.

Baronti, P.
Solar Energy; Energy end uses in Italy.

Colitti, Marcello
Solar Energy; Energy end uses in Italy.

Nardelli, E.
Solar energy; Energy end uses in Italy.

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Solar energy; Energy end uses in Italy.

Scuola Superiore

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Selective surfaces; Solar radiation.

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Collector testing.

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Piwecki, H.
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Rigolini, L.
Collector testing.

Euroslate s.n.c.

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Solar collectors.
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F. Colombo di Alberto Colombo

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Colombo, Alberto
Solar space heating; Solar water heating.
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Scientific Council of Fonti Di Energia Alternative; Air flat plate collectors; Solar domestic water heating; Project TOTEM (total energy system); Parabolic trough collectors; Wind generators.
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External relations.
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Salotti, G.
Solar energy conversion.

Fiat S.p.A. (FIAT)

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Palazzetti, M.
Model and cost-analysis of heat storage system (a subsoil cylinder containing storage medium and heating elements).
(011) 901101

Settore Automobili

Corso G. Mattelli, 26
10121 Torino
ITALY

Onnis, Luigi
Project TOTEM (total energy module).
543637

Ufficio Studi Energia Settore Energia

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Custodero, Salvatore
Direttore
Scientific Council of "Fonti di Energia Alternative", Project TOTEM.

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Marruello,
Photovoltaic conversion.

Fonderie Officine San Giorgio Pra

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Solar domestic water heating; Solar space heating.
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Fonti di Energia Alternative

Via di Villa Emiliani, 111
00197 Roma
ITALY

Santarelli, Enrico
Scientific Editor
Alternative energy sources.

Franco Tosi S.p.A.

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Legnano
Verona
ITALY
Systems for the generation of electrical, mechanical or thermal energy; Process heat; Heliostats; Solar thermal power plants.
(0331) 547690

Fratelli Parodi (FP)

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Molassana
Genova
ITALY
Solar space heating; Solar space cooling.
866448

FEA F.lli s.n.c.

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Scarnafigi
Cuneo
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Solar collectors; Solar domestic water heating; Solar space heating; Process heat.
(0175) 74134

Manzo,
Solar space heating; Solar water heating.
(0175) 74134

Gilardini S.p.A.

Flexider Division

Corso Vercelli, 501
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Greenfield S.p.A.

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Pensa, Gianluigi
Solar energy conversion.
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Gruppo di Lavoro Solare

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Puccetti, Paolo
Design and construction of structurally integrated, passive solar systems working with air convection; Methods of bioclimatic design; Wind energy systems.
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Solimando, N.
Solar energy conversion.

Gruppo Finanziario Termico S.p.A. (FINTERM)

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Flat plate collectors; Solar space heating; Solar water heating; Heat storage.
(011) 784242

Joannes,
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Heliosil: società per lo sviluppo del silicio solare

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Pizzini, Sergio
Gallium arsenide cells; Large size silicon process development.
6595759
667941

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Pesenti, Roberto

Ilva S.a.s. di Carlo Silvestro e Co.

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(010) 932901

Industrie Pirelli S.p.A.

Diversified Products Division

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Industrie Zanussi S.p.A.

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Flat plate collectors.
45361

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(0434) 3961

Gruppo del Ricerca e Sviluppo

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Collector testing; Solar space heating; Solar water heating.
(0434)3961

Renzio, Mario De
Director
Solar collectors; Heat pumps.
(0434) 396893

Zanussi Settore Casa

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Trevisan, Gianfranco
Flat plate collectors; Solar space heating.
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Ing. Gaudenzio Cattaneo e Co. - Impianti Termici S.a.s.

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Greenhouses; Solar water heating; Flat plate collectors; Solar assisted heat pumps.
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(0321) 21074

Inso S.p.A. (INSO)

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Study, elaboration and project development for solar buildings; Solar space heating; Solar air conditioning; Solar domestic water heating.
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(06) 5139733

Integrated Distribution Systems S.p.A.

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Istituto di Fisica dell'Atmosfera Institute of Atmospheric Physics

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Radiation measurements.

Istituto di Meteorologia "Gustavo Colonetti" Gustavo Colonetti Meteorological Institute

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Ricolfi, T.

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Espositi, Walter
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Istituto Nazionale di Fisica Nucleare National Institute of Nuclear Physics

Casella Postale N. 56
00044 Frascati
Roma
ITALY

Quercia, I. F.
Solar energy conversion.

Istituto Universitario di Architettura di Venezia University Institute of Architecture of Venice

Calle Amai, 197
Campazzo dei Tolentini, 191
30100 Venezia
ITALY

Los, Sergio
Professor
Project manager for passive project of U.S./Italian Solar Program of Cooperation in Solar Energy; Research, development and construction of an experimental building testing various passive cooling techniques; Passive solar architecture projects.

Italimpianti

Piazza Piccapietra, 9
16121 Genova
ITALY

Rocco, Carlo
Assistant Director
Solar energy conversion.
5998

Italy, Government of

Rome
ITALY
Committee on the Challenges of Modern Society (CCMS); International Energy Agency (IEA).

Direzione Generale - Segreteria Ministero delle Poste e delle Telecomunicazioni

Via Portuense, 96 F
00100 Roma
ITALY

Di Sarra, Maurizio
Engineer
Active and passive systems for multifamily dwellings in Italy.
5894404

Panella, Roberto
Engineer
Active and passive systems for multifamily dwellings in Italy.
5894404

Juliani Leather Tanning Factory

Salerno
ITALY
Will be using American Heliothermal Corporation collectors for hot water heating.

La Metalli Industriali S.p.A.

Borgo Pinti, 99
P.O. Box 549
50121 Firenze
ITALY

Revelli,
Collectors; Desalination systems.
(055) 49741

Talini, M.
Solar energy conversion.
(055) 49741

Lamborghini Calor S.p.A.

Settore Energia Solare

Dosso S. Agostino
Ferrara
ITALY

Antinucci, Marcello
Solar water heating; Solar collectors.
(0532) 848081

Lancia

ITALY
Research on steam turbine-powered cars in which the steam is produced by collectors.

Lavorazione Leghe Leggere S.p.A.

Via Agnello, 6/1
20121 Milano
ITALY

Fontana,
Flat plate collectors; Heat exchangers.
(02) 85591

Mabosun S.a.s. di Luigi Botter and C.

Via Baronio, 1
26100 Cremona
ITALY

Botter,
Solar water pumps.
(0372) 430215, 35490 CCIAA

Merloni Igienico Sanitari S.p.A

Via A. Merloni, 45
60044 Fabriano
Ancona
ITALY

Merloni,
Solar space heating; Solar water heating.
(0732) 7011

Ministero dell'Agricoltura Ministry of Agriculture

Avversita Meteoriche Ufficio Centrali di Ecologia di Agravia e di Difesa delle Piante Coltivate

Via del Caravita, 7a
00100 Roma
ITALY

Vento, Domenico
Hailstones; Solar energy conversion.

Ministero dell'Industria del Commercio e dell'Artigianato Ministry of Industry, Commerce and Handicrafts

Direzione Generale delle Fonti di Energia ed Industrie di Base

Via Veneto, 33
00100 Roma
ITALY

Simoni, Giovanni
Head
4985

Ufficio Fonti di Energia

Via Veneto, 33
00100 Roma
ITALY

Ammassari, Giuseppe
Director General of Energy
4985

Montedison S.p.A.

Foro Buonaparte, 31
20100 Milano
ITALY

Biondi,
Research and development; Solar water heating; Solar space heating; Photovoltaic conversion.
(02) 6333

Divisione di Ricerca e Sviluppo

Casella Postale 3596
Largo Donegani, 1/2
20121 Milano
ITALY

Baldini, Vittorio
Wind; Flywheels; Photovoltaics.
(02)6333

Canino, Antonio
Photovoltaics; Solar water heating; Solar space heating.
(02) 6333

Officine Fratelli Riello S.p.A. (OFR)

Via degli Alpini, 1
37045 Legnano
Verona
ITALY

Collectors and accessories (boilers, electric control devices, electric pumps and heat transfer fluids) for domestic, industrial and agricultural applications.
(0442) 22500

Foffano,
Comm. Director
Flat plate collectors; Solar water heating.
(0442) 22500

Galassi,
General Director
Solar collectors; Solar space heating; Solar water cooling.
(0442) 22500,

Officine Galileo S.p.A.

Studi e Progetti Divisione Strumentazione

Via Carlo Bini, 44
50134 Firenze
ITALY

Carrara, Eugenio
Heliostat field design for central receivers; Photovoltaic concentrator design.
(055) 47961

Liguori, Alfonso
Heliostat field design for central receivers.
(055) 47961

Scarpi, Giulio Cesare
Director of Studies and Projects
Solar energy conversion; Solar space heating.
(055) 4796

Osservatoria Geofisico

Centro Provinciale di Ecologia e Climatologia

Macerata
ITALY

Murri, A.
Solar radiation measurements at different altitudes for different wavelengths; Collection of data (global, diffuse, direct).

Philco Italiana S.p.A.

Via G. Marconi, 14/22
24030 Brembate Sopra
Bergamo
ITALY

Mahdjuri, Faramarz
Director
Vacuum solar collector.
30129

Politecnico di Milano
Milan Polytechnic

Piazza Leonardo da Vinci, 32
20133 Milano
ITALY

Garribba, Sergio
Solar energy research.
292101

Silvestri, Mario
Scientific Council for "Fonti di Energia Alternative"
292101

Istituto di Fisica Tecnica

Piazza Leonardo da Vinci, 32
20133 Milano
ITALY

Bonauguri, Elisa
Professor
Water heating.

Istituto di Macchine

Piazza Leonardo da Vinci, 32
20133 Milano
Milano
ITALY

Ciborra, Bruno
Energy analysis method for a solar panel.

Gigliali, Gustavo
Solar thermal conversion.
292101

Macchi, Ennio
Organic Rankine engines; Rural village energy needs.
236678

Politecnico di Torino
Turin Polytechnic

Istituto di Fisica Sperimentale

Corso Duca degli Abruzzi, 24
10129 Torino
ITALY

Demichelis, F.
Surfaces for collectors.

Russo, G.
Solar energy conversion.
001-551-616 X339

Istituto di Fisica Tecnica

Corso duca Degli Abruzzi, 24
10129 Torino
ITALY

Boffa, C.
Funding of solar energy projects; Typology of passively heated and cooled buildings and passive architectural devices.

Polivar S.p.A.

Via Naro, 72
00040 Pomezia
Roma
ITALY

Clementi, G.
Flat plate collectors for water heating; Parabolic concentrators.
(06) 9121061

Progetto Finalizatto Energetica (PFE)

Facoltà d'Ingegneria
Istituto di Fisica Tecnica

Viale delle Scienze
Palermo
ITALY

Silvestrini, G.
Active and passive solar heating and cooling systems; Liquid drum walls; Solar chimneys.

PHOEBUS - Ricerche per l'Energia Solare S.p.A.

Corso Sicilia, 24
Catania
ITALY

Beer, Gino
Director General
Consultation on solar projects; Particpipant in *EC projects; Solar research laboratory to test for various passive cooling technologies cost and effectiveness for a commercial building.*
(095) 221240

Salvi, Flora
U.S./Italian solar program.
(095) 221240

Regione Toscana Tuscany Regional Government

Montebello, 66
50100 Firenze
ITALY

Sforza, Carlo Alberto
Architect
Solar space and water heating; Passive solar heating systems.
(055) 210623

Riflexoterm Pansol S.p.A.

Zona Industriale Olbia
07100 Olbia
Sassari
ITALY

Anzara,
Solar collectors; Concentrating collectors; Selective surfaces.
(079) 24792

Samifi-Babcock S.p.A.

Caponago
Milano
ITALY

La Monica, G.
Solar air conditioning.

Sant'Andrea Officine Meccaniche e Fonderie S.p.A.

Via Leonardo Da Vinci, 18
P.O. Box Novara Ferrovia
28100 Novara
ITALY

Ferrari,
Flat plate collectors; Solar water heating; Solar space heating.

Sistemi a Sfruttamento Solare s.n.c. (3S SNC)

Ufficio e Studio Progettazione

Via S. Antonino, 9
29100 Piacenza
ITALY

Cassinari,
Collectors; Photochemical systems; Heat pumps.
(0523) 384583

Cialente, I.
Solar architecture.

Snamprogetti S.p.A.

C.P. 4169
San Donato Milanese
20097 Milano
ITALY

Cinel, Luciano
Solar thermal power generation; International collaboration in solar energy conversion.
(02) 53431

Grandonico, Vittario
Solar thermal power plants; Photovoltaic conversion.
(02) 53431

Energia Solare Applicazione e Studi

San Donato Milanese
20097 Milano
ITALY

Micheli, Carlo
Manager
Thermal storage; Hybrid systems; Solar thermal power production.
(02) 53431

Laboratorio Ricerca di Base

San Donato Milanese
20097 Milano
ITALY

Garozzo, M.
Solar thermal power plants; Photovoltaic conversion.
(02) 53431

Società Italiano per Condotte d'Acqua
Italian Water Supply Company

Viale Liegi, 26
00198 Roma
ITALY

Degner, Helmut
Assistant to the President
Active and passive systems for multifamily dwellings.
8518

Solarconvert s.r.l.

Via O. Respighi 4
50018 Scandicci
Firenze
ITALY
Funding agency for Barra-Constanti solar passive system utilized in single-family dwellings.

Constanti, Tommaso
Architect-Builder
Collaborated with Orazio Barra to construct a single-family dwelling with solar chimneys and heat storage in ceilings.

Studio Prof. Ing. E. Giusti

Viale Mazzini, 61
50132 Firenze
ITALY

Berti, Luigi
Engineer
Solar space and water heating; Passive solar heating systems.
(055) 570094
(055) 572239

Giuseppini, Sergio
Engineer
Solar space and water heating; Passive solar heating systems.
(055) 570094
(055) 572239

Giusti, Enzo
Chief Engineer
Solar space heating; Passive solar heating systems; Heat pumps; Solar water heating.
(055) 570094
(055) 572239

Perone, Luciano
Engineer
Solar space and water heating; Passive solar heating systems.
(055) 570094
(055) 572239

Swedish Astrophysical Station

Anacapri
Island of Capri
ITALY

The station has a solar space heating and cooling and water heating system.

SOFTEC
Sistemi e Tecnologie a Basso Contenuto di Energia

Via Marco Polo, 28
Torino
ITALY
Low energy systems and technologies in underdeveloped areas of Italy; Energy conservation; Energy self-sufficiency in agriculture.
(011) 688861

Caccia, Paolo
Low energy systems and technologies in underdeveloped areas of Italy; Energy conservation; Energy self-sufficiency in agriculture.
(011) 688861

Funaro, Gabriella
Low energy systems and technologies in underdeveloped areas of Italy; Energy conservation; Energy self-sufficiency in agriculture.
(011) 688861

Grosso, Mario
Low energy systems and technologies in underdeveloped areas in Italy; Energy conservation; Energy self-sufficiency in agriculture.
(011) 688861

Ketoff, Andrea
Low energy systems and technologies in underdeveloped areas of Italy; Energy conversion; Energy self-sufficiency in agriculture.
(011) 688861

Matteoli, Lorenzo
Low energy systems and technologies in underdeveloped areas of Italy; Energy conservation; Energy self-sufficiency in agriculture.
(011) 688861

Pagnani, Roberto
Low energy systems and technologies in underdeveloped areas of Italy; Energy conservation; Energy self-sufficiency in agriculture.
(011) 688861

Termomeccanica Italiana S.p.A.

Via del Molo, 1
19100 La Spezia
ITALY

Dellacasa, A.
Prototype of solar generator-desorber for absorption type refrigerating plants; Binary mixtures.

Termosole s.r.l.

Via G. da Castelbolognese, 81
Roma
ITALY

Coffari, Enrico
Manager
Solar space heating; Solar water heating; Heat storage.
(06) 805754

TECNOCASA

Viale Lombardia, 43
Aquila
ITALY

Zambelli, E.
Provides funding for research in passive solar architecture.
620-48

Università degli Studi di Bari
University of Bari

Istituto di Merceologia

Largo A. Braccacreta, 1
70122 Bari
ITALY

Nebbia, B.
Direttore
Solar devices.

Università degli Studi di Bologna
University of Bologna

Via Selmi, 2
40126 Bologna
ITALY

Moggi, L.
Photochemical conversion by means of non-biological systems; Coordination compounds.

Istituto Botanico

Via Irnerio, 42
40126 Bologna
ITALY

Melandri, B. A.
Photoinduced redox reactions in facultative photosynthetic bacteria; Photosynthetic generation of low potential reducing equivalents.
272933

Istituto Chimico G. Ciamician

Bologna
ITALY

Balzani, V.

Facoltà d'Ingegneria
Istituto di Architettura e Urbanistica

Via Risorgimento, 2
Bologna
ITALY

Cuppini, Gianpiero
Professor of Architecture
U.S./Italian solar program; Design, construction, and testing of low income passive solar multi-family housing; Sunspace; Wood heating systems; Summer cooling; Mass (stone) walls; Ventilation through clerestory.

Istituto di Fisica Tecnica
Via Zamboni, 33
40126 Bologna
ITALY

Salvigni, S.
Heat exchangers; Solar collectors.
272933

Università degli Studi di Genova
University of Genoa

Facoltà d'Ingegneria
Via Balbi, 5
16126 Genova
ITALY

Acton, Oreste
Professor
284151

Volta, Ezio
Professor
Solar energy research.

Facoltà d'Ingegneria
Istituto di Fisica Tecnica
Viale Operapia, 11
16145 Genova
ITALY

Pisoni, C.
Solar devices.

Università degli Studi di Milano
University of Milan

Istituto di Scienze Botaniche
Via Festa del Perdono, 7
Milano
ITALY

Forti, G.
Photochemical activity, efficiency, and stability of isolated chloroplast membranes; Photosystems; Electron transport; Fluorescence.

Università degli Studi di Napoli
University of Naples

Corso Umberto, 1
80100 Napoli
ITALY

Di Palma, R.
Researcher
Solar cooling systems.
325060

Monza, E.
Researcher
Solar cooling systems.
325060

Troise, Gioacchino
325060

Facoltà d'Ingegneria
Istituto di Elettrotecnica
Piazzale Tecchio
80121 Napoli
ITALY

Califano, F.
Solar energy conversion.

Istituto di Fisica
Piazzale Tecchio
80121 Napoli
ITALY

Ambrosone, G.
Acquisition of climatic data.

Andretta, A.
Acquisition of climatic data.

Bartoli, B.
Acquisition of climatic data.

Bloisi, F.
Acquisition of climatic data.

Catalanotti, S.
Acquisition of climatic data.

Coluzzi, B.
Acquisition of climatic data.

Cuomo, V.
Acquisition of climatic data.

De Stefano, S.
Acquisition of climatic data.

Formisano, G.
Acquisition of climatic data.

Silvestrini, Vittorio
Solar heating and cooling.

Vicari, I.
Acquisition of climatic data.

Istituto di Fisica Tecnica
Piazzale Tecchio
80121 Napoli
ITALY

Naso, V.
Heat pumps.
325060

Reale, Francesco
Professor
325060

Istituto di Materie Economiche e Giuridiche
Corso Umberto, 1
80100 Napoli
ITALY

Carbone, Vicenzo
Director
Solar laws.
325060

Facoltà di Architettura
Istituto Prog. Architettonica
Corso Umberto, 1
80100 Napoli
ITALY

Cimarra, M. Pica
325060

Facoltà di Scienze
Istituto di Chimica
Corso Umberto, 1
80100 Napoli
ITALY

Bernini, V.
Thermal storage.
325060

Corradini, P.
Thermal storage.
325060

Martino, A.
Thermal storage.
325060

Salerno, V.
Thermal storage.
325060

Vacatello, M.
Thermal storage.
325060

Verde, L.
Thermal storage.
325060

Istituto di Fisica
Facoltà Ingegneria
Piazzale Tecchio
80121 Napoli
ITALY

Fittipaldi, F.
Professor
Developing phase change materials that store heat in solid-to-solid transitions. The completed systems are meant to be used integrally in building walls.

Università degli Studi di Padova
University of Padua

Istituto di Fisica Tecnica
Via F. Marzolo, 3
35100 Padova
ITALY

Bolzan, M.
Absorption cooling systems- open type.
(049) 663533

Brunello, Pierfrancesco
U.S./Italian solar program.
(049) 663533

Lazzarin, Renato
Lithium bromide systems for air cooling; Science council of "Fonti di Energia Alternative"
(049) 663533

Università degli Studi di Palermo
University of Palermo

Facoltà d'Ingegneria
Istituto di Fisica
Via Maqueda, 175
90134 Palermo
ITALY

Barbaro, S.
Professor
Solar radiation.
235651

Coppolino, C.
Professor
Solar radiation.
235651

Leone, C.
Professor
Solar radiation.
235651

Sinagra, E.
Professor
Solar radiation.

Istituto di Fisica Tecnica
Via Maqueda, 175
90134 Palermo
ITALY

Beccali, G.
Solar energy conversion.

Butera, F.
Architecture; Computer modeling; Testing of components; Thermal behavior of buildings; Passive design tools for optimizing multistory buildings.
091/488780/1/2

Università degli Studi di Roma
University of Rome

Dipartimento d'Ingegneria Meccanica
Via Eudossiana, 18
00100 Roma
ITALY

Fanchiotti, Aldo
Professor of Mechanical Engineering
Systems analysis; Agricultural applications; Heat pumps; Instrumentation of passive structures; Trombe test cells; Thermal behavior of materials; Thermal behavior of double-height systems; South to north heat transfer; Monitoring by thermistors, pyranometers, and anemometers.
(06) 8440025

Dipartimento di Chimica Fisica
Piazzale delle Scienze, 5
00100 Roma
ITALY

De Maria, G.
Professor
482796

Istituto di Fisica
Piazzale delle Scienze, 5
00100 Roma
ITALY

Bassani, F.
Solar energy conversion.

Frova, Andrea
(06) 4976-382

Facoltà d'Ingegneria
Istituto di Fisica Tecnica
Piazza S. Pietro in Vincoli, 10
00100 Roma
ITALY

Fontana, D. M.
Professor of Technical Physics

Sovrano, M.
Professor
651400

Laboratorio di Impianti Nucleari
Piazza S. Pietro In Vincoli, 10
00100 Roma
ITALY

Cumo, M.
Collectors.
482796-4755051

Università degli Studi di Sassari
University of Sassari

07100 Sassari, Sardinia
ITALY

Experimental farm that uses solar drying and Fresnel lenses for electricity production.
22066

Università di Cagliari
University of Cagliari

Istituto di Meccanica
Via Universita, 40
09100 Cagliari
Cagliari, Sardegna
ITALY

Bernardini, C.
Professor
66-65-11

Università di Calabria
University of Calabria

Facoltà di Scienze
Arcavata-Rende
87100 Cosenza
ITALY

Conti, M.
Researcher
Linear parabolic concentrator for medium and high temperatures; Parabolic reflectors; Concentrating collectors.

Di Stefano, L.
Researcher
Linear parabolic concentrator for medium and high temperatures; Parabolic reflectors; Concentrating collectors.

Santamato, E.
Researcher
Linear parabolic concentrator for medium and high temperatures; Parabolic reflectors; Concentrating collectors.

Scarmozzino, R.
Researcher
Linear parabolic concentrator for medium and high temperatures; Parabolic reflectors; Concentrating collectors.

Dipartimento di Fisica
Arcavacata-Cosenza
ITALY

Barra, O.
Researcher
Linear parabolic concentrator for medium and high temperatures; Parabolic reflectors; Barra-Constanti Solar Passive System which includes solar chimneys, air flow through ceiling channels, heat absorbing metal sheets, and heat storage in ceilings has been utilized in a prototype house and school.

Università di Catania
University of Catania

Facoltà d'Ingegneria
Via Firenze, 225
Catania
ITALY

Nassr, Y.
Graduate Student
Solar energy conversion.

Istituto di Fisica
Corso Italia,
57 Catania
ITALY

Giaquinta, G.
Solar energy conversion.

Mancini, N. A.
Selective surfaces.

Istituto di Fisica Nucleare
Corso Italia, 57
95100 Catania
ITALY

Rubbino, A.
Solar energy conversion.

Università Commerciale Luigi Bocconi

Istituto de Economica delle Fonti Energia (IEFE)
Via R. Sarfatti, 23
20136 Milano
ITALY

Vacca, Sergio
Director
Scientific Council for 'Fonti di Energia Alternative.
83 131

The International Manufacturers Data Base

International Manufacturers Data Base (INMFG) is a subset of the Manufacturers Data Base maintained by the Solar Energy Information Data Bank (SEIDB) at the Solar Energy Research Institute (SERI). As of October 1980, this data base contains approximately 613 international manufacturers producing solar and solar-related equipment. Solar equipment includes solar systems, components, and materials and products that convert, conserve, store, transfer, measure, or control solar energy in all solar technologies. Data base records include company name, address, telephone, telex, affiliations, executives and their titles, solar exports, tradenames and trademarks, patent information, and solar products. The format presented contains company name, address, and products of June 1980. While these records are updated as frequently as possible, THE INFORMATION CONTAINED NONETHELESS CHANGES RAPIDLY. More complete records may be obtained by contacting SERI International Division (303) 231-1839.

Aerimpianti S.p.A.
Via Bergamo, 21
20135 Milano
ITALY

Solar Cell Power Generation

Aeritalia S.p.A.
Piazzale Tecchio, 51
80125 Napoli
ITALY

Concentrating Collectors

Agea s.r.l.
Piazzale Bossi, 4
Milano
ITALY

Nonconcentrating Collectors
Concentrating Collectors

Alcan Angeletti & Ciucani S.p.A.
Corso Como, 15
Milano
ITALY

Roll Bond Heat Exchangers
Tube-In Absorber Plates
Flat Plate Collectors, Liquid

Alsco Malugani S.p.A.
Via Alserio, 22
20159 Milano
ITALY

Indirect Gain Systems
Thermal Collector Subsystems

Anic S.p.A.
San Donato Milanese
Milano
ITALY

Nonconcentrating Collectors
Energy Storage Systems

Ansaldo S.p.A.
Electric Systems Division
Via Pacinotti, 20
Sampierdarena
16151 Genova
ITALY

Tower Focus Power Plants
Dispersed Solar Electric Power Plants
Domestic Hot Water Systems
Solar Cell Array Field

Colletori Solari Castiglione
Via Solferino, 23
46043 Castiglione
Mantova
ITALY

Flat Plate Collectors, Liquid

Contraves Italiana S.p.A.
Via Tiburtina, 965:
00156 Roma
ITALY

Thermal Collector Subsystems

Costruzioni Termo Meccaniche S.p.A.
Zona Industriale
Oderzo
Treviso
ITALY

Coatings
Concrete Tanks

CTIP Solar S.p.A.
Via Po, 22
00198 Roma
ITALY

Digesters
Domestic Hot Water/Space Heating Systems
Crop Drying Systems
Software

Energy Research Group s.r.l.
Viale dei Mille, 54
20129 Milano
ITALY

Flat Plate Collectors, Liquid

F. Colombo di Alberto Colombo
Via L. Mascheroni, 20
20145 Milano
ITALY

Thermal Collector Subsystems
Active Solar Systems

Fiat Centro Ricerche S.p.A.
Strada Torino, 50
10043 Orbassano Torino
ITALY

Wood Fired Boiler Systems
Organic Decomposition Systems
Large Wind Turbine Generator Systems
Small Wind Turbine Generator Systems
Space Heating Systems
Solar Thermal Power Plants
Flat Plate Collectors, Air

Fonderie Officine San Giorgio Pra
Via G. Ratto, 27
Pra
16157 Genova
ITALY

Space Heating Systems
Domestic Hot Water Systems

Franco Tosi S.p.A.
Piazza Monumento, 12
Legnano
Verona
ITALY

Direct Combustion Systems
Process Heat Systems
Tower Focus Power Plants
Brayton Cycle Engines

Fratelli Parodi
Via Riomaggiore, 16r
Molassana
Genova
ITALY

Domestic Hot Water Systems

FEA F.lli s.n.c.
Via Saluzzo, 51/55
Scarnafigi
Cuneo
ITALY

Absorbers

Gilardini S.p.A.
Flexider Division
Corso Vercelli, 501
Torino
ITALY

Organic Decomposition Systems
Storage Tanks
Collectors, Air

Gruppo Finanziario Termico S.p.A.
P. O. Box 1393
Torino
ITALY

Nonconcentrating Collectors
Energy Storage Systems
Energy Controls and Scientific Equipment

I.R.S.A.P. s.r.l.
Strada Statale 16/4
P O Box 206
45031 Arqua Polesine
Rovigo
ITALY

Radiant Panel Heat Exchangers
Special Building Insulation

Ilva S.a.s di Carlo Silvestro e Co.
Via Milite Ignoto, 27
Sarissola Genova
ITALY

Space Heating Systems
Domestic Hot Water Systems
Active-Passive Hybrid Systems
Thermosiphon Space Heaters
Thermosiphon Water Heaters

Industrie Pirelli S.p.A.
Diversified Products Division

Centro Pirelli Piazza Duca D'Aosta, 3
Milano
ITALY

Flat Plate Collectors, Liquid

Industrie Zanussi, S.p.A.
Viale Treviso, 15
33170 Pordenone
ITALY

Flat Plate Collectors, Liquid
Storage Tanks

Ing. Gaudenzio Cattaneo e. C. Impianti Termici S.a.s.
Baluardo Quintino Sella, 24
Novara
ITALY

Crop Drying Systems
Solar Assisted Heat Pump Systems
Space Heating Systems
Process Hot Water Systems

La Metalli Industriale S.p.A.
Borgo Pinti, 99
P.O. Box 549
50121 Firenze
ITALY

Flat Plate Collectors, Liquid

Laboratori di Strumentazione Industriale S.
Viale Liguria, 20
20143 Milano
ITALY

Instrumentation and Measurement Equipment

Lamborghini Calor S.p.A.
Settore Energia Solare
Dosso S. Agostino
Ferrara
ITALY

Domestic Hot Water Systems
Absorbers

Laminati Alluminio S.p.A.
Corso Como, 15
20154 Milano
ITALY

Thermal Collector Subsystems

Laval S.p.A.
Via Agnello, 6/1
Milano
ITALY

Tube-In Absorber Plates
Energy Storage Systems

Lavorazione Leghe Leggere S.p.A.
Via Agnello, 6/1
20121 Milano
ITALY
Tube-In Absorber Plates

Lowara S.p.A.
Montecchio Maggiore
36075 Vicenza
ITALY
Solar Cell Array Field
Solar Cell System Components

Mabosun S.a.s. di Luigi Botter and Co.
Via Baronio, 17
Cremona
ITALY
Concentrating Collectors
Irrigation Systems

Merloni Igienico Sanitari S.p.A.
Via A. Merloni, 45
Fabriano
Ancona
ITALY
Storage Tanks
Flat Plate Collectors, Liquid
Domestic Hot Water Systems

Officine Fratelli Riello S.p.A.
Via degli Alpini, 1
37045 Legnano
Verona
ITALY
Flat Plate Collectors, Liquid
Domestic Hot Water Systems

Officine Galileo S.p.A.
Via Carlo Bini, 44
50134 Firenze
ITALY
Tower Focus Power Plants
Solar Cell Array Field

Philco Italiana S.p.A.
Via G. Marconi, 14/22
I-24030 Brembate Sopra
Bergamo
ITALY
Thermal Collector Subsystems

Philips S.p.A.
Piazza IV Novembre, 3
20124 Milano
ITALY
Solar Cell Array
Thermal Collector Subsystems
Energy Controls and Scientific Equipment

Polivar S.p.A.
Via Naro, 72
00040 Pomezia
Roma
ITALY
Parabolic Dish Collectors
Flat Plate Collectors, Liquid

Riflexoterm Pansol S.p.A.
Zona Industriale Olbia
07100 Olbia
Sassari
ITALY
Reflective Films
Wind Machines
Coatings

Sant'Andrea Officine Meccaniche e Fonderie
Via Leonardo Da Vinci, 18
P. O. Box Novara Ferrovia
28100 Novara-Cressa
ITALY
Nonconcentrating Collectors

Saunier Duval Italia S.p.A.
Via Ariberto, 3
20123 Milano
ITALY
Thermal Collector Subsystems

Sgs/Ates Componenti Elettronici S.p.A.
Via Olivetti, 2
Agrate
Brianza
ITALY
Solar Cells

Sile s.r.l. - Industrie Costruzioni Termoidrauliche
Casella Postale 254
31100 Treviso
ITALY
Storage Tanks

Societa Italiana Apparecchi di Precisione
Via Massarenti, 412/2
P O Box 296
Bologna
ITALY
Instrumentation and Measurement Equipment

Solaris S.p.A.
Via Carlo Bini, 44
50100 Firenze
ITALY
Solar Cells

Sopac Italiano S.p.A.
Via Pietro Maocagni, 2
Milano
ITALY
Instrumentation and Measurement Equipment
Controllers

Sunlife S.p.A.
Via del Maglio, 2
Pordenone
ITALY
Domestic Hot Water Systems
Space Heating Systems
Swimming Pool Heating Systems
Crop Drying Systems

Tecnosol s.r.l.
Via Assarotti, 7
16121 Genova
ITALY

Termoalfa s.r.l.
Via D. Fiasella, 1/3
16121 Genova
ITALY

Termomeccanica Italiana S.p.A.
Via del Molo, 1
19100 La Spezia
ITALY
Solar Cell Power Generation
Solar Stills
Solar Assisted Heat Pump Systems

Termosole s.r.l.
Via G. da Castelbolognese, 81
Roma
ITALY
Storage Tanks
Thermal Collector Subsystems

Vema Elettropompe S.p.A.
Via Marco Polo, 26
P O Box 385
Mestrino
Padova
ITALY
Energy Controls and Scientific Equipment
Pumps/Circulators

The International Projects Data Base

The ongoing International Projects Data Base (INPRO) development task, begun in August 1979, maintains approximately 714 international programs and projects as of October 1980. Interfacing with the International Contacts Data Base, this file contains information on solar energy programs undertaken by foreign countries and international organizations. Included are outstanding programs mentioned in professional journals, conference proceedings, and technical reports published since August 1978 that are representative of specific technological applications or programs of importance to the United States in its relationship with other nations. International solar activities monitored by the Solar Energy Research Institute (SERI) for the past 18 months are also a part of INPRO. Actual installations resulting from these programs are stored in the Installation Sites (SITES) Data Base. Data Base records, which can be searched across several variables, include project titles, acronyms, numbers, type of project activity, location, description, budget, beginning and completion dates, country sponsorship, and participants and their affiliations. The format presented contains the project identification number, title, location, beginning date, description, budget, and participants of June 1980. While these records are updated as frequently as possible, THE INFORMATION CONTAINED NONETHELESS CHANGES RAPIDLY. More complete records may be obtained by contacting SERI International Division (303) 231-1839.

Independent Projects

00202

Energy Savings from Solid Urban Waste Disposal Systems in Italy

LOCATION:

Milano

DESCRIPTION:

Energy is recovered through bioconversion of solid urban wastes to methane.

PARTICIPANT:

Ente Nazionale per l'Energia Elettrica (ENEL)
Oversight and Evaluation (principal)
Saullo, Angelo
Gruppo per le Ricerche Commerciali e della Programmazione
Via Azario, 1
20123 Milano
ITALY

00203

Lamps for Remote Roads

LOCATION:

Venezia

DESCRIPTION:

Highway lamps designed for remote regions have been developed. Model 7181-D utilizes solar cell panels on the upper external surface of the frame. The cells charge sets of batteries. The batteries are arranged in three different groups, each one being automatically started up when the charge in the preceeding one is exhausted. The model "Condor" is designed with an upper horizontal panel of photovoltaic cells, which collect sufficient energy to charge batteries. The lamp is made of steel satinized on the outside with three mirror-like surfaces in the lower face of the horizontal panels and in the two surfaces around the lamp.

PARTICIPANT:

Design (sole)
Vianello, Vinicio
Industrial Designer
Mestre del rio Storto, 3
30170 Venezia
ITALY

00204

A Swedish Solar-Heated House in Capri

START DATE: 1960

LOCATION:

Anacapri, on the Island of Capri

DESCRIPTION:

In 1960, the Swedish Royal Academy of Science erected a building for the Swedish Astrophysical Station on the Isle of Capri. This building is provided with a solar space heating system, a solar hot water system and cooling equipment. 70% of the heat requirement is met with the solar space heating system.

PARTICIPANT:

Swedish Astrophysical Station
Management (principal)
Anacapri
Island of Capri
ITALY

00205
Cavity-Type Surfaces for Solar Collectors

LOCATION:

Torino

DESCRIPTION:

The optical shape of the surface of solar energy concentrating collectors is investigated. The multi-reflection effect is examined using a macrocavity analysis. A thermotechnical analysis of the system is also presented. To determine the optimum conditions for heat transfer and maximization of the energy radiative balance.

PARTICIPANTS:

Politecnico di Torino
Research (principal)
Russo, G.
Istituto di Fisica Sperimentale
Corso Duca degli Abruzzi, 24
10129 Torino
ITALY

Politecnico di Torino
Research (principal)
Demichelis, F.
Istituto di Fisica Sperimentale
Corso Duca degli Abruzzi, 24
10129 Torino
ITALY

00206
Solar Space Heating/Cooling and Domestic Water Heating

LOCATION:

Rome

END DATE: 1979

DESCRIPTION:

One of the largest solar plants in the world has been developed. About one quarter of the round 2,000 sq.m collector total surface has been installed on the roof of the company's new building. These are open parabolic cylinder mirrors with a 1 m opening facing and following the sun. New collectors are being developed for the remaining collector area and will be erected on the company's parking lot. The plant has been installed for a cold peak load of 670 kW and in winter shall deliver 1000 kW for space conditioning and water heating. It is expected that the plant will produce around 1.5 million kWh per year. About 170,000 kg of oil would otherwise be needed to achieve this. An absorber cooling machine is connected to the air conditioning plant.

PARTICIPANT:

Contraves Italiana (CONTRAVES)
Host/Beneficiary (sole)
Via Tiburtina, 965
00156 Roma
ITALY

00207
Thermal Conversion Equipment

LOCATION:

Sant' Ilario

DESCRIPTION:

The problems of solar thermal energy and design of radiant to thermal conversion equipment, receivers, are being studied. An interesting characteristic of the receiver design is the energy trapping, by the use of open-ended cylinders of Pyrex glass inside the receiver. This reduces convective and reradiation losses, with a subsequent potential increase in receiver heat flux, coolant outlet temperature, and efficiency.

PARTICIPANT:

Ansaldo S.p.A.
Management (principal)
Francia, Giovanni
Via Pacinotti, 20
Sampierdarena
16151 Genova
ITALY

00208
Farm Waste Converted to Power and Heat with New Fiat Engine

LOCATION:

Cervia (near Rimini), Italy

DESCRIPTION:

Methane and raw alcohol derived from animal and plant waste are being used on Swiss, Italian and Danish farms to generate power and heat using a Fiat Engine called TOTEM. The gas is produced from animal droppings, and the 80% raw alcohol from decaying vegetable waste. Both can be burned in the TOTEM (total energy module) engine to provide electric power for farm machinery and buildings, and heat for the greenhouses. TOTEM, which can be powered with methane, methanol, liquid petroleum gas (lpg), manufactured gas, biogas, or alcohol, incorporates a heat exchanger into its design to recover heat from the exhaust and alternator. The waste from 100 cattle can supply 15kW power and 33,000 kcals/h heat on a 24 hour/day operation.

PARTICIPANT:

Fiat Centro Ricerche S.p.A. (FIAT)
Management (principal)
Strada Torino, 50
10043 Orbassano
Torino
ITALY

00209
Drilling for Geothermal Energy in the Tuscan Zone

START DATE: 1979 END DATE: 1984

LOCATION:

Larderello in Tuscany, northern Italy

DESCRIPTION:

The Italian state agencies for electric power (ENEL) and hydrocarbons (ENI) have started drilling the world's deepest (5,000 l.c.) well for geothermal energy. Capacity in the Tuscan zone is 420 MW and production is 2.5 million kWh annually.

BUDGET:

IT L 150,000 million

PARTICIPANTS:

Ente Nazionale per l'Energia Elettrica (ENEL)
Management (joint)
Via G. B. Martini, 3
00100 Roma
ITALY

Consiglio Nazionale delle Ricerche (CNR)
Funding (principal)
Piazzale delle Scienze, 7
00185 Roma
ITALY

Ente Nazionale Idrocarburi (ENI)
Management (joint)
Division for Planning and Development
Piazza Enrico Mattei, 1
00144 Roma
ITALY

00211
Sardinia 2010

START DATE: 1980

LOCATION:

Island of Sardinia

DESCRIPTION:

A general assessment of Sardinia's energy future was made. The objective was to identify problems associated with the transition to a distributed (decentralized) energy system. The institutional impact was assessed. Conservation and renewable sources (solar heating and cooling, passive design, wind, hydro, biomass, photovoltaics, geothermal and cogeneration) were considered.

BUDGET:

US$ 40,000

PARTICIPANTS:

SOFTEC
Management (principal)
Sistemi e Tecnologie a Basso Contenuto di Energia
Via Marco Polo, 28
Torino
ITALY

SOFTEC
Research (joint)
Matteoli, Lorenzo
Sistemi e Tecnologie a Basso Contenuto di Energia
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SOFTEC
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SOFTEC
Research (joint)
Funaro, Gabriella
Sistemi e Tecnologie a Basso Contenuto di Energia
Via Marco Polo, 28
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SOFTEC
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Grosso, Mario
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SOFTEC
Research (joint)
Ketoff, Andrea
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Via Marco Polo, 28
Torino
ITALY

SOFTEC
Research (joint)
Pagnani, Roberto
Sistemi e Tecnologie a Basso Contenuto di Energia
Via Marco Polo, 28
Torino
ITALY

00212

Drying of Agricultural Produce

LOCATION:

Experimental Farm of the University of Sassari, Ottava, Sardinia, Italy

DESCRIPTION:

A drying system transforms agricultural by-products into food for sheep. The solar source supplies both the hot air necessary for the drying process and the electricity consumed by the system. The hot air producing section is equipped with 30 flat plate collectors for a total area of 70 sq. m acting both as component of the solar system and walls of a storehouse. The estimated amount of energy collected and utilized in one year is around 25 million kcal. A 13 cu. m rock-bed works as the heat storage. The electricity producing section is equipped with three rows of Fresnel lens concentrating collectors with a total area of 48 sq. m. This solar plant - the first of its kind in Europe - demonstrates the possibility of building solar systems which are autonomous (able to operate when no conventional energy is available) and complex (associating the production of electricity with the generation of heat).

PARTICIPANTS:

CTIP Solar S.p.A.
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Via Po, 22
00198 Roma
ITALY

Consiglio Nazionale delle Ricerche (CNR)
Management (principal)
Piazzale delle Scienze, 7
00185 Roma
ITALY

00213

Solar Energy Plant for an Agricultural Estate

LOCATION:

Agricultural Estate, Aimonetta, near Alessandria in the Piedmont Region of northern Italy

DESCRIPTION:

Energy consumption on the farm was studied and the feasibility of various alternative energy applications were evaluated. In particular, the following were examined: 1) hot process water for milking and calf-rearing section, 2) drying of maize and sorghum, 3) hot water for sanitation, 4) central heating, 5) forage drying and 6) greenhouse heating. Cost-benefit analysis was performed on various technologies: solar panels, biogas production, etc. The system chosen utilizes 200 sq. m of panels for hot process water. The project provides for the conversion of an existing underground storage tank (500 sq. m) for inter-seasonal storage. The collectors will supply 50% of energy required to heat the water.

PARTICIPANTS:

CTIP Solar S.p.A.
Design (principal)
Via Po, 22
00198 Roma
ITALY

Officine Fratelli Riello S.p.A. (OFR)
Supply (sole)
Via degli Alpini, 1
37045 Legnano
Verona
ITALY

00214

Solar Energy for Tobacco Drying

LOCATION:

Pistrino, in the province of Perugia in north central Italy

DESCRIPTION:

The system was designed for the Tobacco Growers Cooperative. The solar energy plant basically consists of two main circuits. The primary circuit has two batteries of concentrating collectors, each with twelve elements, for a total collection area of 74 sq. m.

In the secondary circuit, the hot water is sent to a water-air heat exchanger system in the cell's drying air conduit, between the external air intake and the conventional hot air generator. The plant also has a heat recovery system for the air coming from the drying section. The solar plant can, on the average, supply about 25% of the seasonal requirements of the drying section. Studies are presently underway to examine the possibilites of using the same solar plant during periods when it is not required for tobacco curing, to supplement the energy requirements for greenhouse heating.

PARTICIPANT:

CTIP Solar S.p.A.
Management (principal)
Via Po, 22
00198 Roma
ITALY

00215

The Application of Solar Energy in Animal Husbandry

LOCATION:

Maccarese Farm, near Rome

DESCRIPTION:

A solar heating system augments the traditional gas heating system to provide warm water (60 C) to mix with an artificial milk powder that is fed to the 400 calves on the farm. The system consists of 40 sq. m. of collectors connected to a storage tank with a capacity of 2000 liters. The solar energy system is able to supply 85% of the annual heat requirement.

PARTICIPANT:

CTIP Solar S.p.A.
Design (joint)
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00198 Roma
ITALY

00216

Energy Plants for Two Municipal Nursery Schools in Rome

LOCATION:

Via Romagnoli and Via delle Galline Bianche, Rome

DESCRIPTION:

Two systems designed by CTIP Solar were installed in two nursery schools in Rome. The systems provide all the hot water required and part of the space heating. The plant for the nursery school on Via Romagnoli is equipped with 14 single-glazed flat plate collectors having a total surface area of 21 sq. m The plant for the nursery school on Via delle Galline Bianche is supplied with 12 parabolic linear focusing concentrators, having a surface area of 22 sq. m.

PARTICIPANT:

CTIP Solar S.p.A.
Design (joint)
Via Po, 22
00198 Roma
ITALY

00217

Solar Air Conditioning for Telephone Exchange Buildings

LOCATION:

Rome

DESCRIPTION:

The possibility of using solar energy for the air conditioning of telephone exchange buildings built according to a specially developed prefabrication system was studied. The project was carried out in two phases: 1) design of a component, acting as both a solar energy collector and a roofing element, suitable for the new prefabrication system and provided with a metal plate able to collect solar energy at low to medium temperatures; and 2) design of a solar energy cooling system. Several designs were developed and compared. It was found that a 200 sq. m area can provide 40-50% of the total annual cooling needs of the telephone exchange building.

PARTICIPANT:

CTIP Solar S.p.A.
Design (principal)
Via Po, 22
00198 Roma
ITALY

00218

Stationary Reflector Tracking Absorber (SRTA)

LOCATION:

Rome

DESCRIPTION:

A system to produce heat at high temperatures through the use of solar energy. The system, known as SRTA (Stationary Reflector Tracking Absorber) consists of a fixed half spherical reflector which concentrates the sun rays on an absorber that moves so as to remain always in focus.

The advantage of the SRTA system is the fixed reflecto SRTA can be used in a field of medium power generation, i.e. with a concentration ratio of solar energy between 50 and 200 and, at present, with generated power up to 500 kW. The system is aimed at the production of heat at high temperatures for direct use or for transformation to electrical or mechanical power.

PARTICIPANT:

CTIP Solar S.p.A.
Design (principal)
Via Po, 22
00198 Roma
ITALY

00219

A Plant for the Anaerobic Digestion of Municipal Sludge with Production of Biologic Gas

LOCATION:

An Island location in Southern Italy to be selected

DESCRIPTION:

As part of the general drive to reduce energy consumption, CTIP Solar has begun to study the possibilities of utilizing certain alternative fuels for industrial processes. A plant to produce methane gas through the anaerobic digestion of sludge from municipal sewage will be designed. Plant is scheduled for an island location in southern Italy and is designed to provide up to 2500 cu. m/day (peak) of biogas to be used in gas-driven power generators. The electric energy generated will cover all the energy requirements of the aerators used in activited sludge treatment (4200 kWh/day).

PARTICIPANT:

CTIP Solar S.p.A.
Design (principal)
Via Po, 22
00198 Roma
ITALY

00220

Wide Ranging Study of Energy Consumption in Italian Agriculture and the possibilities of Solar Energy Applications

START DATE: August 1976
END DATE: January 1978

LOCATION:

Rome

DESCRIPTION:

In order to identify sectors where solar energy could be applied, it was necessary to have a detailed picture of energy inputs in Italian agriculture. CTIP Solar carefully analyzed those items which make up the agricultural energy balance (greenhouses, drying and curing, fertilizers, etc.). The data collected gave a fairly clear overview of energy in the agricultural sector. The study consisted of the collection of data on several hundred solar energy plants that are currently in use in agriculture throughout the world. The data collected has been assembled into information sheets in the following categories; greenhouses, drying and curing, livestock raising, rural housing, irrigation, desalination and biogas. Economic analyses were carried out. The study identifies ways to encourage the use of solar energy technologies in agriculture.

PARTICIPANT:

CTIP Solar S.p.A.
Design (principal)
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ITALY

00221

Solar Energy for the Post Office Building at S. Aventrace, Cagliari, Sardinia

LOCATION:

S. Aventrace, Cagliari, Sardinia

DESCRIPTION:

A study on the possibility of using solar energy for heating and air conditioning requirements of a new post office building at S. Aventrace, Cagliari, Sardinia. A preliminary calculation was made of the average annual amount of solar energy that can be collected in Cagliari. The annual thermal requirements of the building were then calculated on the basis of the seasonal thermal load variations and thermohygrometric factors. An economic analysis followed, for a solar plant having an expected life of about 30 years, to calculate the net savings achievable with different plant sizes.

PARTICIPANT:

CTIP Solar S.p.A.
Design (principal)
Via Po, 22
00198 Roma
ITALY

00222
A Study on Concentrating Collectors

LOCATION:

Rome

DESCRIPTION:

Concentrating collectors are examined in a three part study: 1) the collection of general information on solar energy, its possible applications, and the system of concentration for widening its range of applications; 2) the comparision of high concentration ratio collection systems, particularly solar furnaces and central tower systems; and 3) analysis of various existing types of low and medium concentration ratio collectors.

PARTICIPANT:

CTIP Solar S.p.A.
Design (principal)
Via Po, 22
00198 Roma
ITALY

00223
The Problem of Climatic Models

LOCATION:

Rome

DESCRIPTION:

In designing solar energy systems, it is essential to know how much solar energy is available each day in a given location. Calculation methods have been developed to map insolation for a given region and to determine the potential insolation distribution for any given location. The statistical approach (the Montecarlo Method) is used.

PARTICIPANT:

CTIP Solar S.p.A.
Management (principal)
Via Po, 22
00198 Roma
ITALY

00224
Solar Energy for Temporary Housing

LOCATION:

Rome

DESCRIPTION:

The problem of supplying power to temporary housing has been studied. This study has come up with technical and design solutions both for single houses and for housing groups, with indications on the related energy requirements. Possibility of using solar energy for water heating and space heating and cooling has been considered. Simple technologies: wall-air collectors or natural circulation water collectors have been investigated.

00225
Solar Energy Installation For a Factory near Roma

START DATE: 1978

LOCATION:

Rome

DESCRIPTION:

Europe's largest solar energy installation designed to partially run the space heating and cooling system including a 1-MW refrigeration unit. Collector area is 2000 sq. m. Of this, 1500 sq. m will be "integrated roof" type of tracking concentrating collectors under protective glazing; the remainder will be of the conventional roof top or sealed collector type.

BUDGET:

55,000 Pounds (United Kingdom)

00226
Solar-Powered Steam Turbine Cars

DESCRIPTION:

Solar collectors are used to produce steam to drive a turbine powered car. The accelerator is a valve controlling the amount of water available for steam production.

PARTICIPANT:

Lancia
Research (sole)
ITALY

00227
"Fisica del Clima" (Climatic Physics)

START DATE: September 1977

END DATE: April 1978

LOCATION:

Fiumicino, West of Rome on the Tyrrhenian coast

DESCRIPTION:

The correlation relationship between global and net solar radiation is presented and discussed.

After a brief description of the measurement system employed in the locality of Fiumicino at the Leonardo Da Vinci Intercontinental Airport, the measurements carried out month by month in the period September 1977 - April 1978 are shown. The results achieved and the conclusions to be derived, as far as the above mentioned correlation and its seasonal variation are concerned, are presented and discussed.

PARTICIPANTS:

Consiglio Nazionale delle Ricerche (CNR)
Management (joint)
Guerrini, A.
Istituto Fisica Atmosfera
Piazzale Luigi Sturzo, 31
00144 Roma
ITALY

Consiglio Nazionale delle Ricerche (CNR)
Management (joint)
Lavagnini, A.
Istituto di Fisica
Piazzale delle Scienze, 7
00144 Roma
ITALY

Consiglio Nazionale delle Ricerche (CNR)
Management (joint)
Vivona, Franco M.
Head of Research
Istituto Fisica Atmosfera
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00144 Roma
ITALY

00229

Energy Saving Project

LOCATION:

FIAT factories around the world

DESCRIPTION:

Objective of the project is to design factories and public buildings optimized in energy conservation by the analysis of systems at the most detailed level, characterization of the largest number of energy consumption situations and identification of the optimization in the design phase as well as in the operation of production and service facilities.

BUDGET:

US$ 8.5 million

PARTICIPANT:

Fiat Centro Ricerche S.p.A. (FIAT)
Management (principal)
Strada Torino, 50
10043 Orbassano
Torino
ITALY

00230

Helioelectric Generating Plant Designed to Provide 1-MW of Electric Power to a Grid Network

START DATE: November 1977

END DATE: November 1980

LOCATION:

Catania, Island of Sicily, off the coast of southern Italy

DESCRIPTION:

The power tower is comprised of a central receiver situated on top of a tower that collects reflected radiation from a field of heliostats. The objectives of the project are to demonstrate the feasibility of such a power plant, to optimize operation procedures, and to minimize costs and investigate export opportunities for this type of plant. The heliostat field with centralized suntracking and monitoring systems were supplied by MBB (Federal Republic of Germany) and Cethel (France). The steel tower that supports the receiver was also supplied by MBB. The receiver, based on design work of the late Giovanni Francia (University of Genoa, Italy), was provided by Ansaldo (Italy) as was the steam cycle system including turbine, condenser, water storage tank pumps, etc. Cethel provided the molten salt storage system and most of the electrical system. The plant will produce 1-MW of electrical energy and will be connected to a grid.

BUDGET:

US$ 8.5 Million

PARTICIPANTS:

Ansaldo S.p.A.
Supply (joint)
Via Pacinotti, 20
Sampierdarena
16151 Genova
ITALY

Ente Nazionale per l'Energia Elettrica (ENEL)
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Saullo, Angelo
Gruppo per le Ricerche Commerciali e della Programmazione
Via Azario, 1
20123 Milano
ITALY

European Communities (EC)
Funding (joint)
200 rue de la Loi
B-1049 Bruxelles
BELGIUM

Italy, Government of
Funding (joint)
Rome
ITALY

Germany, Federal Republic of, Government of (FRG)
Funding (joint)
Bonn
FEDERAL REPUBLIC OF GERMANY

France, Government of
Funding (joint)
Paris
FRANCE

Messerschmitt - Bolkow - Blohm GmbH (MBB)
Supply (joint)
Postfach 801169
8000 Munchen
GERMANY, FEDERAL REPUBLIC OF

Cethel (CETHEL)
Supply (joint)
54 Avenue Hoche
75008 Paris
FRANCE

00272
Solar Air Collectors and Systems

LOCATION:

Rome

DESCRIPTION:

This study of solar air collectors and systems is in three sections: collection of general information on flat plate collectors; detailed examination of the operation and performance of each type of air collector; and design, operation, and components of air systems.

PARTICIPANT:

CTIP Solar S.p.A.
Management (principal)
Via Po, 22
00198 Roma
ITALY

00273
The End Uses of Energy in Italy

START DATE: 1964

END DATE: 1975

LOCATION:

Rome

DESCRIPTION:

End use is separated into two categories: thermal and non-thermal end uses. Thermal is broken down further into temperature ranges: low, meduim and high (250 degrees C).

Non-thermal refers to the demand for mechanical uses (transportation and electricity). End use needs for various sectors were identified to provide a factual framework for national energy policy decisions.

PARTICIPANTS:

Ente Nazionale Idrocarburi (ENI)
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Division for Planning and Development
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Colitti, Marcello
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Piazza Enrico Mattei, 1
00144 Roma
ITALY

00274
Small Solar Power Plant Demonstration (SPSS)

START DATE: 1977

END DATE: 1983

LOCATION:

Almeria

DESCRIPTION:

The objective of this project is to demonstrate the feasibility of small central station electricity generation from a solar heat source. Two different engineering concepts have been selected for a comparison of performance, reliability and economics on the same site.

These two systems may be described as follows: 1) Central Receiver System: An array of sun-tracking mirrors focus solar radiation onto a small receiver centrally located at the top of a tower. Heat created is transferred to a fluid which, in a subsequent heat exchanger, produces steam that powers a conventional steam engine, with an output of 500 kW of electricity. 2) Distributed Collector System: Solar radiation falls onto a large number of parabolic troughs and is concentrated onto pipework containing a working fluid that transfers the heat to a conventional steam turbine. The collector field will be divided into two sub-systems so that different designs (US and European) may be compared.

BUDGET:

US$ 39 million

PARTICIPANTS:

Deutsche Forschungs-und Versuchsanstalt fur Luft-und Raumfahrte V. (DFVLR)
Management (principal)
Linder Hohe
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7000 Stuttgart
FEDERAL REPUBLIC OF GERMANY

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Consiglio Nazionale delle Ricerche (CNR)
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Funding (principal)
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Host/Beneficiary (sole)
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SPAIN

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Vienna
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Greece, Government of
Oversight and Evaluation (joint)
Athens
GREECE

Sweden, Government of
Oversight and Evaluation (joint)
Stockholm
SWEDEN

Switzerland, Government of
Oversight and Evaluation (joint)
Bern
SWITZERLAND

Centro de Estudios de la energia (CEE)
Oversight and Evaluation (joint)
Augustin de Foxa 29
Madrid-33
SPAIN

Atomic Energy Authority
Oversight and Evaluation (joint)
11 Charles II Street
London SW1Y 4QP
UNITED KINGDOM

Int. Atomreaktorbau GmbH (INTERATOM)
Design (principal)
Riedrich Ebert Strasse
Bergisch Gladbach
Nordrhein-Westfalen
FEDERAL REPUBLIC OF GERMANY

Acurex Corporation
Design (principal)
Alternate Energy Division
485 Clyde Avenue
Mountain View, CA 94042
UNITED STATES

00281

Hydrogen Production from Water

START DATE: 1977

END DATE: 1981

LOCATION:

IEA Countries

DESCRIPTION:

Thermochemical processes for the production of hydrogen and projections of the market for hydrogen are being evaluated. A laboratory for complete thermochemical processes was installed at the Joint Research Center in Ispra, Italy. Research topics include advanced alkaline and solid polymer water electrolysis and solid oxide water vapor electrolysis. A report to be published in 1980, summarizes the market evaluation aspect of the project. Operating Agents for International Energy Agency are European Communities, Federal Republic of Germany, United States, and Italy.

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Germany, Federal Republic of, Government of (FRG)
Management (joint)
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National Research Council, The (NRC)
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CANADA

Stichting Energieonderzoek Centrum
Oversight and Evaluation (joint)
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Swedish Council for Building Research
Oversight and Evaluation (joint)
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S-11230 Stockholm
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Switzerland, Government of
Oversight and Evaluation (joint)
Office Federal de l'Economie Energetique
Dern
SWITZERLAND

Atomic Energy Authority
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11 Charles II Street
London SW1Y 4QP
UNITED KINGDOM

Japan, Government of
Oversight and Evaluation (joint)
Tokoyo
JAPAN

00282

Solar Energy Pilot Study

START DATE: 1973

END DATE: 1980

LOCATION:

Participating countries of the CCMS Pilot Study on solar energy

DESCRIPTION:

This project is in the 2-year follow-up period (1978-1980) to evaluate the Pilot Study. The Study was established to encourage development of cost-effective applications of solar energy for heating and cooling residential, commercial, industrial, agricultural and public buildings. Information was exchanged concerning solar heating, cooling and domestic hot water systems. The Mediterranean Applications Group focused particularly on passive solar techniques, the adaptability of traditional architecture to passive and active systems, and other related aspects of the utilization of solar energy in Italy and other Mediterranean countries. Reports of national programs were presented at meetings held from 1974-1978. Participants have recommended continuing this type of information exchange for researchers to share their experiences with different systems and possibly avoid duplication of efforts. The lead country is the United States, with 22 countries and the EC also participating.

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UNITED KINGDOM

New Zealand, Government of
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Wellington
NEW ZEALAND

The Netherlands, Government of
Oversight and Evaluation (joint)
Amsterdam
THE NETHERLANDS

Denmark, Government of
Management (joint)
Copenhagen
DENMARK

France, Government of
Management (joint)
Paris
FRANCE

Canada, Government of
Oversight and Evaluation (joint)
Ottawa
CANADA

Israel, Government of
Oversight and Evaluation (joint)
Jerusalem
ISRAEL

00283
Juliani Leather Tanning Factory

START DATE: 1980

END DATE: June 1980

LOCATION:

20 miles south of Salerno, southern Italy

DESCRIPTION:

This is the first Italian tannery to use solar energy. 1,050 collectors (19,286 sq. m) will provide 70-80% of the energy for hot water requirements of 37,500 gallons per day.

BUDGET:

US $ 500,000

PARTICIPANT:

American Heliothermal Corporation (AHC)
Supply (sole)
2625 South Santa Fe Drive
Denver, CO 80223
UNITED STATES

00284
Parametric Analysis of Solar Energy Systems for Room Heating and Cooling Applications

START DATE: July 1976

END DATE: September 1978

LOCATION:

Pordenone

DESCRIPTION:

The objective of this project was to evaluate the efficiency of a working solar heating and cooling system. An analytical study of utilization coefficient data obtained from a mathematical simulation model was performed. Different collector types were evaluated on efficiency levels based on tilt and direction. Computer simulations were performed on two systems, one located in Susegana, the other in Porcia.

BUDGET:

57,470,000 Lire (Italy); EC contribution 49%.

PARTICIPANTS:

Industrie Zanussi S.p.A.
Management (principal)
Renzio, Mario De
Director Gruppo del Ricerca e Sviluppo
Viale Treviso, 15
33170 Pordenone
ITALY

European Communities (EC)
Funding (level unknown)
200 rue de la Loi
B-1049 Bruxelles
BELGIUM

00285
Seasonal Storage of Solar Energy through Heating of Subsoil with a Cylinder Buried in the Ground

START DATE: January 1978

END DATE: June 1978

LOCATION:

Orbassano

DESCRIPTION:

The system stores heat by a centrifugal flow of the fluid used to transport the thermal energy, to obtain a core at a temperature higher than the peripheral zones, for reducing heat escape by conduction. Centripetal circulation of the fluid spilled from the core allows heat utilization.

A model of the system was completed and was tested. System efficiency (utilizable energy/stored energy) was studied based on input and output of the storage system. A cost analysis was performed to find ways to decrease capital investment to make the system cost-competitive with other systems. The project was divided into eight phases: Computer simulation, Optimization criteria, Design of storage model, Construction of storage model, Preliminary tests, Development testing, Design and construction—single element in actual size, Actual size single element testing. As of 30 June 1978, the project had progressed halfway through the fourth phase.

BUDGET:

75,000,000 Lire (Italy); EC contribution 50%

PARTICIPANTS:

European Communities (EC)
Funding (level unknown)
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Torino
ITALY

00286

Study and Construction of a Solar Prototype Desorber-Generator for Absorption Type Refrigerating Plants using Binary Mixtures

START DATE: January 1978

END DATE: December 1979

LOCATION:

La Spezia

DESCRIPTION:

An absorption prototype either for air conditioning or industrial refrigeration with a desorber-generator that utilizes a primary circuit connected with collectors was designed. The generator utilizes a binary mixture that has a good thermodynamic cycle efficiency at expected temperatures of 85-90 C. Water-ammonia and Freon solutions were compared. The generator-desorber is composed of an evaporating circuit having a pre-fixed volume, including special high thermal exchange tube bundles, carrying the liquid from the primary circuit. The type of collector was based on products in the market of suitable design for a primary circuit temperature in the required range and a surface area of 300 sq. m.

BUDGET: 141,940,000 Lire (Italy); EC contribution 28%.

PARTICIPANTS:

European Communities (EC)
Funding (level unknown)
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BELGIUM

Termomeccanica Italiana S.p.A.
Management (sole)
Dellacasa, A.
Via del Molo, 1
19100 La Spezia
ITALY

00287

Process of Deposition of Single Crystal Silicon Directly from Vapor Phase

START DATE: September 1976

END DATE: March 1978

LOCATION:

Novara

DESCRIPTION:

The research program was divided into the following steps: a) Determination of the critical deposition conditions at which single crystal growth occurs, b) Systematic investigations of the role of different process parameters (total gas flow rate, composition of the mixture, deposition temperature) on the growth rate, c) Study of the macroscopic and microscopic defects which occur during the growth of the single crystal in order to maximize the overall efficiency of the process and reduce the losses due to lack of crystallinity, d) Analysis of structural and electrical properties of the p-type B doped crystals, e) Evaluation of solar cells prepared with these crystals, f) Final technical and economical evaluation of the overall process. Research on sections a) -c) was completed and the process was shown to be technically feasible up to crystal diameters of about 2 cm.

BUDGET:

225,000,000 Lire (Italy); EC contribution 31%.

PARTICIPANTS:

European Communities (EC)
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EURATOM
Joint Research Center
21010 Ispra
Varese
ITALY

European Communities (EC)
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00288

Photoinduced Reactions in Facultative Photosynthetic Bacteria with Special Attention to Photosynthetic Generation of Low Potential Reducing Equivalent

START DATE: January 1978

END DATE: June 1979

LOCATION:

Bologna

DESCRIPTION:

Three main problems were approached utilizing mutants on the facultative photosynthetic bacterium Rps. capsulata: a) Mechanism of photoproduction of reducing equivalents, b) Requirement of respiratory flavoproteins for the donation of reducing equivalents for the reduction of nitrogen or for hydrogen evolution, c) Dissimalatory hydrogen metabolism (by spectroscopy). The capability of flavoprotein mutants to utilize hydrogen as photoreductant for pyridine nucleotides was tested.

BUDGET:

55,117,000 Lire (Italy); EC contribution 45%.

PARTICIPANTS:

European Communities (EC)
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40126 Bologna
ITALY

00289

Solar Radiation Measurements at Different Altitudes for Different Wavelengths

START DATE: January 1978

END DATE: June 1979

LOCATION:

Macerata

DESCRIPTION:

The coefficient of transmission for different wavelengths and in relation to cloud conditions was studied. Measurement stations were constructed at an altitude of 340 m and 2200 m. Radiation data (global, diffuse, and direct) are now collected on an hourly basis.

BUDGET:

34,865,000 Lire (Italy); EC contribution 45%.

PARTICIPANTS:

European Communities (EC)
Funding (level unknown)
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BELGIUM

Osservatoria Geofisico
Management (principal)
Murri, A.
Centro Provinciale di Ecologia e Climatologia
Macerata
ITALY

00290

Assistance to Install Complementary Equipment to Existing Stations

START DATE: January 1978

END DATE: June 1979

LOCATION:

Rome

DESCRIPTION:

The project was carried out in two steps: 1) Reference standard stations were installed at Vigna di Valle (near Rome) with 10 recording stations, 2) The remaining 20 stations were then installed. The main station was equipped with 4 pyranometers for measuring the spectral global solar radiation, 4 pyranometers for measuring spectral direct radiation, instruments to measure counter radiation, outgoing radiation from ground surface, and net radiation. The satellite stations were equipped with instruments to measure global radiation. From data collected at these stations, a statistical analysis of the solar energy distribution in Italy can be made.

BUDGET:

60,000,000 Lire (Italy); EC contribution 50%.

PARTICIPANTS:

Consiglio Nazionale delle Ricerche (CNR)
Management (principal)
Vivona, Franco M.
Head of Research
Istituto Fisica Atmosfera
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00291

Test Reference Years Project (TRY)

START DATE: January 1978

END DATE: June 1979

LOCATION:

Rome

DESCRIPTION:

Project objective was to produce recommendations for one selection method for solar radiation measurement Test Reference Years (TRY's) for solar energy system simulations. The reference station at Vigna di Valle was used to generate radiation data. Different TRY's were compared both by climatological properties and by using them as input to solar simulation calculations.

BUDGET:

14,000,000 Lire (Italy); EC contribution 49%

PARTICIPANTS:

Consiglio Nazionale delle Ricerche (CNR)
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00292

Photochemical Conversion of Solar Energy By Means of Non-Biological Systems Involving Coordination Compounds

START DATE: November 1976

END DATE: June 1979

LOCATION:

Bologna

DESCRIPTION:

Water was dissociated into molecular oxygen and hydrogen by means of a cyclic system involving coordination compounds (dipyridine and phenanthroline) and driven by solar radiation. The project included individualizing the parameters that affect the efficiency of the corresponding electron-transfer reactions, investigating new classes of coordination compounds for their use as catalysts in the cyclic systems; and synthesizing complexes with polymeric ligands to obtain heterogeneous catalysts.

BUDGET:

79,728,000 Lire (Italy); EC contribution 50%.

PARTICIPANTS:

European Communities (EC)
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40126 Bologna
ITALY

00293

Investigation on Potentiality Offered by Ion Implantation as a Technique to Fabricate High Efficiency Solar Cells

START DATE: January 1978

END DATE: June 1979

LOCATION:

Bologna

DESCRIPTION:

A detailed analysis was made of the main technological steps required for the fabrication of high efficiency ion implanted silicon solar cells.

The research program included: 1) optimization of the low temperature thermally annealed solar cells made by phosphorus implantation through a front oxide layer and 2) basic research work on laser annealing of the radiation damage. Ion implanted laser annealed solar cell prototypes were fabricated and tested. After initial research, thirteen 5% AM1 efficiency ion implanted solar cells were thermally annealed at low temperature to avoid base lifetime degradation. The cells are now fabricated regularly in the laboratory. Laser annealed prototypes were also investigated.

BUDGET:

163,700,000 Lire (Italy); EC contribution 23%.

PARTICIPANTS:

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Consiglio Nationale delle Ricerche
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Zignani, F.
Laboratorio LAMEL
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00294

Study of the Structure and Function of Chloroplast Membranes

START DATE: January 1977

END DATE: June 1979

LOCATION:

Milano

DESCRIPTION:

The aim of the project was to study the factors affecting the photochemical activity and efficiency of isolated chloroplast membranes and the stability of the isolated photosystem II (PS II), under light limiting conditions, b) Maximal rate of PS II dependent electron transport, c) Efficiency and rate of the complete system, from water photo-oxidation to the acceptors of PS I, d) Efficiency and rate of photosystem I (PS I). It was found that cations, particularly divalent cations in the concentration range of 1 to 5 mm, activate PS II centers and increase the fluorescence yield of PS II and its photochemical efficiency. The effect on fluorescence is independent of the other two and is strictly related to the stacking of the membranes to form grana. At the same concentrations, the cations decrease the efficiency of PS I by about 20-30%. This effect is however independent from the others on PS II.

BUDGET:

153,645,000 Lire (Italy); EC contribution 50%.

PARTICIPANTS:

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00634

Barra-Costantini Solar Passive System: Experimental Test and Simulation

START DATE: 1978

END DATE: 1981

LOCATION:

Casa Solare-02040 Salisano (Rieti)

DESCRIPTION:

This project, a 380 sq. m prototype of a passive solar single-family dwelling, utilizes a solar chimney and the Barra-Constanti system, whose characteristics are: absorbing black surface (thin metallic sheets, decoupled from wall) on south facing building walls; heat distribution by air flows through channels in the house ceiling; and thermal energy storage in the ceilings. The house is completely insulated on the exterior surfaces. The prototype has been designed with a special sensitivity to the thermodynamics of fluid systems. To determine system performance, the most important design variables of the system are: the depth of solar chimneys, the solar collector dimensions; the hydraulic head losses of the air circuit; and the thermal storage capacity. Also being investigated are sizing procedures and manufacturing techniques.

BUDGET:

US$ 50,000.

PARTICIPANTS:

Universita di Calabria
Management (joint)
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Arcavacata-Cosenza
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Management (joint)
Constanti, Tommaso
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02040 Salisano (Rieti)
ITALY

00635

Natural Convection Passive Solar School: Experimental Tests and Computer Models

START DATE: 1979

END DATE: 1981

LOCATION:

Castrovillari, Cosenza

DESCRIPTION:

In the south of Italy, a 2,000 cu. m school, passively heated by the Barra-Constantini system, was constructed in five equal sections. The different sections are used for simultaneous testing of variable storage configurations. Research objectives include: (1) testing solar chimneys for variable geometry and optics; (2) obtaining field data for storage sizing; (3) proposing solutions for overheating problems; (4) testing mathematical models in order to obtain a general computer code.

BUDGET:

US$ 450,000.

PARTICIPANTS:

Universita di Calabria
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Dipartimento di Fisica
Arcavacata-Cosenza
ITALY

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Castrovillari (Cosenza)
ITALY

Castrovillari Municipality
Funding (sole)
Castrovillari, Cosenza
ITALY

00830

Solar Energy Storage by Solid - Solid Transitions

START DATE: 1979

END DATE: 1980

LOCATION:

Naples

DESCRIPTION:

The Institute is developing phase change storage materials that store heat in solid-to-solid transitions. The completed systems are meant to be used integrally in building walls.

BUDGET:

US$ 130,000.

PARTICIPANT:

Universita degli Studi di Napoli
Management (sole)
Fittipaldi, F.
Professor
Facolta Ingogneria
Istituto di Fisica
Piazzale Tecchio
80121 Napoli
ITALY

00848

Simulation and Test of Passive Solar Systems

START DATE: September 1978

END DATE: December 1980

LOCATION:

Urbino

DESCRIPTION:

The University of Venice's Architectural Institute has remodelled several two-story buildings in Urbino, Italy into six Trombe Test Cells. The thermal behavior of stone, brick, and concrete block is compared through the use of about 200 sensors, including thermistors, pyranometers, and anemometers. The test cells are used to study four major questions: a) relation between Trombe wall and thermal mass; b) south to north heat transfer in two-zone configurations; c) thermal properties of double-height systems; d) development of Trombe wall retrofit units.

BUDGET:

US$ 84,000 (approximate).

PARTICIPANTS:

Universita degli Studi di Roma
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Fanchiotti, Aldo
Professor of
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Dipartimento d'Ingegneria Meccanica
Via Eudossiana, 18
00100 Roma
ITALY

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00185 Roma
ITALY

00789

Kindergarten in Crosara-Marostica

START DATE: 1973

END DATE: 1979

LOCATION:

Crosara-Marostica (Vicenza)

DESCRIPTION:

This project involves the construction and monitoring of active and passive systems at a solar school building - the first passive building constructed in Italy. Passive solar technologies used include direct solar gain earth berms, and an attached greenhouse garden.

BUDGET:

US$ 280,000. Funded by Town Council of Marostica.

PARTICIPANTS:

Istituto Universitario di Architettura di Venezia
Management (principal)
Los, Sergio
Professor
Calle Amai, 197
Campazzo dei Tolentini, 191
301000 Venezia
ITALY

Consiglio Nazionale delle Ricerche (CNR)
Contact
Elias, Giacomo
Progetto Finalizzato Energetica
via Nizza 128
Roma
ITALY

00740

Passive Design Tools for Multistory Buildings

START DATE: May 1979

END DATE: April 1980

LOCATION:

Palermo

DESCRIPTION:

The aim of the project is to develop design tools for optimizing heating system performance and winter/summer comfort in passive multistory buildings in different Italian climatic areas. A computer model was developed to address the following problems : (1) heating of north-facing rooms in deep north-south buildings; (2) passive heating requirements in mild climates. The computer simulation was based on hourly weather data using the Finite Difference Method.

BUDGET:

US$ 37,000; 30,000,000 Lira (Italy).

PARTICIPANTS:

Universita degli Studi di Palermo
Research (principal)
Butera, F.
Istituto di Fisica Tecnica
Facolta d'Ingegneria
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90128 Palermo
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00810

Bioclimatic Dwellings for 44 families at Rignano sull' Arno

START DATE: July 1979

END DATE: April 1981

LOCATION:

Rignano sull' Arno-Firenze

DESCRIPTION:

Bioclimatic architectural design of five multifamily blocks. The passive design goal is to reduce the thermal load for heating by arranging the geometry and orientation of the multistory 44 units to optimize insulation, and to provide natural ventilation and convection during the hot season. Research in the project has focused on a passively controlled air conditioning system that works with air collectors and storage integrated into the building structure. The projected solar fraction is 50% at 5% extra building cost.

BUDGET:

US$1,770,000.

PARTICIPANTS:

Gruppo di Lavoro Solare
Management (principal)
Design (joint)
Puccetti, Paolo
Via O. Respighi, 4
50018 Scandicci (Fl)
ITALY

Design (joint)
Papasogli, G.
Via Landino, 5
Firenze
ITALY

Cooperative Society
Funding (sole)
Via Garibaldi, 5
Rignano sull'Arno
Firenze
ITALY

Design (principal)
Tanzi, M.
Via Landino, 5
Firenze
ITALY

00275

IEA Programme to Develop and Test Solar Heating and Cooling Systems

START DATE: 1977

END DATE: 1981

LOCATION:

IEA Countries

DESCRIPTION:

Solar heating and cooling is one of 16 technology fields selected for multilateral cooperation. Five project areas (tasks) were identified: 1) Investigation of the Performance of Solar Heating & Cooling Systems, 2) Coordination of Research and Development on Solar Heating and Cooling Components, 3) Performance Testing of Solar Collectors, 4) Development of an Insolation Handbook and Instrumentation Package, 5) Use of Existing Meteorological Information for Solar Application.

PARTICIPANTS:

Department of Energy (DOE)
Oversight and Evaluation (joint)
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Projektleitung Energieforschung
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Swedish Meteorological and Hydrological Institute (SMHI)
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Switzerland, Government of
Oversight and Evaluation (joint)
Office Federal de l'Economie Energetique
Bern
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Atomic Energy Authority
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11 Charles II Street
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UNITED KINGDOM

00276

Investigation of the Performance of Solar Heating and Cooling Systems TASK I

START DATE: 1977

END DATE: 1981

LOCATION:

IEA Countries

DESCRIPTION:

Italy is participating with eleven other International Energy Agency countries and the European Communities in solar systems performance anlysis. Both liquid and air systems are being compared with the use of simulation programs devised by the participating countries. A set of standard procedures for the measurement of thermal performance of heating and cooling systems was reviewed. Economic analyses were completed for domestic hot water systems and combined space heating and hot water systems. Performance data from the simulations are compared with a system set up at the Los Alamos (New Mexico) National Security and Resources Study Center where data for the validation of the simulation programs are provided. The Operating Agent for the International Energy Agency is the Thermal Insulation Laboratory, Technical University of Denmark.

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00277

Coordination of Research and Development on Solar Heating and Cooling Components TASK II

START DATE: 1977

END DATE: 1981

LOCATION:

IEA Countries

DESCRIPTION:

The objective of this project was the development of cost-effective components for solar heating, cooling and hot water systems. Each participant prepared reports summarizing the current or planned research and development within the country. The reports described projects concerning collectors, heat storage units, air conditioning units, and miscellaneous components. The review of national research and development is to be updated annually. The project encourages exchanges of researchers, materials, and components. The Operating Agent for International Energy Agency was MITI (Japan).

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00278

Performance Testing of Solar Collectors TASK III

START DATE: 1977

END DATE: 1979

LOCATION:

IEA Countries

DESCRIPTION:

Research and Development on Solar Heating and Cooling Components, 3) Performance Testing of Solar Collectors, 4) Development of an Insolation Handbook and Instrumentation Package, 5) Use of Existing Meteorological Information for Solar Application.

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00279

Development of an Insolation Handbook and Instrumentation Package TASK IV

START DATE: 1977

END DATE: 1979

LOCATION:

IEA Countries

DESCRIPTION:

The objective of this Project was to develop improvements in the design and operation of solar heating and cooling systems through a better understanding of insolation and weather data. Improvements in techniques for the measurement and evaluation of such data were emphasized. A handbook was assembled containing information on solar radiation and related weather measurement methods for solar applications. The Operating Agent for International Energy Agency was the U.S. Dept. of Energy.

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00280

Use of Existing Meteorological Information for Solar Applications TASK V

START DATE: 1977

END DATE: 1979

LOCATION:

IEA Countries

DESCRIPTION:

The relationship between solar radiation measurements and other relevant meteorological parameters was studied. Participants reported the location of solar radiation measuring stations as well as their measuring techniques. An inventory was made of solar radiation measurements performed within European countries on inclined and horizontal surfaces. An effort was made to improve routine measurement programs in order to separate diffuse and direct global radiation data. A tape format was developed permitting stations to collect better radiation data for entry into small computers. The Operating Agent for International Energy Agency was the Swedish Meteorological and Hydrological Institute.

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00231

Joint U.S./Italian Program of Cooperation in Solar Energy

START DATE: 1980

END DATE: 1983

DESCRIPTION:

Joint agreement to perform research, development and demonstration of passive, solar thermal electricity production and photovoltaics. Research will be completed at several universities and research institutes in the United States and Italy.

BUDGET:

US$ 4.5 Million

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00232

40 kW Combined Solar Thermal and Photovoltaic System Field Experiment PROJECT A

START DATE: 1980

END DATE: 1983

LOCATION:

Islands of Sicily, Sardinia and at Calabria in southern Italy

DESCRIPTION:

Electricity production using concentrating parabolic trough collectors and concentrating photovoltaics for an isolated rural community unconnected to any electric grid. System will allow the two technologies to be used in an integrated or side-by-side configuration each having peak output of 20 kW. Components will share controls, power conditioning, lighting and refrigeration. Objectives are: to assess credibility of advanced solar conversion systems to meet energy needs of a remote community; to directly compare the solar thermal and photovoltaic systems in their ability to meet these needs; to compare hardware provided by the United States and Italy in their ability to perform in these systems.

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00236

Testing and Characterization of Components, Devices and Materials PROJECT B

LOCATION:

Sites in Italy and United States to be selected

DESCRIPTION:

Components, subsystems, devices, and materials developed or commercially available in both Italy and the United States, and representing both solar thermal and photovoltaic technologies, will be compared, evaluated, and characterized. Adoption of common methodologies for test procedures and performance evaluation will also be included as part of this project. Objectives are: to exchange hardware, devices and materials; to adopt common measurement methodologies, and thereby improve the state of the art in solar thermal and photovoltaic technology development.

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00237

Utility Applications of Solar Central Receiver Technology PROJECT C

START DATE: 1980

END DATE: 1981

DESCRIPTION:

Examine the feasibility and impact of interfacing large solar central receiver power plants in the range of 10-to-several hundred MW capacity into the Italian electric grid. Estimate potential grid penetration of different technologies using various economic and fuel price assumptions. Examine interaction of solar power plants with the balance of the grid for various penetration levels; define site selection criteria and survey candidate sites.

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00238

Small Photovoltaic System Field Experiment PROJECT D

START DATE: 1980

END DATE: 1983

LOCATION:

A site to be selected in Italy

DESCRIPTION:

Will employ flat plate photovoltaic panels in a system delivering 3 to 5 kW peak output. The system will be installed in Italy, using United States manufactured solar equipment. The system will supply electrical needs of an individual consumer not connected to any electric grid, and will be sized and designed as closely as possible to the system presently installed in the United States at Schuchuli, AZ. Data from each system will be compared, and the effectiveness of the design and hardware will be determined in supplying the end-use applications. Objectives of this project are to determine the cost effectiveness of a small photovoltaic system in meeting the needs of a remote rural consumer.

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00202

Research and Development Exchange in Photovoltaics PROJECT E

START DATE: 1980

END DATE: 1983

LOCATION:

Sites to be selected in Italy and United States

DESCRIPTION:

This project will facilitate the interchange of ideas, visits of personnel, and performance of collaborative research studies between participating scientists, technicians, and institutions in the field of photovoltaics research and development. Emphasis will be in materials science and methods of measurement. Technical areas will include surface and interface characterization, thin film device characterization, advanced device theory, and silicon material purification and crystallization.

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00268

Design and Testing of Passive Solar Systems and Components PROJECT F

START DATE: 1980

END DATE: 1983

LOCATION:

Sites to be selected in Italy and the United States

DESCRIPTION:

In this project a number of multi-family, commercial, or office buildings incorporating passive solar systems and utilizing common design and simulation test methods, instrumentation and data analysis will be designed and tested. Passive solar components will be compared within the different climates, building types and cultural/social contexts. A design manual will be compiled and the results of the joint experience in overcoming institutional barriers to passive solar implementation will be widely disseminated. Objectives are: to pool design and testing experience of both countries in passive solar technology and to provide systematic comparision of the performance of passive components.

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00269

Solar Energy Information Exchange PROJECT G

START DATE: 1980

END DATE: 1983

LOCATION:

Italy and the United States

DESCRIPTION:

Cooperative information exchange of technical data.

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00827

Progetto Finalizzato Energetica (PFE)

LOCATION:

Via Nizza 128, Roma

DESCRIPTION:

This energy research program, funded and sponsored by the Consiglio Nazionale delle Ricerche, manages a variety of projects in solar energy research and development.

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00828

Passive Residential Buildings in S. Vincenzo, Toscana

START DATE: 1979

END DATE: 1980

DESCRIPTION:

This project has been developed within the U.S./Italian solar energy cooperation program. Its objective is the design, construction and testing of 4 low-income multi-family buildings with south facing linear configurations and Trombe Walls. Living spaces are oriented to the south, others to the north. Two different sized Trombe Walls (20 cm and 35 cm) are being applied and evaluated.

BUDGET:

US$ 460,000.

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00787

Passive Heating and Cooling Building Typologies

START DATE: 1977

END DATE: 1981

LOCATION:

Venezia

DESCRIPTION:

This project establishes a typology of passively heated and cooled buildings and passive architectural devices. The performance of the different buildings and devices within the typology is predicted by an hourly digital computer simulation program using transfer function methods developed by the Fiat Engineering staff.

BUDGET:

US$ 57,500.

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00788

100% Solar School Building in Sicily

START DATE: 1979

END DATE: 1980

LOCATION:

Sicily

DESCRIPTION:

Design and construction of a 100% solar school building using a passive solar system integrated with an active system. The design includes direct solar gain, a mass drum wall and a solar chimney for cooling.

BUDGET:

US$ 115,000.

PARTICIPANTS:

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00796

Passive Solar Houses for Farmers in Lecce

START DATE: August 1979

END DATE: December 1981

LOCATION:

Tricase (Lecce) Puglie

DESCRIPTION:

Design, construction, and testing of two low-income sets of eight apartments (row houses). The structures will incorporate sunspaces in the south walls, and a sunspace integrated with a wood heating system in the core of the buildings. Summer cooling will be provided by mass (stone) walls and ventilation through clerestory. Passive design considerations include: orientation vs. solar gain; thermal load calculation; ventilation and convection; thermal materials; and performance monitoring.

BUDGET:

US$ 450,000. Funded by I.A.C.P. in Lecce.

PARTICIPANTS:

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00797

Solar Laboratory by Phoebus at Catania

START DATE: June 1979

END DATE: December 1981

LOCATION:

Catania, Sicily

DESCRIPTION:

Design and construction of a 1200 sq. m experimental Solar Research Building consisting of four independent, three-story blocks with various passive cooling technologies and different layouts. The objective of this project is to test cost-effectiveness and performance of the systems for eventual application for commercial buildings. Passive techniques involved are: thermal mass, induced ventilation, and heat gain control.

BUDGET:

US$ 800,000.

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00202
Passive Residential Building in Pisa, Tuscany

START DATE: 1979

END DATE: 1980

LOCATION:

Pisa, Tuscany

DESCRIPTION:

Construction of a 45 apartment, five-story building to demonstrate the cost-effectiveness of passive technologies in a multi-family low-income building. This building incorporates a sunspace along the south facade which serves as a thermal buffer to the outdoor conditions. The internal wall of the sunspace is completely glazed which optimizes the energy input to the apartments. The housing layout exploits the prevalent seasonal winds.

BUDGET:

US$ 1,500 million. Funded by I.A.C.P. in Pisa.

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00799
Passive Residential Building at Certaldo-Tuscany

START DATE: 1979

END DATE: 1980

LOCATION:

Certaldo-Tuscany

DESCRIPTION:

Design, construction, and testing of a low-income five-story, 18-apartment building with a south-oriented linear configuration and floor areas ranging from 45 to 95 sq. m. Living spaces will face south, others to the north. Passive technique involved is: controlled direct gain through a balanced combination of well insulated walls and windows with Venetian blinds.

BUDGET:

US$ 402,000.

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00800

Passive Residential Building at Forte dei Marmi-Tuscany

START DATE: 1979

END DATE: 1980

LOCATION:

Marmi-Tuscany

DESCRIPTION:

Design, construction and testing of a low-income three-story, multi-family building with south oriented "saw-toothed" envelope, mass wall and shading devices for summer cooling control. The building will be monitored to test energy performance.

BUDGET:

US$ 460,000.

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00825

Passive Residential Building in Borgotaro

START DATE: 1979

END DATE: 1981

LOCATION:

Borgotaro, Parma

DESCRIPTION:

Design, construction and testing of low-income multi-family buildings. The structures have south-oriented linear configurations, with double stairwells on the north side, linked to the building by galleries; solar greenhouses are on the south side. The greenhouses are continuous along the south facade and have alternate storage walls and windows for direct gain.

BUDGET:

US$ 580,000. Funded by I.A.C.P. in Parma.

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00826

Prefabricated Prototype in Rome

START DATE: 1979

END DATE: 1980

DESCRIPTION:

The objective of this program is to develop a prototype for a prefabricated passive walling subsystem.

BUDGET:

US$ 80,500.

PARTICIPANTS:

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00829

"Passive System Morphologies" CNR/PFE Sub-Project "Solar Energy"

START DATE: 1978

END DATE: 1981

DESCRIPTION:

The purpose of the project is twofold: (1) to define and categorize currently used design methods for passive solar architecture; (2) to design and construct several different passive architectural configurations for study.

BUDGET:

US$ 55,000.

PARTICIPANTS:

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