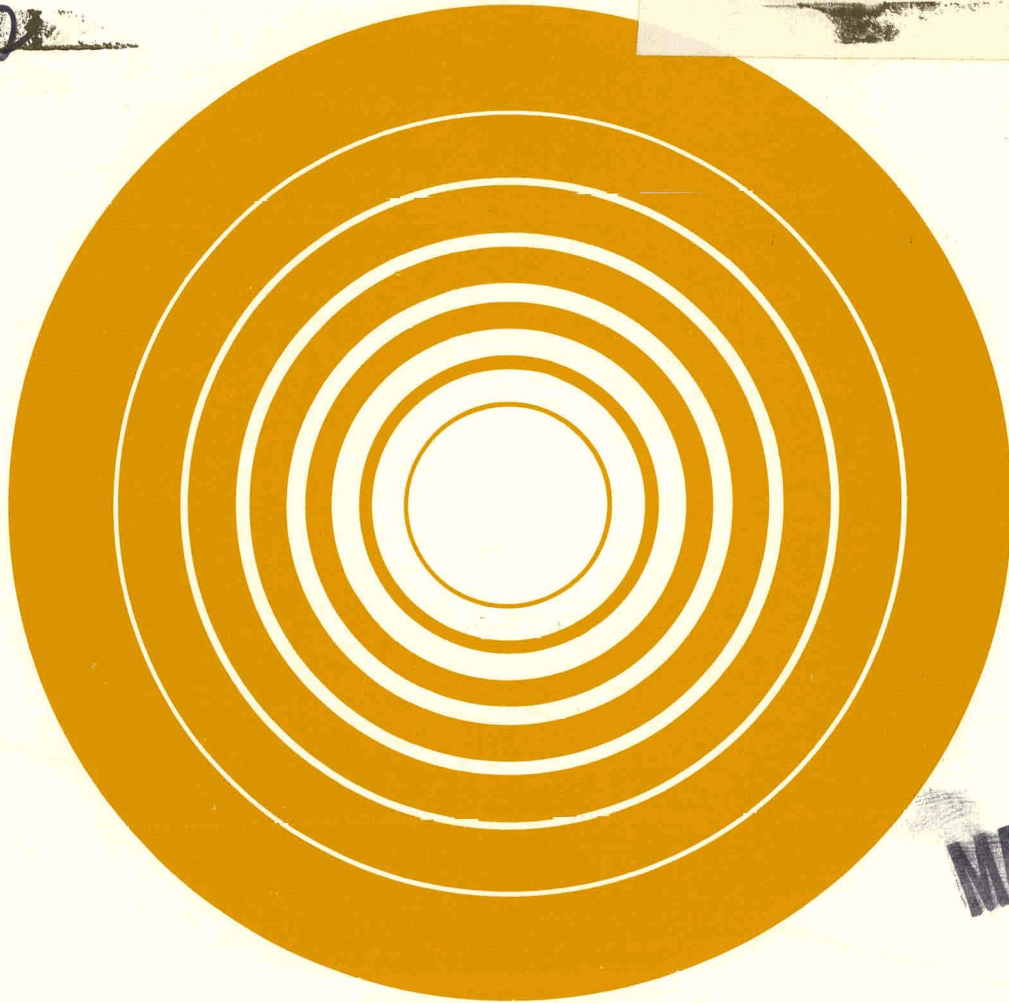


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SOLAR ENERGY IN ARGENTINA

A Profile of Renewable Energy Activity
in Its National Context

by Donna Hawkins

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A Profile of Renewable Energy Activity
in Its National Context

by Donna Hawkins

Solar Energy Research Institute

1617 Cole Boulevard
Golden, Colorado 80401

A Division of Midwest Research Institute

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Foreword

We wish to acknowledge and thank the following people for their contributions to the development of this profile. Ariel Ciro Rietti, Director of Laboratorio Solar in Buenos Aires, Jose Esteban Fernandez, Coordinator of the Laboratorio de Ambiente Humano y Vivienda (IAHV-Human Environment and Dwellings Laboratory) of the Instituto Argentino de Investigaciones de las Zonas Aridas (IADIZA-Argentine Institute for Research of Arid Zones) in Mendoza, Neil H. Woodley, Division Manager of the Utilities and Industry Division of the Solar Energy Research Institute (SERI), and Ari Rabl, Principal Scientist of the Solar Thermal Research Branch of SERI have carefully reviewed the profile and made invaluable comments. Asociacion Argentina de Energia Solar (ASADES) generously provided copies of its bulletin and annual proceedings. James Stamps and Gail Anderson of Systems Consultants Inc. (SCI) collaborated closely with SERI staff to create and process the Argentina files for the data base directories that appear as appendices to this profile.

This document was prepared as part of Task Number 1165.20 International Tracking and Assessment, G. L. Case, editor, of the International Division of the Solar Energy Research Institute (SERI) in cooperation with the Solar Energy Information Data Bank (November 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, of course, be considered inclusive and further information is welcomed. Since the profile was prepared for the administrative use of the Department of Energy and the information contained changes rapidly, it is subject to frequent updating. For further information contact the International Division of SERI (303) 231-1839.

Approved for:

SOLAR ENERGY RESEARCH INSTITUTE

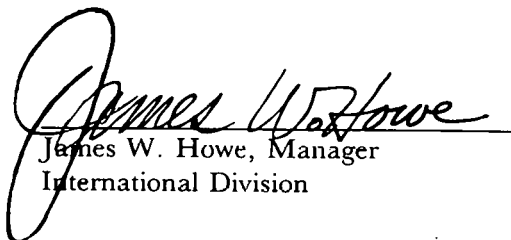

James W. Howe, Manager
International Division

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Nomenclature

ASADES	Asociacion Argentina de Energia Solar (Argentine Solar Energy Association)
AyEE	Agua y Energia Electrica—the state water and electricity board
CGT	Confederacion General del Trabajo—a labor organization identified with Peronism
CIAT	Centro de Investigacion y Asistencia Tecnica (Center for Research and Technical Assistance)
CNEA	Comision Nacional de Energia Atomica (National Atomic Energy Commission)
CNEGH	Comision Nacional de Estudios Geo-Heliofisicos (National Commission for Geo-Heliophysics Studies)
CNIE	Comision Nacional de Investgaciones Espaciales (National Commission for Space Research)
CONICET	Consejo Nacional de Investigaciones Cientificas y Tecnicas (National Council of Scientific and Technical Research)
EC	European Communities—formerly European Economic Community (EEC)
ENTEL	Empresa Nacional de Telecomunicaciones (National Telecommunication Agency)
HIDRONOR	Hydroelectrica Norpatagonica—the state-owned hydroelectric company
IADIZA	Instituto Argentino de Investigaciones de las Zonas Aridas (Argentine Institute for Research of Arid Zones)
IAS/FABA	Instituto de Arquitectura Solar/Federacion de Arquitectos de Buenos Aires (Institute of Solar Architecture)
INTA	Instituto Nacional de Tecnologia Agropecuaria (National Institute of Farming Technology)
INTI	Instituto Nacional de Tecnologia Industrial (National Institute of Industrial Technology)
LAFTA	Latin America Free Trade Association
OAS	Organization of American States
PNES	Plan Nacional de Energia Solar (National Solar Energy Plan)
SECYT	Secretaria de Estado de Ciencia y Tecnologia (State Secretariat for Science and Technology)
UN	United Nations
YCF	Yacimientos Carboniferos Fiscales—the state-owned coal mining company
YPF	Yacimientos Petroliferos Fiscales—the public petroleum corporation

Country Overview

The Republic of Argentina, shaped somewhat like a cornucopia, occupies most of South America south of the Tropic of Capricorn and east of the Andes. It borders Chile on the west, Bolivia and Paraguay on the north, Brazil and Uruguay on the northeast, and Chile and the Antarctic Ocean on the east. In land area and population Argentina ranks second only to Brazil, the country with which it has traditionally vied for hegemony on the South American continent. Although it lies almost entirely within the temperate zone, oceanic and mountain influences affect the climate, which ranges from subtropical to subarctic.

Although Argentina's topography varies, the Pampa, a fertile plain, comprises the agricultural and industrial center of the nation. The agricultural and pastoral bases supply most domestic food needs and the bulk of the exports (principally grains and beef). The industrial sector provides most consumer goods and an increasing range of capital goods. The Military Junta, which deposed Isabel Peron's government in 1976, instituted an economic recovery program designed to lower the world's highest inflation rate, promote agricultural exports, increase private sector participation, and create a favorable climate for foreign investment and trade. Fossil fuels allow Argentina to be almost self-sufficient in meeting its energy demands. The current energy plan stresses hydroelectric and nuclear power development, although it contains a solar component.

Energy Summary

Current Energy Sources

- Coal (soft coal reserves of low quality, located far from industrial centers)
- Geothermal (high probability of deposits along the Andean mountain range)
- Hydropower (vast potential to be fully exploited by 1990)
- Natural Gas (reserves sufficient to last 50 years)
- Petroleum (reserves sufficient to last 16 years)
- Solar Energy (currently at the research level with potential applications for water pumping, drying, and heating)
- Uranium (deposits equivalent to one-third of the oil reserves)

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

Solar Activities

- The Comision Nacional de Estudios Geo-Heliofisicos (CNEGH), the National Commission for Geo-Heliophysics Studies, was established in 1975 to coordinate solar activities in universities, institutes, and federal agencies.

- The Plan Nacional de Energia Solar (PNES), the National Solar Energy Plan, forms a component of the Programa Nacional de Energia No Convencional, the National Program for Non-Conventional Energy.
- The Asociacion Argentina de Energia Solar (ASADES), the Argentine Solar Energy Association, promotes solar research and development and sponsors annual workshop meetings.
- Private industry, though interested in principle, has little involvement in solar applications; few manufacturers of solar equipment exist.

See also: International Contacts, International Projects, Government Energy Structure, Organizations for Implementation, and Solar Energy Organizations.

Solar Applications

- Active Solar Thermal: desalination, refrigeration, solar drying, solar ponds, space heating, domestic water heating, and water pumping.
- Bioconversion: digesters and transportation.
- Passive Solar Thermal: solar drying and space heating.
- Photovoltaics: radiation measurements.
- Wind: water pumping and electricity production.

See also: International Projects, and Solar Research and Development.

Areas for Cooperation

Argentina and the United States signed an Agreement for Scientific and Technological Cooperation on 7 April 1972. A solar annex to this agreement does not presently exist; however, such could be appended if both countries desired.

While U.S.-Argentine diplomatic relations have been problematic, the military government has enacted legislation favorable to foreign investment and technology transfer. Business opportunities could exist for exporting solar equipment to Argentina.

See also: Industry, International Manufacturers, International Contacts, and Solar Energy Organizations.

The Republic of Argentina

Geopolitical, Economic, and Cultural Aspects

Population Demography

AREA AND DENSITY OF ARGENTINA'S POPULATION

Place	Area (km ²)	Population ¹	Population Density ² (km ²)
ARGENTINA	2,766,891 ³	26,393,000	9.5
Buenos Aires (Distrito Federal)	200	2,982,000	14,910.0
Buenos Aires	307,804	10,497,000	34.1
LaPlata		391,247 ⁴	
Bahia Blanca		182,158 ⁴	
Mar del Plata		302,282 ⁴	
Catamarca Catamarca	99,818	176,000	1.8
Cordoba Cordoba	168,766	2,351,000 781,565 ⁴	13.9
Corrientes Corrientes	88,199	601,000 136,924 ⁴	6.8
Chaco Resistencia	99,633	581,000 142,848 ⁴	5.8
Chubut Rawson	224,686	226,000	1.0
Entre Rios Parana	76,218	849,000 127,635 ⁴	11.1
La Pampa Santa Rosa	143,440	183,000	1.3
La Rioja La Rioja	93,331	146,000	1.6
Mendoza Mendoza	150,839	1,117,000 118,568 ⁴	7.4
Misiones Posadas	29,801	520,000	17.4
Neuquen Neuquén	94,078	203,000	2.2
Rio Negro Viedma	203,013	325,000	1.6
Salta Salta	154,775	588,000 176,216 ⁴	3.8

AREA AND DENSITY OF ARGENTINA'S POPULATION (concluded)

Place	Area (km ²)	Population ¹	Population Density ² (km ²)
San Juan	86,137	422,000	4.9
San Juan		112,582 ⁴	
San Luis	76,748	190,000	2.5
San Luis			
Santa Cruz	243,943	113,000	0.5
Rio Gallegos			
Santa Fe	133,007	2,333,000	17.5
Santa Fe		244,655 ⁴	
Rosario		750,455 ⁴	
Santiago del Estereo	135,254	534,000	3.9
Santiago del Estereo		105,127 ⁴	
Tucuman	22,524	799,000	35.5
San Miguel de Tucuman		321,567 ⁴	
Tierra del Fuego	20,392	18,000	0.9
(Territory)			
Ushuaia			

¹June 1978 estimate, unless otherwise specified [*The Europa Year Book 1979*, pp. 1521-22.]

²Population Distribution: 81.1% urban; 18.9% rural (1975) [*1979 Hammond Almanac*, p. 508.]

³Excluding the areas claimed by Argentina that are not under its direct administration (1,247,803 km²): the Argentine Antarctica, Islas Malvinas (Falkland Islands), and some south Atlantic Islands [Area statistics from: *The New Encyclopedia Britannica 1979*, p. 1139.]

⁴June 1975 estimate [*UN 1977 Demographic Yearbook 1978*, p. 261.]

Government Structure

A three-man military Junta has controlled political authority since the ouster of President Isabel Peron on 24 March 1976. It unanimously selects a retired military officer as president for a three-year term with a reappointment option. He appoints his cabinet and, in consultation with the Junta, designates all major executive and judicial officials (including the Supreme Court) at national, provincial, and local levels. A Junta-appointed legislative advisory commission, that has no authority to enact laws, supplanted both national and provincial legislatures. "Political Bases for the Process of National Reorganization," a document announced by the Junta on 19 December 1979, provides an avenue for discussing Argentina's return to civilian government. The plan proposes the eventual election of a president and bicameral legislature, while retaining substantial power for the armed forces.

The Executive

Lt. Gen. (retired) Jorge Rafael Videla, President and Head of State

Junta Militar:

- Lt. Gen. Roberto Eduardo Viola (Army)
- Brig. Gen. Omar Domingo Rubens Graffigna (Air Force)
- Adm. Armando Lambruschini (Navy)

The Diplomatic Register

Jorge A. Aja Espil
Ambassador
1600 New Hampshire Avenue, NW
Washington, DC 20009
(202) 332-7100

Foreign Consulates

Argentine Consulates in: Baltimore, Chicago, Houston, Los Angeles, Miami, New Orleans, New York, San Francisco, and San Juan.

United States Representation

Raul H. Castro
Ambassador
Avenida Colombia 4300, 1425
Palermo, Buenos Aires
ARGENTINA
(011 54 1)774-7611

United States Consulates

None

Institutions

General

Commercial establishments generally operate from 9:00 a.m. to 7:00 p.m., with business often transacted during the two-hour lunch period. A business call usually requires prior appointment. Government offices observe half day schedules, mornings during the summer and afternoons during the winter. Although Spanish is the official language, many businessmen and professionals also speak English. Most Argentines vacation during either the summer months of January and February or the July school holiday.

Education

A 93% literacy rate reflects the successful efforts of Domingo Sarmiento, author-educator and first civilian president (1868-74), to reform the nation's educational system. Government-subsidized education is free from preschool to university and compulsory between ages 6 and 14. There are 53 colleges and universities as well as numerous institutes for specialized studies. [1979 *Hammond Almanac*, p. 509; Argonne National Laboratory 1979, p. AR 2; *The World of Learning 1979-80* 1979, pp. 60-77.]

Labor

Since May 1976, military representatives have controlled the Confederacion General del Trabajo (CGT), a labor organization identified with Peronism, and other major labor unions. The Junta also suspended the Fuero Sindical (Special Labor Law) and the right to strike.

Political Parties

The military regime has curtailed political activity and has banned five leftist parties.

Religion

By a decree on 14 February 1978, all active religious groups other than the Roman Catholic Church, which claims 94% of the population, must register with the National Registry of Worship. [*Worldmark Encyclopedia of the Nations* 1976, p 2.]

Economy

Although Argentina has one of the most favorable agricultural, industrial, and natural resource bases in Latin America, in 1976 the Junta inherited a nation plagued by a severe economic crisis and an inflation rate estimated by some sources of 900%. The Minister of Economy, Jose Martinez de Hoz, immediately announced a reorganization and recovery program based on free market economic principles to reverse the Peronist policies of economic isolationism and to steadily expand the State's role in the economy. Since the recession in early 1978, the Argentine economy has maintained moderate growth and reasonable stability. Argentina currently has international reserves exceeding US\$ 8 billion. The inflation rate, still the highest in the world and the primary economic problem, hovered around 120% in 1979. The foreign trade pattern is undergoing diversification with the Latin America Free Trade Association (LAFTA), the United States, and Japan assuming more prominent roles, although the European Communities (EC) are still Argentina's major trading partners.

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

Currency

100 centavos = 1 new Argentine peso

Exchange Rate

US\$ 1.00 = 1,794 new Argentine pesos (May 1980)

Gross Domestic Product

US\$ 61,536 million (1978) [Hage and Thomas 1979, p. 15.]

Gross Domestic Product per Capita

US\$ 2,331 (1978) [Hage and Thomas 1979, p. 15.]

Principal Trading Partners and Products

Imports in 1977 (January - September)

EC 27.3%; LAFTA 22.4%; United States 18.7%; Japan 8.6% (machinery and equipment, iron and steel products, and chemicals). [Hage and Thomas 1979, p. 16.]

Exports in 1977 (January - September)

EC 32.7%; LAFTA 22.1%; United States 6.8%; Japan 6.3% (grains, meat, and other agricultural products; textiles; and machinery and transport equipment). [Hage and Thomas 1979, p. 16.]

Industry¹

Domestic manufacturing, which provided 36.5% of the GDP in 1978, meets nearly all demands for consumer goods. Imports consist of sophisticated capital goods and raw materials needed by domestic industry. Buenos Aires has the highest concentration of industrial activity. Other centers include Rosario, Cordoba, Mendoza, and the Chaco region. Major industries are packaging and processing foodstuffs, electrical machinery and equipment, vehicles, oil refining, steel, chemicals, pharmaceuticals, zinc and copper smelting, sawmills, and textiles.

¹Data from: Hage and Thomas 1979; *Foreign Economic Trends* 1980; *Worldmark Encyclopedia of the Nations* 1976, pp. 9-10; *Deadline Data* 1980.

The government is no longer the primary employer. In 1976, the Junta dismissed over 300,000 public employees and reduced office hours to induce others to seek employment in the private sector. It has divested itself of 370 state-owned companies and minority interest in 400 other firms. The government still retains holdings in certain heavy industries, especially steel, petrochemicals, and mining.

The military has introduced measures encouraging foreign activity in Argentina to stimulate domestic production. The Foreign Investment Law (No. 21.832 enacted 13 August 1976) allows foreign investors to remit profits or repatriate capital and permits investments in areas previously disallowed. The Industrial Promotion Law (No. 21.608 enacted in 1977) provides incentives for investments (also selectively available to foreign majority-owned firms) in certain industries and in less urbanized areas. Under the new Technology Transfer Law (No. 21.617 enacted in 1977) foreign technology contracts registered in Argentina have increased substantially. The Risk Contract Hydrocarbon Law (No. 21.778 enacted 17 April 1978) augments the role of the private sector, including foreign investment in petroleum and natural gas development.

While Argentina's industrial sector is well developed, there has been little solar activity to date. ASADES has identified less than 10 solar manufacturers.

See also: Economy, Agriculture, and International Manufacturers.

Agriculture²

Agriculture plays a more vital role in the economy than its 13% share of the 1978 GDP indicates. Agriculture and livestock, the traditional mainstay of the Argentine economy, usually supply 70%-80% of the exports, thereby earning the foreign exchange required to pay for the imports absorbed by domestic industry. Processing of agricultural products contributes significantly to the industrial sector. Meat packing, tanning, flour milling, sugar refining, dairy products, wineries, and textiles all depend directly on the agricultural base.

The current regime has tried to redress the imbalance that previous governments created by stressing industrial development at the expense of agriculture. Due to guaranteed minimum purchase prices and special credit assistance, the agricultural sector grew 7.1% in 1977, compared with 3.5% in 1976.

The country's north-south expanse with its varying climates and soils allows crop diversity. Over 60% of the total land area is suitable for agriculture, 8% of which is under cultivation, while the remainder provides pastureland for livestock. Farms tend to be large and highly mechanized. The humid, fertile plains of the Pampas, the principal agricultural region, supply most of the wheat, corn, and beef for export. Agriculturally self-sufficient, Argentina ranks fourth as a world exporter of wheat and meat. Other crops include oats, rye, barley, sorghum, rice, oilseeds, sugar cane, cotton, tobacco, and fruits. Although cattle are the main livestock, only five nations surpass Argentina in sheep raising.

The agricultural sector offers potential for solar applications. The irrigation needed for grapes, other fruits, and vegetables in Mendoza; sugar cane in Salta, Jujuy, and Tucuman; tobacco in the north and northeast; and rice in the northeast could benefit from solar water pumping. Solar drying techniques and solar refrigeration for transporting products suggest other possibilities.

See also: Economy, and Industry.

Communications³

- In 1977 there were 433,000 km of roads; 65,000 km paved and 48,000 km otherwise improved. Truckage has expanded with better highways.

²Data from: Hage and Thomas 1979; Weil et al. 1974; *Deadline Data* 1980.

³Data from: Hage and Thomas 1979; Argonne National Laboratory 1978; *Europa Year Book*, 1979.

- Rail facilities provide most heavy bulk transport, especially in rural areas. In 1977, 37,951 km of track carried 18 million tonnes of freight and served 409 million passengers. Ferrocarriles Argentinas (Argentine Railways) operates the state system. A 1977 plan reduced the number of employees and closed uneconomical routes.
- Argentina has 10 international airports, with Aerolineas Argentinas providing most international and domestic air service.
- Most imports arrive via ship. Of 102 ports, the major ones are Buenos Aires, La Plata, Rosario, and Bahia Blanca. These extensive and well-developed facilities lack deep-water, high capacity arrangements. Flota Fluvial del Estado (State River Fleet) carried 2 million tonnes of freight and one million passengers in 1977.
- In 1976 there were 297 dailies, 960 weeklies, and 765 periodicals. The Junta repealed laws restricting freedom of the press in 1978.
- There are 150 AM and 12 FM stations. Radio Nacional, the state noncommercial network, operates one-third of the stations.
- Argentina has 35 television transmission and 27 closed circuit stations. The government oversees most navigational and signaling telecommunications.
- Empresa Nacional de Telecomunicaciones (ENTEL), National Telecommunications Agency services most of the 2.5 million telephones. International telex-telegraph services are available.

Architecture

Urban homes reflect the local materials available: usually kilned brick, frequently wood, or occasionally stone for walls; wood or concrete for floors; and concrete, ceramic tile, or metal for roofs. The traditional rural dwelling is a quadrangular structure of sun-dried adobe walls, earthen floor, and thatch or baked-mud roof. Oil, coal, or wood fires commonly provide domestic heating, although central heating appeared in the cities during the 1970s.

Architecture traditionally emphasizes attention to materials and design concepts over ostentation. A growing interest in passive solar applications and research exists in La Plata, Mendoza, and Rosario.

See also: International Contacts, and International Projects.

Physical Geography⁴

Argentina, though basically a lowland country, boasts mountains, prairies, deserts, and seacoasts.

The Pampa, meaning "unbroken, level land" in Quechua, is Argentina's heartland. Extending eastward from the piedmont, these fertile, alluvial plains reach less than 200 m above sea level. The rich, deep topsoil consists of clay, loesses, and sands. The nomenclature "humid" for the cereal producing area to the east and "dry" for the cattle pasturelands to the west reflect land utilization patterns, since indigenous vegetation and wildlife were indistinct across the regions. Although the west receives less rainfall, its cooler weather reduces the evaporation rate of surface water.

The windy steppe of Patagonia has 25% of the territory and extends south below the Pampa from the Colorado River. This shallower and less productive soil, composed mainly of sandstone and clay, rests on a crystalline base similar to the Pampa's. The barren Tierra del Fuego and the southern Andes are contiguous to Patagonia.

The fertile lowlands north of the Pampa and east of the Andes delimit the Northeast. This area contains the Argentine Mesopotamia (so designated because of its location between the Parana and Uruguay rivers) and the Chaco Plains with its mixed forest and savanna. Since rivers flood this area

⁴Data from: *The New Encyclopaedia Britannica* 1979; *Encyclopedia of the Third World* 1978; Weil et al. 1974.

during the rainy season, the Chaco's shallower topsoil is composed of materials deposited from the Andes.

The central and northern Andes with their piedmonts are the only regions where elevations extend to 6,100 m. Aconcagua, the largest peak of the Western Hemisphere, reaches 7,021 m. This area provides copper, lead, and uranium for mining.

Climate⁵

Argentina's climate ranges from subtropical in the north to subarctic in Patagonia and Tierra del Fuego. High humidity dominates the subtropical east while dryness characterizes other areas. Intense solar radiation in subtropical areas and high winds in Patagonia accompany this dryness. The Paraguay and Parana rivers mark the transition between the wet and dry subtropical regions while the middle course of the Colorado and Negro rivers divides the subtropic from the western, mid-latitude wind zone.

The Pampa and Northeast experience local windstorms (pamperos) often accompanied by thunder and rain. Wind constancy and strength virtually control climatic conditions in Patagonia.

Highest temperatures (23° C annual mean) occur in the Chaco, while the south has the lowest (5°-6° C annual mean). Maritime and continental influences affect temperatures, reaching maximums in January and minimums in July.

Humidity decreases from east to west. Rain falls throughout the year (100 days/year) in the Argentine Mesopotamia and the subtropic Atlantic coast, while the area west of the great rivers has a summer rainy season and winter dry season. The Northwest and Patagonia experience scant rainfall, although heavy rains characterize Tierra del Fuego and the southern Andes.

Average annual hours of sunshine per day are: four in Tierra del Fuego, six in the north, seven in the subtropic coastal area, and over eight in the Northwest. La Quiaca station records the highest annual average (nine hours/day). Higher elevations and insolation provide excellent solar conditions year round in the Northwest.

The Energy Profile

Energy Policy Objectives⁶

The 1978-85 Energy Plan, released in February 1977, calls for spending US\$ 44.4 billion over the next 20 years to triple the country's power generation. Increased use of renewable resources, especially hydroelectricity, marks a fundamental policy change. Goals for nonrenewable resources include relatively lower oil consumption and increased use of nuclear energy, coal, and natural gas. Estimates indicate hydropower will supply 73% of the electricity by 1995 with nuclear energy providing 15%. Since 1977, CNEGH has spearheaded the effort to define the PNES. This effort covers three areas: conversion to thermal energy (applications to buildings, industry, and agriculture); conversion to other forms of energy; and related studies (solar climatology, national solar data center, transference to industry, etc.).

See also: Indigenous Energy Resources, and Imported Energy Sources.

⁵Data from: *Encyclopedia of the Third World* 1978; Prohaska 1976; *The New Encyclopedia Britannica* 1979.

⁶Newsbeat, p. 11; Argonne National Laboratory 1979; *LAER* 1980b, p. 21.

Government Energy Structure

- The Military Junta carries out programs and budgets.
- The Secretario de Estado de Energia (State Energy Secretary), Daniel A. Brunella, is the principal government energy official. He administers primary energy policies and oversees state-owned energy enterprises.
- The Secretaria de Estado de Ciencia y Tecnologia (SECYT), the State Secretariat for Science and Technology, exercises primary research and development responsibilities. The State Secretary is D. Arturo Otano Sahores.

Organizations for Implementation

- Agua y Energia Electrica (AyEE), the state water and electricity board, was reorganized into a decentralized government corporation in 1977. AyEE builds generation projects and has taken an increasing role as coordinating utility for those nuclear and hydroelectric projects designed to expand the grid system. The State Energy Secretary has administrative responsibility for AyEE.
- Comision Nacional de Energia Atomica (CNEA), the National Atomic Energy Commission, reports directly to the President's office and administers the nuclear power program.
- CNEGH has responsibility for the Argentine solar energy program and coordinates solar research efforts in universities, institutes, and federal agencies. This commission reports to SECYT.
- Consejo Nacional de Investigaciones Cientificas y Tecnicas (CONICET), the National Council of Scientific and Technical Research, conducts scientific and technical research as well as administering numerous basic research institutes. CONICET operates under the auspices of SECYT.
- Gas del Estado, the state gas corporation that delineates natural gas policy, reports to the State Energy Secretary.
- Hidroelectrica Norpatagonica (HIDRONOR), created in 1967 from AyEE as the state-owned hydroelectric company, has recently been developing into a regional utility.
- Yacimientos Carboniferos Fiscales (YCF), the state-owned coal mining company, reports to the State Energy Secretary.
- Yacimientos Petroliferos Fiscales (YPF), the public petroleum corporation, formulates national petroleum policy and develops, processes, and markets hydrocarbon resources. YPF is under the authority of the State Energy Secretary.

See also: International Contacts.

Indigenous Energy Sources

Coal

Indigenous deposits of soft coal are located far from industrial centers. Proven reserves, sufficient to last 70 years, totaled 465 million tonnes in 1977: 460 million in Rio Turbio, Santa Cruz; 3 million in Pico Quemado, Rio Negro; and 2 million elsewhere. In 1979 YCF discovered deposits in Santa Cruz 14 times greater than those in Rio Turbio: 4.5 billion tonnes in the Santa Cruz River estuary and 2.35 billion in the Coyle River. [*LAER* 1979c, p. 120; Alvarado 1978, p. 370.]

Geothermal

Argentina plans to invest US\$ 37 million from 1980-84 for development of geothermal deposits along the Andean mountain range. The National Energy Fund will finance development of this previously untapped resource. [*LAER* 1980c, p. 29.]

Hydroelectric

The long-range energy plan supports hydroelectric power as the primary source for reducing dependence on hydrocarbon fuels. Hydropower supplies an increasing percentage of total electricity needs: 9% in 1970; 26.5% in 1978; 32% in 1979; 37% estimated for 1985; and 73% estimated for 2000. [*LAER* 1980d, p. 36.]

Natural Gas

With reserves sufficient to last 50 years, natural gas is used increasingly for domestic and industrial heating. The underwater pipeline linking island deposits on Tierra del Fuego with mainland storage facilities was opened in 1978. In November 1979, the planning director of Gas del Estado announced that current projects or projects being let for tender would increase the nationwide gas transport network capacity by 50%. [Jeffs 1979; *LAER* 1979c, p. 117.]

Petroleum

Already 92% self-sufficient in oil, Argentina plans to drill 900 wells during 1980 to achieve total self-sufficiency by 1982. The new risk contract law facilitates the participation of foreign and private domestic firms in the exploration and management of new oil fields. [Jeffs 1979; *LAER* 1980e, p. 86; *LAER* 1980d, p. 33; *LAER* 1980b, pp. 17,19; *LAER* 1980a, pp. 263-271.]

Solar Energy

Greatest potential exists in the scantily populated Northwest. Patagonia has excellent potential for wind energy. [Fernandez et al. 1977, p. 265.]

Uranium

Deposits equal one-third of the oil reserves. Atucha I, Latin America's first nuclear facility, was rated the world's most efficient plant in 1979. Nuclear power provided 8.1% of the electricity in 1979, and the energy plan estimates an increase to 15% by 2000 with five more reactors planned. [*Europa Year Book* 1979, p. 1520; *LAER* 1980d, p. 36; Jeffs 1979.]

See also: Imported Energy Sources, and Solar Energy Research and Development.

Imported Energy Sources

Coal

Argentina has traditionally imported coal and the new energy plan anticipates this need. Although indigenous soft coal can be used by thermal plants of electric companies, railroads, and cement and brick manufacturers, coking coal for steel plants must be imported. [Argonne National Laboratory 1979.]

Natural Gas

Importation of 6.5 million m³/day from Bolivia supplements Argentina's own substantial reserves. [*LAER* 1979b, p. 95.]

Petroleum

Argentina currently imports 8% of its oil; however, its goal of total self-sufficiency, last attained 20 years ago, should be achieved by 1982. [Jeffs 1979.]

See also: Indigenous Energy Sources.

Solar Energy Research and Development⁷

Solar-related studies began during the 1950s with the establishment of a nationwide network of radiation measurement stations. The Organization of American States (OAS) provided partial support for this effort. Although the 40 sites eventually decreased to 20, current plans include expanding the network to 50 stations. Reasonable insolation levels (14.65 million J/m²/day) for solar energy applications

⁷Data from: Saravia 1976, pp. 4-17; Fernandez, et al. 1977.

at acceptable costs extend over most of the country at least part of the year; however, highest levels occur in the sparsely populated Northwest.

The year 1975 heralded a new era for Argentine solar energy research and development. Prior to 1975 approximately 20 groups from various universities, institutes, and federal agencies were engaged in solar research. That year, the government began efforts to coordinate solar energy work through CNEGH. In 1976, SECYT decided to channel all federal solar research and development funds through CNEGH for distribution to research centers.

ASADES, also founded in 1975, currently registers over 100 members. It maintains interaction among researchers by sponsoring annual workshop meetings throughout the country, publishing proceedings of its annual meeting, and by regularly issuing a newsletter (*Boletín de la ASADES*).

Solar technologies most applicable for Argentina include hot water systems, heating systems, water pumps, distillers, and drying and refrigeration devices for agricultural products. Research is being conducted in all these areas.

Significant activity and interest in the scientific community and a clearly defined infrastructure bode well for the solar future of Argentina. Argentina does not presently have any bilateral solar agreements, although a Science and Technology Agreement exists with the United States. The OAS and United Nations have granted funds for Argentine solar projects.

Solar Energy Organizations

- Armada Argentina Servicio Naval de Investigacion y Desarrollo
- ASADES
- Centro de Investigacion y Asistencia Tecnica (CIAT)
- Centro Atomico Bariloche
- CNEA
- CNEGH
 - Grupo Relevamiento Solarimetrico
 - Observatorio de Fisica Cosmica
- Comision Nacional de Investigaciones Espaciales (CNIE)
 - Departamento de Energia No Convencional
 - Grupo Relevamiento Solarimetrico
 - Observatorio Nacional de Fisica Cosmica
- CONICET
- Instituto Argentino de Investigaciones de las Zonas Aridas (IADIZA)
- Instituto de Arquitectura Solar/Federacion de Arquitectos de Buenos Aires (IAS/FABA)
- Instituto de Energia Mecanica
 - Facultad de Ingenieria y Arquitectura
- Instituto Nacional de Tecnologia Agropecuaria (INTA)
- Instituto Nacional de Tecnologia Industrial (INTI)
- Observatorio Nacional de la Rioja
- Universidad de Belgrano
- Universidad de Buenos Aires
 - Facultad de Arquitectura
- Universidad Nacional de Cordoba
 - Facultad de Arquitectura y Urbanismo

- Universidad Nacional de Lujan
Grupo de Energia Solar
- Universidad Nacional de Rosario
Facultad de Ciencias Exactas e Ingenieria
Departamento de Fisica
Grupo de Energia Solar
- Universidad Nacional de Salta
Departamento de Ciencias Exactas
Grupo de Energia Solar
- Universidad Nacional de San Juan
Facultad de Ingenieria y Arquitectura
- Universidad Nacional de San Luis
Facultad de Ciencias Fisico-Matematicas y Naturales
- Universidad Tecnologica Nacional

See also: International Contacts.

Solar Energy Related Legislation and Administrative Policies

- No legal environmental restrictions exist to impede energy development.
- The current government's energy policy emphasizes hydroelectric and nuclear power priorities over solar and wind energy. [Argonne National Laboratory 1979; Jeffs 1979.]

References

Actas de la Tercera Reunion de Trabajo de Energia Solar: 12-15 October 1977; Mendoza. Buenos Aires: Asociacion Argentina de Energia Solar; 1978.

Actas de la Cuarta Reunion de Trabajo de Energia Solar: 31 July - 3 August 1978; La Plata. Buenos Aires: Asociacion Argentina de Energia Solar; 1979.

Alvarado, Benjamin. 1978 (Nov.-Dec.). "*Recursos del carbon: enfoque sobre Latinoamerica.*" **Interciencia**. Vol. 3 (No. 6): pp. 366-374.

"*Argentina. Actual Reality.*" 1979 (July 8). **The New York Times**. Vol. 128 (Section 5).

Argonne National Laboratory. 1979 (June). "*Argentina.*" **World Energy Data System: Country Data AF-CO**. Vol. 1. Argonne, IL: Argonne National Laboratory.

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Deadline Data on World Affairs, 1980, s.v. "*Argentina.*"

The Encyclopedia Americana, International Ed., 1978, s.v. "*Argentina.*"

References (concluded)

- Encyclopedia of the Third World, 1978, s.v. "Argentina."
- The Europa Yearbook 1979; A World Survey, 1979, s.v. "Argentina."
- Fernandez, R.; Saravia, L.; Scheuer, W. 1977. "National Solar Program for Research and Development in Argentina." **Solar Energy; Proceedings of the UNESCO/WMO Symposium: 30 Aug. - 3 Sept. 1976;** Geneva, Switzerland. Geneva: World Meteorological Organization; pp. 263-271.
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- Foreign Economic Trends, 1980 (Mar.), FET 80-032, s.v. "Argentina."
- Hage, Walter; Williams, Thomas. 1979 (Dec.). "Marketing in Argentina." **Overseas Business Reports.** OBR 79-37. Washington, DC: U.S. Department of Commerce.
- Jeffs, Eric. 1979 (July). "Energy Profile of Argentina." **Energy International.** Vol. 16 (No. 7): pp. 23-28.
- Latin American Energy Report (LAER). 1979a (Feb. 19). Vol. 1 - (No. 1 -).
- Latin American Energy Report (LAER). 1979b (Sept. 13). Vol. 1 (No. 12).
- Latin American Energy Report (LAER). 1979c (Oct. 25). Vol. 1 (No. 15).
- Latin American Energy Report (LAER). 1980a (Jan. 17). Vol. 2 (No. 2).
- Latin American Energy Report (LAER). 1980b (Jan. 31). Vol. 2 (No. 3).
- Latin American Energy Report (LAER). 1980c (Feb. 14). Vol. 2 (No. 4).
- Latin American Energy Report (LAER). 1980d (Feb. 28). Vol. 2 (No. 5).
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- "Newsbeat." **Electrical World.** 1980 (15 Jan.). Vol. 188 (No. 3): p. 11.
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- Saravia, Luis R. 1976. "Solar Energy Research in Argentina." **Description of the Solar Energy R&D Programs in Many Nations; Final Report.** Edited by F. deWinter and J. W. deWinter. Santa Clara, CA: Atlas Corporation.
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- Weil, Thomas et al. 1974. **Area Handbook for Argentina.** 2nd ed. Washington, DC: American University. GPO Stock No. 008-020-00536-3.
- Worldmark Encyclopedia of the Nations. Vol. 3: Americas, 1976, s.v. "Argentina."
- The World of Learning 1979-80, 1979, 30th ed., s.v. "Argentina."
- UN 1977 Demographic Yearbook. 1978. New York: United Nations.

The International Contacts Data Base

The ongoing International Contacts Data Base (ICON) development task, begun in January 1979, maintains approximately 2,600 international contacts as of December 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 October 1980. While these records are updated as frequently as possible, THE INFORMATION CONTAINED NONETHELESS CHANGES RAPIDLY. More complete and current records may be obtained by contacting SERI International Division (303) 231-1839.

Altube, Ricardo, J.

Olleros 1782, Piso No. 12
Buenos Aires
Provincia de Buenos Aires
ARGENTINA
Solar energy.

Bana, Beatriz

Canning 3167, 4B
1425 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Barrantes, Guillermo

Cespedes 3427
1426 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Berset, Alberto

Paraguay 2535, 5B
Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Canullo, J. Carlos

Urquiza 654
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Provincia de Buenos Aires
ARGENTINA

Cejas, Rogelio

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ARGENTINA

Gnidica, M. Rosa

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1417 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Goldenstein, Leonardo

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Provincia de Buenos Aires
ARGENTINA

Hume, David

Free-lance journalist
Casilla Correo Central 4868
1000 Buenos Aires
Provincia de Buenos Aires
ARGENTINA
World Press Institute

Ivanissevich, Alejandro

Casilla de Correo 555
9100 Trelew
Provincia del Chubut
ARGENTINA

Jones, Oscar E.

A.P. Bell No. 5
9100 Trelew
Provincia del Chubut
ARGENTINA

Marqui, Francisco

Gral Urquiza 109 P.B. Dpto C
1215 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Morrelli, Alberto

Alberti 68
1642 San Isidro
Provincia de Buenos Aires
ARGENTINA

Papini, Norberto

Florida 833, 1 piso
Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Rondelli, Eduardo

Avenida Beyro 3306, 2A
1419 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Energy conservation and solar applications.

Ruvira, Monica
Parosien 1773, 7B
Buenos Aires
Provincia de Buenos Aires
ARGENTINA
Energy conservation and solar applications.

Santamarina, Osvaldo
Condarco 3050
1417 Buenos Aires
Provincia de Buenos Aires
ARGENTINA
Energy conservation and solar applications.

Zeinsteger, Elsa
Ambrosetti 1690
1754 San Justo
Provincia de Buenos Aires
ARGENTINA
Energy conservation and solar applications.

**Armada Argentina
(Argentine Navy)**
Servicio Naval de Investigacion y Desarrollo
Bastianon, Ricardo A.
Scientific Director of Research and Development
*Wind energy conversion; Member of the Advisory Committee
of the National Program for Non-Conventional Energy.*

**Asociacion Argentina de Energia
Solar (ASADES)
(Argentine Solar Energy
Association)**
Casilla Correo No. 13
1602 Puente Saavedra
Provincia de Buenos Aires
ARGENTINA

**AIC, Sociedad Anonima Cordoba
del Tucuman**
Suipacha 552
Buenos Aires
Provincia de Buenos Aires
ARGENTINA
*Refining of sugar products and commercial scale production
of ethanol.*

**Centro de Investigacion y
Asistencia Tecnica (CIAT)
(Center for Research and Technical
Assistance)**
Patricias Mendocinas 1167
5500 Mendoza
Provincia de Mendoza
ARGENTINA
*Development of a prototype solar dryer to dehydrate fruits and
vegetables.*

Fernandez, Jorge
Genovart, Sebastian O.
Solar drying.

Montes, Tomas Anibal
Solar drying.

Pizzuto, Alfredo A.
Solar drying.

**Centro de Investigaciones de las
Fuerzas Armadas
(Armed Forces Research Center)**

Buenos Aires
Provincia de Buenos Aires
ARGENTINA
*Photovoltaics; Solar cell technology; Cadmium sulfide solar
cells.*

**Centro Atomico Bariloche
(Bariloche Center for Atomic
Research)**

Avenida Bustillo Km 9.5
8400 San Carlos de Bariloche
Provincia de Rio Negro
ARGENTINA
Garibotti, Carlos
Solar energy research.

**Comision Nacional de Energia
Atomica (CNEA)
(National Atomic Energy
Commission)**

Avenida del Libertador 8250
1429 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Astudillo, Graciela

Borre, Elena

Crespi, Martin B. A.

Duran, Julio Cesar
Energy conservation and solar applications.

Erramuspe, Hugo
Wind.

Moragues, Jaime Baudillo Axel
*The photothermal conversion of solar energy into electricity;
IIE Multiregional Project on Energy Research and
Technology; Alternative energy; First President of the
Argentine Solar Energy Association.*

Nicolas, Ruben

Platzeck, R. P.
Concentrating collectors.

Scheuer, Walter
The photothermal conversion of solar energy into electricity.

Grupo de Energia Solar

Departamento de Fisica

Avenida del Libertador 8250
1429 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Sponsors Argentine Solar Energy Association (ASADES).

**Comision Nacional de Estudios
Geo-Heliofisicos (CNEGH)
(National Commission for
Geo-Heliophysics Studies)**

Observatorio Nacional de Estudios

Avenida Mitre 3100
1663 San Miguel
Provincia de Buenos Aires
ARGENTINA

Solar insolation studies.

**Comision Nacional de
Investigaciones Espaciales (CNIE)
(National Commission for Space
Research)**

Calle Pedro Zanni 250, 8 piso
1104 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Measurements of solar radiation; Climatic data.

Cardoso, Juana

Energy conservation and solar applications.

Estol, Raul Carlos

Energy conservation and solar applications.

Fabris, Aldo

Researcher

Has conducted research at San Miguel Space Center.

Logusso, Norberto

Roberti, Alejandro

Energy conservation and solar applications.

**Departamento de Energia No-
Convencional**

Division de Energia Solar

Calle Pedro Zanni 250, 8 piso
1104 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Rapallini, Alfredo Tomas

Chief

Solar distillation; Solar heating of fluids.

**Compania Azucarera del Norte,
S.A.**

Belgrano 990
1092 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

*Refining of sugar products and commercial scale production
of ethanol.*

**Compania Azucarera Concepcion,
S.A.**

San Martin 662
1004 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

*Refining of sugar products and commercial scale production
of ethanol.*

**Consejo Nacional de
Investigaciones Cientificas y
Tecnicas (CONICET)
(National Council of Scientific
and Technical Research)**

Rivadavia 1917
Buenos Aires
Provincia de Buenos Aires
ARGENTINA

*A state-supported organization created to promote and
undertake scientific and technical research. Has participated
in Argentina's Rural Environment Systems project to
incorporate solar and other renewable energy sources into rural
housing designs.*

Forni, Floreal

*Participant in Argentina's Rural Environment Systems
project to incorporate solar and other renewable energy sources
into rural housing designs.*

Montagu, Arturo F.

*Participant in Argentina's Rural Environment Systems
project to incorporate solar and other renewable energy sources
into rural housing designs.*

**CI, Sociedad Anonima Azucarera
Argentina**

Corrientes 569
Buenos Aires
Provincia de Buenos Aires
ARGENTINA

*Refining of sugar products and commercial scale production
of ethanol.*

CIFOBI**Facultad de Bioquímica**

Suipada 570
2000 Rosario
Provincia de Santa Fe
ARGENTINA

Has sponsored research activities in solar energy.

**Empresa Obras Sanitarias de la
Nacion
(National Sanitary Works
Company)**

Marcelo T. de Alvear 1840
Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Linares, J.G.

Involved in projects using solar energy for water distillation.

Enercon S.R.L.

1846 Adroque
Provincia de Buenos Aires
ARGENTINA

*Representative in Argentina for foreign solar equipment
manufacturers.*

(011 54 1) 84-1355

Gomoliszewski, A.F.

Company representative.

(011 54 1) 84-1355

**Estacion Experimental Agro-
Industrial "Obispo Colombres"
(Agricultural Industrial Research
Agency, "Obispo Colombres")**

Casilla de Correos 71
4000 San Miguel de Tucuman
Provincia de Tucuman
ARGENTINA

*Agricultural and industrial research programs; A principal
agency involved in the technical research program for
establishing the feasibility of using ethanol from sugar cane as
a gasoline substitute in automotive fuels and as a chemical
feedstock in Argentina.*

Hemsey, Victor

Director Tecnico

*Agricultural and industrial research programs; Performance
tests and feasibility studies of ethanol (from sugar cane) as a
gasoline substitute in automotive fuels and as a chemical
feedstock in Argentina.*

EMEGE S.A.I.C.Y.T.

Avelloneda 1333
1405 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Gak, Pablo

Energy conservation and solar applications.

Oks, Pablo

Energy conservation and solar applications.

**Ingenieria para el Ahorro de
Energia
(Engineering for Energy
Conservation)**

Estanisolao del Campo 520
1706 Haedo
Provincia de Buenos Aires
ARGENTINA

Fernandez, Rodolfo Orlando

Gerente (Director)

Energy conservation.

(011 54 1) 653-8129

Ingenio Rio Grande, S.A.

Reconquista 336
Buenos Aires
Provincia de Buenos Aires
ARGENTINA

*Refining of sugar products and commercial scale production
of ethanol.*

**Instituto de Arquitectura
Solar/Federacion de Arquitectos
de Buenos Aires (IAS/FABA)
(Institute of Solar Architecture)**

Avenida 1, No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

*Research activities in a wide range of areas involving solar
architecture; Active and passive solar heating and cooling
systems.*

(011 55 21) 2-5467

del Cueto, Jose Ramon

Insolation measurements; Passive solar architecture.

Brusasco, Graciela

Insolation measurements for passive application.

Ciancaglini, Leticia Teresa

Insolation and passive.

Delgado, Estela

Fujol, Martha

Guerrero, Jorge Luis

Passive solar heating and cooling research and development for the widely-varying climatic regions of Argentina; Solar distillation.

Lalli, Atilio J.

Solar architecture.

Perelman, Rafael

Ravella, O. R.

Insolation measurement; Passive solar architecture.

Rosenfeld, Elias

Director

Passive solar heating and cooling research and development for the widely-varying climatic regions of Argentina;

Insolation measurement.

(011 54 21) 2-5467

Vinocur, Elisa

Energy conservation and solar applications.

Yarke, Eduardo

Energy conservation and solar applications.

**Instituto de Investigaciones de
Diseno (IDID)
(Design Research Institute)**

Departamento de Diseno

ARGENTINA

Has participated in research and design phase of Argentina's Rural Environment Systems project to incorporate solar and other renewable energy sources into rural housing designs.

**Instituto de Investigaciones
Fisicoquimicas Teoricas
y Aplicadas (INIFTA)**

Diagonal 113 y 64

1900 La Plata

Provincia de Buenos Aires

ARGENTINA

Non-conventional energy sources; Research activities in solar energy.

**Instituto Argentino de
Investigaciones de las Zonas
Aridas (IADIZA/LAHV)
(Argentine Institute for Research
of Arid Zones)**

Laboratorio de Ambiente Humano y
Vivienda

Casilla de Correo 507

5500 Mendoza

Provincia de Mendoza

ARGENTINA

A governmental research laboratory for the design and

development of solar housing for arid zones. Three areas of research have been initiated: construction and analysis of passive solar houses; application of solar technologies to multifamily and multistory buildings; and development of mathematical models for evaluating the economic and energy efficiency of solar houses.

Braun Wilkes, Rolando

Director

Passive solar architecture; Local organizer for the Third Annual Meeting of the Argentine Solar Energy Association; Ecology of vegetable resources.

De Rosa, C.

Has participated in solar house design.

Fernandez, Jose E.

Research and design for solar houses.

Lelio, Gustavo

Passive solar architecture.

Tedeschi, E.

Passive solar architecture for the arid zones of Argentina.

Vilaprino, R.

Passive solar architecture for the arid zones of Argentina.

**Instituto Nacional de Tecnologia
Agropecuaria (INTA)
(National Institute of Farming
Technology)**

Rivadavia 1439

Buenos Aires

Provincia de Buenos Aires

ARGENTINA

Passive solar energy as it relates to farming technology. Has participated in projects designed to promote the use of solar energy in rural communities.

Requena, Rafael

Passive project.

**Instituto Nacional de Tecnologia
Industrial (INTI)
(National Institute of Industrial
Technology)**

Avenida Leandro N. Alem 1067

1001 Buenos Aires

Provincia de Buenos Aires

ARGENTINA

Fucaraccio, Jorge

Energy conservation and solar applications; Member of the Advisory Committee for the National Program for Non-Conventional Energy.

Grunhut, Enrique

Energy conservation and applications of solar technologies.

Peyre, Jaime

Applications of solar energy technologies.

**Instituto Provincial de la Vivienda
del Gobierno de Mendoza
(Housing Institute of the Province
of Mendoza)**

Mendoza
Provincia de Mendoza
ARGENTINA

Provides funding for passive solar architecture projects.

INGENSA

Piedras 113, 4 piso, oficina 8
1078 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Energy conservation and solar applications.

Fernandez, Rodolfo Orlando

Energy conservation and solar applications.

**Laboratorio Solar
(Solar Laboratory)**

Lezica 3948
1202 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Pursues general research activities in solar energy, particularly concerned with photovoltaics and energy conversion; other interests include information collection, exchange, and dissemination on solar activities being conducted in Argentina and other Latin American countries.

(011 54 1) 811-1241

Rietti, Ariel Ciro

Director

Research on solar energy; Photovoltaics; Information exchange and dissemination.

(011 54 1) 811-1241

**Observatorio Nacional de Fisica
Cosmica
(National Observatory of Cosmic
Physics)**

Avenida Mitre 3100
1663 San Miguel Provincia de Buenos Aires
ARGENTINA

Garcia, Monica V.

Researcher

Solar drying; Solar radiation.

**Observatorio Nacional de Fisica
Cosmica
(National Observatory of Cosmic
Physics)**

Avenida Mitre 3100
1663 San Miguel
Provincia de Buenos Aires
ARGENTINA

Conducting studies in all branches of solar energy; Energy planning and management; Solar radiation; Solar crop drying; Solar heating systems.

von Wuthenau, Francisco F.

Solar energy planning.

Grossi Gallegos, Hugo

Solar heating systems.

Lopardo, R.

Solarimetric network; Solar radiation.

**Departamento de Radiacion Solar
Meteorologia**

Avenida Mitre 3100
1663 San Miguel
Provincia de Buenos Aires
ARGENTINA

Measurements of solar radiation and calibration of instruments; Radiation climatology.

**Observatorio Nacional de La Rioja
(ONOLAR)
(National Observatory of La Rioja)**

Avenida Ortiz Ocampo 1700
5300 La Rioja
Provincia de La Rioja
ARGENTINA

Oliveras, Ernesto D.

Energy conservation and solar applications.

**Organization of American States
(OAS)**

1889 F Street
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Atienza, G.

Contracted by OAS to work on Argentina's Solarimetric Network (Red Solarimetrica).

(202)789-3000

**Secretaria de Estado de Ciencia y
Tecnologia (SECYT)
(State Secretariat for Science
and Technology)**

Avenida Cordoba 831, 7 piso
1054 Buenos Aires
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ARGENTINA

Has funded solar energy projects in Argentina; Sponsored a conference on solar desalinization at the Centro Espacial San Miguel.

Garcia Marcos, Fermin

Energy conservation and solar applications.

Programa Nacional de Energia No Convencional

Avenida Cordoba, 7 piso
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Radicella, Sandro

Executive Secretary of the National Program
Applications of solar technologies; Energy conservation.

Secretaria de Estado de Energia (State Secretariat for Energy)

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1430 Buenos Aires
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ARGENTINA

Brunella, Daniel A.

State Secretary
Energy conservation and solar applications.

Schwartzman, Alfred M.

Advisor to the Director of Fuels
Multiregional project on energy analysis and planning.

Solar Energy, Inc.

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Clasen, Eduardo

Energy conservation and solar applications.

SMAR S.A.I.C.

Avenida Mitre 5354
1678 Caseros
Provincia de Buenos Aires
ARGENTINA

Ducard, Juan Carlos

Flat plate collectors; Solar water heaters.

Klosewicz, Gabriel

Flat plate collectors.

Michalski, Marcelo

Flat plate collectors.

Montana, Carlos Alberto

Flat plate collectors.

Wainschenker, Ruben

Participated in design and efficiency studies of flat plate collectors.

Universidad de Belgrano (University of Belgrano)

Federico Lacroze 1959
1426 Buenos Aires
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ARGENTINA

Matin Evans, J.

Energy conservation and solar applications.
(011 54 1) 772-4014 x18

Vigo, Libertad

Energy conservation and solar applications.
(011 54 1) 722-4014 x18

Universidad de Buenos Aires (University of Buenos Aires) Facultad de Arquitectura y Urbanismo

Ciudad Universitaria
F. Alcorta 3024
1425 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Solar energy applications for rural homes, schools, and hospitals.

Alvelo, Juan C.

Solar architecture.

De Giacomo, Atilio

Has participated in research and design phase of Argentina's Rural Environment Systems project to incorporate solar and other renewable energy sources into rural housing designs; Author of material on solar energy.

Universidad Nacional de Cordoba (UNC/FAU) (National University of Cordoba) Facultad de Arquitectura y Urbanismo

Avenida V. Sarsfield 264
5000 Cordoba
Provincia de Cordoba
ARGENTINA

Lastra, Oscar

Passive solar architecture.
47382 (011 54 51) 47382

Peralta Chappell, Renato

Applications of solar energy technologies.
(011 54 51) 47380

Universidad Nacional de La Pampa (UNLP) (National University of La Pampa)

Instituto de Estudios Regionales

Mansilla 178
6300 Santa Rosa

Provincia de La Pampa
ARGENTINA

Solar stills for local communities.

Zabala, Juan Elias

Energy conservation and solar applications; Solar stills for local communities.

Universidad Nacional de Lujan (National University of Lujan)

Grupo de Energia Solar

Casilla De Correo 221
6700 Lujan
Provincia de Buenos Aires
ARGENTINA

Multidisciplinary group with members from various university departments.

Barral, Raul

Solar drying.

Jaoand, Alfredo

Solar drying.

Lanzelotti, J.

Solar drying.

Marsili, Romano

Solar drying.

Silvestre, C.

Solar drying.

Universidad Nacional de Rosario (UNR/FCEI)

(National University of Rosario)

Facultad de Ciencias Exactas e Ingenieria

Departamento de Fisica

Avenida Pellegrini 250
2000 Rosario
Provincia de Rosario
ARGENTINA

Cortes, Alberto

Solar drying; Member of the university's Grupo de Energia Solar.

Di Bernardo, Elio

Architect

Architect for two passive heated single family dwellings in high arid savanna regions; Member of the university's Grupo Energia Solar.

Gaspar, Roberto

Solar drying; Member of the university's Grupo de Energia Solar.

Lara, Miguel A.

Solar drying; Member of the university's Grupo de Energia Solar.

Piacentini, Ruben D.

Solar drying; Member of the university's Grupo de Energia Solar.

Grupo de Energia Solar

Avenida Pellegrini 250
2000 Rosario
Provincia de Rosario
ARGENTINA

A multidisciplinary group with members from the physics and engineering departments; Solar crop drying.

Universidad Nacional de Salta (UNSa)

(National University of Salta)

Buenos Aires 177
4400 Salta
Provincia de Salta
ARGENTINA

Gay, Michel

Energy conservation and solar applications.

Souto, Jorge A.

Energy conservation and solar applications.

Departamento de Ciencias Exactas

Buenos Aires 177
4400 Salta
Provincia de Salta
ARGENTINA

Solar crop drying; Solar refrigeration; Solar ponds; Low-temperature solar collectors on self-supporting metal roofs tested for house heating, using water and air as working fluids; Pebble bed storage.

de Paul, I.

Solar drying; Member of the university's Grupo de Energia Solar.

Alanis, Elvio

Researcher

Development of low-cost passive systems for buildings; Non-convecting water walls; Phase-change storage; Member of the university's Grupo de Energia Solar.

Beckerman, C.

Solar ponds; Member of the university's Grupo de Energia Solar.

Castagnolo, Jose

Solar drying; Member of the university's Grupo de Energia Solar.

Concari, S. B.

Solar drying; Member of the university's Grupo de Energia Solar.

De Beckerman, M.

Energy conservation and solar applications.

Frigerio, Erico

Solar drying; Member of the university's Grupo de Energia Solar.

Guerrero, Santiago

Solar crop drying; Member of the university's Grupo de Energia Solar.

Lesino, Graciela

Solar ponds; Construction and monitoring of two passive heated single-family dwellings; Trombe walls; Earth-sheltered houses; Greenhouses; Member of the university's Grupo de Energia Solar.
20500 Salta 20500

Mangussi, Maria Josefina

Solar ponds; Member of the university's Grupo de Energia Solar.

Ovejero, Roberto

Insolation; Passive solar architecture; Member of the university's Grupo de Energia Solar.

Perez, Jesus

Energy conservation; Member of the university's Grupo de Energia Solar.

Ronco, Alicia

Solar ponds; Member of the university's Grupo de Energia Solar.

Rovetta, L.

Solar heating and storage; Member of the university's Grupo de Energia Solar.

Saravia, Luis

Solar ponds; Construction and monitoring of two passive heated single family dwellings; Pumice and adobe use in conjunction with stone Trombe walls; Greenhouses; Earth sheltered houses; Member of the university's Grupo de Energia Solar.

Grupo de Energia Solar

Buenos Aires 177
4400 Salta
Provincia de Salta
ARGENTINA

Multidisciplinary group with members from various university departments; Solar ponds; Pebble bed storage; Solar refrigeration; Research on solar collectors for domestic heating; Studying applications of solar energy water distillation and purification.

**Universidad Nacional de San Juan
(UNSJ)
(National University of San Juan)**

Avenida Ignacio de la Roza 230
5400 San Juan
Provincia de San Juan
ARGENTINA

Castro, Jose

Solar heating and storage; Member of the university's Grupo de Energia Solar.

Facultad de Ingenieria y Arquitectura

Avenida del Libertador 1109
5400 San Juan
Provincia de San Juan
ARGENTINA

Gallo, Antonio

Solar architecture.

**Universidad Nacional de San Luis
(UNSL)
(National University of San Luis)**

Chacabuco y Pedernera
5700 San Luis
Provincia de San Luis
ARGENTINA

Odicino, Luis

Solar collectors.

Velazco, Pedro

Solar collectors.

Departamento de Fisica y Quimica

Chacabuco y Pedernera
5700 San Luis
Provincia de San Luis
ARGENTINA

Diaz, Mario

Solar water heating; Solar distillation.

Fasulo, Amilcar J.

Solar collectors.

**Facultad de Ciencias Fisico-Matematicas y
Naturales**

Chabuco y Pedernera
5700 San Luis
Provincia de San Luis
ARGENTINA

Constanza, Gregorio

Solar collectors.
San Luis 2644

Follari, Jorge Alberto

Solar collectors.
San Luis 2644

Ronchietto, Victor

Solar collectors.
San Luis 2644

**Universidad Nacional de Tandil
(UNT/FCE)**

(National University of Tandil)

Facultad de Ciencias Exactas

Calle Pinto 399
7000 Tandil
Provincia de Buenos Aires
ARGENTINA

Ferragini, Maria Rosa

Applications of solar energy.

**Yacimientos Petroliferos Fiscales
(YPF)**

(National Hydrocarbons Board)

Avenida Roque S. Pena 777

Buenos Aires
Provincia de Buenos Aires
ARGENTINA

The principal public corporation in Argentina for the formulation of national petroleum policy and for the exploration, production, processing, and marketing of hydrocarbon resources; Provides financing and technical assistance for the preliminary testing of ethanol as an automotive fuel to replace petroleum.

**Universidad Nacional de Tucuman
(UNT/FA)**

(National University of Tucuman)

Facultad de Arquitectura

Avenida Roca 1800
4000 San Miguel de Tucuman
Provincia de Tucuman
ARGENTINA

Gonzaldo, Guillermo

Solar architecture.

Padilla, Evaristo

Engineer

Passive solar architecture.

**Universidad Provincial de la Rioja
(University of the Province of La
Rioja)**

Servicio de Informacion y Documentacion

Avenida Ortiz de Ocampo 1700
La Rioja
Provincia de La Rioja
ARGENTINA

The University has established a center for exchange of information on solar energy with other countries.

**Universidad Tecnologica Nacional
(UTN)**

**(National University of
Technology)**

25 de Mayo 564
Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Litvak, Jose

Applications of solar technologies.

(011 54 1) 41-0071

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 December 1980, this data base contains approximately 615 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 as of October 1980. While these records are updated as frequently as possible, THE INFORMATION CONTAINED NONETHELESS CHANGES RAPIDLY. More complete and current records may be obtained by contacting SERI International Division (303) 231-1839.

Ingenieria Solar

Via del Pinn 2428
Buenos Aires, Buenos Aires
ARGENTINA

Space Heating Systems
Domestic Hot Water Systems
Swimming Pool Heating Systems
Solar Stills

PAŠAC, S.A.

Esmeral 536
Buenos Aires
Provincia de Buenos Aires
ARGENTINA

Siglo XX

Mendoza, Mendoza
ARGENTINA

Space Heating Systems

Solar, S.A

San Luis, San Luis
ARGENTINA

Space Heating Systems

Sonnen-Co.

Buenos Aires, Buenos Aires
ARGENTINA

Space Heating Systems

SMAR, S.A.I.C.

Avenida Bartolome Mitre 5354
1678 Caseros, Buenos Aires
ARGENTINA

Space Heating Systems
Thermal Collector Subsystems

Tomeco, S.R.L.

Avenida San Martin 5790
Lujan, Mendoza
ARGENTINA

Space Heating Systems

The International Projects Data Base

The ongoing International Projects Data Base (INPRO) development task, begun in August 1979, maintains approximately 800 international programs and projects as of December 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 as of October 1980. While these records are updated as frequently as possible, THE INFORMATION CONTAINED NONETHELESS CHANGES RAPIDLY. More complete and current records may be obtained by contacting SERI International Division (303) 231-1839.

00690

Passive Architecture for Humid Temperate Zones

START DATE: August 1978

LOCATION:

La Plata and Ituzaingo, in the province of Buenos Aires

DESCRIPTION:

This program investigated solar passive technology for low-cost dwellings. Solar passive systems with high heat accumulation with controllable heat release and solar chimneys were the subjects of research for mass market applications. The specific techniques were chosen because of the climatic conditions of the region (humidity and high winter cloudiness). A broad range of design tools and simulation techniques includes: daylighting; ventilation and convection; solar chimneys; and liquid walls. Manufacturing techniques for these systems were also studied.

BUDGET:

US\$ 316,211.

PARTICIPANTS:

Instituto de Arquitectura Solar/Federacion de Arquitectos de Buenos Aires
Management (subordinate)
Guerrero, Jorge Luis
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

Instituto de Arquitectura Solar/Federacion de Arquitectos de Buenos Aires
Management (principal)
Rosenfeld, Elias
Director
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

00691

CESAD Program

LOCATION:

La Plata

DESCRIPTION:

Thirty multifamily solar houses (2100 sq m) were constructed in La Plata. The solar energy systems provided heating, ventilation, hot water, and clothes drying. In the Southern Hemisphere, these north-facing buildings are heated by a combination of Trombe walls at ground level and a multistoried sunspace on succeeding floors. A hot air thermosyphoning system works in parallel with a solar chimney, which acts to vent the sunspace. The south faces of these four story buildings are used for circulation.

PARTICIPANTS:

Instituto de Arquitectura Solar/Federacion de Arquitectos de Buenos Aires

Management (subordinate)

Guerrero, Jorge Luis
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires

Management (principal)

Rosenfeld, Elias
Director
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

00692

IAS/FABA Solar House One

LOCATION:

Ituzaingo, 35 km. from Buenos Aires

DESCRIPTION:

A single-family house covering about 80 sq m built by IAS/FABA in a residential quarter near the downtown area was studied. The house's architectural system optimizes the requirements of energy conservation and profitable use of solar energy for heating and cooling, clothes drying, and production of domestic hot water. This two-bedroom house incorporates a Trombe Wall for heat collection and storage, and an attached greenhouse. Thermal balance of the house has been calculated for cold and warm seasons, and a "typical design day" for both seasons is given.

PARTICIPANTS:

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires

Oversight and Evaluation (sole)

Guerrero, Jorge Luis
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires

Design (joint)

Rosenfeld, Elias

Director

Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires

Connected, Relationship Unknown

Brusasco, Graciela
Avenida 1, No. 698
1900 La Plata

Provincia de Buenos Aires

ARGENTINA

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires

Design (principal)

Ravella, O. R.
Avenida 1, No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires

Design (joint)

del Cueto, Jose Ramon
Avenida 1, No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

00693

**Solar Energy Test Facility Experimental
House Prototype**

LOCATION:

La Plata

DESCRIPTION:

Energy requirements and heat gain/loss are monitored in this experimental solar house.

PARTICIPANTS:

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires

Management (subordinate)

Guerrero, Jorge Luis
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires

Management (principal)

Rosenfeld, Elias
Director
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

00694

**Solar Accumulator Collector Wall With
Controlled Discharge**

DESCRIPTION:

Due to conditions of high cloudiness in winter, a high heat accumulation liquid wall system was found necessary as a passive heating device. A controlled heat release technique was also developed in parallel.

PARTICIPANTS:

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires
Management (subordinate)
Guerrero, Jorge Luis
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires
Management (principal)
Rosenfeld, Elias
Director
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

00695

Solar Chimneys**DESCRIPTION:**

Design is being studied for solar chimneys to exhaust heated air as an induced ventilation system for the mass market in Argentina. Night-sky radiation as a cooling technique was precluded because of high humidity and cloudiness.

PARTICIPANTS:

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires
Management subordinate
Guerrero, Jorge Luis
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

Instituto de Arquitectura Solar/Federacion de
Arquitectos de Buenos Aires
Management (principal)
Rosenfeld, Elias
Director
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

Independent Projects

00716

Passive Solar Dwelling for Arid Zones**LOCATION:**

Mendoza, in northwest Argentina

DESCRIPTION:

A single-family house has been constructed in the shape of an open triangle facing North, with direct

gain masonry walls, Trombe walls and a pebble bed storage system. This Southern Hemisphere building also abuts a reflective north courtyard for capturing the albedo. This arid, cold zone design is intended for an urban, middle income family.

PARTICIPANTS:

Instituto Argentino de Investigaciones de las Zonas
Aridas

Contact

Lelio, Gustavo
Laboratorio de Ambiente Humano y Vivienda
Casilla de Correo 507
5500 Mendoza
Provincia de Mendoza
ARGENTINA

Instituto Argentino de Investigaciones de las Zonas
Aridas

Design (principal)

Tedeschi, E.
Laboratorio de Ambiente Humano y Vivienda
Casilla de Correo 507
5500 Mendoza
Provincia de Mendoza
ARGENTINA

Instituto Argentino de Investigaciones de las Zonas
Aridas

Design (subordinate)

Vilaprino, R.
Laboratorio de Ambiente Humanos y Vivienda
Casilla de Correo 507
5500 Mendoza
Provincia de Mendoza
ARGENTINA

00717

Convective Layers in Solar Ponds**LOCATION:**

Salta, in northwest Argentina

DESCRIPTION:

A new experimental model of a solar pond is designed which should avoid double diffusion instability due to growth of convective layers.

PARTICIPANTS:

Comision Nacional de Estudios Geo-Heliofisicos

Contact

Observatorio Nacional de Estudios
Avenida Mitre 3100
1663 San Miguel
Provincia de Buenos Aires
ARGENTINA

Universidad Nacional de Salta

Research (sole)

Saravia, Luis
Departamento de Ciencias Exactas
Buenos Aires 177
4400 Salta
Provincia de Salta
ARGENTINA

Universidad Nacional de Salta
Funding (sole)
Grupo de Energia Solar
Buenos Aires 177
4400 Salta
Provincia de Salta
ARGENTINA

00718

Gradient Saline Solar Pond Modeling

LOCATION:

Salta, in northwest Argentina

DESCRIPTION:

A mathematical model has been developed of the thermal balance within the convective layers of a sodium sulfate solar pond.

PARTICIPANTS:

Comision Nacional de Estudios Geo-Heliofisicos

Contact

Observatorio Nacional de Estudios
Avenida Mitre 3100
1663 San Miguel
Provincia de Buenos Aires
ARGENTINA

Universidad Nacional de San Luis

Research (sole)

Constanza, Gregorio
Facultad de Ciencias Fisico-Matematicas y Naturales
Chabuco y Pedernera
5700 San Luis
Provincia de San Luis
ARGENTINA

Universidad Nacional de Salta

Funding (sole)

Grupo de Energia Solar
Buenos Aires 177
4400 Salta
Provincia de Salta
ARGENTINA

00723

Experimental Solar House at Mendoza

LOCATION:

Mendoza, in northwest Argentina

DESCRIPTION:

A prototype single-family solar house designed for a hot-arid climate will be constructed, incorporating passive (direct gain, Trombe walls, rock-bed collection system and natural convection air collectors) and active air and water heating/cooling systems. The rock bed system is based on a design by B. Givoni. Design has been kept simple and local materials will be used to keep construction costs low.

PARTICIPANTS:

Organization of American States

Funding (sole)

1889 F Street
Washington, D. C. 20006
UNITED STATES

Instituto Provincial de la Vivienda del Gobierno de Mendoza

Management (principal)

Mendoza
Provincia de Mendoza
ARGENTINA

Instituto Argentino de Investigaciones de las Zonas Aridas

Contact

Lelio, Gustavo
Laboratorio de Ambiente Humano y Vivienda
Casilla de Correo 507
5500 Mendoza
Provincia de Mendoza
ARGENTINA

00846

Heat Storage Materials and Their Applications to Passive Solar Systems

START DATE: January 1, 1979

LOCATION:

Salta, in northwest Argentina

DESCRIPTION:

The following low-cost passive systems are being developed: a) low weight/volume Trombe walls using water, plus additives to stop convection; b) small, portable storage systems using phase change materials. Small test cells, constructed for the project, are verified with computer programs using numerical methods to solve differential equations. The use of local materials is a goal of the research.

BUDGET:

US\$ 22,000 for 1980 only.

PARTICIPANTS:

Comision Nacional de Estudios Geo-Heliofisicos

Funding (sole)

Observatorio Nacional de Estudios
Avenida Mitre 3100
1663 San Miguel
Provincia de Buenos Aires
ARGENTINA

Universidad Nacional de Salta

Research (sole)

Alanis, Elvio
Researcher
Departamento de Ciencias Exactas
Buenos Aires 177
4400 Salta
Provincia de Salta
ARGENTINA

00847

Solar Energy in Buildings in the Argentine Pampa

START DATE: 1980

LOCATION:

Abra Pampa-Provincia de Jujay and Laguna Blanca-Provincia de Catamarca

DESCRIPTION:

Two single-family homes are being constructed and monitored in the high arid savannah of Argentina. Local materials, including pumice and adobe, are being used in conjunction with stone Trombe walls and an attached greenhouse for humidification. Computer simulation techniques developed are: a dynamic simulation of Trombe walls and greenhouses (based on Balcomb et al); and a simulation of thermal losses in earth-sheltered houses. A next step will be to study passive heating and cooling applications for different climate zones in Argentina.

BUDGET:

US\$ 39,000 for 1980 only.

PARTICIPANTS:

Universidad Nacional de Salta
Management (joint)
Saravia, Luis
Departamento de Ciencias Exactas
Buenos Aires 177
4400 Salta
Provincia de Salta
ARGENTINA

Universidad Nacional de Salta
Management (joint)
Lesino, Graciela
Departamento de Ciencias Exactas
Buenos Aires 177
4400 Salta
Provincia de Salta
ARGENTINA

Secretaria de Estado de Ciencia y Tecnologia
Funding (sole)
Avenida Cordoba 831, 7 piso
1054 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

00896

Tucuman Alcohol Fuel Research Program

START DATE: 1979

DESCRIPTION:

The National Government of Argentina has authorized the Provincial Government of Tucuman to undertake an alcohol fuel research program with financial and technical assistance from the State Energy Secretariat and the Hydrocarbons Board

(YFP). Tucuman produces 60% of the national sugar cane crop and its economy is dominated by the sugar cane industry. The program will provide basic information for the National Government and will allow Tucuman to assess the desirability of expanding the sugar cane industry to include ethanol production for fuels and chemicals within the Provincial economic development strategy called "Sugar Cane Third Stage Development." The program has 3 stages: (1) Performance testing with a set gasoline/anhydrous ethanol blend (calledalconafta), (2) Performance testing with other blends, and (3) Integrated economic and technical evaluation of large-scale ethanol development. Stage (1) testing is underway at the "Obispo Colombres" Research Agency in Tucuman.

PARTICIPANTS:

Estacion Experimental Agro-Industrial "Obispo Colombres"
Research (joint)
Casilla de Correos 71
4000 San Miguel de Tucuman
Provincia de Tucuman
ARGENTINA

Estacion Experimental Agro-Industrial "Obispo Colombres"
Research (joint)
Hemsey, Victor
Director Tecnico
Casilla de Correos 71
4000 San Miguel de Tucuman
Provincia de Tucuman
ARGENTINA

Yacimientos Petroliferos Fiscales
Oversight and Evaluation (level unknown)
Funding (level unknown)
Avenida Roque S. Pena 777
Buenos Aires
Provincia de Buenos Aires
ARGENTINA

01500

Testing Flat Plate Collectors Used in Solar Water Heating

START DATE: 1977

LOCATION:

Caseros, 20 km from Buenos Aires

DESCRIPTION:

The aim of this project was to construct a facility for testing the relative efficiencies of flat plate collectors of different sizes manufactured by SMAR S.A.I.C., which would lead to quality control for mass produced solar collectors. Solar collectors were placed on an iron mounting (4m x 2m) 1.5m from the ground; an equation was given to determine the collector's efficiency through measuring the temperature of the water heated. Testing was done

based on norms established by the National Bureau of Standards. As a final step, solar collectors from Miromit, Israel, with known calibration curves, were tested on this facility so that results could be obtained with standard values.

PARTICIPANTS:

Comision Nacional de Estudios Geo-Heliofisicos
Connected, Relationship Unknown
Observatorio Nacional de Estudios
Avenida Mitre 3100
1663 San Miguel
Provincia de Buenos Aires
ARGENTINA

SMAR S.A.I.C.
Connected, Relationship Unknown
Ducard, Juan Carlos
Avenida Mitre 5354
1678 Caseros
Provincia de Buenos Aires
ARGENTINA

SMAR S.A.I.C.
Connected, Relationship Unknown
Montana, Carlos Alberto
Avenida Mitre 5354
1678 Caseros
Provincia de Buenos Aires
ARGENTINA

SMAR S.A.I.C.
Connected, Relationship Unknown
Michalski, Marcelo
Avenida Mitre 5354
1678 Caseros
Provincia de Buenos Aires
ARGENTINA

Connected, Relationship Unknown
Bana, Beatriz
Canning 3167, 4B
1425 Buenos Aires
Provincia de Buenos Aires
ARGENTINA

01501

Testing Solar Water Distiller Design

DESCRIPTION:

This project involves research on internal isotherms and the yield of a closed convective flux solar still designed to be used in family dwellings. The fiberglass reinforced polyester distiller was designed according to principles developed by R. V. Dunkle, and was compared with a similar solar distiller which had been developed in the late 1960's. Producing 2.36 kg of distilled water daily, this distiller will be modified to correct sealing problems in the condenser.

PARTICIPANT:

Instituto de Arquitectura Solar/Federacion de Arquitectos de Buenos Aires
Contact
Guerrero, Jorge Luis
Avenida 1 No. 698
1900 La Plata
Provincia de Buenos Aires
ARGENTINA

01502

Winston-Type Solar Concentrators

DESCRIPTION:

The aim of this project was to develop a simple and economical solar concentrator capable of operating in a wider range of temperatures than do flat plate collectors. Winston's proposal for determining a concentrator's parabolic equation was analyzed, and using this equation four small concentrators were built to test different materials- resin, glass, iron and stainless steel. A formula that will allow the custom-design of larger collectors according to predetermined requirements results from these tests.

PARTICIPANTS:

Universidad Nacional de San Luis
Connected, Relationship Unknown
Diaz, Mario
Departamento de Fisica y Quimica
Chacabuco y Pedernera
5700 San Luis
Provincia de San Luis
ARGENTINA

Universidad Nacional de San Luis
Connected, Relationship Unknown
Fasulo, Arnilcar J.
Departamento de Fisica y Quimica
Chacabuco y Pedernera
5700 San Luis
Provincia de San Luis
ARGENTINA

Universidad Nacional de San Luis
Connected, Relationship Unknown
Velazco, Pedro
Chacabuco y Pedernera
5700 San Luis
Provincia de San Luis
ARGENTINA

Universidad Nacional de San Luis
Connected, Relationship Unknown
Odicino, Luis
Chacabuco y Pedernera
5700 San Luis
Provincia de San Luis
ARGENTINA

01503

Solar Concentrator Research, Design, and Development*DESCRIPTION:*

The objective of this project was to theoretically analyze a fixed mirror solar concentrator in which the flat reflecting surfaces are replaced by concave cylindrical elements. The use of cylindrical elements makes it possible to obtain higher concentration factors, thereby reducing the number of concentrators needed. A formula is given to determine the concentration factors of cylindrical elements.

PARTICIPANT:

Comision Nacional de Energia Atomica

Contact

Platzek, R. P.

Avenida del Libertador 8250

1429 Buenos Aires

Provincia de Buenos Aires

ARGENTINA

01504

Trombe Wall Research, Design and Development*DESCRIPTION:*

The aim of this project was to study the thermal behavior and the possibility of the creation of convective currents in a collecting-accumulating wall filled with a mixture of water and bentonite. The experimental wall, 0.1 x 0.5 x 1.2 cu m, was heated electrically on one side; the temperature distribution during heating and cooling periods was recorded, and results were compared with those of a computational model for this mixture, for water, and for a concrete wall. The water-bentonite mixture has a greater specific heat than concrete, thereby allowing the reduction of the wall's mass. Results of the simulation showed the water-bentonite mixture capable of delivering more heat over longer periods of time than either plain water or concrete.

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01506

Solar House at Abra Pompa*START DATE:* 1973*LOCATION:*

Abra Pampa, altitude 3500 m, in northwest Argentina.

DESCRIPTION:

A multi-unit Trombe-wall-heated dormitory was constructed for the cold Altiplano region (3500 meters) of Argentina. Design was aided by a computer program evaluating solar gain versus orientation and configuration. A thermal monitoring and economic evaluation of the building followed construction.

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01507

Rural Environment Systems

DESCRIPTION:

The focus of this group has been the development of Rural Environment Systems (RES), a proposal to integrate aspects of appropriate technology into rural development plans. Specifically, a Focal Energetic System (FES) which concentrates on resolving rural housing problems is investigated. Mobile, semi-permanent, and permanent housing was designed for rural migrants and inhabitants of rural communities. The housing models investigated include a bathroom unit, a solar collector, a Darrieus type rotor to generate electric energy, a cold storage room, a tank to filter rain water, a water distiller, and a methane gas digester.

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01508

Research in Temperature-Sensitive Elements

DESCRIPTION:

Research has focused on the possibility of using silicon and germanium diodes as temperature-sensitive elements. Diodes are relatively inexpensive and their calibration is absolute, thus avoiding temperature references. Application of this research could be useful in systems requiring temperature measurements of minute changes.

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01509

Research in Testing Reflection Coefficients

DESCRIPTION:

An apparatus which determines the mirror reflectivity for variable incidence angles and different wave lengths was designed and constructed by CNEA. The instrument consists of an illumination system, a main optical system with a wedge diaphragm, and a detector system using a photo resistor as sensing element, mounted on a vertically rotating arm.

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01510

Flat-Plate Collector Development*DESCRIPTION:*

This project involves a computer simulation to derive optimal surfaces for flat-plate collectors. The model uses a formula to determine optimal collector area and an economic analysis evaluates the collectors with respect to their cost per unit of energy obtained.

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01511

LOCATION:

Mendoza, in northwest Argentina

DESCRIPTION:

Solar water heaters have been supplied to residents of the city. Collectors (1.43 and 1.73 sq m) and storage tanks (100, 150 and 200 l) were sold for about US\$ 600 per family, and provide 45 l of heated water per person daily. Studies of the units have shown efficiency values of 50-60% and, assuming that the solar energy is used to replace liquefied gas or electricity as a power source, amortization periods of 3 - 5 years.

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01512

Solar Water Heater Storage*DESCRIPTION:*

Research has concentrated on modeling and simulation of solar water heater-storage systems. A mathematical model is used to develop a laboratory simulation using two solar collectors and an insulated thermal storage tank. This model provided data on temperature variations within storage systems.

01513

Technical Aspects of Solar Ponds*DESCRIPTION:*

Research has been conducted on various technical aspects of the mechanics of solar ponds, including maintenance of saline levels, keeping ponds clear, temperature variations due to wind action, and heat extraction. A small experimental pond (16 sq m surface area) was constructed and its behavior observed. In order to avoid the problems of dirt collection and heat loss, the possibility of installing transparent plastic sheets and wind barriers over ponds are investigated. Such a pond, (200 sq m) in the United States cost about US\$ 40.00 per cu m. Using local materials and lower-grade plastic, Argentine researchers estimated costs of US\$ 30.00 per cu m.

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01514

Model for Fruit Drying by Solar Energy*DESCRIPTION:*

The aim of this project was to design a model for fruit drying by solar energy. The model was derived from the equations for heat and mass transfer in porous media. Plum drying, using solar collectors both as fruit containers and as air preheaters, was the focus of the project. Average temperature and water content in the fruit during drying were computed versus time, and the number of days necessary for drying was estimated for different climatic conditions.

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01515

Simulation of Faceted Fixed Mirror Solar Concentrators

DESCRIPTION:

A computer simulation was used to study the behavior of the faceted fixed mirror concentrator proposed by J.L. Russell. Studies were done for concentrators oriented N-S or E-W, at a latitude of 34.5 deg. S. On the basis of this simulation, a 2.5 m long, 1 m radius concentrator was designed and two prototypes started. The prototypes will test mirrors made from local 2.2 mm sheet glass and mirrors using imported 1 mm float glass.

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01516

Research on Flat Plate Collectors

DESCRIPTION:

This project involved research in the area of improving the efficiency of the TERMOSOL-brand flat plate collectors which are manufactured by SMAR S.A.I.C. A dualchambered 30x30x30 cm apparatus was constructed to test collectors. Using a series of equations, experimenters were able to predict absorbance and emittance values for the collectors being tested.

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01517

Design of Thermal Collectors Using Phase Change Materials

DESCRIPTION:

This project focused on phase change materials used in converting and storing thermal energy. Thermal transfer between air flows and a porous matrix composed of an experimental phase change material was investigated. Experiments were performed using a cylindrical element, the interior of which contained a phase change material. Results of these experiments were then compared with equations governing the phase change phenomenon.

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01518

Solar Collector Testing Facility

LOCATION:

Caseros, 20 km from Buenos Aires

DESCRIPTION:

Due to the need of a mechanism for efficiency and performance measurements, a solar collector testing facility was designed. The objectives of this testing facility were: to determine thermal parameters which can be used in simulation experiments; to evaluate thermal behavior of solar collectors; and to establish a set of standards by which performance can be measured and design specifications verified. Instruments used in testing include a circulator pump and flow regulator, a thermal regulator to control the inflowing fluid temperature, a tank to monitor and control variations in the volume of fluid, and a heat exchanger. Measuring instruments include a device for measuring fluid or air flows, an instrument for measuring differential pressure, and wind velocity and solar radiation monitors.

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01519

Testing Collectors Using Phase Change Materials

DESCRIPTION:

Sodium sulfate decahydrate and paraffin were tested as phase change materials with the aim of studying their physical properties, their functioning, and the ultimate feasibility of their use.

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01522

Solar-Powered Refrigeration

DESCRIPTION:

This project investigated ways of technically refining food refrigeration units using solar energy. Research activities focused on the use of thiocyanate-ammoniac in the intermediate absorption cycle as a refrigerating element.

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01523

Solar Radiation Measurement Centers in Argentina

DESCRIPTION:

Argentina's Solarimetric Network (Red Solarimetrica) has as its goal the establishment of 40 stations throughout the country to take continuous daily readings of solar radiation using photovoltaic detectors. The silicon-cell detector used was a modification of the U.S. made Rho Sigma 1800, redesigned to adapt it to harsher climatic conditions and to facilitate use. The SIDCON 5011 integrator computes the integral of the continuous voltage flow.

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01526

Computer Simulation of a Solar Dryer

DESCRIPTION:

A computer simulation was designed to predict the behavior of a solar tobacco drying system. The system simulated consisted of a collector, a pebble-bed accumulator, and a dryer. The project's purpose was to optimize the design of a solar tobacco drying system and to determine the solar heating fraction. The system was monitored during the 136-hour drying process. Collector efficiency and pebble bed accumulator performance were calculated from mathematical formulae.

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01527

Tobacco Drying with Solar Energy in the Northeast

DESCRIPTION:

Two designs have been developed to use solar energy

to provide heat for drying tobacco; both aim at reducing heat loss from the ovens. The first uses a solar collector (25 sq m) and pebble bed accumulator (6 cu m) to dry 200 kg of tobacco. During the day a ventilator circulates heated air directly to the tobacco; at night, air is circulated between the accumulator and the tobacco; thus, solar drying can occur over an entire 24-hour period. Secondly, calcium chloride was investigated as a dehumidifying agent. Heated air is exposed to a liquid calcium chloride solution, and excess humidity removed; the calcium chloride solution can subsequently be regenerated.

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01528

Experimental Results from Solar Drying

START DATE: December 26, 1977

DESCRIPTION:

A prototype for a solar drying system has been developed. The dryer uses a 25 sq m porous matrix collector, an 8 ton circular (diameter 2.4 m) pebble bed accumulator, a tobacco drying chamber (1.45 x 0.9 x 1.8 cu m), and a control system which uses two temperature systems and one solar radiation sensor. Seven drying cycles were achieved during the

project's life, each cycle drying from 100 to 200 kg of tobacco. The results of this pilot project led to the general description of a solar drying system for 7500 kg of tobacco.

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01529

Solar Drying of Grains

LOCATION:

Campo Experimental Villarino, at the University of Rosario, 30 km from Rosario

DESCRIPTION:

A prototype for grain drying employing solar energy as a heat source has been developed. The model consists of a bin with an aeration system designed to obtain an efficient distribution of heat and of a simple solar collector. Data obtained in situ for

winter operation of the system for soya drying are shown. This project has been done under the auspices of the Ministry of Agriculture and Livestock of the Province of Sante Fe.

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01530

Experience with Drying Fruits and Vegetables Using Solar Energy

START DATE: 1977

LOCATION:

the province of Buenos Aires

DESCRIPTION.

During the 1977-78 solar energy drying campaign a solar dryer boosted with an air flat-plate collector was tested. The objective of the project was to demonstrate the feasibility of solar crop drying in humid zones. The first step was the identification of crops which were physicochemically suitable to drying. Tests were run using several different techniques and apparatus. Results of this project

showed: plums were the most difficult fruits to dry; drying chambers covered with fiberglass attained lower interior temperatures and demonstrated lower drying capacities; a flat plate booster collector only slightly elevated the drying chamber temperature, but it dramatically reduced drying time; and a pebble bed with natural convection did not offer promising results.

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01531

Wind Energy Conversion Research, Design and Development

DESCRIPTION:

Experimental tests were performed to evaluate the possibilities of wind energy generation by a confined vortex in a cylindrical tower. The tower that was constructed for this experiment was an open-top cylinder that allows wind entrance through slots along the sides. Wind is thus concentrated inside the cylinder and the resulting vortex used to power a vertical axis turbine. This project was subsidized by the State Secretariat for Science and Technology.

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01532

Solar Ponds with Sodium Sulfate

DESCRIPTION:

Research in this project focused on the problem of maintaining salinity levels in solar ponds. Sodium sulfate was investigated as a salinizing agent which

automatically adjusts itself to changes in the temperature of the pond. A 40x40x40 cu cm model pond was constructed to test the effect of sodium sulfate solutions. This experimental model showed that solar ponds with sodium sulfate are efficient when the water surface does not exceed 10 deg. C, thus limiting these types of ponds to Argentina's Andean regions.

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01533

Solar Ponds with Saturated Salts

DESCRIPTION:

This project continues research done in the use of sodium sulfate solutions as a means of self-maintaining the concentration gradient in solar ponds. A laboratory model (40 x 40 x 40 cu cm), electrically heated on the bottom, insulated along the sides and cooled on the surface, was used to simulate a solar pond to provide information about the growing and the disappearance of convective layers at the bottom and in intermediate zones.

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01534

Solar Ponds and the Problem of Convective Layers

DESCRIPTION:

One of the difficulties found in operating solar ponds is the development and growth of convective layers. In this project a 50x50x60 cu cm glass model was constructed to study thermal sulfate solution. Convective movements within the pond could then be photographed through the introduction of permanganate crystals.

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01535

Solar Dryers for Fruits and Vegetables

DESCRIPTION:

A solar-dryer prototype to dehydrate fruits and vegetables has been constructed by CIAT. The model reduces drying time by exposing products to both direct sunlight and to solar-heated air. The aim of this project is to offer small-scale farmers a simple and economical fruit and vegetable dryer.

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01536

Solar Distillation in Northern Argentina

LOCATION:

Chaco area of northern Argentina

DESCRIPTION:

This project focused on research to design and construct a solar distillation system, with the aim of ultimately installing water distillers in El Cebollar and in Salta.

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01537

Demonstration Solar Hot Water System for Remote Areas

LOCATION:

Pergamino

DESCRIPTION:

INTA has installed a solar hot water system in its building to promote the utilization of this technology among the rural population. The purpose of this installation is to demonstrate solar energy potential for rural and remote applications.

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01538

Water Distillation Projects for Isolated Communities

LOCATION:

La Rioja, a province in northwest Argentina

DESCRIPTION:

An experimental plant has been constructed as a model for water purification systems for isolated Argentine communities. The model provides 100 sq. m surfaces for solar collectors, and is anticipated to supply 500 l of distilled water daily.

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01539

National Program for Nonconventional Energy

DESCRIPTION:

This national program involves research in a wide variety of areas in conjunction with diverse organizations in the country. In accordance with national objectives, the priorities in Argentina for solar research, development, and application are: flat-plate collectors, concentrating collectors, crop drying, solar distillation, storage systems, solar ponds, domestic and industrial hot water heating, refrigeration, and housing design (especially for rural areas).

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01541

Summary of Research by the Group of the University of Lujan on Solar Drying of Fruits and Vegetables

START DATE: 1977**LOCATION:**

Province of Buenos Aires

DESCRIPTION:

This group has conducted research in the functioning of solar dryers with the aim of improving fruit and

vegetable production in the province of Buenos Aires. Two cedar wood dryer models were tested. One model was designed a year earlier in the "1975-76 Solar Drying Campaign" and a second model (1976-77) had an increased collector area and an accumulator to prolong the drying time. The drying of peaches and plums was evaluated. Data about temperature reached in the drying trays and loss of weight of the fruits were obtained; and experimental curves for the behavior of each of the dryers were constructed. Results showed drying time of the latter model longer than that of the 1975-76 model. The increased drying time attributed to the lower temperatures attained in the drying tray of the 1976-77 model was a result of less effective insulation.

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