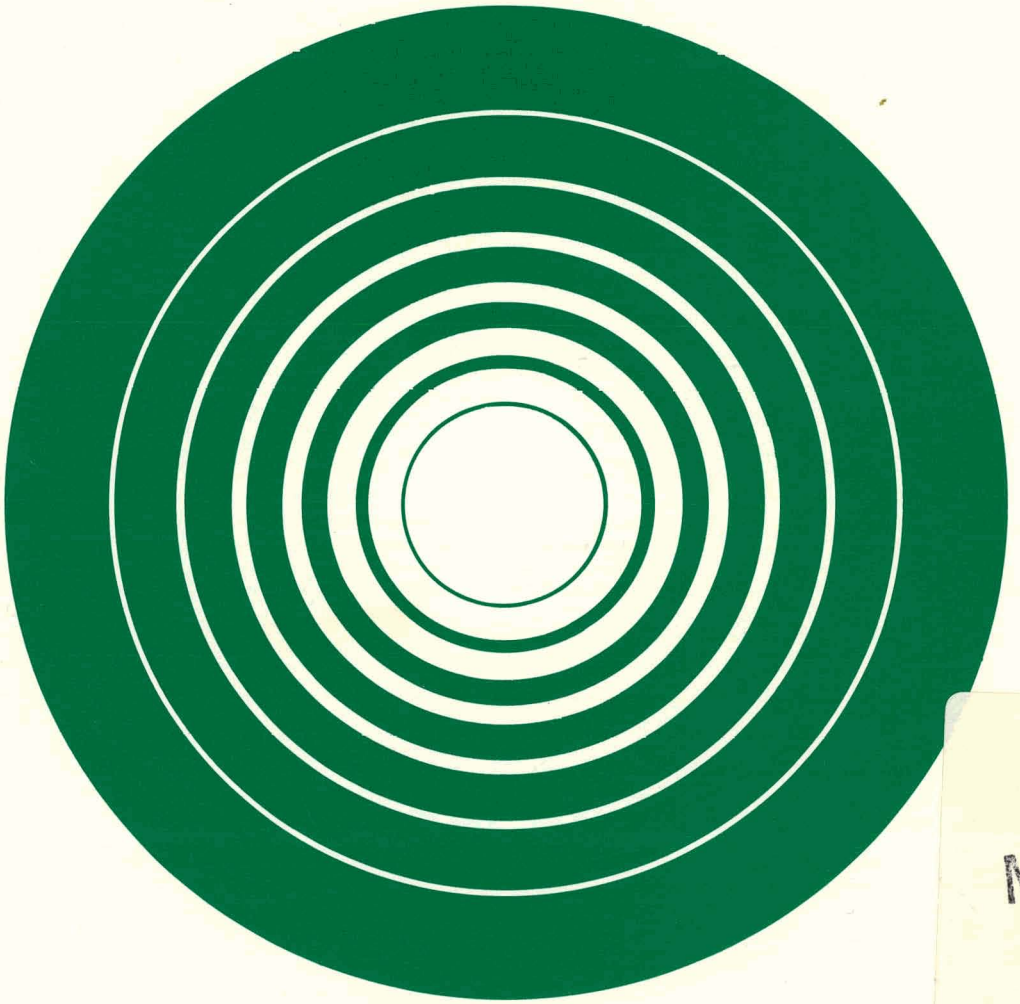

ENERGY IN MEXICO

A Profile of Solar Energy Activity
in Its National Context

by Donna Hawkins

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Solar Energy Research Institute

1617 Cole Boulevard
Golden, Colorado 80401

A Division of Midwest Research Institute

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Preface

This document was prepared as part of Task Number 4330, The Information Task, of the International Division of the Solar Energy Research Institute (SERI) in cooperation with the Solar Energy Information Data Bank (April 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 was prepared for the administrative use of the Department of Energy and is subject to frequent updating. For further information contact the International Division of SERI (303) 231-1839.

Approved for:

SOLAR ENERGY RESEARCH INSTITUTE

George Warfield

George Warfield
Acting Division Manager
International Division

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Nomenclature

BMFT	The Bundesministerium für Forschung und Technologie (Federal Ministry for Research and Technology)
BUO	Bloque Unido de Obreros—a political party combining powerful labor federations and independent industrial unions
CFE	The Comisión Federal de Electricidad (Federal Electricity Commission)
CIM	Centro de Investigación de Materiales (Materials Research Center)
CNC	Confederación Nacional de Campesinos—a political party representing the agrarian sector
CNE	Comisión Nacional de Energía (National Energy Commission)
CNEA	Comisión Nacional de Energía Atómica (National Atomic Energy Comission)
CONACYT	Consejo Nacional de Ciencia y Tecnología (National Council for Science and Technology)
DIGAASES	The Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (General Management for Saline Water And Solar Energy Development)
EC	European Communities
IPN	Instituto Politécnico Nacional (National Polytechnic University)
IIE	Instituto de Investigaciones Eléctricas (Institute of Electricity Research)
LAFTA	Latin America Free Trade Association
MOU	Memorandum of Understanding
PAN	Partido Acción Nacional—a political party with a conservative, pro-clerical, and pro-business orientation
PARM	Partido Auténtico de la Revolución Mexicana—a minority political party
PCM	Partido Comunista Mexicano—a minority political party
PEMEX	Petróleos Mexicanos—the government-owned petroleum company
PLANMAES	Plan Nacional Maestro de Energía Solar—the first national solar energy plan
PPS	Partido Popular Socialista—a minority political party
PRI	Partido Revolucionario Institucional—a nominally leftist political party
UNAM	Universidad Nacional Autónoma de México (National Autonomous University of Mexico)
UNSNH	Universidad Michoacana de San Nicolás de Hidalgo (Michoacan University of St. Nicholas de Hidalgo)

Country Overview

The United States of Mexico, the third largest country of Latin America (after Brazil and Argentina), borders the United States of America on its north, the Gulf of Mexico on the east, Belize and Guatemala on the south, and the Pacific Ocean on the west. Two thirds of the land is arid or semi-arid with only 15% of the national territory receiving adequate rainfall during all seasons. Claiming one of the highest annual demographic growth rates (3.4%), the federal republic of Mexico ranks as the most populous nation of the Spanish-speaking world, having an estimated population of 68,000,000. Although only 15% of the land is suitable for cultivation, the varied climatic regions allow the country to produce both temperate and tropical foodstuffs. Mexico's 1979-82 National Industrial Development Plan encourages decentralized industrial expansion through incentives calculated to raise the growth rate to 10% in the 1980s. Recent discoveries of vast oil and natural gas reserves should enable the country to be energy self-sufficient through the 20th century. Alternative sources of energy are viewed as a means of developing rural areas and reducing domestic consumption of conventional energy sources, thereby enabling Mexico to become a leading petroleum exporter. Officials expect solar energy to provide 0.3% of the national energy consumption by 1982.

Energy Summary

Current Energy Sources

- Coal (reserves adequate through this century)
- Hydropower (few natural unexploited sites remaining)
- Natural gas (massive proven and potential reserves)
- Petroleum (massive proven and potential reserves)
- Geothermal (potential currently being developed)
- Uranium (largest reserves in Latin America)
- Solar (growing interest; greatest potential in the northwest)

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

Solar Activities

- DIGAASES, the Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (General Management for Saline Water and Solar Energy Development), is the federal agency responsible for managing and coordinating the government's solar energy activities.
- CFE, the Comisión Federal de Electricidad (Federal Electricity Commission), has the responsibility for the Rural Electrification Program. It has sponsored solar water pumping demonstration projects for small isolated communities.
- CONACYT, the Consejo Nacional de Ciencia y Tecnología (National Council for Science and Technology), funds solar research projects.
- PLANMAES, the Plan Nacional Maestro de Energía Solar (the first national solar energy plan), was released in 1979.

- Most solar research and development is centered in government laboratories or in universities funded by the federal government.
- Twenty-six manufacturers produce flat-plate collectors. Philips Mexicana appears to be the only private company involved in solar research studies.

See also: International Contacts, International Projects, Organizations for Implementation, Solar Energy Organizations, and Solar Energy Research and Development.

Solar Applications

- Active Solar Thermal: space heating and cooling, domestic water heating, refrigeration, desalination, grain drying, water pumping, electricity production, and collector research.
- Passive Solar Thermal: space heating and cooling.
- Wind: feasibility studies, water pumping, and electricity production.
- Photovoltaics: water pumping, electricity production, telecommunications, and materials research.

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

Areas for Cooperation

West Germany and France have bilateral agreements with Mexico which have resulted in solar demonstration projects. In 1979 the United States and Mexico signed an annex to the science and technology cooperative agreement which includes provisions for several solar research and development projects. Israel and Canada have also announced pending bilateral agreements with Mexico that contain options for the development of alternative energy sources.

The National Development Plan advocates a gradual reduction of import protection. This policy encourages a system that provides local manufacturers with the relative protection of import duties rather than denying licensing permits for products competing with Mexican manufacturers.

See also: Industry, International Agreements, and International Projects.

The United States of Mexico
Geopolitical, Economic, and Cultural Aspects

Population Demography

AREA AND DENSITY OF MEXICO'S POPULATION

Place	Area (km²)	Population*	Population Density‡ (km²)
MEXICO	1,972,547†	66,943,976	34.0
Aguascalientes	5,589	477,628	85.5
Aguascalientes			
Baja California Norte	70,113	1,307,211	18.6
Tijuana			
Mexicali			
Baja California Sur	73,677	193,250	2.6
La Paz			
Campeche	51,833	368,748	7.1
Campeche			
Chiapas	73,887	2,110,203	28.6
Tuxtla Gutiérrez			
Chihuahua	247,087	2,176,505	8.8
Ciudad Juárez			
Chihuahua			
Coahuila	151,571	1,516,726	10.0
Saltillo			
Colima	5,455	344,571	63.2
Colima			
Distrito Federal	1,499	8,988,230	5,996.2
México			
Durango	119,648	1,273,160	10.6
Victoria de Durango			
Guanajuato	30,589	2,991,371	97.8
León			
Guanajuato			
Guerrero	63,794	2,171,184	34.0
Chilpancingo de los Bravo			
Acapulco de Juárez			
Hidalgo	20,987	1,475,155	70.3
Pachuca de Soto			
Jalisco	80,137	4,512,152	56.3
Guadalajara			
México	21,461	7,311,884	340.7
Toluca de Lerdo			

AREA AND DENSITY OF MEXICO'S POPULATION (CONTINUED)

Place	Area (km²)	Population*	Population Density‡ (km²)
Michoacán	59,864	3,030,312	50.6
Morelia			
Morelos	4,941	903,596	182.9
Cuernavaca			
Nayarit	27,621	759,212	27.8
Tepic			
Nuevo León	64,555	2,484,972	38.5
Monterrey			
Oaxaca	95,364	2,361,721	24.8
Oaxaca de Juárez			
Puebla	33,919	3,238,227	95.5
Heróica Puebla de Zaragoza			
Querétaro	11,769	680,726	57.8
Querétaro			
Quintana Roo	50,350	149,289	3.0
Chetumal			
San Luis Potosí	62,848	1,692,833	26.9
San Luis Potosí			
Sinaloa	58,092	1,922,407	33.1
Mazatlán			
Culiacán Rosales			
Sonora	184,934	1,558,456	8.4
Hermosillo			
Tabasco	24,661	1,110,317	45.0
Villahermosa			
Tamaulipas	79,829	2,008,165	25.2
Ciudad Victoria			
Tlaxcala	3,914	513,817	131.3
Tlaxcala de Xicohtencatl			
Veracruz	72,815	5,167,123	71.0
Veracruz Llave			
Jalapa Enríquez			
Yucatán	39,340	1,012,103	25.7
Mérida			
Zacatecas	75,040	1,132,722	15.1
Zacatecas			

* June 1978, unless otherwise specified
† Excluding uninhabited islands (5,363 km²)
‡ Population Distribution: 64% urban; 36% rural

Government Structure

Mexico is a federal republic with 31 states and a federal district each of which manages its own local affairs. The 1917 Constitution vests legislative power in a Senate and Chamber of Deputies. The judiciary consists of a Supreme Court and a federal system of lower courts. The president, elected to a 6-year, non-succeeding term by direct popular vote, heads the executive. Partido Revolucionario Institucional (PRI), a nominally leftist party, has controlled the government since 1929.

The Executive

President José López Portillo y Pacheco elected December 1, 1976.

The Diplomatic Register

Hugo Margain
Ambassador
Mexican Embassy
2829 16th Street, NW
Washington, DC 20009
(202) 234-6000

Foreign Consulates

Mexican consulates in 32 U.S. cities including New York, Chicago, Denver, and Los Angeles.

United States Representation

Ambassador
American Embassy
Paseo de le Reforma No. 305
Colonia Cuahtemoc
Móxico 5, D.F.
MÉXICO
(011 525) 553-3333

United States Consulates

Cuidad Juárez, Guadalajara, Matamoros, Mazatlán, Mérida, Monterrey, Nuevo Laredo, and Tijuana.

Institutions

General

Customarily "México" refers to the capital while "la república" refers to the nation. In written communications Mexicans should be addressed by professional titles. In larger cities, the 40-hour workweek is observed with most businesses closing at least half of Saturday and on Sunday. Two hour lunches, vestiges of the "siesta," are common. Spanish is the official language, although many professionals also speak English.

Education

Education has been free and compulsory for six years, though the current National Education Plan provides for increasing this to nine years. Of the 189 institutes of higher education, 60 are universities.

Labor

Organized labor commands a vital role in politics and government. The Bloque Unido de Obreros (BUO) combines powerful labor federations and independent industrial unions. The Confederación Nacional de Campesinos (CNC) represents the agrarian sector.

Political Parties

PRI has controlled federal and state government since 1929; it maintains tripartite organization (labor, agriculture, "popular") and embraces a wide spectrum of ideologies. PAN (Partido Acción Nacional) leads the opposition with a conservative, pro-clerical, and pro-business orientation. Other parties include Partido Popular Socialista (PPS); Partido Auténtico de la Revolución Mexicana (PARM); and Partido Comunista Mexicano (PCM).

Religion

Ninety-six percent (96%) of the population is Roman Catholic despite strict anti-clerical laws.

Economy

Political stability, abundant and diversified natural resources (including minerals and hydrocarbons), and a broad range of agricultural products have contributed to 25 years of uninterrupted economic growth. Although agriculture, forestry, and fishing employ more than half the labor force, agriculture contributes only 9% of the GDP. Manufacturing claimed 23.1% of the GDP in 1976 while commerce dominated with 49%. Recent discoveries of vast petroleum reserves place Mexico second to Saudi Arabia in documented reserves and should greatly improve the future economy. The economic structure combines government and private industrial activity, although the government dominates vital sectors. The federal government controls electricity generation and distribution; petroleum production, refining and distribution; telegraphic and railway systems; and one of two international airlines. The present administration has emphasized planning and coordination among the economic sectors.

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

Currency

100 centavos = 1 Mexican peso

Exchange Rate

US$ 1.00 = 22.80 pesos (March 1980)

Gross National Product

US$ 92,000 million (1978)

Gross Domestic Product

US$ 82,920 million (1978)

Gross Domestic Product Per Capita

US$ 1,239 (1978)

Principal Trading Partners and Products

Imports in 1977

United States 63.9%; West Germany 5.7%; other European Communities (EC) 9%; Japan 5.2%

(industrial machinery, automobile parts, chemical products, and precision instruments).

Exports in 1977

United States 66.4%; Latin American Free Trade Association (LAFTA) 10.3%; EC 6.9%; Japan 2.2% (crude oil, coffee, cotton, machinery, and shrimp).

Industry

The 1979-82 National Industrial Development Plan seeks to utilize revenue from petroleum exports to broaden the economic base and facilitate industrial expansion. Priorities include oil, steel, electricity, capital goods, agro-industry, petrochemicals, textiles, shoes, and automobiles. Eleven new industrial zones have been designated in order to decentralize the industrialization effort. Corporate incentives for expansion within these zones include a 25% tax credit and a subsidy for 20% of the work force. By investing revenue from oil exports into decentralized, labor-intensive industries, Mexico hopes to lower its 19% unemployment rate, reduce migration to urban areas, and raise the growth rate to 10% in the 1980s.

Mexico's Foreign Investment Commission anticipates new foreign investments of at least $1.5 billion annually by 1982. Federal laws permit direct investment if it does not compete with domestic enterprise and brings technology not otherwise possible into Mexico. Also, at least 51% of a business venture must be Mexican-owned.

Mexico is changing its import licensing system to a tariff system. Since February 1977, a commission on tariffs and foreign trade controls has been studying the import licensing system in order to eliminate the permit requirement while still protecting domestic products through higher duties. The tariff system should be totally restructured by 1982.

A well-developed glass industry, high insolation levels (especially in the north and northwest), and a severe housing shortage augur well for passive solar applications. Passive demonstration projects are being built to test suitability for low-income housing needs.

The CFE manages the 1979-82 Rural Electrification Program. This plan is designed to provide electricity to one-third of the non-electrified areas and to power agricultural industries and small scale mining operations. According to Pedro Ramírez Vásquez, Secretario de Asentamientos Humanos y Obras Públicas (Secretary of Human Settlements and Public Works), solar energy will be used to electrify remote communities of less than one hundred people.

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

Agriculture

Mexico's economy has evolved from a primary agricultural base to the more balanced structure of a semi-industrialized nation. Currently, the agrarian sector contributes less than 10% of the GDP while employing 40% of the labor force. Principal crops are corn, wheat, rice, and beans. During the 1970s, agricultural production lagged behind population growth, requiring the importation of some foods, especially grains. Agriculture provided 30-40% of the export revenues during the last decade; major export crops include sugar cane, cotton, coffee, fruits, and vegetables. Livestock rearing has shown steady growth. The fishing industry, dominated by cooperatives, harvests only 6% of its annual potential.

The 1977-81 Agricultural Plan seeks to reestablish Mexican agricultural self-sufficiency. The current National Industrial Development Plan lists agro-industry as a top priority.

Solar energy could alleviate some major agricultural problems. Solar water pumps have been

used for irrigation. Since 80% of all arable land requires irrigation, this area offers further potential. The development of effective solar refrigeration and cooling systems could reduce the rate of in-transit spoilage of vegetables (40%) and fish (30-35%).

See also: Industry, and International Projects.

Communications

- Mexico has 200,060 km of all weather roads, including three sections of the Pan American Highway. Roads provide 70% of public passenger transport and 60% of freight traffic.
- There are 24,434 km of government-controlled railways.
- There are 17 international and 23 national airports as well as 1,040 landing fields and feeder airports. Extensive airport improvement and expansion is underway.
- Mexico has a 9,903 km coastline, but few navigable rivers and natural harbors. The chief ports are Veracruz, Tampico, and Acapulco.
- Over 300 newspapers range from metropolitan dailies with circulation in excess of 250,000 to provincial weeklies. There are many general interest and specialized journals. The Mexican publishing industry exports books throughout the Spanish-speaking world.
- In 1978 there were 713 commercial radio stations and 33 educational stations; 8,211,115 households had at least one radio.
- In 1978 Mexico has 83 commercial television stations and 3 educational stations; 3,728,013 households owned at least one television.

Architecture

Rapid population growth has created a severe housing shortage in Mexico. Actual homes constructed in 1975 met only 25% of that year's needs; over half were owner-built. In 1976 only 6% of the GDP was devoted to the construction industry while 0.4% of the economically active population was engaged in construction.

The Spanish-style home, predominant in cities and towns, has several rooms opening onto a central patio. Although often large, such units seldom exceed two stories. Design permits maximum sunshine and air circulation. There are also Victorian, Californian, and modern high-rise structures.

The indigenous rural dwelling is usually rectangular, perhaps divided into two or more rooms, with an earthen floor and a palm thatch roof. Adobe, resistant to summer heat and winter cold, is the traditional building material. Regional variations reflect locally available materials and climatic conditions.

See also: Industry, and International Projects.

Physical Geography

Mexican topography ranges from low desert plains and jungle-like coastal strips to high plateaus and rugged mountains. The Sierra Madre Occidental and the Sierra Madre Oriental, extending North and South, are the principal mountain systems; the Sierra Madre de Chiapas and the Chiapas Highlands form other noteworthy ranges. The Río Bravo (Río Grande) drains into the Gulf of Mexico. The Papaloapan ranks seventh among the world's rivers in water volume discharged. Several small rivers in the interior drain into lakes having no outlet.

Mexico divides into five topographical regions: the North Pacific, the North, Central Mexico, the Gulf Coast, and the South Pacific. The North Pacific area lies west of the Sierra Madre

Oriental and includes the Baja California Peninsula. The Sonoran Desert fills most of the region, continuing south into Sinaloa. The North (also called Central Meseta) extends east from the Sierra Madre Occidental to the Gulf of Mexico and comprises the Northern Plateau and a small coastal section. The great plateau of Central Mexico is the heartland of the country. The largest valleys of this region are Puebla, Toluca, Guanajuato, Jalisco, Morelos, Aguascalientes, and México. The Gulf Coast includes the broad plain of Vera Cruz, Tabasco, and the Yucatán Peninsula (the northeastern tip of which is desert). The South Pacific is a mountainous enclave within Central Mexico.

Climate

Although the Tropic of Cancer bisects Mexico, there are notable regional subclimates created by variable factors such as latitude, winds, and cool Pacific currents.

Tropical, humid conditions exist in many regions. It rains regularly throughout the year in northeastern Chiapas, the southwestern tip of Campeche, southeastern Veracruz, and inland Tabasco. Summer monsoon rains fall along the Atlantic slopes of the Sierra Madre Oriental, across upper Veracruz, along the northern edge of the Sierra Septentrional de Chiapas, and in southern Campeche and Quintana Roo. Summer rain characterizes the coastal plains and the northern Yucatán Peninsula.

In a number of regions, temperate humid climates prevail. The northwestern region of the Baja California Peninsula experiences winter rains, while summer rains occur on the western slopes of the Sierra Madre Oriental, in the southern valleys of the Central Plateau, the Sierra Madre del Sur, the Sierra Madre de Chiapas, and in the northern mountainous region of Chiapas. Rain falls throughout the year in the upper Sierras, though scantily in northern Tamaulipas and some mountainous regions of Nuevo León and Coahuila.

Desert, surrounded by steppe, characterizes the northern Central Plateau, the Sonora and Sinaloa plains, the Baja California Peninsula, the western side of the Sierra Madre Oriental, and northwestern Yucatán. Polar climate is localized within the higher elevations of some mountains.

Insolation

Forty percent of the country receives more than 20 million J/m²/day and over half receives 15-20 million J/m²/day. The northwest of Mexico, including the Baja California Peninsula, has the greatest solar potential based on insolation distribution.

The Energy Profile

Energy Policy Objectives

Mexican planning concentrates on the development of its abundant petroleum and gas resources, although exploration will continue for coal, hydro, geothermal, and nuclear resources. Nuclear power will not be used in the immediate future. Energy policy objectives include: the diversification of primary energy sources in order to decrease dependency on oil and gas; promotion of more efficient energy utilization; coordination of planning in the energy sector; development of capital goods associated with the energy sector; and promotion of energy research and development activities.

See also: Indigenous Energy Sources, and Government Energy Structure.

Government Energy Structure

- Article 27 of the Mexican Constitution reserves all energy responsibilities for the federal government.
- The ultimate responsibility for energy policy rests with the President of the Republic.
- No single cabinet position exists within the executive branch where energy matters are centralized.
- Congress plays virtually no role in the energy sector.

See also: International Contacts.

Organizations for Implementation

- CNE, Comisión Nacional de Energiá (National Energy Commission), coordinates national energy policy. The Chairman, José Andrés de Oteyza, is also Minister of Patrimony and Industrial Promotion.
- PEMEX, Petróleos Mexicanos, is the government-owned petroleum company. It has exclusive responsibility for operation of the nation's petroleum and natural gas industry, including the exploration, production, refining, transportation, and marketing of oil, gas, and petrochemical products. The Director is Jorge Díaz Serrano; Chairman of the Board is José Andrés de Oteyza, who is also the Minister of Patrimony and Industrial Promotion.
- CNEA, Comisión Nacional de Energía Atómica (National Atomic Energy Commission), coordinates research, production, and marketing.
- CFE is an autonomous governmental agency that organizes and directs a national system for generation, transmission, and distribution of electric energy. The Director General is Hugo Cervantes del Río.
- IIE, Instituto de Investigaciones Eléctricas (Institute of Electricity Research), coordinates research in electricity and other powers and performs an advisory function in the preparation of regulatory standards. Guillermo Fernández de la Garza is the executive director.
- CONACYT funds research in universities and government laboratories.

See also: International Contacts.

Indigenous Energy Sources

Petroleum

Recent oil discoveries raise Mexico's proven reserves to 40 billion barrels and probable reserves to 200 billion barrels. Mexico currently produces 1.8 million bbl/day and exports one-third of that total. By the end of 1980, one million of the 2.25-2.50 million bbl/day will be exported. Petroleum is the fastest growing sector of the economy, and Mexico hopes to invest petroleum export revenues into an industrial development program. In 1978 the federal government allotted 60% of the budget for all Mexican industry to PEMEX, the national oil company.

Natural gas

Mexico has considerable natural gas reserves. Daily production of 65.5 million m^3 of associated gas and 18 million m^3 of unassociated gas represents a 34% increase over 1978 figures. Domestic consumption has increased substantially due to government subsidies and coal-to-gas conversion programs for large utilities. The federal government has decided to stimulate domestic consumption of natural gas so that hydrocarbon exports can be made in the form of fuel oil.

Coal

Three states have approximately 650 megatonnes of economically recoverable reserves. Four new mines will be opened and others renovated and enlarged over the next three years at a cost of $5 billion. Coal, which currently supplies 6.3% of Mexico's energy, is projected to supply 12% by the year 2000.

Hydro

Installed hydroelectric capacity was 4.8 GW in 1975; plans include installation of an additional 5.3 GW by 1983. In 1975 hydroelectric plants represented 39.6% of Mexico's installed electric capacity, although that percentage should decrease since few natural sites remain unexploited.

Geothermal

Mexico has 120 geothermal areas. By 1999 geothermal is expected to provide 7% of all electric power generating capacity. The Cerro Prieto plant, built in 1973, now generates about 75 MW from 50 wells, enough to power Mexicali and Tijuana during periods of low demand.

Nuclear

Uranium reserves of 136,365 tonnes are the largest in Latin America. Mexico plans to develop nuclear power to aid future energy needs. The Laguna Verde facility, under construction, is scheduled to begin operation in 1982.

Solar

Mexico has initiated solar water pumping, irrigation, and electrification projects for use in outlying villages. The first national solar energy plan was announced during 1979.

See also: Solar Energy Research and Development.

Imported Energy Sources

Presently, Mexico does not need to import energy fuels.

Solar Energy Research and Development

Prospects for renewable energy technologies in Mexico are good. Rugged terrain and diverse climatic conditions encourage a decentralized approach in all but the most densely populated metropolitan areas. Most regions of the country have idle land areas suitable for large arrays of collectors. High year-round insolation in some areas, particularly the northwest, offer potential for photovoltaic or thermal conversion energy factories and passive housing. Rural and agricultural areas could utilize solar applications for irrigation and food preservation.

PLANMAES, published in 1979, reflects the federal government's nascent interest in solar energy. This plan included a $3.62 million initial investment with cooperation to be provided by the United States, France, West Germany, and Spain. Officials who indicate that solar energy will supply 0.3% of the national energy consumption by 1982 predict that figure could be increased to 9% by the year 2000.

The 1979-82 Rural Electrification Program incorporates plans for using solar energy in isolated villages. Pioneer solar energy efforts involve irrigation and rural electrification demonstration projects through the TONATIUH bilateral program with France. Other solar research and development projects are part of West German and United States bilateral agreements. Pending bilateral energy agreements with both Israel and Canada contain options which could develop into cooperative solar research and development projects.

The Universidad Nacional Autónoma de México (National Autonomous University of Mexico) has been collecting insolation data. Mexico is an active participant in the Solar Energy Project

of the Organization of American States which has funded university research projects in Mexico on solar thermal applications, photovoltaics, and passive housing.

See also: Solar Energy Organizations, International Contacts, and International Projects.

Solar Energy Organizations

- Centro Nacional de Enseñanza Técnica Industrial. División de Investigación y Desarrollo Tecnológico.
- CFE
- CONACYT
- DIGAASES
- Grupo del Sol, S.C.
- IIE
- Instituto Politécnico Nacional (IPN) (National Polytechnic University). Centro de Investigación y de Estudios Avanzados.
- Instituto Tecnológico y de Estudios Superiores.
- Universidad Autónoma Metropolitana. Iztapalapa Campus.
- Universidad Autónoma Metropolitana. Xochimilco Campus.
- Universidad Michoacana de San Nicolás de Hidalgo (UNSNH) Michoacan University of St. Nicholas de Hidalgo). Instituto de Investigaciones Metalurgicas.
- Universidad Nacional Autónoma de México (UNAM) (National Autonomous University of Mexico). Centro de Investigación de Materiales (CIM) (Materials Research Center).
- UNAM. Instituto de Geofísica.
- UNAM. Instituto de Ingeniería.

See also: International Contacts.

Solar Energy Related Legislation and Administration Policies

- Article 27 of the Mexican Constitution reserves all energy responsibilities for the federal government.
- Mexico has a Foundation of the Environment and Institute for the Conservation of Renewable Resources. Details unavailable.

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13. Taylor, Theodore B. **Prospects for Worldwide Use of Solar Energy; A Study Performed for the Rockefeller Foundation.** June 15, 1979.
14. Tower, Frederick J. *"Mexico: Oil Leads Economic Growth, Promising Big Opportunities."* **Overseas Business Reports** (OBR 79-26). Washington, DC: U.S. Department of Commerce; September 1979.

International Agreements

Canada/Mexico (May 1979-Present)

The Canada/Mexico Energy Cooperation Agreement, initiated in May 1979, requires ratification by both governments. Mexico will supply crude oil to Canada and purchase Canadian metallurgical coal. Canada will provide technological assistance for the development of Mexico's uranium industry. A clause allows future joint action in energy conservation and renewable resources.

France/Mexico (1969-Present)

The TONATIUH Solar Program is under the governmental authority of Mexico's DIGAASES and France's Ministère des Affaires Etrangères (Ministry of Foreign Affairs). Under this program which began in 1969, several solar water pumping units have been installed in Mexican villages by the French firm SOFRETES.

See also: IDINPRO 01400

Federal Republic of Germany/Mexico (1978-Present)

SONNTLAN, a multi-project solar energy program, is an annex to the Mexican-German Agreement for Industrial and Technical Cooperation. Mexico's DIGAASES and West Germany's BMFT, (Federal Ministry for Research and Technology), are the responsible government agencies.

See also: IDINPRO 01420

Israel/Mexico (Announced February 1978)

The Israeli and Mexican governments have announced the preliminary stage of a bilateral energy agreement. The two major clauses provide: 1) that Mexico will supply Israel's oil requirements; and 2) that the two countries will participate in long-term joint research projects including various forms of solar energy. Information on current projects is not yet available.

Mexico/United States (1979-Present)

Under the auspices of the 1972 Science and Technology Agreement between Mexico and the United States, a Memorandum of Understanding (MOU) on Scientific and Technical Cooperation was signed in February 1979 by Dr. Edmund Flores, the Director General of CONACYT and Benjamin Huberman, Associate Director of the U.S. Office of Science and Technology Policy. This MOU provides for cooperation in the development of energy conservation techniques as well as joint research and development projects in conventional, nuclear, geothermal, and solar energy.

See also: IDINPRO 01428

International Contacts Data Base

The ongoing International Contacts Data Base (ICON) development task, begun in January 1979, maintains approximately 1,360 international contacts as of April 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. More complete records may be obtained by contacting SERI International Division (303) 231-1839.

Centro de Estudios Sociales del Tercer Mundo (CESTM)
Center for Social Studies of the Third World

Colonia Porfirio Díaz 50
México 20, D.F.
MÉXICO

Miranda, Carlos
Appropriate technology and renewable resources.

Centro de Investigación Científica y Educación Superior de Ensenada (CICESE)
Center for Scientific Research and Higher Education of Ensenada
Departamento de Geofísica

Espinoza - Calle 8
Ensenada, Baja California Norte
MÉXICO

Reyes Zamora, César Alfonso
Chairman
Geophysics.

Centro Nacional de Enseñanza Técnica Industrial (NETI)
National Center for Technical Industrial Education
División de Investigación y Desarrollo Tecnólogico

Avenida de las Granjas 682
México 16, D.F.
MÉXICO
Maintains a solar library.
(011 525) 561-60-11

Rigaud, G.
Flat plate and parabolic concentrators.

Comisión de Tarifas (Tariff Commission)

México, D.F.
MÉXICO

Ramon, Felipe

Comisión Federal de Electricidad (CFE)
Federal Electricity Commission

Leibnitz 14, 3er Piso
México 5, D.F.
MÉXICO
Energy Planning, especially for rural areas.
(011 525) 553-7061

Comité de Planeación y Organización

Leibnitz 14, 3er Piso
México 5, D.F.
MÉXICO

Aburto Ávila, José Luis
Technical Secretary
Energy planning, especially for rural areas.
(011 525) 553-7061
(011 525) 553-71-33 x2767

Comisión Nacional de Energía (National Energy Commission)

México, D.F.
MÉXICO

De Vecchi, Bruno
Assistant Director of Studies
Multi-regional project on energy analysis and planning.

Compañía de Luz y Fuerza del Centro, S.A.
Central Light and Power Company, Inc.

Melchor Ocampo 171
México 17, D.F.
MÉXICO

De Vecchi, Bruno
Solar energy planning.

Consejo Nacional de Ciencia y Tecnología (CONACYT)
National Council for Science and Technology

Insurgentes Sur 1814, 6 Piso
México 20, D.F.
MÉXICO
(011 525) 524-6621

Alba Andrade, Fernando
Rural electrification.
(011 525) 524-6621

Flores, Edmundo
Director General
International scientific research and development projects.
(011 525) 524-6621

Ramírez Araiza, Alfredo
Director of International Programs
Solar energy planning.
(011 525) 524-6621

Sánchez, Agustin
Head of Mexico / U.S. Bilateral Program
Mexico / U.S. energy research and development projects.
(011 525) 524-6621

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
General Management for Saline Water and Solar Energy Development

Bulevar Pípila No. 1
Tecamachalco
Presa San Joaquín
México 10, D.F.
MÉXICO

Alegret Pla, Francisco Javier
Head of Thermal Systems Department
Desalination and solar thermal.
(011 525) 589-0166 x101

Camargo, Ernestina
Maintains solar energy information bank.
(011 525) 589-0166

D'Hyver, Francisco Javier
Desalination.
(011 525) 589-0166

Fernández R., Alejandro
Assistant Director of Technological Research in Solar Energy
Government administration for solar energy.
(011 525) 589-0166

Ibarra Herrera, Javier
Director General
Governmental administration for solar energy; Supervision of the construction of a solar energy house.
(011 525) 589-0166

Manjarrez Andión, Rafael
Technical Director
Desalination.
(011 525) 589-0166

Frente Internacional de Derechos Humanos
International Front for Human Rights

Calle Luis González
Obregón 17, Despacho 203
México 1, D.F.
MÉXICO

Luna, Benjamin Laureano
President
Harnessing of solar energy for social and economic development.

Grupo del Sol, S.C.
Sun Group

Costa 209
Colonia Las Águilas
México 20, D.F.
MÉXICO
Solar research and development.
(011 525) 593-9151

Martín J., Roberto
President
Prototype solar village; Solar energy research, development, and demonstration.
(011 525) 593-9151

Ideal Standard, S.A. de C.V. (Ideal Standard, Inc.)

Bulevar Ávila Camacho 40, 9 piso
México, D.F.
MÉXICO
Manufactures thermal tanks.
(011 525) 557-8824

Información Técnica (INFOTEC)

Apartado Postal 19-194
México 19, D.F.
MÉXICO

Quevedo, José
Executive Director
Technical and scientific information dissemination.
(011 525) 559-5211

Instituto de Investigaciones Eléctricas (IIE)
Institute of Electricity Research

Interior Internado Palmira
Apartado Postal 475
Cuernavaca, Morelos
MÉXICO

Fernández de la Garza, Guillermo
Head
Research in electricity.
(011 52 731) 4-14-33
(011 52 731) 4-21-88)

Valverde, Sergio
Engineer
Rural Electrification.
(011 52 731) 4-13-51

Departamento de Fuentes No Convencionales
División de Investigaciones Eléctricas

Interior Internado Palmira
Apartado Postal 475
Cuernavaca, Morelos
MÉXICO

Caldera Muñoz, Enrique
Researcher
Wind energy conversion systems; Solar water heating.
(011 52 731) 4-13-51
(011 52 731) 4-14-33 x36

Puga Ramírez, Nicolás
Researcher
Wind energy conversion systems.
(011 52 731) 4-13-51
(011 52 731) 4-14-33 x36

División Fuentes de Energía

Interior Internado Palmira
Apartado Postal 475
Cuernavaca, Morelos
MÉXICO

Féliz Almada, Alfonso
Biogas.
(011 52 731) 4-21-71

Múlas del Pozo, Pablo
Director
R and D technology transfer for non-conventional energy resources, especially for application in non-electrified rural areas.

Instituto Mexicano del Petróleo (IMP)
Mexican Petroleum Institute

Avenida Cien Metros 152
Apartado Postal 14-805
México 14, D.F.
MÉXICO

del Castillo, Arturo
Deputy Director of Economic Studies and Industrial Planning
Costs and planning of alternative sources of energy and energy conservation for industry.
(011 525) 567-91-00 x2160

Instituto Politécnico Nacional (IPN-CIEA)
National Polytechnic Institute
Centro de Investigación y de Estudios Avanzados

Apartado Postal 14-740
México 14, D.F.
MÉXICO

Nava Jaimes, Hector
Photovoltaics.
(011 525) 754-02-00

Departamento de Ingeniería Eléctrica

Apartado Postal 14-740
México 14, D.F.
MÉXICO

del Valle Padilla, J.L.
Photovoltaics.
(011 525) 754-02-00 x256

Chambouleyron, Ivan E.
Visiting Professor under OAS contract
Photovoltaic energy conversion; Renewable energy sources.
(011 525) 754-02-00 x256

Mimila Arroya, J.
Photovoltaics.
(011 525) 754-02-00 x256

Pérez, Esteban Javier
Solar cells; Photovoltaic modules.
(011 525) 754-02-00 x256

Sánchez, Feliciano
Chairman
Solar cells.
(011 525) 754-02-00 x256

Saucedo, Emmanuel
Photovoltaics.
(011 525) 754-02-00 x256

Instituto Tecnológico y de Estudios Superiores (ITESM)
Institute of Technology and Higher Education

Sucursal de Correos "J"
Monterrey, Nuevo León
MÉXICO

Gutiérrez, Ignacio
Solar architecture; Space heating and cooling; Crop drying.
(011 52 528) 58-20-00 x107

Martínez de la Garza, M.
Low-income housing; Different models of passive heating and cooling.
(011 52 528) 58-20-00 x107

Módulo Solar
Solar Module

Cuernavaca, Morelos
MÉXICO

García, Octavio
Flat plate collectors.
(011 52 731) 5-11-85

Philips Mexicana, S.A. de C.V.
Phillips of Mexico, Inc.

División Energía Solar
Durango 167
México 7, D.F.
MÉXICO

Photovoltaics; Solar village outside Mexico City; Imports solar cells.

Aguirre, Hernan
Engineer
Prototype solar village; Solar energy research, development, and demonstration.
(011 525) 511-8050
(011 525) 525-1540

Martín J., Roberto
Prototype solar village; Solar energy research, development and demonstration.
(011 525) 511-8050
(011 525) 525-1540

Secretaría de Asentamientos Humanos y Obras Públicas (SAHOP)

Ministry of Human Settlements and Public Works

Xola y Avenida Universidad
México D.F.
MÉXICO

Ramírez Vásquez, Pedro
Solar energy planning.

Servicios Integrados de Planeación S.A. de C.V.
Integrated Planning Services, Inc.

Avenida de la Revolución 1600-Letra B
México 20, D.F.
MÉXICO

del Valle González, S. I.
Solar energy planning.

Solarmex

MÉXICO
Manufactures flat plate collectors.

Universidad de Sonora (CICTUS)
University of Sonora
Centro de Investigación Científica y Técnica

Apartado Postal A-068
Hermosillo, Sonora
MÉXICO

Murieta, Xico
Director
Insolation.
(52 621) 2-10-46 343-90

Universidad Autónoma de Chihuahua
Autonomous University of Chihuahua

Bólivar y 4A
Chihuahua, Chihuahua
MÉXICO

Ayala, Carlos
Involved in joint solar project with New Mexico.

Universidad Autónoma Metropolitana (UAM)
Metropolitan Autonomous University
Atzcapotzalco Campus

Avenida San Pablo s/n
México 16, D.F.
MÉXICO

Herce V., J. L.
Experimental flatplate collector made from galvanized iron, eight tubes, and two glass covers.
(011 525) 561-94-00

Juric K., Zoran
Engineer
Solar refrigeration; Absorption cooling; Biomass.
(011 525) 561-94-00

Nissan, I.
Flat plate collector made from galvanized iron, eight tubes and two glass covers.
(011 525) 561-94-00

Iztapala Campus

Apartado Postal 55-534
México 13, D.F.
MÉXICO

Torijano, Eugenio
Collectors for low temperature applications.
(011 525) 581-50-55 x221
(011 525) 581-50-55 x223

Xochimilco Campus

Calzada del Hueso y Canal Nacional
Apartado Postal 23-181
México 23, D.F.
MÉXICO

Ortíz Monasterio, Fernando
Solar and soft technologies.

Universidad Michoacana de San Nicolás de Hidalgo (UMSNH)
Michoacan University of St. Nicholas of Hidalgo
Instituto de Investigaciones Metalúrgicas

Santiago Tapia 403
Apartado Postal 192
Morelia, Michoacan
MÉXICO

Amaya M., R.
Engineer
Biogas.
(011 52 51) 2-05-69
(011 52 51) 2-04-91

Patraca L., R.
Biogas.
(011 52 51) 2-05-69
(011 52 51) 2-04-91

Universidad Nacional Autónoma de México (UNAM)
National Autonomous University of Mexico
Centro de Investigación de Materiales (CIM)

Ciudad Universitaria
Villa Obregón
Apartado Postal 70-360
México 20, D.F.
MÉXICO

del Castillo, Luis
Selective surfaces.
(011 525) 550-52-15 x4735

Best Brown, Gustavo
Flat plate collectors; Refrigeration; Passive systems.
(011 525) 550-52-15 x4737

Best, M. C. Roberto
Solar refrigeration.
(011 525) 550-52-15

Geffroy Aguilar, Enrique
Photovoltaics.
(011 525) 550-52-15

Hernández Hernández, Everardo A.
Passive and insolation.
(011 525) 550-52-15

Martínez Fernández, Manuel
Photovoltaics.
(011 525) 550-52-15 x4735

Mayer, Eric R.
Photovoltaics.
(011 525) 550-52-15

Quintana, Julia
(011 525) 550-52-15

Richards Cambell, Jorge
Director
Working on thermal applications of solar energy; Absorption refrigeration systems; Natural circulation water heaters; Selective surfaces; Insolation data.
(011 525) 550-52-15

Rivera, Martín
Natural heating and cooling of dwellings.
(011 525) 550-52-15 x4735

Romero, A.F.
Domestic air conditioning unit.
(011 525) 550-52-15

Instituto de Geofísica

Ciudad Universitaria
Villa Obregón
México 20, D.F.
MÉXICO

Galindo Estrada, Ignacio
Insolation data collection.

Martinez Guerrero, Jesús
Insolation data collection.

Instituto de Ingeniería

Ciudad Universitaria
Villa Obregón
Apartado Postal 70-427
México 20, D.F.
MÉXICO

Almanza, R.
Photothermal; Research and development on solar energy for electrical and mechanical power generation.
(011 525) 548-65-00

Chicurel, Ricardo E.
Photothermal.
(011 525) 548-65-00

Fernández Zayas, Jóse Luis
Crop drying; Refrigeration.
(011 525) 548-65-00

Garibay, J.
Research and development on solar energy for electric and mechanical power generation.
(011 525) 548-65-00

Hiriart, Gerardo
Low temperature solar thermal applications.
(011 525) 548-65-00

López, S.
Research and development on solar energy for electrical and mechanical power generation.
(011 525) 548-65-00

Muñoz Gutiérrez, F.
Crop drying; Research and development on solar energy for electrical and mechanical power generation.
(011 525) 548-65-00

Reséndiz, Daniel
Director
Solar thermal technology.
(011 525) 548-65-00

Zárate. R.
Thermal conversion: Photovoltaics.
(011 525) 548-65-00

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 April 1980, this data base contains approximately 545 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. More complete records may be obtained by contacting SERI International Division (303) 231-1839.

Calentadores Sol-A-Ris, S.A.
Insurgentes Sur 813-406
México 18, D.F.
MÉXICO
Thermal Collector Subsystems

Calentadores Solares Itesa
Bahía de Chachalacas No. 42
México 18, D.F.
MÉXICO
Thermal Collector Subsystems

Enersol, S.A.
Bulevar Manuel Ávila Camacho 959
Naucalpan de Juárez, México
MÉXICO
Domestic Hot Water Systems
Swimming Pool Heating Systems
Process Hot Water Systems

Gaeher, S.A.
Monterrey 47
México 18, D.F.
MÉXICO
Space Heating Systems
Domestic Hot Water Systems
Swimming Pool Heating Systems
Thermal Collector Subsystems

Ideal Standard, S.A. de C.V.
Bulevar Ávila Camacho 40, 9 piso
México, D.F.
MÉXICO

Insolar, S.A.
Apartado Postal 11-769
México, D.F.
MÉXICO
Pyranometers
Pyrheliometers
Net Radiometers
Radiation Measurement Devices

Philips Mexicana, S.A. de C.V.
Div. Energía Solar
Durango 167
México 1, D.F.
MÉXICO
Solar Cells

International Projects Data Base

The ongoing International Projects Data Base (INPRO) development task, begun in August 1979, maintains approximately 300 international programs and projects as of April 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 monitoried 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. More complete records may be obtained by contacting SERI International Division (303) 231-1839.

01400

TONATIUH Solar Program

START DATE: 1969

DESCRIPTION:

This program was the pioneer solar effort in Mexico. The goals were to supply water, a primary, indispensable element for development, to isolated rural communities and thus to forestall migration to the large cities. Program management, initially under the Subsecretaría de Mejoramiento del Ambiente (Undersecretary for Environmental Improvement), has been placed under the authority of DIGAASES. Sixteen solar water pumping units utilizing a thermal process have been installed and two more are planned.

BUDGET:

US$ 20 Million

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
Management (joint)
Funding (Level unknown)
Ibarra Herrera, Javier
Director General
Bulevar Pípila No. 1
Tecamachalco
Presa San Joaquín
México 10, D.F.
MÉXICO

Société Française d'Etudes Thermiques et d'Energie Solaire (SOFRETES)
Installation (sole)
Zone Industrielle d'Amilly - B.P. 163
45203 Montargis
FRANCE

Centre National de la Recherche Scientifique (CNRS)
Management (joint)
Funding (Level unknown)
15, Quai Anatole
75700 Paris
FRANCE

01401

Solar Pumping Plant

START DATE: January 1979

LOCATION:

San Luis de la Paz

DESCRIPTION:

Collectors of 1,500 sq. m. have been installed in the village. The unit delivers 150 cu. m. of water per hour and operates from 5 to 6 hours daily. The water head pressure is equivalent to 30 and 54 m. This 30 kW system

supplies mechanical and electrical energy to a community of 700, utilizing wind machines for a potable system, irrigation of small orchards and electricity for the community.

PARTICIPANTS:

Société Française d'Etudes Thermiques et d'Energie Solaire (SOFRETES)
Installation (sole)
Zone Industrielle d'Amilly - B.P. 163
45203 Montargis
FRANCE

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
Management (joint)
Ibarra Herrera, Javier
Director General
Bulevar Pípila No. 1
Tecamachalco
Presa San Joaquín
México 10, D.F.
MÉXICO

Centre National de la Recherche Scientifique (CNRS)
Management (subordinate)
15, Quai Anatole
75700 Paris
FRANCE

Comisión Federal de Electricidad (CFE)
Management (joint)
Leibnitz 14, 3er Piso
México 5, D.F.
MÉXICO

01402

Solar Water Pumping Unit in Caborca

START DATE: 1974

LOCATION:

Caborca, a small village in Sonora

DESCRIPTION:

Collectors of 90 sq. m. have been installed on the village school. The unit delivers 3 cu. m. of water per hour and operates from 5 to 6 hours per day. The water head pressure is equivalent to 45 m. The solar pump supplies water to the village.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
Management (joint)
Ibarra Herrera, Javier
Director General
Bulevar Pípila No. 1
Tecamachalco
Presa San Joaquín
México 10, D.F.
MÉXICO

Société Française d'Etudes Thermiques et d'Energie Solaire (SOFRETES)
Installation (sole)
Zone Industrielle d'Amilly - B.P. 163
45203 Montargis
FRANCE

Centre National de la Recherche Scientifique (CNRS)
Management (joint)
15, Quai Anatole
75700 Paris
FRANCE

01403

Solar Water Pumping in Cangrejos

START DATE: 1976

LOCATION:

Cangrejos, Jalisco

DESCRIPTION:

Collectors of 90 sq. m. have been installed in the village. The unit delivers 4 cu. m. of water per hour and operates from 5 to 6 hours daily. The water head pressure is equivalent to 50 m. The solar pump supplies water for the village and livestock.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
Management (joint)
Ibarra Herrera, Javier
Director General
Bulevar Pípila No. 1
Tecamachalco
Presa San Joaquín
México 10, D.F.
MÉXICO

Société Française d'Etudes Thermiques et d'Energie Solaire (SOFRETES)
Installation (sole)
Zone Industrielle d'Amilly - B.P. 163
45203 Montargis
FRANCE

Centre National de la Recherche Scientifique (CNRS)
Management (joint)
15, Quai Anatole
75700 Paris
FRANCE

01404

Solar Water Pumping Unit in Ceballos

START DATE: 1974

LOCATION:

Ceballos, a small village in Durango

DESCRIPTION:

Collectors of 90 sq. m. have been installed on the village school. The unit delivers 4 cu. m. of water per hour and operates from 5 to 6 hours per day. The water head pressure is equivalent to 40 m. The solar pump supplies water to the village.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
Management (joint)
Ibarra Herrera, Javier
Director General
Bulevar Pípila No. 1
Tecamachalco
Presa San Joaquín
México 10, D.F.
MÉXICO

Société Française d'Etudes Thermiques et d'Energie Solaire (SOFRETES)
Installation (sole)
Zone Industrielle d'Amilly - B.P. 163
45203 Montargis
FRANCE

01405

Cedral Irrigation Pumping Station

START DATE: 1975

LOCATION:

Cedral, San Luis Potosí

DESCRIPTION:

Collectors of 80 sq. m. have been installed on the ground for a small irrigation system. The unit delivers 4 cu. m. per hour and operates 5 to 6 hours per day. The water head pressure is equivalent to 20 m.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
Management (joint)
Ibarra Herrera, Javier
Director General
Bulevar Pípila No. 1
Tecamachalco
Presa San Joaquín
México 10, D.F.
MÉXICO

Société Française d'Etudes Thermiques et d'Energie Solaire (SOFRETES)
Installation (sole)
Zone Industrielle d'Amilly - B.P. 163
45203 Montargis
FRANCE

Centre National de la Recherche Scientifique (CNRS)
Management (joint)
15, Quai Anatole
75700 Paris
FRANCE

01406

Solar Water Pumping Unit in La Cruz

START DATE: 1975

LOCATION:

La Cruz, a village in Chihuahua just north of Ciudad Camargo

DESCRIPTION:

Collectors of 80 sq. m. have been installed on a dispensary. The unit delivers 4 cu. m. of water per hour and operates from 5 to 6 hours per day. The water head pressure is equivalent to 30 m. The solar pump supplies water to the village.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
Management (joint)
Ibarra Herrera, Javier
Director General
Bulevar Pípila No. 1
Tecamachalco
Presa San Joaquín
México 10, D.F.
MÉXICO

Société Française d'Etudes Thermiques et d'Energie Solaire (SOFRETES)
Installation (sole)
Zone Industrielle d'Amilly - B.P. 163
45203 Montargis
FRANCE

Centre National de la Recherche Scientifique (CNRS)
Management (joint)
15, Quai Anatole
75700 Paris
FRANCE

01407

Solar Water Pumping in David Gustavo

START DATE: 1976

LOCATION:

David Gustavo Gutiérrez, Quintana Roo

DESCRIPTION:

Collectors of 90 sq. m. have been installed in the village. The unit delivers 4 cu. m. of water per hour and operates from 5 to 6 hours daily. The water head pressure is equivalent to 50 m. The solar pump supplies water for the village.

PARTICIPANTS:

Direccion General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
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Ibarra Herrera, Javier
Director General
Bulevar Pípila No. 1
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Presa San Joaquín
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MÉXICO

Société Française d'Etudes Thermiques et d'Energie Solaire (SOFRETES)
Installation (sole)
Zone Industrielle d'Amilly - B.P. 163
45203 Montargis
FRANCE

Centre National de la Recherche Scientifique (CNRS)
Management (joint)
15, Quai Anatole
75700 Paris
FRANCE

01408

Ixtacuixtla Irrigation Pumping Station

START DATE: 1976

LOCATION:

Ixtacuixtla or San Felipe Ixtacuixtla, a village in Itaxcala, 9 miles west of Itlaxcala.

DESCRIPTION:

Collectors of 90 sq. m. have been installed on a village school. The unit delivers 4 cu. m. of water per hour and operates from 5 to 6 hours per day. The water head pressure is equivalent to 30 m.

PARTICIPANTS:

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15, Quai Anatole
75700 Paris
FRANCE

01409

Solar Water Pumping in Jaumave

START DATE: 1976

LOCATION:

Jaumave, Tamaulipas

DESCRIPTION:

Collectors of 90 sq. m. have been installed in the village. The unit delivers 4 cu. m. of water per hour, and operates from 5 to 6 hours daily. The water head pressure is equivalent to 13 m. The solar pump supplies water for the village and livestock.

PARTICIPANTS:

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15, Quai Anatole
75700 Paris
FRANCE

01410

Solar Water Pumping Unit in Mexicali

START DATE: 1975

LOCATION:

Mexicali, a border town of Baja California Norte

DESCRIPTION:

Collectors of 80 sq. m. have been installed on a restaurant. The unit delivers 7 cu. m. of water per hour and operates from 5 to 6 hours per day. The water head pressure is equivalent to 20 m.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
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Centre National de la Recherche Scientifique (CNRS)
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15, Quai Anatole
75700 Paris
FRANCE

01411

Solar Water Pumping in Nuevo Progreso II

START DATE: 1975

LOCATION:

Nuevo Progreso II, Campeche

DESCRIPTION:

Collectors of 70 sq. m. have been installed on a school. The unit delivers 4 cu. m. of water per hour and operates from 5 to 6 hours daily. The water head pressure is equivalent to 25 m. The solar pump supplies water for the village.

PARTICIPANTS:

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75700 Paris
FRANCE

01412

Solar Water Pumping Unit in Paso Guayabal

START DATE: 1977

LOCATION:

Paso Guayabal, village in the state of México

DESCRIPTION:

Collectors of 90 sq. m. have been installed in the village. The unit delivers 4 cu. m. of water per hour and operates from 5 to 6 hours daily. The water head pressure is equivalent to 35 m. The solar pump supplies water for the village.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
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15, Quai Anatole
75700 Paris
FRANCE

01413
Solar Water Pumping Unit in Todos Santos

START DATE: 1976

LOCATION:

Todos Santos, a small coastal town in Baja California Sur

DESCRIPTION:

Collectors of 90 sq. m. have been installed on a restaurant. The unit delivers 4 cu. m. of water per hour and operates from 5 to 6 hours per day. The water head pressure is equivalent to 30 m. The solar pump supplies water to the village.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
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Director General
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15, Quai Anatole
75700 Paris
FRANCE

01414
Solar Water Pumping in Tolosa

START DATE: 1976

LOCATION:

Tolosa, Zacatecas

DESCRIPTION:

Collectors of 90 sq. m. have been installed on a dispensary. The unit delivers 4 cu. m. of water per hour, and operates from 5 to 6 hours daily. The water head pressure is equivalent to 30 m. The solar pump supplies water for the village.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
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Ibarra Herrera, Javier
Director General
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15, Quai Anatole
75700 Paris
FRANCE

01415
Solar Water Pumping Unit in Villa de Cos

START DATE: 1976

LOCATION:

Villa de Cos, a small village in Zacatecas

DESCRIPTION:

Collectors of 90 sq. m. have been installed on common public land. The unit delivers 4 cu. m. of water per hour and operates from 5 to 6 hours per day. The water head pressure is equivalent to 30 m. The solar pump supplies water for the village and livestock.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
Management (joint)
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Director General
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Management (joint)
15, Quai Anatole
75700 Paris
FRANCE

01416

Solar Village Irrigation

LOCATION:

Yanhuitlan, Oaxaca

DESCRIPTION:

Collectors of 90 sq. m. have been installed in the village. The unit delivers 4 cu. m. of water per hour and operates from 5 to 6 hours daily. The water head pressure is equivalent to 22 m. The solar pump supplies water for irrigation.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
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75700 Paris
FRANCE

01420

SONNTLAN

START DATE: January 1, 1978

DESCRIPTION:

This joint program for solar energy utilization is an annex to the Mexican-German Agreement for Industrial and Technical Cooperation. The goal is to develop suitable solar systems and to test devices which meet the technical and economical requirements of small to medium consumers in sun rich areas. It is a comprehensive development for Baja California where the fishing industry is an important source for foreign funds. The lack of roads, fresh water supplies, electricity, and municipal utilities severely limits work opportunities and amenities. Planning phase ended April, 1979; construction phase will last until January, 1981; a two-year testing and operation period concludes the program.

BUDGET:

Total costs are estimated between 30 and 40 million DM.

PARTICIPANTS:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
Management (joint)
Design (joint)
Ibarra Herrera, Javier
Director General
Bulevar Pípila No. 1
Tecamachalco
Presa San Joaquín
México 10, D.F.
MÉXICO

Bundesministerium für Forschung und Technologie (BMFT)
Management (joint)
Funding (joint)
Design (joint)
Postfach 120370
D-5300 Bonn 12
FEDERAL REPUBLIC OF GERMANY

01421

Solar Houses

LOCATION:

Mexicali, Baja California Norte

DESCRIPTION:

Nearly all houses in this northern Mexican desert town require air conditioning during the summer months and the cost for electricity must be subsidized by the government to help low income groups. Six single family row houses will be built that will be heated and cooled by solar energy. Solar collection that provides the required heat energy for absorption type air cooling and hot water will be integrated into aesthetically pleasing and energy economical homes. Both systems are centrally located for all six houses to reduce the amount of equipment. During the short winter period the system will provide solar heating.

PARTICIPANT:

Messerschmitt-Bolkow-Blohm GmbH (MBB)
Installation (principal)
Unternehmensbereich Raumfahrt
Postfach 801169
D-8000 München 80
FEDERAL REPUBLIC OF GERMANY

01422

Integral Solar System

LOCATION:

Las Barrancas, fishing village on Pacific coast near Tijuana

DESCRIPTION:

A small fishing village (250 people in 50 households) will be equipped with an integral solar energy system. It provides: fish processing (2.5 cu. m./day hot water at 120 deg. C under pressure); temporary storage of fish through solar ice production of 2 cu. m./day; deep freezing of ocean products in a solar cooler (650 kg/day from minus 25 deg. C to 40 deg. C); solar desalination of sea water (using the multipleflash process, 30 cu. m./day and by reverse osmosis, 16 cu. m./day); electricity production for public utilities, households, and backup power systems by means of a small solar thermal power system with 100 kW installed capacity; telecommunications by radiotelephone (150 km reach) with a radio and video system for school instruction; water pumping by a photovoltaic system (90 sq. m., 5 kW peak output); and utilization of wind energy (5 kW) for sea water and generation of auxiliary electric power. An auxiliary diesel generator will serve as backup for medical station and freezer.

PARTICIPANTS:

Gessellschaft für Kernenergieverwertung in Schiffbau und Schiffahrt GmbH (GKSS)
Installation (joint)
Gesthacht
FEDERAL REPUBLIC OF GERMANY

AEG-Telefunken
Installation (joint)
Fachbereich Raumfahrt und Neue Technologien
Industriestrasse 29
D-2000 Wedel
Holstein
FEDERAL REPUBLIC OF GERMANY

Maschinenfabrik Augsburg-Nurnberg AG (MAN)
Installation (joint)
Neue Technologie
Postfach 500620
Dachauerstrasse 667
D-8000 Munchen 50
FEDERAL REPUBLIC OF GERMANY

Dornier System GmbH
Oversight and Evaluation (principal)
Installation (joint)
Postfach 1360
D-7990 Friedrichshafen
FEDERAL REPUBLIC OF GERMANY

01423

Instrumentation for R and D

LOCATION:

La Paz, Baja California Sur

DESCRIPTION:

A solar laboratory will be built in La Paz. Initially it will be used to test solar collectors and other components for the SONNTLAN program; later it will be used for general solar investigations. There will be three meteorological stations with data analysis provisions for the installations in Las Barancas, La Paz, and Mexicali.

PARTICIPANT:

Deutsche Forschungs-und Versuchsanstalt für Luft-und Raumfahrt e.V. (DFVLR)
Design (level unknown)
Linder Hohe
Pfaffenwaldring 38-40
7000 Stuttgart
FEDERAL REPUBLIC OF GERMANY

01428

Science and Technology Cooperation

START DATE: June, 1979

DESCRIPTION:

Cooperative research and development projects in the renewable energy technologies take place under the auspices of the U.S.-Mexico Mixed Commission which was established under the Science and Technology Agreement of 1972. Currently seven project areas have been proposed.

BUDGET:

Not yet determined.

PARTICIPANTS:

Consejo Nacional de Ciencia y Tecnología (CONACYT)
Management (joint)
Ramírez Araiza, Alfredo
Director of International Programs
Insurgentes Sur 1814, 6 Piso
México 20, D.F.
MÉXICO

Department of Energy (DOE)
Management (joint)
International Affairs
Forrestal Building
1000 Independence Avenue, S.W.
Washington, D.C. 20585

01429
Insolation Predictions

START DATE: 1979

DESCRIPTION:

Solar insolation measurement for Mexico. Proposal has been submitted to DOE.

PARTICIPANTS:

Universidad Nacional Autónoma de México (UNAM-CIM)
Research (joint)
Hernández Hernández, Everardo A.
Centro de Investigación de Materiales
Ciudad Universitaria
Villa Obregón
Apartado Postal 70-360
México 20, D.F.
MÉXICO

Solar Energy Research Institute (SERI)
Research (joint)
Bird, Dick
Energy Resources Assessment Branch
1617 Cole Blvd.
Golden, CO 80401

01430
Selective Surfaces

START DATE: December, 1979

DESCRIPTION:

The objective of this project is to study the preparation and characterization of selective surfaces and to understand degradation mechanisms.

PARTICIPANTS:

Universidad Nacional Autónoma de México (UNAM-CIM)
Research (joint)
del Castillo, Luis
Centro de Investigación de Materiales
Ciudad Universitaria
Villa Obregón
Apartado Postal 70-360
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Solar Energy Research Institute (SERI)
Research (joint)
Call, Pat
Materials Branch
1617 Cole Blvd.
Golden, CO 80401

01431
Photovoltaics Research and Development

START DATE: December, 1979

DESCRIPTION:

Three projects are planned. Jack Stone has sent a pre-proposal to DOE for cooperative research on amorphous silicfor between UNAM-CIM and the University of Delaware. Other areas of proposed cooperation are gallium arsenide cells and system analysis.

PARTICIPANTS:

Instituto Politécnico Nacional (IPN-CIEA)
Research (subordinate)
Nava Jaimes, Hector
Centro de Investigación y de Estudios Avanzados
Apartado Postal 14-740
México 14, D.F.
MÉXICO

Universidad Nacional Autónoma de México (UNAM-CIM)
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Martínez Fornández, Manuel
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Solar Energy Research Institute (SERI)
Oversight and Evaluation (level unknown)
Research (joint)
Feucht, Don
Photovoltaics Branch
1617 Cole Blvd.
Golden, CO 80401

01433
Solar Refrigeration

DESCRIPTION:

The goal is to design prototype solar refrigerators for applications that range from 1,000 to 3,000 kg ice/day. The second phase would be the construction and testing of the prototypes. The two principal investigators are to meet in December, 1979 and are expected to write preproposals.

PARTICIPANTS:

Universidad Nacional Autónoma de México (UNAM-CIM)
Research (joint)
Best, M. C. Roberto
Centro de Investigación de Materiales
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Villa Obregón

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Universidad Autónoma Metropolitana (UAM)
Research (subordinate)
Juric K., Zoran
Engineer
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Módulo Solar
Non-Design Consultancy (level unknown)
García, Octavio
Cuernavaca, Morelos
MÉXICO

Lawrence Berkeley Laboratories (LBL)
Research (joint)
Wahlig, Michael
The Solar Group
Room 90-2056
Berkeley, CA 94726

01433

Passive Architectural Applications

START DATE: November, 1979

DESCRIPTION:

The goal is to develop three prototypes of passive houses for three climatic regions of Mexico. The two principal investigators met November 16-19, 1979 to work out a schedule of events for the next six months. Hernández has submitted a proposal to CONACYT for funding.

PARTICIPANTS:

Universidad Nacional Autónoma de México (UNAM-CIM)
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Hernández Hernández, Everardo A.
Centro de Investigación de Materiales
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Consejo Nacional de Ciencia y Tecnología (CONACYT)
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Lawrence Berkeley Laboratories (LBL)
Funding (Principal)
Martin, Marlo
The Solar Group
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Berkeley, CA 94726

01434

SUNCALLI, Solar Village Project

START DATE: 1979

LOCATION:

Ajuchitlan, in a remote rural region of Mexico

DESCRIPTION:

SUNCALLI is a joint Mexican and U.S. government project. Objectives: to raise rural standards of living through solar applications and stimulate Mexican use of solar energy. The photovoltaic system's peak capacity will be 7.6 kW with a d.c. system output of 120V and calcium lead battery storage of 208 kWh (10 days). System load is 4.1 kW with a projected daily consumption of 20.8 kWh. 3 digesters will produce a 50 cu. m./day mixture of methane and carbon dioxide from a manure feedstock provided daily by 100 head of cattle. 20 houses will have thermosiphon hot water systems with 2 sq. m. collector areas and storage capacities of 200 *ℓ* for a system supply of 134 *ℓ* of water at 57 deg. C/day. Crop drying facilities are being discussed. Contracts will be awarded in February 1980 for projected installations in October 1980 and startup in January 1981. A joint Steering Committee provides project management.

PARTICIPANTS:

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Department of Energy (DOE)
Management (joint)
Funding (joint)
International Affairs
Forrestal Building
1000 Independence Avenue, S.W.
Washington, D.C. 20585

01435

Solar Energy Information Exchange

DESCRIPTION:

The objective of this project is to facilitate access to technical information and data in order to broaden knowledge of solar energy in Mexico and the U.S. INFOTEC has sent a formal request for direct access to the SERI Solar Energy Information Databases to the Department of Energy.

PARTICIPANTS:

Consejo Nacional de Ciencia y Tecnología (CONACYT)
Funding (principal)
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Solar Energy Research Institute (SERI)
Management (joint)
Goldberg, Murrey David
Branch Chief
International Division
Industrial Countries Branch
1617 Cole Blvd.
Golden, CO 80401

Información Técnica (INFOTEC)
Management (joint)
Quevedo, José
Apartado Postal 19-194
México 19, D.F.
MÉXICO

01440

Prototype Solar Village

START DATE: 1076

LOCATION:

Mezontepec, Parque Ajusco, south of Mexico City

DESCRIPTION:

An experimental self-sufficient village is being developed in a forest area south of Mexico City. The project is concerned with studying and monitoring various solar applications in order to assess their practical feasibility for Mexico. In an attempt to integrate the project with the surrounding community, project officials are collaborating with experts from the Ministry of Agriculture and Hydraulic Resources and local citizens to address regional forestry and agricultural problems.

PARTICIPANT:

Grupo del Sol, S.C.
Management (sole)
Martín J., Roberto
President
Costa 209
Colonia Las Águilas
México 20, D.F.
MÉXICO

01441

La Casa Solar 1 (Solar House 1)

START DATE: 1976

LOCATION:

Mezontepec, Parque Ajusco, south of Mexico City

DESCRIPTION:

Solar cells generate 100 W/h of electricity, representing an installed capacity of 4,500 W/h (enough for 2 weeks without sun). Rain water (1,500 mm of annual precipitation) is accumulated, filtered, and stored. A 120 W pump delivers it to in-house tanks. Eight silicon-cell modules (11 peak watts each) also operate lighting, television, music and microphone equipment, V.H.F. and F.M. radio, and monitoring and control devices; components come from RTC of France. Flat plate collectors (1.32 sq. m. each), manufactured by Solarmex, heat 115 litres of water daily, enough to supply a family of four and save 300 litres of petroleum annually. The thermal tank, manufactured by Ideal Standard, can store heat for 30 days.

PARTICIPANTS:

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MÉXICO

Grupo del Sol, S.C.
Research (level unknown)
Costa 209
Colonia Las Águilas
México 20, D.F.
MÉXICO

Radiotechnique-Complec, S.A.
Supply (joint)
130, Avenue Ledru-Rollin
75540 Paris, Cedex 11
FRANCE

Solarmex
Supply (joint)
MÉXICO

Ideal Standard, S.A. de C.V.
Supply (joint)
Bulevar Avila Camacho 40, 9 Piso
México, D.F.
MÉXICO

Philips Mexicana, S.A. de C.V.
Installation (principal)
División Energía Solar
Durango 167
México 7, D.F.
MÉXICO

01442
La Unidad Solar 2 (Integral Solar System 2)

START DATE: 1979

LOCATION:

Mezontepec, Parque Ajusco, south of Mexico City

DESCRIPTION:

This demonstration project, currently under construction, uses the concept of helioarchitecture and is to be self-sufficient for five people. 95 percent of the equipment and components are to be manufactured in Mexico. The remaining 5 percent are silicon solar cells which are currently only assembled in Mexico. Electricity will be produced by solar cells, supplemented by an on-site wind generator. There is the same system for accumulating, filtering and storing rain water as in La Casa Solar 1; 120 sq. m. of roof collectors will heat 300 litres of water daily. This project also includes a solar greenhouse, anaerobic digestors to convert domestic animal wastes into methane (with fertilizer as a byproduct), and testing and monitoring equipment for the entire system.

PARTICIPANT:

Grupo del Sol, S.C.
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Martín J., Roberto
President
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MÉXICO

Independent Projects

01438
Solar Energy House

LOCATION:

On the grounds of Mexico's presidential residence

DESCRIPTION:

A single-family dwelling which includes a television set powered by photo-electric cells and solar water heating panels have been constructed.

PARTICIPANT:

Dirección General de Aprovechamiento de Aguas Salinas y Energía Solar (DIGAASES)
Management (principal)
Ibarra Herrera, Javier
Director General
Bulevar Pípila No. 1
Tecamachalco
Presa San Joaquín
México 10, D.F.
MÉXICO

01439
Solar Demonstration Project in a National Government Office

LOCATION:

Secretaría de Asentamientos Humanos y Obras Públicas

DESCRIPTION:

A solar space and water heating system was installed in the Mexican Ministry of Housing and Public Works by Piper Hydro, Inc.

PARTICIPANTS:

Secretaría de Asentamientos Humanos y Obras Públicas (SAHOP)
Management (level unknown)
Ramírez Vásquez, Pedro
Xola y Avenida Universidad
México D.F.
MÉXICO

Piper Hydro, Inc.
Installation (sole)
2895 E. La Palma Avenue
Anaheim, CA 92806

01445
Insolation Data

START DATE: 1957

DESCRIPTION:

This group has collected insolation data since 1957. Three stations are in Mexico (Orizabita Hidalgo, México, D.F., and Chihuahua, Chihuahua). Thus far the results have been used for biometeorological and architectonic projects.

PARTICIPANT:

Universidad Nacional Autónoma de México (UNAM)
Management (principal)
Galindo Estrada, Ignacio
Instituto de Geofísica
Ciudad Universitaria
Villa Obregón
México 20, D.F.
MÉXICO

01449

OAS - Funded Solar Research

DESCRIPTION:

Research has concentrated on flat-plate collectors, solar refrigeration and air conditioning systems, and photovoltaic conversion of solar radiation.

PARTICIPANTS:

Universidad Nacional Autónoma de México (UNAM-CIM)
Management (principal)
Mayer, Eric R.
Centro de Investigación de Materiales
Ciudad Universitaria
Villa Obregón
Apartado Postal 70-360
México 20, D.F.
MÉXICO

Organization of American States (OAS)
Funding (principal)
1889 F Street
Washington, D.C. 20006

01452

Flat-Plate Collector Development

DESCRIPTION:

The main objective of this group is to develop flat-plate collectors for low temperature applications. An experimental flat-plate collector operating in Mexico City is made from galvanized iron with eight tubes arranged at center distances of 9 cm. with two glass covers; the total surface area of the collector is 12.775 sq. cm.

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01458

Solar-Powered Demonstration Projects

START DATE: 1972

DESCRIPTION:

A 7 peak-Watt photovoltaic module of 36 cells, 2 inches in diameter, by phosphorous diffusion from a liquid source has been developed. They have constructed demonstration projects in the eastern Rocky Mountains: a solar powered TV set for educational purposes has operated since 1977 and a rural telephone station has operated since September 1977.

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01462

Thermal Conversion Process Research

START DATE: 1973

DESCRIPTION:

This group has been working on the thermal conversion process using flat-plate collectors and parabolic concentrators.

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01465

Low Temperature Applications for Solar Energy

DESCRIPTION:

The objective is to develop low and medium temperature application of solar energy. The group is working on integral water heaters, intermittent grain dryers, water pumping, and solar desalination.

PARTICIPANT:

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01467

Solar Energy Conversion

DESCRIPTION:

This project involves research to obtain fuel from photochemical solar energy conversion.

PARTICIPANT:

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01469

Village Power Supply

LOCATION:

Hermosillo, Sonora in northwest Mexico

DESCRIPTION:

A complete design has been developed to supply power to the city of Hermosillo, Sonora in northwest Mexico. It currently operates only during the day.

PARTICIPANT:

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01470

Low Income Housing

LOCATION:

Monterrey, Nuevo León

DESCRIPTION:

They are studying different models of passive heating and cooling. A prototype using different construction materials has been studied and shown to be effective in northern Mexico.

PARTICIPANTS:

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01471

Passive Stable Near Veracruz

START DATE: 1979

LOCATION:

Martínez de la Torre (near Veracruz)

DESCRIPTION:

A prototype passive stable is to be built at the experimental farm of the Veterinary School of the National Autonomous University of Mexico which is situated in Martínez de la Torre near Veracruz. The design consists of a solar roof air collector. Roof wind turbines are planned for nocturnal ventilation and to operate simultaneously with the solar roof when insolation conditions are weak due to the diffuse nature of global radiation in tropical, hot, humid climates. Passive solar, wind and combined systems are planned to operate individually and simultaneously to better evaluate performance. Data from the main physical parameters will be monitored for at least one year.

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01480

Windmill Prototype for Rural Mexico

START DATE: January, 1979

LOCATION:

Cuernavaca

DESCRIPTION:

Design and implement one prototype windmill for water pumping and one for small-scale generation of electricity. Pilot models will be distributed throughout Mexico. The goal is to develop a windmill made in Mexico.

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Volunteers in Technical Assistance (VITA)
Funding (principal)
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01481

Feasibility for Wind Power Utilization in Mexico

START DATE: 1979

LOCATION:

Cuernavaca

DESCRIPTION:

The near term goal is to assess the feasibility and potential for wind energy utilization in the 80,000 Mexican rural communities with populations under 1,000. Primary usage would be irrigation, water pumping for livestock, and small-scale generation of electricity. Current studies include wind characterization and energy evaluation studies. WECS development concentrates on: 1) keeping informed and informing the Mexican public on wind energy conversion systems; 2) creating an infrastructure for dissemination of WECS technology; and 3) developing and/or adapting WECS for the Mexican market.

PARTICIPANTS:

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01490

OTEC Offshore Rig

START DATE: September, 1977

LOCATION:

Offshore Gulf of Campeche

DESCRIPTION:

A SEDCO offshore rig is operating in the Gulf of Campeche. SEDCO has a long-range interest in the commercial aspects of OTEC. A contract was signed between SEDCO and a subcontractor for Petroleós Mexicanos (PEMEX), the government-owned Mexican oil company.

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