

THE ITALIAN NATIONAL SOLAR ENERGY HISTORY PROJECT

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ABSTRACT

This poster presentation introduces "The Italian National Solar Energy History Project" (The Project) to the participants of the ISES SWC 2007. The Project is currently being promoted by the "Italian National Committee 'The History of Solar Energy'" (CONASES), a multidisciplinary non profit entity established in 2006 by the Italian Ministry for Cultural Heritage and Activities.

The Project, whose first phase will be carried out over the four year period from 2006 through 2009, is structured as three main initiatives having many cultural, scientific and technological implications:

The National Archive on the History of Solar Energy (Solar Archive) has as its main purpose to preserve and make available the Italian heritage of solar energy use, converted into digital form and accessible through the Internet.

100 solar history events in 100 local communities on "Solar Energy From the Past to the Future: History, Art, Science and Technology."

Traveling exhibition on "Solar Cities from the Past to the Future – Scientific Discoveries and Technological Developments" (Genova 2006, Rome 2007/2009, South Italy pending).

1. INTRODUCTION

Human civilizations developed using only solar renewable energy in all its direct and indirect forms (wind, hydro,

forests and other biomass) until 200 years ago. Is it possible to use only solar energy in modern times? This history project's goal is primarily cultural, aimed at changing the perception of solar energy's potential and its modern application.

2. SOLAR ARCHIVE

Starting from past civilizations and proceeding through the Industrial Revolution to the rapid developments of recent decades, the history of solar renewable energy can hold important lessons for our own times, when humanity is beset by a growing number of problems, closely related to the use and availability of energy.

To reconstruct and document in a systematic and easily accessible way the work of the scores of Italian inventors, physicists, chemists, mathematicians, engineers and architects who played a leading role in the history of renewable solar energy, CONASES has promoted the creation of a National Archive on the History of Solar Energy.

The idea of the Italian solar archive started to take shape within GSES (Gruppo per la storia dell'energia solare) in 2003, while preparing for the celebration at ISES SWC 2005 in Orlando (Florida) of the 50th anniversary of the first solar world congress on modern solar energy in Arizona in 1955.

The Archive, whose units are physically located throughout Italy and accessible through the Internet, is being organized around three main subjects. They are solar pioneers and devices starting in the early years of industrialization, solar

architecture and city planning, and use of solar energy in agriculture.

The Archive's initial core of excellence has been created in the past five years in Brescia, in northern Italy, at the Luigi Micheletti Foundation and the Eugenio Battisti Museum of Industry and Work.

The museum has been promoted by the Luigi Micheletti and Civiltà Bresciana Foundations. Branches are now being set up at multiple locations, based on a program agreement among the Lombardy Region, the city and the province of Brescia, and many other public and private organizations.

Thanks to a decades-long acquisition policy, the museum owns more than two thousand machines, thousands of films, and tens of thousands of photos and documents related to the history of industry and work on the local, regional and national levels.

The collections concern motion pictures, printing, textiles, textile machinery, energy, large engines, machine tools and metallurgy.

The collections that deal with energy, including solar, have been assigned to three new branches of the museum. One is in Brescia, another is in Rodengo Saiano (Franciacorta), and the third is in the Camonica Valley at a former hydroelectric plant from the early 20th century.

The branch at Rodengo Saiano will collect, store and display objects as well as permit researchers to consult documentation.



Fig. 1: A view of the interior of the Rodengo Saiano branch showing shelves for storing machines (on the left) and documents (on the right). (Drawing courtesy of Musil Rodengo Saiano, Cultural Services Center, May 2006).

Once organized and inventoried, solar pioneer archives will undoubtedly prove to be a valuable source of information, especially for researchers and scholars working today on the development of solar energy applications.

The Museum's documentation center on solar energy includes the Giorgio and Gabriella Nebbia collection, one of the largest Italian archives on the environment and solar energy. The Nebbia collection has already been partially inventoried and may be examined at www.musil.bs.it.

At present, CONASES is focusing on the preservation and enhancement of archives and documents that belonged to great Italian solar scientists and scholars of international standing in the 20th century, with the idea that the visibility of these pioneers can also draw attention to experiences which, though less well known, have the potential to raise interest in expanding research work throughout Italy.

Examples of recent acquisitions and archives now being inventoried are those of Giovanni Francia (1911-1980) and Gaetano Vinaccia (1889-1971), donated by the heirs.

Francia, a talented mathematician, engineer, and inventor, pioneered real reflector fresnel systems in the early 1960s.

Known around the world as the father of solar thermoelectric power plants, Francia was forgotten following his death, as were his many extraordinary contributions to the development of a wide-ranging series of solar applications. He contributed to advanced solar research, from the production of heat at low, medium and high temperatures to the concept of a city powered solely by solar energy. Of particular interest today are studies of the Earth's thermal equilibrium.



Fig. 2: Frame supporting structure of the first Fresnel Linear Reflector, designed by Giovanni Francia and installed in cooperation with Marcel Perrot in Marseilles in 1963 (Photo courtesy of the Francia heirs).

Gaetano Vinaccia (1889-1971), an architect and city-planner, is the author of dozens of overlooked publications and articles on solar urbanism and architecture. Among them is the 300 page book “Il corso del sole in urbanistica ed edilizia” (*The path of the Sun in urban planning and building construction* published in 1939).

CONASES also sponsors events to call attention to solar pioneers and their work. This September, for example, the University of Bologna will commemorate the 150th anniversary of the birth of the father of modern photochemistry, Giacomo Ciamician (1857-1922).

The work ahead for CONASES is enormous. Italy has dozens of document collections – national and local, public and private, on paper and in other forms. The project intends to survey these, starting with the State Archives, university and research libraries, the collections of scientific academies and societies, company records (not only energy companies), and private archives kept by scientists and scholars interested in solar energy.



Fig. 3: Front covers of Vinaccia's book *The path of the Sun in urban planning and building construction* (1939) (Photo courtesy of the Vinaccia heirs).

In parallel with the archive survey, particularly interesting bibliographic and photographic materials will be examined.

To involve the whole of Italy in creating the Solar History Archive, the project will make the most of opportunities from the other two project's initiatives, as described in the following.

3. 100 SOLAR HISTORY EVENTS

This initiative promotes events on the local history and

future of solar energy in 100 Italian cities and towns. It was launched nationally on June 16, 2007 in Syracuse, Sicily, on the occasion of the 2007 edition of Speklon, an annual event honoring Archimedes. Under the title “Burning mirrors and the Sun, from Archimedes to the third millennium,” this event included photo displays, in particular on concentrators, screenings of films on the history and future of solar technologies, such as the DVD series on the Italian pioneers of solar energy of the 20th century now being published by CONASES.

In addition, there will be remote access to documents and other historical materials from the National Archive on the History of Solar Energy. The idea is that this will promote the discovery of local document collections and histories that could help enrich the Archive.

A central space in each of the 100 history events is devoted to rediscovering buildings and urban structures built in times when fossil fuels were still unknown or little used. Their efficient design was dictated by the solar source and by the state of energy technology.

Often these constraints resulted in a strong incentive to devise solutions whose value has remained unchanged. For instance, cities evolved compactly and buildings were oriented correctly to the sun's path.



Fig. 4: An aerial view of Spello, a typical Italian small town, whose shape and relationship with the surrounding farmland is a clear reminder of its past. Ancient cities' near total dependence on solar energy set a limit on their size (Photo courtesy of G. Reveane, 1993).

4. SOLAR CITY TRAVELING EXHIBITION

Many historical sources preserved in Italy testify to interest in solar energy from the earliest times. Archaeological evidence – unique in the world – is likewise invaluable.

Italy is the land of Marcus Vitruvius (90-20 B.C.), author of *De Architectura*, one of the most studied and cited ancient texts regarding solar architecture and urban planning. The “Italian Solar City Traveling Exhibition,” shows the public how solar cities of the past can be a source of inspiration in designing cities of the future.

The title of the exhibition is “Solar cities, from the past to the future - from the earliest civilizations to our own day.” It recounts the vicissitudes of cities, of architecture, energy and food-supply infrastructures, and the scientific discoveries and technological developments that marked the major stages in their history, with special focus on day lighting, heating and cooling of buildings.

The first edition of the Exhibition was held on the occasion of the Festival of Science in Genoa in 2006. The second edition is already under preparation and the opening expected in Rome in early spring 2009.



Fig. 5: Window panes from Pompeii, 1st cent. a.d. The Romans had learned to make flat transparent glass and use it to capture the sun's heat for their homes, baths and greenhouses. (Photo National Archaeological Museum, Naples.)

5. CONCLUSIONS

The history of industrial science, technology and enterprise is by now a well-established discipline. However, to date its practitioners have almost entirely ignored the vast and complex technical and scientific fields related to the use of

solar energy (direct and indirect, including forests and other biomass, hydro, wind, etc.).

The Italian Solar Energy History Project intends to help create further cultural and cognitive references on the history of solar energy that can facilitate the start of systematic studies on the subject and possibly provide lessons for the use of solar energy in our times and in the future.

6. ACKNOWLEDGMENTS

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