Energy aspects in traditional buildings at touristic places

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General aspects

Touristic sector is a most sensitive one in Mediterranean countries like Greece or Spain, where it arrives to about a 15% of Gross National Product (GNP) and 20% of employment.

Buildings with traditional architecture in touristic places represent an attraction for tourists but to these buildings the integration of renewable energy sources is a difficult aspect.

Energy saving in buildings is significant for the energy targets of EC for 2020 and the implementation of RES (Renewable Energy Sources, as solar energy, wind energy, biomass, geothermal) in traditional buildings always poses new challenges for designers.

RES and Tourism

Towards energy production by RES, the installation of solar thermal collectors, photovoltaics and of wind turbines close to touristic places affects the “touristic product”.

The wide application of RES includes technological, political and strategic features. Thus, the challenge is to maintain a holistic approach in the renewable energy technologies integration.

This kind of features, transforms touristic regions into poles of an international ecological and cultural heritage.

Holistic Approach

Solar thermal collectors, photovoltaic and wind turbines, are visible and need a special care to be also adapted with the architecture of the touristic sites.

The application of solar energy systems could be of importance for the “qualitative” energy feeding of the touristic places along Mediterranean coast line for the development of local economy.

Considering all above, it is important to observe the potential of a new type tourism, through the implementation of RES, which constitutes a part of the so-called: **eco-tourism**.

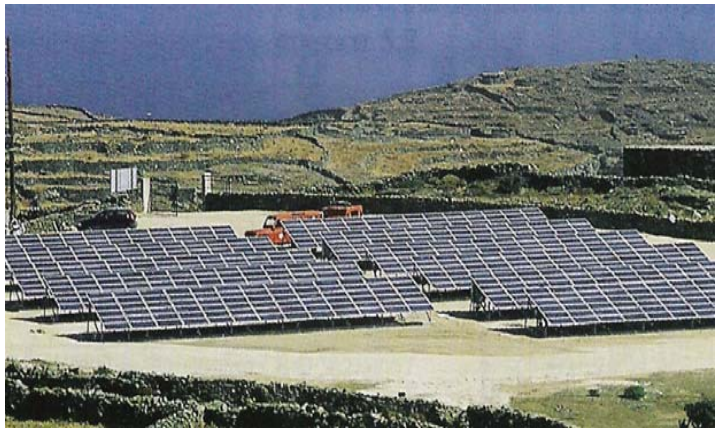
Economic and cultural aspects regarding sustainable tourism

Tourism in Mediterranean area presents 3%-4% annual increase rate, attracting more than 30% of worldwide figure and can be considered the first “industry” at a global level, in terms of expenses, employees and modern life.

The most wide-spread form of tourism is the “Mass Tourism”, which offers a marvellous opportunity for the promotion of effective energy policies, exploitation of RES and reasonable usage of energy in the hotel sector.

Mass tourism, dominant in the majority of cases, often leads to severe degradation of natural landscapes, a lack of water provisions, pollution of coastal zones, and the construction of massive transport and building infrastructure.

Solar Energy Systems are identical for use in tourist accommodations. More than 60% of electricity in EC is consumed for heating and air-conditioning, 25% for services and the 15% for water heating.



In Greece, annual energy demand in hotels represents the 28% of total energy of not domestic buildings, while in Spain is 35% and many successful attempts, by usage of RES and RUE technologies, are reported in an international level.

A priority to sustainable places and consumption of energy by “green” sources, in contrary to places with “CO2” conventional energy, becomes a new situation. Thus, the use of RES in tourism can wide the categories of visitors by eco-sensitive criteria.

Requirements and Prospects

Solar Energy Systems, as thermal collectors and photovoltaics are integrated to the external surfaces of buildings and aesthetics is an additional important aspect.

These systems should be harmoniously implemented into the existing, local, natural particularities of the environment, through good planning and wise environmental studies.

Most of Mediterranean islands are characterized by particular morphological and territorial features, transformed human environment, rich cultural heritage and rich visible resources.

RES implementation strategies to tourism development

Motivation for the RES development includes centrally designed strategy, local skills and innovations spirit.

RES applications can follow different routes, involving action, methodology, effectiveness and collaboration of all policy makers and local actors.

Strategies should aim at preserving nature and heritage, developing society sustainably, building energy autonomy and achieving economical growth.

Local societies should be well informed before the implementation of RES, applied by priority in areas where people are familiarized with these technologies.

Suggested solar energy systems

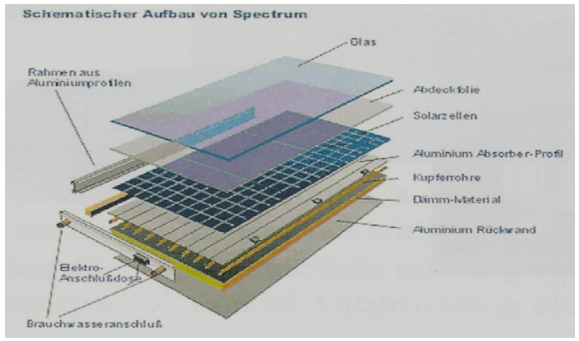
Aiming to a wider application of solar energy systems to Mediterranean touristic places, some of the investigated solar devices at the University of Patras, Greece, can adapt accepted performance, cost and aesthetic requirements.

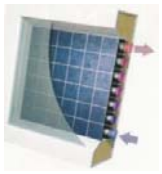
ICS: Water heating through integrated collector storage (ICS) is a more economic and aesthetic choice in relation to the flat type collectors with thermosiphonic operation.

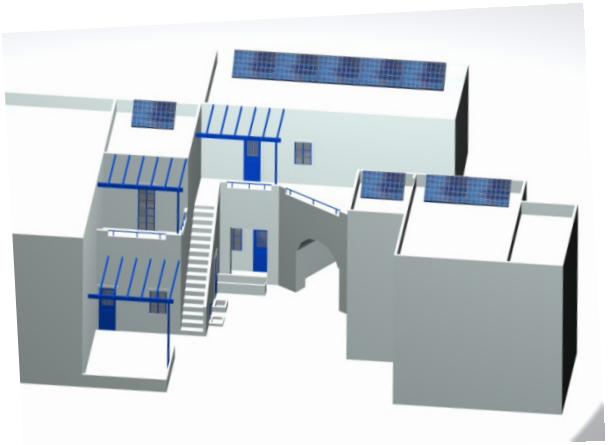
ICS solar water heaters are simpler and aesthetically attractive when integrated in the buildings structure.

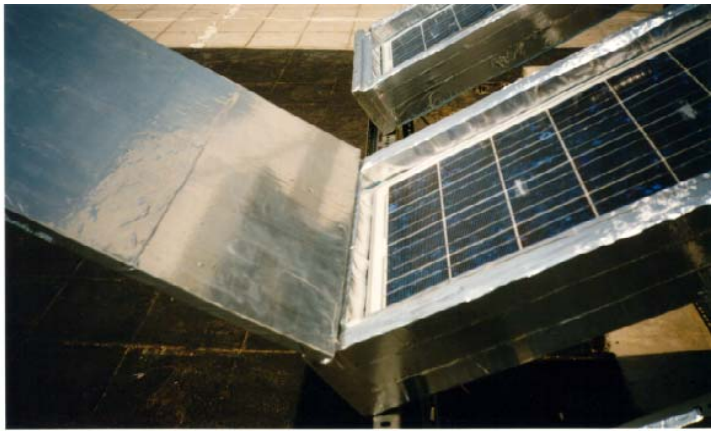
Colored Collectors: To avoid the black color of solar collectors, colored absorbers have been proposed. These collectors even if they absorb lower quantities of solar radiation (roughly 20% less) can be used on the external surfaces of buildings.

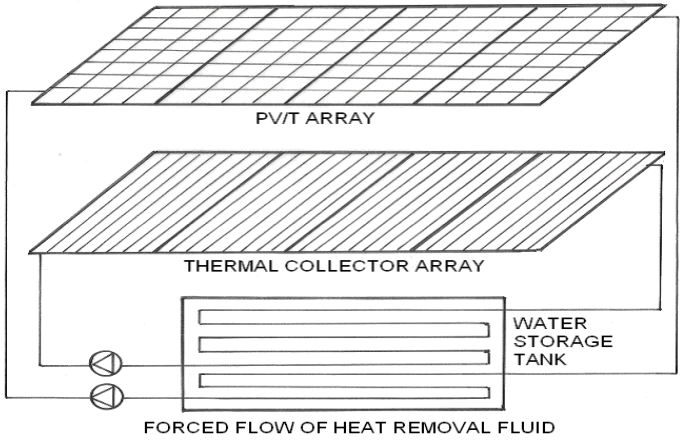
PV/T Collectors: The hybrid Photovoltaic/Thermal (PV/T) collectors convert simultaneously solar radiation into electricity and heat, which can be effectively combined with typical thermal collectors. In addition, the booster reflectors are suggested, in order to increase the energy input to collectors.





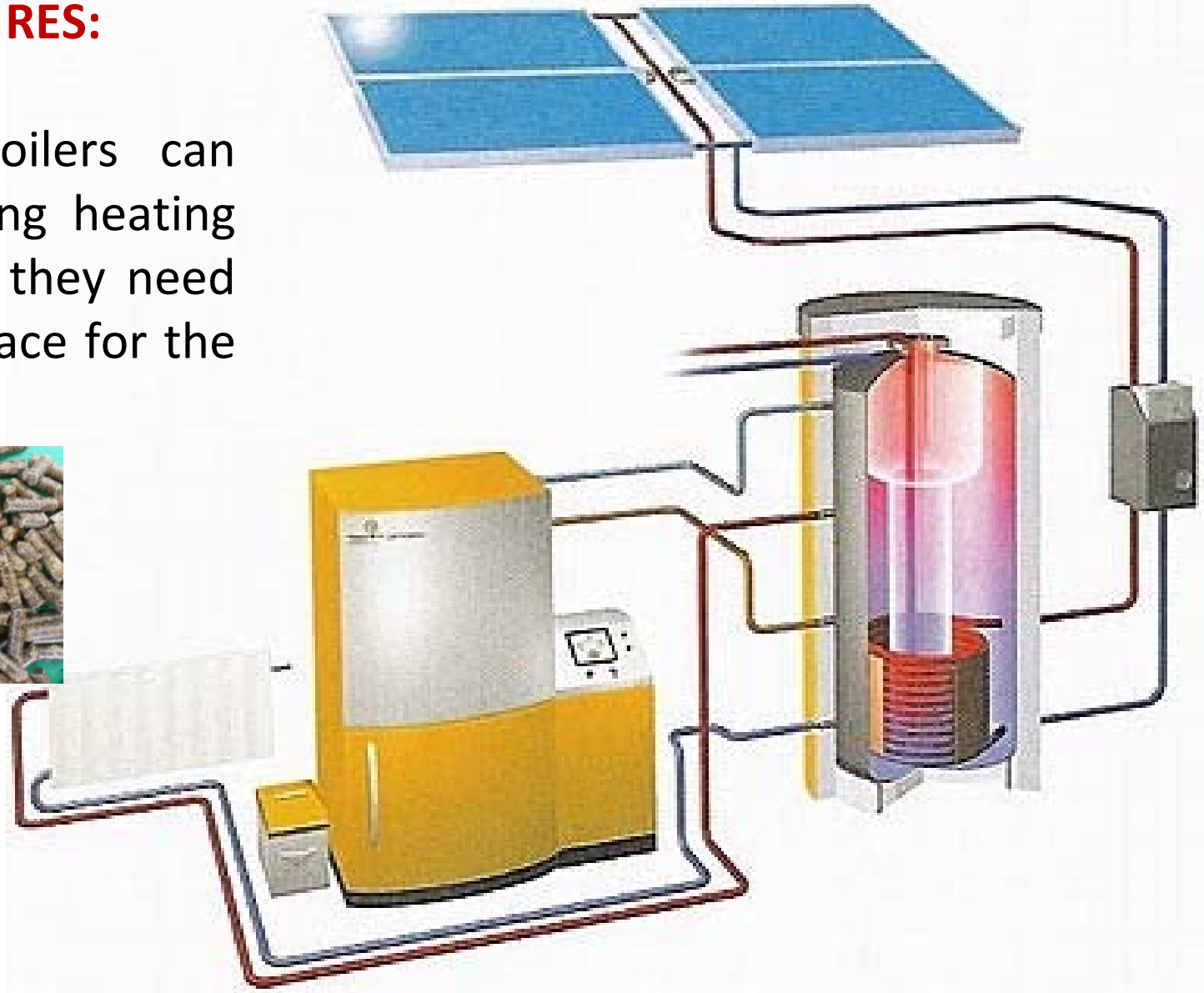






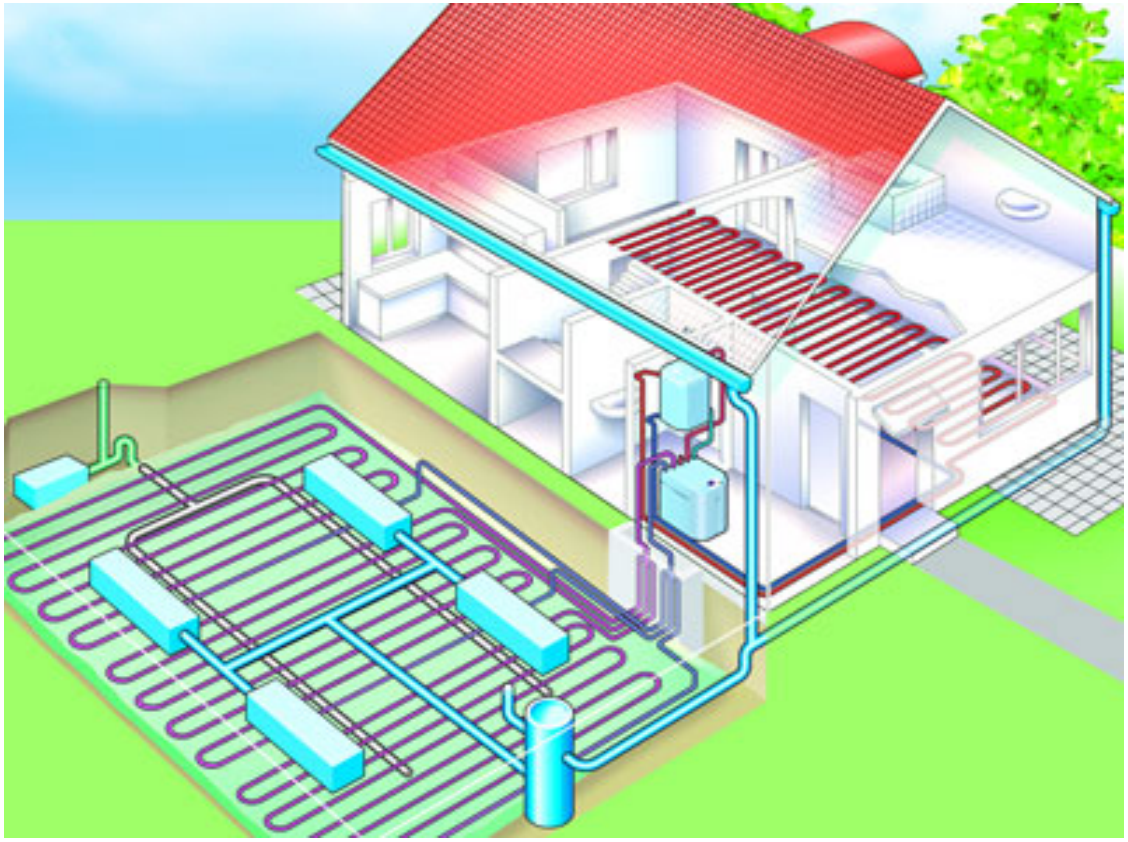
Not Visible RES:

Biomass boilers can fulfil building heating needs, but they need a bigger space for the material.



Not Visible RES:

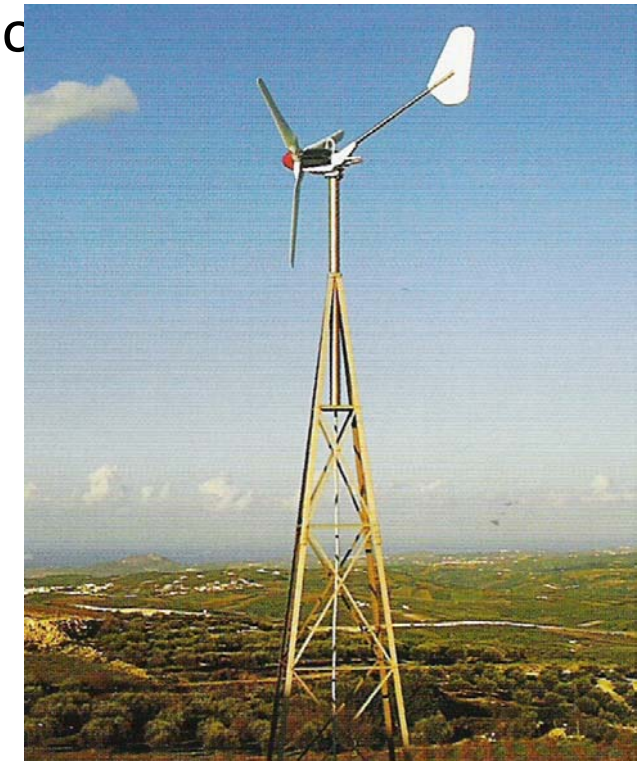
Geothermal heat pumps give good space heating and space cooling, but need electricity (probably covered by photovoltaics).

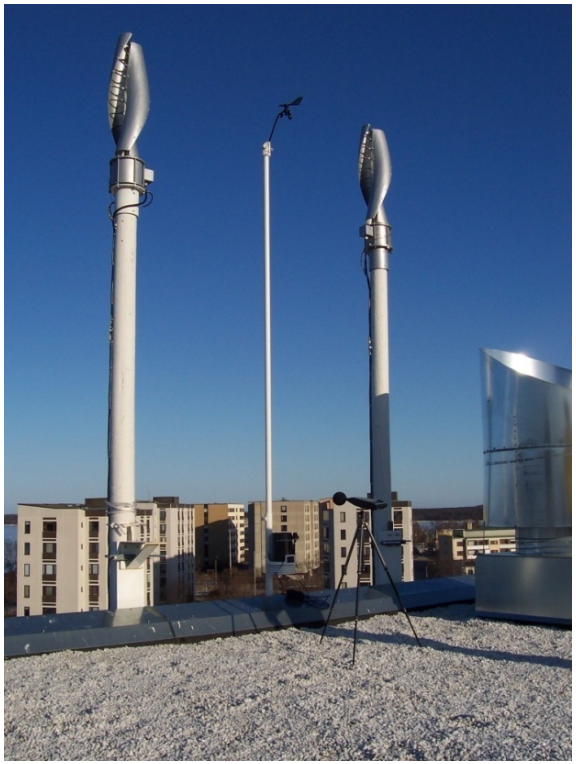


Geothermal heat pump for building heating/cooling

Visibility problems from RES: Solar thermal collectors, PVs, also wind turbines, are visible and need a special care to be also adapted with the architecture of the touristic sites.

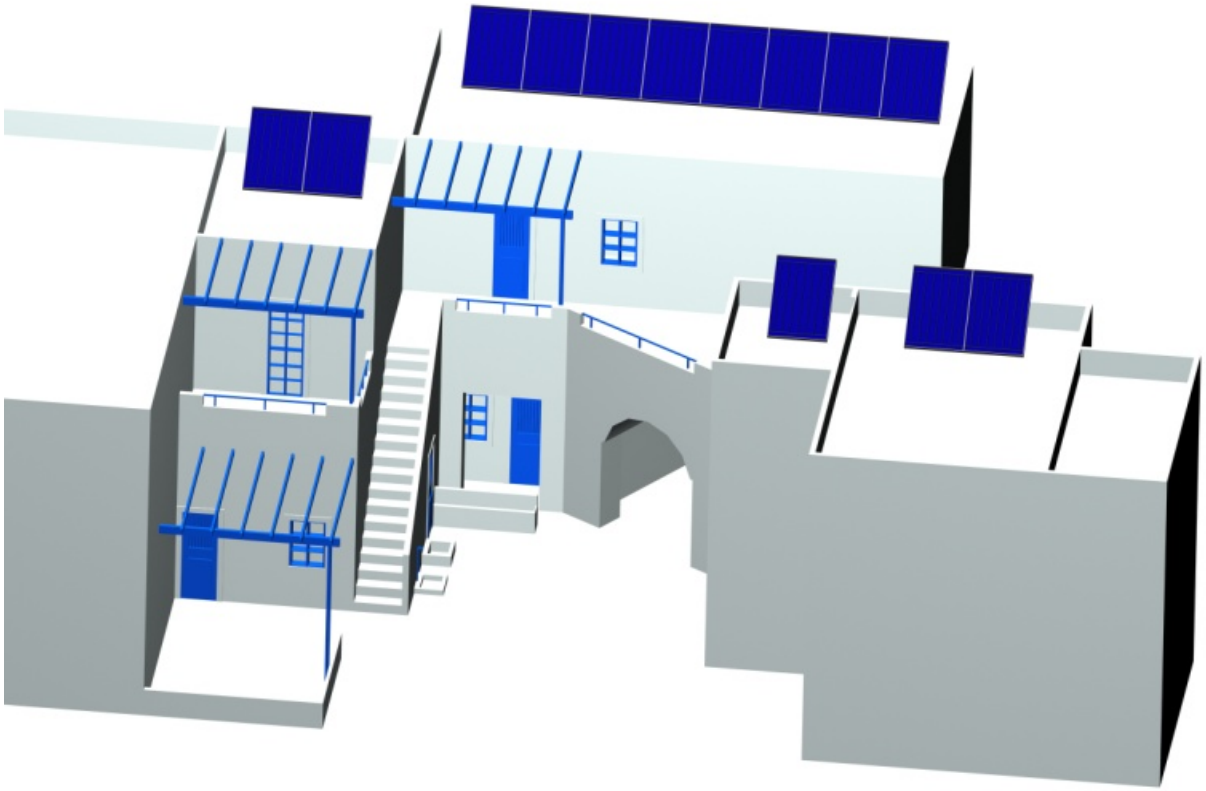
SWT aspects: Small wind turbines can have vertical axis, more adapted to buildings but more expensive, or horizontal axis, less expensive, but they need to follow wind directio



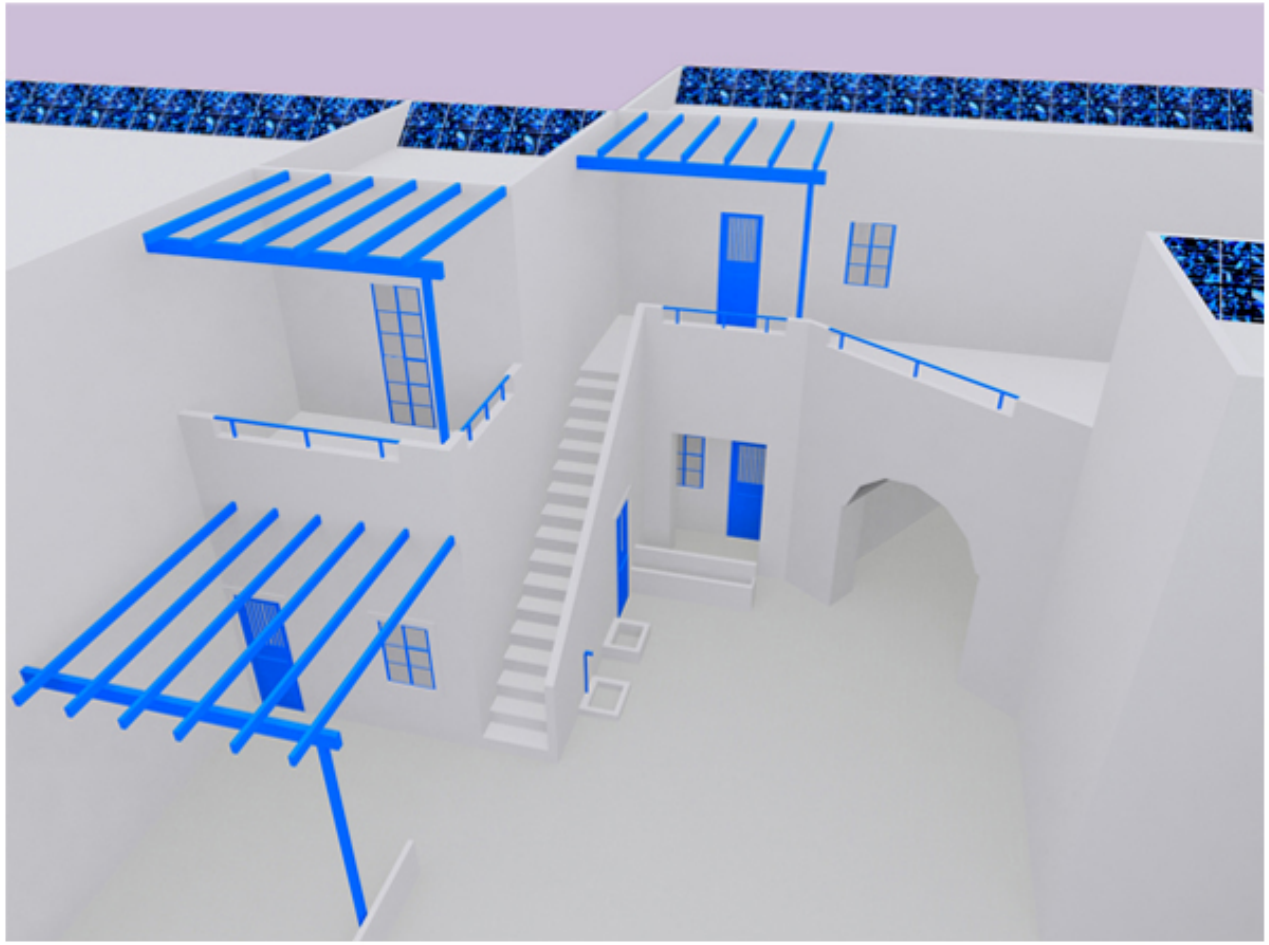


Other aspects:

For coastal places and island complexes (like Cycladic islands), the use of blue collectors is much more aesthetically adapted, might helping in the wide distribution of solar energy systems.

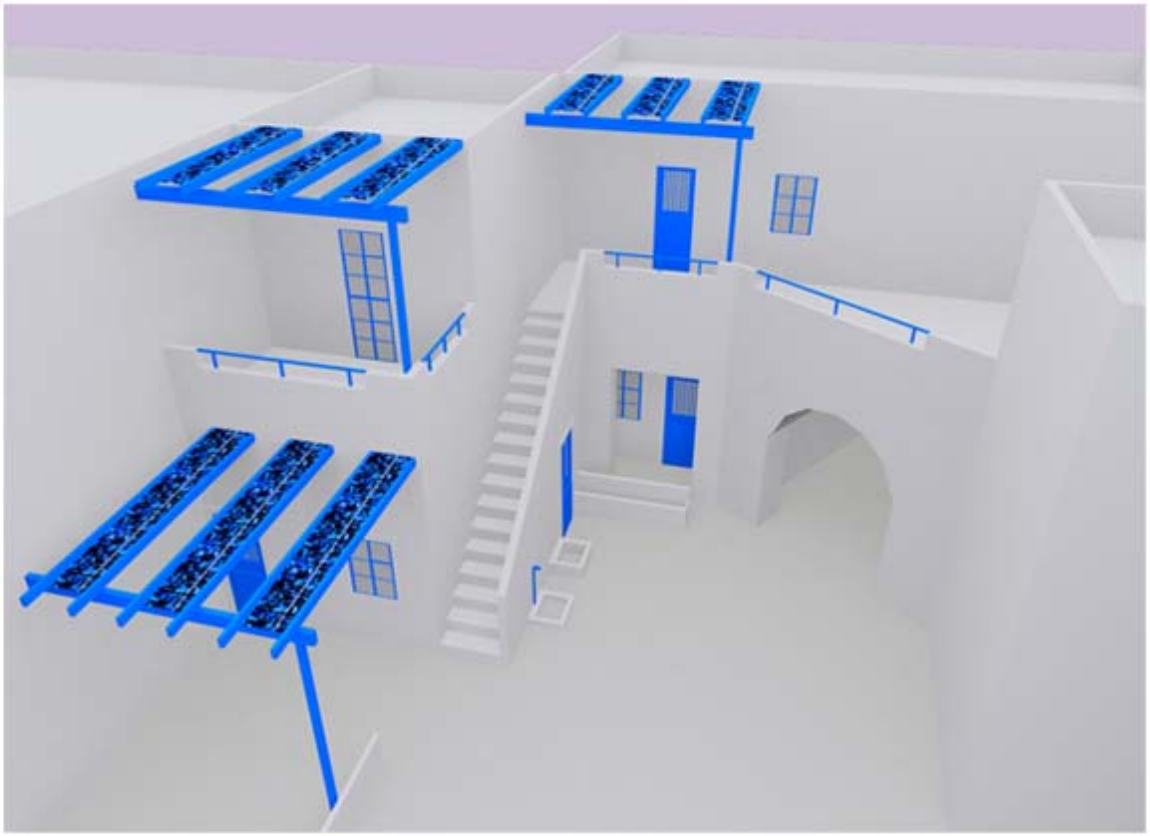


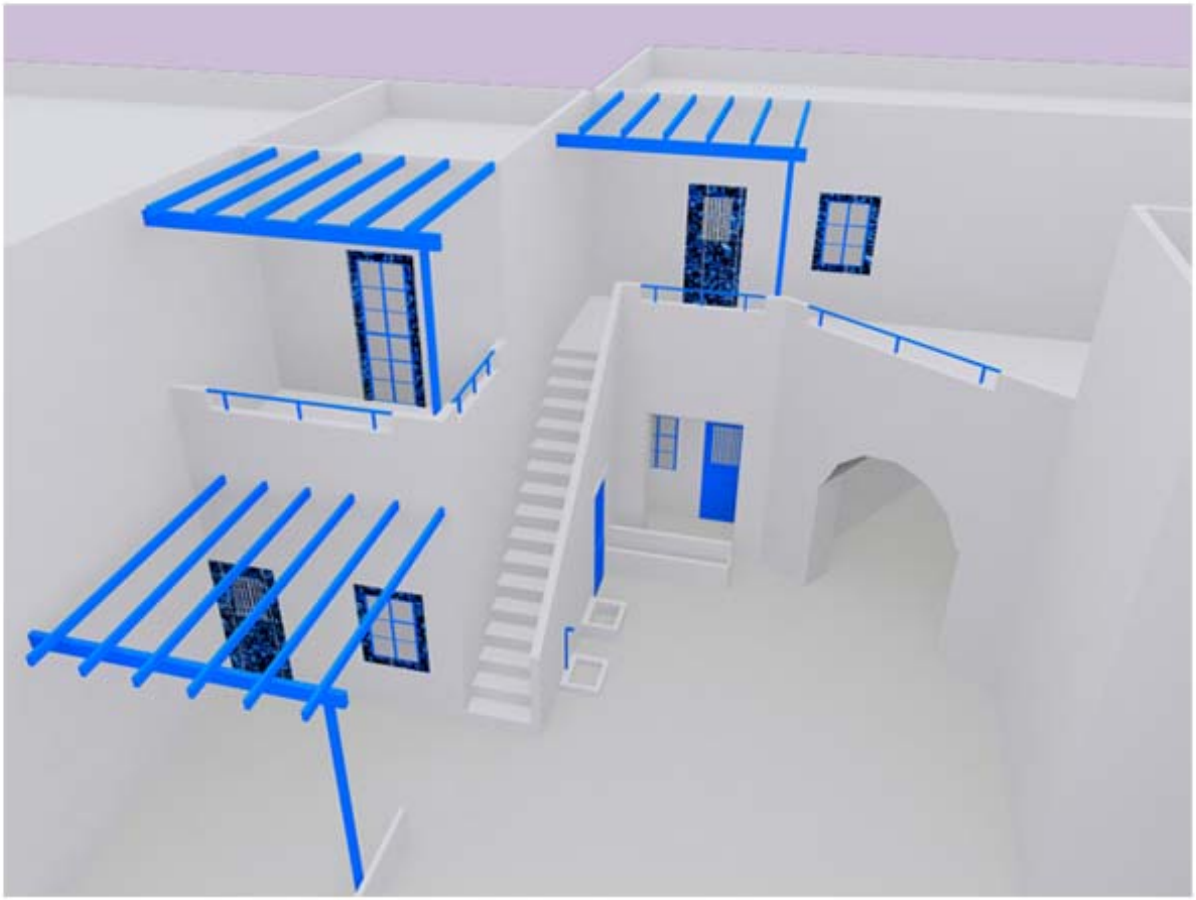
Traditional settlements at Cycladic islands



photovoltaic panels may be placed at the roof of the houses

series of photovoltaic panels could be integrated to the pergola

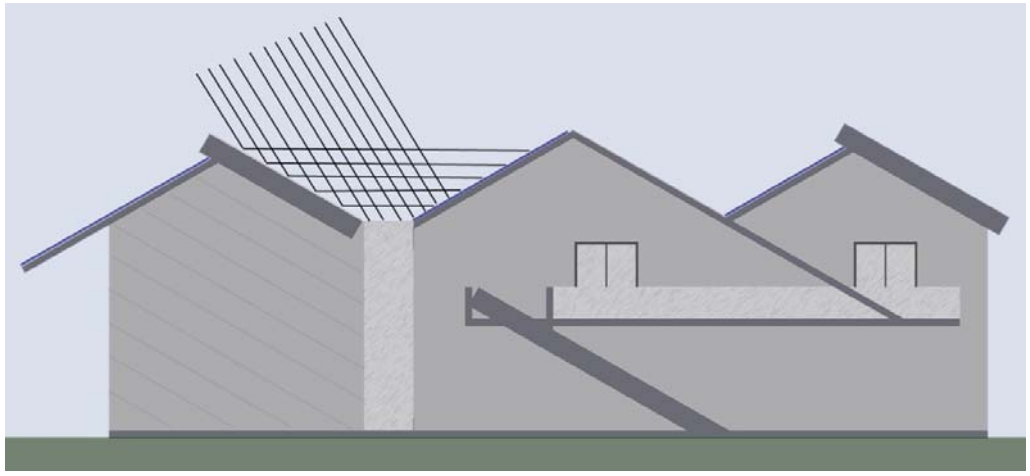


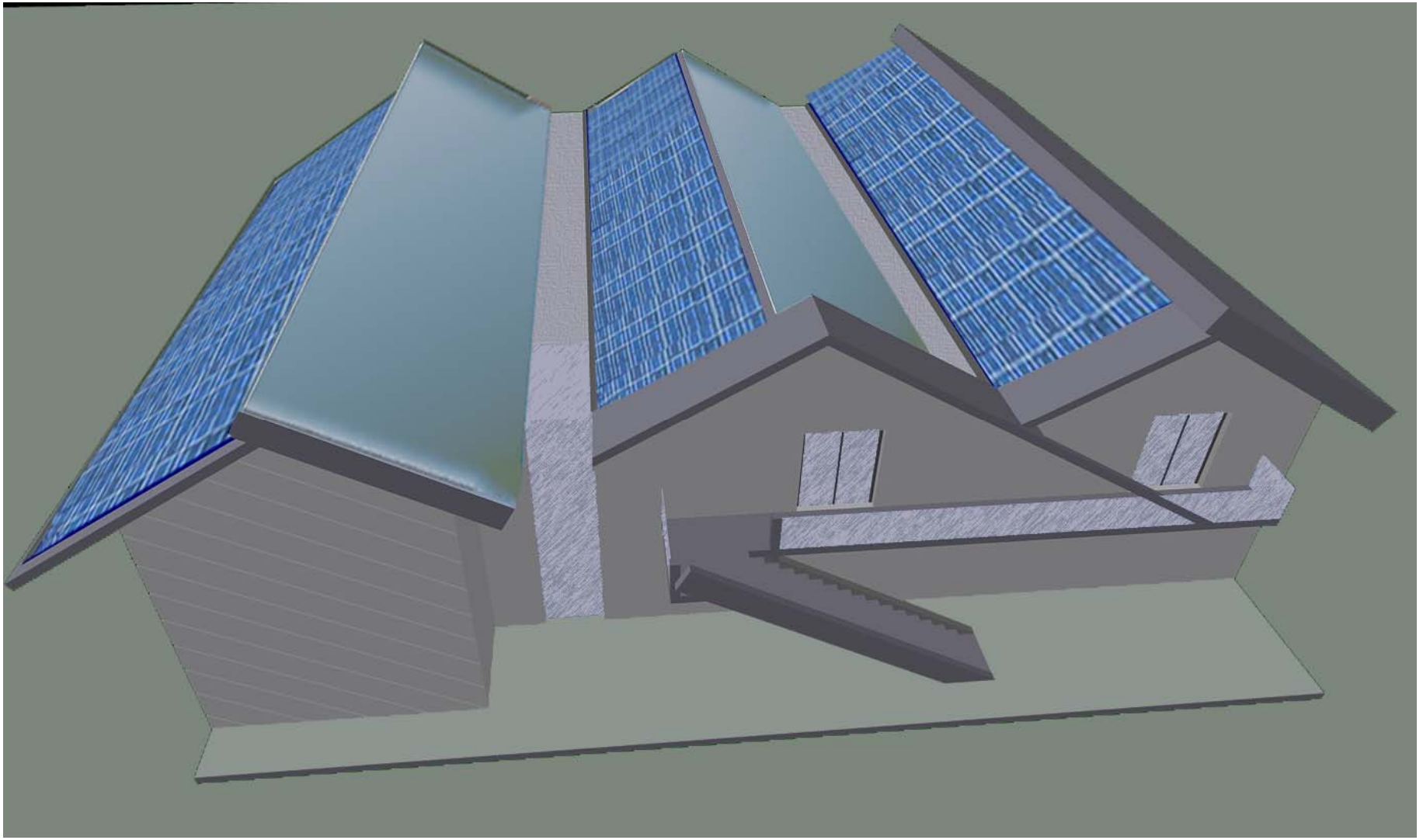


the photovoltaic integration to the doors and the windows of the house

Other aspects:

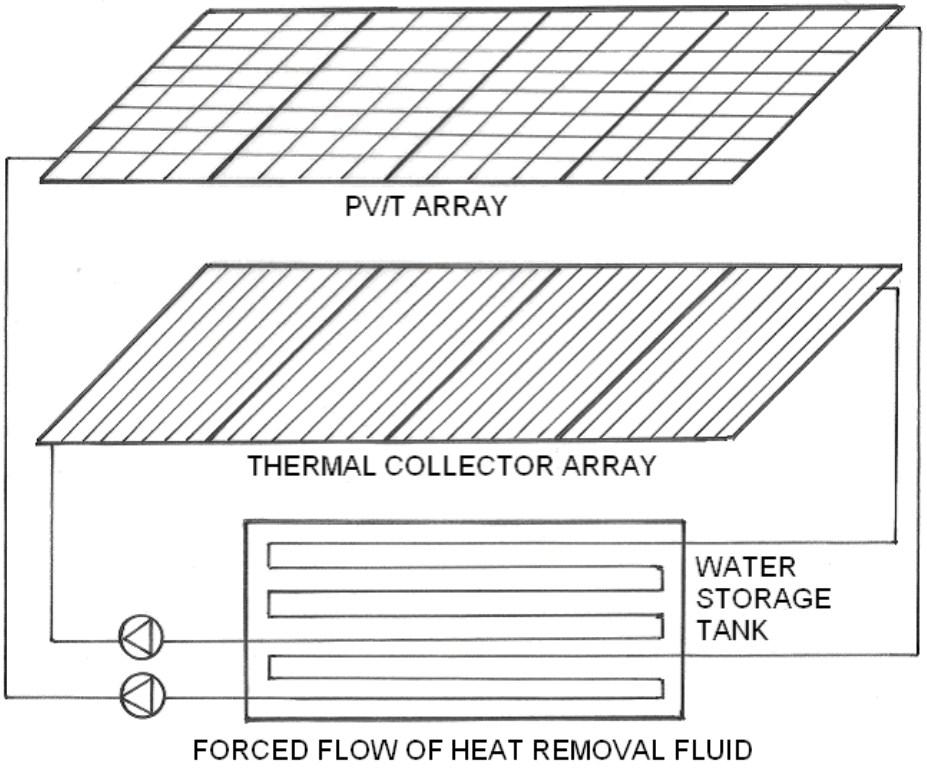
Moreover, in the majority of Mediterranean hotels the placement of flat type mirrors to increase solar radiation on the collectors and photovoltaics, has been proposed. These devices can increase considerably the energy output from spring to autumn and provide cheaper solar heating of liquids or electricity output and a more effective operation of solar air conditioning systems.





To improve performance of PV and PV/T systems, the use of diffuse reflectors increase the energy output.

In large installation of PV/T and thermal collectors on buildings, the PV/T collectors can operate effectively if connected with the lower and cooler part of the hot water storage tank.



The flat plate solar thermal collectors are connected with the higher part of the water storage tank, to operate at higher temperature level of the system.

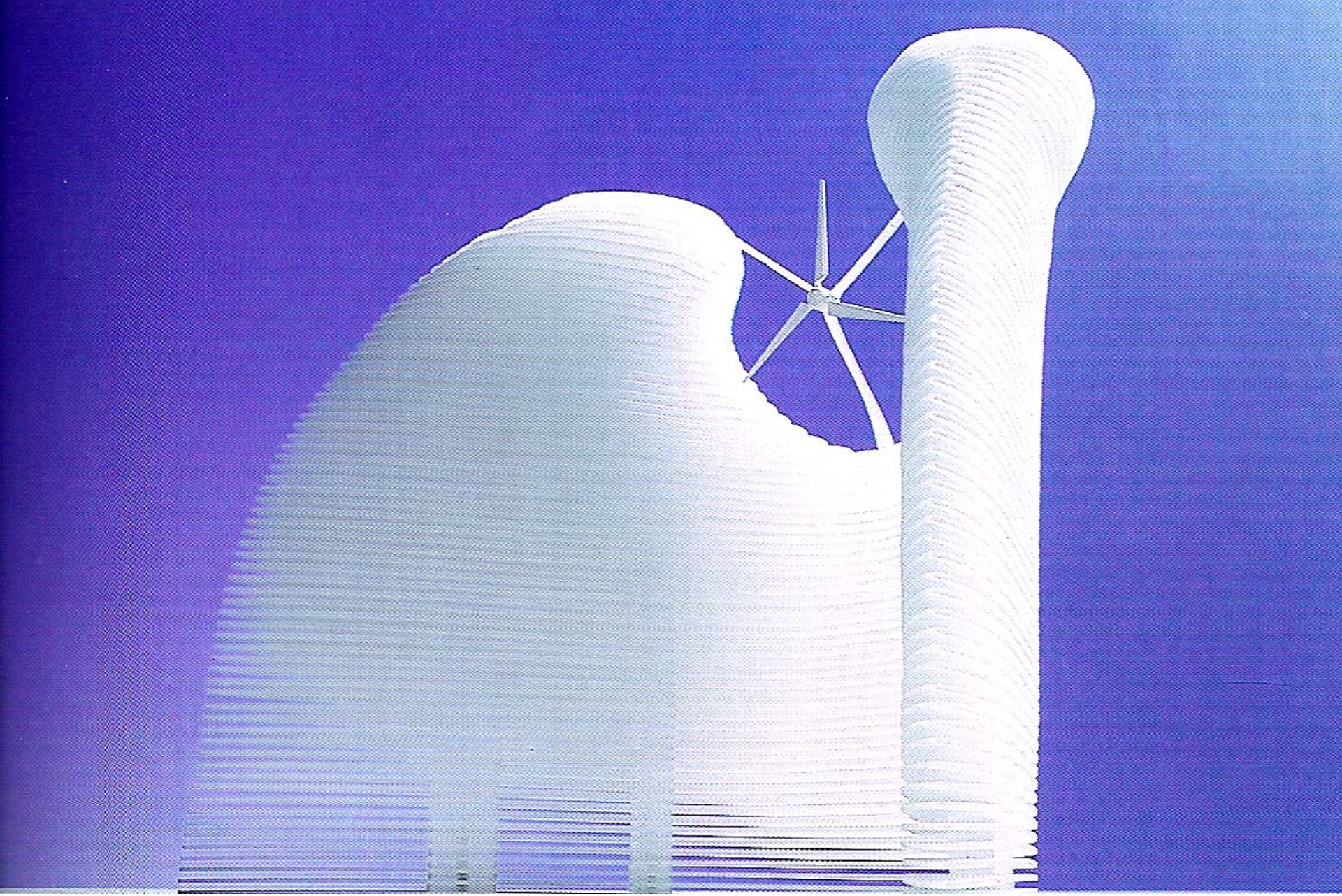
The use of small wind turbines in combination with solar energy systems on a building of Cycladic islands has also been suggested. This system is effective regarding the complimentary operation of sun and wind.

concluding

Solar energy systems are devices that can meet energy demand in tourist sector, considering also social and economic aspects.

Some improved systems have been investigated to increase the penetration of solar energy systems to the touristic sector.

These new cost effective devices can be harmonized to the local architecture in many Mediterranean places.



Thanks - Gracias - Ευχαριστώ