



Cinque Terre

Author: Giovanna Franco (University of Genova)

Integration of PV in UNESCO context

Solar

What is the solution?

This experience refers to a particularly sensitive site, placed under the protection of the state and interested international agencies: The National Park and UNESCO site of the Cinque Terre, Porto Venere and the archipelago of the islands Palmaria, Tino and Tinetto in the extreme east of Region Liguria. In such context, renovation projects designed for residence or agricultural facility are more and more frequently making provisions for the installation of solar energy devices for autonomous energy consumption. These new requests have opened up new questions as to how technologies can be integrated into fragile and sensitive landscapes. The installation of photovoltaic and thermal devices, even if of limited dimensions, entails undoubted modification to the characteristics of buildings and places, the impact of which must be carefully assessed. Such assessment should include details in the form of analysis of the connotative elements of the landscape: the created environment, the presence of panoramic points and routes, the significant visual rapport between site of hypothetical intervention and context and the perception of landscape identity as determined by the European Convention of Landscape. The work herein presented, which constitutes the summary of research aimed at defining criteria and strategies to improve the eco-efficiency of the rural settlements strewn throughout the UNESCO site, has been ordered by the Regional Secretary (a branch of the Ministry for Cultural Heritage and Related Activities and Tourism). It is one of the first case studies preceding the compiling of guidelines for improvement in the energy efficiency of the cultural heritage. Particular in-depth study is dedicated to 1) identification of criteria to better

integrate solar technologies for energy production in rural buildings, for end consumer utilization (owners and technicians), as well as 2) local government and safeguarding agencies called upon to evaluate acceptability.

Why does the solution work in terms of compatibility with conservation and technical aspects?

The application of PV solar panels in sensitive landscapes and contexts is a very controversial problem, especially in Italy, in the absence of specific legislation or shared criteria at national or local level. After some medium-sized installations in prestigious territories, favoured by government economic incentives, a lively debate has taken place, leading to consider this technology as one of the least appropriate for architectural and landscape protection. The option to install solar technologies in sensitive landscapes neither win unanimous approval in scientific circles. Alongside evaluations of a technical-economic nature and considerations relevant to effectiveness and efficiency (duration in time, maintenance and discarding costs all contributing factors), the installation of solar-supplied devices clearly contrasts with the “slippery” project to safeguard cultural and material values, juxtaposing different weights unlikely to find common ground. This study is focused on the identification of technical operations for improvement of energy performance in scattered and rural buildings and architectural and landscape compatibility criteria in the application of solar technologies for heating and electricity supply, which is in effect the most delicate and controversial issue. Compatibility criteria for architecture and landscape safeguarding, consider factors affecting the visibility and impacts on nature: a) localizing (focusing on territorial vocations, panoramas, building and morphological characteristics of the network but also on the real conditions of minor building preservation); b) quantitative (depending on whether it is a question of isolated systems or repeatable/groupings, considering, hence, the question of scale, with implications for the so-called cumulative factor); c) qualitative (relating to the morphology of the device, its colour, the possibility to mitigate on the visual impact).

Description of the context:

The UNESCO site Cinque Terre, Porto Venere and the islands Palmaria, Tino and Tinetto, in the extreme east of Region Liguria stands as one of the foremost examples of safeguarded landscapes. Given its particular morphology, its

relative difficulty of access and a protection policy dating back to even before the Second World War, the territory has managed, in part, to save itself from twentieth-century transformations pursuant to industrialized society. The crucial issue of the Unesco site is, in fact, its conscious management of the questionable balance between the preservation of its constituent features and renewal - often in conflict rather than in harmony with each other. Just think of the problems arising out of tourist over-crowding on the country paths and the difficult recovery of isolated rural settlements or very small groups of buildings which persist in those parts of the area distant from route networks - still devoid of connections for electricity, gas and water installations, not to mention liquid disposal. Historically this has not prevented the creation of temporary, agriculture-based facility forms satisfying comfort expectations and conditions - contrasting starkly with those of contemporary demands. However, on the UNESCO site still now many rural buildings are isolated from any energy supply system and their recovery, as an essential form of protection and reuse, must contemplate the possibility of using electricity. Especially in the most isolated contexts, the insertion of PV cells can be considered a valid intervention, provided it is made according to criteria of architectural and landscape compatibility and protection (objective of the work here presented).

Pros and cons of the solution:

Pros. This study, based on principles of maximum material preservation of traditional buildings, aspires to fruitful dialogue between technical innovation and architectural evaluation and conservation, counting on creativity of project invention, going beyond the threshold of pure camouflage. The material conservation, the minimization of impacts, the protection of the territory and landscape are in fact the indispensable objectives of any new intervention within the Park boundaries. Some important methodological criteria lie at the basis of this specific work: 1) to ensure the maximum material preservation it is preferable to intervene on traditional buildings if quite degraded or in state of collapse, where completely new roofing is required; 2) to minimize the alterations to a landscape it is desirable to intervene on shelters, arbours, service access volumes annexed to the rural building and leased by the country estate rather than on buildings which fully embody traditional rural characteristics; 3) in the grouped nuclei, it is preferable to intervene on buildings already compromised by blatant, modifying stages of intervention or

on recent/ twentieth-century buildings, in which materials and building techniques often employed already differed from traditional architectural regulations. Cons. The compatibility criteria consider eligible some technologies less efficient than others (for example colored PV modules or integrated shingles), with minor impacts on the landscape, even considering that the rural buildings have very limited consumption. These technology may also have major costs in relation to their efficacy.

Type of data available (level of information, simulation):

The installation of photovoltaic and thermal devices, even if of limited dimensions, entails undoubted modification to the characteristics of buildings and places, the impact of which must be carefully assessed. Such assessment should include details in the form of analysis of the connotative elements of the landscape: the created environment, the presence of panoramic points and routes, the significant visual rapport between site of hypothetical intervention and context and the perception of landscape identity as determined by the European Convention of Landscape. Identification of criticality connected to impacts on historical, landscape and environmental context, is substantially summed up below: - visible intrusion, given recipient chromatic characteristics, their shape, reflecting surface (generally contrasting with morphological surfaces, matter and already existing colours); - modification of soil structure, minute territorial soil formation, vegetation etc.; - replacing of existing materials and loss of matter characteristics in traditional architectural presence; - alteration of social perception of the places. The definition of some landscape and architectural compatibility criteria, in full respect of the safeguarding of the characteristics of traditional constructions is based on: 1. Intervention on roof: Quantity and quality factors 1.1 Maximum extension and surface rapport for panels 1.2 Shape 1.3 Materials and colour 1.4 Slope and anchoring/aligning 1.5 Tile and slab textures (elements of small dimensions) 2. Land solutions: related quantity and quality factors 2.1 Maximum height 2.2 Maximum width 2.3 Linear development and alignment

Additional information about the solution:

This work has been published in: Franco G., Solar powered energy and eco-efficiency in a UNESCO site. Criteria and recommendations for the National Park of Cinque Terre, Italy, in "Energy and Buildings" Volume 174, 1 September

Are there any related publications or pictures of the solution?



Unesco site of Cinque Terre, typical terraced landscape, the settlement so called “Fossola”



Unesco site of Cinque Terre, typical terraced landscape, the settlement so called “Monestiroli”



Monestiroli, photo-simulation of a compatible intervention. On the left, current state, on the right, the use of transparent PV cells



Fossola, simulation of use of different products (left: current state): solar copper, PV curved tiles coloured PV cells.



Fossola, simulation of use of different products: coloured PV cells, PV tiles, PV curved tiles, solar copper.



Simulation of a new coloured PV roof (almost integral) on slate or on tiles. A) the current state,



Simulation of a new coloured PV roof (almost integral) on slate or on tiles. b) the new roof inserted on slates



Simulation of a new coloured PV roof (almost integral) on slate or on tiles. c) the new roof inserted on tiles (FAI).



Palmaria Island, simulation of a new solar copper roof on a ruined building (on the left).



Schiara, study of the different impact of two thermal solar panels on a roof changing their position and alignment



Palmaria Island, study on possible texture of PV curved tiles on a ruined roof



Unesco terraced landscape, study of possible position and alignment of coloured PV panels on the terraces