Main partners

Project partners

Associated partners

ITALIANO

FRENCH

CU BÂTI

CULTURE DU BÂTI DE QUALITÉ : RECHERCHE, INNOVATION ET ENTREPRISE POUR LA DURABILITÉ

Technology transfer achievements in the CUBÂTI project

edited by
Maria Luisa Germanà, Manfredi Saeli e Andrea D'Amore

cubati.org

CU BÂTI
CULTURE DU BÂTI DE QUALITÉ : RECHERCHE, INNOVATION ET ENTREPRISE POUR LA DURABILITÉ

The Italy-Tunisia Cross-Border Cooperation (CBC) Programme 2014-2020, adopted by the European Commission, aims to contribute to the overall ENI objective of progressing towards "an area of shared prosperity and good neighbourliness between EU Member States and their neighbours". The objective of the programme is therefore to promote fair, equitable and sustainable economic, social and territorial development in order to foster cross-border integration and enhance the territories and resources of the two participating countries.
Project No. C-5-2.1-16
CUBÂTI Culture du bâti de qualité : Recherche, Innovation et Enterprise pour la Durabilité
Programme Priority 2.1 - Promotion and Support of Research and Innovation in Key Sectors
Programme Thematic Objective OT2 - Support for education, research, technological development and innovation
Programme Outcome R2.1.b - Strengthening links between the business community and researchers working on innovation in key sectors

This booklet has been produced with the financial assistance of the European Union within the framework of the Italy Tunisia Programme 2014-2020©.
Its content is the sole responsibility of the Beneficiary and can under no circumstances be considered as reflecting the position of the European Union or the position of the Programme's management structures.
The Editors disclaim all responsibility for the contents of the individual contributions.

Le Programme de Coopération Transfrontière (CT) Italie-Tunisie 2014-2020, adopté par la Commission Européenne, vise à contribuer à l'objectif global IEV de progrès vers « une zone de prospérité partagée et de bon voisinage entre les États membres de l'UE et leurs voisins ». Le but du Programme IEV de Coopération Transfrontalière Italie-Tunisie 2014-2020 est donc d'encourager un développement économique, social et territorial juste, équitable et durable, en vue de favoriser l'intégration transfrontalière et de valoriser les territoires et les atouts des deux Pays participants.

Projet N. C-5-2.1-16
CUBÂTI Culture du bâti de qualité : Recherche, Innovation et Enterprise pour la Durabilité
Objectif thématique du programme OT2 - Soutien à l'éducation, la recherche, le développement technologique et l'innovation
Priorité du Programme 2.1 - Promotion et appui à la recherche et à l'innovation dans les secteurs clés
Résultat du Programme R2.1.b - Liens renforcés entre le milieu des affaires et les chercheurs travaillant sur l'innovation dans les secteurs clés

Le présent brochure a été réalisé avec l'aide financière del'Union européenne dans le cadre del Programme *ItalieTunisie2014-2020*©.
Son contenu relève de la seule responsabilité du Bénéficiaire et ne peut en aucun cas être considéré comme reflétant la position de l'Union européenne ou la position des structures de gestion du Programme.
Les Editeurs déclinent toute responsabilité pour le contenu des contributions individuelles.

© Copyright 2023
New Digital Frontiers srl
Via Serradifalco, 78
90145 Palermo - Italia
www.newdigitalfrontiers.com

ISBN: 978-88-5509-595-2

Finished printing in
December 2023
at
Priulla Print srl
Palermo

CULTURE DU BÂTI DE QUALITÉ : RECHERCHE, INNOVATION ET ENTREPRISES POUR LA DURABILITÉ

INDEX

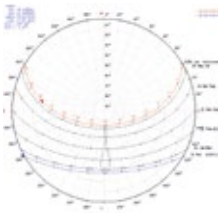
DEMONSTRATION MODELS ON ENVIRONMENTAL DESIGN APPLICATIONS

Maria Luisa GERMANÀ, Fabrizio PROVENZA, Federica ZAGARELLA

Within the framework of the CUBÂTI Project, on the initiative of the Scientific Responsible M. L. Germanà and the joint project of the partners Ecodomus Consorzio and the Department of Architecture of the University of Palermo, two demonstration models of environmental design applications were realised to be placed in the Technology Library of the same Department.

This is an attempt to clarify some basic tools for the application of the bioclimatic approach to architectural design. In spite of sixty years since Victor Olgyay's fundamental contribution 'Design with climate' and the current availability of software that allows for complex representations of environmental data, such as airflows and solar radiation, the realisation of tangible three-dimensional models has been considered a still didactically valid tool. On the other hand, it is known that low-impact materials (because they are local and oriented towards circular processes) are not sufficient to fully achieve a high-quality building culture (baukultur), if the bioclimatic approach, which is indispensable for the sensible reduction of energy requirements for the comfort of indoor and outdoor spaces, is not applied consistently.

The first model realised represents (on a plane of multi-layered birch wood with a diameter of 80 cm) a "polar sun diagram": the projection on the horizontal plane of the apparent solar path referring to the geographical coordinates of building 8 of the Department of Architecture of the University of Palermo (38°10551N; latitude; 13°3485067° longitude). This representation is fundamental for an optimal orientation of the buildings and for the design of passive systems (which do not use energy installations) as it helps to know the position of the sun during the seasons and times of day, understanding the interaction of the built environment with the sun's radiation. The diagram depicts the height of the sun with concentric circles and the azimuth (the distance from the N-S axis) with rays. The model represents the sun's trajectories in the summer and winter solstices and simulates the sun's irradiation with direct light with the help of a lamp. An additional device with an adjustable linear light source helps to simulate diffuse light.



> Above, solar polar diagram referring to the geographical coordinates of Building 8 of the Department of Architecture in Palermo, taken from www.sunearthtools.com and reworked by F. Provenza.Bottom, model of the solar diagram in the design and execution phase (render F. Provenza).

The second model is a 'solar chimney', a device that exploits the chimney effect (air flow triggered by a temperature and therefore pressure difference) mainly for 'passive ventilative cooling' of rooms (while at the same time constituting a form of direct solar gain, useful for passive heating in cold seasons).

Not to be confused with wind towers, traditional Persian elements brought up to date in some contemporary projects (which capture the prevailing cool winds and blow them inside), the Solar Fireplace, on the other hand, extracts warm air, activating an exchange and movement of air inside. The Solar Chimney works even in the absence of wind because it is activated by the temperature difference between the top of the chimney and the communicating room: this is why the model uses black colour for the sloping roof of the Solar Chimney, as the minimum albedo (index of incident solar radiation reflected in all directions) maximises heat absorption.

The model schematises the solar chamber with an L-section volume made of birch plywood (plan 33 x 33 cm and h 30 cm), with the two side faces made of transparent Plexiglas to allow observation of the interior. The sloping cover includes a heating element that allows the temperature to rise, triggering the release of air from inside the mo- ment. Operation is manifested by inserting a small amount of smoke material at the base of the model. A lamp projecting light onto the roof serves as a reminder that the mechanism is activated by solar radiation, without the aid of equipment.

The models of the solar diagram and the solar chimney were produced by the company 'Fablab Palermo APS', which was also entrusted with the executive design following a call for tenders.

> The 'Solar chimney' model. Design and executive representations
> (render F. Provenza).