Building Integrated Solar Thermal Systems (BISTS)

European COST Project TU1205

Introduction:

COST Action TU1205 focuses on research undertaken through national programmes in three scientific areas namely: Development of new innovative methods for building integration of Solar Thermal Systems (STS), modelling and simulation of new BISTS and their behaviour as a renewable energy system (RES) and investigation of new applications for innovative integration of STS in various application areas such as domestic, commercial and industrial buildings. The COST action has members from over 22 countries, chaired by Prof. Soteris Kalogirou, Cyprus.

The Action consortium consists of a multidisciplinary area involving engineers (mechanical, materials), physicists, architects, etc. developing a critical mass of European knowledge, expertise, resources, skills and R&D in the area of STS, which will support the creation of innovative ideas and concepts for BISTS. Three European regions are considered to fully explore the Pan-European nature of STS integration including, Southern Mediterranean, Central Continental and Northern Maritime Europe.

Three Working Groups (WG) have been formed to co-ordinate the research within each theme and a fourth one is dedicated to dissemination of activities.

- Working Group 1: Development and characterisation of new BISTS led by Werner Platzer
- Working Group 2: Modelling and Simulation of BISTS led by Daniel Chemisana
- Working Group 3: Investigation of new applications for innovative BISTS led by Aggelos Zacharopoulos
- Working Group 4: Dissemination led by Brian Norton/ David Kennedy

What is Integrated Solar Thermal System (STS)

A solar thermal system is considered to be integrated into a building if the building integrity or functionality depends on it. The benefits of building integration are the building envelope which can include metal, glass or ceramic, used in current BISTS designs, that can last for more than 50 years. Therefore, significant savings occur by replacing two separate systems (e.g. wall and collector) with one system that performs both functions. Systems can deliver different levels of thermal energy to match the varying needs of building occupants and they should be aesthetically pleasing or mimic the existing appearance of traditional roofing systems and apply colour collectors on façades. Therefore, BISTS must provide a combination of the following: Mechanical rigidity and structural integrity; weather impact protection from rain, snow, wind and hail; energy economy, such as useful thermal energy, but also shading and thermal insulation; life expectancy from the various materials involved (at least equal to the life of the building) and offer fire and noise protection in meeting their tasks.

Key milestones for COST Action

This Action will foster and accelerate long-term (technological) advancement in STS mainly through critical review, experimentation, simulation and demonstration of viable systems for full incorporation and integration into the traditional building envelope. It will lead to an increased range of potential STS options, greater choice and wider application contributing to the achievement of targets outlined by the EU. Main key milestones include:

- Definition of a set of key parameters for the BISTS characterization, taking into consideration the thermal performance, building functionality and aesthetic aspects.
- Development of standardised range of methodologies for evaluating BISTS.
- Modelling and simulation of STS (optical and thermal) for different building integration scenarios and for the developed solutions.
- Application of developed STS solutions for building integration including fabrication, characterisation and demonstration of prototypes to the extent that own research funding allows.
- Dissemination of Action activities (symposium, conference, website and various publications).
- Increased adoption of RES/STS in buildings.
- Aesthetic integration of STS, architectural rhythms and themes.
- Structural/material developments relating to the thermal resistance of the building element, integrity of the element to the weather impact and fire and noise protection.
- Social level impact – help reduce fuel poverty and increase energy security.

The Action will cover many forms of solar collecting methodologies with a particular focus on:

- thermosiphonic units,
- integrated collector storage units,
- forced circulation systems,
- evacuated tube collector systems and
- various low concentration compound parabolic units.

First WG meeting of TU1205, Dublin June 2013

Contact details:

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