European Cooperation in the field of Scientific and Technical Research

Building Integration of Solar Thermal Systems – TU1205 – BISTS

# Training School of COST Action TU1205
# Presentation of the Action

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# Introduction

- Third Training School of Action TU1205
- Warm welcome to all students and lecturers
- Many thanks to Prof. Dorota Chwieduk for hosting this Training School.
- Welcome of the Dean of the Faculty of Power and Aeronautical Engineering Prof. J. Fraczek
- I hope the school will be beneficial to all….
- Start with the introduction of the Action.

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# Objectives of Action

- **Main objective**: The creation of a platform from which a working environment is developed that generates methods to study the integration of STS in buildings.
- Development of new novel STS solutions suitable for building integration across three generic European regions.
- Definition of a set of key parameters for the BISTS characterization, taking into consideration the thermal performance, building functionality and aesthetic aspects.



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# Objectives – cont.

- 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.
- Dissemination of Action activities (symposium, conference, website and various publications).

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# Motivation

- The collective concentration of resources and the targeted focusing of scientists who are involved in the design, development and evaluation of solar thermal systems.
- The Action tried to accelerate long-term advancement in STS mainly through critical review, experimentation, simulation and demonstration of viable systems for full incorporation and integration into the traditional building envelope.

→The most important benefit of this Action is the increased adoption of RES/STS in buildings.

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# Types of systems to consider

- 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 & Fresnel units.



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# What we mean by Building Integration

- A solar thermal system is considered to be building integrated, if for a building component this is a prerequisite for the integrity of the building's functionality.
- If the building integrated STS is dismounted, dismounting includes or affects the adjacent building component which will have to be replaced partly or totally by a conventional/appropriate building component.
- This applies mostly to the case of structurally bonded modules but applies as well to other cases, like in the case of replacing with BISTS one of the walls in a double wall façade.



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# Benefits of integration

- **Building envelope** – metal, glass or ceramic used in current BISTS roofing designs can last for more than 50 years.
- **Thermal and optical performances** – different systems can deliver different levels of thermal energy to match the varying needs of building occupants.
- **Costs** – Significant savings occur by replacing two separate systems (e.g. wall and collector) with one system that performs both functions.
- **Aesthetics** –mimic the existing appearance of traditional roofing systems and apply **colour collectors** on façades.

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- Therefore BISTS must provide a combination of the following:

1. Mechanical rigidity and structural integrity.
2. Weather impact protection from rain, snow, wind and hail.
3. Energy economy, such as useful thermal energy, but also shading and thermal insulation.
4. Life expectancy from the various materials involved (at least equal to the life of the building)
5. Fire protection, Noise protection.
6. Environmental benefit/influence (LCA, embodied energy, emissions).

→ Generally a multidisciplinary area involving engineers (mechanical, materials), physicists, architects, etc.



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# Scientific Program

- This COST Action focuses on the coordination of current research undertaken through national programmes in three scientific areas:

(1) Development of new innovative methods for building integration of STS;

(2) Modelling and simulation of new BISTS and their behaviour as a renewable energy system (RES);

(3) Investigation of new applications for innovative integration of STS in various application areas like domestic, commercial and industrial buildings.

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

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# Status of the Action

- Status of Action, including participating countries:
  - 22 COST countries participating (next slide)
  - 34 MC members
- Non-COST countries:
  - Two non-COST countries participating
  - USA (James Russell-Appalachian State University) and
  - Canada (Andreas Athienites-Concordia University).



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# What is next….

- Introduction by Prof. Dorota Chwieduk
- Following presentations: Various subjects starting from the basics and extending into BISTS
  - Systems (case studies)
  - Models
  - Applications
- Tuesday and Wednesday afternoon – group work.
  - Solar planning considerations for BISTS (more…)

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# More for the Group work….

- Download : www.sketchup.com/download
- Remember to brink a laptop on both days
- Need a feedback how many of you are architecture students…..



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# Practical issues

- Please sign the attendance list (proof of presence)
- Reimbursement – once we return back
- COST profile – add account details (otherwise we cannot pay you).

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# Introductions

- COST is about Networking, so we will start by introducing the students.
- Say:
  - Name
  - Institution
  - Research Interests

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