CETIEB

Cost-Effective Tools for Better Indoor Environment in Retrofitted Energy Efficient Buildings

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In future:
- Increase of energy efficient buildings
- If retrofitted, change of indoor environment
  - Tight building envelope and isolation
  - Low air exchange or HVAC systems
  - Use of new materials with potential of emissions
  - “Sick building syndrome”

Influence on health and comfort:
- Need for assessment of indoor environments
- Need for improvement
- Need for cost-effectiveness
CETIEB aims

- Development of tools to assess and improve indoor environments
  - Monitoring with advanced sensors
    - VOC, thermal surface, light spectra, CO₂, climate
  - Active control
    - Intelligent control platforms and methodologies for HVAC, lighting, and plant based air quality control
  - Passive methods based on advanced materials
    - Photo catalytic plasters, mortars, and paints

- Cost-effectiveness
  - Wireless monitoring based on low cost solutions (MEMS)
  - Adapted solutions for different markets based on the same system
    - End-users, experts, facility managers
  - Effective use of active materials

- Focus: Retrofitted energy efficient buildings

ECTP Conference 2011, 4th – 5th October, Warsaw
### CETIEB Consortium

#### RTD centres

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<tr>
<th>No.</th>
<th>Name</th>
<th>Acronym</th>
<th>Country</th>
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<tr>
<td>1</td>
<td>University of Stuttgart – 3 institutes: MPA (coordinating), IGE and IFK</td>
<td>USTUTT</td>
<td>Germany</td>
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<td>2</td>
<td>DW EcoCo</td>
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<td>UNIVPM</td>
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#### SMEs

- **Grant per type of organisation**
  - Large companies: 13.14%
  - RTDs: 42.22%
  - SMEs: 44.65%
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VOC spectrometric, selective
SME: InfraTec GmbH

“Spectral tunable infrared detector with micromechanical Fabry-Perot filter”

AMA SENSOR Innovation Award 2008

SPIE 2009 Prism Award for Photonics Innovation
Substrate: Si/SiO$_2$(1µm) Wafer

- Electrodes
- Heater
- Temperature sensor Ta(25 nm)/Pt(200 nm)
- Sensitive areas
- Metal oxides

Low Cost VOC Sensor Array, semi selective
SME: TTI GmbH – TGU Smartmote

- Multi-Sensor Board
- Wireless Communication Module (Backside of Processor Board)
- Acceleration Sensor Board
- Processor Board
- Power Supply
- Smartserver™
- Smartgate™
- Smartswitch™
- Smartmote™
- Multi-Sensor Board
- Wireless Sensor

- 200 – 300 €
- enhanced
- user friendly
- low cost

Modular wireless sensor platform

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UNIVPM: Low-cost Infrared vision system

Real-time Infra-red image processing
CETIEB technological highlights 5

Active systems to improve indoor environment

**Optimal operational methodologies and control algorithms** for Lighting, HVAC Systems, and Plant Based air quality control

**Intelligent control platforms** able to implement operation methods and control algorithms

Consortzio TRE

SME: DW EcoCo

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S & B Industrial Minerals: Photo catalytic materials

**Principle of photo catalytic reaction**

Similar effect with lower amount of active material

**Aim: Cost reduction of 50 %**
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Validation and demonstration

FCCCO: Demonstration site
Palacio de Comunicaciones
Madrid

CEA – INES:
Advanced validation
on passive test houses

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Advisory Board

End-users and Stakeholders:

- Town administration of Madrid
- Vereinigte Gmünder Wohnungsbaugesellschaft mbH
- Patrick Durkan, managing director of Ecofix company – Ireland, a leading retrofitting company
- Vermögen und Bau, office for state buildings in Baden-Württemberg

Experts:

- Alan Darlington from Nedlaw, Canada: developed the concept of living walls
- Prof. Whang, National Taiwan University of Science: expert for intelligent lighting
- Several standardisation and Expert committees

Exchange with other EU-projects

- clear-up “clean and resource efficient buildings for real life”
- NANOAIR
- Healthy Air
Acknowledgements:

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- Starting date: 1st October 2011
- Contact: Juergen.Frick@mpa.uni-stuttgart.de