R&D ROADMAP FOR FACADE-INTEGRATED SOLAR THERMAL SYSTEMS



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AGENDA

Methodology

Vision

- Results
- Most important future R&D

Methodology

- Analyse state of the art
- Define vision based on previous studies on potential for ST
- Define design space containing all systems
- Expand the design space
- Define evaluation space
- Identify R&D topics for individual parameters
- Prioritise topics according to vision



Market and potential

- ESTIF: Market 2013 [1]
- BSW: Fahrplan Solarwärme [2]
- ESTIF: Potential of ST in Europe [3]
- RHC documents: Strategic research agenda, implementation roadmap, etc. [4]
- REMod studies from A. Palzer, HM. Henning [5]
- Today usually roof mounted conventional collectors
- Few BIST
- ST is important for renewable energy systems
- Large areas of the building envelope should be activated
- PV better on roof, ST better on facade



Vision

UP TO	UP TO	UP TO
2020	2030	2050
 (partly) prefabricated solar thermal façades available as mass produced products, also in prefabricated houses New business models Cost 50 % of today BIST first established in residential sector (SAH with 50% solar) First commercial solar facades for hospitals, hotels, etc. Special collectors demonstrated for niche markets More know how among architects and installers, less complexity 	 BIST is one standard solution for refurbishment of residential and non-residential buildings with high heat demand SAH with high solar fraction has become the standard for new buildings Mass production for special collector facades (semi-transparent, switchable) First heat networks with BIST demonstrated 	 SAH with high solar fractions as standard for building stock 20 - 34 % of all buildings heat demand covered by (BI)ST BIST and heat networks integrated into national or international energy system Solar engineering as standard tool for urban planners







Physics









Evaluation space

- Functionality
- Aesthetics
- Ecological aspects
- Economics
- Availability/Feasibility



Results: Choice of technology





Results: Glazing / cover





Results: Absorber





Results: Hydraulic interconnection of collectors





Results: Hydraulic interconnection of collectors





Results: Building process





Results: Education and training





Conclusions: Most important future R&D

- BIST education, dissemination, e.g. with www.building-integrated-solar-thermal.com
- Assisting the stakeholders in the building process by recommendations, guidelines and software (e.g. for dimensioning and first calculations)
- The valley of death
- Innovative products, improved (individual) aesthetics, mass produced, new materials
- Special solutions for future multifunctional facades



References

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[2] BSW – Bundesverband Solarwirtschaft e.V., Fahrplan Solarwärme: Strategie und Maßnahmen der Solarwärme-Branche für ein beschleunigtes Marktwachstum bis 2030, available at http://www.solarwirtschaft.de/fahrplan.html (accessed on February 21, 2015).

 [3] ESTIF - Potential of Solar Thermal in Europe, available at http://www.estif.org/policies/solar_thermal_potential_study_downloads/ (accessed on February 21, 2015).

[4] RHC-documents, available at http://www.rhc-platform.org/publications/ (accessed on February 22, 2015).

[5] H.-M. Henning, A. Palzer, A comprehensive model for the German electricity and heat sector in a future energy system with a dominant contribution from renewable energy technologies – part I: methodology, Renew. Sust. Energ. Rev. 30 (2014) 1003–1018.

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Thank you for your attention!



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