IEA DHC Annex TS3: Hybrid Energy Networks -

District Heating and Cooling Networks in an Integrated Energy System Context

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AIT AUSTRIAN INSTITUTE OF TECHNOLOGY
TOMORROW TODAY

IEA DHC|CHP

INTERNATIONAL ENERGY AGENCY IMPLEMENTING AGREEMENT ON
District Heating and Cooling including Combined Heat and Power

iea Energy Technology Network

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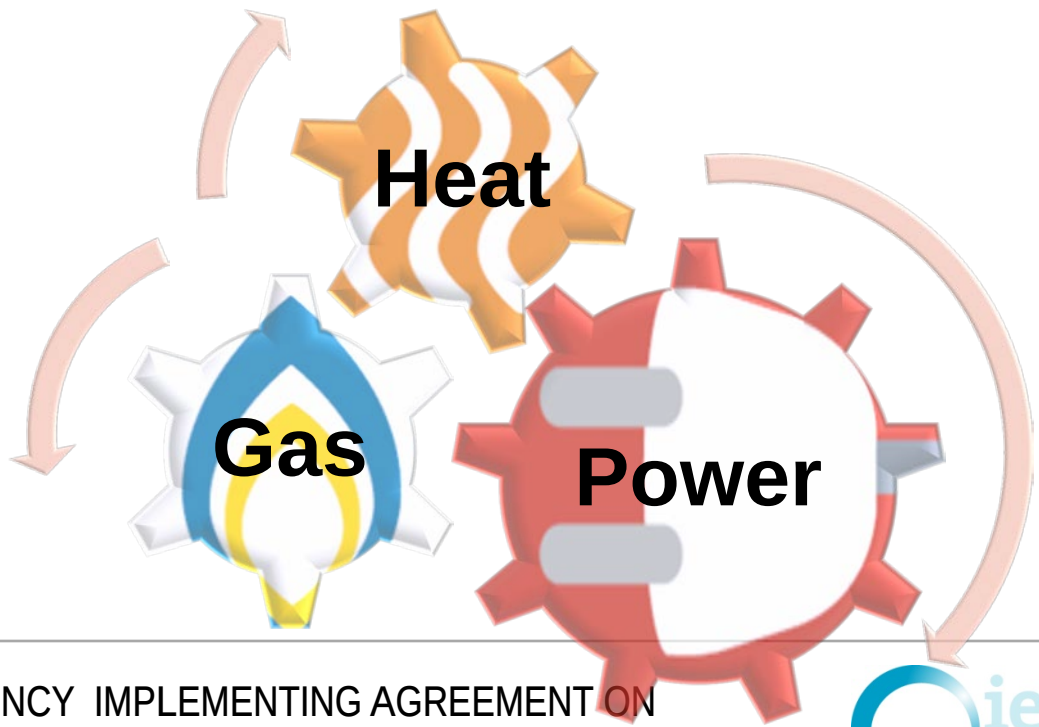
Aim of the IEA DHC Annex TS3

- **To promote the opportunities and to overcome the challenges for DHC networks in an integrated energy system context**
- The chances of a Hybrid Energy Network (HEN) are mainly based on the **synergies** when merging the different energy infrastructures causing measures to be realized effecting all energy domains
- Complement elements
  - Coupling points
  - Storage technologies
  - Time constants
  - System scaling
  - and others



Time schedule

2017		2018		2019		2020		2021		2022
	x	x	(x)	x	x	x	x	x	x	x
Definition		Preparation		Working Phase						Rep.

May 2017: approval to start the definition phase (ExCo Meeting Hamburg)
June 2017: start **definition** phase (incl. contact to IEA ISGAN)
Sep. 2017: **definition** phase WS in Vienna
Nov. 2017: approval to start preparation phase (ExCo meeting in Vienna)
Jan. 2018: start **preparation** phase (1/2 – 1 year)
Jan. 2019: start **working** phase
Jan. 2022: start **reporting** phase
June 2022: end of the Annex

Definition phase workshop, 21.09.2017 bmvit (Vienna/Austria)

In the WS: 28 participants from Austria, Canada, Denmark, Germany, Sweden, United Kingdom, France, Belgium, Switzerland and Italy

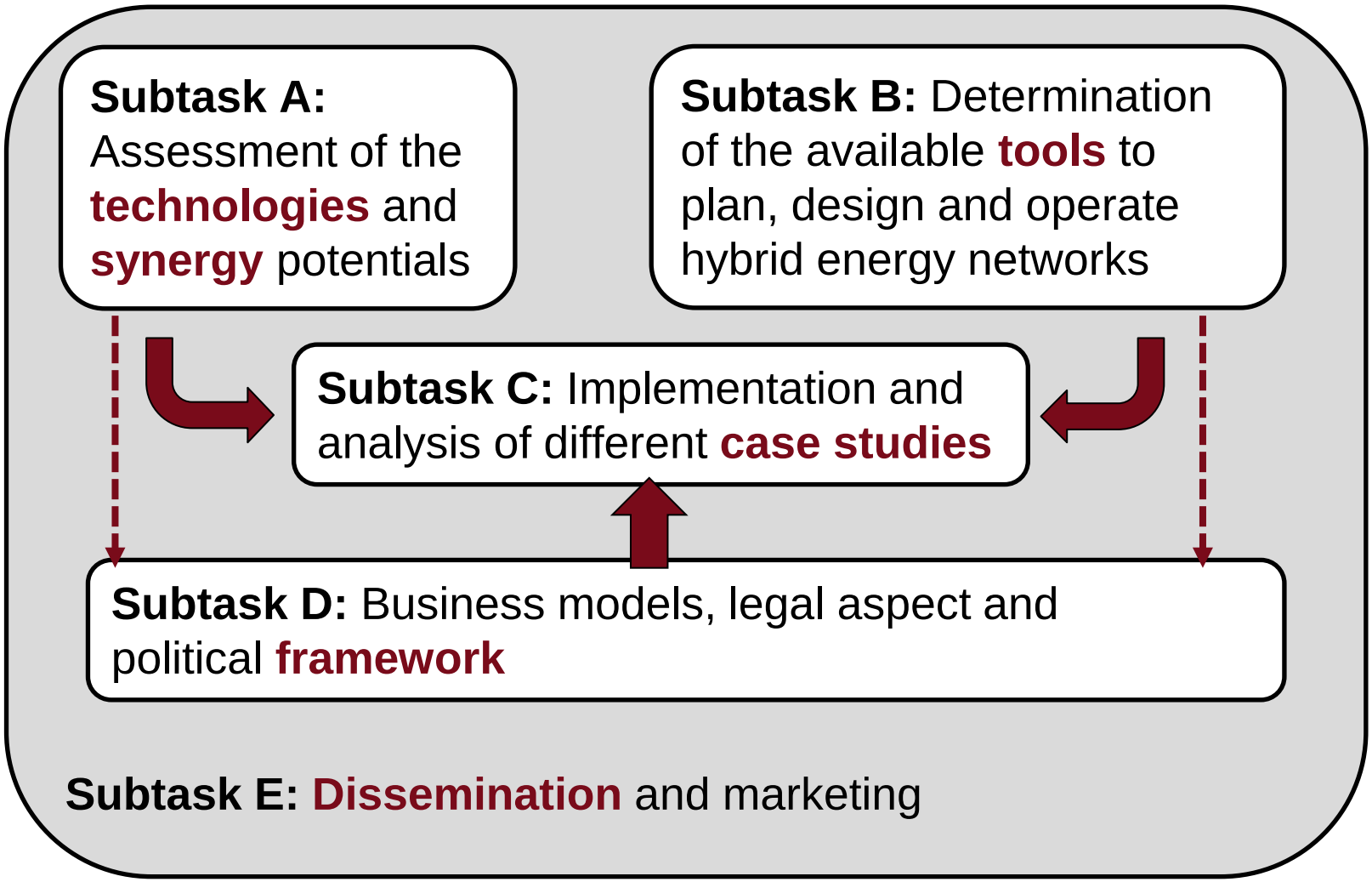
The DHC Annex TS3 participants

- **Austria**
  - AEE Intec
  - AIT
  - ATP sustain
  - Bioenergy 2020+
  - *Energieinstitut Linz**
  - Forschung Burgenland
  - FH Oberösterreich
  - TU Wien
  - *Wärmepumpe Austria**
  - Wiener Netze
- **Canada**
  - *Natural Resources Canada**
- **Denmark**
  - Aalborg University
  - Danfoss
  - DTU
- **Finland**
  - *VTT **
- **Korea**
  - ?
- **Germany**
  - *EIFER**
  - Fraunhofer IWES
- **Norway**
  - *SINTEF**
- **Sweden**
  - RISE
- **United Kingdom**
  - BRE
  - LoLo
  - NTU
  - OrchardPartners
  - University of Manchester
  - *University of Edinburgh**
- **United States of America**
  - ?

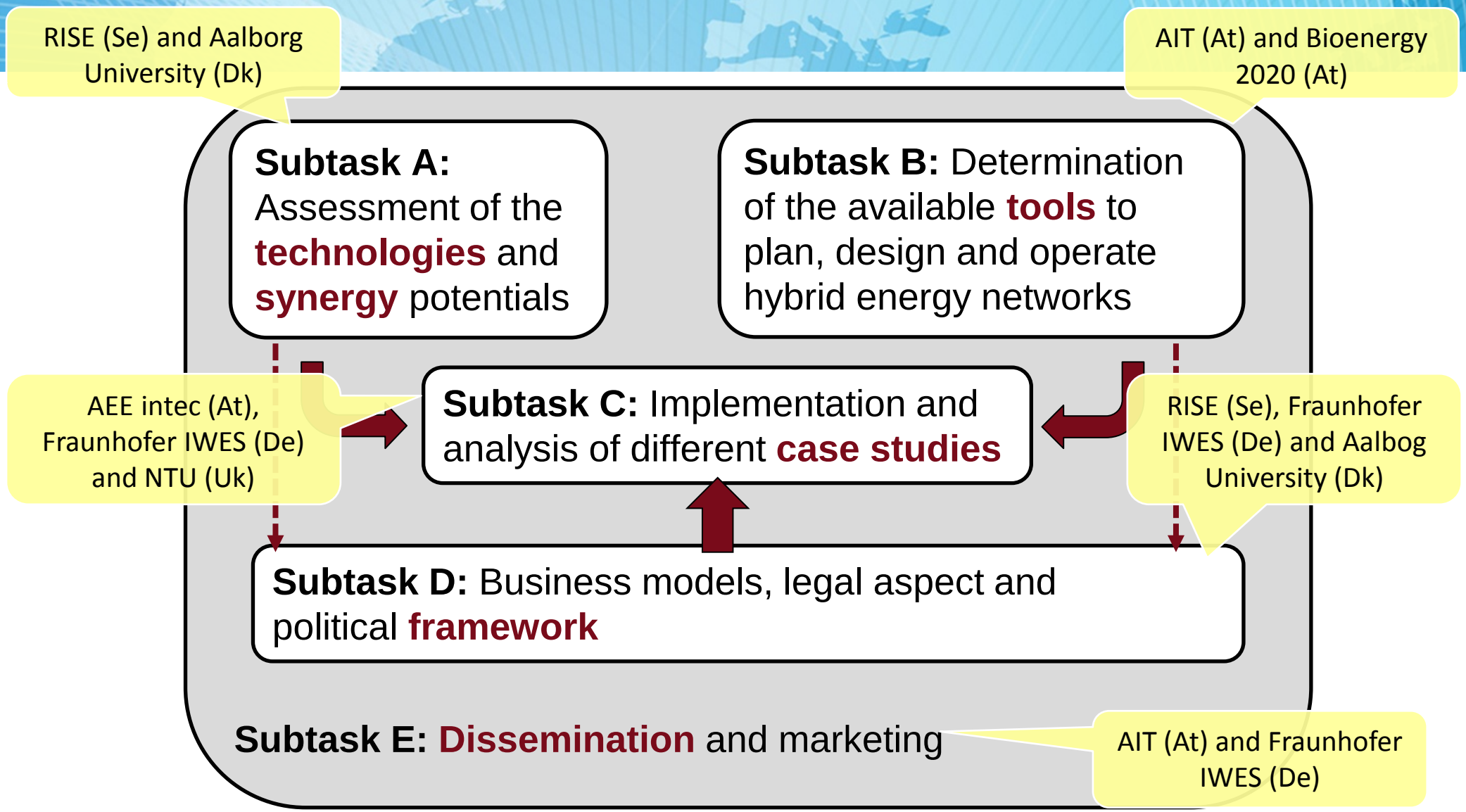
- **Membership under discussion**
  - **France**
    - CEA
  - **Belgium**
    - DHC+TP/ Euroheat&Power
    - *VITO**
  - **China**
    - ?
- **Non-members**
  - CREM (Switzerland)
  - Unipi (Italy)
  - *Glen Dimplex (Irland)**

** Interested to be a partner, but not participating in the definition WS*

Proposed Annex TS3 structure



Proposed Annex TS3 - subtask leaders



cooperation with other initiatives

- **International Smart Grid Action Network (IEA ISGAN)**
  - Contact to Susanne Ackeby (OA of Annex 6 “Power T&D Systems”) → The ExCo endorsed the collaboration. However, the task and interaction need to be clarified in detail.

- **Energy in Buildings and Communities (IEA EBC)**
  - the ExCo agreed on a cooperation → Update and discussion of the cooperation after the definition WS and DHC ExCo decision.
  - One possibility: via a new EBC Annex initiative from Canada.

- Further on, cooperation to other IEA TCPs such as **DSM, Hydrogen** etc. will be investigated.

- **EERA Joint Programme in „Energy Systems Integration“**
  - Contact to Laurens de Vries (Coordinator), further discussions are ongoing

Next steps

- Start of the 6 to 12-month preparation phase (beginning 2018)
  - Further discussion of the cooperation details to IEA ISGAN (and others)
  - Members can secure funding, e.g. by national programs/projects
  - Detailed development of annex text and work programme (first draft in April 2018)

- preparation WS in 25./26.04.2018 in Gothenburg (RISE)
  - Final draft of the annex text and work programme to be delivered to the DHC ExCo

- DHC ExCo Meeting (23./24.05.2018 in Oslo)
  - Decision on “go/no-go” for starting the working phase

Thank you for your attention!

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IEA DHC Annex TS3:

District Heating and Cooling Networks in an Integrated Energy System Context

www.iea-dhc.org

Subtask A – Technologies and synergy potentials

- **Author of ST description**: Jay Hennessy (RISE) and Andrei David (Aalborg University)
- **General**
  - Aim: assessment of coupling points, storage and other relevant technologies, applications areas and advantages of hybrid energy networks.
  - Key goal: identify key technologies at this point in time for different country-specific scenarios; set priorities for the whole Annex.
  - Output: a database/wiki of candidate application areas and a guidebook with an over-view/matrix of key technologies in different countries. These outputs could be published for example in a report or a wiki.

Subtask A – Technologies and synergy potentials

- Structure
  - Task A.1 List available/applicable technologies (AAU, RISE)
  - Task A.2 Identify synergies based on example scenarios (AAU)
  - Task A.3 Identify country-based constraints (RISE, AAU)
  - Task A.4 Define a new energy system (AAU, RISE)
- Deliverables
  - DA.1 Report/Wiki: Technology data for renewable district heating and cooling systems
  - DB.2 Report: Guidebook for integrated district heating and cooling systems

Subtask B – Methods and Tools

- **Author of ST description**: Edmund Widl (AIT)
- General
  - collecting, categorizing and demonstrating recommended methods for the techno-economical assessment of integrated energy systems for planning, designing and operating hybrid energy networks
  - Explore, systematically analyzed and categorized existing approaches,
  - deriving a catalogue of recommended methods and concrete recommendations as well as step-by-step tutorials

Subtask B – Methods and Tools

- Structure
  - Task B.1 Review of existing methods and tools
  - Task B.2 Categorization of approaches
  - Task B.3 Demonstration using test cases
- Deliverables
  - DB.1 Collection of existing methods and tools (for internal use)
  - DB.2 Catalogue of recommended practices (public)
  - DB.3 Tutorials for selected test cases (public)

Subtask C – Case Studies

- **Author of ST description**: Ingo Leusbrock (AEE Intec)
- General
  - Collecting practical examples and lighthouse projects and evaluating lessons learnt
  - analysis, evaluation and dissemination → implementation and replication of successful case studies
  - user acceptance, implemented business models, security and privacy concerns and necessary ICT solutions
  - not only existing case studies, but also simulation and desk studies

Subtask C – Case Studies

- Structure
  - Task C.1 Best practice examples for realized integrated DHC systems
  - Task C.2 Examples for simulation / desk studies / pre-market solutions for integrated DHC systems
  - Task C.3 Criteria for evaluation of best practice examples and simulation / desk studies
  - Task C.4 guidance for transforming existing DHC systems / developing new integrated DHC systems
- Deliverables
  - DC.1 Overview and online documentation of Best Practice Examples
  - DC.2 Overview and online documentation of examples for simulation / desk studies
  - DC.3 Report on Best Practice Examples including recommendations and Do and Dont's (M36)
  - DC.4 Report on examples for simulation / desk studies / pre-market solutions
  - DC.5 list of criteria and indicators on technical, economic, organizational and legislative aspects
  - DC.6 Extended list of criteria and indicators
  - DC.7 Pratical guidance for archetypal situations and boundary conditions (M42)

Subtask D – Business models and regulatory framework

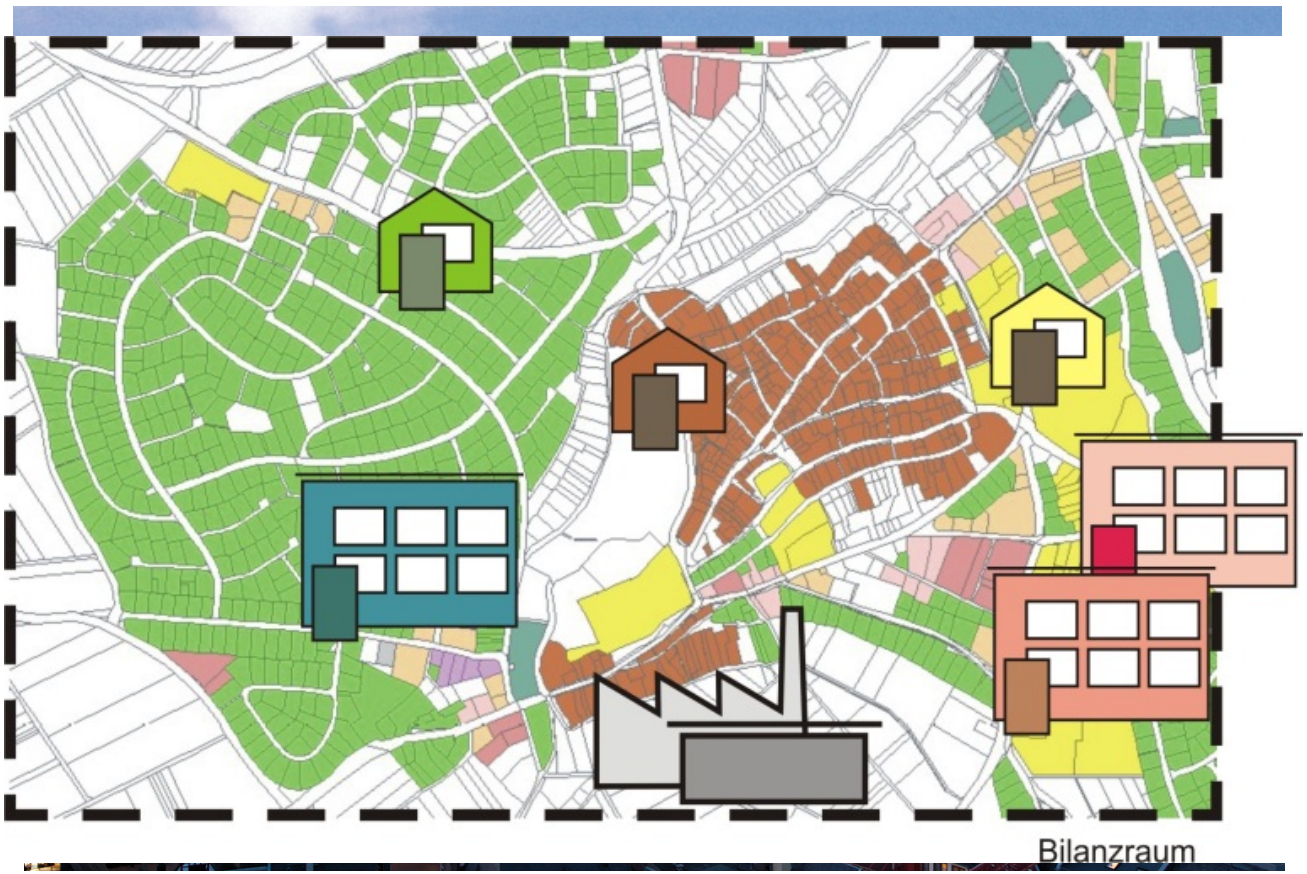
- **Author of ST description**: Tanja Kneiske (IWES)
- General
  - Business models need to show economically advantages in comparison with pure electrical or pure thermal solutions
  - Business cases include
    - local consumption of renewable energy,
    - reliability,
    - cost reduction,
    - participation in energy markets,
    - provision of energy services and flexibility
  - regulatory framework: e.g. unbundling

Subtask D – Business models and regulatory framework

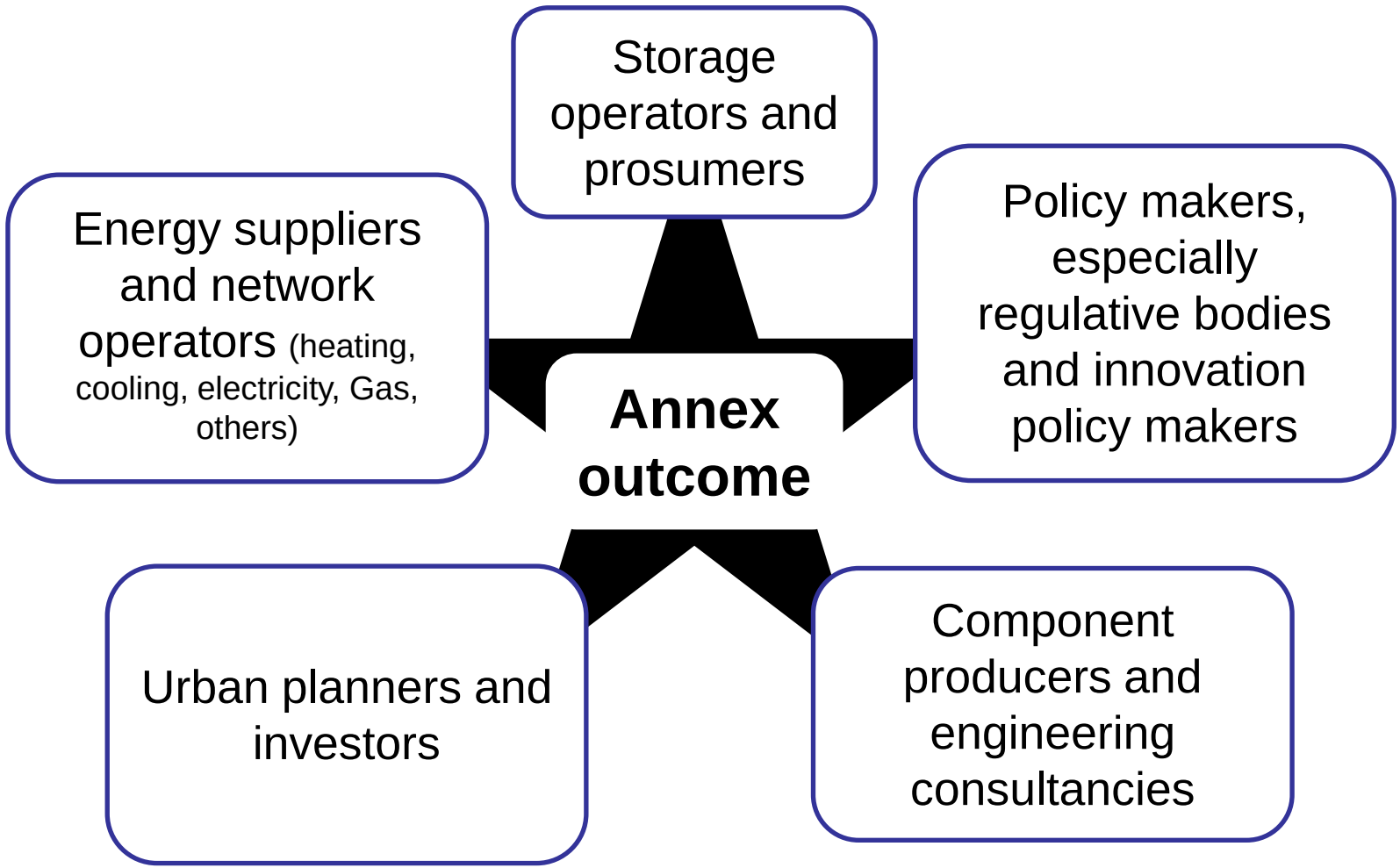
- Structure
  - Task D.1 Business models (BM)
  - Task D.2 Market design
  - Task D.3 Local regulations
  - Task D.4 Data regulations
- Deliverables
  - DD.1 Glossary with international regulations, entities and concept
  - DD.2 Description of status quo and new ideas (based on past and ongoing projects)
  - DD.3 Recommendations (Document 1-2 pages as a result of a workshop)

Challenges in the energy sector

- Buildings/cities are main users of energy
- New buildings shall be developed as small power stations!
- Retrofit rates need to be increased!
- Developments are focusing more and more on a community level.



Target Groups



Goals of the proposed Annex TS3

- create awareness for the advantages
- highlight technological solutions and the synergy potentials
- State-of-the art overview (projects, demonstrators, cast studies)
- assess current methodologies and tools
- evaluate non-technical barriers and enablers