Towards Net Zero Energy Resilient Public Communities

IEA ECB Annex 73

Working Phase Experts Meeting

Dr. Alexander Zhivov
US Army Engineer Research and Development Center, Champaign, IL USA

Rüdiger Lohse
KEA- Climate protection and energy agency of Baden- Württemberg GmbH, Germany

October 1-2, 2018
Graz, Austria

Scope

Decision-making process and a computer based modeling tools for achieving net zero energy resilient publicly owned communities (military garrisons, universities, public housing, etc.)

Objectives

- Develop Energy Targets: definitions, matrix, monetary values
- Summarize, develop and catalog representative building models by building use type, applicable to national public communities/military garrisons building stocks
- Develop a Data-Base of Power and Thermal Energy Generation, Distribution and Storage Scenarios
- Develop Guidance for Net Zero Energy Master Planning
- Integrate the targets, constraints, and monetized values into the NZP Tool such that it can effectively model and identify optimum energy-support infrastructures that ensure sustainment of mission critical functions for military installations
- Collect and describe business and financial aspects and legal requirements and constraints for NZE master planning for public communities in participating countries
- Provide dissemination and training in participating countries and the end users, mainly decision makers, community planners and energy managers and other market partners in the proceedings and work of the Annex subtasks.

Receptors

- Decision makers, planners, building owners, architects, engineers, energy managers and mission operators of public-owned and operated communities e.g.:
  - National Armed Forces through their Infrastructure Components, military garrisons,
  - University and high school campuses,
  - Hospitals and public housing which are responsible for all costs related to new construction, renovation and O&M.
- Industry, energy service companies, architects, engineers and financiers supporting public communities

Annex Structure

Subtask A	Collect and Evaluate Input Data for Energy Master Plan (EMP)
Subtask B	Collect Existing Case Studies and implement Pilot Studies
Subtask C	Describe existing and innovative technologies, architecture and calculation tools for performance analysis (including resilience) of central energy systems (power and thermal)
Subtask D	Develop Guidance for Net Zero Energy Master Planning
Subtask E	Develop a functional modeling tool to facilitate the Net Zero Energy Resilient Communities Master Planning Process
Subtask F	Business, legal and financial aspects of Net Zero Energy Master Planning.

Participating Countries and Organizations

Country	Contracting Party	Subtask Participant	Subtask Co-lead	Letter of Nat. Participation
Australia	University of Melbourne MOD	A,B,C, D. E, F		X
Austria	AEE INTEC B.I.G. (Bundesimmobiliengesellschaft)		F	X
Canada	Carleton University DND???		A	X
Denmark	Aalborg Technical University, Ramboll Danish MOD	A, B A, B	C	X
Germany	KEA/Steinbeis Transfer Centre	A,B	OA, F	X
	GEF Engineering,	C, E	C	
	Stuttgart University of Applied Sciences,	B, C,	E	
	Enisyst,		F	
	German Armed Forces Estate and Infrastructure Agency	A,B		
	German ESCO association	F		
	BPIE		F	
	Susi Funds, Solas Capital Funds	F		

Country	Contracting Party	Subtask Participant	Subtask Co-lead	Letter of Nat. Participation
China	Hong Kong Polytechnic University			X
Norway	Norwegian Defence Estate Agency SINTEF NTNU	A, B, D, F		X
U.K.	UK MOD	A, B		X
U.S.A.	US. Army Engineer Research and Development Center	A, B, C, D, E, F	OA, B, D	X
	USACE HQ/MP	D		
	GSA	B		
	Oak Ridge National Laboratory		A	
	Sandia National Laboratory	C, D	A	
	National Renewable Energy Laboratory	A, B		
	U.S. DOE BTO	A,B		
	International District Energy Association	B, C		
	Carnegie Mellon University	A, B, C		
	Big Ladder Software Company	A,C	E	
	AECOM	A		

Operating Agents and Subtasks Co-Leads

Operating Agents	Alexander Zhivov (ERDC, USA) and Rüdiger Lohse (KEA, Germany)
Subtask A:	Scott Bucking (Carleton University, Canada) and Robert Jeffers (Sandia National Lab, USA), Terry Sharp (ORNL, USA)
Subtask B:	Ingo Leusbrock (AEE, Austria), Michael Case, (ERDC, USA)
Subtask C:	Anders Dyrelund (Ramboll, Denmark) and Domenik Hering (GEF, Germany)
Subtask D:	Alexander Zhivov (ERDC, USA), Reinhardt Jank (Germany)
Subtask E:	Peter Ellis (Big Ladder, USA) and Ursula Eckert (HFT-Stuttgart, Germany)
Subtask F:	Rüdiger Lohse (KEA, Germany) and Mathias Haase (SINTEF, Norway)

Subtask A members

USA	Sharp	Terry
	Jeffers	Robert (Bobby)
	Amanda	Wachtel
FIN	Reda	Francesco
UK	Ellison	Angela
	Doig	Barry
DK	Engelund Thomsen	Kirsten
	Rose	Joergen
AUS	Rizsmanchi	Behzad
N	Haase	Matthias
AT	Ingo	Leusbrock
	Fulterer	Anna Maria
D	Lohse	Rüdiger

Subtask B members

USA	Case	Michael (Mike)
	Thornton	Robert (Rob)
	Rao	Laxmi
	Zaleski	Sarah
	Pless	Shanti
AT	Ingo	Leusbrock
	Fulterer	Anna Maria
FIN	Tuominen	Pekka
UK	Ellison	Angela
	Doig	Barry
DK	Sandemand	Peter
	Rose	Joergen
	Gudmundsson	Oddgeir
AUS	Rismanchi	Behzad
N	Haase	Matthias
D	Eicker	Ursula
	Jank	Reinhard

Subtask C members

USA	Swanson	Matthew
	Wallas	Sean
	Rao	Laxmi
	Pless	Shanti
DK	Anders	Dyrelund
FIN	Reda	Francesco
D	Hering	Dominik
	Jank	Reinhard
N	Haase	Matthias
AT	Ingo	Leusbrock
	Fulterer	Anna Maria

Subtask D

USA	Zhivov	Alexander
	Case	Mike
	Jeffers	Robert
FIN	Tuominen	Pekka
DK	Rose	Joergen
	Gudmundsson	Oddgeir
AUS	Rismanchi	Behzad
AT	Ingo	Leusbrock
	Fulterer	Anna Maria
N	Haase	Matthias
D	Eicker	Ursula
	Jank	Reinhard

Subtask E

USA	Ellis	Peter
	Jeffers	Robert
	Liesen	Richard
	Swanson	Matthew
	Pless	Shanti
FIN	Reda	Francesco
DK	Rose	Joergen
AUS	Rismanchi	Behzad
D	Eicker	Ursula
N	Haase	Matthias
AT	Ingo	Leusbrock
	Fulterer	Anna Maria

Subtask F

USA	**Zhivov**	**Alexander**
FIN	**Tuominen**	**Pekka**
DK	**Dyrelund**	**Anders**
AUS	**Rismanchi**	**Behzad**
N	**Haase**	**Matthias**
AT	**Ingo**	**Leusbrock**
	Fulterer	**Anna Maria**
D	**Lohse**	**Rüdiger**

Expected Deliverables

- A “Guide for Energy Master Planning in public building communities”
- Enhancements for Energy Master Planning Tools
- A Book of Case Studies and Pilot Projects (Examples of Energy Master Plans)

First Annex 73 Experts Meeting (Frankfurt)

Action Items from the meeting

Subtask A		
Participating countries will provide list of framing goals (i.e. renewable energy use, site energy use targets, source energy targets etc. differentiated by building usages or others) and references to these framing goals for public buildings (May 2018)	All /end of May 2018	Alexander, Terry
List of available building models (country, usage)	All /end of June 2018	Alexander /Scott
Participating countries will decide on collecting and providing of public building models as a basis for developing load profiles (➔ needed in Subtask E)	All/ end of May 2018	Alexander/Scott
Participating countries will express level of interest in addressing resilience for specific (mission critical such as hospitals etc.) buildings and community systems	All/end of May 2018	Alexander/Bobby

Action Items from the meeting

Subtask B		
Documentation of case studies: case studies are already in process of the implementation, not using the A 73 methodology (2018- 2019).		
Definition of specific parameters to collect from the case studies (coordinated with subtask A) Preparation of template for documentation of case studies	**Anna- Maria/ mid of May 2018**	**To all**
List of case studies	**All / mid of May 2018**	**Anna- Maria / Mike**

Action Items from the meeting

Subtask C		
Finalize the list of categories including but not limited to: - **Network Technologies: subchapter on heat losses** - **Gas- and Power Grids with transformer** - **Energy Storage technologies: existing and available technologies; innovative technologies should be available as a prototype; fuel storages** - **Production and conversion technologies:** - **Heating and cooling systems (boundary conditions) on the level of the neighborhood and buildings.** - **Emergency generators…** - **Energy- Management and Resilience Chapter**	**Anders/ mid June 18**	**To all**
Templates will be developed to collect data on individual technologies	**Anders will provide examples for filled in templates by mid of June 2018**	**To all**
First draft of the filled in templates	**All/ end of July 2018**	**Anders/ Peter**
Develop scenarios of energy supply solutions for representative campuses including those from MOD, universities, hospitals, public housing: existing, state of the art, innovative.	**Anders / mid of July 2018**	**To all**

Action Items from the meeting

Subtask D		
Agreement on the target groups: Decision makers, energy planners, financiers.		
Table of content: first draft	**Alexander/Reinhard/ end of May 2018**	**To all**
More detailed table of contents with expected contributions from subtasks	**Alexander/Reinhard/ August 2018**	**To all**

Action Items from the meeting

Subtask D		
Agreement on the target groups: Decision makers, energy planners, financiers.		
Table of content: first draft	**Alexander/Reinhard/ end of May 2018**	**To all**
More detailed table of contents with expected contributions from subtasks	**Alexander/Reinhard/ August 2018**	**To all**

Action Items from the meeting

Subtask E		
Agreement on workflow of the scenario development (see below)		
The approach is to implement the workflow routine in existing modeling tools or to provide the workflow routine as a stand- alone tool		
Investigation if GIS- based capability to calculate piping installation costs and heat losses can be available for incorporation into the Annex 73 tool	**Anders/ May 2018**	**Alexander/Peter**
What should be the format of the incorporation of the building load profiles	**Peter/ September 2018**	**ST E team**
Present approaches to generate building cluster load profiles by the participating countries	**ST E team/ September 2018**	**Peter**
Which programs are available to reproduce the above- mentioned scenario development	**ST E team / September 2018**	**Peter**

Action Items from the meeting

Subtask F		
Major activities of ST F will start in October with an analysis of framework conditions for the implementation of NZE neighborhoods	**ST F team / October 2018**	**Rüdiger**

Next Meetings

- 3rd February 25-26, 2019, New Orleans (combined with IDEA campus energy conference)
- 4th September 2019: Denmark
- 5th April 2020: Norway ???
- 6th September 2020: UK???
- 7th April 2021: USA (Washington, DC)
- 8th September 2021: Finland???

- Interim meetings??

Conferences

- ASHRAE Conferences (January, June)
- NATO Energy Center??
- EDA???

Time Schedule

- Preparation phase - one year (through November 2017)
- Working phase - 3 years (starting February 1, 2018)
- Reporting phase – 1 year

Thank you. Questions??