

“Energy Improvement Districts: An Instrument for Local Cooperation on Energy Efficiency”

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Jonas Fischer

HafenCity University
Prof. Dr. Jörg Knieling
Kimberly Tatum
Jonas Fischer

Agenda

- Overview
- The EID Concept
- The Practice
- Summary: Why to use the EID Concept?
- Pilot Insights
  by Prof. Yury Nurulin, Polytechnic University St. Petersburg



Project Key Facts
AREA 21

Funding Programme: Interreg Baltic Sea Region

Duration: 10. 2017 – 09. 2020

Extension: 10. 2020 – 09. 2021

Priority: Natural resources

Spec. objective: Energy efficiency

Aim: To pilot Energy Improvement Districts through the strategic planning and implementation of energy efficient solutions



Partner consortium

- HafenCity University Hamburg (DE) (Lead Partner)
- City of Hamburg | District Wandsbek (DE)
- Kohtla-Järve Town Government (EE)
- Tartu Regional Energy Agency (EE)
- Tampere University of Applied Sciences (FI)
- City of Tampere (FI)
- City of Lublin (PL)
- St. Petersburg Polytechnic University (RU)
- Region Skåne (SE)
- Öresundskraft AB (SE)

https://area21-project.eu

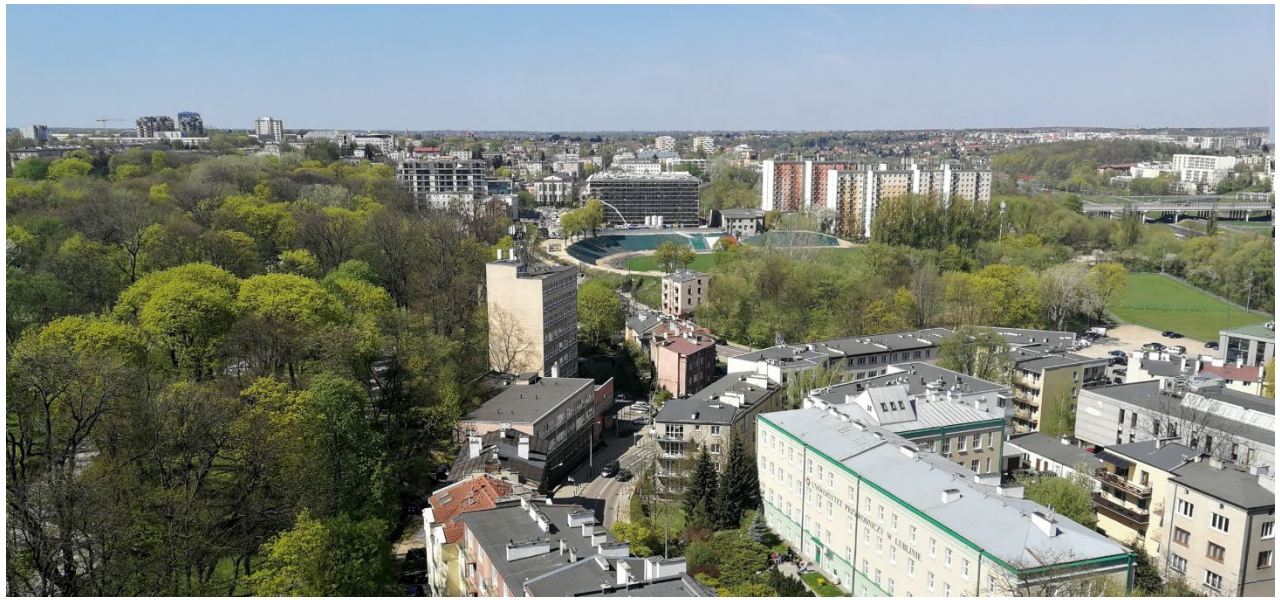
The Energy Improvement District (EID) Concept

Energy Improvement District Concept

Our overall goal is to contribute to..

- reduce CO_2 emissions and
- increase energy efficiency at the district level

.. with the Energy Improvement District Concept



Energy Improvement District Concept

With the EID Concept we..

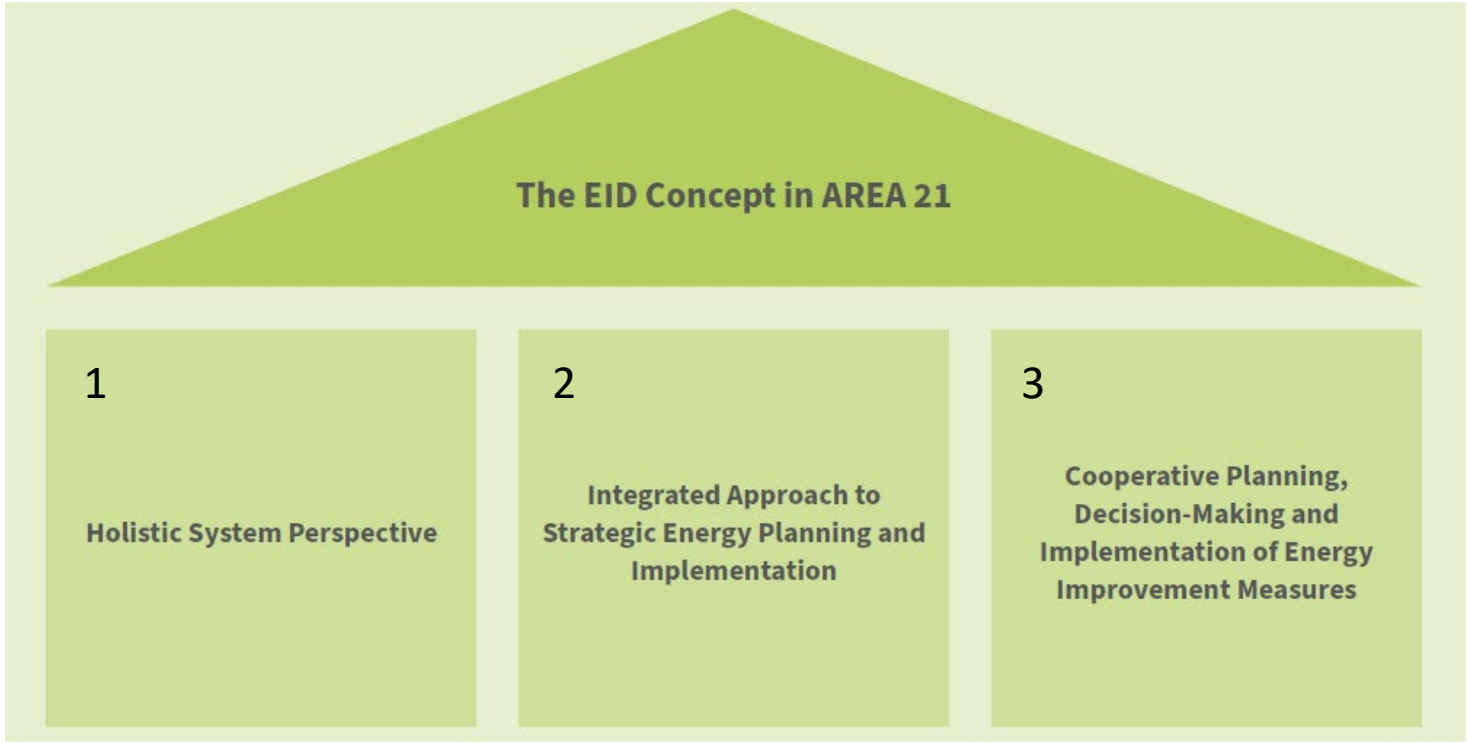
- provide an instrument for tailored and integrated energy efficiency solutions
- test new public and private cooperation formats
- involve end-users in energy planning processes
- use smart technologies (ICT tools)

The EID Concept is transferrable!



Energy Improvement District Concept

- **Central Pillars**
  1. The district as intervention area
  2. Cross-sector, including aspects relevant to achieve goals
  3. Inclusive stakeholder cooperation targeting affected actor groups
- **Target groups**
  - Citizen, housing associations and building owners, local, regional & national energy actors (e.g. utilities, agencies, public administration)



The Practice – Our pilots

Our pilots

Helsingborg, Sweden

- **Stakeholders**
  Hospital (Region Skane) and energy utility (Öresundskraft)
- **Case**
  Deep renovation and new construction of attachments at hospital building
- **Focus energy efficiency**
  Management protocols, awareness raising of staff, reduction of energy (built environment)
- **Results**
  Strategy and action plan incl. measures in place, start of monitoring (e.g. via ICT tools) and enacting of protocols (finalization 2025)



Our pilots

Tampere, Finland

- **Stakeholders**
  Tampere University, home owners, (energy agency EcoFellows)
- **Case**
  Modernization of heating systems, energy counceling
- **Focus energy efficiency**
  Mainly exchange of oil based heating, information (e.g. via ICT tools), facilitation of funding application, reduction of energy (built environment)
- **Results**
  Strategy and action plan incl. measures in place, increased awareness, roll-out started, (finalization 2021)



Summary: Why to use the EID Concept?

Why using the EID Concept?

CHALLENGES

- Low awareness of energy efficiency potential
- Lack of finance and support processes
- Lack of cooperation and interest amongst diverse stakeholder groups
- Lack of data or insufficient data quality

THREATS

- Passive participation in cooperative activities
- Instability (e.g. political)
- Market developments
- Lack of experience in cooperation

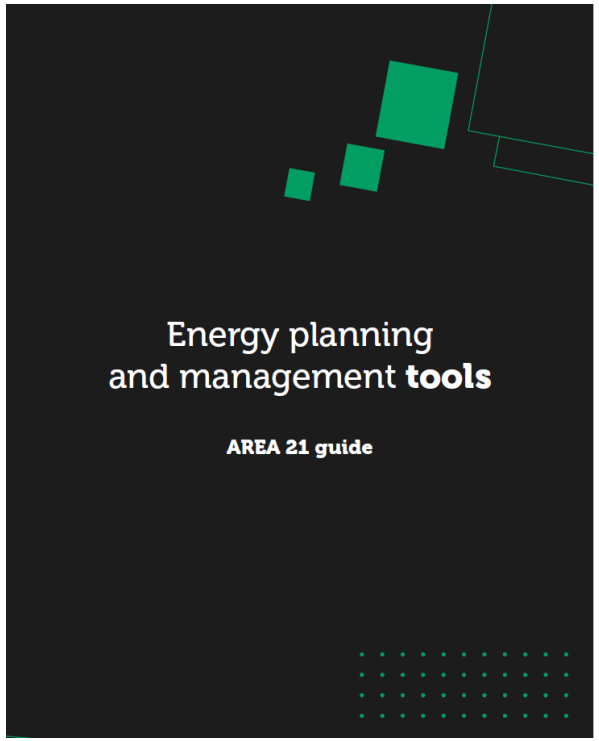
OPPORTUNITIES

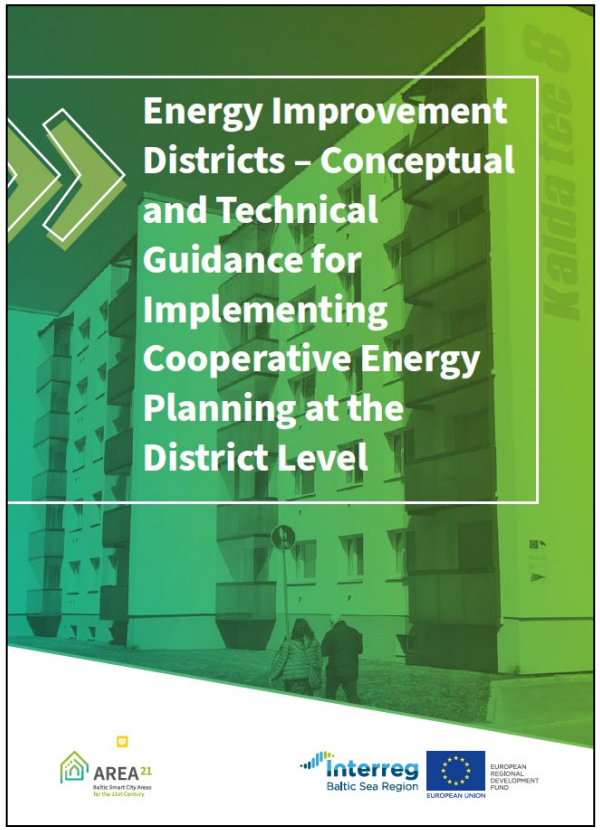
Collaboration, finances, transferability!

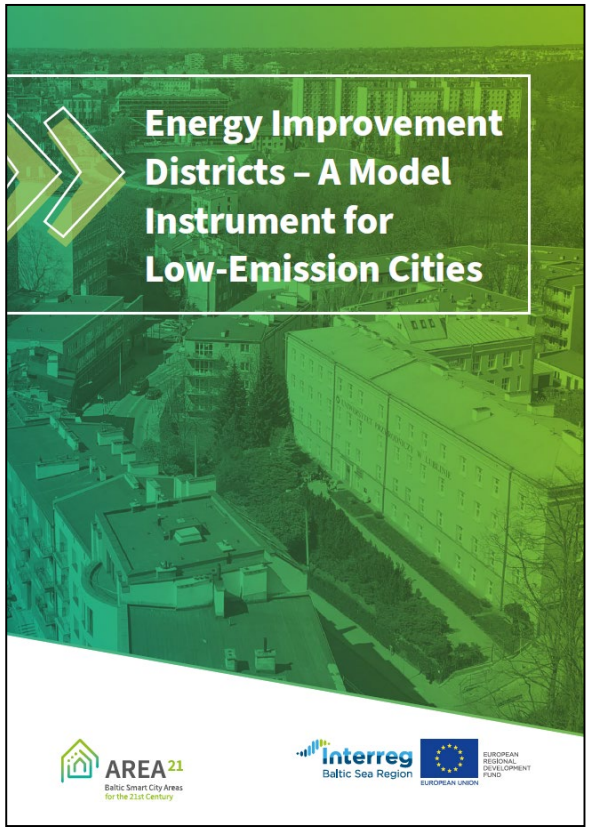
- Central coordination for planning and implementation
- District-scale = manageable area
- Cost reduction in procurement
- Targeted funding schemes
- Using new technologies
- Environmental awareness
- Inclusive and integrative planning and decision making
- Potentials for synergies and resource savings
- Overarching city-level strategies

Main outputs

available here *https://area21-project.eu/downloads/*









CONTACT

HafenCity University Hamburg

Jonas Fischer

jonas.fischer@hcu-hamburg.de

www.area21-project.eu

info@area21-project.eu

twitter.com/area21_project

Our pilots

Kothla-Järve, Estonia

- **Stakeholders**

  City of Kothla-Järve, home owners (housing associations), students/pupils

- **Case**

  Modernization of historic buildings, awareness raising

- **Focus energy efficiency**

  Create blue print for funding application for deep renovations, information, awareness raising

- **Results**

  Strategy and action plan incl. measures in place, roll-out started, (finalization 2021)



Our pilots

Polytechnic University St. Petersburg, Russia

- **Stakeholders**
  University, staff, students
- **Case**
  Modernization of heating systems, behavior change
- **Focus energy efficiency**
  Exchange of heat pumps, behavior change of stakeholders, reduction of energy (built environment)
- **Results**
  Strategy and action plan incl. measures in place, awareness raising campaigns (carried out, further in planning), contracting of heat pumps (finalization 2021)





AREA 21

Interreg Baltic Sea Region

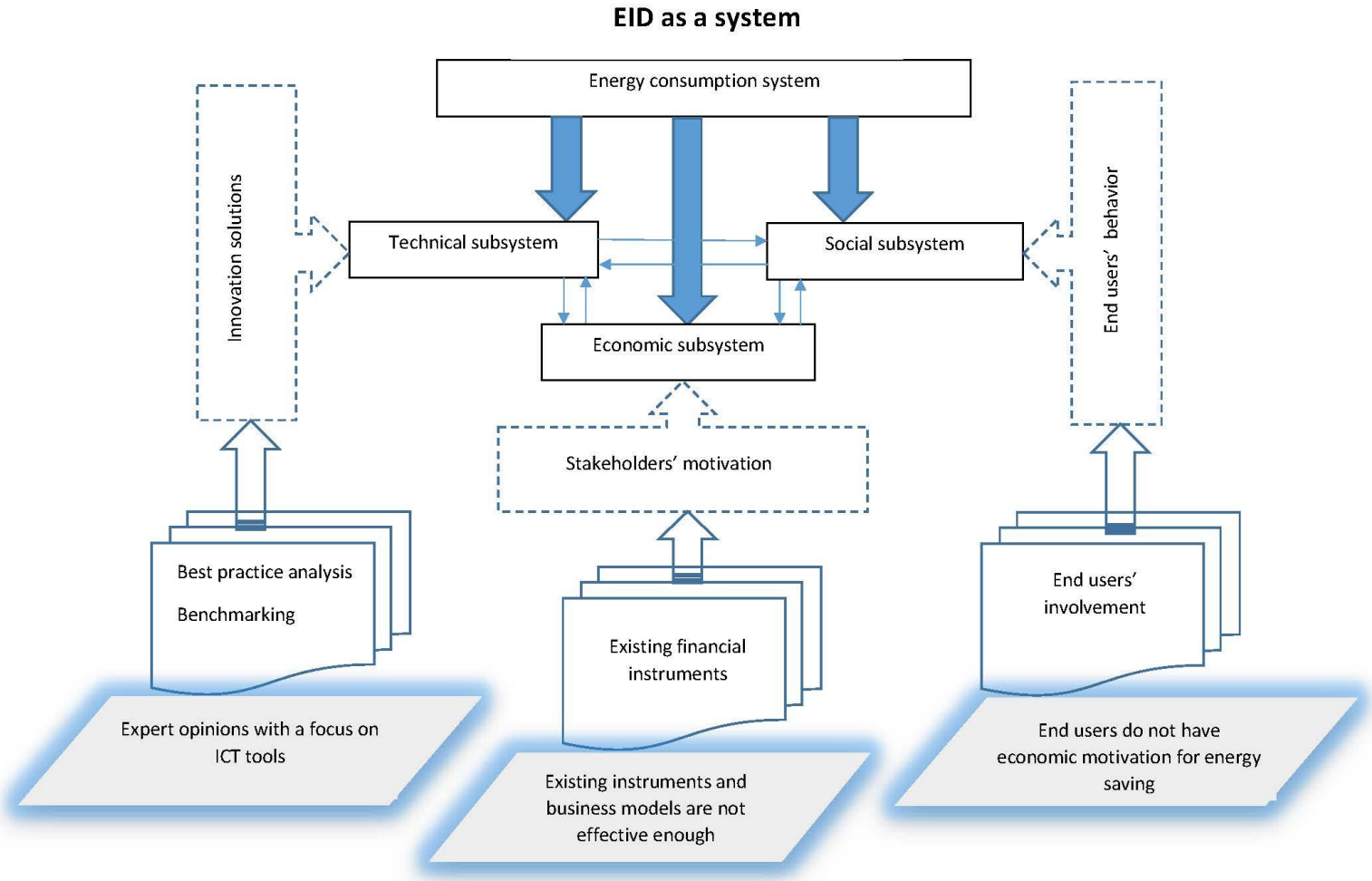
EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

Energy Efficiency in Urban Districts: case from Polytechnic University

Yury Nurulin
Olga Kaltchenko
Inga Skvortsova

15 December 2020 | UBC Talks

POLYTECH
Peter the Great St.Petersburg Polytechnic University



EID concept

Energy consumption in the residential sector is implemented in the framework of complex systems that belong to the class of socio-technical systems, and have technical, economical and social subsystems.

Themes addressed by the EID strategy
Theme 1: performance of the energy system in the EID (technical aspects)
Theme 2: efficiency of the heating and electricity consumption in EID (economical aspects)
Theme 3: end users' motivation and behavior (social aspects)

EID analysis

Step 1. Status quo (collecting the information on the object of analysis):

- City level & administrative unit level
- EID level:
- Building level

Step 2. Analysis of the EID planning process:

- Stakeholder map;
- Energy Planning Process,
- End users behavior

Step 3.Assessment of EID potential:

- Barriers for energy saving
- Energy Assessment
- Integrated Energy Planning Assessment

Step 4. Goal formulation:

- Goals check (goal formulation);
- Stakeholders responsibilities towards goals.

Step 5. Action plan development

Step 1. EID Polytechnic: technical aspects
Status quo



Central campus: 16 educational buildings, 3 administrative buildings, 2 dormitories, 2 residential buildings, 4 manufacture building, 1 social building. Total area more than 250 000 sq.m.
Lesnaya site: 7 dormitories, 1 residential building, 6 manufacture building, 1. Total area more than 62 000 sq.m.
Khlopina site: 4 dormitories, 1 residential building, 4 educational buildings, 3 social building. Total area more than 50 000 sq.m.

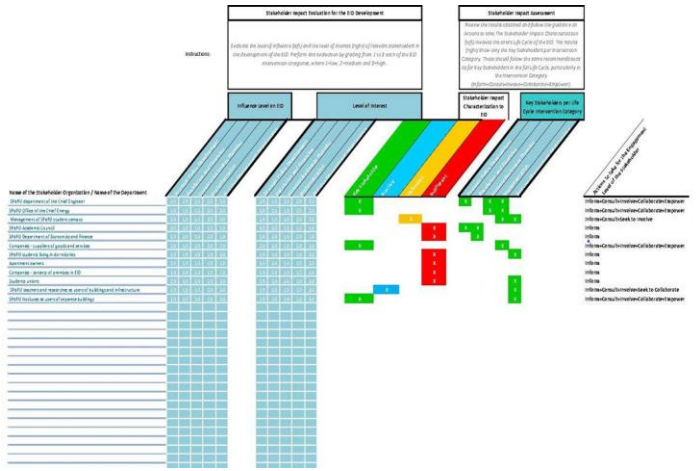


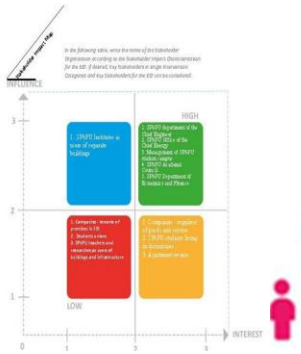
24 electricity transformer substations
42 transformers, 31 of them are more than **45 years old** while life time is **20-25** years.
Cable lines 6kV with the length around 25 km, 90% of which have average exploitation age more than **45 years**
Cable lines 0,3kV with the length around 50 km, 90% of which have average exploitation age more than **45 years**

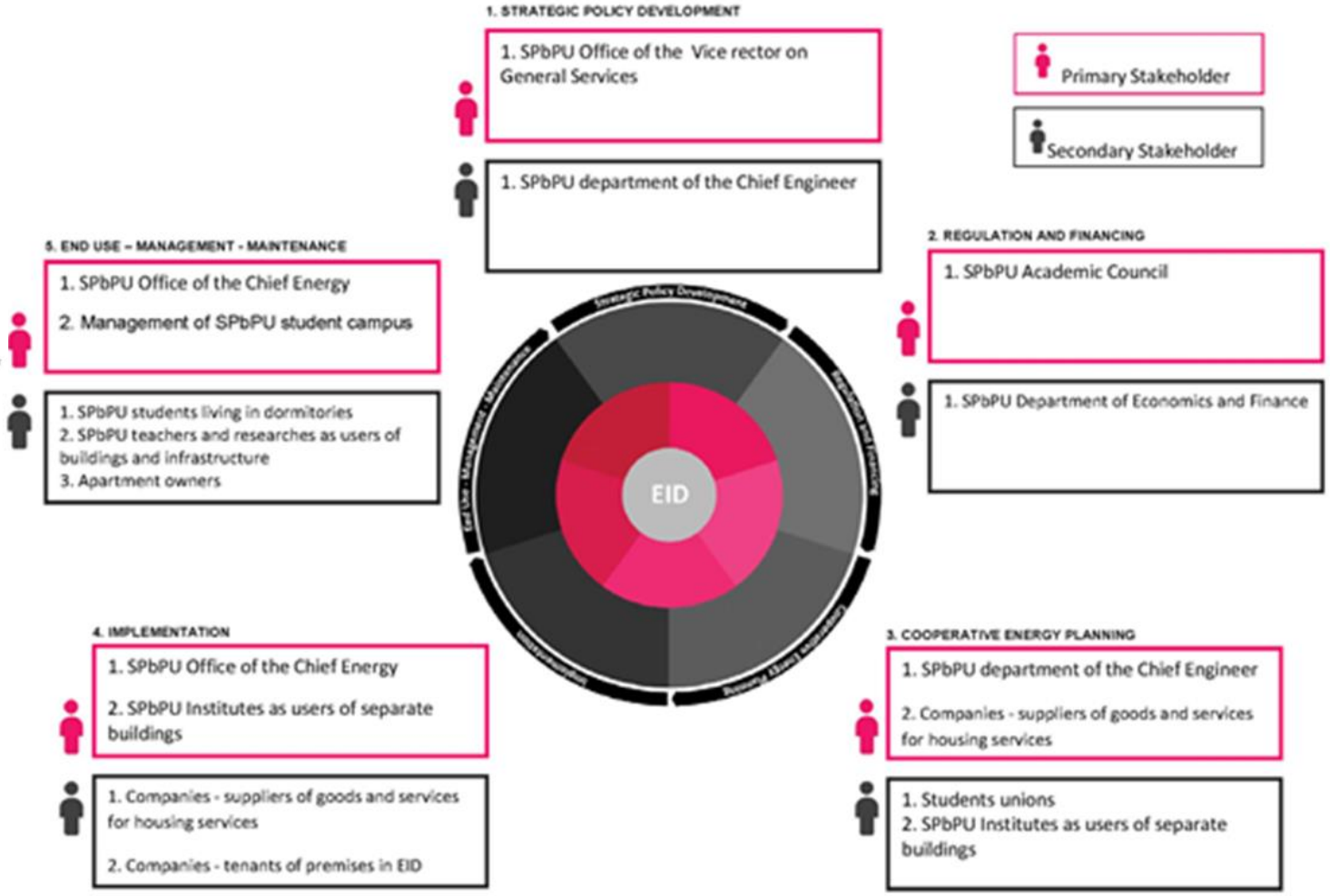
The length of external serviced heating networks is 20 km,
The length of outdoor networks of drinking and fire water supply and sewerage systems is 30 km,
The length of internal heat supply, water supply and sewerage systems more than 150 km
The number of heat nodes and water-measuring units more than 140
The number of sewer and water wells more than 800.

80% of all external and internal water supply and sewerage systems have physical wear or exceeded service life

Step 2. SPbPU Stakeholder map







Step 3. Analysis of the EID potential

SWOT analysis

	FACILITATE the achievement of your EID goal	HINDER the achievement of your EID goal
INTERNAL ORIGIN (attributes of the area)	**Strengths** ▪ *cooperation formats already exist within the district: round tables in frame of local events (SPbPU conferences, SPbPU Scientific Week etc).* ▪ *Benchmarking of technical and organisational solutions that corresponds not used potential of energy saving* ▪ *Centralized system, high level of concentration of stakeholders responsibility* ▪ *Combination of centralized and decentralized heat supply systems: 2 boiler stations and connection to the city grid.* ▪ *The EID territory is under the SPbPU management. SPbPU has direct motivation for reduce of payments for housing resources. Relatively small amount of private apartment owners.* ▪ *Automated system of technical accounting of energy resources in EID.*	**Weaknesses** ▪ *heterogeneous ownership structure with various groups of users* ▸ *different objectives of stakeholders, competition rather than cooperation* ▪ *high percentage of temporary residents* ▪ *Lack of effective financing instruments* ▪ *No electricity generators in the EID. Electricity supply from the city greed to EID* ▪ *Feed-in Tariffs for renewable energy do not apply* ▪ *Special departments in SPbPU are responsible for maintenance of energy infrastructure. Staff of these departments have no direct motivation in energy saving (salary received does not depend to results of energy saving). Most of end users of energy resources in EID are not motivated in energy saving.*
EXTERNAL ORIGIN (attributes of the environment)	**Opportunities** *Examples* ▪ *availability of property oriented incentives* ▪ *use of newly developed ICT-Tools and/or measurement technology* ▪ *local energy policies, SPbPU program for modernization of housing infrastructure (updated annually), etc.* ▪ *Investments for modernization of housing infrastructure in EID.* ▪ *Pilot energy efficient building and wind electricity generator.* ▪ *Motivation rise of end users in energy saving by different means: changes to internal regulations, changes to internal documents, promotion of green sustainable development ideas, ensuring the collection and processing of energy consumption data for each object in EID.* ▪ *Implementation of energy- and resource-saving measures.* ▪ *Having created the EID, SPbPU can play the role of a pilot zone of high energy efficiency, where the best organizational and technical solutions will be demonstrated.*	**Threats** *Examples* ▪ *energy suppliers have no interest in energy saving measures (economically harmful for them)* ▪ *general reluctance of residents to cooperate with the city* ▪ *environmental and other risks associated with climate change (weather and climate hazards, including land reclamation systems, hydraulic structures, shore protection, taking measures to prevent the negative impact of water, etc.)* ▪ *31 transformers are more than 45 years old while life time is 20-25 years.* ▪ *Formal barriers for use of regional financing in EID which is federal property* ▪ *Existing tender procedures are aimed at choosing cheap technical solutions with the limited possibilities of considering the best quality characteristics* ▪ *Long and complex procedures for connecting new customers to existing power grids.*

Step 4. Goals formulation

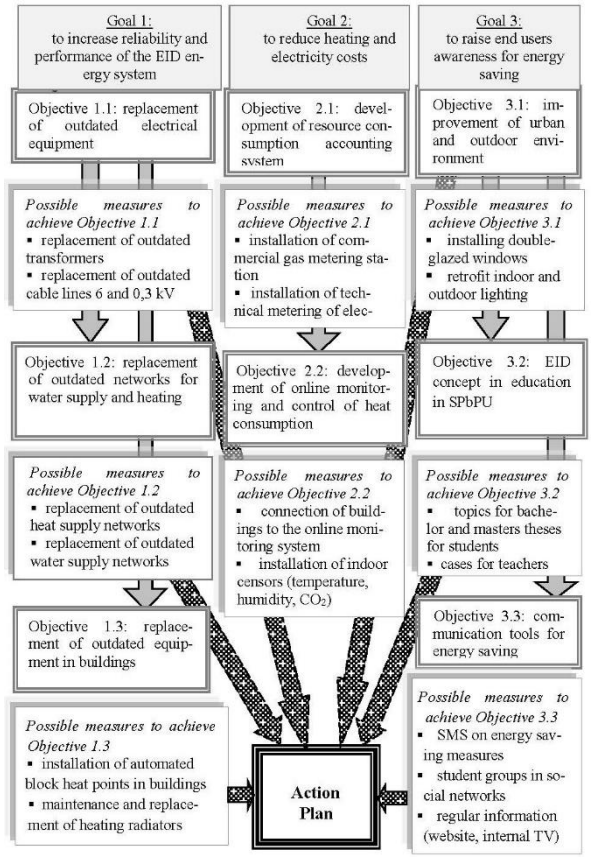
EID Polytechnic goals

Goal 1: to increase the reliability and efficiency of the energy system in the EID. Target indicator: 50% reducing the number of accidents at the heating and electricity networks.
Description: regular maintenance and replacement of obsolete equipment of internal heating, water supply and sewage networks in buildings and external networks
Timeframe: regularly

Goal 2: to reduce heating and electricity costs. Target indicator: 13% reduction of fuel and energy costs while improving the quality of the urban and internal environment.
Description: installing double-glazed windows, retrofit indoor and outdoor lighting. Installation of automated block heat points in buildings, commercial metering of gas and electricity. Development of online monitoring and control of heat consumption.
Timeframe: by 2022

***Goal 3*: to raise end users' awareness for conscious energy consumption and saving.**
Target indicator: involvement of 25% of students and university staff in the implementation of energy saving measures.
Description: promotion of energy saving among users which do not have direct economic motivation. Development the section in the Program of energy saving Polytechnic focused on end users' behavior.
Timeframe: by 2022

Step 5. Action plan development and realization



Measures for end users involvement

- Students societies
- Research and thesis topics (6 students)
- Targeted survey (60 respondents)
- Case championship (37 students involved)
- Promotional video developed by students







Dmitry I. Peskov, Special Representative of the President of the Russian Federation for Digital and Technological Development, Director of the Young Professionals Department of the Agency for Strategic Initiatives

Step 6. AREA21+action

Technical subsystem – Improve energy consumption system at dormitory #17 and educational building #4 in the EID Polytechnic (replacement of the automated heat points)

Economic/organizational subsystem - Piloting an incentive measure for energy saving in a dormitory (development of the internal regulation on stimulating the activity of SPbPU units for energy saving)

Social subsystem - Awareness-raising among end-users

To motivate end users you should engage, involve, inform and listen them

(development of topics for term papers and graduate work of bachelors and masters based on EID issues, target measures on promotion of EID topics in pilot buildings, visualization of collected data on energy consumption in pilot buildings and dissemination of these data among end users)

CONTACT



Yury Nurulin

yury.nurulin@gmail.com

www.area21-project.eu

info@area21-project.eu

twitter.com/area21_project

Спасибо за внимание!