Rebuilding and Decarbonizing District Heating

PROPOSAL FOR

An Investment Portfolio in Ukraine

BRIEF

The district heating systems in Ukraine are an essential part of the critical infrastructure. They are operated by more than 1000 publicly owned companies and supply about 40% of the population during the heating season from mid-October to mid-April.

The goals of the national policy for district heating systems include achieving a 40% share of renewable energy sources and reducing energy losses to 10% before 2035. At present, there is a need to:

- **Decarbonize** and retrofit existing district heating systems
- **Rebuild** and retrofit damaged district heating systems
- Implement **energy saving** measures and improve **energy efficiency** in buildings and district heating systems
- **Develop smart energy** systems, preferably by sector coupling

Meeting these needs requires thousands of investment projects as well as planning, coordination and alignment with state policies and the EU taxonomy.

TEN21 has the experience, network, and expertise to deliver the services of

- **Committing** local authorities and stakeholders
- Provide a **holistic analysis** of local district energy systems and resources
- Identify **least-cost and emission solutions** using the most feasible technologies
- Design **roadmaps** and identify replicable and **bankable investment projects** (we identify what to invest in, how large the installation should be, when in time it should be realized and when existing assets should be retired)
- Develop **models** for **business** and **finance**

TEN21 proposes to develop a portfolio of investment projects in the decarbonization and retrofitting of district heating systems in Ukraine. The ambition is to work with 10 cities and to establish an investment pipeline **worth 1 billion euros**. The quantification of the portfolio is based on a case study in the city of Zhytomyr*.

TEN21 is a collaboration platform supporting the decarbonization of district heating systems. We are **organized by the Swedish Environmental Research Institute** (IVL) as a collaboration between experts across the district energy value chain. Our name reflects our focus: **T**hermal **E**nergy **N**etworks for **21** degrees of indoor comfort, **TEN21**. TEN21 offers to identify the investment pipeline at a cost of **500 000€**.

The TEN21 TEAM

Kristina Lygnerud / The Swedish Environmental Research Institute (IVL), a center of excellence in district heating research, business model development and system modelling. IVL is a **non-profit** organization owned by the Swedish foundation SIV.

Kenneth Karlsson / Energy Modelling Lab (EML), a Danish consultancy company with expertise in advanced energy system analysis and mathematical modelling frameworks.

Chris Garside / Resourceful Futures, a UK based low carbon consultancy company.

Christian Johansson / NODA Intelligent Systems, a Swedish company providing thermal AI solutions.

Roberto Fedrizzi / EURAC, an Italian research institute with expertise in district heating cutting edge technologies.

OUR PARTNERS

The Institute for Economics and Forecasting of the National Academy of Sciences of Ukraine.

Euroheat & Power, The international industry association for district energy, promoting sustainable heating and cooling in Europe and beyond.

OUR EXPERIENCES

Jointly, TEN21 organizations have over 100 years of district heating experience. We have worked on research projects for new technologies, we have established energy transition roadmaps for cities and countries and we have facilitated over 100 M€ investments in the sector. We have mainly worked in Europe but have also done some work for Azerbadjan and Vietnam.

For identifying the investment portfolio in Ukraine, we will resort to an existing TIMES-Ukraine model and tailor it to **analyze city level district heating systems**, enabling us to process **all data on energy production, consumption, and resources as well as data on buildings, industries, transportation, land-use** and other of the studied location.

OUR UNIQUE VALUE

We apply **a scientifically proven methodology** to identify optimum solutions for cities. Our approach enables us to ensure that **what is built today is aligned to long term goals**. We provide **technology neutral solutions** and work with **local stakeholders** allowing us to build **local commitment.**

CASE STUDY ZHYTOMYR

Retrofitting District Heating Systems

Zhytomyr is situated in Northern Ukraine, around 133 kilometers west of Kyiv. The city has an approximate population of 260,000 residents. It relies on district heating for its heat supply and has ambitious energy and climate goals aimed at modernizing its heat generation and distribution network.

- TEN21 has initiated a **collaboration** with the Mayor and has been informed about the objectives for the city's heat supply and on-going projects.
- The Mayor has made a **commitment** for Zhytomyr to serve as an exemplary model for showcasing the TEN21 approach.

Our Ukrainian partners, from the Institute for Economics and Forecasting of the National Academy of Sciences of Ukraine, developed an initial outline of an energy system model, the TIMES-Zhytomyr, in 2017. It has allowed for a comprehensive analysis of the local energy system and resources and for an identification of necessary energy investments to undertake to reach long term goals.

- Zhytomyr **is planning to implement a project** aimed at reducing energy losses, reducing gas and electricity consumption, and improving the quality of service of the heat and hot-water supply system. The project is a collaboration with the European Bank for Reconstruction and Development. A remaining contract, to be procured, is the installation of a biomass fueled CHP. Estimated Total Project Value is **15M€** (EBRD ID: 38147).
- Additionally, Zhytomyr is exploring **opportunities for investments** worth an estimated **90M €**:
    - A CHP plant running on municipal solid waste and biomass (40 MW)
    - Ground-based and water reservoir-based solar parks (50 MW)
    - Micro-hydro power plant

The investment need in Zhytomyr is taken as a proxy of the investment need in cities with a similar district heating system. The city has an investment need in green energy; encompassing district heating and solar parks of 105M €. **We suggest to work with 10 Ukrainian cities in the same way as in Zhytomyr**. Some cities will be larger and some will be smaller than Zhytomyr but we assume that an average investment need of the chosen cities is 100M €. Times ten, **the investment portfolio is 1B€t.**

COMPARATIVE ADVANTAGES

The example of Zhytomyr highlights the comparative advantages of the **scientific and unbiased approach** of **TEN21** as well as the **pivotal role of collaboration with local expertise.**

Generating a comprehensive analysis of a local energy system based on a tailored version of the TIMES-Ukraine energy system model allows for generating alternative futures that a city can choose between. We do so by working with the local stakeholder to perform the following activities:

- **Mapping** local energy resources, production, consumption, and future demand
- **Identifying the cost and emission optimum district heating solutions** for the city ensuring that the **investments made now are aligned to long term goals**
- **Optimum degrees of energy efficiency in buildings can be identified** and efficient investments in refurbishment options (insulation, installation of thermostats and individual heat meters etc.) can be assessed, **rendering a full picture of investments needed in the district heating system and in the connected buildings**
- Develop **roadmaps**, these are broken down into **bankable investment projects** and information is provided on **the efficient timing of realizing the investments**

FOR FURTHER INFORMATION, PLEASE CONTACT

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