

APPENDIX

Heating Management





The Heat resource

- **District heating** can be considered a simple, clean and safe **alternative** to traditional gas heating
- It is characterized **by a hot water distribution network to buildings**, supplied by a single production plant, **which does not require the installation of individual boilers**
- The effective use of district heating has several **positive impacts: expansion of energy sources, reduction of emissions, increased energy efficiency, lower operating costs and simplicity in the management of utility installations.**

Investments in Italy

- District heating systems, very common in some North-Eastern European countries, have a limited diffusion in Italy, although with an increasing trend since the 1980s, especially in five northern regions: Lombardia, Piemonte, Trentino-Alto Adige, Emilia-Romagna and Veneto.
- In 2021, thermal energy production in these regions accounted for 97% of national production (source: ARERA Annual Report 2022).
- To continue the development of this sector, taking advantage of the ability to integrate efficiency with **the use of renewable sources to reduce polluting emissions**, the PNRR (Piano Nazionale di Ripresa e Resilienza) has provided resources to finance projects for the construction of new networks or the extension of existing district heating networks (M2C3 Inv. 3.1)

The challenges

The production of electricity from renewable sources is one of the most important keys to achieving the decarbonization goal by 2030.

The challenges in this area will concern:

- **Reducing emissions** (using clean energy sources can reduce the emission of greenhouse gases)
- Greater **flexibility in the use of energy sources** (power plants can be powered by combining different energy sources, also depending on the location of the plants)
- **Optimisation of thermoregulation** according to external parameters acquired in real time (e.g. weather forecasts) and user behaviour and usage habits

- The **reduction of the risk of vulnerability** of district heating systems
- The **overall efficiency of the networks**, from the production plant to the user substations.

To this end, the Ministero dell'Ambiente e della Sicurezza Energetica (MASE) has set targets to reduce energy consumption by at least 20 ktpe per year by 31 March 2026 through the **completion of the construction of new district heating networks, or the expansion of existing ones**. But that is not all.

Interventions will have to go in the direction of enhancing the **synergies between the use of renewable energy sources and high-efficiency cogeneration (CAR)**, strengthening the national **economic competitiveness and environmental**

quality of the local area, increasing the use of **district heating or cooling systems, and modernizing the energy production plants serving them**.



ReThir - Energy Market



Our Approach

A Composable Platform for Utilities Infrastructure Management

Achieving the objectives and measures envisaged at national level requires a rapid governance system, clear prioritisation, and speed of action in the execution of plans.

To support the management of Utilities infrastructures impacted by the investment lines of the PNRR in the Heating, Water, Power&Gas, Waste areas, we at Engineering have developed a **specific Composable Platform**.

This is a **horizontal technological platform** that integrates, for each ecosystem of reference, our Platforms & Solutions (dedicated to the billing and maintenance area) with the best applications on the market (thanks to a network of partnerships), guaranteeing at the same time high-impact value solutions and advising, thanks to strong competences on business processes and enabling technologies.

What is it?

Heating Efficiency Management System (HEMS)

Within the Composable Platform, the **HEMS system is the vertical answer: created to support the challenges of district heating service operators with an end-to-end approach**, applied to the business processes and operational activities involved in district heating production and distribution.

Our HEMS solution supports:

End-to-end coverage of all operational processes

required for district heating management with respect to user substations, with a focus on efficiencies towards the end user, thanks to:

- Daily profiling of utilities
- Efficient management of “return” temperatures
- Automatic management of pre-ignitions and shutdowns
- Plant function trend and automatic interaction with the operator
- Optimisation of maintenance to keep the

substation efficient

- Complete management of the billing cycle, with integrated management - where necessary - of divisional departments.

Process-driven approach in the analysis and implementation of the project solution, through the definition of an operational WBS (Work Breakdown Structure) consistent with the objectives and requirements of the MASE

Safeguarding of investments made over time on existing applications with a “best fit” technological approach for new elements and enhancement of the existing application stack, with integrations on systems external to the district heating project proposal

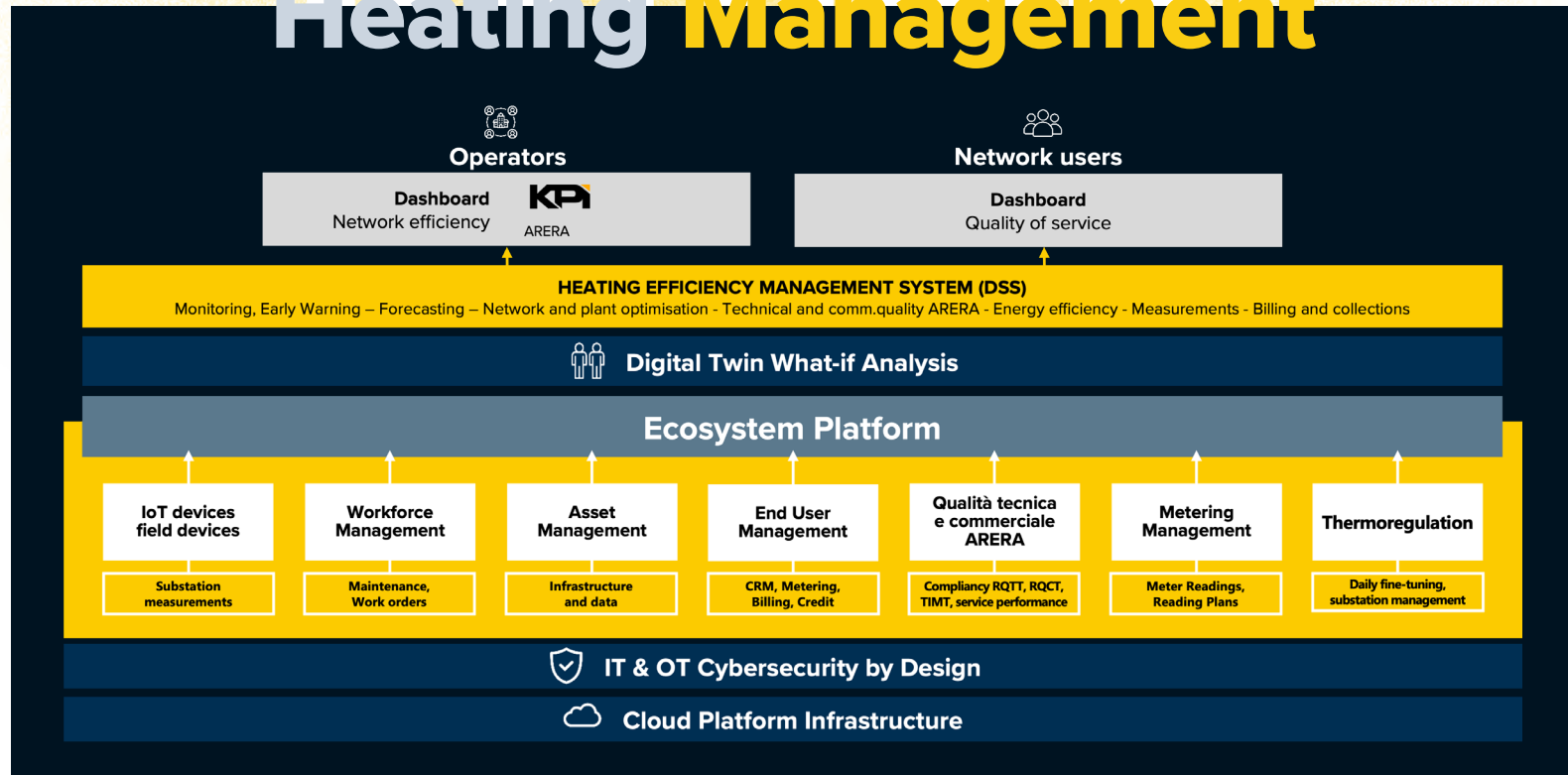
Expertise in core processes, also considering the availability of business solutions such as CRM, Metering to Cash, WFM, Remote Control

Data-driven management with the ability to generate new value through the integration of data from heterogeneous sources related to the district heating network

Management of the **overall governance** of the project (partnership ecosystem).



ReThink Heating Management





What does it do?

HEMS covers the complete life cycle of district heating management in the context of utility substations and operator obligations

Plant thermoregulation

Enabling the grid operator towards **daily optimization of the substation thermoregulation**. Thermoregulation of the primary fluid and control and safety functions. The thermoregulation system enables overall plant diagnostics and monitoring.

The system is also entrusted with the acquisition of requests for heating and hot water production and can directly propose the management of pre-ignitions and pre-power-offs, based on the variation of supply temperatures and expected climatic conditions.

User management

Management of all phases of the contract lifecycle, starting from the pre-contractual phase and up to the periodic management of consumption and billing phases.

The availability of data from the different systems of the overall application map allows for user profiling aimed at proposing commercial offers that are more in line with specific consumption lifestyles.

Governance and Monitoring

Co-control (also predictive) of the plant, based on forecasting algorithms fed by historical data and weather information. Fulfillment of regulatory requirements for technical quality (RQTT), commercial quality (RQCT) and service measurement (TIMT) and reporting to Regulatory Authorities and Trade Associations.

Decision Support

Thanks to a data-driven approach in near real-time mode, the information acquired in real-time for efficient plant management is realised in:

Management of an Early Warning System to support the interventions necessary for the timely resolution of incidents.

Observation of phenomena based on Axis and Time variables (past, present, future):

- **Effectiveness:** Energy Balance (consumption by energy vector of each of the units, types of energy produced - thermal, refrigeration, cogenerated electricity - cogenerated useful heat, etc.)



- **Efficiency:** saving of non-renewable primary energy, waste heat recovery and thermal renewables, ...
- **Quality** of service: enhancement of interaction with the user (optimization of return temperatures, consumption curves).

Planning management

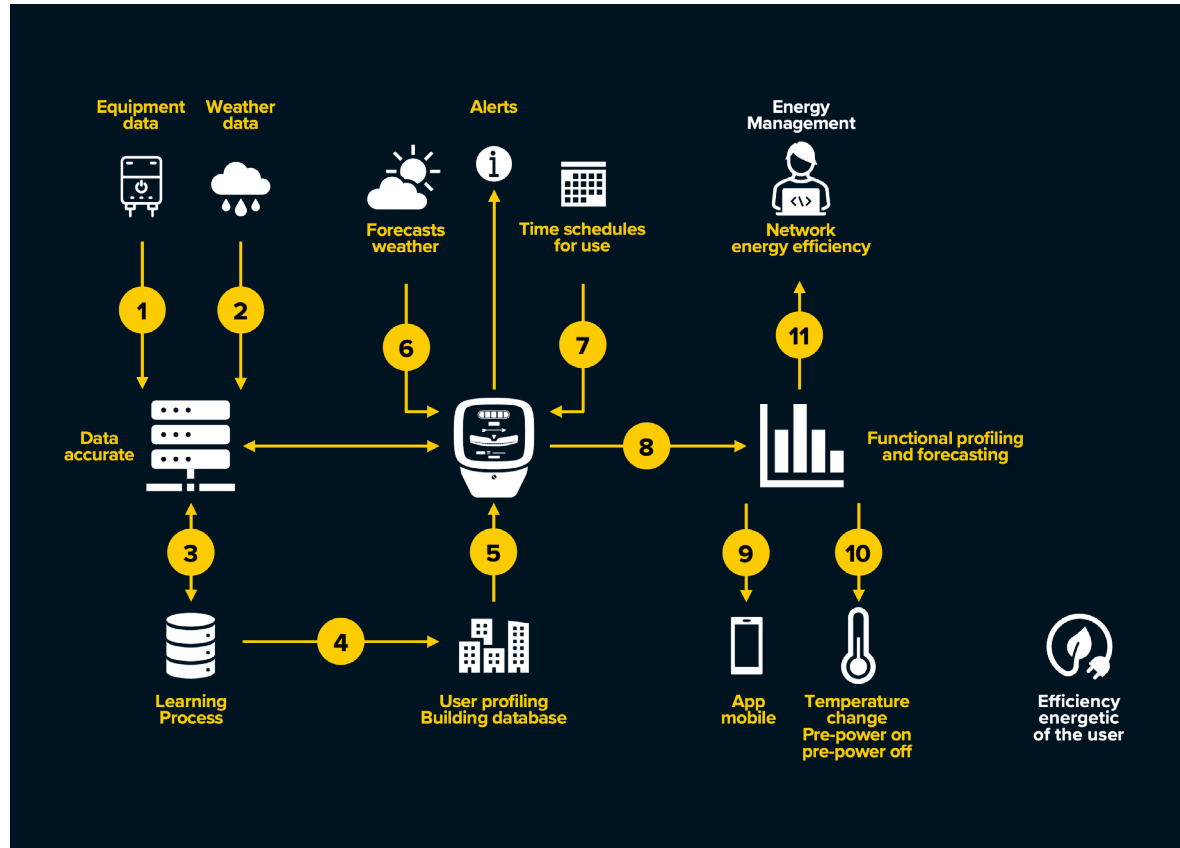
Medium/long-term analysis of network inefficiencies, and the possibility of predicting planned maintenance thanks to information, including statistical information.

Alerting management

Thanks to “early warning” solutions that improve the timeliness of intervention.

PNRR & ARERA KPIs

Ability to **automatically measure PNRR objectives and ARERA KPIs** and manage the related periodic reports to the regulatory bodies provided for.



District heating life cycle management

What Does it Do?



What value for stakeholders?

What value for stakeholders?

There are several target audiences of the information and activities provided by the HEMS solution, to be involved either in a stand-alone mode (specific information) or through an integrated network (shared and transversal information).

- **User:** guaranteeing responses in terms of overall service quality
- **Local Administrations:** the valorisation of territorial energy resources through objectives and results obtained and improved over time
- **Institutions:** Institutions with control functions must have an informed approach on the evolutions initiated through the investments assigned and the results obtained
- **Universities/Research Institutions:** ensure a two-way process between research and the market to continuously improve energy yields, also through international partnerships
- **Trade associations:** to continue the progressive awareness-raising process with institutions to extend the use of thermal energy in the territory
- **Media:** structured awareness and education actions on the importance of using renewable energy sources.



Why choose us?

Our HEMS solution allows:

- An effective **control and monitoring**: informed management of activities guarantees the necessary tool to support the efficiency of district heating network management activities
- The **implementation of pricelist profiling policies**: by profiling the User, it is able to provide all useful information to direct the right contractual formula, also enabling functional discounts to improve both the User's costs and the operational efficiency of the plant
- The **improvement of operational efficiency**: the proposed design approach encourages the industrialization of operational processes

and interaction with the User, enabling plant management centered on digital innovation

- **The development of informed service awareness**: the quality of the information collected, the integration and constitution of useful "new data" improve the awareness of the management process, enabling targeted investments, but progressive over time.



Appendices

@ www.eng.it

in Engineering Ingegneria Informatica Spa

 @LifeAtEngineering

 @EngineeringSpa

