District Heating and Cooling
Pöyry has extensive experience in the field of district heating and cooling.

We have taken part in numerous district heating projects, from feasibility studies to project implementation, including but not limiting:

- CHP production, solid-fuel-fired plants with flue gas condenser, oil and gas heating plants and heat pump processes
- District heating network sizing, design and simulation with pressure-loss calculation
- Investment and operating costs are both considered in the optimal design
- Balancing the peaks of heat demand with heat accumulators - seasonal or daily storage - Sizing, connection and operation pattern are designed on a case-by-case basis
- Rehabilitation planning of district heating systems

A district heating (DH) system supplies buildings with centrally generated heat. Hot DH water is generated in a combined heat and power (CHP) plant or in a heat-only boiler (HOB) and transferred to the customers through a hot-water distribution network.

We provide comprehensive advisory services concerning district heating business activities, including:

- Ownership strategies
- Development of business strategies
- Asset valuation and appraisal
- Business risk analysis
- Tariff planning
Centralised heat production enables the mentally benign fuel. In addition, different sources of waste heat can be utilised. Compared to decentralised heat production, a centralised heating system results in heat generation, which causes less pollution. Instead of coming from many stacks, the flue gases exit into the atmosphere from the stacks of only a few heat production plants, making air-pollution control easier and more efficient.

CHP
Combined heat and power (CHP) production utilise the maximum amount of useful energy from the fuel burned. CHP generation is a process that transforms primary energy into both electrical and thermal energy. The excess process heat is not discharged into the atmosphere, instead, heat is recovered for district heating water or for industrial processes.

The cogeneration of a given amount of electricity and heat requires 35% less fuel than the separate generation of the same amounts. The decrease in fuel consumption leads to improved production viability and to a major reduction in CO2 and other GHG emissions as compared with the conventional separate generation of heat and power.

FEASIBILITY STUDIES
The objective of a comprehensive feasibility study is to identify the development alternative which provides the most profitable investment opportunity and which takes specific local conditions into account. The investment costs required and other fixed and variable energy costs are estimated in order to assess the feasibility of each alternative. On the basis of the calculation results, the best alternative is chosen for further development. Pöyry’s services cover the design of the whole district heating system as well as smaller subprojects.

Pre-engineering:
• Heat load determination and network design
• System dimensioning:
  – optimal plant size
  – optimal network design
  – consumer connections
• Advantages of heat storage, optimal size and type of storage

Procurement and implementation:
• Procurement documents
• Detailed design
• Implementation supervision
• Guarantee tests and emission measurements
• Operation and maintenance planning

REHABILITATION OF EASTERN EUROPEAN DISTRICT HEATING SYSTEMS
One of Pöyry’s main areas of expertise is the rehabilitation of existing district heating (DH). The service level and the efficiency of existing DH systems are inadequate, because the poor technical condition of the old systems results in high maintenance and operating costs. This reduces the competitiveness of DH against other heating methods.

Rehabilitation projects are often financed by international financial institutions (IFIs). Before making decisions concerning financing, IFIs typically require a comprehensive study (development or business plan) to ensure that their funds are utilised in the most effective way. Such a study involves a number of aspects:
• Analysis of the existing DH system
• Environmental aspects
• Institutional analysis
• Financial management → Rehabilitation strategy with financial and economic analysis
• Implementation arrangements

Pöyry not only carries out such studies but also has vast experience in project implementation assistance in accordance with the requirements of IFIs.

DISTRICT COOLING AND TRIGENERATION
District cooling is emerging as an energy efficient tool for providing comfortable indoor climate during summers. The demand for comfort cooling is gradually increasing. Different technologies for cooling associated to a district network can be used. Local natural and economical conditions are of relevance for the choice of the technique used: absorption chillers, compressors, free cooling (sea/lake water).

Trigeneration generally means the simultaneous conversion of a fuel into three useful energy products: electricity, heat (hot water or steam) and chilled water. Flexibility to use the CHP heat for heating during one season (winter) and cooling during another season (summer) provides an efficient way of maximizing the running hours at high total plant efficiency, utilising fuel in the most efficient and environmentally sound manner. Pöyry provides subsequent services for district cooling and trigeneration projects:
• Introduction of technical concepts taking into account heat/power/cooling energy production, storage, distribution and consumer applications
• Load modelling
• Basic conceptual design
• Feasibility studies and analysis
• Assistance in procurement including technical specifications and bid evaluation
• Implementation and commissioning supervision including guarantee measurements and analysis
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