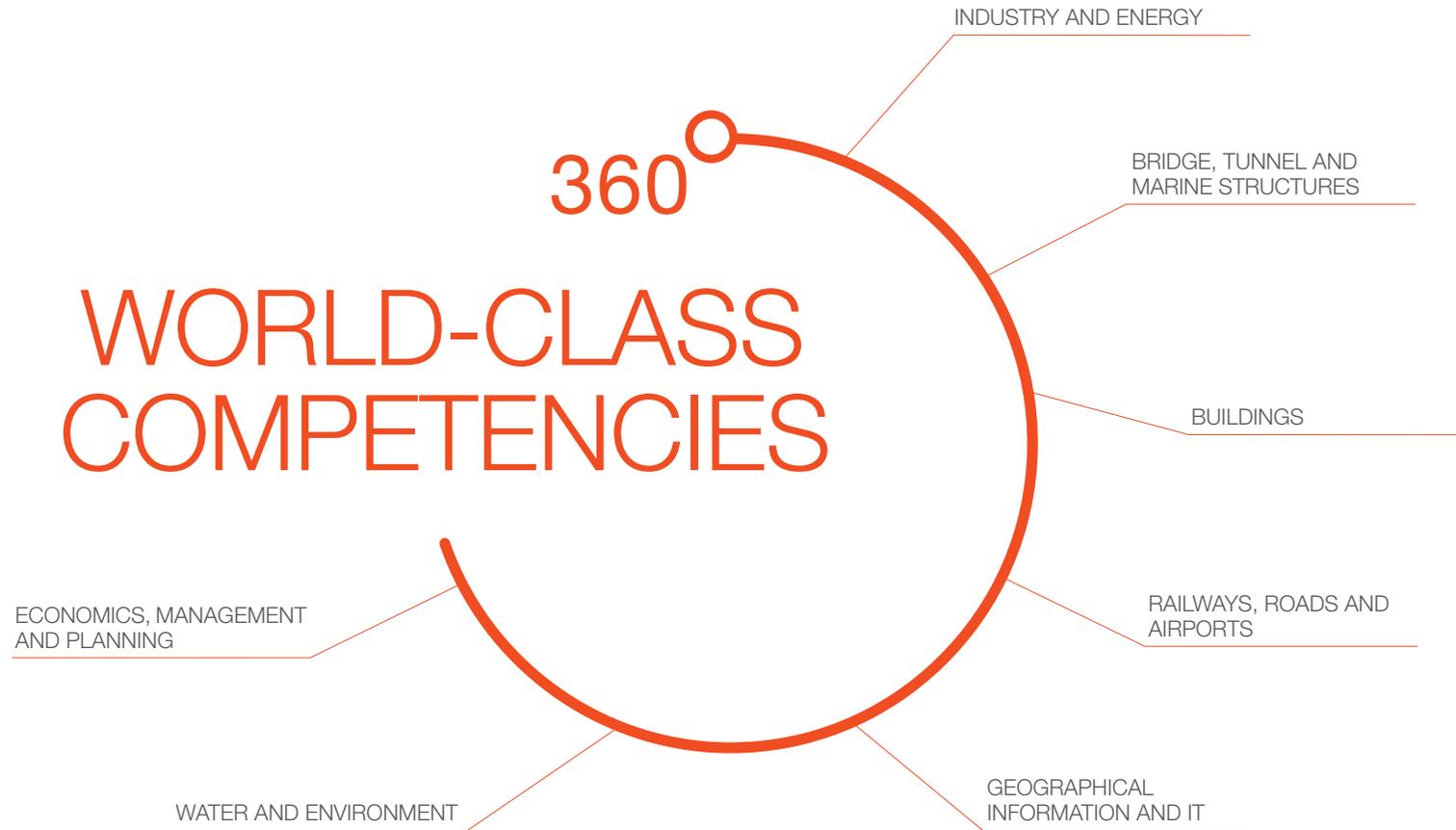


ENERGY PLANNING AND DISTRICT HEATING



COWI



COWI is a leading consultancy group that creates value for customers, people and society through our unique 360° approach. Based on our world-class competencies within engineering, economics and environmental science, we tackle challenges from many vantage points to create coherent solutions for our customers.

With offices all over the world, COWI combines global presence with local knowledge to take on projects anywhere in the world – no matter how large or small. At any given moment, we are involved in more than 17,000 projects worldwide.

We have more than 80 years' experience in the business, and COWI is a leader within its field because our more than 6,000 employees are leaders within theirs. Together with our customers, we create coherence in tomorrow's sustainable societies.



COWI's experts have been involved in district heating since its early development. Our energy planners and designers have been instrumental in the development of many of the large district heating schemes from the early beginnings linking buildings in city centres together, to the development of large transmission mains linking entire cities to the same network.

Together with our clients, COWI continues to improve, develop and optimise systems to create solutions that are more sustainable, efficient and cost effective than before. Right now in Denmark we are working with a new generation of district heating, with lower temperatures and improved efficiencies. New heat sources, previously thought of as intangible, are now being integrated into existing district heating systems, such as heat recovered from waste water and industrial processes.

Within our Energy and Industry Departments we have over 250 specialist staff working with all aspects of energy and industrial efficiency. We can provide a full end-to-end service from design of heat generation plant, heat network and energy efficient building design. Or, of course, anything in between!



SERVICES

Modern district heating systems are often very complex and cover large areas. They may constitute long-distance transmission lines, booster pump stations and large heat exchanger stations, as well as widely different generation methods.

Of course, district heating does not usually begin with the development of an extensive inter-city transmission network. The network is built up over time as new connections are made and new investments are justified. Experience of the development from small to large schemes, and continuous optimisation and efficiency improvements give COWI a sound basis of experience. We advise on projects of all sizes to help ensure that they provide the most economically viable and sustainable option right now, whilst still facilitating future development and improvement. Below is a brief overview of our services:

› **Master Planning:** We have carried out heat master planning studies to assess the optimal methods of heat supply and distribution within cities all over the world,

including Europe, China and the USA. Our experience includes assessment of current and predicted future energy use to provide an outlook on the supply requirements and advice on how current and future demands may be met in the most environmentally and economically sustainable way.

› **Concept Design and Development:** We work with our customers to provide a sparring partner for concept development and design. It is our philosophy to provide a solution that is technically, financially and environmentally sustainable for all the project partners.



- › **Feasibility Studies:** COWI prepares bankable feasibility studies to assist public or private investors in developing a solid basis for decision-making on major investments. Our work includes technical, financial and economic assessment as well as social and environmental studies and analysis.
- › **Detailed Design:** Whether a single pump station or a full biomass CHP plant, our experts have the expertise and experience to provide concept designs for tender or detailed design for construction. COWI's drafts people can create designs in three dimensions, giving a full simulation of the plant and preventing the need for many 2D drawings. This minimises errors both in re-drafting and during construction.
- › **Project Management and Supervision:** COWI's highly developed project management systems allow optimal data sharing and control throughout the course of the project. Project sites and information can be shared with internal and external partners,

improving co-ordination with all parts of the project. This gives the entire project team the tools to effectively manage the project together.

- › **System Optimisation:** An important part of COWI's work with district energy is optimisation of existing heat distribution networks. COWI are the only worldwide system integrator of TERMIS software, and have a team of specialist district heating engineers working with TERMIS to optimise the operation of networks and to inform decisions on network investment and expansion.
- › **Aerial Thermographic Surveys:** Using a thermographic camera mounted on an aircraft, COWI can quickly build a thermographic picture of an area. This is a useful tool to pinpoint areas where there are leakages of heat and which are therefore a priority when planning a renovation project.



SELECTED PROJECTS

DUBLIN, IRELAND

The district heating network at Spencer Docks will eventually include a local heat distribution network, boiler station and a transmission line for connection to a new waste-fired CHP facility. COWI have provided many years of assistance to the development of both the district heating network and the waste to energy plant. Our consultancy included assistance with the initial feasibility work and design and project management of the installation of pipes under the River Liffey to enable connection to the new waste-fired CHP facility. COWI have also been able to assist with marketing information and technical advice on the connection of existing buildings to the scheme.

LERWICK, SHETLAND ISLANDS

Shetland District Energy Scheme was set up in 1998 to provide heat from the waste-to-energy plant on the outskirts of Lerwick to over 1,000 homes and businesses in the area. Over 27km of DH pipe has been installed to date, and the network continues to

grow and develop. COWI have been involved with the project from the beginning, carrying out initial feasibility work, designing the optimal pipe networks, and optimising the systems using cutting edge TERMIS modelling. Now COWI are assisting with developments which will allow additional connections to the scheme, including the integration of wind turbines with electrically heated thermal stores to help regulate the thermal and electrical supplies in the area.

ALBERTSLUND, DENMARK

Albertslund Syd, near Copenhagen, is an area of 2,000 dwellings currently undergoing an extensive refurbishment plan. As part of the refurbishment COWI are replacing part of the district heating system with new system designed to run with a flow temperature of 50°C. This will reduce the heat losses across from the network to half of the equivalent losses for a system running at 95°C.



BJERRINGBRO, DENMARK

As one of the world's leading suppliers of energy efficient pumps Grundfos are keen to ensure that their headquarters is as efficient and environmentally sustainable as possible. COWI were able to assist by designing a heat pump that makes efficient use of the waste heat from the Grundfos manufacturing plant. During the winter the heat pump provides heat to the town of Bjerringbro via the existing district heating network. During the summer the heat pump is turned off and heat is stored in the ground ready for use the next winter.

SERBIA

In many areas of Eastern Europe, district heating systems have fallen into disrepair through lack of investment. COWI are assisting in the rehabilitation of 20 such systems in Serbia. Using cutting edge TERMIS modelling software, combined with the expert knowledge of COWI district heating engineers, we are devising plans for

prioritised future investment to bring the systems back up to a reliable and optimised running pattern.

PURMEREND, THE NETHERLANDS

COWI have worked extensively with the district heating provider in the town of Purmerend to realise significant efficiency and operational improvements across the 281 km of installed pipe network. Detailed TERMIS modelling has helped to optimise the network and assess future investments, such as the addition of new pumping stations and biomass heating plant. Most recently, an aerial thermographic survey has helped to identify over 150 anomalies in the network. A renovation plan based on the results of the thermographic survey has already saved almost two thirds of the daily water losses from the network.

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