

03 CREATING COST-EFFECTIVE AND LOW CARBON CITIES

HOW IT IS DONE

With the push that comes from urbanisation, economic growth, growing industry needs and changing energy needs, local governments must plan the improvement of the energy and building infrastructure. Consider including these elements to ensure an effective energy system moving your city towards carbon neutrality:

- Work on an energy strategy that focuses on integrated solutions for urban design, energy, buildings and transport. This makes it possible to create highly efficient district energy grids that facilitate the production and distribution of thermal energy throughout a city in the most cost-effective and sustainable way.
- Capitalise on the large-scale advantages that are natural in a city. Through creating city-wide district energy grids, it is possible to provide cost-effective and sustainable energy solutions rather than working on individual buildings or building blocks.
- Work cost-effectively by transmitting electricity from e.g. wind farms or solar panel electricity (solar PV) farms at suitable locations connected to the electricity grid, far from cities rather than using local wind turbines or solar PV on rooftops.

The challenge of connecting energy plans and climate proofing

Introducing district energy grids requires a solid strategy and city planning. With the push that comes from urbanisation, economic growth, growing industry demands and changing energy demands, local governments must plan the improvement of the energy and building infrastructure. And whenever urban development projects are planned, the establishing of a basic network for district heating and/or cooling is needed. These networks should be prepared for future expansion so that they can be scaled to meet a variety of demands rather than being limited to the area that is being developed.

In order to connect energy plans and climate proofing it is necessary – but not necessarily simple – to map and address all major economic, social and environmental consequences that the energy solution will have for the citizens.

A clever way towards CO₂ neutrality

It is possible to achieve CO₂ neutrality in numerous ways. The trick is to do it in the smartest way possible, which in this context means with maximum cost effectiveness taking into account the cost of CO₂.

- Work on holistic solutions and focus on cost effectiveness for both the project owner and for the society at large.
- Insist on integrating the planning of power, district energy and buildings which together form the most cost-effective solutions.
- Think large scale. Plan for integration of fluctuating/ low temperatures and renewable energy into the district energy system. This can include large and cost effective thermal storages, large heat pumps, and combined heat and power systems. As this system can store an additional amount of electricity when electricity prices are low and hereby avoid the use of electricity on days of high prices, the system called “the virtual electric battery” has the same impact on the power system as a battery, only it is cheaper.

To reap the benefits of building up a centralised, cost-effective and environmental district energy system, identify the solution that is most economical for the city as a whole. How much can we spend on bringing down carbon emissions? And how to achieve the best possible indoor climate, a healthy environment, comfort in buildings and economic growth at the lowest cost?

Bear in mind that district heating and/or cooling is typically the most feasible solution for densely built-up areas. Likewise, it is smarter to transmit electricity via the power grid from e.g. wind farms or solar PV at suitable locations rather than using wind turbines or solar panels on rooftops, which are likely to produce only one-third of the energy.

Maximise the impact of the silent, invisible backbone of the city

By establishing district energy grids for hot and cold water, cities get more value for money with a high security of supply, a high quality of energy and a low environmental impact at a low cost.

At the same time, it is a valuable advantage that the district energy and power grids are invisible. No cables are hanging above the citizens, no wind turbines are sending out noise, and no solar PV are disturbing the aesthetic feel and architectural design. Centralised district energy and power grids are the silent and hidden backbone of the city.

THE IDEA BROUGHT TO LIFE

Carlsberg Byen – a new city district in Copenhagen, Denmark

Carlsberg Byen has planned and established a sustainable energy infrastructure. The 30 hectare district includes heat demand of 600,000 m² floor area of which 50% also has a cooling demand. The district has chosen the energy solutions which are most cost-effective for Danish society as well as for the local community in Copenhagen, lowering energy costs for all.

Buildings will be connected to the city-wide district heating system, approved by the city council and Carlsberg Byen to be most cost-effective for society, the local community and the consumers.

Buildings with a cooling demand will be connected to a local district cooling facility with chilled water storage in the city district. Carlsberg Byen has estimated the total NPV benefit in 20 years for consumers in 20 years to be 100 mill. DKK compared to chillers established upon the individual buildings.

Roof-top installations for solar PV, chillers and other energy equipment, are avoided to give space to green roofs and architecture.

Establishing a district heating system in Greater Manchester, UK

In Greater Manchester, a metropolitan county in North West England, a district heating energy masterplan for ten local authorities of Greater Manchester has been initiated to facilitate the efficient, cost-effective development and delivery of heat networks to support carbon and energy policy commitments both locally and nationally.

Heat networks are key components in Greater Manchester's plans for low carbon growth, since they not only provide the opportunity to reduce CO₂ emissions from the city's existing activities, but will critically help ensure that they have the right infrastructure to enable future development to plug into low and zero carbon solutions.

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