

## THE DH YEAR IN DENMARK 2020

Despite being a rather bleak year, 2020 was a productive year for both climate, energy and district heating (DH) in Denmark. Although Covid-19 slowed down basically everything and the Danish government shut down most of Denmark for several months, the DH sector has had a rather positive year. DH is considered critical infrastructure and since people were stuck at home, utilities services, such as heat and water, have been (as always) crucial to uphold. As a result, the DH companies and their employees needed to remain fully functional even though much of the country was shut down. In addition, the DH sector has faced political agreements on climate, energy and industry and Danish District Heating Association (DDHA) has presented its national campaign along with several other initiatives.

### The first Climate law of Denmark

The first Danish Climate Law was agreed upon in the Danish Parliament back in December 2019, compelling future Danish governments to work actively on reducing greenhouse gas emissions. The Climate Law has led to various initiatives and legislative proposals, which have governed most of 2020 and had an impact on several aspects of the Danish DH sector.

Importantly, the law sets out a goal of 70 pct. carbon reductions by 2030, compared to 1990 levels. This goal is significantly higher than the EU-commission and European Council target of 55 pct. CO<sub>2</sub> reductions by 2030 or the European Parliament's position of 60 pct. reduction.

### A Climate agreement for energy and industry

To ensure follow-up on the 70 pct. target, a climate action plan was presented by the Danish Climate Council<sup>1</sup>. This action plan was the basis for the proposal from the Danish minority government (currently Social Democratic) on a climate action plan presented in May, which was then negotiated in Parliament. This resulted in a broad Climate Agreement for Energy and Industry reached in June, although detailed parts of the agreement are still being negotiated. An important part of the agreement is an expanded carbon tax scheme as well as a broader revision of green taxation to ensure that carbon pricing becomes the main driver for carbon reductions in Denmark. This agreement is expected to contribute to Danish greenhouse gas reductions corresponding to approx. 3.4 million tonnes CO<sub>2</sub> equivalents annually by 2030. Some of the initiatives relevant to the DH sector will be presented in more detail below.

#### Introduction of the first-ever energy islands

A prestigious and innovative part of the climate agreement is to establish two “energy islands”. One island is to be placed in the North Sea and connected with 3GW offshore wind energy. The other island will be placed in the Baltic Sea by the island of Bornholm and connected to 2GW<sub>e</sub> offshore wind energy. In November, the climate minister ordered the beginning of preliminary studies to assess the geophysical conditions and cable connections for the islands.

The energy islands will not only produce electricity, but may in the long term be able to host PtX facilities aimed at storing and transforming electricity into sustainable fuels to be used to replace fossil fuels in industry and transport, in sectors not easily transitioned to renewable electricity. Danish District Heating

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<sup>1</sup> The Danish Council on Climate Change is an independent body of experts, established by parliament and state funded, providing advice on cost-effective climate policy solutions.

Association (DDHA) would rather see electricity brought ashore and converted in locations where waste heat from conversion processes could be utilised in DH. In addition to the energy islands, an offshore wind energy farm of approx. 1GW<sub>e</sub>, agreed upon in 2018, will be brought forward and placed by the island of Hesselø in the Kattegat. All this additional wind capacity amounts to a total of 6GW<sub>e</sub>, which is over three times the capacity of the current offshore wind energy capacity in Denmark.

#### *Government betting on CCS, CCUS and PtX*

The Danish government is betting on Carbon Capture (Utilisation) and Storage (CCS and CCUS) as well as Power-to-X (PtX) as part of the climate agreement. A government fund aimed at establishing large-scale PtX facilities of a total of 100MW will be established. This amounts to more than five times the capacity of the current largest facility. Here, the Netherlands has already invested approx. €130 million into this project. In addition, support will be available for CCS and CCUS from 2024. According to the Geological Survey of Denmark and Greenland, a government research institute, the Danish underground should be able to hold 22 billion tonnes of CO<sub>2</sub> and according to the Danish Climate Council, CCS could capture and store up to 4.5 million tonnes of CO<sub>2</sub> towards 2030. The climate agreement states that CCS is expected to deliver approx. 0.9 million tonnes CO<sub>2</sub> emission reductions annually by 2030. However, how the CCS will be implemented is not yet decided and the possibility of transporting CO<sub>2</sub> to Norway or the Netherlands, if prices are favourable, is being considered.

#### *Introduction of sustainable heating and a phase-out of oil and gas from the sector*

There has been a significant development in sustainable heating due to the latest climate agreement. A very important aspect of the agreement for DH is that oil and gas is to be eliminated from the building heating sector and to be replaced with sustainable DH and electricity. As part of the annual budget negotiations in December, approx. €109 million have been set aside for the phase-out of oil and gas boilers towards 2025. To accelerate and incentivise this phase-out there will be an increase in taxes on fossil fuels (to €30/MWh) as well as subsidies for building conversions to more sustainable heating solutions. These subsidies will be available from 2021-2030 to support the conversion of building heating systems, disconnection from gas systems and expansion of DH systems. The gas sector seems to accept this phase-out and instead focus on retaining a market for renewable gas (PtX) in industry and transport.

In addition, it was agreed that the possibility of full elimination of mainly gas and oil from DH (where mainly gas, but also oil, is often the backup solution) in 2030 shall be analysed, that current obligations to use gas, placed on DH operators, shall be abolished, and that an obligation in the heat planning system to include fossil heating options in socio-economic analyses shall be removed. Also, the legal requirement for DH systems to use natural gas or CHP for their main production will be removed, making way for heat pumps, electric boilers, geothermal, waste heat and biomass.

#### *Electrification of DH and the fight with individual heat pumps*

From 2021 the tax on electricity for heating purposes will be reduced to the EU minimum (€1/MWh non-business and €0,5/MWh business). This is expected to incentivise expanded use of heat pumps both individually and in DH systems, as well as electric boilers and waste heat from electricity-based processes. Increasing the economic attractiveness of heat pumps may, however, lead to lower investments in geothermal energy, solar heating and biomass in DH.

Subsequent to the presentation of the climate agreement there has been an ongoing struggle with politicians on the role of individual heat pumps. In the climate law approx. €309 million is set aside for the phase-out of oil and gas boilers towards 2030. Of these €309 million, approx. €175 million is set aside for the building stock, where home owners can be subsidised when transitioning to individual heat pumps. €63 million is set aside to cover the costs of disconnecting from the gas grid and €54 is set aside for the development of the DH grid. Although the electrification of DH is welcomed, the DH sector is concerned that the tax reduction along with the favouritism of individual heat pumps in the distribution of subsidies could significantly intensify competition between DH and individual heat pumps in suburban areas, including areas traditionally deemed suitable for DH. Since the benefits of scale of DH increases as more customers connect to the grid, the loss of even a few potential customers in an area could have an impact on the expansion of DH systems. If individual heat pumps become widely distributed in some areas, customers will not be given the free choice between heat pumps or DH, since DH will never reach this area and as a result the customer can only choose an individual heat pump. So much for the free choice!

The climate agreement will also ensure a more efficient efforts on energy efficiency in both industry and buildings. This is done through a boost in the funding for electrification and energy-optimization for industry. At the same time there will be requirements on energy savings for public buildings towards 2030.

#### *The development of discussions on economic regulation of DH*

Apart from the discussions on individual heat pumps versus DH, the issue that has taken up much of DDHA's time is the development of the economic regulatory framework of the DH sector. The DH sector is seen as a natural monopoly and is regulated as such. This involves self-sustaining cost-based-pricing, where the DH sector is governed by a principle of non-profit.

However, it was expected that the government would propose an expanded regulatory framework involving revenue caps and benchmarking to increase efficiency and general requirements to increase productivity. The background is that a consultancy report claimed that Danish utilities – including DH suppliers – are inefficient. However, the report has since been heavily criticised by several sector organizations, including DDHA. Additionally, the efforts to implement the regulation has faced huge problems in designing the scheme for the very heterogenous DH sector. DDHA is concerned that the proposal would create unnecessary bureaucratic burdens and hamper the desired green transformation. Consequently, in January the Minister of Climate, Energy and Utilities put the proposal on hold to further investigate the economic efficiency of the DH sector.

However, with the new climate agreement, discussions on economic regulation have been taken up once more. According to the agreement, the current monopoly regulation of the DH sector must be modernised in order to facilitate a cost effective and climate neutral transformation of the sector while maintaining economic efficiency and consumer friendly prices. In August the Danish Utility Regulator presented their analysis of the potential for optimization of the collective heat supply in Denmark to the Parliament Committee on Climate and Energy. The analysis concludes that DH companies should be able to save DH users from up to €201 million a year through optimization. In addition, the Danish Competition and Consumer Authority suggested, that the DH sector should no longer be governed by a self-sufficiency principle and instead be governed by market forces and economic regulation of DH companies' efficiency.

According to DDHA, the Danish Utility Regulator's analysis does not account for the facts that DH prices have been decreasing annually and that the spread in prices between companies has also decreased. Along with

the increasing amount of renewable energy used in DH despite heat planning obligations and restrictions on DH producers (which will now be abolished), this indicates that DH companies are becoming more and more efficient under the current regulation.

#### Conditions for utilisation of waste heat are improving

Back in March 2019, a political agreement in Parliament on increased utilisation of waste heat was introduced. The current climate agreement confirms the targets, set by the waste heat agreement, but aims at further promoting the utilisation of waste heat. Consequently, the current tax on waste heat has been significantly reduced. In addition, the tax is to be completely eliminated from electricity based waste heat (e.g. from data centres, super markets etc.) as well as from other waste heat sources covered by a certification scheme to ensure energy efficiency at supplier's site. In 2019, 3.3 pct. of heat production came from waste heat and is expected to increase significantly within the next years. E.g., Microsoft has introduced plans to build three new data centres in Denmark, which could potentially produce massive amounts of waste heat. The combination of secure supply of renewable electricity and reuse of waste heat gives data centres locating in Denmark a rather green profile.

The contracting parties to the climate agreement are set to discuss the specific model for a certification scheme. The Danish government has proposed to regulate waste heat through a more simple certification scheme as well as a threshold, under which certification wouldn't be required, which could benefit e.g. supermarkets through minimal administrative burdens and then more likely to sell their waste heat. However, there is still concern that parts of the proposal, namely a RES price ceiling could discourage new waste heat projects. The RES price ceiling exempts businesses from administrative burdens of price regulation if the costs are under a certain limit. The limit will be set by comparing prices with the cheapest RES alternative, e.g. heat pumps. The idea behind this is to deter the production of "false" waste heat, where an industry increase their production of energy in order to sell their waste heat. However, it could hinder new waste heat projects because of the uncertainty of the development of the price ceiling, if it changes from year to year, which could be the case if it needs to be compared to the cheapest RES. Additionally, DDHA believes it should be compared to something undesirable, like fossil fuels (maybe later in the transition, biomass), instead of RES.

#### Legal sustainability requirements for biomass

The sustainability of biomass used for energy production has been widely debated in Denmark over the past year, where some political forces even proposed ceasing import of biomass and ending use altogether. In the climate agreement, the parties agreed to put requirements ensuring sustainability of biomass for energy purposes into law. This includes requirements for documentation and verification. In addition, the political parties behind the energy agreement have agreed to have the consequences, including for security of supply, of future curtailments of the use of biomass for heating and electricity production further analysed.

In October, the Danish government and several political parties agreed on a deal on the specific legal requirements to ensure sustainability of forest biomass. These legal requirements include that biomass should originate from trees cut down legally and that these trees are required to be replanted. Henceforth, biomass is not to be imported from countries, where forests are declining, unless these forests are sustainably managed. Emissions within the chain of production are also required to be kept at a minimum. Violations will trigger sanctions. According to DDHA, for now, biomass is necessary to reach the 70 pct. CO<sub>2</sub> reduction target by 2030, and further discussions are needed on which technologies could and should replace biomass after 2030. Here, it might be that regulation on geothermal energy as well as waste heat needs to

be adjusted, since these are the only technologies mature enough to replace biomass at its current scale of use.

#### Uncertainty about the future of geothermal energy

During the fall, regulation on geothermal energy has been discussed. It was expected to be a central factor in the green transition but was almost non-existent in the climate agreement. Geothermal energy can deliver 100 pct. sustainable energy for heating. In 2030, geothermal energy should be able to cover 10 pct. of DH and in 2050 it should be 30 pct. Several larger cities in Denmark are planning to utilise geothermal energy, but uncertainty regarding prospecting and expected costs affects the assessment of the potential. Aarhus, the second largest city in Denmark, is planning on a large-scale geothermal project of 112MW and has identified a price on the project which is approx. €107 million lower official projections. The Minister of Climate, Energy and Utilities has put together a taskforce to see the Aarhus project through and hopefully this can provide a better assessment of the potential.

In addition, as part of the annual budget negotiations another taskforce was created, meant to investigate what it takes to realise the potential of geothermal energy. However, this taskforce is only set to report back in 2022. This is too late for many DH companies facing a need for immediate investments. E.g. Aalborg, the fourth largest city in Denmark, is unsure about the 100MW project in their pipeline. Whether investments in e.g. a new biomass facility or a shift to geothermal energy is favourable depends on the outcome of this taskforce report. According to DDHA, there is need of a subsidy scheme to support the development and utilisation of geothermal energy – especially with regard to the risks involved.

#### **Green initiatives by DDHA**

DDHA has had a productive year on top of the climate agreement. Especially because of the increased competition with individual heat pumps and discussions on economic regulation of the DH sector, it has been an important task to demonstrate the positive sides of DH and its contributions to the green transition. The transition to sustainable DH will be an important factor in reaching the 70 pct. reduction target for 2030 mentioned above. Here, DDHA has calculated that the DH sector can provide almost half (44.4 pct.) of the needed reductions, and offers initiatives that can facilitate the Danish energy transition. In March, DDHA along with Green Energy Association, an association of industries, researchers and DDHA, presented 10 proposals for reducing CO<sub>2</sub> emissions in Denmark. These were:

- 1) Green transition of the 500,000 households currently heated with fossil energy (oil and gas).
- 2) Increased use of waste heat from industry
- 3) Three large geothermal facilities
- 4) Large electric heat pumps utilizing PV and wind electricity
- 5) Sustainable biomass as additional to electrified DH
- 6) Digitalisation and energy efficiency measures to reduce CO<sub>2</sub> and ensure efficiency in DH
- 7) Carbon neutral heat for industrial manufacturing
- 8) More solar heat in DH,
- 9) Only carbon neutral Waste-to-Energy
- 10) No baseload on fossil fuels

In addition to these 10 proposals, DDHA has presented several other initiatives, some of them related to the above. These initiatives are presented below.

#### DDHA campaign: The future at our feet

In November, DDHA presented their new campaign on “The future right at our feet” to draw attention to the DH sector as a low-cost, accessible, easy and noiseless climate-friendly solution for the future. This included commercials broadcasting on regional TV channels and online as well as outdoor posters. DDHA members have had the possibility to join in and contribute to and use the campaign to promote their own DH company and over 100 members have currently signed up.

#### *Carbon neutrality by 2030*

As part of the Danish government’s 70 pct. CO<sub>2</sub> reduction by 2030 target DDHA has presented a strategy of carbon-neutral heating in 2030. Because of the uncertainty regarding the future economic framework of DH, DDHA has presented this as a counterproposal to some of the more rigid economic regulation proposals. The proposal is simply to utilize DH in the green transition by converting DH plants to sustainable heating and using DH for sector integration with other energy systems. This is possible with a more modern regulation, where companies commit to becoming more efficient.

#### *Sustainable heating for 500,000 additional households*

A specific initiative by DDHA to manage this green transition is facilitate the transition 500,000 individual oil and gas heated homes to sustainable heat by connecting to DH or converting to individual heat pumps. Currently, conversions are not happening at the pace needed to have a fully sustainable heating sector in 2030. Many homes are adjacent to DH networks and should be given the opportunity to connect. For homes not close to the existing DH grids, new, decentralized DH grids could be established. Outside areas suitable for collective heating solutions, buildings should convert to individual heat pumps. Such conversions do happen, but not enough, and not fast enough. That’s why the Danish DH sector is going a little beyond its traditional realm when DH utilities start offering packaged solutions with heat pumps to individual building owners. Many building owners find it difficult to assess the various heat pumps technologies, ensure they get the most efficient solution with regard to their needs and also financing the installation. Some DH companies have started offering a package, taking care of all those issues and selling heat to the building owner on terms equal to DH.

#### *Green Heat Alliance*

In the middle of June DDHA gathered several organizations within energy supply, industry, labour unions and research to create a “Green Heating Alliance”. A main point of the alliance is to emphasize sustainable heating as an important part of the Danish climate goals and the current negotiations on climate and energy.

The alliance seeks to create and secure new green jobs and export opportunities through three larger flagship concepts. First, as part of the green initiative launched by DDHA, the alliance seeks to create sustainable heating for 500,000 additional homes, thereby creating 15,000 jobs and reducing CO<sub>2</sub> emissions by 1.8 million tonnes. Second, the alliance seeks to create five renewable energy stations in 10 years, where energy can either be converted, stored, distributed or used for sector integration. Third, the alliance wants 100,001 digital green homes, where homes will be digitalized in order to adapt to the green transition. Through these flagships, DH is an important tool in combining energy producing and consuming sectors with industry, research, digitalization and technology.