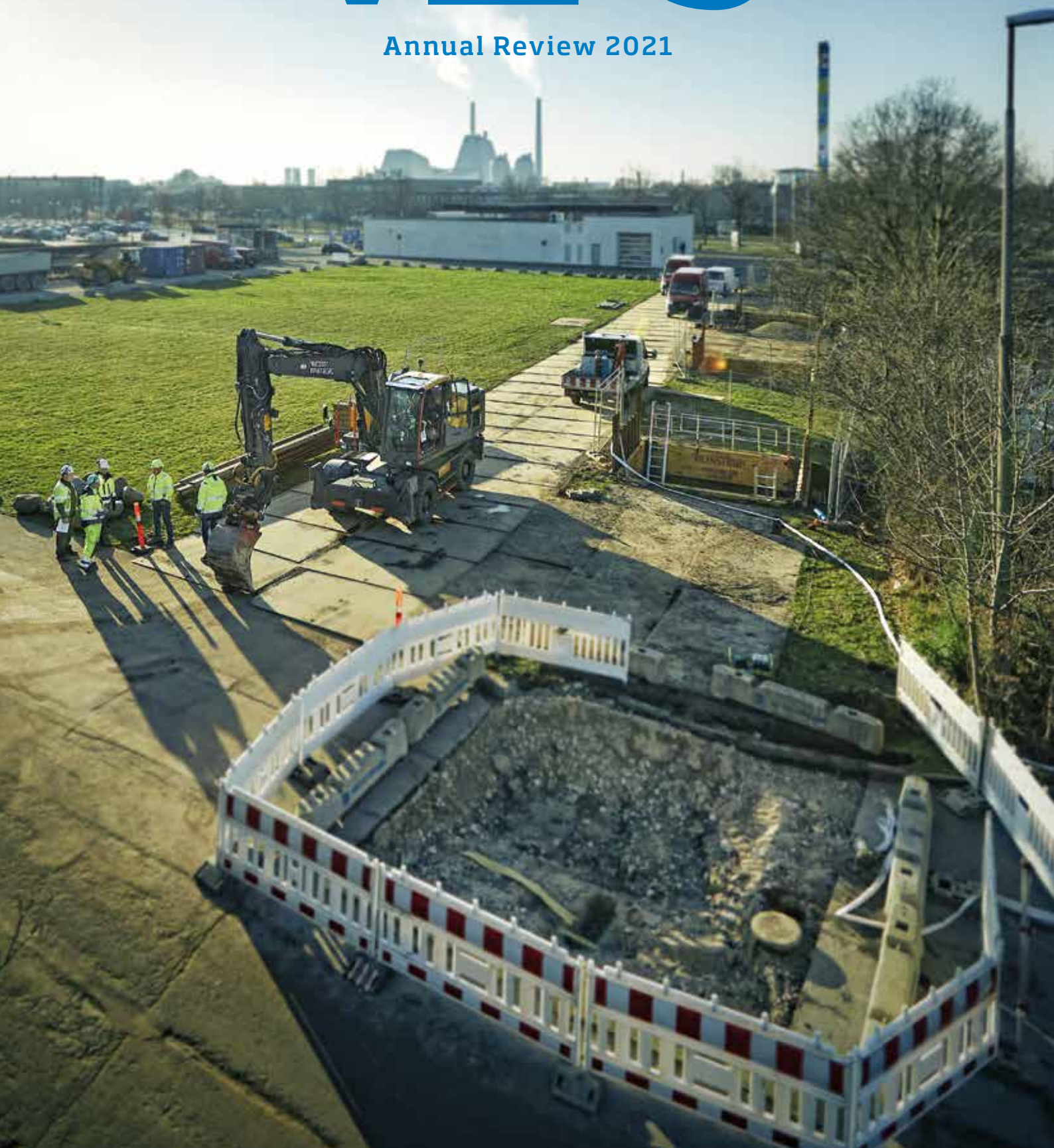


# VEKS

Annual Review 2021







## PREFACE

A Europe in change - also in terms of energy 4

## BACKGROUND

Information about the company 6

## MANAGEMENT'S REVIEW

Key figures 8

Contracts 10

Expectations for 2022 12

## CASES

Introduction to Cases 14

The Future District Heating 16

Like beads on a string 20

District heating on the school timetable 26

Technologies of the future 30

## ACCOUNTS

Profit and loss account 36

Balance sheet as at 31 December 38

Profit and loss account, VEKS Transmission 40

Profit and loss account, Køge CHP plant 42

Profit and loss account, VEKS Gasmotor, Solrød 44

Profit and loss account, Tranegilde District Heating 46

Profit and loss account, Køge District Heating 48

## ORGANISATION

Board of Directors 50

Officials committee 50

Customer forum 51

Organisation, April 2022 52

*The photo shoot of the year is from Avedøre Holme. Here, you find a stretch of transmission pipes where the joints need to be replaced and defect alarm wires to be re-established to ensure the district heating supply to VEKS' customers.*

*In the background, you see VEKS' main supplier of district heating, Avedøre CHP Plant on the front-page photo, which also shows the excavations "Like beads on a string." This is the name of case 2 where the large maintenance project is described.*

*FOTO: Claus Peuckert Photography*

# A Europe in change - also in terms of energy

## Energy policy is reliability of supply

Climate challenges and CO<sub>2</sub> emission are at the top of the agenda in most countries. The population has accepted responsibility and thus it has also become a topic of top political interest and priority. In April 2021, the member countries of the EU and the EU Parliament agreed on reducing the emission of CO<sub>2</sub> by 55% in 2030 compared to the level in 1990.

### Green, greener...

Even though it was a long and complicated process to reach an agreement about a green EU as a common objective, it was probably the simplest part of the process. Now it is down to business and the subsequent discussions have already started - is it possible to compare green?

On 2 February 2022, we recognized that it is possible as the EU gave rise to doubts about what is green. As part of the EU action plan for a greener and cleaner economy, the EU phased in a new classification system (the taxonomy) - to live up to the Paris Climate Agreement and the UN sustainable development goals. This should ensure a homogeneous identification of green and environmentally sustainable investments in the European market.

The outcome was that the European Commission green-stamped natural gas as well as nuclear power with the taxonomy. The reason was that it was necessary to accept imperfect solutions in the transition period to be able to reach the goal of climate neutrality in the EU not later than 2050. You

could imagine that a number of countries are slowly realising that the transition from a fossil-based society to a green, sustainable society is far more complicated in the real world than in the political world.

### Everything's changed

With Russia's invasion of Ukraine on 24 February 2022, the energy policy in the EU was suddenly changed. Now, focus on natural gas as a "green energy source" is definitely replaced by focus on how to combine reliability of supply, security policy and green transition. Not a future in 2030 or 2050 - but now.

Today, no one is talking about creating attractive financial settings for the transition to natural gas. Now, we must reduce the use of natural gas as soon as possible and not least become independent of Russian natural gas.

### Reliability of supply - a forgotten concept

The term reliability of supply has more or less been forgotten since the oil crises in the 1970s. However, back then the Danish politicians took the consequences and started the expansion of district heating based on co-production of power and heat - CHP gained favour. The goal was to minimise the dependence on oil and save resources. Since then, we have taken reliability of supply for granted. Slowly, the concept was hidden and forgotten in our minds - things went quite well. However, the serious, current political situation in Ukraine has once more put reliability of

supply high on the agenda. Now, oil supply is not the challenge but the supply of natural gas to Europe.

If the supply of natural gas to Denmark is constrained, VEKS will prioritise to use oil only in the local boilers in substitution for natural gas. Thereby, VEKS expresses solidarity with the individual natural gas customers who at the current stage do not have an alternative to natural gas.

### The district heating sector can deliver

The district heating sector is ready to undertake the big task of speeding up the phased termination of natural gas and at the same time keep momentum regarding the green transition.

It will neither be easy nor simple in a time where skills and labour are in short supply within many industries - also within the district heating industry.

However, as a society we have no alternative to solving the task. Thousands of natural gas customers within VEKS' supply area must be converted into green district heating. Their heat supply will primarily be based on heat from certified, sustainable biomass from Avedøre CHP Plant and surplus heat from the waste-to-energy plants ARGO and Vestforbrænding. A bit further into the future, this type of heat will be supplemented with geothermal energy and surplus heat from data centres, from "CO<sub>2</sub> capture" and from Power-to-X production of green fuels.



▲  
*It is used by various machine types and sizes.*

### **What should the Danish Parliament deliver?**

The considerable task which turned up during the night on 24 February 2022 does not solve itself, however, it requires adjustments of the current policy in the Danish Parliament.

A prerequisite condition for being able to offer flexible district heating to the present natural gas customers as soon as possible is simple:

- Sustainable biomass must remain as fuel for a longer period than originally planned.
- Utilise the present incineration capacity at the Danish waste-to-energy plants as this will improve the climate all over Europe.

- Stop the process of introducing “reforms” in the district heating sector.
- Take the initiative to a national energy saving strategy with accompanying binding action plans. Saved up energy offers the most inexpensive phased termination of natural gas.

The district heating sector should not use unnecessary resources to shut down well-functioning capacity, privatising or work with bureaucratic earnings bands in a very serious national and international situation. The Government has made it clear. Bureaucracy and unnecessary administration must not prevent efficient and necessary solutions. Denmark has a world-class energy and district heating sec-

tor when it comes to reliability of supply, environment, and economic efficiency. The Government and the Danish Parliament could conveniently start by acknowledging this fact. As is well known, you make opt-in and opt-out. Also when it comes to obstructing the solutions.

Heat is something we share – and in VEKS we look forward to welcoming natural gas customers in the “district heating community” together with the local district heating companies.

*Steen Christiansen  
Chairman, VEKS*

# Information about the company

VEKS, Vestegnens Kraftvarmeselskab I/S, is an inter municipal general partnership which is operated as a non-profit enterprise. VEKS includes production, transmission and distribution of district heating in Vestegnen (Western Copenhagen) in the capital area. 12 municipalities in Vestegnen with a total of 500,000 inhabitants are jointly and severally liable to VEKS' economy. The 12 municipalities are: Albertslund, Brøndby, Glostrup, Greve, Hvidovre, Høje-Taastrup, Ishøj, Køge, Roskilde, Rødovre, Solrød and Vallensbæk. VEKS was founded in 1984 and the primary objective of the company is to utilize heat from the CHP plants and surplus heat from waste-to-energy plants, major industrial enterprises, etc.

### VEKS' district heating system

A total of 135km twin pipes have been laid with 53 heat exchange stations and 19 pumping stations transmitting heat to the local district heating systems. The majority of the heat is supplied to VEKS from Avedøre CHP plant and the other CHP plants in Copenhagen and from the waste-to-energy facilities ARGO and Vestforbrænding. The transmission system is controlled, adjusted and monitored from a 24-hour manned operations centre located in VEKS' headquarters in Albertslund. The reliability of supply is high in

the area, with 22 local boiler stations being used as reserves and for peak load during particularly cold spells.

### Finances and organisation

VEKS consists of five separate areas within the same legal entity: The name VEKS covers the consolidated activity within the given areas which are fully separated financially under the same CVR number.

### Transmission

VEKS Transmission supplies 19 local district heating companies with heat in Vestegnen. The local district heating companies manage the redistribution to private customers, business customers and institutions. The heat supplied is equal to the consumption of 170,000 families.

Together with CTR and HOFOR, VEKS participates - each with an owner's share of 1/3 - in HGS (Hovedstadens Geotermiske Samarbejde - the Geothermal Cooperation of Greater Copenhagen) which operates a geothermal test plant in Amager.

### Production

Køge CHP Plant (KKV) produces electricity for the grid, steam for Junckers Industrier A/S and sells (internally) district heating to VEKS Transmission.

VEKS Gasmotor in Solrød was established in December 2015 and produces electricity for the grid and district heating for VEKS Transmission based on biogas delivered from Solrød Biogas A/S.

### Distribution

Køge District Heating (KFV) handles the distribution of district heating to private consumers, business customers and institutions in Køge. The heat is purchased internally from VEKS Transmission.

Tranegilde District Heating (TFV) handles the distribution of district heating to customers in Tranegilde's industrial area in Ishøj and Greve. The heat is purchased internally from VEKS Transmission.

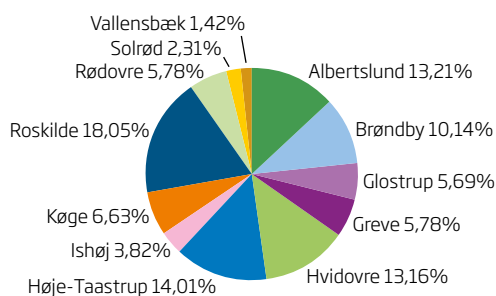
### Legislation

VEKS is governed by §60 of the Danish Act on Local Government (Lov om kommunernes styrelse). For instance, this means stricter terms for taking up loans, etc. than those applicable to both consumers and sole municipally owned heat supply companies. As a collaborative heat supply company, VEKS must observe the regulations provided in the Danish Heat Supply Act when carrying out its business, including pricing.

For instance, this means that VEKS is subject to a financial non-profit principle which implies that VEKS in its pricing of heat must allow for income and expenses of the partnership to balance over a number of years.

*The remains of the old joints with insulation material are securely transported away and separated into fractions.*

### The ownership interest of the partners



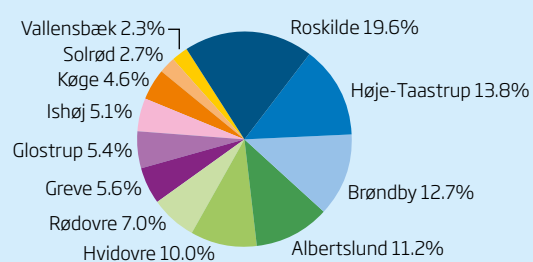


## Key Figures

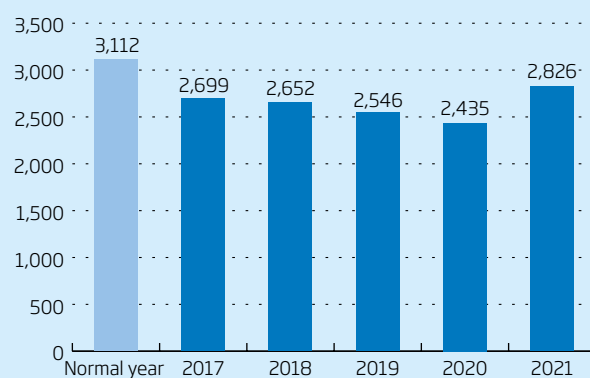
The company's development over the past five years can be described as follows:

(DKK million.)	2021	2020	2019	2018	2017
Net turnover	1,343	1,227	1,345	1,283	1,382
Operating profit or loss	-9	-17	30	-14	18
Financial income and expenses, net	-18	4	-19	-28	-22
Net profit or loss for the year	86	14	23	-34	4
Equity, end of year	191	103	79	133	119
Assets, total	2,298	2,329	2,333	2,236	2,202
Fixed assets	1,832	1,897	1,854	1,858	1,777
Number of employees, as at 31.12	88	86	82	77	74
Net finance costs compared to fixed assets in %	1.0	1.0	1.1	1.6	1.3

### Purchase of heat in the municipalities

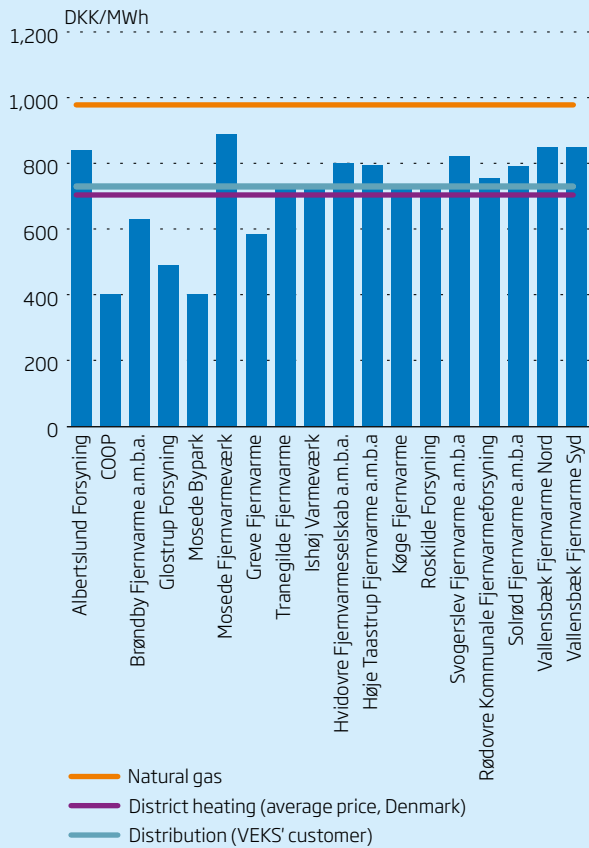


### Degree days





## Heating prices paid by the customer

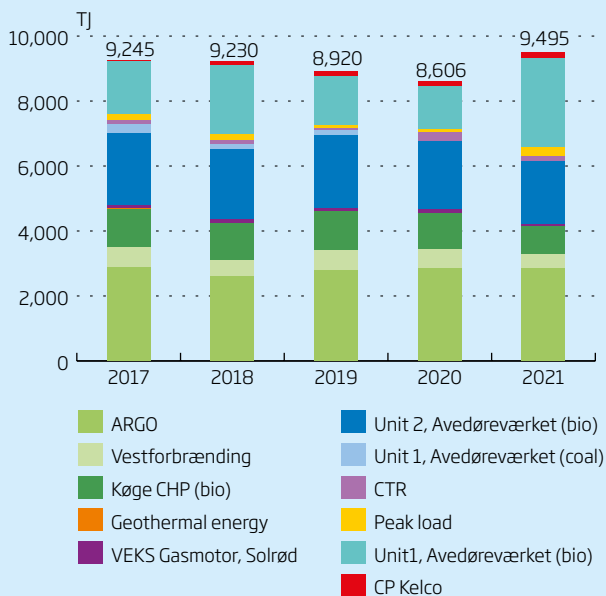


Heating prices paid by the district heating customers in Vestegnen

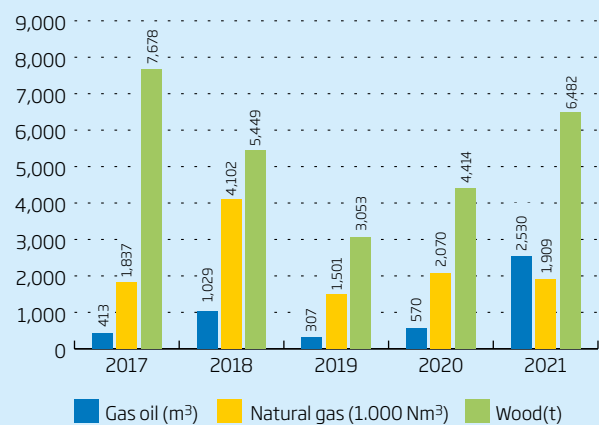
Pre-requisites:

- Prices according to the price statistics of the Danish Energy Regulatory Authority reported by the local district heating companies, December 2021. If the prices were not reported, the public prices are used – stated in the district heating companies respective websites.
- The average heating price is based on calculations made by the Danish District Heating Association for a “standard home” of 130m<sup>2</sup> with an annual consumption of 18.1MWh.
- There is no guarantee that all companies supply the type of “standard home” mentioned.
- The price is exclusive of connection fees.
- The supply point between district heating company and customer may vary from company to company.
- The price of heating with natural gas is provided by the Danish District Heating Association.
- The prices are inclusive of VAT.

## Development in heat production (TJ)



## Peak load



## Contracts

### Ørsted

As a starting point, both units of the Avedøre CHP Plant are completely based on certified, sustainable biomass, however, both units still have 100% backup on fossil fuel in the form of coal in unit 1 (until 2023) and natural gas in unit 2. VEKS has stipulated that the phasing out of coal must not affect the reliability of supply for heat supplies from the unit.

The agreement between Ørsted and VEKS about heat supplies from the Avedøre CHP Plant unit 2 will expire in 2027, whereas the agreement about heat supplies from unit 1 will expire in 2033.

As a consequence of the forward-looking, significant reductions of the subsidy to the biomass-based electricity production (the so-called "15 øren"), Ørsted requested renegotiation of the Avedøre CHP Plant unit 2 agreement in 2019. This unit is the first to be affected by the reduced subsidy. In 2020 and 2021, negotiations have taken place, however, without reaching an agreement on the future basis for contract for the unit.

To obtain greater flexibility as to the operation of the Avedøre CHP Plant unit 2, negotiations were initiated in 2020. The purpose was to create possibilities for the straw-fired boiler at the plant to produce district heat without the main boiler at unit 2 being in operation - so-called mono-operation. The negotiations continued in 2021 where an agreement was made which means that the mono-operation of the straw-fired boiler will be possible at the end of 2022.

### Vestforbrænding

In 2021, VEKS, CTR and Vestforbrænding entered into negotiations about a new heating agreement which, among other things, is to ensure the distribution of the heating price from Vestforbrænding in a variable element (DKK/GJ) and fixed element (DKK/year). The first phase has involved negotiations about an agreement in principle which will identify the settings for the final heating agreement. The agreement in principle is expected to be ready in mid 2022.

### ARGO

In 2015, ARGO and VEKS signed an add-on to the existing agreement securing a stable heating price eventually. This has resulted in a total average heating price from ARGO in 2021 of DKK 71.90/GJ which can be compared to a price ceiling of waste heat of DKK 98.00/GJ.

Since 2017, they have worked on a model facilitating a diversified monthly heating price. At the same time, the heating price is divided into a fixed contribution expressed in "DKK/month" - irrespective of the heat purchase - and a variable contribution expressed in "DKK/GJ." The new model was implemented with effect as from 1 January 2019 and the experience has since then been positive. However, the resulting heating price will always be on or below the price ceiling of the waste heat on an annual basis.

During New Year 2020/21, ARGO was registered on the "closing list" for waste-to-energy plants worked out by Local Government Denmark. Since 35% of VEKS' heat requirement is covered by supplies from ARGO, this was

a serious message for ARGO as well as VEKS. However, in February 2021, the closing list was overruled by the Danish Energy Agency and therefore the political expectation is now that the market will regulate the incineration capacity at the Danish waste-to-energy plants.

### VEKS Gasmotor, Solrød

Each year, VEKS takes approx. six million cubic metres biogas from Solrød Biogas A/S. The biogas is primarily burned in a gas engine producing green electricity for the grid and district heating. Secondly, the biogas is used in a gas boiler for the production of district heating. In 2021, the operation has been stable, however, lower than budgeted, as it was more desirable for Solrød Biogas to deliver the biogas in an upgraded form to the natural gas grid.

The price of biogas is fixed in such a way that it will start by indicating a consequential district heating price corresponding to the price ceiling of the waste heat less 10%. Therefore, the reduced supply of biogas to VEKS Gasmotor has not had a negative impact on the heating price from the gas engine.

In 2021, VEKS and Solrød Biogas A/S entered into an agreement stipulating that VEKS would transfer the balance responsibility for the electricity production of the gas engine to Danske Commodities (DC) with effect as from 1 January 2022. This means that VEKS receives an annual fixed bonus from DC reasoned by the fact that DC thereby guards themselves - and may identify - a rather "secure" base load. Solrød Biogas A/S and VEKS agree that

this bonus goes to VEKS. Thus, all VEKS' customers will benefit from and be compensated for the fact that VEKS accepted a settling price in the period 2017-2020 corresponding to the price ceiling of the waste heat without a discount.

### **CP Kelco**

In December 2016, VEKS and CP Kelco signed an agreement on utilising the surplus heat from CP Kelco's production of pectin, etc. In 2017, the project was realised with the first deliveries in December 2017.

VEKS purchases the heat from CP Kelco and sells it to Køge District Heating on the exact same terms which apply to the other distribution customers of VEKS. The heat is delivered to the distribution system at Skandinavisk Transport Center in Køge and will – when the district heating network in Køge is fully developed – cover approx. 25% of the district heating demand in Køge. In 2021, the surplus heat from CP Kelco covered approx. 50% of the heat demands of Køge District Heating.

The agreement ensures that VEKS will receive the district heat at a price corresponding to VEKS' substitution price from Køge CHP Plant and Avedøre CHP Plant the first years and until the investments of both parties have been depreciated after an expected period of 7 years. Subsequently, the parties will share the gain which implies that VEKS' purchase price will be lower than the substitution price. Thereby, the project will benefit all VEKS' distribution customers.

All things considered, the operating economy has proved better than budgeted in the period 2018-2021. When the investment decision was made, the budgeted amortisation period for the investment of both parties was calculated to seven years. By the end of 2021, the parties could start sharing the profit from the implementation of the project.

### **Geothermal**

Throughout 2021, VEKS has continued the negotiations with AP Møller Holding regarding signing a Letter of Intent (LOI) for the exploitation of geothermal heat within VEKS' supply area. The negotiations have been on the quiet side in 2021 as they await the results from the geothermal energy negotiations between AP Møller Holding and AffaldVarme in Aarhus, Denmark. Just before Christmas 2021, the parties signed an agreement. The negotiations between VEKS and Innargi (company with AP Møller Holding, ATP and NRG) as parties) about signing a LOI (Letter of Intent) is now resumed.

### **Junckers Industrier**

VEKS has two agreements with Junckers Industrier. One of the agreements is for delivery of process steam – and purchase of wood chips, sawdust, and dust – for the period of 1 May 2012 to the end of 2027.

The other agreement which may be terminated at six months' notice concerns mutual purchase of services. In 2021, only minor adjustments of VEKS' purchase of certain services have been made.

### **The heat supply agreements between VEKS and the local distribution companies**

Since 2016, the VEKS Administration and representatives from the distribution companies in VEKS' supply area have worked on preparing new heat supply agreements between VEKS and the company's customers.

In 2021, the new agreements were sent for approval by all the distribution companies where all companies – with the exception of Svogerslev Fjernvarme – have signed the agreements. The new agreements will take effect as from 1 January 2022.

The network of agreements includes a number of complicated and compiled problems. Among other things, the new agreements make allowances for the fact that the future involves an increased decentral heat production which must be handled in the overall operations optimisation in the Greater Copenhagen area's district heating system in order to avoid sub-optimisation. Likewise, the agreements can handle a cost genuine district heat tariff; a variable heating price on a monthly basis.

## Expectations for 2022

### Heat supply agreements

The goal is to make an agreement with Svogerslev Fjernvarme which will not put the company in a worse position than a continuation of the previous agreement would have resulted in for the company.

### “The capture of CO<sub>2</sub>”

In December 2020, the companies ARC, ARGO, BIOFOS, CTR, Copenhagen/ Malmø Port (CM P), HOFOR, VEKS, Vestforbrænding and Ørsted established the cooperation with Carbon Capture Cluster Copenhagen (C4).

The purpose of the cooperation is to examine the possibilities of reducing the CO<sub>2</sub> emissions in the Copenhagen metropolitan area by – put informally – “CO<sub>2</sub> capture” at the large point sources in the Copenhagen metropolitan area.

Realistically, it is possible to create CO<sub>2</sub> reductions of up to three million tonnes a year with CO<sub>2</sub>-capture. This corresponds to approx. 15% of the total Danish need for reaching the ambitious national goal of a 70% CO<sub>2</sub> reduction in 2030.

More than half the CO<sub>2</sub> reduction from point sources in the Copenhagen metropolitan area will be biogenic CO<sub>2</sub>. Thus, it is possible that the energy sector in the Danish capital may not only contribute to the CO<sub>2</sub> neutrality but can actually become CO<sub>2</sub>- negative. During 2021, the cooperation has become closer – in respect of the different interests of the participants. VEKS’ interest in the cooperation primarily focuses on the utilisation of the surplus heat generated in connection with capturing the CO<sub>2</sub>.

To begin with, it will be a matter of utilising surplus heat from the CO<sub>2</sub> capture process at the Avedøre CHP Plant where they expect to draw up a Letter of Intent (LOI) between Ørsted and VEKS/CTR in mid 2022.

### HGS (Geothermal Cooperation in Greater Copenhagen)

In recognition of the fact that geothermal energy is complicated, HGS delivered the part of their exclusive right to utilise geothermal energy lying outside the existing geothermal demonstration plant at Margretheholmen on Amager (GDA) back to the Danish Energy Agency in the summer of 2019. At the same time, the Danish Energy Agency accepted a temporary downtime on GDA.

The return of exclusive licenses meant that other players could hand in an application to the Danish Energy Agency. A total of two players – AP Møller Holding and GEOOP – handed in an application within the supply area of VEKS. In November 2021, the Danish Energy Agency assigned the franchise basis outside GDA to Innargi. During 2021, HGS has communicated with Innargi as well as GEOOP about the future of GDA which could result in one of the companies taking over the GDA plant. A clarification thereof is expected during 2022.

### Heat pumps

In 2014, VEKS, CTR and HOFOR initiated a research and development project regarding the large, electric heat pumps in the Copenhagen metropolitan area’s district heating system. The project received support from EU DP (the Energy Technological Development and Demonstration Programme).

A demonstration plant in Sydhavnen with a heat pump of 5MW with waste/ seawater as an energy source was officially opened on 2 April 2019. Experience shows that large heat pumps are still an immature technology where a number of “children’s diseases” must be eliminated before the technology is stable and financially attractive.

### Sustainable biomass

In accordance with the political wishes in 2012, Ørsted converted the heat production at the Avedøre CHP Plant from fossil fuel to certified, sustainable biomass in accordance with VEKS’ requests.

Biomass must be considered a temporary solution in relation to the long-term target regarding a CO<sub>2</sub> neutral society. However, in the short run – the next 10-15 years – there will be no alternative. There are simply no other technologies which can take over here and now. Therefore, the requirement that the biomass utilised is actually sustainable is increased.

*The dismantling of old joints is one of the first stages of the maintenance project.*



# Four cases

The first case is based on VEKS' role in "The Future District Heating." The following cases focus on the process of renovating joints and alarm wires and Køge CHP Plant's new visitors' service in relation to schoolchildren. Finally, the focus is on the long-term perspective relating to the use of future technologies in connection with district heating.

## Case 1

*The Future District Heating* is the VEKS executive board's estimate on which role the company will fulfil in the development of "The Future District heating in the Greater Copenhagen area in year 2050". How will this affect VEKS' own Strategy 2025 in relation to a number of future scenarios?

## Case 2

What does it take to ensure a 35-year-old (young) district heating system? Case 2 *Like beads on a string* describes the maintenance of joints and alarm wires in VEKS' 135km long transmission system. Furthermore, the photo shoot in this annual report illustrates this work.

## Case 3

*District heating on the school timetable* centres on why Køge CHP Plant opens their gates to schoolchildren. VEKS has organised a visitors' service which was very well received.

## Case 4

How do we integrate the future technology in VEKS' district heating supply? Case 4 *Technologies of the future* illustrates the development projects in which VEKS participates - together with a number of other players in the energy sector.



*VEKS' coordinator, Kim Gravill, manages the project of renovating joints and alarms.*

# The Future District Heating

## VEKS' executive board gives an estimate on which role VEKS will fulfil in the development of "The Future District heating in the Greater Copenhagen area in year 2050 (FFH50)"

Fundamental questions are to be discussed at executive level: Is the technology up to date? *And will district heating be able to keep the pace?*

-Yes! District heating is not outdated and finally we witness the politicians' good graces, Lars Gullev, CEO, VEKS, notes. Even though district heating is well hidden below ground, it has obtained a greater visibility and political recognition in recent years. A vast and wide majority in the Danish Parliament adopted the Climate Agreement in 2020 in which district heating is recognised as part of the solution to our climate challenges.

- Everyday, we demonstrate that district heating is hot. We tap directly into

the trend of today: We work with a circular, green and secure supply which is also based on community, Morten Stobbe, Vice President, VEKS, adds.

### A changeable world

"The Future District Heating" is the name of a collaborative project where four heating companies (see the box "The parties" p. 19) in the Greater Copenhagen area have looked into the future, primarily by means of scenario analyses. In outline, six scenarios have been set up based on six combinations of district heating production - and the consequential system costs have been calculated.

The analysis is based on a number of scenarios of how district heating

matches different "futures" 2030 and 2050. The six CO<sub>2</sub>-free scenarios all measure up to a seventh baseline scenario which is not CO<sub>2</sub> neutral - see figure "Scenarios 2050".

Overall, the conclusion of the report is that district heating is sturdy, competitive and can provide the necessary link between the waste sector, the electricity sector, and the transport sector. Add to this the link to CO<sub>2</sub> capture. Is VEKS on the right track - or are they moving in a direction diverging from

*VEKS' tubular bridge over Amager-motorvejen (Amager motorway) is one of the district heating main supplies from Avedøre CHP Plant.*



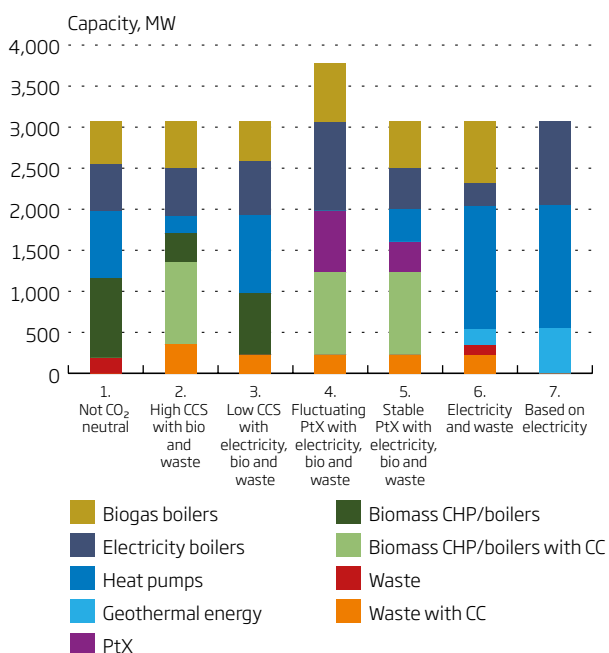


the conclusions in the report?

- In many ways, VEKS' Strategy 2025 is far-sighted and goes hand in hand with the conclusions from the Greater Copenhagen area report. The highest praise to VEKS' board of directors for giving the go-ahead to our ambitious goals and contributions to the green transition already in 2020, Lars points out.

Up until 2050, the biomass district heating and the waste district heating can be reduced when other technologies take over on the way to a district heating system that is even more multi-stringed. In the short run, new technologies can, however, not take over the use of certified, sustainable biomass of the Greater Copenhagen area

### Scenarios 2050



### VEKS' executive board



**Lars Gullev,**  
CEO VEKS,  
employed  
in 1992



**Morten Stobbe,**  
Vice President  
VEKS, employed  
in 2016

### Recommendations

"The Future District Heating" recommends increasing:

- Large heat pumps
- Conversion to district heating
- Low temperature
- Real cost tariffs
- Decentral surplus heat
- New technologies and geothermal energy
- Green peak load

### Vision

The vision for the Future District Heating in the Greater Copenhagen area: **"The district heating is CO<sub>2</sub> neutral and is still the customers' preferred choice in 2050"**

before 2030.

– At first, it will be sensible to choose a multi-stringed supply. This offers sturdiness and adaptability relative to a world that is changing at top speed, Morten establishes.

### Cooperation at a new level

– FFH50 has developed the cooperation between the four heating companies. This, both applies at technician, planner and executive level, Morten says. A spin-off of “The Future District Heating” is that a large number of the participating plan employees from the four companies will continue the cooperation as new common goals require continued common planning and knowledge sharing.

From a practical point of view, there are also ramifications. To improve the utilisation of the production units, VEKS will rebuild a heat exchange facility, e.g. at Vestforbrænding, so the companies can mutually supply each other.

Moreover, “The Future District Heating” project has demonstrated that the industry is no longer based on forced marriages. – We have a common business, and we must help each other to reach the goal. This also applies at executive level. Gradually, we become increasingly depend on each other and more shoulders have to carry the massive investments of the future, Lars remarks. The overall settings are discussed, and the “electrification” of the district heating is, among others, a very topical subject. – Therefore, we also need to work closely together with Energinet. It is obvious that Energinet will be part of our next collaborative project about “The Future Di-

strict Heating,” Morten reflects.

### Arms and legs

*What are the greatest challenges for district heating in the entire Copenhagen metropolitan area?*

The lack of labour, VEKS’ executive board answers with one voice. So far, VEKS has succeeded in recruiting a number of new, competent employees who are primarily going to work with the planning and expansion of district heating. – But we are in a heated market with many parties being ready to expand the district heating in our supply areas. SO many of us are requesting the same key components. As a starting point, subsidies are an important instrument in the green transition. – But right now, we are under more pressure than ever due to the subsidy deadlines. The compressed time just adds even more to the pressure of the limited labour, Morten establishes.

### Essential gear

The surplus heat from the industry is already utilised to a high degree, both in the local district heating companies but also at VEKS, e.g. in the CP Kelco project which supplies heat corresponding to approx. 2,000 households annual heat demand. The report anticipates that the share of surplus heat, data centres included, will increase considerably in the years ahead.

It is also anticipated that large heat pumps, e.g. based on sewage and geothermal energy, will fill an important role in the future district heating. Furthermore, VEKS and Innargi have initiated substantive negotiations about the development of geothermal energy in the Greater Copenhagen area.

However, district heating will primarily become a gear that is even more central in the link between a number of energy sectors and society’s overall transition to more electricity. – Carbon capture (CC) and hydrogen generation, also called Power to X (PtX), will probably become a reality sooner than we had dared to dream of, Morten says. Surplus heat from the technology processes will be essential for the economy to be coherent with the new technologies. VEKS already takes part in the Greater Copenhagen cooperation Carbon Capture Cluster Copenhagen (C4) together with a number of other large energy companies. *Please find more information about the new technologies in case 4.*

– No district heating, no development. Our district heating sector functions as a link between the electricity sector and the transport sector, Lars establishes. The district heating can utilise the fluctuating energy (as the wind blows), e.g. by way of heat storages. Together with Høje Taastrup District Heating, VEKS will put such storage into use during 2022.

As regards green peak and reserve load production, VEKS has already started maturing a project about an electric boiler at Hvidovre Hospital (50MW). Over a short span of years, green biogas and biofuel will probably also come into play where the new types of fuel can be used in the existing boilers.

“The Future District Heating” argues in favour of reducing the temperature in the system. It is a strategic necessity but also a technically complicated move.

## Customers in focus

*Who are our closest cooperative partners? For which tasks?*

- The customers, they answer with one voice again. - The heat supply agreements are a good example of us being closer connected than before and forming plans together, Morten stresses. In VEKS' customer forum we now have completely open discussions, e.g. about the position of new production units and how it will affect our common infrastructure.

- VEKS is built on a principle of solidarity. Our owners (the 12 municipalities) and our customers (the district heating companies) are increasingly of one mind about the fact that there is an increasing risk connected primarily to handling one's own needs - at the expense of the safety in the community, Lars establishes.

Green transition must be based on even more district heating to even

more customers. Therefore, a growing customer base is an important recommendation in "The Future District Heating" anticipating a potential to convert natural gas customers to district heating of at least 10-15% in VEKS' supply area. Many local district heating companies have started expanding the district heating supply to new customers. In 2022, VEKS will introduce a huge project in Køge where 7,000 potential customers are waiting for the district heating.

The latest political statements are that the sector should speed up the process of phasing out natural gas - and we are of course also working on upgrading the district heating. The report recommends that we offer even more streamlined, digital solutions, subscription solutions, high service, etc. to the customers. However, we must also remember to inform new and existing customers about how important green, sustainable and secure district heating is when it comes to solving our climate challenges, Morten concludes.

## The parties

The report is prepared by the companies VEKS, CTR, HOFOR and Vestforbrænding.

## The Future District Heating

The project website: <https://varmeplanhovedstaden.dk/> where you can also download the report, summary, webinar, etc.

*Pipes are drilled in leaving small tunnels in the foam.*



# Like beads on a string

One of the important elements in the maintenance of VEKS' transmission system is to renovate joints and alarm wires

Time has an impact on everything, VEKS' system also requires increasing maintenance to preserve the values and guarantee high personal security - without supply failure.

Therefore, it is necessary to replace joints and re-establish defect monitoring wires in several sections of the transmission network. And the target is? To ensure the district heating supply to VEKS' customers.

Prior to this, feasibility studies have objectively and rationally prepared the strategy to where and when the renovation of joints and alarm wires should start.

Furthermore, the photo shoot of the year offers both an overview and shows details of this comprehensive maintenance project.

## Joints - before and today

Everything is carried out according to a carefully prepared timetable where you after digging disassemble the existing joints. After this, new alarm wires are drilled through the insulation foam of the district heating pipe and forward until the next joint and finally, the new joints are assembled.

The oldest pipes in the VEKS system were installed in 1987. 35 years is no



age when it comes to media pipes which are the steel pipes in which the district heating water flows. In this closed system, efficient water treatment has ensured top quality and the pipes appear without any indication of wear. No, the problem is the 35 years old *joints* which have clear signs of wear. If a joint is not tight, water can penetrate the insulation which will thus be destroyed. There are three welding jobs per joint and the weak point typically turns out to be the actual welding.

At selected sections, a pilot project within Asset Management has analysed the joints and at the same time ranked them according to costs, frequency, impact, and risks. Force Technology has implemented comprehensive status assessments of selected joints. For instance, initial cracking and decay in joints and plastic caps occur.

*Why does the joints not last longer? Shoddy job of the past, perhaps? Well, it is probably more about the development of material and methods where the specification of requirements are higher today when it comes to the joint method but also the introduction of new procedures and quality require-*

◀ *The dream team: From the left: Foreman Hasse from Wicotec-Kirkebjerg, VEKS' technician Brian Noachsen, VEKS' coordinator Kim Gravill, VEKS' working environment coordinator Kim Bøje Olsen and foreman Dennis from Logstor.*

ments to e.g. welding. Moreover, the plasticity limits have been changed which determine how much the material can be bended without being damaged.

Apart from higher quality requirements and standards, conclusive evidence is also required today; both when it comes to material and procedures. The documentation contributes to fulfilling VEKS' goals of obtaining uniformity in ALL welding jobs.

### Monitoring at several levels

All VEKS' transmission pipes (forward and return) have monitoring systems installed by way of alarm wires and detectors. The monitoring systems control the transmission system and will immediately register - live - deviations such as pipe fractures, penetrating water, and alarm wire ruptures. If the alarm wire detects water, an alarm will promptly be sent to the operations centre.

With the alarm system, it is possible to react at the right time on a damage which is about to develop further. Hereby, you avoid expensive, acute digging-up and shut-downs.

### New alarm wires

Therefore, the other important element in this servicing projects is to re-create alarm wires.

At several sections, a corrosion has developed in the alarm wires in the insulation foam surrounding the steel pipes

## Kim Gravill



Kim Gravill,  
VEKS' pipe coordinator -  
employed in 2020

## Objects of the maintenance

**VEKS' maintenance efforts are defined by three conditions:**

- **Nobody must suffer injuries.**
- **The reliability of supply must be close to 100% with "downtime incidences" at a maximum of 24 hours (which we have always lived up to).**
- **The values- the asset- must be ensured in the best possible way.**

## Key ratios for VEKS Transmission

- 135km pipe 100- 800mm
- >5,000 maintenance points
- 1,100 valves 150 x 800mm
- Pressure 25 Bar
- Temperature maximum 120 °C.
- 19 pumping stations
- 53 heat exchanger stations
- Branch stations
- Drain system:
  - 94 hatch-boxes
  - 139 dewatering wells
  - 121 outfall wells
- 223 distribution boards (supply and leakage boards)
- 175 ventilations
- Volume of water: About 50,000m<sup>3</sup>
- 22 boiler stations of which three stations are owned by VEKS

*Now, VEKS uses prefabricated shoring boxes with standard bung which protect against skidding and offer extra safety and security when working below ground.*

*Torben Lang, responsible for VEKS' QHSE, working environment, which inspects regularly and ensures the working place.*

The alarm wires function as a leakage monitoring which can detect admission of humidity to the insulation foam which lies between the media pipe (with the district heating water) and the exterior jacketed pipe. It is important to avoid critical point damages from external dampness and water – e.g. from a damaged joint or if an external contractor digs into VEKS' pipe system.

With alarm wires, you have the optimal solutions from a quality point of view as you have constant monitoring sending valid data – live.

The early wires are re-established – and thus the original complete alarm monitoring – by, in practical terms, drilling small new tunnels through the foam. When the drill is pulled back, four wires are drawn into each pipe at the same time. Two of the alarm wires are blank uninsulated copper wires which function as moist detectors in the pipe's entire length. The other two new extra wires are insulated in the pipe – but uninsulated in the joint – where they function as extra detectors.

### Other monitoring

However, VEKS has by no means lost control of the system without the alarm wires.

Monitoring and detection of moist can also take place manually by the alarm





technicians measuring the system through VEKS' leak boxes which are placed 500-1,000 metres apart. Thereby, the technicians can detect damages and avoid critical leaks.

If the above measurement does not offer an optimal picture of the pipe system's condition, VEKS also make use of drones to detect potential leaks. Through an infrared camera, the drones monitor the system manually. However this type of monitoring can only be used when it is very cold as VEKS' pipes lie relatively deep under the earth surface. Typically, VEKS has drones in action during the winter.

### **Prioritised working environment**

The work is organised like beads on a string. Two gangs consisting of six workers work continuously in six excavations at a time - in each end of the section.

The work progresses positively, sometimes even ahead of schedule. It is, among other things, the result of new procedures. The firmly built crew is hired from external contractors, and the crew has established great routines and expertise within this special maintenance work.

For each hole there are two joints on the supply and return pipe and the cadence is 12 joints a week. In between the renovation of the joints, alarm wires will be re-established, as described above.

Today, in all the excavated shafts, prefabricated shoring boxes are used which is a steel construction in square standard sizes of 4-5 metres with a height of one metre. Below the shoring box, there are standard bung at the depth of six metres.

The standard boxes offer protection

## CASE 2

against skidding and offer extra security and safety when working. The boxes have made the work more efficient and boosted the actual assembly of joints and alarm wires.

VEKS often performs safety inspections at the workplace to create the right settings for a healthy work environment, etc. The work environment coordinator is considered an asset at the workplace and is often sent for “voluntarily” by the crew members who want advice and instructions on how to solve tasks in a safe and healthy manner.

### **Work done...**

In practice, the renovation of joints and alarm wires are carried out according to a well-planned time schedule and it runs very well! The progress is continuous, the project is under budget and the cadence is increased. Naturally, the speed is reduced a bit during winter where a long and challenging period of frost can delay or even stop the projects which are of course also closed during holiday periods.

Given the circumstances, the costs for renovating joints and alarm wires amounted to DKK 4-6 million per month in 2021.

*Will we ever be finished?* Yes, but not all of VEKS' 17,000 joints are to be renovated...

*Part of cutting  
the mantle includes an  
extensive niggling work.*







# District heating at the school timetable

## Great interest in VEKS' visitors' service at Køge CHP Plant which are opening their gates to schoolchildren

For some time, Køge CHP Plant had played with the idea to open their gates to the general public. Partly because the local business is a distinctive figure in Køge Harbour and partly because they had a lot of untold stories about sustainability, contributions to the green transition, etc. In short, the portfolio included a project about establishing a visitors' service for the school-leaving schoolchildren as the target group.

### Perfect match

One day, a young man by the name of Stefan Gudtmann entered the plant:

An mechanical engineer student looking for study-related work with focus on energy and a wish for contributing to the green transition himself. Moreover, he had moved to Køge recently. The result of Stefan's meeting with Ulrik Jørgensen, head of power plant, was an employment contract where the key point as student assistant was to develop a visitors' service.

Stefan started working on 1 March 2020. On 11 March 2020, the country closed down... So due to corona there have been a number of starts and stops along the way.

However, it also required a good deal of preliminary work before the plant could open the doors for the first class. Therefore, the first task was to create the settings and define goals and means for the presentation assignment - assisted by and reporting to the plant power manager.

In general, the intention was to spread the word and knowledge about green district heating as part of the solution to the green transition. With schoolchildren as the target group, you may to a high degree contribute to shaping outlooks instead of changing outlooks.



Køge CHP Plant plays a role in the local community and by opening the doors at the plant, schoolchildren might become positive ambassadors to the district heating – and potential future colleagues.

### Contents

In two hours, VEKS' school visitor service will share their knowledge of district heating in Køge. This takes place by way of:

- Concrete communication and inclusive teaching
- Guided tour at the plant
- A test with ten questions
- Rounding off and encouragement to seek more knowledge.

Stefan uses his own story when he meets the schoolchildren. This means that he tells them about his rather untraditional way from the public school till now where is close at finishing his mechanical engineering education. Stefan wants the ninth grade pupils to know that there are also other and more qualifying ways to follow than upper secondary school educations (grammar school). This especially applies if you career-wise aim at having a technical, specialist education. After his mechanic education, Stefan completed military training and then the

interest of having a career as mechanical engineer arose. An education which could actually lead many ways.

### The real world

When the settings for the visitors' service were established, Stefan contacted a natural science coordinator in Køge Municipality who was right away very interested in establishing a cooperation. In general, many teachers experience a distinct need to give the pupils an insight into the "real" world – and preferably with a corporate visit as turning point. After a joint adjustment of the school visit programme, the above natural science coordinator wanted to turn up with a test class. The complete package was ready in the spring of 2021, however, once again the country was closed down and the schoolchildren were sent home.

In the meantime, Stefan could invite his own family on a tour where the programme and tour stood the test together with a life test of the audio equipment.

### Approval

In the middle of October, Stefan and VEKS' CEO, Lars Gullev, met with a large delegation from Køge Municipality/s school administration (including the head of the school), the industrial association Connect Køge and key science teachers who consider making use of the service in the future. More-

## Stefan Gudtmann



VEKS' visitors' service is implemented of student assistant Stefan Gudtmann, whose CV among other things contains:

- Sports college
- Trained as a mechanic
- National service and sergeant, the Guard Hussar Regiment
- Mechanical engineer school, Lyngby
- Student assistant at VEKS since 2020

◀ *Employee from Logstor put his back into removing old insulation material.*

## Programme for visitors' service at VEKS, Køge CHP Plant (KKV)

- Arrival at Juncker's parking lot and access to KKV through the small gate.
- Gathering in the large conference room where the teaching of the day will take place and the tour will start and end.
- Distribution and going through audio equipment.
- The tour: (Often, the class is divided into two groups for security reasons. Therefore, the tour will start in each end of the below plan.)
  - The sawdust silos. It is possible to look down into a sawdust silo, however, it is not required due to fear of heights.
  - The fuel transportation (Be aware of emergency stop and safety in connection with the conveyor belt!!)
  - The inclined belt (Walk via the inclined belt up to the boiler tops)
  - Boiler top boiler 8 (Walk to boiler top of boiler 8 where the theory of the boiler will be explained. (Better climate))
  - Explanation of boiler 8 (Walk via the stairs at the boiler side down through the boiler where relevant theory and components will be explained with mode of operation and purpose.)
  - The grating boiler 8 (Look into the grating in boiler 8 and experience the heat in the room just at the boiler top)
  - Basement boiler 8 (In the basement under boiler 8, you will hear about incineration residue and primary/secondary ventilator.)
  - Steam rails/HEIKO 1 (From here, the steam rails and the spring-supported floor for the turbines are shown)
  - Waterland
  - The turbine room
  - The control room
  - Large conference room
- Test with 10 questions
- Q/A and finish

## Supplementary teaching

[www.fjernvarmeskolen.dk](http://www.fjernvarmeskolen.dk)

[www.fjernvarmensunivers.dk](http://www.fjernvarmensunivers.dk)

over, a couple of employees from the pectin factory CP Kelco turned up to seek inspiration for arranging a similar school offer.

In a compact form, the meeting went through the objects and content of VEKS' visitors' service and the participants also managed to get a tour - however, a short version - around the plant. The meeting was a success and the participants approved the new visitors' service. In the beginning of November 2021, Køge CHP Plant could open their gates for the first visits of two test classes. It is expected that the school administration of Køge Municipality will soon accept that VEKS' corporate visit offer at Køge CHP Plant will be registered at the national portal: [skoletjenesten.dk](http://skoletjenesten.dk).

### Come prepared

The goal is to receive 1-2 school classes a month, however, the capacity will of course also be adjusted to match Stefan's timetable. The rumour has probably spread because so far, the teachers have come at their own initiative. So far, six classes have made use of the plant's visitors' service and there are moreover no geographical limitations.

The main points in the very specific teaching and tour are a review of the CHP plant's boiler, turbine, generator, and heat exchanger.

Prior to their visit, the teacher has prepared the pupils by basically teaching the pupils about Denmark's energy production and specifically how a boiler, turbine, heat exchanger and generator function. It is a really good idea to make use of [www.fjernvarmeskolen.dk](http://www.fjernvarmeskolen.dk),

both before and after the visit at Køge CHP Plant.

### See you

The schoolchildren's visit is part of the school subject "Science" which is the successor of the previous, separate subjects of physics, geography, and biology. The two-hour long teaching is a relatively compact event leaving a lot of impressions and there is of course always room for posing clarifying questions during the tour. And there are no such thing as stupid questions.

*Control measurement  
of the new alarm wires.*



The pupils' preparation for the visit, the teaching at the plant and the actual tour can replace the curriculum with a module about energy where district heating is on the timetable in this case. Green district heating can also be unfolded even more and has already been the main subject of several scientific project assignments in science which all 9th classes pupils must prepare.

Moreover, an upper secondary school class has visited the plant as an introduction to an Energy course about sustainability and the work connected with the UN's Sustainable Development Goals. Before leaving the plant, the teacher said: "I'll be back next year." Finally, the visitors' service has welcomed two groups of boiler engineers

who are in the process of training at NEXT, CPH.

Since it is a relatively new offer, the visitors' service will be developed on an ongoing basis. What should be adjusted - too easy, too difficult? What is the best way to maintain the focus of the schoolchildren? Do the teachers have any educational tricks? It is all about adjusting the educational theory and practise according to the situation and the composition of pupils.

So far, the visitors' service has apparently offered the right combination as the participants have been enthusiastic over the meeting with the real "district heating world" as well as the green district heating.



# Technologies of the future

## CO<sub>2</sub> capture will contribute considerably to the district heating supply of tomorrow

*“When oil and coal pollute our planet, we need to develop better energy sources. Large windmill farms rise at sea and convert nature’s mighty forces to the benefit of all of us. More is on the way, e.g. “green” fuels for aeroplanes and vessels and ambitious proposals for carbon capture and underground storage.”*

In her New Year’s Speech on 31 December 2021, the Danish Queen addressed the need for a quick acceptance of new technologies for the benefit of all of us. The concrete and very technological message probably came as a big surprise to many Danes. Many within the technical environments and circles have known about the idea of capturing CO<sub>2</sub> for many years, however, the subject of CO<sub>2</sub> capture has suddenly become a common subject which we all need to relate to.

CO<sub>2</sub> capture – also called Carbon Capture (CC) – is considered an extremely important instrument: Capturing CO<sub>2</sub> will contribute to solving one of the biggest climate challenges in the world as the capture will reduce the total amount of CO<sub>2</sub> in the atmosphere. Therefore, technology is considered to be one of the tools which can contribute efficiently to the reduction of global warming.

### CO<sub>2</sub> is not CO<sub>2</sub>

In CO<sub>2</sub> accounts they distinguish between CO<sub>2</sub> from fossil sources such as coal, oil, and natural gas. This also includes CO<sub>2</sub> from plastic and petrol. At the other end we have CO<sub>2</sub> from bio-

genic sources such as wood, straw, and potato peels. Even though CO<sub>2</sub> is CO<sub>2</sub>, we differentiate between the type which is already rotating between plants and the air (biogenic) and all the other types we add to the atmosphere by digging or pumping it up from the underground (fossil).

IPCC, the official definition of UN’s Panel on Climate Change, is that sustainable biomass is CO<sub>2</sub> neutral. In practice, this means that energy originating from burning straw or sustainable biomass in the form of wooden pellets and wood chips are CO<sub>2</sub> neutral; the energy originates from biogenic sources.

### Negative emission

Moreover, they operate with negative emissions. If the biogenic CO<sub>2</sub> originating from biomass is captured and deposited, it generates negative emissions. In short, more CO<sub>2</sub> is absorbed and stored than emitted. We can also remove CO<sub>2</sub> from the atmosphere. It is because that biomass comes from a closed carbon cycle at the earth’s surface where trees absorb and emit CO<sub>2</sub>. However, CO<sub>2</sub> capturing must not recognise the emission of CO<sub>2</sub> – in general, the global goal is to limit our emissions.

VEKS’ interest in CC is two-prong. VEKS both has focus in general on the reduction of CO<sub>2</sub> emission and an interest in utilising the surplus heat produced in connection with CC.

## The new technologies

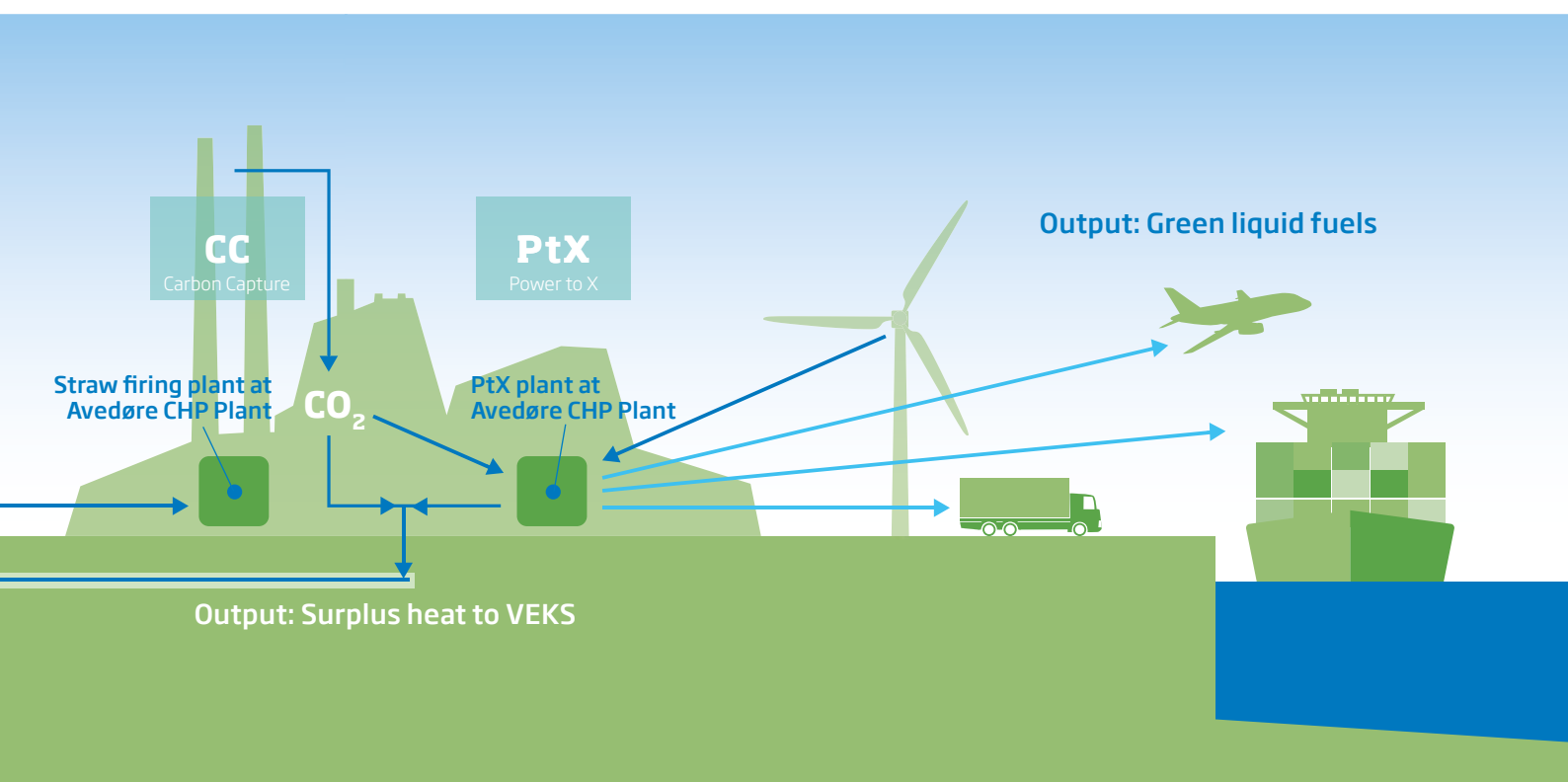
Input: Straw



### New technologies at Avedøre CHP Plant

Various energy companies in the Greater Copenhagen area already cooperate with respect to the new technologies, CC (Carbon Capture) and PtX (Power-to-X). This takes place in VEKS’ supply area – at first, in the straw-fired boiler at Avedøre CHP Plant. Here, VEKS, CTR, Ørsted and HOFOR work together on two parallel development projects which will contribute to the green transition by testing technologies of the future.

System integration between the electricity, transportation and district heating sectors are thus realised by way of specific development projects.



### Straw goes mono

In 2021, Ørsted, CTR and VEKS agreed to rebuild the straw-fired boiler at Avedøre CHP Plant so it could operate in mono - i.e. independently of the main boiler in unit 2 at Avedøre CHP Plant. The reconstruction will be ready in late summer of 2022. With the mono-operation-straw-project you will be able to connect the heat production of the straw-fired boiler separately to the transmission system by inserting a heat exchanger. In this way you can avoid regularly starting/stopping the large biomass-fired main boiler when the heat demand is fairly small. A more efficient and constant operation will reduce the owner's servicing expenditures - and thereby also reduce the

### C4 - Carbon Capture Cluster Copenhagen

Nine enterprises in the Greater Copenhagen area have initiated a cluster cooperation about capturing, storing and utilising CO<sub>2</sub> captured from energy plants. The cooperation is called C4- Carbon Capture Cluster Copenhagen. In C4 participate ARC, ARGO, BIOFOS, Copenhagen Malmö Port, CTR, HOFOR, Vestforbrænding, VEKS and Ørsted. The members represent the complete value chain from energy production to collection of waste heat in the directors and discharge of captured CO<sub>2</sub> to storage or use.

Together, the C4 cooperation includes the potential of reducing the CO<sub>2</sub> emission from the Greater Copenhagen area by 3 million tonnes a year by means of CO<sub>2</sub> capture. This corresponds to approx. 15% of the total Danish reduction goal of 70% in 2030. The C4 cooperation could be one of the greatest one-off contributions to the green transition in Denmark - a climate ambitious cooperation.





heat purchase costs of CTR and VEKS. Moreover, the lifetime of the boiler will be prolonged.

### Two projects at Avedøre CHP Plant

As already mentioned, Ørsted, CTR and VEKS are behind the project of capturing CO<sub>2</sub> in the straw-fired boiler of Avedøre CHP Plant. Ørsted owns the chimney and the heating companies are to utilise the surplus heat.

Captured CO<sub>2</sub> can either be stored in the underground or by isolating the carbon of the CO<sub>2</sub> and utilise it in a PtX process. If hydrogen is used together with the carbon capture from the chimney in the PtX process, it is possible to produce liquid fuel. And this is exactly what the Green Fuels for Denmark project is going to do when it comes to producing e-methanol and e-cerosin for shipping and aviation, respectively. The heavy transport requests green liquid fuels as it is not possible to “make do with” electricity or battery in many cases.

### Surplus heat

For the two heating companies, CTR and VEKS, the CO<sub>2</sub> capture and PtX are primarily about taking advantage of the surplus heat in the two technology processes. CO<sub>2</sub> capture and PtX involve large amounts of surplus heat. Therefore, a requisite for developing the new technologies is also that the processes take place close to the large, existing district heating systems, e.g.

- ◀ *It requires to be meticulous when working on re-establishing alarm wires - here carried out by an employee from Logstor.*

the transmission systems of CTR and VEKS.

The forthcoming, detached straw-fired boiler will play an important part in Ørsted's Power-to-X project Green Fuels for Denmark which is expected in course of time to reach a total capacity of 1.3GW and have a CO<sub>2</sub> reduction potential of 850,000 tonnes per year.

Production of sustainable fuels takes place in the PtX process where carbon, as mentioned before, from the CC process is combined with hydrogen. Electricity, e.g. from windmills and solar power cells, may segregate hydrogen from water by way of electrolysis. Hydrogen can be used directly as fuel in the industry, trucks, buses, etc.

HOFOR will only contribute renewable energy to the PtX-project Green Fuels for Denmark by way of wind power electricity from HOFOR's planned 250MW large offshore wind farm Aflandshage in the Baltic Sea. The current wind power electricity will be supplied directly from Avedøre CHP Plant.

The parties agreed that it was most obvious to establish CC at the Avedøre CHP Plant's straw firing plant as source for delivering sustainable CO<sub>2</sub> to the next stages of the Green Fuels for Denmark project.

As far as VEKS is concerned, the participation in the development projects will contribute to reducing the total CO<sub>2</sub> emission. At the same time, the projects will mature the technologies to the delight of the entire energy sector and the surplus heat will contribute considerably to the district heating supply of tomorrow.

## Green Fuels for Denmark

Green Fuels for Denmark is Denmark's most ambitious vision for large-scale production of sustainable fuels for the transport sectors with a CO<sub>2</sub> reduction potential of 850,000 tonnes in 2030. Behind the project you find a partnership consisting of Ørsted, Copenhagen Airports, A.P. Møller - Mærsk, DFDS and DSV. Nel, Haldor Topsøe and Everfuel are partners in the Green Fuels for Denmark project's first stage and in the development of the second stage. COWI is also knowledge partner in connection with the project. The project is supported by Molslinjen, the City of Copenhagen and Capital Region. Moreover, Green Fuels for Denmark has been selected by Denmark to participate in the first pan-European wave of projects about hydrogen, IPCEI.

*Source: [orsted.com](http://orsted.com)*

A photograph of a worker in a high-visibility yellow jacket and dark gloves, kneeling in a trench filled with gravel. The worker is focused on a large, light-colored pipe, possibly performing maintenance or inspection. The scene is dimly lit, with a strong light source from the left creating a bright, overexposed area in the foreground. The word "Accounts" is overlaid in white text on the left side of the image.

# Accounts



*Sometime, you need to  
be a jack of all trades:  
You stand on your head,  
twist, and turn - to  
ensure the district  
heating supply of VEKS.*

## VEKS - Profit and loss account

	2021 DKK '000	Budget 2021 DKK '000	2020 DKK '000
Net sales	1,342,850	1,207,567	1,226,606
Production and heat purchase costs	-1,220,239	-1,110,201	-1,120,888
<b>Gross profit</b>	<b>122,611</b>	<b>97,366</b>	<b>105,718</b>
Transmission costs	-60,488	-61,886	-56,062
Distribution costs	-32,683	-33,849	-32,591
Administrative costs	-38,766	-40,328	-34,556
<b>Result from primary operations</b>	<b>-9,326</b>	<b>-38,699</b>	<b>-17,493</b>
Other operating income	113,063	108,933	27,529
Other operating expenses	-72	-375	-404
<b>Result before financial items</b>	<b>103,665</b>	<b>69,859</b>	<b>9,632</b>
Financial income	1,469	635	24,212
Financial costs	-19,193	-20,053	-19,807
<b>Year-end result</b>	<b>85,941</b>	<b>50,441</b>	<b>14,037</b>

Statement of profit or loss balance  
pursuant to the Danish Heat Supply Act

	2021 DKK '000	Budget 2021 DKK '000	2020 DKK '000
<b>Year-end result</b>			
VEKS Køge CHP Plant, production	7,972	7,972	0
VEKS Køge District Heating, distribution	-7,427	-8,866	-2,846
VEKS Tranegilde District Heating, distribution	-506	-3,516	452
VEKS Gas Engine, Solrød	0	0	0
VEKS Transmission	85,902	54,851	16,431
	85,941	50,441	14,037
<b>Adjustments</b>			
Reversal of small acquisitions recognised as an expense in accordance with the above-mentioned information	945	1,320	784
Reversal of operating depreciation	110,070	115,185	103,925
Reversal of profits from the sale of assets	0	0	-122
Reversal of financial items in accordance with the above-mentioned information	17,724	19,418	-4,405
Reversal of allocated holiday pay, flex time and public servant pension	-7,021	0	933
Depreciation under the Danish Heat Supply Act	-192,615	-192,615	-129,421
Financial items under the Danish Heat Supply Act	-17,724	-19,418	4,405
<b>Year-end result pursuant to the Danish Heat Supply Act</b>	<b>-2,679</b>	<b>-25,669</b>	<b>-9,864</b>
Surplus/deficit transferred from previous years	44,831	5,520	54,695
<b>Profit or loss balance, year-end pursuant to the Danish Heat Supply Act</b>	<b>42,152</b>	<b>-20,149</b>	<b>44,831</b>

## VEKS - Comments on the profit of the year

The net profit for the year in VEKS amounts to DKK 86 million which is DKK 36 million better than the budget 2021.

The revenue amounted to DKK 1,343 million which is DKK 135 million better than budgeted. The additional sale is primarily due to the fact that 2021 was a cold year and sales in VEKS Transmission amounted to DKK 111 million above budget of which the sale to CTR amounts to DKK 96 million. The sale to CTR has no impact on VEKS Transmission's customers as the sale is at cost and the production and costs related to heat purchase are thus correspondingly higher than budgeted. Apart from the additional sale in VEKS Transmission, the high-power prices have resulted in the fact that income from the sale of electricity in Køge CHP Plant ended at DKK 31 million above budget.

In overall terms, the gross profit is DKK 25 million better than budgeted. The main reason is that considerable revenues have been obtained from the sale of electricity at ARGO and KKV meaning that the prices have been reduced by a total of DKK 28 million compared to budget. Moreover, savings have occurred on fixed heat purchase costs from producers of DKK 15 million and an adjustment of heat purchases from previous years of DKK 8 million which

improve the result in 2021 compared to budget. On the contrary, a changed mix of products (purchased more heat from more expensive producers) and an increased consumption of peak load which resulted in an additional cost of DKK 45 million. Moreover, a number of small improvements occur which means that the total budget improvement will amount to DKK 25 million in 2021.

All in all, the operating expenses amounts to DKK 4 million under budget of which several transferred costs to plants constitute DKK 1.5 million of the reduced expenditure. The remaining reduced expenditure distributes in many different areas.

Other operating revenues are DKK 4 million over budget. This is primarily due to the fact that VEKS has decided only to sell for DKK 107 million CO<sub>2</sub> quotas against a budgeted sale of DKK 105 million.

In 2021, the item under financial income and expenses, net was close to the budgeted amount.

### **VEKS in total 2021 compared to 2020**

The net profit for the year improved by DKK 72 million compared with the result in 2020. In 2021, an amount of

DKK 20 million has been repaid in surplus from previous years and in 2020 an amount of DKK 40 million was repaid. In 2021, CO<sub>2</sub> quotas at a value of DKK 107 million were sold, whereas quotas at a value of DKK 30 million were sold in 2020. Compared to 2020, the operating expenses have increased by DKK 9 million. Of the DKK 9 million, DKK 3 million are due to amortisation - the residual amount is due to increasing activities, including more projects and more employees.

### **Insecurity in connection with recognition**

During the last 15 years, VEKS has taken an active part in the development of geothermal heat and is co-owner of a geothermal test plant in Amager (HGS). For various reasons, the plant has been on hold since 2018, however, although the plant is put on hold, it is expected that the plant may contribute to test and development of geothermics in the future. At the moment, there is ongoing dialogue with interested parties that may be interested in taking over the plant. Therefore, there is some uncertainty about the value at which the plant is entered in the accounts.

### **Expectations for 2022**

VEKS budgets with an overall loss of DKK 47.4 million in 2022.

## Balance sheet as at 31 December

	2021 DKK '000	2020 DKK '000
<b>Assets</b>		
Tangible fixed assets		
<b>Intangible fixed assets</b>		
Captacity rights	340,820	358,240
Ongoing projects	1,532	314
<b>Intangible fixed assets, total</b>	<b>342,352</b>	<b>358,554</b>
<b>Tangible fixed assets</b>		
Land and buildings	7,425	7,425
Production facility	229,263	249,797
Transmission facility	552,210	538,552
Administration facility	2,659	4,094
Distribution facility	728,557	748,053
Projects in progress	139,049	100,472
<b>Tangible fixed assets, total</b>	<b>1,659,163</b>	<b>1,648,393</b>
<b>Financial fixed assets</b>		
Securities	25	25
Long-term debts, VEKS' loan scheme	5,572	7,436
<b>Financial fixed assets, total</b>	<b>5,597</b>	<b>7,461</b>
Fixed assets, total	2,007,112	2,014,408
<b>Current assets</b>		
<b>Stocks</b>		
Fuel stocks	11,637	14,345
Spare part stocks	1,058	1,567
<b>Stocks, total</b>	<b>12,695</b>	<b>15,912</b>
<b>Debtors</b>		
Amounts owed from sales and services	218,566	227,226
Other debtors	30,341	47,621
Prepaid costs	29,471	23,593
<b>Debtors, total</b>	<b>278,378</b>	<b>298,440</b>
<b>Cash at bank and in hand</b>	<b>0</b>	<b>0</b>
Current assets, total	291,073	314,352
<b>Assets, total</b>	<b>2,298,185</b>	<b>2,328,760</b>

	2021 DKK '000	2020 DKK '000
<b>Liabilities</b>		
<b>Capital and reserves</b>		
Invested capital	9,875	9,875
Operating capital reserve	87,727	87,727
Net loss for the year (profit or loss balance) pursuant to the Danish Heat Supply Act	-42,152	-44,832
Accumulated profit in relation to the Danish Financial Statements Act	136,030	50,089
<b>Capital and reserves, total</b>	<b>191,480</b>	<b>102,859</b>
<b>Provisions</b>		
Public servant pension liabilities	4,181	4,181
<b>Provisions, total</b>	<b>4,181</b>	<b>4,181</b>
<b>Creditors</b>		
<b>Long-term liabilities</b>		
Holiday pay obligation, freezed	0	5,617
Loan capital and construction credit	1,570,148	1,357,094
<b>Long-term liabilities, total</b>	<b>1,570,148</b>	<b>1,362,710</b>
<b>Short-term debts</b>		
Loan capital and construction credit, short-term share	261,609	539,535
Credit institutions	7,470	16,684
Suppliers of goods and services	201,359	234,504
Provisions for holiday allowance and flex time	7,326	8,730
Payments of profits for the year - consumer accounts	42,152	44,832
Other creditor	12,461	14,724
<b>Short-term debts, total</b>	<b>532,376</b>	<b>859,009</b>
<b>Creditors, total</b>	<b>2,102,525</b>	<b>2,221,720</b>
<b>Liabilities, total</b>	<b>2,298,185</b>	<b>2,328,760</b>

## VEKS Transmission - Profit and loss account

	2021 DKK '000	Budget 2021 DKK '000	2020 DKK '000
Transmission, fixed tariff	400,427	411,204	398,132
Transmission, variable tariff	573,637	557,316	516,243
Transmission, sales CTR	191,805	95,212	167,168
Transmission, other income	39,122	29,900	27,351
<b>Revenues, in total</b>	<b>1,204,991</b>	<b>1,093,632</b>	<b>1,108,894</b>
Production costs, excl, depreciation	-66,942	-67,768	-52,244
Production costs, depreciation	-41,011	-44,467	-37,784
Heat purchase costs	-1,023,176	-930,583	-958,104
<b>Production and heat purchase costs</b>	<b>-1,131,129</b>	<b>-1,042,818</b>	<b>-1,048,132</b>
<b>Gross profit</b>	<b>73,862</b>	<b>50,814</b>	<b>60,762</b>
Transmission costs, excl, amortisation	-35,113	-35,645	-32,955
Transmission, amortisation	-25,375	-26,241	-23,107
Administrative expenses	-31,092	-32,679	-29,075
<b>Net profit or loss for the year</b>	<b>-17,718</b>	<b>-43,751</b>	<b>-24,375</b>
Other operating income	112,122	108,236	26,840
Other operating expenses	0	-277	-251
<b>Result before financial items</b>	<b>94,404</b>	<b>64,208</b>	<b>2,214</b>
Financial income	1,033	685	23,919
Financial costs	-9,535	-10,042	-9,701
<b>Year-end result</b>	<b>85,902</b>	<b>54,851</b>	<b>16,432</b>

### Statement of profit or loss balance pursuant to the Danish Heat Supply Act

	2021 DKK '000	Budget 2021 DKK '000	2020 DKK '000
<b>Year-end result</b>	<b>85,902</b>	<b>54,851</b>	<b>16,432</b>
<b>Adjustments</b>			
Reversal of small acquisitions recognised as an expense	527	950	547
Reversal of operating depreciation	67,911	72,225	62,390
Reversal of profits from the sale of assets	0	0	-122
Reversal of allocated holiday pay, flex time and public servant pension	-6,439	0	-241
Depreciation under the Danish Heat Supply Act	-148,175	-148,175	-94,191
<b>Year-end result pursuant to the Danish Heat Supply Act</b>	<b>-274</b>	<b>-20,149</b>	<b>-15,185</b>
Surplus/deficit transferred from previous years	36,336	0	51,520
<b>Profit or loss balance, year-end pursuant to the Danish Heat Supply Act</b>	<b>36,062</b>	<b>-20,149</b>	<b>36,336</b>



## VEKS Transmission - Comments on the profit of the year

The net profit for 2021 was a surplus of DKK 85.9 million which is DKK 31 million better than than the budget 2021. The outcome is DKK 69.4 million better than in 2020.

The sale to VEKS Transmission's customers was 9,094 TJ against the budgeted 9,045 TJ and a sale of 8,296 TJ in 2020. The additional sale is the result of a cold year.

The sale to CTR was DKK 96.5 million higher than budgeted. The sale to CTR has no impact on VEKS Transmission's customers as the sale is at cost and the production and costs related to heat purchase are thus correspondingly higher than budgeted.

The revenue for VEKS Transmission's customers amounted to DKK 8 million above budget. The profit on sale of feedwater was DKK 4 million above budget.

The variable production and heat purchase costs of VEKS Transmission's customers amounted to DKK 63.58/GJ in 2021 relative to a budget of DKK 61.76/GJ which gives an additional cost of DKK 15 million. Substantial revenues have been obtained from the sale of electricity at ARGO and KKV which have reduced the prices by a total of

DKK 28 million compared to budget. On the other hand, more heat has been purchased from Avedøre CHP Plant's unit 1 instead of unit 2 which increases the average price. Moreover, a substantially increased amount of peak load has been used with a purchase of DKK 38 million above budget. The heat purchase costs per GJ are almost identical with 2020 as the price was DKK 63.32/GJ in 2020.

Furthermore, an adjustment in the purchase of heat as to previous years was made in 2021 which reduce the costs by DKK 8 million in 2021.

The fixed heat purchase costs from producers were DKK 15.4 million lower than budgeted and DKK 8.4 million higher than in 2020.

Depreciation of production facilities was DKK 3 million lower than budgeted.

In overall terms, the gross profit was DKK 23 million larger than budgeted in 2021. The total production and heat purchase accounted for amounted to approx. DKK 103/GJ per GJ sold compared to a budgeted price of approx. DKK 105/GJ. In 2020, the total price was approx. DKK 106/GJ.

Transmission and administrative expenses exclusive amortisation were DKK 2.1 million under budget in 2021. The reduced expenditure must also be found in a number of areas such as attorney and consultancy expenses, IT expenses and more hours transferred from operation to plant. Compared to 2020, the expenses are DKK 4.1 million higher. The increase from 2020 to 2021 is due to increasing activities in general with more projects and more employees.

Other operating revenues/operating costs are DKK 4 million larger than budgeted. The increase is due to the fact that CO<sub>2</sub> quotas at a value of DKK 107 million were sold in 2021 relative to a budget of DKK 105 million. In 2021, quotas of DKK 23 million were sold.

The financial income was DKK 0.9 million better than budgeted which was due to an interest rate level lower than expected. Compared to 2020, the financial income and expenses, net are DKK 23 million better which is due to the fact that interest-bearing contributed capital of DKK 23 million was repaid in 2020 which for accounting purposes is a financial income that improves the accounts in 2020.

## Køge CHP plant - Profit and loss account

	2021	Budget 2021	2020
	DKK '000	DKK '000	DKK '000
Sale of electricity	64,666	33,962	29,856
Sale of heating, fixed tariff	58,319	60,794	51,238
Sale of heating, variable tariff	29,591	73,892	82,122
<b>Revenues, in total</b>	<b>152,576</b>	<b>168,648</b>	<b>163,216</b>
Fuel	-86,671	-100,682	-104,778
Amortisation -	-11,908	-12,123	-11,547
Other production costs	-40,683	-41,685	-42,633
<b>Production and heat purchase costs</b>	<b>-139,262</b>	<b>-154,490</b>	<b>-158,958</b>
Gross profit	13,314	14,158	4,258
Administrative costs	-4,031	-4,580	-2,558
<b>Result from primary operations</b>	<b>9,283</b>	<b>9,578</b>	<b>1,700</b>
Other operating income	940	698	690
<b>Result before financial items</b>	<b>10,223</b>	<b>10,276</b>	<b>2,390</b>
Financial costs	-2,251	-2,304	-2,390
<b>Year-end result</b>	<b>7,972</b>	<b>7,972</b>	<b>0</b>

### Statement of profit or loss balance pursuant to the Danish Heat Supply Act

	2021	Budget 2021	2020
	DKK '000	DKK '000	DKK '000
<b>Årets resultat</b>	<b>7,972</b>	<b>7,972</b>	<b>0</b>
<b>Adjustments</b>			
Reversal of small acquisitions recognised as an expense	390	350	227
Reversal of operating depreciation	11,908	12,123	11,547
Reversal of allocated holiday pay, flex time and public servant pension	-517	0	1,078
Depreciation under the Danish Heat Supply Act	-20,429	-20,429	-12,655
<b>Year-end result pursuant to the Danish Heat Supply Act</b>	<b>-676</b>	<b>16</b>	<b>197</b>
Surplus/deficit transferred from previous years	528	-16	331
<b>Profit or loss balance, year-end pursuant to the Danish Heat Supply Act</b>	<b>-148</b>	<b>0</b>	<b>528</b>

## Køge CHP Plant - Comments on the profit of the year

The net profit for the year for Køge CHP Plant is always 0 as the earnings from VEKS Transmission and Junckers are always adjusted in relation to the amount of expenses available for producing the heating sold. A decreased/additional consumption of fixed expenses will be adjusted in the regular charging to VEKS Transmission and a deviation of the variable costs/income will be adjusted in the variable contribution.

In 2021, the sale of electricity was 78,711MWh compared to a budgeted sale of 86,625MWh and a sale of 79,503MWh in 2020. The low production is the result of Køge CHP Plant having fewer running hours than expected as Avedøre CHP Plant has been prioritised operation-wise due to the low wooden pellet prices. The average heating price of the sale of power was DKK 810/MWh in 2021, including DKK 150/MWh in biomass subsidy which is DKK 411/MWh higher than budgeted and DKK 446/MWh more than in 2020. All in all, this resulted in the fact that the revenues on selling power were DKK 30.7 million higher than budgeted

and DKK 34.8 million higher than in 2020.

The sale of heat to VEKS Transmission was 1,016TJ which is 324TJ less than budgeted and 230TJ less than in 2020. The changes are due to the fact that the plant has been prioritised less by Varmelast in 2021 than expected and less than in 2020, cf. the above explanations.

The high revenues on electricity mean that the total average price per GJ which is charged by VEKS Transmission and Junckers in 2021 only totals DKK 76.24/GJ relative to the budgeted DKK 89.61/GJ and a price of DKK 95.05/GJ in 2020.

In 2021, other production expenses amounted to DKK 1 million under budget and DKK 2 million less than in 2020.

The administration costs are DKK 0.5 million under budget but has increased by DKK 1.5 million compared to 2020. The increase is due to increased costs for salary, IT, and insurance.

## VEKS Gasmotor, Solrød - Profit and loss account

	2021 DKK '000	Budget 2021 DKK '000	2020 DKK '000
Sale of electricity	26,775	32,871	31,137
Sale of heating, variable tariff	6,825	8,493	8,864
<b>Revenues, in total</b>	<b>33,600</b>	<b>41,364</b>	<b>40,001</b>
Fuel	-29,351	-37,162	-35,999
Amortisation	-1,578	-1,578	-1,578
Other production costs	-1,861	-1,819	-1,580
<b>Production and heat purchase costs</b>	<b>-32,790</b>	<b>-40,559</b>	<b>-39,157</b>
<b>Gross profit</b>	<b>810</b>	<b>805</b>	<b>844</b>
Administrative expenses	-344	-348	-347
<b>Profit from operating activities</b>	<b>466</b>	<b>457</b>	<b>497</b>
Other operating expenses	-18	-19	-32
<b>Result before financial items</b>	<b>448</b>	<b>438</b>	<b>465</b>
Financial costs	-448	-438	-465
<b>Year-end result</b>	<b>0</b>	<b>0</b>	<b>0</b>

### Statement of profit or loss balance pursuant to the Danish Heat Supply Act

	2021 DKK '000	Budget 2021 DKK '000	2020 DKK '000
<b>Year-end result</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Adjustments</b>			
Reversal of operating depreciation	1,578	1,578	1,578
Depreciation under the Danish Heat Supply Act	-1,578	-1,578	-1,332
<b>Year-end result pursuant to the Danish Heat Supply Act</b>	<b>0</b>	<b>0</b>	<b>246</b>
Surplus/deficit transferred from previous years	-4	0	-250
<b>Profit or loss balance, year-end pursuant to the Danish Heat Supply Act</b>	<b>-4</b>	<b>0</b>	<b>-4</b>

## VEKS Gasmotor, Solrød - Comments on the profit of the year

In 2021, the production of the gas engine was affected by the increasing natural gas prices. The natural gas prices reached a level where it would be more profitable for Solrød Biogas to process the gas and sell it to the gas networks relative to burning the biogas in VEKS' gas engine.

The reduced operation resulted in a revenue of DKK 7.8 million less than budgeted in 2021 and DKK 6.4 million less in 2020.

The lower revenues will be counterbalanced by a lower settlement price to Solrød Biogas for the purchase of fuel. Compared to the budget, the settlement was thus DKK 7.8 million lower than budgeted in 2021 and the settlement was DKK 6.6 million lower compared to 2020.

## Tranegilde District Heating - Profit and loss account

	2021	Budget	2020
	DKK '000	2021	DKK '000
		DKK '000	DKK '000
Net sales	26,246	23,029	24,444
Production and heat purchase costs	-14,266	-13,507	-11,609
<b>Gross profit</b>	<b>11,980</b>	<b>9,522</b>	<b>12,835</b>
Distribution costs	-1,102	-1,487	-1,260
Administrative costs	-1,270	-976	-1,107
Depreciation	-7,621	-7,709	-7,530
<b>Result from primary operations</b>	<b>1,987</b>	<b>-650</b>	<b>2,936</b>
Other operating expenses	-36	-44	-67
<b>Result before financial items</b>	<b>1,951</b>	<b>-694</b>	<b>2,869</b>
Financial income	167	11	293
Financial costs	-2,624	-2,833	-2,710
<b>Year-end result</b>	<b>-506</b>	<b>-3,516</b>	<b>452</b>

### Statement of profit or loss balance pursuant to the Danish Heat Supply Act

	2021	Budget	2020
	DKK '000	2021	DKK '000
		DKK '000	DKK '000
<b>Year-end result</b>	<b>-506</b>	<b>-3,516</b>	<b>452</b>
<b>Adjustments</b>			
Reversal of operating depreciation	7,622	7,709	7,530
Depreciation under the Danish Heat Supply Act	-6,544	-6,543	-4,288
<b>Year-end result pursuant to the Danish Heat Supply Act</b>	<b>572</b>	<b>-2,350</b>	<b>3,694</b>
Surplus/deficit transferred from previous years	3,683	2,350	-11
<b>Profit or loss balance, year-end pursuant to the Danish Heat Supply Act</b>	<b>4,255</b>	<b>0</b>	<b>3,683</b>

## Tranegilde District Heating - Comments on the loss of the year

The net loss for 2021 amounted to DKK 0.5 million which is DKK 3.0 million better than budgeted and DKK 1.0 million lower than 2020.

2021 was considerably colder than budgeted and colder than 2020. The sale ended at 47,197MWh compared to a budgeted sale of DKK 43,000MWh and DKK 39,037MWh in 2020.

The increased sale resulted in a revenue of DKK 3.2 million higher than budgeted in 2021 and DKK 1.8 million higher than 2020. Compared to 2020, it should also be noted that the sale prices also dropped by approx. 11% from 2020 to 2021.

The gross profit is DKK 2.5 million higher than budgeted in 2021 which is due to the increased sale. Compared to 2020, the gross profit is DKK 0.9 million lower which - in addition to the falling prices - is due to the fact that the heat purchase costs have increased by 1.6% per sold MWh. In 2021, the operating expenses and financial income and expenses, net, were close to budget and at level with 2020.

## Køge District Heating - Profit and loss account

	2021	Budget	2020
	DKK '000	2021	DKK '000
		DKK '000	DKK '000
Net sales	53,137	53,081	51,966
Production and heat purchase costs	-30,492	-30,829	-24,947
<b>Gross profit</b>	<b>22,645</b>	<b>22,252</b>	<b>27,019</b>
Distribution costs	-2,908	-3,103	-2,921
Administrative costs	-2,029	-1,746	-1,469
Depreciation	-21,052	-21,550	-20,880
<b>Result from primary operations</b>	<b>-3,344</b>	<b>-4,147</b>	<b>1,749</b>
Other operating expenses	-16	-36	-54
<b>Result before financial items</b>	<b>-3,360</b>	<b>-4,183</b>	<b>1,695</b>
Financial income	269	0	0
Financial costs	-4,336	-4,683	-4,539
<b>Year-end result</b>	<b>-7,427</b>	<b>-8,866</b>	<b>-2,846</b>

### Statement of profit or loss balance pursuant to the Danish Heat Supply Act

	2021	Budget	2020
	DKK '000	2021	DKK '000
		DKK '000	DKK '000
<b>Year-end result</b>	<b>-7,427</b>	<b>-8,866</b>	<b>-2,846</b>
<b>Adjustments</b>			
Reversal of small acquisitions recognised as an expense	27	20	11
Reversal of operating depreciation	21,052	21,550	20,880
Reversal of allocated holiday pay, flex time and public servant pension	-64	0	96
Depreciation under the Danish Heat Supply Act	-15,890	-15,890	-16,957
<b>Year-end result pursuant to the Danish Heat Supply Actn</b>	<b>-2,302</b>	<b>-3,185</b>	<b>1,184</b>
Surplus/deficit transferred from previous years	4,290	3,185	3,106
<b>Profit or loss balance, year-end pursuant to the Danish Heat Supply Act</b>	<b>1,988</b>	<b>0</b>	<b>4,290</b>



## Køge District Heating - Comments on the loss of the year

The net loss for 2021 amounted to DKK 7.4 million which is DKK 1.4 million better than budgeted, however, DKK 4.6 million lower than in 2020.

2021 was considerably colder than budgeted and colder than 2020. The sale ended at 106,965MWh compared to a budgeted sale of DKK 108,000MWh. The reason the sale was lower even though the weather was colder was that more new customers were expected than the actual number of customers which were connected. In 2020, the sale was 92.894MWh.

In 2021, the revenue ended close to the budgeted amount and DKK 1.2 million higher than 2020. The reason the revenue only saw a modest increase in 2021 compared to 2020 despite the fact that more MWh was sold is that the sale prices decreased by approx. 11% from 2020 to 2021.

In 2021, the gross profit was close to the budgeted amount. Compared to 2020, the gross profit is DKK 4.4 million lower which - in addition to the falling prices - is due to the fact that the heat purchase costs have increased by 6.1% per sold MWh. The in-

crease is primarily due to the fact that repaid surplus of DKK 1.7 million from VEKS Transmission in 2019 was received in 2020.

In 2021, the operating expenses and financial income and expenses, net, were close to budget and at level with 2020.

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Mikkel Ellung Larsen

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### **Solrød:**

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#### **Fjernvarmeforsyning:**

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Finn Jørsby

### **Solrød Fjernvarme a.m.b.a.:**

Kaj Holm Rasmussen  
Niels Pedersen

### **Svogerslev Fjernvarme:**

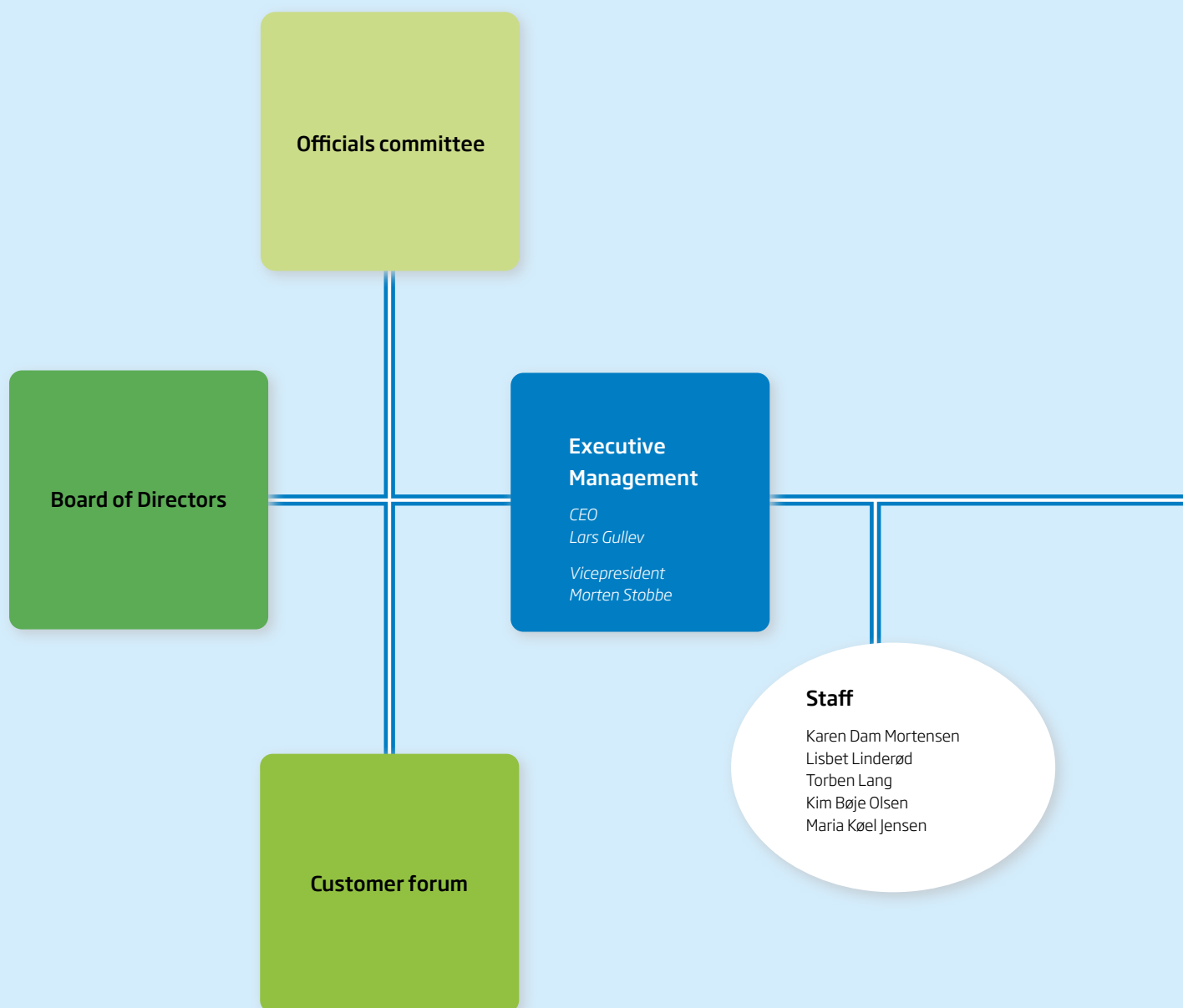
Jakob Henke  
Lars Ejstrup

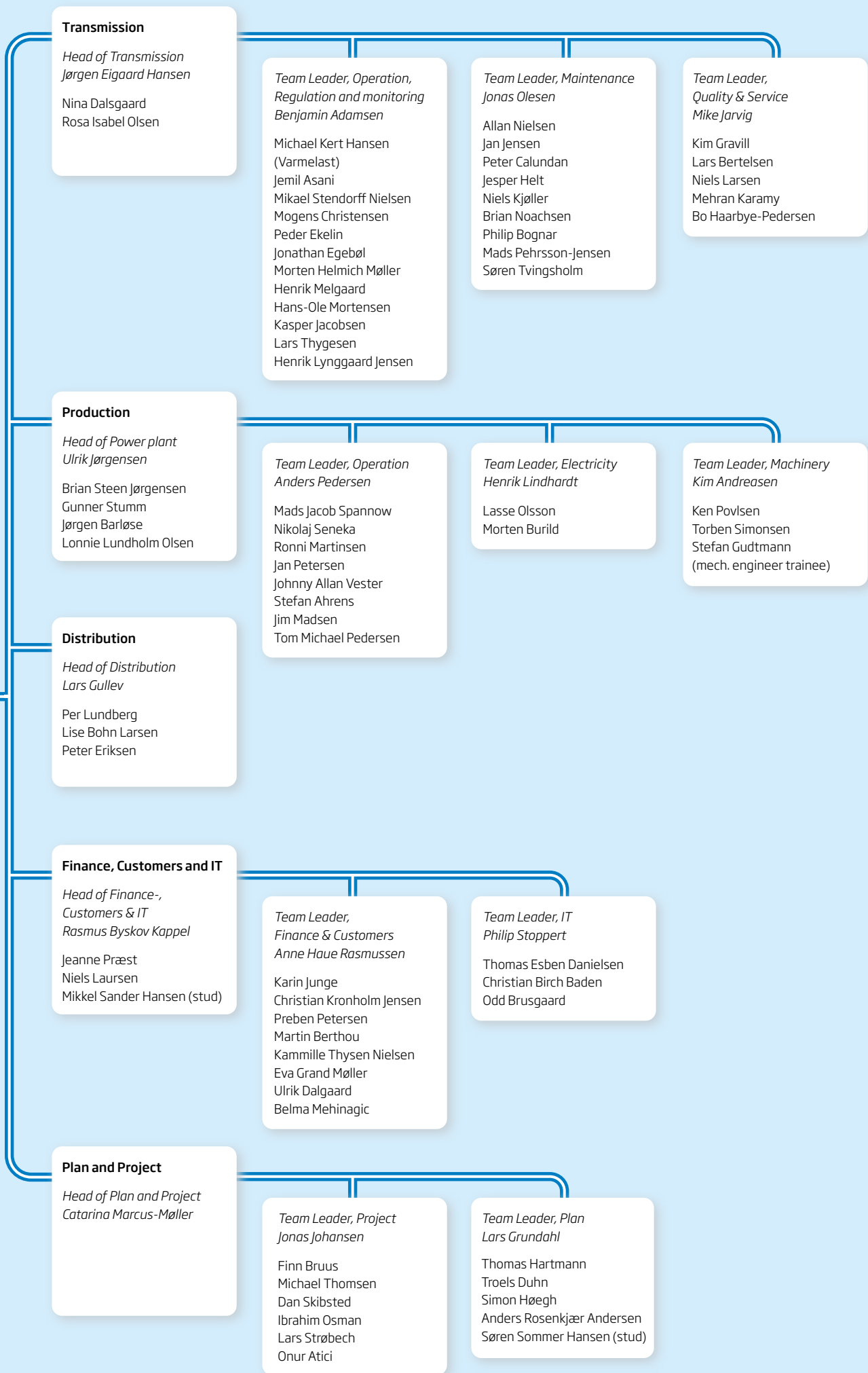
### **Vallensbæk Fjernvarme Nord/**

#### **Vallensbæk Fjernvarme Syd:**

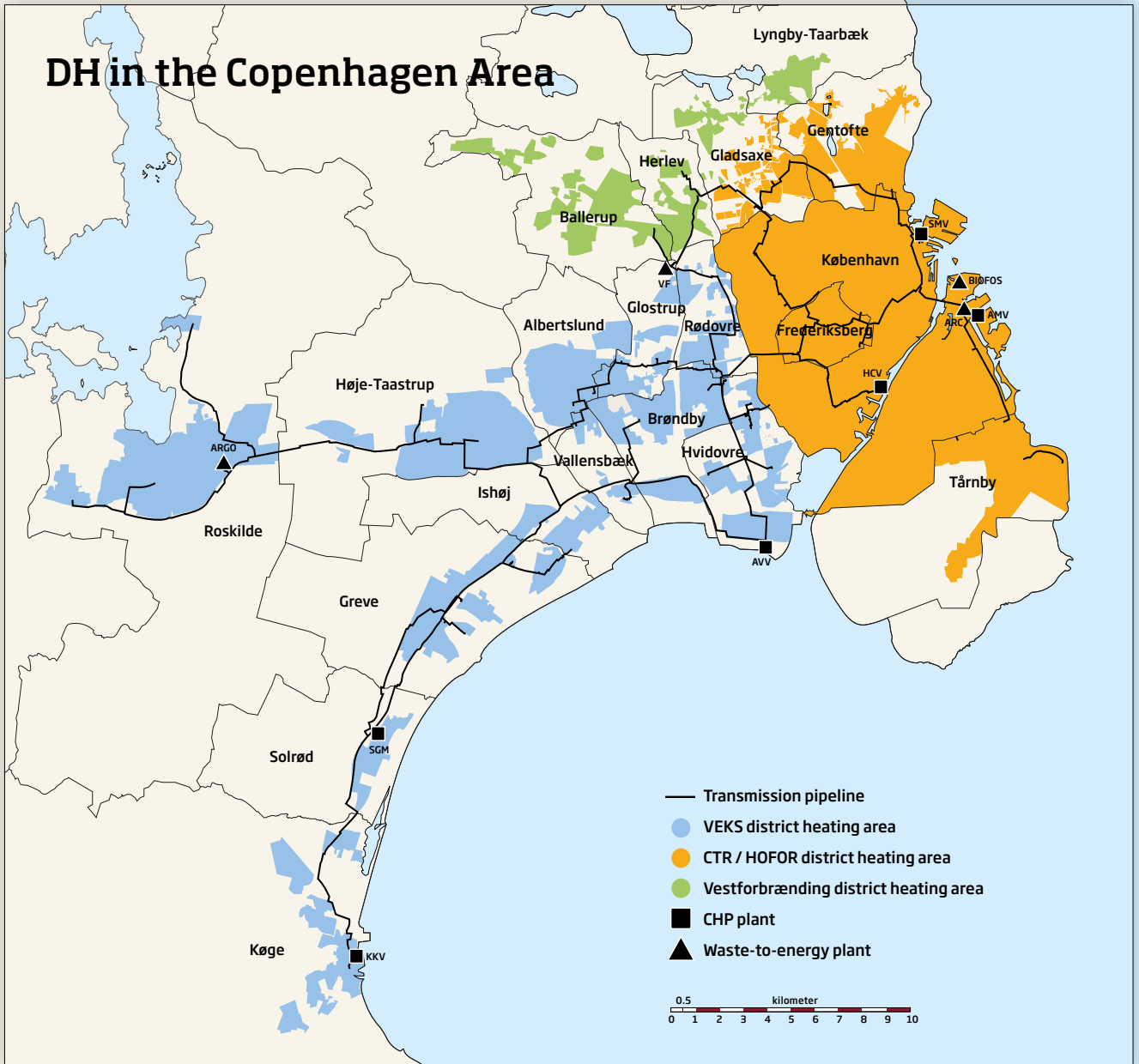
Ruth Sloth Frederiksen  
Mogens Wilbert  
Søren Slothsberg  
Niels Okstoft

## VEKS, April 2022





# DH in the Copenhagen Area



# Units and definitions

TJ	= Terajoule
GJ	= Gigajoule
MWh	= Megawatt hour
1 TJ	= 1,000 GJ
1 MWh	= 3.6 GJ
MJ/s	= Megajoule per second (heat output)
MW	= Megawatt (power output)
1 MJ/s	= 1MW = 1,000 kW

Average energy consumed for heating and hot water amounts to approximately:

- 60 GJ/year for single-family houses (120 m<sup>2</sup>)
- 40 GJ/year for apartments in multi-storey buildings (75 m<sup>2</sup>)

## Degree days

Degree days are applied in connection with the assessment of the heat required in buildings. The number of degree days per 24 hours is an indication of how cold it was and thus how much energy has been needed for space heating.

Degree days are calculated as the difference between mean outdoor temperatures and the 17 degree Celsius indoor temperature. Days during which the temperature exceeds 17 degrees Celsius are not included. The degree days of a normal year are established on the basis of the average of degree days throughout a number of years.

In VEKS' system, the number of degree days is, for instance, 3,112 per year.

Degree days and heating consumption are interlinked, ie the higher degree days, the higher consumption. The degree day summation for one year can be compared with the normal year. This renders it possible to assess for the year in question whether heating consumption has been high or low irrespective of the climatic conditions of the year.

## Emissions

CO<sub>2</sub> (carbon dioxide) is a greenhouse gas released from the burning of fuels.

SO<sub>2</sub> (sulphur dioxide) is released from the burning of coal and oil.

NO<sub>x</sub> (nitrogen oxide) is released when nitrogen in the air and oxygen are combined on burning of fuels.



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