-------- Videresendt meddelelse --------

Emne: SV: HEat pumps in Copenhagen

Dato: Tue, 2 Oct 2018 13:29:45 +0200

Fra: Charlotte Søndergren <chs@hofor.dk>

Til: olivier.glotain@bhge.com, morten.skaaning@ge.com, nh@nhsoft.dk

Kopi (CC): Jørgen Boldt <jobo@hofor.dk>, Bjarne Korshøj <bjko@hofor.dk>

Den 02-10-2018 kl. 13:29 skrev Charlotte Søndergren:

> Dear Niels Hansen, Olivier Glotain, and Morten Skaaning.
>
> On our side we also thank you for the useful meeting we had on 7 September, and we look very much forward to receiving a more concrete proposal from you, as outlined in your email below.
>
> For your benefit, I would like to reiterate our position on largescale heat pumps as follows:
>
> HOFOR District Heating is a distribution company, which, besides the network, owns peak-load and backup heat-only boilers as well as a few demonstration projects, e.g. heat pumps. We do not own actual baseload production plants and do not intend to own such, other than demonstration projects that can help

technological development in a direction that supports future heat supply. However, other companies in the HOFOR family do own baseload plants.

In case other parties wish to establish baseload production facilities to supply heat to us, a number of conditions apply, e.g.:

1. The project must comply with the Heat Supply Act. This implies that the project shall document a positive socio-economic business case. Furthermore, the plant must demonstrate new technology, since the Heat Supply Act only exempts demonstration plants from a requirement that all baseload plants shall be combined heat and power plants.

2. The project must report its planned production to Varmelast.dk on a daily basis (similar to the day-ahead market in Nordpool). To obtain supply allowance, you must supply heat, whose marginal production costs are lower than the alternatives. For verification, Varmelast.dk must have insight into the company's marginal production costs, incl. fuel prices and O&M.

3. The company must enter into a heat-sales contract with HOFOR District Heating, possibly with CTR, if the heat shall be delivered to the transmission network (very large heat pumps). Such an agreement will include rules for setting the price of heat.

Currently, the marginal or variable heat price is around DKK 50-55 per GJ, higher in winter, lower in sum. The supplier may also be eligible to a capacity payment, depending on the need for new capacity and whether we have sufficient trust in the capacity value. The capacity payment can take several forms. We may pay some of the investment in connection with the establishment of the plant, or pay a constant current contribution. The latter applies especially to small heat producers. For this purpose, we must have insight into the investment cost, and we may need a due diligence of the supply company.

4. The plant must be able to deliver the temperatures already in the grid. Typical forward temperature in the distribution network is 85 ^{o}C in Winter, 70 ^{o}C in Summer.

HOFOR District Heating may assist in project preparation and economics in various ways.

With best regards,

Charlotte

Charlotte Søndergren

Afdelingschef Planlægning

PLAN Fjernvarme, Bygas og Kraftvarme

Direkte tlf.: 2795 2724

E-mail: chs@hofor.dk

HOFOR

HOFOR A/S

Ørestads Boulevard 35 | 2300 København S | Telefon: 33 95 33 95 | CVR-NR.: 1007 3022 | www.hofor.dk

Fra: <nh@nhsoft.dk>

Dato: 22. juli 2018 kl. 20.52.17 CEST

Til: <lat@hofor.dk>

Cc: "'Difederico, Gianluca (BHGE)'" <gianluca.difederico@bhge.com>, "'Glotain, Olivier (BHGE)'" <olivier.glotain@bhge.com>, "'Skaaning, Morten (GE Power)'" <morten.skaaning@ge.com>

Emne: HEat pumps in Copenhagen

Dear Lars Therkildsen,

Back in February I had a meeting with Manager Dan Fredskov ARC together with Manager Jens Andersen Næstved district heating. The meeting was regarding a project where Næstved waste incineration plant was to close, and Næstved then would be supplied with heat from a 60 Mw heat pump cooling air. The new waste incineration plant ARC in Copenhagen has a very bad economy because of lack of waste from Greater Copenhagen. The plan then was to burn the waste from Næstved In Copenhagen on ARC, which would result in a healthy economy for the ARC.

However, there are some political obstacles to realizing the plan, which will take a long time to get in place (> 4 -5 years). AND there are better solutions for Næstved.

ARC is owned by Copenhagen and 5 other municipalities in greater Copenhagen and Hofor and CTR buys the district heat from ARC.

Back in 2014 I was In contact with you regarding huge heat pumps to supply Copenhagen with heat. Heat pumps as an alternative to the project at the time that converted the coal power plant Amagerværket to wooden chips. A project that is realized…

After talking with technicians and engineers at Hofor regarding the project the project was abandoned. Mainly because any reliable suppliers to the main parts of the setup could not be found.

I have now started a collaboration with General Electric about the development of these very large heat pumps that can supply cities like Copenhagen with (all the) heat.

At the meeting with Dan Fredskov I made a suggestion that a large heat pump was installed on the waste incineration plant. The setup was to use the plant's electricity production through a new steam turbine that supplied the heat pump with shaft power. ARC can provide 67 MW of electricity, as in a heat pump which operates with the power plant's condenser it would be able to produce 275 – 300 Mw extra heat, when the heat pump is up and running. The heat pump can be made so it can be supplemented with power from the grid so the heat pump can provide 500 Mw or more.

My proposal with a large channel where the heat pump cools sea water see

Due. to the advantageous taxation of the shaft power that the heat pump now consumes when it uses the power plant's electricity generation through a new

steam turbine and the fact that General Electric's heat pumps are very efficient and competitive then the heat price will become below 100 kr./Mwh all inclusive.

But Dan Fredskov claimed that ARC's only business was to burn waste and not to produce heat through a heat pump. But Hofor could buy the steam from the plant to a heat pump that were owned by Hofor!

I've introduced the mayor of Copenhagen Frank Jensen to the issue, and he thought there was a case between Hofor and ARC if a heat pump was to be installed on the waste power plant!

Fully developed, greater Copenhagen (CTR and VEKS) needs at least 1500 MW from heat pumps but then not a single wooden chip will need to be burned.

General Electric can produce a large variety of heat pumps that cools water or cools air in large cooling towers. The heat pumps can be integrated into industries or power plants, etc.

The heat pumps from General Electric uses natural refrigerants and not CFC gasses like the heat pumps in Sweden.

It is a fact that a big heat pump on ARC can rescue the power plant's economy and significantly reduce the

heat prices to Copenhagen, even after the spending of the 6 billion DKK. on rebuilding the Amager power plant for wood chips.

I'll like to introduce you to Gianluca Difederico and Olivier Glotain from General Electric and consider the possibility with heat pumps in Copenhagen.

I think your Office is near to the Airport in Copenhagen and Olivier and Gianluca are often traveling through the airport so they can easily come to you.

Med venlig hilsen/With Best Regards

Niels Hansen

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