Heat Plant Solrødgård

Presentation DHDB

Agenda

Projekt Background and Overall Objective

Solrødgård Heat Plant

Project model and Status

Permits and Cooperation with Hillerød Municipality

Risk Analysis

Questions – raise your hand

Short introduction

Name: Jonas Iversen

Position: Project manager – Energy Department

Background: Project manager for various utility projects.

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Background and objective

Hillerød Utility – District heating area

Heat production in 2022:
Gas = 31,4 pct.
Biomass and excess heat = 68,6 pct.

Total heat production ~ 360.000 MWh

Main objective criteria:
- Invest in alternative heating plants that contributes to phasing put gas and are financially feasible.

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Solrødgård Heat Plant

What are we looking for when developing new projects:

- Reliable heat source (higher eff.)
- Accessible electricity grid (< 5km)
- Accessible district heating grid (< 2 km)
- Available land for plant (land restrictions and extent of required permits)

Projected heat plant

- 10 MW Heat Pump
- 15 MW Electric boiler
- Small VAK – Heat storage

Environmental considerations

Protected land:

- 60 meters from project area to protected waterhole

Protected species:

- 100 meter from project area to possible protected species (Shot-nosed frog, status = almost endangered)

Bat hotel:

- Keep safe distance to bat “hotel”.

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Heat Pump Technologi

How it works:

- Components (simplified): Heat exchangers, compressor and expansion valve.
- With heat from wastewater and electricity to the compressor, the heat pump can produce district heating with a COP around 3,5.

Energy ratio:

- 2,5 MWh Wastewater + 1 MWh electricity = 3,5 MWh District heating

Refrigerants:

Ammonia:

- Natural, GWP=Low, High efficiency, Toxic for humans and environment, sensitive to in change in temperature for DH and WW.

CO2:

- Natural, GWP=Low, Toxic for humans, new tech., sensitive ?

Hydrocarbons:

- Natural, GWP=Low, High efficiency, new tech., sensitive ?

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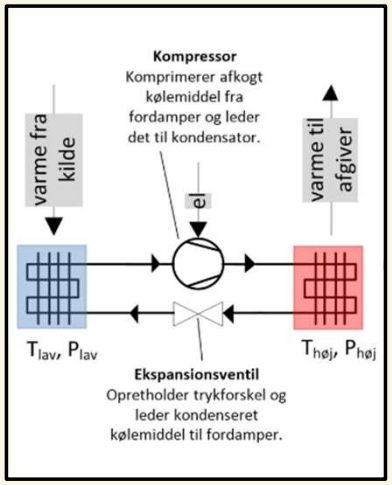
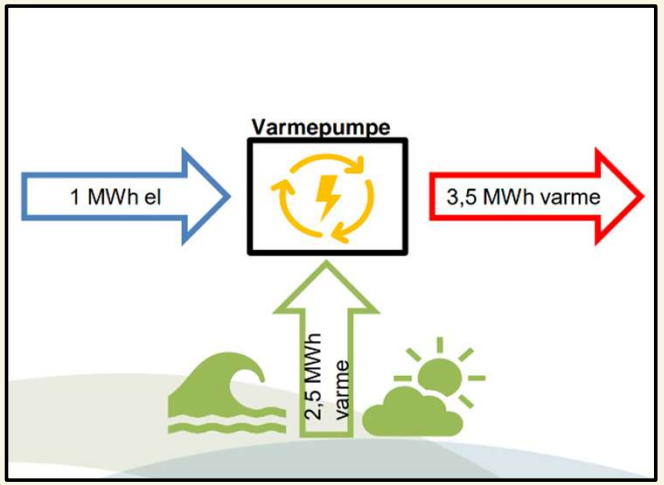




Electric boiler

Electric Boilers in brief

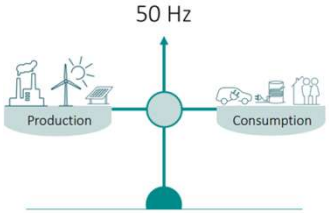
- Large "electric kettle"
- Low CAPAX and OPEX
- Energy efficiency = 1. 1 MWh Electricity = 1 MWh Heat.

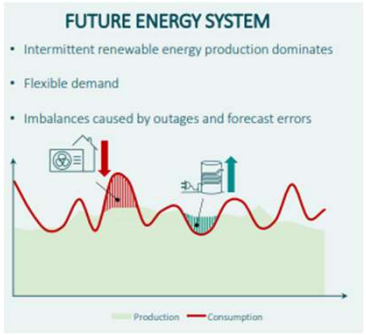
Financial attractive

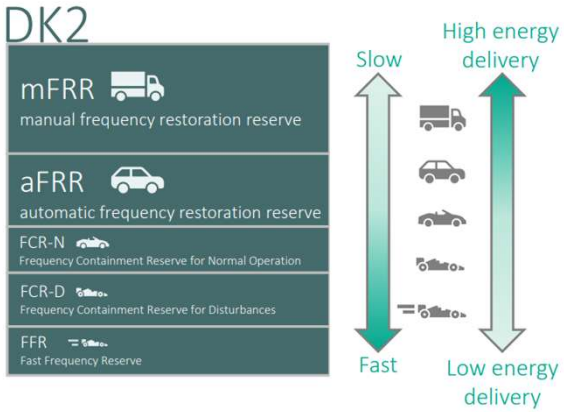
- Expected short pay back time due to income from ancillary service markets – will rise in the future.

Energy Market – Ancillary Service Market

- TSO (Enerignet) auctions ancillary services to balance the high voltage electricity transmissions system







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Wastewater Treatment Plant - HCR Syd

HCR Syd

- New wastewater treatment plant that are currently being expanded with HCR Syd 2.0.
- Build to handle waste from the pharmaceutical industries in Hillerød.

Wastewater temperature

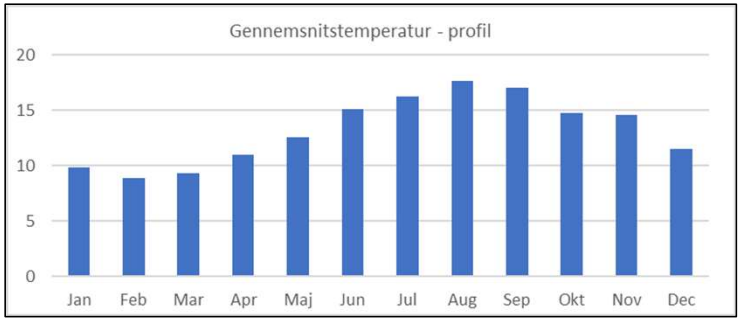
- Varies between 19 C in summer and 9 C in winter.

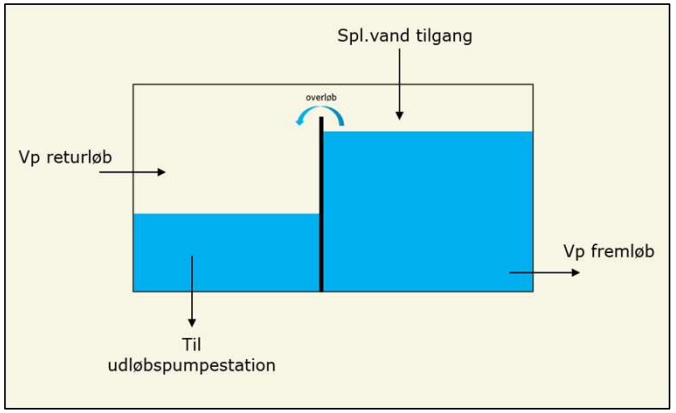
Spildevandsflow

- Flow: Yearly flow in 2022 was 6,4 mill. m^3/y. Expected to rise too around 8 mill. m^3/y in the future.
- Variations: Some variation over a day. Lowest at night and highest in the morning, but otherwise steady over a year.

Wastewater quality

- HCR Syd 2.0 is a new modern wastewater facility, and the quality is expected to be very good,





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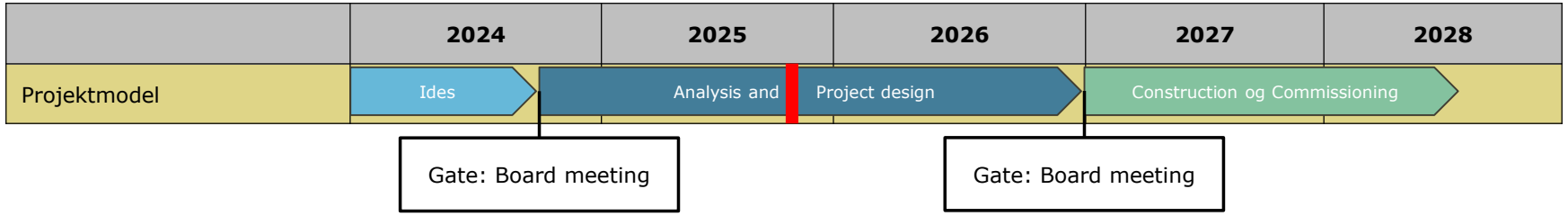
Project model and status



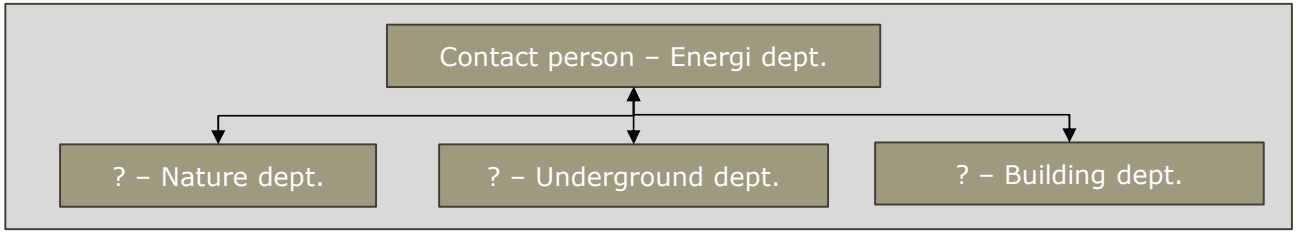
- Risk management = Descending risk curve and increasing spending curve.

WBS:	Status:	Objective:
Machine and Building	🟢	• Complete heat pump system commissioned
Electricity supply	🟡	• Connecting the system to the electricity grid
Permits	🔴	• Approved plant in compliance with permits
Area and land	🟡	• Acquire legal rights for use of land (cables for electricity)
District Heating Grid	🟢	• Connection of heat pump to the district heating grid. Maintaining normal temperature and pressure in grid.
Waste water plant	🟢	• Connection of heat pump to the wastewater outlet • Coordination of connection with HCR Syd 2.0
Operations	🟢	• Operable plant where operation is included in the solutions.
Business case	🟢	• Economically feasible project for Hillerød Kraftvarme ApS
Project Management	🟢	• Project completed with active project management

Permits overview (simplified)

Area	Environment		Design and area planning			Finance
Name (DK)	VVM Rapport	VVM Screening	Kommuneplan	Lokalplan	Byggetilladelse	Projektforslag
Name (Eng)	Environmental impact assessment (EIA)	Environmental impact assessment – Screening	Municipality plan	Local area plan	Building permit	Municipality heat plan approval
Approx process time.	2-3 years	6 mounts	5 years (for new plan)	2-3 years (for new plan)	3-6 mounts	6 mounts
	Large projects or projects failed screening	"All" projects	All projects must comply	All projects must comply	All projects	All projects
Content	*Full report* Environment Noise Animals	*Check list* Environment Noise Animals	General design and area use - applying for the whole municipality	Specific design and area use for a local area	Everything (last permit)	Social and private feasibility analysis
Designated authority by law	Hillerød Municipality Same contact person					

- Same contact person works well, but room for improvements



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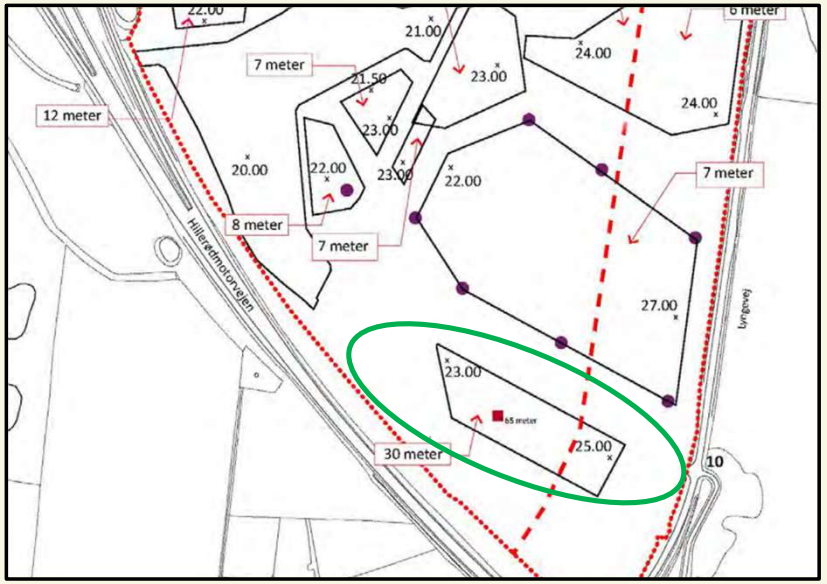
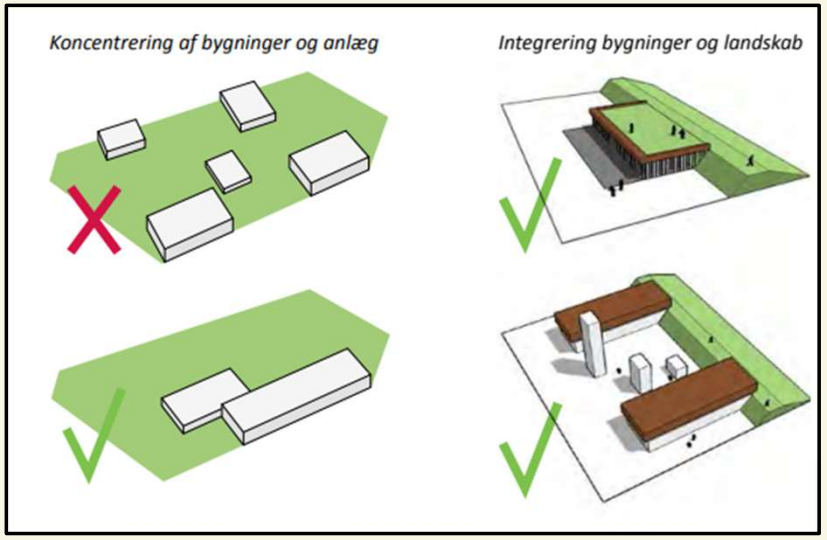
Local area plan

Local area plan for Solrødgård

- Area can be used for district heating production
- Area has a high restriction of 30 meters

- Requirements in local area plan for buildings appearance and incorporation with surroundings





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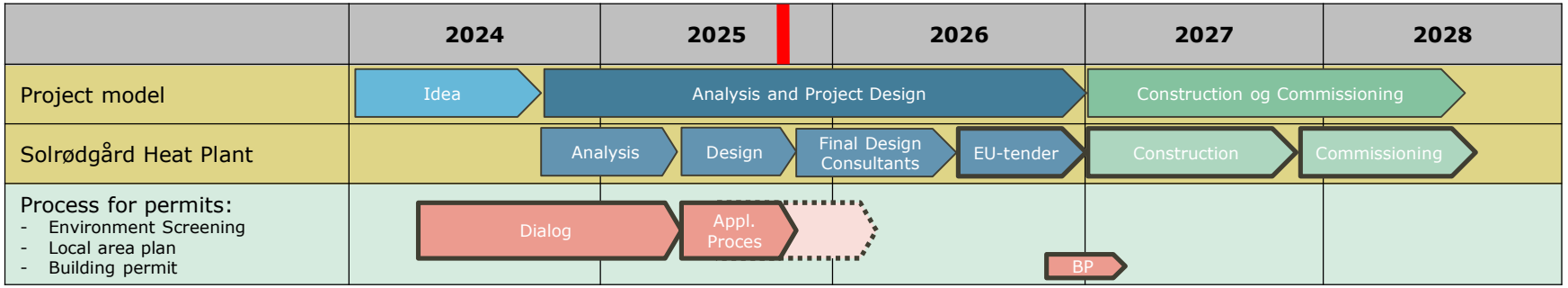
Process for permits by authority



- Plan for Solrødgård Heat Plant
- Delayed process for permits
- Different "opinion" on time of application - level of details

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Riskmatrix

Risk analysis – Top 5

A Delay of Electricity Supply
- Risk of the grid connection delays the commissioning of the heat pump plant

B Delay of Environmental Impact Assesment - Screening
- Risk of EIA screening delaying the project

C Full EIA report
- Risk that authorities will require a full EIA report

D Delay of Area and land agreements
- Risk of the project is delayed by missing area and land agreemens.

E Lack of operational experience with Heat Pumps on CO2 and hydrocarbons in DK
- Risk of unforeseen operating costs with CO2/hydrocarbons as refrigerant due to lack of operating experience with larger plants.