



MARKET CONSULATATION DOCUMENT		
Aquathermal Heat Pump The Hague		
CODE	REVISION N°	DATE OF ISSUANCE
	01	28-03-2021

PREPARED BY	APPROVED BY
Bas Geerdes	Arno Overhamm

	Title		CODE	
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General

Introduction

Uniper has set itself a target to become carbon neutral by 2035. To live up to this goal it is keen on developing new sustainable assets. One of these is the development of a Heat Pump in Uniper's Power plant in The Hague. This document contains information regarding this market consultation to develop this project.

About Uniper

Uniper is an international energy company with about 11,000 employees.

Headquartered in Düsseldorf, Germany, and listed on the Frankfurt Stock Exchange Uniper ranks among large generation and trading companies in Europe, which is one of the world's most important energy markets. Through the commodity trading and technology services businesses, Uniper is also active in energy markets from the Americas to Asia.

Fortum is the largest shareholder in Uniper with a 78% stake.

The core markets are Germany, the United Kingdom, Sweden & the Benelux countries. To support the activities outside of Europe, Uniper operates a trading business in North America and has offices in several international locations.

Uniper Benelux N.V. produces electricity, heat, and steam contributing to the security of supply in the Netherlands. In addition, Uniper provides support services that help balance the high-voltage grid. For more than 10 years Uniper has been working closely together with the surrounding industry in Rotterdam to exchange residual materials to reduce our carbon footprint.

The main location within Uniper Benelux N.V are:

- The Hague
- Leiden
- Rotterdam Maasvlakte
- **R**otterdam **C**apelle (RoCa)

At The Hague Uniper mainly produces electricity and heat. The heat is supplied to the local district heating grid supplying thousands of households in their heat demand. Uniper does not own the local grid nor does it supply heat directly to households.

Additional general information can be found with below link:

<https://www.uniper.energy/benelux/>

Goals of the Market Consultation

Uniper wants to achieve the following goals with this market consultation:

- Obtain budgetary prices for the Lot's. This information is required to support the subsidy application
- Assessment of our performance expectations on at least
 - Targets temperature
 - COP
 - Chosen Refrigerant
 - And preventive measures to prevent and detect leakages in both the canal and district heating water

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- Obtain feedback on
 - Available space
 - Offer validity and impact of current market circumstances
 - Expected timelines
 - LOT structures and scope
 - Required training, operations, monitoring and maintenance
- Reach out to market
 - Offer potential suppliers the opportunity to visit the plant at The Hague

Procedure

Time Schedule Including Project Expectations

Activity	Deadline
Publication of Market consultation documents	Week Commencing 28 th March 2022
Week Available for Site Visits	Planned for week commencing 25 th April 2022
Deadline submission of response	17 th June 2022 12:00
Upcoming Milestones	
Planned Subsidy Application	August 2022
Planned date of Publishing tender Documentation	September 2022 – Lot 1 November 2022 – Lot 2 and 3
Planned Subsidy Award	December 2022
Tender Closing Date	January 2023
Placing Firm order to Suppliers	February 2023
Commercial Operation	Within 2 years of the subsidy award

Exchange of information

The exchange of information for this market consultation is carried out electronically via TenderNed, www.tenderned.nl. The use of TenderNed is free of charge. If you have a product or service that might be interesting for Uniper to use concerning this project, please complete the question form in Annex 1 with any additional material.

For questions about this consultation please email **both** contacts below:

Arno Overhamm
 Uniper Benelux N.V. Procurement
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Bas Geerdes
 Project Manager
 E-Mail: bas.geerdes@uniper.energy

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Conditions

By taking part in this market consultation you agree to the following conditions:

1. Answers must be sent via email to the contact persons of this consultation.
2. Communication is in the English language.
3. Participants cannot derive any rights based on this market consultation.
4. Your answers are confidential and shall only be shared within Uniper;
5. The provided information is only used for further investigations and advice.
6. Uniper is not bound to the results of the market consultation.
7. No rights may be derived from the planning. Uniper retains the right to change the planning.
8. Uniper will not compensate for any costs incurred by respondents during this consultations process.

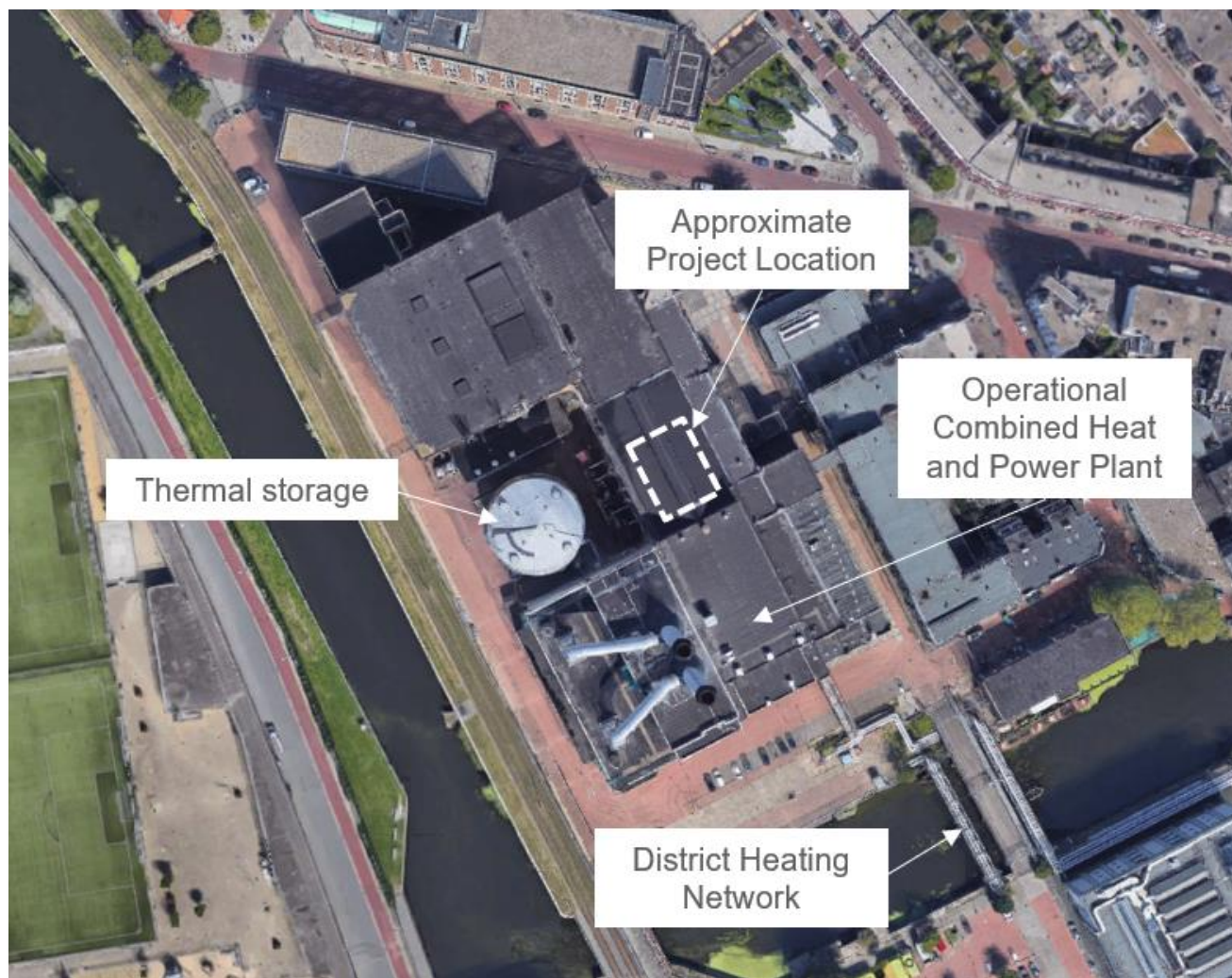
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Description of the Assignment

Project Overview

As stated in the Introduction the goal Uniper is to decarbonised its asset based at De Constant Rebecquestraat, the Hague. (Coordinates 52.07686600856051, 4.290843467561184). See figure below.



The objective of the project is to extract heat from the canal water at 15 degC and utilize a heat pump to boost the district heating return temperature of 60deg C up to 95DegC for recirculation around the network or to be stored in the existing thermal storage facility. Further details on temperature are provided below.

It is hoped that in this way a share of the heat currently provided by a variety of sources including gas boilers will be displaced with a lower Carbon solution thus supporting global climate change.

Uniper has some experience in heat pumps however this will be Uniper's first Heat pump project in the Netherlands.

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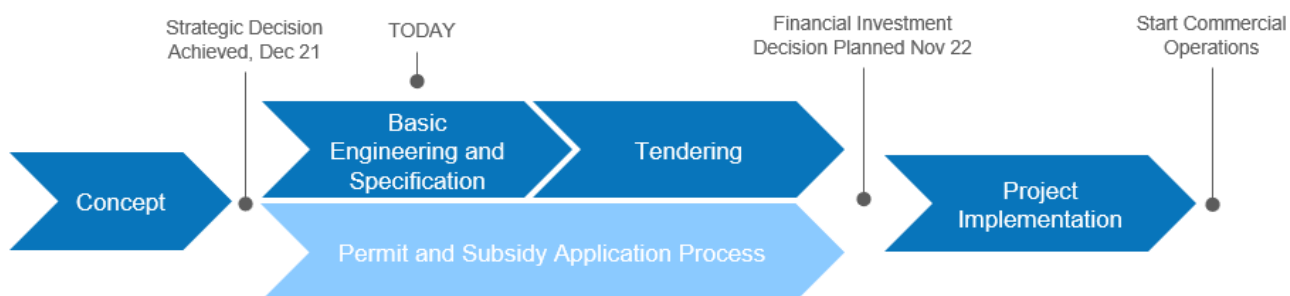
Project Funding

Uniper is the Project Developer and Owner for this project. Funding will be sought internally and supported through an application to the SD++ subsidy scheme to enable the business case.

In order to Make the application for this SDE++ subsidy information on the expected costs of the project are required and due to the timing of various activities it is not possible at this time to tender the full project. This will be planned for Q3 2022. However in order to make the subsidy application information is required on the feasibility and costs of the proposed project.

Project Implementation

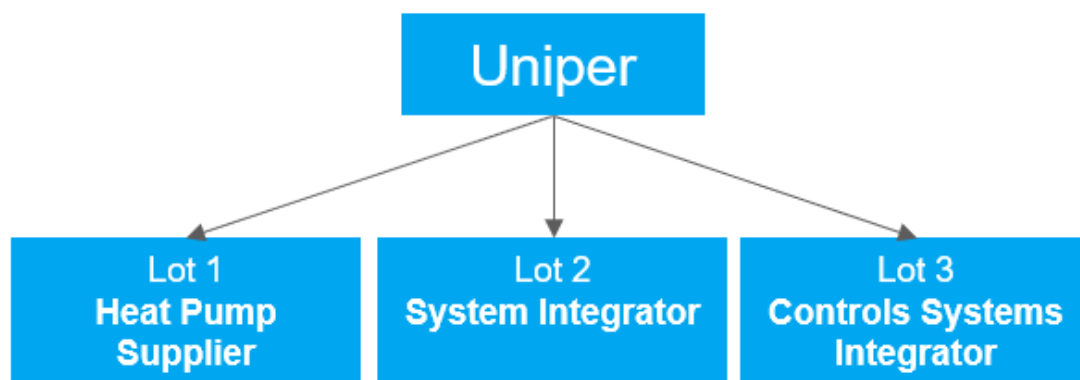
The project is being phased as shown in the figure below.



Currently, we are in the process of basic engineering being undertaken in-house and are developing a specification for the procurement lots as described below. The information gained through this market consultation will inform the writing of the specifications.

Proposed Lot Structure

The following diagram indicates the 3 main procurement contracts which Uniper wishes to enter into, each defined as "a Lot"



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Lot 1 Description

This lot is intended to Procure the Heat pump itself as a packaged unit or “black Box”. This unit shall be supplied with a single connection location for electrical power and similarly for Instrumentation and control connections. Civils Engineering works, cabling to the Heat Pump location, etc are not included in Lot 1.

Lot 2 Description

Lot 2 is intended to cover all aspects of integrating the Heat pump into the existing infrastructure. This can be subdivided into the following areas:

Mechanical to include the detailed design and installation of all mechanical equipment, procurement of necessary valves and pumps, etc.

Electrical to include the connection from a local 10kV transformer to a termination point on the Heat pump power supply panel. This will include the detailed design, routing, trays, etc.

Controls to include all cabling, instrumentation, wiring from the various pumps, valves, heat pump control interface to the existing site DCS system.

Civil Works requirements include foundation design, Heat pump enclosure design, HVAC, fire protection, and detection.

It is preferred by Uniper to bundle these different disciplines into a single Lot however it may be required that Lot 2 is broken down into Lot 2a, 2b, 2c, and 2d accordingly. The outcome of this market consultation will help substantiate that decision.

Lot 3 Description

This lot is intended as a software-only activity integrating the requirements of the heat pump and other components into the existing control system of the wider power plant. It is anticipated that alignment of requirements between the plant operators and HP supplier is best done via a 3rd party rather than acceptance of a standardized OEM-dependent solution.

Performance Requirements

The intention of the heat pump is the supply of the total heat output required in the summer and the support of the heat supply during spring and autumn. The winter supply is optional, depending on available cooling water temperatures.

Due to subsidy requirements, it is mandatory that the heat pump offers an average COP ≥ 3 while it is in operation from spring till autumn, summing up to 6,000 operational hours per year.

Additional operational hours above 6,000 hours per year are desirable but could also offer a lower COP than 3 depending on winter cooling water temperatures.

Therefore, the heat pump should meet the following operational points:

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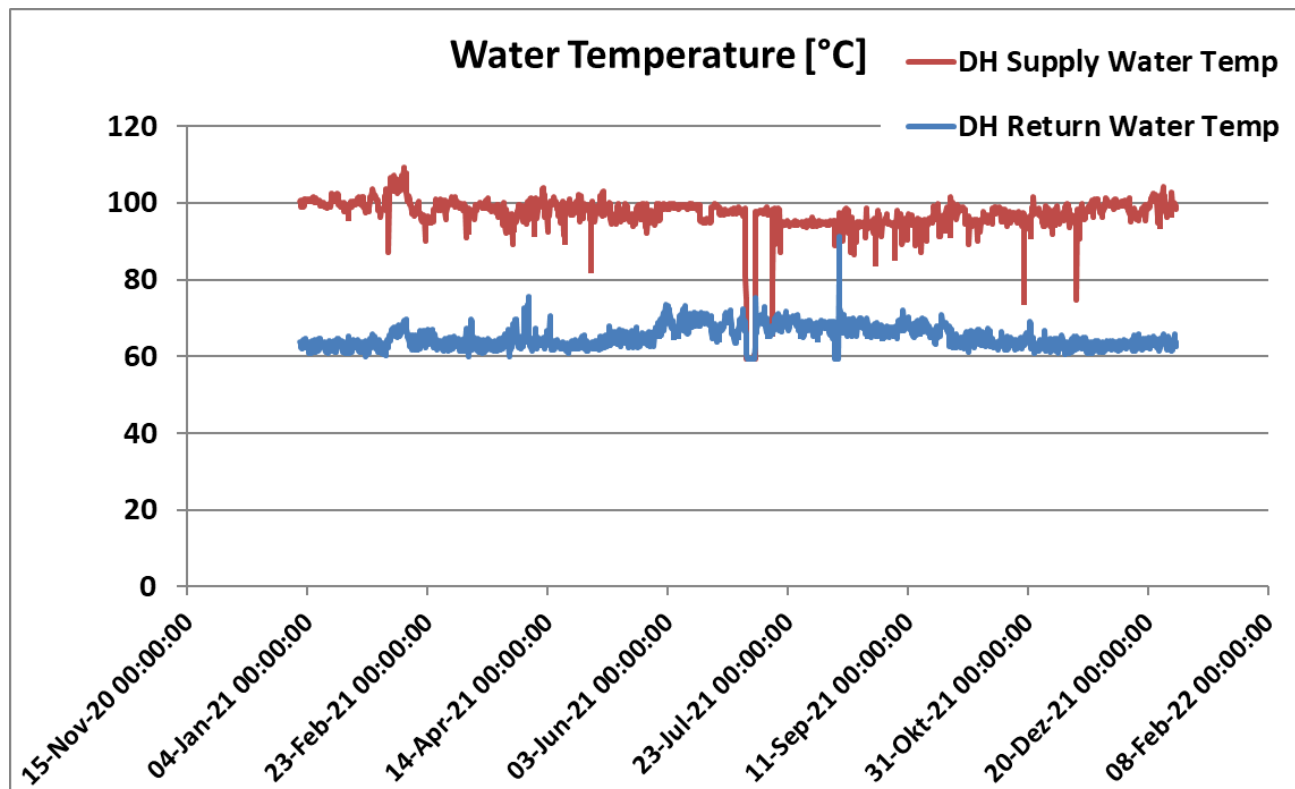
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Season	Summer 2500 h/a		Spring / Autumn 3500 h/a		Winter 2500 h/a	
Heat capacity (% of max.)	100%	50%	100%	50%	100%	50%
Load Point	1	2	3	4	5	6
Heat sink capacity expected [kW]	15000	7500	15000	7500	15000	7500
Heat sink temperature: in/out [°C]	65/95	65/95	62/95	62/95	62/95	62/95
Approx. heat sink mass flow (expected) [kg/s]	120	60	110	55	110	55
Approx. heat source inlet temperature [°C]	20	20	15	15	10	10
COP	>3	>3	>3	>3	> 2.5	> 2.5

Potential heat pump suppliers are asked to state the attainable heat sink capacity [kW], the attainable heat sink temperatures [°C], the heat sink flow [kg/s], the required motor power at terminal [kW] and the attainable COP for the operational points above. Additionally a part load curve for the heat pump is requested.

Supply water temperature

The district heating system is operated at relatively stable temperature levels during the year. The following diagram shows an exemplary course of the year for the return and the supply temperatures.



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The return temperature from the district heating system for the heat pump design should be 62°C. This return temperature could be slightly higher during summer months.

The supply temperature to the district heating system must be 95°C. This temperature should be the target temperature with a deviation of +/- 3K. This temperature could be at the lower end of the range in the summer months.

The peak supply temperature required for the site is 110°C. Should this higher temperature be required during HP operation an additional heat source will be made available on the site.

Quality of the district heating water

The district heating water is a reversed osmosis water, degassed and NaOH is added to increase the pH to prevent corrosion. The pH value is in the range of 9.5 ... 10. The conductivity is typically lower than 25 µS/cm.

The following table provides an overview on typical water quality data over time

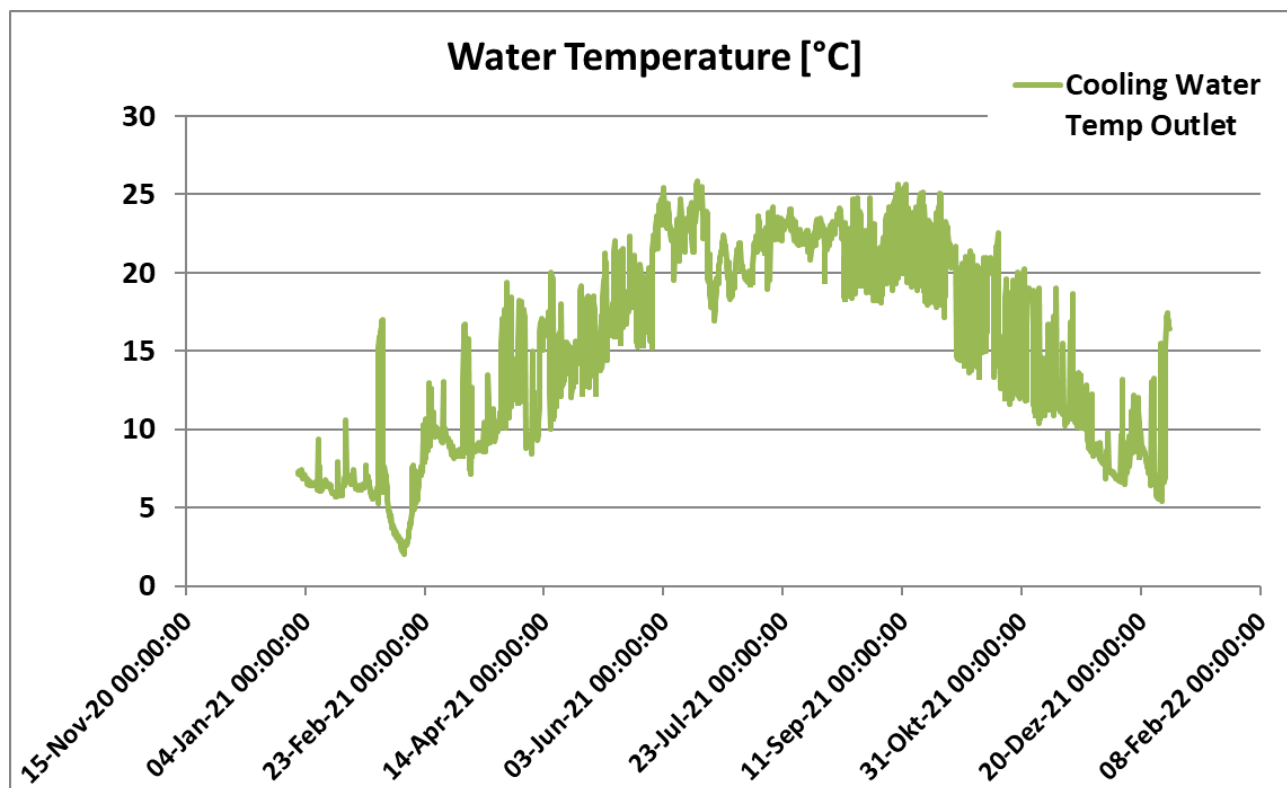
Conductivity µS/cm	pH	Silicate µg/l	Iron µg/l	Calcium mg/l	Magnesium mg/l	Hardness me/l	Ammonium mg/l	Chloride mg/l	Phosphate mg/l	Kalium mg/l	Lithium mg/l	Natrium mg/l	Sulfate mg/l	LAB-O2 µg/l
24,5	9,6	2053	12	0,91	0,05	0,02	0,20	0,52	0,04	0,13	0,00	2,47	0,08	3,7
24,3	9,6	2034	11	0,91	0,05	0,02	0,16	0,57	0,02	0,15	0,00	2,38	0,06	4,1
25,2	9,6	2075	132	1,10	0,07	0,03	0,16	1,00	0,03	0,28	0,00	2,56	0,75	3,4
24,7	9,6	2103	12	0,86	0,07	0,02	0,17	0,58	0,03	0,18	0,00	2,50	0,11	3,8
25,3	9,5	2089	5	0,96	0,04	0,03	0,18	0,60	0,03	0,21	0,00	2,52	0,02	5,0
26,4	9,7	2031	5	0,83	0,06	0,02	0,17	0,49	0,08	0,19	0,00	2,60	0,26	2,7
24,7	9,6	2037	6	0,89	0,06	0,02	-	0,57	0,03	0,16	0,00	2,48	0,16	2,2
24,7	9,6	2383	4	0,89	0,05	0,02	-	0,56	0,31	0,15	0,00	2,55	0,14	1,6
24,6	9,5	2370	9	0,87	0,05	0,02	0,21	0,51	0,08	0,10	0,00	2,50	0,08	1,3
24,5	9,6	2436	4	0,89	0,06	0,02	0,24	0,52	0,10	0,11	0,00	2,53	0,16	4,0
24,1	9,6	2390	4	0,92	0,07	0,03	0,22	0,49	0,23	0,17	0,00	2,48	0,11	4,1

Heat Source: Canal Water

The following diagram shows the water temperature for an exemplary course of the year.

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The heat pump should be mainly operated during spring to autumn (details see below), so no operation at water temperatures below 4°C is envisaged.

Therefore, the heat pump should cope with the following temperatures:

- Summer (ca. 2500 h/a): Water temperature 20 ... 25°C
- Spring / Autumn (ca. 3500 h/a): Water temperature 10 ... 20°C

In winter (ca. 2500 h/a) the water temperature is typically below 10°C.

The typical cooling water flow is about 1000 ... 2500 kg/s. This water can be cooled down by approx. 4 K at spring, summer and autumn conditions. The temperature reduction in the cooling water is part of the subsidy application requirements.

Limitations on the discharge water are as follows

Month	Average T Canal The Hague [C]	Max cooling to [C] (per hour)
1	5,3	
2	5,2	
3	8,2	
4	14,1	6

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5	17,6	12
6	20,6	15
7	23,2	18
8	23,4	18
9	19,9	14
10	14,9	10
11	10,0	
12	6,6	

Quality of the cooling water:

The cooling water available at the site is filtered with a coarse filter to remove the fallen leaves, crabs and shells. No further cleaning or filtering stages are in place. Is to be noted that the canals at The Hague are not deep and heat up in summer easily which speeds up the grow of algae.

The average pH value is in the range of 7.75. The average conductivity is about 820 µS/cm, but could be up to 1200 µS/cm.

The following table provides an overview of the average water quality data:

Geleidbaarheid µS/cm	pH	Silicaat µg/l	IJzer µg/l	P-Getal me/l	M-Getal me/l	Lithium µg/l	Natrium µg/l	Ammonium µg/l	Kalium µg/l	Magnesium µg/l	Calcium µg/l	Fluoride µg/l	Chloride µg/l	Nitriet µg/l	Bromide µg/l	Nitraat µg/l	O-Fosfaat µg/l	Sulfaat µg/l	Hardheid me/l
820	7,74	14326	146	0,00	4,79	23	92477	223	32574	4974	99079	1435	87457	2520	899	12154	1920	54889	2,68
383	3,59	7314	79	0,00	2,18	14	74567	129	15521	2721	48610	931	42875	2891	936	11268	1120	27755	1,30

Available Space

A location has been identified within the existing machine hall where it is planned to install the heat pump and make the ties into the heat infrastructure. The total available space including all noise insulation, walls, etc. is 23.75m long x 9.65m wide and 6.0m high. This is thought sufficient space but comment should be made if additional space is required

Site Visit

All potential respondents to any Lot in this consultation are invited to the Uniper Site in Den Haag. This is thought to be useful in providing additional context for the project. A week has been set aside for this in the week commencing the 25th of April, 2022. The structure of this week will be communicated to those interested closer to the time and will be dependent on the number of visitors.

If you would like to attend a site visit please email the named contacts above as soon as possible.

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Annex 1 – List of questions for responders of this consultation

Question 1 – Please provide company information and Contact details including a description of which lots you are responding to.
Answer
Question 2 – Please provide some references of comparable projects undertaken in the past 5 years.
Answer
Question 3: Please provide and indicative, non-binding price for the supply of equipment within the scope of this project. If responding to the Lot 1 especially please detail the capabilities of the heat pump including for example mechanical interfaces, instrumentation included, controls interface and electrical network interfaces. Please describe in as much detail as possible the scope of any budgetary prices given.
Answer
Question 4: Please provide any comments on the proposed lot structure which may reduce risks during project implementation.
Answer
Question 4: Please indicate the expected duration and future tender response will remain valid at this time.
Answer 4

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Question 5: Please indicate your confidence in achieve the specified performance expectations based on the temperature profiles provided. IN particular the capability of the heat pump to deliver an average COP of > 3.0.

Answer

Question 6: Please comment on the capability to meet the proposed timescales for the project.

Answer

Question 7: Please comment on the on the required training, operations, monitoring and maintenance for the planned equipment

Answer

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