



**LIFE 4 HEAT
RECOVERY**

Guideline on authorisation and tendering processes – Action A.2



**Low temperature, urban waste heat into district heating and cooling networks
as a clean source of thermal energy**

LIFE4HeatRecovery



Project Title: Low temperature, urban waste heat into district heating and cooling networks as a clean source of thermal energy

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1 Summary

The initial plan of the LIFE4HeatRecovery project included demo sites for Ospitaletto (responsibility of COGEME), Rotterdam (responsibility of WBR), Heerlen (responsibility of MIJNWATER), and Wüstenrot (responsibility of WUESTEN, supported by UHRIG and ENISYST). However, due to various reasons, the two demo cases of Rotterdam and Wüstenrot were later cancelled – with the withdrawal of beneficiaries WBR, WUESTEN, and UHRIG from the project – while the new demo case of Aalborg (responsibility of new beneficiary HEATFLOW, supported by other new beneficiaries AAFOR, AAU, and SOREN, as well as by ENISYST), together with a twin replication case in the same city, was included as a replacement, through a project amendment. The Rotterdam demo case was cancelled before the project entered in the detailed analysis of authorizations; moreover, general information on Dutch regulation is the same as for the case of Heerlen, located in the same country. Therefore, no mention of the Rotterdam case is done in this report. On the contrary, general information about the Wüstenrot case, located in Germany, could be collected through the German partner ENISYST and it is here presented to extend the analysis to more countries, in spite of the cancellation of the corresponding demo. In conclusion, this deliverable includes information related to 4 cases: Ospitaletto (Italy), Aalborg (Denmark), Heerlen (the Netherlands), Wüstenrot (Germany), providing a broad overview of authorization and tendering procedures for waste heat recovery projects in 4 different countries.

2 Introduction

This document aims to describe information on the authorisations and contracting procedures the demonstration partners went through.

In order to start the installations at the demonstration plants, building authorizations and other permits are necessary. The authorizations are prerequisites to all LIFE4HeatRecovery activities. Considering this, the demonstration networks started this action at the beginning of the project, in order to produce the documentation in time, also considering possible delays.

Each demonstration partner made an inventory on the construction, environmental and other important permit(s). These and the annexes are listed and placed in an overview which gives an impression of differences between planning and realization and finally their causes. All was reviewed by the project partners.

The waste heat recovery has been discussed and agreed with the technical staff of the companies which are the source of the waste heat. Contracts are signed just before tendering/procurement, when the plans for skids and construction works are finalised. A description of each step in the decision-making process between the operator of the DHC-system and the waste heat source company is presented for each demo partner.

In parallel with the activity devoted to gathering the public permits, the tenders for manufacturing and installing the skids are prepared and delivered. The developed tenders include the devised indications and require that environmental requirements are respected.

As a final result of the Action, some lessons learnt during authorization and tendering processes are reported.

3 Ospitaletto – Heat recovery from cooling towers

This chapter is devoted to the demo case of Ospitaletto, where waste heat is recovered from the cooling towers of a foundry (ASO) and then reused either to supply the local space heating and sanitary hot water needs or to be injected into the already existent cold district heating network. Being the most complex case, the steps described below are also summarized in flow chart form in the Annex.

3.1 National Authorisations

For this case, there are no national authorizations required. Of course, there is a large number of national and international standards and norms to be fulfilled, but they are used to validate design, realization and operation rather than to ask for authorization.

3.2 Local Authorisations

Following some design changes, the skid has been split into two parts:

- the on-site heat exchanger kit, to recover heat from the site circuit upstream of the cooling evaporation tower, installed on the roof of the existing pump room;
- the “geothermal plant” (i.e., the heat pump plant), required to increase the temperature of the heat transfer fluid used to heat and produce domestic hot water for the canteen and changing rooms, implemented on the roof of the changing room area.

In the following image in red it is possible to see the two parts in which the skid was divided and in light blue the pipelines, made by PP-R tubes, joining the on-site heat exchanger kit and the geothermal plant.

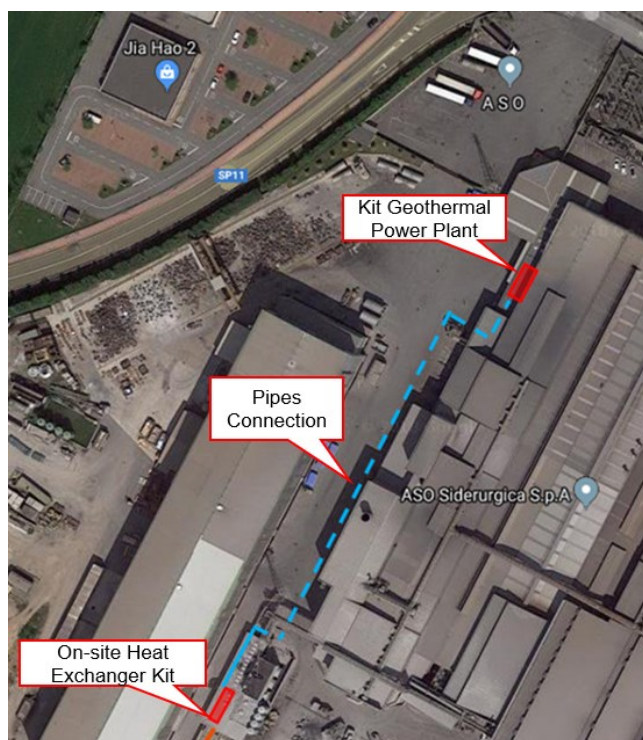


Figure 1: Location of the On-Site Heat Exchanger Kit and of the Geothermal Plant

The on-site heat exchanger kit, consisting of the heat exchanger, valves and control and measurement instrumentation, is installed on the roof of the pump room and enclosed in a prefabricated container/cabinet, to protect the equipment from atmospheric agents: being used only like a technical room, no authorization is needed.

The waste heat is already partly injected into the municipal network, indeed the public permits were given before the network construction. The construction permits were made by the Municipal Council of Ospitaletto, when it agreed to Cogeme's network project.

About environmental permits, the Ospitaletto network is connected on one hand with aquifer wells and on the other hand with the waste heat source company ASO; so the ATS (Agenzia di Tutela della Salute, i.e., the Italian local public department which insures the public health) requires a heat exchanger between the two pipelines (one from/to wells, one from/to metal production plant), so that the water from the factory does not get mixed with the phreatic water.

Hence, the only authorization that Cogeme needs is the municipal authorization, called SCIA (Segnalazione Certificata di Inizio Attività), because Cogeme is building a new volume on the roof of the existing building for hosting the geothermal plant. The geothermal plant is positioned above the current roof, to conserve the existing roof and enable normal water flow.

In the case of the new prefabricated skid for the geothermal plant the following Regulations apply (bilingual Italian-English text is reported for better clarity):

- D.P.R. 6 giugno 2001, n. 380 - Testo unico delle disposizioni legislative e regolamentari in materia edilizia: per la parte autorizzativa edile (*Legislative and Regulatory Provisions on construction - for the building authorization part*)
- Decreto Ministeriale 17 gennaio 2018 - Testo aggiornato delle norme tecniche per le costruzioni: per la parte strutturale (skid prefabbricato, sottostruttura, idoneità edificio esistente); (*Technical standards for buildings - for the structural part (prefabricated skid, substructure, suitability of existing building)*)
- Decreto Legislativo 3 aprile 2006, n. 152 - Testo Unico Ambientale: questa norma non si applica in quanto non si produzione di fumi, rifiuti, acque, ecc. (*Environmental Regulations: this Standard does not apply as the building does not produce fumes, waste, water, etc*)
- D.P.R. 31 del 13.02.2017 Regolamento recante individuazione degli interventi esclusi dall'autorizzazione paesaggistica o sottoposti a procedura autorizzatoria semplificata: per quanto riguarda l'impatto paesaggistico del progetto (*Regulation identifying the interventions excluded from the landscape authorization or subjected to a simplified authorization procedure - As regards the landscape impact of the project*)
- D.Lgs. 81/2008 Attuazione dell'articolo 1 della legge 3 agosto 2007, n. 123, in materia di tutela della salute e della sicurezza nei luoghi di lavoro (*Implementation of article 1 of law no. 123, concerning the protection of health and safety in the workplace*)
- Legge 123 del 03.08.2007 Misure in tema di tutela della salute e della sicurezza sul lavoro e delega al Governo per il riassetto e la riforma della normativa in materia (*Measures regarding the protection of health and safety in the workplace and delegation to the Government for the reorganization and reform of the relevant legislation*)

The SCIA must be submitted to the Municipality before the beginning of the work and must be drawn up by filling in a specific standard model.

Within the SCIA documentation there is the landscape impact report which analyzes the landscape implications of the intervention, concluding that since the impact is below the “relevance threshold”, the authorisation of the Landscape Commission of the Municipality of Ospitaletto is not necessary.

List of documents to be submitted (in Italian):

- Modulo S.C.I.A. (Segnalazione Certificata di Inizio Attività)
- Soggetti Coinvolti
- Ricevuta di versamento dei diritti di segreteria
- Delega di ASO SIDERURGICA S.p.A. a COGEME S.p.A. per la richiesta di rilascio del titolo edilizio
- Conferimento di procura speciale da parte di COGEME S.p.A. al tecnico incaricato per la consegna della pratica
- Visura Camerale di ASO SIDERURGICA S.p.A.
- Visura Camerale di COGEME S.p.A.
- Visura Catastale dell’immobile
- Ultimo titolo edilizio autorizzato: D.I.A. per i lavori di "Realizzazione tettoia, ampliamento per impianto AFR BIG, prolungamento fossa e posa scala esterna in ferro" presentata in data 18/02/2016 prot. n. 3293
- Dichiarazione sul rispetto dei requisiti acustici passivi come stabilito dal DPCM 5/12/1997
- Notifica preliminare D.Lgs 81/2008
- Relazione statica edificio esistente
- ARCHITECTURAL DESIGN
 - Relazione tecnica di asseverazione
 - Relazione fotografica
 - Relazione di impatto paesistico
 - Inquadramento territoriale su C.T.R.
 - Planimetria generale area d’intervento
 - Planimetria di dettaglio cabina centrale geotermica: SdF – SdP - SdC
 - Prospetto Ovest cabina centrale geotermica: SdF – SdP - SdC
 - Simulazione fotografica intervento
- PLANT DESIGN

After the delivery, the SCIA shall be operational immediately. The competent administration has 30 days from the date of receipt of the request to verify the regularity of the documentation submitted. Once the works have been completed, the Communication of End of Works must be deposited with the test certificate, which attests the conformity of the work to the submitted project.

The building works required for the geothermal plant included in the SCIA are:

- Site preparation: includes the implementation of enclosures and site access, setting up a storage area, and places to store materials and assemble fall-protection parapets for work carried out at height.

- Building work to construct the support for the container housing the geothermal plant: includes the container's metal substructure and exterior metal staircase for accessing the station.
- Dismantling the site: including the dismantling of fall-protection parapets and general cleaning of the site area.

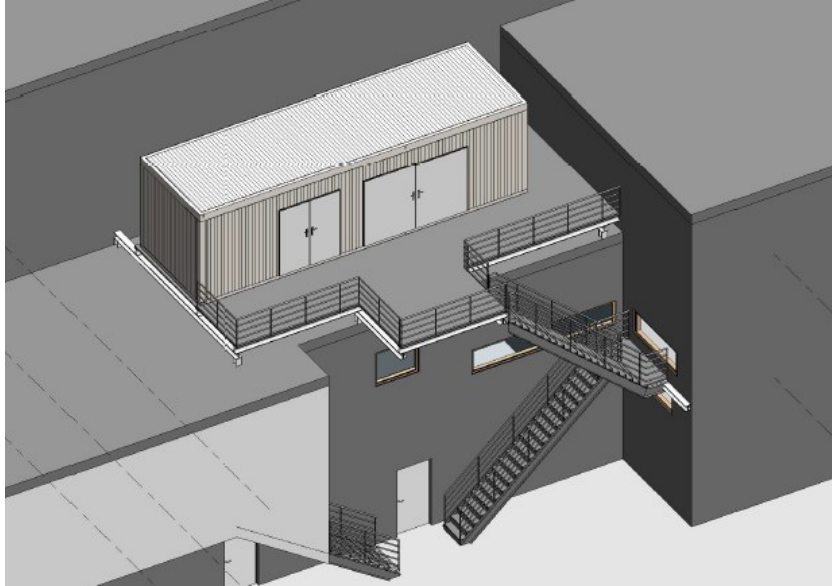


Figure 2: 3D-view of the new external metal staircase initially planned for the geothermal plant (later modified).

3.3 Authorization for cold district heating network

In 2018 Cogeme implemented a cold district heating network of approximately 2.3 km in length in the district of Ospitaletto. The organisation currently manages the system and uses energy sources such as geothermal energy and waste heat from the steel mill ASO, situated approximately 1 km from the town centre, to meet the heating requirements of public and private buildings.

ASO produces steel from scrap, which is selectively collected through a recycling process. The metal is melted into a liquid which is poured into moulds, where it takes shape and hardens after the cooling process. The materials used are aluminium and cast iron. The site operates 5 days a week with three daily shifts. Heat can be drawn from Monday afternoons until Saturday mornings.



Figure 3 - The network, location of consumers, wells and ASO.

The cold district heating network of Ospitaletto was authorized with the following authorization procedures issued by the Province of Brescia:

1. Concessione derivazione acqua pubblica – Atto Dirigenziale n. 4504/2018;
2. Autorizzazione allo scarico – Atto Dirigenziale n. 1468/2018 del 07.05.2018;
3. Voltura Autorizzazione allo scarico – Atto Dirigenziale n. 3135/2018.

3.4 Contracts with waste heat recovery source

Since July 2018, ASO has been transferring heat recovered from the cooling circuit to the district network through a heat exchanger. The thermal energy available is much greater than 2 GWh, the yearly heat requirement of users connected to the network. The heating and domestic hot water system for the canteen and changing rooms at the beginning of the LIFE4HeatRecovery project was supplied with methane gas with inefficient, outdated heat generators.

As a result, Cogeme and ASO agreed to develop a prototype system to collect waste heat from the cooling circuit and use it to meet indoor heating and domestic hot water requirements, or transfer it to the network if these requirements are already being met. At the beginning of the study in 2017, it was estimated that only domestic hot water requirements would be satisfied. ASO subsequently expressed a need to eliminate domestic methane services, asking Cogeme to also take over indoor heating.

In the Annex there are the schematic steps of investigation between Cogeme and ASO. The preliminary agreement by ASO's owners is included in the proposal signed in August 2017, but a final contract had to be prepared. Delays due to Coronavirus situation and additional negotiations shifted the signature towards the second half of 2021.

In order to write a good contract the parts have met each other and discussed to find the right rules. In this sense, the contract has to be written by both sides.

In general, to close the contract between operator of the DHC-system and the waste source company, it is important to have some defined targets.

On the operator side:

1. Which information it wants from the Company.
2. Maximum and minimum energy and power conditions of waste source over the day, the week, the year.
3. The internal needs, power and energy.
4. The possible payment for the energy which is delivered to the network by the Company, if it is possible or not.
5. Any costs which could be incurred by each part.
6. The deadlines of studying, designing, constructive phases.

On the Company side:

1. How invasive the operator could be into productive plant.
2. Which information the Company can or cannot give.
3. When and where the operator can or cannot enter.
4. Economic aspects (e.g., estimated savings with respect to previous situation).

3.5 Tendering procedure

The Italian law for public entities requires a tender procedure only for contracts larger than 40,000 Euro, so when the contract is larger Cogeme is going to apply national procedures, when the contract is less it is going to purchase directly. Cogeme staff is able to make the choice, among the same components, on the basis of the price, or of the technical datasheet, or of both of them.

The following contracts, see also Annex, are subject to a tendering procedure for this demo case:

- Supply PP-R tubes, joining the On-Site heat exchanger kit and the geothermal plant (tender concluded).
- Laying PP-R tubes (tender concluded).
- Construction of the Geothermal plant (excluding heat pump), including the electrical panel, electrical system and the transport and placement on site.
- Construction of the On-Site Heat Exchanger Kit, including the electrical panel, electrical system and the transport and placement on site.
- Hydraulic connections between the Geothermal plant and the On-Site Heat Exchanger kit.
- Electrical connections between the Geothermal plant and the On-Site Heat Exchanger kit.
- Civil and constructive works for the support for the container housing the geothermal plant, includes the container's metal substructure and exterior metal staircase for accessing the station.

Cogeme's tendering strategy will take into account the EU rules with respect to tendering.

A description of actual Cogeme's tender follows, including procedure history and reporting the main requirements specified in tender publication.

Tender subject/title: supply of 2 equipped containers - European research project "LIFE4HEATRECOVERY - Low Temperature, Urban Waste Heat into District Heating and Cooling Networks as a Clean Source of Thermal Energy".

The works for which the tender was called are the construction of the two containers (heat pump unit and heat exchanger unit).

Official tender description: “Supply of no. 2 containers, with the technical and plant characteristics as per the tender documentation, representing the New Experimentation plant consisting of a heat pump plant capable of supplying both DHW and hot water for heating and a heat exchanger kit connected to the pre-existing Energy Saving substation connecting the ASO plant with the district heating network of the Municipality of Ospitaletto. The supply falls within the framework of the European research project “LIFE4HEATRECOVERY – Low Temperature, Urban Waste Heat into District Heating and Cooling Networks as a Clean Source of Thermal Energy” of which Cogeme S.p.A. is a partner”.

A first European tender was issued in August 2022 with a work amount of EUR 307,000 + VAT and a deadline on 21.09.2022. The tender considered best value for money, thus evaluating both economic reductions and technical improvements.

This first tender was unsuccessful, as no company applied: according to discussions with a number of possible competitors, the reason was that the entered prices were too low. The prices used did not take sufficiently into account the high increases of recent years, probably triggered by public emergencies and corresponding political reactions.

The amount of work was therefore changed to 420,745.64 euro + VAT.

A new European tender was hence issued shortly after, with awarding by the economically and technically most advantageous offer.

The award criteria were:

- Economic offer: 30 points.
- Technical offer: 70 points. Sub-points:
 - Improvements in the technical characteristics of supplies: 30 points.
 - Technical assistance and maintenance after delivery: 20 points.
 - Environmental protection criteria: 5 points.
 - Certifications (ISO 45001, ISO 14001, SA8000, 5001 or equivalent): 5 points.
 - Time reduction: 10 points.

The tender was closed on 07/11/2022 and only one offer was received.

The bid was from the company Termotecnica Sebina srl - Costa Volpino (BG), which was then awarded the contract.

The competitor's improvement proposals were analysed and their congruity assessed.

The offer was considered congruous.

Below are the improvements proposed by the winner:

A) CHARACTERISTIC SUPPLY IMPROVEMENTS

The tenderer offers the following improvements:

- Supply and installation of VIESSMANN photovoltaic modules, VITOVOLT 300 series model M410 WK Black Frame (including inverter).
- No. 8 modules for a total power of 3.28 kWp on a prefabricated container (geothermal power station) having the following dimensions 8.72 x 3.00 x 3.00 (h). m.

- Supply and installation of no. 2 single-split air conditioners (one for each Shelter) of primary brand HISENSE with outdoor unit and indoor unit of 9000 btu in R32 gas and energy class A++.
- Supply and installation of Brandoni S.p.A. branded valves, guaranteeing technical performance equivalent to the products envisaged in the project, ensuring a high quality standard. Brandoni guarantees immediate availability of the new valves and spare parts for their maintenance.

(B) TECHNICAL ASSISTANCE AND MAINTENANCE FOLLOWING EXECUTION OF THE WORKS

The tenderer offers the following improvements:

- Management, verification and control systems and services: the tenderer shall make the EDISON application management software available to the Client, with training of the person responsible for its use. This application enables the client to monitor the status of the maintenance carried out and still to be carried out, technical reports on the state of the machines present, and repairs carried out. A QR-code will also be applied to the machines, so that the Client will be able to find out their technical data.
- Maintenance of technological installations: The tenderer will provide 2 specialized thermohydraulic workers and 1 qualified job management technician.
- Duration of maintenance and maintenance plan: the bidder undertakes to maintain and apply, for the plant parts subject to the tender, ordinary and scheduled maintenance with a total duration of 4 years (48 months) starting from the date of delivery of the works. Routine control maintenance will be carried out according to the submitted maintenance plan.
- Warranty extension: the tenderer offers a 2-year (24-month) warranty from the date of delivery of the works.

C) ENVIRONMENTAL PROTECTION CRITERIA

The bidder reports the following improvements:

- The Viessmann photovoltaic modules, VITOVOLT 300 series model M410 WK Black Frame, have an energy efficiency rating of up to 20.9%.
- The two Hisense single-split air-conditioners are produced running on R-32 gas, which reduces the environmental impact by 68% compared to R410-A gas systems and leads to a direct reduction in energy consumption due to its high energy efficiency.
- On-site activities: the transport and lifting of the two prefabricated shelters will be carried out by a truck-crane with 4.0 technology; the bidder has a fleet of eco-friendly vehicles with hybrid CNG/LPG power supply for the transport of people and materials with low polluting emissions.

(D) CERTIFICATIONS

The tenderer holds the following certifications:

- ISO 45001 certification: Certificate No. O-8395/22
- ISO 14001 certification: Certificate No. E-8395/22
- 50001 certification: Certificate No. SGE 50001-001/17

As far as the delivery time was concerned, those in the tender basis (180 days) were confirmed.

The discount for the works amount proposed by the tenderer was 6.15%.

The final award of the works took place on 16/01/2023.

The contract was signed on 17/03/2023.

The contract stipulated is lump sum type.

4 Heerlen – Heat recovery from Dalli – de Klok

This description refers to the initially planned case of waste heat recovery from Dalli – de Klok, a detergent manufacturing company. After a long negotiation process, this case was cancelled. Replacement with a new case in Heerlen was later achieved (VLD foundry, coupled to Otterveurdt swimming pool). However, as the procedures are basically the same, this section reports what expected for the original case. Moreover, the unsuccessful negotiation provided some lessons summarized in the Annex.

4.1 National Authorisations

There are no national authorizations required. Of course, there is a large number of national and international standards and norms to be fulfilled, but they are used to validate design realization and operation rather than to ask for authorization. For a better description of the framework, some national-level requirements for heat networks and buildings are reported below.

Spatial planning

A lot of disciplines are involved in the spatial planning of a heat network: municipalities, housing corporations, industry, inhabitants, and utilities like gas, electricity, glass fiber, heat, and etcetera. In a lot of places in The Netherlands the gas-network has to be improved or replaced as private homeowners cannot be obliged to connect to other means of heating (except electricity). Heat storage needs more and more space. Moreover, glass fiber networks are expanding, the electricity network is increased, roads have to be made climate adaptive etc. As a result, this puts the underground and public space under pressure, none the least as each intervention has their own planning process. Spatial planning has a prominent role and a lot of laws and regulations can be found on this theme.

The spatial policies for 3, 4 & 5th GDHC are mainly covered by the Construction Law. Construction Law is the set of legal rules in the Netherlands that aim to regulate and guarantee building processes. Construction law provisions are partly public-law, with regard to urban development issues, and private-law in terms of agreements between client, architect and contractor. More details can be found at: [Home | Omgevingsloket](#) (in Dutch).

Construction law

Construction law covers issues such as:

1. *General Provisions of Environmental law (Wabo)*. The Wabo was introduced on 1 October 2010 to simplify the procedures for permits. Various permits are bundled in one permit: the environmental permit.
2. *Resolution Environmental Law (Besluit omgevingsrecht)*. The provisions of the Wabo are further elaborated in the Environmental Law Decree. Such as the permit requirement and the appointment of the competent authority. The requirements for a permit (free building) can be found in Annex II of the Environmental Law Decree.
3. *Ministerial regulation on Environmental Law (Regeling omgevingsrecht)*. The Wabo stipulates through the Ministerial Regulation on Environmental Law (Mor), which documents (such as building plan) and data (such as strength calculation) are required for the permit application.

4. *Spatial Planning Standards 2012* Regulation of the Minister of Infrastructure and the Environment, of 11 July 2012, no. IENM / BSK-2012/55325, laying down digital standards for spatial planning.
5. *Spatial Planning Act (Wet op de Ruimtelijke Ordening)*. A structural vision is drawn up by the municipality, the province and the government. In the structural vision, the government describes where building can take place, where it must remain green and who has decision making authority.

Heat Act

Regulation on heat networks is in the Heat Act. It is set up to protect the consumers with a connection of less than 100 kW heating capacity. Energy tariffs for heat and cold are based on the principle that the costs for a household with district heat should not be higher than the costs of an individual condensing gas boiler. The ACM is the regulating body, which also sets the tariffs. In the Heat Act there is regulation on maximum tariff for consumers, a permit needed for delivery of heat, financial dispensation when delivery of heat is disrupted and costs of metering. For utility (larger than 100 kW heating capacity) customers, the energy tariff is a free market tariff.

More details can be found at: *wetten.nl - Regeling - Warmtewet - BWBR0033729*, *Kamerstuk 34627, nr. C | Overheid.nl > Officiële bekendmakingen, Instrumenten handreiking Warmtewet - Aedes.nl*, <https://www.acm.nl/nl/onderwerpen/energie/energiebedrijven/warmte/warmtenetten-aanmelden> (in Dutch).

4.2 Local Authorisations

4.2.1 Energy installation on site and tie-in to production process

Dalli – de Klok, as many industries, has an actual environmental permission, granted by the Municipality of Heerlen, to operate the plant. Dalli – de Klok uses of a permanent advisor (consulting engineering firm). For higher efficiency and clarity, it was agreed that Mijwater only contacted this advisor by means of the Dalli – de Klok internal coordinator, Mr. Perry Gervais and/or Ronald Voncken.

In general, there is contact on a regular basis about the permit situation between the municipality of Heerlen and Dalli – de Klok and its advisor. They are continuously working on the update of modifications and improvements of the production process and its emissions to the environment. Mijwater believes that any intervention in the production process may require a change of the permit. This would have needed to be checked formally after finalization of the technical proposal. The permit would have been influenced positively in terms of:

- consumption of natural gas
- lower use of electricity
- lower emission of CO₂ and natural gas incineration related emissions
- lower discharge of wastewater to the sewer system (responsibility of the local Water Authority and the sewer department of the Municipality).
- no increase in noise and/or dust emissions

Within the framework of the environmental permit there would be checks for:

- construction calculations in terms of stability (cellar, platform for additional vessel)
- the change in subsoil conditions and discharge of soil from the site (construction of the cellar)
- enduements with respect to mains transporting liquids and energy in subsoil conditions

Since the situation tends to improve, approval of permit changes should be automatic.

4.2.2 Mijwater connection in public area

The main connecting Dalli – de Klok’s area with the cluster D network would have been constructed in publicly owned area, i.e. the Municipality of Heerlen. There are well-known procedures set between Mijwater and the Municipality. During the 15 years of its existence Mijwater has been through numerous authorization procedures with respect of construction of its smart grid energy network.

There is a general guideline, called OGN, used by the municipality for other network companies, such as electricity network, data network and natural gas network. The same procedures apply for Mijwater in the area of the municipality of Heerlen. This position anticipates to the final position of Mijwater becoming a regional network company.

Spatial needs of the 5 Generation District heating and Cooling – Mijwater Energy BV

Specific to cluster D and the costumer in Cluster D, the project manager at Mijwater has to submit the permit in the digital portal off the ‘Omgevingsloket’. A normal term of response is 12 weeks. In some cases the Municipality of Heerlen will ask additional information and time (6 weeks maximum). Possible documents and / or drawings could be mandatory for the permit(s):

Examinations / investigations

1. Environmental research
2. Probing research and foundation advice
3. Flora and fauna research
4. Nitrogen calculation
5. Explosives investigation NGE
6. Archaeological research
7. Hydrological examination
8. Acoustic research

Civil engineering drawings

1. Drawing existing situation
2. Drawing new situation
3. Drawing of a temporary situation (site layout during execution)
4. Detailed drawings of terrain design

Architectural drawings

1. Floorplans
2. Façade views

3. Detailing of the construction work
4. Detailed drawings of architectural facilities

Construction details

1. Weight load floors Energy Station (SKID)
2. Foundation calculation
3. Construction calculation building
4. Construction drawing building
5. Reinforcement drawing
6. Element drawing

Other information

1. Photos existing situation
2. Interior drawing Energy Station (SKID)
3. Technical data installation

Administrative documents regarding the company (owner)

From the permit point of view, the Energy Station (SKID) can be seen as a big sewage. At the municipality in Heerlen it is treated like this in the process to acquire permits. The Energy Station can be placed in the roadside, on the edge of a plot, underground or partially deepened. It can be used to sculp the landscape.

The supervisor of the permits for the Energy Station is the municipality of Heerlen.

For more information about Dutch Planning spatial and Heat Law, see the inventory made in the Heatnet-NWE project: [HeatNet-NWE Spatial-Policy-for-4DHC District-Heating.pdf \(guidetodistrictheating.eu\)](https://guidetodistrictheating.eu).

4.3 Contracts with waste heat recovery source

Investigations of the Dalli – de Klok production process and potential for energy exchange started from 2014. The contacts intensified early 2018, resulting in the sensitivity study Mijnwater executed on several production process variations and its stability towards the design of the Energy Installation.

An official Financial and Technical Proposal was submitted to the international board of Dalli – de Klok having discussed options in advance with the local Plant Manager and its staff of process technologists and quality, health and safety officers.

The Proposal was agreed during a meeting in January, 8th, 2019. Based on the intention to participate in the LIFE4HEAT Recovery Project our common project plan became the backbone for cooperation. The next step would have been to summarize all results obtained since January 2019 in a Development and Realisation Agreement. This is a typical document Mijnwater uses to describe all agreements with a client, taking arrangements for:

- Design of the Energy Installation and Tie-in to the factory (object).

- Realization and construction of the Energy Installation, the Tie-in and the connection to Mijnwater's smart grid energy network.
- Delivering energy to the factory and recovering waste heat from the factory.
- All financial arrangements in terms of energy delivery, investments and financing, as well as payment schedules. Energy prices for delivering heat and cold are mentioned in the August 2018 Proposal.
- The planning schedules and milestone targets.
- The organizational and communication issues.
- General conditions for delivering energy and responsibilities in future.

Energy delivery would have been agreed on a long period, at least 15 years.

Interactions with Dalli de Klok, though very close to finalization, stopped at the end of 2020. An agreement was later found with the VDL foundry, on the basis of a free waste heat supply in exchange of reduced cooling needs and internal recovery.

4.4 Tendering procedure

The following contracts would have been subject to a tendering procedure:

- Construction of the additional vessel (8 m³) in the production hall of Dalli – de Klok (including constructive facilities, mechanical parts, electrical connections and regulation devices) – Phase 1.
- Electromechanical construction of the Energy Installation – Phase 2.
- Civil and constructive part of the housing of the Energy Installation (concrete cellar), including the transport and placement on site as well as soil works.
- Civil and constructive works with respect to the connection (mains and earth works) between the Energy Installation and the Tie-in to the production process.
- Civil and constructive works with respect to the connection (mains and earth works) between the Energy Installation and the T-connection in the Cluster D network mains.

So, 5 packages described for tendering were foreseen.

Mijnwater's tendering strategy typically takes into account the Interreg rules (EU rules) with respect to tendering. Mijnwater usually invites for each of the above packages at least 3 contractors to prepare a financial bid. This preselection is done based on Mijnwater's earlier experiences and expertise with the companies to be invited. With respect to the engineering works Mijnwater planned to work with already appointed advisors and engineering firms:

- Preparation and engineering of mains and earth works: Brouwers Advies
- Preparation and engineering of electro-mechanical works: Volantis

Both companies have a long tradition in cooperating with Mijnwater and are highly aware of internal procedures, technical solutions and operating conditions for our system. Volantis developed the Blue Print of electromechanical design of the Energy Installation. Brouwers Advies investigated already several miles of network tracks.

Mijnwater believes that the certainty of well-known expertise is more favourable than a market consultation with more engineering and design companies to potentially find the cheapest and / or best qualified company.

So, under these conditions Mijnwater can decided not to tender the engineering contracts in a competition between several companies after preselection. In fact, Mijnwater preselected the Engineering Team based on the good experiences and available know-how already available within those companies.

Similar considerations have driven the tendering process of the actually implemented demo case (VDL foundry + Otterveurdt swimming pool).

5 Wüstenrot – Heat recovery from sewage water channels

This demo case is related to heat recovery from sewages. After an initial analysis, it was not implemented due to insufficient flow in the considered channels. All administrative procedures were nevertheless explored.

5.1 National Authorisations

Also for the German case there are no national authorizations required. Of course, there is a large number of national and international standards and norms to be fulfilled, to be used to validate design, realization and operation rather than to ask for authorization.

5.2 Local Authorisations

The sewage water channels are in Germany and many other countries typically owned and operated by the community or town within an in-house operation city drainage. As the utilization of waste heat from sewage water channels is still a quite new technology, no standardised authorisation procedures exist. Some towns like Stuttgart are frontrunners in the utilization of this valuable heat source. They developed a map showing the waste heat potential for the whole area of the town, which makes it easy to analyse if for a certain building or district the utilization of waste heat from the sewage water channels is possible. Furthermore, they developed a standardised agreement on the use of heat from sewage water, with clear regulations on the planning, construction and operation of the waste heat recovery systems. The following operation conditions need to be considered:

- a. The heat taken from the sewage water needs to be limited to ensure, that the temperature of the waste water leaving the heat exchanger is not lower than 10 ° C.
- b. The heat transferred to the sewage water needs to be limited to ensure, that the temperature of the waste water leaving the heat exchanger is not above 35 ° C.
- c. The minimum inlet temperature to the sewage treatment plant must not be less than 10 ° C and not be above 35 ° C. The city is entitled to independently interrupt the heat extraction of the user from the raw sewage water if the temperature falls below this minimum entry temperature in the sewage treatment plant (e.g. by ripple control); the technical and operational modalities are to be determined between the city and the user before the start of construction. The central heating system of the user must be equipped in such a way that an energy drop caused by the interruption of the heat extraction can be absorbed.

In Stuttgart the utilization of this waste heat source is free of charge, with the principle first come first served, meaning that the installation of new systems need to take into account the effects of the existing systems. The authorisation includes the following steps:

- Contact of the town to discuss the planned project.
- The executive planning, already coordinated with the town, needs to be handed in with three copies.
- The town analyses the planning and sends a building permit (max. two to four weeks).
- The construction of the system can start as soon as the building permit comes into force.
- For final acceptance, the system is inspected together with the responsibilities of the town and is documented in a final acceptance protocol.

Additionally, the system needs to be evaluated according to sufficient explosion protection by an official approved surveillance body. The protocol of this evaluation needs to be handed in at the responsible body of the town, before the system is set in operation.

To make use of waste heat in Stuttgart the form with the standardised agreement on the utilization of waste heat from the sewage water channels needs to be signed. Within the documents all regulations on the planning process, the authorisation procedure, on the commissioning and the operation of such systems are defined, as described in summary above. It regulates all rights and obligations and the minimum duration (25 years) for the installation and operation of the waste heat recovery system.

More and more towns and communities are adapting these regulations, with some local specific amendments. Some towns and communities also start to ask for a certain utilization fee, which can significantly influence the economic efficiency of the systems and in some cases hinder completely the utilization of this valuable source. Altogether, the main problem for a fast rollout of this solution is still that there is not enough experience and knowledge about the technology available at the communities. Therefore, it is very important to realize more best practice demonstration systems.

5.3 Tendering procedure

The following contracts would have been subject to a tendering procedure:

- Electrical installation for the waste heat integration kit.
- Civil and constructive part for the installation of the heating network from the sewage water channel to the cold district heating network and the connection.

The tendering strategy of the community as a public body needs to take into account the Interreg rules (EU rules) for tendering and awarding. However, due to the small size of the project, the expected sums would not exceed the limits which require the application of the official European rules for tendering and awarding in a public procedure.

Therefore, WUESTENROT planned to invite for each of the above packages at least 3 contractors to prepare a financial bid. This preselection was planned to be done based on earlier experiences and expertise with the companies to be invited.

With respect to the engineering works it was planned to work with the same company (Doppelacker GmbH), who also planned the cold district heating network. This is advisable, to avoid problems in the operation of the innovative system and with the warranty.

6 Aalborg – Heat recovery from data centre

6.1 National and local Authorisations

There are no national and local authorizations required for the demonstration activities in this project. Comments on evolving Danish and EU regulation related to heat recovery from data centres can be found in Deliverables “Report on the trading schemes elaborated” (Action C.5.1, led by Spinergy) and “Business plans for exploitation of heat recovery skid from data centres” (Action C.5.4, led by Heatflow).

6.2 Contracts with waste heat recovery source

Conditions for district heating supply

Unless otherwise agreed in the municipal planning, and if technical and economic considerations do not prevent this, a district heating supply can be established. The district heating supplier determines in each case whether connection can take place.

Request for connection

Before a district heating supply is established for a property, the property owner must sign a supply declaration, confirming that the district heating is preferred to be established in the building.

No contracts are needed in this demonstration project. The building demo site host is already connected to the district heating network. Aalborg Forsyning who is the owner and supplier of the district heating network is participating in the demonstration and has provided all the necessary requirements for waste heat system connection. More general considerations on contracting for data centres can be found in the aforementioned Deliverables of Action C.5.

6.3 Tendering procedure

Procurement policy for Aalborg University

Purpose

The overall purpose of AAU’s procurement policy is to establish a framework which ensures that the University as a whole may purchase products and services of the required standard at the most economically advantageous terms.

All AAU’s procurement activities must comply with all legislation, executive orders, directives etc. in force. Furthermore, all purchases must be made in accordance with business principles and management decisions – and while taking into account service, quality, security of supply, price, environmental considerations, working environment considerations, social responsibility and other ethical considerations.

Scope

This policy comprises all purchases of products and services made by Aalborg University, and thus applies to all University employees. Exempt from this policy are out-of-pocket expenses made during work-related trips subject to the code of practice: “Rules for the use of company credit cards in connection with business travels and minor business expenses”.

Legal basis

The EU Procurement Directive 2004 and the Danish Public Tenders Act section II have been replaced by the Danish Public Procurement Act. The most significant changes in the procurement act apply to procurements of a value of up to DKK 1,645,367. Tendering requirements for procurements worth between DKK 500,000 and DKK 1,645,367 were partially repealed. Moreover, a number of procurements now fall under the new Light Regime which governs procurement areas for which the EU has set a higher threshold value.

The Public Procurement Act stipulates that:

- If a procurement represents a value of up to DKK 1,645,367, either as a single procurement or several procurements over a 4-year period, it is decisive whether the procurement is of transnational interest.
- If a procurement falls under the Light Regime and represents a value of up to DKK 5,583,825, either as a single procurement or several procurements over a 4-year period, it is decisive whether the procurement is of transnational interest.
- If the procurement is clearly of transnational interest, it must be advertised in www.udbud.dk, and the Procurement Unit must be involved.
- For procurements of a value of above DKK 1,645,367, either as a single procurement or several procurements over a 4-year period, the new Public Procurement Act stipulates that the procurement must be put out to EU tender.
- For procurements which fall under the Light Regime and represent a value of up to DKK 5,583,825, either as a single procurement or several procurements over a 4-year period, the new Public Procurement Act stipulates that the procurement must be put out to tender according to the Light Regime. Invitations for Tenders must be published on www.ted.eu, in which case the Procurement Unit must be involved. At Aalborg University (AAU), it was decided to implement the Act as in the following remaining points.
- If AAU enters into a procurement agreement in a given area, this agreement must be adhered to, irrespective of the value of the procurement.
- If the procurement value is DKK 25,000 or less, either as a single procurement or several procurements over a 4-year period, the procurement must be governed by common sense and business acumen. No special requirements apply to documentation of such procurements.
- If the procurement value is more than DKK 25,000 but less than DKK 100,000, either as a single procurement or several procurements over a 4-year period, rules applying to market coverage stipulate that tenders must be invited from a minimum of two and a maximum of three mutually independent suppliers; it must be documented that the most profitable offer was accepted when the agreement was made. View the Danish information guide for procurements over DKK 25,000 and under DKK 100,000.

Due to the small amounts, there have been no contracts in the Aalborg demo that have been the subject of a tender procedure.

7 Lessons Learnt

The purpose of this chapter is to bring together the insights gained during the project that can be usefully applied on future projects.

7.1 Public authoritative procedures

Typically, no national authorizations are required for heat recovery projects. Local (e.g., municipal) authorizations can however be needed, especially for building adaptation. Connection works (occupying public spaces) also require specific authorizations. This follows usual sector rules. Authorization times can range from a few weeks to 3-4 months, depending on the specific works and on the country. In general, this is not a long time for this kind of projects.

7.2 Authorizations and contracts with the waste heat source companies

The contract negotiation and signature appear to be the key process in this type of applications. Experience with 3 different factories in the project showed very different behaviours and issues. The key outcome remains that these agreements can take very long times, possibly even a few years – though the experience of the LIFE4HeatRecovery project cannot be considered too representative from this point of view, having been characterized by multiple international crises (e.g., coronavirus) occurred during its lifetime. General practices which appear to be promising include:

- The signature of multiple agreements in steps, making interaction progressively more binding, keeping customer engagement and reducing the risk of failure.
- The preparation of standardized preliminary contracts, providing a sound framework for customers and speeding up negotiation times.
- The offer of heating and cooling services combined with heat recovery, changing the perspective of the customer and highlighting the advantages of the offered service.

All of this needs of course to be combined with careful technical and business considerations, including possible incentives and a focus on positive environmental impacts.

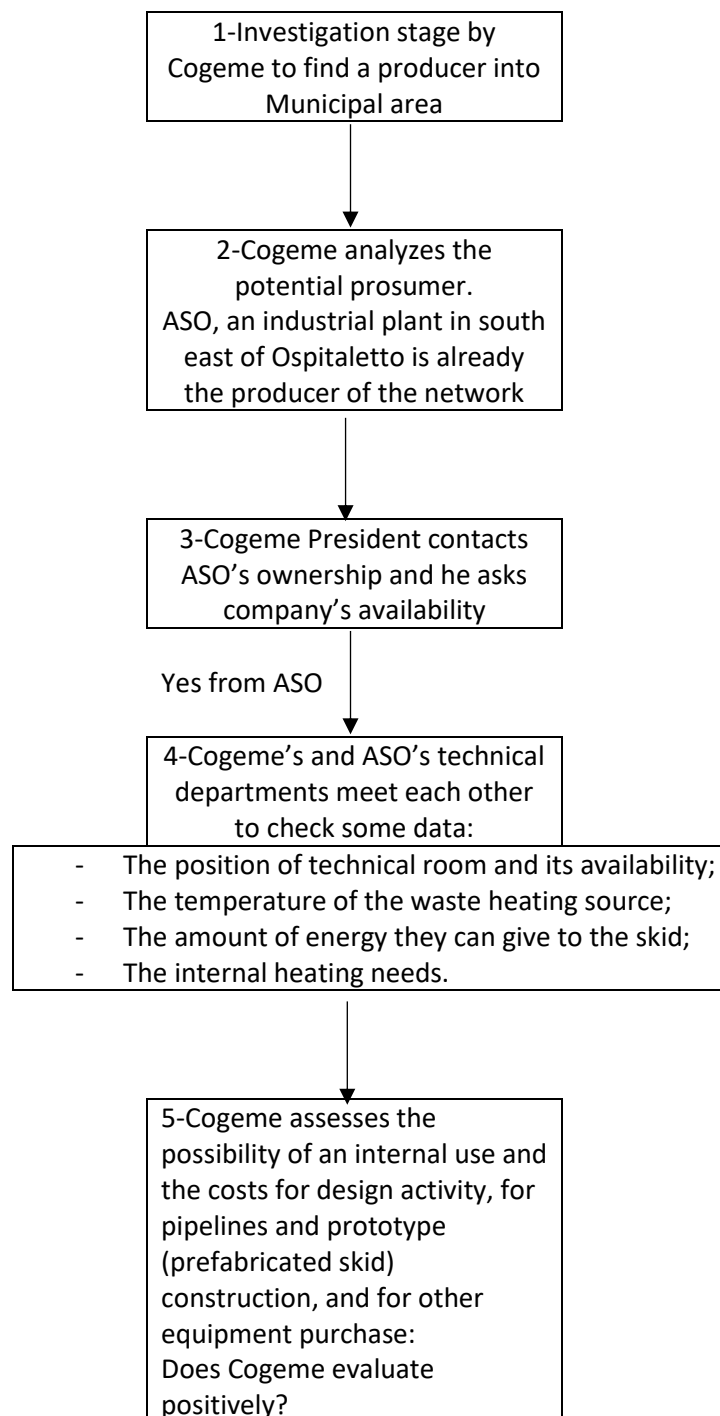
7.3 Tendering procedures

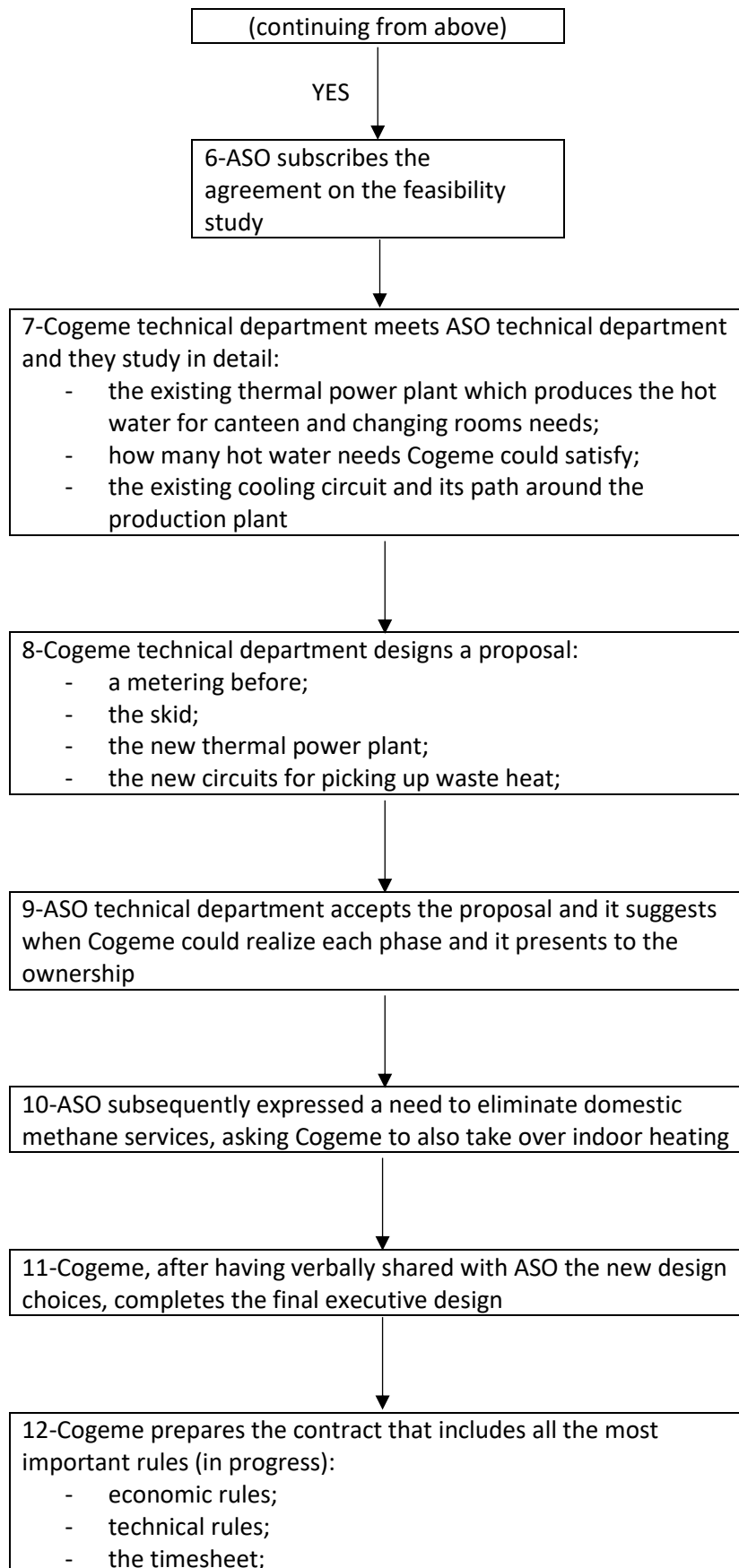
Since DH utilities are often public entities, tendering procedures typically need to follow public rules and to be open. On the other hand, this also depends on the scale of the project (no open tenders are needed below certain thresholds), which can be quite variable in this context (ranging from a few tens to hundreds of kW). Reliability of suppliers also appears to be a crucial concern. In the case of open tenders, this needs carefully written criteria to apply a best-value-for-money approach.

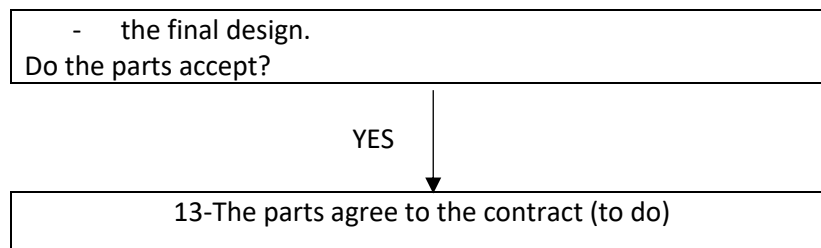
8 Annex

8.1 Procedure flow chart example

The following flow chart exemplifies the various steps taken for the Italian demo case of Ospitaletto. Being the case with the most complex workflow (local authorizations, full contract with the waste heat source, open tender at European level), it is here reported as a general guideline.







8.2 Mijnwater experience from Dalli de Klok negotiation

This section summarized some possible lessons learnt by Mijnwater Energy from the failed negotiations with Dalli – de Klok (later replaced by the demo case combining VDL foundry and Otterveurdt swimming pool).

1. Motivation and incentives

In the final negotiation phase, discussion on technology and business offer was limited to the local costumer (i.e., factory personnel). No connection was made with the management board of the costumer (at group level), possibly missing their high-level motivations and incentives. Moreover, this prevented the possibility of fully sharing Mijnwater’s vision about 5th Generation District and discussing the importance of the connection for the costumer on the long term.

This suggests the implementation of the following practices:

- Discuss and determine motivation of costumers.
- Sign Letters of Intent and or Commitment with costumers (this was actually done in Dalli de Klok case, but only in a preliminary phase: multiple steps might be devised to maintain customer engagement during the process).
- Form a partnership with costumers who could also be prosumers (offering heating and cooling services to the customer can be more attractive than buying waste heat at low price).
- Recognize the higher value of prosumers with respect to pure consumers (see also technical and business cases below).
- Identify different types of incentives that persuade industrial customers to invest in CO₂ reducing measures.
- Clarify contact persons and constantly track possible changes in reference persons (likely to happen during multi-year negotiations).

2. Business Case

Initially, the business case of Mijnwater did not include a risk budget and had a long contract period (30 years). After a first offer made on this basis, further discussion with the potential customer and the inclusion of risk analysis led to a significant revision of the offer. The new offer included a fixed annual amount for a shorter period (15 years). The shorter period was appreciated by the company, though the inclusion of risks affected the overall economic convenience.

This suggests the following considerations:

- Business case models should include risk budgets as soon as possible.
- Industry customers prefer short contract periods.
- The cheaper-than-gas principle does not necessarily close the business case.
- Since industry does not show the same heating or cooling pattern as utility buildings (with possible impact on energy prices), business case analysis needs to be tailor-made.

3. Technical

Mijnwater undertook several studies to understand the technical questions of the customer. Mijnwater even analysed the customer's entire production process and designed optimisations within the factory. The result is a technical system where the utility partly intervenes in the factory.

This suggests the following conclusions:

- Understanding the customer is crucial. Industrial processes can be complex and are of core-value for industrial customers.
- Entering deeply in such process can however be very time consuming and risky. A possible strategy, can be to let the customer estimate the amounts of needed heat and cold (and their schedule). Moreover, in spite of possible optimizations, it can be more convenient for negotiation to avoid intervening in production processes.
- Negotiation with customers typically requires a clear setting of boundaries between systems.
- Industry customers typically have high demands regarding technical installations, maintenance and regulations.
- Forming a solid partnership with customers is crucial and can require multiple steps.