Driving Urban Transitions
EUROPEAN PARTNERSHIP
Co-funded by the European Union

HeatCOOP

D2.2

Best practices of projects and initiatives for district heating supply

January 2025

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1. Executive summary

This deliverable provides an overview and analysis of best practices for projects and initiatives for district heating supply. However, due to the limited number of local district heating supply projects, this deliverable also draws on other community lead decarbonisation projects, where the lessons learnt may be applied to the HeatCOOP project. 14 best practice examples were considered, all of which fell into one of four legal categories:

- Cooperatives (8, Nah-Wärme-West Berlin, ADEV, VITA, DuCoop, Kriegerheimstätte, Biomasse Wolkersdorf, Hrastnik, Loški Potok)
- Associations (2, SmartCity Baumgarten,Klimadörfl)
- Purpose driven companies (1, Iglaseegasse)
- Municipally owned company (3, Přeštice, Kněžice, Holbæk Kommune)

The first three categories were the focus of our analysis and were referred to as *community action projects.* Extensive data was collected relating to the selected best practices examples and analysis was conducted focusing on finding organizational trends and considering the merits of different legal forms. This led to the following key results:

- The most effective legal form of an innovative district heating supply is likely to be largely determined by the country in which the project takes place.
- For community action projects, although grass roots movements are often crucial for initiation, long term professionalisation is both likely and advantageous.

2. Introduction and methodology

Deliverable 2.2 considers best practice examples of decarbonisation initiatives in Austria, Belgium, the Czech Republic, Germany, the Netherlands and Slovenia. For each of these examples their different legal frameworks were considered. The legal frameworks considered fall into two broad categories: community action projects which encompass, cooperatives, associations and purpose driven companies, and the second broad category of municipal action.

For each case study information was provided including project name and brief description, a technical and organisational overview, their respective roles within the heat transition community, and financing and business models. This data informed Section 3 *Technical overview of best practice examples*, and the full completed templates can be found in *Annex I*.

Since the focus of the HeatCOOP project is on community action projects, the case studies where the legal form was that of a cooperative, association or purpose driven company were then further analysed, this analysis focused on the initial and current organisational structure, membership model, and the supply or demand focus. The full completed templates for this analysis can be found in Annex II. From this *Section 4-9* were produced, including a summary of trends observed, overall conclusions, and outstanding questions. Annex III is and overview of legal structures and attached as Annex IV to this document is a survey among owner, managers and residents with responses from partner countries.

3. Technical overview of best practice examples

3.1. Community action projects

3.1.1. Nah-Wärme-West Berlin

The Nah-Wärme-West Berlin cooperative is a local heating network, located in Eichkamp, Berlin, Germany which is organised as a cooperative applying the technical implementation concept of air-to-water heat pumps and wood chips for peak load periods in winter. The project's unique features stem from it being the first initiative in the German-speaking urban area that is in the process of implementing a cooperative and self-sufficient local heating network. Thanks to the funding for restructuring management, the initiative was able to hire Sabine Drewes as refurbishment manager in 2018. Since then, residents and the administration have been working intensively together with Sabine Drewes to establish a cooperative.

In 2012, residents of Eichkamp expressed their desire for the first time to reduce their own CO2 emissions and to actively change in favour of the climate crisis. The focus was on reducing the company's own energy

consumption and switching to renewable energy. Work was carried out on an energy concept in which the heat supply of the entire settlement was to be ensured by means of groundwater heat pumps. However, due to groundwater contamination in the settlement, this turned out not to be possible. The next idea was to connect to the large district heating network operated by Vattenfall. To this end, a cooperation agreement was written between the settlement and Vattenfall. On the initiative of some committed residents, a renovation management was also to be commissioned for the project. Vattenfall agreed to cover the 35% of the costs for restructuring management that are not covered by funding. The redevelopment management itself was then commissioned by the district, as the funding only applies to municipalities. Since 2018, Sabine Drewes has been working as a freelance renovation manager for Nahwärme-West. The cooperation agreement with Vattenfall was cancelled by the settlement shortly afterwards due to dissatisfaction among the residents regarding the cooperation with Vattenfall. Instead, the settlement decided to build its own local heating network, giving rise to their vision of a cooperative. Since 2018, a technical implementation concept has been developed, and interested parties have been recruited for connection to the local heating network and to join the cooperative, alongside formulating the cooperative's articles of association. As of December 2023, the cooperative has not yet been founded, as it is waiting for an assurance from the district that it will also connect the public buildings to the local heating network.

3.1.2. ADEV cooperative energy company

The ADEV cooperative energy company is cooperative located in Switzerland which applies technical implementation concepts including solar power plants, small hydropower plants, wind turbines as well as central heating systems and local heating networks.

ADEV was founded in 1985 as part of the anti-nuclear movement in Switzerland. At the time there were discussions about the construction of a nuclear power plant near Basel, against which there was great resistance from the population. A group of idealists founded ADEV as an energy community to promote energy generation opportunities as an alternative to nuclear power plants. Another motivation for the founding of ADEV was the financing of the first grid-operated wind power plant in the region. This was built on the initiative of the Ökozentrum Langenbruck and still needed financing. The founding of ADEV thus also served as a financing vessel for the wind power plant. In the early years, ADEV primarily supported the establishment of heating networks. These were all largely self-financed and equipped with a combined heat and power plant (gas-based). The cooperative quickly realized that one of the biggest problems was raising borrowed capital, as the deposits of the cooperative members were not considered equity by the banks at the time, as cooperative members could have returned their shares and been paid out at any time. Over the years, ADEV decided to set up stock corporations. The stock corporations are

traded on the Bern Stock Exchange, which is less like a classic stock exchange and more like a trading platform. The joint-stock companies guarantee equity capital and provide security for banks to borrow capital. Since then, the ADEV cooperative has functioned like a holding company for the four stock corporations. Since the stock corporations are structured according to technologies (Windkraft AG, Wasserkraft AG, Solarstrom AG and Ökowärme AG), investors can decide in which technologies they want to invest their money. In the last 10 years, ADEV has experienced strong professionalization.

3.1.3. VITA: Citizens' Energy Cooperative

The *VITA Bürgerenergie Cooperative*, or VITA Citizens' Energy Cooperative was founded in 2011 in the German Black Forest with the aim of using citizens' capital to repurchase the electricity grid from the then operator, Energiedienst AG. The VITA: Citizens' Energy Cooperative, is one of four shareholders of Energieversorgung Titisee-Neustadt GmbH (EVTN) founded in 2012 a merger of the city of Titisee-Neustadt, the EWS Elektirizitätswerke Schönau e.G. and the VITA Citizens' Cooperative, wherein VITA was the smallest shareholder owning 10% of the eventual shares, now 3.6% due to the admission of a new shareholder Badenova in 2023. EVTN both operates the power grid and local heating network and takes on its own energy transition and climate protection projects. For example, the Titisee-Neustadt local heating network was planned in 2020 and put into operation in 2022, in which citizens contributed €110,000 through the VITA cooperative and thus made a significant contribution to the implementation of the local heating network.

However, due to political and economic developments, EVTN has faced increasing economic difficulties. A realignment of EVTN envisages divesting itself from electricity grid operations and instead concentrating on the operation of the local heating network, alongside the sale of electricity and local heating.

3.1.4. DuCoop: cooperative local heating network

DuCoop was founded by project developer Schipperskaai Development, water company Farys and innovator Clean Energy Innovative Projects for the urban development area called "De Nieuwe Dokken" in Ghent, Belgium. Other companies have been added to the project and from 2019 residents have also been able to purchase shares in the cooperative and thus share in the proceeds.

DuCoop has signed an agreement with the City of Ghent for the construction and operation of a heating network, water treatment and other technologies. The Charter of Incorporation stipulates that DuCoop will provide services to all residents. They conclude a contract with DuCoop that guarantees the heat supply and ensures the proper functioning of the technology, meaning that one is not only a customer, but also a cooperation

partner of DuCoop. DuCoop supplies 400 apartments, a school and commercial space, including a café and a bicycle repair shop.

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3.1.5. SmartCity Baumgarten: EEG with anergy network in the existing system.

SmartCity Baumgarten project in the Vienna, Austria was initiated in 2020 by Günter Lang an owner and resident of an apartment in a 80s building, who discovered that according to the construction board of new condominium on a neighbouring property the building would be equipped with gas heating systems. After contacting the developer WIEBE (a subsidiary of Familienwohnbau), Günter Lang succeeded in convincing the managing director to drill geothermal probes for the heat supply of the new building and the existing buildings surrounding it. From this initial starting point a cross-property anergy network (low-temperature network) consisting of 25 geothermal probes in conjunction with brine heat pumps in the three connected buildings, and a corresponding energy community was established.

In the future, the (currently) three buildings of the SmartCity Baumgarten district will be supplied with 100% renewable heating, cooling and electricity via a cross-property anergy network. This is made possible by the construction of the new building in a block vacant lot. Even before construction began, a cooperation was started between the developer of the new building and the owners of the surrounding buildings. They have joined forces to form an association to implement the project and together form Austria's first energy community with an anergy network in its portfolio.

3.1.6. Klimadörfl: an association for the promotion of climate neutrality

The residents of Kahlenberger Village in Vienna, Austria want to divest from oil and gas. In 2023 the KLIMADÖRFL association for the promotion of climate neutrality was founded with the support of realitylab. This association emerged from the previously extant Association for the Promotion of the Kahlenberger Village. The aim of the association is to provide the impetus for the sustainable use of resources in the areas of heat and power supply, mobility and nutrition, and to promote strong neighbourhood communities.

The Kahlenberger village has a growing population of approximately 500 inhabitants making it an optimal size to pioneer and act as a prototype of a climate-neutral village. Consequently, various implementation scenarios have been developed for the Kahlenberger village's phase-out of oil and gas. Throughout this process, the original concept of a central local heating network has been discarded, in favour of defining smaller neighbourhood

clusters, which will act as different starting points for decarbonisation initiatives.

3.1.7. Kriegerheimstätte

The Kriegerheimstätten garden estate in Vienna, Austria is a cooperative which was built in 1921, during the construction the cooperative of the same name was founded. Subsequently, in the 1970s, the company built the multi-storey residential complex, and from the early 2000s began renovating its buildings from its own funds and subsidies. The management of the housing estate and residential complex is carried out by the non-profit housing cooperative Gartenheim. All households within the estate are members of the Kriegerheimstätten cooperative and have a rental or use agreement with the cooperative. The board of directors and supervisory board of the Kriegerheimstätten are elected by the residents from among the cooperative members.

The aim of the Kriegerheimstätte project is to supply the housing and residential complexes with renewable thermal energy and electricity. The initiative for the project comes from the Gartenheim cooperative, which is responsible for the property management of the garden estate. The aim is to supply the individual terraced houses with heat via a local heating network. The heat required for this project will be predominately derived from geothermal energy and heat pumps. With an additional plan to generate most of the electricity supply from photovoltaic systems at a later date. To achieve this, geothermal probes are to be drilled in a parking lot owned by the cooperative, with the building and operation being managed by the Kriegerheimstätten cooperative. External construction companies and service providers will then be commissioned for the construction and maintenance of the systems. One challenge faced by the Kriegerheimstätte project is that tenants cannot be forced to switch from their current predominantly gas-based heat supply to a renewable heat supply therefore a careful process is needed to get all tenants on board.

3.1.8. Iglaseegasse

Since 2022 the owner of a Wilhelminian style house in Vienna, Austria has been seeking to establish a heat transition community, with the goal of both decarbonising the building and involving the residents and, potentially, the neighbours, in controlling their own heat supply. The legal form of this project is that of a purpose driven company and the objective of this project is to thermally insulate and the convert the heating system in the Wilhelminian style house as far as this is economically feasible and technically possible in the protection zone. Regarding the conversion of the heat system the objective is to move from the currently decentralised gas boilers to a brine-water heat pump with five geothermal probes (3 in the front garden and 2 in public land). Furthermore, a photovoltaic system will be installed on the flat roof on the courtyard side and on the south façade. The objective is to extend this project beyond the immediate confines of the

house to include the single-family houses to the right and left of the Wilhelminian style house, each with an additional deep borehole in the pavement area in front of the house, and to connect them to the heat pump in the Wilhelminian style house, so that these houses are also integrated into the heat supply and PV system.

The financing of the thermal-energetic is to be provided by subsidies, equity capital and bank loans, for which the homeowner provides a mortgage security on the property. The initial plan was to establish a cooperative which would operate the heat supply and PV system, with the operating costs being incurred by the cooperative. Meanwhile, the thermal insulation measures and investments in the new heating system would be carried out by the owner. Regarding the use of the building, a lease agreement would be concluded between the cooperative and the owner, whereby the rent paid by the cooperative to the owner would be intended to cover the costs of the equity and debt capital used for the investment over a period of 20 years. The lessor, the owner, would then be responsible for maintaining the substance of the house as necessary for the supply of heat (e.g. insulation, domestic plumbing, etc. Meanwhile, the cooperative, as the lessee, must bear the financing, operating costs and the ongoing maintenance cost of the installations.

However, an in-depth legal analysis revealed major legal hurdles rooted in the Austrian tenancy laws. Thus, a revised non-cooperative approach has been adopted with a new concept based on an increase of the rental fee of ca. 2€/m2/month, which reflects the savings on the cost of gas for heating. The higher rental income will cover the repayment of a loan by the owner for financing the decarbonisation investment. The rental fee increase must be mutually agreed between the landlord and each individual tenant. The cooperative model will still have a limited use, as it will be applied to the energy community for the use of the PV system, having as members all tenants of the house and the owners of the adjoining houses.

3.1.9. Biomasse Wolkersdorf

The Biomasse Wolkersdorf, Austria example consists of three sister companies which have developed a linked network and three biomass boiler houses with a capacity of about 3 MW each (10 MW combined) and a solid heat storage with 100m3. The biomass boilers are only generating heat, no electricity. Since there is no holding company, the network itself is run by a management company which can also be considered as a sibling company. The process to form this structure began in 2002 when Biomasse Wolkersdorf GmbH & Co KG was formed by bringing together 14 private individuals who had previously collaborated on the development of wind farm projects, and were organised as the founders and shareholders of a GmbH, with farmers with forest ownership who were grouped together as limited partners in the joint venture. By forming Biomasse Wolkersdorf GmbH & Co KG, they were able to build a biomass boiler house with a

capacity of about 3 MW and a district heating network which supplies private and commercial customers in the municipality of Wolkersdorf. The project was financed by agricultural subsidies, founder equity and long-term loans provided by the local Raiffeisenkasse Wolkersdorf. This model was successful and in 2011, the shareholders of Biomasse Wolkersdorf GmbH & Co KG without the limited partnership with forest farmers and with the local Raiffeisenkasse Wolkersdorf as a minority shareholder founded the sister company of Biomasse Obersdorf GmbH to supply district heating to customers in the neighbouring municipality of Obersdorf. This led to the construction of a boiler house with about 3 megawatts and a district heating network, which is connected to the Wolkersdorf district heating network being built in Oberstdorf. In 2012, several companies from the Wolkersdorf industrial park approached Biomass Wolkersdorf because they wanted to set up their own district heating supply. For this reason, in 2012 Bioenergie Wolkersdorf GmbH was founded, which is owned by 4 large commercial customers of district heating, as well as the Raiffeisenkasse Wolkersdorf and with 5% the Öko Energie Beteiligungsgesellschaft. Thus, three separate but sibling district heating companies have been created. The technical management of all 3 district heating companies is carried out by Öko Energie Management GmbH, which has essentially the same ownership structure as Biomasse Wolkersdorf GmbH.

In total, these three district heating companies supply approximately 650 customers, including about 40 corporate customers, with a generation capacity of around 10 megawatts with a third of the biomass supplied by neighbouring forest farmers who are also limited partners, and the remainer being supplied via long-term supply contracts with biomass suppliers.

3.1.10. Sunny School Hrastnik

In 2022 through a collaborative effort by the Municipality of Hrastnik, the NGO Focus, and local residents the Zeleni Hrastnik or 'Green Hrastnik' cooperative was established. Green Hrastnik's primary objective is to deliver tangible benefits to its members by spearheading community projects focused on renewable energy sources to ensure affordable energy for cooperative members, and to contribute to local community development through project planning and execution. In January 2024, the community witnessed a significant milestone as the first cooperative community solar power plant emerged on the roof of a public school in the quaint city of Hrastnik, aptly named Sončna šola Hrastnik (translated as Sunny School Hrastnik). For this project the municipality provided the roof space of the public school, extending an invitation to residents to participate in the community endeavour. With a capacity of 300 kW, this innovative facility is set to power 15 households, three public buildings, and two local economic facilities which are all connected to the same transformer to ensure seamless access to the electricity generated by the solar power plant.

The entire project, with a total investment of approximately 235,000 EUR, exemplifies a well-balanced financial structure. Clients contributed 20%, while an additional 20% was secured through subsidies from the Ministry of Environment and Climate of Slovenia. The remaining 60% was financed through credit. Cooperative members initially invested EUR 100 per 1 kW, affording each client the opportunity to purchase the required share and become a vital part of this sustainable energy initiative. The success of Sunny School Hrastnik marks a harmonious collaboration between local entities and residents, showcasing the potential for community-driven renewable energy projects in Slovenia and although it is the first Slovenian solar power cooperative its success has led to many more municipalities expressing interest in similar cooperative approaches.

3.1.11. Loški Potok

Loški Potok is a Slovenian municipality south of Ljubljana with approximately 2000 inhabitants. In 2017 the local municipality initiated the creation of the Wooden Cooperative Loški Potok who have a 15-year concession from the municipality to provide biomass district heating in Loški Potok. Consequently, the focus of the cooperative is on managing the district heating system and supplying the wood chips for its operation. The cooperative itself is comprised of 21 local forest owners or foresters. The district heating system itself is a wooden biomass system which in 2022 used 1800 m3 of wood chips to supply 14 users with heat; including municipal and municipal-owned buildings, and private households. The cooperative has ambitions extending beyond biomass, they wish to grow their investments in other renewable energy systems such as solar power and wind energy, consequently they currently solar panel power plant project, and they are trying to build a wind farm with 1MW of power.

3.2. Municipal action projects

3.2.1. Přeštice

Přeštice in the Pilsen region of the Czech Republic is a small-scale biogas central heating system. Between 2015 – 2018 was the fuel switch and renovation of distribution which led to Přeštice becoming one of the first decarbonised system in the Czech Republic. As part of this process natural gas fuelled boilers switched to biomethane from a nearby biogas station. At the same time, the distribution network was enlarged in order to supply additional buildings. This approach was organised through a municipally owned company, and culminated in a pilot project showing ways to decarbonise local heating system which could become widespread in the Czech Republic

3.2.2. Kněžice

Over the last 25 years the local municipality of Kněžice in the Central Bohemia Region of the Czech Republic has used a municipally owned company to build a fully decarbonised central heating system. This began

as a pilot project showing widespread ways to decarbonise local heating systems in Czech Republic and over the last 25 years an incremental system has been built to include 6,8 GWh of newly built biomass providing biogas, hot water, which has been distributed in urban areas via 5 boilers and two distribution circuits.

3.2.3. Holbæk Kommune

Holbæk Kommune is one of Denmark's largest municipalities and is currently in the process of decarbonisation to align with the municipal council's 2020 target of a 70% reduction CO2 emissions by 2030 compared to 1990 levels, which correspond to approximately halving current emissions. Holbæk is seeking to achieve this goal by expanding the existing district heating network, and to eventually convert the entire city from natural gas to district heating – which is challenging as Holbæk, is the biggest gas-heated city in Denmark. The expectation of the project is that Holbæk will be provided with two geothermal well pairs which can supply 15-30 MW. Alongside this Holbæk municipality is aiming to start replacing existing heat supply units with renewable energy-based technologies. Primarily, wood chip boilers, heat pumps, and solar heat. Consumers without access to a district heating network will be encouraged to replace natural gas boilers with individual heat pumps or hybrid solutions. Moreover, the biogas production potential in the municipality is calculated at around 100 GWh per year and with efforts made in the implementation of heat pumps, this may be able to provide flexibility required to meet the bulk of the heat demand.

The organisations model for this project is driven by the local municipality however, it is worth considering the broader Danish context. The Danish district heating sector provides 64%. of all Danish households with district heating. This makes Denmark one of the countries in Europe with the most developed district heating supply networks. Because of how district heating works, it is regarded in Denmark as a natural monopoly, meaning that is regulated by a principle of non-profit. This has created a structure where municipally owned utilities deliver around two thirds of all district heating. The remaining district heating companies are predominantly consumer owned cooperatives.

4. Analysis of community action projects

Deliverable 2.2 seeks to analyse community action projects, however, this analysis does not compare these examples against one another to suggest the 'most' successful approach, as choosing a metric by which to define this would be too subjective, and likely to erase the nuanced and circumstantial advantages of different approaches. Instead, the analysis focuses on comparing a selection of overarching trends, which can tell us something about best practices of projects and initiatives for district heating supply. However, the analysis is not limited to district heating supply, as although this the primary focus, due to a lack of data we also included models that focused on demand reduction and other decarbonisation initiatives. In this section we will consider some of the trends that were observed over the course of our analysis.

The first consideration for analysis was the possible organisational models including municipal action, cooperatives, purpose driven companies and associations. Their key features and some of their respective strengths and weaknesses are considered:

4.1. Municipally owned company

This is an approach where we have best practice examples from the Czech republic (Přeštice and Kněžice) and the Netherlands (Holbæk Kommune) where the municipality decides to take direct action, in these instances to address heat supply issues. The key feature of this approach is that the services are provided directly to the user via the municipality. This has the advantage that individual citizens are not required to engage directly to create change. However, the converse of this is that it does not empower citizens to take action into their own hands. Equally, this poses a serious financial challenge as actions are inevitably limited by municipal budgets which are generally very constrained. The lack of agency on the part of individual citizens is why these municipal actions projects have not been considered for further analysis in this section. This also differs from a purpose driven company as the relationship to the municipality means that profit making might be less of a primary focus.

4.2. Cooperatives

Cooperatives are the primary approach being explored in the HeatCOOP project, the cooperative form is legally a business, in contrast to an association or a non-profit. However, cooperatives are generally grounded in an idealistic objective. The legal form is close to that of a limited liability company but the agreement can be entered and exited without the need for a notary, this facilitates having a large number of partners/members, which makes it a fairly democratic way of fundraising. Cooperatives have a functionality that extends beyond bringing together small money, to provide non-financial advantages to the members. This is evidenced by the historic legacy of cooperatives societal change makers at the core of emancipatory

movements for workers and other marginalised groups who were unable to supply themselves with affordable and high-quality housing. This historical use of the cooperative model means that it is a well-established legal form in many countries, especially in Austria.

From a legal perspective cooperatives have a few core advantages:

- They provide enhanced security when there are large amounts of money involved. The legal structure of the cooperative provides safety for moving money around in a way that associations do not. This would be an advantage when considering the formation of local heating networks where substantial financial investments would be required.
- Cooperatives are highly flexible allowing for autonomous internal organizational structures to be established, and this enables cooperatives to have clear focal points.
- Cooperatives are always audited making it relatively easy for them to obtain a loan or credit, relative to associations.

One of the most substantive limitations of the cooperative approach is that although it is well established and has been applied in various different contexts in countries like Austria, there are also countries like the Czech Republic where such a model is more uncommon. This means that the legislation and public awareness around cooperatives may be less developed, this makes it harder to form cooperatives, consequently, alternative approaches may be considered which can provide similar outcomes, e.g. municipally owned companies.

4.3. Purpose driven companies

Purpose driven companies can provide access to clean energy and as the best practice example in the form of Biomasse Wolkersdorf GmbH & KN indicates, this is another potential model for localised district heating. However, participation as a limited liability company indicates that the core motivation will be to generate profit. This does not mean that individuals have no input, as they can have power as shareholders etc., and the objective of the company may align with a goal provided by a heating cooperative, however the legal structure prioritises a focus on profit generation.

4.4. Associations

Associations also have the potential to directly empower users, as evidenced in the best practice example of Klimadörfl. Associations share many features with cooperatives, by gathering individuals in a non-profit form and encompassing idealistic objectives within the goal and statutes of the association. However, in contrast to cooperatives, they do not have the same legal and financial security which makes raising capital more challenging.

5. Assessment methodology

Excluding direct action from municipalities, the remaining three legal structures, are able to facilitate citizen engagement and were therefore analysed based on the following criteria:

- Whether they are a primarily supply or demand side dominated model (primarily is operative here, as many of these approaches have elements of both),
- their organizational structure, concerning both their initial organisational structure and their current structure and management, and
- their membership model.

From this starting information a framework was developed to assess the best practices of projects and initiatives for district heating supply. This framework can be seen in Table 1 below:

Table 1 - Cooperatives best practies frameworks

Community action projects	Nah-Wärme-West Berlin	ADEV	VITA	SmartCity Baumgarten	DuCoop	Klimadörfl	Kriegerheimstätte	Iglaseegasse	Biomasse Wolkersdorf	Hrastnik	Loški Potok
Organisational structure											
Initial initiative											
Top-down approach					■					■	■
Bottom-up approach	■	■	■	■		■	■	■	■		
Current structure and management											
Top-down approach		■	■		■		■		■	■	■
Bottom-up approach	■			■		■		■			
Membership model											
Umbrella model	■	■	■							■	
Local model				■	■	■	■	■	■		■
Supply and demand											
Supply side dominated cooperative	■	■		■	■	■	■			■	■
Demand side dominated cooperative			■					■	■		

Regarding the criteria mentioned in this table the distinction between a top-down and bottom-up organisational structure is nebulous. However, generally, top-down was understood to be projects that were initiated by a municipality or commercial organisation in some way or where the

management was professionalised. Whereas, bottom-up was understood as projects initiated by individual actors or small groups of private citizens seeking to make changes, and/or cooperatives that were run without professionalisation. Membership structures were divided into umbrella models where membership was open and any private individual or legal person (entity) can become a member of cooperative, and local models where membership is limited to individual shareholders. Using this division we said that nah Waerme-West Berlin, ADEV, VITA and Hrastnik could be understood as umbrella models where the others were better understood as local models. Although this was useful to understanding the models it appeared to have limited correlations to the. Lastly, whether the project was supply or demand focused was considered, this was used as a loose categorisation due to inevitable overlap between categories. Most of the approaches considered focused on the supply side, however VITA, Iglaseegasse and Biomasse Wolkersdorf were demand focused. This is not in and of itself particularly significant but can be understood as a potentially influencing factor when considering other elements.

6. Trends observed

6.1. Initial and eventual organisation

The trend that was most significantly observed concerned the initial and final organisational structure of the organisations. The analysis based on a top down/botton up approach provided 4 possible trends, a continuation of top down or bottom-up approaches from initiation to present day, or transitioning from one to the other. However, none of the selected best practices began with a top-down approach and shifted to a bottom-up approach. Instead, the remaining 3 trends were found. In 4 cases (Nah Waerme, Smart city, Kimadorfl and Iglaseegasse) the projects were initiated from the bottom-up and not professionalised. The converse was also found in three cases (DuCoup, Hratnink, and Loski Potok) wherein the instigation was not by individual community members, and the management of has remained professional. However, of particular interest is the trend that was discovered wherein there was a transition from community initiation to professionalised management in 4 cases (ADEV, VITA, Kriegerheimstaette and Biomasse).

These observations prompted two key questions for examination: what are the advantages of a bottom-up approach and why do some remain? And what are the advantages of a the top down approach and why do some transition?

The following were proposed as the advantages of a bottom-up approach and the reason why some projects remain in this structure:

- There is increased decision making autonomy in this approach, meaning that a larger number of people control the decision making process and feel responsible for energy supply.
- Although it may be easier to professionalise the running of a project, this has a corresponding loss of control and responsibility.
- In bottom-up approaches, identification with the goals of the project are higher, with people maintaining stronger motivation as they are more likely to identify with their own ideas and visions.

The following were proposed as advantages of a the top-down approach and explanations for why some projects transition:

- Increased efficiency – the cooperative members break through the ice using a bottom-up approach, but this is a one-off effort which is different to the continuous repetitive effort required to sustain a project.
- We are culturally used to a top-down approach with a team of professionals running things for us, as outsourcing our needs to professionals is an efficient and effective way to run an economy.
- There is increased exhaustion in the participation, meaning that the bottom-up approach is simply unsustainable for many of the first initiators.

From this we are able to conclude that there begins to be an incentive to move towards professionalisation, as you can use the momentum found in collective action to initiate the project, but professionalisation alleviates the sustained energy required to maintain the project. Moreover, although we have examples which remain bottom-up approaches, it is unclear whether these will remain in this format indefinitely or if they are also on a pathway towards eventual professionalisation when the burden of continued management and collective decision making becomes too high.

6.2. Organisational structure and the membership model

One question that emerged is whether there was a relationship between the organisational structure and the membership model. Generally, the trend was found, with some exceptions, that umbrella models generally started as bottom-up models and transitioned to professionalised management structures. This tendency towards professionalisation perhaps reflects the challenges of maintaining the sustained management and coordination efforts required for the operations of such models.

6.3. Organisational structure and supply v. demand focus

Another question considered is whether there exists a correlation between initial organisation structure, and whether it is a supply or demand focused cooperative. A clear correlation indicating causation was not demonstrated, however, the trend that was observed was that all three demand focused initiatives began via a bottom-up approach, which we would expect as users would directly receive the benefits both financial and other.

7. Overall conclusions

In this analysis we found that each of these four models seemed compatible with increasing decarbonisation, however, the different legal forms have an impact on the precise form of this decarbonisation. Thus, from this analysis we are able to infer that there is no a-priori reason why these models should not be used to form local district heating networks.

However, given the assertion that all these models have the potential to effectively decarbonise heating supply, the choice of which model is most appropriate remains open. What was most significantly noted was that the choice of model was generally determined not by which legal form would be optimal for achieving the decarbonisation objectives, but appeared to be primarily determined by the norms and degree of establishment in each country. Thus, the converse observation was also found that countries appear not to explore models which diverge from the status quo. This is perhaps due to different legal structures making specific legal forms more or less implementable in any given instance. But is also perhaps due to the cultural context where particularly for bottom-up initiatives, individuals are less likely to mobilise for unfamiliar models where there are not already existing models for replication, thereby reducing the opportunity to introduce new models into countries.

The other notable conclusion was that there seems to be a long-term advantage in professionalisation, as even for initiatives that were founded and driven by grassroots eventually a fatigue emerges which makes professionalisation a more sustainable long-term outcome, and this applies to all community action models.

8. Outstanding questions

Despite these conclusions certain questions remain outstanding:

- Is there a difference between these four models' abilities to pursue these heating services specifically for their members?
- Should the HeatCOOP project recommend the cooperative approach specifically, or should the legal from chosen be primarily determined by geographical norms?

Annex I – T2.1 Analysis

Nah-Wärme-West Berlin

T2.1 Analysis of international best-practice examples	
Research and analysis of international examples of urban heating supply and energy transition initiatives, projects, and case studies, including state-of-the-art approaches. Focus on existing urban energy commons.	
Project name and brief description : Nah-Wärme-West Berlin: cooperative local heating network	
Project location	*Eichkamp, Berlin, Germany*
Technical implementation concept	*air-to-water heat pumps and wood chips for peak load periods in winter*
Organisational model	*Cooperative*
Unique features of the project	*The Nah-Wärme-West Berlin is the first initiative in the German-speaking urban area that is in the process of implementing a cooperative and self-sufficient local heating network. Thanks to the funding for restructuring management, the initiative was able to hire Sabine Drewes as refurbishment manager in 2018. Since then, residents and the administration have been working intensively together with Sabine Drewes to establish a cooperative.*
History of the project	*In 2012, residents of Eichkamp expressed their desire for the first time to reduce their own CO2 emissions and to actively change in favor of the climate crisis. The focus was on reducing the company's own energy consumption and switching to renewable energy. Work was carried out on an energy concept in which the heat supply of the entire settlement was to be ensured by means of groundwater heat pumps. However, due to groundwater contamination in the settlement, this turned out not to be possible. The next idea was to connect to the large district heating network operated by Vattenfall. To this end, a cooperation agreement was written between the settlement and Vattenfall. On the initiative of some committed residents, a renovation management was also to be commissioned for the project. Vattenfall agreed to cover the 35% of the costs for restructuring management that are not covered by funding. The redevelopment management itself was then commissioned by the district, as the funding only applies to municipalities. Since 2018, Sabine Drewes has been working as a freelance renovation manager for Nahwärme-West. The cooperation agreement with Vattenfall was cancelled by the settlement shortly afterwards due to dissatisfaction among the residents regarding the cooperation with Vattenfall. Instead, the settlement was recommended to build its own local heating network. This also gave rise to the vision of a cooperative. Since 2018, a technical implementation concept has already been developed, interested parties have been recruited for connection to the local heating network and for joining the cooperative, and the cooperative's articles of association have been formulated. As of December 2023, the cooperative has not yet been founded, as it is waiting for an assurance from the district that it will also connect the public buildings to the local heating network.*
Technical overview	
Technical implementation of the project	*The local heating network is now (as of autumn 2023) planned as a low-temperature network and the heat is to be 100% renewable. 64% of the heat is generated by air-to-water heat pumps and 36% by a wood chip plant for peak load periods in winter.*

kWh	*4.5 gWh per year*
Energy form	*Local heating for heating and hot water*
Location of the heat/energy system	*Should be located on a parking lot directly adjacent to the Eichkamp settlement (needs approx. 10sqm)*
Connection between households	*All energy consumers must be members of the cooperative. Those members who are on the route of the local heating network must connect to it. The heat transfer stations are privately financed by the homeowners.*
Ownership structure	*The plant and pipe network are owned by the cooperative. The property on which the plant is located is public or belongs to the municipality. The heat transfer stations belong to the individual homeowners.*
Organisational overview	
Organisational model	*Refurbishment management (Sabine Drewes) was the driving force behind the vision of establishing a cooperative.*
Tasks of the heat transition community	*o Organisation and advice on energy-efficient building modernisation measures (works together with two energy consultants).* *o Financing (taking out loans, receiving subsidies) of the plant.* *o Tendering and supervision of the construction of the plant.* *o Operation and maintenance of the plant.* *o Billing / sale of heat to cooperative members.*
Respective roles within the heat transition community:	
Members	*Pay the entrance fee and membership fee, are invited to the General Assembly and elect the Board of Directors.*
Board of Directors	There should be three board members, each of whom will be remunerated with a small salary. The Board of Directors convenes and chairs general meetings. He reports to the Supervisory Board.
Supervisory Board	*The Supervisory Board is voluntary, it monitors the Executive Board and sets up committees.*
Committees	*The committees are voluntary and advise the Supervisory Board.*
other	Sabine Drewes as refurbishment manager, is paid by subsidies.
Financing and Business Models	
Financing the project	*The entrance fees of the cooperative members (€1,000) and the cooperative shares (€500) are primarily used to finance the cooperative.*
Busines and economic model	*An external company, commissioned by the district office, evaluated the economic viability of the project. The results were:* *o With 150-160 subscribers, the cost-effectiveness is given.* *o If the public buildings are also connected, 100 private households will be sufficient.* *As of December 2023, there are 100 interested households. Negotiations are now pending with the district office as to whether the district office will become a member of the cooperative and whether the connection of the public buildings in Eichkamp will be guaranteed.*

ADEV

T2.1 Analysis of international best-practice examples

Research and analysis of international examples of urban heating supply and energy transition initiatives, projects, and case studies, including state-of-the-art approaches. Focus on existing urban energy commons.	
Project name and brief description: ADEV : cooperative energy company in Switzerland	
Project location	Switzerland
Technical implementation concept	*Solar power plants, small hydropower plants, wind turbines as well as central heating systems and local heating networks.*
Organisational model	*Cooperative*
Unique features of the project	**If available, describe in 1-2 paragraphs*
History of the project	*ADEV was founded in 1985 as part of the anti-nuclear movement in Switzerland. At that time, there were discussions about the construction of a nuclear power plant near Basel, against which there was great resistance from the population. A group of idealists founded ADEV as an energy community to promote energy generation opportunities away from nuclear power plants. Another motivation for the founding of ADEV was the financing of the first grid-operated wind power plant in the region. This was built on the initiative of the Ökozentrum Langenbruck and still needed financing. The founding of ADEV thus also served as a financing vessel for the wind power plant.* *In the early years, ADEV primarily supported the establishment of heating networks. These were all largely self-financed and equipped with a combined heat and power plant (gas-based).* *The cooperative quickly realized that one of the biggest problems was raising borrowed capital, as the deposits of the cooperative members were not considered equity by the banks at the time, as cooperative members could have returned their shares and been paid out at any time. Over the years, ADEV decided to set up stock corporations. The stock corporations are traded on the Bern Stock Exchange, which is less like a classic stock exchange and more like a trading platform. The joint-stock companies guarantee equity capital and provide security for banks to borrow capital. Since then, the ADEV cooperative has functioned like a holding company for the four stock corporations. Since the stock corporations are structured according to technologies (Windkraft AG, Wasserkraft AG, Solarstrom AG and Ökowärme AG), investors can decide in which technologies they want to invest their money.* *In the last 10 years, ADEV has experienced a strong professionalization.*
Technical overview	
Technical implementation of the project	ADEV pursues various technical implementation concepts. Currently (2023) it owns 130 plants, including 90 PV systems, 12 small hydropower plants, 2 wind turbines and around 25 district heating networks.
kWh	
Energy form	
Location of the heat/energy system	

Connection between households	
Ownership structure	**Describe in 1-2 paragraphs*
Organisational overview	
Organisational model	*The legal form of the cooperative was chosen so that citizens can participate, stay informed and actively engage in the energy transition. In order to be able to provide equity capital to the banks, four stock corporations were also founded, each of which is structured according to technologies (Windkraft AG, Hydropower AG, Solarstrom AG and Ökowärme AG). Thus, investors can decide which technologies they want to invest their money in.*
Tasks of the heat transition community	• *Financing and planning/implementation of the plants.* • *Contracting: Operation, administration and maintenance of the systems.* • *Information and education for the cooperative members (e.g. through a cooperative magazine and excursions to the facilities).*
Respective roles within the heat transition community:	
Members	*2200 members, of which about 250 people attend the annual general meeting*
Board of Directors	There are 14 boards of directors, across the 5 companies. They are all remunerated at a daily rate of 500 francs.
Supervisory Board	**Does a Supervisory Board exist and what is their role? Describe in 1 -2 sentences*
Committees	**Does a Committees exist and what is their role? Describe in 1-2 sentences*
other	*Management: 3 people* *Employees: A total of 21 people employed in the areas of "Staff Units and Assistance", "Finance and Administration" and "Planning and Construction".* *Investment managers: The cooperative has also employed 30 people to look after the facilities and maintain them if necessary.*
Financing and Business Models	
Financing the project	*The cooperative is financed by a mix of:* *Cooperative shares: 1 part costs 500 francs. A maximum of 60 shares (CHF 30,000) can be purchased by one member.* *Stocks/capital raising: Investors can buy and trade shares in the AGs. When the AGs were founded, a start-up capital was paid in and capital increases are carried out regularly.* *Loan system: The members of the cooperative can grant loans to the cooperative, i.e. they can put their money into the cooperative in the form of a loan for either 3 to 5 years or for 6 to 10 years. The minimum amount is 500 francs. Lenders can choose from a range of interest rates (currently between 0-1% for short-term loans and up to 1.5% for long-term loans). Most people put their money in the ADEV for 0% interest, because they put their money into the ADEV out of conviction and their own values.* *Debt capital: currently, the cooperative has enough equity so that it does not need to borrow capital.*

Busines and economic model	*Due to the financing mix in terms of equity (cooperative shares and shares), as well as debt capital (loans and bank loans), ADEV has secure financing and good profitability. As a cooperative and non-profit-oriented company, ADEV pays out a maximum of 3% dividends. Usually it is 1-2%.* *Since the foundation of the joint-stock company, ADEV has been able to provide equity capital and thus take out loans from the bank. ADEV now has sufficient equity and is no longer dependent on borrowed capital.*

VITA: Citizens' Energy Cooperative

T2.1 Analysis of international best-practice examples	
Research and analysis of international examples of urban heating supply and energy transition initiatives, projects, and case studies, including state-of-the-art approaches. Focus on existing urban energy commons.	
Project name and brief description : VITA : Citizens' Energy Cooperative	
Project location	Black Forest, Germany
Technical implementation concept	**Describe in 1-2 paragraphs*
Organisational model	*Cooperative*
Unique features of the project	*The citizens' energy cooperative VITA is one of four shareholders of Energieversorgung Titisee-Neustadt GmbH (evtn) and an important local player in climate and energy protection. In addition to its role as a local heating network operator through its participation in evtn, VITA also plans its own projects in the sense of the energy transition and climate protection and carries out important public relations and networking work in the region.*
History of the project	*The Vita Bürgerenergie Cooperative was founded in 2011 with the aim of participating with citizens' capital in the repurchase of the electricity grid from the then operator, Energiedienst AG. In order to buy back the power grid, evtn (Energieung Titisee-Neustadt GmbH) was founded in 2012, which is a merger of the city of Titisee-Neustadt, the EWS Elektirizitätswerke Schönau e.G. and the VITA Citizens' Cooperative. As the smallest shareholder, Vita owned 10% of the eventual shares. In addition to operating the power grid, evtn also took on its own projects. For example, the Titisee-Neustadt local heating network was planned in 2020 and put into operation in 2022, in which citizens contributed €110,000 through the VITA cooperative and thus made a significant contribution to the implementation of the local heating network.* *However, due to political and economic developments, evtn has been getting more and more into economic difficulties in recent years. A realignment of evtn now envisages divesting itself of electricity grid operations and concentrating on the remaining business areas of local heating network operation, as well as the sale of electricity and local heating. In addition, a fourth shareholder, Badenova, was admitted to evtn at the beginning of 2023. Since VITA did not increase its equity, Vita's share in evtn fell to 3.6%.* ***Timeline:*** *• 2011 Foundation of over 100 citizens* *• 2012 Founding of evtn and buyback of the power grid.* *• 2020 Start of planning of the Titisee-Neustadt local heating network.*

	• *2021 Commissioning of the first PV system from VITA* • *2022 Commissioning of the Titisee-Neustadt local heating network.*
Technical overview	
Technical implementation of the project	*In 2022, the Titisee-Neustadt local heating network was put into operation. This consists of a woodchip plant and two small combined heat and power plants and is operated by evtn. At the same time, VITA also commissioned its first PV system in 2021, which supplies around 35 households.*
kWh	
Energy form	*Local heating for heating and hot water*
Location of the heat/energy system	*The woodchip plant is located on a plot of land owned by the city and the combined heat and power plants are housed in a retirement home and a school.*
Connection between households	*The connection of the individual houses is carried out by means of heat transfer stations.*
Ownership structure	*The plant, the pipe network and the heat transfer stations are the property of evtn.*
Organisational overview	
Organisational model	*The Vita Citizens' Energy Cooperative was founded in 2011 with the aim of participating in the buyback of the electricity grid with citizens' capital. The organization as a cooperative offered citizens the opportunity to become a member of the cooperative and to give individual capital to the cooperative in order to ultimately participate in the buyback together as a cooperative.*
Tasks of the heat transition community	• *Implementation of own renewable energy projects – planning, financing (through loans), installation, construction.* • *Networking and public relations for sustainable projects in the region.* • *Recruitment of new customers for the eventual*
Respective roles within the heat transition community:	
Members	*Currently about 300. Pay the entrance fee and membership fee, are invited to the General Assembly (about 40 come) and elect the board.*
Board of Directors	The board is active on a voluntary basis. It convenes and chairs the Annual General Meeting and reports to the Supervisory Board.
Supervisory Board	**Does a Supervisory Board exist and what is their role? Describe in 1 -2 sentences*
Committees	**Does a Committees exist and what is their role? Describe in 1-2 sentences*
other	
Financing and Business Models	
Financing the project	**Describe in 1-2 paragraphs*
Busines and economic model	• *Despite the lack of profitability of the company's own projects, they prove to be very effective in terms of publicity and contribute to a positive sense of cohesion within the cooperative.* • *As a result of its participation in evtn, VITA slipped into a strong financial dependency. This has been somewhat mitigated since the entry of Badenova and the resulting decrease in VITA's share of evtn from 10% to 3.6%.* • *VITA is currently in negotiations with evtn as to whether cooperative members will receive a discount on local heating. For households that obtain their heat*

	from the Titisee-Neustadt local heating network, it is not a prerequisite to be a member of the VITA cooperative.

DuCoop : cooperative local heating network

Project name and brief description : DuCoop : cooperative local heating network	
Project location	*Urban development area "De Nieuwe Dokken" in Ghent, Belgium*
Technical implementation concept	**Describe in 1-2 paragraphs*
Organisational model	**Describe in 1-2 paragraphs*
Unique features of the project	*DuCoop has signed an agreement with the City of Ghent for the construction and operation of a heating network, water treatment and other technologies. The Charter of Incorporation stipulates that DuCoop will provide services to all residents. They conclude a contract with DuCoop that guarantees the heat supply and ensures the proper functioning of the technology. You are not only a customer, but also a cooperation partner of DuCoop. DuCoop supplies 400 apartments, a school and commercial space, such as a café and a bicycle repair shop.*
History of the project	*DuCoop was founded by project developer Schipperskaai Development, water company Farys and innovator Clean Energy Innovative Projects. Other companies were added to the project and from 2019 residents will also be able to purchase shares in the cooperative and thus share in the proceeds.*
Technical overview	
Technical implementation of the project	*• Heating: All houses are connected to a heating network. This means that the residents do not have an individual heating system, but there is a heat exchanger in each apartment that extracts heat from a collector pipe. The heat is 100% sustainable and consists of residual heat from industry and heat obtained from the district's wastewater. Process water with spread 55°C/35°C -> waste heat from the factory increased 35°C->45°C => rest with 15kW heat pump Water-water (process water) in apartments: only small heat exchanger for space heating (surface heating in all apartments, floor) and hot water* *• PV systems and 230kW battery as storage > software anticipates electricity prices and always feeds in when electricity prices are highest during the day => electricity cost savings for everyone* *• Water: Wastewater is collected and purified in the district. After purification, it is given a second life as process water at the neighbouring company Christeyns. Vacuum toilet flushing at -0.6bar by pumping* *• Waste: Separate waste processing is the norm at Nieuwe Dokken. DuCoop processes kitchen waste into biogas and a fertiliser product that is reused on site.* *• Mobility: DuCoop promotes sustainable mobility by offering a network of electric charging stations for cars and bicycles.* *• Smart District: All these sustainable technologies contribute to closing the*

	cycles of water, energy and nutrients as much as possible. In combination with intelligent control of all processes and the buffering of energy (heat and electricity), we create an environmentally friendly residential area. *• Biogas process for organic waste and residues from water treatment*
kWh	*see https://ducoop.be/en/*
Energy form	*Heat, Electricity*
Location of the heat/energy system	*The power generation plants and the plants for wastewater treatment and methane extraction are located in the residential complex.*
Connection between households	*The heating network draws waste heat from a nearby soap factory, and vice versa, this factory draws industrial water in the form of the treated wastewater.*
Ownership structure	*The facilities and the heating network are owned by DuCoop. All recipients of heat and electricity must join the cooperative.*
Organisational overview	
Organisational model	*DuCoop was founded as a cooperative of entrepreneurs and employees. Cleanenergyinvest provided capital to the cooperative. All consumers of heat and energy – i.e. all resident households and companies – must join the cooperative. The Board of Directors currently consists of founders and employees and is elected by the General Assembly of all members. Residents are invited to take an active role in shaping the cooperative. You need to understand the basic features of the technical concept and be involved in its implementation in everyday life.*
Tasks of the heat transition community	*o Planning, tendering and construction of the plants* *o Operation and maintenance of the systems* *o Heat generation and supply of the residents* *o Electricity generation through PV and supply of residents via smart grid*
Respective roles within the heat transition community:	
Members	*Residents*
Board of Directors	to date, consists of representatives of the founding companies, no residents
Supervisory Board	**Does a Supervisory Board exist and what is their role? Describe in 1 -2 sentences*
Committees	**Does a Committees exist and what is their role? Describe in 1-2 sentences*

other	
Financing and Business Models	
Financing the project	• *Investment:* *o previously a one-time fee of 2500 € per apartment, in the future 5000 €.* • *Energy:* *o 16 cents per kWh.* *o In addition, approx. 400€ flat rate per apartment per year (approx. 1€ per sqm per month).*
Busines and economic model	*Cooperative members can purchase two forms of cooperative shares: A shares and B shares. Every person who buys or rents an apartment in "De Nieuwe Dokken" has to join the cooperative and receives an A share with a nominal value of €10. If the cooperative makes more than 6% profit, the General Assembly may decide to distribute this profit to the A shareholders in the form of a discount on your energy bill. Furthermore, tenants and owners from De Nieuwe Dokken can purchase B shares for €250 each and thus contribute to the financing of the project. As a recognized cooperative, DuCoop is allowed to pay a maximum of 6% return on the contributed capital as a dividend to the cooperative members. A maximum of 20 shares (€5,000) may be purchased.*

SmartCity Baumarten: EEG with anergy network in the existing system.

T2.1 Analysis of international best-practice examples	
Project name and brief description : SmartCity Baumarten : EEG with anergy network in the existing system.	
Project location	Linzer Straße, 14th district, Vienna
Technical implementation concept	*Anergy network (low-temperature network) with 25 geothermal probes in conjunction with brine heat pumps in the three connected buildings.*
Organisational model	*Association*
Unique features of the project	*In the future, the (currently) three buildings of the SmartCity Baumgarten district will be supplied with 100% renewable heating, cooling and electricity via a cross-property anergy network. This is made possible by the construction of the new building in a block vacant lot. Even before construction began, a cooperation was started between the developer of the new building and the owners of the surrounding buildings. They have joined forces to form an association to implement the project and together form Austria's first energy community with an anergy network in its portfolio.*

History of the project	*In 2020, Günter Lang, initiator of the SmartCity Baumgarten project and resident and owner of an apartment in the 80s building, discovered a construction board for the new construction of a condominium on a neighboring property. According to the construction board, this new building was to be equipped with gas heating systems. After contacting the developer WIEBE (a subsidiary of Familienwohnbau), Mr. Lang succeeded in convincing the managing director to drill geothermal probes for the heat supply of the new building and the surrounding existing buildings. This gave rise to the idea of a cross-property anergy network and the establishment of an energy community.* *Of the four houses initially planned for the anergy network, three houses ultimately remained. The fourth building, an apartment building directly adjacent to the new building, jumped off shortly before the signing of the cooperation agreement because the owner did not see himself in a position to cope with the finances. However, there is a contractual agreement with this house that the lines of the anergy network are allowed to run through the house.*
Technical overview	
Technical implementation of the project	*The anergy network, which will be in operation from summer 2024, is a multi-building pipe system in which low-temperature water circulates between heat sources (solar collectors, waste heat from cooling), heat storage (geothermal probes) and heat consumers (brine heat pumps in each house). For this purpose, a geothermal probe field with 25 geothermal probes was built in the new building and a central energy management system was installed. This not only controls the heat, but also the electricity, which comes from the building's own photovoltaic systems on the façade, roof and pergola, among other things. The 25 geothermal probes are on average 150m deep and are connected to central brine heat pumps in each house (central 38 kW heat pump and apartment-by-apartment booster for hot water in Linzer Straße 280, 45 kW heat pump in house 282 as well as brine surface collector, thermal solar collectors, two 60 kW heat pumps and 50 kW boosters and 12 kW peak load coverage on property 286-288)*
kWh	
Energy form	*local heating for heating and hot water, photovoltaics for electricity*
Location of the heat/energy system	*The central heat pumps are located in the basement of each building.*
Connection between households	*The households are connected to the central heat pump in the basement via risers. All households will be connected to the anergy network.*
Ownership structure	*The association is the owner of the entire anergy network.*
Organisational overview	
Organisational model	*An association was founded to finance the anergy network, as well as its operation. The four founding members of the association are the managing director of the developer, the owner of the apartment building, the property manager of the condominium and Günter Lang as the project initiator. After the anergy network is put into operation, all energy consumers will become members of the association.*

Tasks of the heat transition community	*o Coordination of planning (primarily with Günter Lang)* *o Operation, Maintenance, Billing*
Respective roles within the heat transition community:	
Members	**What role do the members of the project have? Describe in 1 -2 sentences*
Board of Directors	Founding members.
Supervisory Board	**Does a Supervisory Board exist and what is their role? Describe in 1 -2 sentences*
Committees	**Does a Committees exist and what is their role? Describe in 1-2 sentences*
other	***Chairman:*** *Günter Lang. He also acts as a caretaker, especially in the planning and start-up phase, and coordinates the entire project. 2/3 of his working time is non-profit. Approximately 1/3 can be paid for through research funds.* ***Treasurer:*** *Managing Director of the new building.* ***Secretary:*** *Property manager of the condominium.* ***Deputy Chairman:*** *Owner of the apartment building.* *Roles must be re-elected every 2 years.*
Financing and Business Models	
Financing the project	*An association was founded to finance the anergy network. The costs of the geothermal probes and the pipe network were divided among the members of the association, depending on their energy needs.* *• Investment:* *o Apartment building (5.4 probes): €80,000 paid in by the owner alone.* *o WEG (6.6 probes): Eight out of 15 apartments paid the €6,500 investment costs directly. The remaining apartments want to pay off the costs via a monthly lump sum (probably about 45€ per month over 15 years).* *o New construction (12 probes): The investment costs for the anergy network are included directly in the sale of the apartment.* *• Energy:* *o The energy will not be provided free of charge, but will cost about 5 cents per kWh. This money will go to the association and cover the operating costs.* *• Renovation costs:* *o The prerequisite for the construction of the anergy network was the thermal renovation of the apartment building and the condominium. The renovation costs are not included in the financing concept of the anergy network and are borne by the houses themselves. In the case of the condominium, the renovation costs are expected to be €50,000 net per apartment, minus the subsidies.*
Busines and economic model	*o Expected to cost saving after 5 years.*

Klimadörfl: an association for the promotion of climate neutrality

T2.1 Analysis of international best-practice examples
Research and analysis of international examples of urban heating supply and energy transition initiatives, projects, and case studies, including state-of-the-art approaches. Focus on existing urban energy commons.

Project name and brief description: Klimadörfl : an association for the promotion of climate neutrality	
Project location	*19th District of Vienna*
Technical implementation concept	*Various implementation scenarios have been developed for the Kahlenberger village's phase-out of oil and gas. In the process, the original concept of a central local heating network was discarded. Instead, smaller neighbourhood clusters are currently being defined, which will represent different starting points for decarbonisation initiatives.*
Organisational model	*Association*
Unique features of the project	*The residents of Kahlenberger Village want to get out of oil and gas. On our own initiative, an association for the promotion of climate neutrality in the Kahlenbergerdörfl (KLIMADÖRFL) was founded. The aim is to provide impetus for the sustainable use of resources in the areas of heat and power supply, mobility and nutrition, and to promote good neighbourliness. With about 500 inhabitants (number growing), the Kahlenberger village is the right size to act as a pioneer and prototype of a climate-neutral village.*
History of the project	*The KLIMADÖRFL association was founded at the beginning of 2023. It emerged from the Association for the Promotion of the Kahlenberger Village. realitylab has been supporting the association since 2023. In the coming years, the first renovation and decarbonisation projects are to be tackled jointly.*
Technical overview	
Technical implementation of the project	
kWh	
Energy form	
Location of the heat/energy system	
Connection between households	
Ownership structure	**Describe in 1-2 paragraphs*
Organisational overview	
Organisational model	*The residents of the Kahlenbergerdorf are currently organized as an association. Analogous to the considerations of building a central local heating network, there was also the idea of founding a cooperative that finances, builds, owns and operates the local heating network. With the current conception of the smaller neighbourhood clusters, the establishment of a cooperative no longer seems so urgent. However, a joint organization continues to bring advantages such as the joint development of know-how, the collection of offers from companies, which generate synergy effects in the joint maintenance and operation of plants.*
Tasks of the heat transition community	**Describe in 1-2 paragraphs*
Respective roles within the heat transition community:	

Members	*What role do the members of the project have? Describe in 1 -2 sentences
Board of Directors	*Does a board of directors exist and what is their role? Describe in 1 -2 sentences
Supervisory Board	*Does a Supervisory Board exist and what is their role? Describe in 1 -2 sentences
Committees	*Does a Committees exist and what is their role? Describe in 1-2 sentences
other	
Financing and Business Models	
Financing the project	*Describe in 1-2 paragraphs
Busines and economic model	*Describe in 1-2 paragraphs

Kriegerheimstätte

T2.1 Analysis of international best-practice examples	
Research and analysis of international examples of urban heating supply and energy transition initiatives, projects, and case studies, including state-of-the-art approaches. Focus on existing urban energy commons.	
Project name and brief description: Kriegerheimstätte :	
Project location	*22nd district of Vienna*
Technical implementation concept	*The aim is to supply the individual terraced houses with heat via a local heating network. The heat required for this is to be geothermal energy and heat pumps. It is also planned to generate most of the electricity supply from photovoltaic systems at a later date.* *The geothermal probes are to be drilled in a parking lot owned by the cooperative.* *The aim is for the geothermal probes and heat pumps to be built and operated on behalf of the Kriegerheimstätten cooperative. External construction companies and service providers are commissioned for the construction and maintenance of the systems.*
Organisational model	*The management of the housing estate and residential complex is carried out by the non-profit housing cooperative Gartenheim. It is also a garden settlement cooperative. (They also refer to each other as "siblings"). All households are members of the Kriegerheimstätten cooperative and have a rental/use agreement with the cooperative. The board of directors and supervisory board of the Kriegerheimstätten are elected by the residents from among the cooperative members.*
Unique features of the project	*The aim of the Kriegerheimstätte project is to supply the housing and residential complexes with renewable thermal energy and electricity. The initiative for the project comes from the Gartenheim cooperative, which is responsible for the property management of the garden estate.* *Since tenants cannot be obliged to switch from their current*

	predominantly gas-based heat supply to a renewable heat supply according to the current situation, a careful process is needed to get all tenants on board.
History of the project	*In 1921, during the construction of the Kriegerheimstätten garden estate, the cooperative of the same name was founded. In the 1970s, the company built the multi-storey residential complex and renovated all its buildings from its own funds and subsidies from the beginning of the 2000s.*
Technical overview	
Technical implementation of the project	
kWh	
Energy form	
Location of the heat/energy system	
Connection between households	
Ownership structure	**Describe in 1-2 paragraphs*
Organisational overview	
Organisational model	**Describe in 1-2 paragraphs*
Tasks of the heat transition community	**Describe in 1-2 paragraphs*
Respective roles within the heat transition community:	
Members	**What role do the members of the project have? Describe in 1 -2 sentences*
Board of Directors	**Does a board of directors exist and what is their role? Describe in 1 -2 sentences*
Supervisory Board	**Does a Supervisory Board exist and what is their role? Describe in 1 -2 sentences*
Committees	**Does a Committees exist and what is their role? Describe in 1-2 sentences*
other	
Financing and Business Models	
Financing the project	**Describe in 1-2 paragraphs*
Busines and economic model	**Describe in 1-2 paragraphs*

Iglaseegasse

T2.1 Analysis of international best-practice examples	
Research and analysis of international examples of urban heating supply and energy transition initiatives, projects, and case studies, including state-of-the-art approaches. Focus on existing urban energy commons.	
Project name and brief description: Iglaseegasse :	
Project location	*Iglaseegasse 37, 19th district of Vienna*

Technical implementation concept	*As far as this is possible in the protection zone and economically feasible, the Wilhelminian style house is to be thermally insulated and the heating system is to be converted from currently decentralised gas boilers to a brine-water heat pump with five geothermal probes (3 in the front garden and 2 in public land). Furthermore, a photovoltaic system is to be installed on the flat roof on the courtyard side and on the south façade.* *It is also planned to include the single-family houses to the right and left of the Wilhelminian style house, each with an additional deep borehole in the pavement area in front of the house, and to connect them to the heat pump in the Wilhelminian style house, so that these houses are also integrated into the heat supply and PV system.* *The financing of the thermal-energetic is to be provided by subsidies, equity capital and bank loans, for which the homeowner provides a mortgage security on the property.*
Organisational model	*The owner initially planned to set up a cooperative for the supply of electricity and heat together with the tenants. The planned structure was:* *This cooperative should operate the heat supply system and the PV system. The operating costs are incurred by the cooperative. The thermal insulation measures and the investments in the new heating system should be carried out by the owner. For the use of the building, a lease agreement is concluded between the cooperative and the owner. The rent paid by the cooperative to the owner is intended to cover the costs of the equity and debt capital used for the investment over a period of 20 years. The lessor is responsible for maintaining the substance of the house necessary for the supply of heat (insulation, domestic plumbing, etc.), while the cooperative, as the lessee, has to bear the financing costs, the operating costs and the ongoing maintenance of the installations. However, an in-depth legal analysis revealed major legal hurdles rooted in the Austrian tenancy laws. The new concept is based on an increase of the rental fee of ca. 2€/m2/month, which reflects the savings on the cost of gas for heating. The higher rental income will cover the repayment of a loan by the owner for financing the decarbonisation investment. The rental fee increase has to be mutually agreed between the landlord and each single tenant. The cooperative model will be applied to the energy community for the use of the PV system, having as members all tenants of the house and the owners of the adjoining houses.*
Unique features of the project	*The initiative to establish an energy community comes from the owner of the Wilhelminian style house. The motivation is to decarbonize the building and involve the residents and, if necessary, the neighbors in their own heat supply.*
History of the project	*The idea of establishing a heat transition community has been pursued since 2022.*

Technical overview	
Technical implementation of the project	The Wilhelminian style house is to be thermally insulated and the heating system is to be converted from currently decentralised gas boilers to a brine-water heat pump with five geothermal probes (3 in the front garden and 2 in public land). Furthermore, a photovoltaic system is to be installed on the flat roof on the courtyard side and on the south façade.
kWh	70.000 kWh/year after renovation
Energy form	Geothermal
Location of the heat/energy system	on site
Connection between households	pipes for warm water, electricity cables
Ownership structure	*House is owned by single private owner*
Organisational overview	
Organisational model	*contractual relationship between landlord and tenant /mutually agreed increase of rental fees to cover interest and repayment of investment loan; energy community for electricity generated by on-site PV*
Tasks of the heat transition community	*communication to present, discuss and agree on the project and on the necessary financial, legal and contractual steps for implementation.*
Respective roles within the heat transition community	
Members	*owner/landlord; project development, explanation to tenants, financing, investment, operation. Tenant: acceptance of project and construction works, agreement on necessary rental fee increase.*
Board of Directors	n.a
Supervisory Board	n.a
Committees	n.a
other	
Financing and Business Models	
Financing the project	*mortgage loan raised by owner of the house*
Business and economic model	*tenancy model; energy community for electricity produced by PV*

Annex II – Best practices of projects and initiatives for district heating supply assessment matrix.

Nah-Wärme-West Berlin

Types of co-operatives	
Nah-Wärme-West Berlin	
This table looks at common features of cooperatives and considers how the international best practice examples chosen by project partners comply with these standard features of cooperatives.	
Organisational structure	
Who is taking initiative? Is it the owner or the user? Who is the initiator	
Initial initiative	
Bottom-up approach	*This was a bottom up approach wherein in 2012, residents of Eichkamp expressed their desire for the first time to reduce their own CO2 emissions and to actively change in favour of the climate crisis. The focus was on reducing the company's own energy consumption and switching to renewable energy.*
Current structure and management	
Bottom-up approach	*Funding for restructuring management, has allowed the initiative to hire Sabine Drewes as refurbishment manager in 2018. Since then, residents and the administration have been working intensively together with Sabine Drewes to establish a cooperative. Although this represents some degree of a move towards professionalisation, this remains a bottom up movement*
Membership model	
Umbrella model *Membership open*	*The membership model is open, anyone is able to pay the entrance fees of the cooperative members which are €1,000 and cooperative shares which are €500. Once these are paid members are invited to the General Assembly and to elect the Board of Directors.*
Supply and demand	
Supply side dominated cooperative	*This is a supply side focused cooperative, the focus is on building its own local heating network.*

ADEV

Types of co-operatives
ADEV
This table looks at common features of cooperatives and considers how the international best practice examples chosen by project partners comply with these standard features of cooperatives.
Organisational structure
Who is taking initiative? Is it the owner or the user? Who is the initiator

Initial initiative	
Bottom-up approach	*ADEV was founded using a bottom-up approach by members of the Swiss anti-nuclear movement.*
Current structure and management	
Top-down approach	*ADEV has become professionalised with 30 staff members maintaining facilities and 21 people managing the cooperative itself.*
Membership model	
Umbrella model *Membership open*	*Membership is open, with 1 part costs 500 francs. A maximum of 60 shares (CHF 30,000) can be purchased by one member. Consequently, there are around 2200 members, of which 250 attend the AGM.*
Supply and demand	
Supply side dominated cooperative	*This is a supply side focused cooperative, the goal when it was founded was to promote energy generation opportunities other than nuclear. Currently ADEV owns 130 plants, including 90 PV systems, 12 small hydropower plants, 2 wind turbines and around 25 district heating networks.*

VITA

Types of co-operatives	
VITA	
This table looks at common features of cooperatives and considers how the international best practice examples chosen by project partners comply with these standard features of cooperatives.	
Organisational structure	
Who is taking initiative? Is it the owner or the user? Who is the initiator	
Initial initiative	
Bottom-up approach	*The Vita Citizens' Energy Cooperative was founded in 2011 with the aim of participating in the buyback of the electricity grid with citizens' capital. The organization as a cooperative offered citizens the opportunity to become a member of the cooperative and to give individual capital to the cooperative in order to ultimately participate in the buyback together as a cooperative. VITA is a citizens' energy cooperative which is one of the 4 shareholders in Energieversorgung Titisee-Neustadt GmbH (evtn), allowing it to take on the role of a local heating network operator, alongside planning its own energy transition and climate protection projects*
Current structure and management	
Top-down approach	*This transitioned to a professionalised top down approach.*
Membership model	

Umbrella model *Membership open*	*The membership model is open, there are currently about 300 members who pay the entrance fee and membership fee, are invited to the General Assembly (about 40 come) and elect the board.*
Supply and demand	
Demand side dominated cooperative	*Although VITA has move towards supply side activities, notably the commissioning of VITA's first PV system in 2021 suppling aprox. 35 households, the primary focus of the cooperative is on the buyback of the electricity grid with citizens' capital, alongside this VITA negotiates for members to receive a discount on local heating.*

SmartCity Baumgarten

Types of co-operatives	
SmartCity Baumgarten	
This table looks at common features of cooperatives and considers how the international best practice examples chosen by project partners comply with these standard features of cooperatives.	
Organisational structure	
Who is taking initiative? Is it the owner or the user? Who is the initiator	
Initial initiative	
Bottom-up approach	*This is a bottom up approach initiated by the developer of the new building and the owners of the surrounding buildings to construct 25 geothermal probes alongside brine heat pumps across three connected buildings.*
Current structure and management	
Bottom-up approach	*The project is primarily managed by Günter Lang, who acts as the caretaker, especially in the planning and start-up phase, and coordinates the entire project.*
Membership model	
Local model *Membership limited to individual stakeholders*	*This is a local membership model where membership is limited to local and individual beneficiary stakeholders.*
Supply and demand	
Supply side dominated cooperative	*This is a supply side dominated cooperative focusing on providing the heat, and electricity for three buildings.*

DuCoop

Types of co-operatives
DuCoop

This table looks at common features of cooperatives and considers how the international best practice examples chosen by project partners comply with these standard features of cooperatives.	
Organisational structure	
Who is taking initiative? Is it the owner or the user? Who is the initiator?	
Initial initiative	
Top-down approach	*This is a top-down approach, DuCoop was founded by project developer Schipperskaai Development, water company Farys and innovator Clean Energy Innovative Projects, as a cooperative of entrepreneurs and employees. Cleanenergyinvest provided capital to the cooperative. All consumers of heat and energy – i.e. all resident households and companies – must join the cooperative. Other companies were added to the project and from 2019 residents are also able to purchase shares in the cooperative and thus share in the proceeds.*
Current structure and management	
Top-down approach	*This remains a top down cooperative, where the Board of Directors currently consists of founders and employees and is elected by the General Assembly of all members. Residents are invited to take an active role in shaping the cooperative. You need to understand the basic features of the technical concept and be involved in its implementation in everyday life.*
Membership model	
Local model *Membership limited to individual stakeholders*	*DuCoop has a more closed membership model approach, it was founded by companies and it is only a more recent development that residents were able to purchase shares. However, for the facilities and the heating network which are owned by DuCoop, all recipients of heat and electricity must join the cooperative.*
Supply and demand	
Supply side dominated cooperative	*This is a supply-side focused cooperative, focused on the construction and operation of a heating network, water treatment and other supply technologies.*

Klimadörfl

Types of co-operatives
Klimadörfl
This table looks at common features of cooperatives and considers how the international best practice examples chosen by project partners comply with these standard features of cooperatives.
Organisational structure
Who is taking initiative? Is it the owner or the user? Who is the initiator?
Initial initiative

Bottom-up approach	*This is a bottom-up approach where the initiative was taken by the residents of Kahlenberger Village who wanted to move away from oil and gas.*
Current structure and management	
Bottom-up approach	*This remains a bottom-up approach, however, there has been some professionalisation with the support of realitylab since 2023.*
Membership model	
Local model *Membership limited to individual stakeholders*	*The membership model takes the form of the KLIMADÖRFL association, which represents the residents of Kahlenberger Village.*
Supply and demand	
Supply side dominated cooperative	*The focus is on creating a supply-side solution, the initial idea of a central local heating network was discarded. Instead, smaller neighbourhood clusters are currently being defined, which will represent different starting points for decarbonisation initiatives.*

Kriegerheimstätte

Types of co-operatives	
Kriegerheimstätte	
This table looks at common features of cooperatives and considers how the international best practice examples chosen by project partners comply with these standard features of cooperatives.	
Organisational structure	
Who is taking initiative? Is it the owner or the user? Who is the initiator?	
Initial initiative	
Bottom-up approach	*The initial founding of this cooperative is closer to embodying the bottom-up approach. In 1921, during the construction of the Kriegerheimstätten garden estate, the cooperative of the same name was founded.*
Current structure and management	

Top-down approach	*The cooperative has shifted towards being more professionalised, in the 1970s, the company built the multi-storey residential complex and renovated all its buildings from its own funds and subsidies from the beginning of the 2000s.* *he management of this cooperative is fairly top down, with the management of the housing estate and residential complex being carried out by the professionalised non-profit housing cooperative Gartenheim. It is also a garden settlement cooperative. (They also refer to each other as "siblings"). All households are members of the Kriegerheimstätten cooperative and have a rental/use agreement with the cooperative. The board of directors and supervisory board of the Kriegerheimstätten are elected by the residents from among the cooperative members. So although residents are able to elect the board the action here is being driven by the owner more than the user. All households are members of the Kriegerheimstätten cooperative and have a rental/use agreement with the cooperative. The board of directors and supervisory board of the Kriegerheimstätten are elected by the residents from among the cooperative members.*
Membership model	
Local model *Membership limited to individual stakeholders*	*The membership is comprised of all members of Kriegerheimstätte who have a rental/use agreement with the cooperative.*
Supply and demand	
Supply side dominated cooperative	*This is a supply side project which aims to supply the housing and residential complexes with renewable thermal energy and electricity. This reflects the top down approach of this cooperative as since tenants cannot be obliged to switch from their current predominantly gas-based heat supply to a renewable heat supply according to the current situation, a careful process is needed to get all tenants on board.*

Iglaseegasse

Types of co-operatives
Iglaseegasse
This table looks at common features of cooperatives and considers how the international best practice examples chosen by project partners comply with these standard features of cooperatives.
Organisational structure
Who is taking initiative? Is it the owner or the user? Who is the initiator?
Initial initiative

Bottom-up approach	*This is approach cannot be clearly defined as top-down or bottom-up but is more of a hybrid approach where owner of the house is instigating the cooperative for the supply of electricity and heat together with the tenants, however the owner themselves is also a resident, thus the boundary between top-down and bottom up is blurred.*
Current structure and management	
Bottom-up approach	*The project development and management of the project conducted by the owner/landlord, making this more of a top-down approach.*
Membership model	
Local model *Membership limited to individual stakeholders*	*The membership is limited to the building owners, tenants and involving neighbours if interested.*
Supply and demand	
Demand side dominated cooperative	*This cooperative does not fit neatly into a supply or demand binary, but instead is somewhere in between, as measures range from thermal insulation and conversion of the heat system and the installation of a photovoltaic system. However, the primary focus appears to be on reducing the demand for electricity and heating.*

Biomasse Wolkersdorf

Types of co-operatives	
Biomasse Wolkersdorf	
This table looks at common features of cooperatives and considers how the international best practice examples chosen by project partners comply with these standard features of cooperatives.	
Organisational structure	
Who is taking initiative? Is it the owner or the user? Who is the initiator?	
Initial initiative	
Bottom-up approach	*In 2002, a group of 14 private individuals from Wolkersdorf near Vienna and farmers with forest ownership founded Biomasse Wolkersdorf GmbH & Co KG. The private individuals have previously collaborated on the development of wind farm projects. Organizationally, the private owners are the founders and shareholders of the GmbH, which is the general partner of the GmbH&CoKG. One of the shareholders is also the managing director of this limited liability company. The "forest farmers" were grouped together as limited partners in the KG.*
Current structure and management	
Top-down approach	*This is a top-down approach with 3 companies owning the district heating system using a similar, but not identical shareholder structure.*

Membership model	
Local model *Membership limited to individual stakeholders*	*This is limited to private companies who provide biomass heating.*
Supply and demand	
Supply side dominated cooperative	*This is focused on the supply-side, providing bio-mass heating suppling the district heating system.*

Hrastnik

Types of co-operatives	
Hrastnik	
This table looks at common features of cooperatives and considers how the international best practice examples chosen by project partners comply with these standard features of cooperatives.	
Organisational structure	
Who is taking initiative? Is it the owner or the user? Who is the initiator?	
Initial initiative	
Top-down approach	*This Zeleni Hrastnik (Green Hrastnik) cooperative, was established in 2022 through a collaborative effort by the Municipality of Hrastnik, the NGO Focus, and local residents. In particular the local municipality provided the roof space of the public school, extending an invitation to residents to participate in the community endeavour.*
Current structure and management	
Top-down approach	*This remains a top-down approach wherein the municipality provided the roof space of the public school, extending an invitation to residents to participate in the community endeavour.*
Membership model	
Umbrella model *Membership open*	*This is an umbrella membership model approach, wherein any private individual or legal person (entity) can become a member of cooperative, but it has to be approved by the board of the cooperative. Private individual has to pay 100 EUR to become a member of cooperative, legal person (entity) 1000 EUR.*
Supply and demand	
Supply side dominated cooperative	*This is a supply side cooperative focused on the production of a solar power plant built on the roof of a local school.*

Annex III – Overview of legal structures

Name	Legal Structure
Nah-Wärme-West Berlin	Cooperative
ADEV	Cooperative
VITA	Cooperative
SmartCity Baumgarten	Association
DuCoop	Cooperative
Klimadörfl	Association
Kriegerheimstätte	Cooperative
Iglaseegasse	Privately owned
Biomasse Wolkersdorf	Privately owned
Hrastnik	Cooperative
Loški Potok	Cooperative
Přeštice	Municipally owned company
Kněžice	Municipally owned company
Holbæk Kommune	Municipality owned company

Annex IV - Survey among owner, managers and residents