HeatCOOP

WP3:

Handbook

Description of the administrative model of a heating cooperative

&

How to develop a business model for a heating cooperative

March 2026

Executive summary

This handbook, developed under the HeatCOOP Project, seeks to help stakeholders carry out transitions to clean energy in apartment buildings by providing a comprehensive guide for establishing, managing and financing heating cooperatives. It serves as both a practical tool and a strategic framework for decarbonising residential heating systems, diving into the technical, financial, and legal perspectives of cooperative ownership models.

The document addresses the three foundational pillars of sustainable heating transition projects: social engagement, technical feasibility, and economic viability. It begins with the motivation for upgrading traditional energy systems in apartment buildings through a focus on emphasising benefits such as cost savings, energy independence, increased comfort, as well as environmental sustainability.

Social and communication aspects explore how community involvement and stakeholder engagement are fundamental to successful cooperative initiatives. This handbook outlines the strategies for engaging diverse stakeholders, including residents, landlords, technical managers, and funding agencies, while guaranteeing affordability and inclusivity for all low-income groups and communities.

Technical aspects present a full and comprehensive overview of heat pump technologies and renewable energy systems that are suitable for apartment buildings and multi-unit settings. Detailed comparisons of air-water, ground-water, and air-air heat pumps are provided, along with suggested supporting technologies such as heat storage systems, photovoltaic (PV) systems, and solar thermal collectors. Case studies and practical considerations, including space, efficiency, and installation processes, help guide technical decision making.

Economic and legal aspects form the groundwork for this handbook, detailing the organizational models for heating cooperatives: administrative, lease, and asset based. The guide outlines how to determine the appropriate scope of operations (core, extended, or full) and how to align this with legal rights and responsibilities over shared infrastructure. It is through case studies that this handbook demonstrates the challenges and solutions associated with financing, ownership, and cooperative governance.

The report discusses national regulatory contexts, in Austria, the Czech Republic, and Slovenia, with an emphasis on how EU directives can be implemented on energy communities. It provides funding pathways through equity and public subsidies, as well as highlighting the importance of matching financial structures to cooperative types.

The handbook is an essential resource for municipalities, citizen groups, housing associations, and policymakers aiming to implement cooperative-led heating transition projects. It combines technical depth with actionable economic and social strategies to make community energy both feasible and inclusive. This document helps stakeholders find the perfect balance between financial pathways, ownership and technical solutions for each and every scenario.

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1 Introduction

Across Europe, apartment buildings and residential neighborhoods struggle to decarbonize their heating systems in response to rising energy costs, climate targets, and aging infrastructure. However, transitioning to clean energy heating systems is especially difficult in multi-ownership contexts, where decision-making is fragmented, financing is complex, and suitable business models are lacking. Many communities, despite strong motivation, lack the tools and frameworks to organize collective action and invest in clean, reliable, and affordable energy systems.

This handbook was developed to address these challenges facing low-income communities. It focuses on the potential of heating cooperatives as a practical, inclusive, and scalable solution for local decarbonization. Heating cooperatives allow residents, building owners, and stakeholders to jointly own and manage renewable heating systems—enabling coordinated investment, shared benefits, and long-term sustainability.

The aims of this handbook are to:

- **Provide a practical framework** for establishing and operating heating cooperatives across different legal and national contexts. This document outlines the administrative processes, member roles, and decision-making mechanisms needed for a cooperative to function effectively.

- **Support informed decision-making** by outlining various cooperative models, legal structures, and financing options which help stakeholders decide which models best suits their situation.

- **Bridge technical and social perspectives** by linking clean heating technologies (e.g., heat pumps, solar collectors) with stakeholder engagement strategies as well as comparing technological limitations, advantages, installation, etc. as a way to approaching stakeholder mapping, affordability, and participatory planning.

- **Demonstrate real-world applicability** through case studies, national insights, and action planning tools that provide examples as to how clean heat system cooperatives can be successful in a diverse range of settings. Action planning templates, stakeholder engagement tools, and legal references are included to help users move from concept to implementation.

- **Empower communities,** especially those with limited resources, to take a leading role in the energy transition by giving them the tools and outlets to succeed. This project provides users with the liberty to take direct control of their energy systems while simultaneously reducing the dependence on fossil fuel-based energy and heating systems. This handbook promotes inclusivity for groups that face clean energy discrepancies as a way to help them partake in sustainable energy transitions and benefit from long-term cost savings and environmental gains.

Ultimately, this handbook is a resource for municipalities, housing associations, citizen groups, and technical experts working toward resilient, low-carbon heating systems that are community-owned and future-proof.

1.1 Why deal with energy upgrades in an apartment building?

Energy management in apartment buildings is no longer just about paying bills for heating and electricity. We are increasingly facing rising energy prices, demands for higher living comfort, and the need to reduce environmental impacts, like heat waves during summertime. Modernizing energy systems therefore brings specific benefits—from cost savings to greater independence from suppliers and an increase in property value.

A well-chosen and managed modernization is not just an investment in technology; it is an investment in the future of your building and its residents. Every apartment building needs heating, hot water, and electricity for household operations and common areas. And with rising temperatures cooling facilities will become necessary. The modernization of these systems aims at the following key goals:

- **Savings:** Reducing operating costs through more efficient technologies and better consumption management. A heat pump utilizes "freely available" heat from the surrounding environment and can provide “free cooling” in the summer season. The initial investment gradually pays off with lower heating bills.
- **Energy Independence:** Utilizing self-generated energy (e.g., through photovoltaics) reduces dependence on external suppliers.
- **Comfort:** A more stable supply of heat, easier control, and better temperature regulation enhances residents' comfort. no coal, gas, or wood chopping. A heat pump operates quietly and without the need for supervision.
- **Environmental Consideration:** Lower greenhouse gas emissions and the use of renewable energy sources contribute to sustainable development.
- **Healthier home:** No exhaust fumes, no dust. Suitable for allergy sufferers and parents of small children.
- **Future-proof:** More and more cities are planning a gradual shift away from gas and central heating. A heat pump ensures your independence.

Why Modernize Heating and Hot Water Systems?

Heating and hot water account for most of the energy consumption in an apartment building. If these systems are outdated or poorly configured, they can be unnecessarily expensive and inefficient. Modernization brings:

- Improved heating efficiency through modern technologies such as heat pumps or solar systems.
- The ability to utilize renewable energy sources, thereby reducing emissions and costs.
- Flexibility in managing heat and water, including the option to store excess energy in accumulation tanks.

A modern system today often means not just one technology, but a smart combination of technologies that adapts to the specific conditions of the building.

This brochure presents an overview of the most used modern technologies that can be utilized independently or in combination:

Heat Pumps	Solar Collectors	Photovoltaics panels	Accumulation
Harness energy from the earth, air, or water for efficient heating	Heat water using solar energy	Convert sunlight into electricity	Store hot water or heat for more efficient energy use
Combination of Technologies			

2 Social aspects and communication

2.1 Introduction

Technical feasibility is not the real problem with heat transition projects. In our projects, it is more likely that financing and user acceptance are the most obstructive factors.

Both problems are strongly related: If a solution only finds support from some of the users, e.g., the owners or tenants, the necessary majorities will not be achieved at all in the worst case. Or the implementation of a planned decarbonization becomes so expensive that it no longer makes economic sense. This makes it all the more important to take the social aspect of decarbonisation projects into account.

In HeatCOOP, we basically see two possible approaches here:

- **Top-down:**
  There is already a cooperative (e.g. a housing cooperative) that wants to implement a specific project.
- **Bottom-up:**
  There is an interested group of people who would like to found a cooperative in order to be able to better advance their project.

In the following, we want to describe goals, roles and methods that can be applied either in one or the other case – at best, even in both cases. It is important to understand at this point that there is no patent remedy – and there cannot be – for how to win over residents and other stakeholders to work on decarbonization.

2.2 Typical Cases and frequent Stakeholders

Board members	They represent the residents and make the important decisions regarding renovation, decarbonization, awarding of services, etc.
Technical property management	Takes care of the technical condition of the buildings and helps with technical problems, damage and concerns of the residents.
Commercial property management	Ensures the business operation, the allocation of apartments and deals with the concerns of the residents
Planners and consultants	Planners are responsible for the renovation process and create the renovation concept, the planning, coordinate the companies and authorities.
Authorities and funding agencies	Will be consulted by the project management or planners regarding the necessary permits and possible funding.

Residents	Play a key role in the success of decarbonisation processes. The speed and quality of implementation depends on their acceptance and motivation.

2.3 Affordability

Making heating cooperatives affordable for low-income groups is essential to ensure equitable access to clean, reliable, and cost-stable energy. These groups are often most vulnerable to energy poverty and rising utility prices, yet have the least control over their heating systems. By designing the model of the heating cooperative to be inclusive and affordable, low-income and vulnerable groups can become part of the community and can benefit the most from the cost savings.

To make heating cooperatives affordable for low-income groups, there are several possible strategies:

Loan from the cooperative to low-income members

- The cooperative invests in the heating system, and the higher-income members pay their share of the investment. The rest is covered by own means of the cooperative / by loans from the high-income members / loan from a bank.
- The low-income members pay back their share each month in small instalments for a defined amount of time. The instalments are usually equally high as the payments for heating before the renovation. The interest rate can be very low, 0-2%.

Community ownership and participation

- Structure cooperatives so residents co-own and share decisions, and even the low-income groups can share their opinions and constraints. This helps to make decisions that are acceptable to everyone.
- Eliminate profit-driven middlemen to reduce long-term costs.
- Offer training in cooperative management and energy use.

Scalable and flexible models

- Modular installation: Start small (e.g., one building or block) and expand.
- Heat-as-a-service: Residents pay monthly for heat, not infrastructure.
- Mobile or prefabricated systems: Use containerized biomass or solar units.
- Shared infrastructure: Combine heating with other services (e.g., laundry, hot water).
- Only install the new heating system in some households: if some of the households do not want the new heating system, there are systems which allow for installations only for some households (e.g., small heat pumps installed in each housing unit).
- Partnerships: Link with existing cooperatives to reduce costs and share knowledge.

Public funding and subsidies

- Use government grants, climate funds, municipal grants, or EU programs to cover upfront costs.
- Get low-interest loans or subsidies for installation in social housing.
- Promote municipal partnerships to share infrastructure and expertise.

2.4 Stakeholder communication goals

Let's start by looking at the goals for a successful Stakeholder communication.

Get to know the individual stakeholders better:

This is often the necessary prerequisite for being able to start communicating properly in the first place. You may discover that there are very different groups (e.g., in a house community) (e.g. the young and the old). Furthermore, it is essential to ascertain the interests of the various stakeholders and to determine the most effective methods of engaging and reaching them.

Obtain information from the stakeholders

In practice, we repeatedly observe that the residents themselves, for example, are the best experts for their flats and houses and often already know many things that the professionals only come across after some time. For example, where there is a draught, where the cold penetrates or even where damp patches have formed. This information is usually very relevant for the planners and is easy to obtain if you involve the residents in good time. This 'social inventory' of a building can be of great help to other stakeholders, such as planners, property managers and consultants, if it is properly prepared and communicated.

Getting stakeholders to participate:

The more intensively the individual stakeholders are involved in the entire process and the better they work together, the better the results can be expected.

Getting the residents to sign a declaration of consent:

Depending on the legal situation in the specific country, it may be necessary for residents to consent to the heating system being replaced. It is important to achieve the highest possible participation in the heating replacement in order to receive more subsidies and ensure a more economical process.

Encourage residents to make a financial contribution (increase rent or contribute own funds):

Depending on the type of project, it may be necessary for residents to contribute financially to decarbonisation. Either directly by contributing their own funds (in the case of owners' associations, building groups) or indirectly via a rent increase (in the case of large housing cooperatives).

Engage stakeholders to participate in the organization (to be elaborated)

- Participation in the existing housing cooperative, e.g., by going to the general meeting or even taking on a function.
- Or to join a newly founded organization

At the beginning of good stakeholder work there is a discussion and ultimately a conscious decision about which goals you want to achieve.

Roles and responsibilities

- Pioneers
  Some people are attracted by the opportunity to take action themselves and help shape a solution rather than buying one off the shelf – these are the pioneers. In our experience, these people tend to be a little older and often have considerable expertise, e.g. in technical, legal or financial matters. It is not uncommon for them to have been or still be entrepreneurs or to have learned from experience that taking the initiative pays off. In heat transition projects, they are often the driving force behind change, as they often take the first step and approach their neighbours.

  Key motives:
  - Environmental and climate awareness
  - Heat transition as a profession and a calling
  - Energy costs
  - Connection to the property
  - Social status
  - Community and social interaction

- Consumers
  Consumers need a detailed offer that they can accept or reject. They examine this offer more or less carefully to weigh up its advantages and disadvantages or its benefits. It is not always just about economic benefits; comfort or exposure to noise, dust and other emissions also play a role. We have grown up as consumers, are addressed as consumers every day by the media – especially through advertising – and are used to acting as consumers: we pay for a product or service if we like the concept. So, when pioneers approach consumers, they need a concrete offer to win them over.

  Key motives:
  - Good environmental and climate awareness
  - Lower energy costs
  - More community and social interaction

- Professionals
  By this we mean people who are professionally involved in buildings, their maintenance, renovation, energy supply, etc., and who bear responsibility for them. This includes, for example, property managers, property owners, directors of housing associations and similar. In principle, every property owner is concerned with his or her building and bears responsibility for it, but it is not his or her profession and often the specialist knowledge associated with the profession is lacking. Like consumers, professionals act primarily according to economic and legal criteria and in a use-oriented manner. However, they have more knowledge about the technical, economic and legal framework conditions and can therefore make more rational decisions. While pioneers are mainly driven by idealistic motives, professionals are guided by figures, facts and paragraphs. However, we repeatedly see that even professionals become pioneers when they recognise synergies between the benefits for their company and the benefits for the general public/climate.

Key motives:
- Good environmental and climate awareness
- Lower energy costs
- Less dependence on raw material suppliers and energy markets
- The heat transition as a profession and a calling
- Connection to the property
- Competition in the rental market
- A good relationship between owners and tenants

- External experts
  This includes external experts, e.g. in energy technology, architecture and construction, social sustainability, financing and subsidies, or law, who have no local ownership in the heat sharing projects. This also includes the project team.

  Key motives:
  - A strong awareness of environmental and climate issues
  - Heat transition as a profession and a calling
  - concept of a service portfolio

It is important that there is a person or a core group who takes on the leadership role and responsibility and provides the necessary resources for a project to develop well. Sometimes it is sufficient to make one's own work available in one's free time (e.g., to organize group meetings or to write an application for a funded project). Sometimes you also need to be able to mobilize money (e.g., to be able to hire planners).

2.5 Methods and tools in stakeholder work

Stakeholder Mapping and Personas

When we analyse stakeholders, it is not out of a scientific interest, but in order to be able to better plan stakeholder work and participatory processes. To this end, it is particularly instructive to record the interests and motives of individual groups, but also to get to know the relationships between the stakeholders better. For example, older people have a low motivation to accept high costs and dirt and dust in the course of a renovation, while younger people are more inclined to do so because they can benefit from the benefits of a renovation for a longer time in their lifetime.

Action planning

The aim is to pour the modules that are suitable for the project into an action plan. The action plans for Wurmsergasse and Johnstraße are role models. We may be able to better present the connection between the concrete action plans for Wurmsergasse and Johnstraße and the modules on the website.

Communication	Events
• Notices • Letters • Website • Questionnaires • WhatsApp • Events • Link to scheduling and other domains	• Get-to-know-you meeting • Information event • Vision-Finding • Forum • Working Groups

The first figure below shows the internal process plan for a renovation and decarbonization project in Vienna. This plan was developed together with the cooperative and the project team and ensures that the social support process is coordinated with the technical construction schedule. A few important steps have been highlighted and marked with numbers in the plan (1 - 4) – these specific examples of communication work with residents can be found below.

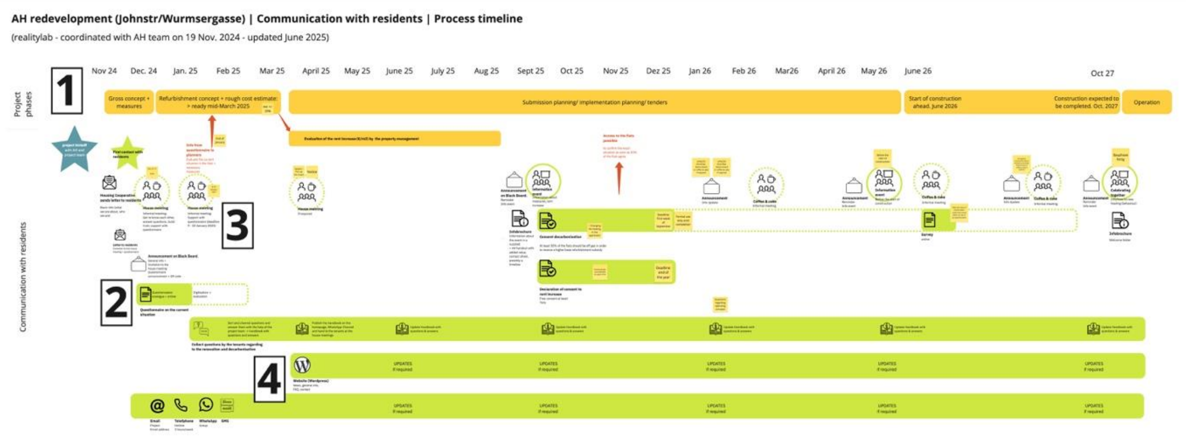


Figure 1 - process timeline

One of the main goals of the social process support is to present complex information in an easily understandable and visually appealing way.

For example, a technical construction schedule designed for planners, architects and construction experts is presented in a simple process plan that shows the most important project phases for residents (see Figure 2).

This is followed by further documents developed for working with residents (the number in brackets refers to the chronological location in the process timeline above – Figure 1).

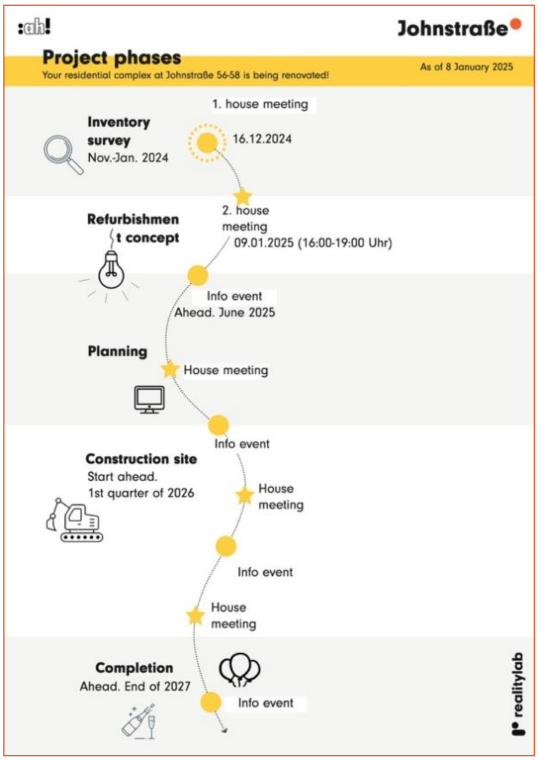
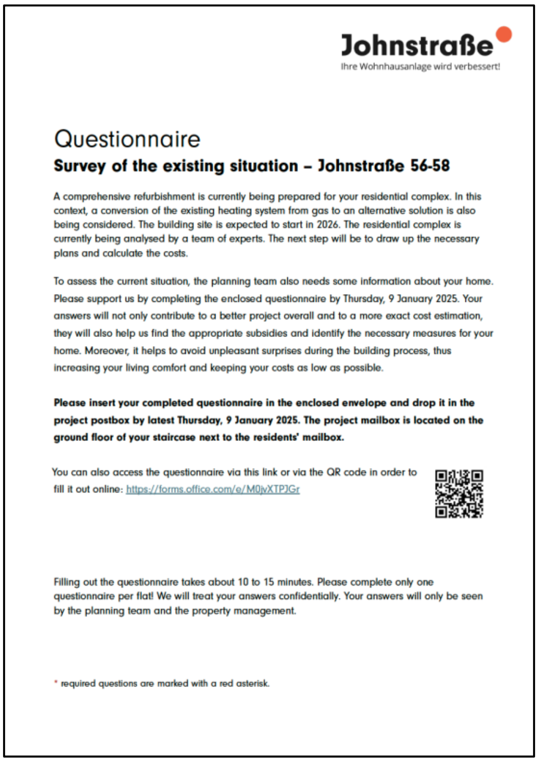


Figure 2 – process plan about the next relevant steps (1)



Johnstraße
Ihre Wohnhausanlage wird verbessert!

Questionnaire

Survey of the existing situation – Johnstraße 56-58

A comprehensive refurbishment is currently being prepared for your residential complex. In this context, a conversion of the existing heating system from gas to an alternative solution is also being considered. The building site is expected to start in 2026. The residential complex is currently being analysed by a team of experts. The next step will be to draw up the necessary plans and calculate the costs.

To assess the current situation, the planning team also needs some information about your home. Please support us by completing the enclosed questionnaire by Thursday, 9 January 2025. Your answers will not only contribute to a better project overall and to a more exact cost estimation, they will also help us find the appropriate subsidies and identify the necessary measures for your home. Moreover, it helps to avoid unpleasant surprises during the building process, thus increasing your living comfort and keeping your costs as low as possible.

Please insert your completed questionnaire in the enclosed envelope and drop it in the project postbox by latest Thursday, 9 January 2025. The project mailbox is located on the ground floor of your staircase next to the residents' mailbox.

You can also access the questionnaire via this link or via the QR code in order to fill it out online: https://forms.office.com/e/M0jvXTPJGr

Filling out the questionnaire takes about 10 to 15 minutes. Please complete only one questionnaire per flat! We will treat your answers confidentially. Your answers will only be seen by the planning team and the property management.

* required questions are marked with a red asterisk.

Figure 3 - questionaire about the existing situation (2)

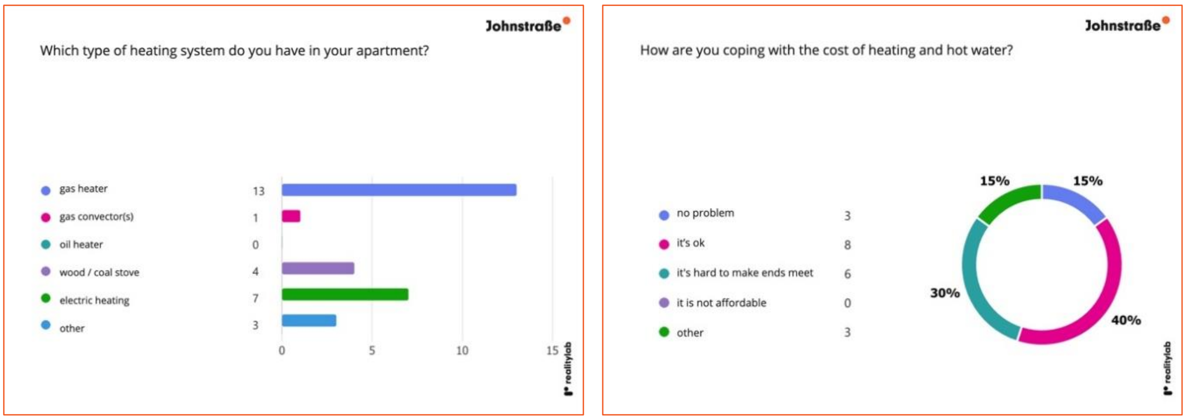


Figure 4 – two examples of evaluated questionnaires – the goal is to gather additional technical and social informations about the buildings from the people who live there – we call it a "social inventory" (2)

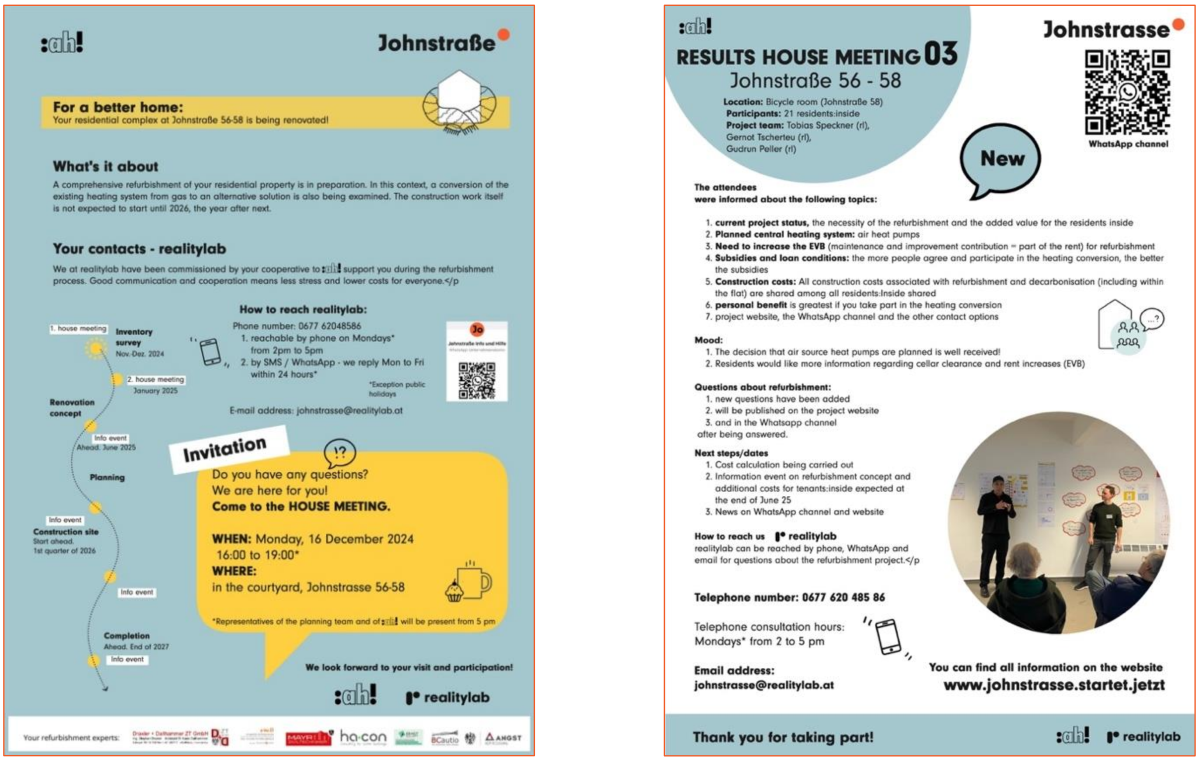


Figure 5 - announcement and prepared results of a house meeting (3) - the intention is to strengthen the house-community, collect and answer existing questions and to explain the project. The results are shared digital via whatsapp and the project homepage and printed on the project board in the common areas of the houses.

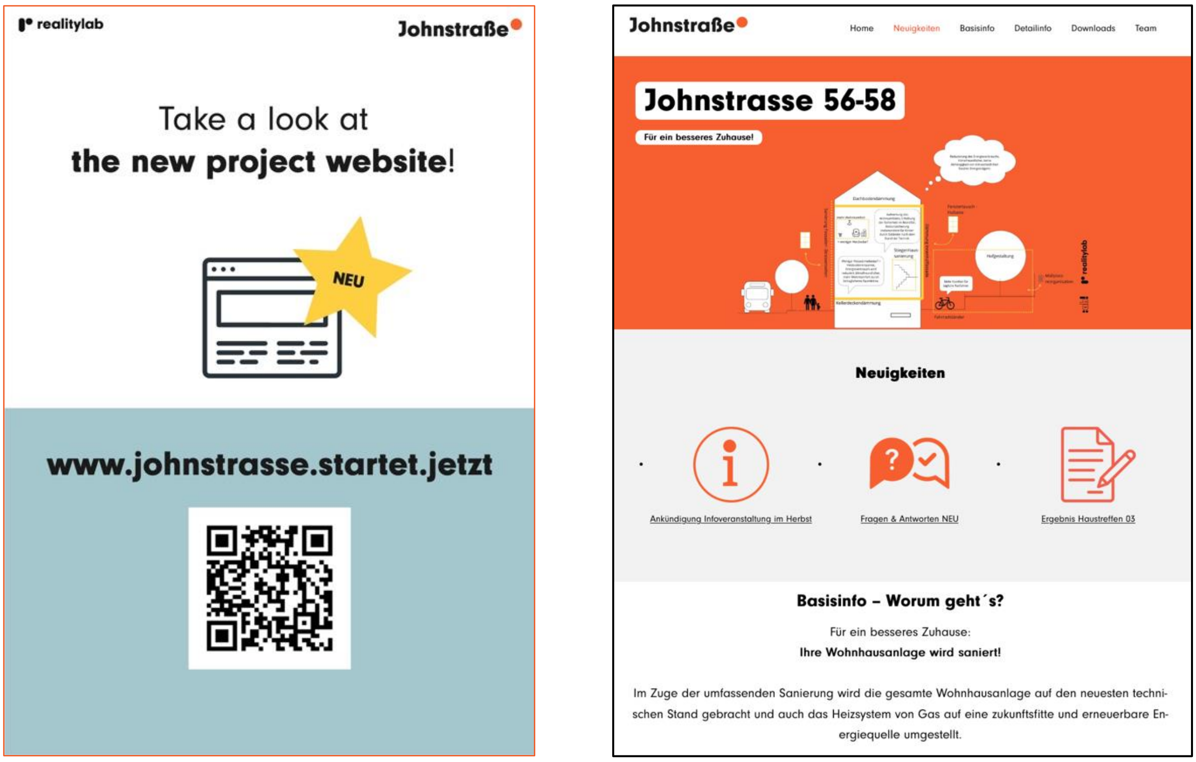


Figure 6 - announcement and landing page of a project website, where the tenants can find information about the project, answers to their frequently asked questions (FAQs), updates and news (4)

Case study: Milín, Czech Republic

Renovation of municipal social residential buildings to passive standard while the tenants lived there. The Milín project shows that with good planning and EU funding, even low-income housing can be renovated affordably and effectively:

- Buildings were in very bad condition, with mould and poor comfort.
- The municipality chose a full renovation: insulation, new heating, and controlled ventilation.
- Because the housing wasn't privatized, it was easier to plan and coordinate.
- The whole renovation was done while the tenant lived there. It was planned in phases and coordinated with the construction companies to make it possible.
- The renovation was coordinated and financed by the municipality. EU funds made the deep renovation possible.
- The communication was done by e-mails, municipal website, information and personal meetings with the tenants.
- Energy use dropped by 80%, improving comfort and allowing future renewable energy use. The renovation brought the benefits and savings to all the tenants of the social housing, including low-income and vulnerable groups.

Figure 6 Renovated residential building for municipal social housing in Milín. Photo: Aleš Brotánek

3 Technical aspects

From a technical point of view, energy sharing can be assessed from three perspectives: according to necessary technical elements, according to technical design (method of heat energy production), and according to the energy network concept and scope.

3.1 Technical elements:

- Energy source – produces energy and is located within or connected to the community, preferably renewable or low-emission energy sources or their combination.
- Distribution and sharing system - external (public or local private) or internal (within the building) distribution network, rules for energy allocation and consumption accounting.
- Consumption measurement – installation of smart meters - calorimeters measure heat consumption continuously (whereas electricity meters are typically non-continuous meters with annual readings; for measurement within energy communities, it is necessary to upgrade to a smart meter with continuous measurement at 15-minute intervals and remote reading).
- Control and monitoring system – with possibility of smart metering, weather forecasting, adaptive learning and system optimization and flexibility in demand-response.

3.2 Energy network concept

When dealing with a single building or small complex, the main issue is choosing the right and effective heat source. Connecting buildings to the heat source is then usually a simpler matter. However, if the scope is larger—multiple buildings or entire neighbourhoods or part of the city (and it can be the case) —and, in addition, there is a combination of different types of buildings (with different operations at different times), it is also necessary to address the concept and scope of the entire distribution network. Several cases can be considered here:

- Local residential level – local energy source (house boiler room, block boiler room or housing estate energy source) with distribution to multiple delivery points in the building or area, local heat loops, usually 3rd generation of energy heating network (central energy source, pre-insulated piping, temperatures up to 100 degrees Celsius).
- Local combined level – district heating within the energy community with the combination of residential and non-residential buildings, utilization of waste heat, usually 3rd generation.
- Heating networks of 4th generation – central energy source, the temperature of the medium (hot water) is between 50 and 70 degrees Celsius resulting in lower network energy losses, energy flow towards consumers, possibility of better integration of (low temperature) renewable sources and waste heat, integration of seasonal energy accumulation, better regulation and flexibility of the system, combination of categories of consumers[1].

[1] GRUNDFOS. 4th Generation – The Future of District Heating and Cooling. Available online at: https://www.grundfos.com/cz/learn/ecademy/all-courses/grundfos-district-energy/the-4th-generation-the-future-of-district-energy (accessed 30 Oct 2025)

- Heating networks of 5th generation – also " cold district heating", heat at a temperature close to the ambient temperature (around 15 to 25 degrees Celsius) which reduces energy losses, closed circuit where heat can flow in both directions, utilization of reversible heat pumps as heat exchangers between the network and consumers in every building (the building draws heat from the network (heating) or, conversely, supplies heat to the network (cooling) as needed), energy accumulation, combination of different renewable and low-emission energy sources, flexibility and possibility to participate in grid balance services (use of excess energy for hot water heating)[2].

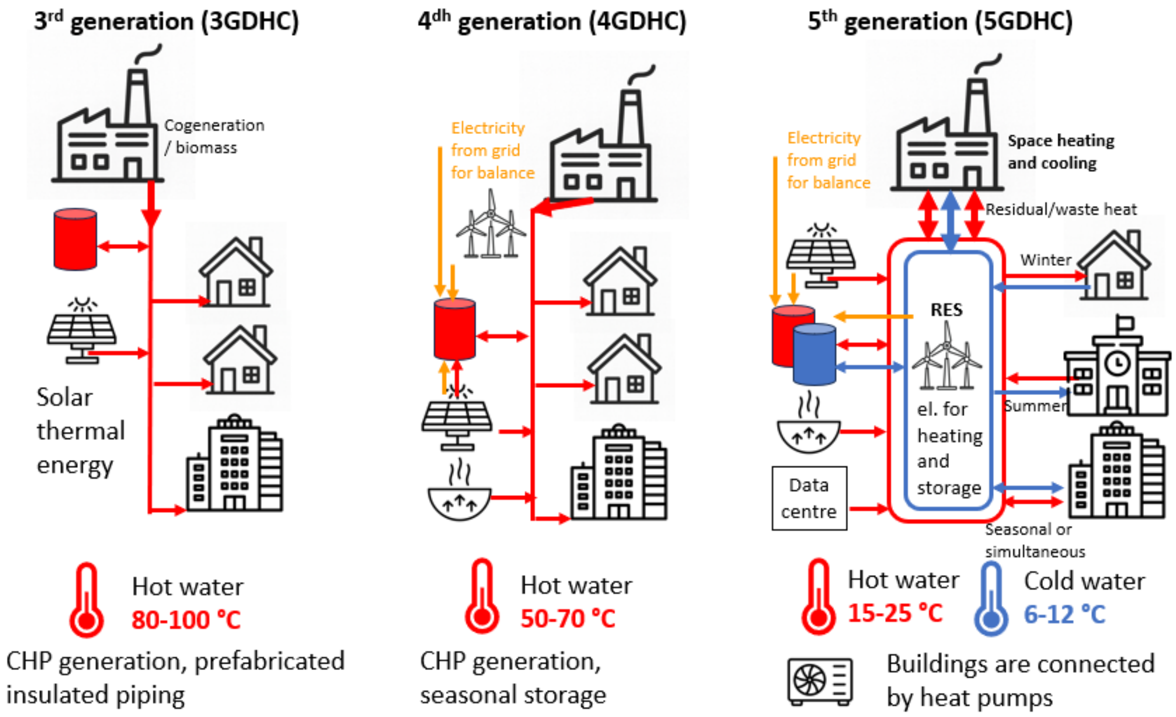


Figure X 7 - Schematic comparison of heating networks generations (source: authors)

3.3 Encyclopedic basics to learn the principles

What is a heat pump?

A heat pump is a device that can transfer heat from one place to another – for example, from the air, ground, or water to your apartment. And it can do this even when it's cold outside!

> Interesting fact: A heat pump is one of the few devices that can deliver more energy than it consumes itself – because part of the energy is taken directly from nature.

[2] WIKIPEDIA CONTRIBUTORS. Cold district heating. Wikipedia. 2024. Available online at: https://en.wikipedia.org/wiki/Cold_district_heating (accessed 30 Oct 2025)

It may sound like magic, but it’s pure physics. Thanks to smart technology and a bit of electricity, a heat pump can heat an apartment building with surprising efficiency – for every 1 kWh of electricity, it can provide 3 to 5 kWh of heat.

Principle of operation – how does it all work?

Heat pumps operate on a simple idea: to extract heat from a place where there is less of it (for example, from the outdoor air in winter) and deliver it to where we want more of it (e.g., to your apartment). This is made possible by a substance called refrigerant – a special liquid that can effectively absorb and transfer heat.

To understand this, it's helpful to clarify two concepts:

- Heat – this is a type of energy that bodies transfer when they have different temperatures. A warmer body transfers heat to a cooler one.
- Temperature – this is essentially an indicator of how much the particles in a given substance are "moving." Higher temperature = more energy.

According to the second law of thermodynamics, heat cannot spontaneously flow from a cooler body to a warmer one. However, a heat pump "reverses" this direction using supplied energy (usually electricity) – and that’s the whole trick.

How does a heat pump transfer heat?

A heat pump utilizes a closed cycle with four main phases:

1	Evaporation	The refrigerant absorbs heat from the surroundings (air, ground, water). These heats it up and changes it into a gas.
2	Compression	The gaseous refrigerant is compressed by a compressor, which increases its temperature. (Similar to when you pump air into a tire and the hose gets warm.)
3	Condensation	The hot refrigerant passes through a heat exchanger, where it transfers heat to the heating water, which then travels to the radiators or underfloor heating. The refrigerant condenses back into a liquid.
4	Expansion	The liquid refrigerant cools down and returns to the beginning of the cycle under low pressure.

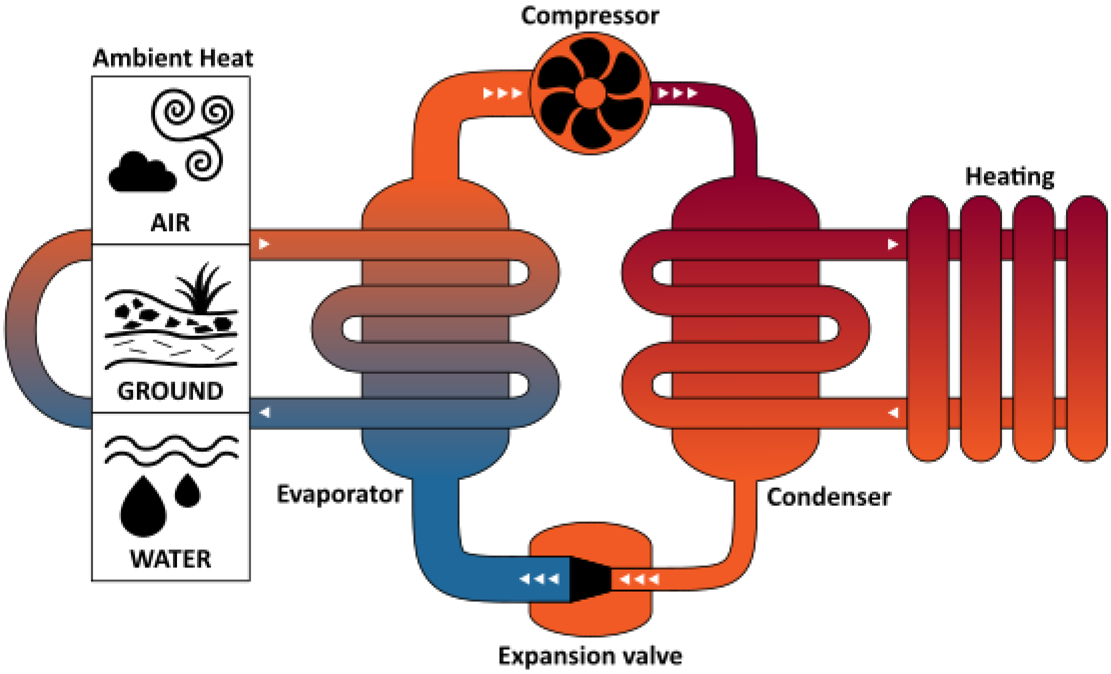


Figure 8 – Principle of heat pump[3]

Main components of a heat pump:

Compressor	the "heart" of the entire system. It compresses the refrigerant, thereby supplying it with energy.
Evaporator	this is where the refrigerant absorbs heat from the surrounding environment.
Condenser	the place where heat is transferred to the heating system.
Expansion valve	it regulates the pressure and temperature of the refrigerant for the next cycle.

[3] https://www.ceskestavby.cz/clanky-foto/princip-tepelneho-cerpadla-jak-funguje-a-proc-muze-mit-vice-nez-100-ucinnost-32141.html?photo=2

Interesting facts that may surprise you:

- A heat pump works even in freezing temperatures! Modern units can operate at temperatures as low as -20 °C.
- In the summer, it can cool. By reversing the cycle, the pump can also be used as an air conditioner.
- Ground-source pumps "harvest" heat from the depths of the earth – where the temperature remains stable at around 8–12 °C throughout the year.
- Air-source pumps are currently the most common – they can be installed without complex groundwork and are suitable for older apartment buildings.
- The state offers subsidies. Part of the purchase price may be covered by subsidy programmes

Efficiency and Coefficient of Performance (COP)

One of the biggest advantages of a heat pump is its high energy efficiency. This is expressed using the coefficient of performance (COP – Coefficient of Performance).

What does this mean in practice?

If a heat pump has a COP of 4, it means that it produces 4 kWh of heat from 1 kWh of electricity. In other words, 75% of the heat is obtained for free from the surrounding environment (from the air, ground, or water), while the rest is electrical energy for operation.

Typical COP values:

Air–water	3–4
Ground–water	4–5
Water–water	up to 6 (under ideal conditions)

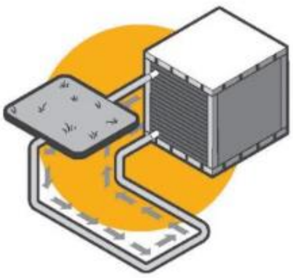
3.4 Types of Heat Pumps and their Use in Apartment Buildings[4]

All types of pumps operate on the same principle; they differ only in where they extract heat from:

Air – water

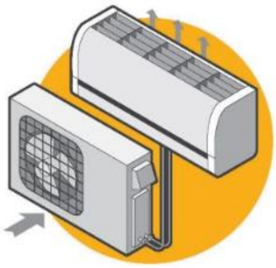
The most popular and simplest type. It extracts heat from the outdoor air and transfers it to water, which then heats the house. Ideal for most apartment buildings, especially where there is no space or possibility for drilling. Advantages: Low initial costs, simple installation, no building permit required. Disadvantages: Lower efficiency in severe frost (COP decreases).

Ground – water



It extracts heat from the ground using boreholes or a flat collector. Stable performance throughout the year. Suitable for new buildings or renovations where there is access to land for drilling. Advantages: High efficiency, quiet operation, stable temperatures even in winter. Disadvantages: Higher investment, need for space, permits for drilling.

Air – air



Works like an air conditioner "in reverse" – it extracts heat from the outdoor air and blows warm air inside. More suitable for smaller buildings or individual apartments, not for central heating of an entire apartment building. Advantages: Quick installation, cooling function in summer. Disadvantages: Does not heat water, unsuitable for radiators.

[4] https://www.sciencedirect.com/science/article/abs/pii/S0378778813007858

3.5 Heat pump: Air – water

It extracts heat from the outdoor air and transfers it to the water in the building's heating system. Suitable for both heating and water heating.

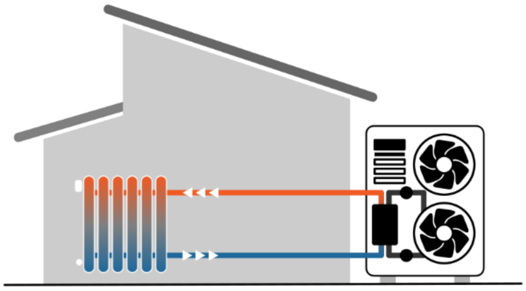
Use in Apartment Buildings:

The most common choice when renovating heating systems in apartment buildings. Possible central installation for the entire building or separate units for sections.

Two solution options:

Monoblock type

consists of either just an outdoor unit or just an indoor unit, or in a split design, where the refrigerant circuit is located only in the outdoor unit, is closed, and is pre-filled with refrigerant from the factory. A pipe carrying heating water leads to the indoor unit.



Simpler Installation: Since the refrigerant circuit is pre-assembled and sealed in the outdoor unit, installation is generally easier and quicker.

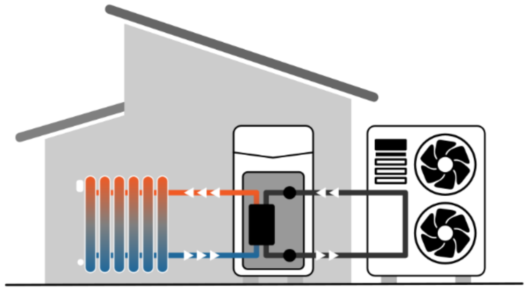
Lower Risk of Refrigerant Leaks: With the refrigerant contained entirely in the outdoor unit, there is less risk of leaks during installation and operation.

Less Maintenance Required: Fewer components and connections mean potentially lower maintenance needs over time.

Cost-Effective: Typically, Monoblock systems can be less expensive to install due to their simpler design.

Split type

consists of an outdoor and an indoor unit, which are connected by refrigerant piping. The installation is more complex than that of monoblock heat pumps, as the refrigerant circuit is created by connecting the outdoor and indoor units using refrigerant piping. This circuit is then filled with refrigerant.



Higher Efficiency at Low Temperatures: Split systems can be more efficient in colder climates, as they can be designed to optimize performance in low temperatures.

Flexible Installation Options: The separation of the indoor and outdoor units allows for more flexible placement, which can be beneficial in certain building designs.

Quieter Indoor Operation: Since the compressor is located in the outdoor unit, the indoor unit can operate more quietly, making it suitable for residential settings.

Better for Larger Systems: Split systems can be scaled up more easily for larger buildings or complex heating needs.

Impact on Residents' Lives:

Short-term during installation.

Outdoor units may produce noise (approximately 40–55 dB) – important to place them away from bedroom windows.

Efficiency:

COP = 3 to 4 (depending on outdoor temperature).

Higher electricity consumption during frost (approximately below -10 °C may require an additional electric boiler).

Space Requirements:

It is necessary to appropriately size the distribution systems and hot water tank.

Indoor unit (hot water tank and possibly a storage tank): 1–2 m².

Outdoor unit: similar in size to an outdoor air conditioning unit.

Compatibility:

Works with underfloor heating and low-temperature radiators.

Possibility to connect to solar panels, photovoltaic systems, or a hybrid system with a gas boiler.

Limitations Throughout the Year:

Significantly dependent on outdoor temperature – performance may decrease in winter.

Higher noise levels during unit defrosting.

3.6 Heat Pump: Ground - water

It extracts heat from the ground using a flat collector or deep borehole. It transfers this heat to a water heating system.

Installation options:

Horizontal collector (Flat Collectors)	Vertical collector (Boreholes)	Water collector
Ground looped collector Ground horizontal collector		

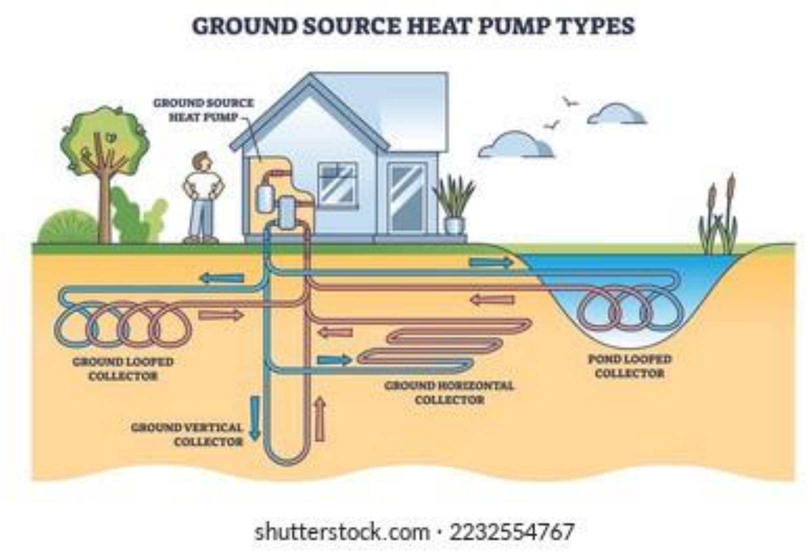


Figure 9 - [5]

Shallow piping in the ground, requiring a large area (approximately 2× larger than the heated area).	Depth of 60–120 m, requiring less space but necessitating hydrogeological surveys and permits.	

Use in Apartment Buildings:

Excellent for new constructions or houses with access to land.

[5] https://duckduckgo.com/?q=heat+pump+ground-water&atb=v451-1&ia=images&iax=images&iai=https%3A%2F%2Fwww.shutterstock.com%2Fimage-vector%2Fground-source-heat-pump-types-260nw-2232554767.jpg

Very suitable for low-energy and passive apartment buildings.

Impact on Residents' Lives:

More significant only during drilling or laying of collectors.

Quiet operation, with no outdoor unit = no noise.

Efficiency:

COP = 4 to 5 (high year-round, as the ground has a stable temperature).

Performance is stable even in winter – the most efficient type of heat pump.

Space Requirements:

Indoor technology similar to air-water systems (1–2 m^2).

Need for outdoor space for collectors or a location for a borehole (e.g., in front of the house, yard).

Compatibility:

Ideal for underfloor heating or low-temperature radiators.

Can be easily combined with photovoltaics or storage systems.

Limitations Throughout the Year:

Performance is very stable.

Higher initial costs and more complex approvals.

3.7 Air-Air Heat Pump

It extracts heat from the outdoor air and transfers it to the indoor air (blowing it into the room). It is not connected to a water circuit.

Use in Apartment Buildings:

Suitable for individual apartments, not for central heating.

An alternative to direct electric heaters in apartments or supplementary heating.

Installation:

An outdoor unit and one or more indoor units (similar to air conditioning).

Quick and straightforward installation, often without significant construction work.

Impact on Residents' Lives:

Short-term, units can be installed within one day.

Indoor units produce sound (25–40 dB) and blow air – not everyone may find this suitable.

Efficiency:

COP = 3–4.5 (depending on outdoor temperature).

Most efficient at mild outdoor temperatures (spring/autumn).

Space Requirements:

Each apartment needs its own indoor unit (mounted on the wall).

The outdoor unit can be placed on a balcony, roof, or facade.

Compatibility:

Does not heat water!

Operates independently – cannot be connected to a heating system.

Limitations Throughout the Year:

Limited performance during frost.

Not suitable as the sole heat source in cold areas.

3.8 The Importance of Heat Pumps in Modern Heating and Cooling

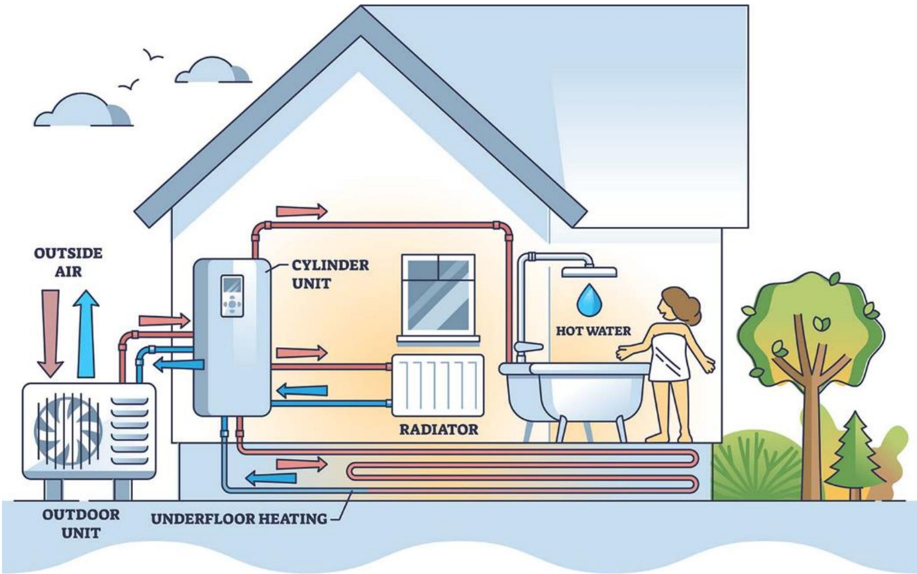


Figure 10 -[6]

Heating

Heat pumps can serve as the primary heat source for heating residential spaces. They can be connected to radiators, underfloor heating, or other heating systems. Due to their high efficiency, heat pumps can reduce heating costs compared to traditional systems such as gas or electric boilers.

Heat pumps are ideal for underfloor heating, which requires lower water temperatures than traditional radiators. This increases the overall efficiency of the system.

Cooling

Many heat pumps have the ability to function as air conditioning units. In the summer, they can remove heat from the interior to the outside, thereby cooling the apartment. Heat pumps can be an efficient alternative to traditional air conditioning units, as they operate on the same principle as heating.

[6] https://stock.adobe.com/cz/images/air-source-heat-pump-system-with-floor-heating-and-radiators-outline-diagram-labeled-educational-scheme-with-technical-home-drawing-and-climate-model-explanation-vector-illustration-ac-fan-solution/550336073

Water Heating

Heat pumps can be used to heat water for household use, including water for showers, dishwashing, and other needs.

3.9 Bivalent Water Heating

Bivalent water heating is a system that combines two different technologies for heating water, typically heat pumps and another heat source, such as an electric heater or gas boiler. This system is designed to optimize the efficiency and reliability of water heating, especially in areas with variable climatic conditions.

Primary Heat Source: The heat pump functions as the primary heat source for heating water. It utilizes renewable energy sources (e.g., air, ground, or water) to efficiently heat water. Heat pumps have high efficiency, meaning they can produce more heat than the energy they consume.

Supplementary Heat Source: The second heat source (e.g., electric heater or gas boiler) serves as a backup or supplementary system. This source is activated in cases where the heat pump cannot provide the required water temperature, such as during extremely low outdoor temperatures when the efficiency of the heat pump is reduced.

3.10 Cascade Heat Pump Systems

(Cascade systems / Multiplex cascade heat pumps)

Cascade systems represent a powerful, flexible, and safe solution for larger apartment buildings. Their main advantage is adaptability to current heating and water needs, but they require careful design and sufficient space. For homes with irregular heat demand or high hot water requirements, they can be an ideal choice.

What is a cascade system?

A cascade system is a solution in which multiple heat pumps are connected to a single building, working together to provide both heating and hot water. These pumps can operate either independently or simultaneously, depending on current needs.

For example:

In mild weather, only one pump operates.

When temperatures drop, a second and possibly a third pump is activated to efficiently heat the space.

(Another variant is that one pump heats the water while the other provides heating.)

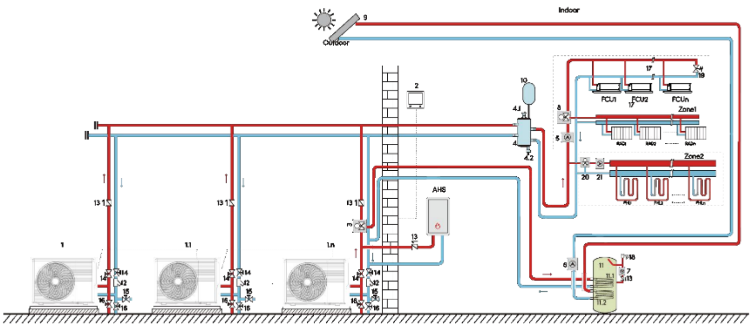


Figure 11 - [7]

Why is this advantageous for apartment buildings?

Apartment buildings have higher and variable demands for heat and hot water. A cascade system can better distribute this demand and manage it flexibly. Additionally, it can be easily connected to existing distribution systems without the need to reconstruct the entire heating system.

Advantages of Cascade Systems

Higher output temperatures – ideal for heating hot water.

Operational flexibility – pumps turn on as needed, saving energy.

Easy modernization – suitable as a replacement for a boiler, without interfering with the distribution systems.

Backup operation – if one pump fails, the others can continue to operate.

Better weather-based control – systems can heat more gently or strongly depending on the outdoor temperature.

Disadvantages and Limitations

Lower efficiency at full capacity – when all pumps are operating, overall efficiency decreases.

Higher electricity consumption – a stronger electrical connection is required.

Greater space requirements – the system takes up more space than a single pump.

Higher service and installation costs – more complex equipment = more expensive operation.

Economic limitations – with too many units, the return-on-investment decreases.

Not always the best choice – sometimes it may be more advantageous to use one powerful pump.

[7] https://www.shenlingglobal.com/blog/what-is-air-source-heat-pump-cascade-systems/

3.11 Environmental impact / benchmark

Why should this matter to you?

Every home today consumes energy for heating and hot water. Most apartment buildings still use natural gas, coal, or electricity from fossil sources – this has a significant impact on the environment as well as household bills. Heat pumps provide a cleaner, more economical, and long-term sustainable alternative.

Reduction of CO_2 Emissions

A heat pump transfers heat from the surrounding environment (air, ground, or water) while using only a small amount of electrical energy.

- It consumes up to 60–80% less primary energy than a conventional gas boiler.
- It reduces CO_2 emissions by 50–70%, even if the electricity comes from the regular grid.
- When using green electricity (e.g., from photovoltaic systems), emissions approach zero.

Example:

By replacing a gas boiler with a heat pump in a medium-sized apartment building, annual emissions can be reduced by 20–40 tons of CO_2 – equivalent to the emissions from operating 10 personal cars per year.[8], [9]

Energy Efficiency and Electricity

Savings Heat pumps achieve a coefficient of performance (COP) between 2.5 and 5. This means that from 1 kWh of electricity, they can obtain up to 5 kWh of heat. This is much more than electric heaters or older gas boilers.

Lower electricity consumption for heating → reduced demands on the energy grid.

Possibility of combining with photovoltaics – part of the electricity can be generated by the house itself.

Better Air Quality in Cities Heat pumps do not emit exhaust gases or nitrogen oxides (NO_x), which worsen air quality and harm health.

The transition to pumps in urban areas with local heating (e.g., gas boiler plants) can significantly reduce smog and health risks.

\+ *They also help reduce noise, as outdoor units are quieter than combustion sources or district heating exchange stations.*

[8] https://publications.jrc.ec.europa.eu/repository/

[9] https://www.agora-energiewende.de

Support for Energy Independence

Heat pumps reduce dependence on imported fossil fuels (especially natural gas). They can be part of a decentralized, more stable, and sustainable energy system.

Combining with batteries, photovoltaics, or smart management allows households to be partially energy self-sufficient.

+ *They contribute to reducing peaks in energy demand when managed as part of energy flexibility.*

3.12 The Future of Heat Pumps: Higher Efficiency and Eco-Friendly Refrigerants

Heat pumps represent a key technology for a sustainable future in heating and cooling. Thanks to continuous development, modern systems achieve higher efficiency and utilize eco-friendly refrigerants, providing benefits for both the environment and users.

COP and SCOP: Increasing Efficiency

COP (Coefficient of Performance) indicates the ratio between the heat produced and the electrical energy consumed. Modern heat pumps typically achieve COP values between 3.0 and 5.0, meaning that for every unit of electricity consumed, they produce 3 to 5 units of heat.

SCOP (Seasonal Coefficient of Performance) takes into account the efficiency of the heat pump over the entire year, including various climatic conditions. SCOP values for modern devices range from 4.0 to 5.1, providing a more realistic picture of the system's year-round efficiency.

Eco-Friendly Refrigerants: R290 and CO_2

In response to European legislation and environmental requirements, heat pump manufacturers are focusing on using refrigerants with low global warming potential (GWP).

R290 (Propane):

GWP = 3 – significantly lower than traditional refrigerants, which have a GWP around 2000.

High energy efficiency due to excellent thermodynamic properties.

Suitable for systems with a water outlet temperature of up to 75 °C, allowing for efficient hot water heating.

CO_2 (R744):

GWP = 1 – the lowest possible value, making it one of the most eco-friendly refrigerants.

High safety and efficiency, especially for systems requiring high water outlet temperatures.

Refrigerant	GWP	Water Outcome Temperature	Energy Efficiency	Note
R290	3	Up to 75 °C	High	*Natural refrigerant with low GWP*
R410A	~2088	Up to 60 °C	Medium	*Higher GWP, gradually being replaced*
R32	675	Up to 65 °C	High	*Lower GWP than R410A, still synthetic*

3.13 Trends in Renewable Energy Sources

Current developments in renewable energy sources are bringing new opportunities for efficient and eco-friendly heating of households. Heat pumps, especially in conjunction with photovoltaic systems and smart consumption management, represent key elements of this transformation.

Smart Consumption Management

Modern heat pumps are often integrated into smart home systems, allowing for the optimization of operation based on weather forecasts, electricity prices, and other parameters. This technology enables, for example, heating water at times when cheaper or self-generated electricity is available, thereby reducing energy costs and increasing the energy efficiency of the household.

Combination with Photovoltaics

The combination of a heat pump with a photovoltaic system represents an effective way to maximize the use of renewable energy. Photovoltaics generate electricity that the heat pump uses for its operation, leading to significant savings on energy costs. With this combination, energy savings of up to 70% can be achieved, along with a reduction in CO_2 emissions of up to 8 tons per year.

Energy Communities and Energy Sharing

Another trend is local energy sharing within energy communities or multi-unit residential buildings. This model allows for the efficient use of surplus energy generated from renewable sources among community members, contributing to energy self-sufficiency and reducing dependence on central energy suppliers.

The integration of these technologies and approaches represents a pathway to more sustainable and efficient energy use in households, aligning with global goals for emission reduction and the transition to renewable energy sources.

3.14 Storage System

The storage system balances the difference between the output of the heat pump and the heat loss of the house at any given moment. The heat pump typically has a slightly higher output than the heat loss for most of the heating season, and this surplus thermal output is stored in water within the accumulation tank. When a certain level of charge is reached, the heat pump shuts off, and the house is heated solely by the heat from the accumulation tank until it is depleted. After that, the heat pump turns back on. This significantly improves the operating conditions of the heat pump.

Heat Storage Tanks (Accumulation Tanks)

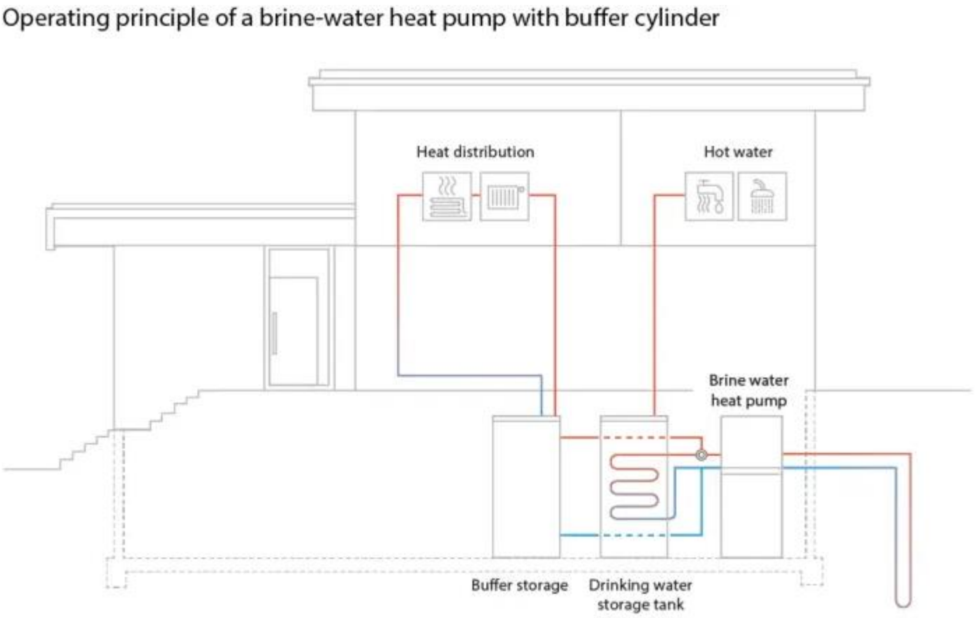


Figure 12 - [10]

An insulated tank (usually 300–1000 litters) filled with water that stores heat from the heat pump and allows for its later use for heating or domestic hot water.

Advantages:

Optimizes Heat Pump Operation: The pump runs in longer cycles, which reduces wear and increases efficiency.

Flexibility: You can store heat during low tariff periods (e.g., off-peak/night electricity) or when there is a surplus from photovoltaic systems.

Combination of Multiple Heat Sources: For example, a boiler + heat pump + solar heating.

Types of Storage Tanks:

Accumulation Tank (without Domestic Hot Water): Designed for heating (e.g., underfloor heating), with no hygiene risks.

[10] https://www.buderus.com/cz/cs/informace/produkty-a-sluzby/clanky/ulozeni-tepelneho-cerpadla/

Combined Tanks (e.g., tank-in-tank): An inner stainless-steel liner for domestic hot water, with an outer volume for heating water.

Layered Tanks: Better maintenance of different temperature zones (hot water at the top, cooler water at the bottom).

3.15 Regeneration of Boreholes in Ground-Source Heat Pumps

Ground-source heat pumps utilize the stable temperatures of the underground for efficient heating and cooling of buildings. However, with long-term operation, the surrounding boreholes can cool down, reducing their efficiency. Borehole regeneration is a process that restores the thermal balance in the underground and ensures the long-term stability of the system.

What is Borehole Regeneration?

Borehole regeneration[11] involves supplying heat back into the underground to compensate for the cooling caused by heat extraction during the heating season. This process is crucial for maintaining system efficiency and preventing a long-term drop in temperature around the boreholes.

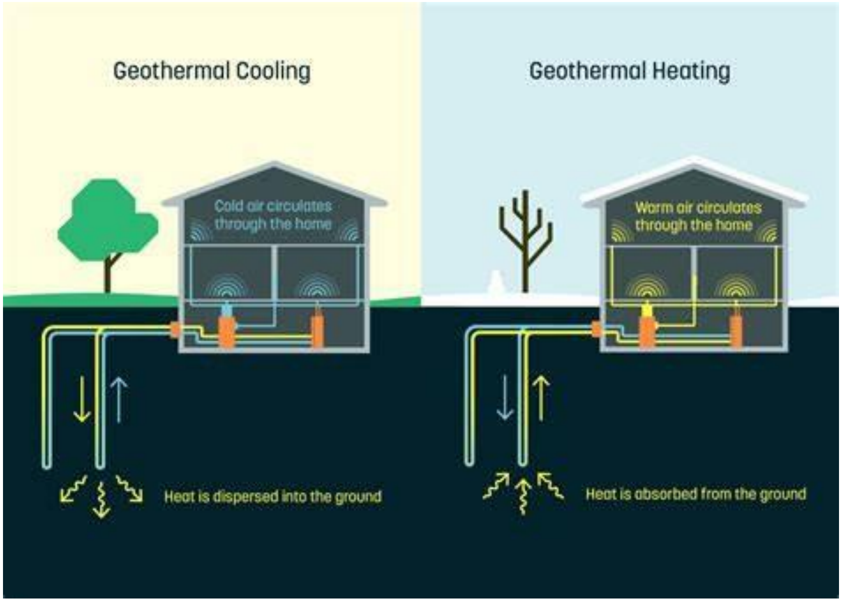


Figure 13 – Borehole regeneration scheme

Methods of Regeneration

Passive Regeneration (Cooling):

During the summer months, the natural heat flow from the building to the underground can be utilized. In passive cooling, heat from the interior is transferred to the boreholes, "recharging" the underground with heat. This method is energy-efficient and enhances system performance.

[11] https://www.sciencedirect.com/science/article/pii/S1876610217334288

Active Regeneration:

Excess heat, such as that from photovoltaic systems, industrial processes, or waste heat, is deliberately injected into the boreholes. This increases the underground temperature and improves the performance of the heat pump during winter.

Benefits of Regeneration

- Increased System Efficiency: Regeneration ensures a stable temperature around the boreholes, leading to a higher coefficient of performance (COP) and lower operating costs. [12]
- Long-Term Stability: Regular regeneration prevents a decline in system performance and extends its lifespan.
- Bidirectional Use of Boreholes: In winter, the boreholes serve as a heat source, while in summer, they act as a cooler, allowing for year-round utilization of the system.

3.16 Photovoltaics (PV) in Apartment Buildings

The installation of solar panels on the roof of an apartment building represents a key step towards energy self-sufficiency, lower costs, and sustainable operation. PV systems are becoming a standard component of the modernization of apartment buildings, both in new constructions and during renovations.

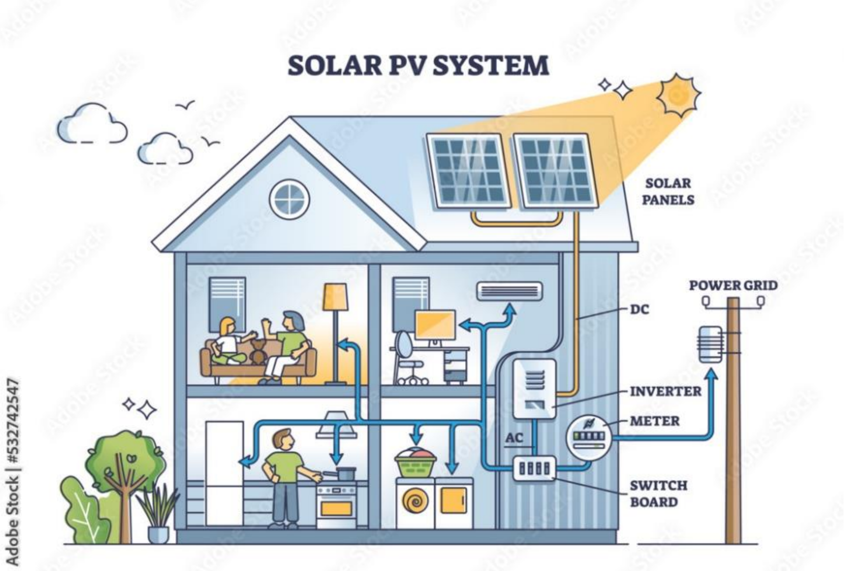


Figure 14 – Solar PV system scheme[13]

Reduction of Energy Costs

[12] https://link.springer.com/chapter/10.1007/978-3-031-46877-3_29

[13] https://stock.adobe.com/cz/images/solar-pv-system-explanation-for-house-electricity-production-outline-diagram-labeled-educational-scheme-with-detailed-photovoltaic-energy-usage-and-technological-power-graphic-vector-illustration/532742547

Photovoltaic panels enable the generation of electricity directly at the point of consumption. In apartment buildings, this energy is typically used for:

- Common areas – lighting of hallways, basements, attics, operation of elevators, or security systems,
- Technological infrastructure of the building – powering the boiler room, pumps, heat recovery systems, or charging stations for electric vehicles.

As a result, the costs of electricity from the common repair fund decrease, which positively impacts the monthly payments of residents. In the case of participation in an energy community, electricity can also be fairly distributed among individual apartments.

Environmental Benefits[14], [15]

PV systems generate electricity without emitting CO_2, SO_2, NO_x, and other pollutants. Unlike electricity generation from coal or gas, solar energy has a zero-emission factor during production, which significantly contributes to reducing the carbon footprint of the building.

- Local production also minimizes energy transmission losses and reduces pressure on the grid.
- The transition to renewable sources is a fundamental contribution to achieving both European and Czech goals for climate neutrality.

Long-Term Investment

Modern photovoltaic panels have a lifespan of 25–30 years, while inverters typically last 10–15 years. The return on investment for PV systems in apartment buildings ranges from 7 to 12 years, depending on:

- System size,
- Feed-in or market price of electricity,
- Method of use (self-consumption vs. sale of surpluses),
- Available subsidies.

Increase in Property Value[16]

The installation of PV systems also has an economic impact on the value of the building:

Higher energy class = more attractive property on the market.

Lower operating costs = better position for sale or rental.

A modernized building with PV systems presents itself as an active, sustainable, and progressive living space.

[14] https://www.iea.org/energy-system/renewables/solar-pv

[15] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en

[16] https://www.bpie.eu

3.17 Water Heating Using Solar Thermal Collectors

How Do Solar Thermal Collectors Work?

Solar thermal collectors are devices that utilize solar radiation to heat water. They capture solar energy on the roof of a building and transfer heat to a hot water storage tank. This system can cover a significant portion of a household's annual hot water needs.

Advantages of Solar Collectors[17]

- Lower Hot Water Costs: By utilizing solar energy, the costs of heating water can be reduced, as part of the water is heated for free by the sun.
- Eco-Friendly Solution: Solar collectors use clean energy from the sun, contributing to a reduction in CO_2 emissions and other greenhouse gases.
- Long Lifespan: Collectors have a lifespan of 20–30 years, making them a long-term investment.
- Proven Technology: Solar thermal collectors have been used worldwide for decades; for example, in Cyprus, more than 90% of households utilize them.

Disadvantages and Limitations

Dependence on Weather: The performance of solar collectors depends on sunlight, so the benefits are lower during winter months.

Higher Initial Investment: The acquisition costs for solar collectors can be higher, but they provide savings in the long run.

Space Requirements: The installation of collectors requires sufficient space on the roof and room for the hot water storage tank in the technical area.

Combination with Other Technologies [18]

Combining solar collectors with a heat pump allows efficient water heating even at lower outdoor temperatures. Integration with photovoltaic panels enables the use of generated electricity to power circulation pumps or for electric water heating, maximizing the utilization of solar energy.

Solar thermal collectors represent an eco-friendly and economical solution for water heating in households. Although they have certain disadvantages, such as dependence on weather and higher initial investment, their long-term benefits in terms of savings and reduction of CO_2 emissions are significant. Combining them with other technologies, such as heat pumps and photovoltaic panels, can further enhance the efficiency of the system.

[17] https://www.energysage.com/clean-heating-cooling/pros-and-cons-of-solar-hot-water/?utm

[18] https://www.sciencedirect.com/science/article/pii/S2352152X24021546

4 Economic aspects

This chapter provides an overview of how decarbonisation measures—such as the implementation of sustainable heating systems—can be organised, with a focus on the role of cooperatives as a suitable organisational model.

Generally speaking, the decarbonisation of heating, cooling and hot water for a building requires the use of non-fossil energy through energy-efficient systems (energy generation and energy supply from renewable energy sources) and often the improvement in structural thermal insulation to save energy (energy efficiency measures). From the perspective of a cellular view of the energy system, an apartment is an energy cell that always seeks to balance its energy needs by consuming energy. PV systems, solar thermal systems and geothermal plants can be represented as energy cells with energy surplus, and energy storage systems (batteries and – from a seasonal point of view – geothermal probes) are energy cells with changing energy load and generation states. All these energy cells can be aggregated to energy systems at different levels of aggregation – an apartment building is an energy cell consisting of the aggregated cells of the apartments.

A decarbonisation project for heating thus consists of providing an energy cell with sufficient surplus of energy to supply the heat energy need of an apartment or a building. The cost per kWh of heat supplied by this energy cell over its lifespan can be calculated as "**Levelized cost of heat" (LCOH)** by dividing the sum of **capital cost (Capex)** and **operating cost (Opex) and financial cost** by the sum of kWh generated over its lifetime. The LCOH can be compared with the cost per kWh of the actual heat source.

In many cases the infrastructure of the passive energy cell (apartment or building) needs improvement by thermal insulation to reduce the heat energy consumption need. These additional cost are not part of LCOH, but have to be reflected in the **total project cost calculation** by adding up all expenses on Capex (for the active and the passive energy cell) and Opex including financig cost over the lifetime of the project. In a more sophisticated approach inflation rates for Opex and a discount factor can be introduced. If in comparison with the cost of heating using the existing energy system the sum of positive cash income (energy savings) is over the lifetime higher than the expenses the project has a **positive economic value** (i.e the project has a positive net present value)**.** The same figures can be used to calculate the **amortization time of the investment,** again with or without considering inflation rates and a discount factor.

The **user of an apartment or a building** usually makes regular monthly payments for the use of the apartment/building including heat and hot water. He will evaluate the economic advantage of the decarbonization project by comparing the cost of heat before and after decarbonization. He will want to know what he has to pay for heat and hot water after the project is implemented. The calculation of the LCOH is therefore most relevant for the heat consumer.

For the owner of an apartment or building, who usually is the investor in the project the financial value is the relevant perspective. He will not only look at the revenue from the generation and supply of heat, but also on the total income derived from the apartment/building and compare it with the total project cost (including renovation and thermal insulation).

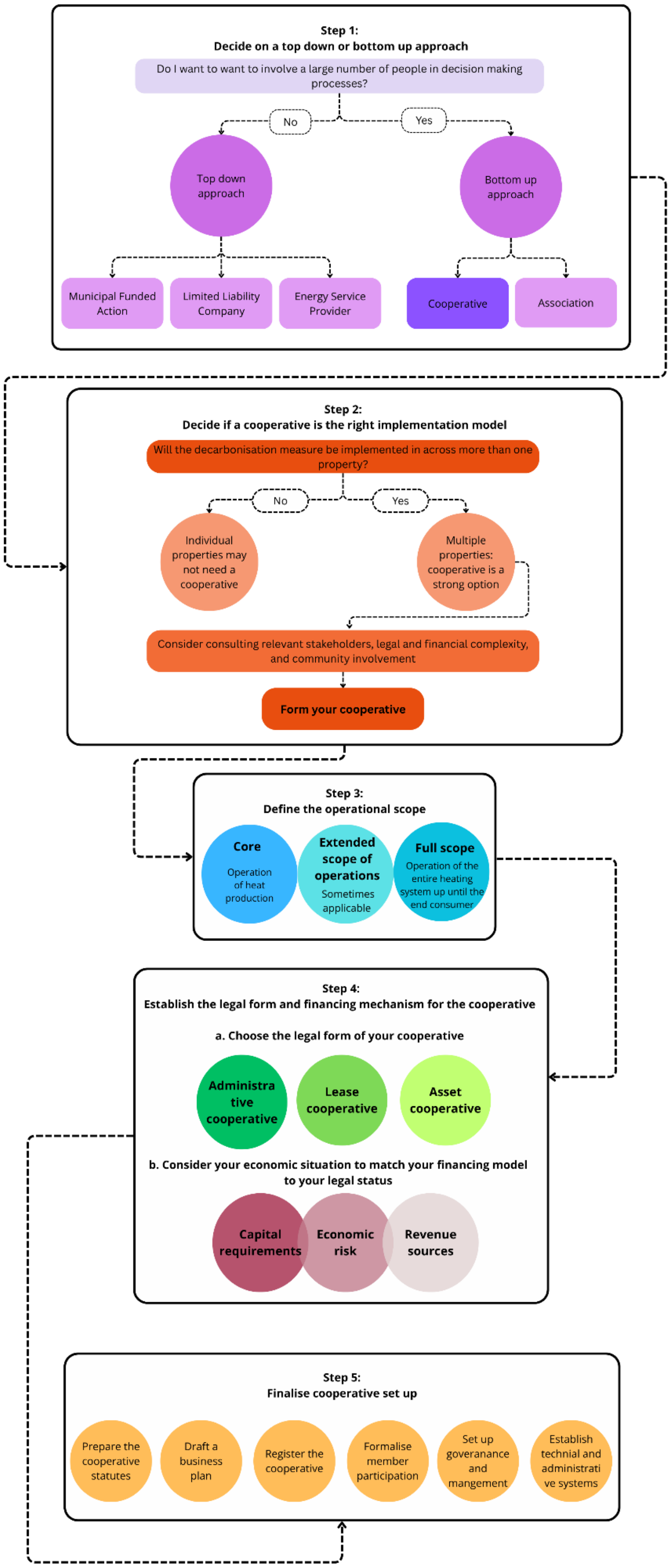
The economic and financial viability of the project for users and investors is the prerequisite for establishing a heat cooperative.

This chapter outlines in which situations a cooperative approach is an advantageous operational responsibility that cooperatives can assume. Based on these distinctions, various cooperative models are presented and analysed with regard to their strengths, limitations, and financial implications. Finally, the chapter highlights key funding and financing options available for covering the investment costs of decarbonising heating and cooling systems in buildings.

The graph below shows the different steps and decision-making processes required for establishing a heating cooperative. This chapter guides the user through a sequence of necessary decisions required to move forward with setting up a heat cooperative.

The first step in this process is deciding whether a cooperative is the right implementation model, with influencing factors including the number of properties and the relevant stakeholders, providing the user with support to make the initial go/no-go decision. Having decided to proceed, the next step is to decide on a scope of operation for your cooperative, ranging from the minimal core scope, where the fewest possible elements are encompassed in the cooperative, and stretching to the full scope where the entire heating system until the end consumer comes under the purview of the cooperative. Guidance is then provided on establishing the legal form and financing mechanism for the cooperative, with common legal forms being presented and guidance on what key elements of an economic situation may be conducive to which combination of financing models. Finally, an overview is given of the required administrative steps to finalise the cooperative set up.

How to start a HeatCOOPerative for decarbonisation



4.1 Decide if a Cooperative is the right implementation model

The first step is to determine whether the planned decarbonisation measure will be implemented within a single property or across multiple properties. In general, a cooperative is a particularly suitable organisational model when a decarbonisation project spans several properties with multiple owners.

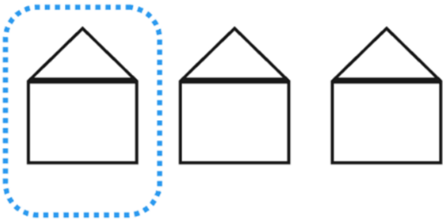


Figure 15 - Within a Single Property

Within a single property means that the conversion of the heating supply from fossil fuels to renewable resources takes place within a building or neighbourhood that is owned by a single owner. This can include private owners, housing cooperatives (more common in Austria), or homeowner associations. In this case, the owner must find a way to finance the decarbonisation measure and—if applicable—determine how and to what extent tenants (users) can be involved in the costs. How this can be done depends greatly on the national legal and financial framework.

In this case, the owner is responsible for financing the decarbonisation measure. If tenants (users) are involved, the owner must determine if and how they can contribute financially. The possibilities for tenant involvement depend heavily on national regulations and legal frameworks.

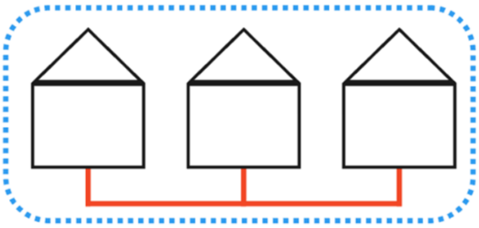


Figure 16 - Across Multiple Properties

Across multiple properties means that the renewable-based heating supply spans several properties and may include multiple buildings or entire neighbourhoods with different owners.

If the project involves several properties, founding a **heating cooperative** can be the appropriate legal form to regulate and manage the financing and organization of the decarbonisation measure.

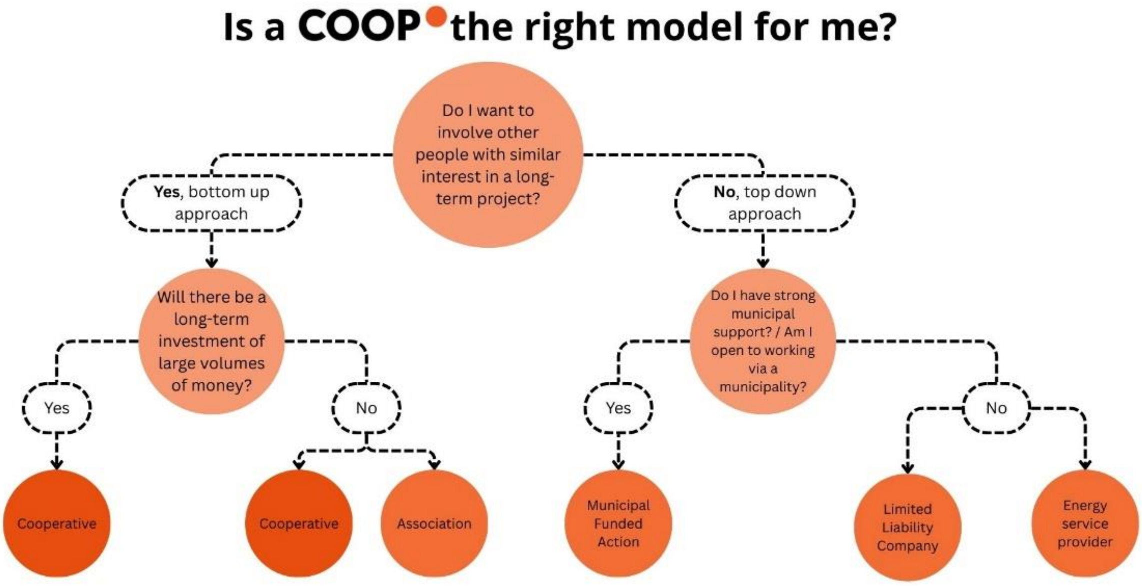


Figure 17 – HeatCOOP decision making tree

If the decarbonisation measure is planned to involve multiple properties, following implementation models can be considered: municipal action, associations, purpose driven companies and cooperatives. Cooperatives are the specific focus of this handbook as they have a few unique advantages for the creation of local heating networks (see to Figure 17):

- 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.
- Another indication of this flexibility is that members can join and leave the cooperative and agreements can be entered and exited without the need for a notary. Meaning cooperatives have many of the advantages in terms of protections as a limited liability company but not needing a notary facilitates having a large number of partners/members, making it a fairly self-managed way of fundraising.
- Cooperatives are always audited making them financially transparent facilitating to obtain external funding like 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.

To determine the most appropriate business model for a cooperative there are two component elements that need to be defined, the **scope of operations** and the **scope of ownership**.

Heidi's Case Study *(one multi-family building & two single family houses)*

1. **Decide if a Cooperative is the right implementation model**

Heidi owns a small multi-family building in a sub-urban area where she and her family live alongside tenants who she rents apartments to (13 flats). Heidi is concerned about the climate crisis, and wants to reduce her dependence on volatile energy prices. Furthermore, she sees the need in providing cooling during the increasingly hot summer months. Therefore, plans to replace the building's gas heating system with a decarbonised alternative. Her tenants are in favour of those changes. She knows that there is not enough space on the property for geothermal energy and installing the number of air-source heat pumps required is also not a viable option due to noise concerns and her worry about contributing to the urban heat island effect in summer. She therefore decides to approach her two neighbours, who each live in single-family homes with spacious back gardens, which they themselves occupy to ask whether they would be interested in collaborating on a joint decarbonization effort. Together they then commission technical concept. Their proposed heating system will be a low temperature grid with **geothermal probes** on the property of the two single family houses (This can be summarized as the heating system). Each building has their own heat pump and a PVT system for the regeneration of the **geothermal probes.**

The total cost for the source (geothermal probes) and the distribution network, including all additional expenses, amounts to €1,900/kW.

However, they realize that in order to ensure the long-term operation of the geothermal system and its shared use by all parties, a formal legal structure is necessary. They aim to adopt a **bottom-up approach** that allows the owners of the properties to participate in the decision-making process. Acknowledging the need for significant financial investment, they decide to establish a cooperative.

Fred's case study

1. **Decide if a Cooperative is the right implementation model**

Fred lives in a terraced house on a quiet residential street where **eight identical houses stand side by side in a single row**. Each of these houses is **individually owned and occupied by the residents**, meaning that everyone living in the houses is also the legal owner of their home. The street forms a cohesive and well-connected community, with strong unneighborly relationships.

At the end of the street, there is a **small publicly owned plot** that could be used for placing shared infrastructure—such as a heating central or distribution node. On the opposite side of the street, and in the adjacent streets, there are more rows of terraced houses with similar ownership structures. However, the owners in those homes have so far shown less motivation to participate in a shared heating solution—though they could potentially join in the future if the project proves successful.

Fred and several of his immediate neighbors have grown increasingly concerned about **rising and unpredictable energy costs**, as well as their dependence on imported fossil fuels, particularly natural gas. They are interested in finding a more stable, locally controlled, and climate-friendly energy source.

As they begin talking, it becomes clear that **many of the residents are experiencing similar problems with their old gas boilers**. They also realize that **while none of the individual homes has enough space to install a complete renewable system on its own**, by coordinating across all eight properties, they would have enough collective space and flexibility to implement a more efficient and sustainable solution.

Together, the group commissions a **technical feasibility study**, which proposes a **combined groundwater and biomass heating system**, with the central components (e.g., pumps, boilers) located at the public plot at the end of the street. Each home would remain individually supplied but connected to the shared system.

To organize the financing, operation, and long-term management of the system, and to ensure that all participating owners have an equal say in key decisions, the group decides to establish a **heating cooperative**. They want a structure that supports a **bottom-up approach**, enables **broad member involvement**, and is suitable for **joint financial responsibility and future expansion**.

The cooperative model allows them to formalise their collaboration while also creating a platform that could, over time, include more households from the neighbouring streets as interest grows.

4.2 Define the Operational Scope

The scope of operation of the heat cooperative is determined by which assets and components of the energy system of a heating system it takes over and manages. In a cooperative the scope of operations, meaning the limits of the services provided to its members, must be clearly determined and defined. The flexibility of the cooperative itself to define the core, secondary and full scope of its operations is a key component of the model.

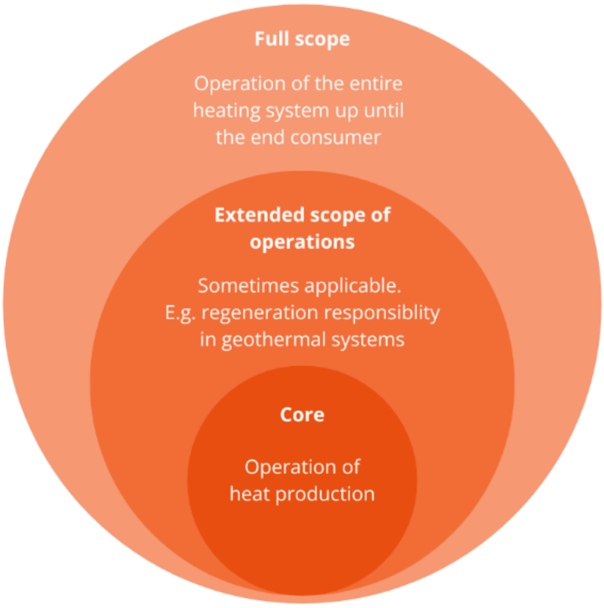


Figure 18 - XXX

The **core scope** of operations is for all heating cooperatives is operating the heat production (e.g., geothermal heat pumps, Groundwater, Waste heat, Wastewater heat, Biomass), the grid and (where it exists) the storage system e.g., geothermal heat pumps, as these are the jointly used core components of the heating system of the connected buildings.

Depending on the heat source some cooperatives will also have a **secondary scope** of operation. Wherein the scope of the heating cooperative can be extended by transferring the responsibility for other parts of the heating system to the cooperative, without comprising the full scope of operation. A common example of this would be in geothermal system where, the responsibility for regeneration in summer, which usually is on each single building, would also be transferred to the heating cooperative using solar thermal panels or an air/water heat exchanger Having an extended scope of operations which includes responsibility for regeneration in the geothermal case can allow for further protection and better organisation, because the users do not have to rely on regeneration duties of single members , but on the cooperative they have under their control as members. In this case, the participants or cooperative members can limit themselves to the anergy purchase from the cooperative that they need to generate heating and hot water, while the cooperative takes over the responsibility for managing regeneration. This extended business model is more complex from an organisational and operational point of view and can also be shaped by transferring the cooperative's rights of use and disposal of the components to varying degrees. It offers participants significantly more services and relief from operational and administrative tasks.

Full scope encompassing heat generation and heat supply. In this form, the entire heat energy system up to the end consumer, i.e., the radiators in the individual apartments, is taken over by the cooperative. This scope becomes equivalent to the scope extended by a local heating or district heating company. The cooperative enters into direct contact with the users on behalf of the building owners/landlords and supplies them with heating and hot water. It must therefore establish an appropriate operational and administrative organisation.

4.3 Establish the Legal form and Financing mechanism for the Cooperative

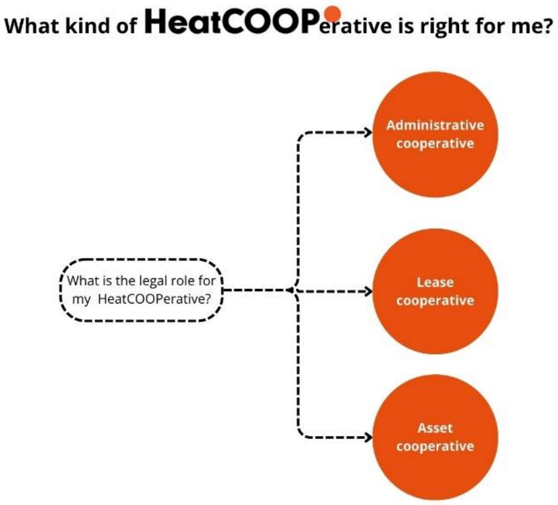


Figure 19 – XXX

In order for a heating cooperative to operate effectively and provide services to its members, it must hold legal rights to use and manage the infrastructure within its defined scope of operations. These rights form the legal basis for the cooperative's role and responsibilities. The cooperative can only manage or operate assets—such as heat production units, distribution networks, or regeneration systems—if it has legally secured usage and disposal rights. These rights determine whether the cooperative can make decisions about operation, maintenance, or investment in these assets.

From this, three legal models for heating cooperatives can be distinguished, each defining how the cooperative accesses and manages the heating infrastructure (see Section 3.2 for details)::

- **Administrative cooperative**: The cooperative does not own the assets but is authorized by the owner(s) to manage them. This is typically done through a formal assignment or agreement, granting the cooperative rights of use without transferring ownership or leasing.
- **Lease cooperative**: In this model, the cooperative leases the heating infrastructure from the owner(s), or is granted usage rights through public law.
- **Asset cooperative**: Here, the cooperative owns the infrastructure and associated rights outright. This gives it full legal authority over the system, including decision-making, maintenance, and investment planning.

Each model has different implications for governance, liability, and financing, and should be chosen based on the goals of the cooperative and the ownership structure of the energy system.

When considering which form of financing to choose, understanding funding and financing options is an essential component. Decarbonizing heating systems usually shifts the cost structure: unlike fossil-based systems with high operational expenditures (OPEX) and lower capital expenditures (CAPEX), decarbonized systems—excluding biomass—typically require significant upfront capital investment, followed by relatively low ongoing costs. These upfront costs must be financed. Debt financing has to be repaid through regular payments by users, usually via heat tariffs. This section outlines the funding needs and financial mechanisms for setting up Sustainable Heating Cooperatives, depending on the cooperative model.

Before deciding on one of the three legal forms for a heating cooperative, it's important to understand the **financial implications** in terms of capital needs, income sources, and risk distribution. These factors depend largely on **whether the cooperative owns the heating infrastructure or not**.

Cooperative Type	Capital Requirements	Economic Risk	Revenue Sources
Administrative Cooperative	Operating/admin costs only (e.g., office, IT)	Low – limited to administrative tasks	Administration fees
Lease Cooperative	Working capital for heat generation and supply	Moderate – responsible for operations, not assets	Payments for heat supply
Asset Cooperative	Full investment in heating assets	High – includes asset and operational risks	Heat delivery revenues, potential returns on equity

4.4 Financing Options (Applicable to All Models)

Public Subsidies

Grants and subsidies play a vital role in ensuring the financial viability of decarbonisation projects. These are discussed in more detail in Chapter 5.

Equity

Equity can be raised through capital contributions from cooperative members. Such capital contributions can be made in cash or in kind, e.g. by the owners of heat system components, depending on the cooperative model chosen. Other equity-like instruments include non-repayable grants from members, participatory funding (e.g., crowdfunding), or investments by supportive community members like neighbours or tenants.

Debt

Loans can be used to finance capital expenditures but must be repaid through future revenues. The legal organisation, the earnings base and the asset structure of the balance sheet of the cooperative influences the feasibility and conditions of debt financing. Individual property owners can generally secure loans under better terms, as they can use buildings and real estate as collateral. Newly formed cooperatives, especially those without substantial assets, may face challenges in accessing favourable loan terms.

The repayment of loans will depend on the cooperative model and the nature and the timing of the earnings of the cooperation. Heating tariffs are typically structured to ensure regular income for covering debt service, operating costs, and other financial obligations.

4.5 Three Models of heating cooperatives

Administrative cooperative

How does it work?

1. Each owner or co-owner of a relevant asset, who is also a member of the cooperative, transfers the responsibility to the cooperative for the operation and management of the assets owned by them.
2. The owner authorises the cooperative to form the necessary contracts with other participants (heat supply and heat purchase) or with third parties (electricity supply, maintenance, technical plant operation). The ability to transfer responsibility to the cooperative can be anchored in the statutes of the cooperative.

Advantages of this model:

- This business model is simple and can be implemented at low cost.
- This model is also a flexible model which can take the burden of taking care of their heating assets off the cooperative members. This could also be achieved by commissioning and authorising a third party in which participants are not cooperatively involved. However, maintaining this administrative function within the cooperative model enables the members to control the activities of the cooperative and thus can be a better security for a long-term assignment.

Limitations of this model:

- This model allows for the cooperative to take over the long-term ongoing operation and management of individual components or the entire heating network, similar to a property management company. However, it does not have the power to dispose of the assets owned by the participants and cannot sell, substantially modify, exchange, replace them, etc. For this purpose, a special power of attorney would have to be granted by the asset owner(s). The granting of such a power of attorney could be stated as a statutory obligation of the individual owners. However, such a commitment is not completely irrevocable. The long-term existence and development of the heating system is therefore ultimately not in the hands of the cooperative, but of the individual participants.

Financial components of this model:

- The cooperative only needs capital for basic office-related investments and working capital to cover administrative resources such as staff, external services, and equipment.
- Its income comes from management fees and reimbursement of third-party service costs paid by the asset-owning members.
- The cooperative does not require capital to invest in the main heating infrastructure.
- The financial risk associated with the heating assets remains with the individual owners, not the cooperative.

- Since the cooperative is only responsible for administrative services, its business plan can focus on estimating operating expenses and income, without needing to consider energy consumption or generation profiles.

Lease cooperative

How does it work?

1. In the case of a lease cooperative, the cooperative has to **pay a lease** to the landlord, and in exchange they receive a long-term right of use with the individual owners of the assets. This lease can be calculated in such a way that the lessor owners can amortize the capital they have invested in these assets and/or achieve a return on investment.
2. This lease agreement means that the cooperative has a **legally protected right to use the assets**. However, the cooperative has no ownership and thus no right of disposal (selling or replacement of the assets) over the included assets of heating network itself.
3. The cooperative takes over the **operation of the leased assets** on its own account and receives income from the supply of heat and cooling, from which the lease and the ongoing operating and administrative costs, including maintenance and servicing, are to be covered.

Advantages of this model:

- This model provides beneficial ownership to the cooperative without the need of financing the assets by the cooperative and establishes a mechanism for the members of the cooperative who have invested themselves in the assets to recover their financial investment by the leasing rates they receive from the cooperative. The leasing cooperative thus can include people who do not have the capital resources for the acquisition of assets in the cooperative. This makes it particularly suitable for situations where there are both owners and renters who would like to join the cooperative.
- The lease cooperative assumes the economic risk of operating the anergy/heating network, but not the risk regarding the substantial value of the assets.
- The long-term operation of the anergy/heating network is much more secured by the lease because the individual participants have transferred the economic risk to the lease cooperative and the long-term lease agreement with the right of beneficial ownership of the assets represents a stronger title of use than a mere assignment of operational management.

Limitations of this model:

- Similar to the administrative cooperative, the lease cooperative does not have comprehensive power of disposal over the assets that remain the property of the participants and can neither sell, substantially change, exchange, acquire new ones, etc. However, it has a claim against the lessor/owner for the preservation of the leased property, which also includes any necessary substantial repairs or replacement purchases. The asset risk remains with the owner.

The lease cooperative itself cannot decide on substantial changes that go beyond the preservation of the leased property within the framework of its organisation, but only the individual owners. A special power of attorney could be granted by the asset owner(s), and what has been stated above about the possibility to establish a statutory obligation in this regard applies also to the lease cooperative. Financial components and business plan development of this model:

- Since the heating assets are financed by the owners, the cooperative does not need capital to acquire them; it receives usage rights through a lease agreement, which is not recorded on the cooperative's balance sheet.
- Like the administrative model, it only needs capital for business operations, but it requires more working capital because it must also pay lease fees and provide the heat supply services itself.
- These operational expenses are covered by payments from members for the heat supplied.
- To manage fluctuations between income and expenses, lease cooperatives need larger cash reserves, which must be funded through member contributions.
- The business plan must account for operating and maintenance costs (including lease payments), administrative costs, and income from heat and cooling services.

Asset cooperative

How does it work?

1. The asset cooperative acquires ownership of the assets of the heating network.
2. As the owner of the assets, the cooperative is called upon to fully utilise/operate and to exercise all rights and obligations in connection with the heating network.
3. The assets of the cooperative are managed exclusively within the framework of the cooperative's administrative organization, which makes all decisions on the management and disposal of the cooperative's assets. The individual participant can only influence this within the framework of his rights as a cooperative member.

Advantages of this model:

- This design provides maximum independence from the individual property owners and users
- This design has the highest degree of security of existence.
- A change of ownership of the building(s) or apartment(s) only has the effect of a change of cooperative member (the old owners leave the cooperative and the new owner(s) join the cooperative) and cannot impair the power of disposal over the assets if the corresponding property law protection exists in favour of the cooperative in the form of servitudes/real encumbrances

Limitations of this model:

- The cooperative holds full economic risk incl. asset risk.
- High capital requirements, the cooperative must have the necessary capital for the acquisition and construction of assets.

- Difficult to get bank loans by the newly founded cooperative at all or at reasonable credit conditions, therefore the cooperative needs equity from its members to finance the investments

Financial components and business plan development of this model:

- Asset cooperatives directly own the heating infrastructure, meaning that capital expenditures (CAPEX) and asset depreciation must be accounted for in the cooperative's balance sheet and financial planning.
- The business plan must reflect all key cost elements, including operation and maintenance, administrative expenses, and any debt service related to asset financing. Revenue comes primarily from payments by members for heat and related services.

Options for Acquiring Assets

- If the heating infrastructure already exists, it can be transferred to the cooperative through a purchase agreement or as a contribution in kind. In-kind contributions directly increase the cooperative's equity and do not require repayment.
- If assets still need to be purchased or constructed, the cooperative must be capitalized in advance, either through:
  - Cash contributions from members,
  - Non-repayable grants,
  - Or equity-like instruments such as crowdfunding, participation rights, or community investment models.
- The cooperative can also issue subordinated loans or bonds, enabling tenant or citizen participation in the financing effort.

Challenges in Debt Financing

- Accessing bank loans can be challenging for new cooperatives due to a lack of collateral and cash flow history.
- Individual property owners often have better access to loans, especially if rental income or property value can serve as collateral. In some cases, it may be more viable for owners to finance the assets directly and transfer them to the cooperative later, e.g., as in-kind contributions under a leasing or administrative structure.

Low-Cost Operation with In-Kind Equity

- If the members of the cooperative transfer heating system components they already own (such as pipes, probes, or pumps) into the cooperative as in-kind contributions, the cooperative becomes the legal owner of these assets without needing to purchase them.
- If all key assets are transferred to the cooperative as in-kind contributions, the cooperative requires only working capital for basic operations such as personnel, IT systems, and office needs.
- In this scenario, no profit needs to be generated. The cooperative can operate on a cost-covering basis, charging only management and maintenance fees, and potentially providing heat free of charge to members who contributed the infrastructure.

4.6 Finalize the Cooperative Set-Up

Once the operational scope, legal model, and financing structure of the heating cooperative have been defined, the final step is to establish the cooperative as a functioning legal entity. While the general process is similar across many contexts, the specific administrative requirements can vary depending on national laws and regulations. Consulting national cooperative associations or legal experts can help ensure compliance.

Key steps

- **Prepare the cooperative statutes**
  Define the cooperative's purpose, decision-making structures, membership rules, and operational responsibilities.
- **Draft a business plan**
  A business plan is essential for demonstrating the cooperative's financial viability. It should cover:
    - Operating and administrative costs (e.g., staff, maintenance, billing)
    - Revenue streams (e.g., member payments for heat or service)
    - Financing and loan repayment strategies
    - Working capital needs to manage cash flow fluctuations
- **Register the cooperative**
  Complete any required legal registration processes. In some countries, this includes notarial certification or submission to a public cooperative registry.
- **Formalize member participation**
  Secure commitments from cooperative members, including service agreements, financial contributions, and voting rights.
- **Set up governance and management**
  Appoint the board or operational managers who will oversee the day-to-day and strategic functions of the cooperative.
- **Establish technical and administrative systems**
  Set up systems for billing, maintenance coordination, data monitoring, and any required IT infrastructure.

4.7 Case Studies

Heidi's Geothermal Case Study - establishing an administrative cooperative
2. Define the Operational Scope Before selecting the legal model, Heidi and the other property owners must define the scope of operation for the cooperative. At a minimum, they require the cooperative to manage the jointly used low-temperature grid and the geothermal probes—this forms the **core scope of operations**. They also consider an **extended scope**, which would include shared responsibility for summer regeneration. A **full scope**, including responsibility for the individual heat pumps and internal heating systems, is also discussed but ruled out, as it would unnecessarily increase complexity and reduce individual control. They decide to establish the cooperative with a **core operational scope** only.

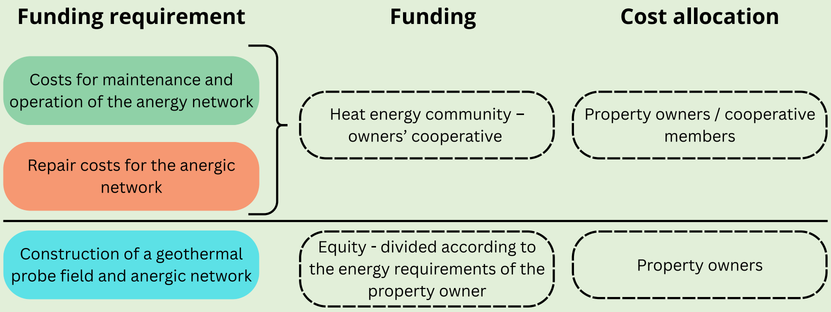
Heidi and the other property owners decide to adopt a core scope of operations for their heating cooperative. Since each of the three building has an air/water heat exchanger system for regeneration installed on their buildings they agree that it is more practical to leave this component outside the cooperative's responsibility.

3. Establish the Legal form and Financing mechanism for the Cooperative

Once the operational scope is set, the group must determine **how the cooperative will manage the shared infrastructure legally and financially**.

The key questions are: Who will finance the assets within the cooperative's operational scope? And in what legal form should the cooperative receive the right to use these assets? Should the cooperative itself acquire legal ownership of the assets? In that case, the members would need to provide the necessary capital to the cooperative. Alternatively, should the members invest in the assets individually, retain ownership, and only transfer the rights of use and management to the cooperative? They decide that they want to set up a structure which allows for the simplest possible way to operate and manage the heating system across the three properties. Based on this, they decide to establish an **administrative cooperative**.

Heidi and the other building owners must consider how they will finance the planned heating cooperative. They agree that each owner will be responsible for financing the necessary investments in their own building, and that the costs for the anergy system and the geothermal probes will be shared among them. The owners of the assets transfer the responsibility for the operation and management of their assets—e.g., the geothermal probes—to the cooperative, which then forms the necessary heat supply and purchase contracts on behalf of the asset owners with other participants and/or with third parties. The cooperative may also commission a third party to reduce the administrative burden on its members.



In this case, the business plan depends on the revenue sources of the cooperative. In the case of an administrative cooperative, whose expenditure and income are largely independent of the load profiles and generation profiles of heat consumption and energy generation—because it is paid only for administrative services, the business plan can be limited to a simple estimation of operating expenses and operating income.

It is important to point out, however, that while the administrative cooperative is simple and can be implemented at low cost, it does not provide a straightforward repayment mechanism for the debt that Heidi needs to repay under the initial assumptions. It works well if the owners handle the financing and debt repayment independently, without involving the cooperative. If Heidi wants to create a source of revenue for repaying her investment, she would need to choose the leasing alternative.

In addition, the administrative cooperative can be entitled as beneficiary of the property-related rights (servitudes, real encumbrances) and the right of use of the geothermal probes and pipelines erected on public land. This allows the cooperative to bundle the assets of the anergy network or heating network in a kind of administrative trust, and it thus can take care of the administration, ongoing operation and billing.

1. Finalize the Cooperative Set-Up

To complete the process, Heidi and the other building owners formally establish the administrative cooperative. They draft and adopt the cooperative's statutes, clearly defining its responsibilities, governance structure, and scope of operation. Each member signs the necessary contracts, including service agreements and operational authorizations for the cooperative to manage the shared assets. A simple business plan is created, focusing on operating costs and income from member contributions. Once the infrastructure is installed and basic administrative systems (such as billing and communication processes) are in place, the cooperative becomes operational.

Fred's case study (Asset cooperative)

2. Define the Operational Scope

Before selecting the legal form of the cooperative, Fred and the other owners must first define the **operational scope** of their planned heating cooperative. This means deciding whether the cooperative should be responsible for the **core**, **extended**, or **full** system operations.

At a minimum, the cooperative would need to manage the **shared groundwater system, the biomass boilers, and the heating network** connecting the terraced houses—these are the core components used collectively. Since the system does not include elements like seasonal storage or regeneration, an extended scope does not apply in this case.

After discussion, the group decides to adopt a **full operational scope**, meaning that the cooperative will also manage the **transfer stations within each home**. This approach ensures clearer responsibilities, better operational reliability, and more comprehensive energy independence for all involved households.

3. Establish the Legal form and Financing mechanism for the Cooperative

Now that Fred and his neighbors have agreed to adopt a **full operational scope**, they must determine how the cooperative will **own and finance** the assets required for the heating system—namely, the groundwater system, biomass boilers, and the distribution network.

The technical infrastructure still needs to be purchased and installed. However, none of the individual homeowners is willing—or financially able—to cover these costs alone. The group explores two possible scenarios, depending on whether the **cooperative itself can raise sufficient funding** or whether **individual owners must take on financial responsibility**.

After deciding on a full operational scope, Fred and his neighbors now face the question of how the cooperative should legally and financially manage the heating system. This depends largely on whether the cooperative itself can raise sufficient capital to acquire the assets, or whether the individual homeowners will need to step in as financiers.

Scenario 1: Asset cooperative

In this scenario, the cooperative is able to raise enough equity and/or secure a bank loan. This would allow the cooperative to own all the system assets directly, making it an asset cooperative.

This model gives the cooperative full legal ownership and control over the infrastructure, and therefore full responsibility for its operation, maintenance, and future investment decisions. The cooperative becomes a fully independent entity—asset management is handled collectively, and no individual household is tied to specific components.

This has some advantages for Fred, including maximum independence from the individual property owners and users, and ensuring the continued existence of the cooperative irrespective of any one individual. For example, if Fred were to sell his house, he would leave the cooperative and the new owner would simply take his place as a member.

To make this model work, members would need to provide the cooperative with sufficient initial capital through cash contributions or in-kind contributions (e.g., by purchasing parts of the system and transferring ownership to the cooperative). The cooperative might also apply for bank financing, though this is often difficult for newly founded cooperatives due to a lack of collateral and financial history.

However, in Fred's case, the cooperative is newly established and lacks both the collateral and financial track record required by most lenders. Accessing a bank loan therefore proves difficult. Even if the members can contribute some equity, it is unlikely to be enough to cover the full investment costs.

Scenario 2: Lease or administrative cooperative cooperative

Because of the limited financing options available to the cooperative, the group begins exploring a second approach. In this case, the system would not be financed by the cooperative itself, but by individual homeowners, either acting independently or jointly. Depending on how the rights of use and control are defined, this arrangement could take the form of either an **administrative** or a **lease cooperative**.

Fred and his neighbors consider this approach more realistic given their current financial situation. They agree to pursue a **lease cooperative**, in which one or more homeowner's secure private loans, using their property as collateral. They agree to finance the construction of the groundwater system, the biomass boilers, and the heating network. These assets are then **leased to the cooperative**, which pays a **leasing fee** to the owners. Through these leasing payments, the investing members can **refinance their upfront investment** over time.

This setup allows the cooperative to carry out its operational role while enabling the financing members to gradually recover their investment. All participants remain actively involved through the cooperative structure, which coordinates operations and member engagement. Overall, this solution provides a practical balance between shared management and individual financing capacity.

4. Finalize the Cooperative Set-Up

With the legal model and financing structure agreed upon, Fred and his neighbors move ahead with setting up the cooperative. Given the number of parties involved, the initial coordination and decision-making process requires considerable effort and results in relatively high transaction costs. To support this phase, they bring in external support in the form of a decarbonization manager, who helps facilitate the process, and consult legal experts to ensure that the cooperative statutes are well-structured and future-proof. Once the cooperative is registered, agreements are signed, and the technical systems are in place, the cooperative begins its operations.

4.8 Summary

Table 1 - Types of sustainable heat cooperatives regarding legal title on assets

Cooperative type	Capital requirements	Risk assumption
Administrative cooperative	Operating and administrative expenses	Risk of administration
Lease cooperative	Working capital for heat generation and supply	Risk of commercial operation
Asset cooperative	Acquisition/construction of assets	Full economic risk incl. asset risk

Table 2 - Overview Table; Funding needs for SHC

Type of SHC	assets	capital	expenses	revenues
administrative cooperative	office equipment, IT systems	capital contributions	office, IT, staff	administration fees
lease cooperative	office equipment, IT systems right of use of heating system	capital contributions	office, IT, staff cost of operation and maintenance of the heating system rental payments	payments for heat supply
asset cooperative	office equipment, IT systems ownership of heating system	capital contributions in kind or in cash; debt	office, IT, staff cost of operation and maintenance of the heating system dividends, debt service	payments for heat supply

5 National specifics

EU Energy Community legislation at EU level

RED II

Renewable Energy Directive, formally the Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (Text with EEA relevance.)

- Defines and lays down rules for the Renewable Energy Community (Articles 2 and 22).
- Defines self-consumers of electricity from renewable sources (relevant if the energy community also uses photovoltaics) (Article 21).

Directive on common rules for the internal market for electricity (IEMD)

Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast) (Text with EEA relevance.)

- Defines and lays down rules for the Citizens' Energy Community.

EED III

Energy efficiency directive, or formally the Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast) (Text with EEA relevance)

- Defines efficient district heating and cooling (Article 2).
- Sets criteria for an efficient district heating and cooling system (Article 26).
- Sets conditions for the conversion, transmission or transport and distribution of energy (Article 27).

EPBD IV

Energy performance of buildings directive, or Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast) (Text with EEA relevance)

- Establishes requirements for technical building systems (Article 13).

Table 3 - Comparison of energy community parameters in EU legislation

Parameter	Renewable energy community	Citizen energy community
Legal framework	Directive 2018/2001 (RED II)[19] – Article 22	Directive 2019/944 (IEMD)[20] – Article 16
Issuance of directive / transposition	2018 / June 30, 2021	2019 / December 31, 2020
Purpose	Primarily providing environmental, economic or social community benefits to its members or shareholders or to the local areas where it operates	Primarily providing environmental, economic or social community benefits to its members or shareholders or to the local areas where it operates
Profit	Financial profit is not main purpose	Financial profit is not main purpose
Energy source / focus	Renewable energy	Renewable and non-renewable
Type of energy	Electricity and other forms	Electricity
Geographical scope	Members must be located in proximity to the community's projects	No location-based restrictions
Type of activities	Production, consumption, storage, and sale of renewable energy	Electricity generation and other services in the electricity sector
Membership	Natural persons, small and medium enterprises or local authorities, including municipalities	Natural persons, local authorities, including municipalities, or small enterprises
Control / voting rights	ditto	ditto
Large enterprises	No membership or voting rights	No membership or voting rights
Membership	Open and voluntary	Open and voluntary

RED II

Article 2 Definitions

(16) 'renewable energy community' means a legal entity:

(a) which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity;

[19] Consolidated text: Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (Text with EEA relevance). *Official Journal of the European Union,* L 328, 21 December 2018, P0082-0209. Available at: http://data.europa.eu/eli/dir/2018/2001/2024-07-16 (accessed 27 Oct 2025)

[20] Consolidated text: Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast) (Text with EEA relevance). *Official Journal of the European Union,* L 158, 14 June 2019, P0125-0199. Available at: http://data.europa.eu/eli/dir/2019/944/2024-07-16 (accessed 27 Oct 2025)

(b) the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities;

(c) the primary purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits;

Article 21 Renewables self-consumers

Comment: Article 21 deals exclusively with self-consumption of electricity from renewable energy sources. The article may be relevant in the case where the energy community would combine electricity generation, especially from solar systems, with heat generation through heat pumps. In this case, it would be self-consumption of self-generated electricity. The combination of solar systems with heat pumps is generally considered a technically and economically best practice concept. However, it should be noted that this concept will not be applicable everywhere (in particular, the installation of solar systems on houses in and around city centres may be significantly regulated by local regulations, such as conservation authorities).

Article 22 Renewable energy communities

1. Member States shall ensure that final customers, in particular household customers, are entitled to participate in a renewable energy community while maintaining their rights or obligations as final customers, and without being subject to unjustified or discriminatory conditions or procedures that would prevent their participation in a renewable energy community, provided that for private undertakings, their participation does not constitute their primary commercial or professional activity.
2. Member States shall ensure that renewable energy communities are entitled to:
   a) produce, consume, store and sell renewable energy, including through renewables power purchase agreements;
   b) share, within the renewable energy community, renewable energy that is produced by the production units owned by that renewable energy community, subject to the other requirements laid down in this Article and to maintaining the rights and obligations of the renewable energy community members as customers;
   c) access all suitable energy markets both directly or through aggregation in a non-discriminatory manner.

Comment: Article 22: Sets out the framework for renewable energy communities, including the rights and obligations of Member States in promoting them. This Article emphasises the right of these communities to produce, consume, store and sell renewable energy, as well as access to all appropriate energy markets. According to the Article, Member States shall:

- Ensure that renewable energy communities have the right to produce, consume, store and sell renewable energy, including access to all appropriate energy markets.
- They shall remove disproportionate regulatory and administrative barriers to such communities.

Ensure that distribution systems operated by such communities are subject to the same rights and obligations as other distribution system operators.

EED III

Article 2 Definitions

(46) 'efficient district heating and cooling' means a district heating or cooling system meeting the criteria laid down in Article 26;

(47) 'efficient heating and cooling' mean a heating and cooling option that, compared to a baseline scenario reflecting a business-as-usual situation, measurably reduces the input of primary energy needed to supply one unit of delivered energy within a relevant system boundary in a cost-effective way, as assessed in the cost-benefit analysis referred to in this Directive, taking into account the energy required for extraction, conversion, transport and distribution;

(48) 'efficient individual heating and cooling' means an individual heating and cooling supply option that, compared to efficient district heating and cooling, measurably reduces the input of non-renewable primary energy needed to supply one unit of delivered energy within a relevant system boundary or requires the same input of non-renewable primary energy but at a lower cost, taking into account the energy required for extraction, conversion, transport and distribution;

Article 26 Heating and cooling supply

The article sets out the criteria for an efficient district heating and cooling system, becoming stricter over time (at least one of the criteria must always be fulfilled):

Table 4 – XXX

Date	Renewable Energy	Waste Heat	Cogenerated Heat	Combined Conditions	Alternative - CO_2 emission limits (in g/kWh)
until 31 December 2025	-	-	-	-	< 200
from 1 January 2026	-	-	-	-	< 150
Until 31 Dec 2027	≥ 50%	≥ 50%	≥ 75% (cogenerated)	≥ 50% of a **combination** of renewable energy, waste heat, and/or cogenerated heat	-
From 1 Jan 2028	≥ 50%	≥ 50%	≥ 80% (high-efficiency)	Combo with ≥ 5% renewable **AND** ≥ 50% total from renewable energy, waste heat, or high-efficiency cogenerated heat	-
From 1 Jan 2035	≥ 50%	≥ 50%	-	Combo with ≥ 80% total from renewable, waste heat, or high-efficiency	< 100

Date	Renewable Energy	Waste Heat	Cogenerated Heat	Combined Conditions	Alternative - CO_2 emission limits (in g/kWh)
				cogenerated heat **AND** ≥ 35% from renewable energy or waste heat	
From 1 Jan 2040	≥ 75%	≥ 75%	-	≥ 95% total from renewable, waste heat, or high-efficiency cogenerated heat **AND** ≥ 35% from renewable or waste heat **OR** ≥ 75% of a **combination** of renewable energy and waste heat	-
From 1 Jan 2045	≥ 75%	≥ 75%	-	≥ 75% of a **combination** of renewable energy and waste heat	< 50
From 1 Jan 2050	100% (if used)	100% (if used)	-	**Only** renewable energy, waste heat, or a combination of both	0

Article 27 Energy transformation, transmission and distribution

Key requirements:

- The principle of "energy efficiency first" must be applied to:
- Network planning and development,
- investment,
- network tariffs.

Other obligations:

- Monitoring and reduction of network losses.
- Promoting smart grids and innovation.
- Reporting on the efficiency of network operations.
- Removal of incentives that reduce efficiency.
- Promoting combined heat and power.
- Taking energy efficiency into account when connecting equipment.

EPBD IV

Article 13 Technical building systems

3. Member States shall require new buildings, where technically and economically feasible, to be equipped with self-regulating devices for the separate regulation of the temperature in each room or, where justified, in a designated heated or cooled zone of the building unit and, where appropriate, with hydronic balancing. The installation of such self-regulating devices

and, where appropriate, hydronic balancing in existing buildings shall be required when heat generators or cooling generators are replaced, where technically and economically feasible.

6. Member States shall ensure that, when a technical building system is installed, the overall energy performance of the altered part and, where relevant, of the complete altered system is assessed. The results shall be documented and passed on to the building owner, so that they remain available and can be used for the verification of compliance with the minimum requirements laid down pursuant to paragraph 1 and the issue of energy performance certificates.

Member States shall take the necessary measures to ensure that the energy performance of technical building systems is optimised where they are retrofitted or replaced.

Member States shall promote energy storage for renewable energy in buildings.

11. Member States shall lay down requirements to ensure that, where technically, economically and functionally feasible, from 29 May 2026, new residential buildings and residential buildings undergoing major renovations are equipped with the following:

(a) the functionality of continuous electronic monitoring that measures systems' efficiency and informs building owners or managers in the case of a significant variation and when system servicing is necessary;

(b) effective control functionalities to ensure optimum generation, distribution, storage, use of energy and, where applicable, hydronic balance;

(c) a capacity to react to external signals and adjust the energy consumption.

5.2 Czech Republic

Laws relating to energy communities in the Czech Republic

Act No.458/2000 Coll., on the Conditions of Business and the Exercise of State Administration in the Energy Sectors (Energy Act)

- The basic framework for all business in the energy sector in the Czech Republic, it sets out the conditions for the production, distribution and use of energy, including heat
- Permit for heat production (licence)
- Obligations of operators of heating plants, especially in the area of safety, reliability, requirements for heat supply and efficiency of heat production.
- Regulation of heat prices and conditions for contractual relations between heat suppliers and consumers.

Act No. 406/2000 Coll., on Energy Management

- Provides for Efficiency of energy use of energy sources and distribution systems
- Inspection of heating and air-conditioning systems
- Reducing the energy consumption of buildings - conditions and requirements
- Energy performance certificate - validity and conditions

Act No. 165/2012 Coll., on supported energy sources and on amendments to certain acts

- Information on support for the use of RES (note: RES will probably not be eligible)
- Decree No.194/2007 Coll., laying down rules for heating and hot water supply, measurement indicators of thermal energy consumption for heating and hot water preparation and requirements for the equipment of internal thermal installations of buildings with devices regulating the supply of thermal energy to final consumers
- Defines rules for heating and hot water supply,
- Defines the measurement indicators for the consumption of heat for heating and for the preparation of hot water,
- Defines the requirements for the equipment of indoor thermal installations of buildings with measuring and indicating technology and devices regulating the supply of thermal energy to final consumers,
- Defines the scope of equipment of indoor thermal installations of buildings with devices recording the supply of thermal energy.

Decree No. 269/2015 Coll. on the allocation of costs for heating and common hot water preparation for a house

Decree No. 405/2015 Coll. on the method of sharing the costs for the supply of thermal energy in the case of common metering of the amount of thermal energy consumed

Act No. 90/2012 Coll., on Commercial Corporations

- Defines the rules and obligations for legal entities of the form of Cooperative and Limited Liability Company

Act No. 89/2012 Coll., Civil Code

- Defines the rules and obligations for legal entities of the form of Company
- Act No. 283/2012 Coll., on air protection
- Defines rules and requirements for air pollution and also, for example, for stationary energy sources, especially those that can pollute the air (combustion sources)

Act No. 458/2000 Coll., on the conditions of business and state administration in the energy sectors (Energy Act)

Act No. 458/2000 Coll. forms the crucial framework for all business in the energy sector in the Czech Republic. The Act sets out the **conditions for the production, distribution and use of energy**, including heat (Part 3 - Thermal energy (§ 76 - § 89)):

- Permit for heat production.
- Obligations of heat plant operators, in particular in the areas of safety, reliability, heat supply requirements and efficiency of heat production.
- Regulation of heat prices and conditions for contractual relations between heat suppliers and consumers.

According to the law, **the production and distribution of energy is usually subject to the need for a licence** (the law provides for some exceptions, e.g., production for self-consumption and in the case of low power sources, e.g., photovoltaic power plants up to a certain capacity) and sets out the conditions for controls and measurements.

Energy communities are also governed by the Energy Act. Energy communities were introduced into the law by the amendment to the Energy Act No. 469/2023 Coll., which completed the transposition of the RED II Directive into the Czech legal system. This amendment enables the establishment and functioning of energy communities in accordance with European legislation. The aforementioned amendment constituted the 42nd and 43rd versions of the Energy Act, while as of April 2025 the 45th version is already in force and 8 other future versions have been prepared and approved (e.g., Amendment 87/2025 Coll., which has a split effect and will enter into force gradually until 2028).

Energy communities may be subject for the licensing if they involve activities related to the generation or distribution of energy (for example, in the case of renewable electricity generation). However, these requirements may be lower compared to other entities due to the energy community status.

From the point of view of energy communities, sections 20b to 20i, which deal with the rights and obligations of energy communities, are relevant.

§ 20b Energy Communities and Renewable Energy Communities

(1) The Communities are the Energy Community and the Renewable Energy Community.

(3) A renewable energy community is a legal entity in the form of an association, cooperative or other corporation whose internal relations under its founding act are substantially similar in content and purpose to the internal relations of an association or cooperative as defined by law, and

(a) the purpose of which is to provide environmental, economic or social benefits to its members or to the territory in which it operates,

(b) the object of which is the production of electricity or other forms of energy from renewable energy sources, the supply of electricity, the sharing of electricity or the performance of other activities or the provision of other services related to the provision of the energy needs of its members,

(c) whose members are only natural persons, small or medium-sized enterprises, territorial self-government units or voluntary associations of municipalities or other contributory organisations of territorial self-government units,

(d) in which voting rights belong only to members located in the vicinity of the energy installations operated by that legal person, and no one other than those members may exercise, directly or indirectly, any other decisive influence in it,

(e) in which membership may be terminated by unilateral legal action against the renewable energy community at any time and free of charge; and

(f) which is registered as a renewable energy community in the register kept by the Energy Regulatory Office.

(4) The name of an energy community may include the designation "energy community" and the name of a renewable energy community may include the designation "renewable energy community". A person who is not a community may not use the designation "energy community" and "renewable energy community".

(5) The constitutive act of the community shall also contain a statement of the purpose of the community. The constitutive instrument of a renewable energy community shall also contain a definition of the territory in which the renewable energy community is to generate electricity from renewable energy sources, and which is legally relevant for determining the status of the member in the vicinity of the energy facilities. This territory may include the contiguous territory of the administrative districts of not more than 3 municipalities with extended competence or the territory of the capital city of Prague.

(6) A member in the vicinity of an energy facility means a member who resides or has a registered office or place of business in the area defined in the constitutive instrument under subsection (5).

(7) The Community shall be obliged to keep a list of members which shall also include the following information:

(a) the name and surname, the name or business name of the member, the place of residence or registered office and the date of birth in the case of a natural person, the registered office of a legal person and the identification number, if any,

(b) the type of membership,

(c) the number of votes of the member with voting rights,

(d) in the case of voting members of an energy community, whether the member is an individual, a small enterprise, a local government unit, a voluntary association of municipalities or another contributory organisation of a local government unit which is not an enterprise,

(e) for members of a renewable energy community, whether the member is a natural person, a small or medium-sized enterprise, a local authority, a voluntary association of municipalities or another contributory organisation of a local authority which is not an undertaking,

(f) in the case of members of a renewable energy community in the vicinity of energy installations, the address of the residence or registered office or place of business in the territory defined in the constitutive act referred to in paragraph 5.

(8) If the association is in the form of a cooperative or other similar business corporation, it may, if the instrument of incorporation so permits, distribute not more than 33% of its profits and other resources among its members only,

(a) if it does not jeopardise the fulfilment of the purpose of the community and the provision of the needs of the members of the community,

(b) if it creates a fund from the profits of not less than 30 % of the share capital which cannot be distributed among the members.

(9) Where the society is in the form of a society or other similar corporation which is not a business corporation, the distribution of profits or other resources of the society shall be prohibited.

The other paragraphs deal with: § 20c Some requirements for membership and measures for the protection of members of the community, § 20d Registration of the community, § 20e Notification obligation of the community, § 20f Change of data in the register of the community, § 20g Deletion from the register of the community, § 20h Register of the community and § 20i Rights and obligations of the community.

Table 5 - Comparison of energy community parameters in Czech legislation

Parameter	**Renewable energy community**	**Energy community**
Legal framework	Act No. 458/2000 – § 20b (definition)	
Law implementation	Act No. 469/2023, effective from January 1, 2024	
Purpose	Providing environmental, economic, or social benefits to its members or in the area where it operates	
Profit	Not main purpose, cooperatives and other business corporations may distribute 33% of their profits to their members under certain conditions. Other legal forms may not distribute profits.	
Energy source / focus	Renewable energy	Renewable and non-renewable
Type of energy	Electricity and other forms	Electricity
Geographical scope	Voting rights belong only to members who are located in proximity to community projects.	No location-based restrictions
Type of activities	Production of electricity or other forms of energy from renewable energy sources	Electricity generation and other services in the electricity sector
Membership	Natural persons, small or medium-sized enterprises, churches and religious societies and their registered legal entities, local authorities including contributory organizations and municipalities or voluntary associations of municipalities	
		Large enterprises

Control / voting rights	Belongs only to members who are located in the vicinity of energy facilities operated by this legal entity (defined by law)	Same as membership, without large companies
Large enterprises	No membership or voting rights	Membership yes, no voting rights
Membership	Open and voluntary, membership withdrawal free of charge and within the maximum of three months	

Act No. 406/2000 Coll. on Energy Management

The Energy Management Act is the second key law in the field of energy management. While the Energy Act deals mainly with the production and distribution of energy, the Energy Management Act deals with the efficient use of energy in buildings.

Thus, from the point of view of the energy communities, the requirements for thermal systems are essential, in particular:

- § 6 Efficiency of energy use of energy sources and energy distribution systems – provides for the requirements for minimum technical standards and minimum energy efficiency of the electricity or thermal energy production plant and heat distribution systems including "requirements for the regulation and control of the supply of thermal energy, the equipment of distribution thermal installations with thermal insulation and control elements, requirements for the thermal insulation of thermal energy storage tanks, the method of determining the heat losses of distribution thermal installations, the parameters of the heat carrier for the transfer of thermal energy and the parameters of the refrigerant for cooling" as laid down in the implementing legislation.
- § 6a Control of heating and air conditioning systems – establishes the obligation of the owner or building manager to ensure regular technical inspections of heating systems, combined heating and ventilation systems with a nominal output of more than 70 kW, including the preparation of an inspection report. Exceptions may be made for systems where a building automation and control system is installed which meets the requirements laid down in the implementing legislation or where an energy services contract is in progress.
- § 7 Reduction of energy performance of buildings – it requires compliance with the technical requirements according to the implementing legislation (minimum energy efficiency of the source) and further conditions for the operation of the heating system (e.g., equipping the internal thermal equipment of buildings with devices regulating the supply of thermal energy, including remotely readable meters or following the rules for heating and hot water supply).

Act No. 165/2012 Coll., on Supported Energy Sources and on Amendments to Certain Acts

The Act contains, among other things, Section 23 Heat support and forms of heat support, which deals with investment and operational heat support.

- Investment support takes the form of support programmes from state or European funds or funds from the sale of greenhouse gas emission allowances.

- Operational support for heat takes the form of a green heat bonus, but this applies to heat produced from renewable sources, in particular geothermal energy, biomass or biogas.

Recommended legal forms for renewable energy community in the Czech Republic

On the basis of the Energy Act *"A renewable energy community is a legal entity in the form of an **association, cooperative or other corporation** whose internal relations according to the founding legal act are substantially similar in content and purpose to the internal relations of an association or cooperative as defined by law."*

On the basis of the Business Corporations Act and the Civil Code, the following have been identified as appropriate legal forms:

- Registered association (marking z.s.), under the Act No. 89/2012 Coll., the Civil Code
- Cooperative, under the Act No. 90/2012 Coll. on Commercial Companies and Cooperatives
- Limited liability company, under Act No. 90/2012 Coll. on Commercial Companies and Cooperatives

In the Energy Community Register[21], as of 24.10.2024

Table 6 – Number of registered Energy Communities in Czech Republic

Legal form	Energy community	Renewable energy community
Registered association	24	2
Cooperative	1	0
Natural person under ROS 3	3	0
Other	0	0
Total	**28**	**2**

Procedures for establishing an Energy Community

According to law and consulting company Frank Bold, the following points need to be addressed during the registration process[22]:

Step 1	Choosing the appropriate legal form – Registered association / Cooperative / Limited liability company

[21] https://eru.gov.cz/registr-energetickych-spolecenstvi

[22] https://www.fbadvokati.cz/cs/clanky/9045-jak-zalozit-energeticke-spolecenstvi-ctete-prehledny-navod-krok-po-kroku

Step 2	Choosing the ownership structure of the energy community – to set who will be the owner, manager or operator of the individual elements of the electricity (and heat) production and distribution infrastructure and to determine the legal relations in electricity sharing
Step 3	Statutes or other founding legal acts – to define the nature of the community, the basic organisational structure, the rights and obligations of members, the status of members and setting out the concept of internal relations in terms of the settlement of benefits from the production and sharing of electricity.
Step 4	Plan for members' participation in the community, financing of resources and other costs – a plan for how members, shareholders or external parties will contribute to the operation and costs of the energy community.

The basic registration procedure is described in Energy Act 458/2000 § 20D[23]:

(1) The registration of a community shall be made on application.

(2) An application for registration of a community shall include:

(a) the name or business name of the applicant, its registered office and identification number, if any,

(b) the object of the activity,

(c) the name and surname, residence and date of birth of the applicant's members, if they are natural persons, and the name or business name and registered office of the applicant's members who are legal persons, and the members' identification number, if any, indicating which of those members are to have voting rights and which of those members is an SME,

(d) the name and surname, residence and date of birth, if natural persons, and the name or business name and registered office, if legal persons, and the identification number, if any, of the members, as well as, where applicable, the addresses of the premises of the members in the vicinity of the energy installations, if the application is for registration of a renewable energy community,

(e) a statement by the applicant as to which member or members exercise decisive influence.

(3) An application for registration of a community shall include a copy of

(a) the founding legal act,

(b) the document establishing the legal entity,

(c) documents showing that the applicant member is an SME or a declaration by the applicant member that it is an SME.

[23] https://www.zakonyprolidi.cz/cs/2000-458#p20d

Paragraphs 4 to 7 then deal with the procedures and course of registration by the ERO, possible conditions and procedures for refusal of registration, registration before the establishment of a legal entity and failure to register a legal entity in the public register. Overall, the rules concern the registration of energy communities and the control of their legality before their establishment as legal entities.

The detailed procedure is then described on the ERO website, where the individual conditions for the application for registration (those described in the Energy Act) are also described[24].

Legal limitations for renewable decarbonization measures (Condominiums)

Gap in heat energy sharing

The legislation in the Czech Republic is now mainly focused on electricity sharing and the topic of the active customer. The definition of a renewable energy community is also anchored in the legislation, but there is not much information on this form yet.

The question is the relationship of the owner of heat source and distribution system (i.e., heat supplier) with the customers within the renewable energy community, for which there are several variants:

- The owner of the heat source produces and supplies heat to his own properties – according to the ERO's interpretative opinion no licence is needed.
- The owner of the heat source is one of the owners of the property where the heat is supplied, but property has more owners (i.e., the producer supplies heat to himself, but also to other persons owning the property) - this is unclear (can be the same as the point below).
- The owner of the heat source produces and supplies heat to properties of which it is not the owner (i.e., to third parties)- according to the ERO's interpretative opinion a licence or concession is needed.
- The community (in the form of a cooperative) produces and supplies to other properties, but they are members of the cooperative (so they are not full owners of the building) - this is unclear.
- The nominal customer may use his consumption facility to buy and take more heat than he needs and consumes himself and pass this heat on to another customers and bill for it without profit (or with justified costs for the supply equipment). This is similar case to heat consumption by a condominium association in an apartment building and billing to users (but this case is governed by another Act).
- If nominal customer makes a profit or supplies heat to a larger number of users and charge costs like those of a normal distribution system, this may be considered a licensed activity.

However, when these aspects are combined, certain ambiguities may arise, particularly if the property to which heat is supplied is jointly owned and one of the owners is also the owner of the heat source or heat distribution system and other is not. Given the characteristics of energy communities, it is unclear whether a license would be required when accepting different

[24] https://eru.gov.cz/energeticke-spolecenstvi-zadost-o-registraci

members (similar to third parties at first) into the community and what their property relationship should be to the facility producing or supplying heat energy.

Nevertheless, in the Czech Republic is possible to operate a boiler house for housing estates and, especially in the past decades, it was a common way of heating new housing estates. However, it is characterised by the fact that in most cases it is necessary to have the appropriate licences for the production and distribution of heat. From the point of view of the Renewable Energy Community, this raises the question of whether the Renewable Energy Community could have some relief or simplification in this administrative/licensing environment (as in the case where the owner of the heat source and distribution system supplies heat to his property and thus does not need to have any licences, only to comply with cost allocation decrees).

In the case of Renewable energy communities, there may then be further questions about what the status will be, particularly in terms of the need for a licence and in terms of the conditions for budgeting the energy supplied if the community owns the heat source and heat distribution system and:

- The members of the community are all owners of the houses to which the thermal energy is supplied. (Note: this should be situation, where no licence is needed)
- Only some of the owners of the houses to which thermal energy is supplied shall be members of the community.
- The owners of the houses to which the thermal energy is supplied are not members of the community (but we assume that this does not fulfil the principle of the renewable energy community).

Interpretative opinion of the ERO and the SEI on the provisions of Act No. 458/2000 Coll. for the assessment of the issuance of licences with the subject of business “distribution of thermal energy” and “production of thermal energy”[25]

The interpretative opinion of the ERO and the SEI from the end of the 2024 addresses the conditions of ownership and the conditions of the arrangement of the heat source, distribution systems and supply points under which it is necessary to have or not to have a licence for the production and distribution of heat with regard to the conditions of the Energy Act (458/2000 Coll.). It also sets out the methods of budgeting and metering of the consumed thermal energy (by reference to the Decree in question[26]).

The document focuses on the following main cases:

1) Thermal energy source located in the same building (domestic boiler room) up to 50 kW

- The heat source is operated by the owner of the separate building
- The heat source is not operated by the owner of the separate building

2) Thermal energy source located in the same building (domestic boiler house) above 50 kW

[25] https://eru.gov.cz/vykladove-stanovisko-eru-sei-k-ustanoveni-zakona-c-4582000-sb-pro-hodnoceni-vydavani-licenci-s

[26] Note: although this is a 2024 document, it refers to decrees that have been out of force for several years. However, there is a current replacement for these decrees.

- The heat source is operated by the owner of the separate building
- The heat source is not operated by the owner of the separate building

3) Co-existing objects

- Related houses (objects) of one owner
- Related houses (objects) of different owners
- Co-contiguous houses of several owners

4) Detached buildings

- Block boiler house standing alone or as part of one of the houses supplied, owned by one owner
- Block boiler plant - produces and distributes heat for DHW heating only.
- Block boiler house - producing and distributing DHW and hot water. Central DHW preparation in the boiler room, distribution is four-pipe.
- Block boiler plant - production and distribution of DHW and DHW. Heat distribution is two-pipe.

5) Complexes and industrial zones

- Block boiler house inside the complex (industrial zones)

To sum up, as long as the owner of the heat source and heat distribution system supplies heat energy to the objects under his ownership, there is no relationship between the supplier and the customer as they are the same person, he does not need to have a licence. However, the moment he supplies heat to any other party (a supplier-consumer relationship is formed), he must have a business licence (free trade, concession, heat production or heat distribution licence). But this is not clear enough in the case of combination of these aspects, which can occur especially if the property, where the heat is supplied, is in shared ownership and one of these owners is also owner of the heat source and heat distribution system.

Interpretative opinion of the Energy Regulatory Office 1/2024 on the issue of supplying and billing energy consumed by customers[27]

According to Paragraph 77(8) of the Energy Act "*The customer has the right to supply the purchased thermal energy to another person via their own or an operated thermal energy consumption device; the costs of purchasing thermal energy are only allocated to these persons in the agreed manner.*"

The final/nominal customer may use his consumption facility to buy and take more heat than he needs and consumes himself and pass this heat on to another consumer and bill for it without profit or with justified costs for the maintenance of the supply equipment. A contractual obligation between the nominal customer and the buyer is assumed.

This is similar situation to the case of heat consumption and redistribution by a condominium association in an apartment building and billing to individual unit users or tenants. However, in this case it is governed by Act No. 67/2013, which regulates certain issues related to the

[27] https://eru.gov.cz/vykladove-stanovisko-eru-12024-k-problematice-poskytovani-rozuctovani-odebrane-energie-zakaznikem

provision of services associated with the use of apartments and non-residential premises in apartment buildings.

Anyway, these "another" consumers to whom thermal energy is supplied (except for the above case according to Act No. 67/2013), do not have the status of customers under the Energy Act because they do not consume energy at a separate consumption point using their own consumption equipment (a condition of the law). Therefore, they do not have the rights guaranteed by the customer statute.

If final/nominal customer makes a profit (this means the activity is considered a business activity under the Civil Code - Act No. 89/2012) or supplies heat to a larger number of users (i.e., "*exceeds the scope and function of a consumption device primarily used to ensure energy consumption by a single entity*") or charge costs like those of a normal distribution system, this may be considered a licensed activity.

Tax situation

In terms of taxation, there are no known exemptions or specificities for energy communities in the Czech Republic.

Taxes are governed by Act No. 235/2004 Coll. on Value Added Tax. The basic tax rate is 21%, the reduced tax rate is 12% (§ 47) (before 1.1.2024 the rate was 15%). According to paragraph 3, heat and cold are also covered by the reduced tax rate.

Act No. 261/2007 Coll. on the stabilisation of public budgets also provides for a tax on energy commodities, i.e., natural gas, solid fuels and electricity. According to PART FORTY-FIVE § 8, section 1 *Gas intended for use, offered for sale or used is exempt from tax: (a) for the production of heat in households and in domestic boiler rooms falling within the nomenclature codes 2711 11 and 2711 21.* In the case of electricity, the tax rate is set at CZK 28.30/MWh (approx. EUR 1.14), with no exemption for use in the production of heat (under PART FORTY-SEVEN, § 8, an exemption is possible for use for technological purposes necessary for the production of electricity or combined production of electricity and heat).

Pursuant to Act No. 586/1992 Coll., the Income Tax Act, the energy producer is usually subject to an income tax of 21% for legal entities and 15 or 23 % for natural persons (depending on the level of income).

Links to subsidies in the Czech Republic

The Czech Republic relies mainly on alternative measures to save energy and achieve the targets under the EED (Articles 4 and 8), which consist mainly of subsidy support programmes. These programmes support, among other things, the construction or renovation of heat sources, the modernisation of heat supply systems and the promotion of energy communities.

Modernisation Fund[28]

Support programme "KOMUNERG – Community energy" focuses on support for open energy communities established for the purpose of satisfying their own energy needs (the main purpose is not to generate profit).

Support programme "RES+ New Renewable Energy Sources" supports the use of RES and low-carbon sources of energy primarily intended for heating, such as a change in the fuel base and modernisation of heat sources and distribution systems. Support is provided for public building, residential buildings and for business).

National Restoration Programme[29]

The programme supports "the preparation of technical, economic and legal background materials necessary for the establishment and effective functioning of the Energy Community" and "the implementation of related activities necessary for the establishment of the Energy Community, including training and the actual activities of the Energy Community Coordinator." So far, there has been one Call between 2023 and 2024.

The programme also supports the "Reduction of energy consumption in the buildings of the organisational units of the state", which includes the replacement of the heating source with efficient sources using biomass, heat pumps, or cogeneration facilities using renewable energy sources (note: may be partially applicable within energy communities).

Operational Programme Technologies and Applications for Competitiveness[30]

The programme in enterprises supports heating system upgrades/efficiency improvements) including, for example, the installation of on-site integrated equipment that generates electricity, heating or cooling from renewable energy sources (note: could be marginally applicable to energy communities).

New Green Savings[31]

Within the framework of the subsidy support to apartment buildings, funding is provided for the renovation of the heat source in the house or for the connection to the central heating supply. (note: this could be applicable in certain specific cases of energy communities, however, it would need to be confirmed).

5.3 Austria

Recommended legal forms for renewable energy community in Austria

Two models for energy communities

[28] https://www.sfzp.cz/en/about-the-modernisation-fund/

[29] https://www.sfzp.cz/dotace-a-pujcky/narodni-plan-obnovy/

[30] https://optak.gov.cz/uspory-energie-vyzva-ii/a-324/

[31] https://novazelenausporam.cz/bytove-domy/

Energy communities were legally anchored in Austria by § 79 of the **Renewable Energy Expansion Act (EAG)** and the **Electricity Industry and Organisation Act (ElWOG 2010). The energy communities' framework** was introduced by an amendment of the EAG package published in the Gazette 150/2021 of 27 July 2021.

On 23 December 2025 the "Elektrizitätswirtschaftsgesetz" (ElWG) was published in the Gazette 91/2025 which will be the legal basis for energy communities in the electricity sector as of October 1 2026.

The new regulations for joint energy use or energy communities in the electricity sector (citizen energy – Section 65 Paragraph 1 Item 6 and Paragraph 2 as well as Sections 66 to 72) provide for a transitional period: October 1, 2026. Until then, existing joint generation plants and energy communities will continue to operate under the previous legal framework according to the EAG/ElWOG and will be transferred to the new system upon the entry into force of the aforementioned regulations.

The ElWG will also add additional provisions for electricity sharing, but the new provisions are only relevant for energy communities in the electricity sector.

For energy communities in the heating sector the regulations in § 79 EAG remain the sole legal basis:

Section 79.

(1) A renewable energy community may generate energy from renewable sources, consume, store, or sell the energy it generates itself. Furthermore, it may engage in aggregation and provide other energy services. The regulations applicable to the respective activity must be observed. The rights and obligations of participating grid users, in particular their free choice of supplier, remain unaffected.

(2) Members or shareholders of a renewable energy community may be natural persons, municipalities, legal entities representing public authorities with respect to local departments, other legal entities under public law, or small and medium-sized enterprises. A renewable energy community must consist of two or more members or shareholders and must be organized as an association, cooperative, partnership, corporation, or similar entity with legal personality. Its primary purpose may not be financial profit; this must be stipulated in the articles of association unless already evident from the legal form. The renewable energy community must primarily bring ecological, economic, or social benefits to its members or the areas in which it operates. Participation in a renewable energy community is voluntary and open; in the case of private companies, participation must not be their main commercial or professional activity.

(4) The provisions of the Trade Regulation Act 1994, Federal Law Gazette No. 194, do not apply to renewable energy communities.

The regulations which are relevant also for a heat energy community can be summarized in the following chart (Source: https://energiegemeinschaften.gv.at/

Model	Renewable Energy Community (EEG) local regional
Acceptable for (energy type)	renewable electricity and heat
Number of generation plants	min. 1, no upper restriction
Number of participants	min. 2
Who is allowed to participate?	natural persons, companies (small and medium-sized enterprises), municipalities, other corporations under public law
Own legal form required?	Yes
Which legal form is suitable?	Association, cooperative. Other forms are possible.

A detailed description of the legal framework (focussing on the electricity sector) can be found in **The Energy Communities Repository** which has collected data from the EU Member States on their existing policies and regulations for energy communities in the Clean Energy Package context: https://energy.ec.europa.eu/topics/markets-and-consumers/energy-consumers-and-prosumers/energy-communities/energy-communities-repository-policy-database_en#austria.

The "Österreichische Koordinationsstelle für Energiegemeinschaften" has published information material and templates on the establishment and the operation of Energy communities (https://energiegemeinschaften.gv.at/, and also a manual on the tax treatment of Energy communities (https://energiegemeinschaften.gv.at/steuern-und-abgaben-in-energiegemeinschaften/

Cooperatives in Austria

Cooperatives are associations with a non-closed number of members that serve to promote the income or economy of their members. Their legal basis is the Austrian law on cooperatives, dating back to 1873 (RGBl Nr.70/1873).[32]

In practice, there are different types of cooperatives, such as credit, purchasing, sales, consumption, exploitation, use, construction, housing and settlement cooperatives. Currently, the legal form is particularly popular for the establishment of energy and service cooperatives.

The cooperative is a legal entity and therefore has its own legal personality. It comes into being with the entry in the commercial register. The prerequisites for founding the company are the preparation of a written statute, a positive profitability forecast (the basis for this is usually a business plan) and admission to an auditing association.

The most important organs of the cooperative are the general assembly and the board of directors. Management and representation are carried out by the board. Board members are always also cooperative members (principle of self-administration).

In principle, there is a social security obligation for the board of directors who manages the business of the cooperative, provided that taxable income from the board activity is available. Cooperatives are subject to corporation tax, but there is no minimum KÖSt that must be paid. Profit distributions are subject to capital gains tax.

In contrast to other corporations, no minimum capital must be raised in the context of the formation of a cooperative. The nominal amount of a share is fixed in the articles of association and is usually the same for each member. The number of shares that a member can acquire or has to acquire (minimum subscription obligation) is determined by the articles of association.

Another significant advantage is that the admission and withdrawal of members is possible in a simplified way.

The cooperative opens up opportunities for cooperation between companies, but also private individuals and local authorities, in order to jointly exploit synergies and have a stronger presence in the market.

Links to subsidies in Austria

The funding landscape for heating and building decarbonisation in Austria (as of April 2025) operates on two main levels. On the one hand, there are **national subsidies** provided by the federal government. On the other hand, **regional support schemes** are offered by the individual provinces ("Bundesländer"). The availability, scope, and design of these funding programmes are strongly influenced by current political priorities and are subject to regular change.

[32] The actual version can be found in: https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10001680

This section provides an overview of the funding landscape as of April 2025. The list is not exhaustive and is intended to give orientation rather than a complete catalogue.

In recent years, several generous federal programmes have expired, including:

- **Sanierungsbonus**: for thermal renovation of buildings (expired)
- **Raus aus Öl und Gas**: support for replacing fossil fuel heating systems (expired)

Currently, federal funding is still available in the area of heat supply, particularly through the "**Commercial Heating and Cooling Supply**" programme (Gewerbliche Wärme- und Kälteversorgung). While primarily targeted at businesses, it may also be relevant for cooperatives and larger-scale shared systems. The programme includes:

- Module 1: Generation facilities for heating and cooling
- Module 2: Heating and cooling networks
- Module 3: Microgrids, with or without heat sales

Additional federal funding is also available for:

- Hydraulic balancing of heating systems (Hydraulischer Abgleich)
- Individual measures (Einzelmaßnahme wie Fenstertausch)(e.g., window replacement, previously part of the Sanierungsbonus)

In addition to federal programmes, Austria's provinces offer their own funding schemes. These vary significantly in terms of eligibility, conditions, and available budgets. Detailed programme descriptions are available in the Appendix.

Overview of Provincial Support Programmes (Austria, April 2025)

Province	Thermal Renovation	Heating System Replacement	Support for Heating Networks	Other Measures
Vienna	✓ Yes	✓ Yes	✓ Yes (Low-temp networks)	PV, storage, green roofs
Lower Austria	✓ Yes	✓ Yes	✗ No	PV (limited)
Upper Austria	✓ Yes	✓ Yes	✗ No	–
Salzburg	✓ Yes	✓ Yes	✓ Yes (Biomass networks)	PV, storage
Styria	✓ Yes	✓ Limited	✗ No	–
Carinthia	✓ Yes	✓ Yes	✗ No	PV
Burgenland	✓ Yes	✓ Yes	✗ No	Storage, e-mobility
Tyrol	✓ Yes	✓ Yes	✗ No	PV, solar thermal

Province	Thermal Renovation	Heating System Replacement	Support for Heating Networks	Other Measures
Vorarlberg	✓ Yes	✓ Yes	✕ No	PV, eco/CO_2 bonuses

Appendix:

Wien:

- Thermische Sanierung: Thermisch-energetische Sanierung
  - Förderung von Sanierung der Gebäudehülle auf bestimmtes Niveau (gemessen an Heizwärmebedarf)
  - Je nach Umsetzung Einmalzuschuss und/oder Annuitätenzuschuss und Landesdarlehen
- Heizkesseltausch: Errichtung und Umstellung/Nachrüstung vorhandener Heizanlagen
  - Förderung der Umstellung fossiler Wärmebereitstellungen auf Fernwärme, Wärmepumpe, Biomassekessel
  - Je nach Umsetzung Einmalzuschuss und/oder Annuitätenzuschuss und Landesdarlehen
- Wärmenetze: Förderung für Wärmenetze (Anergienetze) in Verbindung mit Wärmepumpen im Rahmen einer Heizungsumstellung ab 2 Objekten
  - Förderung eines gebäudeübergreifendes Wärmenetzes (Anergienetz) auf Wärmepumpen-Basis bei Bestandsbauten
- Zusätzliches:
  - Einzelmaßnahmen wie Fenstertausch
  - PV: Sonnenstromoffensive
  - Stationäre Stromspeicher
  - Wiener Gründachförderung

NÖ:

- Thermische Sanierung: Wohnbauförderung Wohnungssanierung
  - Förderung von Sanierung der Gebäudehülle auf bestimmtes Niveau (gemessen an Heizwärmebedarf)
  - Annuitätenzuschuss und Landesdarlehen
- Heizkesseltausch: Wohnbauförderung Wohnungssanierung
  - Förderung der Umstellung fossiler Wärmebereitstellungen auf Fernwärme, Wärmepumpe, Biomassekessel
  - Annuitätenzuschuss und Landesdarlehen
- Wärmenetze: keine bekannt
- Zusätzliches:
  - PV: nur bei Förderung Eigenheim (Nutzfläche max. 500m²)

OÖ:

- Thermische Sanierung: Wohnhaussanierungs-Verordnung
  - Annuitätenzuschuss und Landesdarlehen

- Heizkesseltausch: Förderprogramm für Wärmepumpen, Fernwärmeanschlüsse und thermische Solaranlagen
    - Förderung der Umstellung fossiler Wärmebereitstellungen auf Fernwärme oder Wärmepumpe und einer thermischen Solaranlage
    - Annuitätenzuschuss und Landesdarlehen
- Wärmenetze: keine bekannt
- Zusätzliches: keine bekannt

S:

- Thermische Sanierung: Wohnbauförderung (derzeit keine Registrierung möglich)
    - Förderung von Sanierung der Gebäudehülle auf bestimmtes Niveau (gemessen an Heizwärmebedarf)
    - Einmalig, nicht rückzahlbarer Zuschuss
- Heizkesseltausch: Wohnbauförderung und Erneuerbare Zentralheizungen
    - Errichtung oder Erneuerung eines gebäudezentralen Wärmebereitstellungssystems auf Fernwärme, Wärmepumpe oder Biomasse und thermische Solaranalagen
    - Einmalig, nicht rückzahlbarer Zuschuss
- Wärmenetze: Biomasse-Nahwärme-Anlagen
    - Förderung von Biomasse-Nahwärme-Erzeugungs-, Leitungs- und Verteilanlagen inkl. Kraft-Wärme-Kopplung und Nebenanlagen wie z.B. Brennstofflager, Trocknungs- und Logistikeinrichtungen
- Zusätzliches:
    - PV und Stromspeicher

STMK:

- Thermische Sanierung: Umfassende Sanierung
    - Förderung von Sanierung der Gebäudehülle auf bestimmtes Niveau (gemessen an Heizwärmebedarf und Endenergiebedarf oder Gesamtenergieeffizenzfaktor)
    - Einmaliger, nicht rückzahlbarer Förderungsbeitrag oder Annuitätenzuschuss oder Landesdarlehen
- Heizkesseltausch: Umfassende energetische Sanierung (derzeit nicht verfügbar) und Umfassende Sanierung
    - Erhöhung der Ökopunkte durch den Einbau einer Wärmepumpe oder Biomasseheizung
- Wärmenetze: keine bekannt
- Zusätzliches:

K:

- Thermische Sanierung: Wohnbauförderung
    - Förderung von Sanierung der Gebäudehülle auf bestimmtes Niveau (gemessen an Heizwärmebedarf und Endenergiebedarf oder Gesamtenergieeffizenzfaktor)
    - Einmalzuschuss oder Förderungskredit
- Heizkesseltausch: Wohnbauförderung und Raus aus fossilen Brennstoffen

  - Förderung der Umstellung fossiler Wärmebereitstellungen auf Fernwärme, zentrale Biomasse oder zentrale Wärmepumpe
- Wärmenetze: keine bekannt
- Zusätzliches:
  - PV Anlagenförderung

BGLD:

- Thermische Sanierung: Wohnbauförderung
  - Förderung von Sanierung der Gebäudehülle auf bestimmtes Niveau (gemessen an Heizwärmebedarf und Endenergiebedarf oder Gesamtenergieeffizenzfaktor)
  - Landesdarlehen
- Heizkesseltausch: Alternativenergieanlagen
  - Förderung der Umstellung fossiler Wärmebereitstellungen auf Fernwärme, Biomasse oder Wärmepumpe, thermische Solaranlage, Komfortlüftung, Maßnahmen zur Effizienzsteigerung bestehender Biomasseanlagen
  - Einmaliger Zuschuss
- Wärmenetze: keine bekannt
- Zusätzliches:
  - Speicheranlagen (Stromspeicher)
  - Alternative Mobilität

T:

- Thermische Sanierung: Wohnbauförderung
  - Förderung von Wärmeschutzmaßnahmen sowie Feuchtigkeits- und Schallschutzmaßnahmen
  - Einmalzuschuss oder Annuitätenzuschuss
  - Einmalzuschüsse für Zusatzförderungen wie Ökobonus und Bonus – klimafreundliches Heizsystem
- Heizkesseltausch: Wohnbauförderung und Bonus - klimafreundliches Heizsystem
  - Förderung der Umstellung fossiler Wärmebereitstellungen auf Fernwärme, Biomasse oder Wärmepumpe, Komfortlüftung und effiziente Warmwasserbereitung
- Wärmenetze: keine bekannt
- Zusätzliches:
  - PV
  - Thermische Solaranlagen

VLBG:

- Thermische Sanierung: Wohnhaussanierung
  - Förderung von Sanierung der Gebäudehülle auf bestimmtes Niveau
  - Einmalzuschuss oder Förderungskredit
- Heizkesseltausch: Raus aus Öl, Förderung Holzheizungen, Förderung Wärmepumpen
  - Förderung der Umstellung fossiler Wärmebereitstellungen auf Fernwärme, Biomasse oder Wärmepumpe

- Wärmenetze: keine bekannt
- Zusätzliches:
    - Bonus Ökoindex (über Wohnhaussanierung)
    - CO_2-Bonus (über Wohnhaussanierung)
    - PV

5.4 Slovenia

Energy communities are playing an increasingly important role in achieving energy transition goals across the European Union. They are becoming more established tools for promoting a fair transition and achieving climate neutrality, as well as meeting mandatory shares of renewable energy sources. According to some data, by 2050, half of European citizens could produce up to 50% of renewable energy.

In line with EU legislation, energy communities can take various legal forms: cooperatives, associations, partnerships, NGOs, or limited liability companies. Energy communities enable residents to pool resources and invest more easily in their own energy supply. They contribute to decarbonization and a more flexible energy system, while also gaining access to energy markets under the same competitive conditions as other market participants. They allow residents to actively participate in decisions about their own energy supply, leading to better energy efficiency, lower energy costs, greater acceptance of renewables, reduced greenhouse gas emissions, affordable personal energy investments, local economic support (by keeping money in the local economy), and job creation.

Legal Definition of Energy Communities

In 2018, the EU formally recognized energy communities and citizens as active participants in the energy system. There are two EU-level legal definitions:

- Citizen Energy Community (CEC) – defined in the EU Electricity Market Directive (EU) 2019/944.

- Renewable Energy Community (REC) – defined in the Renewable Energy Directive (RED II) (EU) 2018/2001.

According to Slovenian legislation:

- ZOEE (Art. 24) allows the creation of a citizen energy community as a cooperative, with members connected to the Slovenian distribution system. Members share electricity produced by community-owned production facilities. Energy communities are established as cooperatives by the law, which is valid for Cooperatives. (Cooperatives act https://pisrs.si/pregledPredpisa?id=ZAKO217)

CEC is technologically neutral (renewables and others) and it operates in the electricity market (generation, supply, aggregation, energy efficiency, energy services)

- ZSROVE-1 (Art. 3 and 43) defines the renewable energy community as a legal person, based on voluntary participation, primarily aiming at community benefits rather than financial profit. Legal entities engaging in economic activity can only be members if they do not conduct their primary activity within the community.

REC communities can work in all energy sectors, but technologically it has to be renewable energy sources. They can occur as companies or cooperatives.

ZSROVE-1 in its Art. 3 it also defines “community self-supply.” “Community self-consumption” means the generation of electricity from renewable energy sources for the full or partial coverage of the consumption needs of at least two final customers participating in a community self-consumption arrangement, using one or more self-consumption installations.

There are two options possible: self-supply of multiapartment building or community self-supply.

Energy Act (EZ-2) (2024), Art. 21 says that local communities with more than 10 000 inhabitants must include in their Local energy concept plan for the establishment of at least 1 RES energy community, it can be wither electricity or heat (for example biomass district heating).

Establishing a Cooperative

The most common legal form of an energy community is a cooperative, governed by the Cooperative Act (https://pisrs.si/pregledPredpisa?id=ZAKO217) Requirements include:

- At least three founding members
- Founding Act and Cooperative Rules (Statute)
- Notarized documentation
- Business account and mandatory contributions (usually lower for individuals and proportionate to energy use)
- Registration with the court/business register

Cooperative Bodies:

- General Assembly (meets annually, adopts statute, elects board)
- Management Board and President
- Supervisory Board

Municipalities can be cooperative members, if their council confirms the public interest. Public schools, however, cannot legally be cooperative members.

Financial Models and Funding Schemes

Establishing a heating cooperative, particularly for biomass district heating systems (DOLB), requires significant upfront investment. Therefore, appropriate financial models and funding schemes are critical to ensure project feasibility and sustainability.

1. Financial Models

- Member Contributions: Each cooperative member contributes a share based on expected energy consumption (e.g., EUR/kW). Contributions can vary between households, small businesses, and municipalities.
- Equity Investment: Municipalities or private investors may contribute equity in exchange for a stake in the cooperative.
- Power Purchase Agreements (PPA): Long-term contracts with consumers ensure predictable revenue streams, supporting investment viability.
- Energy-as-a-Service (EaaS): The cooperative may retain ownership of the infrastructure and sell heating as a service to end-users.

2. Funding Schemes

- EU Funding Instruments:
    - LIFE Programme: Supports climate action and energy transition projects.

- Horizon Europe: Provides funding for research and innovation in energy systems.
- European Regional Development Fund (ERDF): Co-finances energy efficiency and renewable energy investments.

- National Grants and Subsidies:
  - Slovenia's Ministry of Environment, Climate and Energy and Eco Fund regularly issue calls for co-financing renewable energy and heating systems. Eco fund is also offering credits with lower interest rate: https://www.ekosklad.si/
  - Borzen (Slovenian energy market operator and support centre) offers incentives as well as calls for co-financing renewable energy systems and technical support for community energy projects. www.borzen.si
- Loans and Credit Instruments:
  - EIB (European Investment Bank) and SID Banka offer favorable loans for green infrastructure, also Eco fund offers loans
  - Commercial banks may offer green credit lines with lower interest rates, backed by public guarantees.

As of now (February 2026) the call is open to co-finance renewable district heating and cooling systems (offered to new construction and reconstruction of systems); it is co-financed under European cohesion policy (2021-2027). Tender co-finance the installation of heat generators that use renewable energy sources, waste heat or a combination of both and the continuation of the share of renewable energy sources in district heating systems: heat pumps, solar collectors for heat production and wood biomass boilers, construction of plants for the cogeneration of heat and electricity from renewable sources in existing district heating systems and operations for the construction of new expansion of existing district heating systems, using renewable energy sources, waste heat or combination of both. Tender is open until 11.9.2026, there is 51,2 mio EUR funds available (financing reaches from 45-65 %). Cooperatives are also eligible for the tender.[33]

[33] https://www.gov.si/zbirke/javne-objave/javni-razpis-za-sofinanciranje-izgradnje-in-prestrukturiranja-daljinskih-sistemov-ogrevanja-in-hlajenja-na-obnovljive-vire-energije-za-obdobje-2025-do-2029/

6 Recommendations

6.1 Best Case Scenarios (BCS)

In the following section, the most important factors are presented in four best-case scenarios using ideal-typical examples. In reality, these scenarios often do not occur clearly separate from each other but can also merge into each other.

BCS1: Climate-active neighbourhood: A neighbourhood, a village or a small town takes off together

Typical for this scenario is that some residents themselves take on the pioneering role. I.e., they do not wait for a solution from above or from outside but become active themselves and begin to organize themselves. As a rule, these residents are themselves owners or co-owners of buildings or properties in urban peripheral locations and areas characterized by single-family homes and small apartment buildings. As a rule, these owners do not rent but live on site themselves.

Enabling factors: It has proven to be helpful if the neighbourhood is already organised in an association, i.e., is used to organising itself and is socially or culturally active. A growing or rediscovered sense of community can trigger a real development boost here. It is also easier if professionals live on site.

Hindering factors: It often proves to be an obstacle when the ownership structure in a neighbourhood is very fragmented and the technical framework conditions, e.g., the degree of renovation, are also very different. In addition, each owner has his or her own temperament and speed.

Tips for implementation: It is not easy to reconcile everyone. It is crucial

- understand the needs and motives of the neighbours,
- to win over key players in the neighbourhood, especially the professionals next door,
- work with external professionals to develop a clearly communicable heat transition offer that also convinces passive neighbours (consumers),
- that the offer is scalable. This means that it will work even if only a few participate in the first implementation phase. When the first success stories make the rounds, many will want to follow suit so as not to miss anything.

Central motifs:

- Environmental and climate awareness
- Heat transition as a profession and as a vocation
- Energy
- Reference to the property

Examples:

- Climate Village
- Gartenheim Building Group
- ADEV

BCS2: An Institution of Change: A Non-Profit Property Developer Takes Off

Typical of this scenario is that professionals take on the pioneering role. Often, these professionals are on the board of a non-profit building association or other influential position in their organization. What motivates these pioneering professionals?

- Service to the cooperative member/residents in order to save them energy costs and to maintain or increase the quality of life or the value and benefit of their apartment.
- Service to the residential complexes as assets of the building association, because this value also increases or is maintained
- Fulfilment of legal transformation requirements in order to avert penalties and other damage to the cooperative.
- Improvement of the credit conditions of the building association by decarbonizing the existing properties. (EU taxonomy)
- And of course, there are also many professionals who also want to take on ecological responsibility and do a service to the climate.

Enabling factors: It has proven to be particularly beneficial for building associations to participate in research projects in order to be able to enter the topic of decarbonisation with such good support and cushioned risk. The fact that GBVs are recognised institutions that are legally well protected and represent a firmly established factor in the housing and construction industry also has a favourable effect, because they have a lot of capital, creditworthiness and know-how.

Hindering factors: It often turns out to be an obstacle when the organization of the cooperative and often also the people involved are getting on in years. Very often

there is also a lack of reliable data on the condition and need for renovation of the existing buildings.

Tips for implementation:

- Get an overview of your building stock with the aim of creating a priority list. Start with the "low-hanging fruits"!
- The revitalization of their building stock should go hand-in-hand with a revitalization of their organization. The entire company, all departments (AGM, technology, project development, etc.) should be involved in the organizational development process. It is of central importance that this process is used by management and has the backing of those at the front.
- From the very beginning, the process needs the support of professionals who not only take care of planning and technical feasibility, but also communication with the resident base.
- It is crucial to achieve the acceptance – or even better: the active participation – of the residents / cooperative members; this means awakening them from their passive role as consumers of cooperative housing and building them up to become active co-creators of their living space.

Compared to BCS1, "Climate Active Neighbourhood", this scenario is more of a top-down approach. However, if one considers that most building associations started as small housing cooperatives in the 1920s, often in self-construction, then it is reasonable to conclude that

BCS1 can develop into BSC2 over the decades. Or that "climate-active neighbourhoods" and "non-profit building associations" can learn a lot from each other. In any case, the leverage that non-profit building associations have in decarbonisation is enormous: around 1 million apartments in Austria are managed by GBVs, which is around a quarter of the total housing stock. As outlined above, the decarbonisation of the stock could also be accompanied by a revival of the cooperative system and thus also an activation and awareness-raising of over half a million cooperative members.[34]

Central motifs:

- Environmental and climate awareness
- Heat transition as a profession and as a vocation
- Energy
- Reference to the property
- Social status
- Community and social interaction

Examples:

- Simon-Denk-Gasse 7 and 9

BCS3: Property with responsibility: An innovative private homeowner takes off

Typical of this scenario is that a homeowner takes on the pioneering role in order to develop a sustainable form of heat supply in winter and temperature control in summer together with his tenants and possibly also with his neighbours (owners of the neighbouring properties). His central motives are:

- Preservation or increase in value of his property (e.g., his apartment building),
- Handover to the next generation in good condition.
- Responsibility towards tenants.
- Environmental awareness and climate awareness.

Enabling factors: It has proven to be particularly advantageous if the owner is not only a pioneer, but also has a lot of experience, i.e., is actually already a professional or expert, because he/she is active in the real estate or energy sector, for example, has already carried out similar projects and thus has proven expertise in the fields of law, business administration, energy technology, etc.

Hindering factors: It often proves to be an obstacle that the homeowner cannot expect any additional income from renting despite considerable additional expenses. On the contrary, he/she is dependent on the cooperation of the tenants. With regard to the decarbonisation of apartment buildings, the current tenancy law thus leads to a stalemate:

On the one hand, tenants are dependent on their landlord if they want a more sustainable and cheaper form of heat supply – they themselves are powerless. On the other hand, landlords are dependent on their tenants if they want to finance decarbonization measures. There are

[34] https://www.gbv.at/Extras/AktuelleMeldungen/2025/GBV%20Zahl%20des%20Monats%20Februar/

hardly any incentives to get out of this stalemate. It only works if both sides want to and trust each other. In practice, unfortunately, this is the exception rather than the rule.

Property managers could play an important, mediating role. In most cases, however, they are not suitable because of a lack of social skills.

Tips for implementation:

- A trusting relationship between owner and tenant is needed as a basis. This does not happen overnight, but needs to be cultivated.
- It is advisable to build up a good relationship in the house before the topic of "renovation" arises, e.g., through a summer party.
- It is absolutely necessary to be accompanied by experts: architecture, energy planning, social support and, perhaps most importantly, a lawyer who drafts contracts.
- If there is a relationship of trust between owner(s) and tenant, then the establishment of a local energy community in the form of an association or cooperative is worth considering in order to be able to regulate the relationships among each other well.
- If there is a cross-property form of cooperation between neighbouring property owners, then the form of a cooperative is particularly suitable.

Again, this is a classic top-down scenario that only gets going with a committed homeowner. In order to be able to roll out this model more broadly, in addition to the changes in the law, targeted promotion of resident contact and communication is probably also needed, which prepares and accompanies the technical and energetic transformation.

Examples:

- Iglaseegasse
- DuCoop

BCS4: Active Climate Policy: A Political Actor Takes Off

Typical for this scenario is that a political actor takes on the pioneer role and puts energy transition / decarbonization on his political agenda. If there is already a municipal heat supply in the form of a district heating network, then expanding this network and decarbonising it is often a good idea to advance the heating transition. In practice, however, district heating often reaches capacity limits, and high connection fees and high energy costs often make it less attractive for building owners and tenants. Institutional building owners in particular, such as non-profit building associations, therefore often prefer their own heating solutions, independent of the district heating network. This is where isolated solutions are often created at the moment. When it comes to cross-property solutions, e.g., an anergy network or a local heating network, then classic district heating suppliers such as WienEnergie or Kelag take on the role of contractors who build and operate the plants. This is also often unsatisfactory for property owners and tenants because it creates new dependencies and often offers no cost advantage. However, a real game-changer could be the emergence of thermal energy communities that are created independently of the municipal energy supplier and the municipal utilities, but which are nevertheless funded and desired by the municipality. The heat generation facilities, e.g., the wells and the geothermal probes or collectors as well as the anergy or local heating network, are owned by the thermal energy communities and would also be operated by them. Of course, classic urban utilities could support the emergence of such heat energy communities and possibly also offer services for operation and administration, but the energy community itself would remain in the role of contractor. The Heat Plan 2040 has set an important prerequisite for the establishment of local heat energy communities with the zone "local heat together". Now suitable implementation models must be created.

Enabling factors: Municipal energy planning that is well equipped in terms of personnel and budget, which can plan for the long term and is politically supported. Politics and administration work closely together. There is a commitment to an active climate policy that allows citizens to become active themselves and become prosumers

Hindering factors: There are still no elaborated business models for thermal energy communities and also few companies that could offer services for thermal energy communities or set them up

Recommendations:

- The role of a political actor or a community is often to initiate development and to enable the framework conditions for the emergence of solutions.
- It is very helpful if communal forms of heat supply are communicated as politically desired
- After that, accompanying laws, ordinances and public planning documents must be adopted and subsidies and counselling centres must be installed.
- Corresponding programs must be designed in such a way that they outlast the next election, because decarbonization requires solid planning and a long-term perspective.
- It is of central importance to promote the emergence of an ecosystem of companies that can provide services for thermal energy communities. Here, too, the social support of the thermal energy community during its creation and during ongoing operation should not be forgotten.

With our "Wärmewende.jetzt" initiative, we want to contribute to the creation of heat energy communities within the framework of the Heat Plan 2040 and bring the term "local heat together" to life with concrete business models. The success of energy communities for electricity shows that it is possible in principle. The fact that EEGs can also play an important political role is shown by the "Burgenland Fan Club". Of course, the supply of heat is to be thought of completely differently from the supply of electricity - because it involves completely different grid structures and markets - but the possibility of founding cooperatives by the users themselves should also be considered as a suitable solution here and given its place in the market structure.