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Green4HEAT

Pannon Novum
Nyugat-dunántúli
Regionális Innovációs Nonprofit
Korlátolt Felelősségű Társaság

Final Report

Activity A1.3

Exploring policy options to accelerate the uptake of sustainable technonologies through the adoption of green business models in heating and cooling

September 2025

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Table of contents

Executive summary

This report published within the framework of the Interreg Europe Green4HEAT project, presents the results of the project's Activity A1.3, and is titled "Exploring policy options to accelerate the uptake of sustainable technologies through the adoption of green business models in heating and cooling." The activity A1.3 comprised an online survey and an online workshop aimed at identifying barriers and enabling policies to accelerate the adoption of Green Business Models (GBMs) in District Heating (DH). This report will set out the main conclusions drawn from the collected territorial evidence and the workshop by discussing the policy pathways. These include the need for awareness raising, advocacy strategies, and demonstration projects. The report outlines a few indicative preparatory measures to pave the ground for the adoption of green business models in district heating.

This report consists of the following sections:

Section 1 – Data selection and workshop summary: An overview of the data selection process, followed by a summary of the workshop including its objectives, participants, and key takeaways.

Section 2 – Enablers and barriers to the adoption of green business models: A side-by-side examination of the factors that support or inhibit the adoption of GBMs based on territorial inputs.

Section 3 – Best practices as presented in the workshop: A country-by-country showcase of regional best practices.

Section 4 – Lessons learned from partner best practices: Key insights drawn from partners' shared experiences, highlighting transferable strategies and lessons to guide future policy actions.

Section 5 – Policy pathways: An exploration of the policy options discussed during the workshop, refined and expanded upon including awareness-raising and advocacy strategies, demonstration projects and preparatory measures for the adoption of green business models in district heating.

The Annex contains the survey form, which was distributed to project partners to gather territorial data and identify transferable good practices. The insights gained directly supported policy recommendations and practical steps for scaling sustainable DH solutions across Europe.

1. Overview of the activity

1.1 Data Collection Process

The first phase of the activity comprised the **data-collection process** and concluded on July 8. Green4HEAT partners were provided with a methodology and online forms to document the policy landscape in their territories regarding the level of adoption of green business models in district heating. Eight (8) out of nine (9) partners submitted their questionnaire responses regarding the territorial policy framework, including the enablers, barriers and regional best practices of Green Business Models (GBMs) in District Heating (DH) that are presented in detail in this report.

1.2 Workshop

During the second part of the activity, PANOV, the lead partner of GREEN4HEAT 1.3, hosted a **workshop** focused on exploring **policy strategies to speed up the adoption of green business models in district heating** which took place on July 8. In the first part of the workshop, PANOV presented a classification of green business models for district heating based on the project's methodology and invited partners to share regional best practices which will be presented in detail in the next chapter of this report. Following the best practices, partners discussed some of the barriers to the adoption of GBMs in DH in their countries. Some highlighted the implementation gap between theory and reality and asked the Baltic States to share more details on their best practices. Others underlined their countries' focus on conventional centralized, low-cost energy solutions (coal, gas) without environmental considerations and the overall lack of awareness of alternative green business models. They also emphasized the communication deficit for "environmental awareness" which results in citizens and businesses remaining unconvinced. In the final part, participants assessed the different regional best practises and examined several policy pathways including awareness-raising and advocacy strategies, demonstration projects and preparatory measures for the adoption of green business models in district heating. The workshop concluded with a series of recommendations that will be further developed in the final section of this report. Below you may find the agenda of the workshop and the topics discussed.

Green4HEAT Activity A1.3 ONLINE PARTNERS' WORKSHOP Tuesday, 8 July 2025 – 9:00am (CET)		
Time (CET)	**Session**	**Presenter/ Participants**
09:00 – 09:10	**Welcome**	***Pannon Novum***
09:10 – 09:30	**Presentation of the findings from the online territorial data collection:** • Overview of DHC green business models currently used in partners' regions • Enablers and barriers for each green business model (TEPAs, LTEPs, TECs, HaaS, Servitisation, EnPCs, Hybrid).	***Pannon Novum***
09:30 – 10:00	**Partners' presentation of good practices** *[Based on the collection of territorial evidence, each partner will present at least one good practice, focusing on their transferability, feasibility and effectiveness.]*	***All partners***
10:00 – 10:15	**Short Break**	
10:15 – 11:15	**Group Discussion:** • **Joint assessment** of identified models' transferability and overall effectiveness. • **Explore policy pathways** to accelerate the adoption of green business models by private and public actors, including funding criteria, tax incentives, changes in public procurement procedures, regulatory adjustments and tariff structures.	***All partners***
11:15 – 11:30	**Closing Remarks**	***Pannon Novum***

Table 1: GREEN4HEAT Workshop Agenda

2. Presentation and analysis of territorial input

Figure 1 presents the use of GBMs in the partners' regions, according to the territorial data submitted by 8 out of 9 partners. During the workshop, six GBMs were discussed, but Local Thermal Energy Providers (LTEPs) and Thermal Energy Purchase Agreements (TEPAs) stood out in terms of use. More specifically, in 3 out of the 8 partner countries, LTEP and TEPA are commonly or frequently used. In contrast, Energy Performance Contracts (EnPCs), servitisation, heat-as-a-service (HaaS) and Thermal Energy Communities (TECs) are either rarely or not used at all in many of the partners' regions.

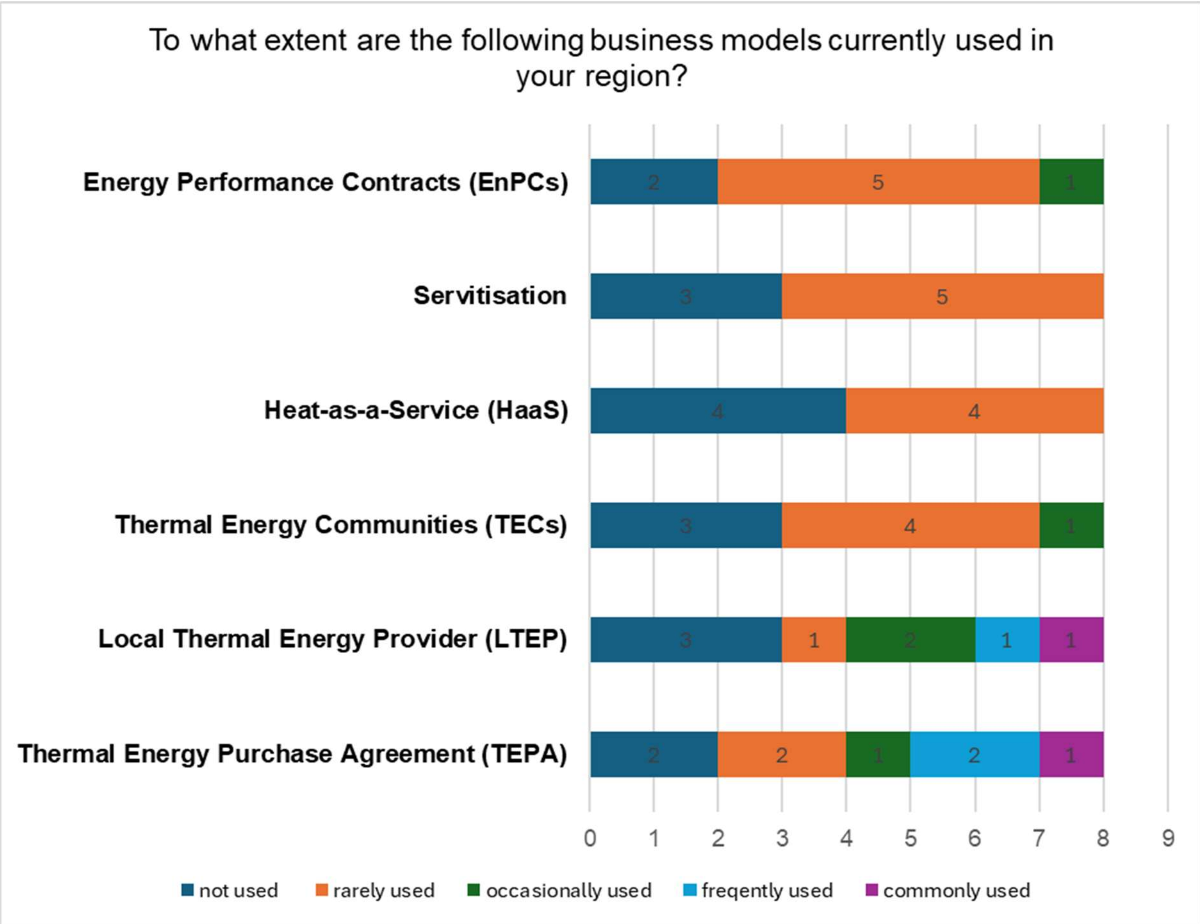

Figure 1: Current use of business models in GREEN4HEAT partners' countries

Overall, the adoption of GBMs in DH is **still in progress and varies widely across countries**. In the next section, we will explore the enablers for and barriers to the adoption of GBMs based on the territorial data collected and insights from the workshop. Understanding these factors enables countries that are falling behind to identify precisely where they can intervene and thus tailor policies and pilot plans to bridge the implementation gap.

2.1 Enablers for the adoption of GBMs in DH

Thermal Energy Purchase Agreements

Based on Figure 1, TEPA and LTEP are the most-used models in partner countries. Partners were invited to pinpoint factors they consider crucial for either a green business model's success or its potential future implementation. For **TEPA** in particular, territorial data presented in Figure 2 indicate that partners perceive **dedicated funding schemes for renewable heating or DHC modernization as the main enabler** as these schemes can reduce upfront costs and improve bankability for TEPA contracts, making infrastructure investments more attractive. Additionally, 3 out of 8 partners consider local or regional regulations favoring service-based energy contracts as an enabling factor, since such regulations can help remove barriers, enhance market stability, and boost consumer protection. Finally, 3 out of 8 partners point to utility participation in flexibility markets or RES integration initiatives, which can provide extra revenue streams, support grid stability, and, ultimately, facilitate TEPA adoption.

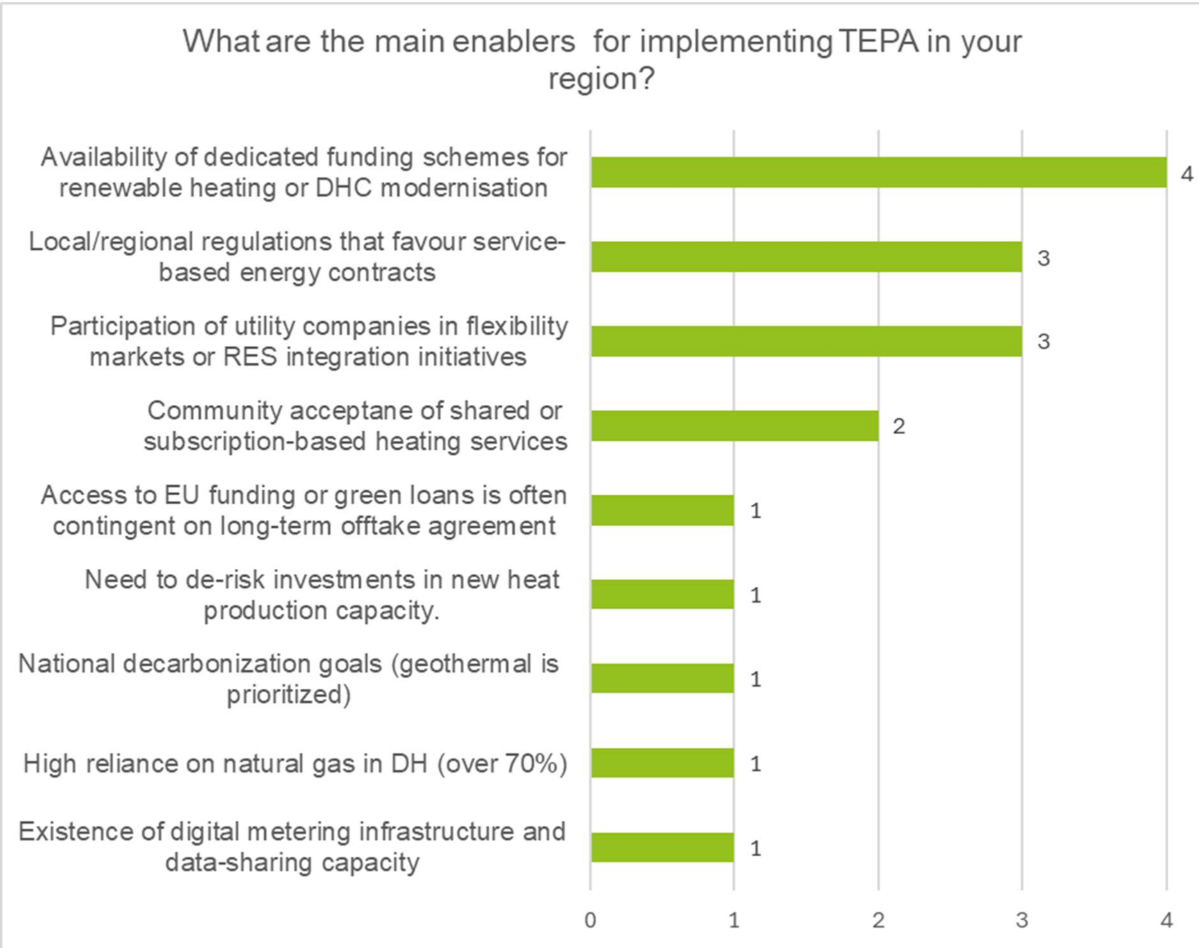

Figure 2: Main enablers for the adoption of TEPA

Local Thermal Energy Providers

Based on Figure 3, **four key factors**, each selected by 3 out of 8 partners, **emerge as enablers for the adoption of LTEP**, according to the territorial data. First, legal provisions allowing shared or multi-actor ownership of heating networks can facilitate joint ownership among citizens, municipalities, and companies, supporting democratic governance and collective investment in infrastructure. Second, the availability of decentralized heating infrastructure, including building-level systems and microgrids can reduce initial installation costs. Third, municipal ownership models that delegate operational control to local actors or prosumers empower communities and enable cities to hold ownership of networks while allowing local stakeholders to manage day-to-day operations, leveraging local expertise. Finally, a high spatial concentration of renewable energy sources, including geothermal, solar thermal, and low-temperature waste heat, can lower network costs and boost the economic viability and feasibility of LTEP systems.

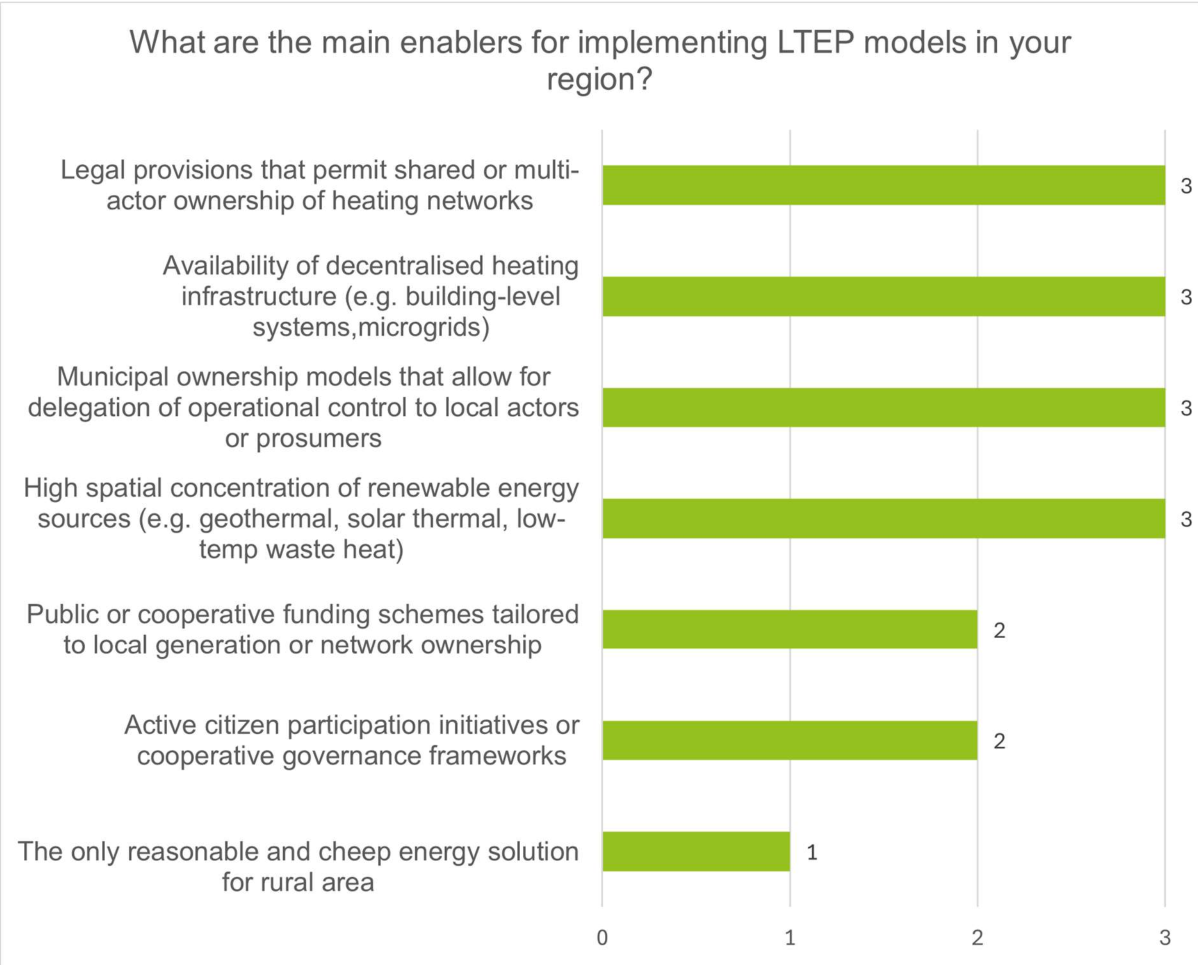

Figure 3: Main enablers for the adoption of LTEP

Thermal Energy Communities

As portrayed in Figure 4, half of the partners (4) perceive the availability of low-temperature renewable or waste heat sources at the neighborhood level as an enabling factor to the development of TECs as they promote technical readiness while lowering infrastructure costs. Another enabling factor to the development of TECs is the existence of local leadership or established community energy initiatives that ensure the mobilization of members and the reduction of development costs through volunteerism, while at the same time securing early adopters[1].

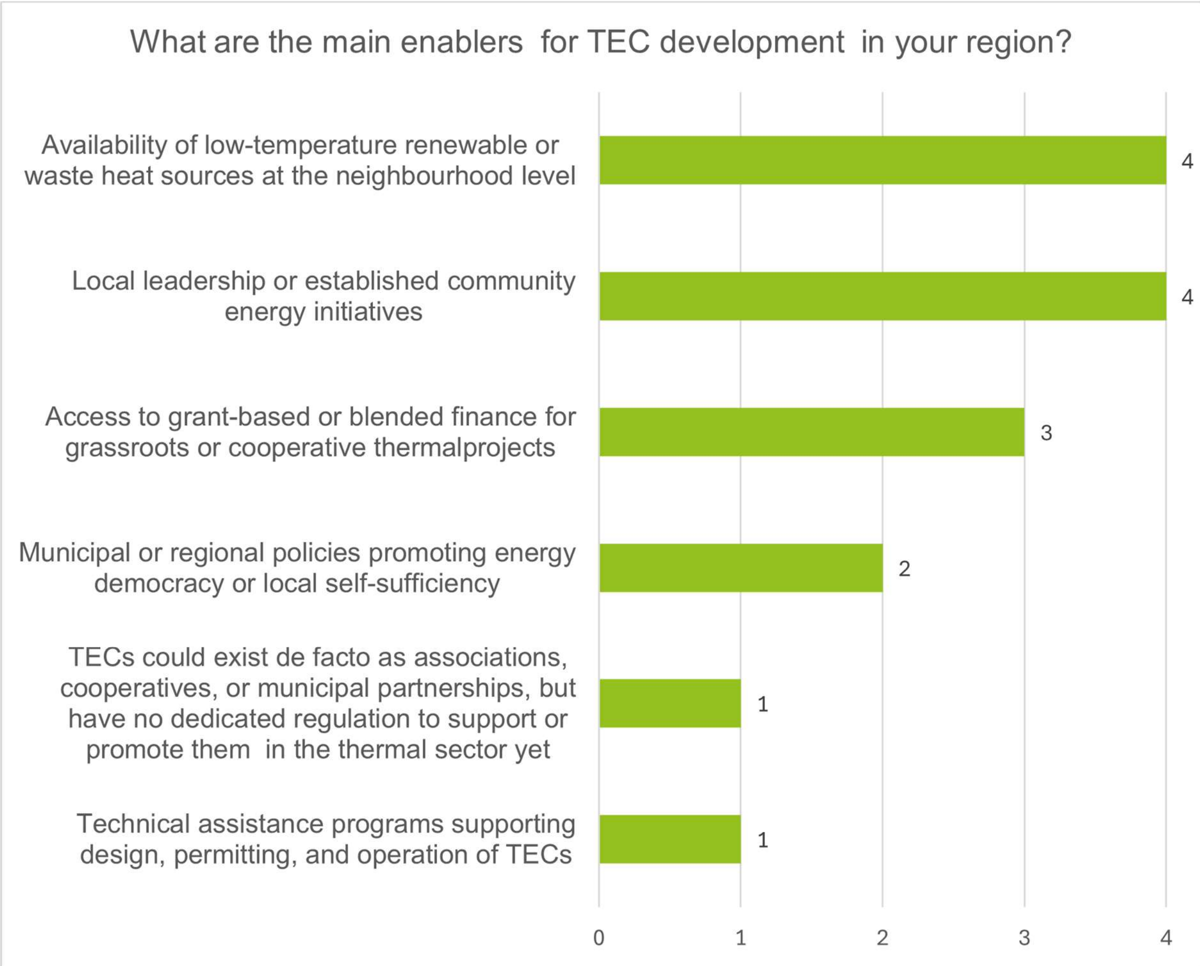

Figure 4: Main enablers for the development of TECs

Heat as a Service

The rest of the green business models, HaaS, servitisation and EnPCs, are not yet adopted in the partners' countries. However, partners identify certain factors that can act as enablers for their future

[1] Katharina Hartmann and Jenny Palm, "The Role of Thermal Energy Communities in Germany's Heating Transition," Frontiers in Sustainable Cities 4 (2022): article number 1027148, https://doi.org/10.3389/frsc.2022.1027148.

adoption. Figure 5 shows that the integration of HaaS with building renovation schemes or energy efficiency subsidies can maximize cost-effectiveness by using existing financial channels to share investment burdens and streamline implementation[2]. Municipal or social housing providers willing to act as early adopters or aggregators can also reduce perceived risk by providing a demand base and demonstrating the project's viability. Both factors ultimately help communities move from concept to implementation.

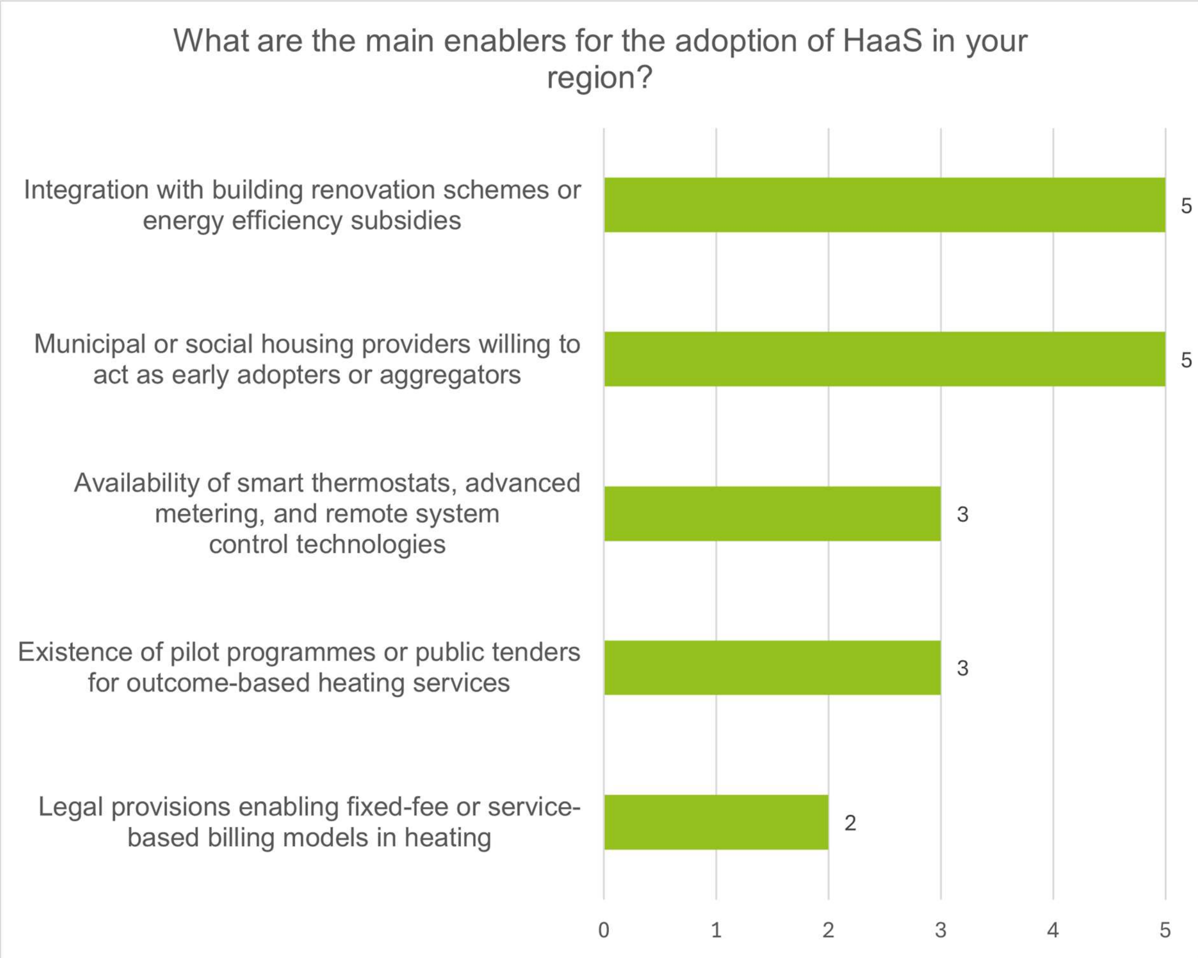

Figure 5: Main enablers for the adoption of HaaS

Servitisation model

Even though the **servitisation model remains underdeveloped** in the partners' countries, 3 out of 8 countries identify **three enablers** that suggest a policy pathway forward, as presented in Figure 6. First, incentives or subsidies for performance-based upgrades of district heating infrastructure can encourage providers to invest in system improvements by linking financial rewards to achieving energy savings and reliability goals. Second, long-term service agreements favoring lifecycle

[2] Daniel Galis, Heat-as-a-Service in action: Insights from early renewable heat projects, World Business Council for Sustainable Development (WBCSD), July 1, 2024.

performance can facilitate cost predictability and performance targets and ensure that providers invest in maintenance and upgrades over the full lifecycle. Finally, the availability of advanced monitoring tools and analytics platforms for DH performance can improve data-driven optimization, predictive maintenance, and assured performance levels throughout service contracts by continuously tracking system health. These factors can collectively support a shift toward green service-based delivery in district heating.

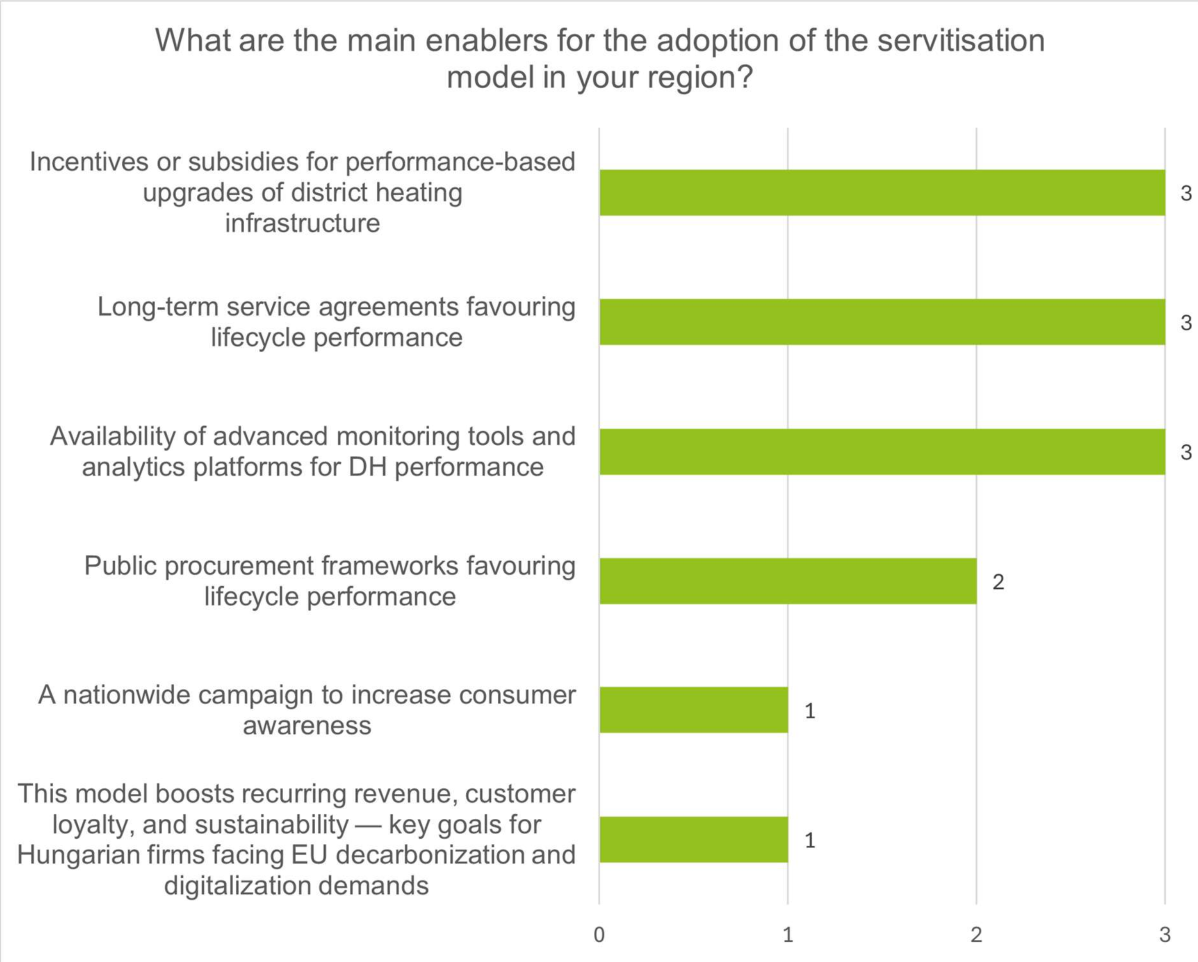

Figure 6: Main enablers for the adoption of the servitisation model

Energy Performance Contracts

Almost all partners indicate the main enabler to the adoption of energy performance contracts is the existence of **institutional clients seeking energy efficiency upgrades without upfront investment**, as presented in Figure 7. Institutional clients including municipalities, schools, hospitals, and universities frequently lack capital budgets and upfront upgrades, but have strong incentives to reduce energy costs and meet energy efficiency targets. EnPCs allow these institutions to implement comprehensive energy-saving measures with no upfront payment by relying on guaranteed performance savings that function as a repayment to the investment. This removes financial barriers and provides energy benefits making EnPCs especially attractive to the public sector.

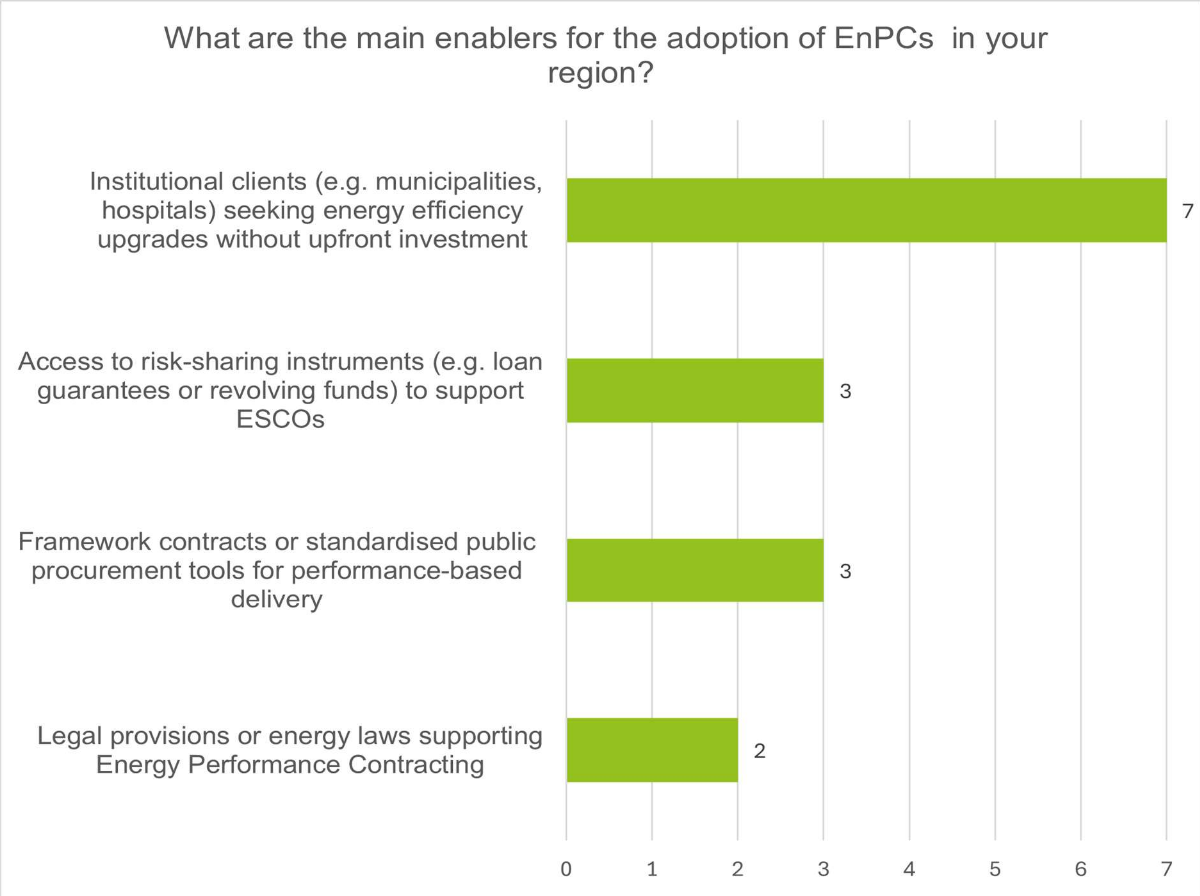

Figure 7: Main enablers for the adoption of EnPCs

2.2 Barriers to the adoption of GBMs in DH

Thermal Energy Purchase Agreements

Even though TEPA is the most used green business model among the partners, many factors hinder its use based on the partners' territorial data. Based on Figure 8, the main one indicated by 5 out of 8 partners is the **lack of familiarity with and trust in outcome-based heating services.** This can be due to the marketing deficit or the reluctance to give up control of their energy consumption, due to concerns about service quality, pricing and perceived inflexibility of centralised systems. Half of the respondents (4) also indicate the fragmentation of responsibility across municipalities, utilities, and private actors as a barrier due to differences in cost concerns, environmental goals, and service expectations that can hinder collaboration between the different actors. Finally, half of the partners (4) cite the difficulty in accessing long-term financing for decentralised or service-based heat production as a barrier due to the long payback periods for the stakeholders and investors, which can be seen as an increased risk.

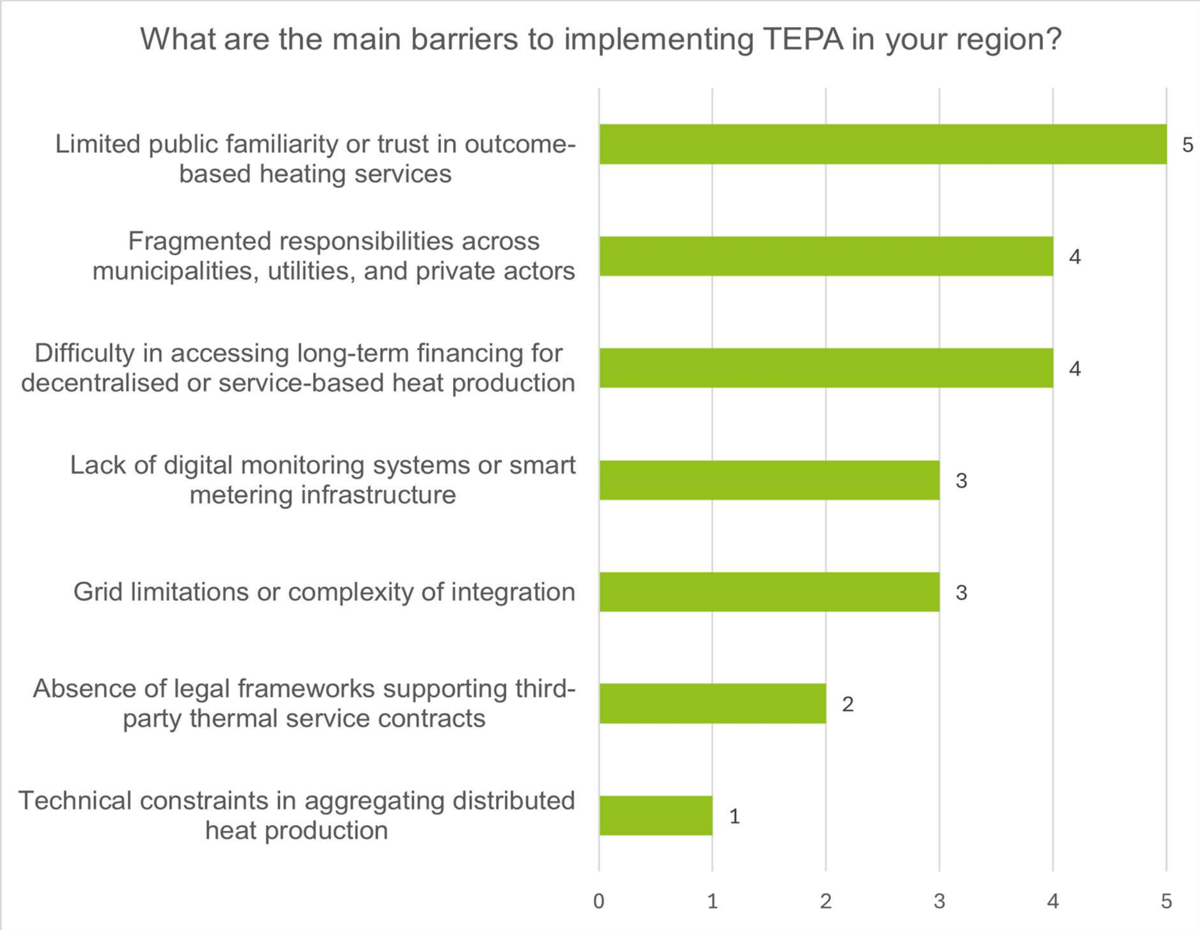

Figure 8: Main barriers to the implementation of TEPA

Local Thermal Energy Providers

As portrayed in Figure 9, the majority of partners indicate as the main barrier to LTEP implementation the **limited access to upfront capital for local stakeholders or cooperatives** that can be due to the high initial investment requirements for networks and generation units, or due to high perceived risk, low expected margins, transaction costs, and uncertain revenues without guaranteed customer contracts from the side of the traditional lenders who are reluctant to finance small-scale or cooperative projects. 6 out of 8 partners also specify the lack of technical support for small-scale producers or network managers as a barrier. This can be due to the lack of supportive financial frameworks including the lack of access to tailored financial instruments or loan guarantees and institutional loans making it hard to bridge the gap between planning and implementation.

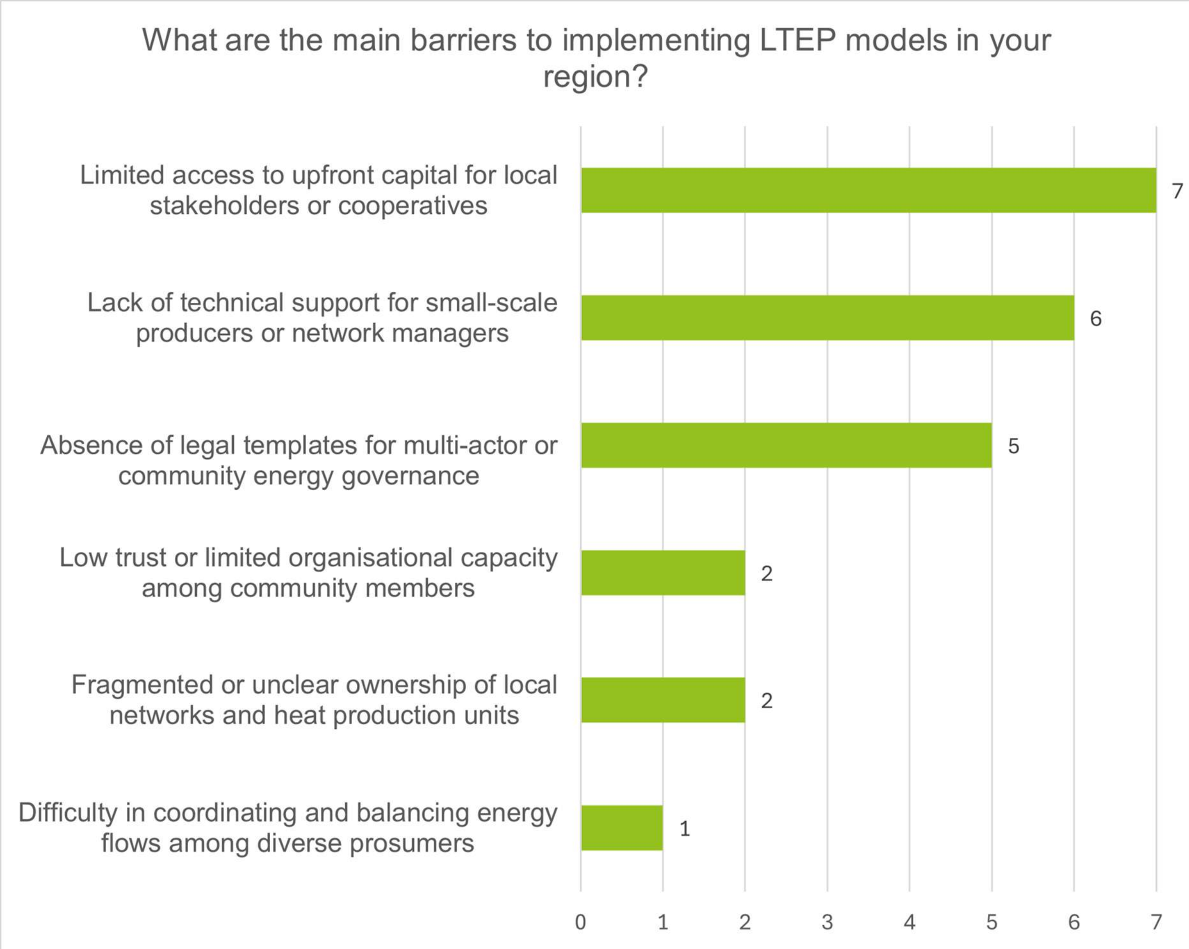

Figure 9: Main barriers to the implementation of LTEP

Thermal Energy Communities

TECs are still underdeveloped in most of the partners' countries. Two main barriers are identified according to the territorial data. Based on Figure 10, the main barrier is the **lack of dedicated legal frameworks for collective thermal energy ownership and operation** that hinder the legitimacy and financing of these initiatives. The second is the limited organisational capacity within communities as many of these initiatives lack the technical expertise, governance structures, administrative resources and project management skills to navigate complex regulations, secure financing and sustain long-term operations[3].

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[3] Jacob Bryant, "Regulatory Barriers and Opportunities for Energy Communities: Insights from Research," *European Future Energy Forum*, January 16, 2025, accessed July 16, 2025, https://www.europeanfutureenergyforum.com/regulatory-barriers-and-opportunities-for-energy-communities-insights-from-research/.

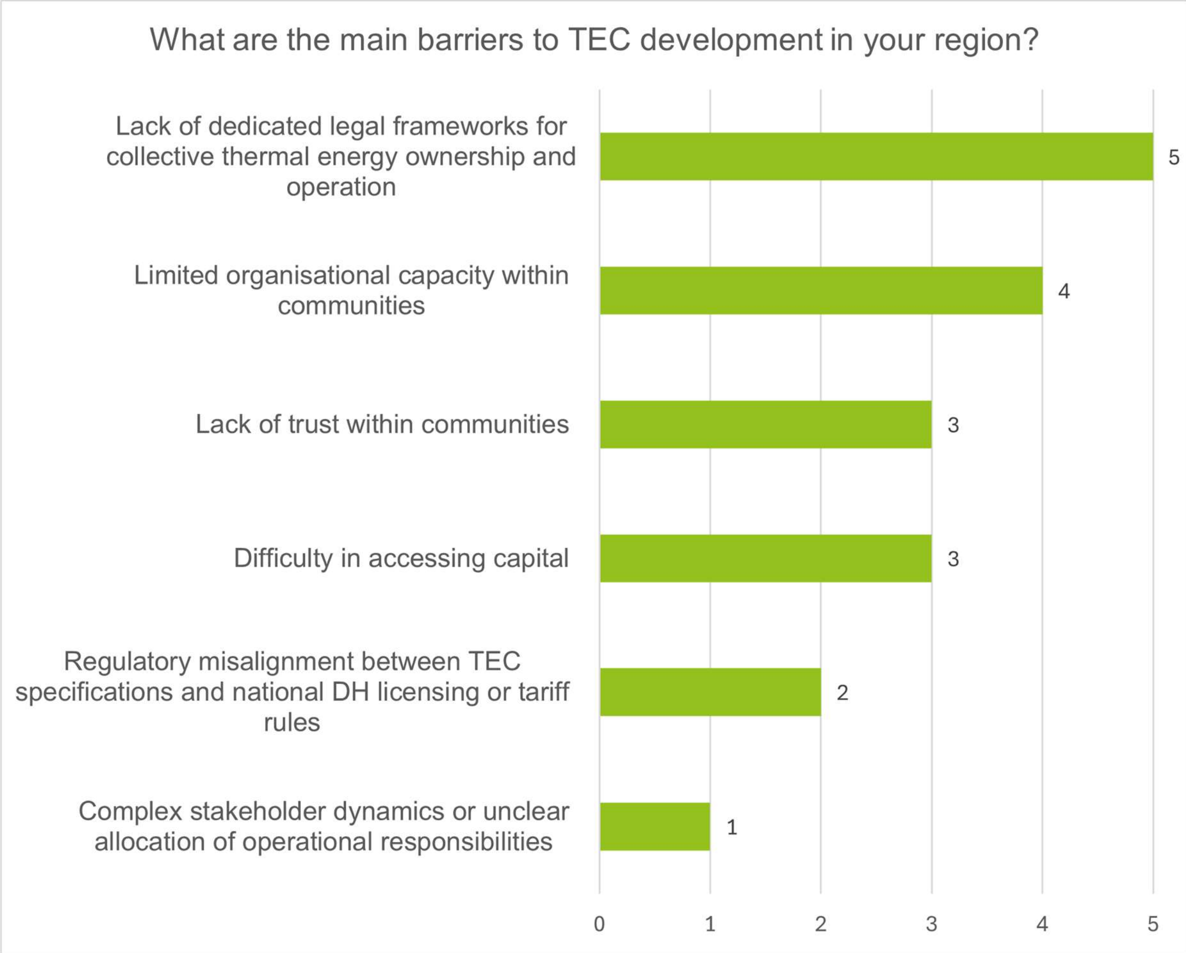

Figure 10: Main barriers to TEC development

Heat as a Service

Similar to the TEPA model, the main barrier to the implementation of the HaaS model, as it is shown in Figure 11, is both **low public awareness of service-based models** that can be due to lack of marketing and advertising campaigns and also the **reluctant to relinquish control** of their energy consumption, due to concerns about service quality, pricing and perceived inflexibility of centralised systems. A lack of specific regulation promoting performance-based energy contracts is another barrier to adopting heat-as-a-service in district heating because it can increase financial risk and make investors and providers reluctant to fund or enter long-term contracts.

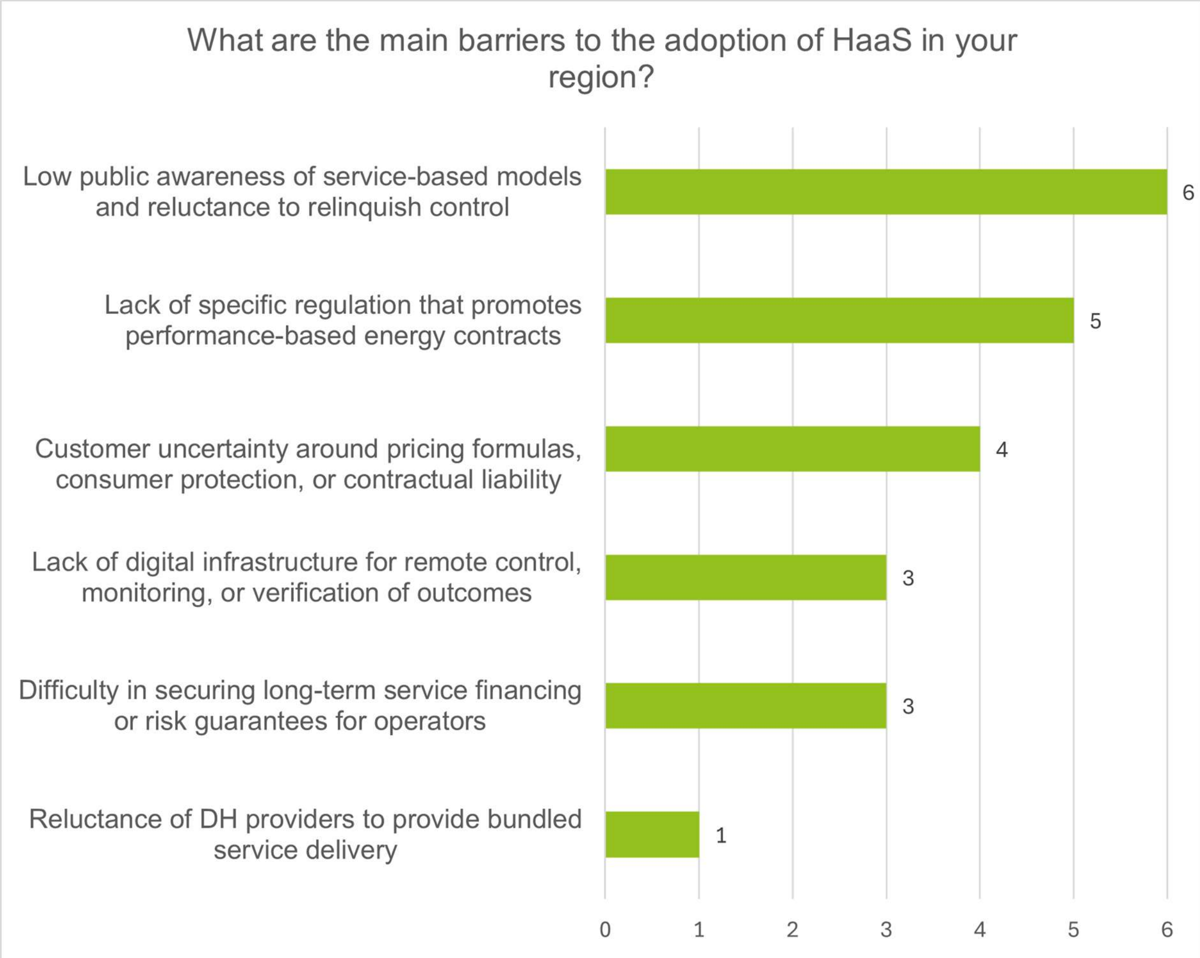

Figure 11: Main barriers to the adoption of HaaS

Servitisation model

Similar to other models, the barriers to the adoption of the servitisation model, as presented in Figure 12, are low-awareness among clients of added-value services or performance guarantees and the lack of regulatory clarity on permitted service bundling within DHC contracts. The lack of awareness means that quite often the potential clients do not recognise the benefits of this model as they are accustomed to traditional heat supply and heating setups. Additionally, when regulations do not define which services such as monitoring, maintenance, efficiency guarantees are combined with heat supply, providers can face uncertainty.

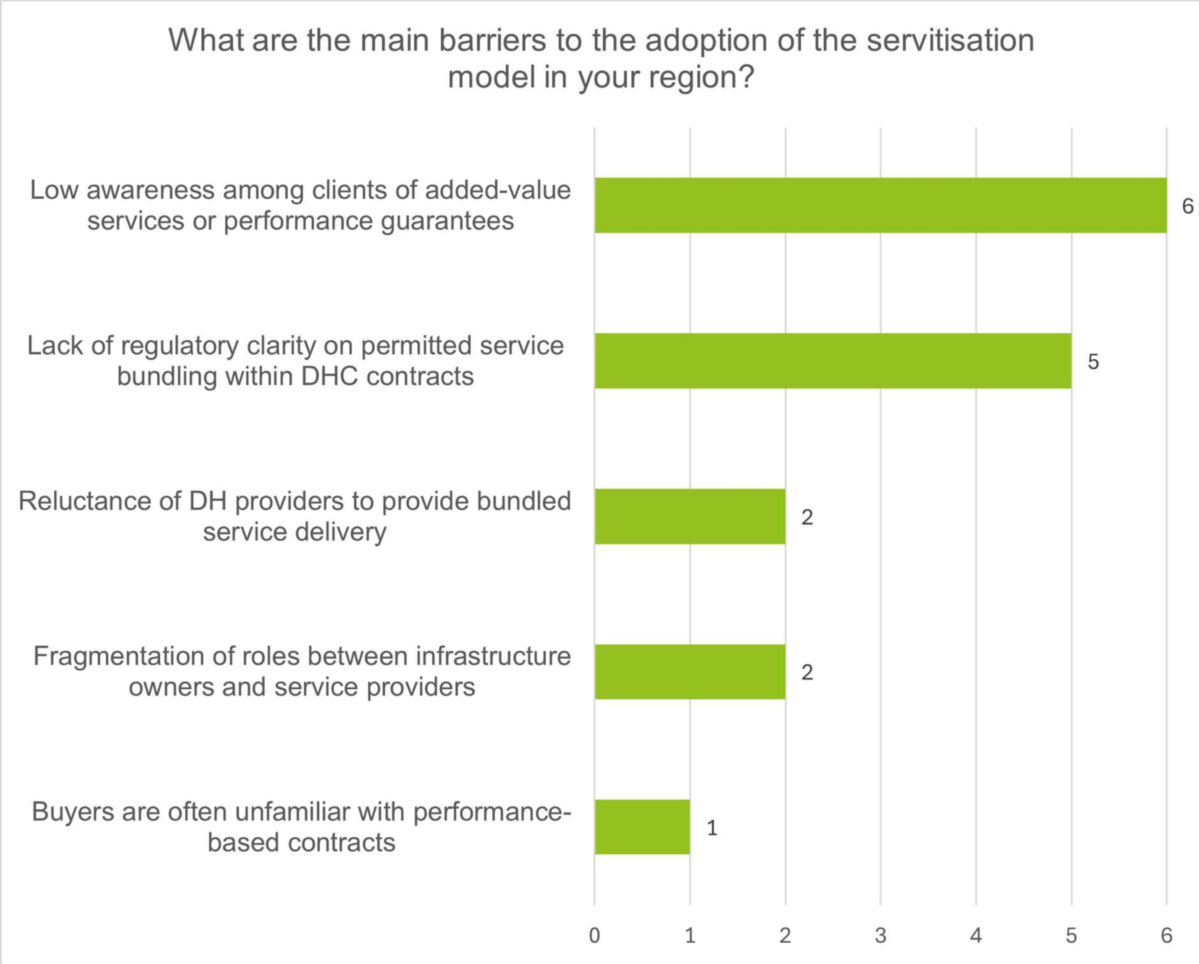

Figure 12: Main barriers to the adoption of the servitisation model

Energy Performance Contracts

Finally, when it comes to the barriers to the adoption of EnPCs the partners highlight **mismatch between short political/administrative cycles and long EnPC payback periods**, as presented in Figure 13. Administrations often prioritize initiatives that deliver results within their term whereas EnPCs require long periods to fully pay back. It is also possible that political leaders decide to reallocate funding and change political directions when they get elected which can disrupt long-term commitments needed for EnPCs. The second barrier to the adoption of EnPCs is similar to the one for the servitisation model and is the lack of regulatory clarity on permitted service bundling within DHC contracts which creates uncertainty to customers[4].

[4] Sara Moles-Grueso, Paolo Bertoldi, and Benigna Boza-Kiss, Energy Performance Contracting in the Public Sector of the EU – 2020, EUR 30614 EN (Luxembourg: Publications Office of the European Union, 2021), https://doi.org/10.2760/171970.

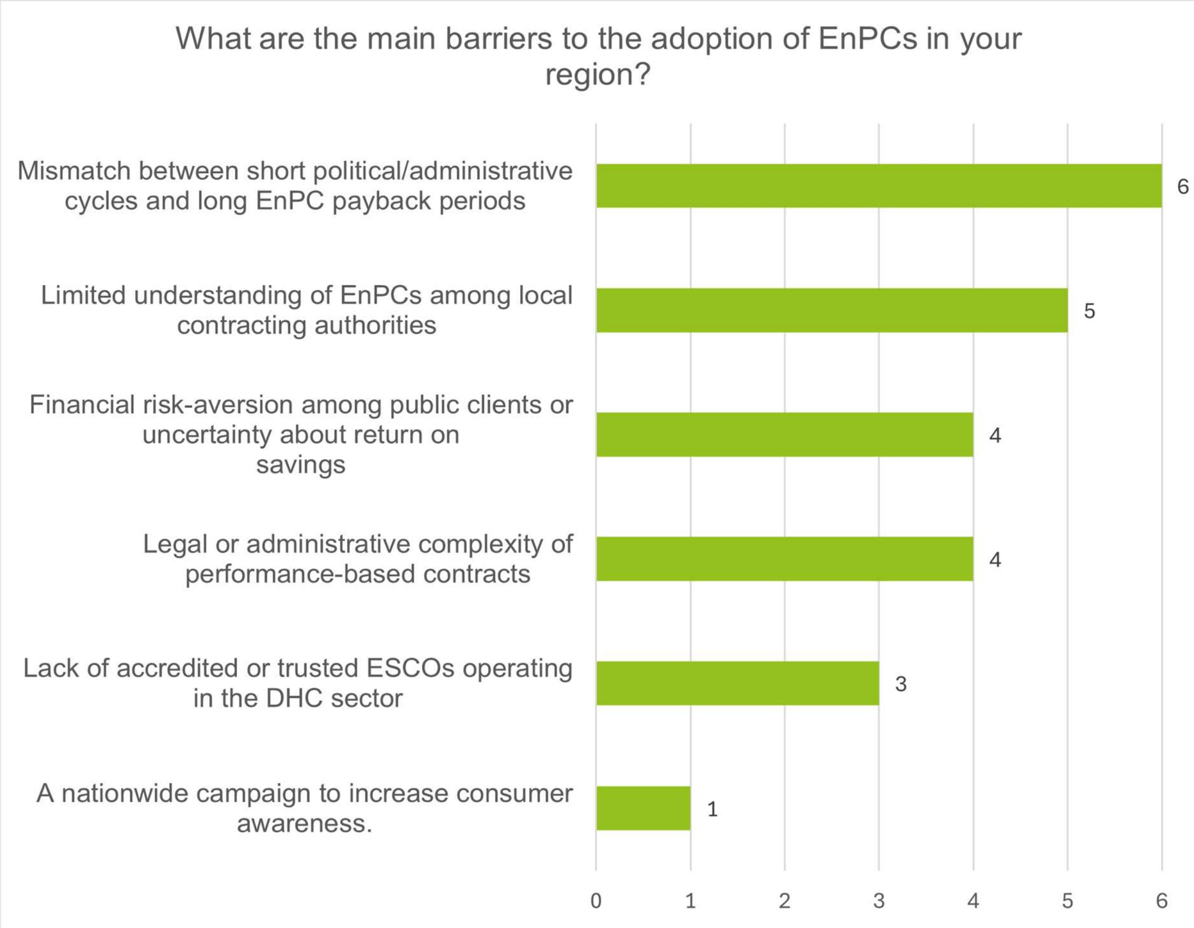

Figure 13: Main barriers to the adoption of EnPCs

3. Best Practices

Region of East Macedonia and Thrace, Greece

During the workshop, partners shared regional best practices on green business models in district heating, highlighting how pilot projects can inspire and guide more initiatives. In Greece, **Alexandroupolis** is developing one of the country's **first geothermal district heating networks** as a pilot for community-scale renewable thermal energy use. The project will provide heat for municipal buildings, social housing and greenhouses and will expand to residential buildings and potential industrial consumers[5]. Although it doesn't yet meet the EU's official definition of TEC, it embodies several TEC principles including community-scale renewable heat production using geothermal energy, municipal involvement in ownership and coordination of the network, the integration of other renewables and the inclusion of local prosumers. The project is supported by national, and EU funding

[5] Alexander Richter, "EU-Funded Project to Develop Geothermal District Heating in Greece," *ThinkGeoEnergy*, March 9, 2021.

schemes, including ERDF and Horizon 2020, and sets Alexandroupolis as a pioneer in Greece's DH decarbonization.

Public Regional Energy Entity of Castilla y León, Spain

In Spain, like other economies, energy is provided to residential and industrial users mainly for space heating and process heating/cooling. It originates from diverse primary sources including biomass, fossil fuels, solar PV, hydro, nuclear, or electricity. The sector supports **multiple distinct business models depending on the region**: traditional utility-supplied natural gas or electricity, small- and medium-scale biomass boiler supply, district heating networks (more prevalent in some regions like Castile), operation and maintenance services, and equipment manufacturers. While utilities dominate the market, supplying electricity, gas, or heat directly, other models like SME biomass providers, district heating operators, service contractors, and equipment vendors also play key roles. Even though the region has the third most developed district heating network in Spain (in terms of installed capacity), its overall importance in the heat market remains low. It is important for Spain to shift beyond the dominant utility model, expanding participation of local biomass suppliers and DH businesses to diversify services and foster more sustainable, regionally adapted energy solutions.

Province of Antwerp, Belgium

In Antwerp, district heating initiatives are emerging but remain limited and unevenly distributed, with projects largely driven by local and municipal enthusiasm rather than unified Flemish policy. The feasibility of these projects often depends on local circumstances and existing regulations. While operation with Fluvius, the dominant utility, remains essential, many municipalities that have transferred development rights to the utility face complex regulatory environments and growing challenges in launching small-scale networks. To overcome these constraints municipalities frequently partner with private actors who offer greater flexibility in terms of technology and business models. In projects that proceed, residents express high satisfaction as they value the sustainable alternative and take pride in being part of a greener district heating network. A locally driven initiative in Mortsel is **Warmte Verzilverd**, developed by two citizen energy communities ZuidtrAnt-W and Ecopower, which connects residual heat from the Agfa-Gevaert factory to around 300 homes and small businesses, and demonstrates how community-based models can complement larger Fluvius-led networks[6].

Westpomeranian Region, Poland

In Poland, district heating innovation lags due to two primary barriers: low customer awareness of advanced green heat solutions and the absence of enabling legal and funding frameworks. Public regulation still favors traditional tariff-based heat distribution paid per gigajoule which hinders green business models based in contracts or shared services. Still, change is underway: pilot projects like the **Heat-Generating Plant of the Future** in Lidzbark Warmiński which is developed by EUROS ENERGY, funded by Poland's NCBR and EU regional development fund, combines high- and low-

[6] Óscar Güell, "March Success Story: A Heating System Shared with the Community," *REScoop*, March 31, 2022.

temperature heat storage, heat pumps, and an innovative distribution network. This flexible approach allows technology to adapt to different local needs and conditions, which accelerates the process of building and expanding heating infrastructure, supporting the transition to renewable energy sources. This project enables heating and hot water provision to 28,000 m² of apartments while cutting carbon emissions by around 80%, representing a replicable model for Poland's future sustainable district heating systems[7].

University of Patras, Greece

SUNBREWED at the Athenian Brewery in Patras offers a compelling analogue to the Heat-as-a-Service (HaaS) model and the servitisation model by delivering thermal energy (steam) under a long-term thermal purchase agreement, where Protarget (with Elpedison support) owns, operates, and maintains the solar installation, and the brewery pays for the delivered heat service[8]. This arrangement aligns with HaaS principles including fixed-price thermal delivery, provider-owned infrastructure, and the operator bearing full performance responsibility. It also presents some servitisation features as the provider bundles thermal output with operation, maintenance, system optimization and monitoring services over the lifecycle of the installation. Although it serves an industrial facility and not a district heating network and it has not been fully implemented yet, SUNBREWED demonstrates the commercial and technical viability of outcome-based thermal contracting, highlighting a transferable model for residential or public heating systems accompanied by advanced metering and service guarantees. Additionally, by producing process heat in the form of steam using solar energy, it will replace significantly part of the fossil fuel based thermal demand, in the brewery's production processes.

Public Institution National Regions Development Agency, Lithuania

Lithuania's district heating sector is highly centralized and regulated, with the National Energy Regulatory Council overseeing pricing and licensing essentially acting as a market regulator under methodologies set by the Law on the Heat Sector. While local authorities must develop strategic heat plans aligned with national climate targets, their limited staffing and funding means much planning is outsourced to energy companies. Third-party access rules, introduced in 2010, allow independent heat producers to connect to existing grids, stimulating competition and enabling integration of renewable and waste heat sources9. Municipalities like Kaunas are investing in renewable-driven upgrades including EUR 35 million for biomass and solar integration with EIB backing and a guarantee

[7] Government of Poland – The National Centre for Research and Development, "Heating Plant of the Future – EuroS Energy HC Plant," *gov.pl*, accessed July 17, 2025, https://www.gov.pl/web/ncbr-en/heating-plant-of-the-future--euros-energy-hc-plant.

[8] "Elpedison Signs 15-Year Thermal Purchase Agreement with Athenian Brewery to Construct Greece's Largest Solar Thermal Steam System (5.75 MW_{th} with 15.5 MWh_{th} Storage)," Energygame (via Elpedison press release), March 12, 2025, accessed July 16, 2025.

[9] Daina Korsakaite, Darius Bieksa, and Edita Bieksiene, "Third-Party Access in District Heating: Lithuanian Case Analysis," *Competition and Regulation in Network Industries* 19, no. 3-4 (2019): 218–41, https://doi.org/10.1177/1783591719837410.

from the European Commission's InvestEU programme10, while Vilnius has modernized its network, cut heat losses, and installed the region's largest absorption heat pump11. One important step that was mentioned in the workshop was the ECO-Life project, an EU-funded initiative aimed at creating sustainable, low-carbon urban neighborhoods by combining energy-efficient building renovations with renewable energy systems like biomass boilers and solar panels12. It focused on Birštonas to upgrade residential and public buildings and integrate renewable district heating, though financial challenges prevented its full implementation. Collectively, these efforts are gradually decarbonizing Lithuania's DH, but important barriers remain such as institutional and capacity barriers at the municipal level such as existing regulatory discrepancies that result in stricter rules for municipal heat supply companies compared to independent heat producers and fragmented and monopolistic laws that hinder private, innovative and greener alternatives.

Municipality of Postojna, Slovenia

Slovenia's district heating system relies largely on **local wooden biomass as a renewable thermal energy source**, supplied by a local energy provider managing both the biomass supply and the heating grid. The sector is gradually moving towards servitisation, aiming for long-term contracts with thermal energy users, though this is still in progress. However, challenges persist, especially due to gaps in the legal framework and low awareness of green business models and alternative heating options. GBMs such as thermal energy communities, including small-scale biogas projects with farmers, remain mostly theoretical but hold potential for future development. Overall, practical and well-documented good practices beyond biomass district heating are currently limited in the region.

Pannon Novum West-Transdanubian Regional Innovation Nonprofit Ltd., Hungary

Hungary's DH has been a major part of the heating sector over the past decades, with approximately 640,000 households connected to a heat network and is primarily built around two dominant business models. The first is the LTEP Single-Owner Model, where a municipally owned utility operates both the heat production facilities and the distribution network. This model is enabled by national legal provisions that allow for public ownership of thermal infrastructure but faces challenges such as limited technical support for small-scale actors, restricted access to upfront capital, and aging infrastructure, particularly in larger cities where systems are often over 50 years old. Examples include **FŐTÁV in Budapest**, Hungary's largest local energy provider serving around 240,000 apartments and 7,000 institutions, and **MIHŐ in Miskolc** which is municipality owned, and is exploring the integration of renewable sources like geothermal and biomass. Opportunities in this model include

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[10] European Investment Bank, "Kaunas to Get Modern and Greener Heating with €35 Million Support from EIB," *European Investment Bank*, September 16, 2024, accessed July 17, 2025, https://www.eib.org/en/press/all/2024-339-kaunas-to-get-modern-and-greener-heating-with-eur35-million-support-from-eib EuropaWire+6.

[11] Covenant of Mayors, "The Greenest City in the Making: Vilnius Decarbonising Its District Heating," *Covenant of Mayors* – Europe, accessed July 17, 2025, https://eu-mayors.ec.europa.eu/en/The-greenest-city-in-the-making-Vilnius-decarbonising-its-district-heating.

[12] ECO-LIFE, "ECO-LIFE Site: Birštonas," *Smart Cities Marketplace,* European Commission, accessed July 18, 2025, https://smart-cities-marketplace.ec.europa.eu/projects-and-sites/projects/eco-life/eco-life-site-birstonas.

access to EU funding mechanisms such as the Modernisation Fund and potential roles in smart energy systems, though barriers remain due to strong reliance on natural gas and limited pricing flexibility under state regulation.

The second model is the TEPA, increasingly used for low-carbon projects involving geothermal or biomass energy. In this structure, a private developer builds and operates the energy generation facility, often funded with EU support, and signs a long-term contract (15–25 years) with a municipal district heating operator, which agrees to purchase a minimum quantity of heat. TEPA models allow risk allocation and index-linked pricing but are challenged by regulatory constraints such as capped heat prices set, mandatory public procurement procedures as competitive tendering to select TEPA partners, and tariff mismatches that can lead to funding gaps often requiring subsidies or blending. Key examples include the **Szeged geothermal project**, the largest of its kind in Central Europe[13], and the **Szentlőrinc biomass district heating system** operated by Veolia. Together, these models reflect Hungary's evolving approach to modernizing and decarbonizing its district heating sector while navigating financial, legal, and structural barriers.

Vidzeme Planning Region, Latvia

In Latvia, the most common business model for district heating is **TEPA, supported by the national energy law**, which obliges heat suppliers, which are typically district heating companies, to purchase thermal energy from local, independent producers who meet defined technical and economic criteria. These producers primarily use renewable energy sources, especially biomass (wood chips, pellets, or logs), or solar energy, while natural gas is mostly reserved for peak demand. Prices are regulated and depend on the supplier's size and capacity. **The LTEP model is also widespread, especially in rural areas**, where small, often outdated, municipally owned local boilers supply heat to local buildings, typically using biomass (wood logs, pallets, wood chips). These systems are remnants of Soviet-era centralized heating and often serve high-energy-consuming buildings that have seen little to no renovation, making them inefficient but rich in modernization potential. TECs are not yet present in Latvia and despite the recent adoption of energy community legislation, efforts have focused only on electricity, not heating, due to high upfront costs, lack of technical knowledge, and limited support infrastructure.

In Latvia, there is also **progress towards the adoption of the HaaS model** with the national energy efficiency renovation programme, mainly driven by financial support from institutions such as ALTUM. This programme has supported deep retrofits in multi-apartment buildings, including the reduction of heat demand by insulation and heating system upgrades which create an efficient building base that is amenable to performance-based energy services. However, the lack of regulation and awareness of service-based models still hinder the adoption of this model. Additionally, there is some **ongoing progress towards the servitisation model** with substantial modernization and smartification of district heating infrastructure backed by EU Recovery and Cohesion funds, including SCADA upgrades, real-time analytics, and the expansion of renewables such as biomass-fueled CHP plants.

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[13] SZETÁV – Szegedi Távfűtő Kft., "Switching the District Heating of Szeged to Geothermal," *Geotherm.SZETAV.hu*, accessed July 17, 2025, https://geotherm.szetav.hu/.

This has strengthened the technical backbone necessary for service delivery models, although ongoing barriers include high upfront costs, coordination challenges, and a lack of regulatory clarity on bundling services into DH contracts. Finally, the **promotion of EnPCs frameworks**, supported by state-backed financial instruments and primarily managed by ALTUM, has addressed capital constraints and enabled measurable energy savings. This good practice provides financial instruments, including EU fund co-financing, state loan guarantees, and capital rebates which directly tackle the major barrier of high upfront capital investment and help de-risk projects for building owners, making extensive renovations, which make EnPCs financially viable and attractive. However, implementation is often hindered by fragmented owner consensus, limited availability of skilled ESCOs and lack of regulatory clarity.

4. Lessons Learned

Clear and enabling regulatory framework

A clear and enabling regulatory framework is critical for the development and success of green business models in district heating. In countries like Latvia and Hungary, national laws that support long-term heat purchase agreements (TEPAs) have allowed renewable energy producers, particularly those using geothermal or biomass, to enter district heating markets through structured, low-risk contracts. These legal provisions ensure technical standards, pricing mechanisms, and purchasing obligations, which reduce uncertainty for investors and municipalities alike. Additionally in Hungary national legal provisions that allow public ownership of thermal infrastructure have enabled the adoption of the LTEP model. In contrast, regions without such regulatory clarity often face stalled initiatives, and fragmented progress toward decarbonization. Slovenia's legal barriers and the absence of structured energy community frameworks demonstrate how a lack of legal support and technical guidance can hinder innovation and collaboration in thermal energy.

EU funding for demonstration projects and renovation infrastructure

At the same time, EU funding plays a crucial role in enabling pilot projects and bridging investment gaps, especially in countries with outdated infrastructure or limited access to capital. Large-scale initiatives like the Szeged geothermal project in Hungary, SUNBREWED in Alexandroupolis, Heat-Generating Plant of the Future in Poland were made possible through a mix of EU funds and public-private partnerships. Projects in places like Birštonas (ECO-Life) similarly show both the potential and limits of EU-funded innovation, where local co-financing or regulatory shortcomings can still prevent success. Moreover, smaller rural systems in Latvia and Slovenia have benefitted from targeted EU support to modernize boiler houses, integrate renewables, or pilot service-based delivery models. Ultimately, these pilot projects can inspire and prove the feasibility of similar initiative and funding in infrastructure paves the way for future adoption of GBMs in district heating.

Local capacity and technical knowledge

Local capacity and technical know-how are just as essential as funding and regulations. Even when legal frameworks and EU funding are in place, the lack of local expertise, in the form of trained workers to maintain these heating systems and specific knowledge on how to operate them, can stall the transition to greener, more innovative district heating systems. Latvia's example shows that legislation for TECs is crucial but, it must also be accompanied by capacity-building and accessible technical know-how to make thermal energy communities or service-based models viable. Similarly, in Slovenia, some local heating systems remain outdated not just due to infrastructure issues, but because municipalities or cooperatives lack the operational and organizational skills to pursue modernization or servitisation models.

Ownership and governance structures

Ownership and governance structures strongly influence the flexibility and innovation potential of district heating systems. In many Central and Eastern European countries, district heating networks are still largely municipally owned, a legacy of Soviet-era infrastructure. While this public control can ensure service continuity and equity, it can also limit innovation, particularly when municipalities lack resources or incentives to experiment with new business models like servitisation. For instance, in Lithuania and Hungary, traditional municipal ownership often restricts pricing flexibility and complicates the integration of private operators, especially under strict public procurement rules. On the other hand, cities that have enabled mixed-ownership or public-private arrangements, such as Szeged's geothermal partnership in Hungary, have shown greater ability to attract investment and adopt low-carbon technologies.

From individual pilots to systemic solutions

Scaling up successful pilots requires long-term planning and financial sustainability mechanisms. While pilot projects which are often supported by EU funding can demonstrate the technical feasibility of renewable-based district heating, many struggle to scale or replicate without stable long-term financing, policy continuity, and clear pathways for integration into broader energy systems. For example, Slovenia's local biomass systems and Latvia's rural boiler houses highlight how small-scale, technically viable solutions remain underdeveloped due to short-term funding cycles, limited coordination, or lack of post-pilot business models. Even promising projects like ECO-Life in Lithuania stalled when local co-financing or implementation capacity was missing. This shows the importance of considering mechanisms like long-term thermal energy purchase agreements, energy service models, or cooperative ownership from the initial phases of the projects and to ensure alignment with national strategies and funding. Without this, good ideas risk remaining isolated successes rather than becoming systemic solutions.

5. Policy Recommendations and strategic proposals

In retrospect, there are many factors that combined can facilitate the adoption of green business models in district heating. Due to the inherently localised characteristics of heating systems, it is essential to develop solutions tailored to specific areas, considering the unique territorial conditions, requirements, and available resources. Therefore, implementing policy measures at regional and local levels is crucial to effectively addressing sector and region-specific deficiencies and challenges.

5.1 Awareness raising and advocacy strategy

The main issue that was flagged as a barrier to the adoption of GBMs in DH during the workshop was the **lack of awareness** of green business models. Both the public and industry, as well as municipal actors, remain primarily focused on conventional, centralized, low-cost energy solutions (e.g. coal, gas), often without considering environmental impacts. According to the collected territorial data, one of the main barriers to the adoption of service-based and outcome-based models such as TEPA, HaaS, and servitisation is low public awareness and a general reluctance to give up control over heating systems. Three possible policy pathways can be highlighted: the promotion of **environmental awareness**, the organisation of **communication campaigns** and **targeted advocacy**.

Environmental awareness means that public, industrial, and municipal actors are made aware that there are other approaches to DH that are both profitable and environmentally sustainable. **Study visits**, such as the one organised in the context of this project, are crucial because they offer direct exposure to successful and innovative initiatives, providing both inspiration and a sense of feasibility for similar projects. Additionally, study visits showcase operational systems and help transfer know-how and local knowledge. **Workshops** organised at the regional or local level, showcasing local or regional good practices and involving consumers, civic actors, ESCOs, DH operators, and regulators, can foster coalition-building and networking while enhancing local legitimacy. These workshops can also present good international practices and explore their transferability to other regions. Finally, **awareness raising events** can also shed light on, for instance, geothermal energy applications, highlighting their environmental and financial benefits.

A second important pathway to raise awareness is through **communication campaigns** that actively promote green heating solutions to citizens, local businesses, and energy companies. Demonstration projects play a key role in proving the feasibility of these solutions and in sharing operational experience and technical know-how. However, if the knowledge generated by such projects is not publicly communicated and widely shared, it cannot serve as a motivating or replicable example. In fact, a lack of communication was identified during the workshop as a significant factor hindering the adoption of GBMs. To improve outreach and ensure critical information reaches relevant stakeholders, provinces could invest in dedicated communication strategies, such as hiring communication experts at the local or regional level. While some regions may face funding constraints, shifting public and institutional perceptions through targeted communication can help generate greater demand for more sustainable DH models and support the transition from theory to practical implementation.

A third policy pathway is **targeted advocacy**, directed both at key stakeholders and the public, particularly those living in buildings or areas that are potential candidates for GBMs. Unlike general communication campaigns, targeted advocacy focuses on specific groups that are directly affected or positioned to influence change, such as residents of multifamily housing blocks, housing associations, building managers, municipal planners, and local energy providers. In Latvia, for instance, even though the adoption of Energy Performance Contracts (EPCs) has been promoted by financial support schemes, securing consistent consensus among multi-apartment building owners remains an ongoing organizational barrier.

Targeted advocacy can be strengthened by **engaging relevant NGOs**, especially those working in the fields of environmental sustainability, consumer protection, and social innovation. NGOs, including some of this project's partners, already possess grassroots networks and thematic expertise to conduct effective outreach, mediate between communities and decision-makers, and build public trust. To increase their impact, local or regional governments could formally mandate such NGOs to carry out advocacy activities as part of DH transition strategies. This could be done through public-private partnerships, and project-based grants. In areas where direct mandates are not feasible, regional authorities could still support NGOs by facilitating access to public data, offering logistical support, or co-organizing events and consultation processes. Customized advocacy efforts, tailored to the needs and concerns of specific communities, could include neighborhood-level information sessions, door-to-door awareness campaigns, and the development of easily accessible guides or toolkits that explain the benefits, financial implications, and available support for switching to green business models in district heating. Ultimately, when advocacy is embedded in local networks and supported by public institutions, it can significantly accelerate the social acceptance and practical implementation of GBMs, especially in areas where reluctance, disinterest, or lack of information remain. Below are some relevant organisations per partner country.

Country	NGO Name	Focus Area(s)	Potential Role in GBM Adoption
Greece	**INZEB (Initializing Energy Balance Towards Zero)**	Energy efficiency, energy poverty, energy communities	Local advocacy, public awareness campaigns, technical support for municipalities
Slovenia	**Ekologi brez meja (Ecologists Without Borders)**	Community engagement, sustainability education	Awareness campaigns, grassroots mobilisation, support for local workshops
Hungary	**Friends of the Earth Hungary**	Environmental justice, sustainable energy, community-led initiatives	Policy lobbying, advocacy training, public education
Latvia	**Zemes Draugi (Friends of the Earth Latvia)**	Renewable energy, community involvement, ecological living	Targeted outreach in residential areas, participatory planning

Country	NGO Name	Focus Area(s)	Potential Role in GBM Adoption
Lithuania	**Žiedinė Ekonomika**	Circular economy, energy justice, sustainable policy	Energy poverty advocacy, public materials, neighborhood-based workshops
Spain	**Ecologistas en Acción**	Climate action, energy democracy, public mobilisation	Large-scale awareness campaigns, community workshops, citizen pressure on local governments
Poland	**Polish Green Network (Polska Zielona Sieć)**	Sustainable energy, climate policy, regional development	Advocacy for DH transformation, public consultations, stakeholder coordination
Belgium	**Bond Beter Leefmilieu (BBL)**	Sustainable development, energy transition, climate action	Policy influence, expert communication, regional campaigns involving citizens and municipalities

Table 2: List of relevant organisations by partner country

5.2 Demonstration projects

During the workshop, partners mentioned the potential benefits of demonstration projects as one of the main policy pathways to encourage the adoption of green business models in district heating. As mentioned, demonstration projects can function as real-world results that show viability and visibility of green initiatives in district heating. Additionally, demonstration projects can serve as a case study for study visits, local workshops, or policy briefings to municipal leaders and energy users. Demonstration projects can also offer guidance by providing concrete information on costs, benefits, technical setup, partnerships and funding. Even demonstration models from different domains such as the industrial implementation of HaaS and servitisation in SUNBREWED and energy communities in electricity in Latvia can offer some insights into the adoption of these models in district heating.

5.3 Paving the way

Mapping renewable energy resources

Partners can use existing methodologies to map the renewable energy resources in their regions[14], helping to identify the technical and economic potential for sustainable models in district heating. For instance, geological mapping of the local geothermal potential of the region can provide feasibility studies for the development of geothermal heat plants in countries like Spain. These methodologies allow partners to generate high-resolution resource maps that highlight optimal locations for renewable heat projects. This type of mapping supports strategic decision-making by helping municipalities, planners, and energy service providers identify priority zones for investment, assess

[14] Resource Mapping – Procurement, ESMAP, accessed July 21, 2025.

the feasibility of alternative business models, and align energy planning with climate goals. Moreover, these maps can be used in public outreach and advocacy campaigns to visually demonstrate the local potential for cleaner, more sustainable heating systems.

Workforce and capacity building

EU funding is essential for demonstration projects, infrastructure renovation, and the deployment of green business models in district heating. The exceptionally high upfront costs remain the principal barrier to adopting GBMs. To address this, partner countries must ensure they have the necessary resources and skilled workforce to identify and secure EU funding, financial instruments, or alternative funding streams. Additionally, regional offices can provide technical training during project implementation to stakeholders, including public officials and ESCO personnel, to support the project delivery. Training municipal and regional staff in heating planning, technical feasibility assessment, and ESCO formation can strengthen local capacity and improve the quality and long-term sustainability of district heating initiatives. Finally, regional offices can uptake reskilling initiatives to support the energy transition in the heating sector (e.g. heat pump technicians).

Methodologies/guidelines for sustainable heating solutions

Region-specific guidelines are essential for establishing the methodologies required for GBMs and demonstration initiatives. Partners should mandate institutions or universities to prepare **feasibility studies** that consider the specific context and develop tailor-made recommendations and investment plans. Even though some municipalities cannot afford major equipment purchases or network renovations, supporting infrastructure remains crucial for enabling demonstration projects and serves as a key motivating factor. For example, in Latvia, although the servitisation model is not yet present, large-scale investments in the modernization and smartification of DH networks and heat production facilities can provide the essential technical foundation for optimizing heat delivery and offering performance-based services in the future. Finally, municipalities and regional offices can also request **cost-benefit assessments of waste heat recovery** and integrate these opportunities into local systems where feasible. These studies help determine whether converting industrial or process waste heat into district heating systems is economically and environmentally viable. Ultimately, integrating viable solutions into local plans supports sustainable heating, energy efficiency, and aligns with broader climate policy mandates.

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ANNEX Survey form - Green Business Models in District Heating

SECTION 1: GENERAL INFORMATION

Name:	
Organisation:	
Role/Position:	
Region/Country:	
Email:	

SECTION 2: TERRITORIAL RELEVANCE OF GREEN BUSINESS MODELS

1. TO WHAT EXTENT ARE THE FOLLOWING BUSINESS MODELS CURRENTLY USED IN YOUR REGION (E.G. IN MUNICIPAL DH SYSTEMS, PRIVATE NETWORKS, OR NEW DEVELOPMENTS)? **(1 = NOT USED, 5 = COMMONLY USED)**					
MODEL	1	2	3	4	5
THERMAL ENERGY PURCHASE AGREEMENT (TEPA)	☐	☐	☐	☐	☐
LOCAL THERMAL ENERGY PROVIDER (LTEP)	☐	☐	☐	☐	☐
THERMAL ENERGY COMMUNITIES (TECS)	☐	☐	☐	☐	☐
HEAT-AS-A-SERVICE (HAAS)	☐	☐	☐	☐	☐
SERVITISATION	☐	☐	☐	☐	☐
ENERGY PERFORMANCE	☐	☐	☐	☐	☐

CONTRACTS (ENPCS)					

SECTION 3: TEPA MODEL

2. Which TEPA implementation model do you think is more viable in your region?
☐ Network Owner Model (DH manages network, outsources production) ☐ Energy Producer Model (DH manages both network and production) ☐ None
Please provide the rationale behind your choice:
3. What are the main enablers and barriers for implementing TEPA in your region?
<u>Select up to 3 key enablers:</u>
☐ Availability of dedicated funding schemes for renewable heating or DHC modernisation ☐ Local/regional regulations that favour service-based energy contracts ☐ Existence of digital metering infrastructure and data-sharing capacity ☐ High density of heat pump installations leading to high aggregation potential ☐ Participation of utility companies in flexibility markets or RES integration initiatives ☐ Community acceptance of shared or subscription-based heating services

☐ Other (please specify)
<u>Select up to 3 key barriers:</u>
☐ Absence of legal frameworks supporting third-party thermal service contracts ☐ Lack of digital monitoring systems or smart metering infrastructure ☐ Difficulty in accessing long-term financing for decentralised or service-based heat production ☐ Limited public familiarity or trust in outcome-based heating services ☐ Grid limitations or complexity of integration ☐ Technical constraints in aggregating distributed heat pumps ☐ Fragmented responsibilities across municipalities, utilities, and private actors ☐ Other (please specify)
4. Please describe a good practice that has promoted TEPA implementation in your region. What were the implementation barriers and challenges met and/or tackled by said practice?
5. HOW WOULD YOU RATE THE FOLLOWING ASPECTS OF THE IDENTIFIED GOOD PRACTICE IN YOUR REGIONAL CONTEXT?

• *(SCALE: 1 = VERY LOW; 5 = VERY HIGH)*					
ASPECT	1	2	3	4	5
TRANSFERABILITY — **(POTENTIAL FOR REPLICATION IN OTHER REGIONS OR CONTEXTS)**	☐	☐	☐	☐	☐
FEASIBILITY **(TECHNICAL, ECONOMIC, OR FINANCIAL VIABILITY)**	☐	☐	☐	☐	☐
EFFECTIVENESS **(IMPACT ON ACHIEVING ITS INTENDED GOAL: PROMOTION OF THE TEPA BUSINESS MODEL)**	☐	☐	☐	☐	☐

SECTION 4: LOCAL THERMAL ENERGY PROVIDERS (LTEPS)

6. Which variation of the LTEP model do you find more relevant or viable for your region?
☐ Prosumer-operated systems (e.g., local users generate and manage energy) ☐ Single-owner model (same entity owns both network and production) ☒ Neither
Please provide the rationale behind your choice:

7. What are the main enablers and barriers for implementing LTEP models in your region?

<u>Select up to 3 key enablers:</u>

☐ Municipal ownership models that allow for delegation of operational control to local actors or prosumers

☐ Active citizen participation initiatives or cooperative governance frameworks

☐ High spatial concentration of renewable energy sources (e.g. geothermal, solar thermal, low-temp waste heat)

☐ Availability of decentralised heating infrastructure (e.g. building-level systems, microgrids)

☐ Public or cooperative funding schemes tailored to local generation or network ownership

☐ Legal provisions that permit shared or multi-actor ownership of heating networks

☐ Other (please specify)

<u>Select up to 3 key barriers:</u>

☐ Fragmented or unclear ownership of local networks and heat production units

☐ Lack of technical support for small-scale producers or network managers

☐ Absence of legal templates for multi-actor or community energy governance

☐ Limited access to upfront capital for local stakeholders or cooperatives

☐ Difficulty in coordinating and balancing energy flows among diverse prosumers

☐ Low trust or limited organisational capacity among community members

☐ Other (please specify)

8. **Please describe a good practice that has promoted LTEP initiatives in your region. What were the implementation barriers and challenges met and/or tackled by said practice?**

9. HOW WOULD YOU RATE THE FOLLOWING ASPECTS OF THE IDENTIFIED GOOD PRACTICE IN YOUR REGIONAL CONTEXT?
- ***(SCALE: 1 = VERY LOW; 5 = VERY HIGH)***

ASPECT	1	2	3	4	5
TRANSFERABILITY — **(POTENTIAL FOR REPLICATION IN OTHER REGIONS OR CONTEXTS)**	☐	☐	☐	☐	☐
FEASIBILITY **(TECHNICAL, ECONOMIC, OR FINANCIAL VIABILITY)**	☐	☐	☐	☐	☐
EFFECTIVENESS **(IMPACT ON ACHIEVING ITS INTENDED GOAL: FACILITATION OF LTEP INITIATIVES)**	☐	☐	☐	☐	☐

SECTION 5: THERMAL ENERGY COMMUNITIES (TECS)

10. What scale of TECs do you see as most feasible in your region?
☐ Small (up to 3 households) ☐ Medium (neighbourhood-level, 10–20) ☐ Large (city-level) ☐ Not sure
11. What are the main enablers and barriers for TEC development in your region?
<u>Select up to 3 key enablers:</u>
☐ Existence of community energy legislation or support schemes specifically addressing TECs ☐ Access to grant-based or blended finance for grassroots or cooperative thermal projects ☐ Local leadership or established community energy initiatives ☐ Availability of low-temperature renewable or waste heat sources at the neighbourhood level ☐ Technical assistance programs supporting design, permitting, and operation of TECs ☐ Municipal or regional policies promoting energy democracy or local self-sufficiency ☐ Other (please specify)
<u>Select up to 3 key barriers:</u>

☐ Lack of dedicated legal frameworks for collective thermal energy ownership and operation ☐ Difficulty in accessing capital ☐ Lack of trust within communities ☐ Limited organisational capacity within communities ☐ Regulatory misalignment between TEC specifications and national DH licensing or tariff rules ☐ Complex stakeholder dynamics or unclear allocation of operational responsibilities ☐ Other (please specify)
12. Please describe a good practice that has promoted TEC initiatives in your region. What were the implementation barriers and challenges met and/or tackled by said practice?
13. HOW WOULD YOU RATE THE FOLLOWING ASPECTS OF THE IDENTIFIED GOOD PRACTICE IN YOUR REGIONAL CONTEXT? • ***(SCALE: 1 = VERY LOW; 5 = VERY HIGH)***

ASPECT	1	2	3	4	5
TRANSFERABILITY — **(POTENTIAL FOR REPLICATION IN OTHER REGIONS OR CONTEXTS)**	☐	☐	☐	☐	☐

FEASIBILITY **(TECHNICAL, ECONOMIC, OR FINANCIAL VIABILITY)**	☐	☐	☐	☐	☐
EFFECTIVENESS **(IMPACT ON ACHIEVING ITS INTENDED GOAL: FACILITATION OF FACILITATION OF TEC DEVELOPMENT)**	☐	☐	☐	☐	☐

SECTION 6: HEAT-AS-A-SERVICE (HAAS)

14. What are the main enablers and barriers to the adoption of HaaS in your region?
<u>Select up to 3 key enablers:</u>
☐ Existence of pilot programmes or public tenders for outcome-based heating services ☐ Availability of smart thermostats, advanced metering, and remote system control technologies ☐ Legal provisions enabling fixed-fee or service-based billing models in heating ☐ Municipal or social housing providers willing to act as early adopters or aggregators ☐ Integration with building renovation schemes or energy efficiency subsidies ☐ Other (please specify)
<u>Select up to 3 key barriers:</u>

☐ Lack of specific regulation that promotes performance-based energy contracts

☐ Lack of digital infrastructure for remote control, monitoring, or verification of outcomes

☐ Customer uncertainty around pricing formulas, consumer protection, or contractual liability

☐ Reluctance of DH providers to provide bundled service delivery

☐ Difficulty in securing long-term service financing or risk guarantees for operators

☐ Low public awareness of service-based models and reluctance to relinquish control

☐ Other (please specify)

15. Please describe a good practice that has promoted the adoption of HaaS in your region. What were the implementation barriers and challenges met and/or tackled by said practice?

16. HOW WOULD YOU RATE THE FOLLOWING ASPECTS OF THE IDENTIFIED GOOD PRACTICE IN YOUR REGIONAL CONTEXT?

- ***(SCALE: 1 = VERY LOW; 5 = VERY HIGH)***

ASPECT	1	2	3	4	5
TRANSFERABILITY — **(POTENTIAL FOR REPLICATION IN OTHER REGIONS OR CONTEXTS)**	☐	☐	☐	☐	☐

FEASIBILITY **(TECHNICAL, ECONOMIC, OR FINANCIAL VIABILITY)**	☐	☐	☐	☐	☐
EFFECTIVENESS **(IMPACT ON ACHIEVING ITS INTENDED GOAL: PROMOTION OF HAAS)**	☐	☐	☐	☐	☐

SECTION 7: SERVITISATION

17. What are the main enablers and barriers to the adoption of the servitisation model in your region?
<u>Select up to 3 key enablers:</u>
☐ Availability of advanced monitoring tools and analytics platforms for DH performance ☐ Long-term service agreements favouring lifecycle performance ☐ Public procurement frameworks favouring lifecycle performance ☐ Incentives or subsidies for performance-based upgrades of district heating infrastructure ☐ Other (please specify)
<u>Select up to 3 key barriers:</u>

☐ Lack of regulatory clarity on permitted service bundling within DHC contracts ☐ Fragmentation of roles between infrastructure owners and service providers ☐ Reluctance of DH providers to provide bundled service delivery ☐ Low awareness among clients of added-value services or performance guarantees ☐ Other (please specify)
18. Please describe a good practice that has promoted the adoption of the servitisation model in your region. What were the implementation barriers and challenges met and/or tackled by said practice?
19. HOW WOULD YOU RATE THE FOLLOWING ASPECTS OF THE IDENTIFIED GOOD PRACTICE IN YOUR REGIONAL CONTEXT? • ***(SCALE: 1 = VERY LOW; 5 = VERY HIGH)***

ASPECT	1	2	3	4	5
TRANSFERABILITY — **(POTENTIAL FOR REPLICATION IN OTHER REGIONS OR CONTEXTS)**	☐	☐	☐	☐	☐
FEASIBILITY **(TECHNICAL,**	☐	☐	☐	☐	☐

ECONOMIC, OR FINANCIAL VIABILITY)					
EFFECTIVENESS **(IMPACT ON ACHIEVING ITS INTENDED GOAL: PROMOTION OF THE SERVITISATION MODEL)**	☐	☐	☐	☐	☐

SECTION 8: ENERGY PERFORMANCE CONTRACTS (EnPCS)

20. Which type of EnPC model would be more relevant in your territory?
☐ Guaranteed Savings Model (ESCO guarantees savings; client keeps surplus) ☐ Shared Savings Model (ESCO and client share actual savings) ☐ Both ☐ Neither
21. What are the main enablers and barriers to the adoption of EnPCs in your region?
<u>Select up to 3 key enablers:</u>
☐ Framework contracts or standardised public procurement tools for performance-based delivery ☐ Access to risk-sharing instruments (e.g. loan guarantees or revolving funds) to support ESCOs ☐ Institutional clients (e.g. municipalities, hospitals) seeking energy efficiency upgrades without upfront investment ☐ Legal provisions or energy laws supporting Energy Performance Contracting ☐ Other (please specify)

Select up to 3 key barriers:
☐ Legal or administrative complexity of performance-based contracts ☐ Lack of accredited or trusted ESCOs operating in the DHC sector ☐ Financial risk-aversion among public clients or uncertainty about return on savings ☐ Limited understanding of EnPCs among local contracting authorities ☐ Mismatch between short political/administrative cycles and long EnPC payback periods ☐ Other (please specify)
22. Please describe a good practice that has promoted the adoption of EnPCs in your region. What were the implementation barriers and challenges met and/or tackled by said practice?
23. HOW WOULD YOU RATE THE FOLLOWING ASPECTS OF THE IDENTIFIED GOOD PRACTICE IN YOUR REGIONAL CONTEXT? • ***(SCALE: 1 = VERY LOW; 5 = VERY HIGH)***

ASPECT	1	2	3	4	5
TRANSFERABILITY — **(POTENTIAL FOR REPLICATION IN**	☐	☐	☐	☐	☐

OTHER REGIONS OR CONTEXTS)					
FEASIBILITY **(TECHNICAL, ECONOMIC, OR FINANCIAL VIABILITY)**	☐	☐	☐	☐	☐
EFFECTIVENESS **(IMPACT ON ACHIEVING ITS INTENDED GOAL: ADOPTION OF ENPCS)**	☐	☐	☐	☐	☐

SECTION 9: COMBINED OR HYBRID BUSINESS MODELS

24. Have any of the green business models described above been implemented in combination in your region (e.g. a TEC providing Heat-as-a-Service, or an Energy Performance Contract that includes servitisation components)?
☐ Yes ☐ No ☐ Not sure
If yes, please describe briefly: • Which models were combined? • What motivated their integration (e.g. complementarity of technical solutions, financing structure, policy alignment, user preferences)? • What benefits or challenges arose from the combined implementation (e.g. operational complexity, improved efficiency, stakeholder coordination)?