WARM, SAFE AND CLEAN

Integrating sustainable heating systems in Ukraine`s multi-story apartment buildings



The report was financed by the Greenpeace Environmental Foundation

GREENPEACE

Berlin Economics
Economic Consultancy

Warm, safe and clean: Integrating sustainable heating systems in Ukraine's multi-story apartment buildings

by Pavel Bilek, Dinara Saparova, Olena Baida, Henriette Weser

POLICY PAPER

Research and consultancy in support of economic development.

Berlin Economics is a research-oriented company that has specialised in government consultancy in matters of economic policy. In our work, we combine sound methodology with practical solutions to foster economic development.

BE Berlin Economics GmbH
Schillerstraße 59
10627 Berlin

Tel: +49 30 20613464-0
Fax: +49 30 206134649

info@berlin-economics.com

CONTACT

Pavel Bilek, Senior Consultant and Project Lead – bilek@berlin-economics.com

Executive summary

Ukraine's residential sector stands at the intersection of reconstruction, energy security, fiscal stability, and EU accession. Four years into russia's full-scale invasion, the country continues to face systematic attacks on energy infrastructure, widespread housing damage, and severe winter supply constraints. The pernicious role of fossil fuels more broadly and fossil fuel-powered large-scale centralised electricity and heat generation have also been exposed throughout the war. At the same time, Ukraine has committed to climate neutrality by 2050 and is aligning its legal framework with the EU acquis. These parallel pressures create a strategic opportunity to rebuild the residential sector in a way that strengthens resilience, reduces fiscal burdens, and accelerates the green transition.

This report examines how sustainable heating systems, especially heat pumps combined with building-level energy efficiency and renewable electricity, can be integrated into Ukraine's multi-family housing (MFH) stock. Using the Trostyanets Lighthouse project as a case study, it assesses technical performance, emissions impacts, economic viability, and the policy conditions required for scale. It concludes with a proposal for a dedicated support scheme that can operate under current tariff distortions while remaining compatible with future market liberalisation and EU integration.

The structural challenge: inefficient buildings and gas dependence

Ukraine's MFH residential sector comprises **600 million m² in more than 180,000 buildings**, but about **80% of the housing stock was built before 1991** and does not meet modern thermal standards. As such, buildings account for **40% of Ukrainian final energy consumption**, with energy use per square meter substantially higher than in the EU.

Heating dominates household energy demand and remains heavily dependent on natural gas both in district heating and in individual boilers. In **2024, households consumed over 10 bcm of gas**, but residential gas prices are fixed at **7.96 UAH/m³ (approx. EUR 0.16/m³)**, far below wholesale levels, resulting in an implicit subsidy of **over EUR 2 billion in 2024 alone**. This creates three systemic risks:

- **Energy security risk:** Gas infrastructure and generation assets have been repeatedly targeted.
- **Fiscal burden:** Subsidised tariffs generate large budgetary costs and arrears.
- **Investment distortion:** Artificially low gas prices weaken the economic case for energy efficiency and introduction of sustainable heating, including heat pumps.

As Ukraine advances toward EU accession, these distortions will become increasingly unsustainable. Alignment with EU legislation, including the European Climate Law, the recast EED, EPBD, RED III, and eventual participation in the EU ETS, will require binding sectoral delivery and progressively cost-reflective price signals.

The Trostyanets case: a proof of concept

The Trostyanets Lighthouse project, implemented by Greenpeace in cooperation with the City of Trostyanets and technical partners, demonstrates that switching to sustainable

heating is feasible even during wartime. The pilot building is a five-storey MFH severely damaged during the occupation in 2022. As part of reconstruction, the building received energy efficiency improvements and a renewable-based heating system consisting of: **air-source** and **ground-source heat pumps, thermal storage systems, rooftop solar PV** and **electric storage.** The results of retrofits are significant:

- **Final energy demand** decreased from 159 kWh/m² to 104 kWh/m² (-36%).
- **Direct gas use was eliminated and annual CO_2 emissions fell by 36%**, equivalent to over 30,000 kg CO_2 per year. This means that **cumulative emissions reduction (2026–2050)** of approx. 0.76 million kg CO_2.

A representative Ukrainian five-storey MFH with no prior renovation shows even larger potential. Deep renovation combined with heat pumps can reduce energy demand by 73% and emissions by over 70%. Importantly, benefits go beyond emissions:

- Reduced exposure to fuel disruptions
- Improved thermal comfort
- Better air quality
- Increased resilience during outages

The economic barrier: high CAPEX and long payback periods under distorted tariffs

Despite strong technical performance, capital costs remain substantial, and under current tariff conditions, where payback periods are long, many projects are not economically viable without grants. Under a counterfactual scenario with cost-reflective tariffs and carbon pricing, which foreshadows the development of Ukrainian utility prices, payback however improves:

- Trostyanets: 35 years (26.9 years for representative building)
- With 50–80% grant support, payback falls to 13–23 years

However, HOA decision-making horizons are typically shorter. This therefore confirms that:

1. Tariff reform is structurally necessary.
2. Grant-based support remains indispensable during the transition.

Grants should not be viewed as fiscal burden but rather as a corrective instrument compensating for distorted price signals and avoiding future lock-in of inefficient systems.

Governance and policy alignment

Ukraine's legal framework is broadly aligned with EU climate architecture. Climate neutrality by 2050 is established in law, and preparatory steps for MRV and ETS are underway. However:

- Energy efficiency obligations remain largely indicative rather than binding.
- Heat planning instruments lack enforceability.
- The definition of "efficient" district heating does not yet embed a decarbonisation pathway.
- Renewable energy policy is stronger for electricity than for renewable heat.

Scaling clean heating in MFHs requires not new institutions, but stronger delivery levers, enforceable planning, and finance-linked compliance mechanisms.

Proposal: an EEF-led sub-track for integrated renovation and clean heating

The Energy Efficiency Fund (EEF) already provides a functioning platform for MFH renovation through programmes such as Energodim and GreenDim. However, clean heating is not yet the central organising objective. This paper proposes the creation of a dedicated EEF sub-track focused on integrated renovation-plus-clean-heating packages. Key features include:

- **Package-based eligibility:** Heat pumps linked to minimum envelope and standards.
- **Performance-based support:** Grant disbursement tied to commissioning and verification.
- **Two-tier grant structure:** Base renovation grant with a clean heating top-up.
- **Complementary concessional finance:** via the Decarbonisation Fund to address liquidity gaps.
- **Strong quality assurance:** Certified installers, approved equipment lists, post-install verification.
- **Tariff clarity and grid coordination:** Clarification of electricity tariff treatment and DSO procedures.

The objective is to create bankability under current tariff distortions while remaining compatible with future liberalisation and EU market integration. Importantly, quality assurance and administrative simplification are not bureaucratic add-ons but rather social safeguards. In MFH, perceived bill risk and comfort concerns can derail projects even when lifecycle economics are positive. Early failures can undermine public trust and slow replication nationwide.

Why this matters: reconstruction as a strategic pivot

Ukraine's reconstruction presents a one-time opportunity to avoid locking in another generation of gas-based heating systems. Every rebuilt building is a long-term asset decision.

Sustainable heating in MFHs is not only a climate measure. It is:

- A fiscal reform measure (reducing implicit gas subsidies)
- An energy security measure (reducing exposure to imported fuel and infrastructure attacks)
- A social measure (improving comfort and predictability)
- An EU accession measure (aligning with binding directives)

Reforms at different levels of **policymaking** are fundamental to accelerating the roll-out of energy efficiency solutions and transitioning to clean heating:

1. Establish an EEF Clean heating sub-track: Create a dedicated window for integrated renovation-plus-heat-pump packages, and link support to verified performance and minimum technical standards.

2. Embed robust quality assurance: Use approved equipment lists and certified installers and require commissioning and post-install verification.

3. Maintain high grant intensity during tariff distortions: Combine base renovation grants with clean heating top-ups, and use the Decarbonisation Fund to provide concessional co-financing and liquidity support.

4. Clarify tariff and grid treatment for MFH heat pumps: Provide clear guidance on electricity tariff categories and simplify DSO procedures for capacity upgrades and metering.
5. Strengthen heat planning and binding delivery mechanisms: Align municipal heat planning with EU recast EED logic and introduce enforceable decarbonisation pathways for district heating.
6. Gradually reform gas PSO while protecting vulnerable households: Develop a roadmap for phased tariff liberalisation and replace broad subsidies with targeted social protection.
7. Treat reconstruction as a clean heating opportunity: Make electrified and renewable-based heating the default option in post-war rebuilding, helping avoid locking in new gas heating in MFHs.

The green transition in Ukraine's residential sector is not a luxury reserved for peacetime. It is a resilience strategy, a fiscal stabilisation tool, and a pathway toward EU integration. Done correctly, it is good for households, good for public finances, and good for the country's long-term security and competitiveness. The Trostyanets Lighthouse project shows that the transition is possible. The next step is to make it scalable.

Table of contents

1. Introduction 7
2. Ukraine's residential sector 8
3. Sectoral governance 13
   - 3.1 Policy, regulatory and institutional framework 14
   - 3.2 Tariffs and market reform 18
4. Sustainable heating systems and energy efficiency 21
   - 4.1 Energy efficiency measures 21
   - 4.2 Sustainable heating systems 22
5. Economic and technical assessment: the case study of Trostyanets 24
   - 5.1 Residential housing stock overview 24
   - 5.2 The Trostyanets Lighthouse project: Renewable heating in a multi-family residential building 25
   - 5.3 Economic and technical modelling results 26
     - 5.3.1 Energy consumption and savings 26
     - 5.3.2 Emissions 27
     - 5.3.3 Expenditures 29
     - 5.3.4 Payback period 29
6. Proposal for support scheme design 31
   - 6.1 International experience: what drives bankability in MFH 32
   - 6.2 Why current price signals suppress bankability 36
   - 6.3 Ukraine's existing instruments, delivery and financing architecture 37
   - 6.4 Draft support scheme 40
7. Conclusion and policy recommendations 43
8. Annex 47

1. Introduction

For nearly four years now, Ukraine has endured the unprovoked and devastating full-scale invasion by russia. With a deliberate focus on residential areas and destroying the country's energy infrastructure, the results have been blackouts and a destabilised heating supply, which are currently severely impacting the lives of millions of Ukrainians. In the current winter period (2025/26), this situation is arguably at its direst, with very limited electricity, heating and water supply to Ukrainian households despite very low temperatures. Nonetheless, despite these challenges, Ukrainians, with the support of international partners, have been demonstrating remarkable resilience in even the toughest of situations, with operations around the clock to maintain the grid and provide at least some service to the population.

In the light of this situation, Greenpeace, along with CES, and IC consulenten have been supporting the rebuilding and upgrading of a residential building in the city of Trostyanets, integrating a state-of-the-art heat pump and solar PV system that replaces the old inefficient and dirty gas boilers with clean heat. The objective has been not only to rebuild a building severely damaged by russian attacks, but to "build back better", demonstrating also the potential of integrating green energy heating solutions into Ukraine's reconstruction. This project, unveiled in December 2025 serves as a tangible example of how sustainable heating systems and energy-efficient solutions can improve both the comfort as well as secure energy supply of citizens, even under difficult circumstances.

Energy efficiency and the integration of sustainable heating solutions play a crucial role in addressing climate change, but in the context of an ongoing war targeting critical infrastructure, their significance extends well beyond environmental and financial benefits. For Ukraine, improving building performance and decarbonising the residential energy supply h is not simply a means to reduce energy consumption, costs and emissions, but a core energy security and resilience measure. The war has demonstrated the vulnerability of centralised, fossil fuel-dependent energy supply to targeted attacks, fuel disruptions and systemic shocks. In contrast, electrified and renewable-based heating systems, when combined with improved building envelopes and on-site generation and storage, reduce dependence on imported fuels and exposure to single points of failure.

Concurrently, other important obstacles are currently preventing a larger roll-out of energy efficiency and sustainable heating solutions. A major factor are the currently very low, below-market, household prices for natural gas, which fail to reflect the real cost of gas including the environmental damage that it causes, and which make energy efficiency investments, including heat pumps less economically attractive. In addition, the subsidisation of gas for households creates a significant burden on Ukraine's budget, estimated at EUR 2.09 bn in 2024 alone, which could instead be channelled into more

productive, greener investments.[1] Reform is desperately needed to reflect the real cost of gas, spur energy efficiency and continue alignment with the EU as Ukraine progresses on its path to membership, but importantly a strong social compensation system has to be put in place to ensure any impacts on vulnerable consumers are adequately mitigated. It is however key to also acknowledge the extremely impacted and vulnerable state of Ukraine's electricity system, which has been a consistent bombing target. While it is important to keep developing decentralised infrastructure (including at the residential level), it is important to phase developments to not further strain the grid. By identifying viable solutions and the conditions for their expansion, Ukraine can simultaneously strengthen energy security, enhance households' ability to maintain basic thermal comfort under crisis conditions, and advance its long-term decarbonisation objectives.

This study builds upon the already implemented project undertaken in Trostyanets, extending the scope to include a comprehensive legislative and economic analysis. The focus of this work is on evaluating the costs, benefits, and economic viability of the implemented energy solutions, providing valuable insights into the broader economic and environmental impacts of such measures. With this analysis in hand, the study then aims to establish the foundation for a more extensive and sustainable rollout of sustainable heating solutions across Ukraine. Based on the findings from the legislative and economic analysis, a heat pump and small-scale renewables-specific support scheme is proposed, along with a series of actionable recommendations which are proposed to support the widespread adoption of these measures across Ukraine.

The study is structured to provide a comprehensive understanding of sustainable heating solutions and energy efficiency in residential buildings, beginning with the assessment of the current state of play and policy landscape, including existing regulations and support schemes. This is followed by the available sustainable heating options in Ukraine and a quantitative economic analysis of the case study of Trostyanets, including the associated costs and benefits. Next, the study concludes with the proposal of a draft support scheme aimed at facilitating a nationwide transition and key policy recommendations.

2. Ukraine's residential sector

Ukraine's residential housing stock has been heavily affected by russia's invasion and consistent targeting, resulting in heavy damages estimated at USD 49.9 billion as of November 2024.[2] Nevertheless, the sector has always been highly energy inefficient and heavily reliant on fossil-fuels for heating. The following section provides and overview of the sector to help contextualize the size of the challenge but also the importance of the decarbonisation of heating systems, primarily in multi-family houses (MFH).

[1] Calculation using regulated gas tariff, TTF prices and domestic consumption of gas for direct use and domestic hot water.

[2] Kyiv School of Economics (2025. Report to Damages to Infrastructure from the Destruction Caused by Russia's Military Aggression Against Ukraine as of November 2024. Link

2.1 Residential housing stock in Ukraine

Ukraine's residential housing stock comprises approximately 1.1 billion square meters of floor area as of 2023 based on the Long-term strategy for thermal modernisation of buildings.[3] Excluding territories under temporary occupation, the usable residential area is estimated at around 985 million square meters. The sector includes about 9.2 million residential units, ranging from single-family houses to multi-family apartment buildings and dormitories.

Multi-family buildings, which are the primary focus of this report, account for a substantial share of the housing stock, representing around almost 600 million square meters across over 180,000 buildings. Of these, 45,539 are classified as very old, requiring urgent and significant renovation. Ukraine currently has approximately 19.3 million apartments (around 17.1 million excluding occupied territories as of December 2023), with 47.5% of the population living in apartment buildings with an average of 2.4 persons per apartment.

Figure 1: Housing stock distribution between single-family and multi-family buildings by regions, 2023



Source: State Statistics Committee of Ukraine, own calculations

The figure above illustrates the regional structure of Ukraine's housing stock, highlighting clear differences in the distribution between single-family and multi-family buildings. Kyiv city stands out as the primary urban centre, with a strong predominance of multi-family housing amounting to approximately 92.4 million square meters. Other regions characterised by high-density housing include Dnipropetrovsk, where multi-family buildings account for around 75% of the total stock, followed by Zaporizhzhia (73%), Odesa (67%), Lviv (66%) and Sumy (64%) where apartment buildings clearly dominate. In contrast, the housing stock in Kyiv region, Khmelnytskyi, and Vinnytsia regions is more evenly balanced between single-family and multi-family buildings. Regions such as Ivano-Frankivsk, Cherkasy, and Zakarpattia are characterised by a higher prevalence of single-family housing. Overall, these regional patterns reflect differing urban and rural development trajectories

[3] *Cabinet of Ministers of Ukraine. (2023). Long-term strategy for thermal modernisation of buildings for the period up to 2050. Link*

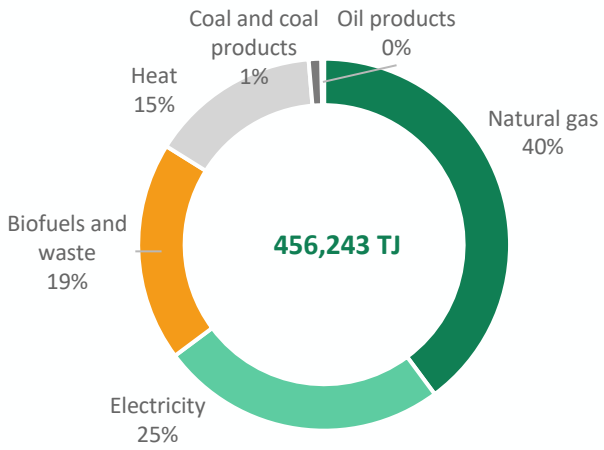
and provide important context for tailoring thermal renovation strategies to local housing typologies.

2.2 Energy consumption and costs

Around 80% of the housing stock was built before 1991 and does not meet modern thermal performance standards.[4] As a result, average energy use stands at roughly 194 kWh per square metres, which is 30–50% higher than in many European countries.[5] The building stock is the largest energy consumer in Ukraine, accounting for close to 40% of total final energy consumption.

The sector has historically been characterised by a strong reliance on fossil fuels, particularly natural gas. In 2023, the last year for which comprehensive data is available, natural gas was the most commonly used source of energy, but it is worth noting that both electricity and heat were also often generated using natural gas, putting this figure higher.

Figure 2: Residential total final consumption by source, 2023



Source: IEA, n.d.

Natural gas consumption in Ukraine's residential sector has been falling steadily since 2012 but has accelerated in recent years.[6] While the full-scale russian invasion has reduced overall energy and gas consumption and strengthened the focus on energy self-reliance, structural shifts in the heating sector are also relevant. In many municipalities, multi-apartment buildings were disconnected from centralised district heating and switched to individual gas boilers. Moreover, new residential constructions are frequently not connected to district heating networks, instead relying on individual heating units from the

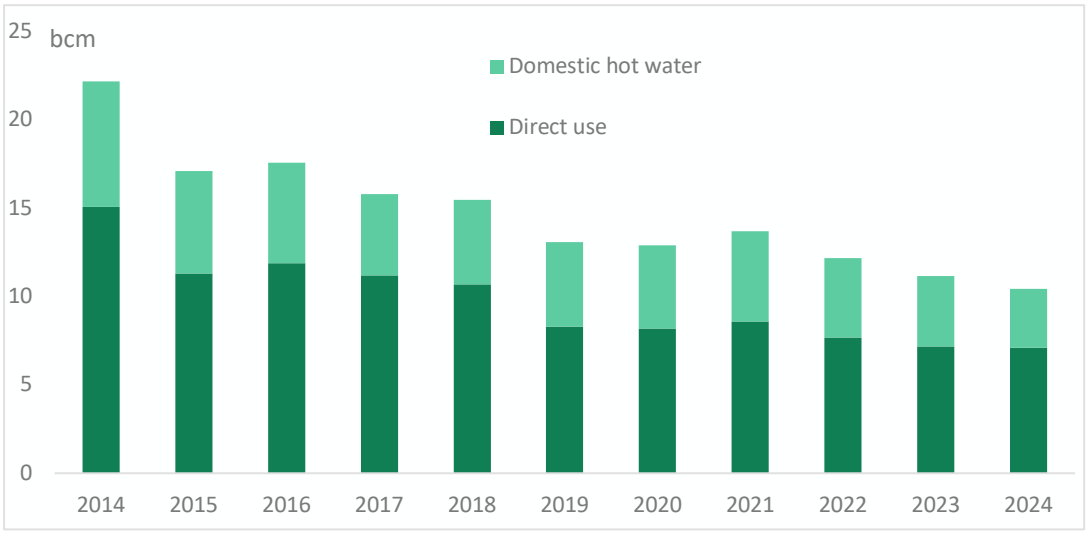
[4] State Statistics Service of Ukraine (2022). *Social and demographic characteristics of households of Ukraine 2021. Link*

[5] UNECE (2022). *Draft Ukraine Recovery Plan*. Link

[6] NEURC

start. As a result, continued dependence on natural gas poses long-term challenges for emissions reduction and energy security, especially in the absence of efficiency gains.

Figure 3: Natural gas consumption by households



Source: NEURC

The Ukrainian gas sector is highly vulnerable to significant disruption. With large immobile assets, all parts of the value chain, including production, transmission as well as gas power plants, including combined heat and power plants needed to provide district heat have been targeted by russian attacks. This has significant implications for the power sector, but also for the heating segment which is currently heavily gas-dependent.

2.3 Residential heating and natural gas

In residential buildings, more than half of energy use is attributable to space heating, i.e. heating demand dominates household energy consumption.[7,8] Given that space heating and domestic hot water account for the dominant share of household energy consumption, heating technologies largely define final energy use and emissions.

The structure of heating supply in Ukraine reflects the spatial distribution of the housing stock and legacy infrastructure. Ukraine exhibits a comparatively high penetration of central, or district, heating, particularly in dense urban areas dominated by multi-family buildings.[9] These systems are typically supplied by central boiler houses or combined heat and power plants, predominantly fuelled by natural gas (and sometimes coal), and distribute heat through extensive networks. In regions with lower housing density and a higher share of single-family buildings, heating is predominantly provided through individual gas systems, most commonly gas-fired boilers installed at the dwelling or building

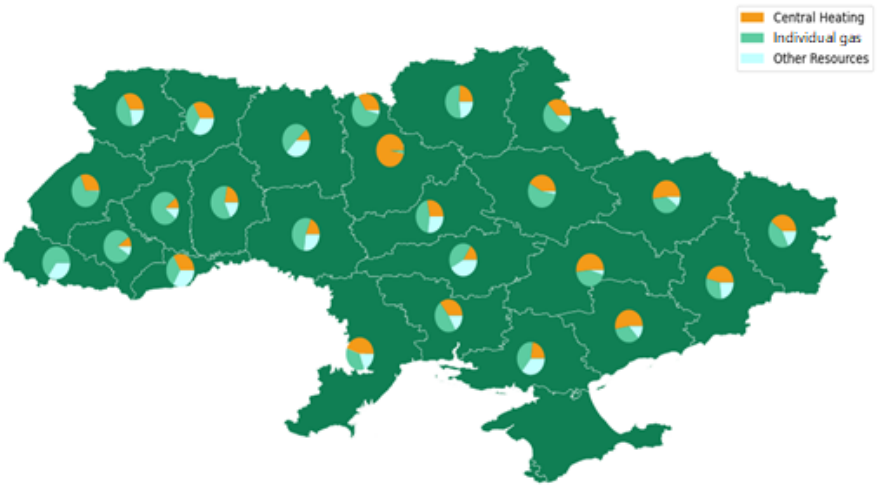
[7] UNECE (2022). *Draft Ukraine Recovery Plan*. Link

[8] State Statistics Service of Ukraine. (2021). *Final Energy Consumption for 2007 – 2021*. Link

[9] GIZ. (n.d.) Improving the performance of district heating systems in Central and Eastern Europe https://keepwarmeurope.eu/countries-in-focus/ukraine/english

level. Solid fuels and other decentralised energy sources remain relevant in rural areas and in locations without access to district heating or gas infrastructure.

Figure 4: Distribution of space heating sources



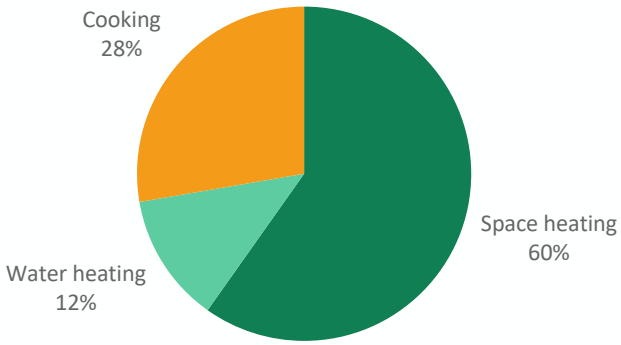
Source: The Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine

The distinction between central heating (which often runs on natural gas) and individual gas use (most often in gas boilers in the houses and apartment buildings) is nonetheless important. Although both systems are predominantly gas-based, the energy efficiency solutions and decarbonisation pathways are very different, requiring specific technologies and financing models.

Regional data illustrate the implications of this structure for heating system transformation. In Sumy Oblast, where Trostyanets is located, space heating is supplied through a mixed system comprising central heating (37%), individual gas-based systems (53%), and other energy sources (10%). Central heating primarily serves multi-family apartment buildings in urban areas, while individual gas boilers dominate in single-family housing and in buildings that are disconnected from district heating networks. The remaining share reflects the use of solid fuels and other decentralised solutions, largely in areas with limited infrastructure coverage.

Given the current primacy of natural gas in the residential sector and in heating, it merits a further note. Prior to the war, the bulk of natural gas use across the residential sector was for space heating, primarily in individual gas boilers. The large share of consumption is due to the design of buildings and heating systems, but also due to the aforementioned lack of energy efficiency which means more gas is used to maintain thermal comfort.

Figure 5: Distribution of natural gas use by households, 2020



Source: Ukrstat

The heavy use of natural gas has implications for energy security, but also for both costs to the state and consumers as well as for emissions. Households in Ukraine currently pay a highly subsidized rate for natural gas under the Public Service Obligation (PSO, discussed in depth in following sections), which imposes a significant fiscal burden and leads to significant debt accumulation.

The current residential gas PSO tariff is fixed at 7.96 UAH per cubic meter (0.16 EUR/m^3). In 2024, Ukrainian households consumed roughly 10.43 bcm of gas for space heating, domestic hot water and cooking amounting to EUR 1.67 billion, excluding distribution fees.[10] However, the wholesale (not retail) market rate natural gas for 2024 (average TTF) was closer to 0.36 EUR/m^3, with the difference (0.2 EUR/m^3) forming an effective subsidy.[11] This comes to at least an enormous EUR 2.09 billion in 2024 alone just for residential gas, but also fundamentally shows how undervalued gas is, with significant implications for energy efficiency investments and bankability. Crucially, as of February 2026, the spot price for Ukrainian gas has increased above 2024 levels, yet tariffs have stayed the same, further increasing the subsidy amount. Importantly, this implicit subsidy is larger than most existing renovation support schemes, yet it rewards continued gas use rather than investment in efficiency or clean heat.

3. Sectoral governance

While the Ukrainian housing stock still has a long way to go in terms of energy efficiency and sustainable heating solutions, significant progress has been made in recent years, although several key hurdles remain. The following section provides and overview of the key aspects of governance, policy and tariffs and their effect on catalysing the decarbonisation of the sector.

[10] See for example: https://agroreview.com/en/newsen/gas-and-electricity-tariffs-ukraine-2

[11] See: https://aleasoft.com/fall-european-market-prices-2024-renewable-energy-gas/

3.1 Policy, regulatory and institutional framework

A fundamental enabling factor for scaling energy efficiency and clean heating is the overarching legal framework, which acts as a set of guardrails for the direction of policy and investment. Ukraine already has a legislative structure covering climate policy, carbon-pricing readiness, energy efficiency, district heating and heat supply governance, building energy performance, and renewable energy development. In terms of the overall architecture, this structure broadly mirrors the EU acquis, driven also partially by continued regulatory alignment as well as Ukraine's pathways to becoming an EU member state.

With Ukraine's EU candidate status and the ongoing accession process, alignment with the EU acquis is no longer merely strategic orientation but a progressive legal obligation. Upon accession, the core provisions of the European Climate Law, the recast Energy Efficiency Directive, the recast Energy Performance of Buildings Directive, RED III and the EU ETS will become binding. This materially increases the seriousness of implementation, indicative targets and strategy documents will have to translate into enforceable delivery mechanisms. The key question for implementation, therefore, is not whether laws and strategies exist, but whether they create binding obligations, credible planning requirements, and enforceable incentives that translate policy intent into measurable delivery and investable project pipelines.

At present, Ukraine's framework provides a clear long-term decarbonisation direction, but several delivery levers remain weaker than in the most recent EU recasts. This gap is particularly relevant in light of accession, as the EU framework increasingly relies on binding sectoral instruments rather than indicative planning. Table 1 summarises the legal landscape in a compact way, structured along two layers. The governance layer (climate law, MRV and ETS preparation) sets the strategic direction and future price signals. The sector layer (energy efficiency, district heating and heat supply planning, building performance, and renewables) determines whether this direction is translated into enforceable standards, municipal planning and market incentives. For each area, the table highlights the main Ukrainian legal basis and the most important targets, the corresponding EU analogue, the status quo barriers, and why each element matters specifically for renewable energy deployment and the decarbonisation of heating systems.

Table 1: Overview of legislative framework

Area	Ukraine (legal basis and most important targets)	EU analogue	Status quo and what is missing / barriers	Why relevant to RE and heating systems
Governance				
Climate policy [12]	Law "On the Key Principles of State Climate Policy": climate neutrality by 2050; at least -65% emissions by 2030 vs 1990. Requires LEDS, NDC, NECP, Adaptation Strategy; defines responsibilities.	European Climate Law	Strategic direction is clear and EU-shaped. Practical impact depends on sector rules and enforcement (i.e., whether targets translate into binding requirements and compliance incentives).	Sets the long-term guardrail for moving away from fossil heating; provides policy certainty for EE and clean heating investment.
MRV for GHG emissions[13]	MRV law establishes MRV (2021). War disruption: reporting suspended 2021-2023. Jan 2025 amendments: reporting reinstated; 2024 reporting deferred to end-2025; combat-zone exemptions.	EU ETS Directive 2003/87/EC	MRV exists but continuity was interrupted. Reinstatement helps, but delayed data and exemptions mean the system is not yet a stable basis for a near-term carbon price signal.	MRV is the prerequisite for ETS; over time it supports carbon pricing that can influence heating fuel choices and unlock revenue-based support.
ETS development[14]	ETS Action Plan: phased ETS introduction 2025-2028; ETS Law planned (draft scheduled Aug 2025).	EU ETS (institutional model)	Ukraine is in the "pre-operational" phase: roadmap exists, but ETS Law and trading system are not yet in force, so there is no predictable carbon price or recycling of revenues.	Carbon pricing can progressively tilt economics toward electrified/renewable heating and support EE/RE funding streams.

[12] Regulation (EU) 2021/1119; Verkhovna Rada of Ukraine. (2025). On the basic principles of state climate policy. https://zakon.rada.gov.ua/laws/show/3991-20#Text

[13] Verkhovna Rada of Ukraine. (2020). On the principles of monitoring, reporting and verification of greenhouse gas emissions. https://zakon.rada.gov.ua/laws/show/377-20; Verkhovna Rada of Ukraine. (2025). On amendments to certain laws of Ukraine regarding the resumption of monitoring, reporting and verification of greenhouse gas emissions https://zakon.rada.gov.ua/laws/show/4187-20#Text

[14] CMU.(2025). On approval of the action plan for the creation of a national greenhouse gas emissions trading system https://zakon.rada.gov.ua/laws/show/146-2025-p#Text; CMU. (2025). On approval of the Government's priority action plan for 2025 https://www.kmu.gov.ua/npas/pro-zatverdzhennia-planu-priorytetnykh-dii-uriadu-na-2025-rik-180225-131r;

Sectors				
Energy efficiency (general)[15]	Law "On Energy Efficiency": "energy efficiency first". Savings obligation: 0.8% annual. NECP includes indicative (non-binding) energy caps for 2030.	Recast EED 2023/1791	Framework exists but targets are largely indicative and weaker than the recast EED model. This limits accountability and reduces pressure to deliver measured savings at scale.	EE is the enabling layer: lower heat demand improves viability of heat pumps, low-temperature DH and renewable heat solutions.
Recast EED heating-relevant benchmarks[16]	*Not yet fully aligned with recast EED.*	*Recast EED 2023/1791*	*Key EU benchmarks include: binding 11.7% energy-use reduction by 2030 and mandatory heating/cooling planning for cities >45,000. Ukraine has not yet implemented the binding-target logic or systematic heat planning requirement.*	*These provisions are "delivery levers": they turn strategy into mandatory planning and time-bound implementation, creating bankable project pipelines.*
District heating and cooling (definition)	"Efficient DH/C" defined as >=50% renewables or waste heat, or >=75% cogeneration, or >=50% combination.	Recast EED 2023/1791	Status quo definition can label systems "efficient" without requiring progressive decarbonisation steps. Ukraine has not aligned to the stricter phased pathway toward full decarbonisation by 2050.	The definition affects investment signals for DH modernisation (waste heat, large heat pumps, renewables integration) vs continued reliance on legacy heat sources.
Heat supply sector governance[17]	Heat supply schemes: CBA-based, validity 10 years; implied mandatory. Draft DH Law (May 2025) improves access/zoning but lacks binding recast alignment.	Recast EED (heat planning, efficient DH/C)	Core barrier is enforceability: there is no effective national instrument ensuring that municipalities develop, adopt and follow heat supply schemes. Draft reforms help operational rules but do not hard-wire decarbonisation obligations.	Heat planning and enforceable schemes determine whether cities modernise DH or shift to decentralised options, and whether projects become financeable.

[15] Verkhovna Rada of Ukraine. (2022). About energy efficiency https://zakon.rada.gov.ua/laws/show/1818-20#n212

[16] *EU Directives 2023/1791 (Recast EED)*

[17] Verkhovna Rada of Ukraine (2025). About heat supply https://zakon.rada.gov.ua/laws/show/2633-15#Text; Ministry of Community and Territorial Development of Ukraine . (2025). Notice on the publication of the draft Law of Ukraine https://mindev.gov.ua/news/povidomlennia-pro-opryliudnennia-proiektu-zakonu-ukrainy0505

Energy performance of buildings[18]	Law "On the Energy Performance of Buildings" (2017). LTRS objective: decarbonise building stock by 2050 (incl. boiler phase-out by 2050 as policy direction). NZEB (2025): new buildings Class A, major reconstructions Class B; minimum RES share 53/57% for heating/cooling; assumes 51-54% heat via heat pumps; voluntary in Ukraine.	EPBD recast: Directive (EU) 2024/1275	Status quo is "rules exist, triggers are weak": LTRS is not a law; NZEB is voluntary; enforcement and finance-linked triggers are needed for scale, especially in reconstruction.	Building standards and enforcement drive heat demand. Weak triggers risk lock-in during reconstruction, undermining clean heating economics for decades.
Renewable energy development (targets)[19]	RED III benchmark: >=42.5% RES in gross final energy by 2030. Ukraine NECP indicative overall RES target: 27.1% by 2030 (no dedicated buildings target).	RED III 2023/2413; RED II 2018/2001	Status quo: renewables targets are indicative and more explicit for electricity than for renewable heat/buildings. Absence of a buildings-specific target and mostly indicative heating framework weakens the pull for renewable heat.	Explains why PV/self-consumption can move faster than renewable heat; stronger sector signals are needed to scale clean heating consistently.

[18] Verkhovna Rada of Ukraine. (2017). About energy efficiency of buildings https://zakon.rada.gov.ua/laws/show/2118-19; CBU. (2023). Some issues of strategic development of energy efficiency of buildings https://mindev.gov.ua/npas/deiaki-pitannia-strategicnogo-rozvitku-energeticnoyi-efektivnosti-budivel; Ministry of Community and Territory Development of Ukraine (2020). On approval of Minimum requirements for energy efficiency of buildings https://zakon.rada.gov.ua/laws/show/z1257-20#Text; Ministry of Regional Development, Construction and Housing And Communal Services of Ukraine (2018). On approval of the Methodology for determining the economically feasible level of energy efficiency of buildings https://zakon.rada.gov.ua/laws/show/z0823-18#Text; Ministry of Regional Development, Construction and Housing And Communal Services of Ukraine (2018).On approval of the Methodology for determining the energy efficiency of buildings. https://zakon.rada.gov.ua/laws/show/z0822-18#Text;

Ministry of Community and Territory Development of Ukraine. (2013). DBN V.2.5-67:2013 "Heating, ventilation and air conditioning" https://e-construction.gov.ua/laws_detail/3074971619479783152; Ministry of Community and Territory Development of Ukraine. (2025). Some issues of implementing requirements for buildings with nearly zero energy consumption https://zakon.rada.gov.ua/laws/show/z0284-25#Text

[19] CMU. (2024). On approval of the National Renewable Energy Action Plan for the period until 2030 and the action plan for its implementation https://zakon.rada.gov.ua/laws/show/761-2024-p#Text;

Ukraine's legal framework is broadly aligned with the EU acquis in overall structure and direction. The governance framework is in place, including climate targets and preparatory steps for MRV and an ETS, but carbon pricing remains pre-operational and therefore cannot yet provide a predictable investment signal or a stable revenue stream for supporting efficiency and clean heating.

Moreover, under accession conditions, climate neutrality by 2050 and sectoral decarbonisation, including heating, will no longer be strategic aspirations but binding obligations. Currently, energy efficiency obligations remain largely indicative compared to the recast EED, which reduces accountability for achieving measured savings. This matters because lower heat demand is a precondition for the technical and financial viability of clean heating in multi-apartment buildings.

Heat governance is one of the key bottlenecks: planning instruments exist, but enforceability is weak, and the definition of "efficient" district heating does not embed a phased pathway to decarbonisation. In buildings, standards are advancing, but where triggers remain voluntary or weakly enforced, reconstruction risks locking in performance levels that undermine clean heating economics for decades. Renewable energy policy is comparatively more operational for electricity than for renewable heat, and the policy pull for buildings and heating is less explicit than under RED III.

The policy implication is straightforward. Ukraine's priority is to strengthen binding obligations, enforceable heat planning and decarbonisation benchmarks, and finance-linked compliance mechanisms. This is not only necessary to ensure delivery credibility but also to prepare the system for the moment when EU obligations become directly binding and subject to compliance monitoring.

3.2 Tariffs and market reform

Energy tariff regulations and Public Service Obligations (PSOs) are particularly relevant for clean heating deployment, as they shape relative price signals between gas, heat and electricity and therefore directly influence heating technology choices in the residential sector. Ukraine's system of Public Service Obligations and wartime tariff freezes currently play a central role in shaping energy pricing, with significant impacts for energy efficiency and sustainable heating systems investment feasibility. The regulated retail energy prices and current supply conditions for defined consumer groups at levels well below market, ensuring short-term social protection and limiting price volatility. Whilst this is important within the current war-time context, regulated concurrently they weaken cost recovery, reduce incentives to invest in system modernisation and distort the economics of energy efficiency and clean heating.[20] For example, as was mentioned in the previous section, the implicit subsidy between the current residential gas PSO tariff and wholesale (not retail)

[20] While a reform of the energy sector is politically difficult, a well-managed price liberalisation could help solve many key problems in the energy sector, ultimately helping with new energy investments, security and decarbonisation.

market rate reaches at least EUR 1.42 billion in 2024 which is larger than most renovation schemes.

For residential decarbonisation, the main implication is that low and administratively fixed prices suppress the financial case for deep renovation. Energy efficiency measures deliver savings in physical energy terms, but when energy prices remain far below cost-reflective levels, the monetary savings are insufficient to make investments bankable for households and Homeowners Associations (HOAs) without substantial support. In parallel, utilities and heat producers face chronic revenue gaps, arrears and limited capacity to co-finance upgrades, which further reduces the ability to scale renovation programmes through sustainable financing models.

Table 2: Tariff system overview

Market	Status quo regulation	Key parameters	Implications for clean heating and energy efficiency
Cross-cutting (price signals)	Public Service Obligations (PSOs) + wartime tariff freezes	Retail prices and supply conditions for defined groups are kept below market / below cost-reflective levels to provide social protection and limit volatility.	Weakens cost recovery and investment incentives; distorts relative prices between gas, heat and electricity, which directly affects heating technology choices and the bankability of EE and clean heating.
Natural gas[21]	Household PSO + segmented market	Household gas price fixed at 24 Feb 2022 level; increases prohibited during martial law and 6 months thereafter. Household supply largely under Naftogaz under regulated conditions.	Low, fixed gas prices suppress monetary savings from EE and reduce incentives to switch away from gas-based heating without substantial support. Limited competition in household supply reduces market-based signals.

[21] CMU. (2022). On the peculiarities of regulating relations in the natural gas market and in the heat supply sector during martial law and the subsequent restoration of their functioning https://zakon.rada.gov.ua/laws/show/2479-IX#Text; CMU. (2022). On approval of the Regulation on imposing special obligations on natural gas market entities to ensure general public interests in the process of functioning of the natural gas market https://zakon.rada.gov.ua/laws/show/222-2022-п#Text; CMU. (2022). On approval of the Regulation on imposing special obligations on natural gas market entities to ensure general public interests in the process of functioning of the natural gas market regarding the features of natural gas supply to thermal energy producers and budgetary institutions https://zakon.rada.gov.ua/laws/show/812-2022-п#Text

Heat[22]	Moratorium on household heat/hot water tariffs + compensation mechanism	Household heat and hot water tariffs frozen since July 2022. Producers entitled to tariff-difference compensation, but compensation not provided in practice; arrears accumulate (state arrears to heat producers UAH 62 bn as of 1 Jul 2025; household arrears across heat and gas UAH 106.6 bn). Moratorium cancellation and move toward cost-reflective tariffs scheduled Q4 2026 (Ukraine Plan).	Heat utilities face chronic revenue gaps and arrears, limiting their ability to co-finance modernisation and integrate clean heat. Low end-user tariffs weaken the household/HOA business case for EE and clean heating (savings exist in kWh, but not in EUR/UAH). Scheduled reform is pivotal, but near-term programmes must assume distorted price signals.
Electricity[23]	Household electricity PSO + targeted preferential tariffs	Household tariffs fixed below market, financed via cross-subsidisation by state-owned generators (Energoatom, Ukrhydroenergo). Preferential “half-rate” seasonal tariffs for specific household categories with a 2,000 kWh/month cap; off-peak tariff for 23:00–07:00 with TOU metering. Preferential provisions valid until 1 Jan 2026.	Can partially support electrified heating economics (heat pumps) and load shifting, but capped/time-limited measures do not replace structural reform. Continued below-market pricing blurs long-term signals and can complicate investment planning for electrification at scale.

The persistence of PSOs across energy markets has resulted in tariffs below cost-recovery levels and has contributed to large arrears and limited investment capacity. Under the Ukraine Plan, the Government mandated the Ministry of Energy and NEURC to prepare a

[22] CMU. (2022). On the peculiarities of regulating relations in the natural gas market and in the heat supply sector during martial law and the subsequent restoration of their functioning https://zakon.rada.gov.ua/laws/show/2479-IX#Text; CMU (2021). On measures aimed at settling the debts of heat supply and heat generation organizations and centralized water supply and wastewater enterprises https://zakon.rada.gov.ua/laws/show/1730-19#Text; The 2025/2026 Association for the Development of Heat Supply Systems "Ukrteplokomunenergo". (n.d.).Heating season is under threat of disruption: heating companies declare a critical situation due to the state's multi-billion-dollar debts https://mautke.com.ua/?p=5521; CMU (2024). CHANGES, to the Ukraine Plan, approved by the Order of the Cabinet of Ministers of Ukraine, dated 18 March 2024 No. 244-p https://me.gov.ua/view/63be75fc-efba-47eb-9637-febc1faeb4bb

[23] CMU (2019). On approval of the Regulation on imposing special obligations on electricity market participants to ensure general public interests in the process of functioning of the electricity market https://zakon.rada.gov.ua/laws/show/483-2019-п#Text

roadmap for liberalisation of gas and electricity markets by Q2 2026. [24] The roadmap is expected to define steps for phased removal of PSOs, gradual transition to market-reflective tariffs and targeted protection for vulnerable consumers, enabling improved investment conditions and closer alignment with European market integration.

4. Sustainable heating systems and energy efficiency

The progressive decarbonisation of domestic heat, especially for multi-family houses (MFH) involves a wide range of possible sustainable heating solutions, which vary significantly in terms of the effort and work required for installation, as well as in terms of the economics. The following section provides an overview of energy efficiency as well as some of the key solutions that are available, taking into consideration Ukraine's unique context.

4.1 Energy efficiency measures

The concept of energy efficiency is as simple as it is impactful: it means delivering the same level of energy services with lower energy input. In the residential sector, and particularly in MFHs, energy efficiency is primarily achieved by reducing heat losses through the building envelope and improving the performance of heating, ventilation, and distribution systems. These measures are among the most effective tools for lowering energy demand, reducing household energy expenditure, and cutting greenhouse gas emissions.

Table 3: Energy efficiency measure

Measure category	Measure	Impact	Relevance for sustainable heating
Building envelope	Thermal insulation of external walls	Major reduction in heat losses	Enables low-temperature heating systems
	Insulation of roofs, attics, and basements	Reduces peak heat demand	Improves heat pump and DH performance
	Replacement of windows and doors	Reduces infiltration and losses	Improves comfort and system efficiency
Heat distribution & control	Insulated heat pipes	Reduces distribution losses	Lowers overall system demand
	Thermostatic radiator valves	Demand-side control	Improves efficiency and user comfort
	Hydraulic balancing	Optimises heat delivery	Essential for system-level upgrades
Ventilation	Modernised ventilation with heat recovery	Reduces ventilation heat losses	Improves indoor air quality with minimal energy penalty
Heating systems	Replacement of legacy boilers	Improves conversion efficiency	Precondition for low-carbon heat

[24] CMU (2024). UKRAINE PLAN. https://me.gov.ua/view/444634c4-aa4f-4bc7-8f8c-58247fbbe29e

	Individual heating substations	Improves controllability	Enables efficient district heating
Domestic Hot Water	Low-flow fixtures	Reduces DHW energy use	Increases post-renovation savings
	Efficient DHW circulation control	Reduces losses	Often overlooked in MFHs
Renewables (complementary)	Rooftop photovoltaic systems	On-site electricity generation	Reduces operating costs of electric heating
Demand side measures	Individual heat metering	10–20% demand reduction	Aligns incentives in MFHs
	Smart thermostats and building controls	5–15% demand reduction	Reduces peak load and oversizing
Non-energy reconstruction	Roof reconstruction, drainage, asbestos removal, safety upgrades	Enables renovation works	Reflects realistic reconstruction scope

Source: Author's own elaboration

In Ukraine, the role of energy efficiency is especially critical due to the age and condition of the housing stock. A large share of MFHs were constructed during periods of mass urbanisation with limited or no thermal insulation and inefficient heating systems. As a result, space heating demand per square metre is high by international standards, reinforcing dependence on gas-based heating and increasing exposure to price volatility and supply disruptions. Post-war reconstruction presents a unique opportunity to address these structural inefficiencies at scale, rather than reproducing legacy building performance.

Building-level thermal performance directly affects heat demand, which in turn determines system sizing, operating conditions, and investment requirements. This relationship is particularly binding in multi-family buildings, where technical constraints, collective decision-making, and legacy infrastructure limit flexibility in heating system choice.

4.2 Sustainable heating systems

A range of heating technologies can contribute to a transition away from gas-based space heating in Ukraine, although their suitability varies significantly depending on building typology, energy efficiency levels, and local infrastructure. Rather than a single optimal solution, sustainable heating in the residential sector can best be understood as a portfolio of pathways, each associated with different technical and institutional requirements.

Table 4: Overview of sustainable heating system options for Ukrainian residential buildings

Technology	Application	Energy source	Advantages	Constraints	Suitability for MFH
Air-to-water heat pumps	Heating, cooling, DHW	Electricity	High efficiency	Needs low-temp heat distribution and insulation	High

Air-to-air heat pumps	Heating, cooling	Electricity	Lower cost, easy installation	Limited DHW, less suited for MFH	Medium
Ground-source heat pumps	Heating, DHW	Electricity	Very high efficiency	High costs, site requirements, installation	Medium
District heating	Heating, DHW	Large heat pumps, waste heat, CHP, renewables	System-level efficiency, fuel switching at scale	Legacy networks inefficient; requires coordinated planning and investment	High
Biomass boilers	Heating, DHW	Solid biofuels	Dispatchable; familiar technology; potential fuel cost savings	Air pollution; sustainability of biomass supply; logistics	Medium (in rural or transitional)
Solar thermal (hybrid)	DHW, heating	Solar energy	Low costs; complements heat pumps and DH	Seasonal variability; insufficient as standalone system	High (as complement)
Electric resistance heating	Heating	Electricity	Low capital cost; simple installation	Very high operating costs; inefficient; grid stress	Low, not a sustainable pathway

Source: Adapted from IEA, 2024.[25]

Heat pumps represent the most energy-efficient and scalable low-emissions option for residential heating. By transferring rather than generating heat, air- and ground-source heat pumps can deliver three to five units of heat for each unit of electricity consumed. In Ukraine's climate, they are technically viable and can also provide cooling, an increasingly relevant co-benefit given more extreme intra-annual temperature swings. However, their performance and cost-effectiveness depend strongly on building insulation levels and low-temperature heat distribution systems, making their deployment closely linked to energy efficiency investments.

District heating systems, which already serve a large share of urban households, offer an important system-level decarbonisation pathway. While many existing networks are inefficient and gas-dependent, modernised district heating can integrate large-scale heat pumps, waste heat, and renewable energy sources. In dense multi-family housing areas, rehabilitated district heating can deliver low-carbon heat at scale while avoiding the need for individual system installations, provided that governance, tariff structures, and investment coordination are addressed.

Other technologies may provide some benefits but should be thought of as supportive rather than standalone. For example solar thermal systems can be extremely valuable, but should be thought of as a complement, especially in larger MFH. Nonetheless, they can help reduce energy demand when combined with heat pumps or district heating. Biomass-based heating can also play a complementary or transitional role, particularly where access to electricity infrastructure is constrained or in smaller towns and rural areas. While biomass boilers can reduce reliance on gas, their large-scale deployment raises concerns related to air quality, fuel sustainability, and supply logistics. As such, biomass is best viewed as a

[25] IEA. (2024). Home Heating Technology Guide. Link

targeted solution rather than a universal substitute for gas heating. Importantly, electric resistance heaters, despite not running on gas are also not a great option given low efficiency rates and high operating costs.

Taken together, these technologies highlight that sustainable heating in Ukraine is not a question of technological availability but of system integration. The choice of heating system must be aligned with building characteristics, renovation depth, and local infrastructure, underscoring the importance of linking heating system deployment with energy efficiency measures and coordinated planning.

5. Economic and technical assessment: the case study of Trostyanets

While many options exist for sustainable heating systems in Ukraine's MFH, the following focus specifically on the use of heat pumps, renewables and storage, using the city of Trostyanets and the recent Greenpeace Lighthouse project as a case study. The following section presents an economic and technical assessment of the project as well as a potential extrapolation onto the wider housing stock in the Trostyanets.

5.1 Residential housing stock overview

Trostyanets is a city with a population of around 20,000 people in Ukraine's Sumy region, located in Okhtyrka Raion on the Boromlya river and serving as the administrative centre of the Trostyanets urban hromada.[26] The city is roughly 35 km from the russian border, and had sustained significant damage during the first wave of the russian invasion of Ukraine, with major damage to the housing stock and wider city infrastructure.

The data on the multi-family houses (MFH) stock in Trostyanets provided by the City Council for this study consists of 117 MFHs with the total area of 87,579 m² and 2,125 apartments.

Figure 6: Distribution of total area across MFH (2025)

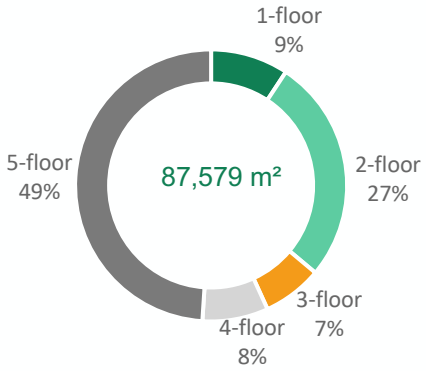
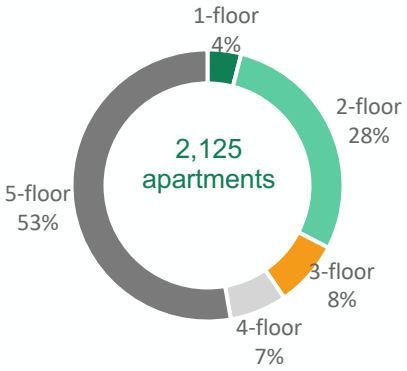


Figure 7: Distribution of apartments across MFH (2025)



Source: City Council of Trostyanets

[26] CES clean energy solutions Gesmbh (2023). *Master Plan – New balance Trostyanets.* https://ic-consulenten.com.ua/wp-content/uploads/2023/04/master_plan_Trostyanets_short_en_public.pdf

MFH range from 1-5 floors, with most buildings represented by the two- to five-floor typology (approximately 75% of the total MFH area). The largest share belongs to five-floor buildings (1,121 apartments; 42,889 m² or 49% of total MFH area). Two-floor buildings form the second-largest group (607 apartments, 23,487 or 27% of the total MFH area).

The building stock is relatively old, with an average construction year of 1963 across the entire MFH. One-floor buildings are the oldest (average 1940), reflecting early development periods, two-floor buildings – mid-1960s and three- to five-storey buildings - mid-1970s and early 1980s. Brick is the dominant wall material across all building categories.

Heating across the cities' MFH is provided exclusively through individual systems, almost entirely gas-based, with no connection to centralised heating. Very limited amounts of firewood use have been reported. All MFH have access to centralised water supply, drainage, and gas, indicating full basic utility coverage.

All MFH are however rated as "needs repair" by the City Council, and none have had an energy audit conducted, pointing to low renovation levels and information gaps relevant for planning energy-efficiency investments.

Overall, the MFH stock is highly aged, fully reliant on individual gas heating, structurally diverse but predominantly brick-built, and in uniformly poor technical condition, which indicates substantial potential for future renovation and energy-saving measures.

5.2 The Trostyanets Lighthouse project: Renewable heating in a multi-family residential building

The Trostyanets Lighthouse Project is a two-year demonstration project implemented by Greenpeace in cooperation with the City of Trostyanets, along with the involvement of Green Planet Energy, iC consulenten Ukraine, CES clean energy solutions, and the contractor Sahara. The project focuses on the design and implementation of a renewable-based heating system in a large multi-family residential building under post-war reconstruction conditions.[27]

The pilot building is a five-storey multi-family residential building with a basement and an unheated attic. It has a heated area of approximately 2,500 m² and comprises 60 apartments, housing around 150 residents. The building was heavily damaged during the Russian occupation in spring 2022 and required capital renovation and thermal insulation. These reconstruction works were carried out under a national recovery programme, with construction starting at the end of 2023 and with a planned completion by the end of 2024.

In spring 2024, it was agreed that the building's heating supply would be based on renewable energy sources and implemented within the framework of the Greenpeace project. The heating system combines air-source and ground-source heat pumps to provide space heating, cooling, and domestic hot water. Thermal storage is ensured through dedicated water tanks for heating and domestic hot water, with a total storage volume of approximately 2,000 litres per system. Electrical backup heaters are integrated for peak demand, and the domestic hot water system includes a heat exchanger with a maximum capacity of 218 kW. A rooftop solar photovoltaic system complements the concept by

[27] Greenpeace. (2025). Factsheet Project Trostyanets. Link

partially covering the electricity demand of the heat pumps, particularly during summer operation.

5.3 Economic and technical modelling results

The following sub-sections provide an economic and technical assessment of the upgrading of the Trostyanets five-story multi-family house to more sustainable heating solutions. The MFH already went through an energy efficiency upgrade prior to the installation of the heat pump, energy storage and solar panel system. In addition, to provide a second data point, this section also assesses a sample Ukrainian MFH which undergoes significant energy efficiency upgrading along with the installation of a heat pump, storage and renewable energy system.

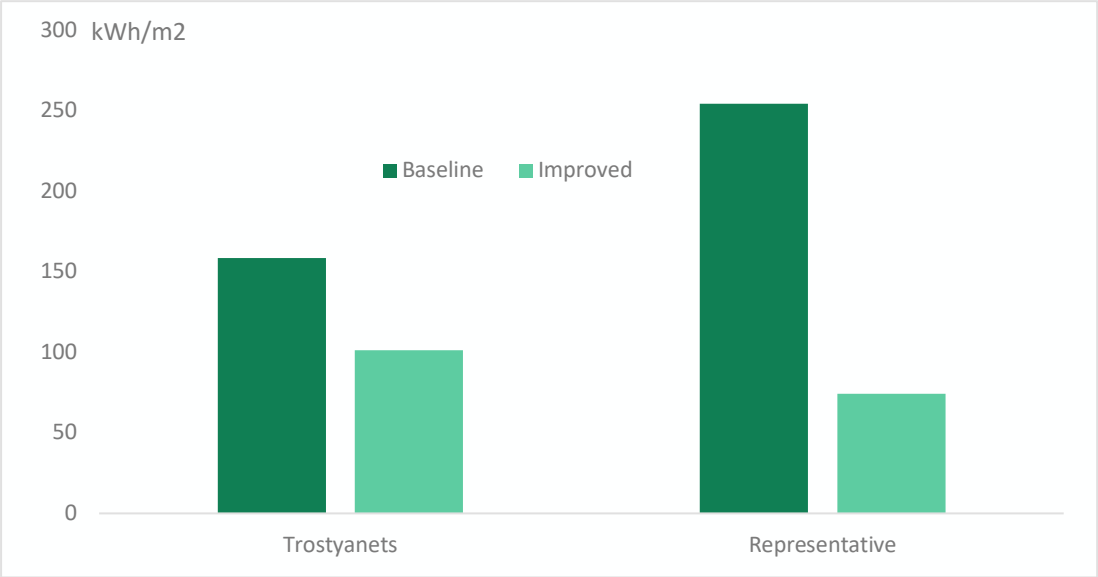
5.3.1 Energy consumption and savings

The baseline consumption of the MFH in Trostyanets prior to the installation of the heat pump system was estimated at roughly 159 kWh/m^2 including space heating, domestic hot water provision and electricity use. Given the age and profile of the building, this value therefore already reflects some energy efficiency upgrades conducted during the repair process. However, the building's thermal insulation has not been upgraded to the absolute highest standard (with the possibility of slightly thicker wall and roof insulation), although it performs vastly better than the average Ukrainian residential building.

The addition of the heat pump, storage system and renewable energy sources fully eliminates the use of gas in the building, and given the higher efficiency of the heat pumps vis-à-vis the existing gas boilers, the energy consumption of the building decreases by almost 36% to only 104 kWh/m^2, a significant improvement.

Another modelled theoretical representative five-story MFH building which has not been improved at all since construction also demonstrates the very significant benefits which energy efficiency improvements and the installation of heat pumps, storage and RES can bring. Here the baseline consumption is reduced from over 250 kWh/m^2, high even by Ukrainian standards, to only 74 kWh/m^2, or a reduction of 73%.

Figure 8: Standardised energy consumption



Source: authors' calculations

For the Trostyanets building, this translates to annual energy savings close to 151,000 kWh, eliminating over 229,000 kWh of direct gas usage for space heating and domestic hot water provision.

The large-scale shift in the energy source used nonetheless also has important implications for the energy grid. While gas is eliminated from the system, the Trostyanets building will require roughly 90,000 kWh of electricity more per year, primarily in the heating period when stress on the grid is already high. Along with the wider scale roll-out of sustainable electrified heating solutions, but also the electrification of transportation and industry, electricity distribution system expansion and stability will be key. Scaling clean heating in MFHs is as much a distribution system planning issue as a building renovation issue, and will also require further integration of heat and electricity storage, renewable energy and demand (load) shifting to prevent bottlenecks and system failure.

5.3.2 Emissions

The significant reduction in natural gas use has a positive impact on emissions reduction. It is however important to note that the building running heat pumps now however consumes significantly more electricity, which also has emissions attached to it.

Prior to the start of the war Ukraine's electricity system was highly dependent on highly emitting unabated coal power plants leading to an average emissions factor of 0.298 $kgCO_2/kWh$.[28] While the country has experienced lower energy demand in general the almost complete destruction of thermal generation and higher reliance on other sources has significantly decreased the emissions factor, down to about 0.197 $kgCO_2/kWh$ in 2025.[29] This again underscores the key point that installing additional renewable generation capacity is key, but even more important is the progressive and consistent decarbonisation

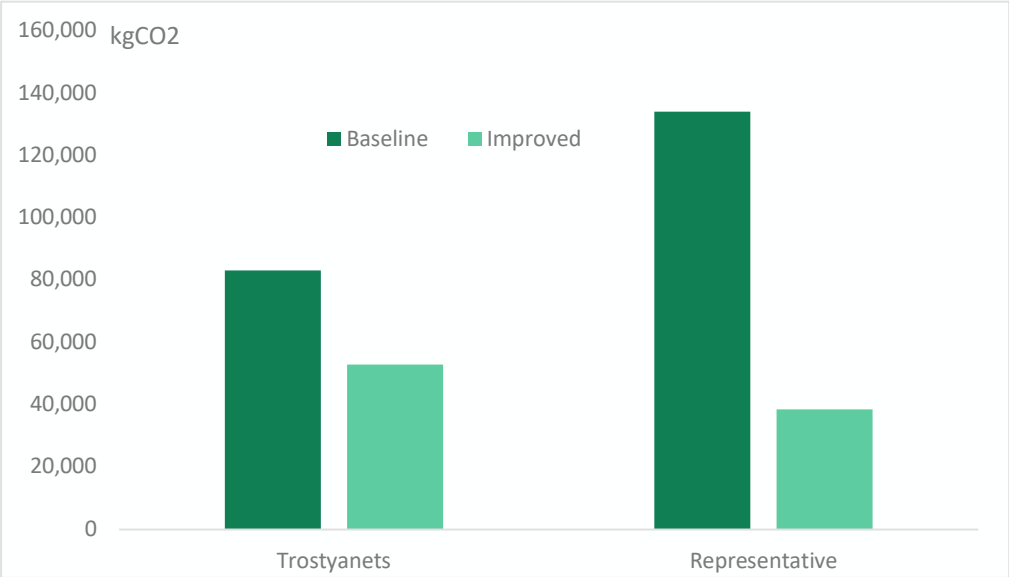
[28] DiXi Group. (2025). GHG emission factors for electricity generation and consumption in Ukraine: analytical study and description of the methodological approach to the calculation. Link

[29] Ember. (2025).

of the power system to ensure that emissions mitigated through the phasing-out of gas aren't simply replaced in the power sector.

This is indeed the case in both the Trostyanets and representative building, where emissions see significant reductions. For Trostyanets, CO_2 emissions fall by almost 36% through the elimination of gas, resulting in an annual reduction of over 30,000 kg of CO_2. For the much less energy efficient representative building, this decrease is even more significant, resulting in emissions savings of 71% or over 95,000 kg of CO_2 per year.

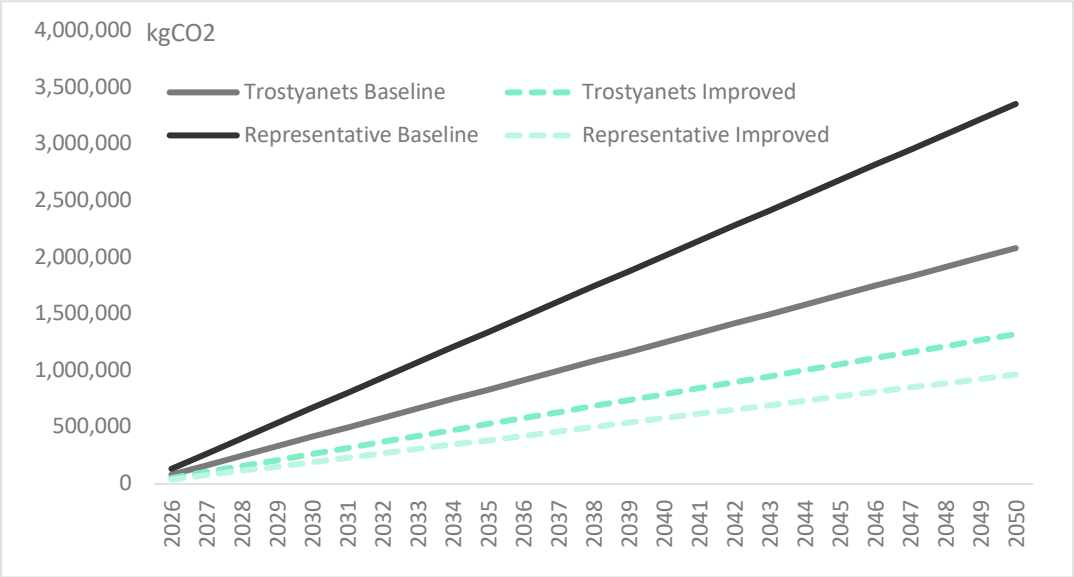
Figure 9: Emissions reductions in the five-story MFH



Source: authors' calculations

Importantly, the improvements in energy efficiency and the switch to sustainable heating solutions have a large cumulative effect over time. In the case of the upgraded Trostyanets building, cumulative emissions reductions between 2026-2050 reach 0.76 million kg of CO_2, representing a significant abatement. When upgrading a more representative Ukrainian building, the reductions increase significantly, amounting to 2.4 million kg of CO_2 in the same time period.

Figure 10: Cumulative emissions for upgraded Trostryanets building (2026-2050)



Source: authors' calculations

These very high reductions are also for only a single upgraded building, with massive reduction significant potential for city-wide upgrading. Hypothetically (and assuming a mix of the Trostyanets and Representative building types), upgrading every MFH in the city of Trostyanets could reduce emissions by 58% and save close to 2.1 million kg of CO_2 annually and 52.2 million kg of CO2 cumulatively between 2026-2050. This represents the equivalent of taking more than 450 cars of the road annually.[30] The emission reductions through the elimination of gas heating are also accompanied by improvements in thermal comfort as well as air quality both in the buildings and city-wide.

5.3.3 Expenditures

While the reductions in energy consumption and CO_2 emissions are substantial, the costs of installing heat pump systems and energy efficiency reconstructions are very high. In the Trostyanets project, the total cost of the project is roughly EUR 218,000 for the heating system and 30,000 for a solar PV system for a total cost of 93.9 EUR/m^2. For a project also involving deep energy efficient retrofits such as the representative building, this cost balloons to close to EUR 860,000 or 325 EUR/m^2.

5.3.4 Payback period

While not the primary focus of this study, these latter estimates of 325 EUR/m2 are still far below the costs of single-family house energy efficiency and heat pump upgrades (540 EUR/m2), reflecting the improved economies of scale that come from larger buildings. Concurrently, the large costs of the air-source and ground-source heat pumps, along with storage for both heat and electricity for the solar PV factor significantly raising into the overall costs. Concurrently, the costs mentioned here are higher than MFH which are connected to district heating systems, which tend to perform best in energy efficiency

[30] Author's calculations based on modelling results and annual CO_2 savings based on D-Carbonize.eu estimates of conventional car emissions.

upgrades. This is usually the case as installing a centralised individual heating substation is highly cost-effective and in general less work needs to be done at the apartment level. 31

While the costs of energy efficiency upgrades are substantial, the very high energy savings can often make projects economically viable. In Ukraine this is however currently not the case due to the very low energy prices charged to the population under the current PSO regime.

While electricity prices have increased significantly in the past few years, gas prices have almost not increased at all and are still significantly below cost-reflective levels. Given that for both the major transition through the energy efficiency upgrades and installation of heat pump systems means moving from natural gas to electricity, even the reductions in overall energy demand are still sometimes somewhat insufficient to counterbalance the price differential.

Under the current "Status quo prices"[32] the MFH projects do not pay off at all. This is the case since the much higher price for electricity as opposed to gas means residents could even be exposed to higher energy costs. Given the lifetime of housing and energy efficiency equipment, as well as renovation expenditures, these projects are therefore unviable without significant external support.

Nonetheless, it is also key to demonstrate the effects that a more cost-covering tariff would have on project economics. In a counterfactual scenario where Ukraine has liberalised its energy markets (for gas, electricity and heating) retail energy prices would increase quite significantly[33], which would have a very positive impact on project payback periods. This reflects a future pathway where the Public Service Obligations are phased out but also includes effects of carbon pricing (both ETS I and ETS II) that Ukraine will be party to upon acceding to the EU.

In this case, the payback period for the Trostyanets building project is significantly better at roughly 35.4 years while the representative building could be paid off within 26.9 years. This is good news, especially the given the very high rate of sustainability as well as energy efficiency retrofits performed in the representative building scenario.

Table 5: Payback periods (years)

Housing type	Status quo prices	Cost-covering prices	50% grant	80% grant
Trostyanets	>76	35.4	22.7	13.7

[31] Bilek, P., Stubbe, R., Saparova, D., (2023). The Green Reconstruction of the Residential Sector of Bucha. Link

[32] The Low prices scenario represents current gas tariffs for households, electricity tariffs for households and electricity tariffs for small non-household consumers. These are then increased by a factor of 2% annually.

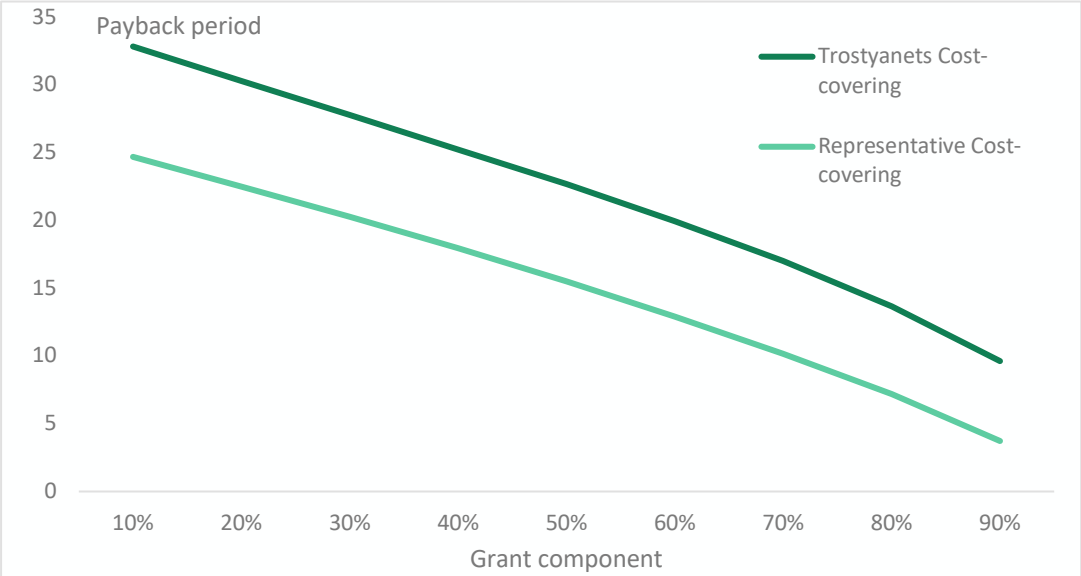
[33] The Cost-covering prices scenario takes a Ukraine's neighbour's retail electricity prices as proxies with a long-term forecast. These include transmission, distribution fees and all taxes. Gas prices are also derived from long-term forecasts including all fees as well as a ETS II simulated carbon price. Significant levels of uncertainty regarding the future of Ukraine's power system currently make any price forecasting very difficult, but long-term convergence with Ukraine's neighbours and the EU more broadly can be expected, especially given Ukraine's accession to the EU.

Representative	>76	26.9	15.5	7.2

Source: authors' calculations

While still quite long, these payback periods are significantly shorter and may become more viable with support. This is demonstrated in the figure below, where varying levels of grants are provided to decrease the CAPEX share for the building's residents. While the level of energy prices is still a large determinant, with a 50% grant components payback periods for the Trostianets building decrease to below 22.7 years and with an 80% grant component the project payback periods fall to below 13.7 years. Nonetheless, these payback periods exceed typical HOA decision horizons, reinforcing the need for grant-led models rather than debt-only financing.

Figure 11: Upgrade expenditure under different grant shares



As such, besides the most important factor of electricity and especially gas tariff liberalisation, financial support for sustainable heating solutions and energy efficiency more broadly is still a fundamental determinant of the viability and ability to execute projects. The grants themselves should never be seen as a waste of money, but rather as fundamental compensators for highly distorted price signals due to regulated tariffs and debt throughout the energy system. Designing a robust and implementable energy efficiency support scheme is therefore key to making project bankable and catalysing the Ukrainian residential energy efficiency sector.

6. Proposal for support scheme design

As shown in the previous section, the economics of sustainable heating solutions and energy efficiency projects in Ukraine is currently largely uneconomical due to high capital costs combined with very low energy tariffs as well as implicit subsidies for natural gas. As such, in order to overcome these barriers, Ukraine's reconstruction requires a support scheme that can deliver energy efficiency and sustainable heating investments at scale despite today's tariff environment. High upfront costs combined with below cost-reflective tariffs weaken household and HOA bankability, while market and tariff reform remains

politically sensitive and is likely to be phased. A credible support model therefore needs to function under current price signals, while remaining compatible with future liberalisation and EU market integration.

This section firstly presents the international experience with sustainable heating support schemes to identify design features that make multi-apartment building heat pump projects bankable in practice. Second, Ukraine's current price signals and fiscal treatment are assessed as constraints on payback-based financing. Third, the section reviews the existing Ukrainian delivery and financing landscape, with the EEF and Decarbonisation Fund as the core building blocks. Finally, it proposes an EEF-led support window with complementary financing and quality assurance features tailored to multi-apartment buildings.

6.1 International experience: what drives bankability in MFH

International experience from a variety of countries can provide a practical benchmark for how multi-family apartment building heat pump deployment can be scaled despite high upfront costs and complex governance. Across European cases, successful programmes typically optimise for four elements: (i) predictable support over multiple years, (ii) financing structures that work for homeowners' associations (HOAs) without relying on utility billing or district heating arrangements, (iii) standardised delivery models that reduce transaction costs, and (iv) strong quality assurance to protect performance and consumer confidence. Where these elements are missing, uptake can be volatile. Poland's recent experience is instructive: generous support enabled rapid market expansion, but subsequent market contraction highlighted sensitivity to operating-cost conditions, programme stability, and quality control.

The comparative overview in Table 6 below is not intended as a blueprint to replicate, but as validation of design features that are transferable to Ukraine's context and can be implemented through existing instruments.

Table 6: Overview of international experience

Country	Multi-apartment building approach (what the system optimises for)	Support schemes relevant to multi-apartment buildings (heat pumps)	Financing mechanisms	Policy/market enablers that reduce risk and increase bankability	Quality assurance and delivery features
Sweden	Low administrative burden; relies more on broad fiscal tools and price signals than large, dedicated grants.	Primarily general tax deductions for renovation/installation labour (ROT). Targeted climate/innovation-type grants can support fuel switching for organisations (incl. housing associations), but programme-style HP subsidies are less central.	Mostly market-based: housing associations borrow from banks; "green" loan products may apply where upgrades improve cashflows and asset value.	Strong long-term direction away from fossil heating supported by carbon price signals and mature electrification; stable expectations reduce regulatory risk.	General compliance via building regulations and certified installers (incl. refrigerant handling); less reliance on programme-specific QA layers.
Norway	Standardised national delivery and package logic: push upgrades through an agency model and bundle HPs with building efficiency.	National agency support (Enova) for energy upgrades in housing cooperatives/condominiums, often including central HPs as part of a retrofit package.	HOA/cooperative bank borrowing supported by public co-financing; grants reduce principal and improve DSCR without utility-bill repayment.	Clear non-fossil trajectory and electrification readiness; stable institutional delivery reduces policy risk; incentives aligned with measurable energy outcomes.	Documentation and planning requirements (energy assessment); installer competence requirements; eligibility rules encourage proper sizing and integrated measures.
Denmark	System-consistent deployment via zoning/planning: steer HPs to least-cost areas and avoid stranded investments.	Time-limited grant pools with fixed amounts; eligibility commonly linked to location/planning (e.g., not in DH/planned DH zones) and	Bank loans + vendor financing; possible third-party ownership for building-level plants (service contracts) without DH reliance.	Heat planning and zoning are core; strong phase-out direction for fossil heating stabilises demand; tax/tariff structures can improve HP operating economics.	Approved product lists; certified installers; streamlined application processes; basic compliance checks (proof of

		replacement of fossil heating; larger-building pathways exist.			replacement/decommissioning).
Germany	Rapid market shift through high support intensity plus strong compliance; clear regulatory direction to renewable heating.	National programmes provide high support shares for heating replacement in multi-family buildings (central HPs), with bonuses targeting early replacement and higher efficiency.	Blended finance: grants plus concessional loans via development-bank channels; third-party heat contracting/ESCO models can finance/own the plant and sell heat to the building.	Explicit renewable-heating trajectory and rising carbon cost signals; stable programme rules reduce lender risk and support supply-chain scaling.	Strong technical eligibility rules; documentation and expert sign-off; verification protects performance and programme credibility.
Netherlands	Make HOA projects financeable via subsidy plus dedicated public lending designed for multi-apartment governance (VvE).	Investment subsidy (device-based) can support HPs; workable for central or unit-level systems depending on design and eligible equipment lists.	Dedicated public loan facility for HOAs (long tenors; repayment via HOA service charges); highly compatible with no-DH contexts.	Clear direction away from gas and local transition planning; predictable subsidy schedules support pipelines and lender confidence.	Certified installers; eligible product lists; documentation checks; noise/technical standards support proper design and acceptance in dense housing.
Poland	Rapid scaling via subsidies, but volatility revealed when operating-cost conditions and quality control were not fully aligned with mass deployment. The system optimises first for fast replacement and air-quality gains; bankability became sensitive to electricity-to-gas price ratios and programme stability.	Multi-family track “Warm Housing” supports heat source replacement and thermal modernisation in multi-family buildings (incl. heat pumps). In parallel, the “Clean Air” scheme (primarily single-family) shaped supply chains and market momentum; its design and stability still affected the broader installer/product ecosystem relevant to MFH.	Grant-led uptake; co-financing frequently relies on household/HOA resources and bank lending where feasible. Where credit conditions tightened, uptake became more dependent on high grant intensity (i.e., less resilient to shocks).	Market confidence proved highly sensitive to operating economics: An electricity-to-gas price ratio around 4:1 is considered as a key deterrent, alongside energy-price uncertainty. Programme continuity also matters; pauses/sudden rule shifts can translate into stop-go demand and contractor risk.	Quality gating tightened after problems with low-quality devices and bill shocks. Since June 2024, heat pump grants under Clean Air require selecting devices from the ZUM list (Green Devices and Materials) intended to ensure declared parameters/labels are credible.

Source: LCP Delta, 2024[34]; European Heat Pump Association, 2025[35]; Interreg, 2024[36]; European Heat Pump Association, 2024[37]

[34] LCP Delta. (2024). Analysis of the EU heating market https://www.agora-energiewende.org/fileadmin/Projekte/2024/2024-10_EU_Clean_Heat/EU_heating_market_analysis.pdf;

[35] European Heat Pump Association. (2025). Subsidies for residential heat pumps in Europe https://ehpa.org/wp-content/uploads/2025/11/Subsidies-for-residential-heat-pumps-in-Europe-1.pdf

[36] Interreg. (2023). D.3.1.1 Baseline on financing models and instruments, potentials, and policy frameworks in partner countries https://www.interreg-central.eu/wp-content/uploads/2024/05/D.3.1.1.-Baseline-on-financing-models-and-instruments-Poland.pdf

[37] European Heat Pump Association. (2024). Pump it down: why heat pump sales dropped in 2023 https://www.ehpa.org/wp-content/uploads/2024/04/Pump-it-down-why-heat-pump-sales-dropped-in-2023_EHPA_April-2024.pdf

Table 6 highlights that scaling in multi-apartment buildings is driven by delivery and risk design rather than by the presence of subsidies alone. Programmes that scale up successfully often reduce transaction costs for HOAs through standardised pathways and predictable rules (e.g. Norway's Enova or the Netherlands' structured VvE-compatible subsidy and loan framework). They avoid the common failure mode of underperforming installations by linking heat pumps to a minimum technical bundle that ensures system compatibility and protects bills, as reflected in Germany's technical eligibility rules or Denmark's planning-linked deployment logic.

Bankability depends on whether financing is structured at building level and aligned with HOA governance, typically through a grant-plus-loan logic with long time periods and predictable repayment channels. This is particularly visible in the Netherlands' dedicated public lending facility for HOAs or Germany's blended grant-plus-development bank loan structure, which reduce debt-service risk.

Policy credibility and quality gates form the final layer: stable multi-year support reduces perceived risk for HOAs, lenders and suppliers as shown in Germany's or Norway's institutionalised delivery models. While eligibility lists, installer competence, commissioning and verification protect outcomes and sustain trust. Poland's recent tightening of quality gating (e.g. ZUM list) illustrates the consequences of scaling before fully embedding these safeguards. For Ukraine, the implication is a programme pathway that standardises integrated packages, aligns finance with HOA decision-making, and embeds enforceable QA from the outset.

6.2 Why current price signals suppress bankability

As shown in the previous section, the economics of sustainable heating and energy efficiency investments in Ukraine are currently constrained by high upfront capital costs combined with tariffs that remain below cost-reflective levels. This directly weakens the investment case for households and HOAs: energy efficiency generates savings in physical energy terms, but when regulated tariffs are low, the resulting monetary savings are often insufficient to service debt or justify the required upfront co-financing. In parallel, suppressed tariffs reduce cashflows in the heat and gas sectors, which limits the ability of utilities and service providers to co-finance upgrades or support implementation at scale.

For electrified heating, the operating-cost competitiveness depends critically on the ratio of electricity to natural gas (and heat) tariffs, adjusted by heat pump performance. [38]A heat pump reduces delivered heat cost roughly in proportion to its seasonal performance factor (SPF/COP). If tariffs distort relative prices, households may face weak or uncertain bill savings even where heat pumps are technically efficient. In this context, a support scheme needs to create bankability primarily through upfront cost reduction, affordable complementary finance, and performance safeguards, rather than relying on tariff-based payback alone.

[38] Letz. C, et al (2025). Heat pumps are gaining ground in Europe – electricity prices matter https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-englische-Dateien/Fokus-2025-EN/Focus-No.-487-February-2025-Heat-pumps.pdf

Fiscal policy also affects effective investment costs.[39] Ukraine's VAT and customs duty exemptions for defined energy-saving and renewable energy equipment reduce upfront capex. This is material for heat pumps and related equipment, but it also creates a programme eligibility lists.

In practical terms, this means the scheme must create bankability primarily through upfront support and affordable complementary finance, while using quality gates to prevent bill shocks and reputational risk in the early scale-up phase.

6.3 Ukraine's existing instruments, delivery and financing architecture

This section reviews existing financing instruments through the lens of their ability to support deep renovation combined with clean heating technologies, with a focus on scalability, predictability, and suitability for MFHs.

Ukraine's two most relevant domestic pillars are the Energy Efficiency Fund (EEF) and the Decarbonisation Fund, complemented by state programmes, international facilities and local co-financing initiatives.

- **The Energy Efficiency Fund (EEF)**, established under the Law "On the Energy Efficiency Fund" (2018), is the government's flagship mechanism for residential energy efficiency modernisation. It is financed through the State Budget and contributions from international partners, including the EU and Germany via the EE4U Programme (managed by IFC). The Fund is undergoing an EU Pillar Assessment, which would enable it to manage EU funds directly.

  The EEF focuses on multi-apartment buildings managed by homeowners' associations (HOAs) and applies a tranche-based model linked to audits, design approval and post-completion verification. Works are supervised by certified energy auditors and require energy performance certification. The EEF has developed three core programmes: Energodim (comprehensive modernisation support), VidnovyDIM (grant-based restoration and urgent modernisation of war-damaged multi-apartment buildings), and GreenDim (support for heat pumps, solar PV and storage).[40] The detailed parameters of these programmes, including grant shares, caps and eligible measures, are summarised in Annex 6. Nonetheless, under the Greendim program, only one project out of 175 projects (that are either completed or in the process of finalisation) envisages the installation of a heat pump.[41] The low uptake of heat pump grants may be explained by higher upfront investment costs, lower grant coverage relative to project CAPEX, more limited installation market maturity compared to solar PV, lower beneficiary familiarity

[39] European Heat Pump Association. (2025). Heat pumps versus boilers: taxes and running costs https://www.ehpa.org/wp-content/uploads/2024/12/EHPA_VAT-report_Heat-pumps-versus-boilers-taxes-and-running-costs-1-1.pdf

[40] The GreenDim programme is currently suspended due to a lack of financing. Nonetheless, after the replenishing of the EEF by the CMU, the programme can either be resumed or have its features integrated into the Energodim programme.

[41] For more details see: Energy Efficiency Fund (2026). Status of Projects under the Greendim Programme. https://docs.google.com/spreadsheets/d/1fCovgwgMbm4V1xH7mVpypCnvjLeKopoS-WxoneswRqE/edit?gid=0#gid=0

with the technology, and higher technical and procedural compliance requirements.

While these programmes increasingly include clean heating components, their design remains primarily renovation-driven, and uptake of heat pumps and renewable heating solutions depends on grant share with the total project costs and complementary financing conditions.

- **The Decarbonisation Fund**, operational since 2024, was created as a state-owned joint-stock company under the State Agency for Energy Efficiency and Energy Saving of Ukraine (SAEE). It is primarily financed by proceeds from the CO2 emission levy (carbon tax), supplemented by state borrowings and other revenues. The Fund can finance energy efficiency and renewable energy measures and can provide compensation or subsidisation under credit and leasing arrangements. However, for comparison, the 2025 tax rate in Ukraine was around EUR 0.68/tCO_2, while the EU ETS – EUR 65.23 highlighting the significant difference.[42]

  Eligible beneficiaries include HOAs and housing cooperatives, state and municipal enterprises, local authorities, and legal entities with resident beneficial owners, among others. Access to support is linked to a Voluntary Agreement with SAEE defining targets, with verification through documentation and site inspections. The Fund offers several instruments (including loans, leasing, factoring, interest-rate compensation and selected grant support for certification and audits); the instrument overview and conditions are provided in Annex 7.

The Decarbonisation Fund therefore has the potential to complement grant-based programmes by addressing financing gaps for clean heating technologies, particularly where upfront investment costs are high.

- Beyond these two national pillars, Ukraine has **additional state and internationally supported programmes** that can complement a support scheme either through co-financing, technical assistance, or parallel investment pipelines. In July 2025, the Government adopted the State Targeted Economic Programme for the Thermal Modernisation of Buildings until 2030[43], aiming to accelerate renovation in residential and public buildings, reduce gas imports and promote NZEB standards. The programme includes quantitative targets for renovations and deployment of heat pumps and solar PV by 2030, with financing expected from the state, municipalities and external partners; the target overview is provided in Annex Table 10. International programmes (including IFI-financed public building initiatives and technical assistance facilities, please see Annex Table 11) further broaden the ecosystem and can support preparation of bankable pipelines and replication of implementation approaches.

- **Fiscal measures** complement programme-based support by reducing upfront costs for energy efficiency and renewable energy equipment. The Tax Code of Ukraine provides VAT and customs duty exemptions for the import of defined categories of energy-saving and renewable energy equipment, with the eligible goods and their

[42] Tax Foundation Europe. (2025). Carbon Taxes in Europe, 2025. https://taxfoundation.org/data/all/eu/carbon-taxes-europe/

[43] CMU (2025). On approval of the State Targeted Economic Program to Support Thermal Modernization of Buildings until 2030 https://zakon.rada.gov.ua/laws/show/694-2025-p#Text

UKT ZED classification codes approved by the Cabinet of Ministers.[44] [45] In addition, temporary wartime provisions exempt a defined range of energy-related equipment from import duties and VAT for imports into Ukraine until no later than 1 January 2029.[46] A separate VAT exemption may apply to imports conducted under agreements financed through the Energy Community Secretariat, subject to lists approved by the Cabinet of Ministers.[47]

- **Local incentives** provide an additional, albeit uneven, layer of support. Municipalities have introduced small-scale co-financing and revolving instruments that either complement national schemes (including EEF programmes) or address specific local needs. Examples include a top-up co-financing share for EEF projects (Zhytomyr[48]), interest-free repayable assistance to HOAs under the Revolving Cities Fund operated by the Energy Efficient Cities of Ukraine association[49], and local support for renewable energy systems for businesses (Vinnytsia[50]). As of end-2024, the EEF had signed 255 Memoranda of Understanding with municipalities to coordinate co-financing and technical support.

In analytical terms, the EEF provides a functioning delivery platform for the HOA segment, with established procedures for audits, design approval, tranche payments and post-completion verification. The main gaps relate to fragmentation and objectives rather than institutional absence. Existing programmes remain renovation-led, clean heating is not yet treated as the core organising objective, and the co-financing gap for HOAs is not systematically closed through concessional instruments. This is where the Decarbonisation

---

[44] CMU (2016). The issue of importing energy-saving materials, equipment, fixtures and components into the customs territory of Ukraine under Japanese technology demonstration projects https://zakon.rada.gov.ua/laws/show/293-2016-п#n16

[45] Verkhovna Rada of Ukraine (2012). Customs Code of Ukraine https://zakon.rada.gov.ua/laws/show/4495-17#n2338

[46] VAT and customs duty exemptions prolonged in December 2025. Verkhovna Rada of Ukraine (2025). On Amendments to the Tax Code of Ukraine and Other Laws of Ukraine Concerning the Peculiarities of Taxation of Banks with Corporate Income Tax in 2026 and the Postponement of the Entry into Force of the Electronic System for the Circulation of Alcoholic Beverages, Tobacco Products, and Liquids Used in Electronic Cigarettes https://zakon.rada.gov.ua/laws/show/4698-IX#Text

[47] CMU (2024). Some issues of implementation of clauses 9 - 37 of Section XXI “Final and Transitional Provisions” of the Customs Code of Ukraine and clause 88 - 1 of subsection 2 of Section XX “Transitional Provisions” of the Tax Code of Ukraine https://zakon.rada.gov.ua/laws/show/1193-2024-п#Text

[48] Zhytomyr City Council (2024). On amendments and additions to the city target program "Municipal Energy Plan of Zhytomyr Urban Territorial Community for 2021-2024" and its extension to 2025 https://zt-rada.gov.ua/?doc_id=44538; EEF (2025). Activity Report of the State Institution "Energy Efficiency Fund" for 2024 https://eefund.org.ua/documents/zvit-diyalnosti-dyrekcziyi-derzhavnoyi-ustanovy-fond-energoefektyvnosti-za-2024-rik/; EEF (n.d.) Regional cooperation https://eefund.org.ua/energodim/regionalne-spivrobitnycztvo/

[49] Association “Energy Efficient Cities of Ukraine” (2024). Green Transformation of cities: 5 stories of Ukrainian communities that embody the European green course https://enefcities.org.ua/upload/files/Publications/Poradnyk/EGD_cities_cases_2024.pdf

[50] Vinnytsia City Council (2025). On amendments to the decision of the city council dated 28 April 2023 No. 1589 (as amended) https://www.vmr.gov.ua/media/003_ВДЄ/Рішення%20від%2031.01.2025%20№%202686.pdf

Fund and municipal top-ups can be used to align financing conditions with an integrated renovation-plus-heating pathway.

Taken together, the financing landscape provides a functional starting point but does not yet constitute a single, predictable support model capable of systematically scaling deep renovation combined with clean heating across building types and income groups. Existing instruments differ in eligibility, grant intensity, and procedural complexity, and are not fully aligned around a common objective of heating system decarbonisation. The proposed support scheme therefore builds on these instruments to create a coherent, scalable framework that explicitly integrates building renovation with clean heating deployment.

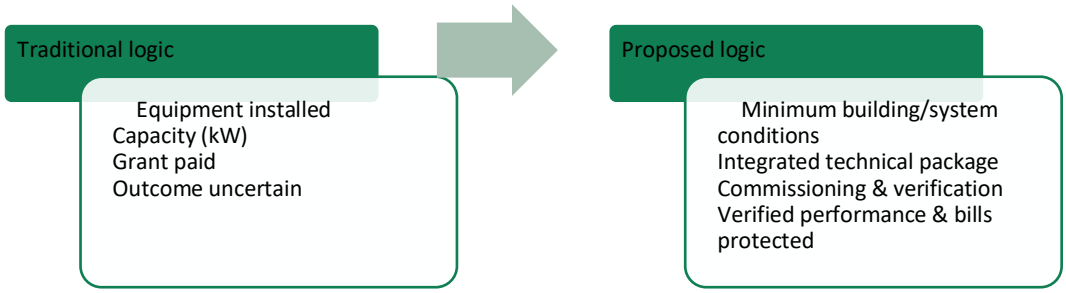
6.4 Draft support scheme

Rather than creating new institutions, the most pragmatic option is to **introduce a dedicated EEF sub-track that targets MFH renovation packages compatible with clean heating**. The sub-track should operate within the existing Energodim / VidnovyDIM / GreenDim architecture, but with a clearer organising objective: scaling integrated renovation-plus-clean-heating solutions in MFHs under current tariff distortions, while remaining compatible with gradual market liberalisation and EU alignment.

The key design principle is to **treat clean heating in MFHs as a system intervention** rather than an equipment purchase. This implies a package logic that ensures technical feasibility (heat loss, distribution, DHW integration), financial feasibility (grant-led cost reduction with concessional co-financing), and implementation feasibility (standardised procedures and strong quality assurance). Implementation feasibility must also explicitly account for technical and bureaucratic interactions with other institutions, particularly distribution system operators (DSOs), where increasing contracted capacity, grid connection approvals, and metering adjustments for building-level heat pumps can create delays and uncertainty. Simplifying and standardising these procedures is critical to avoid turning grid-access processes into a bottleneck for deployment.

The sub-track should operate as a **scaled programme with predictable multi-year funding envelopes and stable rules** to avoid stop-go cycles that undermine HOA confidence and supplier capacity. Eligibility should be package-based and require a minimum technical bundle that reduces the risk of underperformance and bill shocks. In practice, this means linking clean heating support to minimum building and system conditions: defined envelope measures or an explicit heat-loss / heat-demand threshold, internal distribution upgrades (balancing and controls), a DHW solution compatible with electrified supply (including storage and proper hydraulic integration), and mandatory commissioning and post-install verification. This shifts the support logic from “installed capacity” to “verified functioning performance”, which is essential in MFHs where design and commissioning quality directly affects bills and user acceptance.

Figure 12: Shift in support logic: from capacity-based to performance-based



Source: Authors' own illustration

Given current PSOs and tariff freezes, the sub-track must **create bankability primarily through upfront support rather than payback-based debt logic**. A **two-tier grant structure** is therefore appropriate, combining **a base grant for deep renovation measures** (within the existing EEF logic) **with a clean-heating top-up for electrified/renewable heating components** (central heat pump plant, controls, DHW integration, storage and associated enabling works). The clean-heating top-up should be linked to documented design quality and verification, not only to protect performance but also to reduce reputational risks in early scale-up.

At the same time, system resilience considerations should be treated explicitly: the sub-track should not implicitly assume that buildings must be cut off from gas entirely. In Ukraine's current security and supply context, it is reasonable that some solutions retain a limited back-up option (e.g., retained capacity or emergency back-up) while moving the core heating supply away from gas. The **key policy point is to clarify under what technical and regulatory conditions such back-up arrangements are allowed**, **how they are treated in eligibility, and how they avoid undermining decarbonisation objectives**.

A further constraint is **tariff uncertainty for heat pumps in MFHs**, which can arise when the installation, metering or billing arrangement does not clearly fall under household PSO conditions. Depending on configuration, parts of electricity consumption for a building-level system can face tariffs that differ from households' expectations, including arrangements closer to small non-household supply. This issue should be treated as a policy and implementation gap to be clarified rather than as a strict gate that would delay projects. In practical terms, the sub-track should encourage applicants to clarify the intended tariff and billing approach at application stage (meter configuration, allocation concept, and expected tariff treatment), and it should prioritise solutions with transparent allocation and lower exposure to tariff-category ambiguity. Where tariff treatment remains uncertain during the transition period, the programme design should allow for pragmatic safeguards to reduce the risk of early bill shocks and loss of trust, especially for vulnerable households, without recreating broad price distortions.

Importantly, **fiscal and procurement conditions** should be integrated into the sub-track design, including **alignment of eligible equipment lists with VAT/customs exemptions** and explicit management of the risk of wartime import relief expiring by 1 January 2029.

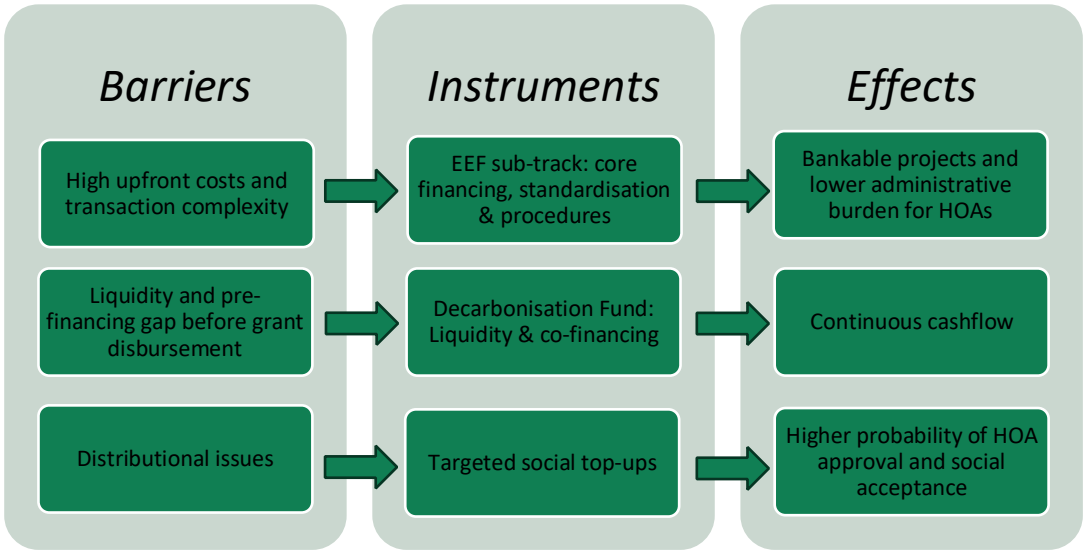
HOA governance constraints are a central implementation barrier. MFH projects require **collective decisions, face uneven willingness-to-pay**, and often rely on **volunteer HOA boards with limited technical and administrative capacity**. In addition, the overall number of formally established HOAs in Ukraine remains relatively low compared to the total multi-

apartment building stock, limiting the pool of buildings that can currently access structured renovation and clean heating support schemes. This institutional coverage gap directly constrains the speed at which new building-level heating models can diffuse.

A further structural gap is the **absence of a dedicated one-stop shop for MFHs guiding clean heating renovation**. At present, HOAs must independently navigate feasibility studies, energy audits, technical design, DSO procedures, eligible supplier identification and financing options. This fragmentation increases transaction costs and deters volunteer HOA boards with limited capacity. Establishing a centralised advisory and coordination function, e.g. EEF-managed, providing standardised guidance, pre-qualified expert lists, template documentation and procedural support would reduce soft barriers and improve programme uptake without fundamentally altering the financing architecture.

The governance constraints also **interact directly with financing design**. Even where grant shares are high, **HOAs typically struggle** with the co-financing requirement, the need **to pre-finance works, and the timing of reimbursements**. In EEF practice, grant support is tranche-based and linked to audits, design approval and post-completion verification, which is sound from a control perspective but can create long waiting periods and a liquidity gap for HOAs and contractors. As a result, projects can stall not because total support is insufficient, but because cashflow timing is incompatible with HOA realities.

Figure 13: Policy instruments mapped to implementation barriers and outcomes



Source: Authors' own illustration

Fundamentally, in multi-family buildings, the viability of clean heating projects is determined not only by average lifecycle economics, but by **how risks are perceived and distributed within HOAs**. In practice, **bill uncertainty** matters more than average payback: even projects with positive long-term economics can be rejected if households fear short-term bill increases or unpredictable electricity costs, particularly under distorted tariffs and unclear billing arrangements.

Non-financial factors further shape acceptance. **Noise, indoor comfort and reliability** are highly salient to residents, and when systems underperform, responsibility is often attributed not to installers or programme design but to the HOA board or local authorities,

amplifying social friction. As a result, early failures have outsized reputational effects: a small number of poorly performing installations can undermine trust in heat pumps across entire municipalities, slowing replication well beyond the affected buildings. In this context, quality assurance, commissioning, clear tariff treatment, and simplified grid and administrative procedures are not administrative formalities but social safeguards.

Robust design standards, mandatory commissioning, post-install verification and transparent billing rules reduce the risk of bill shocks and comfort complaints, protect HOA leadership from blame, and build confidence among residents. Similarly, high grant shares are not merely financial support but a risk-sharing mechanism that lowers resistance to collective decisions. Treating QA, grants, tariff clarity and administrative simplification as acceptance mechanisms rather than bureaucracy is therefore essential for scaling clean heating in MFHs.

Overall, the proposed EEF sub-track is designed to function under today's distorted price signals by creating bankability through upfront support, concessional complementary finance, and quality assurance. It also prepares for future reform by keeping the core delivery model stable, ensuring that tariff liberalisation strengthens rather than disrupts the economics of clean heating.

7. Conclusion and policy recommendations

The Trostyanets Lighthouse project demonstrates that electrified clean heating in a multi-family building is technically feasible in Ukraine, including under reconstruction conditions and in regions with high security risks. The modelling results confirm that combining improved building performance with heat pumps and supporting equipment can reduce final energy demand and eliminate direct gas use at the building level. In Trostyanets, standardised final energy demand decreases from 160 kWh/m2 to 104 kWh/m2, and emissions fall by 36% as gas combustion is eliminated. While this study does not quantify city- or national-level impacts, the case is indicative of a broader point: the underlying technical approach and delivery logic are replicable across other MFH typologies and cities, provided enabling conditions are addressed. This is also shown through the other Representative building which starts from a much lower energy efficiency base (i.e. worse condition) with very significant energy efficiency gains possible through deep retrofits and upgrading to more sustainable heating solutions. Trostyanets can therefore serve as **a practical reference model for replication in other municipalities and reconstruction projects**.

The Trostyanets case shows that clean heating in multi-family buildings delivers **resilience benefits alongside emissions reductions**. By eliminating on-site gas use and shifting heat supply toward electrified systems supported by storage and local generation, buildings become less exposed to fuel disruptions and can recover more rapidly after outages or damage. These co-benefits are especially relevant in a war-time and post-war context, where continuity of basic services is a strategic priority.

The **core scaling constraint** is not the availability of technology, but **the policy and implementation conditions** that **determine operating-cost predictability, affordability, and HOA decision feasibility**. This is why an EEF-based sub-track is the most practical way forward: it builds on an existing delivery platform for MFHs, can structure support around integrated renovation-plus-clean-heating packages, and can embed verification and quality

assurance without creating new institutions. However, to move from pilots to scale, several enabling actions must be taken in parallel.

Key implementation condition for the EEF sub-track is clarification of the tariff, metering and billing treatment for building-level heat pump systems in residential MFHs (including cost allocation at building level). While household energy prices are shaped by PSOs and wartime tariff measures, heat pump systems may face tariff treatment that is not fully predictable ex ante, depending on connection, metering and billing configuration. Building-level electricity consumption for hot water supply can in some cases be treated differently, including arrangements closer to small non-household supply, which can materially change operating costs and undermine acceptance. **Without practical clarification, perceived bill risk will remain a decisive barrier** for HOA decisions and increases the risk that early replication is undermined by negative feedback.

More broadly, **the operating-cost case for electrified heating in residential buildings remains closely linked to the trajectory of electricity and gas market reform**. As long as PSOs and wartime tariff measures continue to suppress and distort relative price signals, households and HOAs face uncertainty over future bills, which weakens investment incentives and complicates financing at scale. A **predictable and well-sequenced reform pathway**, **combined with targeted social protection**, would **gradually improve** the underlying **economics for clean heating and deep renovation**.

Near-term (up to 12 months) measures to remove the first-order implementation barriers

1) **Address regulatory and permitting issues** that are creating uncertainty. Addressing these barriers requires a variety of aspects, including simplified and accelerated permitting procedures for heat pump installations, reduction or waiver of subsoil use permit fees for geothermal projects, differentiated and proportionate rules for shallow and deep geothermal systems, and adoption of pending legislative amendments on streamlined permitting and grid connection, and standardisation of DSO procedures for contracted-capacity upgrades and metering arrangements for building-level heat pump systems to avoid case-by-case administrative delays.

2) **Tariff/billing clarity for MFH heat pumps** led by Ministry of Energy and NEURC. Provide a practical and enforceable clarification on how electricity used for building-level heat pump systems in residential MFHs is classified, metered and billed, and how costs are allocated at building level. This should be aligned with EEF application documentation so that tariff treatment is transparent to HOAs at the decision stage. While long-term PSO phase-out is key, an interim measure could be the explicit inclusion of heat pump operation among the eligible uses of PSO electricity tariffs in multi-apartment buildings is needed, and as a next step the progressive alignment of electricity pricing signals with decarbonisation objectives so that electrified heating becomes economically rational for consumers.

3) **Address HOA liquidity and timing constraints** led by EEF with the support of Decarbonisation Fund. Even where grant shares are high, projects can stall because HOAs must pre-finance audits and works and then wait for reimbursement under tranche-based disbursement. Policy and programme implementation should explicitly treat liquidity as a binding constraint. This implies (i) adjusting tranching and pre-financing rules where possible without weakening verification, and (ii) systematically using complementary instruments (interest-rate compensation,

enabling-cost support, and leasing/bridge-type arrangements) via Decarbonisation Fund to close the pre-financing gap for EEF-approved packages.

In parallel, expanding the institutional base of functioning HOAs should be treated as a medium-term structural objective, as the current share of formally organised HOAs limits the addressable building stock for programme-based clean heating solutions.

4) **Targeted social protection within HOA projects** led by the Ministry of Social Policy in coordination with the Ministry of Energy**.** Develop administratively workable mechanisms for targeted top-ups for vulnerable households (or buildings with high share of vulnerable households) to reduce distributional tensions that otherwise block HOA votes. Where transition-period tariff uncertainty cannot be eliminated quickly, time-limited safeguards for vulnerable households can protect acceptance without recreating broad PSO-type price distortions. Theses protections are as much a protection of consumers as they are acceptance-preserving tools for sustainable heating solutions.

5) **Clarification on reliability and back-up arrangements** to be led by the Ministry of Energy. In Ukraine's current security and supply context, it is not realistic to assume that all buildings will immediately remove any possibility of gas use. A practical policy gap is therefore to define what an acceptable limited back-up arrangement (technical scope, safety requirements and operational rules) can be and how it is treated under eligibility, so that resilience needs are met without locking in primary reliance on gas.

6) **Use public buildings projects as exemplary case studies** to build wider trust in energy efficiency and heat pumps, helping mitigate lack of understanding and uncertainty. Public sector demand is widely used to reduce perceived technology risk, build installer capacity, create reference projects and expand the market for energy efficiency, which could play a catalytic role in building technical capacity and market confidence. This implies introducing mandatory decarbonisation pathways for public buildings, prioritising heat pump solutions in public renovation projects where technically and economically justified, and publishing performance results to support market learning.

7) **Establish an EEF-based one-stop-shop** to provide guidance on energy audits, feasibility studies, technical design, DSO interaction, supplier selection and financing arrangements across multiple institutions. Such centralised advisory platform within the EEF architecture by providing standardised guidance, template documentation, pre-qualified expert lists and procedural coordination would significantly reduce soft barriers and improve uptake without creating new institutions.

Medium term (longer than 12 months) measures to align reform direction and system readiness with scaling.

8) **Continued approximation to EU standards and taking lessons learned** is key to scaling up the sector and should focus on aligning finance, planning and building standards to drive clean heating deployment. EU experience shows that heat pump uptake accelerates where binding heat planning, mandatory building standards and targeted financial support reinforce each other. In Ukraine, these elements exist

but are not yet aligned: renewable heat support remains limited, heat supply schemes lack enforceable zoning and technology assessment, and NZEB standards remain voluntary despite relying heavily on heat pumps in their methodology. Addressing this requires strengthening EEF support for integrated renovation and heat pump projects, updating heat planning methodologies in line with the recast EED, and making NZEB standards mandatory, initially for public buildings. Ukraine's pathway to EU membership will entail significant changes and it is key to understand that these are coming and have to be prepared for.

9) **Sequenced market reform signals** led by the Ministry of Energy and NEURC in coordination with the respective ministries. Provide predictable sequencing for PSO adjustment and tariff reform, combined with targeted protection, to reduce operating-cost uncertainty and progressively strengthen the business case for electrified heating and deep renovation. The social compensation mechanism set-up will require updated data on consumers to ensure correct targeting, but is necessary to ensure an already vulnerable population does not face adverse effects. Fiscal stability also matters, uncertainty linked to the potential expiry of wartime VAT and customs relief can affect procurement costs and investment planning, particularly in early-stage market development.

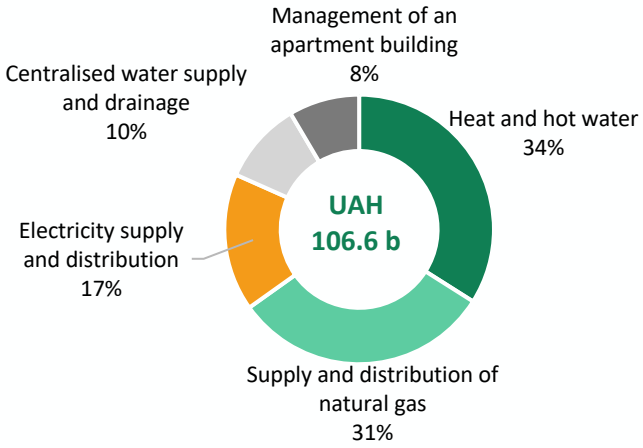
10) **Grid connection and metering readiness for MFH electrification led by NEURC and DSOs.** Clarify and streamline connection and metering rules for building-level heat pump systems, including requirements relevant for cost allocation. This will be fundamental as more projects are built and pressure on the power system and especially electricity distribution grids grows.

11) **Quality assurance and market capacity led by EEF**. Strengthen competence requirements and commissioning/verification expectations to avoid underperformance and bill shocks that could undermine confidence in early scale-up. This should be treated as a market-building measure, not only compliance.

Taken together, the Trostyanets case supports a conclusion that clean heating solutions in MFHs can deliver energy and emissions reductions and strengthen resilience, but scaling depends on parallel policy action that reduces tariff and billing uncertainty, supports HOA decision-making capacity, protects vulnerable households through targeted mechanisms, clarifies reliability and back-up expectations, and aligns infrastructure, quality and fiscal conditions with the transition pathway. Getting this right is however imperative for Ukraine, to ensure that greener, more sustainable and resilient heating solutions can contribute to wellbeing of her citizens.

8. Annex

Figure 14: Household arrears in payments for housing and utility services by type of service



Source: State Statistics Service

Table 7: Market-based mechanisms promoting renewable energy under the Law "On Alternative Energy Sources"

Type of Support	Eligible Beneficiaries	Key Features / Recent Updates
Green Tariff/ Feed-in tariff	Private households	Applies to private homes; rooftop/facade PV up to 30 kW (or 50 kW if rooftop/facade). In force until 31 Dec 2029.
Market Premium/ Feed-in Premium	RES producers that opt out of FIT	Optional switch from FiT to market-premium support. Price = market price + premium. 226 facilities (1,454 MW) switched to premium contracts (2022–2025); 28 facilities (161.8 MW) returned due to instability.
Auctions with Market Premium (CfD-type)	Mandatory for wind >5 MW, solar >1 MW; voluntary for others	Support via market premium contract with Guaranteed Buyer for 12 years; annual quotas set by the Government. Pilots in 2024 – only one biomass/biogas/small hydro (900 kW) succeeded; no solar/wind bids. 2025 quotas: 33 MW solar, 250 MW wind, 47 MW other. Single participant cap increased to 50% of quota (Jan 2025).
Self-Production/ Net Billing	Households (≤30/50 kW), small non-households (≤50 kW), cooperatives/others (≤150 kW), large consumers within contracted capacity	Excess sold at DAM price (households, small non-households) or at free prices (others). hourly netting; export limits apply; contract with supplier + DSO registration. Complemented by interest-free loans and GreenDim grants.
State Credit Programme for Households	Individuals installing RES at home	Covers PV/wind systems 1–10 kW with hybrid inverters and storage (≥1 kWh per kW installed).
Price Stability Contracts/ PPAs	RES producers and consumers, traders, suppliers	First pilot signed Jan 2025: 100 MW wind farm with industrial off-taker. Allows bilateral hedging of price risks. Terms flexible, aligned with EU practice.

Table 8: An overview of the Energy Efficiency Fund's support programmes

Programme	Objective	Eligible measures	Financing structure	Maximum grant amount
Energodim[51] – Package A (Light)	Improve efficiency of heat supply at building level through essential measures	**Mandatory measures**: building heat meter; installation/ modernisation of individual heating substation. **Optional measures**: replacement/ modernisation of common boiler; small-scale energy efficiency measures	3 tranches: 1) reimbursement of preliminary audit; 2) reimbursement of design & expertise; 3) reimbursement of works & post-works services. Advance: up to 30% of eligible construction works, cap UAH 6.5m	70% of audit, documentation, supervision, certification; 60% of works/equipment/materials
Energodim – Package B (Comprehnsive)	Deeper energy savings through comprehensive measures	**Mandatory measures:** all Package A mandatory measures + insulation/replacement of internal pipelines (heating, DHW) in unheated areas; automatic balancing valves; replacement/repair of external doors & lobbies; replacement/repair of windows in common areas. **Optional measures:** insulation of external walls, roofs, basements, walls below ground; replacement/modernisation of common boiler; modernisation of DHW; small-scale energy efficiency measures	Same 3-tranche system and advance rules as Package A	70% of audit, documentation, supervision, certification; 70% of works/equipment/materials
Vidnovydim[52]	Restore and urgently	Restoration of façades, roofs, windows, doors; repair of heating, water, electricity networks;	2 tranches:	100% of eligible measures

[51] EEF (2019). Support Programme for Energy Modernisation of Multi-Apartment Buildings "Energodim" (version No. 1/2019) https://eefund.org.ua/documents/programa-pidtrymky-energomodernizacziyi-bagatokvartyrnyh-budynkiv-energodim-redakcziya-vid-21-serpnya-2025-roku/

[52] EEF (2022). Programme "Vidnovidim" (new edition) https://eefund.org.ua/documents/programa-vidnovydim-redakcziya-vid-21-08-2025/

	modernise multi-apartment buildings damaged by attacks	installation of individual heating substation; repair of common-area finishes; accessibility (ramps, lifts); urgent structural safety works; technical supervision	1) 60% upon joining; 2) 40% after completion, acceptance, and verification. Tech supervision support capped at 1.5% of works and UAH 80,000	Up to UAH 10m per building
Greendim[53]	Support for energy efficiency measures and renewable energy generation	Heat pumps (ground/water/air); hybrid solar station (includes energy storage); additional materials listed in Technical Requirements; energy performance certification	Paid after full completion of works	Grant covers: 50% of equipment cost and 70% of certification costs. Caps: solar stations – UAH 1m (<8000 m² buildings) or UAH 2m (>8001 m²); Heat pumps – UAH 2m; combined solar station + heat pump – UAH 4m. Certification costs reimbursed up to UAH 15,000 per service

[53] EEF (2025). Grindim Programme (new edition) https://eefund.org.ua/documents/programa-grindim-redakcziya-vid-28-01-2025/

Table 9: An overview of the Decarbonisation Fund's support instruments

Support type	Rate/fee	Amount (min–max)	Tenor	Own contribution/first payment	Other conditions
Direct support by the Decarbonisation Fund					
Loans for eligible projects	Up to 9% p.a.; up to 7% p.a. if national equipment	UAH 120k – UAH 90m	Up to 10 years	≥15% of project cost	Voluntary agreement with SAEE required
Financial leasing of equipment for implementation of eligible projects	Up to 9% p.a.	UAH 100k – UAH 90m	1–7 years	≥15% first lease payment	Voluntary agreement with SAEE required
Factoring for borrowers under loans for eligible projects or ESCO executors	Base fee ≤7%; discount split	UAH 150k – UAH 25m; up to 90% of claim	—	—	—
Funding of energy certification and/or audits (2025–2026)	—	Up to UAH 40k (certificate); up to UAH 500k (audit)	—	—	Only for state-sector entities[54]

[54] Ministries, other executive authorities, state enterprises, institutions, organisations under their management, and companies with more than 50 % of shares owned by the State.

Funding installation of PV + hybrid inverters + storage (2025–2026)	—	Storage ≥1 kWh per 1 kW	—	—	Only for state-sector entities; annual consumption ≥30,000 kWh
		Compensation on state-bank loans			
Interest-rate compensation on state-bank loans	Nominal ≤21%; SAEE via Fund compensates≤12% (≤14% with national equipment)	UAH 60m (group), UAH 5m (individual entrepreneurs), UAH 90m (heat/water utilities), UAH 20m (ESCO incl. individual entrepreneurs)	Up to 10 years	—	Only for loans from state banks which have cooperation agreement with SAEE; voluntary agreement with SAEE required

Table 10: State Targeted Economic Programme for the Thermal Modernisation of Buildings until 2030 - quantitative targets

Category	Target
Residential Buildings	51276 individual residential buildings renovated 941 individual residential buildings renovated to NZEB standard 5,875 multi-apartment buildings renovated
Public Buildings	10 central government buildings renovated to NZEB standard 12 municipal public buildings renovated to NZEB standard
Heat pumps	9,025 individual residential buildings equipped 450 municipal buildings equipped 10 central government buildings equipped
Solar PV	9,025 individual residential buildings equipped 450 municipal buildings equipped 10 central government buildings equipped

Table 11: Overview of main international programmes

Ukraine Public Buildings Energy Efficiency Programme (UPBEE)[55] Launched in **2020**, UPBEE is financed through an **EIB EUR 300 million loan**, complemented by **EU Neighbourhood Investment Platform** and **Eastern Europe Energy Efficiency and Environment Partnership Fund grants**. It targets the **refurbishment** of around **1 000 public buildings** such as schools and hospitals. **Grants** cover **up to 50% of project costs** (max EUR 300 000 per site), with **UNDP** providing EUR 2 million in technical assistance for audits, design, and procurement.
FELICITY II (2022–2028)[56] Implemented by **GIZ** and the **EIB** under the **International Climate Initiative (IKI)**, FELICITY II provides technical assistance for preparing **bankable low-carbon infrastructure projects**. In Ukraine, it focuses on the **residential energy-efficiency** and **water/wastewater** sectors, with pilot cities **Kryvyi Rih** and **Mykolaiv**.
Renewable Energy Solutions (RES) Programme (2023–2027)[57] Funded by Germany through the **IKI** (EUR 20 million), this programme supports **solar, biomass, geothermal**, and **battery-storage systems** in public buildings. It works in synergy with EIB loans to increase renewable integration in reconstruction.

[55] UNDP (2022). EIB and UNDP expand partnership to help Ukraine rebuild sustainable and energy-efficient public buildings https://www.undp.org/ukraine/press-releases/eib-and-undp-expand-partnership-help-ukraine-rebuild-sustainable-and-energy-efficient-public-buildings

[56] IKI (n.d.) FELICITY II - Eastern Partnership and Central Asia Program https://www.international-climate-initiative.com/en/project/felicity-ii-eastern-partnership-and-central-asia-program-21-i-387-global-g-felicity-ii-east/

[57] IKI (2023). German Government and EIB support Ukraine's energy transition with €20 million grant https://www.international-climate-initiative.com/en/iki-media/news/german-government-and-eib-support-ukraines-energy-transition-with-eur20-million-grant