



Mitigation Activity Idea Note

**Energy Efficient Public-Building:
Insulation and Heat Pump
Example: Kindergarten**

This document is one in a series of concise, public-facing briefs to help potential actors understand selected mitigation options observed in Ukraine's evolving carbon-market landscape. Each MAIN follows a consistent format covering the activity description, technologies, expected impact, financing and carbon-market applicability, and key risks. MAINs are generic archetypes: they do not endorse or name specific companies, technologies or locations. See the MAINs overview page for the full set.

Project Description

ACTIVITY OVERVIEW

Replace legacy fossil-fuel heating systems in refurbished public buildings (e.g., kindergartens, schools, clinics) with high-efficiency electric heat pumps. Prioritize building-envelope upgrades and control systems to enable efficient low-temperature operation.

IMPLEMENTATION SCHEME

Conduct an energy audit and heat-loss model; implement envelope improvements (insulation, windows, air-sealing); retrofit hydronic distribution or fan-coil systems; size and install the heat pump; commission the system; and monitor performance for contribution tracking.

OWNERSHIP & GOVERNANCE

The municipality owns the asset. Operation and maintenance are contracted out under performance-based key indicators, including the seasonal performance factor of the heat pump, comfort bands, and system uptime.

STAKEHOLDERS

City energy department, design engineers, installers, independent verifiers (for contribution statements), donors/financiers, and local NGOs or companies supporting project planning and implementation.

LOCATION

Public buildings such as kindergartens in cities or municipalities across Ukraine.

STATUS

Pilot projects underway; scalable through replication and potential scale-up via programmatic or policy frameworks.



Expected Impact

Avoided emissions depend on baseline fuel emission factors, grid emission factors¹, and the seasonal performance factor of the heat pump. Even with a moderately carbon-intensive grid, the switch generally yields net emission reductions — especially when combined with envelope improvements. Replacing coal- and gas-fired systems should be prioritized. A suitable methodology reference is **AMS-II.E: Energy Efficiency and Fuel Switching Measures for Buildings**² under the UNFCCC Clean Development Mechanism.

Electrification with renewables is key to decarbonizing the building sector.³ This paradigm shift emphasizes designing **resilient, energy-efficient buildings** with envelopes that require less energy, combined with modern electrified heating and cooling systems powered by renewable sources.⁴

Example:

Refurbishing a medium-sized kindergarten can combine two key measures:

1. Envelope insulation to reduce energy demand and improve comfort.
2. Efficient heat pump installation to replace fossil-fuel heating (coal, gas, or oil).

It is advisable to ensure renewable electricity supply — for example, by installing rooftop solar photovoltaics.

Together, these measures can avoid approximately 50 tCO₂e per year and significantly enhance comfort for building users.

1. <https://gto.dixigroup.org/en/assets/images/files/dixi-gto-a4-eng-1.pdf>

2. <https://cdm.unfccc.int/methodologies/DB/6R5OGZ6R2HF1HN3GDQO-J02TZRXA03R>

3. <https://www.sciencedirect.com/science/article/abs/pii/S2666278725000224>

4. <https://www.iea.org/commentaries/rebuilding-better-and-faster-why-energy-efficiency-is-key-for-ukraine>



Technologies / Solutions

TECHNOLOGY

Air-to-water, ground-source, or air heat pumps; low-temperature radiators or fan-coils; smart controls; optional thermal storage for peak shaving; and ventilation systems with heat recovery.

MITIGATION LEVER

Displacement of gas or coal heating through efficient electric heat and renewable energy supply. Additional co-benefit: cooling capability during summer.

DATA & METERING

Install separate heat and electricity meters, indoor comfort logging, and maintenance records. Provide donors with direct access to digital monitoring systems for transparent tracking of key project indicators.

Financing and Applicability to Carbon Finance

COST PROFILE

Capital expenditure (CAPEX) is moderate for a medium-sized building (envelope + heat pump + controls). Operating expenditure (OPEX) is lower due to reduced and more cost-effective energy use. Common barriers include limited refurbishment budgets, rigid public budget cycles, and insufficient project planning capacity.

CARBON MARKET POSITIONING

A **mitigation-contribution financing approach**⁵ could be a pragmatic starting point. Under this model, a company or organization sponsors one or more projects of this kind. A local NGO supports project planning and implementation, ensuring that funds are directed toward effective measures and reporting energy and emission savings back to the sponsor through transparent indicators.

Example:

For a kindergarten, total CAPEX may range between **USD 80,000–200,000**.

Operating costs could drop from **USD 10,000 to USD 5,000 per year**.

With estimated emission reductions of about **500 tCO₂e over 10 years**, payback could exceed 10 years without external financial support, under simplified assumptions.

A programmatic or policy crediting approach could extend this model to similar buildings through standardized, aggregated crediting. This would require a more complex financial structure to mobilize larger upfront investments.

Risks and Challenges

TECHNICAL PERFORMANCE

Low efficiency due to improper design, limited user acceptance, or insufficient operation and maintenance skills.

FINANCIAL RISKS

Tariff exposure, rigid baseline contracts (e.g., cases where district heating cannot be separated from water supply due to anti-freezing requirements), and potentially misleading CO₂-mitigation claims.

RISK MITIGATION

Ensure proper design and sizing, engage users early, verify existing contracts and possible changes, use bivalent operation only when necessary, optimize tariffs, establish clear service contracts, and coordinate mitigation claims with project sponsors to avoid double counting or misreporting.

5. <https://climateresponsibility.org/>

Implementation Roadmap

(12–18 months)

Month 0–3

Energy audit, envelope design, preliminary heat-pump sizing, and financial planning (including co-funding options via climate-contribution financing).

Month 4–8

Procurement, installation, commissioning, and comfort testing.

Month 9–12

Monitoring period, contribution statement preparation, and development of a replication toolkit for other buildings.





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