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POLICY BRIEFING
UZBEKISTAN

Electric heat pumps for households: Techno-economic rationale and considerations for Uzbekistan

- Summary of results -

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1. Introduction

Background

- » Uzbekistan has traditionally relied on significant domestic natural gas reserves to power the country's economy and provide sizeable shares of domestic heating
- » The reliability of gas supply in Uzbekistan is decreasing due to the depletion of domestic gas reserves, export obligations, ageing infrastructure, and a rise in domestic demand
- » Importantly, the significant gas subsidies currently present in the system impede the efficient use of energy and the much-needed investments in the Uzbek energy sector
- » Considering these factors, it is important to assess possible alternatives to natural gas, with a focus here on options for household heating

Purpose of this Policy Briefing

- » Overview of electric heating technologies and the economic viability for electrifying heating systems in Uzbekistan
- » First considerations of making electric heating solutions in Uzbekistan economically viable

2. Technical overview

Overview of uses and efficiency of electric heating technologies

Technology	Typical Use	CAPEX (USD)	Efficiency
Electric boiler	Flexible operation		99%-100%
Air-to-Air heat pump	Room/Apartment	1,000 - 10,000	180%
Air-to-Water heat pump	Apartment/small house	2,000 - 18,000	300%
Ground/Water-source heat pump (residential)	House-complex/multistorey building	8,000 - 35,000	370%
Ground/Water-source heat pump (utility)	District heating/Industry	0.680 – 1.7 (m/MWth)	200%-900%

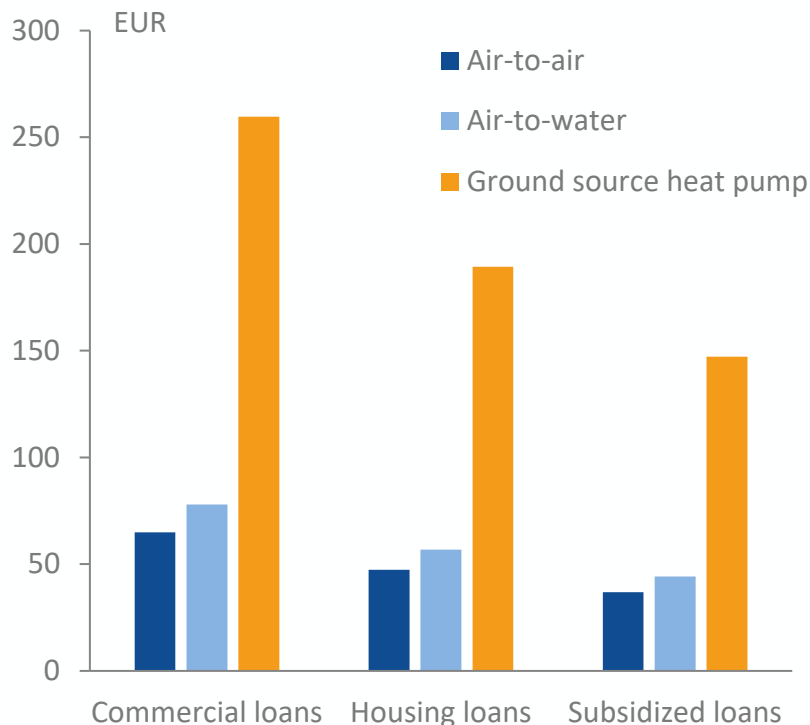
Source: AgoraIndustrie (2022), Fraunhofer ISE (2022)

- » The main technologies for electrical heating are heat pumps and electric boilers
- » **Electric boilers** convert electricity into heat and insert it into a heating system
 - Efficiency of almost 100%
- » **Heat pumps** use electricity to extract thermal energy from an external source, convert it to heat and feed it into a heating system
 - Efficiency in residential sector up to 370%*
- » Heat pump adoption is growing significantly in many countries, with several European countries being at the forefront
- » Many countries subsidize the installation of heat pumps, incentivizing their deployment
- **Due to their high efficiency rates, this briefing focuses solely heat pumps as a means of electric heating**

*An efficiency of higher than 100% is possible as heat pumps do not transform electricity into heat but use heat energy already present in the outside air, ground or water

3. Economic viability of heat pumps in UZB (1/2)

Inflation-adjusted monthly payments of 5-year loan for Heat Pumps



Source: own calculations.

Assumptions:

Costs (EUR) - Air-to-Air 5,000 ; Air-to-Water; 6,600; Ground source heat pump: 20,000

Interest rates - Commercial 24%; Housing 17%; Subsidized; 12%

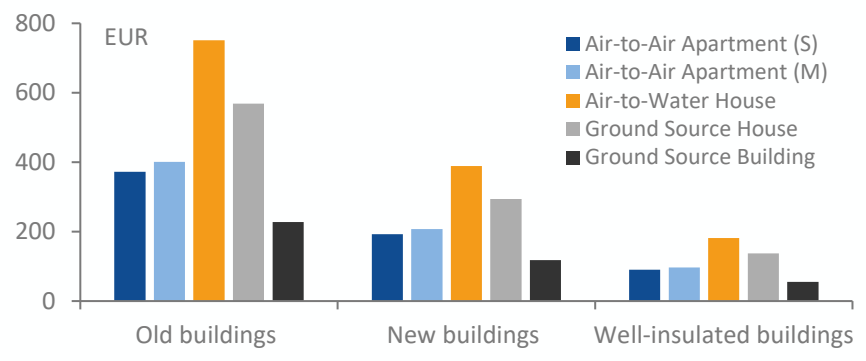
Inflation - 14%

- » Heat pumps have relatively high up-front investment costs
- » Example for Uzbekistan
 - 5-year loan for a heat pump at a 17% - 24% interest rate would mean EUR 64 – EUR 259* monthly payments
- » Affordable financing solutions are critical to tackling the issue of high up-front costs
- » A subsidised interest rate of 12 % would decrease monthly payments to range between EUR 37 and EUR 147*
- High upfront costs compounded by steep interest rates can significantly hinder roll-out of heat pumps

*All values adjusted for Inflation.

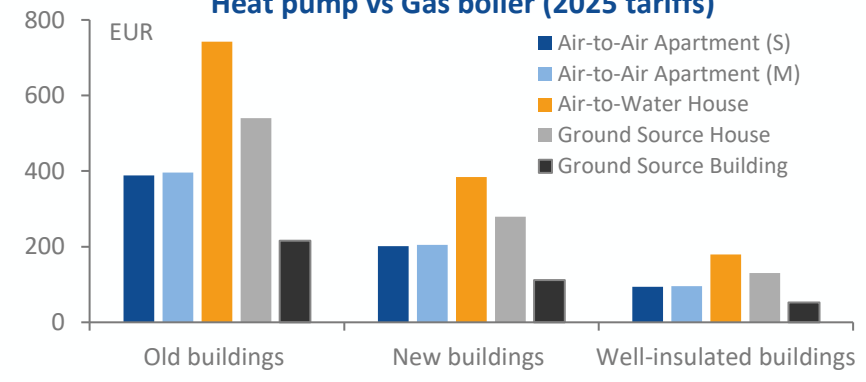
3. Economic viability of heat pumps in UZB (2/2)

Annual cost increase per household using Heat pump vs Gas boiler (2024 tariffs)



Source: own calculations

Annual cost increase per household using Heat pump vs Gas boiler (2025 tariffs)



Source: own calculations.

Assumptions:

Size (m²): Apt. (s) 40; Apt (m) 80; House 150; Building 1,200 (20 households)
 Building's energy needs (kWh p.a.): Old 290; New 150; Well-insulated 70
 Efficiency: A2A 180%; A2W 300%; Ground source heat pump 370%
 Natural gas calorific value (kWh / m³): 10.83
 Tariff elec (201 -1000 kWh) : 2024 UZS 900 = EUR 0.06; 2025: UZS 1000 = EUR 0.7
 Tariff gas (<500 m³): 2024 UZS 650 = EUR 0.04; 2025 UZS 1000 = EUR 0.07

- » Energy savings provided by heat pumps can translate into monetary savings for households
- » In the EU, households with heat pumps have seen reductions in their annual energy bills
 - EUR 250 in 2021
 - EUR 850 in 2022
- » Possible monetary savings of using a heat pump compared to a gas boiler are determined by
 - Heat pump's efficiency, size of the area to be heated, insulation conditions and **electricity and gas prices**
- » High electricity prices and low gas prices negatively impact heat pump economics
- » In UZB under current and planned tariffs installation of heat pumps would lead to **monetary losses** for households in 2024 and in 2025
- **With current and planned gas and electricity tariffs, heat pumps are not the cost-effective solution for heating in Uzbekistan**

4. Policy recommendations

Economic viability

- » Phase out gas subsidies to enhance economic viability - electric heating would be more expensive than gas heating with current electricity and gas tariffs
- » In parallel, implement a support scheme for vulnerable and energy-poor households without the means to invest in a heat pump to cushion the impacts of tariff hikes

Legislative framework, regulatory support and incentives

- » Introduce a law that sets requirements for new-built and retrofitted buildings, specifying minimum energy requirements, including heating system installations
- » Develop a long-term thermal renovation strategy focusing on energy efficiency with phased requirements to provide time for stakeholders to adjust to, and to address challenges like labour force shortages, supply bottlenecks, and the reliability of power supply
- » Introduce financial incentives such as investment subsidies or low-interest loans to counteract the high investment costs of heat pumps, targeting the replacement of outdated gas boilers. Alternatively, programs funding energy efficiency measures can also be implemented

Infrastructure development

- » Improve grid infrastructure as electric heating requires reliable electricity supply. Currently, UZB faces significant challenges due to an ageing and overloaded electricity system

Education and workforce development

- » Upskill the workforce through programmes on the installation and maintenance of electric heating
- » Increase the awareness about the benefits of electric heating with public awareness campaigns

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Financed by the Federal Ministry for Economic Affairs and Climate Action, the German Economic Team (GET) advises the governments of Ukraine, Belarus*, Moldova, Kosovo, Armenia, Georgia and Uzbekistan on economic policy matters. Berlin Economics has been commissioned with the implementation of the consultancy.

**Advisory activities in Belarus are currently suspended.*

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