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Dual Infrastructures in Transition: Gas Networks, District Heating, and Strategic Choices for German Municipal Utilities

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Extended Abstract

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Abstract Summary

Germany's heat transition is often framed as a technological shift. In practice, it requires coordinating two heat supply infrastructures: gas distribution networks and district heating, which are subject to different regulatory signals and timelines.

At the building level, the 2024 reform of the German Buildings Energy Act (GEG) introduced a 65% renewable energy requirement, constraining fossil gas in new heating systems. Current policy proposals by the federal government would lower this requirement by allowing continued gas use with gradually increasing shares of low-carbon gases (e.g. "Biotreppe", starting at 10% from 2029). At the same time, infrastructure regulation points towards a managed decline and eventual decommissioning of gas distribution networks, including links to heat planning and designated district heating areas.

This paper examines where these tensions become operational. Using a nationwide, high-resolution spatial dataset (100 m grid), it identifies areas where gas networks and district heating coexist and compete for the same demand base. The analysis combines heating structure data with demand estimates and operator-level mapping.

Results show that overlap is concentrated in dense, high-demand urban areas with a high share of rental housing. Measured in energy terms, operator exposure is substantially higher than area-based metrics suggest. These areas represent both the core revenue base of gas networks and the primary expansion zones for district heating, marking the key interface where value shifts between infrastructures.

Regulatory requirements diverge across sectors: district heating is subject to minimum renewable shares (e.g. 30% by 2030), while gas-based heating can continue under significantly lower initial requirements. This creates a structural mismatch in precisely those areas where economic exposure is highest.

The paper contributes by (i) identifying infrastructure overlap, (ii) demonstrating its economic concentration, and (iii) framing the heat transition as a two-network coordination problem for municipal utilities.