

France's 118 TWh Blind Spot

A quantitative analysis of thermal decarbonisation and the strategic imperative of industrial waste heat.



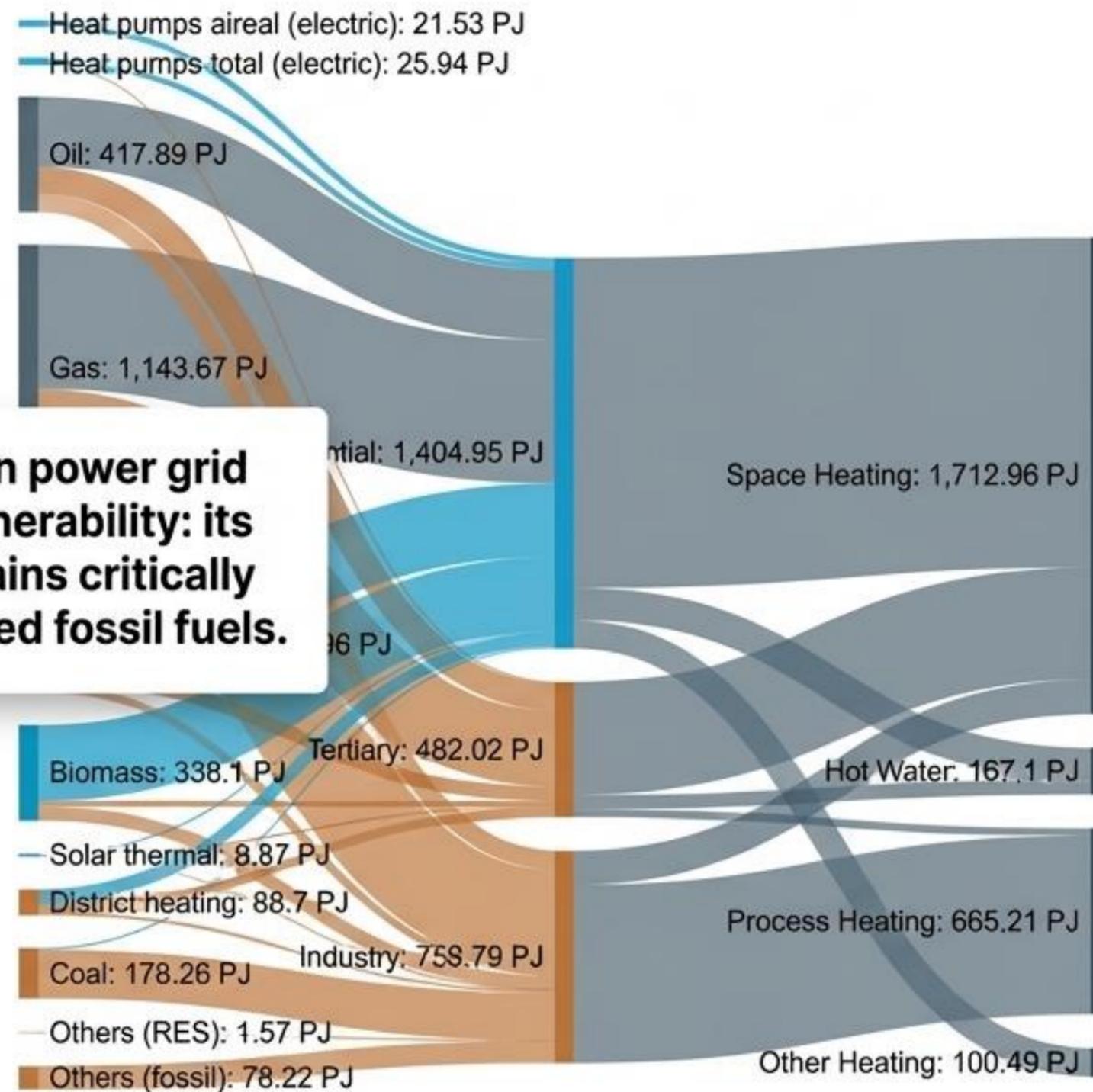
The Grid

64.3% Nuclear Electricity (2023)

France's low-carbon power grid masks a critical vulnerability: its thermal sector remains critically dependent on imported fossil fuels.

Total Final Energy Consumption (2023)

The Heat

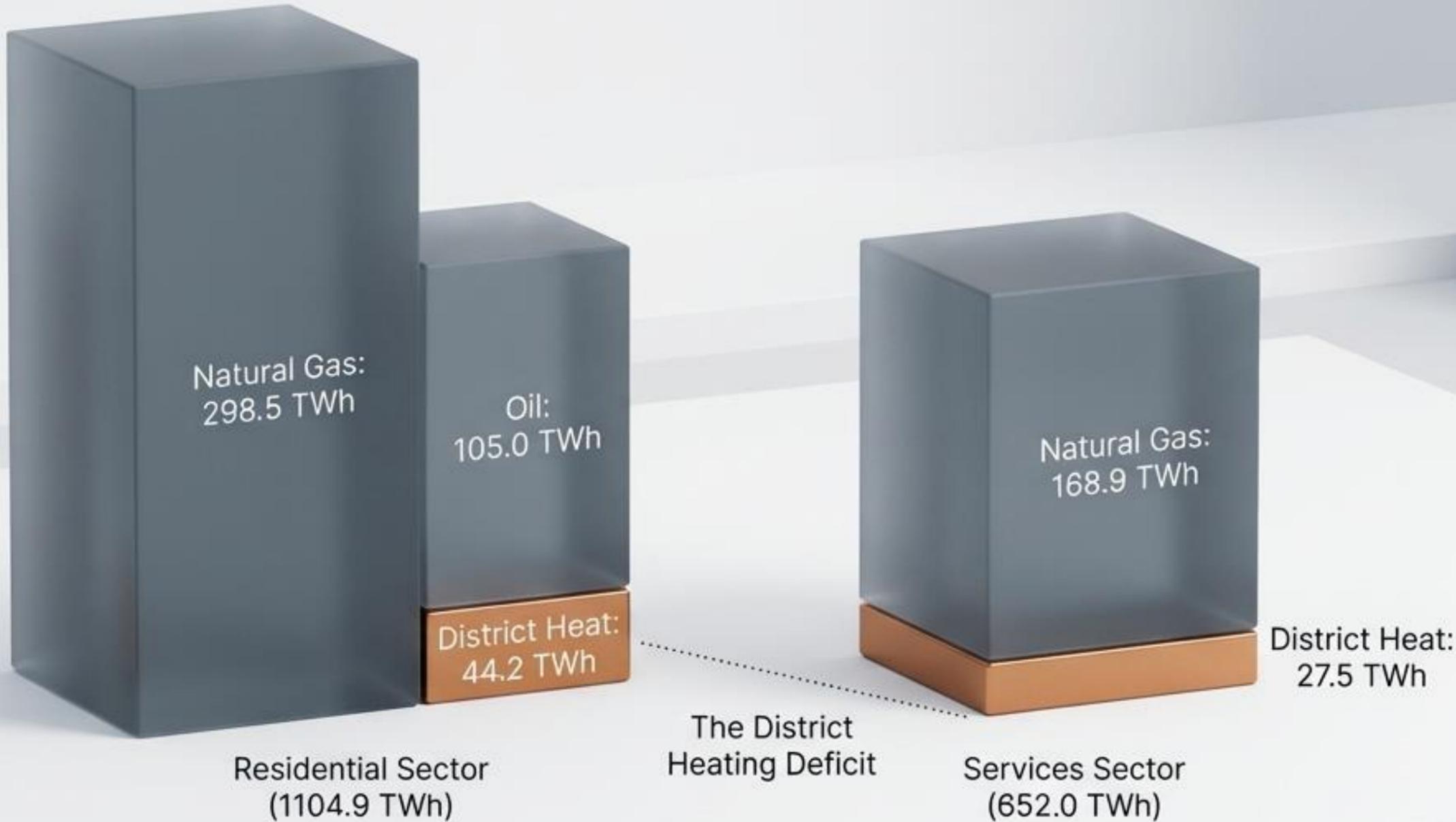


• Natural Gas: 17.2%

• Oil Products: 43.8%

The 2023 Thermal Architecture

Insight: Space and water heating dominate building energy use. In the residential sector alone, gas and oil supply nearly 40% of all energy consumed. District Heating currently provides only 4%.



Electrification is vital, but displacing urban gas boilers strictly through individual heat pumps places unsustainable peak demands on the national grid.



Individual Gas Boilers

- Fossil Independence: Low
- Grid Strain: Low
- Urban Viability: High, but locks in carbon intensity



Individual Heat Pumps

- Fossil Independence: High
- Grid Strain: High
Output reached 43.5 TWh in 2023
- Urban Viability: Medium
Spatial constraints in dense cities



4th Gen District Heating (4GDH)

- Fossil Independence: High
- Grid Strain: Low
Leverages non-electric waste heat
- Urban Viability: High
Ideal for high-density areas

118 TWh

France's Recoverable Industrial Waste Heat Potential (Annual)

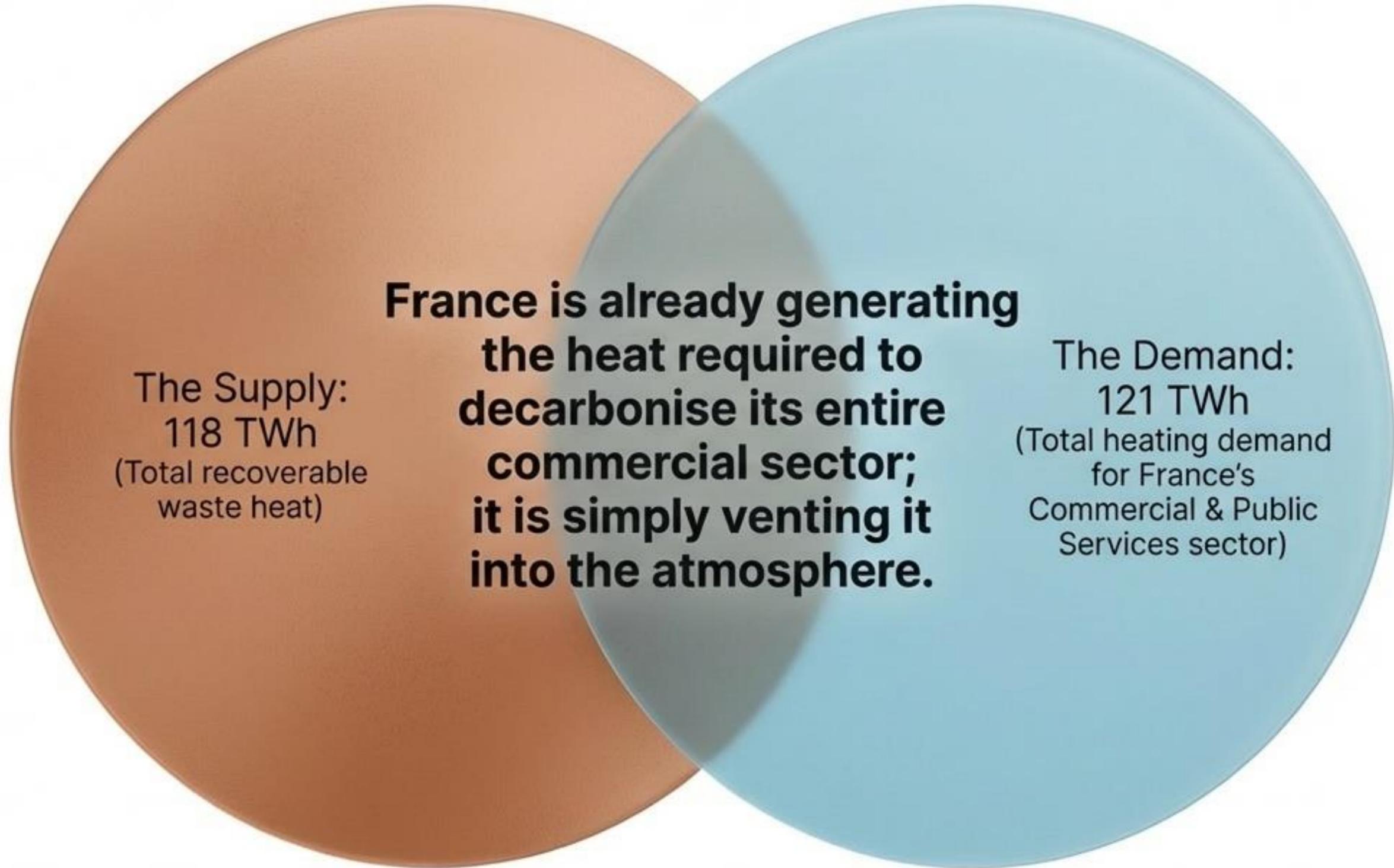


15.5% Currently Utilised
(18.3 TWh)

The 100 TWh
Opportunity Gap

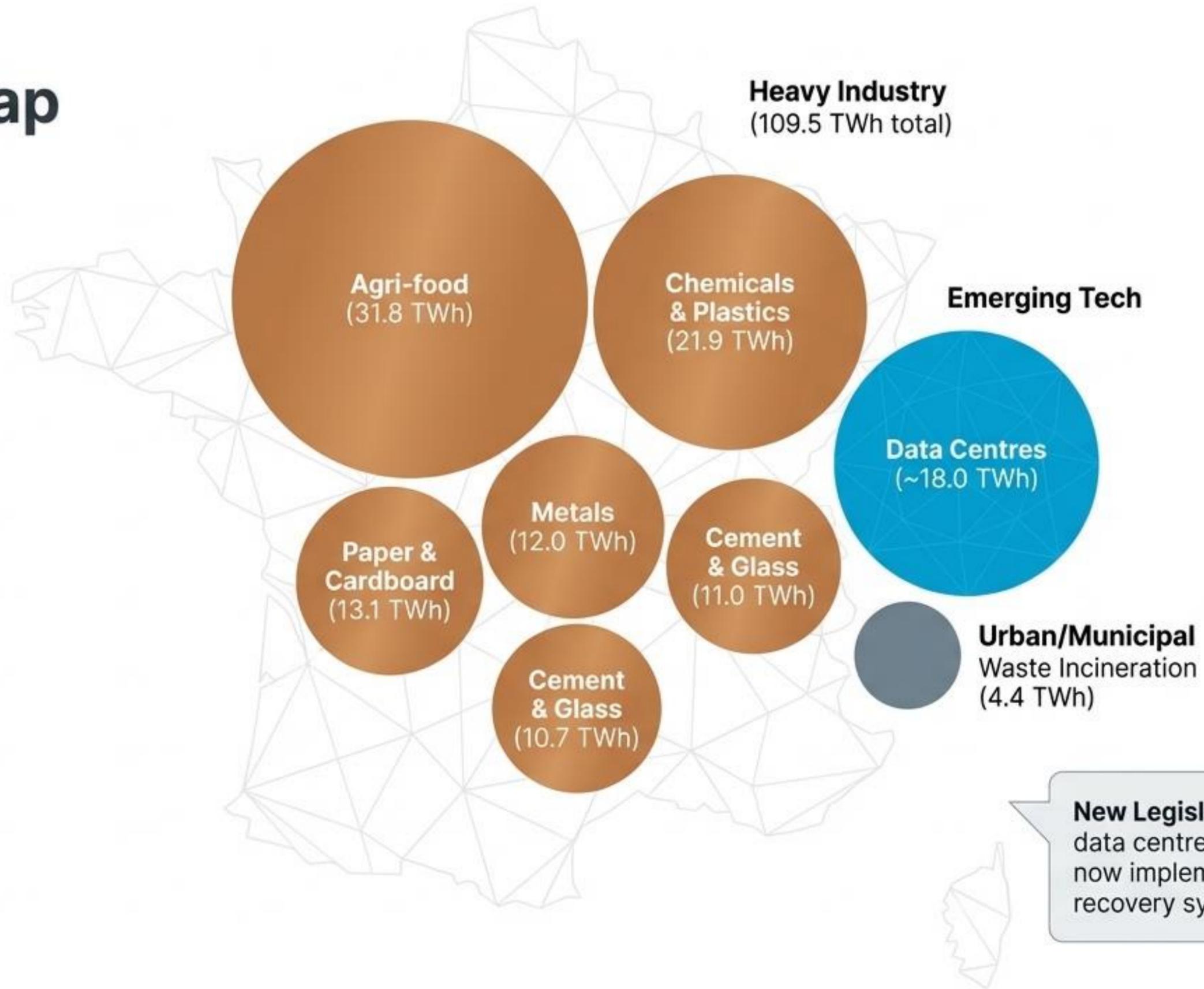
This represents approximately one-third of the entire energy consumed by French industry—a massive systemic inefficiency currently vented into the atmosphere.



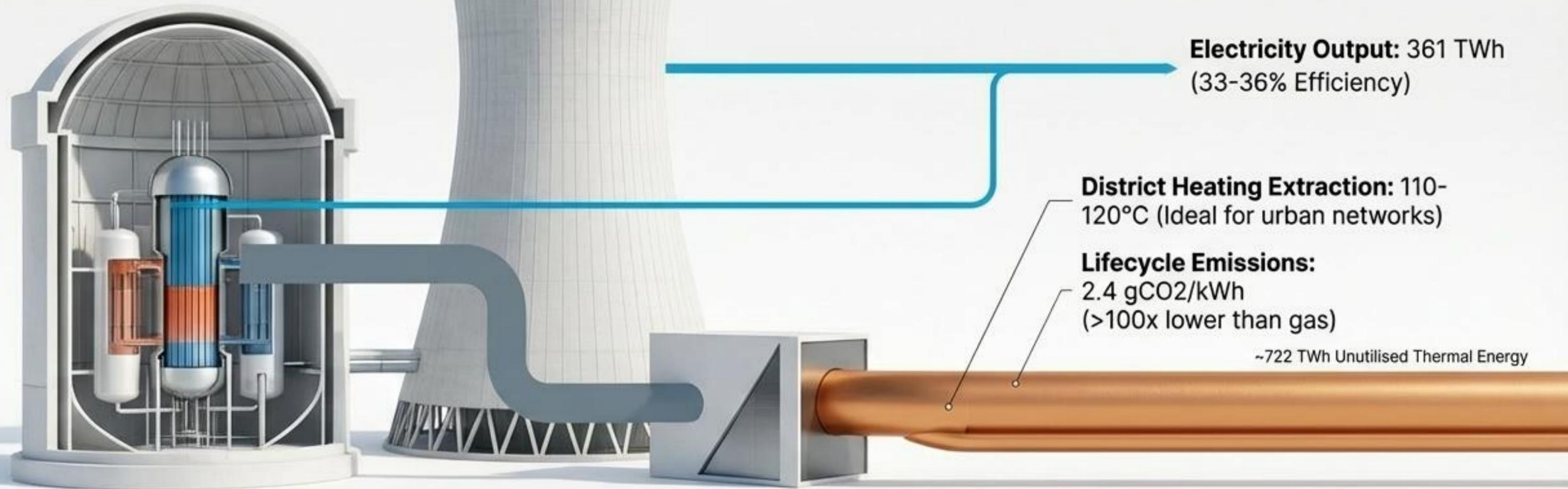


Note: 118 TWh is equivalent to 28% of the total heating demand for every home, office, school, and shop in the nation (417 TWh).

Resource Topology Map



The Nuclear Cogeneration Model

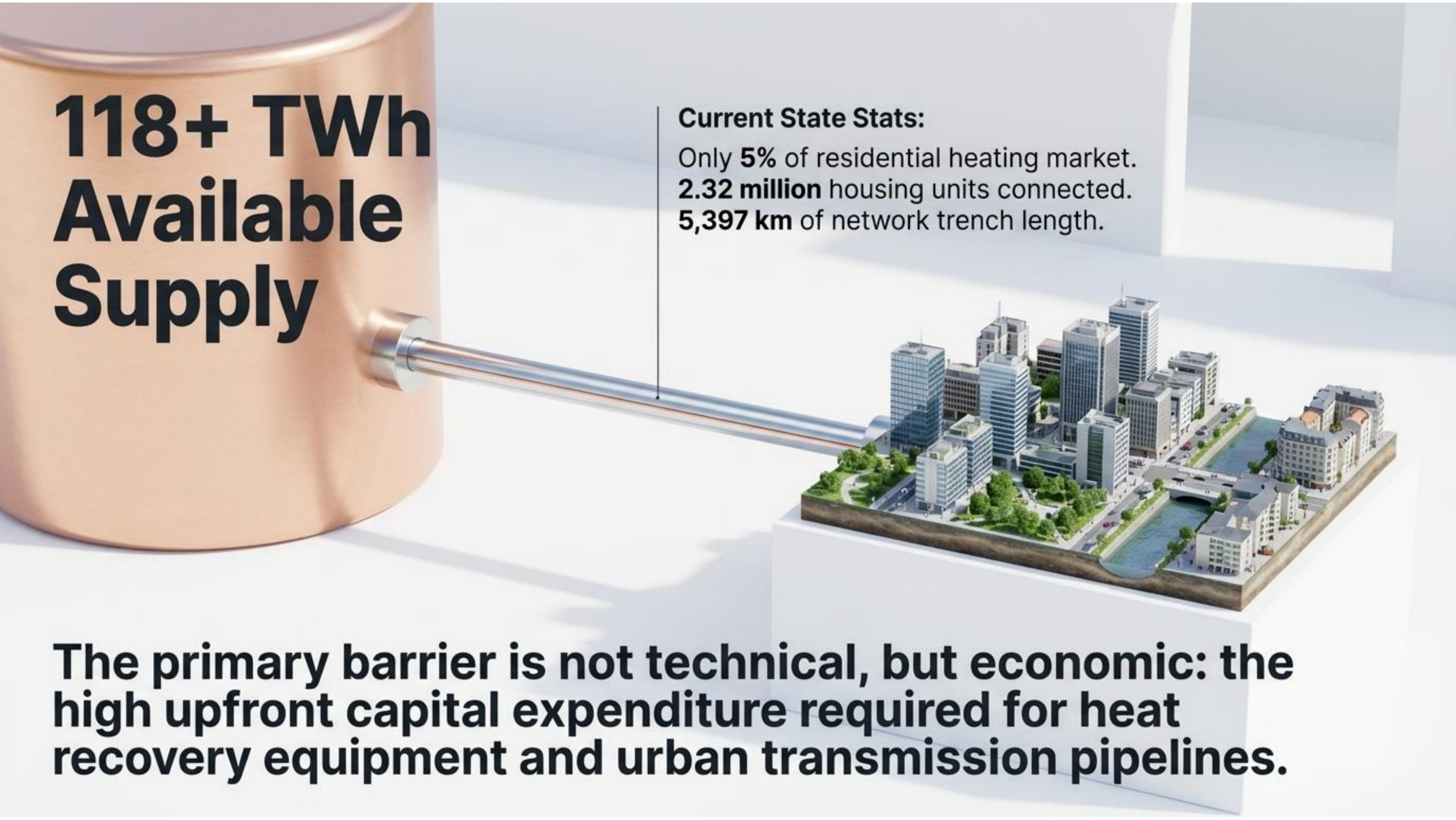


For every **1 MWh** of electricity lost to extraction, approximately **5 MWh** of thermal heat can be supplied.

The Thermal Source Matrix

	Nuclear Waste Heat	Heavy Industrial Heat	Data Centre Residual
Temperature	110-120°C+	100°C - 280°C	Low: 30-40°C
Output Scale	Massive / Gigawatt	Large / Megawatt	Medium / Growing
Proximity to Demand	Distant (Requires transmission corridors)	Peri-urban edges	Hyper-urban / Embedded
Carbon Intensity	Ultra-low	Low / Recovered	Low / Grid-dependent

High-grade heat (Nuclear/Heavy Industry) requires **strategic transmission corridors**, while low-grade heat (Data Centres) requires 4th Generation District Heating (4GDH) integration.



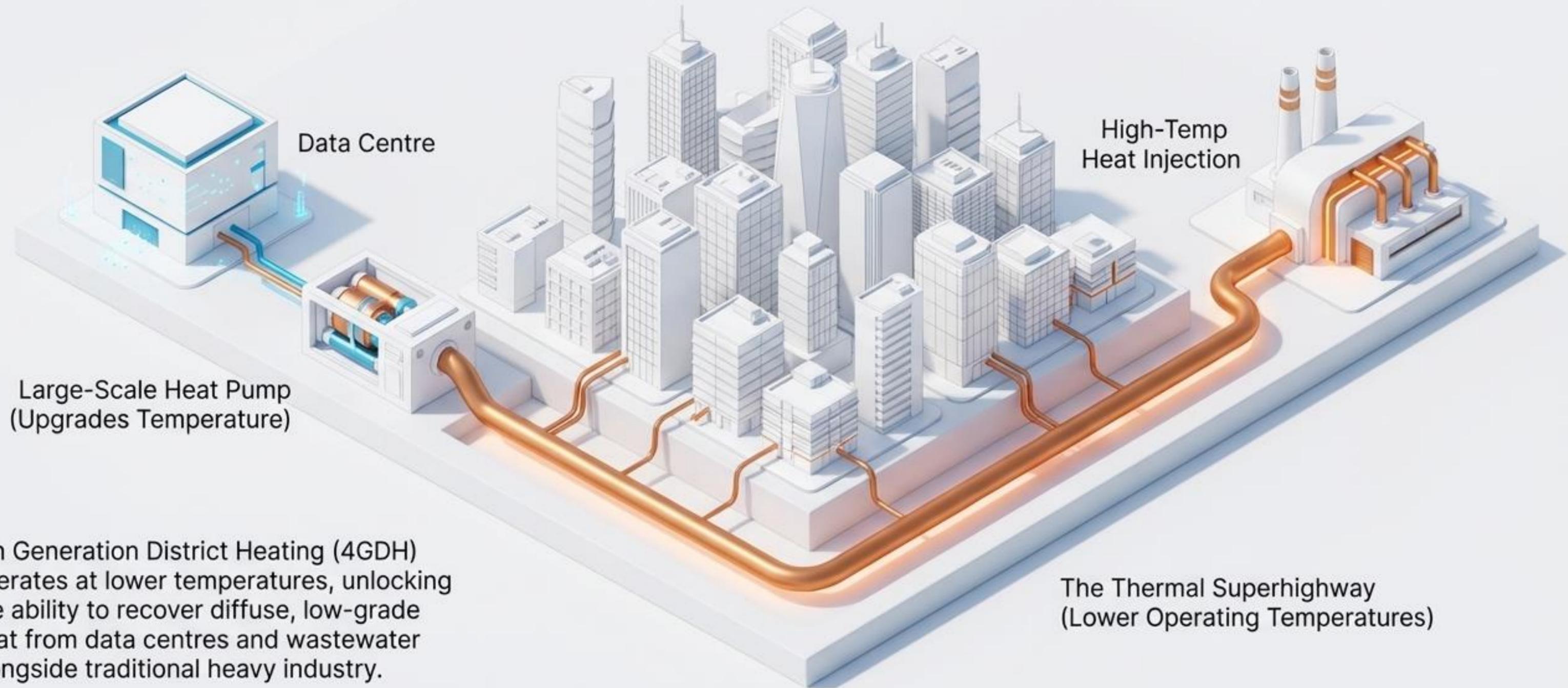
118+ TWh Available Supply

Current State Stats:

Only **5%** of residential heating market.
2.32 million housing units connected.
5,397 km of network trench length.

The primary barrier is not technical, but economic: the high upfront capital expenditure required for heat recovery equipment and urban transmission pipelines.

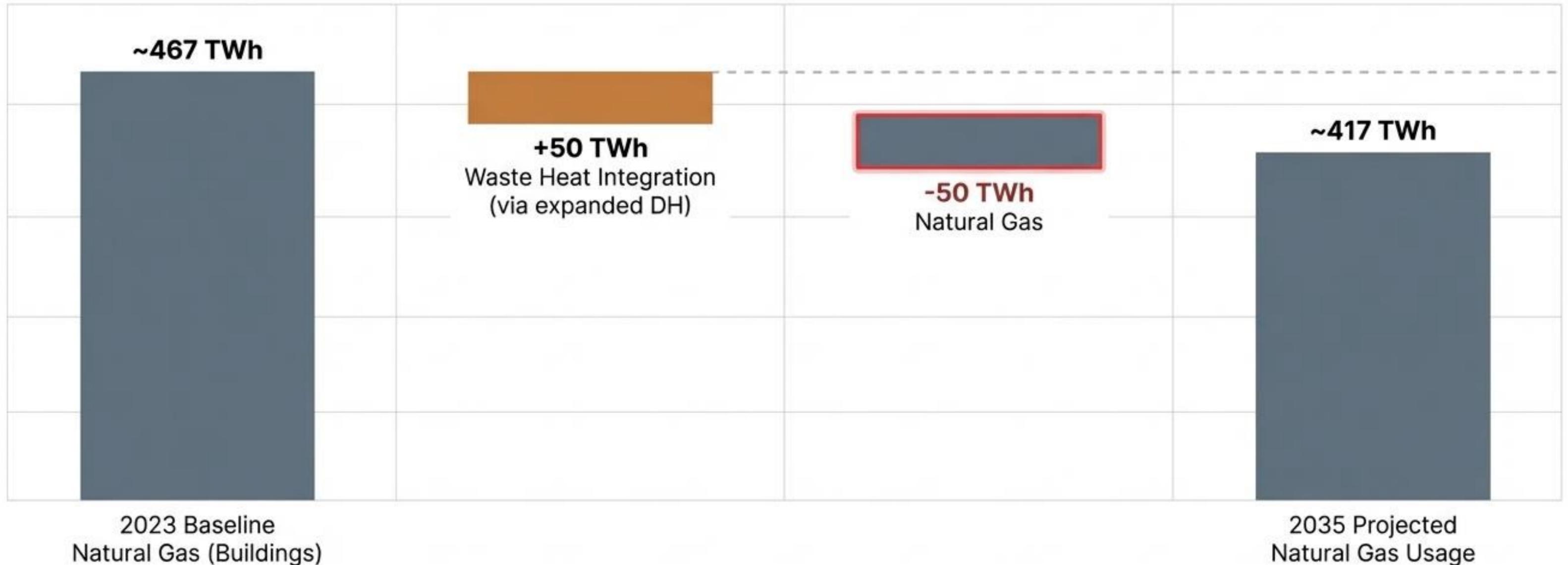
The 4GDH Ecosystem



4th Generation District Heating (4GDH) operates at lower temperatures, unlocking the ability to recover diffuse, low-grade heat from data centres and wastewater alongside traditional heavy industry.

The Thermal Superhighway
(Lower Operating Temperatures)

The Displacement Bridge



Injecting just **50 TWh** of waste heat by 2035 directly displaces nearly **5 billion cubic meters** of imported natural gas annually.



Pillar 1: Strengthen Local Mandates

Move from incentivised to obligatory local heat planning for large municipalities, aligned with the EU Energy Efficiency Directive.



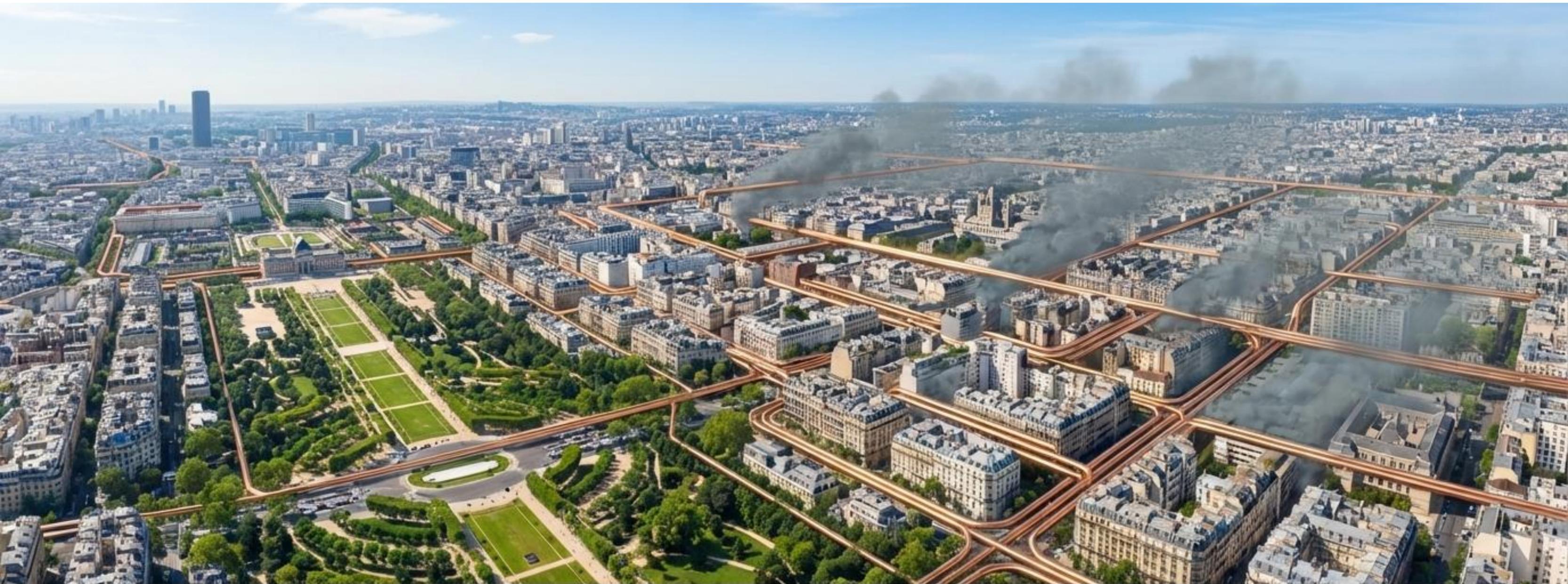
Pillar 2: De-risk Infrastructure

Scale the national Heat Fund (Fonds Chaleur) to target the high upfront capital costs of long-distance transmission pipelines (**Heat Superhighways**).



Pillar 3: Integrated Spatial Planning

Mandate the co-location of new high-yield heat sources (**data centres, industrial builds**) with existing or planned **District Heating networks**.



“Waste heat is no longer a byproduct. It is a strategic national asset.”

“By harnessing 118 TWh of domestic thermal energy, France can definitively break its reliance on imported fossil fuels, insulate its economy from price volatility, and secure its 2050 carbon neutrality mandate.”