10 Terawatt-Hour

The Opportunity

A strategic blueprint for decarbonising Ireland's thermal energy sector through the capture of indigenous industrial waste heat.

Prepared for Irish Policymakers, Infrastructure Investors, and Climate Strategists.

Ireland's thermal security is critically compromised by an 86% reliance on imported fossil fuels.

The Climate Mandate

Legally binding targets demand a 51% emissions reduction by 2030 and a net-zero economy by 2050.

The Thermal Bottleneck

Heating and cooling represent 38% **of all energy-related CO2 emissions** in Ireland. While **wind power** accelerates electricity decarbonisation, the thermal sector remains stubbornly tied to international **oil** and **natural gas** markets.

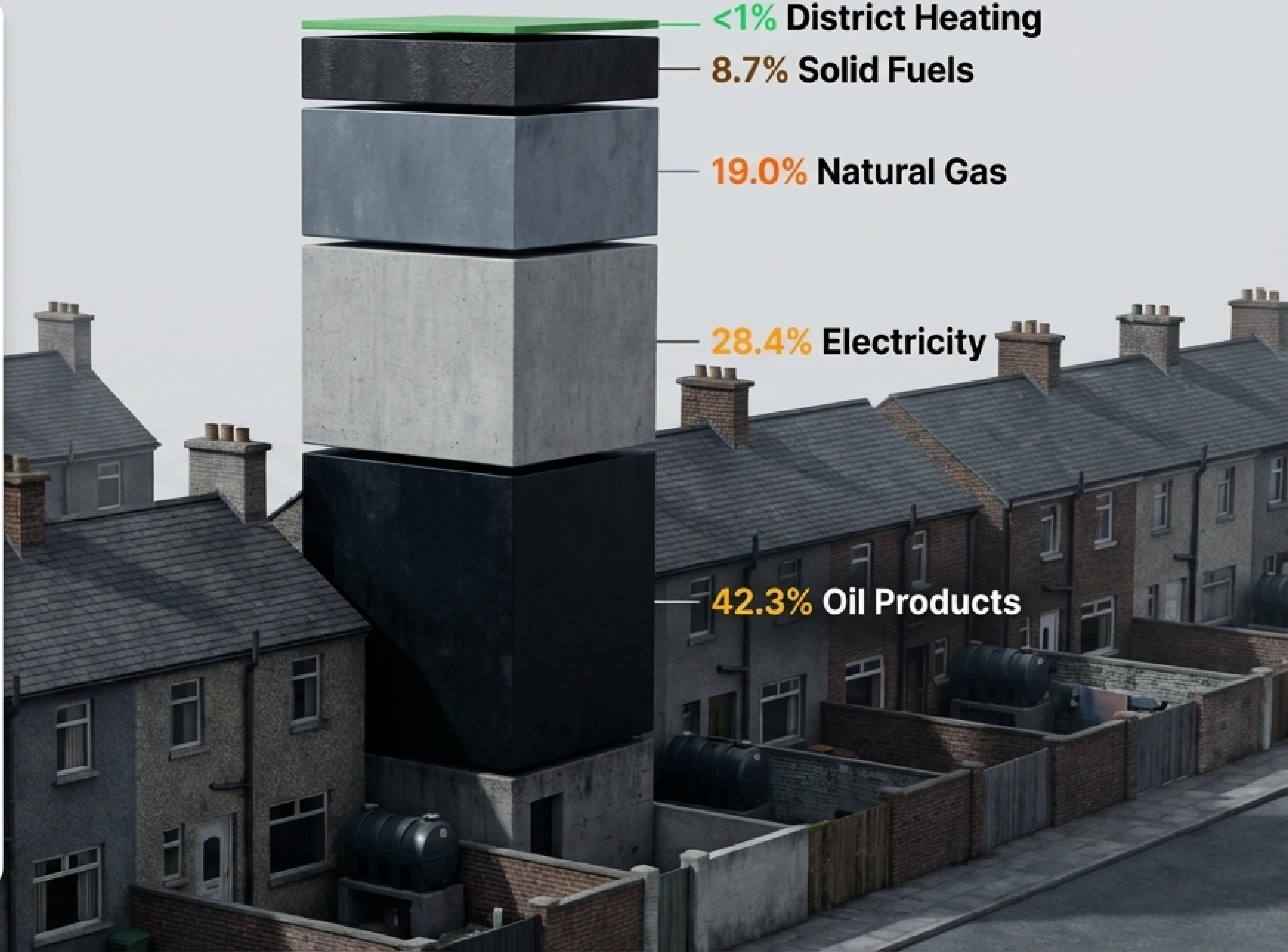
The Vulnerability

86% of the national energy supply (2022) is derived from fossil fuels, exposing the economy to extreme **price volatility** and **geopolitical risk**.

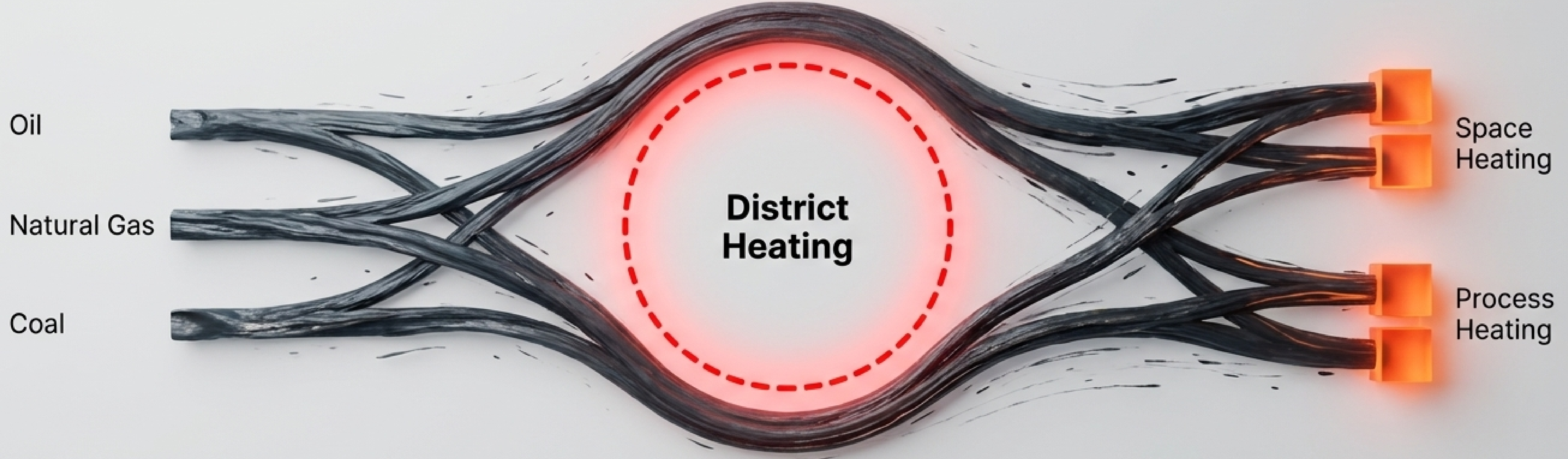
Decentralised fossil fuel boilers dictate the residential heating landscape.

The 2023 Residential Fuel Mix (26.3 TWh Total Demand)

- **Oil Products**: The dominant source, highly carbon-intensive and primarily decentralized in individual tanks.
- **Electricity**: Rapidly growing via heat pump deployment, but constrained by grid capacity.
  Lead pumpn deployment, but constrained by grid capacity.
- **Natural Gas**: Piped directly to individual boilers in urban and suburban centers.
- **Solid Fuels**: Coal and peat, representing the highest carbon intensity in the mix.



Energy flows currently bypass central infrastructure, locking in inefficiencies.



The Decentralised Norm

Energy inputs travel point-to-point directly to final consumers. There is virtually zero centralized heat conversion.

The Infrastructure Gap

District heating networks contribute **less than 1%** to Ireland's building heat demand, representing the **lowest share** of renewable heat in the European Union.

The Result

Millions of individual, uncoordinated combustion points that are nearly **impossible to decarbonize** simultaneously without **massive grid strain**.

A 10 Terawatt-hour indigenous energy asset is currently being vented into the sky.

A national assessment identifies 1,800 MWth of recoverable heat capacity across 45+ large point sources. Assuming realistic load factors, this yields >10 TWh of potential annual heat supply.

6 Thermal Power Stations

Large, concentrated outputs.

2 Energy-from-Waste Facilities

Consistent, high-grade urban baseloads.

17 Large Industrial Sites

Medium-to-high grade heat from cement, alumina, and food & beverage processing.

20 Mapped Data Centres

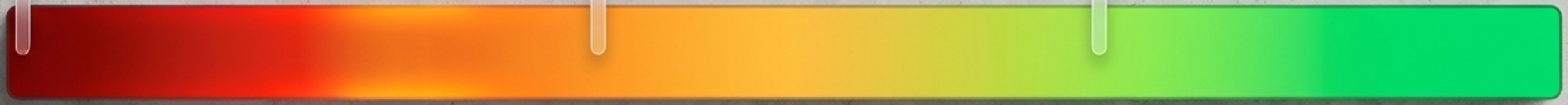
Massive clusters of stable, low-grade heat uniquely positioned near urban demand centers.

District heating is the only technology capable of capturing diffuse, low-grade heat at scale.

High-Grade Heat (>500°C, 26%): Traditional heavy industry (cement, alumina). Valuable, but geographically isolated.

Medium-Grade (150-500°C, 35%): Manufacturing and processing.

Low-Grade Heat (<150°C, 40%): The most abundant and rapidly growing category, driven entirely by data centres.



Temperature Gradient

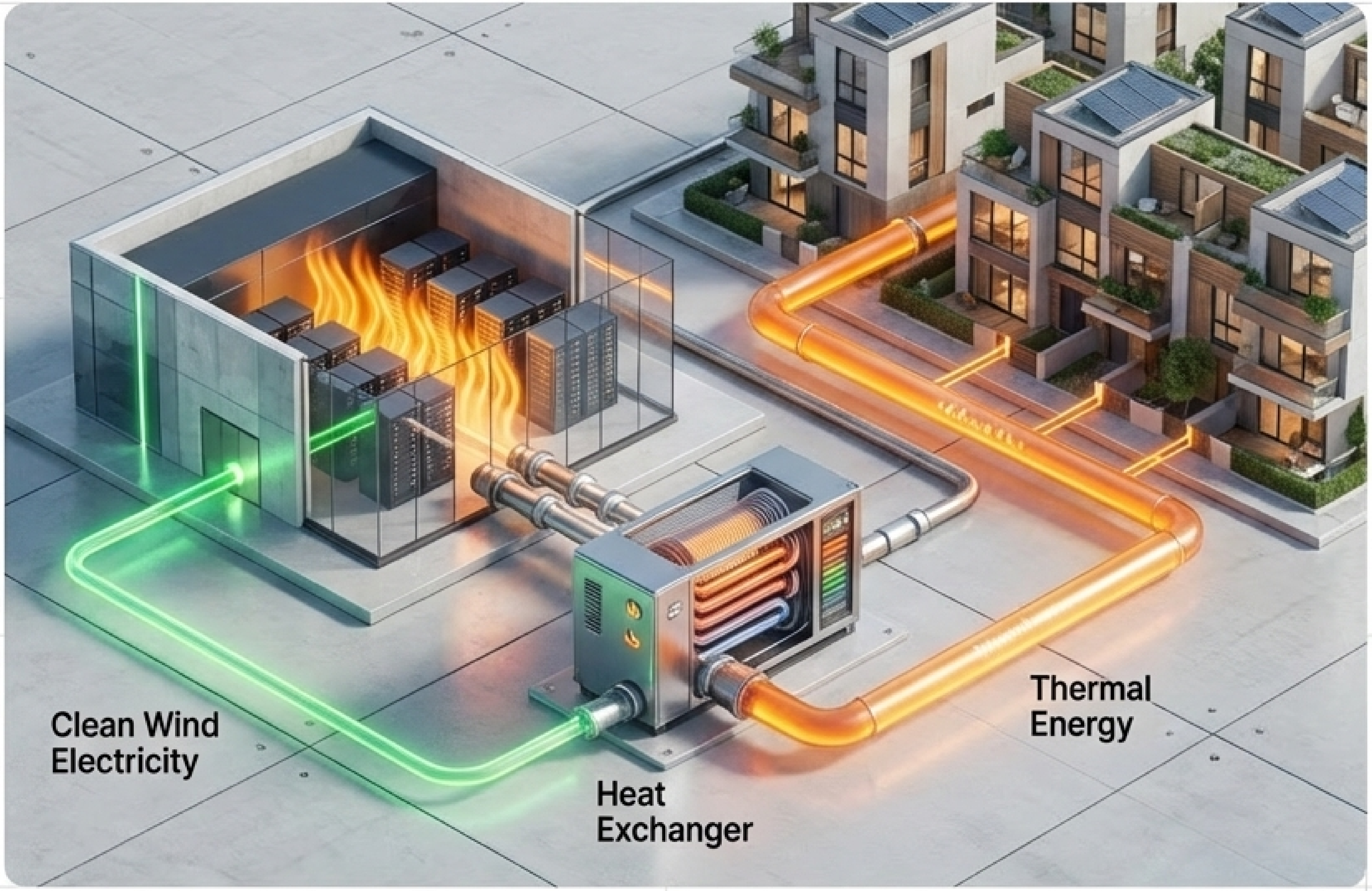
The Engineering Reality: Low-grade heat cannot be transported effectively without the insulated, centralized water loops of a District Heating (DH) network. Without DH, the largest share of our waste heat potential remains mathematically unrecoverable.

Data centres represent a symbiotic, circular thermal engine for urban environments.

The Digital Byproduct
Data centres produce vast quantities of stable, low-grade heat exactly where heat demand is highest—in dense urban clusters (particularly Dublin).

The Proof of Concept
The Tallaght District Heating Scheme successfully captures waste heat from an AWS data centre to heat local public buildings, proving the viability of the circular energy model.

The Policy Shift
New guidelines demand all new data centre builds be engineered as connection-ready for future thermal grids.



Captured waste heat has the capacity to offset nearly 30% of total building demand.

Supply vs. Demand Balance Matrix

National Building Demand

The residential (26.3 TWh) and commercial services (10.0 TWh) sectors require a combined 36.3 TWh of thermal energy annually.

The Untapped Supply

Industrial and high-tech waste heat offers 10.0+ TWh of clean, continuous thermal baseload.

The Displacement Metric

Fully deploying this resource equates to a 28% displacement of total building heat demand, systematically pushing imported fossil fuels out of the national mix.

The 2035 Scenario: Injecting 5.0 TWh of indigenous heat directly displaces imported oil and gas.

1

The Target State

Integrating just 5.0 TWh of waste heat—less than half the identified potential—into an expanded national DH network by 2035.

2

The Substitution Effect

Oil Products drop from ~18.3 TWh to ~15.8 TWh. Natural Gas drops from ~12.1 TWh to ~9.6 TWh.

3

The Strategic Outcome

A 5.0 TWh net reduction in imported fossil fuel dependency, concentrated in dense urban zones where DH economics are strongest.

The systemic transition from a decentralised liability to a circular asset.

Systemic Contrast Matrix

2023 Baseline	2035 Target State
Architecture: Highly decentralised, point-to-point individual boilers.	**Architecture:** Centralised conversion nodes sharing energy across urban districts.
DH Penetration: Less than 1%.	**DH Penetration:** Reaching 10% of total building heat demand.
Resource Dependency: Overwhelmingly reliant on imported international oil and gas.	**Resource Dependency:** Anchored by indigenous, continuous industrial waste heat.
Economic Profile: High exposure to volatile global commodity pricing.	**Economic Profile:** Circular economy model shielding consumers from price shocks.

The Four-Pillar Blueprint for unlocking Ireland's thermal infrastructure.

1. Legislative Certainty
(The Heat Bill)

Enact the planned 2025 Heat Bill to establish regulatory oversight, consumer protection, and legal confidence for long-term infrastructure investment.

2. Capital De-Risking
(National Heat Fund)

Establish a dedicated national fund to bridge the high upfront capital expenditure of network development for both public and private developers.

3. Spatial Integration
(Local Heat Plans)

Mandate local authorities to map heat resources and demands, officially zoning high-viability DH areas within county development plans.

4. Mandated Recovery
(Planning Condition)

Legislate that all new large-scale industrial sites and data centres (>1 MW) must be engineered as connection-ready to capture and export thermal byproducts.

From a fossil fuel laggard to a circular economy leader.

Ireland's historical reliance on individual fossil fuel boilers is an **economic and environmental liability.** Yet, venting **10 TWh of indigenous energy** into the atmosphere is an unparalleled **strategic opportunity.**

By treating industrial and data centre waste heat not as a byproduct, but as **foundational national infrastructure**, Ireland can permanently **break its import dependency.**

The math is undeniable. The technology is proven.
The imperative is now **execution.**