FROST & SULLIVAN



Turning Up the Heat: The Heat Pump Opportunity to 2035

How policy, technology innovation, and service-based business models are reshaping heat pump adoption and growth through 2035

© 2026 Frost & Sullivan. All rights reserved. This document contains highly confidential information and is the sole property of Frost & Sullivan. No part of it may circulated, quoted, copied or otherwise reproduced without the written approval of Frost & Sullivan.

FOCUS POINTS

1. HEAT PUMP OVERVIEW
2. HEAT PUMP POLICY AND REGULATION
3. TECHNOLOGY INNOVATION
4. BUSINESS MODEL INNOVATION
5. GROWTH OPPORTUNITIES & CALL TO ACTION
6. KEY TAKEAWAYS

HEAT PUMP OVERVIEW

Top 3 Strategic Imperatives



Transformative Megatrends

WHY IT MATTERS

Decarbonization and electrification are accelerating heat pump adoption, making efficient, low-carbon heating a critical part of the energy transition.

FROST PERSPECTIVE

Companies that align with electrification and sustainability goals will be best positioned to capture long-term market growth.

Disruptive Technologies

WHY IT MATTERS

AI, IoT, and advanced controls are expanding heat pump capabilities through improved monitoring, optimization, and system integration.

FROST PERSPECTIVE

Suppliers investing in intelligent controls and energy-management capabilities will achieve stronger differentiation and wider market penetration.

Geopolitical Chaos

WHY IT MATTERS

Energy price volatility and fuel supply uncertainty are accelerating the shift toward electrified heating and greater energy resilience.

FROST PERSPECTIVE

Heat pumps are becoming strategic assets that reduce fuel dependency while improving energy security and operational stability.

HEAT PUMP OVERVIEW

Growth Drivers and Restraints



TOP DRIVERS

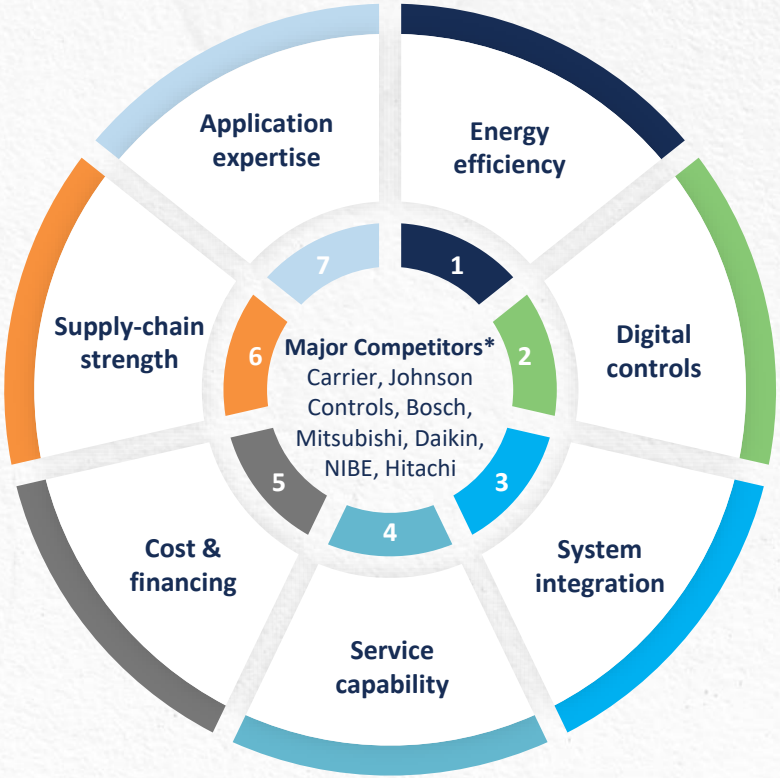
1. **Decarbonization and net-zero targets**
   Policies accelerate electrification and adoption of heat pumps as a low-carbon alternative to fossil-fuel heating.
2. **Subsidies and supportive regulation**
   Government incentives reduce upfront costs, improve affordability and boost demand.
3. **Superior energy efficiency**
   Lower energy consumption and operating costs strengthen the business case for heat pumps.
4. **Energy security and fuel price volatility**
   Demand grows for technologies that reduce dependence on imported fossil fuels.
5. **Digital controls and energy integration**
   Advanced controls and flexible energy management expand heat pump applications across buildings and industry.

TOP RESTRAINTS

1. **High upfront costs and CAPEX**
   Investment requirements slow adoption, especially in retrofit projects and cost-sensitive markets.
2. **Policy and electricity price uncertainty**
   Changing subsidies, policy shifts and electricity pricing volatility weaken investment confidence and demand.
3. **Shortages of skilled specialists**
   Too few installers, engineers and commissioning specialists limit deployment capacity and increase project costs.
4. **Integration and retrofit complexity**
   Complex installations raise project risk in existing buildings and industrial facilities.
5. **Dependence on low-cost natural gas**
   Cheap gas in many regions reduces the economic attractiveness of switching to heat pumps.

HEAT PUMP OVERVIEW

Competitive Environment



FROST & SULLIVAN

Competitive Factors

1 **Energy efficiency and lifecycle performance** drive customer ROI and operating cost savings.

2 **Digital controls, IoT connectivity, and optimization capabilities** improve monitoring, flexibility, and system performance.

3 **System integration and solution breadth** enable suppliers to deliver complete heating, electrification, and energy-management solutions.

4 **Service capability and installed base** strengthen customer confidence through execution support, maintenance, and proven references.

5 **Cost competitiveness and financing options** improve affordability and help overcome high upfront investment barriers.

6 **Manufacturing scale and supply-chain strength** support delivery certainty, shorter lead times, and market responsiveness.

7 **Application expertise and consulting support** help customers navigate complex retrofit, industrial integration, and decarbonization projects.

*Competitor list is not exhaustive. Source: Frost & Sullivan

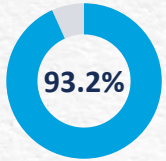
HEAT PUMP OVERVIEW

Global Revenue Outlook

Residential revenue

$50.79B
Global revenue, 2026

$113.79B
Global revenue, 2035
10.0% CAGR (2025–2035)

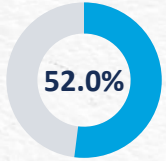


2035 revenue by technology
Air-source: 93.2%
Ground-source: 6.8%

Industrial revenue

$5.58B
Global revenue, 2026

$9.08B
Global revenue, 2035
5.6% CAGR (2025–2035)



Europe: largest region
Global industrial unit shipment share, 2035

Commercial heat pump trends: offices, malls, and large buildings

Retrofits drive demand

HVAC replacement and carbon targets support uptake.

Payback shapes uptake

Savings must offset retrofit and electrical upgrade costs.

Efficiency gains matter

Variable-speed systems target lower heating and cooling costs.

FROST & SULLIVAN

Source: Frost & Sullivan

HEAT PUMP OVERVIEW

Regional Growth Trends Through 2035



North America

US: Replacement demand and cold-climate systems will sustain growth, increasingly shaped by state and utility incentives.

Canada: Oil-heating replacement will expand cold-climate adoption, with growth moderating as the market matures.

Non-residential applications: Deployment should accelerate in the 2030s as incentive and power-price uncertainty eases.



Europe

Germany and UK: Boiler replacement and residential retrofits will drive growth through 2035.

Nordics: Mature residential markets will shift toward replacement demand.

Non-residential applications: 120–160°C systems will scale commercially, integrating waste-heat recovery with thermal storage and digital controls.



APAC

China: Clean heating and equipment replacement will sustain growth despite weaker housing construction.

Japan: Efficient inverter replacements will underpin residential demand, while market maturity limits growth.

Non-residential applications: China and East Asia may outpace Europe in heat pump shipment growth through 2035 as industrial modernization advances.

HEAT PUMP POLICY AND REGULATION

Decarbonization Policies Are Creating Structural Demand for Heat Pumps

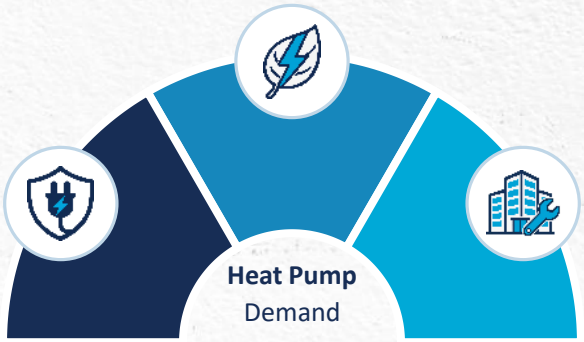
Heating electrification is becoming a policy objective, not a consumer choice

Climate policy embeds heat pumps

- Net-zero plans accelerate heating electrification.
- REPowerEU, RED III and the Energy Efficiency Directive support fossil-heating replacement.
- Heat pumps reduce building and industrial emissions.

Energy security strengthens support

- Less reliance on imported fossil fuels.
- Electrified heating supports resilience and long-term supply security.
- Climate and security agendas reinforce adoption.



Regulation shifts toward retrofits

- Existing buildings and facilities offer the largest decarbonization opportunity.
- Renovation and fossil-heating replacement create demand pipelines.
- Tighter performance rules expand the market.

KEY TAKEAWAY

Regulators are moving beyond incentives, making heat pumps a core component of climate, energy and industrial policy.

HEAT PUMP POLICY AND REGULATION

Policy Is Rebalancing the Economics of Heating

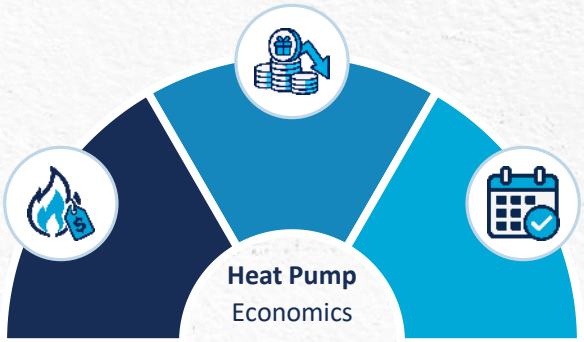
Regulations are narrowing the cost gap between electric and fossil-based heat

Incentives lower adoption barriers

- Grants, rebates, tax credits and renovation funding lower upfront costs.
  - Public funding supports adoption and manufacturing expansion.
- Demonstrations accelerate commercialization and reduce technology risk.

Carbon pricing raises fossil-heat costs

- Emissions policies raise gas and fossil-heating operating costs.
- ETS2 and related carbon pricing strengthen the case for electrification.
- Carbon costs shape lifetime heating economics.



Consistency matters as much as generosity

- Stable, multi-year support builds investor and customer confidence.
- Sudden subsidy changes create market volatility.
- Long-term visibility supports deployment planning and capital investment.

KEY TAKEAWAY

The most effective regulations lower heat pump costs while raising the cost of fossil heating.

Source: Frost & Sullivan

HEAT PUMP POLICY AND REGULATION

Regulation Is Shaping the Next Generation of Heat Pump Technologies

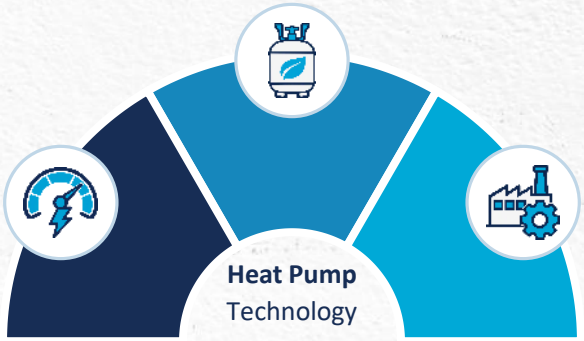
Compliance requirements are influencing product development, manufacturing, and competition

Refrigerant regulations accelerate technology shifts

- F-Gas regulations drive low-GWP refrigerant adoption.
- R290 is gaining momentum in building applications.
- Industry increasingly uses ammonia, CO_2, hydrocarbons, water and steam.

Efficiency standards raise performance expectations

- Building performance rules favor efficient heating technologies.
- Industrial mandates drive waste heat recovery and high-temperature heat pumps.
- Compliance increasingly depends on overall system efficiency.



Industrial policy strengthens local supply chains

- Net Zero Industry Act: heat pumps are strategic net-zero technologies.
- Governments back local manufacturing, resilient supply chains and deployment readiness.
- Major markets prioritize domestic production.

KEY TAKEAWAY

Regulation is no longer just driving demand. It is determining which technologies, refrigerants, manufacturers, and supply chains will succeed in the future heat pump market.

Source: Frost & Sullivan

TECHNOLOGY INNOVATION

Heat Pumps Are Reaching Higher Temperatures and More Applications

Technology advances are expanding heat pumps beyond traditional space heating

Heat pumps are overcoming historical performance limitations

- Better compressors, heat exchangers and thermodynamic cycles enable higher temperatures while maintaining efficiency.
- Residential supply temperatures now reach 75°C, improving compatibility with existing radiators.
- Improving cold-climate performance supports adoption in Northern Europe and North America.
- Industrial process heat is increasingly viable below 160°C, with some solutions approaching 200°C.

New opportunities are emerging across industrial sectors



Food and beverage



Pulp and paper



Chemicals



Pharmaceuticals



District heating networks

WHY IT MATTERS

Reduces retrofit complexity.

Expands the range of economically viable applications.

Accelerates replacement of fossil-fuel heating systems.

TECHNOLOGY INNOVATION

The Move to Low-GWP Refrigerants Is Driving the Next Innovation Cycle

Refrigerant technology is becoming a key factor of competitive advantage

R290 is becoming a leading refrigerant in heat pumps

- Delivers very low global warming potential (GWP).
- Supports higher water temperatures.
- Improves alignment with evolving environmental regulations.
- Increasingly used in next-generation air-to-water heat pumps.

Refrigerant choice is influencing system design

- Compressor architecture
- Heat exchanger design
- Safety systems
- Installation requirements
- Operational efficiency

Examples of natural refrigerants



Ammonia (R717)



CO_2 (R744)



Water (R718)



Propane (R290)

WHY IT MATTERS

Compliance is becoming embedded in product design.

Refrigerant transition is creating opportunities for differentiated product portfolios.

Manufacturers with low-GWP expertise are strengthening their competitive position.

FROST & SULLIVAN

Source: Frost & Sullivan

TECHNOLOGY INNOVATION

Heat Pumps Are Evolving into Intelligent Energy Management Platforms

Digitalization is shifting value from equipment performance to system optimization

Smart controls are becoming a core differentiator

- Real-time monitoring improves operating efficiency.
- Predictive maintenance reduces downtime and costs.
- Connectivity enables remote diagnostics and better service.

Heat pump applications are becoming more integrated

- Dynamically optimize waste heat recovery.
- Coordinate process heat loads with electricity prices.
- Thermal storage improves operational flexibility.

Integration is creating additional value; heat pumps are increasingly connected with:



Solar PV systems



Battery storage



Thermal energy storage



Building management systems



Smart grids and demand response

STRATEGIC IMPLICATION

Competitiveness will require software, controls and energy management alongside hardware performance.

Equipment suppliers are evolving into integrated energy solution providers.

BUSINESS MODEL INNOVATION

Industry Shift: From Equipment Sales to Energy Outcomes

Heat pump providers are expanding beyond hardware sales as customers demand lower risk, predictable costs, and measurable performance.

Traditional equipment sales are reaching their limits

- High upfront costs remain a major barrier to heat pump adoption.
- Customers favor predictable energy costs, lower operating risk and guaranteed performance over ownership.
- Decarbonization increases demand for measurable energy and carbon savings.

New business models span the value chain

- OEMs are expanding into energy services and long-term customer relationships.
- Utilities, energy service companies and financial institutions are joining deployment.
- Digitalization enables remote monitoring, predictive maintenance and performance-based contracts.

Strategic imperatives driving change

Decarbonization → Demand for guaranteed energy savings

Decentralization → Integration with distributed energy resources

Digitalization → Outcome- and performance-based services

FROST & SULLIVAN

Source: Frost & Sullivan

BUSINESS MODEL INNOVATION

Heat-as-a-Service Is Redefining Heat Pump Business Models

Suppliers are creating recurring revenue by delivering guaranteed heat, comfort, and efficiency rather than selling equipment alone.

Performance contracting today				Performance contracting in the future	
Product-Driven		Product/Output-as-a-Service		Outcome-as-a-Service	
Product supplier		**Systems supplier**		**Service provider**	
Offering	Asset provider: one-to-many	**Offering**	Customized functions: one-to-few	**Offering**	Personalized value: one-to-one
Pricing	Product-driven	**Pricing**	Customers' KPIs	**Pricing**	Outcome-driven
Cost of capital	Capex model	**Cost of capital**	Opex model	**Cost of capital**	Opex + profit-sharing
Business model	Product sales	**Business model**	Energy-as-a-Service; Heat-Output-as-a-Service	**Business model**	Energy-as-a-Service; Comfort-as-a-Service; Heat-Outcome-as-a-Service
Asset	Cost of obsolescence	**Asset**	Cost savings	**Asset**	Profit improvements
Maintenance	Reactive	**Maintenance**	Preventive, based on captured data	**Maintenance**	Proactive, based on generated insights
Differentiation	Product specifications	**Differentiation**	Customer experience	**Differentiation**	Outcomes and pricing models

Risks Addressed by Service-as-a-Solution				
Equipment financing	Maintenance and repair	Heat output based on equipment efficiency	Customer demand and time of use	Wholesale electricity price and output
Financial	**Technical**	**Performance**	**Behavior**	**Energy price**
Customer Value Creation				
Asset leasing	**Efficient asset leasing**	**Energy payment plan**	**Heat output as a service**	**Heat outcomes as a service**

FROST & SULLIVAN

Source: Frost & Sullivan

BUSINESS MODEL INNOVATION

Heat-as-a-Service Reduces Adoption Barriers

Outcome-based contracts improve affordability, reduce customer risk, and accelerate heat pump adoption across residential and industrial markets.

Heat-as-a-Service reduces customer risk

Traditional purchase	Heat-as-a-Service
Large upfront capital investment	Minimal upfront investment
Customer bears performance risk	Provider assumes performance risk
Customer handles maintenance	Maintenance included
Uncertain operating costs	Predictable service payments
Equipment ownership	Delivered outcomes

Why adoption accelerates under service models

- Converts capital expenditure into operating expenditure.
- Improves affordability for residential, commercial and industrial users.
- Performance guarantees increase customer confidence.
- Long-term contracts generate recurring provider revenue.
- Continuous monitoring and optimization improve efficiency throughout the asset lifecycle.

Benefits across stakeholders

End users
- Lower financial risk
- Predictable costs
- Guaranteed performance

Providers
- Recurring revenue streams
- Stronger customer retention
- Access to operational data

Financiers
- Long-term contracted cash flows
- Lower technology adoption risk
- Better visibility into asset performance

FROST & SULLIVAN

Source: Frost & Sullivan

GROWTH OPPORTUNITIES & CALL TO ACTION

GO 1



Intelligent Heat Pump Optimization

- Embed AI-driven controls, predictive analytics, and remote diagnostics to improve efficiency, reduce downtime, and optimize energy consumption.
- Enable demand response and dynamic tariff participation by automatically adapting operations to changing electricity prices and grid conditions.

GO 2



Integrated Energy Ecosystems

- Combine heat pumps with solar PV, battery storage, EV charging, and energy management platforms to create a seamless low-carbon energy solution.
- Unlock recurring revenue through energy optimization services, connectivity offerings, and long-term customer engagement.

GO 3



Outcome-Based Energy Solutions

- Move beyond equipment sales by delivering guaranteed heating, efficiency, and decarbonization outcomes through service-based business models.
- Combine equipment, controls, software, financing, monitoring, and lifecycle services into a single value proposition that reduces customer risk.

KEY TAKEAWAYS

1. **Heat pump revenue more than doubles by 2035**
   Residential revenue rises from $50.79B in 2026 to $113.79B in 2035. Industrial revenue grows from $5.58B to $9.08B.

2. **Policy supports demand, but affordability still limits adoption**
   Decarbonization rules, incentives and retrofits support growth. Upfront costs, electricity prices and policy uncertainty remain barriers.

3. **Higher temperatures and low-GWP refrigerants expand the opportunity**
   Performance advances open more retrofit and industrial applications. Low-GWP expertise increasingly shapes product design and differentiation.

4. **Competitive advantage extends from hardware to system optimization**
   AI controls, predictive maintenance and integration with solar, storage and grids improve efficiency, flexibility and service capability.

5. **Heat-as-a-Service aligns customer outcomes with recurring revenue**
   Financing, maintenance and performance guarantees reduce customer risk. Integrated service models create long-term provider revenue.