

HYBRID HEATING SOLUTIONS: POWERING A SUSTAINABLE ENERGY FUTURE

Innovative hybrid heating systems are revolutionizing the heat treatment industry by combining traditional and renewable energy sources to improve efficiency and support sustainability initiatives for energy-intensive parts production worldwide.

TABLE OF CONTENTS

- 3 Introduction
- 4 Challenges of Traditional Heating in Industrial Manufacturing
- 5 Global Sustainability Trends in Industrial Heat Processing
- 6 The Role of Innovation in Achieving Sustainability
- 7 The Future of Energy: Hybrid Heating Solutions
- 8 Honeywell's Hybrid Heating Solutions
- 9 Conclusion

INTRODUCTION

Industrial heat processing plays a critical role in modern manufacturing, where continuous and/or extreme temperatures are required to produce a wide range of products.

From metals, electronics and textiles to pharmaceuticals and food and beverage, energy-intensive heat treatment processes — including drying, melting, sterilization, distillation and evaporation — are essential for high-yield, quality parts production.

Traditional heating methods primarily using fossil fuels raise concerns about long-term sustainability and environmental impact. Innovative heating approaches, including hybrid solutions, offer one way to balance production demand with environmental responsibility.



CHALLENGES OF TRADITIONAL HEATING IN INDUSTRIAL MANUFACTURING

Traditional heating methods typically use fossil fuels for industrial processes. Relying solely on natural gas, oil and coal, however, poses some significant challenges.



HIGH ENERGY CONSUMPTION

Industrial heating uses a significant energy in manufacturing. Maintaining temperatures over extended periods results in substantial energy consumption, high costs and potential environmental harm when derived from nonrenewable sources (for each MWh of natural gas burned, 202 kgs of CO₂ are emitted).



REGULATORY PRESSURES

Governments worldwide are increasingly enforcing stricter environmental regulations, pushing businesses that rely on fossil fuels to adopt eco-friendly, more sustainable technologies to comply with these regulations, avoid penalties and maintain their brand reputation and competitive advantage.



RESOURCE DEGRADATION

Fossil fuels are finite resources and reliance on them raises long-term sustainability concerns. As these resources become scarce, cost and availability may fluctuate, potentially destabilizing industrial operations.



ENVIRONMENTAL IMPACT

Burning fossil fuels produces carbon emissions and other greenhouse gases (such as NO_x), major drivers of climate change, poor air quality and overall environmental degradation.



MARKET DEMAND FOR SUSTAINABILITY

Consumers and stakeholders increasingly prioritize sustainability, which requires industries to shift toward more environmentally friendly practices.

GLOBAL SUSTAINABILITY TRENDS IN INDUSTRIAL HEAT PROCESSING

There is a growing global trend toward integrating renewable energy sources into industrial heating systems to reduce carbon emissions and enhance sustainability, driven by increased environmental awareness and stricter regulations worldwide.

HEAT IN INDUSTRIAL PROCESSES AND POTENTIAL HYBRID SOLUTIONS

INDUSTRY & ENERGY USAGE	HYBRID SOLUTION
Construction Materials: Building materials, such as cement and glass, require extremely high temperatures for production due to the chemical and physical processes to transform raw materials into finished products.	Combining renewable energy sources like solar or wind with traditional natural gas can help reduce reliance on fossil fuels. Electric heaters or furnaces can provide precise and controlled heat at lower temperatures and/or augment other heat sources.
Automotive: High temperatures are required for critical production components, including forging metal, molding plastics and spray-painting processes.	Combining electric heating elements with a gas furnace can help reduce energy consumption. For example, in metal forging, gas can quickly heat the metal to an initial high temperature, while electric induction heating can provide more precise, localized heating to fine-tune the temperature of specific components.
Food and Beverage: Energy-intensive processes include pasteurization, sterilization and cooking.	Using electricity to preheat water or air while using natural gas for high-temperature applications helps minimize the carbon footprint of production while enhancing energy efficiency.
HVAC: High energy is consumed due to continuous operation, size of systems and reconciling temperature differentials.	Hybrid systems that combine traditional and electric energy sources and integrate heat recovery and storage technologies allow for better use of energy throughout the building.
Textile: High temperatures are required for fabric dyeing, drying and finishing.	Electricity can be used during the most energy-intensive production phases to reduce emissions and lower operational costs.
Paper: Efficient and thorough drying of fibers requires continuous and consistent high heat.	Electric heat sources can provide preheating to mitigate the natural gas needed during some phases of paper production.



Europe is leading the shift toward incorporating sustainable energy solutions in industrial heat processes, with all 27 EU Member States committed to achieving climate neutrality by 2050.

As part of this effort, the European Union's Green Deal and the "Fit for 55" package aim to cut greenhouse gas emissions by 55% by 2030 compared to levels in 1990.¹

In 2023, the revised Renewable Energy Directive set a target to reduce emissions from industrial heating by increasing the renewable energy share to at least 42.5% by 2030, up more than 40% from the initial 30% goal.²

THE ROLE OF INNOVATION IN ACHIEVING SUSTAINABILITY

As the heating industry evolves, technological advancements will play a critical role in reducing reliance on fossil fuels to help industries meet sustainability goals while maintaining productivity and profitability.

For example, heat recovery systems enable industries to capture and repurpose waste heat from industrial processes, reducing energy consumption and environmental impact. Additionally, integrating digital technologies facilitates precise monitoring and optimization of heating processes, which can help minimize energy use, decrease waste and improve operational efficiency.



THE FUTURE OF ENERGY: HYBRID HEATING SOLUTIONS

As industries continue to grow and diversify in response to rising environmental concerns and the increasing demand for sustainable solutions, the need will increase for advanced, reliable, energy-efficient heating systems to balance product demand with profitability, environmental sustainability and regulatory compliance. Hybrid heating solutions offer a promising opportunity to make a significant difference in sustainable industrial heating processes.

By combining traditional energy sources, such as natural gas or electricity, with renewable energy alternatives, hybrid systems provide a flexible and adaptable approach to heating that maximizes energy efficiency while minimizing environmental impact.

These systems offer greater operational flexibility, allowing industries to optimize their energy use based on external factors like energy prices and the availability of renewable sources. This ability to optimize makes hybrid systems more sustainable and resilient in an era of fluctuating energy prices and tightening environmental regulations. As the energy landscape continues to evolve, renewable energy sources will play an increasingly prominent role, with technological advancements driving even greater adoption of these solutions for industrial heating.

Hybrid systems that leverage both conventional and renewable energy sources help companies reduce reliance on fossil fuels, lower operational costs, and meet regulatory requirements for lower emissions and more efficient energy use. Additionally, these systems provide the adaptability to switch between energy sources based on cost, availability and environmental considerations, making them a critical tool in achieving a more sustainable industrial future.



Hybrid energy solutions merge renewable sources, energy storage and traditional power generation to provide a balanced, reliable energy supply. As businesses navigate the energy transition, these systems offer flexibility, cost savings, and a critical step toward sustainability.³

— Diversegy, Commercial Energy Advisory

HONEYWELL'S HYBRID HEATING SOLUTIONS

The heating industry is at a crossroads. As industries continue to expand and strive for sustainability, developing and adopting more advanced, energy-efficient heating solutions will be essential in meeting the challenges of both production demands and environmental responsibility.

Hybrid heating solutions offer a practical, flexible way for industries to embrace sustainability without sacrificing efficiency or performance. Honeywell's Hybrid Heating Solutions combine the benefits of traditional energy sources with renewables, providing businesses with energy-efficient solutions that reduce emissions and lower operational costs.



CONCLUSION

By adopting hybrid heating solutions, manufacturers can work toward striking a balance between productivity, profitability and environmental responsibility. And, as innovative technologies continue to evolve, they will undoubtedly expect them to play an even more critical role in shaping the future of industrial manufacturing and sustainability.

Honeywell is dedicated to sustainability, creating products and technologies that promote long-term environmental and economic benefits.

REFERENCES

¹ European Commission. "[Delivering the European Green Deal: On the path to a climate-neutral Europe by 2050.](#)" Accessed 1/2/2025.

² European Commission. "[Renewable energy targets.](#)" Accessed 1/2/2025.

³ Diversegy. "[Optimizing Power with Hybrid Energy Solutions: Merging Renewables, Storage, and Traditional Sources for Reliability.](#)" 19 December 2024.

For more information

process.honeywell.com/us/en/hts

Honeywell Thermal Solutions

2101 CityWest Blvd.
Houston, TX 77042

01/25
© 2025 Honeywell International Inc.

THE
FUTURE
IS
WHAT
WE
MAKE IT

Honeywell