



# Efficient Electricification of drying industry

WSE Heat Pump Technology Solution for Super heated Steam drying



## Overview- Case study

Material Usage for 2025 – Sales Materials Only

All information is WSE Turbo without third-party validation. The information is provided as an indicative basis and may be different in final installations depending on application specific parameters.

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# About WSE Turbo



Since our formation in 2019 through the strategic partnership of Weel & Sandvig and Ecergy, we have been synonymous with cutting-edge energy solutions and turbo machinery innovation. Today, we continue that legacy from our headquarters in Denmark, supported by a network of engineers.

WSE Turbo develops and manufactures high-performance steam compressors, and industrial heat pump systems. All designed to maximize efficiency and drive decarbonization. Our solutions harness advanced thermal process optimization and waste heat recovery, helping industries reduce emissions while improving operational performance.

Backed by decades of engineering expertise, we combine precision turbo machinery with intelligent energy systems, supported by dynamic simulation and process modeling. More than a technology provider, we are a strategic partner—delivering end-to-end support from concept to integration, ensuring solutions are tailored to each client's sustainability goals.

At WSE Turbo, we don't just decarbonize industrial heat—we redefine industrial energy systems for a cleaner, more efficient future.

## The Energy Dilemma in industrial drying process

The drying process is one of the most common manufacturing operations across a wide range of industries, including food and beverage, waste management, product manufacturing, and more.

However, it brings its own set of challenges that directly impact profit margins. High energy consumption and CO<sub>2</sub> emissions remain major concerns. Processes such as drying is among the largest contributors to carbon emissions in production facilities.

At WSE Turbo, we specialize in industrial energy optimization. Our solution is a cutting-edge heat pump system that doesn't just reduce energy use. It fundamentally reimagines how drying processes can be powered.

# Technical Overview of the Proposed Solution



The Challenge:

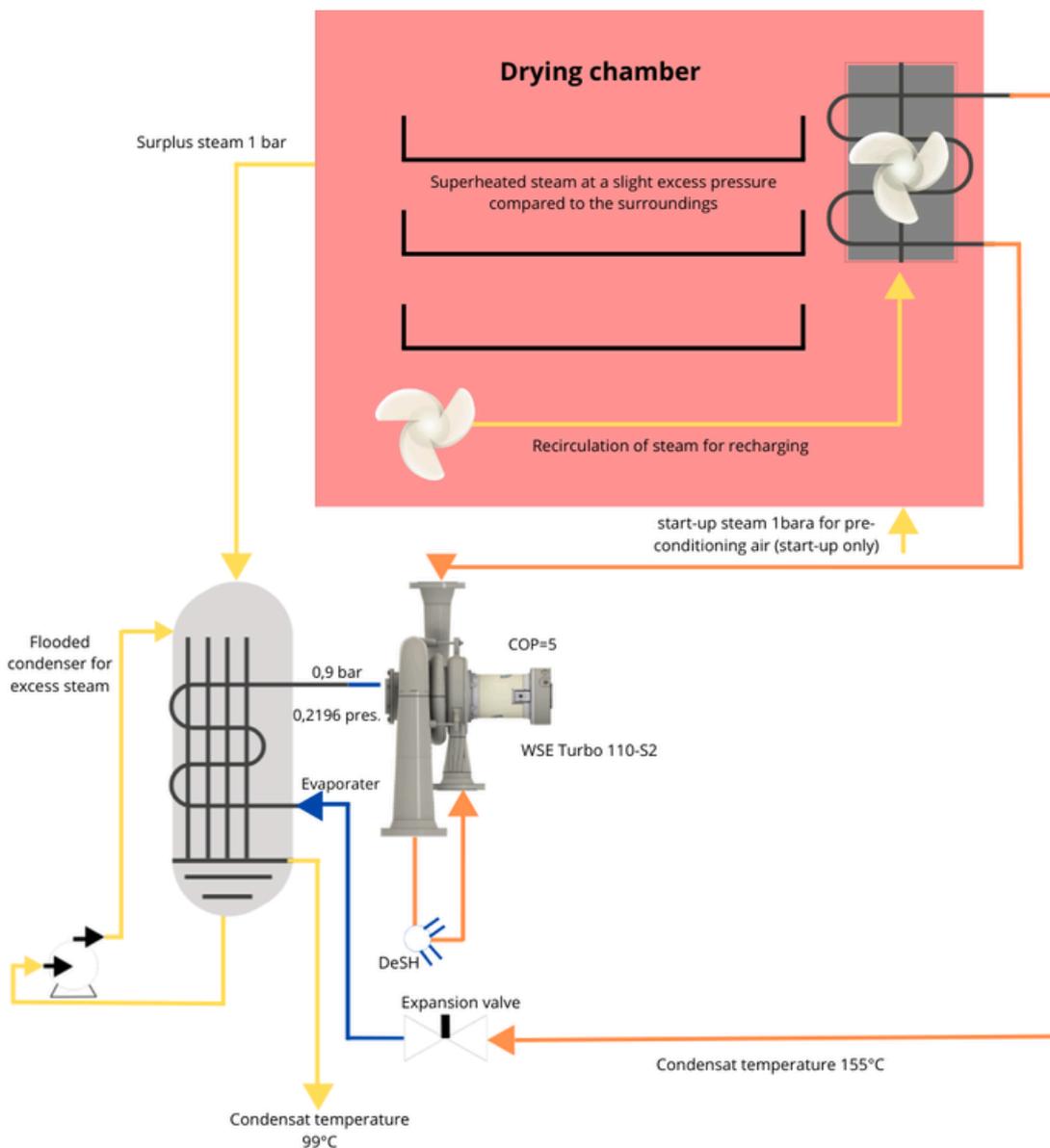
A representative superheated steam drying system was analyzed using typical process values:

- Inlet steam temperature: 145 °C (recirculated)
- Exhaust steam temperature: 110 °C
- Thermal load: approximately 1080 kW

By integrating a two-stage heat pump, the steam demand can be nearly eliminated:

- Electrical power required: 200 kW
- Achieved COP (Coefficient of Performance): 5.3

This results in substantial reductions in both energy consumption and CO<sub>2</sub> emissions.



Figur 1: Simulation with Heat Pump integration on column C2.

# Economic and Strategic Potential

Best estimates indicate strong long-term economic performance, even with conservative assumptions. Key advantages include:

- Lower operational costs as energy and carbon prices rise
- Scalability across existing and future dryer systems
- A meaningful contribution to corporate decarbonization goals

The concept also supports broader electrification strategies and aligns with global sustainability targets.

## ESTABLISHING SUSTAINABLE PROCESSES

With a COP of 5.3, this heat recovery system presents a strong business case. It combines high efficiency with quick payback and solid financial returns, while also helping to future-proof industrial operations.

The success of this recovery cycle shows how industrial separation processes can be completely rethought. By transforming them into efficient heat pump loops, it becomes possible to drastically reduce both energy costs and emissions. With the ability to add further compression, the system can also support higher-temperature applications, making it an ideal solution in regions facing volatile gas prices or strict CO<sub>2</sub> reduction targets.



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