

# PINcHED - Process INtegrated HEat pump Drying

Accelerating the implementation of high-temperature heat pumps



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**Budget** 460 k€  
**Duration** 2019 - 2021

## Project Scope

Accelerate adoption of industrial heat pumps in the Netherlands by creating reference cases in two main industrial sectors of Food and Paper:

- Less customization and integration effort for the market by defining integrated drying units as new product for the technology manufacturers of this project consortium and
- Actively communicate this approach with the industrial community including technology manufacturers.

## Objective

- Define optimal balance between standardization < > customization:
- Formulate the designs for new value propositions for equipment manufacturers and create a possible route for fully heat pump integrated drying processes in 2030.
- Increased understanding of the heat and mass balances in conventional drying processes vs. the heat pump integrated drying process.
- Design/Create 4 full scale integrated heat pump designs for 2 green and 2 brown field situations & Formulate the R&D questions to be answered on pilot scale and on demo scale.
- 4 designs of pilot systems able to answer the defined R&D questions.

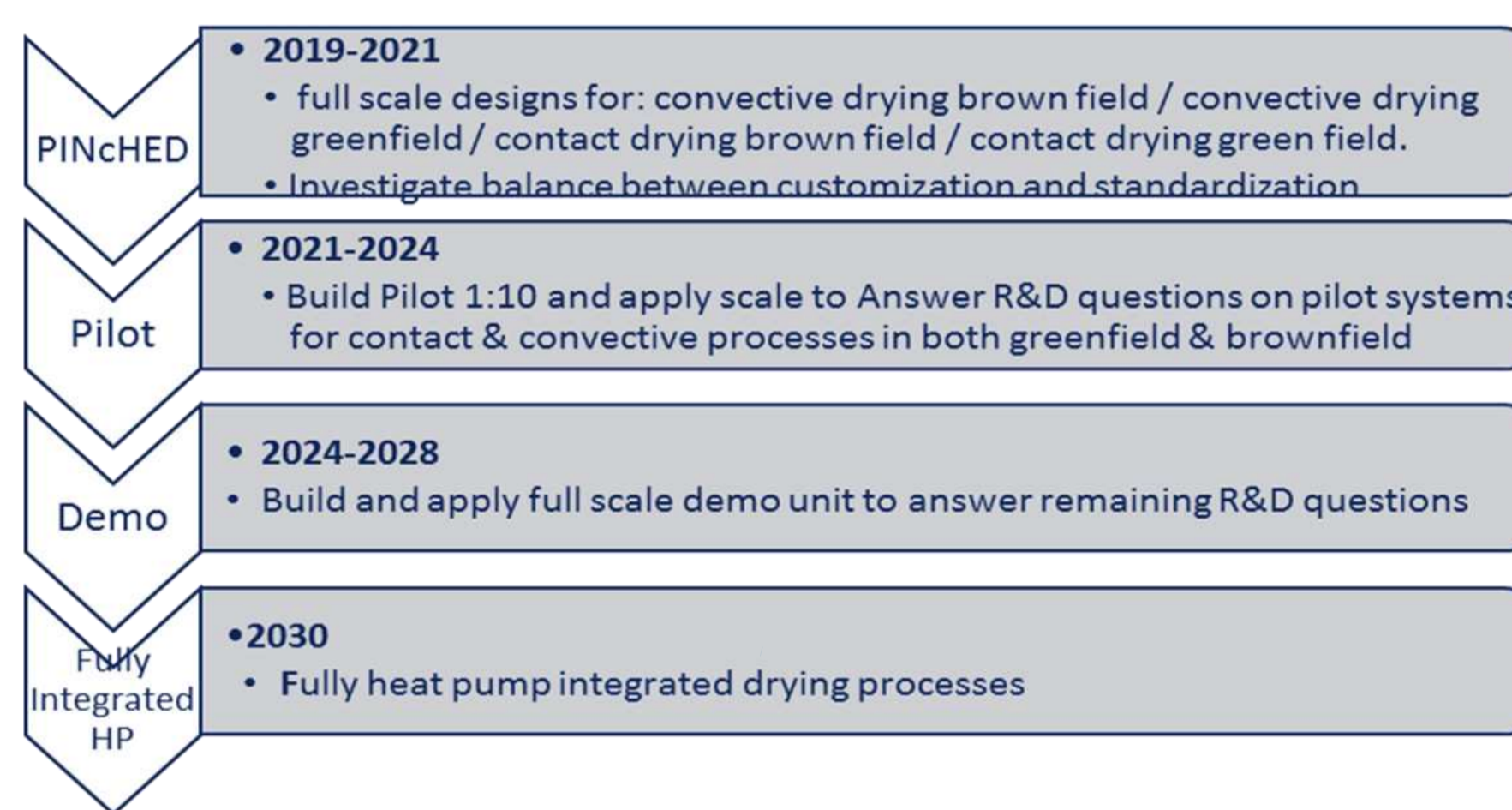
## Motivation

Drying processes account for 15% of industrial energy consumption in some processes, e.g. paper production, up to 70% of the energy is used for drying. Improving of the energy efficiency of drying processes will therefor contribute significantly to energy saving targets and to the reduction of CO2 emissions.

## Results

- 1st PDEng finished her work in September 2020 successfully and 2nd PDEng started in April 2020.

- Brown Field retrofit of a heat pump in both contact drying and convective drying proved technically very challenging and economical not feasible.
- Green field application in convective drying seems possible with trans critical cycle or Stirling cycle but challenging.



Back casting integration HP's

## Next steps

- Green field application in contact drying (work in progress).
- Technical & economic feasibility study of Green Field heat pump integrated convective drying process. Start 1st November 2020.
- Technical & economic feasibility study of Green Field heat pump integrated contact drying process. Start to be determined.

