

# WCRHP - Upgrading waste streams with compression resorption heat pumps

Investigate potential of wet CRHPs for high temperature heat recovery. Develop a compressor prototype suitable for wet compression operation.



**Project number** UH-20-10

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**Partners** Atlas Copco, DOW, Frames, IBK, ISPT, Nouryon,  
TU Delft

**Budget** 590 K€

**Duration** 2015 - 2019

## Incentive

Electrification in industry requires the use of high temperature heat pumps. When a temperature glide of sink and source flows is required, wet compression heat pumps show superior performance.

## Objective

Identify the potential of wet compression resorption heat pumps for heat recovery of waste streams in industry. Develop a compressor prototype suitable for operation in wet compression resorption heat pumps and verify the expected advantages of operation under such conditions.



## Approach

Possible applications at partners sites. Advantages of adding CO<sub>2</sub> as an extra component to the NH<sub>3</sub>-H<sub>2</sub>O solutions. Modeling of the wet compression process. Wet compressor prototype manufacturing & testing. Technical and economical evaluation of CRHPs

## Results

The impact of adding small amounts of CO<sub>2</sub> to the working fluid has been investigated. Indicating a ca. 5% improvement in COP.

A thermodynamic model has been developed for twin-screw wet compressors which allows localization of major irreversibility losses during the compression process in CRHPs.

An experimental set-up has been constructed at the TU Delft to test the performance of the wet compressor prototype.

The first results with the wet compressor prototype are available and show the impact of wet operation (liquid in suction line) on the compressor performance.

