

Industrial Heat Pumps

Upgrade of waste heat to process heat



Project: Multiple project proposals (ideation)
Project Leader: t.b.d
Researchers: ECN heat technology and others
E-mail: lycklama@ecn.nl
Partners: t.b.d
Budget indication: 0.5-1.5 MEuro (per project)
Duration: 2012-2015

Objective

Development of industrial heat pumps for the upgrading of waste heat to useful process heat.

Motivation

- Large energy savings ranging from 30 to 80 % by application of heat pumps.
- Advanced heat pumps: high lift and high working temperature compared to commercially available heat pumps.
- Environmental friendly working media

Principle Heat Pumps

Waste heat is pumped to process temperature by means of a driver. Multiple driver options:

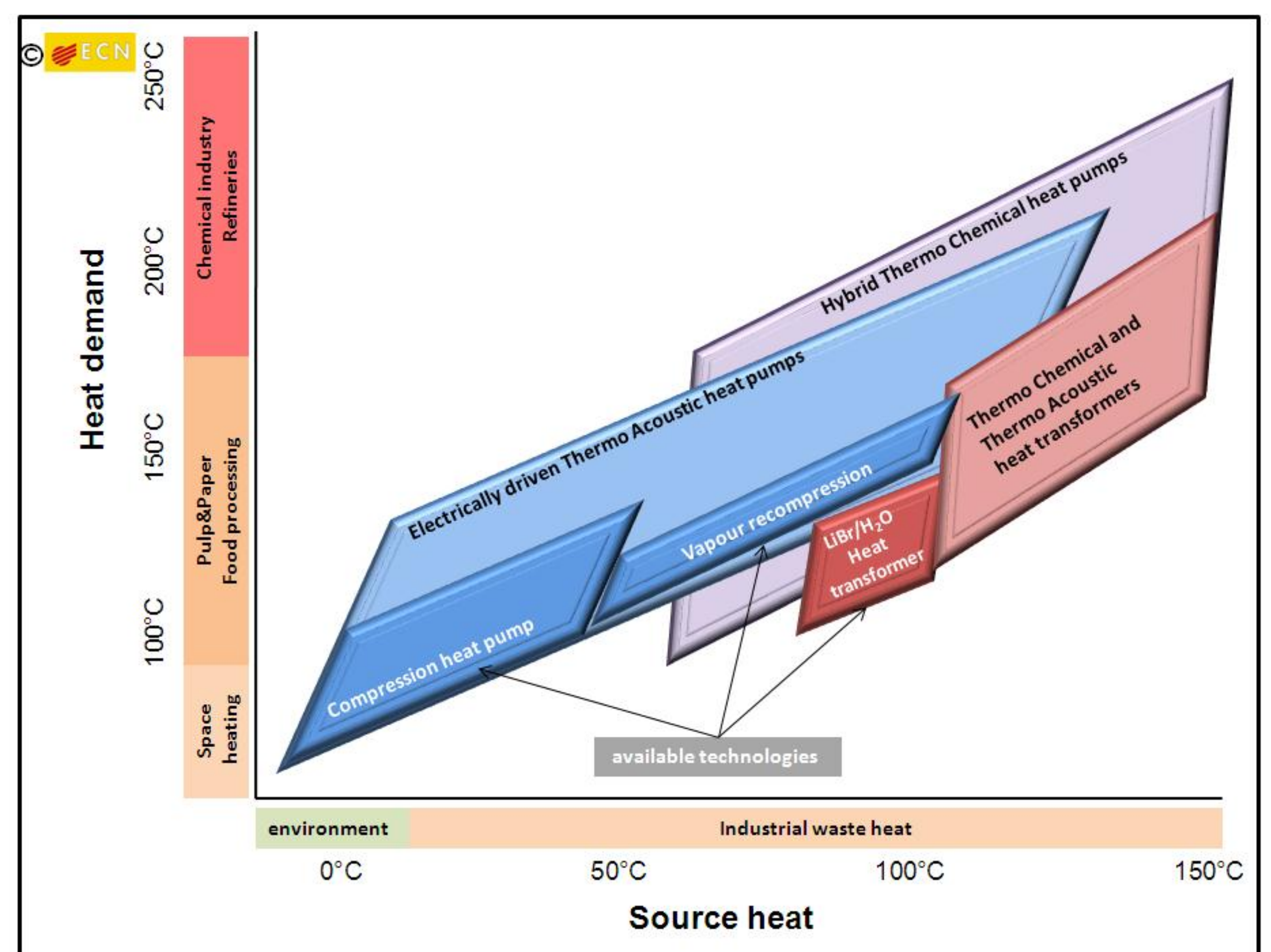
- Waste heat (heat transformer)
- Mechanical power (electric)
- Mechanical and heat (hybrid)

Applicability

Wide application range: Food processing, Chemical industry, Refineries, Pulp and paper.

Selection of heat pump concept depends on:

- Techno-economic feasibility
- Scale of application
- Temperature level
- Temperature lift



Characteristics and Status development

Heat pump technology	Energy input	T-lift (°C)	T- work (°C)	Status Developm.
Electrical Thermoacoustic heat pumps	electric	30-120	10-200	1kW scale
Thermoacoustic heat transformers	Waste heat	30-100	100-200	10 kW scale
Thermochemical heat transformer	Waste heat	30-100	100-200	1-10 kW scale
Hybrid thermo chemical heatpumps	electric + waste heat	30-150	50-250	1 kW

Ideation proposals have been submitted for these four heat pump technologies.