

CONTAIN

Publieke samenvatting / Public summary

Aanleiding

High-temperature heat pumps are commercially not yet available to supply low carbon process heat in industry. The electrically driven thermoacoustic heat pump (TAHP) can fill this gap since it can deliver heat at very high temperature (up to 250 °C) combined with high operational flexibility. Heat can be delivered over a very wide range of process and waste heat temperatures with a standardized design of the TAHP lowering the investment costs. The CONTAIN project builds upon the bench scale TAHP available at TNO. This heat pump is electrically driven by a reciprocating piston compressor. With this set-up steam production of 120 °C up to 180 °C has been demonstrated with temperature lifts up to 100 °C. Durability testing of this bench scale TA heat pump could not yet be demonstrated due to too high leakage of helium from the piston rod seal. Therefore, the durability of components (flexible membranes) used in the TAHP could not be evaluated. The containment of helium inside the heat pump and the verification of the durability are required before scaling-up the heat pump in the next phase of development.

Doelstelling

Objective of CONTAIN is to significantly lower the leakage of helium from the piston rod seal by application of a new type of piston rod seal and to perform durability testing of the TAHP.

Korte omschrijving

Advanced seals will be built and tested in the bench scale TAHP. By measurement of the static pressure over time the leak rate of the seal can be verified.

Projectinformatie / Project information

Projectnummer / Project number

TIND24-03691729

Subsidiebedrag / Grant amount

€ 475.475,00

Algemene informatie / General information

Penvoerder / Secretariat

Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO

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Durability of critical components of the TAHP will also be experimentally evaluated.

Resultaat

The results from CONTAIN prepares for the design and realization of a pilot scale (100 kW) high temperature thermoacoustic heat pump as part of a follow-up projects. After successful commercialization, this development could result in a net primary energy saving potential of 76 PJ/year and a CO₂ emission reduction of 6.3 Mton/year within the industrial sectors food, paper & board, bulk chemical, and refineries in the Netherlands. Major fuel cost savings for Dutch industry can be realized. In the future renewable electricity system carbon free electricity would result in even higher CO₂ emission of 9.4 Mton/year. The worldwide market value for high temperature (steam) TA heat pump equipment and installation is estimated at 300 million euro per year during 20 years.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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