

Sustainable Process Heat

Publieke samenvatting / Public summary

Aanleiding

The Dutch industry is a major consumer of energy for heating with a total heat demand in 2017 of 560 PJ/year (including the refining sector). Only a very small fraction originates from a sustainable source. A transition to a sustainable energy system depends on forming a CO₂ free industrial heat system. This is the central theme of the Mission-driven Multi-year Innovation Programs (MMIP-7), which is currently being drafted. Despite many advantages, the industrial transformation towards a climate neutral system is hampered by a number of obstacles. e: • Lack of knowledge and technology options for industry and lack of knowledge on applications and market size for technology providers. • Heat is used in industry in a wide variety of processes and temperatures and as such the subject has no ownership. Currently, the approach in this area is very fragmented and lacks a programmatic view on an industry wide level. A programmatic approach is needed to arrive at an industry wide development program that provides industry with technologies and knowledge required for the energy transition.

Doelstelling

The overall objective of this SPOT project is to start an innovation program on Industrial Heat Technology in order to achieve a coherent and consistent program that leads to significant reduction of the use of fossil energy carriers in industry. The goal is to reduce fossil energy use for industrial heat with at least 100 PJ/year in 2030. The associated CO₂-emission reduction is estimated at 6 Mton/year. Innovations within this program lead to new products with export potential for technology

Projectinformatie / Project information

Projectnummer / Project number

TEEI119018

Subsidiebedrag / Grant amount

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Algemene informatie / General information

Penvoerder / Secretariat

Ned. Org. v. toeg.-nat.wetensch. onderz.
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suppliers. This program builds upon existing activities, mainly in the area of reuse of waste heat. SPOT will add essential aspects and in the future further expansion is foreseen. In a first assessment, a number of technology options have been identified that provide added value compared to the current developments. These options relate to the sustainable supply of heat (carbon free fuel, fuel cell cogeneration) as well as additional options for the reuse of waste heat (high-temperature heat storage, small scale steam compression). These 4 technologies will be assessed both technically and economically on their impact on the industrial heat system.

Korte omschrijving

The project contains the following work packages: • Assessment of a chain of technologies will provide industry with the most effective way of producing high-temperature heat with a carbon free fuel that eventually originates from renewable electricity. The assessment, that will differ per application, will be based on cycle efficiency, costs (including infrastructure), and impact on energy system (WP1). • Determine the applicability and suitability of fuel cell based Combined Heat & Power with a high electrical efficiency that can also be applied to generate medium pressure steam by means of an experimental program (WP2). • Experimental and modelling activities to investigate molten salt technology for heat storage and - re-use in the high temperature processes in steel and chemistry sector (WP3) • Experimental verification of the functionality of small scale (1 MW) steam compressor technology and determine industrial integration issues (WP4). • Exploration and identification of new technologies and modeling of impact on the industrial energy system (WP5)

Resultaat

In addition to achieving an industrial heat program with all relevant stakeholders involved, the following concrete results will be obtained in this SPOT project. • Assessment of which carbon-free fuel and associated technologies suits industry needs best, at which costs, including future R&D needs; •

Demonstrated performance of fuel cell cogeneration technology for the production of electricity (> 50%) and steam (> 30%) for industrial applications at competitive cost levels; • Demonstrated that molten salt technology is a feasible technology with high heat transfer rates, compact systems are cost competitive. • Demonstrated thermodynamic performance of 1 MW scale steam compressors > 60% of Carnot efficiency at costs levels < 200 €/kWoutput • Methodology for impact assessment of industrial heating transitions on the national energy system

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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