

Hybrid Solar Power

Publieke samenvatting / Public summary

Aanleiding

The Dutch government aims to convert 30,000-50,000 existing homes to make them gas-free. Most important is to shift hot water and heating to a gas-free system. The Solarus system, winner of the Accenture innovation Award in 2016, is one of the prime candidates to make this happen. The Solarus system pursues gas-free water heating and electricity production using a unique approach of solar concentration. Current hybrid systems are still on the expensive side to be acceptable for urban housing. The Solarus system is the only concentrated hybrid PV and thermal system on the market that combines 7 times concentration for both solar thermal and PV. In this project, we aim to reduce the costs of the Solarus system by 30%, by clever system adjustments that improve the performance and will make a fully automated production possible.

Doelstelling

The purpose of HYSOP is to make a fully automated production possible by adapting the Solarus hybrid system by replacing conventional cells with back contact solar cells. These back contact cells are important because they make possible the introduction of a flat plate heat exchanger. The combination of flat plate collector and back contact cell technology enables fully automated fabrication leading to reduction of the production costs. The production of such a hybrid system is a major distinctive feature for local manufacturing that enables a positive business case for solar hot tap water production and solar heating in the Netherlands.

Projectinformatie / Project information

Projectnummer / Project number

TEUE018003

Subsidiebedrag / Grant amount

€ 339.128,00

Algemene informatie / General information

Penvoerder / Secretariat

Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO

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Korte omschrijving

Primarily, the design of the hybrid system will bring together back contact solar cell and module technology (TNO) with the hybrid PowerCollector (Solarus). In combination with a novel developed flat plate heat exchange system the back contact solar cells will be directly mounted on the heat exchanger, and that is impossible with standard solar cells. Also, the back contact solar cell array can be built with diodes directly in the array on the heat exchanger, also currently impossible. The integration of simple diodes per cell is important to reduce power losses due to partial shading and inhomogeneous illumination, that is naturally occurring in a low concentrator setup without solar tracking. The back contact solar cell array and diodes will be manufactured as a prefab allowing fast mounting on the flat plate heat exchanger surface. The direct mounted cells and diodes and flat plate heat exchanger will be much easier to produce than the current design. The new design will be tested with accelerated life time testing of the materials in combination with proven material concepts. Finally, a prototype will be tested in a real-life environment.

Resultaat

The main results will be a Solarus power collector solar thermal and solar photovoltaic hybrid system comprising back contact cell and module technology mounted to the systems flat plate heat exchanger. Specific results will be:

- Integration of a newly developed flat plate heat exchange system inside the collector chamber;
- Back contact solar cell array directly mounted onto the heat exchanger;
- Solar cell diodes for series connection integrated into the solar cell array making the system much more tolerant for shading losses, increasing energy yield;
- Diodes will be ultra- thin and small ready for automated placing;
- Overall design change leading to integration of high TRL level flat plate heat exchange and back contact solar cell array into existing Solarus hybrid housing;
- Reducing parts and easy manufacturing by automatized processes for mass production;
- Striving towards a cost reduction of 30% for water heating compared to

standard gas free heating and hot tap water systems; • Improved acceptance by residential end-users by design changes based on discussions between the partners; • Outdoor test of hybrid prototype performance at a dedicated test site.

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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