Design for Recycling & Reuse

Publieke samenvatting / Public summary

Aanleiding

When a solar panel reaches its end of life, it is currently not possible to re-use all materials. The materials that can be re-used, cannot be applied for the same application. This is a waste of materials and value, making it impossible to go to a Circular Economy. The reason that this is so difficult is that a panel is glued with a material that can only be burned off at high temperatures. Therefore, solar panels are 'crushed' and the useful pieces of material are sorted out. There is a strong need for a more sustainable process. By 2050, the Dutch government wants Circular Economy. For application of PV in the built environment, all materials need to be re-used as building owners want to fulfil to BREEAM [1] and other environmental codes. This means that solar panels need to be re-designed for re-use.

Doelstelling

The purpose of DEREC is to develop and apply materials that allow re-use, while ensuring the desired life time of a panel. This leads to the development of novel materials (encapsulant, interconnection and conductor material) that enables a positive business case for recycling of solar panels. The production of such panels is a major distinctive feature for European panel manufacturers. DEREC fulfils the TKI Urban Energy goals: - Lower costs while improving the integral sustainability of the product. We will contribute to this aim, because back contacted solar modules have a higher efficiency of 3-5%. We benchmark costs against existing panels. - Our Circular Economy (CE) solar module fulfils the specific goal

Projectinformatie / Project information

Projectnummer / Project number
TEUE117017
Subsidiebedrag / Grant amount
€ 644.632,00

Algemene informatie / General information

Penvoerder / Secretariat
Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO

Publicaties en materialen / Publications and attachments

- **06.09.2021**

  Eindrapport TEUE117017

Volg Topsector Energie op X / Follow Topsector Energie on X

@TSEnergie

of sustainability and re-use. Our aim is to keep the durability and payback time competitive with state-of-the-art technology. In particular, the fact that scarce materials (like silver) can be recycled is really important for the future of solar and makes it possible to keep on using silver. - It is an innovative product for a new market. Circular Economy is growing and customers find it important to produce renewable energy in an eco-friendly and sustainable way.

Korte omschrijving

Firstly, the design of the module is optimized (Exasun). An appropriate LCA method is also developed and used to calculate the impact on re-use and business case (ECN). Conductive circuit processing and encapsulant (DSM) and, interconnection material (Mat-Tech) are developed for re-use and proven stability. With this combination of materials, test panels are manufactured (Exasun) and tested in climate chambers and in an outdoor installation (ECN). With existing and proven recycling methods, these panels are then dismantled (ECN). PV Cycle assessed the suitability of the concept and the possibility of re-use. ABN Amro makes its circular buildings available for a pilot test, and also provides feedback on conditions for re-use and suitability of the DEREC panels for CE buildings.

Resultaat

The main results will be a Circular Economy solar module based on back contact cell technology comprising glass front and rear side. Specific results will be: - A newly developed encapsulant material, fully tested for market readiness. - Lead free interconnect material, suitable for the module manufacturing lamination profile. - Test reports on reliability studies of accelerated stress tests and outdoor behaviour, compared to current state-of-the-art module. - An LCA model which addresses end-of-life (EOL) scenarios for various recycling and/or re-use options. - Report about the recycling tests performed on DEREC modules, reporting on the suitability of the disassembly and readiness of the material for re-use material quality after EOL will

be validated for further re-use options. - Evaluation report on the implementation of the CE solar modules in combination with CE buildings. The report will add to guidelines for circular economy with respect to PV applications in the built environment. This evaluation will take place in close cooperation with the company responsible for the design of the CE building. Results of the project will be shared.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.
Voor meer informatie over de Topsector Energie, ga naar **www.topsectorenergie.nl**.

Voor meer informatie over de TSE / Energie-Innovatie regelingen die RVO aanbiedt, ga naar **www.rvo.nl/tse**.