

Bussard

Busbarless solar cells with passivated contacts for Next Gen Module Integration

Project duration: from 02.2021 to 01.2024

Report submitted: 06.2022

Publishable Summary

As mentioned in the SET-Plan, the EU PV industry remains well positioned in equipment manufacturing. However, to maintain this leading position, cost reduction, throughput increase and innovation for new processes and materials must be ensured.

In the past, the learning rate in terms of conversion efficiency has been around 0.6%abs/year when increasing mass production. A promising cell concept for high efficiencies combined with easy integration into existing production lines for mass production of Si solar cells is the so-called TopCon concept (Tunnel Oxide Passivated Contacts). Currently, industrial n-type cells with a poly-Si passivated back contact and screen-printed metallization achieve efficiencies of 22% to 23%, peaking already at values >24% in R&D environments. In combination with a busbarless metallization and interconnection concept, this is a very promising approach for the next generation of solar cell and module technology.

This is the subject of the Bussard project, in which high-throughput processes and cost-efficient production facilities for modern high-efficiency cell concepts are to be developed. Within the framework of the Bussard project, large-area TopCon solar cells with efficiencies of up to 24% are to be realized with the aid of innovative atomic layer deposition (ALD) processes for improving surface passivation and the development of novel fine-line printing processes for front surface metallization. Furthermore, the project will evaluate and realize the interconnection of busbarless TopCon solar cells to large-area modules using the "Tape Solution" technology of the project partner StickySolarPower.

The highly efficient cells and modules with excellent performance demonstrated in the project will allow to increase the energy yield and thus help to further reduce the levelized cost of PV electricity and the cost of turnkey systems (through reduced BOS) in Europe. The production throughput of the manufacturing processes addressed by the Bussard project should be at least as high as in production. Assuming an increase in efficiency and / or a reduction in production costs (e.g. less silver), the total cost of ownership (TCO) as well as the levelized cost of electricity (LCoE) will therefore be significantly reduced. A reduction of 5-10% relative to the industry standard seems realistic.

Project consortium

Coordinator and all contact details:

Full name of organisation	Fraunhofer Institute for Solar Energy Systems
First and family name of coordinator:	Dr. Andreas Lorenz
Full address:	Heidenhofstr. 2, 79110 Freiburg, Germany
E-mail:	andreas.lorenz@ise.fraunhofer.de

Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
Germany	4	2 128 328	1 411 235
Sweden	2	739 670	415 829
Israel	1	137 551	85 969
<i>Total</i>	<i>7</i>	<i>3 005 549</i>	<i>1 913 033</i>

Funding agencies involved and contracts

Funding Agency	Contract N° and Title
Projektträger Jülich (PtJ)	Contract No. 03EE1071A „Evaluierung und Entwicklung innovativer Front-, Backend und Verschaltungsprozesse für busbarlose TOPCon-Solarzellen“ Contract No. 03EE1071B "Paralleldispensverfahren für Solarzellen mit passivierten Kontakten" Contract No. 03EE1071D „Entwicklung eines indirekten Tiefdruckverfahrens für busbarlose Solarzellen“
Energimyndigheten	Beslut Energimyndigheten, Dnr 2020-012836, Projektnr 51193-1, "Modulintegration av solceller utan buss bars".
Ministry of Energy (MoE)	220-11-003