

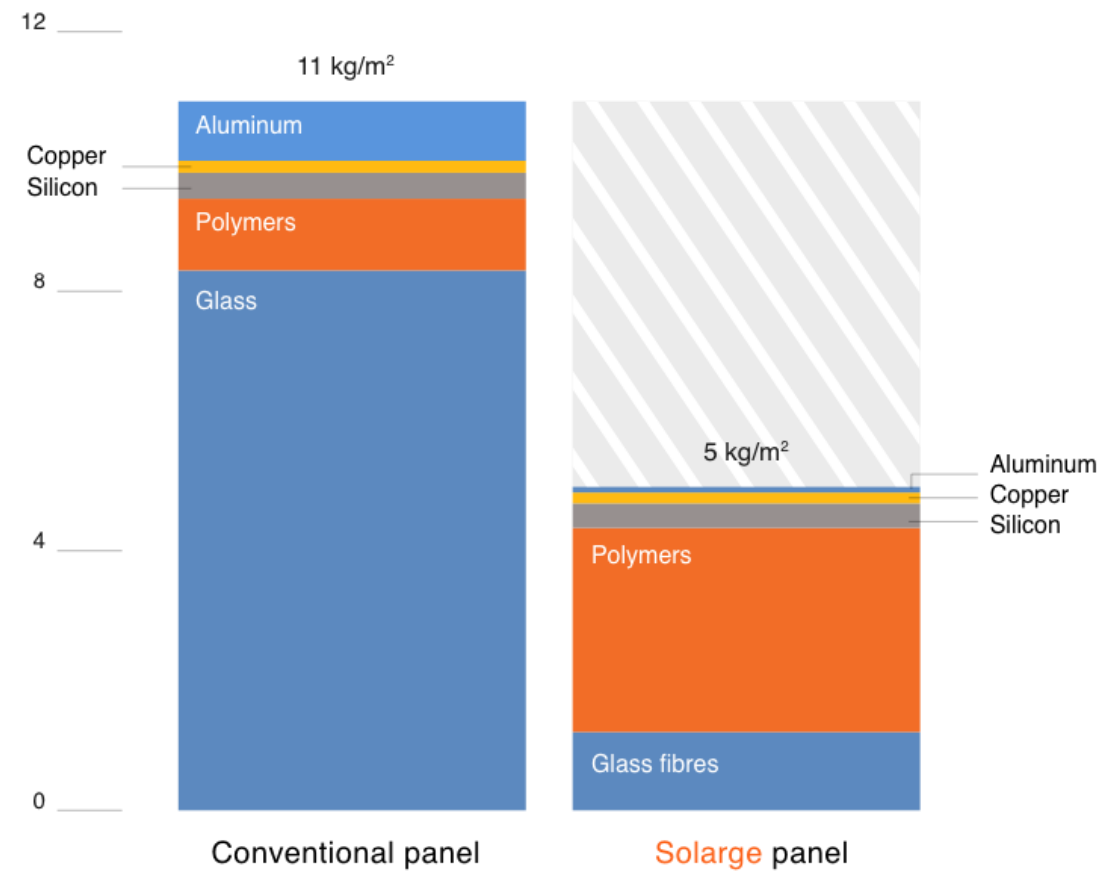
A new factory for the production of circular, lightweight, ultra low carbon solar modules in the Netherlands



April, 2023

Gerard de Leede

solarge



Solarge lightweight modules unlock 250 km² extra rooftop for PV in NL

The ultimate dream: solar energy just from sand & plant



For a Solarge module, all you need is 2 kgs ultrapure sand, few grams of silver, tin, copper and...



...this could be the final raw material for the polymers..or other biobased



Part of the backend of Solarge manufacturing site (ready May 2023)



One of the three production halls of Solarge – lamination & post processing

By combining state-of-the-art polymer and solar technology, new applications become available for solar:

- 50% weight reduction
- 25 – 50 % lower carbon footprint now, 50 - 80% lower in 2 years
- 100% Circular
- PFAS free (no fluor)

Made in Holland

Available from Q2 2023

480-520 Wp



50%



50%



100%



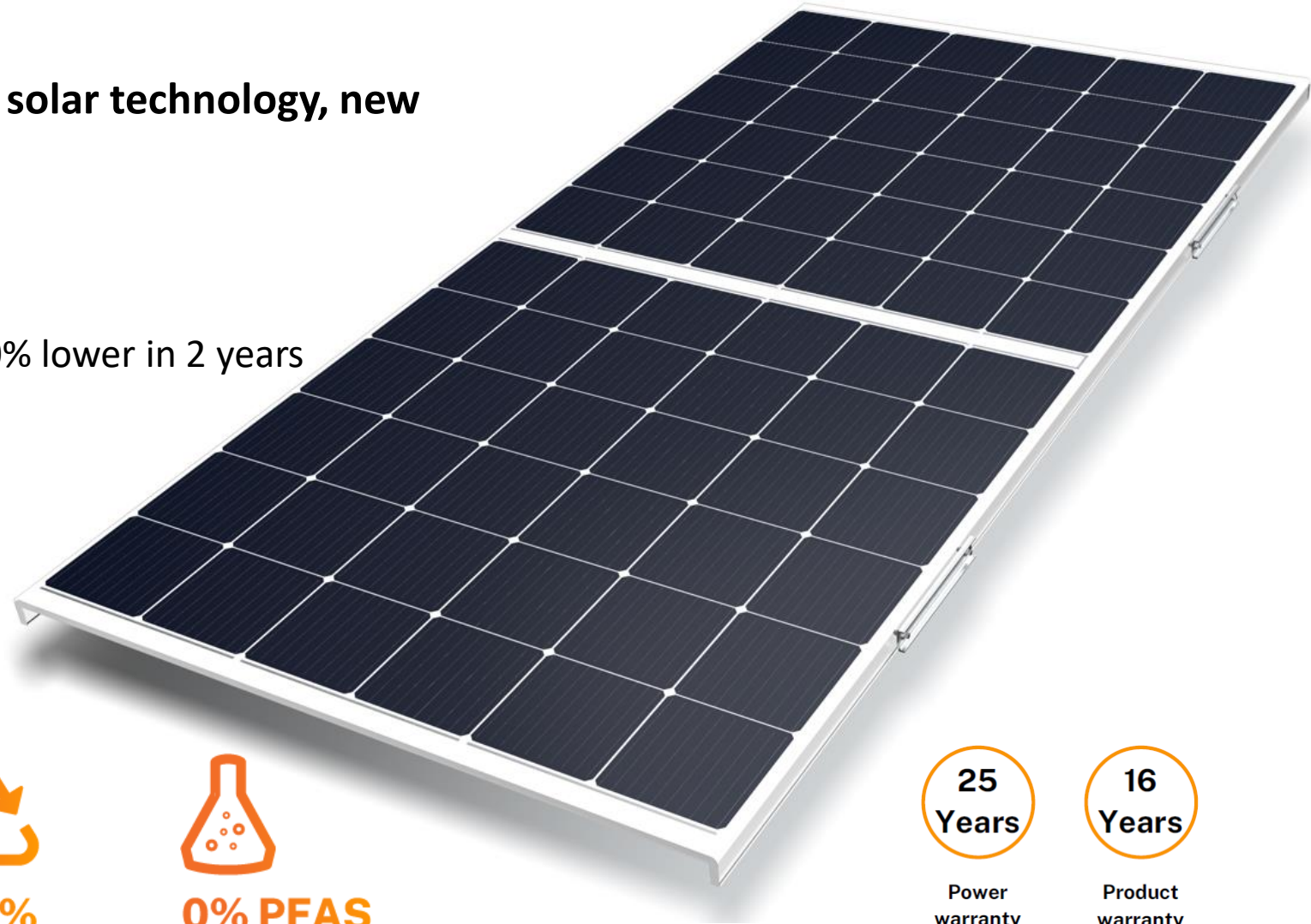
0% PFAS



Power
warranty



Product
warranty



We introduce a radically innovated solar panel

General: worldwide growing amount of end-of-life modules

- *200 GWp worldwide production today*
- *This implies an annual disposal amount of a size of 20 m wide around the entire earth (40.000km)*
- *In 2040 this annual disposal of PV panels is as big as a 'ring around the earth' with a width of 100 meter!*



Circularity for solar modules is a must; not a luxury

Production of an average silicon wafer:

- Consumes 125 kWh/kg energy
- Emits 82 ton of CO₂ per ton

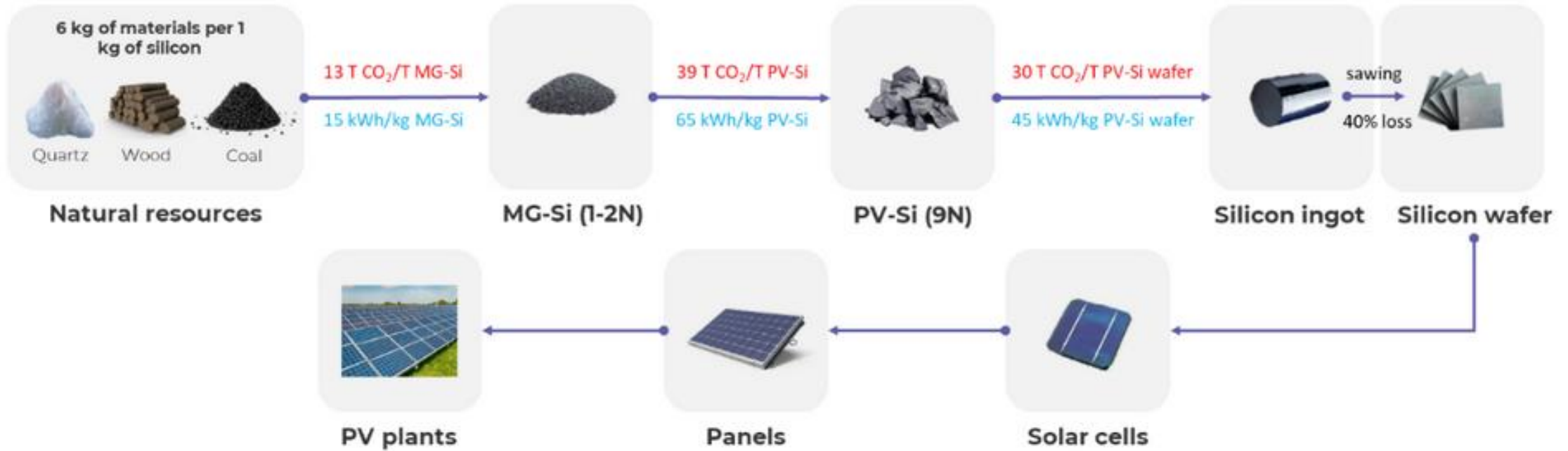


Figure 1. Manufacturing of silicon in the PV value chain.

Source: Rosi Solar

Energy consumption and CO₂ emission in silicon supply chain

Solarge has designed its module in such a way that it can be disassembled at end-of-life and materials can be re-used in the same supply chain



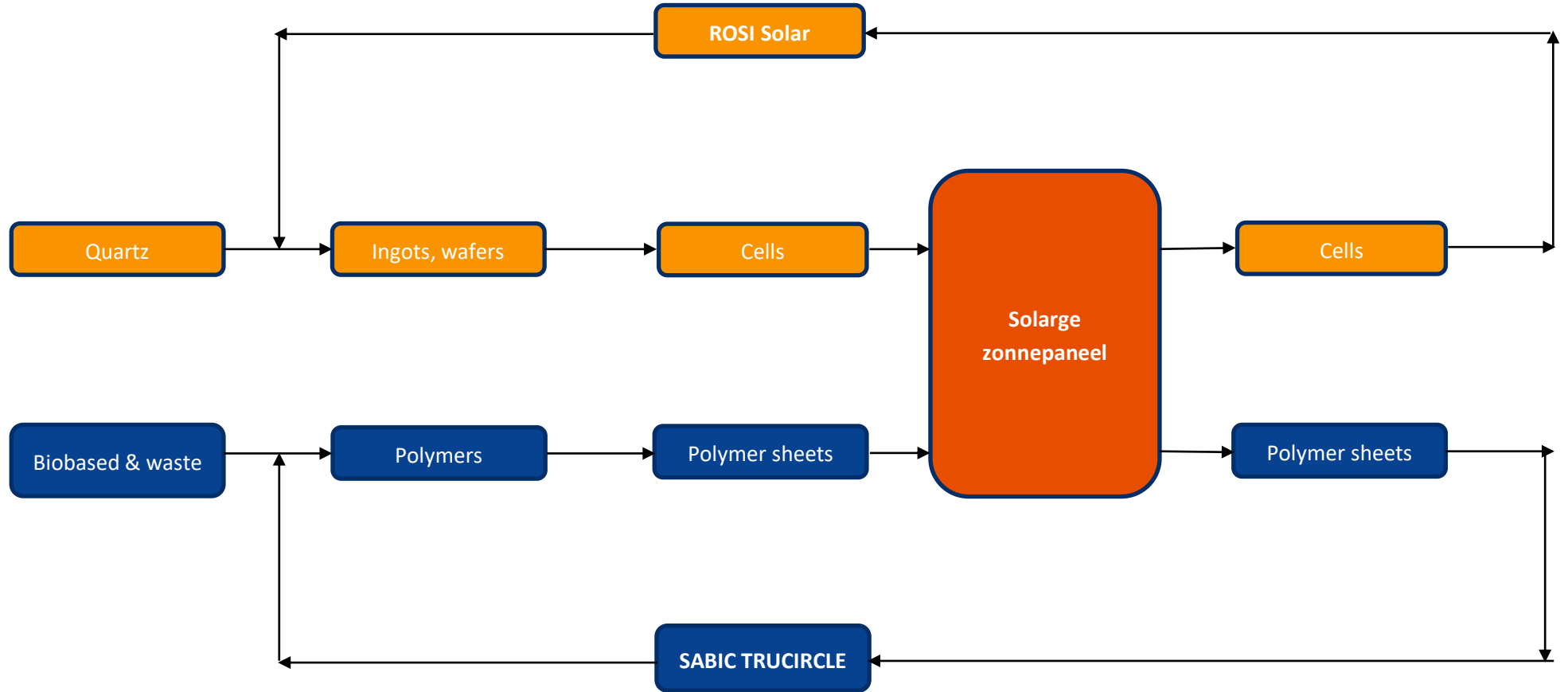
Best-in-class ECO design voor Ultra Low-carbon solar modules



Biomass



Plastic waste



Techniques of SABIC TRUCIRCLE & ROSI Solar enable a complete fully circular solar module/supply chain

SABIC TRUCIRCLE™ biobased or recycled polymers as feedstock



Biobased feedstock

- 4 kgs/kg reduction in GHG compared to fossil feedstock



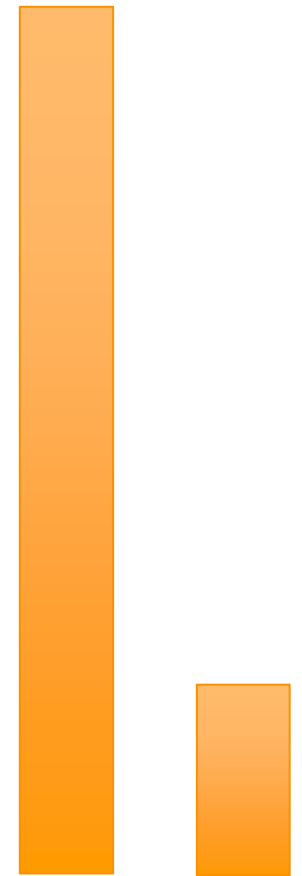
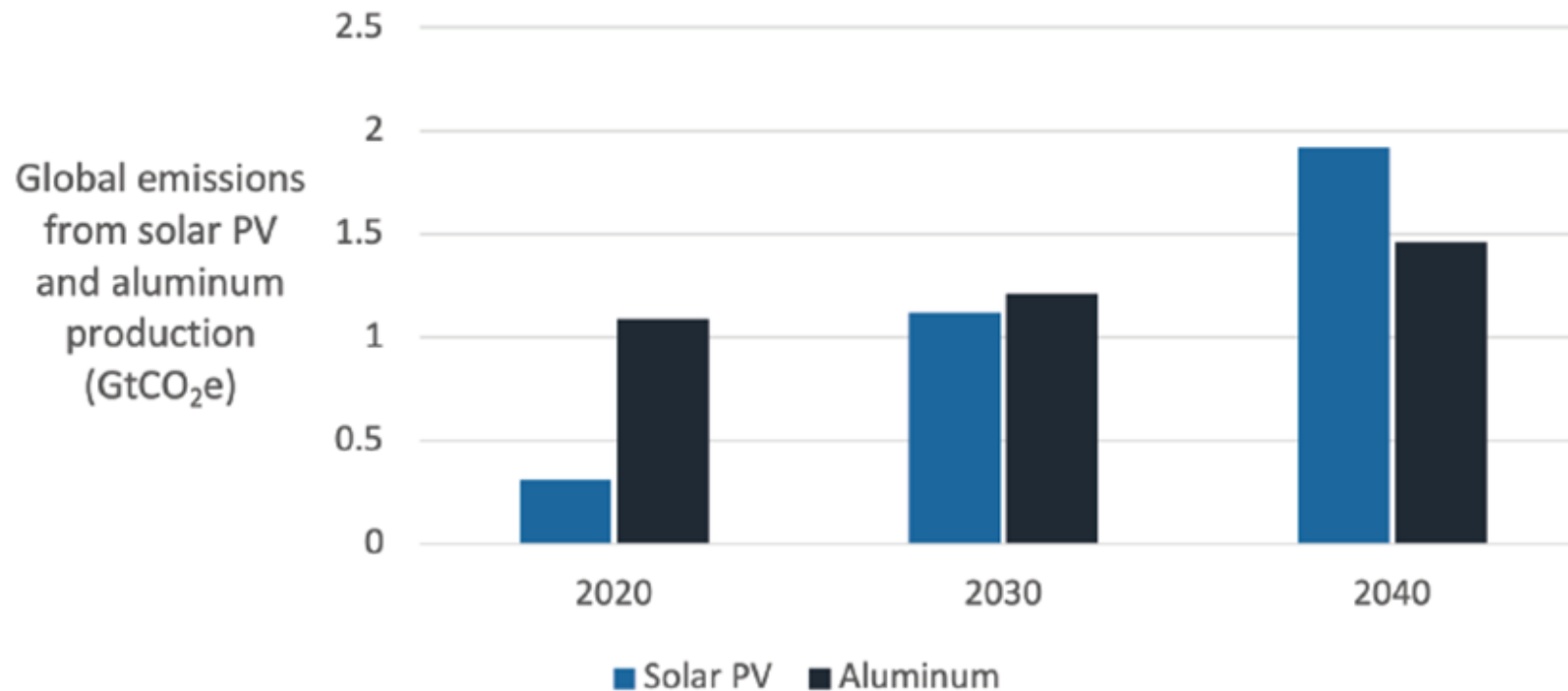
Post-consumer plastics feedstock

- 2 kgs/kg reduction in GHG compared to energy recovery from plastic

32 kg CO₂ reduction per 500 Wp PV panel

16 kg CO₂ reduction per 500 Wp PV panel

Forecasted growth in carbon emissions from solar PV vs. aluminum production

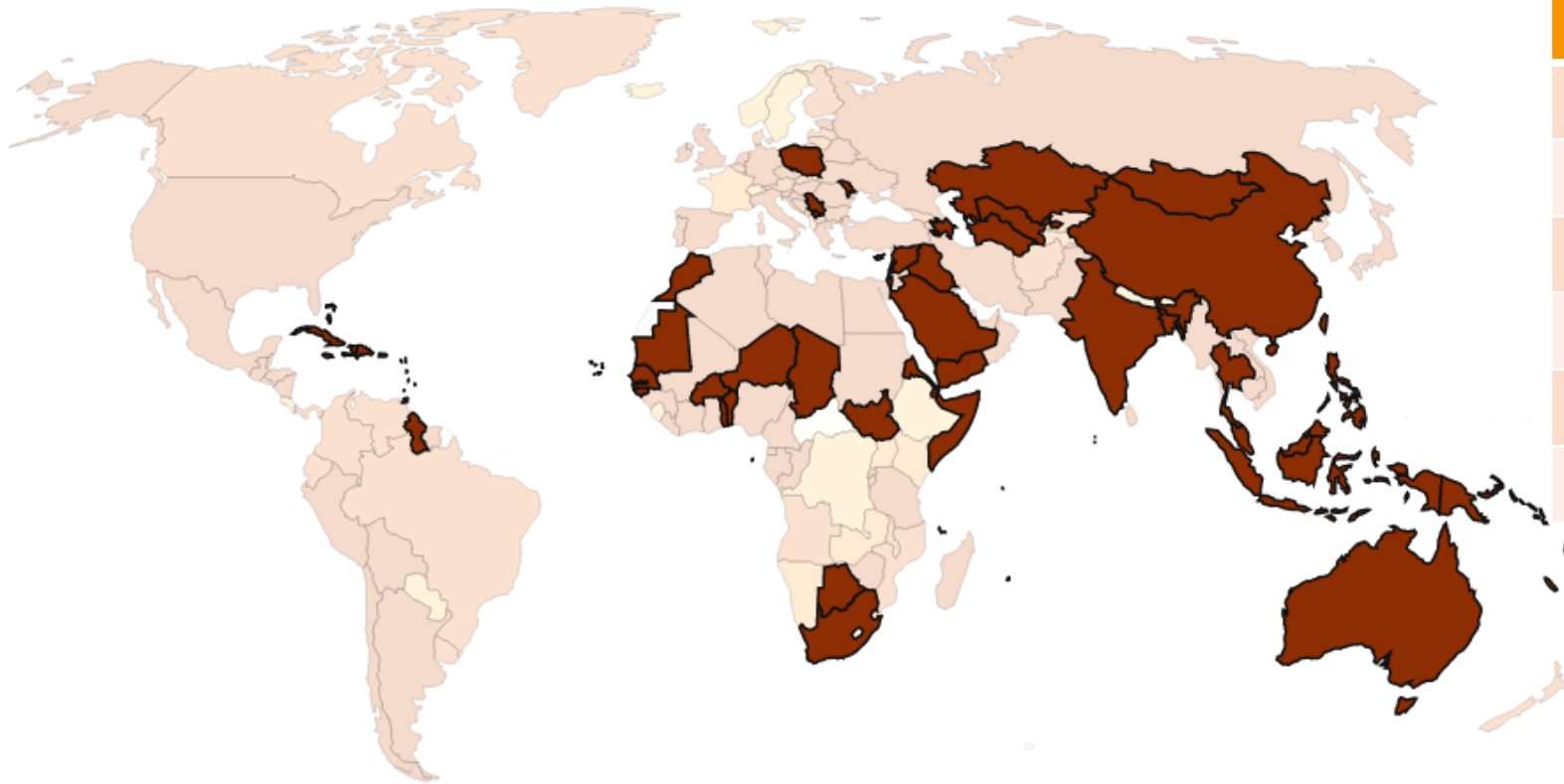


In a Business-As-Usual (BAU) scenario Carbon emissions from PV industry will overtake those from aluminum industry

Carbon intensity of electricity, 2022

Carbon intensity is measured in grams of carbon dioxide-equivalents emitted per kilowatt-hour of electricity.

World



Country	g CO ₂ /kWh
India	637
China	544
Germany	386
United States	379
Netherlands	361
Norway	26

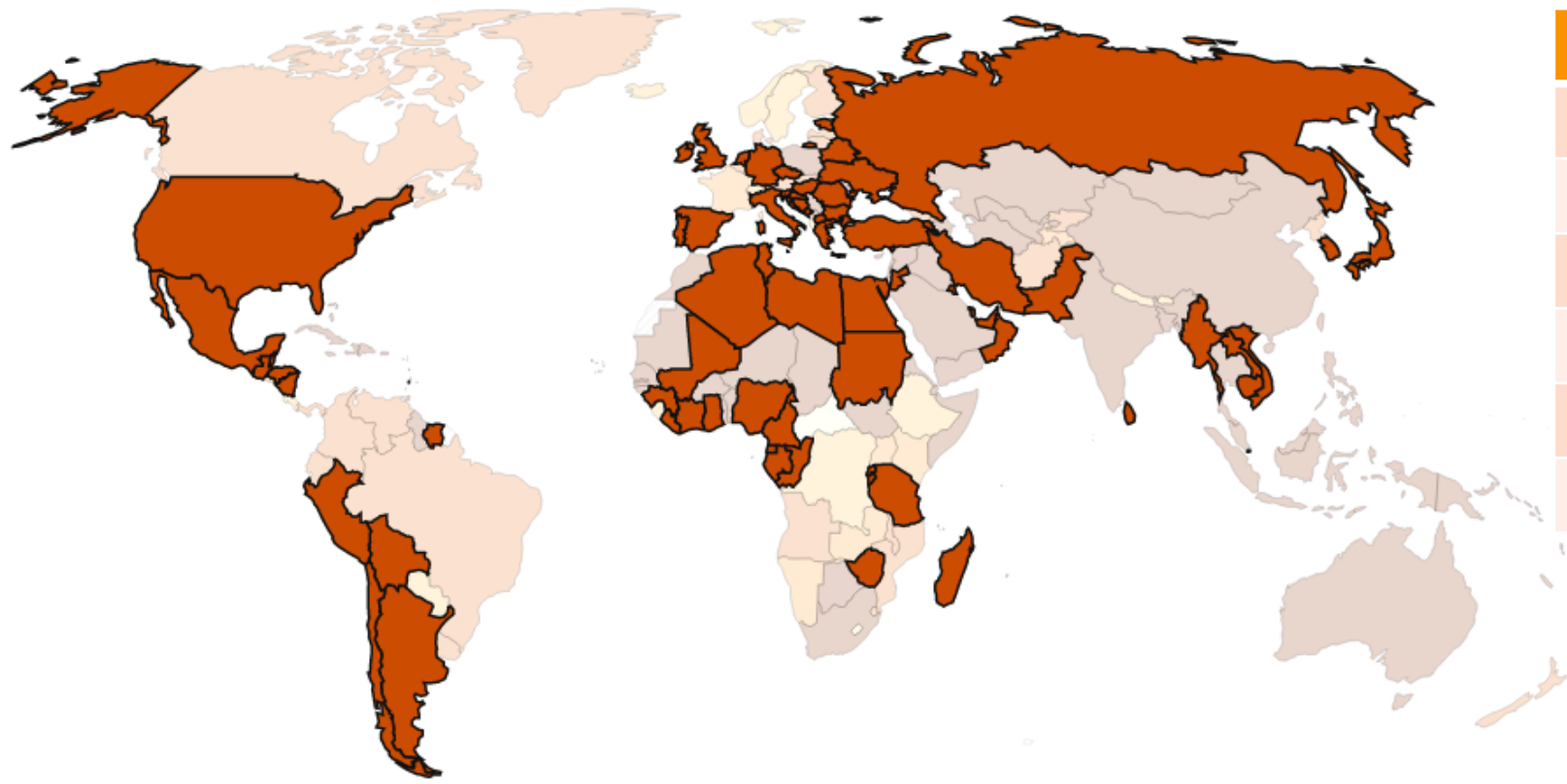
Source: Ember Climate (from various sources including the European Environment Agency and EIA)

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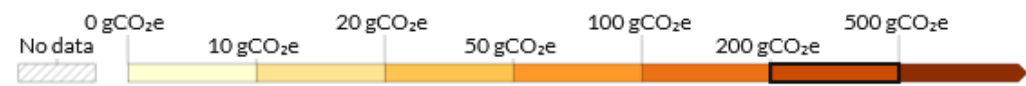
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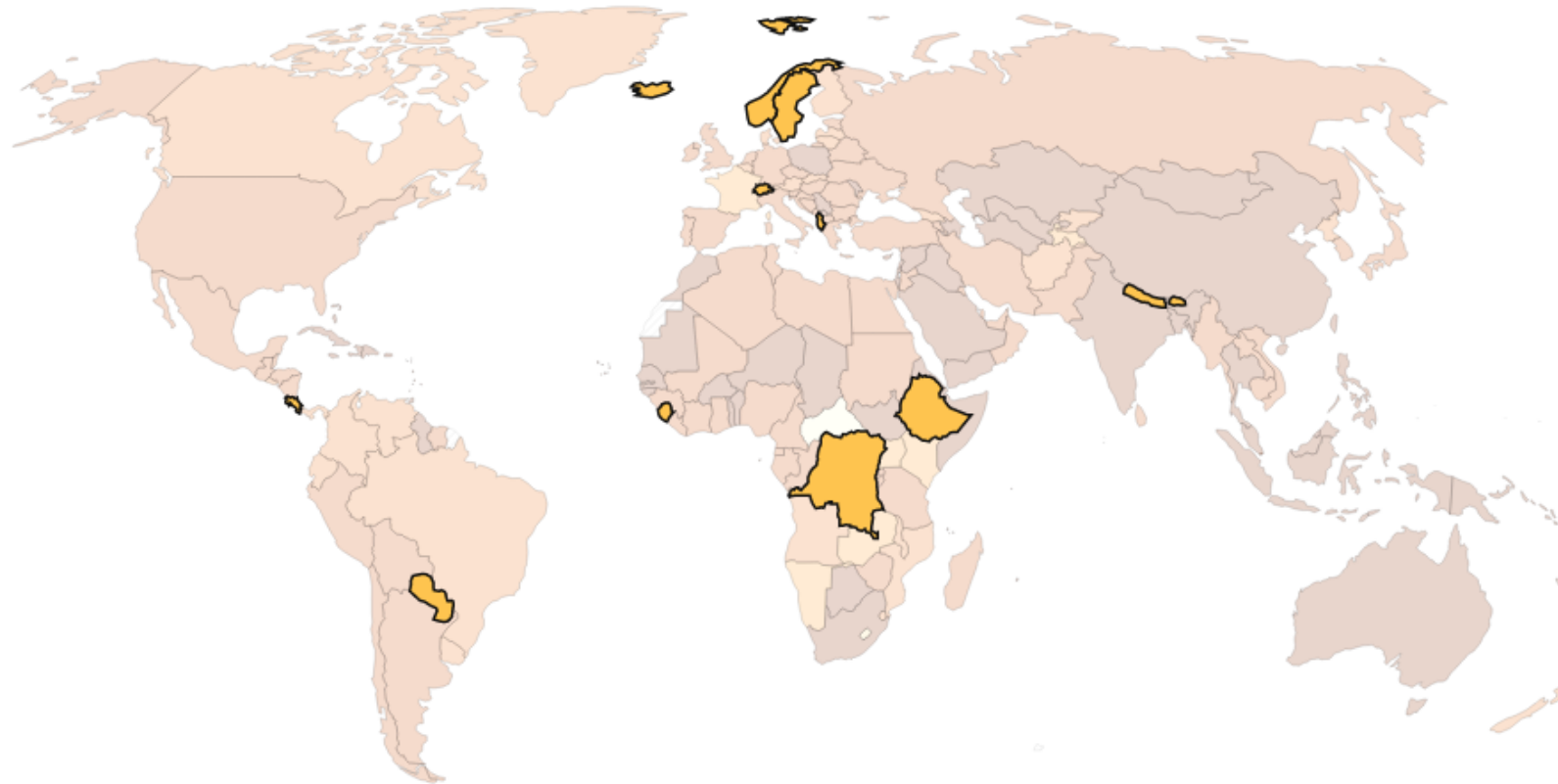


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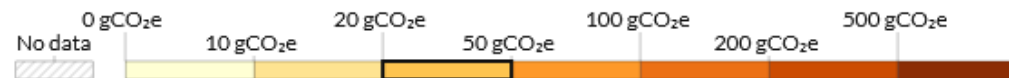
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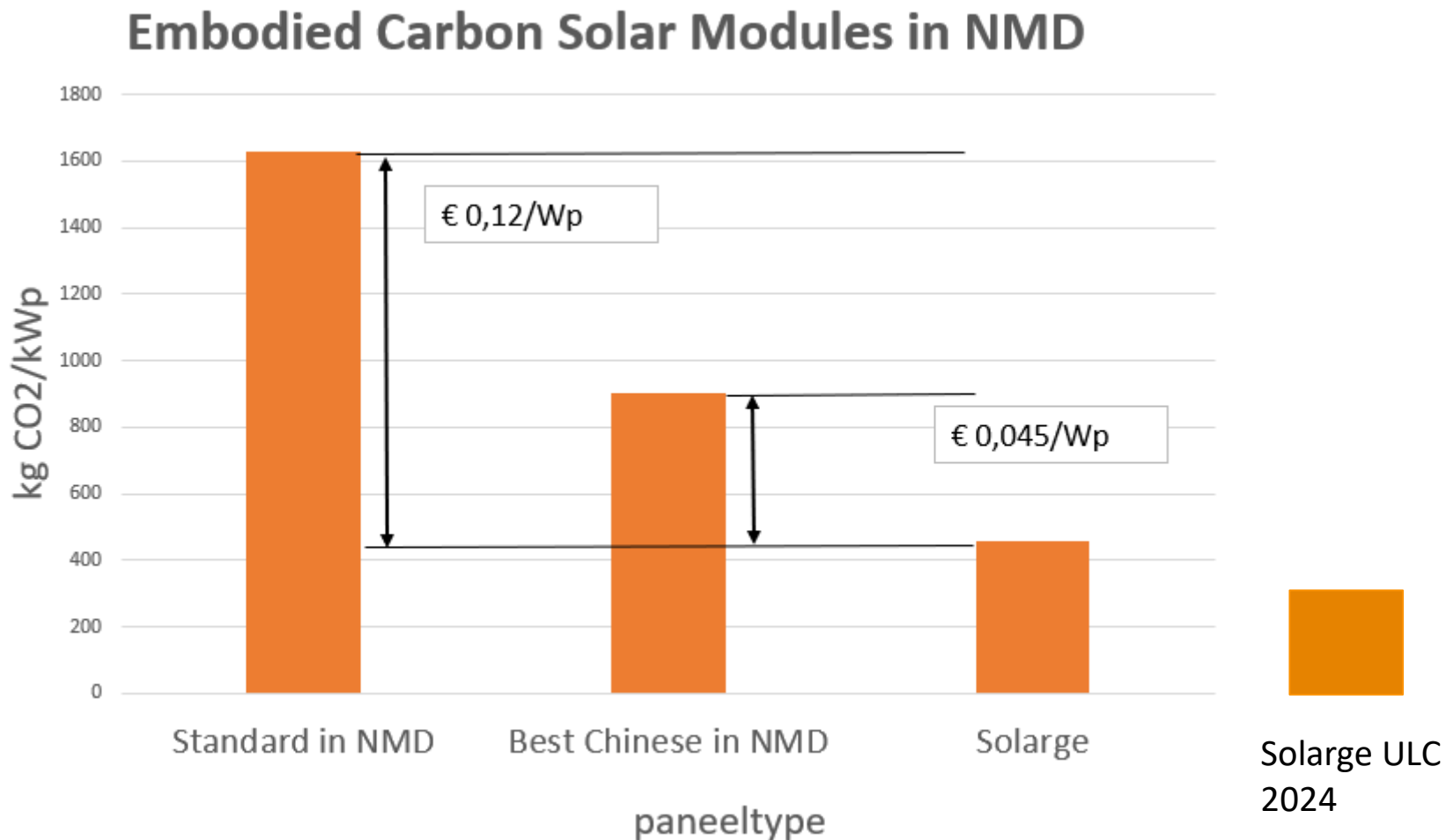
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Effect (theoretical) of carbon tax of 100 eur/ton CO₂

EPEAT Low Carbon
630 kg/kWp

EPEAT Ultra Low Carbon
400 kg/kWp



Ultra Low Carbon Solarge modules – Solarge in EPEAT certification, expected October 2023





Solarge M10 full cell module for C&I rooftops (right-hand side) and half cell module for residential market (left, prototype)

Saudi Arabia testing very succesful already for 1.5 years

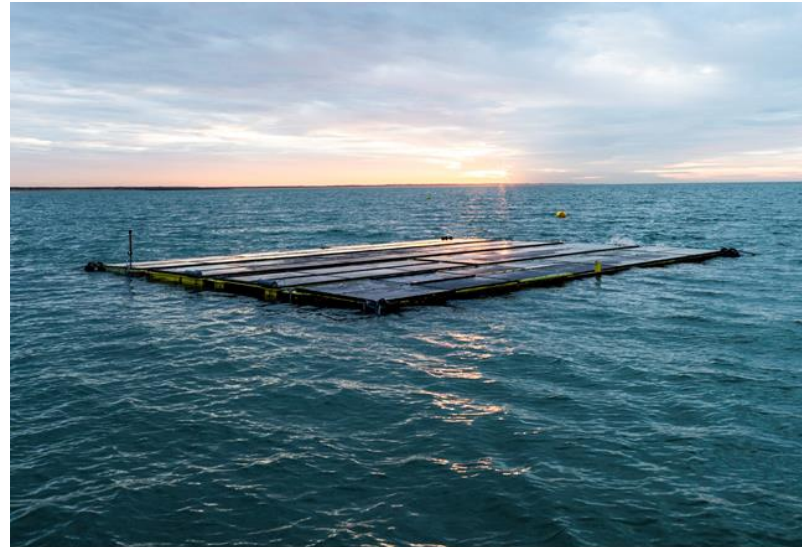


- Comparable performance to glass based Mono PERC modules, better than poly and ETFE
- Do not seem to have so much burden from soilage, when compared to glass based modules



Following the sun by tracking

Trial big lake near coast



Solar at (North) sea
12 km from coast

Solarge and floating PV pilots



Solarge façade system (Solarix design)

solarge

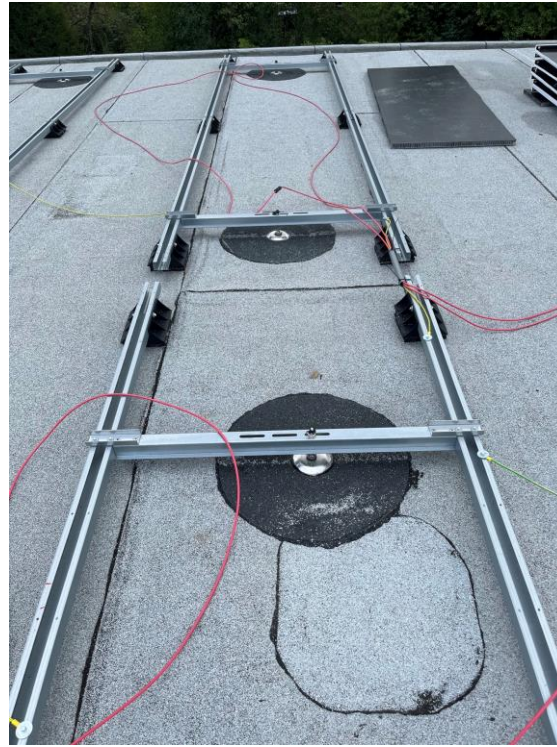


Solarge lightweight roof mounting system

solarge

Mounting parallel to horizontal roof:

- Less wind-lift forces by horizontal mounting
- Lighter and cheaper installation
- No frame-> no pollution
- Yield similar to East/West 12 degree mounting



Roof parallel mounting on flat roof with roofing anchors



Flat roof installation by glueing without mounting rail and without roof penetration

PLANNING FACTORY

April – May '23: Commissioning and startup of line

22 May official opening by minister Jetten & EU commissioner Kadri Simson

June '23: Startup 100 MWp/year

Mid '24: 400 MWp/yr – 120 FTE

Dutch National Growth Fund application to execute a roadmap for solar industry in the Netherlands, including new cell generations [900 mio EUR in total]

2025-2030:

expansion by licensing/JV's



Solarge ambition

Very good results in ease of installation and yield



Pilot Heijmans Eindhoven

Pilot Dairy Campus Leeuwarden

Pilot AgroPuur Hoevelaken

Not just in the lab. We did test successfully in various pilots



Pilot projects - anchoring