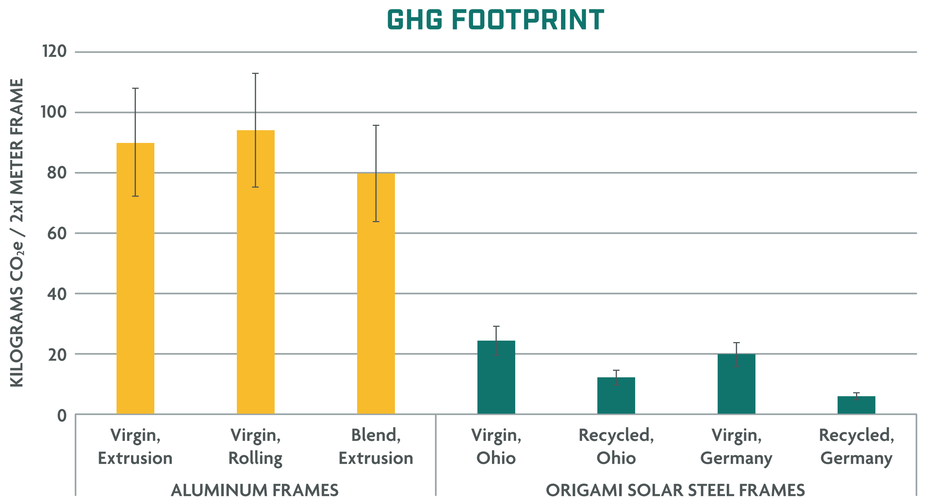
GHG FOOTPRINT REDUCTION OF 87%



GHG emissions generated per frame for aluminum and Origami Solar steel frames. Source: Boundless Impact Research & Analytics; www.origamisolar.com/environmental-impact-report/

GHG Assessment

Origami Solar hired a third-party Life-Cycle Analysis (LCA) firm called Boundless Impact Research & Analytics to evaluate the GHG impact of our steel frames compared to a traditional, aluminum frame. Boundless compared a 35-mm tall, 2 x 1 meter Origami Solar steel frame to a 40-mm tall, aluminum frame for various locations of manufacture and recycled vs virgin steel. The analysis accounted for GHG emissions from cradle-to-gate meaning Boundless included material sourcing (mining and/or recycling), refining and processing, transportation, and production in our study to calculate the GHG Footprint and Fossil Energy Footprint associated with each solar module frame. The Origami frame has a GHG reduction of 87% when produced in the US compared to an aluminum framed produced in China.

STEEL SOLAR MODULE FRAMES SIGNIFICANTLY OUTPERFORM ALUMINUM MODULE FRAMES WITH A LOWER GHG FOOTPRINT AND INCREASED STRENGTH

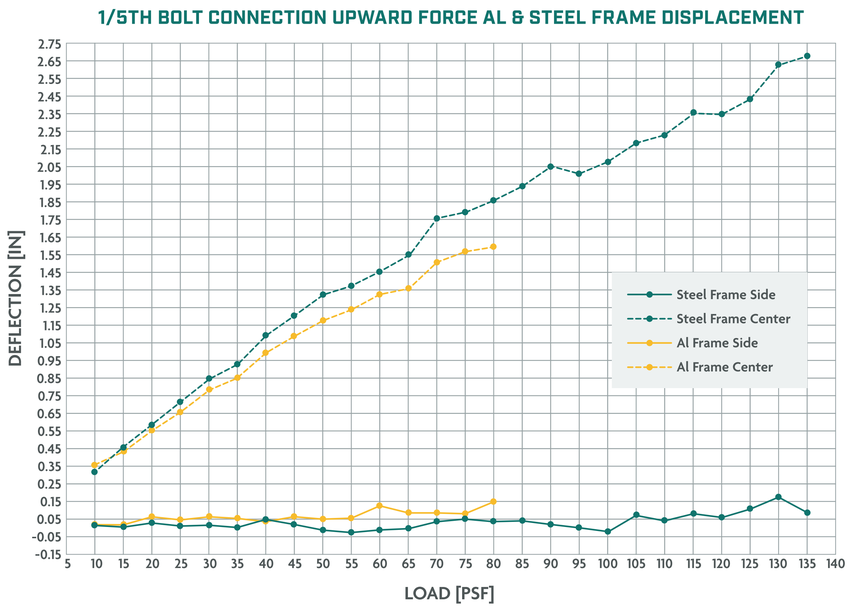
This work compared the mechanical loading and GHG emissions of a steel-framed module and aluminum-framed module. Both modules performed comparably in downward testing. The steel module significantly outperformed the aluminum module in upward testing, surviving approximately 68% higher load. In terms of GHG emissions, the Origami steel frame generates about 87% fewer emissions from cradle-to-gate.

Image of Origami Solar's steel-framed module loaded with 150 psf (3200 lb)

55 PSF MORE THAN ALUMINUM FRAMES

Mechanical Load Testing

Origami Solar and our third-party testing partner (TECSI) installed our steel frame on PV laminates from a US manufacturer. We purchased typical, 40-mm aluminum-framed modules. The panels were then installed on a test fixture and loaded with sandbags in 5 psf (pounds-per-square-foot) increments. The displacement was recorded in two places for each load: the center of the module and halfway along the long side of the frame. The modules were tested to UL and IEC standards, where the minimum passing load is 50 psf. The image above shows the steel-framed module with a 150 psf (3200 lb) load. The chart shows the results from the upward load testing. The two most important observations in this figure are that the aluminum module failed at 85 psf (thus no data recorded at 85 psf) and the steel module failed at 140 psf. The steel-framed module failure mode was adhesive failure, whereas the aluminum frame buckled. This demonstrates that the steel frame is significantly stronger than the aluminum frame and will perform even better than observed if a different adhesive is used in future testing.



Deflection of steel and aluminum modules for varying load in the upward direction

ORIGAMI SOLAR

Origami Solar is developing a steel frame to replace the current aluminum frames used on PV modules. Steel frames have several advantages over aluminum frames including cost reduction, increased strength/stiffness, greenhouse gas (GHG) emission reduction, and supply chain regionality.

Booth #3992

origamisolar.com

Contact Erick Petersen
erick@origamisolar.com