



ALUMINUM

recyclable sustainable versatile

Today's Material of Choice

Aluminum Extrusions are Better for PV Mounting Structures

IBIS PV Mounting Structure Analysis

Using information available in the public domain, IBIS Associates set out to determine what it costs to fabricate, assemble, ship, and install PV mounting structures for two separate material systems: aluminum extrusions and galvanized steel. Specific installation scenarios considered in the analysis include:

- Residential sloped roof-top system
- Commercial flat roof-top system
- Small utility-scale ground-mount systems
- Large utility-scale ground-mount systems

The workplan included:

- Establishing baseline designs
- Collecting component, material, process
- Building component list and process flow diagrams
- Constructing cost models for component production and assembly
- Use of cost models to establish cost comparisons and sensitivity analyses
- Validating results via external experts

Three specific cost factors were considered: system components (rails, footings, clamps, etc.), fully burdened installation labor, and shipping costs. Cost of land and site preparation was not considered in ground-mounted scenarios.



Small utility-scale ground mounted system



Commercial flat-roof top system

Photo courtesy of SunConnect

CONCLUSIONS

When taking into account the total cost of materials, other components, shipping, and installation, **aluminum is a more economical alternative to steel in PV mounting structures, across all market segments.** In addition to this demonstrated “initial” cost advantage, you can expect structures built with aluminum extrusions to have a **lower Total Cost of Ownership**, primarily as the result of lower on-going maintenance costs and substantially higher residual value.

Other advantages to using aluminum extrusions for PV structures include:

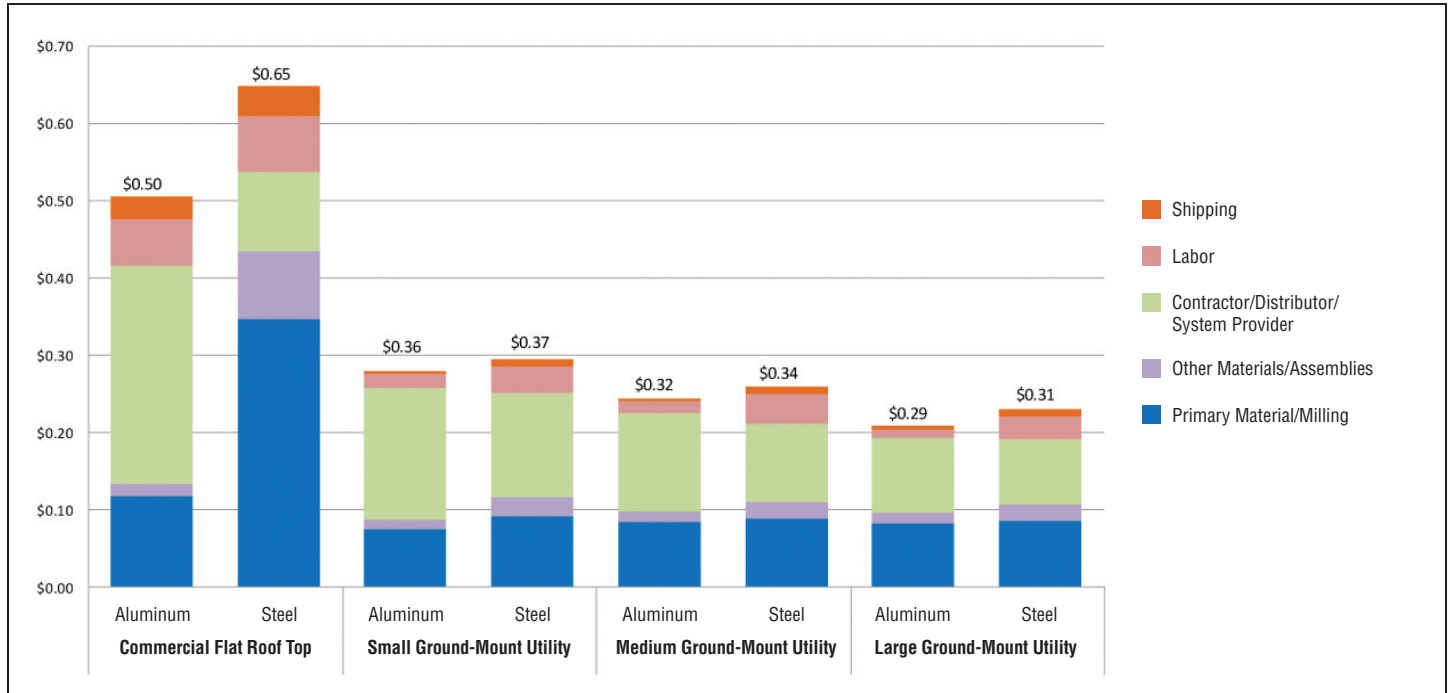
- Low density and high strength-to-weight ratio
- Low tooling costs and unlimited design flexibility to optimize performance and reduce fabrication steps
- High corrosion resistance for superior durability, even in extreme environments
- Ease of recycling and high scrap value



For additional information on this study, go to: www.aec.org/extrusionapplications/energy.cfm

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PV Mounting Structure Cost (\$/W)



For all systems compared, aluminum is the lower cost option, with the greatest cost savings expected for commercial flat roof top installations

Recycling value comparison

The aluminum system is nearly one-third the mass of the steel design, but it has three times the residual scrap value upon decommissioning (see table below).

A mere 5% of the original energy used in primary aluminum production is needed to remelt aluminum products.

Recycling aluminum saves nearly 95% of the greenhouse gas emissions associated with primary aluminum production. And, aluminum can be recycled time and time again. In contrast to steel, aluminum's properties never change.

50 Mega Watt System	Aluminum	Steel
Total Mass of Structure (lbs)	2,473,348	6,835,683
Scrap Price (\$/lb)*	\$0.79	\$0.09
Total Recycled Value	\$1,961,365	\$635,719

* USGS Minerals Yearbook 2009 - Recycling Statistics

About IBIS Associates

- IBIS Associates, Inc. are a team of experts specializing in Technology Strategy and Business Development Consulting (www.ibisassociates.com)
- IBIS focuses on competitive position assessments of traditional and advanced materials and manufacturing technologies
- The automotive industry relies heavily on key research by IBIS on the total effect of light-weighting vehicle components; the IBIS study is widely recognized and cited
- IBIS' background and experience in strategic material choice has been utilized for the PV mounting structure analysis

Aluminum Extruders Council

1000 N. Rand Road, Suite 214 • Wauconda, Illinois 60084 USA • 847.526.2010 • mail@aec.org • www.aec.org



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