



# ALUMINUM

*recyclable sustainable versatile*

Today's Material of Choice

## Aluminum Extrusions are Better for Solar Frames and Mounting Systems

### IBIS Associates Frame Structure Analysis

Using information available in the public domain, IBIS Associates performed an independent detailed analysis of various existing parabolic trough CSP (Concentrated Solar Power) frame designs from steel and aluminum used for utility scale solar power applications.

Material, fabrication, transportation and field assembly costs were estimated and vetted for use in this study.

The included excerpts from the IBIS analysis are extremely useful in understanding why aluminum extrusions represent such exceptional competitive advantages in both total installed cost and performance to steel alternatives.

- IBIS Associates, Inc. are a team of experts specializing in Technology Strategy and Business Development Consulting ([ibisassociates.com](http://ibisassociates.com))

- IBIS focuses on competitive position assessments of traditional and advanced materials and manufacturing technologies

- The automotive industry relies heavily on key research summarized 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 CSP frame structure analysis



### Steel Frame CSP Designs

18-21 kg/m<sup>2</sup>

Length: 12 - 19 m

Aperture: 69 - 129 m<sup>2</sup>



### Aluminum Frame CSP Design

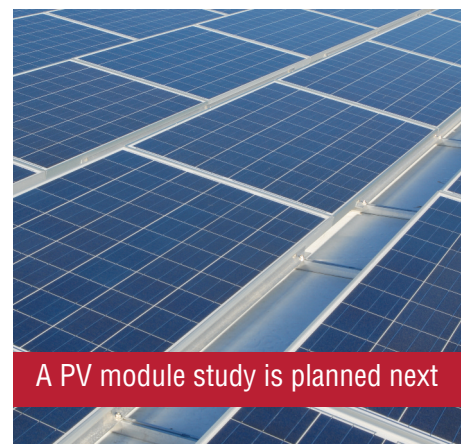
11 kg/m<sup>2</sup>

Length: 12 m

Aperture: 69 m<sup>2</sup>

- IBIS created parts and material processing models for the aluminum extruded and galvanized steel frame designs, detailing components/materials/processes and modeled the costs associated with these elements

- The results are a strategic cost analysis (not a final "price" analysis, as it does not include SG&A costs nor profit)



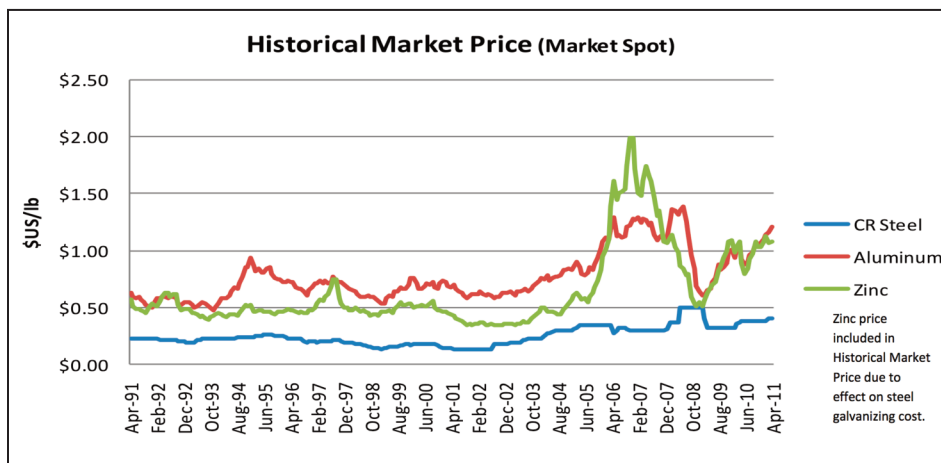
A PV module study is planned next

Photo courtesy of SunConnect

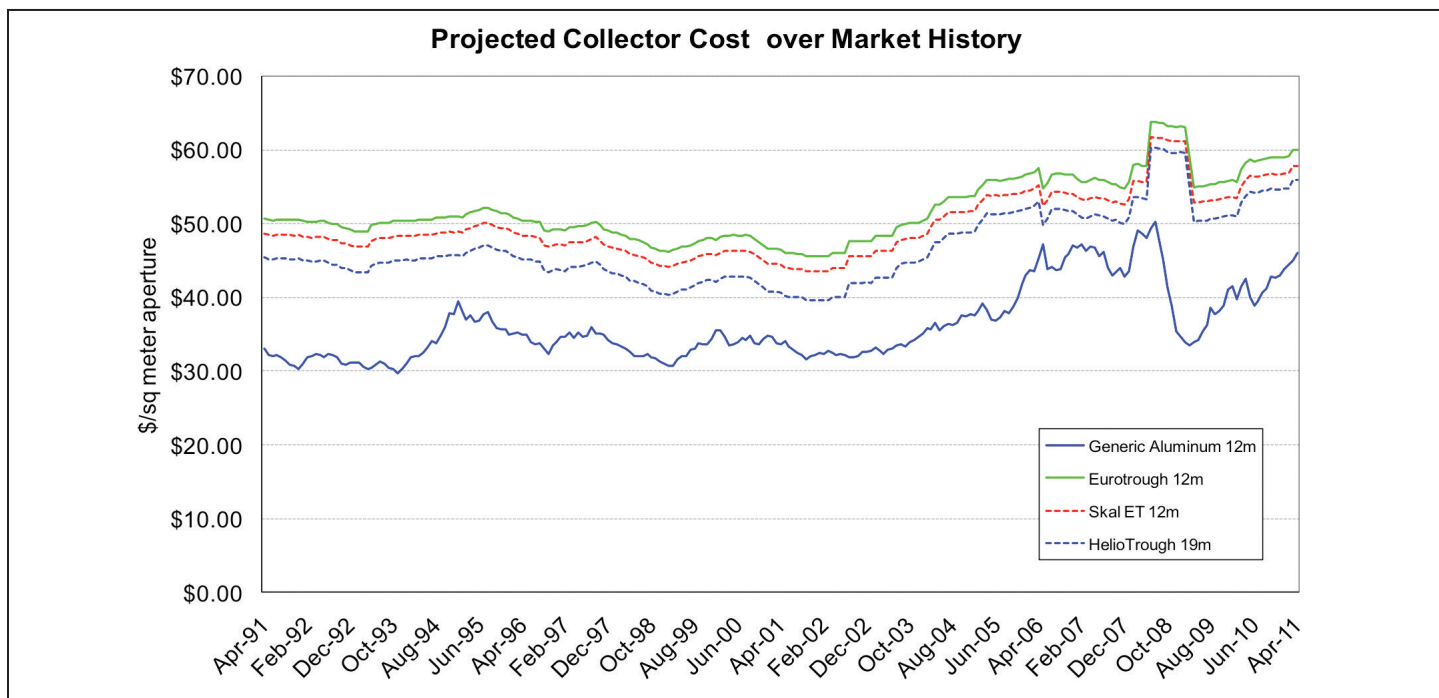


For additional information on this study, go to: [www.aec.org/extrusionapplications/energy.cfm](http://www.aec.org/extrusionapplications/energy.cfm)

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*Steel costs less than aluminum on a \$/lb basis, but aluminum is approximately 1/3 the weight of steel. Using aluminum extrusions for the frame structure provides cost and performance benefits which far outstrip the pure material cost differences.*



*At no time from 1991 through 2011 would the comparative prices of steel, zinc and aluminum extrusions have resulted in a case where the cost of the modeled extruded aluminum frame would have been greater than the galvanized steel frames.*

AEC: Based on published operating results at Nevada Solar One (NSO), which utilizes aluminum frames, the optical efficiency and energy performance of aluminum frames is equal to or better than tested steel designs. "The National Renewable Energy Laboratory recommends a combined "slope error" (mirror error plus frame-alignment error) of ~ 3.0 milliradians or less for solar trough arrays. NSO operates with a combined slope error near 2.0 milliradians. This translates to a focus improvement of 34 to 38% over NREL recommendations."

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## Aluminum Extruders Council

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For additional information on this study, go to: [www.aec.org/extrusionapplications/energy.cfm](http://www.aec.org/extrusionapplications/energy.cfm)