

Life Cycle Inventory of Wrought Aluminum Products for Various Usages

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OBJECTIVE

- The environmental load of wrought aluminum products depends upon the **raw materials mix and process routes** among different kinds of products and alloys.
- Therefore, an LCI study was conducted for the purpose of constructing a reliable database on various rolled/extruded aluminum products.

CALCULATION OF INVENTORY

- Functional unit:
 - 1,000 kg of wrought aluminum products.
- Data processing:
 Inventory data for each kind of product were accumulated along the process flow.
Weighted average of the manufacturers concerned was taken.
- Allocation:
 The environmental loads for common facilities and internal transportation, were allocated among kind of products based on the mass processed in hot rolling or hot extrusion process.

Product system

Sheet products

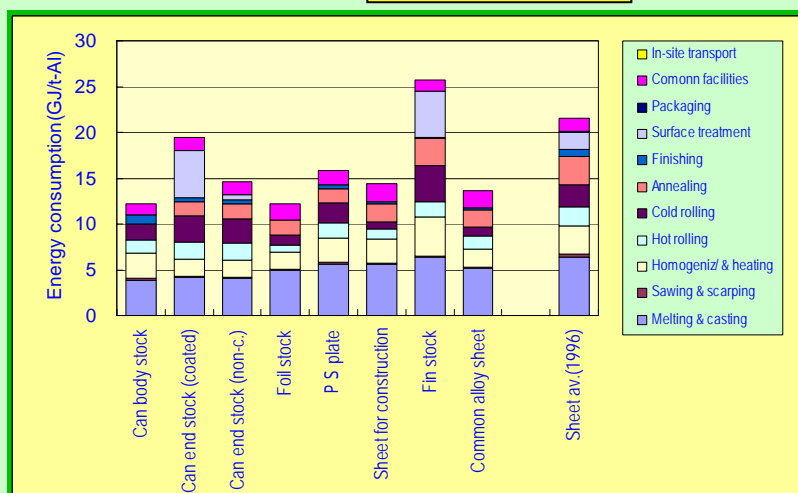
Product	Alloy & Temper	Dimension
Can body stock	3004-H19	0.3mmt-1,200-1,500mmw
Can end stock (coated)	5182-H19	0.25mmt-1,500-1,655mmw
Can end stock (non-coated)	5182-H19	0.25mmt-1,655mmw
Foil stock	1N30-H14	0.28-0.35mmt- 1,000-1,500mmw
PS plate	1050-H18	0.24mmt- 1,030mmw
Sheet for construction	1100s-H14	2.0mmt- 1,000x2,000mm
Fin stock with surface treatment	1000s-H26	0.115mmt- 700-1,200mmw
Common alloy sheet	5052-H32	2.0mmt- 1,000x2,000mm

Extruded products

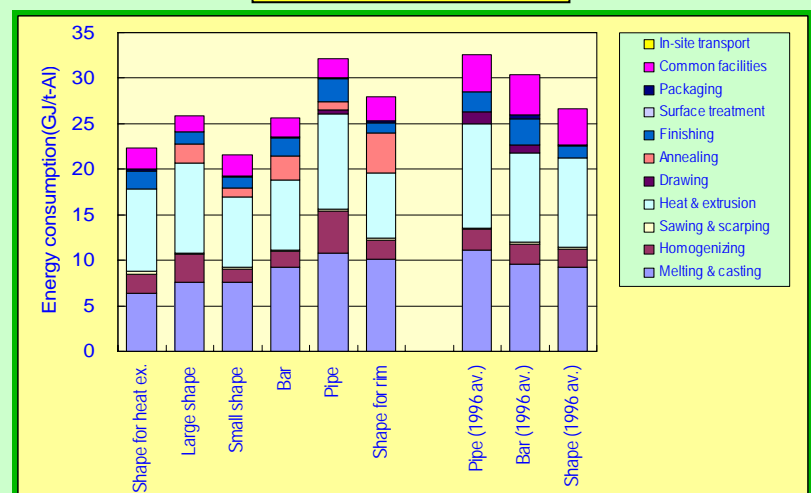
Product	Alloy & Temper	Dimension	Remarks
Shape (for heat exchanger)	1000s-H112	approx. 100 mmw	direct extrusion
Large shape	6063-T5	Billet dia. 11-16 inch	direct extrusion
Small shape	6063-T5	Billet dia. 7-8 inch	direct extrusion
Bar	2017-T4	Billet dia. 12inch, Bar size 60mm	indirect extrusion
Pipe	5056-H34	Billet dia. 7-9inch, Pipe size 50mm	indirect extrusion -drawing
Shape for rim	7N01-O	Billet dia. 8-10inch	Direct extrusion

Production energy

Sheet products

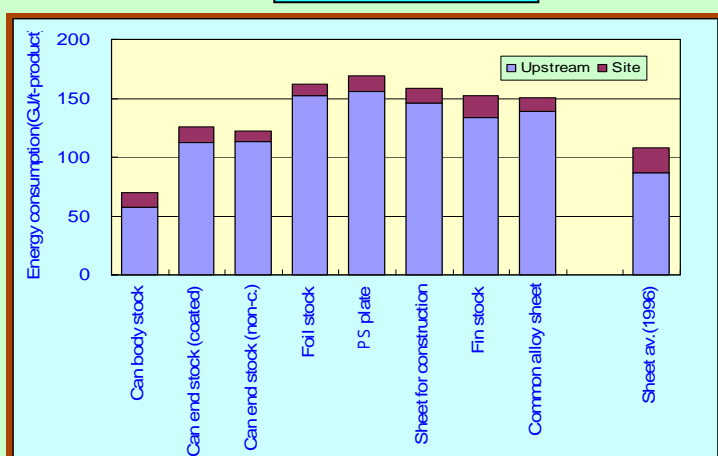


Extruded products

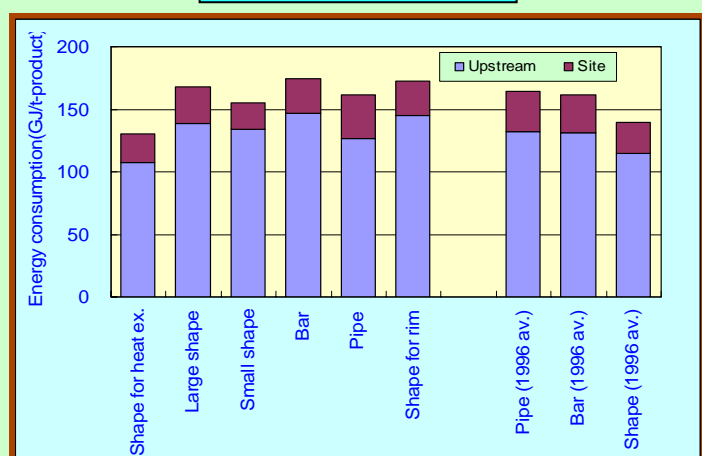


Life cycle energy

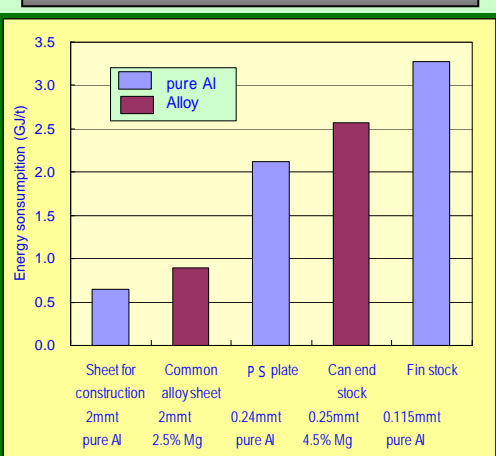
Sheet products



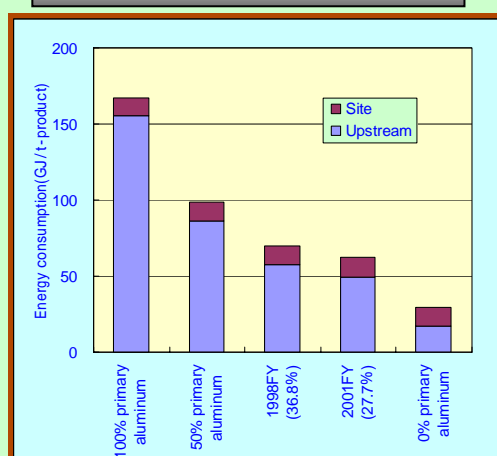
Extruded products



Effect of thickness and alloys on cold rolling energy



Effect of raw materials mix on life cycle energy



CONCLUSIONS

- Differences in life cycle inventory due to the differences in raw materials, thickness, shape of the cross section and other conditions were analyzed.
- Although the amount of energy consumption varied among different processes, the study confirmed that **the raw materials mix had far more significant effects** on the total inventory of the product than other factors.
- Thus, for conducting an LCA of aluminum products, **recycling** should be considered adequately and treated accordingly.