









THE ALUMINIUM STORY

ENERGY BANK FOR THE FUTURE

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iMore





Sir Jonathan Ive Senior Vice President of Design, Apple Inc.





"The best design acknowledges that you can't disconnect the form from the material. The material informs the form." "The only way to make the *MacBook Pro* unibody was to machine it from a single piece of aluminium."



The Future Moves with Aluminium







"The use of aluminium... brings many benefits in terms of weight savings, improved fuel efficiency, lower emissions, increased crash safety and even better vehicle dynamics"



"Aluminum will be the material of choice"





The Future Builds with Aluminium







The Future Builds with Aluminium





recycled durabel sympatheticsourcing efficient powerful recycled ight circular efficient powerful recycled circular powerful recycled powerful mining responsible urban flexibleeconomic architecture strong buildings green



The Future Moves with Aluminium





The Future Protects with Aluminium





(alu) The Future Moves with Aluminium



"Aluminium allows *Bombardier* to manufacture low weight vehicles and thus reduce environmental impact, with a high quality exterior finish"

Guillaume Rétaux Director Strategic Sourcing









"The aluminium curtain walling system of the Hong Kong Shanghai Bank looks as crisp as the day it opened in 1986"







Heasure Young watchingh Schweppes. Jonic Water CONTAINS QUININE

















Available EoL scrap

"split c. 50:50 between wrought and casting alloys"





Three quarters of all aluminium ever produced is still in productive use

- 1 billion tonnes primary produced since 1888
- 750 million tonnes in products in use

• A positive recycling story but...



...more significantly a story of

- Demand growth
 - For light, strong, conductive, protective products
 - 800 million tonnes produced since 1980
- Durability
 - Aluminium in long lifetime products have not yet reached the end of their "First Life"
 - Long lifetime products tend to have high recycling rates (>90%)



то траними то траними





Apparent consumption (semis)

"dominated by long/mid lifetime products"





Aluminium in use

"dominated by long/mid lifetime products"





Final product demand per capita





"In Use" stock per capita





Global aluminium demand will be met increasingly from primary sources





In 2020, less than 20% of global demand will be met through recycling of "old scrap"





End of Life Recycling (Collection) Rates









2020: what if all available End of Life scrap is recovered?





Primary Production 1990





Primary Production 2013





World Aluminium

Regionalisation

950-1970

- Integrated aluminium companies with regional value chains located close to markets (Europe, Japan, N America);

Integration

- Regional associations;

- Limited scrap flow, little trade.



Globalisation

- Integrated model
- applied to new
- production centres,
- close to resources
- (Brazil, Australia, GCC)
- to serve distant, mature markets;
 - Global price discovery (LME);
 - IAI incorporated;
 - Recycling.

Regionalisation

- Differential pricing (regionally & along
- value chain);
- Increase in seabornebauxite;
- Increase in traded scrap;
 - Smelting follows energy;
 - Downstream at both smelting & market.



2008 data

Since then:

...China aluminium production increased by 80%

...China alumina production increased by over 100%

...China bauxite imports doubled

...Indonesia resources export ban (3/4 of China bauxite import in 2013)

...China scrap imports increased by almost 50%

Mining	Bauxite	Refin.	Alumina	Prod.	Aluminum	Form.	Semis	Manuf.	Products	Use	Scrap	Prod.
USA		USA		USA	-	USA		USA		USA -		USA
NOR		NOR		NOR	1	NOR		NOR		NOR		NOR
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GUY	11	GUY		GUY		GUY		GUY		GUY		GUY
PAK		PAK		PAK		PAK		PAK		PAK		PAK
MOZ		MOZ		NIOZ		MOZ		MOZ		MOZ		NIUZ
GHA	17	GHA		GHA	- C	GHA		GHA		GHA		GHA
NGA		NGA		NGA		NGA		NGA		NGA		NGA
CMR		CMR		CMR		CMR		CMR		CMR		CMR
BGD		BGD		BGD		BGD		BGD		BGD		BGD
SLE		SLE		SLE		SLE		SLE		SLE		SLE
GIN		GIN		GIN		GIN		GIN		GIN		GIN



Dismantling & contraction of integrated value chain

Increasing demand from customers for responsibly sourced aluminium

The aluminium industry must demonstrate...

- 1. that it produces responsibly, by mitigating environmental impacts and positively impacting the communities in which it operates;
- that its products bring a net benefit to society in terms of reduced environmental impact; improved quality of life, health, safety & wellness and economic growth;
- 3. that at the end of product life, the value of the metal, the energy that went into its production and the resource inputs are retained and realised as another product, through collection and recycling or energy recovery.











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Industry must responsibly manage the transformation of raw materials into products:

- Rehabilitate bauxite mine sites;
- Improve alumina recovery rates;
- Reduce water consumption where appropriate;
- Improve energy efficiency;
- Reduce carbon consumption;
- Manage emissions and product waste streams;
- Reduce caustic use, improve caustic recovery.

Global Electrolytic Energy reduced by 15% since 1980



THE

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Regional Energy Intensities





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Smelting Power Mix (GWh)



Perfluorocarbons (PFCs)





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Carbon Footprint





Anthropogenic GHG Emissions by Sector (total 50 Gt CO₂e in 2010)





Opportunities to reduce GHG emissions through use of aluminium in:

- Green buildings;
- Lightweight vehicles;
- Protective packaging;
- Efficient machinery;
- Cables;
- Turbines & solar panels;
- Efficient consumer durables;
- Intelligent control systems.



Aircraft Bringing the World Closer with Aluminium



Freight Containers

Increasing Trade with Aluminium



Marine Cutting the Waves with Aluminium



Automotive High-Performance with Aluminium



Buses Transporting More People with Aluminium

- The use of 1 kg of aluminium replacing heavier materials in a car or light truck can save a net 20 kg of CO₂ over the life of the vehicle;
- This figure is even higher for more weight sensitive applications (for instance, up to 80 kg CO₂ per kg aluminium used in trains);
- The 17 million tonnes of aluminium used in transport in 2012 could save almost 350 million tonnes CO₂ and over 100 billion litres of crude oil over the vehicles' lives.











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The Aluminium Story

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From Mine to Market





















FRESHNESS & FLEXIBILITY

30% of the food in developing countries perishes due to the lack of packaging. Aluminium has the best barrier properties to keep food and drink, pharmaceuticals and toiletries fresh and safe, guaranteeing longer shelf-life and contributing to the sustainability of packaged products. SHOW PRODUCT SHELF





Carrier	(ŀ							100)% 🔳
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RECYCLING TRANSFORMS PRODUCTS & SOCIETIES

The recycling of aluminium products ensures that this valuable metal can change its use over and over again, while retaining its unique qualities. Thus, what was once a drinks can could one day form part of an aircraft, a laptop computer or even another can.





















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