


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."


## World


"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"





## WORLD <br> ALUMINIUM



alu The Future Moves 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


## WorLd <br> ALUMINIUM



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

2015


## 2025



## Available EoL scrap <br> "split c. 50:50 between wrought and casting alloys"



## ALUMINIUM

## 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\%)


## ALUMINIUM <br> 75\% still in use ... at least 50\% still in "first use"



Apparent consumption (semis) "dominated by long/mid lifetime products"


## Aluminium in use <br> "dominated by long/mid lifetime products"



## World <br> ALUMINIUM

## Final product demand per capita



## "In Use" stock per capita



## World <br> ALUMINIUM

## 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"



ALUMINIUM

## End of Life Recycling (Collection) Rates

萛
>90\%
-
$>90 \%$
c. $75 \%$ beverage cans
c. $30 \%$ flexibles

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



## Primary Production 1990



## ALUMINIUM

## Primary Production 2013




## Regionalisation



## World <br> ALUMINIUM

## 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 |  | NOR |  | NOR |  | NOR |  | NOR |
| SGP |  | SGP |  | SGP |  | SGP |  | SGP |  | SGP |  | SGP |
| IRL |  | IRL |  | IRL |  | IRL |  | IRL |  | IRL |  | IRL |
| AUS |  | AUS |  | AUS |  | AUS |  | AUS |  | AUS |  | AUS |
| CAN |  | CAN |  | CAN |  | CAN |  | CAN |  | CAN |  | CAN |
| CHE |  | CHE |  | CHE |  | CHE |  | CHE |  | CHE |  | CHE |
| NLD |  | NLD |  | NLD |  | NLD |  | NLD |  | NLD |  | NLD |
| DNK |  | DNK |  | DNK |  | DNK |  | DNK |  | DNK |  | DNK |
| SWE |  | SWE |  | SWE |  | SWE |  | SWE |  | SWE |  | SWE |
| FIN |  | FIN |  | FIN |  | FIN |  | FIN |  | FIN |  | FIN |
| AUT |  | AUT |  | AUT |  | AUT |  | AUT |  | AUT |  | AUT |
| GBR |  | GBR |  | GBR |  | GBR |  | GBR |  | GBR |  | GBR |
| BEL |  | BEL |  | BEL |  | BEL |  | BEL |  | BEL |  | BEL |
| JPN |  | JPN |  | JPN |  | JPN |  | JPN |  | JPN |  | JPN |
| FRA |  | FRA |  | FRA |  | FRA |  | FRA |  | FRA |  | FRA |
| ISL |  | ISL |  | ISL |  | ISL |  | ISL |  | ISL |  | ISL |
| DEU |  | DEU |  | DEU |  | DEU |  | DEU |  | DEU |  | DEU |
| ITA |  | ITA |  | ITA |  | ITA |  | ITA |  | ITA |  | ITA |
| ESP |  | ESP |  | ESP | $\square$ | ESP |  | ESP |  | ESP |  | ESP |
| KOR |  | KOR |  | KOR |  | KOR |  | KOR |  | KOR |  | KOR |
| NZL |  | NZL |  | NZL |  | NZL |  | NZL |  | NZL |  | NZL |
| QAT |  | QAT |  | QAT |  | QAT |  | QAT |  | QAT |  | QAT |
| GRC |  | GRC |  | GRC |  | GRC |  | GRC |  | GRC |  | GRC |
| ARE |  | ARE |  | ARE |  | ARE |  | ARE |  | ARE |  | ARE |
| PRT |  | PRT |  | PRT |  | PRT |  | PRT |  | PRT |  | PRT |
| CHL |  | CHL |  | CHL |  | CHL |  | CHL |  | CHL |  | CHL |
| CZE |  | CZE |  | CZE |  | CZE |  | CZE |  | CZE |  | CZE |
| ARG |  | ARG |  | ARG |  | ARG |  | ARG |  | ARG |  | ARG |
| VEN |  | VEN |  | VEN |  | VEN |  | VEN |  | VEN |  | VEN |
| MYS |  | MYS |  | MYS |  | MYS |  | MYS |  | MYS |  | MYS |
| POL |  | POL |  | POL |  | POL |  | POL |  | POL |  | POL |
| HUN |  | HUN |  | HUN |  | HUN |  | HUN |  | HUN |  | HUN |
| BGR |  | BGR |  | BGR |  | BGR |  | BGR |  | BGR |  | BGR |
| THA |  | THA |  | THA |  | THA |  | THA |  | THA |  | THA |
| SAU |  | SAU |  | SAU |  | SAU |  | SAU |  | SAU |  | SAU |
| OMN |  | OMN |  | OMN |  | OMN |  | OMN |  | OMN |  | OMN |
| TUR |  | TUR |  | TUR |  | TUR |  | TUR |  | TUR |  | TUR |
| MEX |  | MEX |  | MEX |  | MEX |  | MEX |  | MEX |  | MEX |
| RUS |  | RUS |  | RUS |  | RUS |  | RUS |  | RUS |  | RUS |
| BHR |  | BHR |  | BHR |  | BHR |  | BHR |  | BHR |  | BHR |
| IRN |  | IRN |  | IRN |  | IRN |  | IRN |  | IRN |  | IRN |
| CHN |  | CHN |  | CHN |  | CHN |  | CHN |  | CHN |  | CHN |
| SRB |  | SRB |  | SRB |  | SRB |  | SRB |  | SRB |  | SRB |
| BRA |  | BRA |  | BRA |  | BRA |  | BRA |  | BRA |  | BRA |
| COL |  | COL |  | COL |  | COL |  | COL |  | COL |  | COL |
| ROU |  | ROU |  | ROU |  | ROU |  | ROU |  | ROU |  | ROU |
| ZAF |  | ZAF |  | ZAF |  | ZAF |  | ZAF |  | ZAF |  | ZAF |
| DOM |  | DOM |  | DOM |  | DOM |  | DOM |  | DOM |  | DOM |
| IDN |  | IDN |  | IDN |  | IDN |  | IDN |  | IDN |  | IDN |
| SUR |  | SUR |  | SUR |  | SUR |  | SUR |  | SUR |  | SUR |
| EGY |  | EGY |  | EGY |  | EGY |  | EGY |  | EGY |  | EGY |
| JAM |  | JAM |  | JAM |  | JAM |  | JAM |  | JAM |  | JAM |
| DZA |  | DZA |  | DZA |  | DZA |  | DZA |  | DZA |  | DZA |
| IND |  | IND |  | IND |  | IND |  | IND |  | IND |  | IND |
| VNM |  | VNM |  | VNM |  | VNM |  | VNM |  | VNM |  | VNM |
| PHL |  | PHL |  | PHL |  | PHL |  | PHL |  | PHL |  | PHL |
| GUY |  | GUY |  | GUY |  | GUY |  | GUY |  | GUY |  | GUY |
| PAK |  | PAK |  | PAK |  | PAK |  | PAK |  | PAK |  | PAK |
| MOZ |  | MOZ |  | MOZ |  | MOZ |  | MOZ |  | MOZ |  | MOZ |
| GHA |  | GHA |  | GHA |  | 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 |

The aluminium industry must demonstrate... aluminium

1. that it produces responsibly, by mitigating environmental impacts and positively impacting the communities in which it operates;
2. 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.


## alu

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



## Regional Energy Intensities



## Smelting Power Mix (GWh)



## Perfluorocarbons (PFCs)




## Carbon Footprint

18
16
14
12

2
0Perfluorocarbons (PFC)
Electrolysis indirect




# Anthropogenic GHG Emissions by Sector (total 50 Gt CO 2 e 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

## 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 $\mathrm{CO}_{2}$ over the life of the vehicle;
- This figure is even higher for more weight sensitive applications
(for instance, up to $80 \mathrm{~kg} \mathrm{CO}_{2}$ per kg aluminium used in trains);
- The 17 million tonnes of aluminium used in transport in 2012 could save almost 350 million tonnes $\mathrm{CO}_{2}$ and over 100 billion litres of crude oil over the vehicles' lives.



## The Aluminium Story

From Mine to Market

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INDUSTRY STATISTICS






