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Modeling in Environmental Product Declarations of Aluminum Products

33rd LCA Discussion Forum, 22.11.2007

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Modeling of Recycling for Aluminum (containing) Products: Goal dependent

- Methodological approaches
  - Attributional (historic) approach (cut-off): focus on recycled content (no LCA)
    → **information/reporting**
  - **OR**
  - Consequential (prospective) LCA approach: focus on recycling at end-of-life of products
    → **decision-making/influencing the future**

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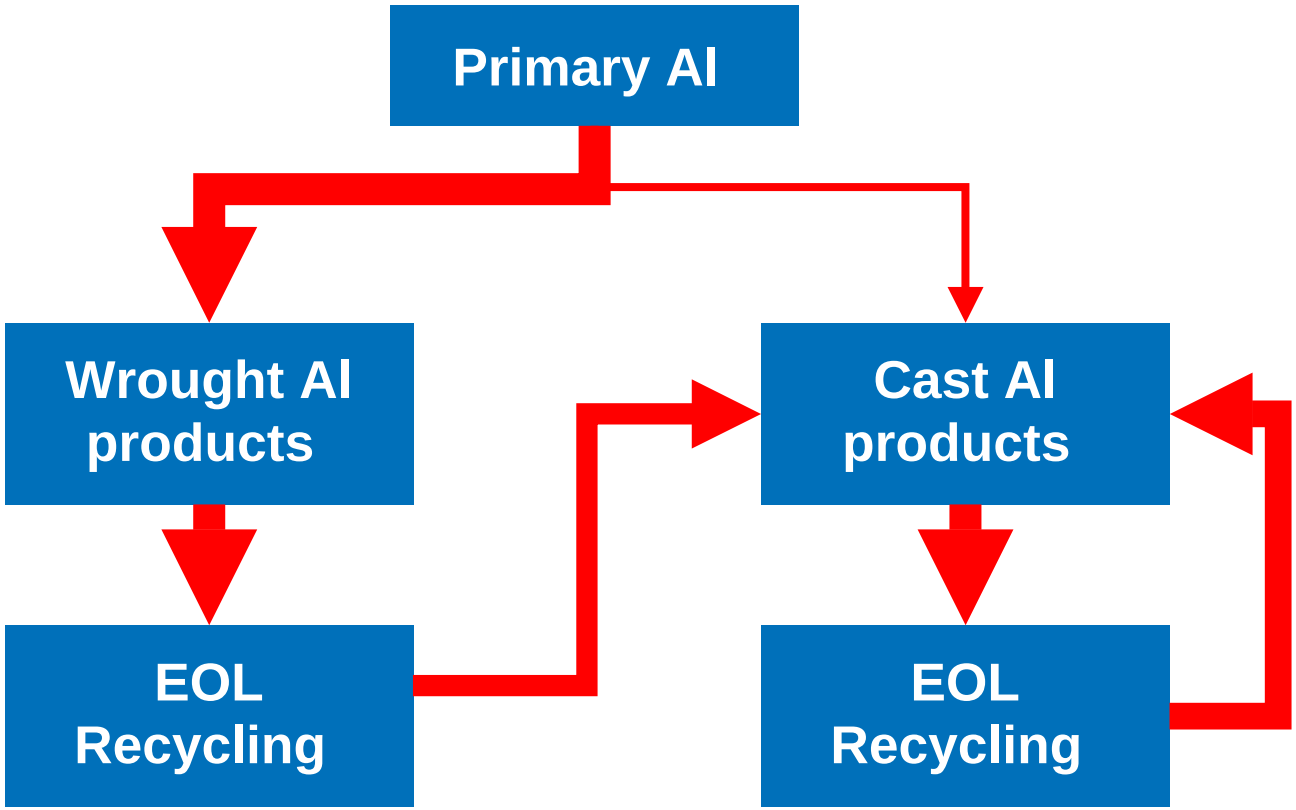
Aluminum Recycling via Closed Material Loops – An efficient and working system



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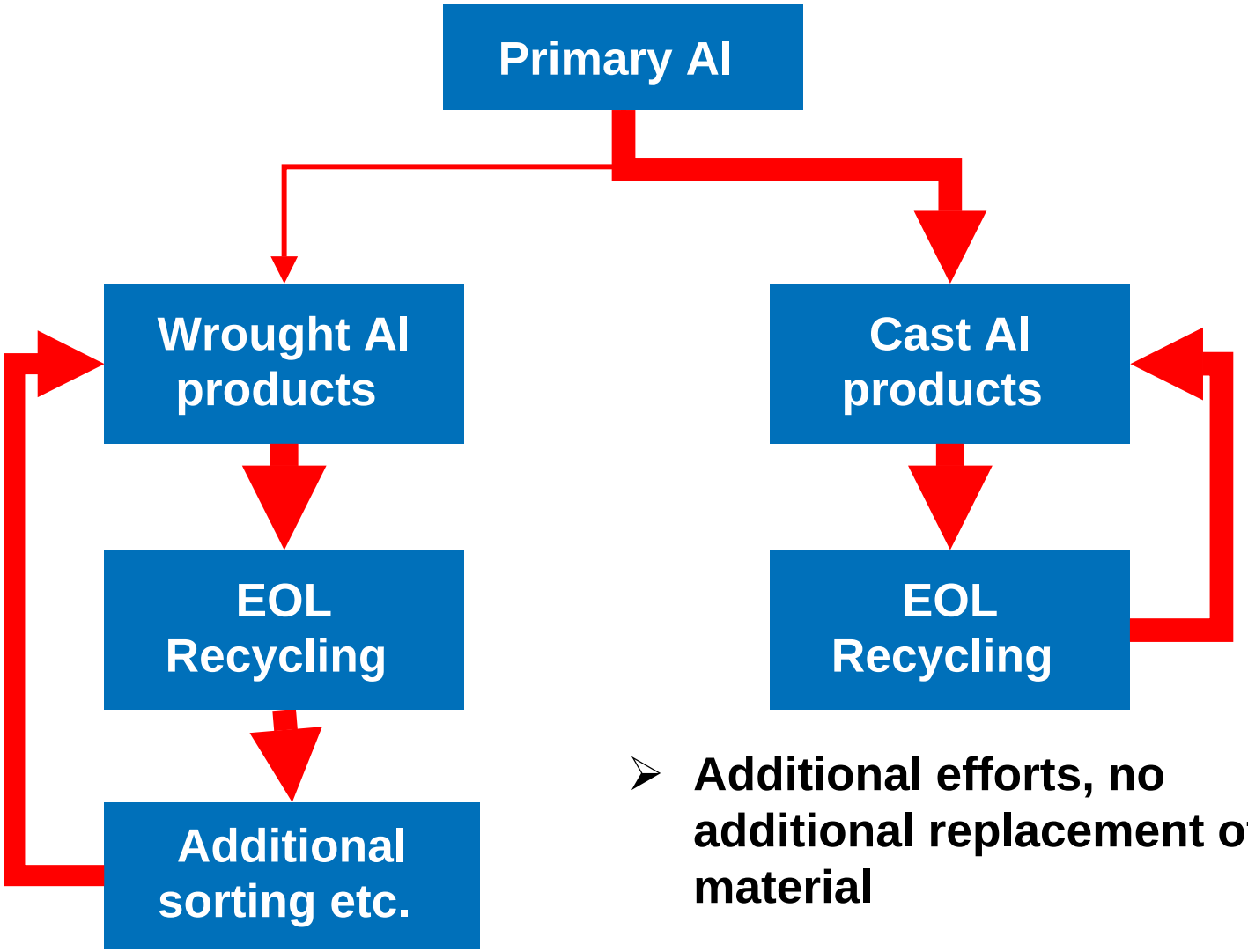
Aluminum Recycling via Closed Product Loops: What is the Added Value?



- Additional efforts, no additional replacement of material

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Global Aluminum Use 1950 - 2000

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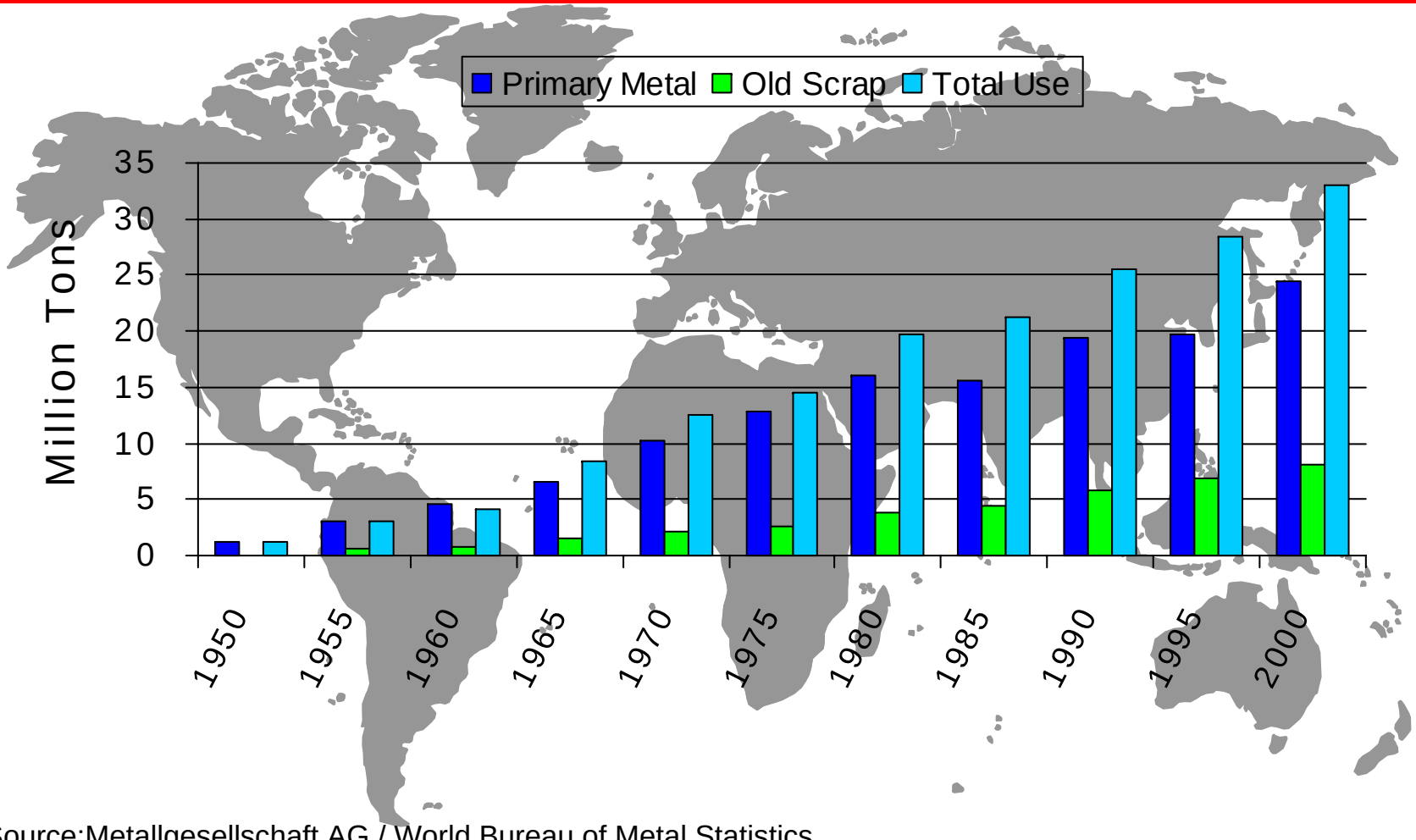
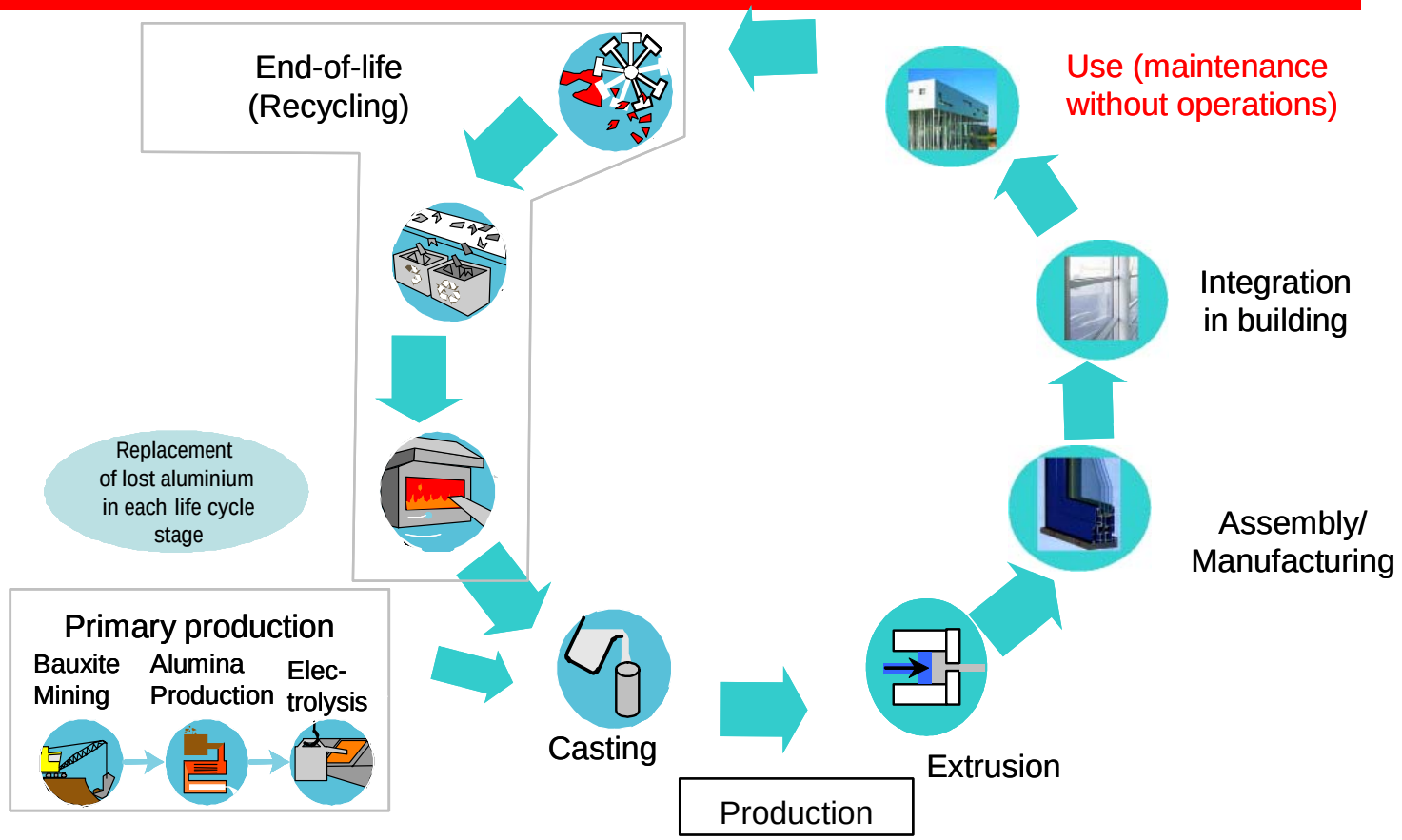
World aluminum use needs both primary and recycled metals supply



Source:Metallgesellschaft AG / World Bureau of Metal Statistics

System Expansion according to ISO 14040: Life Cycle of an Aluminum Window Frame

Recycled aluminum is credited in this EPD as substituting primary aluminum. Aluminum losses in each stage of the life cycle need to be balanced by primary aluminum



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System Expansion applies for all metal (containing) products: Int J LCA 12 (1) 2007

Life Cycle Management

Declaration by the Metals Industry on Recycling Principles

Corresponding author: John Atherton, ICMM – International Council on Mining & Metals, 19 Stratford Place, London W1C 1BQ, United Kingdom (john.atherton@icmm.com)

DOI: http://dx.doi.org/10.1065/lca2006.11.283

The metals industry works towards the establishment of an accurate understanding of metals recycling. Environmental models and policy discussions that concern product recycling should characterize material recycling in a manner that is appropriate and that promotes the objectives of sustainable development.

Objectives

To this end, the metals industry supports the characterization and modeling of recycling of metal-containing products in a way that:

1. Encourages good environmental practices;
2. Aids assessment of the overall life cycle of products and understanding of materials;

their associated environmental impacts and energy consumption – required to dig, crush, grind and otherwise metallurgically process virgin ore. Recycling increases the material and energy efficiency of product systems throughout the life cycle and thus is good management practice.

Facts

The following are relevant to metals recycling:

a) Recycling of metals has environmental, economic and social value. Consequently, and for many years, metals from end-of-life products are widely recycled at high rates.
b) Recycled metal is readily sold on the market. The constraint to greater levels of metal recycling is the avail-

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Recycling of end-of life aluminium building products: an efficient business

- Very high collection rates
  - Highlighted by a TU Delft study
  - 9 demolition sites analysed in 6 European countries
  - Average collection rate reaches 96% of total aluminium inventory
  - Large parts, such as windows, corrugated roof plates, curtain walls and exterior cladding plates collected and dismantled separately for direct remelting
- Metal yield during remelting: 98%
- A net recycling rate of 94% is realistic for an aluminium window
- Other regions: similar figures (e.g. North America 97% avg. collection rate)

Square aluminium ceiling plates stacked and ready for transportation

Aluminium ceiling strips in the Pirelli building

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Recycling Aluminium Window Frames in Europe: End-of-life approach

- The following recovery rates (after demolition and shredding) have been determined and are basis for the calculation of the LCA:
  - Aluminium 96%
  - Steel, stainless steel and zinc: 95%
  - Glass: 95%
  - Thermal bars and gaskets: 90%
  - All other materials: 0%

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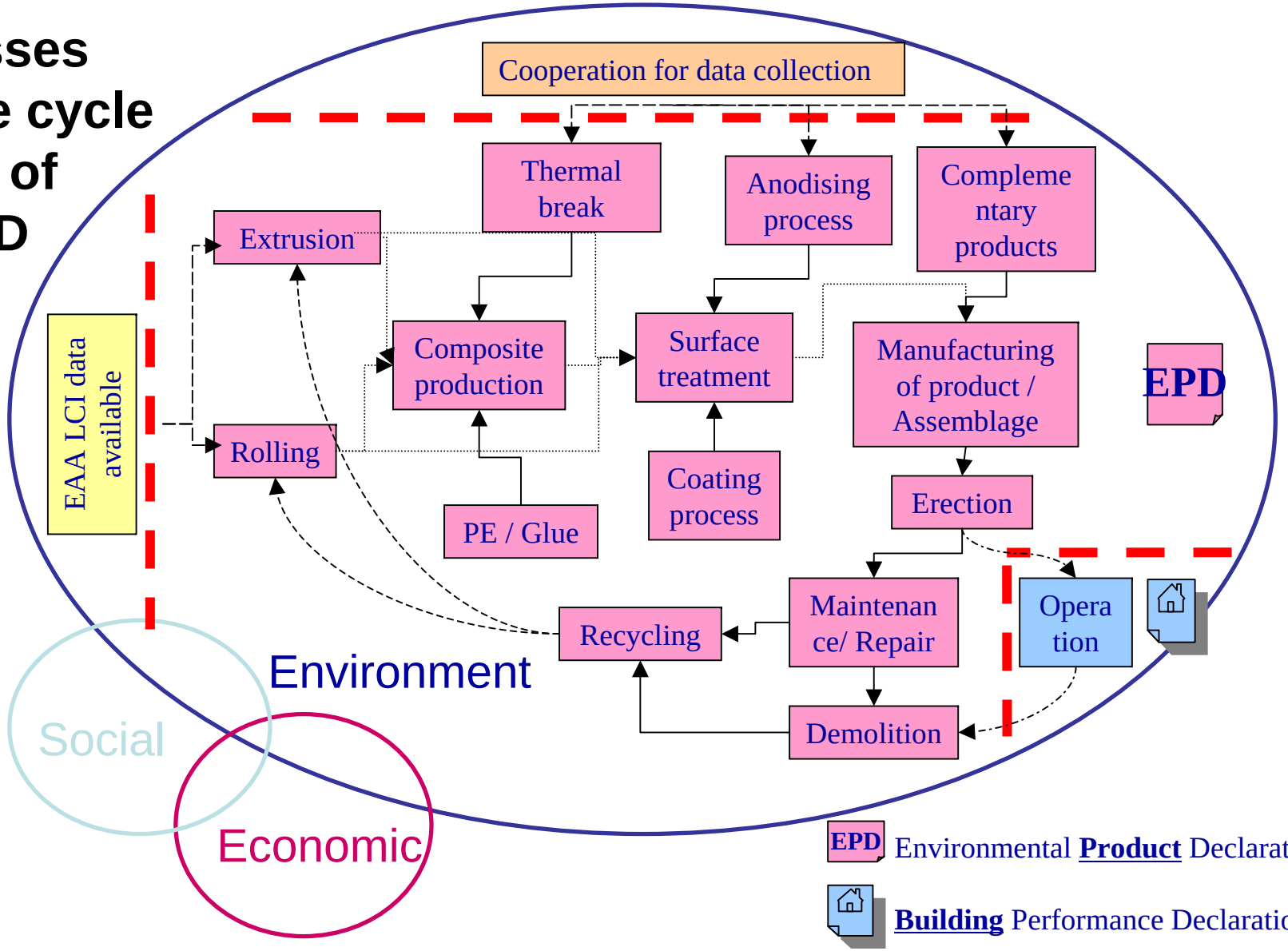
The three types of environmental labelling

Type I	Type II	Type III
ISO 14024	ISO 14021	ISO TR 14025
Environmental Seals	**Self-declarations**	**Quantified product information**
Selected criteria as hurdles, describing environmental excellence	Single issues, describing specific environmental characteristics	Life Cycle Performance data, aiming for continuous improvement
Life Cycle Thinking	Life Cycle Thinking	Life Cycle Assessment
• Mandatory Certification • Issued by private or governmental, accredited institution	• Certification possible • Issued by manufacturer	• Mandatory 3rd party validation. Certification possible • Issued by private, accredited institution
like: Blue Angel, European Eco-Label	*like: water consumption of a washing machine*	EPD *like: Environmental Product Declaration*

For EAA EPDs

Processes and life cycle stages of the EPD



EPD Environmental **Product** Declaration

Building Performance Declaration

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EAA EPD project

- Development of an EAA scheme of Environmental Product Declarations (EPDs)
- Based on ISO TR 14025
- Creation of a user friendly web-based tool allowing our customers to produce their own EPDs

- Demo…

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Informations:

- Building products
  - Windows
  - Curtain walls

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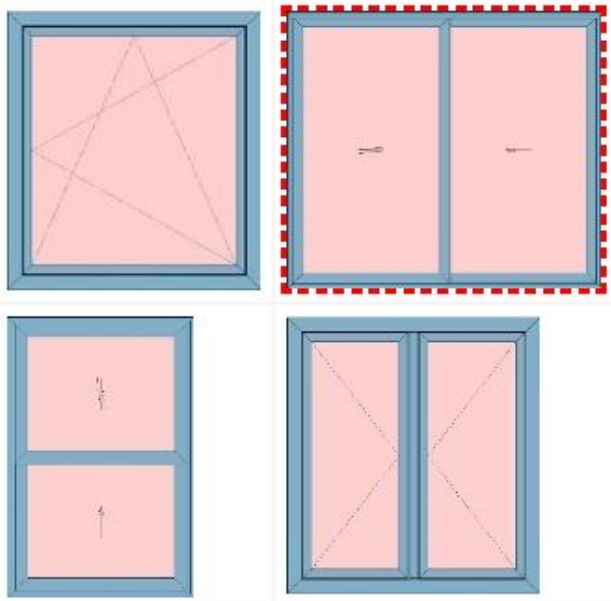
Informations:

Back to catalog ...

- Aluminium windows
  - Product type
    - Dimensions
    - Characteristics & further details

Product: Aluminium windows

Product type



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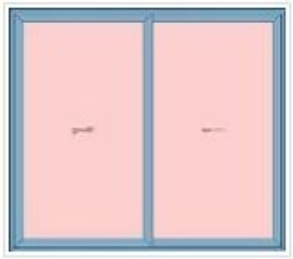
Informations:

Product type

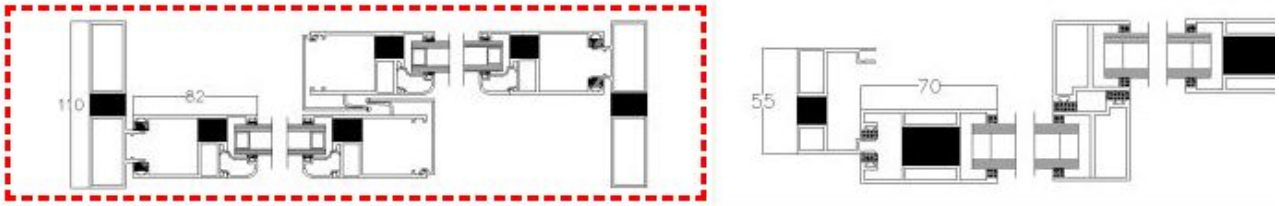


Back to catalog ...

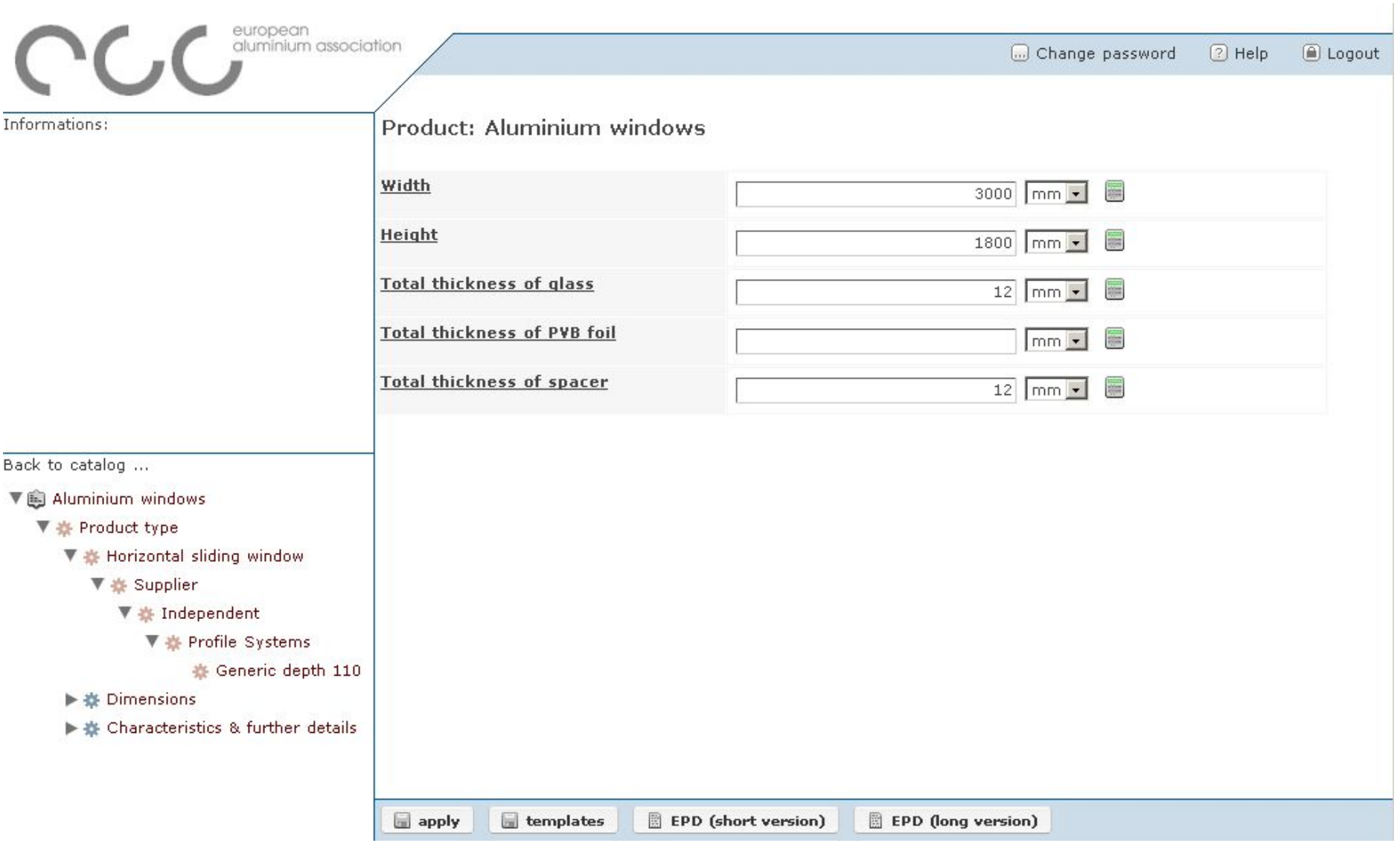
- Aluminium windows
  - Product type
    - Horizontal sliding window
      - Supplier
        - Independent
          - Profile Systems
      - Dimensions
      - Characteristics & further details

Product: Aluminium windows

Profile



apply | templates | EPD (short version) | EPD (long version)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Informations:
Product: Aluminium windows
Width
3000
mm
Height
1800
mm
Total thickness of glass
12
mm
Total thickness of PVB foil
mm
Total thickness of spacer
12
mm
Back to catalog ...
Aluminium windows
Product type
Horizontal sliding window
Supplier
Independent
Profile Systems
Generic depth 110
Dimensions
Characteristics & further details
apply
templates
EPD (short version)
EPD (long version)

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Informations:

Product: Aluminium windows

Thermal transmittance (Uw-value) [W/(m²*K)]	1.8
Light transmittance value of glass (TL) [%]	88
Solar factor (g-value) [%]	87
Burglar resistance	npd
Acoustic performance [dB]	
Reaction to fire	npd

Back to catalog ...

- Aluminium windows
  - Product type
    - Horizontal sliding window
      - Supplier
        - Independent
          - Profile Systems
            - Generic depth 110
    - Dimensions
    - Characteristics & further details
      - Characteristics of the window
      - Details

apply | templates | EPD (short version) | EPD (long version)

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Informations:

Product: Aluminium windows

Project name	Demo
Product name	Sustainable window
Country of assemblage	UK
Surface	Powder coating
Environmental management system	No
Did you got a Material Safety Data sheet for any part entering into the composition of the window?	No

Back to catalog ...

- Aluminium windows
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apply | templates | EPD (short version) | EPD (long version)

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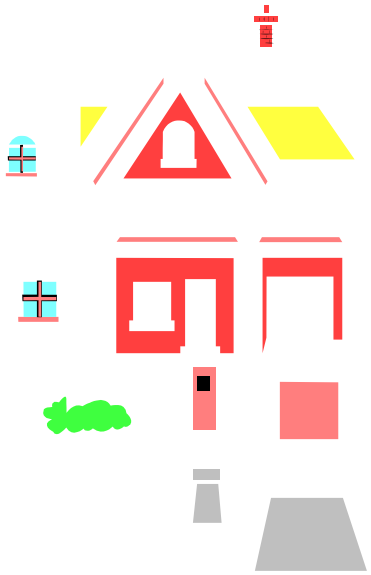
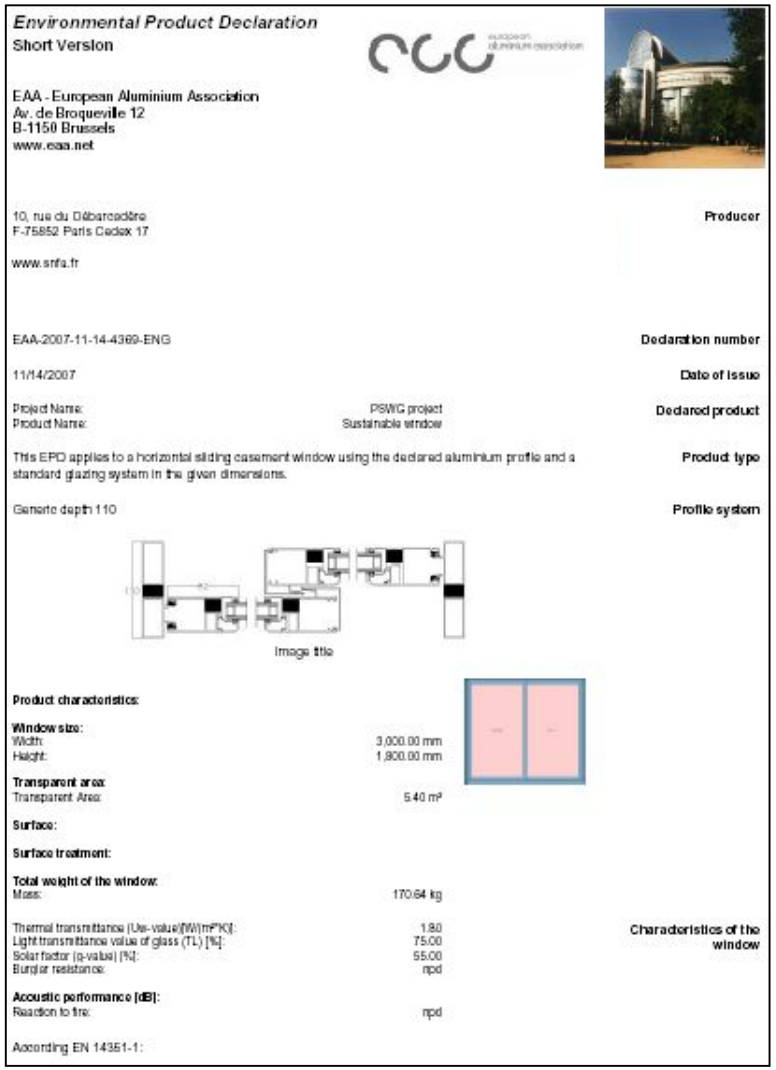
Environmental Product Declaration versus Environmental Performance of a Building Declaration!



EPD results



Environmental Product Declaration
Short Version

EAA - European Aluminium Association
Av. de Broqueville 12
B-1150 Brussels
www.eaa.net

10, rue du Débarcadère
F-75852 Paris Cedex 17

www.snfa.fr

Producer

EAA-2007-11-14-4369-ENG

Declaration number

11/14/2007

Date of issue

Project Name: PSWG project
Product Name: Sustainable window

Declared product

This EPD applies to a horizontal sliding casement window using the declared aluminium profile and a standard glazing system in the given dimensions.

Product type

Generic depth 110

Profile system

Image title

Product characteristics:

Window size:
Width: 3,000.00 mm
Height: 1,800.00 mm

Transparent area:
Transparent Area: 5.40 m²

Surface:

Surface treatment:

Total weight of the window:
Mass: 170.64 kg

Thermal transmittance (Uw-value)[W/(m²*K)]: 1.80
Light transmittance value of glass (TL) [%]: 75.00
Solar factor (g-value) [%]: 55.00
Burglar resistance: npd

Characteristics of the window

Acoustic performance [dB]:
Reaction to fire: npd

According EN 14351-1:

Life Cycle Indicator	Result for declared Life Cycle
Primary energy, non-renewable [MJ]	2,132.86
Primary energy, renewable [MJ]	29.94
Water consumption [kg]	355.59
Depletion of Abiotic Resources (ADP) [kg Sb-Equiv.]	2.00
Global Warming Potential (GWP) [kg CO2-Equiv.]	529.93
Ozone Depletion Potential (ODP) [kg R11-Equiv.]	1.590e-4
Acidification Potential (AP) [kg SO2-Equiv.]	1.70
Eutrophication Potential (EP) [kg Phosphate-Equiv.]	0.19
Photochemical Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	0.27
Non hazardous waste [kg]	9.11
Hazardous waste [kg]	0.81

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Thanks!

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