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SiC
High and Low Value Recycling

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SiC Photovoltaic Module

Module Layers and Module Back

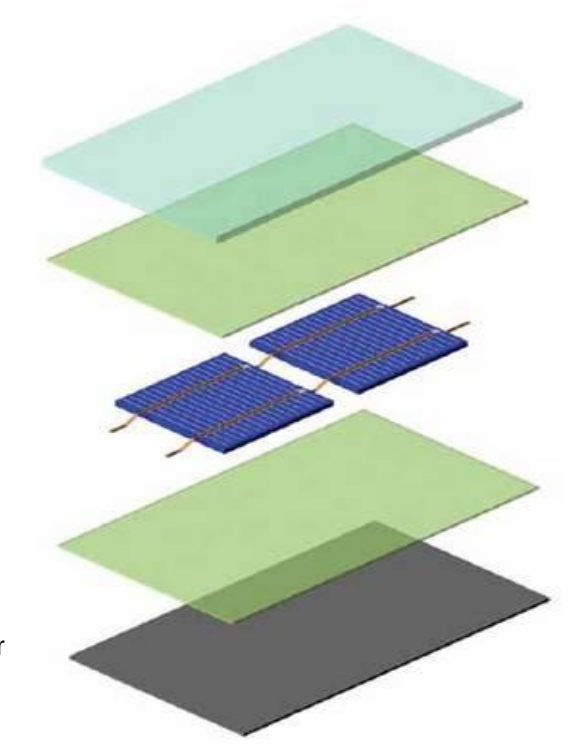
1) Glass

2) EVA

3) Cells

2) EVA

6) Tedlar

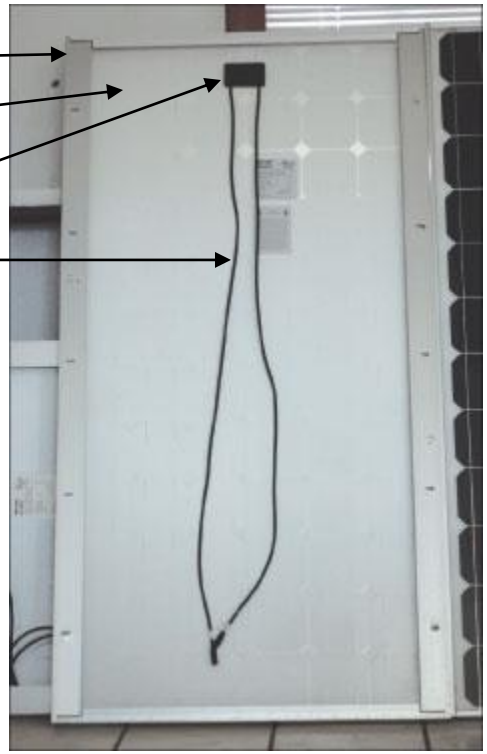


5) Aluminum

6) Tedlar

7) Junction Box

8) Cables



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High and Low Value Recycling

- High Value Recycling
  - Recovery of silicon and all valuable substances
- Simplified Process
  - Crushing, incineration of plastic materials in MWI, disposal of inorganic components
- Incineration
  - Remove aluminum frame
  - No other material separation

Source: Study on the Development of A Take Back and Recovery System for Photovoltaic Products, November 2007

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High Value Recycling

- High Value
  - Material separation
  - Chemical treatment of broken solar cells
  - Recovery of aluminum frame, glass and other metals
  - Recovery of silicon for crystallization

Source: Study on the Development of A Take Back and Recovery System for Photovoltaic Products, November 2007

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Low Value Recycling

Simplified Procedure

- Mechanical material separation
- Recycling of the aluminum frame
- Incineration of EVA and Tedlar
- Disposal of remaining components

Incineration

- Recycling of the aluminum frame
- Incineration of what remains
- Disposal of remnants after incineration

Source: Study on the Development of A Take Back and Recovery System for Photovoltaic Products, November 2007

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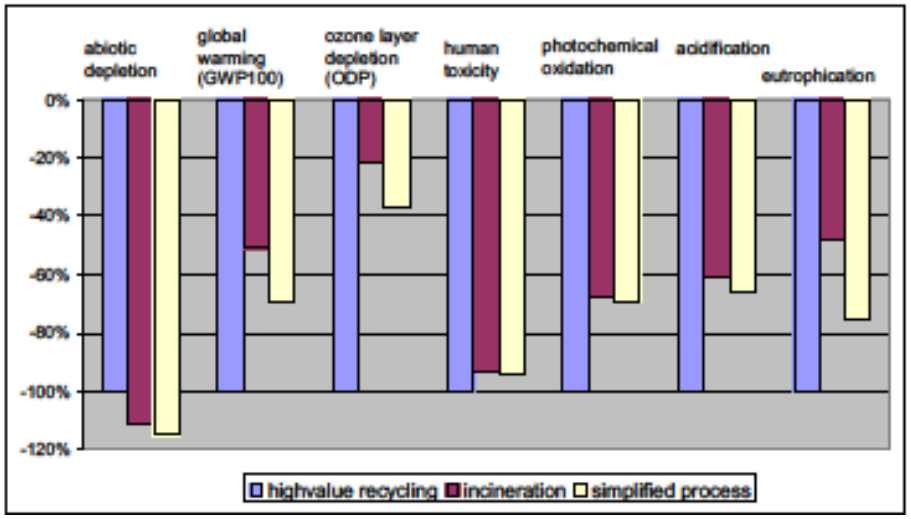
Burden of 3 Disposal Methods



- Abiotic depletion: depletion of natural resources in kg Sb-eq.
- Global warming potential: green house effect in kg CO2-eq.
- Ozone layer depletion: depletion of the ozone layer kg CFC-11-eq.
- Human toxicity: human toxicity in kg 1.4-DB eq.
- Photochemical oxidation: near-ground ozone depletion in kg C2H4 eq.
- Eutrophication: prevention of light penetration and oxygen absorption in of aquatic ecosytems in kg phosphate eq.

Source: Study on the Development of A Take Back and Recovery System for Photovoltaic Products, November 2007

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Technical Challenges

- Separation of materials
- Refining of reclaimed materials for reuse
- Using methods with low environmental burden

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