Life Cycle Assessment of Current Photovoltaic Module Recycling

Introduction

- c-Si PV modules are currently treated in recycling plants designed for glass, metals or electronic waste. Only the bulk materials glass, aluminium and copper are recovered; the cells and other materials are incinerated.
- CdTe PV modules are recycled in dedicated facilities. The semiconductor material (Cd and Te) is recovered in addition to glass and copper.

Approach for LCA

- Life cycle inventories
  - c-Si PV module recycling based on a survey among current European recyclers (3 glass recyclers, 1 metal recycler)
  - CdTe PV module recycling by First Solar
- Two life cycle inventory modelling approaches: Cut-off / End-of-life
- Commonly used life cycle inventory database: KBOB LCI data DQRv2:2016 (based on ecoinvent v2.2)
- Impact assessment method used in the European Product Environmental Footprint (PEF) pilot phase: ILCD Midpoint 2011

Citation: *P. Stolz, R. Frischknecht, K. Wambach, P. Sinha, G. Heath, 2018, Life Cycle Assessment of Current Photovoltaic Module Recycling, IEA PVPS Task 12, International Energy Agency Power Systems Programme, Report IEA-PVPS T12-13:2018.*

Environmental impacts of end of life of PV modules (cut-off approach)

- Current generation treatment of c-Si and CdTe PV modules causes a small share (<5 %) of the total environmental impacts of residential rooftop PV systems.
- The contribution of PV module recycling is highest in the impact category climate change (from transport, electricity supply, and waste disposal).

Net environmental impacts of PV material recovery (end-of-life approach)

- Recovery of glass, metals, and semiconductor material from PV modules causes lower environmental impacts than the extraction, refinement and supply of the respective materials from primary resources.
- The highest potential benefits are observed in the indicator: mineral, fossil and renewable resource depletion.