Deliverable Report

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Project website:	www.summit-project.eu
Technical coordination:	TULiPPS (www.tulipps.com) (NL)
Project management:	TULiPPS / Uniresearch (www.uniresearch.com) (NL)

Executive Summary

The general objective of the SuMMiT project concerning the environment was to achieve PV modules with the lowest carbon footprint in the world (by reducing the carbon footprint by 40% compared to existing glass framed (aluminium) modules). In order to meet this goal, two LCA studies were raised. Relating to the research and development that was done by Fraunhofer ICT, the first LCA study was performed to assess the environmental impact of the developed fixation system within the project (mainly based on polymer profiles). The second LCA study was extended and focused on the whole PV module across the entire life cycle.

According to the functional unit of the first study, "the fixation of a photovoltaic module mounted on the roof with a surface of >1,96m² and a lifetime of 25+ years", primary data were tracked especially for the manufacturing and recycling of the polymer profiles. The results showed that the total product carbon footprint (PCF) of the developed fixation system was about 55 kgCO2-eqv. (primarily due to impact of additional galvanized steel parts) and thus about 81% higher compared to the current state of the art - a fixation system based on aluminum profiles. In summary, the results showed that the use of the developed fixation system in SuMMiT didn't lead to a reduction of PCF. On the contrary, additional efforts for the fixation of the PV modules were required.

For the assessment of the overall LCA study, the functional unit was adapted. The study now focused on "1kWh of electrical power which is produced by a PV system and provided to the power net". The complex upstream and downstream processes for the manufacturing of the PV system were taken into account by secondary data from LCA databases and literature. The results showed that the developed SuMMiT module has an impact of 75g CO2-eqv./kWh. The PCF is thus 19% lower across the entire life cycle in comparison to the reference module. The manufacturing of the solar cell was identified as the main driver (40g CO2-eqv./kWh). An additional sensitivity analysis demonstrated that a reduction of the developed SuMMiT solar cell thickness from 300µm down to 180µm causes 14g CO2-eqv./kWh less greenhouse gas emissions. Moreover, an optimized generation of energy (performance ratio of 85%) reduces the PCF of the SuMMiT cell by 7g CO2-eqv./kWh. In total, these innovations of the developed SuMMiT module will ensure a reduction of the greenhouse gas emissions of 42% in comparison to the current state of the art.

Limitation of the study: Across the project and the development of the fixation system, the material composition of the fixation system changed a few times fundamentally. The final fixation solution is mainly based on aluminum. A screening-analysis showed that the PCF of the new fixation system is comparable with the polymer fixation system. Therefore, it can be assumed that the developed SuMMiT-Module will lead to a reduction of the PCF >40% in total in comparison to the current state of the art.

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http://cordis.europa.eu/fp7/cooperation/home_en.html

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