Ecodesign of organic photovoltaic modules from Danish and Chinese perspectives - DTU Orbit (27/12/2018)

Ecodesign of organic photovoltaic modules from Danish and Chinese perspectives

The life cycle of a solar park made using organic photovoltaic (OPV) technology is assessed here. The modules have been fabricated in a pilot scale plant and they have been installed together with other components to evaluate the balance of system, in a solar park located in Denmark. Three possible waste management practices have been contemplated for the end of life of the solar park: recycling, incineration or the average local mix. The assessment of the environmental impacts of such a system reveals that silver used in the electrodes is overall the largest source of impacts, such as chemical pollution and metal depletion. The establishment of resource recovery systems for the end-of-life management of the OPV modules is therefore crucial to reduce overall environmental impacts. Liability on the manufacturers or on the operators should be implemented. The electricity produced from OPV solar parks yields similar footprints to other traditional energy technologies; e.g. coal and natural gas. However, when the efficiency of the OPV modules is increased from 1% to 5% they are comparable to other mature PV technologies already on the market. The effects of outsourcing or exporting the production of the OPV modules from Denmark to China have additionally been studied to determine the most advantageous configuration. The stakeholders should aim at anchoring the manufacturing of solar parks in countries with stringent emission standards and/or high technology efficiencies, e.g. Denmark, and at deploying them in countries with high solar radiation to maximise the environmental benefits of the PV technology.

General information
State: Published
Organisations: Department of Energy Conversion and Storage, Functional organic materials, Department of Management Engineering, Quantitative Sustainability Assessment
Contributors: Espinosa Martinez, N., Laurent, A., Krebs, F. C.
Pages: 2537-2550
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Energy & Environmental Science
Volume: 8
ISSN (Print): 1754-5692
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 30.87 SJR 14.59 SNIP 4.819
Web of Science (2017): Impact factor 30.067
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 26.39 SJR 12.283 SNIP 4.325
Web of Science (2016): Impact factor 29.518
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 19.28 SJR 7.769 SNIP 4.001
Web of Science (2014): Impact factor 20.523
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 14.81 SJR 6.019 SNIP 2.996
Web of Science (2013): Impact factor 15.49
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 11.84 SJR 5.868 SNIP 2.599
Web of Science (2012): Impact factor 11.653
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 9.96 SJR 3.737 SNIP 2.505
Web of Science (2011): Impact factor 9.61
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
Scopus rating (2010): SJR 3.87 SNIP 2.42
Web of Science (2010): Indexed yes
Scopus rating (2009): SJR 2.111 SNIP 1.15
Original language: English
Electronic versions:
Espinosa_2015_post_print.pdf
DOIs:
10.1039/c5ee01763g
Research output: Research - peer-review › Journal article – Annual report year: 2015