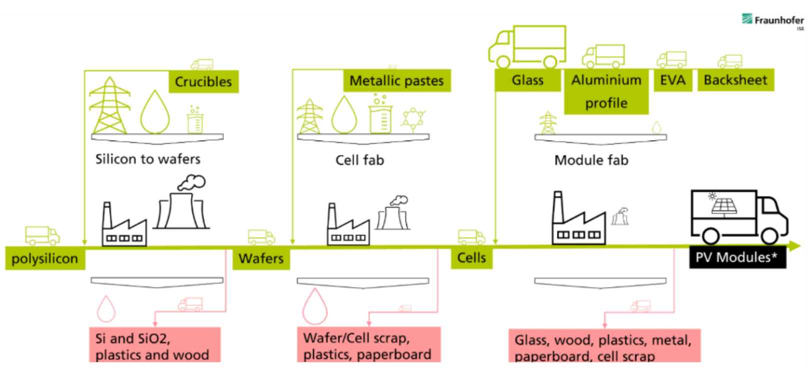
TECHFLASH

Fraunhofer

Photovoltaics: Production Technology and Transfer

[Technology Assessment and Transfer]

Numerous new technologies and processes are being developed at Fraunhofer ISE in order to produce solar cells on an industrial scale faster, better and, above all, more cost-effectively and sustainably. Deciding which approach to pursue requires not only a scientifically sound technology assessment, but also detailed knowledge of the associated costs and ecological impacts. Through detailed process modelling and material flow analysis we perform techno-economic and ecological assessment of both current standard processes and various new technologies and process sequences. Our aim is to determine the most sustainable technology option, by considering the economic, environmental and social impacts based on specific boundary conditions.



[Life Cycle Inventory of a wafer, PV cell and PV module factory]

Through direct contact with the relevant process specialists, both in-house and external, we are able to provide in-depth process evaluation. This ranges from laboratory scale processes that are still in the development phase to the investigation of more complex process sequences in a near-industrial pilot production environment. The knowhow gained provides the basis for an in-depth assessment of the cost structure for different solar cell structures and process routes in a real industrial environment.

Fields of Work: In the research topic "Technology Assessment and Transfer" we focus on the following fields of work

Market Analysis & Business Creation: In addition to technology expertise, we have long-term experience in the international photovoltaic market and industry developments, having worked with most of the relevant industry and research partners along the entire PV value chain.

Techno-Economic Assessment of PV Production Technologies along the PV Value Chain: We analyse and compare the economic performance of different PV technologies and processes, while combining and/or optimizing elements of process design, process parameter modelling, equipment selection, capital expenditure (CAPEX), and operating expenditure (OPEX) projections.

Material Flow Analysis (MFA) and integrated PV Factory Planning: We perform detailed Material Flow Analysis (MFA) for each processing step along the entire manufacturing process as well as associated treatment and recycling processes within the factory environment. The MFA is used to optimize process and material flows economically and ecologically. We provide support in the planning of total facility layouts (including buildings, logistics and administration) as well as in the procurement of process and characterization equipment, based on the specific requirements of the targeted technology, process, and material flows.

Life Cycle Assessment in Photovoltaics: The production and operation of all components of the PV value chain, like any economic activity, leaves an ecological footprint and has an impact on the environment and resource consumption. Through Life Cycle Assessment (LCA), we assess the environmental impact over the entire life cycle in different impact categories by modelling the energy and material flows throughout the individual production stages.

Resource Criticality Assessment: We analyse the criticality of materials and products not only on a global and regional level. For industrial processes or technologies, we identify raw material requirements, map supply chains and highlight potential supply bottlenecks, based on an analysis of social, techno-economic and geopolitical risks and projections. These studies can serve to inform strategic business decisions as well as accompany product development.

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Kindly get in touch with us if you are interested in this technology or require further information.
Thanks and Regards,

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