NRP 70 Electricity supply

Joint project: PV2050

Overview

Context

According to the energy strategy of the Swiss Government, photovoltaics (PV) should become a major electricity source by 2050. Such a wide scale (>10 Gw_p) deployment faces three major challenges: i) the global cost of solar electricity must be further reduced ii) the management of PV electricity at such scale level creates new challenges both in intraday and inter-seasonal supply with a clear impact on the grid iii) due to the limited space available in Switzerland, a careful planning and design is required such as not to create a repulsion effect in the population.

Objectives

- Development of novel PV materials and interfaces, which can be implemented in multi-junction solar cells combining various high-efficiency PV technologies, with a realistic potential for reaching > 30% efficiency.

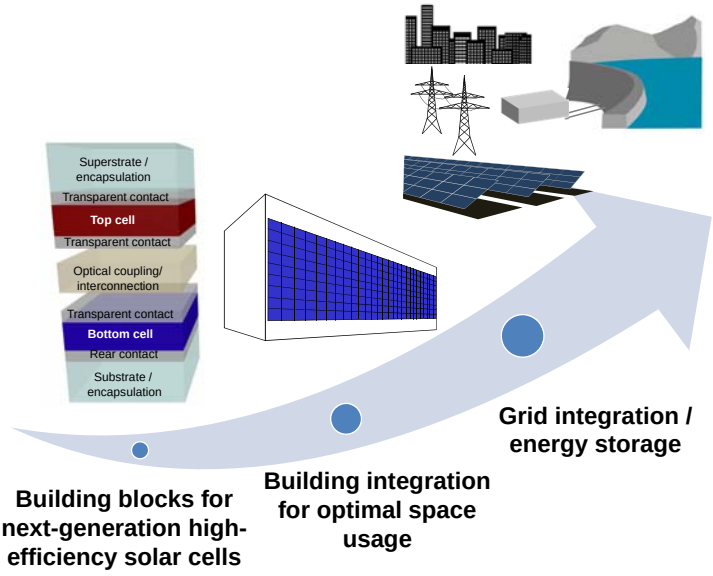
  Outcome: Lower costs of PV in Switzerland down to 5-10 cts/kWh.

- Use of such materials for innovative, multi-functional architectural elements with a focus on semi-transparency for glazing and façades and on ultra-high efficiency modules for reduced space requirements.

  Outcome: Higher acceptance of PV by improved building integration and reduced space usage

- Quantification of all environmental aspects of the products, consideration of social aspects, establishment of cost and market penetration roadmap, including scenarios on how to implement large scale PV in Switzerland.

  Outcome: Enable high market penetration of PV compromising neither the grid stability, nor the security of supply



Main industrial partners:

Several industrial companies active in solar energy and building fully support the project:

Subprojects

Umbrella: Novel PV technologies for optimum space usage and efficient electricity production
EPFL PV-Lab, PI: Prof. C. Ballif

Project 5: Simulation and characterization: from cells to systems
ZHAW-ICP, EMPA-TF, EPFL-PV-Lab -LPI
PI: Dr. M. Schmid

Project 1: Novel materials and interfaces for advanced photovoltaic devices
EMPA-FP, EMPA-TFPV, EPFL PV-Lab, EPFL LPI
PI: Prof. F. Nüesch

Project 2: Building blocks for next generation multi-junction solar cells
EPFL-PV-Lab, EPFL LPI, EMPA-TFPV
PI: Prof. C. Ballif

Project 3: Novel Generation Perovskites Devices
EPFL-LPI, CSEM
PI: Prof. M. Grätzel

Project 4: Photovoltaics into the built environment: from semi-transparent PV glazing to high efficiency roof integrated solutions
CSEM, EPFL-LAST,G2E, EPFL PV-lab
PI: Dr. L.-E. Perret-Aebi

Project 6 PV2050: Sustainability, market deployment and interaction to the grid of emerging solar technologies for building-integrated applications
ZHAW-INE-IUNR- ICP- IEFE
PI: Prof. B. Furrer

Energy Turnaround

- Switzerland has the potential to lead in wide-scale deployment of renewables thanks to a diverse grid topology, pumped hydro storage and international interconnections. However, its small size and urban landscapes make a careful visual and environmental integration of renewables mandatory.
- For PV, this means being highly efficient to minimize space requirements or being integrated in a harmonious way to buildings and landscapes.
- The impact on electricity production costs would allow PV to become a true alternative to standard electricity sources. Similarly, PV glazing or façade elements at affordable costs could mainstream in the building sector.
- The PV2050 project could hence have a high impact in Switzerland and strongly contribute to the realization of the strategy 2050.

Contact

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