Accelerating Solar Energy Ecosystems through Open Innovation: the paradigm of SolarHub EU Project

O. Spyroglou[1], A. Koumpis[2]

[1]International Development Ireland (IDI) Ltd, Ireland
[2]University Hospital Cologne, Germany
Presenting author email: o.spyroglou@idi.ie

Introduction

Solar energy is a key component in the global shift towards sustainable energy systems and the energy transition, yet it still faces significant hurdles such as market alignment, securing finance, and overcoming infrastructure limitations. These challenges require more coordinated approaches to facilitate collaborated innovation and contribute substantially to the sector's growth and sustainability. The SolarHub EU project, is implementing a model based on open collaborative innovation through the development of Pre-Designs of Solar Energy solutions that paired with an innovation support and acceleration programme will bridge the innovation ecosystems of Greece and Türkiye, showcasing a model of environmental diplomacy and demonstrating how strategic partnerships can accelerate the development of solar technologies.

Our approach blends academic and research work with business insights and tools, suggesting new strategies and policies to understand and navigate EU legislation and regulation and leverage EU funding. SolarHub will establish an "Excellence Hub" as a key player in mediating between the innovative capacities within the solar energy sector and the practicalities of market and regulatory demands.

Methodology

At the heart of SolarHub's approach is the development of 4 Pre-Designs, serving as early-stage integrative platforms within the solar energy ecosystem. These Pre-Designs are designed to align with the ecosystem needs, allowing early feedback and iterative development.

Around these Pre-Designs we have created a 3 cycle Innovation Support and Acceleration programme that is open to all relevant stakeholders of the ecosystem from research teams and startups to mature SMEs and industrial players. This process ensures that by the time a Pre-Design progresses through SolarHub's three acceleration cycles, it has evolved into a mature asset ready for ecosystem integration. This early and ongoing engagement is critical for adapting solutions to real-world needs and maximizing their market readiness and impact.

The analytical framework employed to evaluate SolarHub's impact revolves around the program's structured acceleration cycles, each targeting startups and projects at varying levels of maturity:

- The first cycle focuses on nurturing research teams and early-stage ideas,
- the second on advancing established startups towards market penetration and investor readiness, and
- the third on scaling mature companies for broader market impact.

This approach in 3 cycles, ensures tailored support that addresses the unique challenges and opportunities at each stage of development. The effectiveness and impact of our program is measured through a combination of innovation metrics (such as the number of IP assets created or products launched), collaboration indicators (including partnerships formed and knowledge exchange events), and more qualitative market entry success stories.

This methodology, with its emphasis on early integration, supported acceleration, and comprehensive evaluation, demonstrates the novelty of SolarHub approach within the solar energy sector. By blending academic research with business strategies, SolarHub promotes a practical, forward-thinking approach to accelerating solar energy innovation, collaboration, and hopefully achieve higher market success. Hopefully, the lessons and insights from the implementation of the SolarHub can lead to the development of a replicable model for sector-wide innovation acceleration.

Results and Discussion

The SolarHub EU project suggests an approach to acceleration and innovation through open innovation principles and cross ecosystem collaboration. Although specific data on the number of startups, technological innovations, and market impacts will be detailed during the presentation, the innovation support and acceleration framework can already be a significant contribution to the sector. The project aligns with several Sustainable Development Goals (SDGs), particularly those focused on affordable and clean energy, industry innovation, and sustainable cities and communities, indicating its broader relevance to global sustainability targets.

The literature on open innovation in the solar energy sector underscores the importance of broad knowledge sourcing and cooperation across borders. Studies by (Subtil Lacerda and van den Bergh 2020),(de Paulo and Porto 2017; Buitenhuis and Pearce 2012; Nagendra et al. 2022; Hakkim and Heidrick 2008) collectively affirm the value of open innovation strategies, from international collaboration in research to the

application of open-source designs and new partnership and franchise models as flexible ways to increase openness within the thin film PV industry. These findings highlight the potential of open innovation to accelerate technological advancements and market readiness in solar energy.

By leveraging the collective intelligence and resources of a diverse range of stakeholders, including research institutions, startups, industry partners, and policy makers, SolarHub aims to build an integrated, cross-country ecosystem for knowledge exchange, technological development, and sector innovation. This method aligns with current literature and shows a practical use of theoretical models for speeding up innovation in renewable energy. Moreover, by addressing key sector challenges such as market alignment, access to finance, and infrastructure development, SolarHub is expected to stimulate the development of innovative solar energy solutions that are both commercially viable and environmentally sustainable.

The project's emphasis on open innovation facilitates the rapid development and dissemination of new solutions and promotes a culture of collaboration and knowledge sharing that is essential for overcoming the sector's challenges and problems. The comprehensive evaluation of SolarHub's impact, will offer valuable insights into the effectiveness of acceleration programs in driving progress within the renewable energy industry.

Conclusions

The SolarHub project and its Open and Collaborative approach of accelerating innovation, demonstrates how open innovation ecosystems can speed up innovation and promote sustainable growth. SolarHub had brought together researchers, startups, industry players, and policymakers, making a significant difference in the advancement of solar energy technologies and solutions. This project helps create new solar innovations and simplifies the route from idea to market, ensuring that these innovations are commercially viable and environmentally impactful.

The findings from SolarHub highlight the need for future research to continue exploring and expanding upon the principles of open innovation in renewable energy. There is a clear opportunity for policy development to support and enhance these ecosystems, recognizing the role of collaborative networks in speeding up technological advancements and addressing the pressing challenges of climate change. For practitioners within the renewable energy sector, the SolarHub model provides a blueprint for integrating open innovation into their strategies, emphasizing the importance of cross-sectoral partnerships and knowledge exchange in driving progress.

Looking ahead, the scalability and replicability of the SolarHub model stand out as two of its most compelling attributes. Our approach offers a template for other renewable energy sectors aiming to stimulate innovation and collaboration and the project's success demonstrates that such a model can be adapted to different contexts and geographies, offering a pathway to accelerate the transition to a sustainable energy future globally.

In the future, we intend to replicate and extend the methodologies and insights of SolarHub's open innovation approach to the health sector, particularly hospitals. The SolarHub Open Innovation model, with its emphasis on early-stage integrative platforms, Pre-Design concepts and structured acceleration cycles, offers a valuable framework for identifying, developing, and implementing innovative solutions in hospitals especially in the area of effective Health Care Waste Management.

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