

Science for Environment Policy

What are the barriers to solar energy adoption?

The solar energy market is hampered by multiple barriers to adoption in the EU and worldwide, according to a new review. Researchers from Sweden and Spain found that lack of government commitment as well as various sociotechnical, management and economic barriers prevent photovoltaic technologies from being more readily adopted.

The EU has a well-developed solar energy market compared to other regions of the world, yet generates only 3% of its energy from solar. Although the cost of producing photovoltaic devices continues to fall, adoption is not increasing particularly rapidly. In order to explore the barriers to adoption, the researchers carried out a systematic review based on a search of the most up-to-date literature on solar power.

As part of this process, the researchers searched web databases for studies about solar power adoption or diffusion published between 2011 and 2013. Their initial search produced 103 publications. These were narrowed down to 33 studies covering 28 countries that were relevant to the review topic. The researchers split the barriers they identified in the studies into four approximate categories: sociotechnical, management, economic and policy. Many of the barriers were more relevant to remote areas and the developing world, but a number were relevant to the EU.

The sociotechnical barriers are complex. The researchers highlighted varying product quality and quality standards in different countries, as well as consumer concerns about complexity, durability, efficiency and safety. These negative perceptions about solar technologies can create major barriers. In addition, a lack of knowledge about solar technologies leads to planners not recommending photovoltaics for new buildings, or to improper use and poor maintenance by adopters. In some countries and regions, climatic conditions and architectural constraints make solar less suitable than in others. For instance, Scottish tenement buildings offer little roof space for solar cells. According to the researchers, this is a limitation that is difficult to address through policy measures.

Within the policy category, the researchers identified a lack of stability of incentives for the adoption of photovoltaics — examples are inconsistencies between policy measures and socioeconomic factors, or the sudden removal of existing subsidies. While most countries have policy measures to support renewable energies, the market loses trust when policy decisions are reversed, such as the recent retrospective reduction of feed-in tariffs in Italy and Spain. Failure to involve all the relevant stakeholders in energy policy planning and regulatory issues, such as difficulties acquiring building permits and lengthy decision processes, constituted further barriers to adoption.

Management barriers included inappropriate differentiation between rural and urban, or low-income and high-income business strategies. For example, fee-for-service and microcredit financial schemes could be used for the low-income access-oriented markets in rural areas, but would not be so suitable for the high-income adopters in cities, where solar is an alternative power supply. The researchers also referenced poor after-sales service; ineffective marketing and education campaigns; lack of collaboration between the building and PV industries; lack of national infrastructure; and lack of policy backing.

Economic barriers meanwhile included high initial costs of the solar PV modules and high installation, maintenance and repair costs, and the low costs of competing sources of energy. Perception of the cost can be an additional barrier, as can uncertainties in the funding process, inadequate government subsidies compared to competing energy sources (including fossil fuels) and the unwillingness of banks to fund medium- or long-term investments in shrinking economies.

The researchers conclude that, although several studies argue that solar PV is mature enough to compete with conventional energy sources, there are still barriers to adoption in both high-income and low-income economies. Barriers vary across contexts, but the authors especially highlight the importance of collaboration, dedicated government support and effective marketing.



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