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Streamlining photovoltaic deployment: The role of local governments in reducing soft costs

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Abstract

Steep declines in photovoltaic (PV) technology prices have directed attention to the so-called soft costs associated with PV deployment. This paper focuses on one element of soft costs: those that arise from local permitting and inspection processes typically being handled by municipalities. Based on a literature review, the paper compares the status of local PV permitting in the US and Germany. Results show the significant potential for municipalities to streamline local permit procedures, a process that can be facilitated by higher-level governance rules, standardizing bodies, and other solar advocacy coalitions.

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Keywords: photovoltaic; permitting; soft cost reduction; municipality; governance

Nomenclature

PV	Photovoltaic(s)
US	United States

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1. Introduction

Competitive, building-sited photovoltaics (PV) has the potential to become one of the key pillars of low-carbon urban energy systems. Recent declines in PV system prices[†], largely driven by PV module cost reductions, have improved the economics of PV technology. As a consequence of PV hardware cost reductions, the importance of soft costs is increasing. Soft costs for PV deployment arise from processes related to customer acquisition, technical and legal-administrative planning and inspection, installation work, financing, etc. Soft costs now constitute 20–64% of turnkey residential and small commercial PV system prices [1–4]. Recent literature has focused on the mapping and benchmarking of soft costs [5,6] and their variations in different geographic contexts [4,7–11].

Municipal governments serve an important role in urban PV deployment. Many cities around the world have implemented a variety of policies and measures, including grant programmes, local feed-in tariffs schemes, showcase projects, and various other measures, to support solar PV market development [12–16]. The role of urban jurisdictions in streamlining PV deployment and supporting the reduction of soft costs, however, has not received much attention in the academic literature so far.

This paper focuses on one element of soft costs, namely that arising from local permitting and inspection processes and involving municipal departments. The paper presents a novel comparison of the status of local PV permitting in two major PV markets, the US and Germany. Soft costs for local permitting have shown to vary widely across these different jurisdictions, suggesting that a significant potential for cost reduction in "high-cost" locations does exist. Specifically, the paper analyses the role of municipalities and higher-level jurisdictions in streamlining local permit processes. By comparing two countries, the paper offers novel insights into the role of multilevel governance interactions in streamlining PV deployment at the local level.

2. Material and methods

The paper is based on a literature review of the status of local, municipal permitting for rooftop PV in the US and Germany.

3. Results

3.1. Local permitting in the United States

The purpose of the permitting and inspection processes required for new PV systems is to ensure compliance with public health, safety and design standards. In most U.S. states, the local city or county building department controls the review and issuance of permits for rooftop solar installations within its jurisdiction, the most common ones being building and electrical permits as well as zoning and design review. In many US municipalities, this process is characterized by a diversity of documentation requirements, cumbersome application procedures, multiple inspection processes, and permit fees, which all add up to significant extra costs for PV installations [5,6]. Besides, requirements and processes for the permitting of PV across the 18,000 different local jurisdictions in the US vary widely, further complicating matters for installer firms that work across several municipalities.

[†] Key components of a grid-connected PV system are modules, inverter(s), a mounting system, and cabling. In addition to the hardware costs, PV system turnkey prices typically also incorporate the costs for technical and legal-administrative planning, permitting, installation, and connection to the grid.

This diversity of permitting requirements and processes can be explained by the multilevel governance structure in the US. Due to variations in state laws, policies and political climates, different states have taken different approaches with regard to the exercising of control over local solar permitting processes. While in some states municipalities are obliged to follow mandatory state policies related to permitting, other states have only set specific parameters around the local permitting process. A few other states solely provide non-mandatory guidance and recommendations to influence permitting processes at the local level. Even in most cases where there are statewide codes, local jurisdictions can modify and tighten the requirements of the statewide code, for example due to unique, local climatic, geological or geographical conditions [17]

Numerous initiatives led by the federal government, states, regional bodies, think tanks, and solar advocacy organizations have been launched to reform and streamline solar permitting and reduce the soft costs associated with it. These include the creation of online databases of city-level permitting requirements [18–20], roundtable workshops, multi-stakeholder networks, and development of national uniform guidelines for expedited permitting [21].

Municipalities have engaged in a variety of approaches to streamline local permitting. Good practice approaches include the provision of guidance documents, permitting checklists, solar-specific permit application forms targeted at installers and prospective PV customers to provide them with the information they need to efficiently submit applications for local permits. Besides, municipalities developed routines for the expedited review of pre-qualified projects, plans or installers, and they introduced over-the-counter or electronic submittal and review procedures to reduce the time installers need to spend on the permitting procedure. Other measures included the alignment of technical and procedural permit requirements with neighbouring communities, revision of fee structures, and efforts to better coordinate municipal permitting processes with the grid interconnection process [17,22]. Despite these efforts, the US solar market on average still exhibits significantly higher costs for local permitting and inspection processes than the German market [4].

3.2. Local permitting in Germany

Contrary to the US, municipal permitting requirements for rooftop PV systems are minimal in Germany. Although PV systems are subject to an extensive legal framework of building legislation, which is non-uniform across states and municipalities [23], in practice the overwhelming majority of rooftop PV systems have never been subject to any permit requirements placed by local authorities. While in the early 1990s some building authorities were suspicious regarding the aesthetics of PV installations, the positive and innovative image of PV and the absence of serious accidents resulted in a relaxed attitude of municipal authorities with regard to the regulation of PV system installations. As of 1997, PV systems have been explicitly exempted from building permission requirements in the model building code [24]. PV systems requiring a permit or notification to the authority can - depending on the specific stipulation in the state's building codes - include (1) larger PV systems, (2) façade systems exceeding the dimensions of the building shell, (3) overhead systems, (4) systems on public buildings, and (5) systems planned on or at listed buildings [25]. However, the number of listed buildings suitable for the utilization of PV technology is small, amounting to about 1.5% of all German buildings [26]. As a consequence, planning and transaction costs related to municipal requirements are generally minimal to non-existent for most rooftop PV installations.

4. Discussion and Conclusions

The results show that US municipalities place substantially higher permitting requirements on rooftop PV installations than their counterparts in Germany. Both countries have federal governance structures, and responsibilities for policies and regulations related to PV deployment are shared by jurisdictions at the national, state and municipal levels. Despite this similarity, legal-regulatory processes related to PV deployment are substantially more uniform in Germany. With regards to building law, one explanation for this uniformity is the prevalence of a (national) model building code, which municipalities closely adhere to. In the US, the absence of such a national model building code has resulted in more fragmented local regulations, which not only impose transaction costs on installer firms, but also create barriers to market entry and limit competition across installer firms [8].

The comparison raises the question as to what extent municipalities (and states) should be given the autonomy to develop their own permitting requirements and procedures. While distinct local regulations may be justified by different climatic conditions (e.g. wind loads, snow loads, etc.) or location-specific aesthetic requirements, greater standardization of legal-regulatory processes would likely benefit PV market development by reducing transaction costs and enhancing conditions for competition. For this purpose, standardizing organizations, multi-stakeholder networks and higher-level governance bodies can play an important role in developing widely accepted codes and regulations. Besides, governance reforms may be needed in order to ensure that municipalities adhere closely to state and national-level standards, codes, and practices.

While the costs of local permitting have become more transparent, more research is needed to understand the benefits of local permitting. For example, it has been proposed that regulations can serve as a protection against unscrupulous or unskilled PV installers. Finally, the widespread absence of municipal permitting requirements in Germany raises the question of whether and how alternative mechanisms such as installer certifications, quality management schemes, local learning and the prevalence of trust in the marketplace could offer more cost-effective ways of ensuring the safety and quality of PV installations.

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