WHO KNOWS WHAT: INFORMATION BARRIERS TO EFFICIENT DER ROLL-OUT

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Overview

The rise in Distributed Energy Resources (DERs)—resources that reside in the distribution system, often behind the customer's meter—is reshaping the energy sector. The shifts that DERs bring have spurred investigations into future policies and regulations needed for the energy sector, especially into the necessary market design and to adjustments in DER compensation and retail rate design. That research frequently focuses on the idealized, "first-best" outcomes ([9], [4], [5], [3], [8]), ignoring factors that affect the actual implementability of those outcomes, such as business models and incentives that the electricity sector agents face. Most of the existing studies rely on the (implicit) assumption of complete information, under which the information about the existing system and electricity sector participants is common knowledge. Perfect information, i.e., the agents having access to all information relevant for their decisions, is another frequent assumption.

However, the incomplete or imperfect information is a widespread phenomenon in the energy sector, as documented by the economic literature on the utility price regulation and utility investment regulation. Information issues have also been shown to arise in regulation of energy efficiency programs, in the context of dispatch decisions, affecting how much market power the electricity sector participants can exert, in energy-saving investments, and in decisions about switching the electricity supplier. We hypothesize that DERs, in addition to reinforcing some of the existing information problems, can induce new ones. This would imply inefficiencies in the roll-out of DERs absent policies that target information availability.

As current discussions around DERs, both in the academic literature and policy proceedings, often ignore the information bottlenecks,[1] this paper aims to illuminate the sources and importance of information barriers around DER. We identify and examine DER-related information problems and the current policy responses in the U.S. to learn what unavailability of information can imply for the DER energy transition. We also describe what information is needed for the success of the power sector reforms and how policymakers can help make the information available without imposing unnecessary burdens.

Methods

We review existing engineering and economic literature on distributed resources for general findings on the role of information in the context of DERs. To identify the current information problems around DERs and the various ways in which policymakers approach those problems, we study DER-related state-level proceedings in which information access emerged as an issue.

Additionally, we survey electricity sector stakeholders—consumers, utilities, DER-focused parties (owners, developers, and aggregators), environmental groups, and others (regulators, transmission-level operators etc.)—in multiple states to inquire about their perception of information relevance and accessibility. Our survey aims at providing insights on the relative importance of the information challenges for various electricity sector actors and the ways with which they deal with them in practice. We sent the survey to 1047 parties we identified through analyzing state-level proceedings on DER remuneration and received 210 responses.

Results

Our findings suggest that there are substantial information problems around DERs. We identify a multitude of DER-related information problems frequently raised by stakeholders in the proceedings, the most prominent of which are interconnection information, value of non-wire alternatives, optimal remuneration for DERs, and consumer information. The first two issues relate to characteristics of distribution networks, such as hosting capacity, apparent flow limits of the distribution lines, voltage limits of the distribution nodes, and impedances.

We use the survey to confirm our findings from the literature and proceedings review and to quantify the impacts of the information issues. We find that the perceived severity varies strongly across stakeholders: When asked to state on a scale between 0 and 10 the effect of missing or incomplete information on the functioning of their organization

[1] Notable exceptions include, among others, [7], [2], [6] and [1], as well as information-related proceedings in New York and California.

in the context of DERs, the survey participants chose on average 5.9, but every fourth of them chose a value of 8 or higher. When asked about the need for new regulation to ensure the availability of relevant information for decisions related to DER, 61% of the respondents supported that, while 17% did not see a need for such measures. Generally, DERs and environmental groups report experiencing systematically greater information barriers, while utilities face relatively little information issues.

The stakeholders are also heterogenous in the negative consequences of information barriers that they report in the survey. Information unavailability slows down the pace of decision-making and actions for everyone but regulators, it also decreases the effectiveness of actions for DER-focused organizations, environmental organizations, utilities, and others, while limiting the set of feasible projects for DERs and utilities. DERs additionally report negative competition, risk, and profits effects, while the majority of consumer respondents mention increased project risk. Only six respondents state that their organization is not affected by missing or incomplete information.

Conclusions

DERs can provide substantial value, by avoiding costs of utility-level generation, costs of transmission- and distribution-level network, while providing ancillary services and enabling load shaping, shifting, shedding, and shimmy. They can also decrease emissions. However, overcoming the current information problems is necessary for the DER roll-out to be cost-effective. Missing information results in suboptimal amount of DERs, and build-out of the wrong resource types at the wrong locations. It also has distributional impacts, with additional rents flowing to the agents with an information advantage. Finally, information problems may have implications for DER ownership: under scenarios with significant information barriers, utility ownership of DER may be more efficient despite its potential anticompetitive effects.

Inefficiencies associated with information problems warrant new regulation, and thus indicate the role of policymakers for the future DER developments. The most straightforward regulation approach, which has also been widely chosen by regulators in the DER context so far, is to direct stakeholders to publicly share some of the information they own. Alternatively, regulators can provide incentives for the parties to truthfully reveal their information. For utilities, this can happen through replacing traditional cost-of-service regulation with performance-based regulation that conditions utilities' profits on reaching some pre-defined DER deployment targets. Regulators could also offer a menu of cost-sharing (or profit-sharing) contracts for utilities to choose from.

Our results also mean that economic and engineering literature needs to account for information accessibility when modeling distributed resources

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