



Original research article

# Electricity governance and the Western energy imbalance market in the United States: The necessity of interorganizational collaboration

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## ABSTRACT

In the Western United States, widespread growth of wind and solar resources is putting pressure on state policy makers, electricity system operators, and utilities to integrate renewable resources into the grid, while maintaining reliability, affordability, and improving efficiency. These resources are creating new challenges because their variability can contribute to transmission constraints and system imbalances. This paper examines a recent initiative to make energy imbalance market services available throughout the Western Interconnection and provides insight into evolving electricity system governance. Drawing on boundary organization and interorganizational collaboration literature, this research explores the processes and practices used to create a new interorganizational collaboration. The research supports theoretical claims that facilitating policy innovation requires discursive formation of a collective identity.

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## 1. Introduction

In many countries the widespread growth of wind and solar electric generation is changing how electricity systems are planned and operated. Policymakers, planners, and grid operators seek to integrate variable renewable resources while maintaining system reliability and affordability. These actors need to innovate organizationally to advance both regional integration and decarbonization, which can be difficult [1,2]. At base, these challenges are ones of governance, and approaches to meeting them have varied across countries and regions in Europe, Asia, and the Middle East and North Africa [3–10]. This study of an innovative approach in the Western United States provides insight into these regional governance challenges.

In the United States more than 64 GW of wind and 10 GW of solar capacity accounted for 7% of net summer capacity [11]. The variability of these renewable resources can contribute to transmission constraints and system imbalances. In response to this variability, in the short term, grid operators can ramp up flexible resources, if available, or curtail wind generator production to reduce output. In

the longer term, they can expand the system's geographic footprint, develop more flexible resources, or build additional transmission capacity. As renewable resources have become a larger part of the system, curtailments of wind and solar have increased. For example, in recent years some regions have curtailed from 1 to 4% of wind generation while Texas curtailed as much as 17% of wind generation [12]. Resource curtailment affects the economics of wind and solar development and can stymie progress toward policy goals.

This situation is not unique to the United States, and worldwide many different organizations are evolving new and innovative approaches to better integrate renewable energy into electricity systems [13]. However, in the United States, multiple overlapping jurisdictions, legacy operations, and fractured electricity system governance have made wind and solar integration especially challenging. Historically, the U.S. electricity system has been "highly balkanized relative to most other countries" [14]. While state or regional electricity markets now coordinate 70% of wholesale electricity trades [15], across the western states, energy federalism continues to shape decentralized decision-making and coordination has often been fractious. For example, while most of California participates in a wholesale energy market operated by the Cal-

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ifornia Independent System Operator (CAISO),<sup>1</sup> the rest of the Western Interconnection<sup>2</sup> has opposed joining federally authorized regional transmission organizations (RTOs) like CAISO and is managed through 37 other balancing authorities.<sup>2</sup> The balancing authorities are traditionally regulated and lack dynamic mechanisms to respond to energy imbalances or congestion. Within this institutionally and jurisdictionally complex system, policies and market designs determine the mix of generating resources, location of transmission assets, whether conventional or renewable resources are curtailed, and the extent to which alternative tools for maintaining system balance are available.

The expansion of renewable resources in the Western United States has, in turn, increased pressure on utilities and energy system planners to improve renewable resource integration while maintaining reliability, affordability, and improving system efficiencies. State renewable energy policy goals, coupled with decreasing costs of renewable technologies, have supported the installation of approximately 75 GW of wind and solar across the West [16]. It has also led some industry leaders and policy makers in the West to explore new approaches for regional electricity system governance. In the Western Interconnection, expansion of regional electricity markets would increase efficiency, reduce current and anticipated curtailments, and facilitate renewable resource integration through automated economic dispatch and access to larger geographic regions [17–24]. However, regionalization will alter the distribution of benefits and burdens among stakeholders and the political and institutional challenges require more coordination, policy innovation, and new institutional paradigms of electricity system governance.

The recent CAISO initiative to make energy imbalance market (EIM) services available to balancing authorities throughout the Western Interconnection is changing electricity system governance in critical ways. Typically Western balancing authorities have relied on bilateral electricity contracts instead of real-time energy markets. The EIM will extend the real-time energy market outside of California while allowing Western-balancing authorities to maintain a level of autonomy from Federal Energy Regulatory Commission (FERC) jurisdiction and the CAISO market. The EIM provides participating balancing authorities and CAISO with greater efficiency and flexibility through real-time automated and economic dispatch, improved communications, increased system visibility, access to additional flexible reserves, and sharing of resources. Expansion of the EIM to PacifiCorp, the first balancing authority to participate, started live operation on November 1, 2014. NV Energy began participating in December 2015 and Puget Sound Electric and Arizona Public Service Company signed agreements to join in 2016 (Fig. 1).<sup>3</sup> However, important questions of long-term EIM governance remain.

The EIM is being implemented through a newly emerging interorganizational collaboration among CAISO, incumbent CAISO stakeholders, new EIM participants, and other entities in the Western Interconnection. An interorganizational collaboration is a distinct organizational form in which members organize around social problems or opportunities for innovation to leverage difference in knowledge, skills, or resources and to accomplish objectives that could not be realized alone [25–27]. The emerging EIM governance structure is a particular type of interorganizational collaboration, referred to as a boundary organization, in which policy

and technical-scientific domains co-mingle [28,29], and the multiple tensions among diverse stakeholders are negotiated through a dynamic process of continuous negotiation [28].

A fundamental issue for boundary organizations that rely on voluntary participation is how to achieve collective action. CAISO is extending its market infrastructure, but participation in the EIM is voluntary. CAISO must engage with and be responsive to stakeholders and delegation of CAISO authority is a central implementation question. The nature of the EIM depends on the interaction among incumbent and new stakeholders and their willingness to participate in collective action. Interorganizational collaboration literature suggests that collective identity can motivate collective action because it provides a rationale for cooperation and creates the legitimacy needed to enable action [25]. Collective identity is particularly important for collective action in voluntary collaborations where hierarchical and economic authority is limited [25,26].

Traditional research on boundary organizations and collective identity often conceptualizes interactions as seeking lasting stability among stakeholder demands [27–30] and identity as forming around central, enduring, and distinctive attributes [31]. However, given the pressing need for energy governance arrangements to be dynamic, rather than static [32], the contingency of technological development [33], and our interest in the process of governance transition in the Western Interconnection, we draw on a growing literature that focuses on the tension and fluidity in both collective identity and boundary organizing [25,26,34–36]. This literature is grounded in a discursive perspective, which focuses on how collective identity is produced and reproduced through conversations, recognizes the contextual and temporal nature of boundary organizing, shifts attention from assessing beliefs, and allows the researcher to focus on how change occurs in practice. Furthermore, our approach and findings directly address some of the “most promising avenues” as identified by Sovacool: communication and persuasion, geography and scale, and institutions and energy governance. In particular, by examining a newly emerging governance structure this study contributes to answering, How “have the central principles of governing energy shifted?” [37].

The purpose of this study is to conceptualize the context of evolving electricity system governance in the Western United States using a model of discourse and collaboration as a theoretical framework for explanation. We develop a longitudinal case study of the formation of the EIM Transitional Committee. This committee is an initial and temporary governance structure for the EIM. Using document analysis, interviews and field observations we explain the boundaries that contributed to the previous lack of organized markets in the Western Interconnection and we trace the emergence of the EIM Transitional Committee and a new collective identity.

This study extends the literature on collective identity and interorganizational collaboration to the context of boundary organizations by demonstrating how discursive practices and strategies can constitute the collective identity of an emerging boundary organization. This study demonstrates how discursive practices that maintain a space for both agreement and dissent contribute to formation of a dynamic collective identity. Furthermore, this study demonstrates how the discursive strategy of abstraction can be used to normalize dissensus and thereby, allow a collective identity to form by orienting stakeholders to diverse understandings of an issue and preserving participation of multiple voices. Finally, this study explains the tensions in the Western Interconnection that prevented previous efforts to introduce organized markets from succeeding, how the growth of renewable resources has put pressure on legacy governance institutions, and the strategies that have contributed to change.

<sup>1</sup> List of Acronyms: CAISO—California Independent System Operator; EIM—Energy Imbalance Market; FERC—Federal Energy Regulatory Commission; PUC—Public Utility Commission; RTO—Regional Transmission Organization.

<sup>2</sup> For definition see Table 1.

<sup>3</sup> In November 2015 and in April 2016, Portland General Electric and Idaho Power, respectively, announced their intent to join CAISO's Energy Imbalance Market.

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