GRANULAR MATCHING FOR GREEN ELECTRICITY CLAIMS: MOTIVATIONS, CHALLENGES, AND PATHWAYS TO SUCCESSFUL IMPLEMENTATION

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Overview

The liberalization of power markets worldwide has empowered consumers to advocate for green electricity. Recent legislation, such as the Corporate Sustainability Reporting Directive (CSRD), has further reinforced the imperative for firms to adopt sustainable practices. Consequently, the demand for green electricity has grown significantly. The green-labeling of electricity relies on Energy Attribute Certificates (EACs), which are typically canceled on an annual basis to attribute renewable energy usage to an entity's yearly electricity consumption. However, this annual accounting system has faced sustained criticism from academics and industry stakeholders for its limited effectiveness and transparency. Calls for a transition to more granular accounting, enabling closer alignment between electricity consumption and renewable generation in time and location, have grown louder. Despite these calls, research on the implementation of granular matching remains scarce.

My study addresses this gap by leveraging insights from first movers in granular energy matching. Using a multiple case study approach, I investigate the motivations, challenges, and pathways for adopting more granular matching. Aiming to enhance the credibility and effectiveness of green electricity claims, my research offers practical and theoretical insights and recommendations for policy frameworks to support future implementation efforts.

Methods

I seek to answer three key research questions:

1. What are the main motivations and enablers behind adopting granular matching for green electricity claims?
2. What are the key challenges and barriers to implementing granular matching for green electricity claims?
3. How can granular matching be effectively navigated and implemented to enhance green electricity claims?

To address these questions, I employ a multiple case study approach based on Kathleen Eisenhardt's framework for theory building (1989, 2021). Following Eisenhardt's key sampling principles, I theoretically sample my cases via a three-stage process:

First, I focus exclusively on cases that have actively engaged in granular matching. Second, I limit my analysis to cases within a homogeneous market environment, specifically the European Guarantee of Origin (GO) market, the largest standardized EAC market. To enrich theory building by capturing both similarities and differences across cases, I sample within and across four key areas of granular matching: Electricity Provision (generation and supply of renewable electricity to consumers utilizing granular matching), Matching Solution Provision (development and management of platforms and technologies enabling real-time matching of renewable energy consumption with production), Registering and Certification (creation and oversight of registries and certification systems that verify and track the origin of renewable electricity), and Corporate Procurement (granular procurement of renewable energy and EACs).

My data collection involves conducted semi-structured interviews with experts from the selected firms, supplemented by archival data, including case descriptions, workshop recordings, and podcasts. Additionally, I draw on interviews conducted with stakeholders from related industry initiatives and standard-setting organizations to triangulate my findings. I ultimately derive the theoretical framework for the adoption of granular matching by transcribing, systematically coding, and analyzing the collected data using both within-case and cross-case analysis.

Results

Preliminary findings reveal that motivations for adopting granular matching vary across the four areas of investigation. For organizations involved in "Electricity Procurement", motivations often center on enhancing sustainability credentials and mitigating risks of greenwashing. In contrast, in the other three areas, motivations primarily focus on meeting customer demands for greater transparency and market differentiation.

However, the transition to granular matching is not without significant challenges. Key obstacles include the need for advanced technical expertise, (perceived) high setup costs, limited access to real-time and detailed data, and the operational complexity of managing the voluntary granular system while complying to the mandated annual certificate cancellation. Furthermore, uneven resource availability across Europe exacerbates locational disparities, hindering implementation in certain regions. The severity of these challenges is often shaped by specific design and approach choices. Moreover, small firms and less energy-intensive firms are found to face particularly significant challenges in adopting granular matching.

Collaboration emerges as a pivotal enabler for overcoming these barriers. By pooling resources, sharing expertise, and fostering knowledge exchange, organizations can address competence gaps and infrastructure limitations. Additionally, collaboration can generate added value; for example, strong demand from large customers has helped organizations overcome internal resistance related to setup costs and operational dualism.

Conclusions

The results of my study can largely be grounded within Resource Dependency Theory (RDT) and Institutional Theory. RDT emphasizes organizations' reliance on external resources, underscoring the critical role of collaboration and partnerships in addressing resource and capability gaps when adopting granular matching. Institutional Theory sheds light on the pressures driving organizations toward granular matching, particularly normative pressures (e.g., customer and societal demands for transparency) and coercive pressures (e.g., regulatory mandates such as the CSRD).

Moving forward, based on my analysis, I urge standard setters and policymakers to support the adoption of granular matching by developing flexible frameworks that allow for gradual transitions and account for the varying capacities of firms, such as those stemming from their differing significance of energy. By facilitating a broader adoption of granular matching, these measures can help enhance the effectiveness of green electricity claims and facilitate more robust and transparent practices in the energy sector.

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