FEDECOM "Market Watch" Newsletter

Edition N°3 / Q3 2024

Zia.Lennard@R2Msolution.com

This 3rd Edition of the FEDECOM market watch newsletter explores:

- **Page 1:** Overview of the first two Editions and preview of the current third Edition.
- **Pages 2-3:** FEDECOM Customer Segments (i.e., Managers, Members, Municipalities, Grid Operators).
- **Pages 3-4:** Energy Community Business Model Archetypes (i.e., CSOPs, P2P, PAYG, EaaS).
- **Page 5:** In the energy community news.

Page 1. **Contents**

If any partner wishes to learn more about the market watch results presented herein (or any other trends), email me (zia.lennard@r2msolution.com) and I will be happy to explore the topic(s).

Contents

QUICK REFERENCE:

Page 2. **FEDECOM Customer Segments (1 of 2)**

This page highlights the main FEDECOM Customer Segment: Energy Community Managers.

Energy Community Managers

Software

- **ROSE Energy Community** (MAPS ENERGY) is an innovative cloud application for creating simulating and fully managing energy communities that combines an Intelligent Energy Management module and a mobile App to engage participants. Configure, simulate and evaluate energy and economic performance in advance.
- **Energy Community Manager Tool** (HexErgy) is used for configuring, monitoring, optimizing, managing the members and devices of any energy community. Each energy community member must be measured, and the flexibility of the platform allow to integrate any sensor already install or use directly the sensor from our partner.
- **Torus Community** (Torus) is a distributed energy management application that enhances grid stability. The initiative uses advanced microgrid technology to transform buildings into mini power plants, providing real-time insights, reduced power costs, carbon emissions reduction, corporate sustainability support, and educational resources for energy resilience.
- **coneva Community** (coneva) is software that enables community aggregation and balancing of generation and consumption as core functions. Robust algorithms manage balancing, with frontend applications providing visualization. Local energy management optimizes collective self-consumption, offering economic and ecological benefits through charging infrastructure, battery storage, and heat pumps.
- **Communit-e** (CIRCE) promotes sustainability and efficiency in local communities by managing energy resources, monitoring production and consumption, enabling collaborative sharing, and integrating renewable energy sources.
- **FlexyGrid** (FlexyGrid) is software for managing energy consumption in RECs, offering a user-friendly interface, economic benefits, and support for decarbonization, encouraging participation from various users.
- **QUIXOTIC** (QUIXOTIC 360) provides a cloud-based software solution for managing RECs and CECs, promoting RE production and consumption in Spain. The platform includes tools for CRM management, invoicing, and mobile app integration, emphasizing social movement and collaboration in project development.

Papers

- **(2024, HAL): "A Three-Stage Strategy with Settlement for an Energy Community Management Under Grid Constraints"** This paper proposes a three-stage management strategy for a low voltage energy community, achieving an average 30% individual cost reduction among 55 households, based on real-time operation, sensitivity studies, and scalability tests.
- **(2024, Elsevier):** "**How Can ECs Provide Grid Services?** A Dynamic Pricing Mechanism with Budget Balance, Individual Rationality, and Fair Allocation" This study explores enabling ECs to offer grid services to DSOs, focusing on capacity limitation services using a bilateral agreement for reduced grid import tariffs, requiring coordination between community managers and prosumers. The model uses dynamic pricing to ensure budget balance and fair allocation of benefits.
- **(2024, MDPI AG): "Reinforcement Learning for Energy Community Management: A European-Scale Study"** This paper presents a European-scale study on energy management within RECs introducing a reinforcement learning controller for Battery Energy Storage Systems (BESSs) and energy flows. The research analyzes various energy communities and markets across Europe, including Italy. The RL controller outperforms state-of-the-art rule-based controllers in simulations, demonstrating adaptability and alignment with complex patterns observed in Italian and European energy markets.
- **(2024, MDPI AG): "EC Management Based on AI for the Implementation of RES in Smart Homes"** This paper is on a home-smart community connected to a power grid with cooperative game theory to share excess energy and reduce costs.
- **(2023, Elsevier): "An integrated model for CECs and RECs based on clean energy package:** A two-stage risk-based approach" This paper proposes a two-stage risk-based optimization model for energy management in Smart Multi-Carrier Energy Networks (SMCENs) incorporating Citizen ECs (CECs) and Renewable ECs (RECs). The model considers energy demand uncertainties and operator risk attitudes, determining (Smart Multi-Carrier Energy Network) SMCEN profit.
- **(2023, HAL): "Coupling Optimal Energy Management and Allocation Through Keys of Repartition in ECs"** This paper discusses the management of an EC where distributed energy resources are controlled collectively, and energy is distributed among members through 'keys of distribution'. An all-in-one optimization method is proposed, integrating energy management strategy with cost allocation, resulting in a 10.7% total bill reduction in a French context.
- **(2019, IEEE): "Artificial intelligence based smart energy community management: A reinforcement learning approach"** The paper introduces a smart EC management system that enables P2P trading and household energy storage, utilizing a local energy pool and real-time demand/supply ratio to optimize renewable energy utilization and promote participation, using a Markov Decision Process and reinforcement learning algorithm.
- **(2018, IEEE):** "**The 'Energy Community Management' Framework for Energy Service Providers"** This bottom-up approach integrates personal preferences for energy-related rule settings among ECs. It aims to enhance the integration of ECs in Smart Grid Architecture by ensuring their functionality is determined based on these preferences.

Page 3. **FEDECOM Customer Segments (2 of 2)**

This page highlights the 3 secondary FEDECOM Customer Segments: Energy Community Members, Municipalities, and Grid Operators.

Energy Community Members

- (2024, Elsevier): **"Are EC members more flexible than individual prosumers? Evidence from a serious game"** This study explores the impact of RECs on energy flexibility among young adults, finding that belonging, peer pressure, and environmental concerns influence energy flexibility, suggesting potential benefits for sustainable practices.
- (2024, T&F): **"Citizens' participation in local energy communities: the role of technology as a stimulus"** This study explores the determinants of citizen participation in LECs, focusing on sustainable technologies, gamification, empowerment, and pro-environmental behavior. It highlights the importance of these factors in sustainable development.
- (2023, Enlit): **"How young people can contribute to energy communities"** Sheen Schockaert (REScoop, Eco Power) emphasizes youth's role in ECs, despite challenges like low awareness and policy hurdles.
- (2022, Elsevier): **"Modeling the EC members' willingness to change their behaviour with multi-agent systems"** This study proposes a multi-agent modeling framework for ECs, focusing on collective actions and user sobriety to reduce carbon emissions in residential areas, highlighting the potential of energy sharing mechanisms.
- (2021, Springer): **Web-based platform for the management of citizen energy communities and their members"** This paper proposes a platform for CEC management, focusing on energy tariffs, end-users' aggregation, price elasticity, and load response. It presents a case study and offers deep analysis of energy profiles.

Municipalities

- (2024, Sun4All): **"Municipalities: with great power come green responsibilities?** Highlighting effective ways for local governments to support ECs and socially inclusive RE projects" The report states the crucial role of local governments in the EU's green transition, but suggests challenges such as insufficient funding, human resources, and skills.
- (2024, Elsevier): **"We like sharing energy but currently there's no advantage**: Transformative opportunities and challenges of local energy communities in Europe" This paper highlights the challenges faced by LECs in driving energy innovation, highlighting the need for legislation to remove barriers and promote democratic participation, despite the willingness of municipal companies to adopt innovations.
- (2023, IEEE): **"Municipalities' ecosystem roles in different energy communities"** This study uses the ecosystem approach to present an overview of different ECs and municipalities' roles in them. Mostly, the municipalities have a supportive and reactive role, but they also can have a proactive ecosystem leadership role in coordinating and facilitating ECs.
- (2020, Elsevier): **"From smart EC to smart energy municipalities: Literature review, agendas and pathways"** This paper examines smart energy systems at community level, and their potential applications in smart energy municipalities. It emphasizes the importance of a coherent approach to achieve sustainable RES and efficient sources.
- (2020, Springer): **"How municipalities support energy cooperatives: survey results from Germany and Switzerland"** This study compares limiting factors and municipal support for energy cooperatives in Germany and Switzerland using survey data. Results show that municipal support can benefit cooperatives by addressing major limiting factors.

Grid Operators

- (2024, DG Ener): **"Energy Communities' impact on grids"** This report explores the role of ECs in promoting RE generation and democratizing the energy sector. It highlights the EU's support for these communities, their potential for grid integration, and the need for inclusive market designs.
- (2024, Elsevier): **"On the operation and implications of grid-interactive RECs"** This paper proposes a grid-interactive approach for RECs, enhancing efficiency and stability by providing flexibility and reducing curtailment.
- (2024, MDPI AG): **"From LECs towards National Energy System: A Grid-Aware Techno-Economic Analysis"** This paper demonstrates the integration of ECs at the national level using a bottom-up approach.
- (2023, CESifo): **"The Energy Community and the Grid"** This paper explores how RECs can reduce energy system costs by promoting self-consumption, aligning community interests with welfare maximization, and implementing feasible internal organization for benefit distribution.
- (2022, Elsevier): **"The grid access of ECs: a comparison of power grid governance in France and Germany"** This study examines the access conditions for ECs in France and Germany, focusing on RE connections, affordable prices, and the influence of national regulations and financial incentives.

Page 4. **Business Models (1 of 2)**

The energy community business model explored on this page is: CSOP

Consumer Stock Ownership Plans (CSOPs)

- (2024, Elsevier): **"Empirical insights into enabling and impeding factors for increasing citizen investments in RECs"** This study explores factors influencing citizen investments in RECs. It finds that participants value delegating voting rights to trustees but dislike capital-based voting rules and co-investments by firms. The findings suggest that a REC business model with ownership and governance features may face a trade-off between lower participation rates and higher investment amounts from firms, municipalities, and citizens. Results give mixed support for the scalability of a CSOP.
- (2023, U-Porto): **"Understanding the Implementation of RECs in Portugal – Hurdles and Benefits"** This dissertation states that REC business models depend on its unique situation, including socio-economic outlook, governance, and resource capabilities. RECs require flexibility, equitable distribution of obligations, and compliance with RED II. The CSOP model is emphasized for scenarios with limited funding, diverse membership, and small members.
- (2021, SCORE): **How to set up a CSOP for Energy Communities"** This report provides guidance to local municipalities on setting up an energy community and a CSOP. It outlines practical steps, feasibility study, and stakeholder involvement, aiming to inform interested municipalities and support inclusive community energy projects.
- (2021, Elsevier): **"Implementing a just RE transition: Policy advice for transposing the new European rules for RECs"** The paper highlights the importance of financing and ownership models for renewable energy complementarity, resource organization, demographics, and inclusion of marginalized groups in Member States for a just energy transition and RED II implementation. It states that the co-operative model and CSOPs are a business model specifically intended to support engagement of low-income households in joint ventures.
- (2021, CSD): **"Challenges towards implementation of the CSOP model and policy options for RECs in Europe"** This presentation focuses on the rights of citizens and local entities under the new Renewable Energy Directive II (RED II). Key rights include production and consumption rights, market access, and peer-to-peer (P2P) trading. Support schemes and incentives vary across countries, including feed-in tariffs (FiT), premium tariffs, tax deductions, and tax deductions for energy efficiency (EE) and RE projects. Challenges include inconsistent legal frameworks, access to finance, and technological hurdles in balancing RE supply with demand.
- (2021, REES): **"Blockchain-Based CSOPs As a Catalyst for Impact Investments in Sustainable Energy Infrastructure"** This paper proposes a sustainable energy infrastructure model using a CSOP model and blockchain-based smart contracts, transferring ownership to the community over time. The model aims for long-term energy supply in developing countries through self-administration, education, and stakeholder participation.
- (2020, MDPI AG): **"CSOPs—The Prototype Business Model for RECs"** The article highlights the importance of flexibility in business models. CSOPs facilitate scalable investments in utilities, enabling low-income households to invest in renewable projects. They reduce transaction costs and provide consumers with additional income. Recommendations for implementing CSOPs are formulated.
- (2020, SCORE): **"Consumer Co-Ownership in Renewables in RECs under the new Renewable Energy Directive (RED II)"** This is a presentation from the SCORE Workshop & Webinar, delivered by Prof. Dr. iur. Jens Lowitzsch, European University Viadrina, Kelso Professor of Comparative Law, East European Business Law and European Legal Policy
- (2020, EECJ): **"Investing in a renewable future – RECs, consumer (co-)ownership and energy sharing** in the clean energy package" The article is an overview of new rules for RECs under the RED II and IEMD/R frameworks. It analyzes prevalent business models for RE investments across the EU, focusing on energy/electricity sharing within RECs and digital technologies. It also introduces a financing concept for consumer co-ownership compatible with RECs (i.e., CSOPs).
- (2019, MDPI AG): **"Consumer Stock Ownership Plans (CSOPs)"** The article presents consumer stock ownership plans (CSOPs) as a prototype business model for Renewable Energy Certificates (RECs), highlighting the importance of flexibility in business models. CSOPs facilitate scalable investments in utilities, enabling low-income households to invest in renewable projects. They reduce transaction costs and provide consumers with additional income. Recommendations for implementing CSOPs are formulated.
- (2019, IOP): **"Financing Renewables while Implementing EE Measures through CSOPs"** This paper demonstrates synergies between EE measures and RE investments via CSOP financing in blocks of flats in Poland and the Czech Republic. Empirical evidence from Germany backs these effects of consumer co-ownership. Preferential conditions for RECs under the 2018 recast of the Renewable Energy Directive (RED II) will support such schemes in the future.
- (2019, RELP): **"Consumer (Co-)ownership in Renewables, EE and the Fight Against Energy Poverty** – a Dilemma of Energy Transitions" This article argues that CSOPs can contribute to and meet the challenges of opening up the existing hermetic system of property ownership.

Page 5. **Business Models (2 of 2)**

The business models explored on this page are: P2P, PAYGo, EaaS, & Aggregation.

Peer-to-Peer (P2P)

- (2023, MDPI AG): **"A Case Study of Existing Peer-to-Peer Energy Trading Platforms"** This paper provides a comparative analysis of various P2P energy trading schemes, focusing on their business models, market focus, and the use of blockchain technology. It includes case studies of platforms like Piclo, Vandebron, and Power Ledger.
- (2022, ORE): **Peer-to-peer energy communities: regulatory barriers in the EU context"** This paper examines the knowledge advancement in the regulatory context of 4 pilot sites in the Netherlands, Spain, Slovenia, and Italy.
- (2021, FSR): **"Peer-to-Peer Trading and Energy Community in the Electricity Market** - Analysing the Literature on Law and Regulation and Looking Ahead to Future Challenges" This article surveys existing research on legal aspects of P2P trading and ECs in the EU and aims to provide an overview of potential legal issues.
- (2021, FSR): **"Peer-to-Peer, Energy Communities, Legal Definitions & Access to Markets"** This article explores the legal challenges and market access issues for P2P energy trading and energy communities.
- (2021, Elsevier): **"Roles of Retailers in the Peer-to-Peer Electricity Market"** This paper examines different market models, including retailer-based P2P models, and discusses the participation and flexibility of prosumers in these markets.
- (2019, Elsevier): **"Peer-to-peer and community-based markets: A comprehensive review"** This paper contributes with an overview of these new P2P markets that starts with the motivation, challenges, market designs moving to the potential future developments in this field, providing recommendations while considering a test-case.

Pay-as-you-go (PAYGo)

- (2023, Switch2): **Pay as You Go Energy - Is It the Future for Community Heating?** This blog post explores the potential of pay-as-you-go energy systems in community heating, highlighting their benefits like affordability, flexibility, and cost management. It also addresses challenges like infrastructure investment and consumer education.
- (2020, IRENA): **"Innovation landscape brief: Pay-as-you-go models"** This report highlights the role of PAYG systems in enhancing energy access through RES, especially for off-grid communities. PAYG models allow consumers to pay in installments through mobile payment systems, making solar energy more affordable and enabling innovations like community ownership and P2P trading. Key enablers include consumer awareness and access to finance.

Energy-as-a-service (EaaS)

- (2023, Elsevier): **"An energy-as-a-service business model for aggregators of prosumers"** This paper proposes a new business model for aggregators of prosumers based on energy-as-a-service, which allows prosumers to pay a monthly fee for aggregators to represent and optimize them in multiple wholesale electricity markets. This model maximizes economic benefits for both aggregators and prosumers, increasing average profit by 438% and reducing average electricity costs by $583/year. The model also provides simplicity and predictability for prosumers.
- (2020, IRENA): **"Innovation landscape brief: Energy as a Service"** This report highlights the emerging business model of Energy-as-a-Service (EaaS) in the context of digitalization and distributed energy resources. EaaS offers various energy-related services to consumers, allowing energy service providers (ESPs) to bundle services like energy advice, asset installation, and energy management. EaaS is gaining traction globally, with SolarCloud and Helen providing solutions.

Aggregation

- (2024, BMWK): **"Aggregator Services for Energy Communities"** This webpage mentions the GAIA-X project in relation to aggregator services for ECs. The project offers a secure transfer of energy production plant data to a GAIA-X-based cloud infrastructure, enabling the creation of new business models and addressing data sovereignty issues. This solution can be differentiated according to the various actors involved, enabling the creation of new business models.
- (2023, MDPI AG): **"Business Models for Energy Community in the Aggregator Perspective**: State of the Art and Research Gaps" The study revises current research agenda by conducting a systematic literature review. It highlights Aggregators' features, strategies, value capture, partners, customers, financial aspects, and business model structures. It also considers the EC context, potential areas for Aggregator support, hindrances, and gaps for future research.
- (2021, Elsevier): **"Optimal sizing of ECs with fair revenue sharing and exit clauses: Value, role and BM of aggregators** and users" This study presents a business model for aggregators of ECs that optimizes agency risk, reward distribution, fair payment, and exit clauses. Results show cost reduction, improved RES penetration, and stable reward schemes.

Page 6. **In the energy community news**

Noteworthy items not directly related to customer semgments or specific business models.

PAPERS

- (2023, Elsevier): **"ECs: A review on trends, energy system modelling, business models, and optimisation objectives"** This paper reviews EC literature, focusing on detailed business models and objective functions. It highlights collaborations across nations and research fields, highlighting significant research opportunities in technical design, policy, and economics, particularly in multi-energy and sector-coupled systems, which are rarely considered in the EC field.
- (2023, Elsevier): **"EC business models and their impact on the energy transition: Lessons learnt from France"** This paper examines five energy community business models (ECBMs) in the French energy system, revealing their contribution to policy objectives. However, no ECBM has improved grid flexibility. The study suggests three recommendations to help ECBM diffusion: protect economic viability, support intermediaries, and nurture local governments. These insights guide policymakers in effectively incorporating ECBMs into energy policy roadmaps.
-

REPORTS

- (2024, CEES): **"Energy solidarity toolkit"** This report provides guidance on how ECs can integrate solidarity measures into their core activities. It covers preparing for new skills, identifying and engaging with vulnerable individuals, practicing energy solidarity, financing, legal and regulatory aspects, and evaluating.
- (2023, CLUE): **"D3.3 Requirements for tools for Local Energy Communities"** This deliverable describes and characterises different digital tools that are needed for the development of LECs. It argues that the development of LECs can be divided into 5 phases: LEC concept development, LEC energy system design, LEC implementation and organisation, LEC energy system operation and LEC transaction accounting. Different digital tools are needed for all 5 phases.
- (2023, CLUE): **"D8.3 Final recommendations regarding technical, organisational, regulatory aspects for future ECs"** This deliverable provides an overview of technical, organizational, and regulatory aspects of ECs in four countries involved in the CLUE project. The report covers demo sites, progress made between Austria and Sweden, organizational and regulatory barriers, and the current state of regulatory and organizational concepts in Scotland. It also discusses lessons learned and next steps, including further work on market potential, new business models, and solution upscaling.

NEWS

- (2024, CINEA): **"Insightful discussions in the last LIFE CET energy community projects' gathering"** This blog post reports on the CINEA gathering of EC projects, attracting 58 participants from 15 ongoing projects. Key highlights included policy updates, project sharing, breakout discussions, and feedback sessions.
- (2024, EUSEW): **"EU Energy Communities legislation 2.0: an upwards trend"** This blog post discusses the EU's second-generation EC legislation, which empowers citizens to own and manage RES, reducing reliance on corporations.
- (2024, Resilience): **"Unlocking community energy democracy"** This blog post states that the UK Labour Party's Local Power Plan aims to empower local authorities and communities to own RE projects, with a £3.3 billion fund.
- (2024, Balkan Green Energy News): **"Energy Community issues policy guidelines for energy communities"** This blog post reports on how the EC Secretariat has released policy guidelines for establishing ECs that aim to facilitate development in Western Balkans, Ukraine, Moldova, and Georgia.
- (2024, Euronews): **"Not (just) for hippies: ECs should be the drivers of the EU's re-industrialisation"** This blog post describes how community led RE projects are transforming Europe's energy landscape, projecting that half of EU citizens could generate their own electricity by 2050. REScoop.eu represents over 2 million citizens, but these initiatives are often underestimated. The EU's upcoming Net Zero Industry Act and European cohesion policies highlight their importance.
- (2024, REScoop): **"Unleashing the potential of community energy in Poland"** This blog post discusses the rise of EC initiatives in Poland, particularly the formation of Związek SERC, a national coalition of energy cooperatives. Despite legal advancements, challenges remain, including regulatory restrictions and outdated laws. The coalition aims to clarify these issues and promote EC benefits, particularly amid energy security concerns following the Russian war.
- (2023, Enlit): **"Looking past profit to see the business case for energy communities"** This blog post argues that investors often view EC business models as risky, leading to a lack of understanding of their potential for long-term investment.
- (2023, Enlit): **"Maximising benefits for local energy communities"** This blog post addresses LECs in Europe, like the Minoan EC in Crete, aim for energy democracy and independence, despite challenges in legal frameworks and corporate exploitation. They focus on decentralization and community-driven projects, emphasizing social and developmental contributions.