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Guest Editorial

Challenges and opportunities of empowering consumers

Luiz Barroso and Carlos Batlle

Since their introduction decades ago, electricity markets have been largely one-sided. In most cases, end users have not even played the role of passive observers of market price fluctuations, they have directly ignored them.

There are many reasons why this has been the case. First, it is not easy to change consumer attitudes when electricity prices have been the direct responsibility of governments in one way or another for more than a century. Even today, the European Union (EU) energy crisis of 2022 is its best example, when electricity bills skyrocket, consumers look to their governments rather than regret not having secured their future price with contracts. But at the same time, governments and regulators have been reluctant to expose end-users to short- and long-term market signals: the costs of demand-side imbalances are generally socialized, and governments quickly and abruptly intervene in the markets as soon as prices reach high levels.

However, there is a growing consensus that an efficient decarbonization process requires the active participation of end users. Providing them with the regulatory tools, technology, and information needed to make smart and informed choices about when and how to consume electricity, is then a big challenge. These regulatory tools should also enable end users to become service providers for the system, for example, by unlocking their flexibility potential and thus facilitating the deployment of renewable energy sources and making it easier to achieve decarbonization targets.

This idea of giving individuals or households more control over their energy consumption, costs, and choices has been labeled “energy consumer empowerment.” As said, it does not come without its regulatory challenges. And they are the focus of this special issue of IEEE Power and Energy magazine. Our aim in this issue is to discuss regulatory and market tools and solutions to optimize end-users’ engagement in the decarbonization of power systems, based on practical experience. This issue features a carefully selected international group of authors with broad experience from both academia and industry, focusing on the regulatory and market challenges that lie ahead. We asked them to focus on the challenges that the goal of consumer empowerment poses for regulation and the barriers that need to be overcome. We asked them to be provocative in their writing, to stimulate a pragmatic debate about what has been learned and what is missing.

We start searching for lessons from full retail liberalization, a hot topic for the future. Not many experiences exist in which the process went all the way. The United Kingdom case is undoubtedly a key reference. So, we invited Prof. Stephen Thomas to develop his assessment of the benefits of removing regulated end-user tariffs, pushing British electricity consumers to choose their suppliers. He took up the challenge and delivered a paper with good food for thought, particularly for countries considering a retail liberalization process.

It is in this context that the analysis developed in our second paper is set. The team led by Gabriel Cunha discusses the challenges of achieving retail liberalization in middle-income countries, using Brazil as an example. Middle-income countries often have a high proportion of socially and economically vulnerable consumers, relatively young institutions, and immature markets for hedging risk and/or raising finance. In addition, "legacy costs" from 20th-century reforms can pose further challenges. The article highlights the challenges the country faces when taking the full retail liberalization road.

We then deep dive into business models for consumer engagement, examining engagement as a collective action, where a plurality of consumers chooses to act together. This is the concept of energy communities in Europe, the counterparts of Community Choice Aggregation (CCA) in the United States. Nicolò Rosseto discusses how energy communities work and illustrates some of the critical issues that have emerged, as well as the opportunity that the new energy reality in Europe may represent.

We then focus on the new role of end users as system service providers. Ellen Beckstedde and Leonardo Meeus discuss the potential of demand-side flexibility and how to unlock it, addressing the interactions between decentralized energy resources and Distribution System Operators (DSO) in the European context. DSOs face challenges connecting these new grid users to their networks, leading to an increased need for grid investments and new and complex coordination processes. These challenges entail potential cost increases but also opportunities for DSOs to manage their networks more efficiently. The authors did an outstanding job describing the need, organization structures, and open issues in congestion management in distribution grids.

Based on concepts of nearly zero energy building and smart building, Iason-Iraklis Avramidis, Florin Capitanescu, Geert Deconinck, Himanshu Nagpal, Per Heiselberg, and André Madureira, analyze a smart sustainable building archetype. The authors, benefitting from the results of a multi-year international research project, show the potential for smart sustainable building applications.

We complete the review by tackling the long-term dimension. Empowering customers necessarily requires exposing them not only to short-term but also to long-term price signals. The essential nature of the electricity service implies that this process cannot be realistically undertaken without designing the necessary safeguards against extreme price scenarios. With this in mind, we requested Pablo Rodilla, Paolo Mastropietro, and Paulo Brito-Pereira to draw regulatory recommendations for the participation of demand resources in capacity mechanisms. They identified all potential participation modes, highlighted the inefficiencies that could arise from certain designs and provided guidelines for regulators who are currently addressing this type of mechanism.

We could not complete a discussion about consumer empowerment without tackling the severe energy crisis Europe has faced since the summer of 2021. Governments intervened in markets and spent billions of euros to shield consumers and industry from high electricity prices. Tim Schittekatte and Carlos Batlle reflect on the European energy crisis and the overall market design, and on how consumers should hereafter be protected in a market-based way. They elaborate upon a proactive regulatory-driven

solution, named affordability options, to protect (certain tranches of) end users from periods of sustained high electricity prices.

Wrapping up this issue, we invited Jaume Loffredo, who represents the European Consumer Organisation, to walk the talk, that is, to reflect on whether the current legislation in Europe adequately empowers consumers to become active participants or not. In the In My View column, he brings a perspective on the status of consumer participation in EU power markets, its hurdles and how they can be overcome.

We would like to thank the authors for the time, dedication, and articles provided, which shed light on the key topics related to this discussion, which is very relevant. We thank IEEE Power & Energy Magazine for the opportunity to reflect on and analyze such challenging and relevant matters, which have taken us out of our comfort zones and made us reflect on them as well. We thank the Editor-in-Chief, Prof. Innocent Kawma, for continuing to provide the conditions for IEEE Power & Energy magazine to remain as an IEEE flagship publication. A special thank you goes to the past Editor-in-Chief, Steve Widergren, that supported our proposal and gave us all conditions to improve it through fruitful discussions with the magazine board members. And, last but not least, to all reviewers and the IEEE Editorial staff, for the usual brilliant work.

With these articles, we aim to give a contribution to the important debate of how to foster the active participation of end users in power markets. We hope the reader enjoys the reading as we enjoyed to plan and organize this issue.