

A Study on Energy Platform Using Data in the US: Based on Opening Platform Model

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Abstract

The purpose of this study is to analyze various energy platforms using data in the US and to suggest directions and implications. Some of the leading energy platforms are selected and analyzed based on the opening platform model. We focus on the case analysis of the US utility companies. In case of the horizontal open platform, Green Button sponsor's 'Connect My Data (CMD)' driven by the government invites the utility companies to jointly develop the sponsor's data solution. In case of the vertical open platform, the certification program 'Share My Data (SMD)' allows backward compatibility, because the technical improvement is minimal. The utility companies benchmark Amazon's three-sided market mediation and prefer platform and category exclusivity. For the former, they have data analytics companies like Enervue, Opower and for the latter, they have electronics manufactures and energy service providers (ESPs) like Distributed Energy Resources (DERs). Based on this US case study, we suggest the energy platforms to open their platform for renewable energy supply, energy conservation, high-efficiency products, and residential DER dissemination. To successfully implement the government's energy transition policy, the US platforms should be benchmarked as a business model. Especially, it is needed for them to coordinate a platform ecosystem. To ensure trust in the products and services offered on the marketplace platform, platform's certification program is helpful.

Keywords— Energy platform, data, ecosystem, Green Button, Share My Data

I. INTRODUCTION

The platform is defined in various forms depending on the actual situation and conditions. From a business point of view, a variety of businesses are created by connecting producers and consumers. The platform is usually a virtual market mediating transaction between producers and consumers and can provide low-cost and high-quality value to producers and consumers. The energy platform is applied throughout the energy industry, from electric power to gas and heating due to changes in energy policy, technology, market and consumer. The energy platform is divided into power grid and service platform business, and the U.S. companies aim to dominate business and increase profits through convergence of new industries.

The ecosystem of the energy service business focuses on data, power grid, customer management, market/transaction,

and energy service. With those core values, connection is important in order to serve as a foundation for convergence of technology and services. So, the energy platform ecosystem can be largely composed of three separate roles: 'Power grid', 'service', and 'data.'

The power or utility companies focus on operation and management of power facilities for stable electricity supply. It is conventional work of the utility company. The service providers can provide an efficiency environment commonly required for service activities at the point of contact with customers. They are used by the conventional utility companies, but newcomers using data are emerging as complementors to power companies. The last data engine companies have foundation for using information and software necessary for providing data-based services to the energy customers. This paper focuses on the service platform business ecosystem which consists of the U.S. utility companies, distributed energy resources (DERs) service companies and data engine companies.

II. THEORETICAL BACKGROUND

A. Previous Research

According to the research of Binley et al. (2016), in the US, utility companies have promoted high-efficiency products to customers. However, for example despite of various incentive programs for people in California like 'Plug Load Appliance Program' and 'Retail Product Program,' these conventional incentive programs are not effective and have difficulty promoting high-efficiency products [1]

Niederberger & Champniss (2017) tested direct and interaction effects of two distinct but related energy product attributes improving market transparency: Energy score, a relative product model energy efficiency index and energy savings, estimated energy bill savings compared to a base model benchmark. It shows the use of an energy score has a significant effect on consumer product choices, encouraging them to select more energy-efficient products, consistent with the observational data. Responses to the energy bill savings information varied across the studies, offering insights about the influence of buying context and decision styles on consumer choice. [2]

Wehlitz et al. (2017) define smart energy platform as smart appliances equipped with sensors, actuators and tags

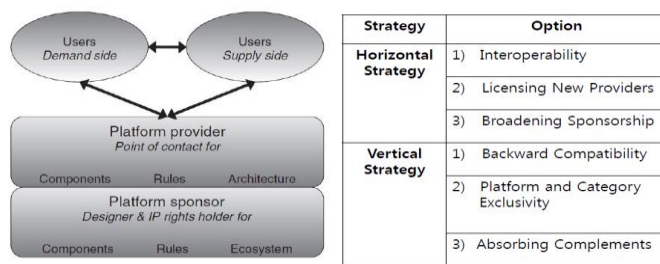
connected to the Internet and their ability to communicate with one another forms the basis for an Internet of Things (IoT) increase. They propose a solution for a smart energy platform to provide the infrastructure and tools enabling the integration of smart appliances and the development of value-added services for an automated energy management in households. They overview the main challenges for IoT platforms and show that existing solutions do not fully meet them. [3]

S.Kloppenburger & M. Boekelo focus on the energy platform. The smart grid is swept up by applying the economic, social and technological model of the platform to energy provisioning. The energy platforms offer decentralized, digitally enabled exchanges of energy from distributed resources. They can record flows of energy to administer connections of exchange between household users, develop algorithms to steer the flow of energy from and to household batteries, and enable crowdsourced investments into renewable energy production. In their platform studies, they show how logics of ‘platformization’ will drive changes to the energy system. The marketization of new domains and activities, the formation of new collectivities and the creation of digital environments can afford new types of engagement with energy assets and other users of the grid. Their concern is that uncertainties produced by these platforms and their tendency to privatize energy provisioning may slow down the transition towards sustainable energy systems and they call upon energy social scientists to not only examine these developments but also use these insights to participate in the responsible design of the energy grids of the future. [4]

B. Theoretical background

Eisenmann, Parker, and Van Alstyne (2008) [5] studies ‘opening platforms’ and defines platform-mediated networks including end users, complementors, platform providers who facilitate users’ access to complements, and sponsors who develop platform technologies, as Figure 1 shows.

Fig. 1. Platform-mediated network & strategic options for opening platform



Each of roles can be opened or closed. It is each platform’s strategic options. The researchers review factors motivating decisions to open or close platforms. At the platform provider and sponsor levels, there are three decision options and it is related to the horizontal strategy. The first horizontal option is interoperating with established rival platforms means, users of platform A can interact with platform B’s users, including supply-side users who offer complements. Second option is licensing additional platform providers. In case of relatively young market, a proprietary provider can mobilize users through subsidization strategies. The proprietary provider of a mature platform finds it attractive to license additional platform providers while preserving control over platform technology. Third option is broadening sponsorship. A more radical option for opening an established platform entails that

platform’s sole sponsor inviting other parties to jointly develop the platform’s core technology.

With respect to end users and complementors related to the vertical strategy. There are also three decision options. The first vertical option is backward compatibility with prior platform generations. When launching next-generation platform products and services, platform sponsors must decide whether to engineer them to be backward compatible with complements developed for previous platform generations. Failing to provide backward compatibility can be construed as closing a platform to the extent that it limits existing complementors’ access to new versions of the platform.

The second vertical option is securing exclusive rights to certain complements. Agreements between sponsors and third-party complementors that restrict complementors’ platform access have two dimensions: platform exclusivity and category exclusivity. The first type, ‘platform exclusivity’ means a sponsor’s denying a complementor access to rival platforms. When competing against rival platforms, securing the exclusive affiliation of complementors can accelerate a platform’s growth. In order to secure exclusive rights when a platform is young and there is uncertainty about its prospects, sponsors typically must offer economic concessions to third party complementors. After users are mobilized, however, the value of exclusive supply agreements to a platform provider typically will decline. The second type, ‘category exclusivity’ means a sponsor’s granting privileged platform access to a complementor. Complementors may be reluctant to make platform-specific investments if they will face a serious problem with ‘business stealing’ by their close rivals. One way for platform sponsors to profit from this situation is to deliberately exclude all but a few supply-side users, then charge that sole user high fees for the privilege of trading with the platform’s demand side users.

The third vertical option is absorbing complements into the core platform. As platforms mature, proprietary providers may absorb complements previously supplied by third parties.

This research’s implication is that platform’s strategy is moving from proprietary and shared platforms to hybrid governance models characterized by centralized control over platform technology such as closed sponsorship and shared responsibility for serving users such as an open platform provider.

III. RESEARCH DESIGN

Eisenmann, Parker, and Van Alstyne (2008) [5] categorize various strategic options about taking the platform open. As a result, the opening types are especially the innovation of the platform sponsors. It has been found that it promotes and enables “diversity” of services. Not only helping to meet the needs of users on the demand side, for the platform itself, opening platform can reduce the marketing costs, realize a more differentiated service provision, which in turn is a real benefit to all participants.

This study is interested in the data-based energy market and platform sponsor market in the already mature energy utility market. With this interest, the research questions are divided into the following two categories: 1) If an open type is possible in a two-sided market where the platform is mediated, what types of horizontal opening platform are realized in American utility industries?

2) If an open type is possible in a two-sided market where the platform is mediated, what types of vertical opening platform are realized in American utility industries?

The research scope will be limited to energy platforms centered on major U.S. utility companies. The research method is secondary literature analysis and each company's business strategy and financial status analysis will be conducted in parallel.

IV. ANALYSIS AND FINDINGS

A. Horizontal opening platform: Broadening Sponsorship

According to the above open platform strategy logic, platform's sole sponsor can invite other horizontal parties to jointly develop the platform's core technology. It has several potential advantages, for example, costs incurred in creating and maintaining a platform's core technology are to some extent fixed and independent of the number of firms involved in development, then the original sponsor can reduce its R&D costs by sharing those costs with additional sponsors and competition among sponsors to incorporate their respective technologies into a common standard may result in survival of the fittest proposals.

The case of energy sector is from the Green Button initiative in the US giving utility customers easy access to their electricity usage data. This data is provided as a text file in a format that is standard across multiple utilities and is shared with third party developers who can provide valuable context, analysis, and other functions based on that usage data. About 20-30 million customers (commercial and residential) have access to their data in this format by the end of 2012. [6]

The Green Button Connect My Data (CMD) standard is the energy-industry standard for enabling easy access to, and secure sharing of, utility-customer energy- and water-usage data. Utilities providing standards-based Green Button customer-consumption and billing data can provide customers new data-driven services, programs, and platforms; digitally empowering customers with the ability to securely transfer their data to third-party solution providers who can further assist them in monitoring and managing energy or water usage. As Figure 2 shows, Green Button CMD is an open-data standard designed to unlock access to utility interval usage and billing data providing easy, seamless access for third party software applications. It enables utility customers to authorize third-party solutions to quickly and securely obtain interval meter data and enables an accurate and detailed level of analysis to inform energy and water management decision-making, while ensuring customer data are protected and their privacy is maintained. [7, 8]

Fig. 2. Green Button based energy data sharing system in the US

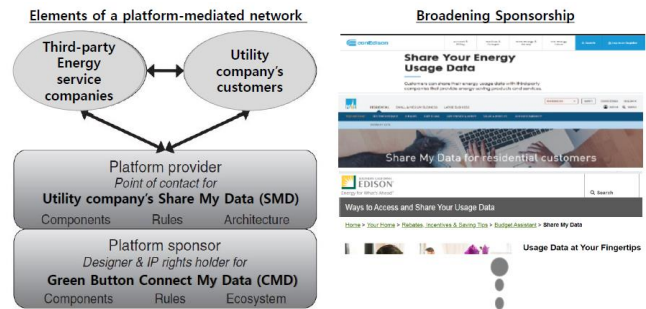


Green Button has broad sponsorships with the US major utility companies to make them share data more easily with authorized third parties, energy service companies. In order to be able to do so, the Green Button is linked to the US utility companies' 'Share My Data (SMD)' service which is a data analysis platform of the conventional utility enterprise. This sponsorship is government driven and SMD used for energy

savings, makes the national energy system stable and induce to save direct energy costs.

For this sponsorship, the US government promotes Green Button Alliance (GBA) which is a non-profit organization, formed in North Carolina, USA, as a 501(c)(3) corporation in 2015, to foster the development, compliance, and widespread adoption of the Green Button standard. [9] California Public Utilities Commission (CPUC) qualifies this sponsorship to the utility companies using consumer data clearly. In addition, the utility company should not transfer its customer's address or service ID to another company. The following Figure 3 shows the sponsorship of Green Button Alliance and the major US utility companies. [10]

Fig. 3. Green Button CMD and sponsorships with utility companies



B. Vertical opening platform: Backward compatibility

On the two-sided market, customers of the utility companies can use each company's SMD for free. Through this, customers can understand and manage capacity and the third-party energy service company can also create innovative ideas for customer energy savings. In terms of the backward compatibility, the utility company customers have the authority to control access their own energy consumption data. They have online accounts of the utility companies and through the website, they can grant access to the third-party service companies and allow multiple energy service companies to access their data. After downloading the software, customers can select and sign among the third-party energy companies authorized by their utility company. The ultimate purpose of SMD is that consumers can save energy and use it efficiently. Various energy solutions for similar purposes are provided on the web, but the differentiation of this SMD is that the utility is accredited by the provider of energy saving solutions.

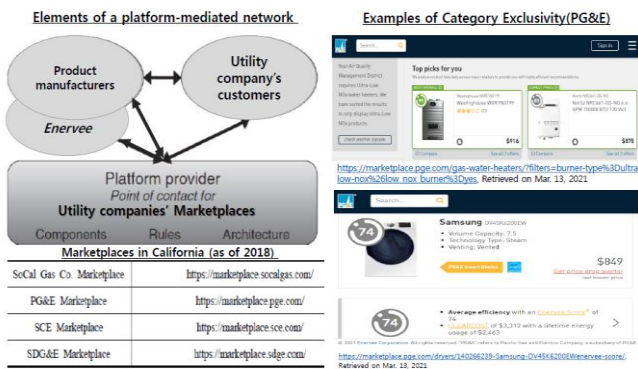
C. Vertical opening platform: Platform & category exclusivity

Based on the authorized data sharing service, SMD between the customers and the third-party energy service companies, the US utility companies seek online energy marketplaces for inducing consumers to purchase energy-efficient products. In terms of platform exclusivity, the utility companies' marketplace goes with a data engine company, 'Enervee' which provides data engine to organize data collection including 1,000,000 products and 100,000 energy consumption profiles and certificates. The exclusive affiliation of complementors like Enervee can accelerate a platform's growth. [5]

In terms of category exclusivity, the utility companies establish a cooperative partnership with all product manufacturers such as GE, LG, Samsung, and so on. The following Figure 4 shows platform and category exclusivity.

The platform provider must ensure that sellers like Samsung manufacturer granted this privilege do not abuse their monopoly position, otherwise, demand-side users will avoid the platform. [5]

Fig. 4. Product marketplace with platform and category partnership

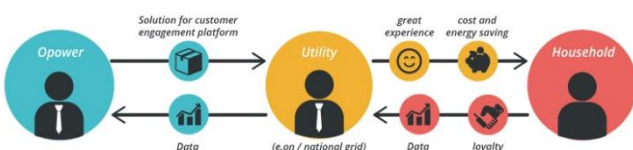


Product marketplace provides information and purchasing options for high-efficiency products to consumers and opens a variety of markets to partner manufacturers. For example, Pacific Gas and Electric Company (PG&E) in the US induces its customers to purchase energy-efficient products by establishing 'Marketplace' platform (marketplace.pge.com). By embedding the energy data into shopping information, it has a role of a platform provider to provide its own customers for affordable energy-efficient home appliances and devices. This Marketplace is intuitive and easy to reach consumers through 'energy score,' which is given a score of 1 to 100 for each product and the consumers enable comparison. The view of interested energy efficient products are offered and personalized energy savings rates for purchases is also provided. In addition, energy usage for high-efficiency equipment, potential energy savings, information on ratings, specifications, rebates, prices, and local stores are provided. It provides them with local store availability for a selection of 19 home appliance and consumer electronics product categories as of 2021. PG&E has been offering Marketplace to its customers since March 2015. [11]

Another vertical model as above is platform partnership with Opower, a software company transforming the way utilities relate to their customers by using data management, insightful analytics and behavioral science and category partnership with energy service providers (ESPs) focusing on distributed energy resources (DERs) like smart thermometer, residential solar power, energy efficiency service.

As Figure 5 shows, Opower brings rich AI tech and behavioral science methodology to each utility platform of its customer relationships, enabling its customer to learn more, enhancing its utility's program reach, and empowering real change in everyday habits that could change the world. [12]

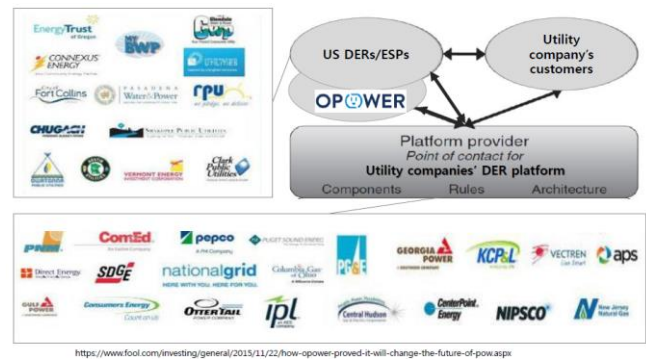
Fig. 5. Opower solution platform licensing utility platforms



As of 2021, 27 out of the 50 largest utilities in the US are Opower customers including ConEdison, Commonwealth Edison, Duke, First Energy, National Grid, PG&E, Southern

California Edison and Southern Company, as well as E.ON, EDF and Energy Australia internationally. Their leadership position has enabled them to build one of the largest energy datasets in the world. [13] The utility companies' DER platform ecosystem is the following Figure 6.

Fig. 6. DER platform's platform and category



ConEdison, a utility company in New York State, conducted a "Connected Home Platform pilot project" in 2015 to expand the introduction of DERs in the home sector and to revitalize the DER market. The biggest obstacles in spreading and expanding DERs are the lack of information about DER providers in demand side and the high cost for customer acquisition in supply side. The advantage of the platform is its scalability to minimize exploration and transaction costs and create other services and businesses. Also, if household customers and DER suppliers are matched on the platform, they meet the needs of customers by matching customized, personalized DERs, high-efficiency equipment or energy-saving services based on the energy usage data and analysis of households.

Energy data analysis is important for customer-tailored DER (Smart Thermostat, Outdoor Solar, Energy Saving Service), high-efficiency devices and services. ConEdison partnered with Opower, energy conservation solution provider to provide insight into customer energy consumption and Opower conducts 'outbound communication' providing the household customers information about DER companies in cooperation with call center company, Bridgevine. This outbound call method is the way to access customers on a large scale and it is important for customers who are not actively exploring information.

ConEdison is also considering selecting DER suppliers so that customers can trust and purchase products from platforms. During the pilot phase in 2015, three DER suppliers, SunPower, a solar system company, HomeServe USA, a home energy service provider, and Nest, a smart temperature controller was selected. SunPower provides its customers with systems combined with residential photovoltaic (PV) systems and residential solar and energy storage system (ESS) on its platform. HomeServe USA provides energy efficiency diagnostics/modifications and energy equipment installation and repair, while Nest sells products combined with proprietary smart thermostat systems, along with services that help customers reduce cooling and heating energy usage by adjusting temperature settings. ConEdison is a new revenue generator (DER supplier) with its platform and gets opportunities from such as advertising fees and analysis platform fees. Traditional customer engagement in energy efficiency programs has been increased with consistent and relevant message delivery to customers. [14, 15]

V. CONCLUSION

Among various overseas energy platforms, it focused on American companies that created a platform ecosystem using my data initiative of the government driven Green Button CMD. In the U.S., utility companies are expanding to marketplace and DER brokerage platforms based on SMD, a data-sharing platform. The results of the study are summarized in Table 1 below.

TABLE I. SUMMARY OF RESULTS

Platform	Strategic Options	Cases
Horizontal	Broadening sponsorship	Green Button CMD
Vertical	Backward compatibility	SMD
Vertical	Platform & category exclusivity	Product marketplace /DER MP

Through SMD, U.S. utilities provide personalized solutions that enable third parties, energy service companies to efficiently use energy to their customers. Product marketplaces encourage consumers to purchase energy-efficient products by adding energy information to shopping information. ConNectED Homes Platform provides customers with customized DERs and enterprises through various data analysis, including customer energy consumption data, residential forms, and regions.

In each case, market barriers exist in data sharing, high-efficiency product distribution, DER distribution, and renewable energy distribution, and the opening platform model is used as the way to overcome them. In the case of SMD, when sharing data, customers may hesitate to share their energy-using data because they lack information about third-party entities. Therefore, a third party authorized by the utility company could be selected by the customer to provide data. In the case of product marketplace, consumers can not consider information such as rebates, energy efficiency, life-cycle operating costs, and energy savings when purchasing products, and utility companies are in trouble promoting and disseminating high-efficiency products. By leveraging marketplace, utility companies can overcome these obstacles by providing customers with information about their incentive programs as well as energy information about products. In the case of DER marketplace, for example, ConNectED Homes Platform is built for the customers to reduce the cost of searching for DER suppliers and their products.

The analyzed power companies are making the most of their economic feasibility and scalability to build two-sided or three-sided platforms. Along with the economic feasibility of minimizing exploration and transaction costs, the scalability of consumers and businesses to create value is being maximized through the opening platform model. The platform operates in partnership with various types of companies. Since the platform is based on data, it needs a company that manages and analyzes data, and if it sells products, it needs a cooperative relationship with manufacturers and suppliers.

Even if the operator of SMD is a power company, it partners with Green Button of government-driven data standardization and a third-party energy services company of data analytics and solutions delivery. Marketplace is operated by utilities after partnership with home appliance manufacturers such as Enervee, LG, and Samsung, which collect and organize data. ConNectED Homes Platform is partnered with data analytics firm, Opower and customer call center Bridgevine, and three DER vendors (SunPower,

HomeServe USA, Nest) and it is run by the power company, ConEdison.

SMD and ConNectED Home Platform use consumer's personal data including e-mail and product advertising. Since they use and analyze consumer data, only government-approved third-party companies can utilize consumer data, and the utility company cannot share consumer addresses or service IDs with other companies.

In conclusion, SMD allows consumers to save energy, get advice or consultation on medicine methods and products, which is available in the product marketplace leading to the purchase of high-efficiency products. DER platform like ConNectED Homes Platform allows consumers to use DER to save energy, get introduced to the product. It is also possible to purchase DER products through DER marketplace. Every platform is designed to efficiently use and save energy, and consumers, service providers, and platforms are the most powerful. They are organically connected to each other.

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