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Two-sided markets and the utility of the future: how services and transactions can shape the utility platform

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ABSTRACT

Platform business models are fundamentally different from traditional 'linear' business models in that they derive their revenues and profits primarily from intermediating transactions between buyers and sellers. In order for it to present a sustainable alternative to the traditional model, a utility platform will need to produce market growth, as benchmark platform businesses have. Getting there is a tall order for businesses that have focused on cost reduction as their primary value proposition.

1. Introduction

The coming of age of distributed energy resources (DERs) has introduced a degree of facilities-based competition into the retail electricity market, whereby small-scale resources (e.g., rooftop solar photovoltaics) can meet portions of local electricity demand. To make this work, these local resources need access to the electricity grid as well as a way to interact and settle accounts with customers. The infrastructure needed to facilitate the resulting transactions – involving electricity as well as energy-related services – has been referred to as the distribution or utility *platform*.

Recent articles and reports have chronicled the potential disruptive impact of these developments, particularly how it has consequences, perhaps significant, for system planning and utility revenue recovery. Some have gone so far as to suggest it places utilities in a financially untenable position. However, other analysts and some policymakers have centered their attention on the upside opportunities associated with platform business models. Specifically, they point to the profitability of notable platform businesses in the economy, and the possibility that a platform business, if operated by the utility, may be profitable enough to offset traditional utility revenue needs, in whole or in part. In other words, they suggest that the utility platform may present a proverbial "win-win" scenario: Greater access to the grid provides customers with choice, new services and, ideally, lower prices, while utilities, assuming that they are platform operators, will realize sizable revenue streams from facilitating peer-to-peer transactions.

Platform business models are fundamentally different from traditional "linear" business models that derive revenues and profits by converting inputs into finished products that are worth more than the sum of the input costs. In contrast, platforms derive their revenues and profits primarily from enabling, or intermediating, transactions between buyers and, frequently but not always, unaffiliated sellers. Platform developers and operators, such as Amazon, eBay and credit cards, have been very successful in their intermediary role – that is, taking a small percentage fee for facilitating the transaction – because their platform has facilitated market growth. Growth has come either from their platform's network effects – connecting more buyers with sellers (compared to the pre-platform portfolio of services) – or from flow-through from entirely new services, with innovation enabled, at least in part, by the access to customers and/or tools provided through the platform. A utility platform will likewise need to produce market growth in order for it to be financially viable and present a sustainable alternative to the traditional utility business model.

2. Platform basics

"Platform," as it is used in everyday parlance, typically refers to a set of systems and/or processes over which services can be provided. For example, it is not uncommon to hear about a platform that enables you to easily and rapidly rent a car. For that matter, utility systems are sometimes referred to as platforms over which electricity is delivered to customers. However, "platform" has a slightly different meaning in the utility of the future (UoF) context, which is more in line with the way the term is used in the economics and management literature.

Platforms, in economics, are rooted in two-sided markets, a business model that is found throughout the economy but is brand new for

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regulated infrastructure-based providers like electric utilities. This is bound to cause some confusion: all markets have two sides, namely a buyer and a seller. But, in economics, two-sided markets refer to situations in which buyers and sellers are brought together through an intermediary that operates an ecosystem that enables them to engage in products and services transactions. Even a farmers market, which brings a range of producers and customers together under a common tent, can be considered a platform under this definition. However, most of the platforms of note (for example, Amazon or eBay) use a combination of technology, digital communications, and logistics to enable buyers and sellers to find each other and complete transactions.

Platform operators, at least the pure play ones, follow a fundamentally different business model compared to more traditional "linear" businesses. Linear businesses, which account for the majority of businesses in the economy, derive revenues and profits by converting inputs into finished goods whose value exceeds the mere sum of the input costs, i.e., they produce value-added products through a linear value chain. In contrast, platform operators are instead focused on enabling and completing transactions between buyers and sellers, and are compensated from the fees they charge for either access to the platform, completing transactions, or both. Their value-added comes through facilitating interconnections.

A beneficial effect of platforms is that, by focusing on enabling and completing transactions, they tend to expand the size of the market (in terms of transaction volume and/or overall dollar value), which is accomplished mainly through network effects. "Network effects" refers to the phenomenon that the value of a platform increases as more people use it. More specifically, there is a positive externality created that increases, up to a point, as participation in the platform grows. The classic example of network effects involves the telephone: the value of being connected to a ubiquitous telephony network is derived from being able to talk to anyone you'd like; on the other hand, the value is quite low if you are the only person with a telephone. This example can readily be applied to other platforms, such as credit cards, which are a valuable means of facilitating retail transactions because many establishments accept them and many consumers have and use them. In addition, growth in the size of a market is also driven by innovation that is enabled by tools or functionalities made available over a platform. The resulting new products and services provide additional value to customers, for which, in return, they are willing to pay additional amounts.

The profitability of platform businesses is also determined largely by growth in the market. A platform operator's compensation (from transaction-based fees) adds to the end-use cost of products and services. Nominally, that would be viewed as making consumers worse off. However, platforms' network effects produce both value-added and price competition by expanding the scope of sellers. This provides the headroom for the platform's transaction fee. In addition, the platform's externality effects grow with the number of transactions, so larger transaction volumes allow for low per-unit transaction fees. From a societal (or "social welfare") perspective, effective platforms thus tend to make consumers better off − through the realization of lower prices, by allowing for new and valued products and services, or both.

On the other hand, though, a platform that is considered ineffective (in that it produces no such positive externalities and, thus, does not provide sufficient growth opportunities) is simply displacing the transactions that took place in the pre-platform world, and the imposition of transaction fees might lead to higher prices, and accordingly provides little societal benefit.

3. The platform in the UoF ecosystem

A platform to facilitate exchanges and transactions of electricity and information at the distribution system level (i.e., a peer-to-peer system) is at the center of most, if not all, UoF frameworks. In its simplest sense, such a platform can be thought of as having two layers. The first layer is mainly made up of physical infrastructure; that is, the wires and associated functionality that connect customers to the distribution grid. Although much of the infrastructure is in place, it will need to be augmented in order to: (1) provide smart grid functionality; (2) allow for two-way power flows; and (3) more fully integrate distributed energy resources (DERs). The second layer contains the functionality needed to enable a potentially large number of market participants to financially engage in peer-to-peer transactions and the systems keeping track of their exchanges and settlements.

Many of the details concerning how such a platform will work, as well as associated roles and responsibilities, have yet to be fully worked out. Most views foresee the incumbent distribution utility continuing to build and operate the physical layer of the platform. Initial pushes into UoF, notably in New York's Reforming the Energy Vision (REV), have also given the utility responsibility for building and operating the exchange and settlement layer, mainly because utilities already have expertise concerning the complexities associated with energy trading. However, this will most likely only be a starting point. Distributed ledger technologies (DLT), as exemplified by blockchain technology, are being applied to many rule-based transaction settings, including at the peer-to-peer level, and are currently being used in pilot programs in electricity markets. The exchange and settlement layer will need to be integrated and coordinated with the physical layer but, going forward, it may well be built and operated by a non-utility.

The idea of a utility platform has captured the imagination of many industry observers because of its transformational possibilities − with respect to the way consumers can chose electricity options and, also, how it might change the way utilities do business. Some have postulated that a platform-based business model may soon replace the traditional utility model, in whole or in substantial part. Specifically, they point out that making the utility the platform operator would motivate them to enable transactions among non-utility providers and customers, rather than block them. They also suggest that the volume of peer-to-peer transactions may be sizable enough to generate revenues (via fees) sufficient to offset some or even all of a utility's revenue requirements, which might redirect the traditional incentive structure that emphasizes realizing returns by building rate base.

The introduction of a peer-to-peer market structure (via a utility platform) is an exciting prospect. At a minimum, a platform-based model would enable a higher degree of customer engagement and choice in the electricity market, a longstanding goal of many policymakers. However, whether or not it will turn the traditional utility business model on its head is less clear, and depends on the products and services that will be offered over the platform.

4. Platforms and services

A platform provides value only to the extent that the products and services provided over it are valued by its users. From the user perspective, value is typically derived through lower prices for the current portfolio of products and services and/or new and valued products and services. Platform businesses may be based on strategies to gain market share from their linear business competitors but, in practice, few if any of the widely cited platforms are based wholly on displacement strategies. Instead, their model is based on exploiting their platform's network effects in expanding the market, either through connecting more buyers with sellers for the existing product set and/or providing the avenue for innovators to introduce a whole new product set. This allows for upward sales and profit potential and also, as previously noted, allows the platform operator to keep transaction fees low enough so that they do not impede transactions.

Estimating the scope of services as well as associated transaction volumes is nearly an impossible undertaking, especially with respect to new products and services − because it requires knowing what customers want before they do themselves. However, this does not mean that successful platforms were developed wholly under an "if you build it,

they will come" mindset. Many of the products and services currently offered over successful platforms were in design or testing phases, albeit not fully formed, well in advance of platform construction. While it is true that few, if any, analysts predicted the scope and scale of products and services that are now available over the internet or an iPhone, many were in the works or based on technologies that were well beyond the brain-storming stage. For example, streaming services were being tested in the mid-1990s, long before mobile broadband was available and well in advance of becoming a staple of the wireless communications and media industries. It is inevitable that many of the services that will be offered over a platform will come from unexpected places, but successful platforms haven't been based on blind hope.

In addition, most of the services that are offered over platforms tend to be designed around enhancing value and/or increasing sales volumes, more than they are on reducing unit costs. For example, the iPhone platform enabled consumers to receive new services (e.g., apps) that provided them with value sufficient enough that they were willing to expend more of their "wallet share" than they used to when they were receiving plain old voice service. Services that provide additional value to customers is a particularly important driver of network effects: new value-enhancing services attract additional participants to the platform and motivate innovators to develop still more new value-enhancing services, and so on.

5. Platform envy

So far, most of the ideas for services over the utility platform have concerned either ways to reduce customer bills or green and/or local power options. These services will undoubtedly be well received by customers, but they mainly displace services that are currently provided by the utility or elsewhere. Furthermore, reducing overall energy demand and incorporating more renewable energy sources into the mix may be a good outcome from a policy standpoint. However, adding transaction fees to the cost of the current portfolio of services may drive the final prices paid by consumers above pre-platform levels, negating some, if not all, of the original value proposition. Under this case, customers gain choice and engagement but likely do not accrue very much monetary value. Accordingly, assuming that the retail electricity industry can easily emulate the self-sustaining platform model used in the telecom-media and merchandising industry may be a weak basis for policy prescriptions.

Policymakers, as well as utility managers, have frequently pointed to the successful development of platforms in the telecommunications industry, and have asked: Why not us? In relatively short order, former voice-only telecom customers have been transformed to platform users who willingly pay additional fees for ever-larger data plans and associated network functionality that enables them to access a wide diversity of applications. However, in practice, the role of infrastructure providers in the telecom-applications platform world is more complex than it may initially appear.

Many platforms (e.g., the iPhone platform) are run over a broadband infrastructure, so that sales (via fixed and mobile broadband plans) increase in order to enable increased throughput of value-added products and services. These new services include so-called "killer apps," or services that are so widely appealing that they quickly create network effects and increase sales on the platform over which it is offered. However, a substantial portion, if not the majority, of profit generated over the platform goes to content or applications developers themselves – so much so that some telecoms are moving upstream (i.e., into content development and distribution) into that space through mergers and acquisitions (e.g., AT & T's acquisition of DirecTV and its proposed acquisition of Time Warner). In any event, though, the applications that run over the platform lift all boats – the infrastructure provider, platform operators, and the applications developer.

The importance of value-added services has not been lost on utility executives, and has been the subject of numerous industry conferences and conventions over the course of the last decade or so. However, despite these efforts, few value-added services have come to light. The outcome is, unfortunately, quite understandable: electricity is perceived as a commodity service by large portions of the customer base, who will only pay more for an energy-related value-added service if it somehow reduces their overall electricity cost. Therefore, the current portfolio of services in the retail electricity industry has not expanded the size of the market the way that applications have expanded the size of the telecom-media market.

Beneficial electrification, or switching from a fossil-based fuel source to an electric one that is sourced with renewables, represents an increasingly viable application that can significantly increase flow-through over the utility platform. The electrification of portions of the transportation sector, especially electric vehicles (EVs) used by residential and commercial customers, is a particularly attractive platform application. Whether or not EVs will rise to killer app status has yet to be determined; however, it has the hallmarks of one: it has captured the interest of consumers and industry, will increase throughput, and requires the functionality included in a platform in order for the application to reach its potential.

6. Pace and policy

Policymakers in some states, as well as utilities, are weighing how, and how fast, to deploy the utility platform. A few platform experiments, capable of completing and settling transactions involving electricity, are currently being piloted by utilities and, in some cases, deployed by entrepreneurs at the microgrid scale. However, it appears that regulated utilities have been left to fill the role of platform developer and operator at the system-wide level, at least for the initial platform stages.

Of equal, if not greater, interest concerns the pace and staging of platform development and rollout. Utilities typically conduct (or are required to conduct) benefit-cost analyses for major capital projects, with the concomitant uncertainties of both costs and benefits. However, uncertainties are higher with new services and/or market participants, making it difficult to determine the scope, scale, and timing of platform deployment.

Getting the pace and staging right is (obviously) very important. It is relatively easy to point out the need for precautions, but it is much more difficult to provide a prescription for success. Building out too rapidly comes with the risk of not quite getting it right and inadvertently handicapping market development, as well as adding costs to recover through utility revenue requirements in advance of benefits. Not getting it right may also lead to committing to technologies which are quickly outdated followed by utility requests for stranded asset cost recovery. On the other hand, moving too slowly is an almost surefire way to hold innovation at bay. Furthermore, experience in other industries indicates that the timing of marketplace development is almost always different from what is expected. For example, the scope and volume of services provided over platforms in the mobile communications and media industries turned out to exceed even the most optimistic forecasts, but those forecasts also turned out to be off by a decade or so.

There is no universal prescription for a "right" path and pace for platform deployment. Geographically-specific market considerations should factor in prominently, as should developments in services and applications, notably in electrification opportunities. Whether to lead market development in this area or to adopt a more measured approach will largely reflect individual preferences of customers. However, a widely applicable baseline path might involve a two-pronged approach: increased piloting of transactive platform functionality combined with leveraging the digital communications and smart functionality already deployed via utility investment in automated metering infrastructure (AMI).

AMI was not designed to support a transaction-based platform, but

it can be used as a springboard to increasing customer engagement in the retail electricity sector. In addition, information gathered over AMI can be used to refine the next generation of energy-related services, including energy efficiency, which may be offered over the utility platform. Finally, it will also make good on promises tied to AMI investments; that is, the new and innovative services that were frequently advertised by utilities and regulators as forthcoming once AMI investments were completed and the system is in place.

Getting to the transactive platform will also involve stepping up and tuning pilot programs so that the platform is able integrate services and applications that are in the pipeline, notably electric vehicles, but also quickly evolving applications such storage. Pilots can build off recent experiences, such as recent tests and pilots involving customers transacting for green and local power. Tuning pilots to leading applications will prepare for the first wave of customer demand, and may also assist in jump-starting the market.

7. On its head?

Transforming the traditional utility business into a model that is more in line with the success stories found in our modern economy is the stuff that policymakers dream about. However, it may represent an unfair yardstick to measure against. Most platforms are complex undertakings that require development and coordination among system, software, and logistical elements. The utility platform is even more so because it also involves constructing, maintaining, and operating an extensive, complex, and costly physical layer. This separates it from nearly all of the other platforms that are frequently cited as role models. Even the iPhone platform is exempt from concerns about the network over which the platform is enabled; the actual communicating is conducted over broadband networks that were built and are operated by mobile carriers.

It will be difficult, if not impossible, to generate sufficient revenues to offset the traditional utility revenue requirements (mainly reflecting the costs of constructing, maintaining, and operating the physical layer) with transaction-based fees from services based on bill reductions as their primary value propositions. Even adding in transaction fees associated with green and local energy services, for which consumers will likely pay a premium above low-cost options, will barely dent the physical layer's revenue requirements tab. Having the platform business model completely overturn the traditional utility business model is thus a tall order in the near term.

It could be quite different in the longer term, however. Peer-to-peer transactions involving electricity and energy-related services very well may become the norm, similar to the way that other prominent platforms are now regarded as mainstream. Even then, though, the possibility that transaction-fee-based revenues will be sufficient to cover the costs associated with running the physical layer will probably remain a stretch target. However, success in the platform arena will bring its own set of new regulatory issues. These may include, for example, access and competition issues (competing platforms focused on niche markets may compete with the utility platform) and conditions under which a regulated utility platform may be transferred to an unregulated business line. Undoubtedly, the new regulatory issues will come from unexpected places, just like the services that will be offered over the platform.

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