



DIGITAL PLATFORM REGULATION OF ELECTRIC UTILITIES

MISSION DATA
empowering energy savings

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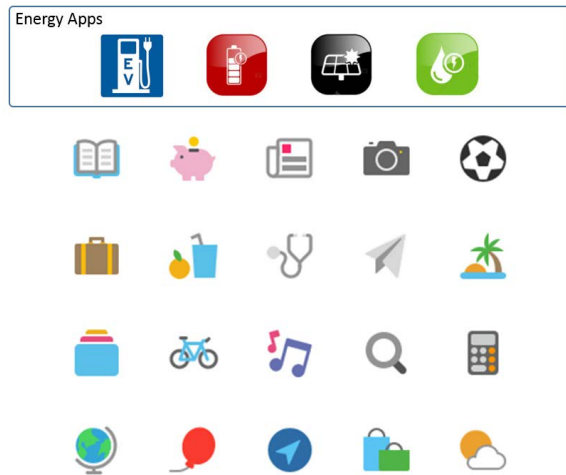


Mission:data Coalition is a national coalition of 30 innovative energy technology companies that empower consumers with access to their own energy data. Mission:data advocates for customer-friendly data portability policies throughout the country in order to deliver benefits to consumers and enable a vibrant market for energy management services.

EXECUTIVE SUMMARY

New smart meter “App Stores” provide fertile ground for energy innovation. But they also present new opportunities for electric utilities to hinder competition and impede their distributed energy competitors.

Monopoly electric utilities increasingly provide digital services such as data portability to distributed energy resources (DERs), but government regulation of these monopolies has not adapted to the digital age. Unfortunately, rate regulation alone is ill-equipped to face modern challenges posed by the digitization of the power sector. DERs provided by non-incumbents have digital interactions with utilities, such as gathering real-time or historic electric usage data, billing information, etc. and provide demand reduction services back to the utility. New smart meters from major manufacturers such as Itron and Landis+Gyr feature on-board computers that create tremendous opportunity for innovative DERs that would benefit customers, but they also create opportunities for utilities to abuse their market power by exploiting asymmetries of information and discriminating against DER providers by limiting access, withholding information or imposing onerous terms of use. This report analyzes the new competitive landscape of electricity-related services through the lens of digital platform regulation. Just as the U.S. Congress and countries around the world are grappling with how to regulate the tech giants’ “app stores” such as Apple’s, state public utility regulators must familiarize themselves with abuses that are coming to the electricity sector (such as crippling, discriminatory terms and conditions, and snooping) and then craft pro-consumer policies to address them such as non-discrimination mandates, prohibitions on self-dealing, and establishing fair terms for digital interconnection. Modern utility regulators must go beyond prudence review to restrain utilities’ anti-competitive activities.



UTILITIES’ DIGITAL PLATFORMS NEED OVERSIGHT

The modern power grid is becoming increasingly decentralized, decarbonized and digitized. Industry and state utility regulators are beginning to grapple with those first two trends — decentralization and decarbonization. But relatively little attention has been paid to the third trend: digitization. The objectives of this paper are to (1) demonstrate the need for digital platform regulation, particularly as it relates to utilities’ anti-competitive conduct that harms distributed energy resources (DERs), and to (2) propose policy solutions in the form of fair competition principles to guide regulators as the electricity system enters a new era.

State utility regulators are unprepared to oversee the increasing volume and variety of digital interactions that occur between DERs and utilities. DER aggregators of demand response, energy efficiency, smart electric vehicle (EV) charging, and various non-wires alternatives (NWA) must communicate electronically with a monopoly distribution electric utility. DER aggregators interact with utilities’ information technology (IT) systems for various purposes, such as gathering and analyzing customer energy usage information, acquiring information necessary for a customer to participate in a wholesale market, or receiving control signals from the utility to alter load. However, utilities are not traditionally skilled at managing IT systems, and DER aggregators have experienced failures on the part of utilities to provide certain

data in a timely and reliable manner.¹ Furthermore, many utilities view DERs as a competitive threat, and utilities' IT systems therefore represent a likely venue in which utilities can stifle DERs' business prospects with complex, opaque and highly technical processes. State regulators have long recognized the need for oversight of interconnection rules governing the attachment of solar photovoltaics to the distribution grid in order to establish fair terms between regulated and non-regulated entities. However, no state regulator has established comprehensive interconnection rules for digital interactions. There is a substantial risk that utilities will act discretely to hobble, undermine, or "slow-walk" their digital interactions with third party DERs in an anti-competitive fashion. As a result, it will be very difficult to decentralize and decarbonize the power sector (while maintaining low energy costs) if monopoly utilities are not held accountable for open and transparent operation of the online systems that are necessary for DERs to flourish. Put another way, many state utility regulators were already struggling to hold utilities accountable and maintain a level playing field in an analog world. A digital world presents even greater challenges.

While we acknowledge that some utility-owned DERs are useful and necessary, in order to meet the need for rapid emissions reductions in the face of climate change, the digital playing field must be leveled between *a//* DERs and utilities. Our assumption in this paper is that behind-the-meter innovation will only occur at the speed necessary to address climate change if non-utility DERs (i.e., DERs owned or controlled by customers and/or customer-selected third parties) are permitted to proliferate. And as non-utility DERs grow, certain digital interactions with the utility become necessary, as exhibited during the recent California heat wave when third party demand response providers were called upon by utilities to manage peak demand and avoid blackouts.² DERs often require electronic access to customer usage data and certain information about customer accounts held by the utility in order to operate. It is these digital interactions between co-equal market participants — utilities and third party DERs — where regulatory oversight is necessary to ensure a level playing field.



State public utility commissions have no choice but to become digital platform regulators in order to be effective in the 21st century. Utilities have many IT systems whose interactions with DERs must be overseen. The first major digital platform to come about has been Green Button Connect (GBC). Used in five (5) states today covering 36 million electric meters, GBC electronically provides customer-authorized DERs with energy usage and billing information necessary for DERs to function. Unfortunately, these platforms have not always worked reliably (or sometimes haven't worked at all), as we have written about previously.³

Recent technological developments besides GBC cry out for oversight of digital platforms. The latest is a new generation of smart meters that contain on-board computers. These computers allow software "apps" to be loaded on the meter. Apps could, for example, analyze electricity usage at high frequencies and disaggregate consumption by appliance or device. The ability to load an app onto a meter at zero marginal cost and receive accurate disaggregations of energy usage is potentially game-changing for DERs, who could better understand each household and more accurately target their customers with cost-effective efficiency recommendations. For this new "App Store" on advanced meters to benefit customers and to maximize its carbon-reducing potential, state regulators must force utilities to make these computing advancements accessible to third parties. Regulators must move beyond cost-of-service regulation by adopting pro-competition principles and developing enforcement mechanisms tailored to digital interactions.

¹ See, e.g., *Complaint of OhmConnect, Inc. Against Southern California Edison Company for Data Failures*. California Public Utilities Commission, Docket No. C1903005. Filed March 8, 2019.

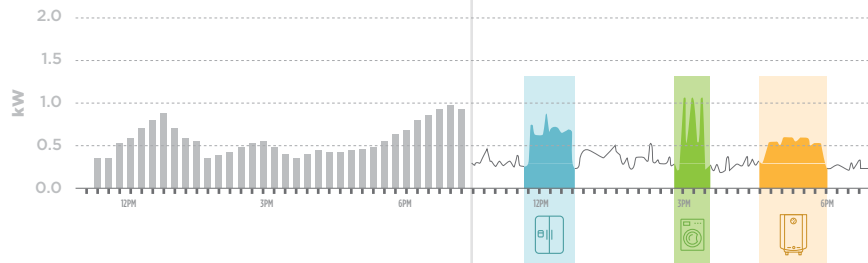
² <https://www.greentechmedia.com/articles/read/western-heat-wave-tests-californias-clean-grid-transition>


³ See *Energy Data Portability: Assessing Utility Performance and Preventing 'Evil Nudges.'* Mission:data Coalition, January, 2019. Available at <http://www.missiondata.io/reports/>.

SMART METER



SMART METER + COMPUTER



SAMPLE FREQUENCY	15 minutes	1/10,000th of a second or less
MEASUREMENTS	energy (kWh)	energy (kWh), voltage, current
END-USE IDENTIFICATION ACCURACY	40%-80%	90%+
EXAMPLE RECOMMENDATIONS	<i>"Your heating system needs attention"</i>	<i>"You left the living room lights on"</i>
APPLIANCE LEVEL INSIGHT	Overall heating Overall Cooling Large loads such as EVs	Individual devices/appliances 

HOW UTILITIES CAN DISCRIMINATE AGAINST DERS

App Stores on smartphones have seen discrimination and anti-competitive activities in the past, as we discuss below. Utilities are poised to similarly hinder competition by virtue of their control over meter-based app stores. Examples of potential abuses include:

Prohibiting Apps from Duplicating Utility-Provided Functions. Suppose a software company makes an app that sends you text message alerts when you approach a budgeted amount for your monthly electric bill. This would be valuable to many customers, but many utilities already offer "high bill alerts" via text message. Utilities eager to maintain their direct customer relationship could ban similar apps in order to retain "ownership" of the customer. In the past, Apple has banned podcast apps that would have competed with Apple's native podcasts app and music apps that would have duplicated some of iOS's built-in music functions.

Consumers will download apps that compete with pre-installed apps only when there is a noted quality difference, and even then, lower-quality pre-installed apps will still enjoy an advantage over third-party apps.

- U.S. House of Representatives Antitrust Subcommittee Report (p. 352)

Privileging the Utility's Pre-Installed Apps With Better User Experiences. Your electric meter could come pre-installed with apps for energy disaggregation and bill alerts, courtesy of the utility. However, the utility could make it difficult or complex for customers to consent to the installation of a third party app that provides similar capabilities. Pre-installed apps involve less "friction" of user experience because they can be used immediately without completing a consent process or waiting for the app to be loaded. This pitfall

could be remedied by (1) banning pre-installation of apps by the utility and (2) requiring all apps, whether utility- or third party-made, to follow the same customer consent process.

Utility-Friendly App Makers Receive Better Treatment. App makers that are friendlier to the utility's business model could receive faster approvals; have terms and conditions selectively waived; or have reduced fees or commission percentages. A firm providing, say, behind-the-meter battery storage that reduces the utility's capital investment (and thus earnings) would be a prime target for "back-burner" treatment, whereas an app beneficial to the utility could be welcomed with a red carpet. When Uber was in violation of Apple's terms, Apple's CEO telephoned Uber's CEO and amicably resolved the disagreement. Smaller firms than Uber, however, would have simply seen their app banned from the App Store without an opportunity to appeal. Utilities must be agnostic when it comes to which services their customers choose. Size, political influence or business model should not influence how an app maker is treated by a utility.

Crippling Hardware Features to Third Party Apps Such as Voltage or Current Measurement. A utility could allow its own apps to access voltage or current information while providing inferior power data to third party apps. Voltage and current measurement permits even greater accuracy with load disaggregation; certain "signatures" seen in voltage and current fluctuations are traceable to certain loads, such as motors or compressors, in a way that power data (measured in watt-hours) cannot discern. Platform operators can reserve superior information for themselves via private APIs. According to the U.S. House of Representatives Antitrust Subcommittee Report, "Apple is permitted to use the private APIs on iOS devices, but third-party developers are not" (p. 353).

EXISTING REGULATORY APPROACHES ARE INADEQUATE

Today, the primary tool of utility regulation is disallowing costs from inclusion in rates. Utilities must prove to their regulator that they have "prudently" incurred costs, meaning that those costs were necessary to deliver safe and reliable electric service. One could argue that the threat of

cost disallowance is sufficient to compel a utility to operate its IT platforms in such a way that is open to DERs, pro-competitive, and maximally beneficial to customers. But there are several reasons why the threat of cost disallowance is by itself inadequate to ensure positive outcomes for digital platforms that serve DERs and customers:

- 1. Disallowance is costly for regulators to prove.** Utilities can exploit information asymmetry to frustrate regulators' efforts to get information about the performance of IT platforms and App Stores. And since utilities' legal costs are paid by ratepayers, they can out-manuever and outlast state regulators. Utilities can even appeal disallowances in court, further straining regulators' resources. As a result, disallowances are rare, diminishing their coercive force.⁴
- 2. Time lags between prudence reviews.** Often, several years elapse from the time a utility's IT platform fails and the punishment (i.e. cost disallowance) is meted out (if punishment occurs at all). In contrast, in a competitive market, the failure of an IT platform results in immediate financial consequences in the form of reduced users, lowered revenue, and contractual penalties. A delayed feedback loop in conventional prudence reviews is not only a departure from norms in a competitive market, but it is ill-suited to IT systems that can change rapidly. For example, a perfectly functional IT platform can become inoperable within seconds.
- 3. Lack of clear performance metrics.** Whereas the prudence of a power plant investment can be evaluated in part by its capacity utilization rate (0%-100%), there is no comparably simple, widely-used metric for an IT platform. "Uptime" or IT system availability can be manipulated by, for example, claiming uptime despite the presence of severe bugs. Moreover, it is difficult to predict the expected utilization of an IT platform by DERs outside of regulators' and the utility's control, frustrating the setting of appropriate utilization targets.

Performance-based regulation (PBR) is one possible mechanism for correcting these shortfalls. However, for PBR to be successful, regulators must educate themselves about the desirable outcomes for utilities as digital platform operators,

4 David Littell, Jessica Shipley and Megan O'Reilly. *Protecting Customers from Utility Information System and Technology (IS/IT) Failures: How performance-based regulation can mimic the competitive environment*. Regulatory Assistance Project. September, 2019. https://www.raponline.org/wp-content/uploads/2019/09/rap_littell_shipley_oreilly_performance_regulation_information_technology_2019_september.pdf

as well as *undesirable* outcomes to be avoided. We propose several performance metrics and tools for regulators that will be necessary to oversee digital platforms, whether or not PBR is applied. But first, we must understand lessons learned regarding the market power wielded by digital platform operators in other industries, most importantly App Stores on smartphones.

LESSONS LEARNED FROM TECH

“Platform” is a modern-day buzzword with as many definitions as there are apps in an App Store. We have social platforms like Facebook, shopping platforms like Amazon, and communication platforms like Signal. In this paper, we define a digital platform as software through which other entities make and sell their own software. Examples include operating systems such as Microsoft Windows and Apple’s iOS. Platforms act as funnels or bottlenecks through which customers access other products and services.

Digital platform owners are powerful middlemen. They host, curate, monetize, and deliver digital goods. Increasingly, in tech, they also act like banks, publishers, tax collectors, and judges who mediate disputes among their users. Charitably, platform owners could be described as gardeners, pruning the walled environment for users’ enjoyment. Less charitably, they could be described as rent-seekers, censors, and iron-fisted rulers. Regardless of individual temperament, platform owners undeniably wield considerable power. They own the real estate in which commerce occurs, and their tenants can’t afford to be evicted.

THE POWER OF THE APP STORE

Almost from day one, Spotify had problems with Apple’s App Store.

From its launch in 2008, the music-streaming app became one of the most popular apps on Apple’s iPhone, propelling Spotify’s meteoric growth. But as the App Store matured, its guidelines began rapidly changing. The most profound change involved in-app purchases (IAP). Apple required apps to use Apple’s built-in payment system, meaning that Spotify users wishing to upgrade from “free” to “premium” service couldn’t pay Spotify directly.

Users would need to enter their credit card into Apple’s payment system, where Apple would charge a 30% fee. If Spotify didn’t submit to Apple’s payment system, Spotify had two options: Either cripple Spotify’s functionality by eliminating all “premium” service, or have Spotify removed from the App Store altogether.

Spotify has alleged that Apple’s conduct is unfair and discriminatory, with the issue growing into an ongoing anti-trust investigation of Apple in the European Union. Other app makers have made similar complaints: Amazon’s Kindle app for iPhone doesn’t allow users to buy books from the app, because that would compete with Apple’s own iBooks; gaming apps from Microsoft, Google and Facebook aren’t allowed on the App Store because it would disrupt Apple’s existing game economy.

In addition to IAP, other guidelines are a moving target. App developers find themselves on a treadmill, spending millions of dollars adding and subtracting features to remain in compliance with the latest standards. And even if developers keep up with the dizzying pace of updates, they might find that the App Store guidelines are not evenly enforced. For example, Apple permits Uber to intake credit card information directly from customers without using Apple’s IAP. “We aren’t seeking special treatment,” said Daniel Ek, Spotify’s CEO. “We simply want the same treatment as numerous other apps on the App Store, like Uber or Deliveroo, who aren’t subject to the Apple tax and therefore don’t have the same restrictions.”⁵

As recently as June, 2020, angry app developers took to social media to complain as Apple refused app updates from numerous developers until they submitted to in-app purchases (and Apple’s 30% fee). Remarking on this outburst, tech journalist and analyst Ben Thompson noted that app developers are intimidated into silence:

I wondered on Twitter⁶ if Apple was blocking other developers from updating their apps unless they added in-app purchase, and was surprised at the response: twenty-one app developers who contacted me had added in-app purchase in the last twelve months...Nine more had either committed to adding in-app purchase, still had their app in limbo, or had simply given up on the App Store.

5 <https://newsroom.spotify.com/2019-03-13/consumers-and-innovators-win-on-a-level-playing-field/>

6 <https://twitter.com/benthompson/status/1273079296618201093>

I have sat on these anecdotes for several months now, in part because this is all I can say: none of the developers were willing to go on the record for fear of angering Apple.

Successful platforms such as the iPhone have considerable power over app developers. The iPhone has created fertile ground and a large user base for apps to thrive, but with that potential comes a downside: App developers are often forced to submit to whatever financial, technical or business arrangement Apple wants.

Similarly, utilities could charge third party DERs exorbitant sums to appear on the meter-based app store. Utilities could offer their own apps to customers at no charge, harming precisely the innovation that these new smart meters promised to bring to consumers. In addition, utilities could modify their app store's terms and conditions to disadvantage any apps perceived as a strategic or competitive threat.

Regardless of one's views on Apple's practices, electric utilities deserve greater scrutiny from regulators because electric utilities have received government-sanctioned monopolies. Nowhere in America do consumers have a choice as to which meter is installed on the side of their house. Consumers' level of captivity can be debated in the tech world, but complete captivity is incontestable in the electricity sector. Regulators therefore have an obligation to ensure that meter-based digital platforms are truly open to the competitive marketplace and are not monopolized by their utility owners.

FEATURES FOR ME, BUT NOT FOR THEE

Discriminatory behavior of platform owners can also extend beyond business terms and sales commissions to the selective availability of certain technical features to some app developers but not to others. Take Tile, a helpful product for finding lost keys and wallets. Buy a one-inch-square Tile and put it in your wallet, and it broadcasts a Bluetooth beacon that makes your wallet findable with your iPhone. Among forgetful consumers, Tile saw considerable commercial success. That is, until Apple announced they would be adding a different type of radio to iPhone that is superior to Bluetooth for use by Apple's competing product, AirTags. AirTags — small disks — serve the same purpose as Tiles, but they broadcast ultra wideband radio signals that propagate through walls more effectively than Bluetooth, and with lower battery

drain. Conveniently for Apple, it appears that iOS will make the ultra wideband radio accessible only to Apple's AirTags and not to competitors such as Tile. After incubating a lucrative market around finding lost objects using iPhone and Bluetooth, Apple is now tilting the playing field in its favor by selectively "crippling" certain features of new iPhones for app developers.

Similarly, utilities could ban all apps (except their own) that use voltage and current readings in disaggregating energy usage. As described above, high-frequency voltage and current measurements can significantly improve the accuracy of statistical inferences, permitting apps to determine how much energy is being used by each device or appliance. Excluding such apps from the app store would tilt the playing field in the utility's favor even further, ensuring that only the utility would have detailed insights into household energy usage patterns.

RECOMMENDATIONS

PRINCIPLES FOR DIGITAL PLATFORM REGULATION

Public utility commissions have a historic opportunity to become leaders in digital platform regulation **before** millions of electric meters across the U.S. are upgraded. The question about meter replacements is not merely about "smart meters"; it is whether on-board computers will be included. Addressing the potential (and, some would say, inevitable) harms from these computers requires Commission oversight. The following principles — based on non-discrimination, due process rights, and fair competition — should be incorporated into Commission orders and rules:

1. **App Stores' policies shall be fair, reasonable and non-discriminatory (FRAND).**

- **Commission approval of terms.** The Commission must approve the terms under which DERs access and use the App Store. This includes business terms and cybersecurity terms. Utilities should not be permitted to impose their own terms without Commission approval.
- **No crippling:** Every app developer gets access to the same hardware and software features as the utility. For example, a utility shall not reserve voltage or current measurement capabilities only for itself. If meters support Wifi (as many manufacturers'

do), utilities shall not ban apps that bypass the utility by sending meter readings out to a third party over the customer's Wifi network.

- **No self-preferencing.** Utilities shall not be permitted to pre-install their own apps on meters.
- **Regulatory oversight of costs and revenues.** Charges to third parties for use of the platform may not be excessive in relation to the utility's actual operating costs for maintaining the App Store. Revenues, if any, should be scrutinized so that ratepayers are not forced to subsidize unregulated businesses.

2. Due process rights for DERs.

- **Rapid adjudication of disputes.** Commissions should hear disputes raised by DERs and permit discovery. In order to operate at the pace of modern technology, regulators should target resolution of disputes within 60-90 days.
- **Structurally separate approval of apps.** To avoid conflicts of interest and anti-competitive conduct, approval of an app to exist on a utility's App Store should be the Commission's responsibility, not the utility's. App developers should have the opportunity to comment on utilities' proposed apps prior to Commission approval.

3. Fair Competition.

- **Transparency of platform features.** Pre-release documentation on changes to meters and the App Store over time should be available to all app developers with sufficient advance notice.
- **Reverse compatibility.** If upgrades to meters or the App Store become necessary and would result in apps not being backwards-compatible with prior versions, the utility shall provide sufficient notice and opportunity for app makers to adapt.
- **No snooping ("mind your own business"):** Utilities may not surveil, reverse-engineer or gain insights into third party apps. Utilities may only monitor apps for legitimate system health reasons. Commissions should conduct periodic audits to ensure compliance.
- **Prohibition on using a metering App Store until policies are in place.** If a regulator is unable to ensure a utility's compliance

with these principles, then the regulator should prohibit all use of meter-based App Stores, including the utility's use.

TOOLS FOR REGULATORS

In addition to implementing the principles above, state regulators need a new set of tools and information to monitor utilities' IT platforms. Quarterly or annual written reports are simply inadequate in a digital age. Regulators need to invest in information systems to continuously monitor compliance and implement service level agreements (SLAs), a mainstay of modern IT contracting. Only then can Commissions become true digital platform regulators. Specifically, Commissions should:

1. **Require issue tracking systems.** Issue-trackers or web-based "help desks" are simple online tools for submitting support requests. Support requests are submitted by an app developer who, for example, may be confused by an unknown error message. The Commission should have supervisory visibility over all issues in order to assess the utility's responsiveness and overall uptime of the platform. Issue-tracking websites must be administered by the Commission rather than delegated to utilities.
2. **Performance metrics.** Key metrics should be reported on a continuously-updated, publicly-accessible website. Performance metrics are essential in how modern technology companies manage their IT vendors in a competitive market, and public disclosure helps ensure equal access to information and aids in enforcement. Key metrics include:
 - a. Availability / uptime of meter-based computers and the App Store
 - b. Statistics regarding errors in App Store operation, such as number, description, severity and duration of errors
 - c. User experience time to complete an authorization for loading an app onto his or her meter
 - d. Time for the utility to conduct technical app reviews
 - e. Number and severity of reported issues by DERs in the online issue-tracker, including mean acknowledgment time and mean resolution time

- 3. Service Level Agreements (SLAs).** SLAs establish minimum performance criteria for platform operators and are extremely common in IT contracting today. In order to ensure accountability, SLAs for utilities should prescribe the following:
- a. Maximum time to acknowledge a reported defect according to severity classification (mild, medium, severe)
 - b. Maximum time to resolve a reported defect according to severity
 - c. Punishments for violations, such as financial penalties

CONCLUSION

Electric meters are part of a utility's natural monopoly, but the software that runs on them is not. Major manufacturers are now shipping meters with on-board computers, scrambling existing notions of the demarcation line between monopoly and competitive service. Meter-based app stores that support a range of innovative apps from independent entities could bring tremendous new benefits to consumers, such as tailored recommendations for energy efficiency. However, these benefits to consumers will not materialize in an optimal or efficient manner without effective oversight from state regulators. In order to establish a level playing field, public utility commissions must embrace their new role as digital platform regulators.