# ENERGY POLICY AND THE DIGITAL DIVIDE

Broadband deployment and adoption are insufficient to meet the needs of demand response and the smart grid. Evidence from California shows what can be done to remedy the problem.

By Lloyd Levine, *University of California Riverside*

The internet of things is, by definition, dependent on the internet. But what if you don't have internet? What if millions of Americans don't have internet access at home? This isn't a hypothetical question; it is a real problem.

In 2018, the internet and device technology have achieved such a level of ubiquity, functionality and speed that they have become broadly incorporated into modern life, including energy policy and operations. That ubiquity is expected to increase, and policymakers, regulators, energy companies, environmental groups, and researchers all operate with the implicit assumption that the electricity grid of the future will be tied to a real-time communications loop facilitated by the internet. But that implicit (and in some cases explicit) incorporation into policy assumes everyone has access to the same technologies at the same rate. That is a demonstrably false assumption with real-world implications for households, policymakers and communities at large.

## DIGITAL DIVIDE – SIZE AND SCOPE

There is no official government definition of the digital divide, although it is generally understood as a divide between technology haves and have-nots. However, for policymakers and regulators, it is useful to have a clearly articulated definition. The best definition we find comes from the California Emerging Technology Fund (CETF), which defines the digital divide "… as the condition when significant segments of the population do not have access or are not using technology at the same rate and manner as the average." More specifically, CETF applies a "general rule in statistical variation in populations, and a divide exists if any segment of the population is 10 percentage points or more away from the population as a total (or average)."

Figure 1 draws on data from the Annual Broadband Adoption Survey commissioned by CETF and conducted by IGS Berkeley and shows that since 2010, broadband adoption in California has held steady at approximately 70 percent. That translates to 3.8 million households that lack meaningful internet access at home, with the vast majority – 3.2 million – being in urban areas where lack of access is not the problem. An additional 4.78

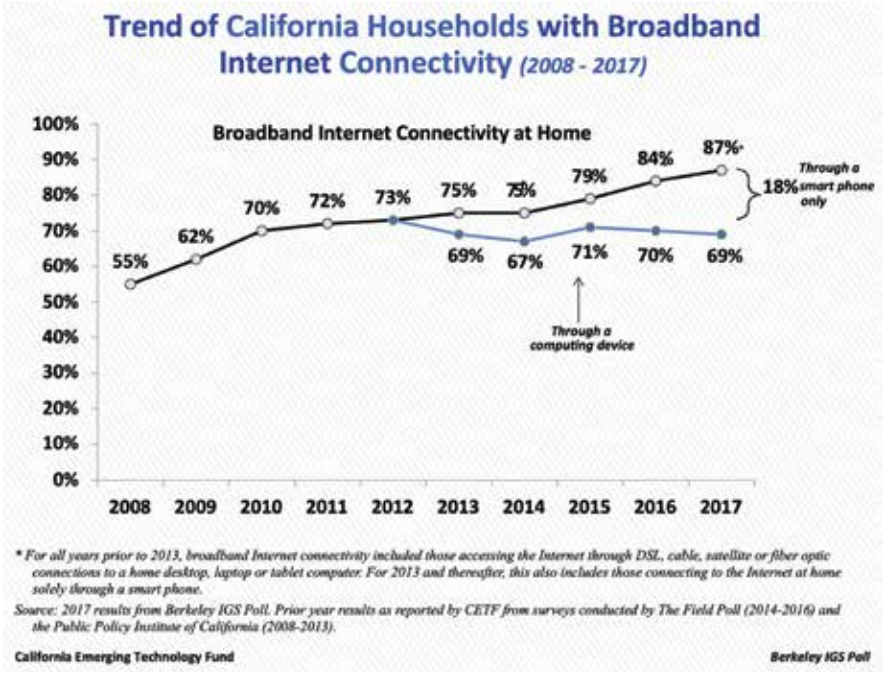


Figure 1

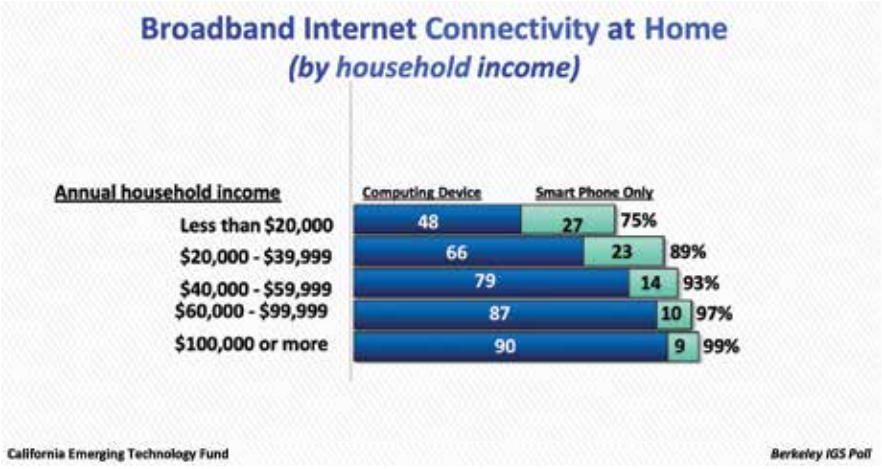


Figure 3

percent of Californians living in rural households lack internet access because of the absence of broadband infrastructure.

The Pew Research Center and the California data find income the strongest predictor of broadband status. The Pew data in Figure 3 show 47 percent of households with an annual income of less than $30,000 lack broadband at home. And Figure 2 from the annual Broadband Adoption Survey shows the broadband adoption rate falling as household income falls. This means those 3.2 million households lack internet access because they can't afford the monthly service, a device, or both.

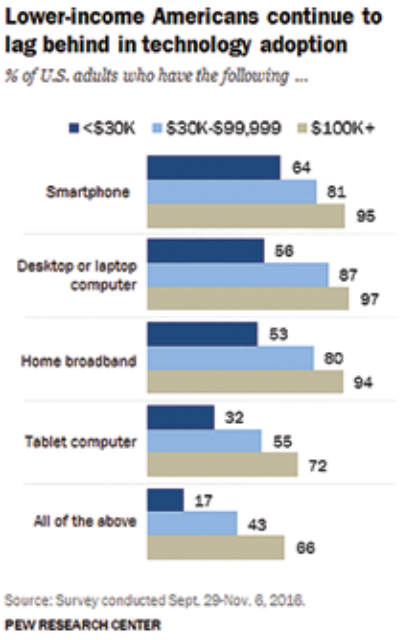


Figure 3

Figure 2 also shows that reliance on smartphones for internet access increases as income decreases, with 23 percent of households with an income between $20,000 and $39,000 relying only on a smartphone for internet access (11 percent have no access at all). The Pew data also show 44 percent of households with incomes below $30,000 don't have a laptop or a desktop computer.

Relying on a smartphone alone is insufficient, as those who depend on a smartphone for internet access face numerous challenges. Those problems are most pronounced for "instrumental activities," such as conducting web searches, uploading résumés and performing other functions relating to employment and economic advancement. The underlying reasons for those challenges are in large part due to the technological limitations of the devices, including small keyboards, inferior devices, storage capacity, data caps and connection speeds. Intermittent access due to unpaid bills is also a significant impediment.

## INTERNET-DEPENDENT ENERGY POLICY AND TECHNOLOGY

California's per capita energy consumption is the lowest in the nation and, as Figure 4 illustrates, has remained virtually unchanged since 1974.

The genesis of this was the Warren-Alquist State Energy Resources Conservation and Development Act, which created the California Energy Commission. The Commission was charged with, among other things, developing energy efficiency standards for the state of California. The Commission, along with the legislature, must continually update energy efficiency standards for housing, commercial buildings and a wide variety of electronic appliances and devices. But with California's already low per capita consumption, the state's policymaking and regulatory bodies are looking to demand response, real-time pricing, smart meters and other similar measures to save energy, spread out demand and reduce greenhouse gas emissions.

Under the authority of the California Public Utilities Commission (CPUC), California's investor-owned utilities (IOUs) are in the process of replacing old electricity meters with smart meters. The CPUC, citing data from the Edison Foundation, indicates that more than 8 million smart meters have already been installed throughout the United States and forecasts that by 2020, at least 60 million will be in place. In California, the CPUC authorized the IOUs to install nearly 11 million smart meters. The CPUC website lists numerous benefits that derive from smart meters, including providing consumers with more information about electricity consumption and pricing, thereby allowing customers to exert more control over their power consumption. The Commission also believes the use of smart

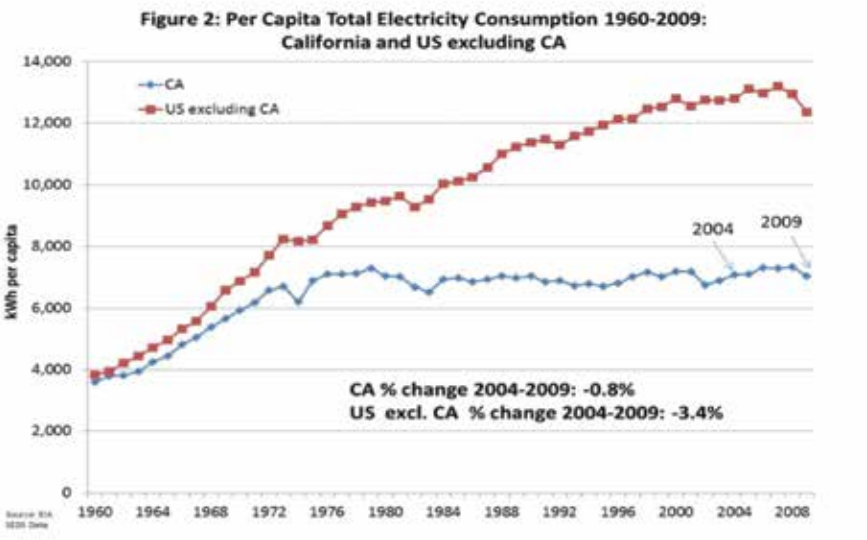


Figure 4

meters will help the environment "by reducing the need to build power plants, or avoiding the use of older, less efficient power plants as customers lower their electric demand."

Reliance on internet technology is explicitly stated:

> *Customers with Smart Meters today can access their prior day's electricity usage through their utility's website. In the near future, by installing an in-home display device that communicates wirelessly with a Smart Meter, a customer could monitor their electricity usage and costs in real-time…allowing them to adjust their usage instantaneously in response to changes in prices or system reliability events. … (CPUC, 2018)*

It culminates by declaring that

> *Smart Meters are the first step toward creating a Smart Grid in California. With a Smart Grid, digital technologies are applied to every aspect of the industry, from generation, to transmission, to distribution, to the customer interface. This will help the grid sense what is happening to the energy flow, keep it in balance, and improve reliability and make the grid more resilient in the face of outages and other problems. (CPUC, 2018)*

In addition to utility-installed smart meters, the earliest devices of the internet of things are just coming to market. One of the more popular is the Nest thermostat. According to Nest, citing independent studies, its thermostats can save consumers "an average of 10 percent to 12 percent on heating and 15 percent on cooling." The company's website has a ticker claiming that since 2011, Nest thermostats have saved more than 23 billion kilowatt-hours of electricity. Obtaining these benefits comes from a consumer's ability to receive mobile notifications and control the device remotely. However, a disclaimer on the Nest website states, "Mobile notifications and remote control require working internet and Wi-Fi." Nest's energy saving benefits are unavailable to households without Wi-Fi internet access.

Beyond Nest, the commercial sector for smart home appliances is just starting to emerge. A quick search of the internet shows a variety of Wi-Fi–enabled refrigerators, air-conditioners, ovens, washers and dryers, water heaters and many more. Washers and dryers, for example, are touted as allowing users to load them and then let the machines communicate, in real-time, with the electricity provider to determine the best time to start, thereby allowing for better grid management and savings for consumers. The biggest impact from the commercial sector will be in electric vehicle charging. With batteries that currently range from single digits of power consumption to 100 kWh, EVs will quickly become the single biggest consumer of electricity. Managing that demand is already assumed to rely on broadband technology to manage the grid. Whether it is the charging stations, the cars themselves or both, they will need to communicate with the network to ensure maximum efficiency while ensuring that drivers are not stranded without a charge.

## ELECTRIC UTILITIES AND BROADBAND

Myriad benefits from broadband can accrue to electricity generators, operators, consumers and society at large. Primary among the benefits is demand management and demand response to maintain a stable grid structure. That demand management/response will depend on a real-time communications/information exchange that can be accomplished only with broadband. The benefits of those programs are an increase in efficiency from all parts of the system, resulting in less energy generated with fewer resources consumed and a reduction in greenhouse gas emissions. Working in conjunction with demand response is time-of-use metering, which allows consumers and appliances to respond to price signals and saves money for both utilities and customers.

Broadband also enables other potential technologies that facilitate better grid management, which results in more efficient overall operations. Specifically, sensors can enable remote monitoring and control of non-residential facilities from water management and agriculture to rural

electricity consumption, among other uses, including those that are currently in development or have yet to be conceived. Those sensors will give system operators more information, flexibility and control. However, according to the 2017 CASF Annual Report from the CPUC, 618,719 rural California households do not have broadband because they lack network access. That means the internet backbone and/or middle mile hasn't been connected to those communities. Without the broadband infrastructure to support the communications, none of those benefits can be realized.

Lack of broadband also creates inefficiencies and extra costs in non-energy transactions. Though many utility customers use email and the internet to receive and pay bills, that option is not available to the millions of households without meaningful internet access. The data in Figure 5, which California's IOUs provided to CETF, show the significant disparity between the number of customers enrolled in California's low-income bill assistance program, California Alternate Rates for Energy (CARE), and those with email addresses on file with the utilities. It is reasonable to assume that a number of these households have email addresses but have chosen not to provide them. However, given the income correlation in Figure 3, it is also highly likely that a number of these households are digitally disconnected.

Email correspondence and internet access by customers creates a time and money savings by eliminating costs associated with printing and postage. It also facilitates near instantaneous communications, which is beneficial for utilities that provide their customers with emergency alert notifications.

Between enabling smart meter technology, robust demand response programs, real-time price and usage information, grid stability, cost savings, lower energy demand and reduced greenhouse gas emissions, it should be clear that the public policy goals of legislatures and utility commissions and the operations of electric utilities already depend on access to a high-speed communications network and that dependence will only increase over time. Even if electric utilities are not going to become broadband providers, they can play a role in facilitating a greater degree of broadband adoption. And regulatory commissions that set broadband-dependent goals for those electricity providers can assist and encourage the utilities (and the broadband companies) in reaching 100 percent deployment and adoption rates approaching 100 percent.

## BROADBAND ADOPTION AND UTILITY ASSISTANCE

A siloed approach is no longer appropriate. Everything is technology dependent, and as we have seen, the electricity (and natural gas) sector is no different. Given the evidence that the present and future of the energy grid depend on communications technologies, those entities that will depend on a ubiquitously deployed and adopted network – utility companies and government – should play a role in increasing both deployment and adoption. What follows are three specific "interventions" that legislative and regulatory entities and utility companies can undertake.

### Advanced Services Fund

In 2008, the California Legislature and the CPUC created the California Advanced Services Fund (CASF). It was created specifically to offset the higher costs of broadband infrastructure deployment in unserved rural areas. Funding for CASF comes from a monthly surcharge on telecommunications bills. The fee is paid by customers, collected by telecommunications companies and remitted to the CPUC. CASF funding is available to all companies deploying broadband infrastructure in unserved rural areas in the state and is technology-neutral, meaning it can be used for wireless, wireline, cable or fiber-based communications connection technologies. This year, for the first time, the CASF is authorized to spend a significant amount on adoption-related efforts as well as rural infrastructure. Given the relative percentages of the households that make up the digital divide, closing it without spending money on low-income adoption programs will be unlikely in the time frame needed for full implementation of broadband-dependent energy-saving measures.

| **Digital Communication Efforts by California Investor Owned Utilities** | | | |
|---|---|---|---|
| Current Enrolled CARE Customers in IOU Service Territory | | | |
| **PG&E** | **SCE** | **SDG&E** | **SoCalGas** |
| 1,406,799 | 1,227,268 | 282,388 | 1,557,184 |
| CARE Enrolled Households with Email Addresses on File | | | |
| **PG&E** | **SCE** | **SDG&E** | **SoCalGas** |
| 488,752 | 445,807 | 197,672 | 761,709 |
| 35% of total CARE | 36% of total CARE | 70% of total CARE | 49% of total CARE |

Figure 5

### Low-Income Broadband Adoption Programs

As the tables show, the lower the household income, the less likely the household is to have meaningful internet access. Most, if not all major ISPs already have a stand-alone, low-income broadband offering for qualified families. Unpublished data from CETF focus groups in the lowest income census tracts in Fresno County, California, found that of the 309 participants, 77 percent had internet in the home (via either smartphone or fixed connection). However, despite 309 households being qualified for a low-income offer, only 33 percent of those with internet subscribed to one of those plans. Yet of those 229 families who did not subscribe to an ISP's low-income offering, 76 percent wanted information about the offerings. The data clearly show there is a large gap between those who are eligible for stand-alone, low-income broadband and those who actually enroll. The data further show those who aren't enrolled want information about the programs. Given those percentages, it seems there can be big gains in adoption by informing households of available offers and assisting them with enrollment.

Utility companies can help bridge the information gap. With the income eligibility criteria for CARE enrollment and the broadband/income correlation, it can easily be inferred from the data that CARE-enrolled customers lack meaningful internet access at a far greater rate than the population in general. With utility companies and regulators having a vested interest in maximizing broadband deployment and enrollment, utility companies should promote existing low-income broadband offers to their low-income customers.

A recent example of this was the project CETF conducted along with the Sacramento Municipal Utilities District (SMUD), the electricity provider in Sacramento County. SMUD sent letters to its Energy Assistance Program Rate (EAPR) customers notifying them that as low-income customers, they may be eligible for low-cost broadband. The letter provided information designed to raise awareness of existing low-income broadband offerings and a phone number to call for assistance. This two-year effort was completed in June of 2016 after SMUD sent out approximately 90,000 letters to its EAPR customers. CETF, San Diego Gas & Electric, and 211 San Diego recently completed a pilot project with different outreach methodologies. They also provided callers with information on community-based organizations that offer free or low-cost computing devices as well as free digital literacy training.

### Shared Planning and Infrastructure

For rural areas, the challenge is in deploying network infrastructure. The cost of trenching hundreds of miles is prohibitive, and the numbers of households and businesses reached is often small. The economies of scale related to the infrastructure investment necessary just don't make financial sense in a competitive market with publicly traded companies. CASF was implemented to offset the costs of deployment, but there are additional steps to take.

Electric and gas utilities have infrastructure that reaches many rural communities. When trenching or doing other infrastructure upgrades, electricity and gas utilities should coordinate with the regulatory commission and internet service providers to assess the cost and feasibility of deploying broadband upgrades, or even empty conduit, at the same time. This is a more efficient method of construction than having each company trench and/or deploy individually and will very likely result in closing the rural digital divide more quickly and for less cost than it otherwise would.

## CONCLUSIONS

The future of energy policy, like so many other aspects of life in the 21st century, depends on broadband. Demand response policies, smart grid technologies and many more depend on real-time data transfer between all aspects of the grid, from customers, regulators, and power producers to power providers, grid operators, etc. But broadband deployment and adoption lag far behind what the energy system will require.

Currently, it appears there has been a siloed approach to energy planning resulting in market structures, energy policies and technologies that seem to be based on the (incorrect) assumption that broadband is ubiquitously deployed and adopted. With the government and industry becoming increasingly dependent on broadband technology and meaningful internet access holding constant at 70 percent for the past eight years, new approaches will be necessary to meet the goals of policymakers and achieve technology-dependent, next-generation energy and economic efficiencies. ❖

* * * * *

*A version of this article first appeared in The ICER Chronicle Edition 9 (December 2018)*

*Former California State Assembly member Lloyd Levine is president of Filament Strategies, a public policy and public affairs consulting firm, and a senior policy fellow at the University of California Riverside's School of Public Policy. Levine is the former chair of the Assembly Committee on Utilities and Commerce, where he crafted policy in the areas of telecommunications, broadband, energy efficiency and renewable energy. He was a founding board member of the California Emerging Technology Fund, a member of Governor Schwarzenegger's Broadband Task Force and an ex officio member of the California Energy Oversight Board. Levine currently serves on the Founding Advisory Board of the University of California, Riverside School of Public Policy, and is a co-founder of the school's Center for Technology, Society and Policy.*