Building the 22nd century utility

How a utility CEO remakes her business to survive—and even thrive—into the future.

By Val Jensen, ICF

Executive summary

Utility-of-the-future investigations almost invariably view tomorrow's utility as a modified version of today's business. This is both fascinating and limiting: fascinating for what it says about our general discomfort with uncertainty; limiting in that if we can only see a future that is a straight line from today, we are denied the chance to explore an extraordinary range of possibilities. As Daniel Kahneman argues in *Thinking, Fast and Slow,* "We believe we understand the past which implies that the future should also be knowable, but in fact we understand the past less than we believe we do." Wanting to see the future utility as a continuation of today's, except better, makes it hard to see the circumstances under which significant value is lost for the companies or their customers if the industry takes a sharp turn.

One way to counter this "tomorrow is today plus 1.0" perspective is to imagine what the future could look like. This changes the question from, "What will the world look like in 20 years and how do we prepare for it?" to, "What do we want the world to look like 20 years from now and what can we do to create it?" In the former case, an unpredictable event can undercut our entire strategic foundation, since our strategy is about prospering in a future that now looks entirely different. In the latter case, what we want the future to look like has not changed, though the pathway there may have.

What would Sam Insull do?

Imagine a modern-day Sam Insull[1] is hired as the CEO of an investor-owned utility and receives the mandate to remake the business to survive into the 22nd century. Taking stock of what she has to work with, she sees:

- An economy vitally dependent on electricity. Commerce, communication, public health and safety, leisure, and–increasingly–transportation require electric power. The direct and indirect costs of being without power are high and growing, which means that customers place a very high value on high-quality, uninterrupted electric power[2].
- An existing electric power infrastructure that is extraordinary in its reach and complexity. Almost every device using AC electricity is connected to every generator east of the Rockies through a vast hierarchical network of transmission and distribution conductors. This network is under fairly centralized control, and users, whether producers or consumers, are subject to conditions set by a small number of people and organizations in the name of preserving the integrity of this highly interconnected and interdependent system.
- A wholesale power market that is coming apart. Designed for a world of traditional fossil and nuclear generation, the power market is being jostled and undercut by stagnant demand, significant zero marginal cost resources—mostly wind—flooding markets, state policies that favor non-fossil resources, demand response, the rise of storage, and aggregated distributed resources controlled by third parties that don't play by the old rules. Some or all of the generation for which Sam is about to be responsible is, at best, breaking even in the market, with little relief in sight.

What do we want the world to look like 20 years from now and what can we do to create it?

- Electric pricing is a mess. A large share of the costs of running this huge network are recovered via a price administratively set for the kWh logged by meters at every service point. This system was perfect for the young and rapidly expanding utility industry. Sales grew at close to double-digit rates, which stimulated powerful economies of scale in kWh production and, in turn, allowed prices to fall in a virtuous cycle. With growth barely registering, this cycle has reversed itself; revenue from sluggish kWh sales is barely sufficient to cover depreciation, let alone to fund billion-dollar modernization and resilience investments. Depending on the jurisdiction, a customer's bill is a mishmash of kWh-based charges for electricity, distribution and transmission, fixed customer charges, demand charges, and taxes. Usually, they bear only a passing resemblance to the costs a given customer actually imposes because customers are lumped into broad classes, bear no relationship to the value of the services the customer receives, and virtually no customer really understands what their bill is about
- The revenue model is wrong, and not just because of bad pricing. Distribution companies charge volumetric prices for a product (i.e., electricity)

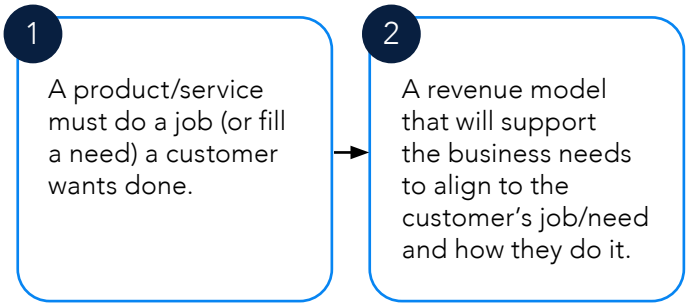
[1] Sam Insull was an assistant to Thomas Edison who later founded Commonwealth Edison Company in Chicago and was responsible for many of the business-model and regulatory innovations that gave rise to the electric power industry as we know it. While the original Sam was a man, in this instance, his modern-day namesake is a woman.

[2] The value of assured access to high-quality electricity often is estimated by assessing what customers would pay to avoid losing that access or by attempting to estimate damages from actual outages. Both methods yield wide results that vary by the duration of an outage, but most find the value to exceed the price by substantial amounts.

that they do not actually produce. The companies' financial strength is hostage to customers' best efforts to use less electricity (and policymakers' best efforts to promote such). This is the unfortunate vestige of the brilliance of the original utility revenue model conceived during an era of high compounding growth.

- Rapidly developing technology across the whole electric power value chain from generation to use is getting smaller, better, cheaper, smarter, cleaner, and more connected. More importantly, it is becoming more ubiquitous; almost anyone can be their own power producer. Most importantly, the pace of this improvement seems to be increasing. Economies of scale in generation, transmission, and distribution are challenged by the economies of mass production and installation of distributed resources to the point where some numbers point to cheaper electricity coming from the roof than from the utility[3].
- As a closely related point, the technology to sense, measure, and control electricity use is rapidly getting better and cheaper, creating opportunities for new transactions and new architectures.
- Demand for electricity, at least sold by electric utilities, is generally stagnant. The services that rely on electricity, however, seem to be growing rapidly. And the interconnectedness of electricity, telecommunications, and transportation is increasing.
- The climate is changing: weather patterns are more volatile; extreme and horribly damaging climate-driven events are more common.
- The consumer base is deeply ambivalent about ceding control over their lives to large industrial organizations, but many still readily turn over their money and decision-making to organizations that promise to simplify things.
- Design is king in everything from thermostats to home batteries, customer web portals and apps, cars, and even customer bills.
- Customers seem to be focused on "the local," and increasingly look to municipalities for action on climate change and social justice. Place seems to be more important even as globalization deepens, a trend reinforced by the COVID pandemic.
- Finally, there is an existing industry for generating, distributing, and selling electricity that is very much focused on those activities (the latter activity still referred to as "meter-to-cash" in some places) as opposed to what customers are actually doing with the electricity[4].

Besides these observations, Sam comes to the job with two related core beliefs about building a sustainable business. First, a successful business is built on a product or service that does a job (fills a need) that a customer wants done (or does it better, cheaper, or faster).[5] Second, a business model and, specifically, a revenue model that will support the business, needs to align to the customer's job/need (e.g. lighting or cooling a space) and how they do it.



She recalls that Edison began his power business charging by the lightbulb—as a proxy for lighting service—rather than by charging for the electricity that powered it. If what the customer wants is a service and you provide an input to the service, you are likely to be substituted out of business. As the experience

[3] The US Department of Energy's Sunshot Program estimates the levelized cost of residential rooftop solar at 10 cents per kWh in 2020. The average price of a utility-supplied kWh was about 13 cents.

[4] See Theodore Levitt, "Marketing Myopia," Harvard Business Review, September–October 1975 for an examination of the focus on product and production as opposed to the customer. Originally published in 1960, the article has become a classic in the study of business strategy.

[5] Our modern-day Ms. Insull got this idea from Clayton Christensen and Michael Raynor, The Innovator's Solution: Creating and Sustaining Successful Growth (Harvard Business School Press, 2003). The influence of Levitt is clear.

of the last 40 years of energy efficiency demonstrates, the service need is durable; the input need is elastic. To light a room today, it takes a tiny fraction of the electricity needed 20 years ago.

The new utility[6]

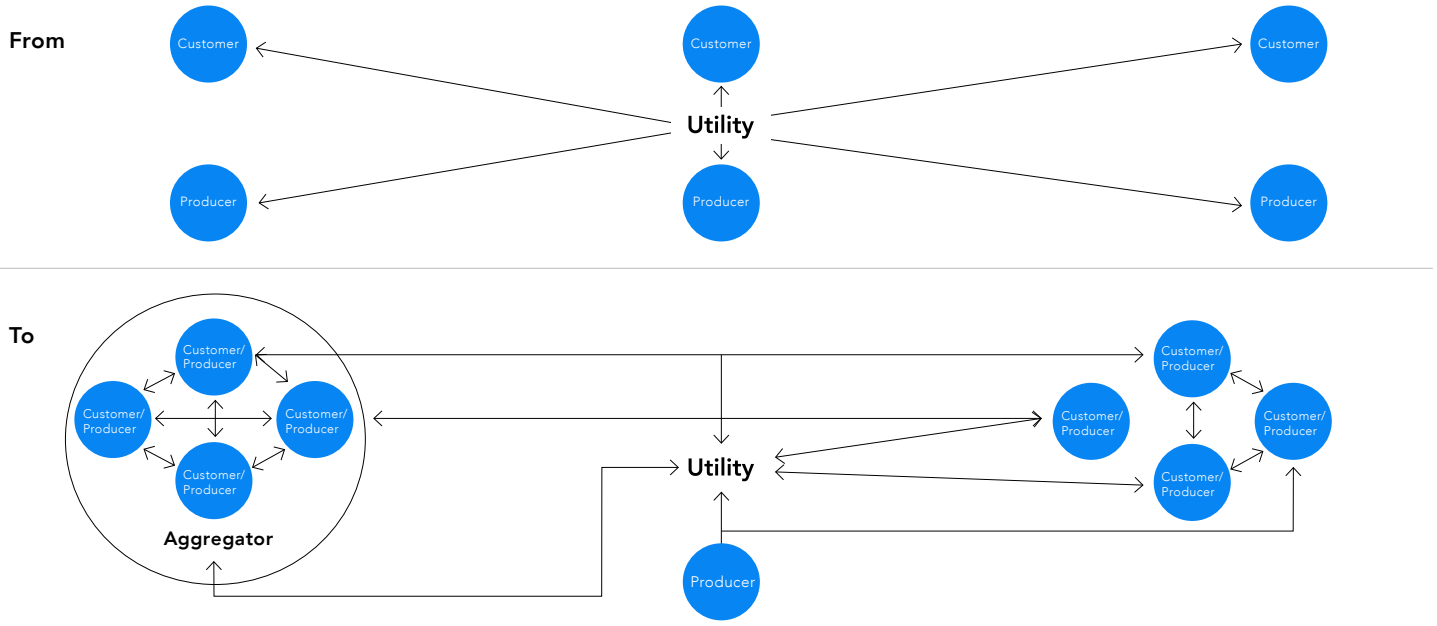
Given these initial conditions, what kind of business would Sam build, and how?

The business rests in part on observation of what seems likely, and in part on conviction. Sam's vision is of a business that creates broad financial and public value by closely aligning with its customers through a services enterprise that thrives in a decentralized, distributed, democratic (in the sense that consumers have a wide range of choice), decarbonized, and just manner.

Armed with this vision, Sam needs a business model. The current model of selling electricity seems to take them on a long trip down the revenue curve. But the activities customers undertake with electricity are durable, and many—lighting, heating, cooking, transporting, communicating, and entertaining—they've done since before electricity. After observing how customers fill these needs, Sam designs a two-tiered business model that gives the utility both revenue stability and also mines the opportunity inherent in technological change.

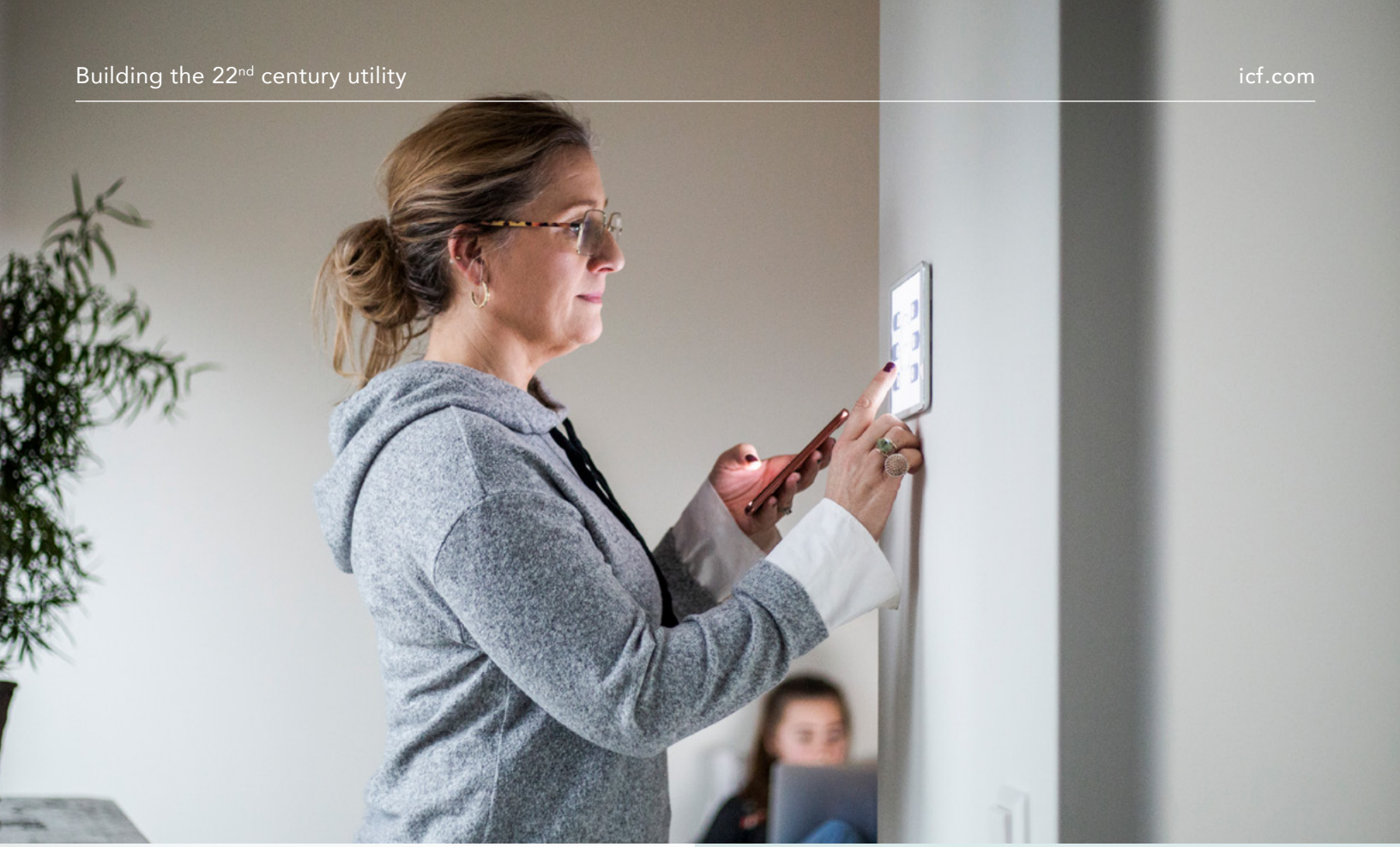
- The first tier of the model will sell network and platform service. Even though electricity per se might not be a growth business, virtually every customer still buys at least some centrally generated electricity. More important, though, is that most customers still see the network as their lifeline. Even most solar and storage customers maintain their interconnections and take power from the grid when it's cheaper or when power from their systems is insufficient, and to provide a sink for their own excess generation. Therefore, what customers buy is the connection and the ability to transact with other parties. In fact, the more customers can do on this platform, the more valuable it becomes[7].

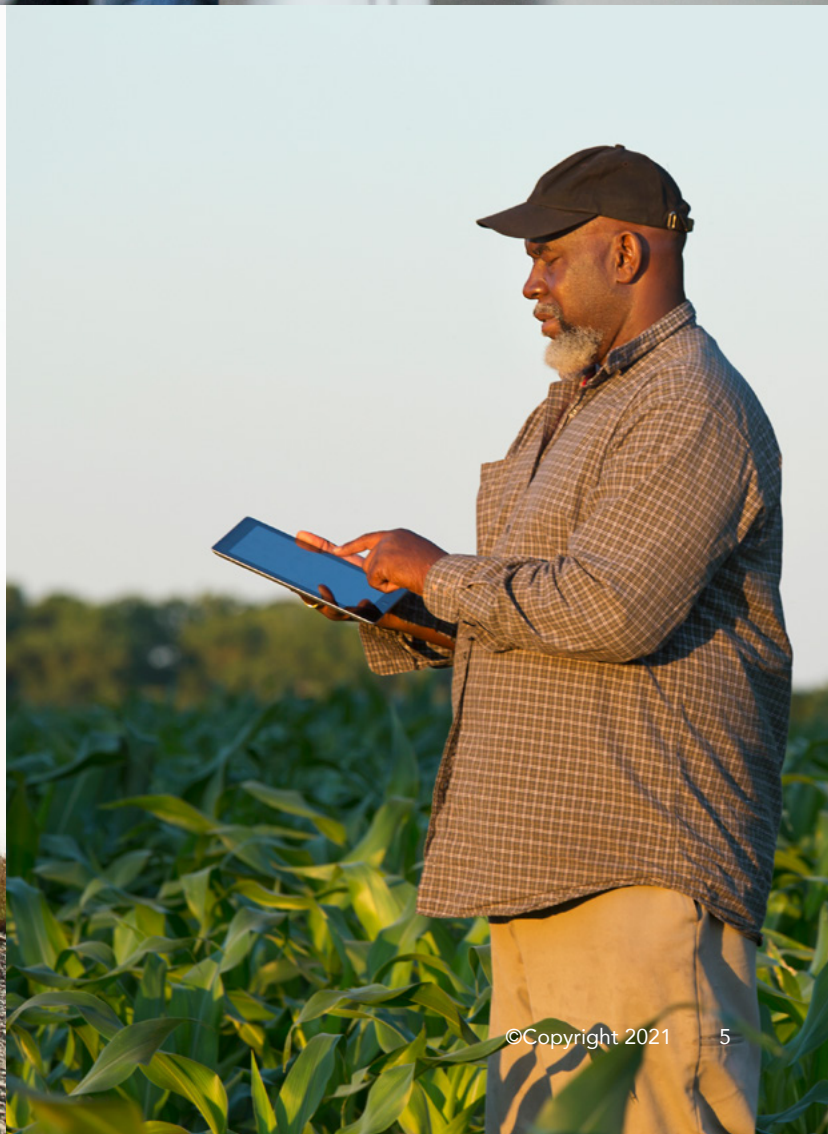
These connections will change as more distributed energy resources are installed. Electricity, money, and information will flow in both directions between customers and the utility, between customers and energy service suppliers, and between customers and other customers. What begins as a hub-and-spoke architecture will evolve into a web.



[6] We are assuming the business is an investor-owned utility. While municipal and cooperative utilities face many of the same broad challenges, their governance structures and the fact that most states do not regulate munis and coops, opens a different set of options for responding.

[7] And as customers do more and more on this platform, the importance of the resilience of the grid-based platform increases.





It is likely that certain nodes in the web will take on some organizational functions as entities emerge to coordinate activity in communities of interest or geography. Over time, Sam's network begins to look like a cluster of smaller networks all coordinated, balanced, and supported by the utility.

Over the long run, as distributed technologies improve, it is possible that these smaller networks—community energy systems—could rely less and less on the utility grid. The second tier of the business model—energy-as-a-service—will provide some optionality if that becomes the case, but also offers substantial mid-term upside potential. The current model of selling kWh—an input into energy service production—rather than the service itself, is limiting in several ways. First, the pricing system conflates the pricing of energy, distribution, transmission, and customer service in all sorts of ways that are inefficient and constraining. Second, as a related matter, selling a commodity relegates one ultimately to a cost management exercise—the low-cost producer wins.

Selling a service, however, allows Sam to differentiate her product and to price it based on the value of the service to the customer. It's clear that, even within service categories, product differentiation is possible and valuable. A customer can activate a light with the flip of a switch, a motion-detected step into a room, a voice command, a location sensor, or any number of other ways. And since the customer cares only about the lighting (and what it costs), Sam can mix and match electricity from the grid, the solar panel, and the battery with a myriad of lighting technologies and controls. As the costs of these various inputs change, or as parts and pieces become more sophisticated, she can change the input mix.

The idea of energy-as-a-service is not new. But even though customers live their lives as consumers of energy services, they have been conditioned to think of themselves as buyers of electricity-powered products on the one hand, and of electricity on the other, seeing the two as separate. Marketing energy-as-a-service will be key.

Prior models have failed in part because the commodity risk-management piece was too hard to solve. Selling a service dependent on grid-supplied electricity put the model at the mercy of both commodity price and demand risk, and the cost of managing them consumed profit margins[8]. Though not entirely without risk, the availability of inexpensive and unobtrusive control technology combined with lower electricity market price volatility and the ability to self-generate gives Sam a much more powerful arsenal of risk-management tools.

Given that Sam runs a utility, the obvious challenge to this model is that utility regulation prevents it from readily moving into either tier. The state views the utility as a monopoly that cannot be allowed to extend its economic power into a competitive services market. The state also sees the utility as being in the kWh business, rather than evaluating what the utility provides in a different way. However, in the near term, there are some steps Sam can take:

- **Establish a competitive services affiliate.** This affiliate, whatever its legal construction, needs to operate very separately from the rest of the company. Utilities that form services businesses are still utilities; that is where the earnings are generated. Services businesses are, in their most basic form, anti-utility. Their success lies in believing that their mission is to disrupt the utility business. Entrenched interests within the utility will work against these disrupters to ensure that they are not successful (by working to constrain resources, for example), so the services business needs to be able to stand on its own. The ideal structure might be for Sam's utility to help fund a private equity venture to build a services business then forget about it. When it succeeds, the shareholders own a controlling stake.
- **(Re)negotiate franchise agreements that enable community-based energy systems.** While, in most cases, state regulatory commissions set prices and broad terms of service, municipalities permit utilities to operate via franchise agreements that

[8] Or the restrictions placed on consumers to manage demand risk made the product unappealing.

are, in effect, permits to operate a poles-and-wires monopoly. Modern utilities tend to see these agreements as necessary evils—essential to enable efficient operation but also a means by which municipalities periodically extract concessions. Sam recognizes that franchise agreements are a way to test ideas related to: (1) leveraging the network to support other local infrastructure; (2) enabling and coordinating community-based energy systems (like microgrids); and (3) delivering energy-as-a-service to municipal facilities. Most importantly, she sees the franchise agreement as the manifestation of the nature of a public service company and, by working with a municipality to re-envision the terms of local service, she sees an opportunity to redefine the meaning of such a company in terms more aligned with the 21st and 22nd centuries rather than 19th and 20th[9].

- **Invite stakeholder and policymaker collaboration.** As a public service company, Sam's business serves the public interest. Changing how it does so will require broad stakeholder and policymaker support. To win that support, some amount of co-design by a range of stakeholders, including customers, is essential.

  The risk associated with a co-design collaboration stems mostly from the fear of losing control and being forced to accept the unacceptable. Fortunately, the history of collaborations across the industry and over time doesn't confirm this fear and, in fact, sincere efforts to engage stakeholders tend to be met[10].

  A co-design process won't fully realize Sam's vision, but it will lay the essential foundation without which progress will arrive more slowly and at greater cost. In the short run, collaboratives can focus on any number of compelling issues, such as clean energy investment, electrification, or non-wire alternatives. However, what Sam really needs to engage stakeholders on is distribution pricing. This model of a platform and energy service company will not work with a pricing structure based on electricity throughput, something that has little to no relationship with what her business provides.

Finally, Sam has to puzzle through what to do with the generation she currently owns, which is largely a mix of fossil and nuclear power with some wind. She doesn't want to hold large generating assets in the long run, since these are inflexible to changes in markets and grid architecture, making them financially risky, in addition to being environmentally problematic. If Sam's utility is fully integrated, existing generation enjoys some protection through its inclusion in rate base. However, realizing that state policymaker attitudes can shift quickly, selling the assets might make more sense.

If the generation is held in a competitive affiliate, there is a good chance it is struggling financially, particularly if it is located in a region with active clean energy policies, substantial wind generation, or significant amounts of cheap natural gas, any combination of which drives market prices down. Undoubtedly, there is a future for some clean central station generation. But there are few, if any, synergies with a platform and energy services business. Sam decides to bet on her network and to spin off or sell her generation portfolio, strengthening her ability to pursue investments and acquisitions more aligned with her model.

Confident in that model, Sam turns her attention to her company's physical, digital, and human assets. Like most other utilities, these assets were acquired and developed for the original utility business model. They support a hub-and-spoke architecture (one-to-many) over a fully networked grid (many-to-many). And, while the utility has invested in some aspects of an intelligent grid, including smart meters, it has not invested in the sensing, supervisory, and control technologies required to support a highly transactional, bi-directional web.

[9] Using franchise agreements to explore alternative models is an incomplete solution given that Sam's entire territory includes a variety of unincorporated areas that do not have franchise agreements. This approach does, however, provide an opportunity to test ideas that can then be explored more broadly if they are successful.

[10] Recent work in Hawaii to reinvent the regulatory model and introduce a strong performance-based process is an example. Although probably no party feels as though the process has been perfect, the utility, regulators and third parties collectively have moved the state far along in the journey to a 21st century utility regulatory model.

It also is clear that grid intelligence is not enough to manage all of the new business's possible complexities. For example, the inability to easily ramp renewable generation up or down to match load will require more capacity to move supply around and out of the control area, as well as a greater ability to control loads (including storage). If sufficient sinks for off-hour generation can't be developed, additional transmission will likely be needed to support low-load conditions.

Sam's vision of a utility platform rests on its ability to enable and support as many types of transactions as possible.

One of the most strategic grid investment choices Sam must make relates to the management of distributed energy resources (DER). She needs to choose between managing DER directly or partnerships with third parties who will aggregate DER. The argument for direct management and control is compelling. The utility has an obligation to maintain the integrity of its system, and the uncoordinated operation of hundreds of thousands of distributed resources—such as storage (including electric vehicles), solar, small-scale wind, fuel cells, etc.—could imperil that stability under plausible conditions. But there is strong sentiment against this option as well, driven by deep suspicion of utility motives and the fear that the utility will curtail DER operation to serve its financial interests rather than only to serve security.

The alternative is to forge partnerships with third parties who market DER to customers and aggregate the installed capacity. The purpose of the aggregation is to be able to sell energy, capacity, or ancillary service to the utility or into the wholesale market.

Given the relatively low DER adoption, this issue is more conceptual for now—but Sam understands that the conceptual inevitably will become the practical. This leads to one of several business inflection points: Will she invest in a DER management platform to control every endpoint, or to connect aggregators' systems? The choice depends as much, or more, on vision and commitment to a still-forming business model than on dollars and facts on the ground.

Sam's vision of a utility platform rests on the ability of that platform to enable and support as many types of transactions as possible. It matters less if a transaction is initiated by the customer or the customer's agent. She also recognizes that painting aggregators as "disintermediators" is a distraction. When the objective is to maximize transactional volume, it should not matter whether one's partners sell energy-consuming or energy-producing machines. Sam ultimately invests in a Distributed Energy Resource Management System (DERMS) designed to manage connections with aggregators—to become an aggregator of aggregators—rather than in a system that tries to manage every end point[11].

The utility's customer systems are still rooted in the meter-to-cash culture that has characterized most utilities for decades. The customer side of the business has mostly been about how to make core transactions—signing up, paying for, moving and stopping service, and outage communication—as easy, inexpensive, and effective as possible. Great strides have been made to improve customers' experience of these transactions, but the focus has been on making unpleasant transactions less unpleasant and fewer in number. Realizing the need to make every transaction as smooth as possible for customers, Sam also knows that the utility's success ultimately depends on greatly increasingly its transactional flow.

The utility needs customers to want to use its platform to transact, and so it needs to create more options for transactions by broadening service offerings and also the systems that facilitate and clear transactions.

Sam's first act is to update the utility's core billing, payment, and customer relationship systems.

[11]A third, though not necessarily mutually exclusive, approach could be building what the National Renewable Energy Lab calls an "autonomous energy grid," which envisions individual end-point supply and demand, which self-controls within cells organized within a hierarchical control system. Early work is promising and, while widespread adoption is a long way off, the likelihood that something like this will materialize convinces Sam to avoid a major investment in systems to control all devices.

It doesn't matter if the day of reckoning is five or 25 years from now; a company that is not deliberate in its approach to changing to meet its world will succeed only by chance.

Out of the thousands of system requirements, Sam insists on a handful:

- The system needs to be based on the customer as a transacting party, rather than just as a user of electricity.
- The ability to bill and account for transactions is not based on kWh. Although kWh will remain the primary transactional unit for some time, the system needs to be sufficiently flexible to handle other bases.
- The ability to manage multidirectional flows of money: from customer to utility; utility to customer; and customer to customer.
- The ability of the system to manage many types of billing arrangements, including the standard monthly post-consumption bill, pre-pay, micropayments, subscriptions, and more.
- The ability to track every customer interaction and present this information to those who deal with customers.

The bottom line is that the nature of transactions (some of which can't even be contemplated today) should determine the billing and accounting approach, rather than vice versa.

Second, Sam knows she needs to rethink and rebuild her customer-facing user interface. As with the customer billing and payment systems, the industry has gradually evolved toward digital customer-facing assets that are more transactional. However, the transactions still mostly revolve around start/stop service, bill payment, and outage information exchange. Sam aspires to turn the company's website into an energy services hub—one that invites customers to learn about and engage in a wide variety of transactions, from acquiring energy efficiency and demand-management devices, rooftop solar and battery storage, and electric vehicles, to enrolling in various pricing and energy services programs.

Consistent with her view on how the DER market will evolve, Sam does not envision her utility as selling these products and services. Instead, she views her digital platform as a place to connect customers with those from whom they can acquire these products and services, and then to connect those products and services easily to the grid.

Finally, Sam understands that none of this is possible unless her utility, by working with its stakeholders, finds a more effective and sustainable way to address affordability. This is not strictly a utility issue and utilities for decades have argued that they should not be held responsible for addressing such a persistent, complex, and deep economic and social issue. At the same time, almost one-third of her customers are economically challenged, and there is no path to a better and more sustainable business model that does not confront their ability to afford essential energy services.

As with issues of pricing and a shift into services (and away from kWh), addressing affordability effectively requires deep collaboration with policymakers and stakeholders. Some partial solutions, such as pre-pay arrangements or subscriptions for essential service, historically have elicited negative reactions from some consumer advocates. At the same time, solutions such as permanent disconnection moratoria and expanded financial assistance shift the costs around but fail to address structural issues.

As with most other issues, moving forward on affordability will entail some mix of actions including:

- Providing payment options, such as micropayments and pre-pay, which allow customers to align payments with their income streams and avoid large monthly bills.
- Prioritizing energy efficiency programs for hard-to-reach customers, using much more sophisticated education and outreach approaches.
- Revisiting pricing structures and aligning the costs that lower-income customers impose on the distribution system with the prices they are charged.
- Developing energy service packages that provide a fixed price for service along with energy efficiency and demand management services, as well as devices to manage consumption risk.
- Creating community development programs that help to restore community health. While not a conventional element of affordability policy,

programs that address some of the structural issues behind the affordability crisis can be an important element in a package of actions. In particular, programs that foster community-based energy systems that provide lower-cost electricity via community-delivered clean energy can have multiple benefits.

The investment needs are substantial, but this is still a regulated utility and it needs permission to recover investment and operating costs. While Sam believes that the traditional rate base, rate-of-return model remains viable for governing a regulated monopoly, she also appreciates that she will not win permission to invest billions of dollars in system improvements under the current model, unless she can demonstrate the value she creates with her investments and expenditures is equal to or greater than the cost to customers.

This equation of value received > cost has always been implicit in the regulators' work, but as utility requests for the recovery of billions of dollars proliferate across the country, regulators and stakeholders demand increased transparency as to how the equality is proved[12]. Rather than waiting for a major rate case defeat, Sam decides to propose a regulatory model reform with the following elements:

- **A set of performance metrics tied to the rate of return on rate base** so that, as the utility's performance rises or falls against the metrics, shareholders will feel the impact. Well aware that there is a deep and ongoing debate over performance-based regulation, Sam proposes a simple model based on measurable outcomes with a clear relationship to the value the utility creates for customers.
- **A transparent capital planning process.** The details would vary depending on whether Sam's jurisdiction uses historic or future test years or includes multiple future years. The basic idea is that the utility would share its planned investments along with its assessment of the value created. Often, regulators prefer not to approve or disapprove investments based on such a plan, but instead to wait for the actual request for cost recovery. Utilities typically prefer pre-approval to reduce risk. However, in either case, transparency with respect to utility investment plans can build confidence in utility decision-making, which can ease the actual cost recovery challenge. Sam sees this as an opportunity to explain the utility's thinking and to benefit from stakeholders' input in a less adversarial proceeding than a rate case.
- **A clear definition of utility service.** Many state statutes that regulate electric utilities define what constitutes a utility service. Cost recovery hinges on whether the costs were necessary for the efficient delivery of that service, and whether costs were incurred for an activity that falls outside of what might be considered standard service. Sam faces the reality that what her utility does (or what she believes it should do) is quite different than what a utility did when that piece of a statute was last amended. In the end, however, Sam argues for the definition of utility service to include giving consumers and producers the ability to distribute and take delivery of electricity essential to consumption of energy services, including activities required to ensure the safety, security, reliability, affordability, and environmental quality of that service. Where the electric utility's infrastructure can be used to support broader community infrastructure related to telecommunications, water, natural gas, and transportation, they would like the clear authority to pursue those opportunities so long as customers see a net benefit.

[12]Few concepts are as ambiguous as "value" in this context. An equally ambiguous concept is "utility," which means essentially "what you get for your money." Certain attributes of value, such as reliability or clean/green, can be approached by estimating customers' willingness to pay for electricity from various sources for various uses at various times.

A public service company for the 21st century

Sam's utility business has, as its purpose, the creation of customer value that exceeds the cost to create and deliver it. That ambition aligns it with most successful companies. What sets it apart is that it operates in the interests not just of its private customers and owners, but also of the wider public. The utility provides an essential service for public safety and welfare, and operates as a governmentally sanctioned monopoly to provide services prescribed by local and state governments for a given jurisdiction.

This special status, however, does not ensure a healthy business. The revenue collected must be "allowed" by regulators and so financial health depends in part on demonstrating that value ≥ cost as an argument for that permission.

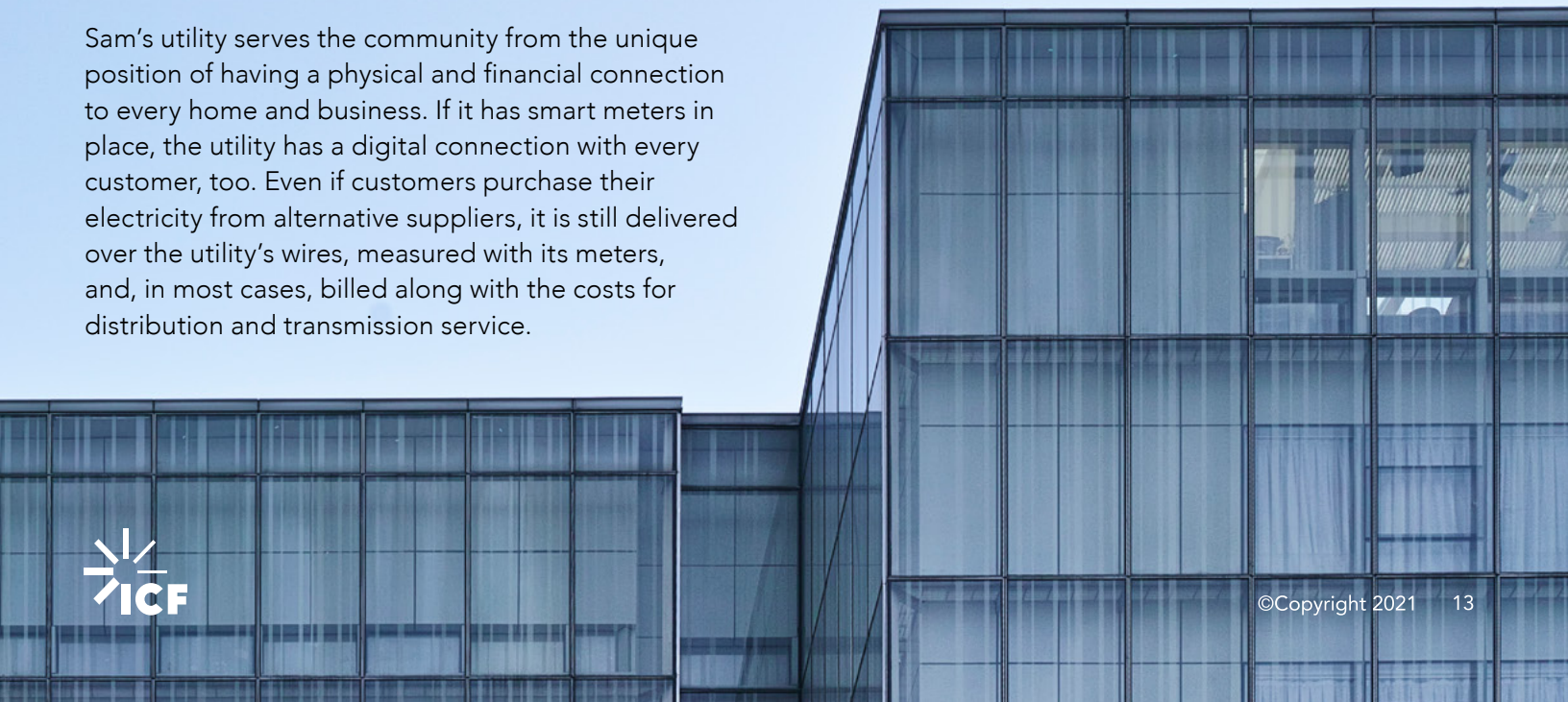
A vibrant community provides not only a platform for utility financial success, but also a pool of qualified employees and suppliers and an engaged set of stakeholders. An unhealthy community means customers struggle to pay bills, growth disappears, civic institutions decay, the labor pool stagnates, and worker safety becomes a concern.

A utility cannot simply move to another location if its service territory declines, so it has a deep stake in ensuring community health and resurgence. Being that the place it serves is as defining of a public service company as its monopoly franchise, Sam has a compelling vested interest in supporting the communities she serves as a way to sustain her business.

Sam's utility serves the community from the unique position of having a physical and financial connection to every home and business. If it has smart meters in place, the utility has a digital connection with every customer, too. Even if customers purchase their electricity from alternative suppliers, it is still delivered over the utility's wires, measured with its meters, and, in most cases, billed along with the costs for distribution and transmission service.

This unique set of connections positions the utility as a cornerstone of essential community infrastructure:

- It allows every customer to physically connect their energy service needs to a wide range of energy service options. Even if a customer elects to self-supply, the physical interconnection with the distribution system creates huge value by providing inexpensive back-up for self-generation and/or storage and as a counterpart for excess self-supply. As these options and their viability grow, the value of the grid connection increases because it enables more transactional activity. In the long run, this activity could include autonomous and human peer-to-peer transactions.
- The physical and digital networks can be used to support community environmental and safety monitoring by hosting emissions sensors, security cameras, and gunshot detectors.
- These same networks can be used to host and carry gas and water utility equipment and services such as telecom small cells, meter reading, and leak detection.
- The distribution network provides a physical and, potentially, a financial platform for community-based energy systems such as those that might be designed around a microgrid and/or community solar project. Sam's vision sees these community-based systems as becoming a much more important element of the energy services business, providing affordable, clean energy solutions and local jobs.



Beyond the value of the utility network, the role of the new public service company extends in several directions. As one of the largest local employers, Sam recognizes the opportunity and obligation to help develop a strong workforce through a job-training program focused on systemically under-employed community members. She asks her supplier/contractor network to join the initiative.

She invests in next-generation workers through supporting STEM programs. She revamps her supply chain to focus more on local sourcing from disadvantaged businesses. None of these actions is purely altruistic. Being a major contributor to community health is a prerequisite to local stakeholder support for the investments Sam will need to make. Community building is an essential part of adding value.

Strategy as storytelling

The story of Sam the new utility CEO can be distilled into three parts. First is Sam's recognition of four fundamental truths about this business.

Technology is leading the energy services industry towards a more distributed future.

→

As a result, consumers have more control, whether or not they choose to exercise it, and more choice, which they demand.

→

Customers largely want a specific end—jobs done and service provided—and utilities provide the means—electricity. Lots of others in the market want to help customers use less of what they sell and even they offer large energy efficiency programs.

→

Sam's new utility is expected to be part of a climate solution.

Second is Sam's recognition of what these truths mean about the future. While Sam consults the normal oracles to get predictions on when things will happen at what price, understanding the above truths offers all she really needs to and can know. The energy services business will become more distributed, decentralized, democratic, and clean. Sam knows that it needs to be affordable and just. Her current business is in many ways misaligned with this future. She chooses to set her company on a course to be the platform on which this new distributed energy services will be built and to ultimately be a company that thrives as an energy services solution provider.

She must also face the hardest choice any CEO has to make: whether to reject the obvious conclusions from these truths (or to reject the truths themselves) and try to shape the environment to align with the business; to generally acknowledge the truths but try to accommodate them through incremental adjustment; or to accept the obvious conclusions and try to reshape her business to align with the environment as it exists.

Changing the model to meet a changing world carries very apparent risks—there is no way to know how and when technology will alter the world in a way that requires a fundamental business model change. Getting it wrong could involve major mis-investment and the risk of disallowance. There is always the fear that a radical shift could impair reliability or customer service, and no executive wants to cede control or territory to would-be competitors.

Third is how Sam rebuilds the business to serve her vision. The architecture and construction of the grid needs to be rethought as a web, with huge implications for investment. She needs to reinvent the customer side of the business with new systems and a different culture. And she needs to bring about a very different regulatory model while she secures cost recovery for the investment in the new business. Accepting the four basic truths about the business doesn't inexorably lead through the three parts of Sam's journey. But it does force us to think about how the operating environment might look after enough time has passed to support some fundamental shifts in the business, and about what sort of business we would build if we could. It helps to expose those choices over which we exercise substantial control, e.g., how we want to structure our customer business, as well as those that are controlled by others, e.g., regulatory model changes. And, maybe most importantly, it makes strategy a deliberate process. It becomes about what we can and will do to shape our environment to enable our success.

Being deliberate does not guarantee success. A very deliberate plan is subject to the same uncertainties as having no strategy at all. Investment will be needed to support the business plan, which may not show returns for years, if ever. This means that the investment planning and budgeting process will also require a new approach.

It becomes about what we can and will do to shape our environment to enable our success.

Traditional utility investment planning follows a fairly standard process. First, the physical parts of the grid that are at high risk (probability and consequence) of failure are addressed. Second, growth and system constraints have to be accommodated. Third, end-of-life equipment and system replacement is funded. Fourth, grid modernization investments are added. Finally, any outstanding needs are addressed. The process tends to be deterministic in the sense that, if certain criteria are met and sufficient funds are available, the investment is budgeted. Under this regime, a utility would invest in upgrading a feeder to accommodate DER adoption if it expected high rates of adoption in the near term, as opposed to encouraging additional DER adoption. The vast majority of a utility's investment is to ensure that its facilities and systems can meet current expectations under current or near-term expected conditions.

Sam needs a different approach. The utility still needs to prioritize investment in plant and equipment with a significant risk of failure. But that investment still should be subject to the additional criterion of whether it would make sense if conditions changed tomorrow or over some defined time period. Beyond replacing high-risk equipment, virtually every other investment should be subject to a stronger "what if" analysis. Would the utility still invest in a new substation if the area became part of a community energy system built around a microgrid, and should it encourage that?

Should it spend an extra $20 million to build peer-to-peer functionality into its billing system, when the timeline for real peer-to-peer transactions might be a decade away or might never happen? Many of the investments that Sam would make will be important for creating new customer value, but with uncertain timing and subject to a range of material uncertainties.

The investment planning process certainly becomes more complicated, but this is the type of investment problem many businesses face and sound tools are available to help structure the decision. However, this risk-based process will not work without there being a clear view of what Sam is trying to build.

The future she is trying deliberately to bring about is what conveys value to the investment. The uncertainties associated with bringing that future about define the risks. Depending on the perceived level of uncertainty, this approach will favor modular or incremental investment that creates options that can be exercised as uncertainties are eliminated.

Sam's success or failure rests on how this process is managed, because the way the utility invests its money is how it builds its future. If the investment thesis is that capital will be allocated to those projects that most efficiently advance the vision, subject to preserving key operating metrics, she may succeed. If the investment thesis is that capital will be allocated to those projects that best preserve and enhance operating metrics, with incremental discretionary capital allocated to utility-of-the-future projects, she will fail. The appetite for conventional project capital will always exceed its supply, and the utility-of-the-future projects will be allocated something only to allow the institution to feel forward-thinking. Absent a deliberate top-down change in the allocation process, there simply is too much well-intentioned momentum to enable the company to change in time.

The future she is trying deliberately to bring about is what conveys value to the investment.

It actually doesn't matter if the day of reckoning is five or 25 years from now; a company that is not deliberate in its approach to changing to meet its world will succeed only by chance. All of the other changes Sam wants to make flow into or from the capital allocation process. As she works to convince stakeholders that she is building a new utility that will better serve its public service company purpose, this is the curtain that she will need to open.

In the end

Most likely there is a real Sam out there thinking about how to remake her utility to survive as a vibrant business into the 22nd century, and it is highly likely the makeover differs from the one described above. An incredibly complicated activity has been made to look like a straightforward series of executable steps and, by doing so, has maybe made the story seem naive. Transformation is risky.

The reason most business transformations struggle is that leadership tries to remove short- and medium-term operational and financial risk. The operational risks are often overstated. Absent a financial collapse, there is no reason for sub-par operations. If the utility excels at anything, it is core construction, maintenance, and operations.

The financial risks are real. But they are also easy to mischaracterize or exaggerate. The risk is not really that Sam's tinkering will lead to materially lower short-term earnings. Instead, the risk is that the financial community will not embrace the strategy, or will lose confidence in the utility's ability to generate earnings and dividends. That will translate into less favorable stock performance and perhaps even to less positive securities ratings.

But the risks of not rewriting the narrative are also high. The financial community sees the same set of truths reshaping the industry's environment that Sam does, and is asking utility leaders how they intend to maintain growth in that environment. Depending on the jurisdiction, a leader answering that they are staying the course will signal that there is no real plan for future growth; that the leader is banking on policymakers to hold back the combined pressures of technology, customers, and climate so that the company can adjust incrementally. Economic history is rich with examples of industries that fell under technology and consumer pressure while believing that regulation meant protection. The electric utility world is changing in some very clear ways, and if a leader does not act to align with the change, they will only achieve their aims by chance.

About the author

Val Jensen

Senior Fellow, Energy Utility Services

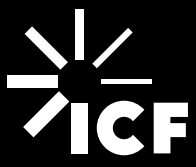
Val Jensen is a senior fellow within ICF's energy practice, focusing on important issues facing the utility industry.

Val brings over 40 years of energy industry experience, most recently as senior vice president for strategy and policy at Exelon Utilities. In this role, he led the development of the company's technology and business strategy, supported policy, and coordinated strategy development for Exelon's family of operating utilities. Previously, Val served as senior vice president for customer operations at Commonwealth Edison (ComEd), where he managed development and delivery of the utility's customer-facing products and services, including its $250 million annual portfolio of demand response and energy efficiency programs.

Val returned to ICF in 2020. From 2001–2008, he served as an ICF senior vice president, where he helped grow ICF's Commercial Energy business and then later managed its San Francisco office. During this time, he specialized in the design and management of energy efficiency programs for numerous utilities including ComEd, WE Energies, Wisconsin Public Service, Nevada Power, Ameren, and PG&E.

Val previously served on the boards of the Chicago Lighthouse for the Blind, Energy Foundry, Alliance to Save Energy, and the Smart Grid Consumer Collaborative. He also served on the U.S. Department of Energy's Electricity Advisory Committee and was a founding board member of the Midwest Energy Efficiency Alliance.

Val holds a master's in public administration from the University of Minnesota and a bachelor's in political science and government from Hamline University.



Val Jensen
val.jensen@icf.com

linkedin.com/company/icf-international

twitter.com/icf

facebook.com/ThisIsICF

icf.com/work/energy

About ICF

ICF (NASDAQ:ICFI) is a global consulting and digital services company with over 7,000 full- and part-time employees, but we are not your typical consultants. At ICF, business analysts and policy specialists work together with digital strategists, data scientists and creatives. We combine unmatched industry expertise with cutting-edge engagement capabilities to help organizations solve their most complex challenges. Since 1969, public and private sector clients have worked with ICF to navigate change and shape the future. Learn more at **icf.com**.