

The Essence of the Galvin Electricity Initiative

Transforming the Grid: An Executive Summary

Aging, unreliable, inefficient, insecure and incompatible with the needs of a digital economy, the U.S. electric system is in dire need of modernization. With technology that pre-dates the 1950s, the system includes decades-old equipment on the verge of failure. While these parts can and will be replaced, the situation presents the nation with an unprecedented opportunity – a chance to also reinvent and change America’s electric grid in ways that are profoundly beneficial to consumers, the environment and the economy. Founded by former Motorola Chairman and CEO Robert Galvin, the Galvin Electricity Initiative is a catalyst for this transformation.

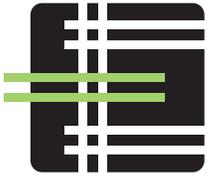
The first objective of the Initiative is to promote regulatory reform, based on a guiding set of **Electricity Consumer Principles** (see page 4). Current regulations set incentives for utilities to maximize the amount of power they produce and sell, with no real rewards for reliability, customer service, innovation or resource conservation. Since regulations that protect the status quo also effectively prohibit the introduction of technologies that would enhance the grid’s performance, reform is a vital initial step.

The Initiative’s second objective is to support projects that concretely demonstrate the benefits of regulatory change, incorporating technologies already in existence into smart microgrid electricity distribution systems, using Six Sigma quality principles not often employed by the industry. Designed to augment the bulk electricity grid and improve the quality, reliability and security of service, such interactive microgrids – small, modernized versions of the bulk power grid – comprise what the Initiative calls the Perfect Power System. A working example of Perfect Power is now under development in Chicago, at the campus of the Illinois Institute of Technology.

Third, since these impending changes challenge those comfortable with a known system, communications on the advantages of Perfect Power are critical to reform. The Initiative’s advocacy efforts are focused on influential state and federal stakeholders, as well as others in a position to lead policy change.

The existing grid served the U.S. well for much of the 20th century. Its hardware and the people who operate it will continue to deliver power to end-users into the future. The industry, however, has failed to spawn significant innovation in more than 50 years, largely due to a regulatory structure not attuned to the needs of the 21st century. The essence of the Galvin Electricity Initiative, then, is to stimulate entrepreneurial innovation and investment aimed at providing consumers with choices, while removing barriers that prohibit a value transformation of the electricity system.





The Challenge

Electricity is one of the few sectors where performance and earnings are not directly aligned with the interests of consumers or their satisfaction. Instead, utilities answer primarily to state regulatory agencies, elected officials and federal authorities, operating under numerous rules that precede the New Deal. But like many elements of the U.S. infrastructure, much of the equipment in the electricity grid is near the end of its functional lifespan. We therefore face a choice of reinvesting in a system that served the past, or transforming it in ways that serve the consumers, businesses and society of tomorrow.

The case for change is clear. Consider, for instance, the unreliability of today's grid. Despite great efforts by utilities to improve reliability, each day roughly 500,000 Americans spend at least two hours without electricity. Brownouts, power spikes and even minor blips can bring high-tech production lines to a halt. Such impurities and failures cost business and consumers an estimated \$150 billion a year. Moreover, the system is vulnerable to terrorist attack, major storms and even moderately turbulent weather.

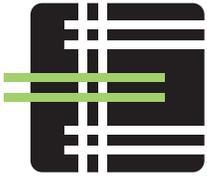
The system is also inefficient. While nearly half of America's electricity comes from coal-fired generation plants, more than 60 percent of the energy in each ton of coal is lost through smokestacks and cooling towers in the form of emissions, heat and warm water. When electricity from coal, nuclear or hydroelectric plants is moved long distances over transmission lines made from copper cables – just like a century ago – still more power is lost as heat, at times up to 10 percent. In homes, telephone chargers and “instant-on” televisions bleed power even when not in use, devouring an average of 7 percent of a household's total consumption. In some cases, more than 90 percent of the thermal units that go into electricity never light a room or run a motor.

The inefficiency in turn contributes greatly to electricity's environmental impact. Power plants produce more pollution than any other single industry, and more carbon dioxide than the entire transportation sector. What's more, nearly a quarter of the total investment in power generation is devoted to providing electricity for peak periods of demand, which occurs 5 percent or less of the time.

Today's electricity industry is much like the old telephone system, when rotary-dial phones came only in black and were owned by the phone company and rented to consumers who legally had no other option. In most jurisdictions microgrids are currently illegal, simply because utilities hold an exclusive right to string wire across roads. Utilities are compensated with a fixed return on how much they invest in facilities to meet maximum power demand, charging consumers for the average cost of providing power. But there are no incentives to give consumers information on costs or choices of when and how much power to use.

The Opportunity

Just as regulatory change created a consumer-focused telecommunications industry, it stands to reason that a reformed electricity regulatory structure will produce similar results. In fact, many of the technologies needed to meet 21st century power demands already exist. Founded on Six Sigma quality methods and researched and designed by a team of industry experts, the Perfect Power System features local power generation from renewable and other distributed sources, including solar panels, generators,



batteries and un-used hybrid automobiles. It incorporates smart in-home devices and meters and a self-sustaining infrastructure with smart switches, which ensure reliability and efficiency.

Such microgrids may encompass a building complex, a campus or an entire community, with power managed by smart controllers. Owned by a town, a third party or a utility, a microgrid can interact with dozens more, woven into a collective that increases systemic strength. Smart controls can instantly identify and isolate a fault, so that customers no longer experience power outages. With dynamic price information provided in real time, the system enables users to control power use and spending. Consumers who produce or store excess electricity – say from solar panels or an electric vehicle – can sell power back into the grid. Estimated annual savings from a smart microgrid can exceed installation costs by a factor of four to five.

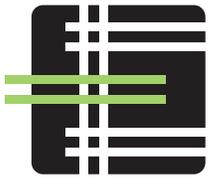
Operating in concert with the bulk power grid, a network of microgrids will enable the system to efficiently re-route power and smooth out the spikes of peak demand. In turn, this reduces or eliminates the need to build more conventional plants to meet demand. Under a regulatory transformation, utility and private investment will shift from expanding the system to optimizing its performance, expediting alternative and renewable power development and creating new green job opportunities.

The campus-wide Perfect Power System at Illinois Institute of Technology (IIT) in Chicago – the first such system built in the U.S. – is the Galvin Initiative’s flagship project. It’s the result of collaboration among the Initiative and IIT; Commonwealth Edison and its parent company Exelon; Endurant Energy, an entrepreneurial energy developer; and S&C Electric Company, which is a global provider of electric power systems. The IIT system is designed to pay for itself as it’s built, over a period of nearly five years. The U.S. Department of Energy recently joined the effort, providing \$7 million to further condense the payback period while contributing to a cutting-edge prototype for nationwide grid modernization.

The Galvin Approach

Driving Regulatory Reform: The Initiative is researching and promoting new regulatory structures that will facilitate and accelerate the transformation of America’s electricity system to a more consumer-driven, entrepreneurial, distributed-service enterprise, while ensuring that regulations are accountable to the **Electricity Consumer Principles**. The Initiative is supporting several states in this effort. In Illinois, the Initiative has convened a Team of Leaders, including local councils of government, to establish guiding principles designed to produce consumer-focused policy changes. The Initiative is also providing technical and analytical support to local communities and consumer groups in their efforts to draft and pass state legislation. The Initiative will showcase this work for use by other states and the federal government.

Developing Perfect Power Systems: Smart microgrids initially built to serve communities and smaller entities offer the most effective architecture for new regulatory structures, technologies and systems. Ongoing demonstration projects also create opportunities for entrepreneurial innovation and electricity service optimization, especially when based on a commitment to quality. The Initiative is creating a utility-focused Six Sigma education program at the University of Minnesota’s Juran Center



for Leadership and Quality. The Initiative has meanwhile completed two Perfect Power system designs, one at IIT and another for the Forest City Ratner Mesa del Sol development in New Mexico. A variety of other community-level microgrid projects are now being designed and installed by entrepreneurial innovators.

Raising Awareness: Communications that promote regulatory reform and Perfect Power to influential national and state-level audiences are critical to the Initiative. With messages that reveal the unsustainable costs of maintaining the status quo, the communications also demonstrate the economic, social and environmental rewards of changing the current regulatory structure and culture. The campaign consists of earned media, national and local advertising, speaking engagements and personal outreach to key stakeholders.

Electricity Consumer Principles

These principles reflect the desire to establish a much more consumer responsive, reliable and environmentally responsible electricity system. Developed with citizens, mayors, the business community and other stakeholders, these Principles provide an electricity consumer's "bill of rights," a template for evaluating existing and proposed electricity policies and legislation. The following precepts are designed to guide policy making today and help future generations adapt to changing circumstances:

1. **All electricity consumers have the right to receive dynamic electricity pricing**, and the means and incentives to use this information to their best advantage.
2. **All electricity consumers have the right to buy their retail electricity services from any source they choose** in open, competitive markets.
3. **All electricity consumers have the right to electricity service system reliability and quality** that protects life and safety under all conditions, and meets the needs of today's digital society.
4. **All electricity consumers have the right to access, at all times, the fully transparent performance metrics** of their electricity service system.
5. **All communities have the right to improve their electricity distribution system**, with the full cooperation of their utility, in order to best serve the needs of their citizens.