The history of U.S. infrastructure industries has been marked by a number of major milestones. Some relate to key technological developments that lower costs or bring new products to market. Others involve changes in the underlying economics that create the impetus for regulatory reforms. But the need to adapt or reinvent U.S. industries to achieve smaller carbon footprints and greater energy security may, in retrospect, prove the most sea-changing of all. In his new book, *Smart Power – Climate Change, the Smart Grid, and the Future of Electric Utilities*, Peter Fox-Penner takes on this question for the electricity sector. In *Smart Power*, he educates, analyzes, and advocates his way through a comprehensive assessment of what is needed to effect a successful metamorphosis to a more efficient, smarter electricity grid. The product is perhaps the first and most compelling templates for change that has been articulated.

*Smart Power* speaks to a reader assumed to be familiar with the U.S. electricity industry, motivated to think differently about how we produce and deliver energy to consumers, and accepting of the daunting challenges change will impose on us. Fox-Penner calls for a redesign of the electricity industry with three major features. One is a decentralized control paradigm which puts more choice and information about consumption decisions into the hands of the consumer. A second is retooling for low-carbon supplies. And a third is a business model that promotes more efficiency. This complementary set of tasks, *Smart Power* argues, will create the “future of power.”

There is something for everyone in *Smart Power*. There has to be, since the industry redesign contemplated will involve virtually every aspect of electricity production and delivery. It will therefore necessarily draw upon an array of differentiated and coordinated expertise. Fox-Penner’s message to a multidisciplinary audience (matching his own background) is one of the major appeals of the book. It recognizes that in electricity—much like in telecommunications—technical, institutional, economic, business, and legal considerations weigh heavily in policy making.

In the first section, Fox-Penner sorts out the puzzle that is Smart Grid, whereby consumers will access the technologies and pricing systems to control their usage and self-production in order to lower power costs and increase reliability. Here, the roles of smart metering,
distributed generation, plug-in electric vehicles, technology suites, and power system
management begin to make sense. This in itself is a “must read” for federal and state policy
makers who have had Smart Grid decisions and issues thrust upon them, but who may not
fully grasp the complexities of Smart Grid.

In the second section, Smart Power takes on the issue of defining (albeit with uncertainty) the
costs and benefits associated with a more efficient, lower-carbon supply portfolio and
revamping transmission to accommodate non-traditional sources of generation such as
remote wind and solar. Approaching these issues requires a good deal of reasoned scenario
analysis. This is particularly true when many new technologies have not withstood the test of
the market, high reliability standards in the U.S., or cost comparisons with traditional
technologies (even when both direct and indirect costs are included). This scenario analysis is
where Fox-Penner adds significant value to the debate and again lends structure and clarity
to forward-looking policy issues.

In the process of giving some shape to the challenges of Smart Grid infrastructure and
decarbonizing electricity production and delivery, Fox-Penner reveals multiple dilemmas that
stymie progress. These include the historical use of flat-rate pricing, which notoriously
encourages consumption when electricity is the most expensive to produce and discourages
it when it is cheap to make. Another, newer dilemma is how to create incentives for electric
utilities to carry out efficiency improvements in the face of stagnant or declining sales. This
is particularly true when utility profits are tied to sales of electricity, instead of to both selling
and saving electricity. An additional quandary is how to create a transmission super grid to
bring in more efficient but remote sources of energy when it is not clear who should pay or
even if public opposition to siting new facilities can be overcome?

For students of business models and industry organization, the third section of the book
holds special appeal. Change, Smart Power argues, will require a fundamental retooling of how
traditional electricity utilities organize themselves. Fox-Penner tees up two basic models—
the Smart Integrator (SI) and the Energy Service Utility (ESU). The first is the more novel of
the two, whereby the SI model operates the power grid and information and control systems
without owning or selling the power it delivers. The ESU model is built on the more
traditional integrated regulated electric utility model, selling power to a variety of users and
ensuring reliability. But integration into generation and the coupling of profits to electricity
sales change an ESU’s incentives in key ways. One is potentially discriminate against
independent generators and a second is to sell electricity, as opposed to energy.

As in the first two sections of the book, Fox-Penner does a good job of connecting the
known with the unknown on the business model side. So much of how business models will
evolve depends on the underlying regulatory structures, roles of other players such as public
power in the market, state and federal efficiency mandates, and who will implement those
mandates. Of special interest to an antitrust audience, Fox-Penner recognizes yet another
important factor that will drive the evolution of business models, namely the competitive
landscape in an increasingly diverse industry. That industry involves more than the historical
trio of generation, transmission, and distribution. In a lower carbon, more efficient industry,
a host of new products and services are brought into the fold, including information
technology services, software, consumer-side technologies, and others.
*Smart Power* rounds out nicely, having done the heavy lifting of piecing together the rationale for and template for an industry redesign. Fox-Penner’s insight, however, prompts competition policy advocates to consider an additional dimension: how the degree of competition will affect the electricity sector’s metamorphosis. This critical question creates another series of feedback loops and scenario analysis that *Smart Power* handles so well, making us wish the book included yet a fourth section that addresses the competition policy dimension of this important subject. For example, how will incentives to exercise market power affect the evolution of business models? Will interoperability standards for Smart Grid technologies reflect any undue influence of large powerful players in the market? Could the entry of new, non-traditional sources of generation be frustrated by barriers such as reliability requirements and anticompetitive conduct?

*Smart Power* leaves us feeling better organized and educated on a very complex topic that the industry has likely only begun grappling with. It is a timely volume since it gives consumers, analysts, and policymakers important stepping stools for getting on the train that is leaving the station. That Fox-Penner takes on the job of lending structure and clarity to perhaps the most daunting challenge ever to face the electricity industry speaks volumes. But it is his sense of optimism and confidence that we will succeed which makes the book a home-run.