Book Review


>Pricing in Competitive Electricity Markets examines two questions. First, what will the deregulated industry look like? Generation and retailing may be deregulated, but monopoly and regulation will remain for transmission and distribution. Second, what products will emerge in the new structure? Price competition on a homogeneous good characterized by high fixed cost and low marginal cost means losses for all firms. Hence, product differentiation emerges, through pricing, power quality, or ancillary services. Authors from various backgrounds address these questions in 27 chapters over six sections. Section highlights and comments follow.

Section I overviews deregulation and the emerging product differentiation.

Retail competition focuses initially on price, resulting in widespread losses. Profit recovers with consolidation and product differentiation. The limited ability to differentiate electricity per se forces competition along other dimensions, the most immediate is price. This ranges from a guaranteed price (e.g., flat or time-of-use), where the energy provider bears the risk, to a spot price (e.g., real-time pricing), where the customer bears the risk. A related dimension is power quality, such as green power, premium power for sensitive computing, and interruptible power for flexible producers. A more removed dimension is ancillary services, such as advanced metering services, energy and risk management, and engineering services.

Section II examines industry history and deregulation.

The problem of having price reflect production cost, the peak-load problem, and customer alternatives emerged almost immediately. John Hopkinson (circa 1892) proposed a demand charge and an energy charge. Since this ignores the timing of customer relative to system peak, Gisbert Kapp proposed time-of-use pricing, with peak power priced at a premium relative to off-peak power. Arthur Wright advocated a declining block rate, the initial block based on maximum consumption, to avoid price constraints in the U.K. This was widely adopted in the U.S. though no price controls were in effect.

Regulation similarly evolved, with utilities initially regulated by franchise competition. Scale economies, no monopoly protection, and corruption of some
politicians and utility executives created financial problems. Franchise competition also led to reduced maintenance and investment near the end of the franchise period. A 1905 National Civic Federation commission urged monopoly provision, public or private, with private utilities regulated. The Wisconsin Public Utility Commission was established in 1906 based on commission recommendations, and served as a model for other states.

Dissatisfaction with regulation decades later led to experiments with generation and retail deregulation, raising new issues. First, the balkanized markets mean varied initial conditions, form, and timing of deregulation. In addition, the enabling laws may be reversed if problems emerge. Second, the conditions insuring competitive behavior, such as the minimum number of generators required and plant diversity across generators, aren’t obvious. Third, meter and end-user equipment upgrades are required to implement real-time pricing. Uncertainty and coordination problems could thus undermine deregulation.

Section III examines generator market power and demand-side ways to mitigate this.

A survey of game theory simulations suggest that one firm with a low-margin strategy can reduce profit to competitive levels, that profit stabilizes (well below the cartel level) when a few players emerge, and that rules of elimination affect pricing strategies. Simulations based on the England & Wales (E&W) generation market (1990–99) suggest that market power may be easier to exercise than in other industries. With identical generators, as the bidding function becomes more convex, raising price becomes more profitable, so that even with eight generators it is profitable for one to raise its bid prices up to 20%. Hence, competitive bidding may require more generators than commonly believed, and depends on the diversity of plant owned by each.

Spot price volatility in E&W, Victoria in Australia (VICT), Norway (NORD), and New Zealand (NZ) is consistent with the exercise of market power. Prices in E&W and VICT are more volatile and less predictable than in NORD and NZ. E&W and VICT are dominated by private ownership that can alter bids half-hourly, whereas NORD and NZ are dominated by public ownership with less bid flexibility. The profit motive and bid flexibility provide an incentive and opportunity to exploit market power, especially during system peak. E&W and VICT are, however, dominated by fossil-fuel, whereas NORD and NZ are dominated by hydro, accounting for some of this difference.

Since the exercise of market power is most likely during system peak, reducing peak consumption enhances competition. Several experiments during the 1980s indicate responsive demand. For example, Pacific Gas & Electric’s residential customers under time-of-use rates reduced consumption during peak 21%. Virginia Power’s large commercial and industrial customers under real-time pricing reduced consumption during peak about 40%. Finally, American Electric Power’s customers with interactive thermostats that respond to price reduced consumption during