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NATIONAL ECONOMIC RESEARCH ASSOCIATES
15 Stratford Place, London W1C 1BE
http://www.nera.com

ENERGY REGULATION BRIEF

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THE ADEQUACY OF PROSPECTIVE RETURNS ON GENERATION INVESTMENTS UNDER PRICE CONTROL MECHANISMS

BY DR. A. E. KAHN

The problems of the California electricity sector during 2000 started a debate about the appropriate role of regulation in wholesale electricity markets. The Federal Energy Regulatory Commission has a legal duty to ensure that energy prices are "just and reasonable" and it has the power to cap wholesale market prices. Did the problems in California demand that the FERC set price caps? If so, what did the experience from California tell us about the need for price caps, or special forms of energy market regulation, in other parts of the world?

Dr Alfred Kahn is one of the US's most distinguished experts on regulation. In 2001, he joined a number of economists in calling for the FERC to impose "just and reasonable" price caps on wholesale electricity prices in California. His support for price caps was, however, subject to several important caveats intended to ensure that such interventions did not make matters worse – specifically by weakening incentives to invest in new generation and transmission capacity.[1] These caveats deserve careful attention in any discussion of electricity market regulation. In the following abstract,[2] Dr Kahn repeats and develops his thoughts on the conditions that wholesale electricity price caps would have to meet.

Dr Kahn supports temporary price caps provided they do not harm the incentive to construct generating capacity. Such price caps, he argues, cannot be set equal to the average annual costs of efficient new peakers. Energy price ceilings might have to be as high as $6,000 to $12,000 per megawatt-hour to elicit needed investment in new generating plants. The creation of capacity markets would lower this figure, but at a cost to efficiency, since they tend to provide reliability more expensively than an effective energy market. The highest priority must therefore go to real-time metering and (at least) hourly pricing for a sufficient fraction of the market – the essential condition of an ideally functioning energy market.

During 2001 I joined a number of economists more knowledgeable than I about the electric power industry and its restructuring in calling upon the Federal Energy Regulatory Commission to fulfill its responsibility to impose just and reasonable caps on wholesale electricity prices in California.

I included a warning that it would be severely counterproductive, by so doing, to interfere with the fundamental corrective mechanisms —of expanded capacity, on the one side, and intensified conservation, on the other.

1 Price caps may reflect economic fundamentals, as discussed by Jonathan Falk in his NERA Energy Regulation Brief of September 2000. See Dr J. Falk, *How California Should Respond to High Electricity Prices*, NERA Energy Regulation Brief, www.nera.com, September 2000

2 From "The Adequacy of Prospective Returns on General Investments Under Price Control Mechanisms," 9 December 2001, scheduled for publication, *The Electricity Journal*, March 2002.

Representatives of an unregulated energy company approached me shortly thereafter expressing a concern that my statement was being used to support the imposition of price controls without a full appreciation of the implications of my warning.

They presented me with the results of analytical work showing, they said, that in competitive – and properly functioning - energy markets the recovery of investment costs is necessarily disproportionately concentrated in times when demand presses hard on capacity. My colleagues at NERA have reviewed the company's analyses and they agree, with the one qualification that the existence of capacity and ancillary service markets substantially alters its results, although at some sacrifice of economic efficiency. In the paper that is abstracted here, I reflect these new observations.

In sum, my present view emphasizes even more strongly my previous repeated statements: the absence of mechanisms permitting an effective demand response to rapidly changing real costs is the greatest structural flaw in the newly developed markets for electricity. Combined with episodic supply deficiencies, it has resulted in unnecessarily high prices (and extreme transfers of wealth), such as led me to endorse the joint letter to FERC supporting price caps on a limited and temporary basis. As I also emphasized at the time, however, price control mechanisms that threaten the prospect of investors in additional capacity recovering their investments can produce brownouts or blackouts whose effects can swamp the benefits of temporary caps. And any price controls that are not temporary are simply incompatible with the logic or the success of deregulation. It would be far better to retain historical methods of regulation, with their virtual guarantee of sufficient investment, than to remove those guarantees opportunistically, while leaving would-be investors subject to an inevitably political process of second-guessing the functioning of a market that is supposed to be effectively competitive.

To illustrate the order of magnitude of energy prices at system peaks that would be required to recover such capital costs from energy markets alone: I understand the annualized fixed cost of a new combustion turbine peaking plant in certain regions to be about $75/kW-year. In a year with only 50 hours above its marginal cost, the price of energy would have to average at least $1500 per MWh ($1.50 a kWh) during those hours, plus marginal operating costs.

The staff of the energy company presented analysis demonstrating that occasional prices as high as $6,000 per MWh could be required in order to permit new peaking units to recover their capital costs, *under a system that relied exclusively upon energy prices for their recovery*. In finding that estimate plausible—indeed, possibly modest—my NERA colleagues compare it with estimates by Hobbs et al—defenders of price control mechanisms in the dysfunctional market situation prevailing at the time—that occasional prices of $12,000 per MWh would be required to generate acceptable levels of reliability. Under such a system the imposition of price ceilings below that seemingly ridiculous level would inevitably discourage investment and, sooner or later, result in unacceptably frequent and extended brownouts or blackouts.

Calculation of Price Caps

Assuming a "normal" reserve margin, the energy company staff calculate, peakers run between 1 and 9 percent per year at prices that start at marginal cost and go to the cap ($6,000 per MWh) for 10 hours per year on average. Some years, of course, had no such hours, and other, high peak demand years had quite a few.

Capital recovery therefore requires both a substantial number of hours at prices somewhat above marginal costs and a few sharp jolts. The former are easy to obtain. This paper concerns itself with the latter.

On average, we expect about 10 hours per year of tight capacity; the modeling suggests that prices of $6,000 per MWh would be required in all such hours. The remainder of capital recovery comes from milder conditions of scarcity.

Of course, some years will have many such hours and other years few or none. Over the lifetime of the plant, some years will see capital recovery many multiples of the annual price, while others will see virtually no capital recovery at all. It is for this reason that focus on capital recovery in any single year would be meaningless.

There are two reasons why such peak energy prices seem so forbiddingly high compared with prices consumers have been accustomed to paying. First, of course, capacity or capital costs have previously been recovered from some large customers in explicit demand charges (so many dollars per kW capacity) rather than in energy charges per kWh of consumption. Second, and more important, energy prices have not in fact fluctuated from moment to moment, hour to hour or day by day, if only because the overwhelming bulk of consumption has not been metered on a real time basis, but has been charged rates averaged over longer periods of time. This system has had the severe disadvantage that it has precluded consumers being guided by the varying true incremental costs of serving them, moment to moment: this was and remains *the main reason* for the inelasticity of demand that was one of my two bases for characterizing power markets as dysfunctional.

I conclude specifically that:

- The case for energy price controls in recent years has been that the extreme inelasticity of demand for electricity and, at times of shortage, of short-term supply threatened to drive prices to levels far higher than necessary to elicit additional capacity. My support of temporary price caps at that time was explicitly conditioned on their being purged of any interference with the incentives of investors to construct the urgently needed additional generating capacity, whether by subjecting them to automatic sunsetting within a very few years or making them simply inapplicable to new investments.

- Any such ceilings on energy prices can obviously not be set on the basis of or in any sense equated to the average annual costs of efficient new peakers, in terms of assessing their effect on consumers or their sufficiency to induce optimum expansion of capacity, but will have to be a large multiple of that level, depending on the probable distribution of unconstrained prices above and below them over the life of the plant. Correspondingly, they cannot incorporate only average acceptable rates of return, because a system that sets ceilings above

which prices will not be permitted to go when supplies are short will necessarily produce insufficient returns over any significant time period, embracing conditions of both shortage and surplus.

- Nor can they be rationally set except in conjunction with whatever reserve capacity requirements are imposed on all load-serving entities. These create an opportunity for generators to obtain revenues also by contracting to sell capacity. In the absence of such capacity markets, energy price ceilings might well have to be as high as $6,000 to $12,000 a megawatt-hour to elicit needed investments in new generating plants—ceilings effectively constraining, of course, in only a very small fraction of the total hours in a year.

- With regulatorily imposed capacity requirements and the capacity markets to which they give rise, ceilings on energy prices need be only a fraction—as little as a tenth—of those levels. Capacity requirements are, however, a relatively inefficient way of providing reliability; they tend to provide it at higher overall cost than an effective energy market. In ideal energy markets, there would be no need for such requirements, capacity markets or other inefficient, regulatory guarantees of reliability. Demand response in the short term and capacity response within the time span of a few years would suffice to hold prices, including the cost of optimum reliability, at efficient and equitable levels.

- The highest priority must therefore go to establishing the essential condition of an ideally functioning energy market that does not now exist—real-time metering and pricing at least on an hourly basis to a sufficient fraction of the market. Once these are installed, wholesale price spikes will automatically be severely limited, and such spikes as continue would be economically beneficent, in consideration of their effects on both the supply and demand side—inducement of efficient levels of capacity, on the one side, and of energy conservation, on the other.

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NATIONAL ECONOMIC RESEARCH ASSOCIATES

NEW YORK

National Economic Research Associates
50 Main Street
White Plains, New York 10606
Telephone: (+1) 914 448 4000
Fax: (+1) 914 448 4040

LONDON

National Economic Research Associates
15 Stratford Place
London W1C 1BE
Telephone: (+44) 20 7659 8500
Fax: (+44) 20 7659 8501

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