

Energy Efficiency: Towards the End of Demand Growth, edited by Fereidoon Sioshansi (Oxford, UK and Waltham, MA, USA: Academic Press 2013), 631 pages, ISBN: 978-0-12-397879-0

During the post WWII economic boom, residential customers greatly expanded their capacity to consume electricity. In California this capacity to consume electricity hit a ceiling in about 1970 as the growth in demand slowly ended. The limit to growth was likely to be a saturation of the market for central air conditioning. The stagnant market for residential electricity consumption has allowed the California electric industry to become refocused into being the government's instrument for social change. Inverted residential rates transfers wealth from high income consumers. Net metering rules provide for a similar transfer of wealth to those who install on site generation. Utility costs now include conservation programs for a few customers paid for by the entire customer base.

Fereidoon Sioshansi and his peers take a contrarian view to California being one of the first states to be saturated in residential AC. Sioshansi's anthology *Energy Efficiency: Towards the End of Demand Growth* addresses the approaches taken in California to prevent the resumption of the growth in utility provided electric energy. Thus, there is praise for the net zero energy buildings that have non-utility sources of electric energy but presumably still rely on the local utility for expensive reliability. Sioshansi's anthology presents other conservation programs that serve to reduce the use of electricity, especially utility supplied electric energy.

The Limits to Growth: A Report to the Club of Rome dealt with the issue of supply, how much resources the world has available to meet the presumably insatiable demand for goods. But as somewhat demonstrated by Sioshansi's anthology, the demand for electric energy had been sated in California by the early 1970's (see the graphic on p.44), perhaps because the state's higher average income allowed it to achieve saturation levels of central air conditioning prior to the rest of the nation. Given that the demand for electric energy has been satisfied, Sioshansi's anthology then follows California's quest to rein in the electric utilities that had worked so hard to meet the demands of the populace.

Part I of *Energy Efficiency: Towards the End of Demand* is "End of Demand Growth is within Reach," which includes the graphic showing that the demand for electric energy had already been sated in California by the early 1970's. "Carpe Diem--Why Retail Electricity Pricing must Change Now" by Allan Schurr and Steven Hauser presents some examples of shifting revenue from an energy charge to a customer charge. This revenue shift is at odds to the praise heaped on inverted block rates elsewhere in Sioshansi's anthology. Inverted block rates effectively have a negative customer charge, the antipode to Schurr's and Hauser's presentation.

Part II, "The -- Frustratingly Slow -- Evolution of Energy Efficiency," includes a discussion of demand side management. One of the problems with demand side management not addressed is the interaction of rate designs that are dependent upon collecting revenue based on the energy consumed throughout the billing period without drilling down to the time periods when the value of electricity soars. Customers participating in demand side management programs often just see an economic benefit that is not commiserate with the value to the utility of the demand side management program.

The zero net energy programs identified by some of the articles in Sioshansi's anthology reduce the energy being supplied by the electric utilities, while increasing the cost of utilities. A zero net energy program does not reduce the electric utility's responsibilities for reliability, to be ready instantly to provide high cost electricity. The gulf between the high value of reliability and the commodity type price associated with net metering is likely to harm the electric utilities economically. Diminishing net energy billing quantities in the face of the fixed costs of the electric utilities practically screams death spiral and argues for a change in the way electric utilities determine their billing quantities, issues outside the scope of Sioshansi's anthology.

Part III, "Case Studies of Low-Energy Communities and Projects," has at least one chapter that recognizes the importance of reliability issues, in "Crouching Demand, Hidden Peaks: What's Driving Electricity Consumption in Sydney?" Reliability is the important cost of the electric utility in a discussion of net zero buildings and communities. Reliability issues show up as peak demands. The utility needs to build to meet these peak demands and should find pricing structures which collect revenue based on consumers contributing to these peak demands instead of the net energy that moves through the utility's meter on the customer premises.

Part IV, "Opportunities and Remaining Obstacles," continues the effort to reduce energy consumption with little in the way of addressing the demand for reliability. Reducing net energy will be a huge driver in reducing the carbon footprint of electricity. But the cost of reliability includes a huge carbon footprint associated with the decreased efficiency of fossil fueled plants that are required to provide the reliability that consumers in the United States have come to expect. Simple cycle gas turbines which are required for rapid response to intermittency issues require much more fuel per KWH during reliability periods than do the coal plants and the combined cycle plants that operate as base loaded units.

Sioshansi's anthology does a good job of identifying how energy efficiency gains have contributed to keeping annual electricity consumption at the 1970s ceiling. With most of the heavy electricity consumption being for heat transfer, programs to increase insulation have resulted in less heat entering the home during the summer and less heat leaving the home during the winter. Similarly, there have been insulation improvements on water heaters and refrigerators. Also important has been the improvement in the mechanical efficiency of the equipment that accomplishes the heat transfer, the compressors used by HVAC equipment and refrigerators.

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