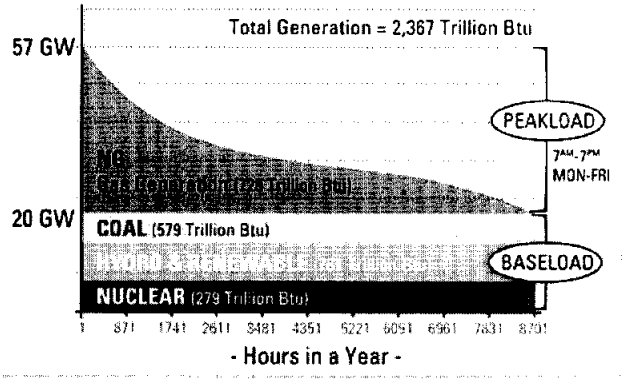
Alternatives to Grid Expansion
GTI Future Grid Study, Sponsored by DOE

This paper provides evidence that policy makers can leverage private investment in clean energy technology to slow or eliminate peak electric load growth and more fully utilize the existing assets.

Figure 1



The California Integrated Energy Policy Report Update cites a number of challenges facing the electric industry. These include insufficient transmission, distribution, and generation resources. The situation is exacerbated by an aging power-generation fleet and growing peak demand as California shifts to a service economy. The result is an electric system where the power generation assets are only 30% productive. As shown in Figure 1, of the 57 GW of generation, transmission, and distribution only 20GW are fully utilized.

Some argue that California needs to act quickly to build more central power plants, transmission lines, and supporting distribution systems to keep up with the growing peak demand. This response is typical of many regions in the U.S., where electricity is relatively inexpensive and access to open land is plentiful. California, on the other hand, is landlocked in many counties. In fact, regions such as San Diego are seeking to recapture developed space and return it to open or green space.

Furthermore, energy efficiency and green energy technology development and deployment, threaten to fundamentally shift electricity consumption trends in California. A breakthrough in lighting technology could significantly reduce on-peak demand, stranding billions of dollars of planned investment in generation, transmission, and distribution equipment.

John Rowe, CEO of Exelon, challenged electric system planners to find alternatives to the continued build-out of the transmission and distribution system. He stated that Exelon might not recover the costs of current investments in new transmission and distribution due to shifting demographics and loads. As a result of this challenge, Exelon created a VP of Asset Utilization, reorganized system planning, and embarked on a number of new initiatives aimed at reducing T&D costs.

Recent studies by DOE indicate that California may have another choice. DOE's Future Grid studies demonstrate that targeted deployment of energy efficiency, CHP, and renewables on constrained circuits could fundamentally change the electricity load shape; slowing peak demand growth and thereby eliminating the need for new distribution, as well as, supporting transmission and generation capacity (see Figures 2 through 4).

The studies identified several innovative policies that can direct the deployment of load shaping technologies by influencing private investment. Policies include:

- Waiving standby charges for capacity-constrained areas of the system
- Focusing incentives on capacity-constrained areas
- Applying stepped demand charges or time-of-use rates that increase as load increases during the day.

All of the above policies are in use, in some form, in the U.S., and they improve the rate of return for private investment in CHP, EE and renewables. DOE, with support from GTI, has developed modeling tools that allow regulators to design time-of-use rates that improve rates of return on private investment in these new technologies, thereby slowing peak-load growth without impacting the growth of intermediate- and base-load consumption. The end result is increased energy efficiency and improved grid utilization, which will decrease the cost of electricity for California consumers and decrease T&D costs for utilities.

GTI suggests that California policymakers explore alternative policies and rate designs to encourage targeted investment by consumers in advanced energy technologies. GTI has been working with the U.S. DOE and several major utilities for over two years, addressing five specific goals through case study modeling of utility circuits. The goals are to:

1. Increase the use of clean energy sources
2. Improve grid utilization and relieve capacity-constrained areas
3. Slow or eliminate peak-load growth
4. Improve system reliability
5. Attract private investment

The case studies[1], which include circuits in Detroit Edison service territory, have shown that the above five goals can be met through strategic deployment of energy efficiency, CHP, and renewables. Figures 2, 3 and 4, successively, show the effects of applying CHP and a full combination of energy-efficient technologies to an actual Detroit Edison circuit.

The reference study demonstrates that energy-efficient end-use technologies can benefit both consumers and power companies. The results indicated that policy makers can spur targeted private investment in clean energy technologies that support growth in base and intermediate electric demand while slowing or eliminating peak load growth as shown in Figure 3 and 4. Policy makers and distribution system planners should expand their thinking to include creative ways, such as those described here, to meet anticipated load growth.

[1] Kelly, J.F., Kingston, T., and Wrobel, J. "Economic Potential of CHP in Detroit Edison Service Area: The Customer Perspective" Final report prepared under subcontract between UT-Battele, Prime Contract No. DE-AC05-00OR22725 with the U.S. DOE, and GTI

Figure 2

Figure 2 shows the current load and projected 12-year load growth for a real circuit in Detroit Edison's service territory. The load was predicted to surpass the circuit capacity of 16MW.

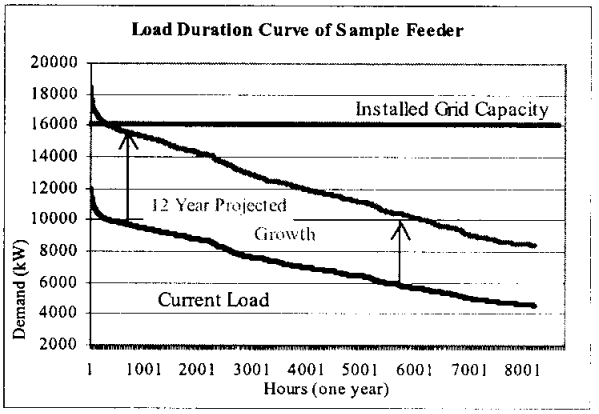


Figure 3

Figure 3 shows the effects of installing 5MW of CHP over the ten-year study period. The study determined that 5MW was the likely CHP penetration rate based on economic modeling for each building on the circuit.

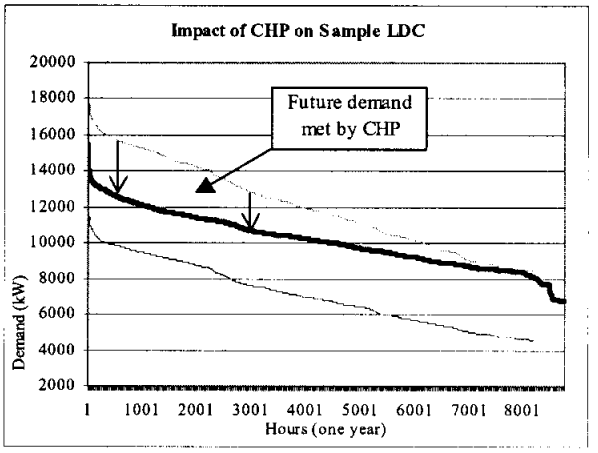
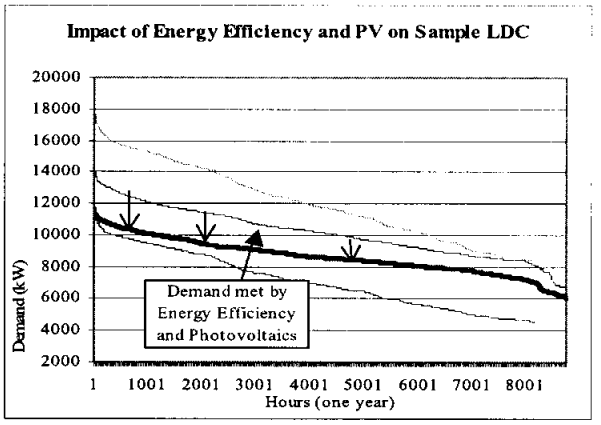


Figure 4

Figure 4 shows the combined effects of CHP, energy efficiency, and renewables on the same circuit. This included installing T5 lighting that was assumed to be 50% more efficient than typical incandescent and roof-mounted solar panels that covered 50% of the commercial buildings.



From: <Tim.Kingston@gastechnology.org>
To: <docket@energy.state.ca.us>
Date: 5/13/2005 8:42:05 AM
Subject: Dockets 04-IEP-1E, 04-DIST-GEN-1

Attached is GTI's white paper regarding the use of energy efficient technologies to eliminate peak load growth and improve electric grid utilization. We have incorporated comments and are sending Revision 1. Please consider this in your proceedings.

(See attached file: CA Rate WP Rev1.pdf)

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