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## **The Virtual Power Plant**

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Investors continually assess a utility's ability to adapt to and create value during the early stages of profound structural change in an industry. The dual forces of customer-driven deregulation and new technology are rapidly introducing competition to the utility industry. One such tested and reliable technology available today enables utilities to boost their power during times of peak energy use, such as the summer. And utilities don't need to build new substations, transmission lines, or power plants to make it work.

By upgrading and expanding current, and very familiar, interruptible-rate programs, utilities can add 100MW to 400MW to their power supplies in each major metropolitan area in just a few months. Statewide, that could mean thousands of additional MWs available to meet demand during peak times. This can be done without affecting customers' business operations.

The new technology enables utilities to "borrow" power directly – from those living room-sized, customer-owned standby generators that sit quietly behind hospitals, office buildings, manufacturing plants, and hundreds of other businesses – without disrupting customers' business. These often-idle onsite generators offer a gold mine of additional power that utilities can access with the flip of switch, through this new technology.

Here's how the new interruptible-rate program could work:

The customer (university, office building, manufacturer, etc.) pays to add or upgrade the appropriate switchgear and communication equipment to connect its onsite generator to the utility grid and to give the utility dispatch capabilities. At the same time, the utility purchases special software that enables it to control and monitor the network of onsite generators from one location, probably a central control room or dispatch center.

Whenever the utility experiences an extreme peak and decides to shut off power to its interruptible customers, the utility software talks directly with each customer's upgraded onsite generator equipment. Communication can occur simultaneously with many different customers through broadcast-type media, or simple phone lines can be used to dial up each customer individually. Either way, the automated equipment makes the process transparent to the utility dispatcher and the customer, no human intervention is required. When the customer's new control system receives a dispatch command from the utility, it automatically starts the onsite generator; allows it to warm up properly; brings it up to speed; precisely synchronizes the onsite generator's frequency, phase and voltage with the grid; closes a breaker to "lock on" the grid (referred to as "parallel" operation); and then gradually ramps up the onsite generator output to transfer load off the grid and onto the onsite generator. The customer's load appears to have been dropped, as far as the utility is concerned, but the customer never experiences a power blip and can continue all operations as usual since the onsite generator can remain in parallel with the grid to server the customer's entire load.

When the critical peaking period is over, the whole sequence takes place in reverse to softly unload, disconnect, cool down, and stop the onsite generator.

This process keeps everyone happy. Regulators are satisfied because the utility attacks quickly and proactively any peaking/reserve margin shortages. Investors are delighted because the utility is eliminating the risk of stranding more assets while avoiding a reduction in energy revenues associated with traditional demand-side management programs. Most importantly, customers are thrilled because they get the savings of an interruptible rate without having their businesses interrupted, plus their onsite generator becomes reliable, convenient insurance against emergencies. Clearly, this new technology makes large interruptible programs a reality. The technology creates a win-win solution for utilities and their larger customers – customers certain to be initial “cherry picking” candidates among highly competitive utilities in the coming years.

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