

## Perfect Power System Proves Worth

IIT system could become model  
for electrical distribution

BY MIKE LARSON



The Illinois Institute of Technology, shown here in an aerial view, is paying \$12 million for its Perfect Power smart-grid electrical system. Photo courtesy of IIT

**The new Perfect Power** smart-grid electrical system that the Illinois Institute of Technology is installing on its Chicago campus could be the blueprint for a new microgrid power-distribution system that would revitalize the aging electrical grid in the U.S.

Officials from the Galvin Electricity Initiative, which developed the Perfect Power concept, say the system going in at IIT is the country's first Perfect Power system and one of just nine "renewable and distributed systems integration" prototypes funded by the U.S. Dept. of Energy. DOE is paying \$7 million of the system's \$12-million cost. IIT is paying the other \$5 million.

**System Will Eliminate Outages, Boost Efficiency** Installing Perfect Power will stop the three unexpected power outages it averages per year, which cost the

university a total of \$500,000 in ruined experiments, restarting costs and lost productivity.

The new system's efficiency will also give IIT plenty of electrical capacity to support the school's future growth, while eliminating the need to build a \$5-million third substation on campus. When the system reaches full operation in 2013, its computerized controls will also save the university money by automatically purchasing electricity when rates are cheapest.

The IIT plans to eventually add more on-site auxiliary generating capacity that will enable it to sell electricity back to the grid.

The savings from eliminating outages, not having to build a third substation, using electricity more efficiently, buying electricity when rates are lower, and eventually selling campus-generated electricity back to the grid are expected to add

up to a five-year payback and estimates that net earnings from the system range from \$10 million to \$20 million over the next decade.

### IIT is Demonstration and Research Site

The Perfect Power concept was created by the Galvin Electricity Initiative, a nonprofit group founded by Robert Galvin, retired chairman of Motorola Inc. The group's aim is to change the way the country generates and delivers electricity.

IIT, the Galvin Electricity Initiative, S&C Electric and local utility Commonwealth Edison, all of Chicago, are working together to develop and build the Perfect Power system that will enable IIT to minimize power outages and meet its growing need for reliable, lower-cost electricity.

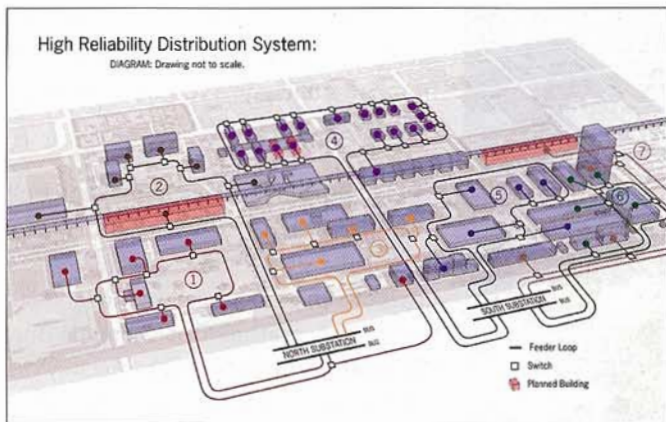
Aldridge Electric Inc. of Libertyville, Ill., is doing the first two years' installation projects. Contracts for later installation work have not yet been let.

In addition to helping IIT meet its need for reliable, efficient and economical power, the university's Perfect Power system will serve as a laboratory for research on microgrids and will demonstrate how the system could be used nationwide to help improve the U.S. power grid.

"One of IIT's goals is to show that this technology can be applied at the community scale," Galvin says. "What we do here on the campus could be repeated in cities across the country. It could become the blueprint for how to fix the U.S. electrical grid system."

### Smart Technology Makes it Work

The Perfect Power system is a smart microgrid that serves a local area through dual electrical loops that are controlled by smart meters, advanced electronically operated switches and a master controller that all communicate electronically. The full system also includes local auxiliary power sources that store electricity or kick in instantly if the main power feed from the utility fails. >>



LEFT PHOTO: The Perfect Power system, illustrated by Michael Meiners with the Galvin Electricity Initiative, is a smart microgrid that serves a local area through dual electrical loops. RIGHT PHOTO: The advanced switchgear receives continuous feedback about the loop's condition and passes it to the master controller. Photo courtesy of IIT

The local Perfect Power grid divides the university campus into seven loops, each serving a number of buildings. Each loop has the ability to feed electricity to its buildings from at least two directions, so that if there's an outage anywhere along one line, power can be delivered uninterrupted through the other one. The advanced switchgear for each loop receives continuous feedback

about the loop's condition and passes it to the master controller.

Information from all of the loops is fed to the master controller. The brain of the system, the master controller is a computer that instantly evaluates mountains of information, then in milliseconds decides whether the system is working properly, how much electricity is being demanded and where the demand is coming from.

If it detects a problem, the controller can reroute power, or allocate it to higher-priority needs, or turn on on-site back-up generating systems. In addition, it can be programmed to evaluate current power prices from the utility, adjust for expected weather or to allow for a myriad of other conditions.

The end result is that the system runs smoothly, reliably and efficiently on its own to eliminate outages and cut electricity costs.

**Installation Comes in Steps** ITT is installing the infrastructure for the Perfect Power system over five years. The first segment of work began in 2009 and finished this spring. It upgraded one of IIT's two on-campus power substations and installed one of the seven power-distribution loops that will eventually provide the campus with reliable power. The first loop serves five buildings.

From this summer through late fall, Aldridge Electric will install two more loops. Next year, the other four loops will be installed and the university's second on-campus substation will receive a major upgrade costing about \$2 million. Also, the master controller that takes in all kinds of information and makes decisions about priorities, power purchasing, power distribution etc. will be installed and put into operation. Programming is now about 75% complete.

In 2012, the communication system will be set up and put into operation for all the loop and in 2013, the fully operational system will be tweaked and tuned.

Some developments, says Clair, will come after that. <<

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