Advanced Research Projects Agency • ENERGY

ADEPT PROJECT

GEORGIA TECH

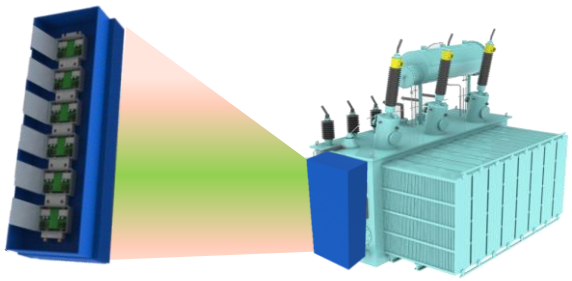
UTILITY-SCALE POWER ROUTER

PROJECT TITLE:	Dynamic Control of Grid Assets Using Direct AC Converter Cells		
ORGANIZATION:	Georgia Tech Research Corporation (Georgia Tech)	LOCATION:	Atlanta, GA
PROGRAM:	ADEPT	ARPA-E AWARD:	$998,619
TECH TOPIC:	Electricity Transmission & Distribution	PROJECT TERM:	9/1/10 – 8/31/12
WEBSITE:	www.gtrc.gatech.edu		

CRITICAL NEED

All electric devices are built to operate with a certain type and amount of electrical energy, but this is often not the same type or amount of electrical energy that comes out of the outlet in your wall. Power converters modify electrical energy from the outlet to a useable current, voltage, and frequency for an electronic device. Power stations also use power converters on a larger scale to modify electrical energy so it can be efficiently transmitted. Today's power converters are inefficient because they are based on decades-old technologies and rely on expensive, bulky, and failure-prone components. Within the next 20 years, 80% of the electricity used in the U.S. will flow through these devices, so there is a critical need to improve their efficiency.

PROJECT INNOVATION + ADVANTAGES



Georgia Tech is developing a cost-effective, utility-scale power router that uses an enhanced transformer to more efficiently direct power on the grid. Existing power routing technologies are too expensive for widespread use, but the ability to route grid power to match real-time demand and power outages would significantly reduce energy costs for utilities, municipalities, and consumers. Georgia Tech is adding a power converter to an existing grid transformer to better control power flows at about 1/10th the cost of existing power routing solutions. Transformers convert the high-voltage electricity that is transmitted through the grid into the low-voltage electricity that is used by homes and businesses. The added converter uses fewer steps to convert some types of power and eliminates unnecessary power storage, among other improvements. The enhanced transformer is more efficient, and it would still work even if the converter fails, ensuring grid reliability.

IMPACT

If successful, Georgia Tech would lay critical building blocks for the smart grid, the advanced electrical infrastructure that will replace today's outdated electrical grid.

- SECURITY: This project could contribute to a smarter, more advanced, and more reliable power grid.
- ENVIRONMENT: This project could help improve the energy efficiency of the power grid and reduce some of the harmful emissions created by coal-fired power plants.
- ECONOMY: This project could help lower power bills for consumers.
- JOBS: Projects like this could help create high-skill jobs in manufacturing and engineering.

CONTACTS

ARPA-E Program Director:
Dr. Tim Heidel,
timothy.heidel@hq.doe.gov

Project Contact:
Deepak Divan,
ddivan@ece.gatech.edu

Partner Organization:
National Electric Energy Testing,
Research, and Applications Center