

GENESIC SEMICONDUCTOR

UTILITY-SCALE SILICON CARBIDE SEMICONDUCTOR

PROJECT TITLE:	Silicon Carbide Anode Switched Thyristor for Medium-Voltage Power Conversion		
ORGANIZATION:	GeneSiC Semiconductor Inc.	LOCATION:	Dulles, VA
PROGRAM:	ADEPT	ARPA-E AWARD:	\$2,530,958
TECH TOPIC:	Power Electronics	PROJECT TERM:	9/1/10 – 8/31/12
WEBSITE:	www.genesicsemi.com		

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

GeneSiC is developing an advanced silicon-carbide (SiC)-based semiconductor called an anode-switched thyristor. This low-cost, compact SiC semiconductor conducts higher levels of electrical energy with better precision than traditional silicon semiconductors. This efficiency will enable a dramatic reduction in the size, weight, and volume of the power converters and electronic devices it's used in. GeneSiC is developing its SiC-based semiconductor for utility-scale power converters. Traditional silicon semiconductors can't process the high voltages that utility-scale power distribution requires, and they must be stacked in complicated circuits that require bulky insulation and cooling hardware. GeneSiC's semiconductors are well suited for high-power applications like large-scale renewable wind and solar energy installations.



IMPACT

If successful, GeneSiC would enable integration of large-scale wind and solar power plants into the smart grid, the advanced electrical infrastructure that will replace today's outdated electrical grid.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 increase the use of renewable energy sources and in turn reduce the harmful emissions created by traditional coal-fired power plants.
- **ECONOMY:** Projects like this could help establish U.S. businesses as technical leaders in the electronics industry and bring lower power bills to consumers.
- **JOB:** Projects like this could create high-skill, high-paying jobs in manufacturing and engineering.

CONTACTS

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

Project Contact:
Dr. Ranbir Singh,
contact@genesicsemi.com

Partner Organization:
Dow Corning Corporation