

# TRANSFORMING

U.S. MANUFACTURING THROUGH ADVANCES IN

# WIDE BANDGAP POWER ELECTRONICS

## What are power electronics?

Systems that control the flow of electrical energy.

## What's the challenge?

Today's silicon-based power devices have nearly reached their operational limits.

## What's the solution?

To power electric vehicles, harness renewable energy, and make the U.S. more energy efficient, electronic components made from materials like silicon carbide and gallium nitride are needed.

## Why wide bandgap?

SiC GaN

Silicon carbide and gallium nitride-based semiconductors are the next generation of power electronics devices. They have a wider bandgap when compared to silicon-based components. This enables:

Higher operating temperatures, frequencies & voltages



And smaller, more efficient devices



Leading to faster switching & lower power losses, compared to silicon



## Where is wide bandgap technology making an impact?

Silicon carbide and gallium nitride semiconductors improve the performance of power electronics systems beyond the limits of traditional silicon-based designs.



### Industrial

Precision variable-speed drives & high temperature operation



### Electric Utilities

A more resilient, secure energy grid



### Electric Transportation

Efficient charging & increased range



### Renewable Energy

Higher efficiencies in power conversion



### Military

Smaller, faster, lighter, & more rugged power electronics

PowerAmerica member companies are the driving force behind a power electronics revolution valued at

# 3.75

**BILLION \$**  
GLOBAL MARKET  
BY 2020\*

poweramericainstitute.org

We connect the brightest minds in SiC and GaN power electronics technology with the companies that use semiconductors in their products.

We are a pipeline of innovation that fuels economic growth in North Carolina and beyond.

# 11 MILLION \$

Invested by the State of North Carolina returned an economic impact of:

# 41.9 MILLION \$

In benefits to the NC economy since 2015, nearly 4X the amount PowerAmerica has received in NC state funding.\*

## ENGINEERING DESIGN

Research funding speeds SiC & GaN innovation & materials production

## RESEARCH

Connecting university & government WBG experts with industry to accelerate innovation

## FUNDING

Providing industry-driven funding to improve WBG performance & processes

## EDUCATION PIPELINE

Preparing the next generation of wide bandgap technologists to meet industry needs

## WBG

### SEMICONDUCTOR MANUFACTURERS

Access to WBG design & processes enables new, more powerful devices

## END-USERS

Power electronic products built with WBG devices are smaller & more efficient

## SYSTEM INTEGRATION

Testing, reliability & packaging to meet end-user needs

## GROWING

The North Carolina manufacturing workforce & North Carolina-based industry

