Introduction to PowerAmerica

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PowerAmerica

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MEMBERS

PowerAmerica is a Manufacturing USA, member-driven consortium of industry, universities, and national labs, accelerating the commercialization of next-generation SiC and GaN power semiconductor chips and electronics. Our membership spans the WBG technology ecosystem, including leading universities that educate the future workforce. PowerAmerica catalyzes semiconductor manufacturing, job creation, and energy sustainability, which are vital to our economic growth and national security.

ACADEMIC INSTITUTIONS

University of Arkansas
University of Alabama
University at Albany, State University of New York
University of North Carolina Charlotte
Central Carolina Community College
University of Colorado Boulder
University of Houston
Marquette University
Morgan State University
Miami University
Mizzou, University of Missouri
University of Nebraska Lincoln
NC State University
Pitt Swanson Engineering
Purdue University
Rensselaer
University of South Carolina
Stanford University
University of Tennessee Knoxville
Texas Tech University
Virginia Tech
Washtenaw Community College
Western Carolina University
University of Wisconsin

GOVERNMENT LABS

Argonne National Laboratory
Naval Research Laboratory
Naval Nuclear Laboratory
NREL National Renewable Energy Laboratory
Oak Ridge National Laboratory

MATERIALS, EQUIPMENT, FAB, MODULES

AEHR Test Systems
Alithia
Alliance MOCVD
Alpha & Omega Semiconductor
Analog Devices
APC
APEX Microtechnology
Applied Materials
atomera
beneq
Cactus Materials
Carbice
Coherent
CoolCAD Electronics
Crystal Sonic
CVD Equipment Corporation
Entegris
Hesse Mechatronics
Forge Nano
GlobalFoundries
GE Aerospace
Globitech
Heraeus
Hyperion Materials & Technologies
Ideal Power
Infineon
Keithley, A Tektronix Company
MAREL Power Solutions
Microchip
Navitas
Nitride Global
onsemi
Oxford Instruments
pallidus
Polar Semiconductor
PUREON
Semikron Danfoss
Sensitron Semiconductor
Signatone
Six Point Materials
Sonrisa Research, Inc.
soitec
Texas Instruments
TEL
Vishay
VisIC Technologies
Wolfspeed
XFAB

WIDE BANDGAP SYSTEMS

ABB
BAE Systems
BorgWarner
EPRI
John Deere
Lockheed Martin
Mercedes-Benz Research and Development North America, Inc.
Mersen
RCT Systems
Syndem
Trane Technologies
Vertiv

PARTNERS

semi
Power Electronics News
International Semiconductor Executive Summit

PowerAmerica Provides Value to Members and Accelerates WBG Commercialization

- **Funding Member Selected Projects ($7M in Member Projects)**
  - Paid with members dues; members share results and IP
- **Networking**
  - Summer/Winter member meetings
  - Summary presentation of all PA projects at meetings
  - Long networking breaks at meetings
- **Access to Universities and Recruitment**
  - Student internships
  - WBG trained searchable student database for recruitment
  - Student WBG project stipends
  - Collaborative research projects
- **Education and Workforce Development**
  - Discounted WBG short course with industry driven content
  - Tutorials presented at major WBG conferences
- **WBG Ecosystem Benefits** promoting members at conferences (i.e. APEC, ECCE, WiPDA, ICSRM) and at high-level government meetings, roadmap collaboration, customer/supplier introductions
- **Quick Access to PowerAmerica Device Bank Engineering samples**

PowerAmerica's **US$150M** Investment in **212** Power SiC and GaN Projects Addressed All Major Technology Areas

PowerAmerica

PowerAmerica's $150M in power SiC and GaN projects addr **esign/fabrication/testing, modules, reliability, ruggedness, and WBG circuit in** **applications** including automotive and rail traction, on-board chargers, photo nics, aerospace, flexible alternative current transmission systems (FAC (HVDC), microgrids, energy storage, wind power, motor drives

Projects' outcomes: further ind that create high-tech manufacturing jobs and ene onal security.

PowerAm						Total
Indi					14	73
Acad				24	26	112
Nationa		2	2	2	3	11
Yearly	34	41	37	41	43	196

16 additional projects since 2021

The 196 Project Areas:

- **67** SiC Device and Fabrication
- **28** Modules and Reliability
- **24** Low-Voltage GaN Applications
- **40** Low-Voltage SiC Applications
- **21** Medium-Voltage SiC Applications
- **20** Education and Workforce training

430 Students trained, over 7000 attendees in tutorials

V. Veliadis

PowerAmerica Project Pathways

Member Initiated Projects (MIPs)

- Member dues will be used to fund MIP projects (without DoE funds)
- Topics, proposal review, and project selection will be member directed
- Cost match is encouraged, but not mandatory
- The MIP request for proposals (RFP) has been submitted to DoE for review and approval

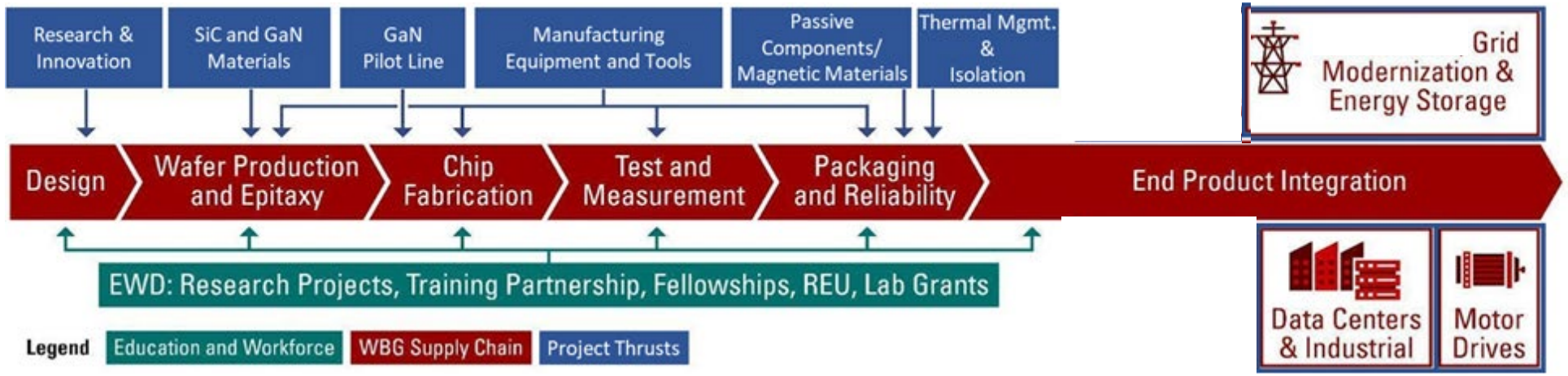
DoE Supported Institute Initiated Projects (IIPs)

- An RFP developed with input from the 2024 Request for Information has been submitted to the DoE for approval
- RFP covers all technical areas from WBG materials through power electronic applications, and education
- Approximately 25 projects are anticipated to be awarded when this RFP is released and projects are selected
- All activities require 1:1 cost share

RFP Approved by DOE

RFP document submitted to DoE was formulated from member input from previous PowerAmerica meetings:

- Manufacturing of WBG Materials, Equipment, Chips, Modules, and Passive and Magnetic Components
- Power Electronic Circuit Demonstrations
- GaN “R&D and Low Volume” Production Pilot Line
- Education and Workforce Development



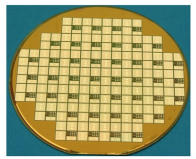
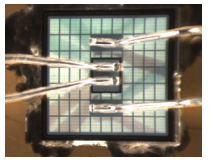
PowerAmerica Technologies Enable DoE Priorities 1

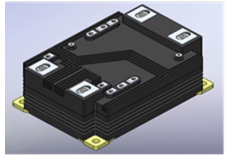
2. Unleash American Energy Innovation:

The Department's Research and Development (R&D) enterprise is the envy of the world. We must focus our time and resources on technologies that will advance basic science, grow America's scientific leadership, reduce costs for American families, strengthen the reliability of our energy system, and bolster America's manufacturing competitiveness and supply chain security. As such, the Department's R&D efforts will prioritize affordable, reliable, and secure energy technologies, including fossil fuels, advanced nuclear, geothermal, and hydropower.
The Department must also prioritize true technological breakthroughs – such as nuclear fusion, high-performance computing, quantum computing, and AI – to maintain America's global competitiveness. To that end, the Department will comprehensively review its R&D portfolio. As part of that review, the Department will rigorously enforce project milestones to ensure that taxpayer resources are allocated appropriately and cost-effectively consistent with the law.

Manufacturing Competitiveness and supply chain security in mature SiC and GaN semiconductor chip fabrication:

- Supply of SiC and GaN chip manufacturing equipment
- Manufacturing of SiC and GaN chips
- Manufacturing of advanced SiC and GaN modules




and power electronics including AI

- Manufacturing of SiC and GaN based *Variable Frequency Motor Drives* for Consumer and Industrial Applications (competitiveness lower weight/volume, higher temp operation and improved heat management, reduced cooling cost, higher power integration reduced system cost)
- Manufacturing of SiC and GaN based *Data Centers, AI, and Uninterruptible Power Supplies* (competitiveness higher power, lower weight/volume, higher temp operation and improved heat management, reduced cooling cost, higher power integration reduced system cost)
- Manufacturing of SiC and GaN based *aerospace radiation-hard electronics* (competitiveness in reliability, higher power)

"Electricity produced by fossil fuels, advanced nuclear, geothermal, and hydropower": power conditioning and transmission utilizing reliable and secure WBG based power electronics and electric grid.

"Nuclear Fusion": SiC is perfectly suited to condition the high power needed for fusion

PowerAmerica Technologies Enable DoE Priorities 2

8. Strengthen Grid Reliability and Security:

Fortifying America's electric grid is critical to the reliable and secure delivery of electricity. Under President Trump's Executive Order, "Declaring a National Energy Emergency," the Department will identify and exercise all lawful authorities to strengthen the nation's grid, including the backbone of the grid, our transmission system. This is an imperative as we consider current and anticipated load growth on our nation's electric utilities. Moreover, after two decades of very slow demand growth, electricity demand is forecast to soar in the coming years. The Department will bring a renewed focus to growing baseload and dispatchable generation to reliably meet growing demand.

"Electric Grid modernization for reliable and secure delivery of electricity": efficient WBG based circuits support electricity sustainability, grid power conditioning/modernization, and transmission at +6.5 kV including solid state circuit breakers, solid state transformers, converters, HVDC, FACTS, and energy storage systems.

https://bakerhomeenergy.com/kc/the-california-electric-grid-vpps-explained/

https://www.sunpullwire.com/who-manages-the-u-s-electrical-grid/

PowerAmerica 10 Year Anniversary

PowerAmerica

10TH ANNIVERSARY

216

Research projects funded by PowerAmerica and completed by members

400+

Former undergraduate and graduate student researchers now working in industry and academia

7,000+

Attendees at PowerAmerica tutorials, short courses and webinars

20+

Patents generated by PowerAmerica and its members

80+

Publications in peer-reviewed journals on PowerAmerica-funded projects

18,000+

Total learners taught, from K-12 students to Ph.D.'s

$7M Invested in 23 Member Projects