

The Transformer Resilience and Advanced Components (TRAC) Program: Perspectives and Updates

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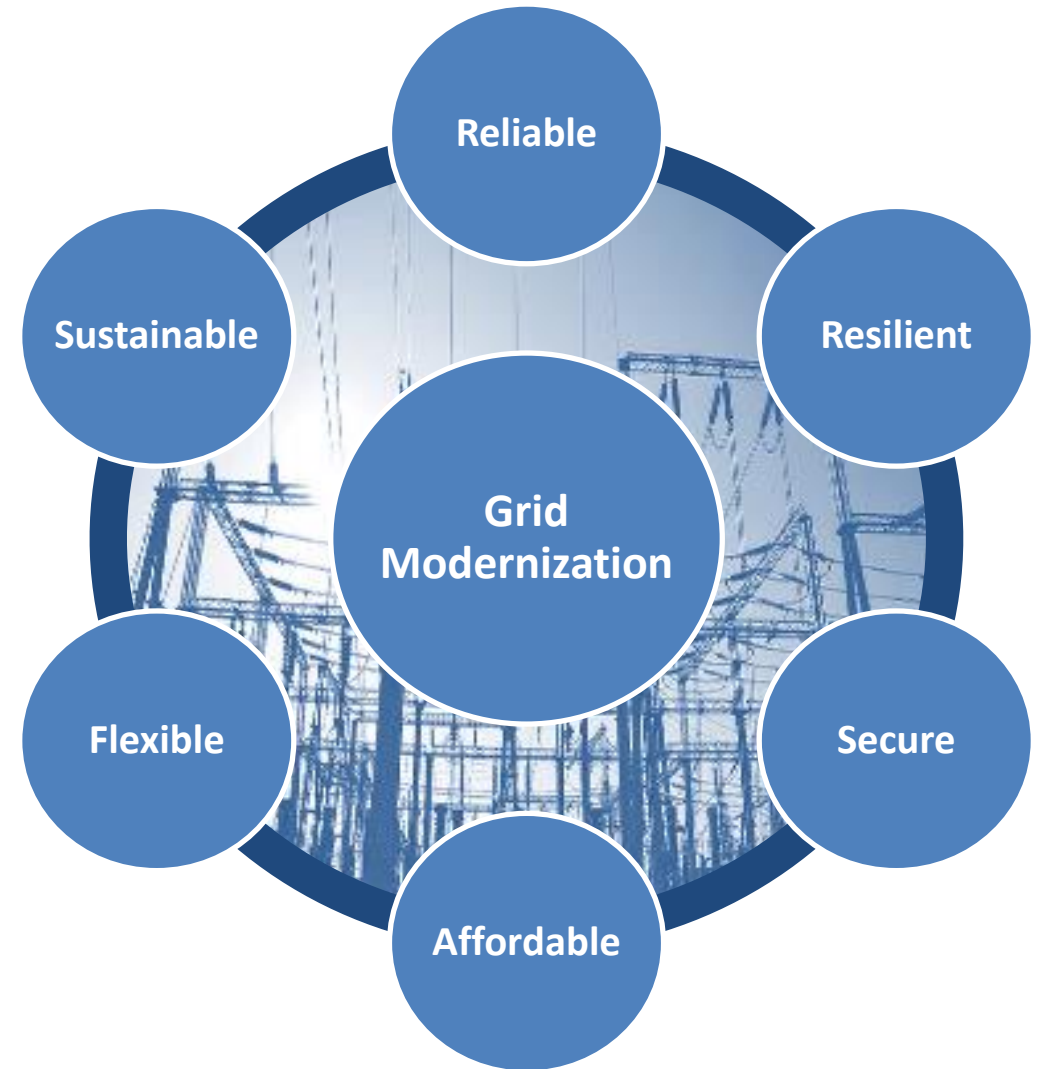


U.S. DEPARTMENT OF
ENERGY

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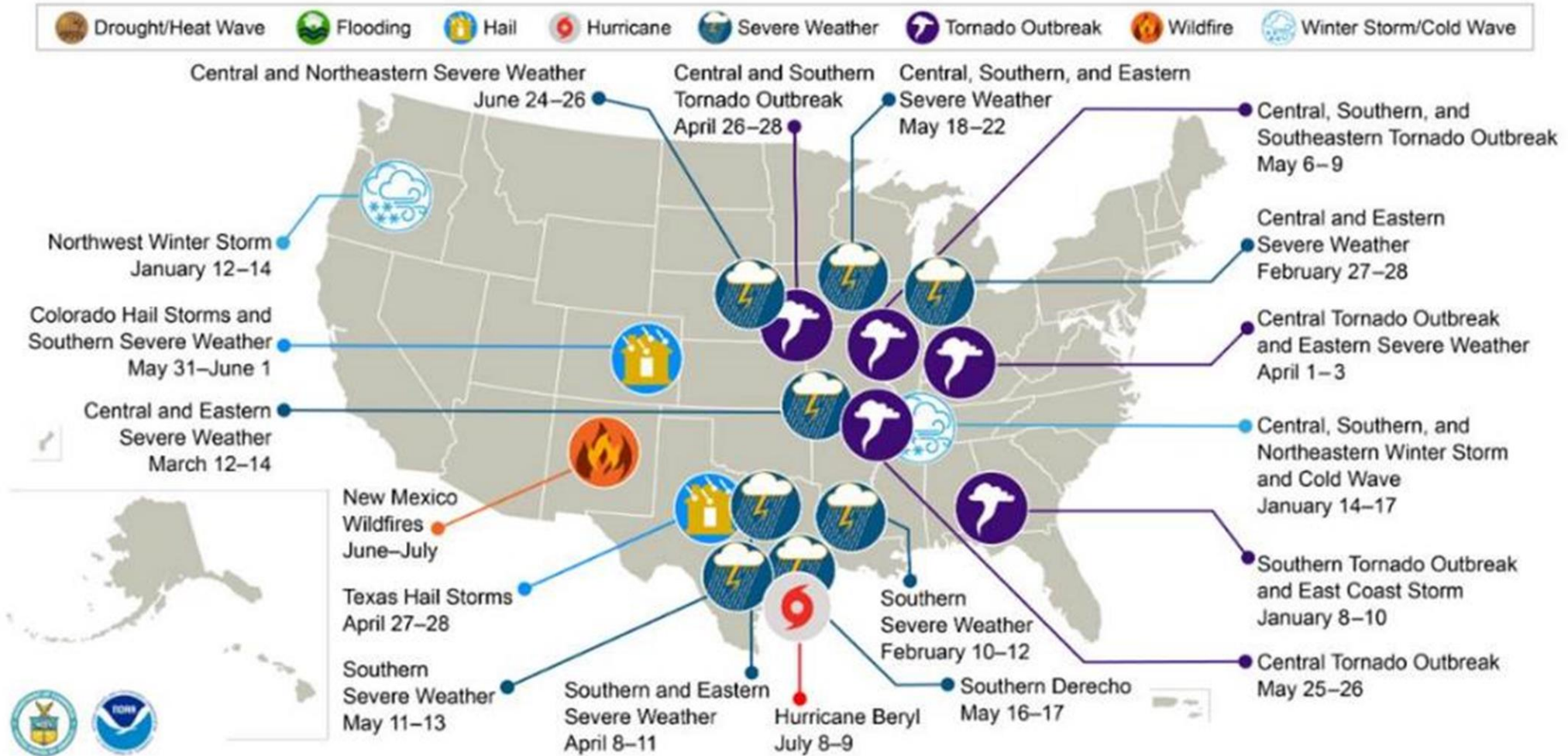
Features of a Modernized Grid

- **Reliable**
Improves power quality and reduces the frequency and duration of power outages
- **Resilient**
Withstands or recovers quickly from any adverse situation or power outage
- **Secure**
Provides protection to our critical infrastructure from a variety of threats
- **Affordable**
Maintains cost of electricity commensurate with value to consumer
- **Flexible**
Responds to the variability and uncertainty of conditions across a range of timescales, including a range of energy futures
- **Environmentally Sustainable**
Reduces environmental impact of energy-related activities



Severe Weather Events (2024)

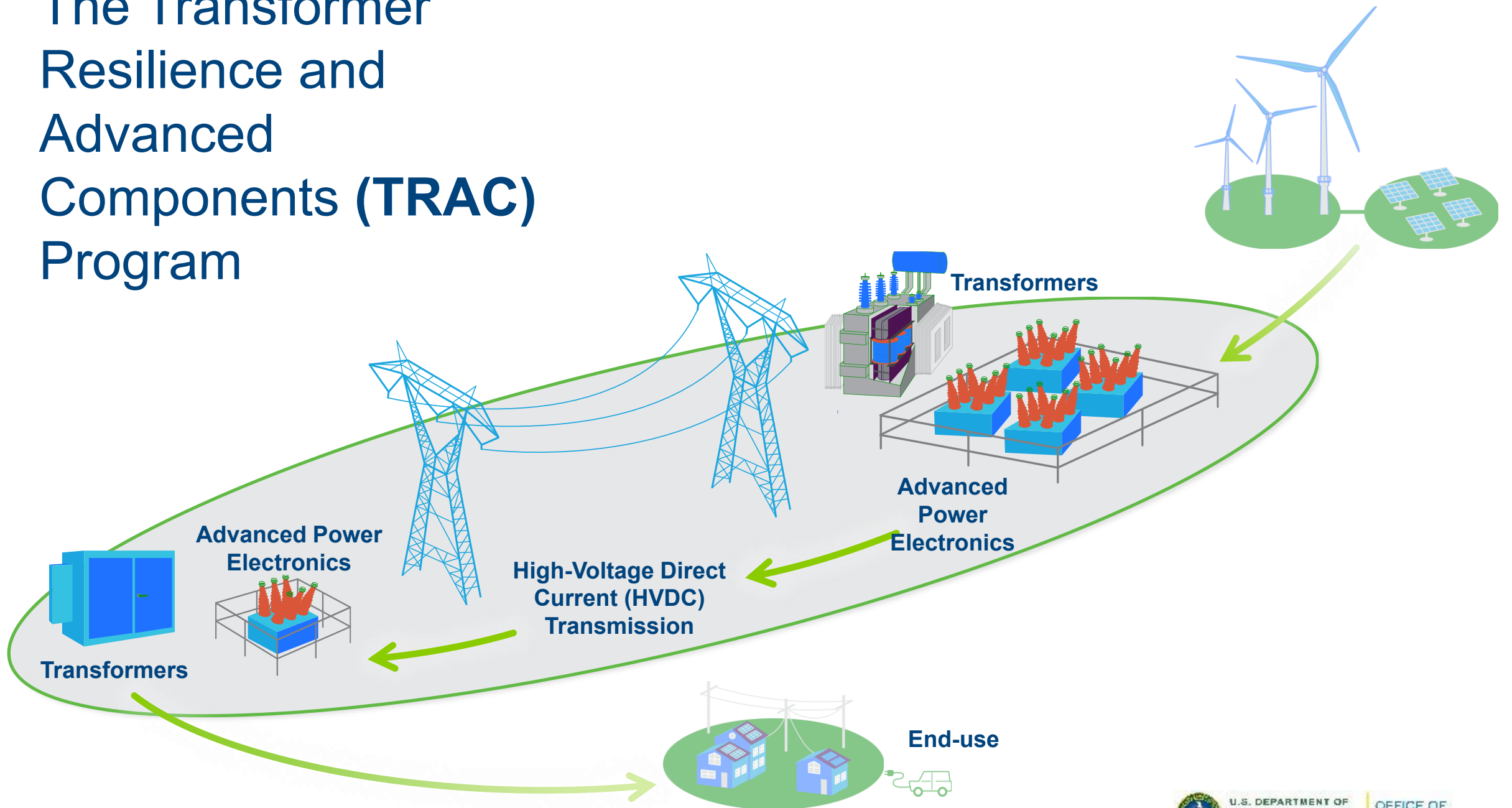
U.S. 2024 Billion-Dollar Weather and Climate Disasters



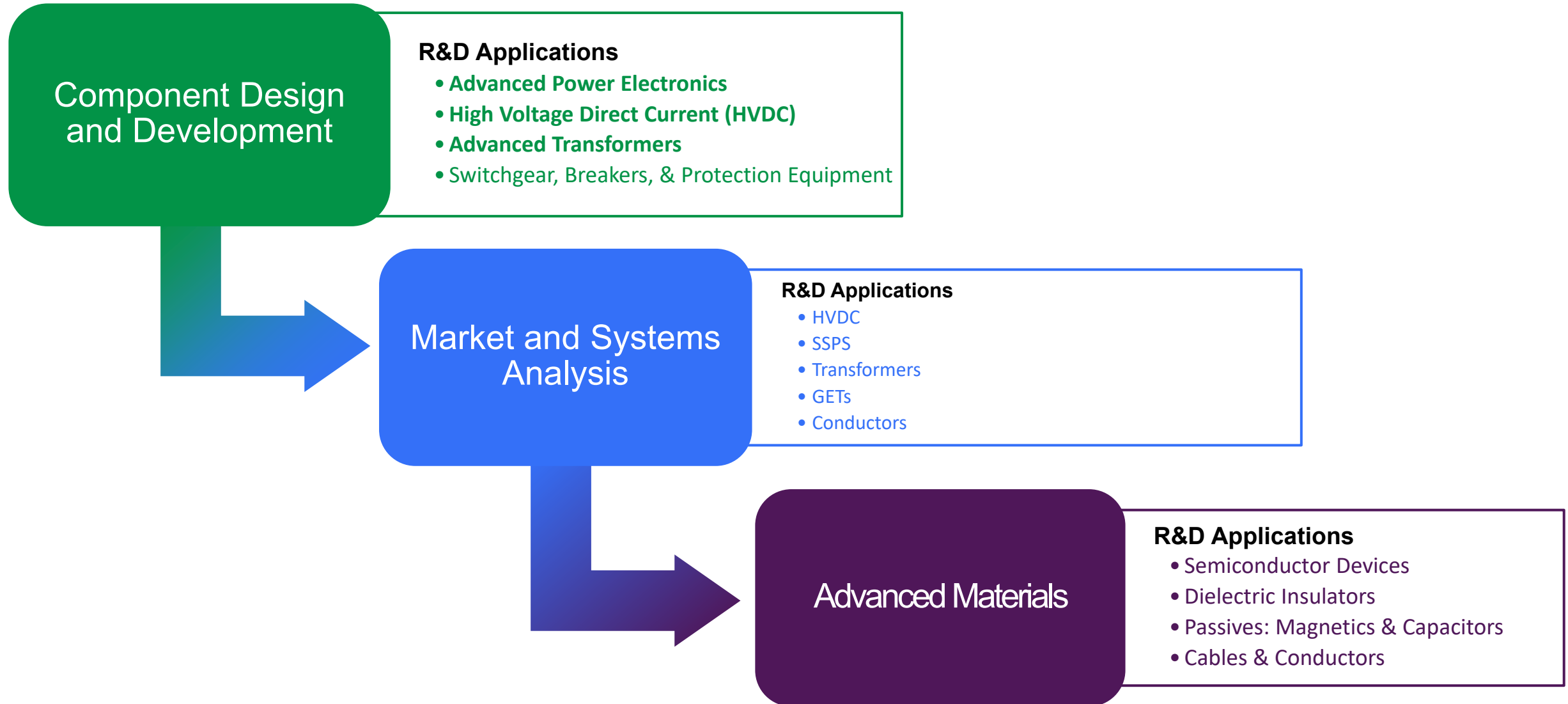
This map denotes the approximate location for each of the 19 separate billion-dollar weather and climate disasters that impacted the United States through July 2024.

Source: U.S Department of Homeland Security (DHS)

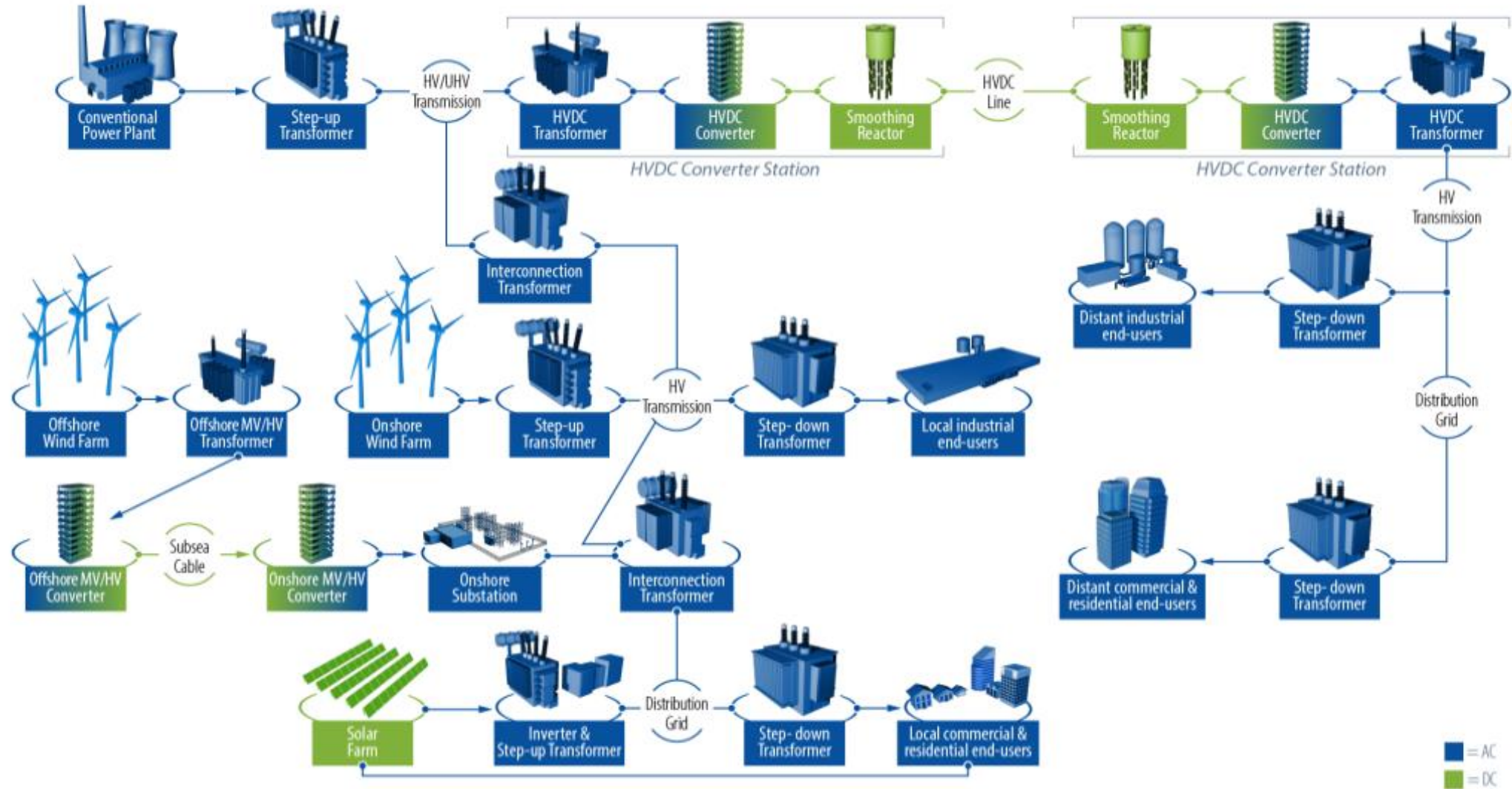
The Transformer Resilience and Advanced Components (TRAC) Program



TRAC Program Strategy Enabling Research to Application



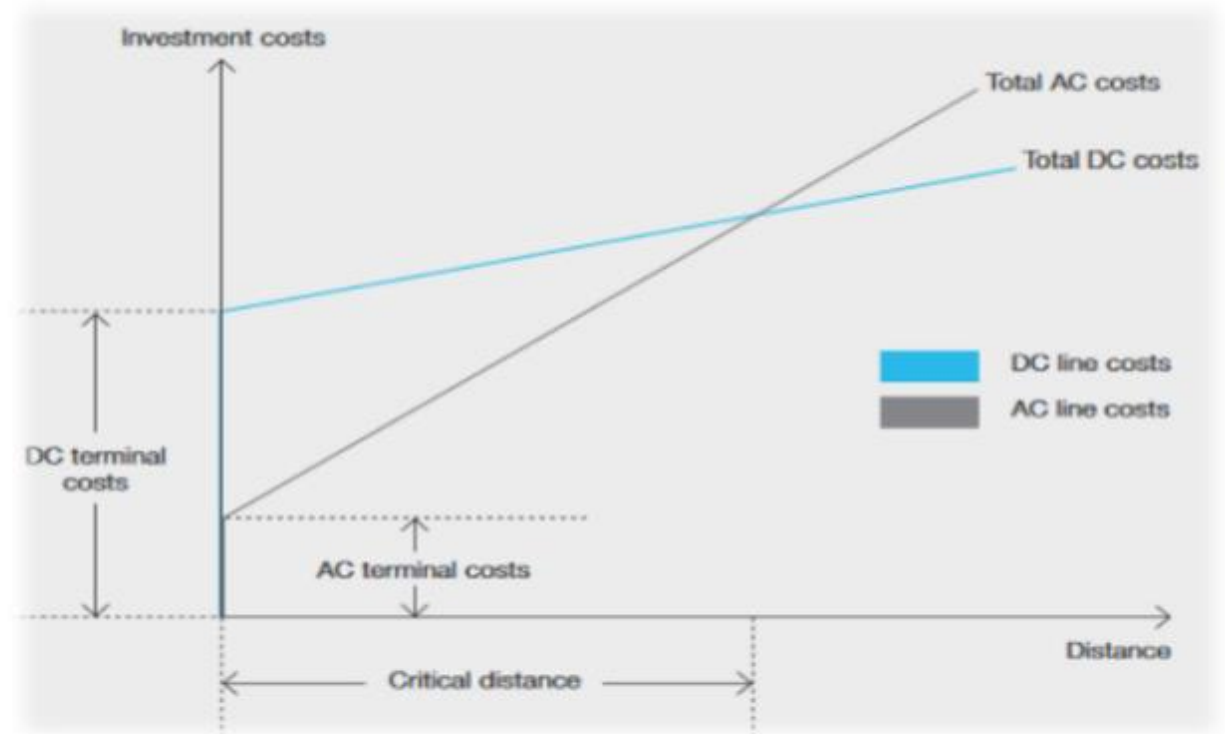
TRAC and Advanced Transformers



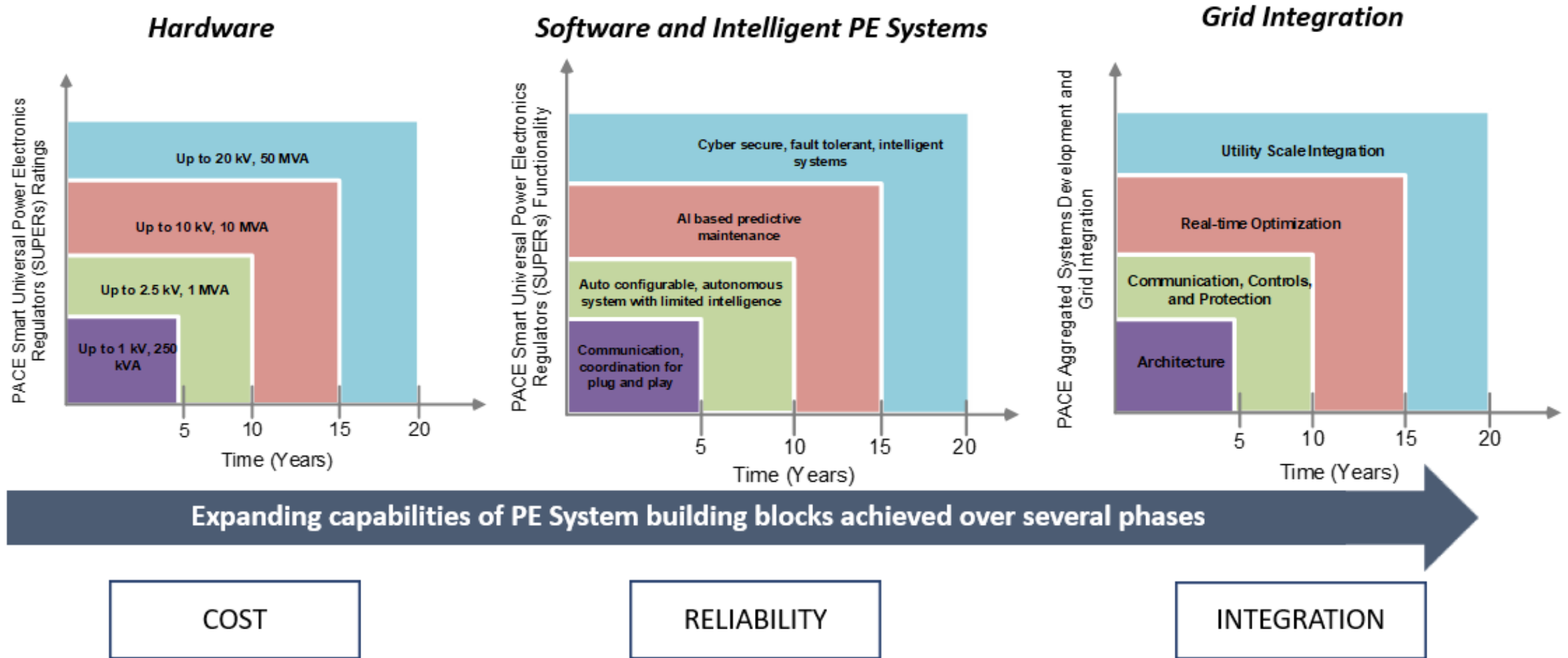
TRAC and HVDC

Benefits of onshore HVCD

- Superior economics for long-distance application
- Lower losses
- Smaller right-of-way (ROW) requirements and lower costs
- Ability to connect asynchronous AC Systems
- Higher capacity rating



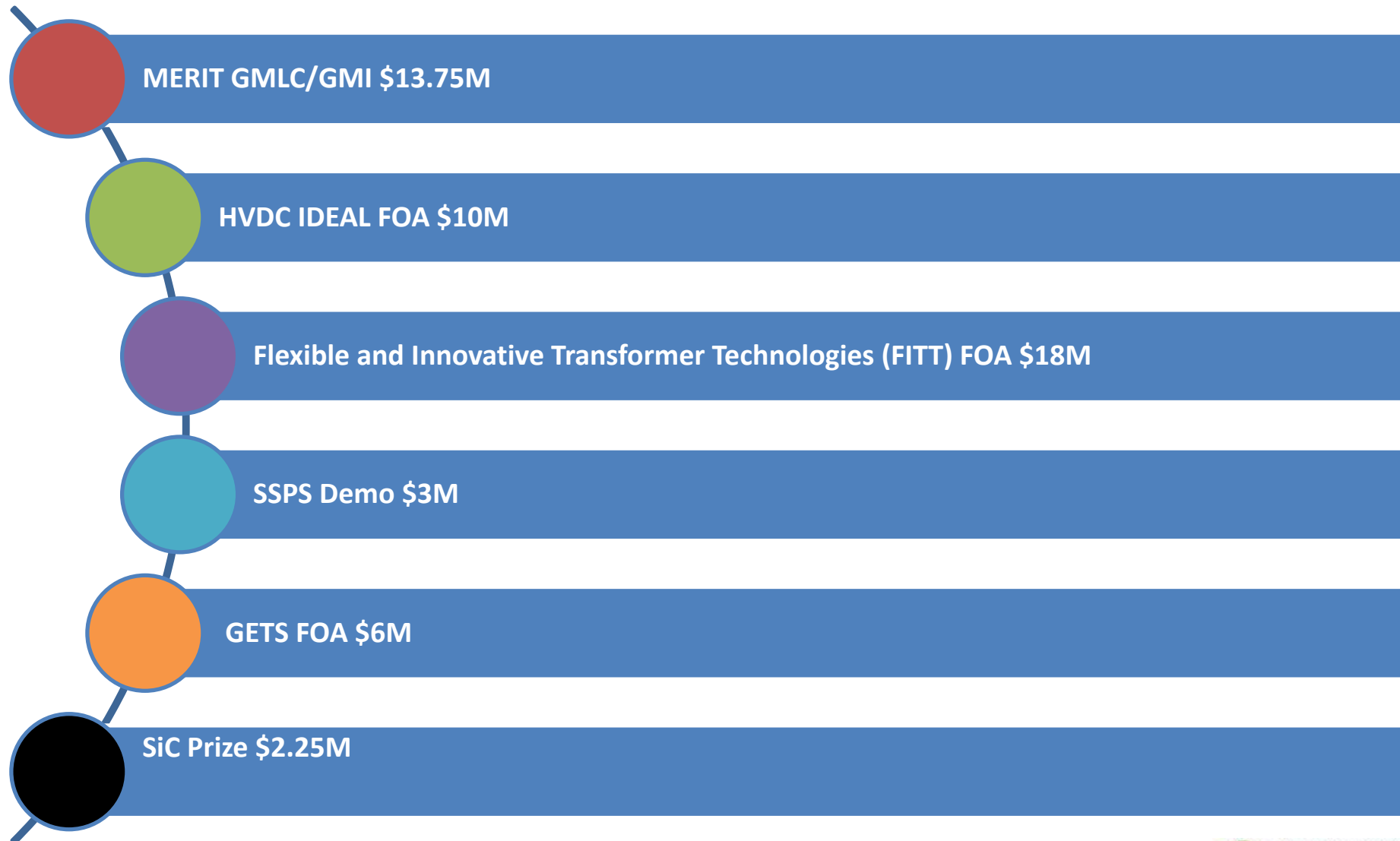
TRAC and SSPS



TRAC Engagement Opportunities



TRAC Recent Funding Opportunities



Silicon Carbide (SiC) Packaging Prize

This \$2.25 million prize—launched by the U.S. Department of Energy’s (DOE’s) Office of Electricity—invites competitors to **propose, design, build, and test state-of-the-art packaging prototypes** that move the industry beyond its current state. This prize establishes a final goal of developing 10-kV, 2,000-A rated SiC power modules that expand the state of the art in semiconductor packaging.

Phase & Prize Details

Phase 1 – Design Study (8 months) *NOW OPEN | SUBMISSIONS DUE AUG. 30*

Prizes: Up to 10 winners of \$50,000 each

Phase 2 – Initial Demonstration (14 months) *OPENS NOV. 2024*

Prizes: Up to 4 winners of \$250,000 each

Phase 3 – Final Demonstration (14 months) *OPENS FEB. 2026*

Prizes: Up to 1 winner of \$750,000

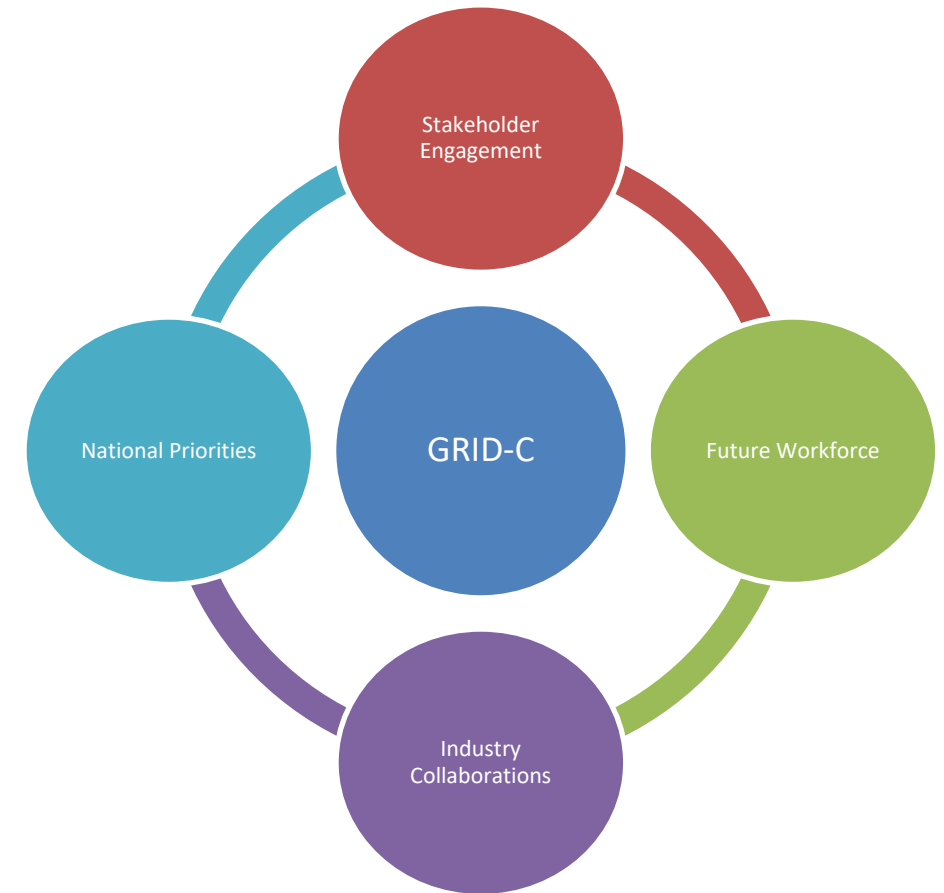
Learn More

- Follow the prize on HeroX: <https://www.herox.com/SiCPackagingPrize>
- Register for an Informational Webinar on March 20: https://nrel.zoomgov.com/webinar/register/WN_Gpqs82HYQG-LpLt4wJBRQg

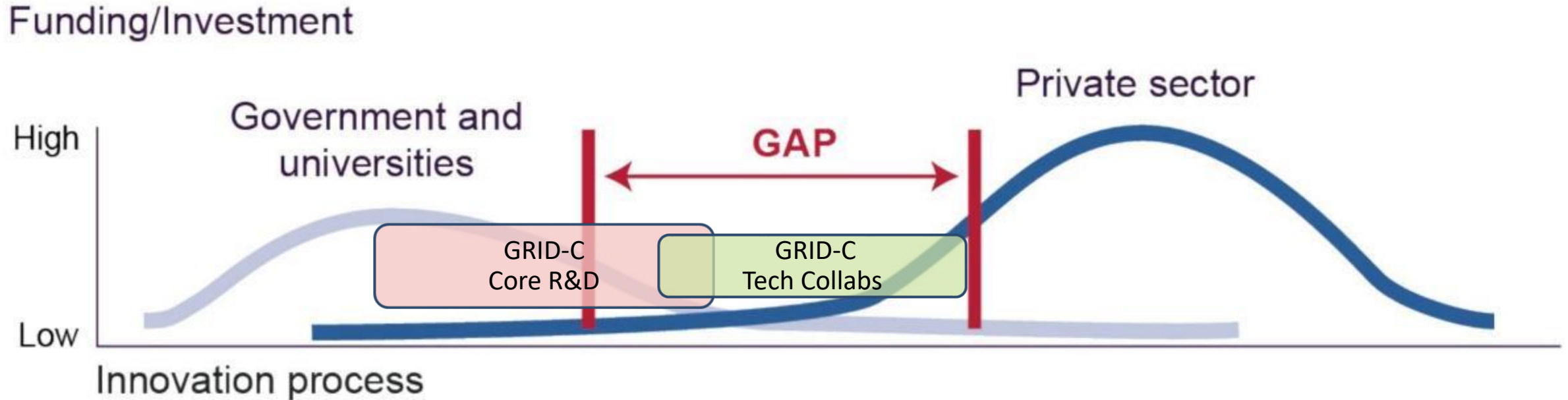
Technical Collaboration Program (TCP) GRID-C

Program Intent

- **Provide open, affordable and convenient access to national lab infrastructure**, hosted resources, tools, and expertise to facilitate rapid development and adoption of new energy efficient technologies.
- **Collaborate with industry through cost shared projects** to investigate, improve, and scale process methodology
 - to **reduce the risk and accelerate the development and deployment** of innovative energy efficient grid technologies
 - **de-risk adoption** of new energy efficient technologies
- Creation and preservation of **domestic ecosystem and creation of jobs** is a primary goal



TCP GRID-C : A Bridge Over the Innovation “Valley of Death”



Basic grid research

Proof of
concept

Production in
laboratory

Capacity to
produce
prototype

Capability in
production
environment

Demonstration
of production
rates

Upcoming Opportunities & Recent Workshops

- **TRAC Program Laboratory Call for Proposals**
 - Component Design and Development
 - Market and System Impact Analysis
 - Advanced Materials
- **DC Breakers Workshop (May 1st, 2024) Key Takeaways:**
 - Standardization of specifications for HVDC circuit Breakers is critical for the development of this technology. This includes standardization of the speed of operation, DCCB voltage rating, breaking current rating, and coordination of AC and DC protection systems.
 - **Pilot demonstrations** can progress the DC circuit breaker technology
 - **Testing facilities** in the US will be needed for the development of DC circuit breaker technology.
 - The DOE should support to some extent the **development of disruptive technologies** that are different from the existing DC circuit breaker technologies

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