

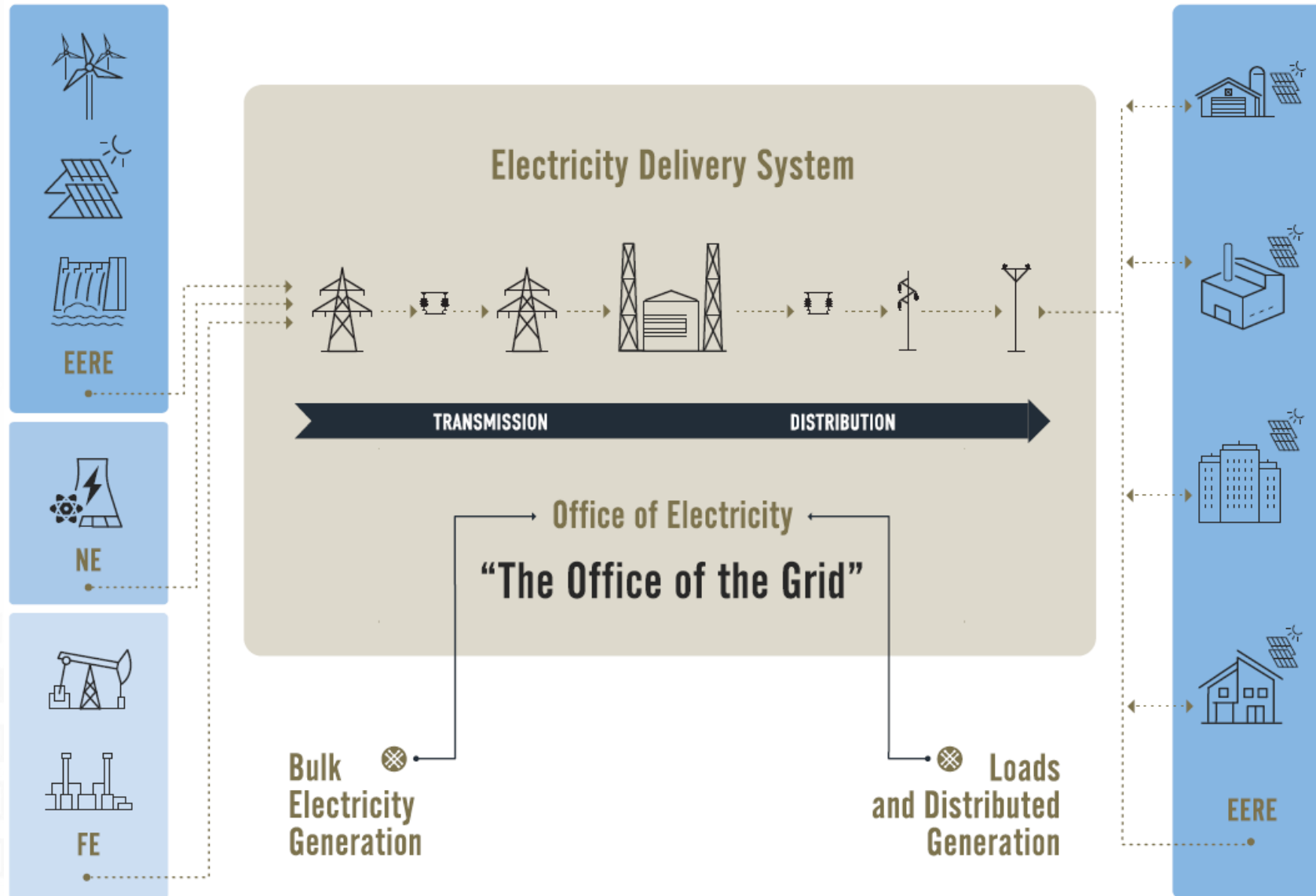


2023 SNL Power Electronics & Energy Conversion Workshop

Andre Pereira – Program Manager

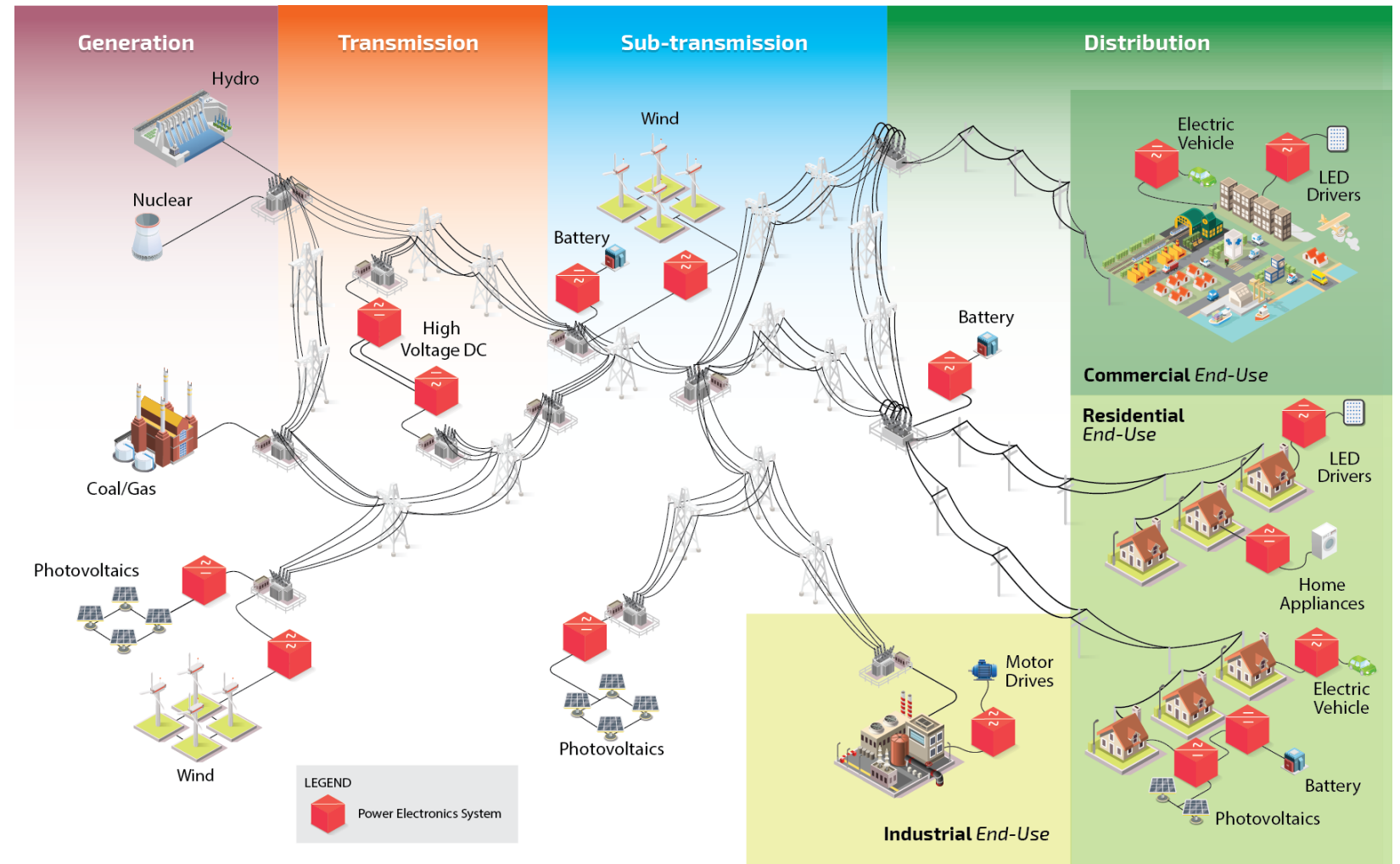
8/21/23

The Office of the Grid

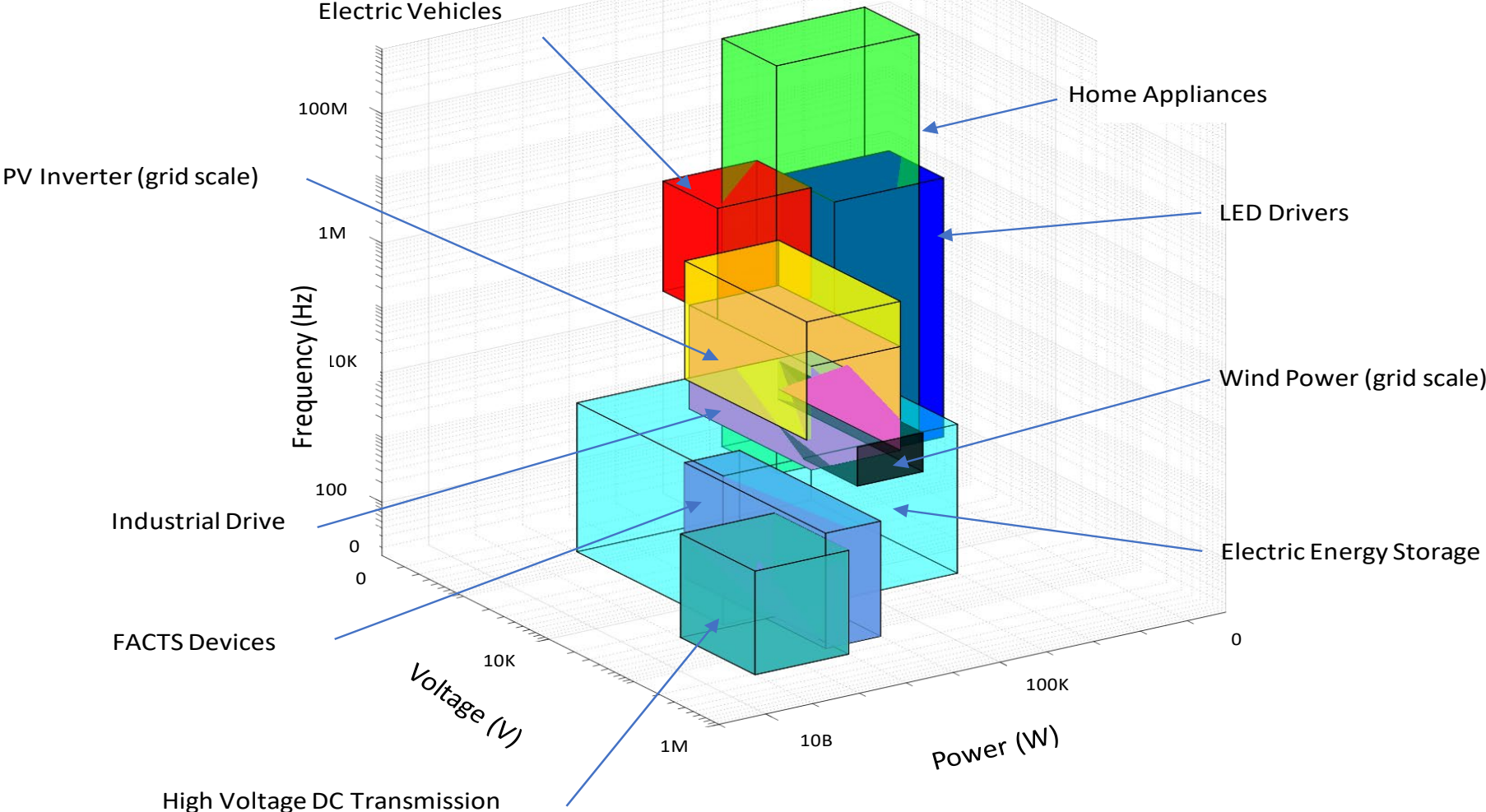


Increasing role and Opportunities for power electronics

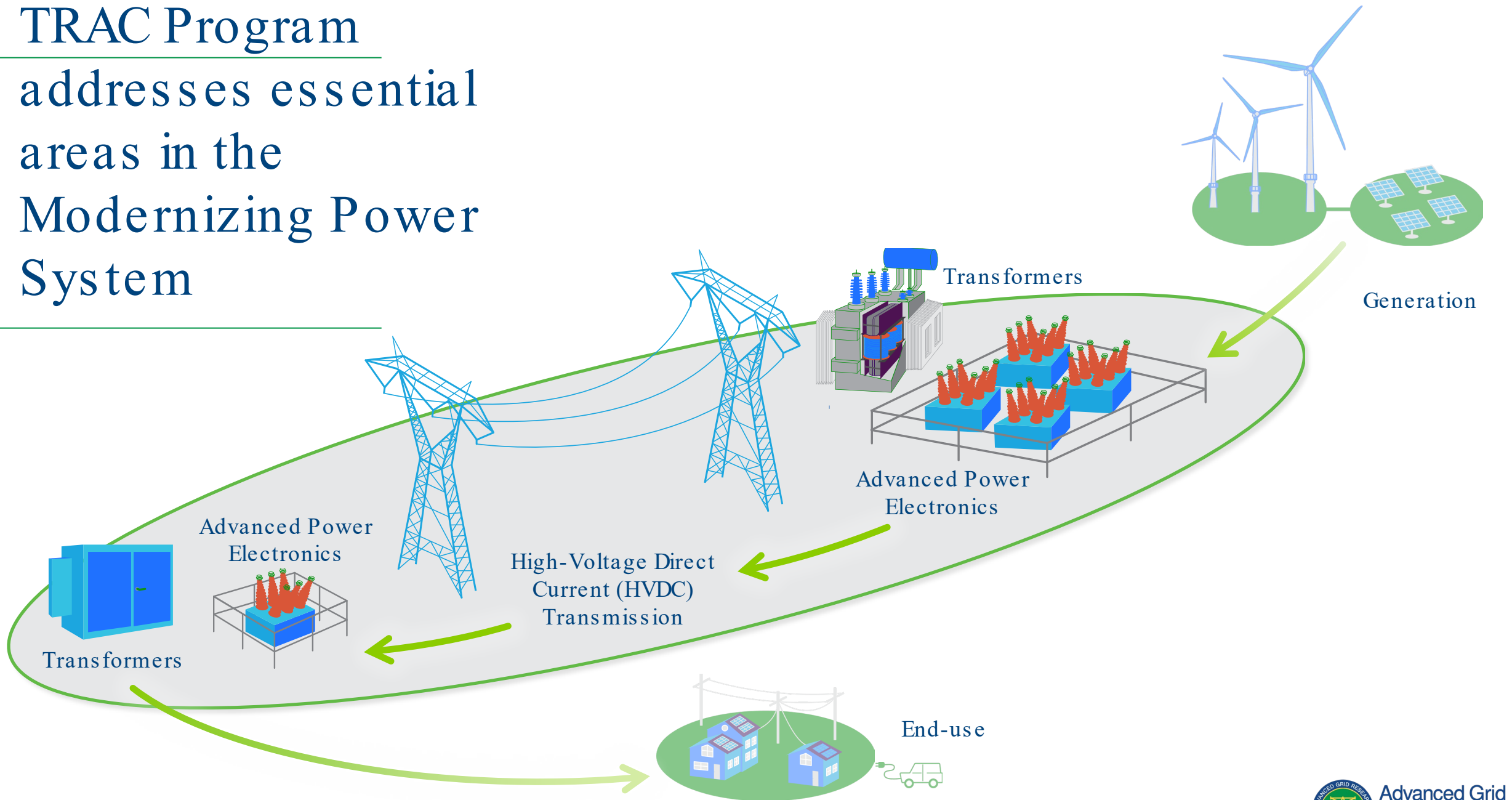
- **Interfacing**
Power conditioning and grid integration: DER and energy storage
- **Delivery**
Long distance power transfer: Off-shore wind, utility-scale solar
- **Management and conversion**
Megawatt-scale charging infrastructure, industrial processes and equipment



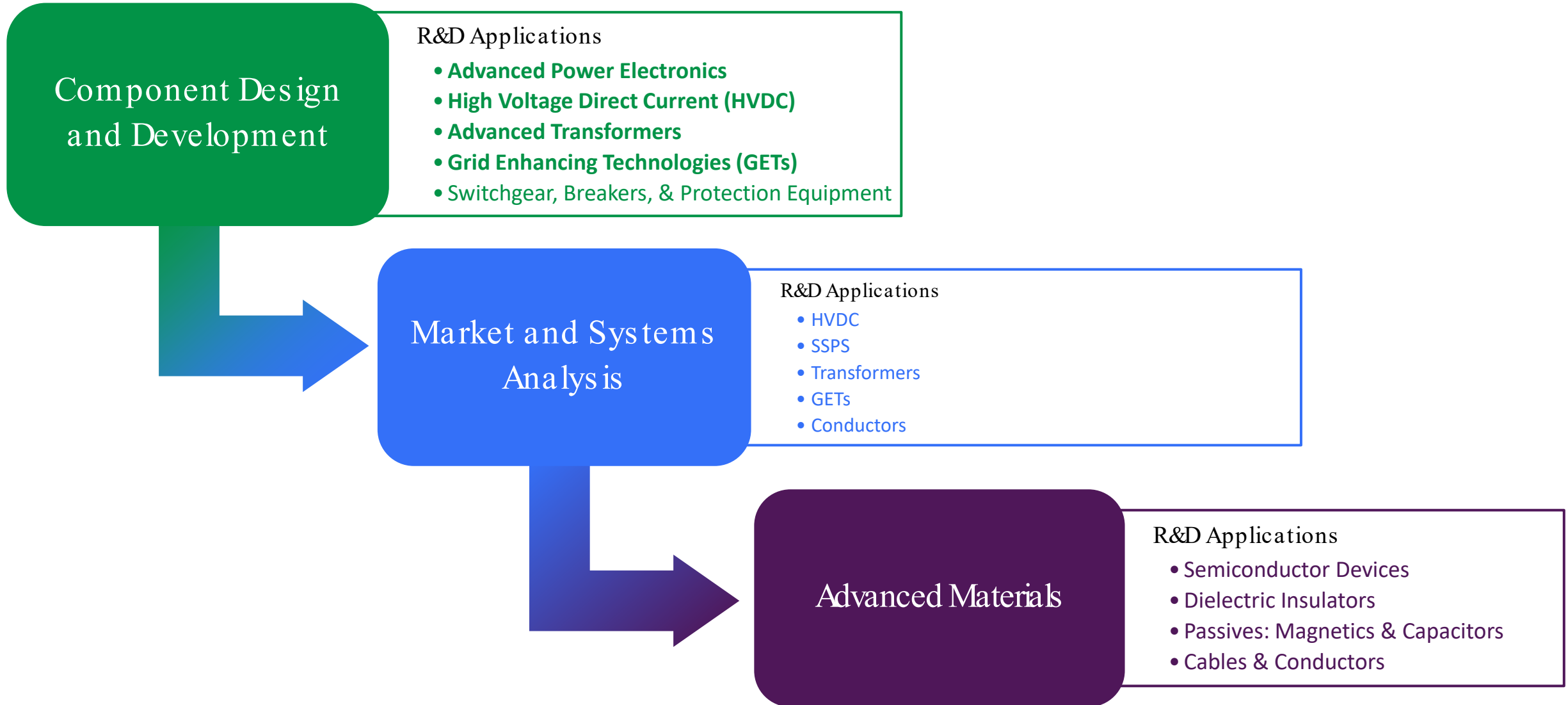
PES Design Space for various applications



TRAC Program addresses essential areas in the Modernizing Power System



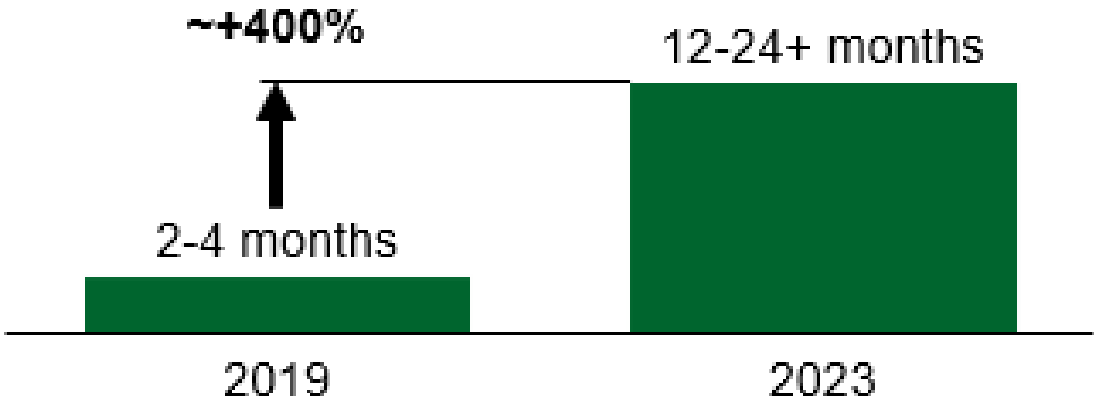
TRAC Program Strategy Enabling Research to Application



Transformers

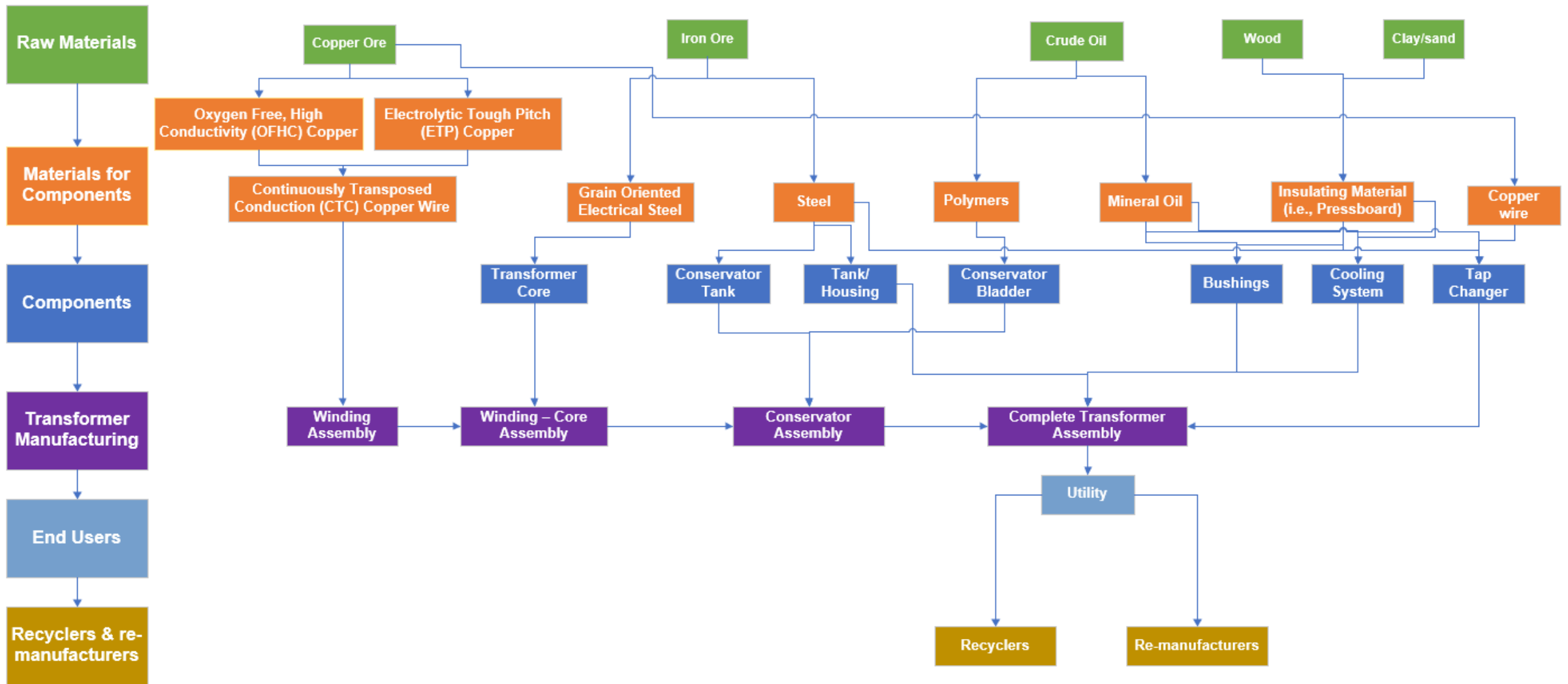
Distribution Transformer Landscape

Distribution transformer lead times



Source: U.S. Department of Commerce – Bureau of Industry and Security, Electrical Steel and Transformer-Related Products; ESCC Tiger Team Survey; Goulden; Industry Expert interviews; DOE/Labs Expert interviews

Supply chain segments for Transformers



DOE TRAC Initiatives: Transformers

Funding Opportunity Announcement (FOA): FY18 \$7.5M

FOA focused on the development of LPT prototypes that are more flexible and adaptable

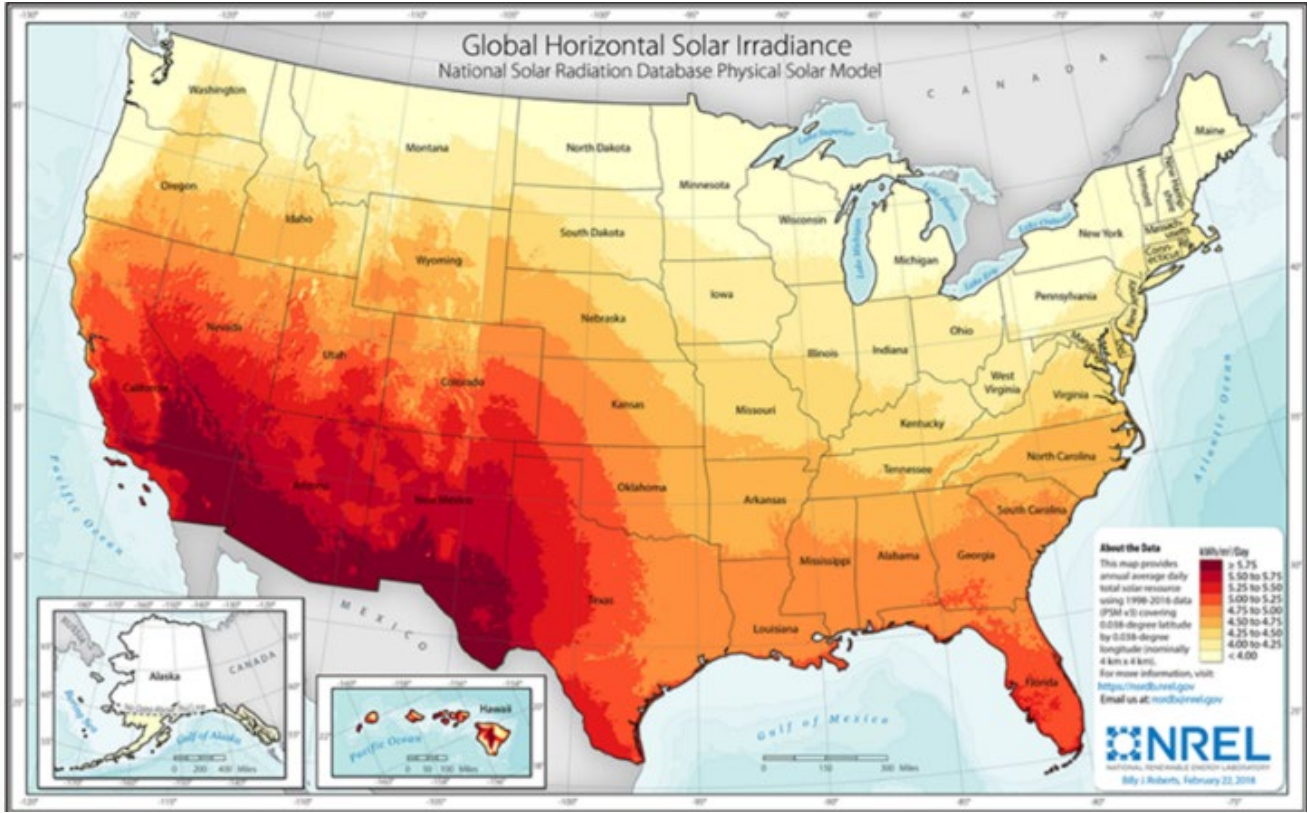
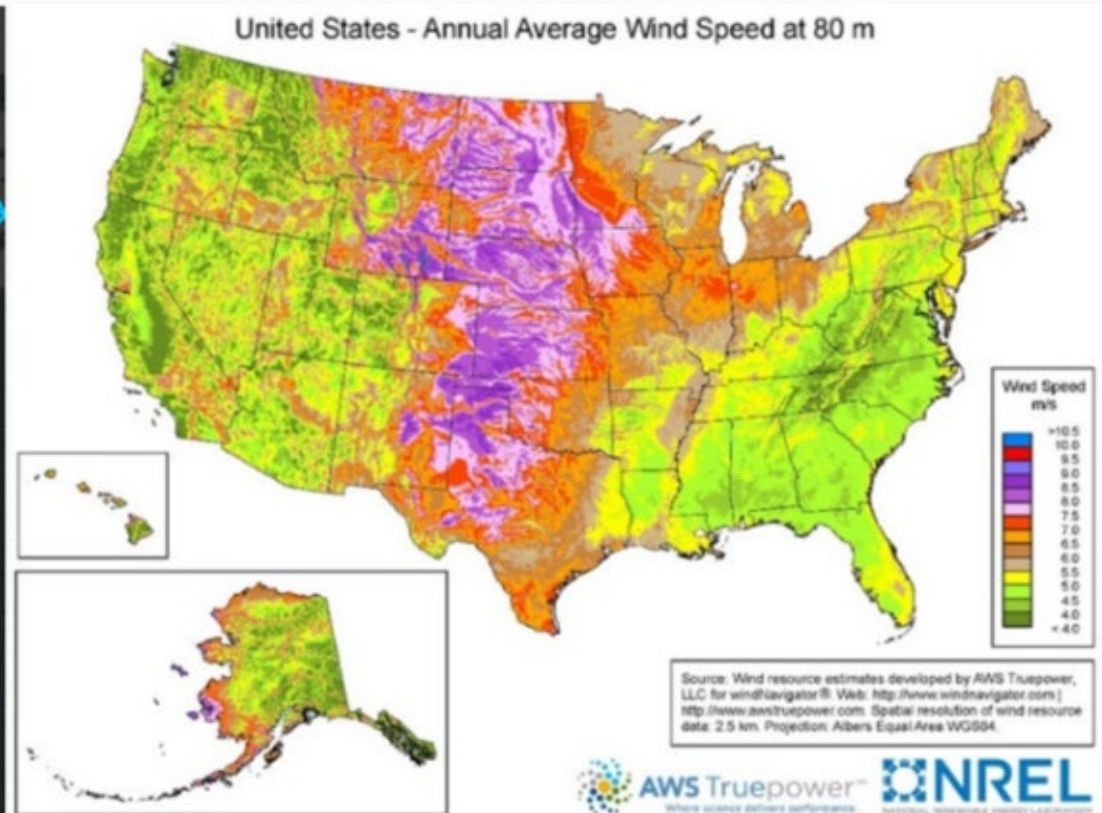
RFI Issued – April 2023: A Request for Information (RFI) for Innovative Advanced Transformers to obtain public input regarding a potential future Funding Opportunity Announcement seeking the research, development, and demonstration of innovative advanced transformers that can be readily utilized across a range of distribution to transmission scale applications

OE Transformer Technologies Workshop – May 2023: The goal of the workshop was to identify research, development, and demonstration (RD&D) opportunities for both distribution and power transformers



High Voltage Direct Current (HVDC) Transmission

High Potential Areas for Wind and Solar Generation



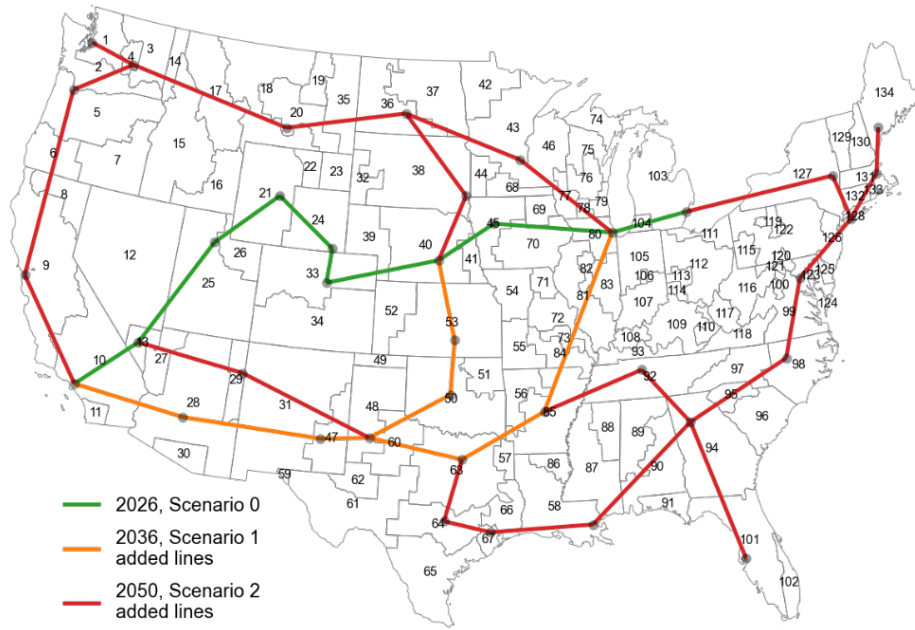
Source: NREL

80% or 250 million Americans live east of the line.



DOE TRAC Initiatives: HVDC

National Labs R&D, Annual Operating Funds



Models and methods for HVDC Technologies 2016-2019

Scalable Hybrid Large-Scale dc-ac Grid Analysis Methods: 2021-2024

Activities

- **HVDC Workshop (2022 : TRAC+WETO)**
 - ORNL, PNNL, NREL, EPRI
- **HVDC Technology Roadmap**
 - ORNL, PNNL, NREL, EPRI
 - Anticipated Release December 2023
- **HVDC Prize Competition**
 - Winner Announcement – August 26th
- **HVDC Moonshot (TRAC+WETO)**
 - Focus : HVDC Stations, HVDC Systems
 - ORNL, PNNL, NREL, EPRI
 - Currently working on drafting metrics
 - Cost: BOS \$/MVA
 - System reliability
 - System Ratings
 - Standardization

DOE TRAC Initiatives: Advanced Power Electronics and SSPS

Solid State Power Substation Technology Roadmap

*U.S. DOE Office of Electricity
Transformer Resilience and Advanced Components (TRAC) Program
June 2020*



Workshop 2018

Roadmap 2020

**National Labs R&D, Annual Operating
Funds**

SSPS 1.0 Architecture Development-
2020-2021

SSPS 1.0 Hardware Prototype
Development – 2021-2023

Total. no. of publications ~ 20

Total. No. of. Patents – 5

PACE Lab Call: Medium Voltage subsystem development

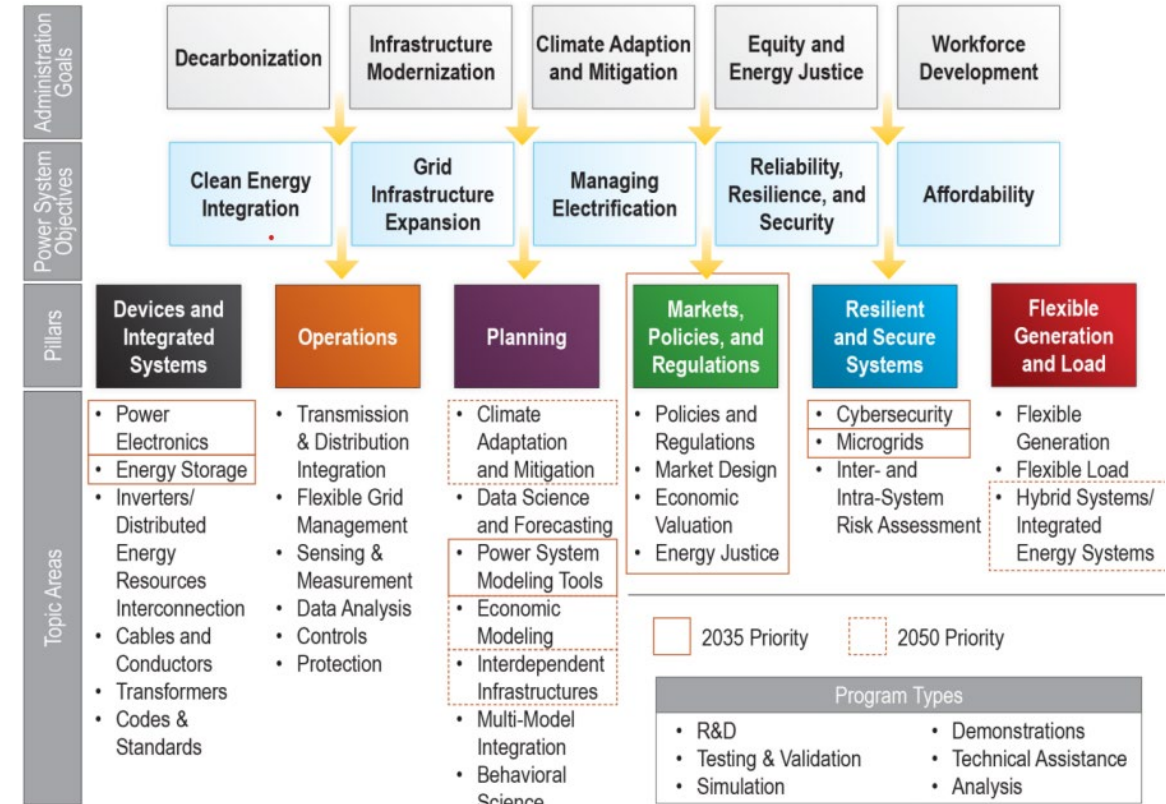
Supporting Offices: EERE, OE

Funding: \$13.75 M

The focus is on addressing gaps in ‘smart’ medium-voltage (MV, 4.16kV-34.5kV) electrical interfaces critical to a modernized grid through development of a medium voltage power and control electronics sub-system approach that is modular, scalable, and cost effective.

National Labs R&D

Partners: Industry and Academia



DOE Initiatives: GETs

- **GETs FOA: Increasing Utilization and Reliability of Electric Infrastructure with Grid-enhancing technologies (GETs) (Feb 2023)**

Supporting Offices: EERE, OE. **Funding: \$6.5 M**

The FOA aims to fill gaps in information on the real-world benefits and usage of GETs through at-scale field demonstrations. The FOA is focused on Power Flow Controllers (PFCs) and Dynamic Line Rating (DLR)

- **Grid-Enhancing Technologies: A Case Study in Ratepayer Impact (March 2022)**
- **Transmission Optimization with Grid Enhancing Technologies (TOGETs) Project**
- **Advanced Transmission Technologies Report (December 2020)**



TRAC's Success is founded in its diverse, strategic Domestic Partnerships



TRAC support maintains US competitiveness in the science and technology – fundamental to this sector through funds to national labs, universities and industry partners.

Questions?

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