

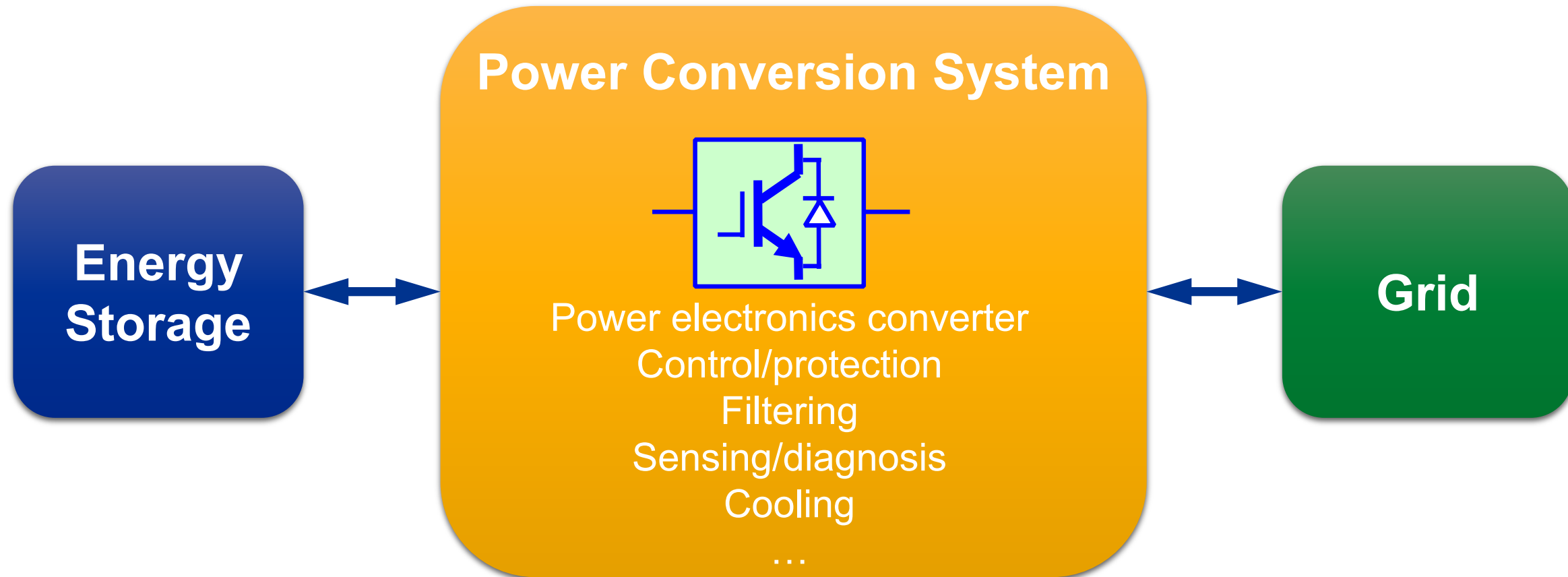
Panel Session: Power Electronics – What to Consider in PCS Technology in the Near Term?

- Moderator: **Dr. Henry Huang**, Pacific Northwest National Laboratory

Panelists:

- **Dr. Stan Atcitty**, Sandia National Laboratories
 - SNL Power Electronics Program R&D Insights on PCS Reliability & Safety
- **Dr. Michael Starke**, Oak Ridge National Laboratory
 - ORNL Power Electronics Program R&D Insights on PCS Reliability & Safety
- **Dr. Blake Lundstrom**, Enphase Energy
 - Advances in PCS Technology and Products

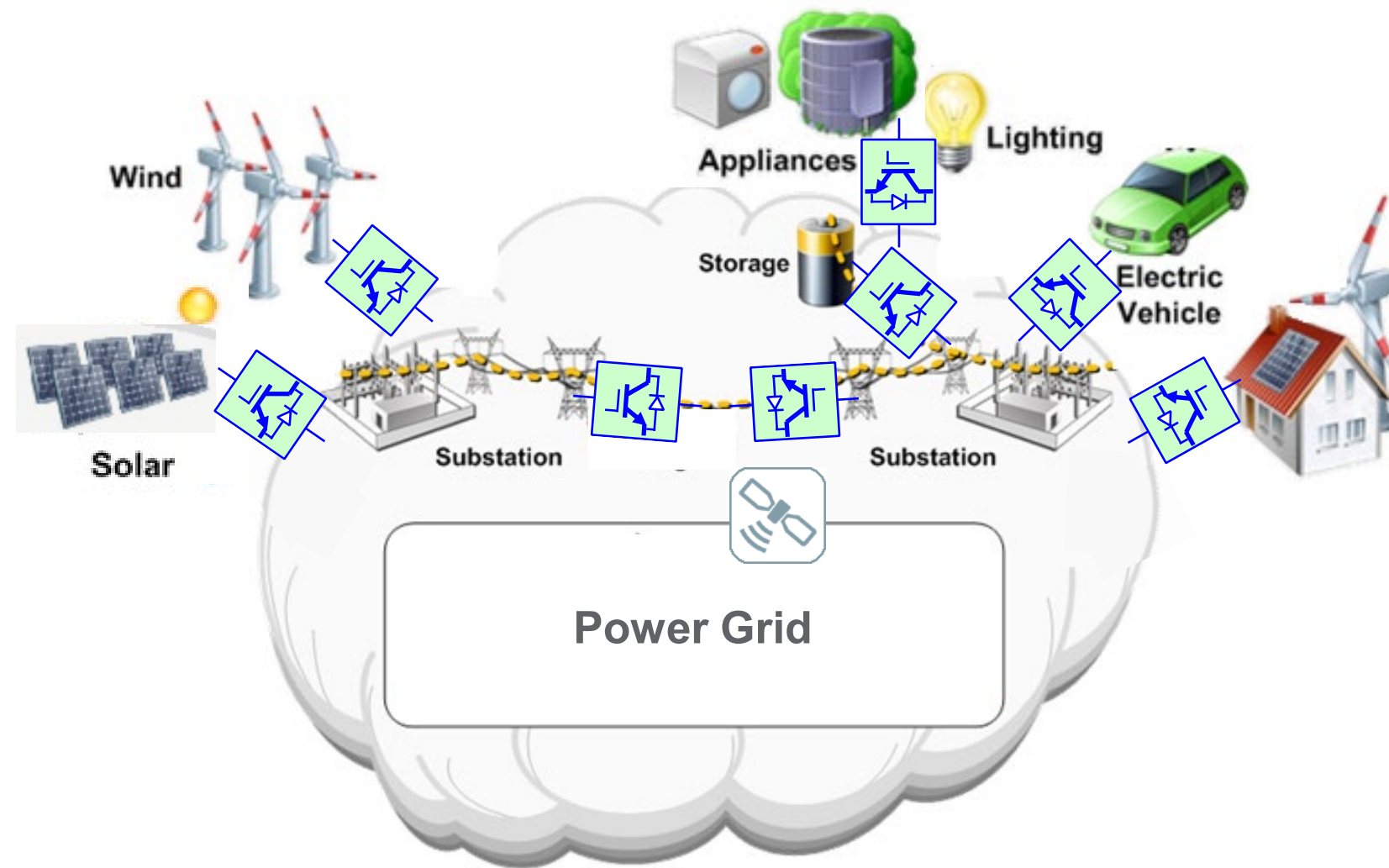
What is PCS? And its functions for energy storage system



- Power conversion
- Power conditioning
- Power control/grid services

Ubiquitous power electronics at all levels

- Power electronics are the glue if the grid is the fabric



Dr. Stan Atcitty, Sandia National Laboratories

SNL Power Electronics Program R&D Insights on PCS Reliability & Safety

- Dr. Stan Atcitty received his BS and MS degree in electrical engineering from New Mexico State University in 1993 and 1995, respectively. In 2006, he received his Ph.D. in electrical and computer engineering from Virginia Tech University. He is presently a Distinguish Member of Technical Staff at Sandia National Laboratories in the Power Electronics & Energy Conversion Systems department. He leads the power electronics subprogram as part of the DOE Energy Storage Program and has gained international recognition for its state-of-the-art research and development under his leadership. Five of his projects have won the prestigious R&D 100 award and one Gold Green Energy award from the Research & Development magazine. His interest in research is power electronics necessary for integrating energy storage and distributed generation with the electric utility grid.

Dr. Michael Starke, Oak Ridge National Laboratory

ORNL Power Electronics Program R&D Insights on PCS Reliability & Safety

- Dr. Michael Starke is an Electrical Engineering System Integrator at the Oak Ridge National Laboratory. He has been at ORNL for over 10 years performing research in different areas of systems optimization, control, and communications in power systems and power electronics. He received his B.S, M.S. and Ph.D. in electrical and computer engineering at The University of Tennessee in 2004, 2006, and 2009 respectively. He is a member of IEEE and of the Power and Energy Society with over 50 publications in power systems and power electronics. His research areas have been primarily focused on energy storage, load control, and microgrids. In the microgrid area of research, he has led a team that developed an open-source microgrid controller called CSEISMIC, which is currently being utilized in a number of demonstration projects. He has also led a team that has successfully constructed a secondary use energy storage system composed of Nissan batteries for deployment with Habitat for Humanity. He has also worked on several load control projects (Connected Neighborhoods).

Dr. Blake Lundstrom, Enphase Energy

Advances in PCS Technology and Products

- Dr. Blake Lundstrom is a Senior Staff Systems Engineer in the CTO Storage Innovation group at Enphase Energy. He is currently leading the control system design for a new multi-system battery power product and supports research and product development projects at Enphase. From 2009 to 2021, Dr. Lundstrom was a Research Engineer at the National Renewable Energy Laboratory where his work involved optimization and control of large-scale deployments of distributed energy resources, microgrid control, machine learning for energy management, power electronics controls development, and the use and development of real-time hardware-in-the-loop techniques for energy systems integration research. He is a Senior Member of the IEEE, is co-leading IEEE P2004, and is a registered Professional Engineer in Colorado. He received his PhD in Electrical Engineering from the University of Minnesota.

Candidate discussion questions

- Integration of power electronic systems is a challenge, specifically with multi-vendor systems. What are your thoughts on how this can be improved?
- Why is a reliable PCS important for grid-tied energy storage?
- What are you doing to increase PCS reliability? What do PCS product monitoring and diagnostic capabilities provide in terms of increasing reliability?
- What reliability and safety impacts in PCS products are expected from using wide bandgap devices?
- How can PCS enhance grid reliability?

Questions?