Grid Modernization Update
Electricity Advisory Committee

Bill Parks, Office of Electricity Delivery and Energy Reliability
Kevin Lynn, Office of Energy Efficiency and Renewable Energy
Carl Imhoff, Pacific Norwest National Laboratory

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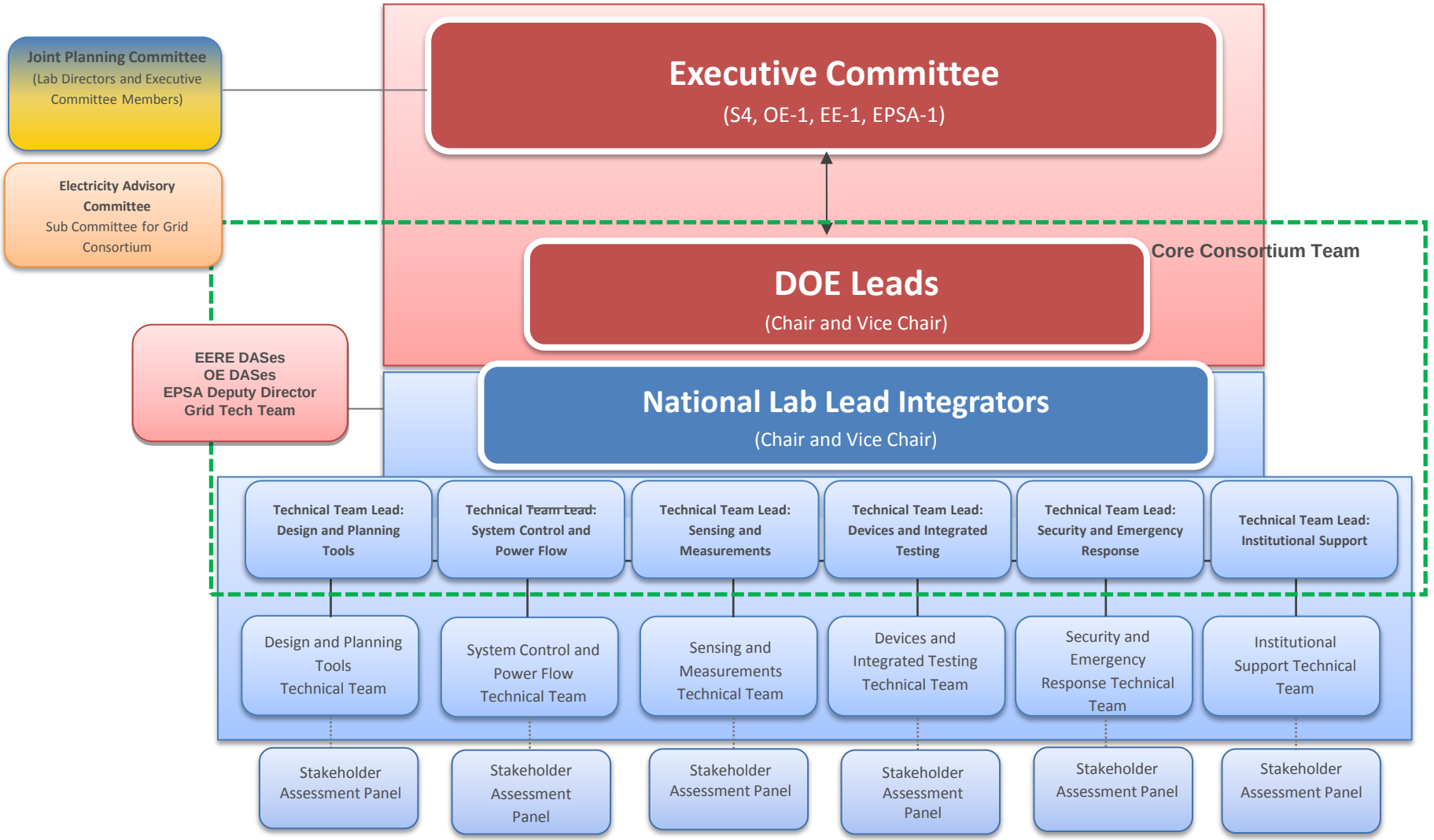
Grid Modernization Cross-cut Initiative

- One of the new cross-cut programs requested by Secretary Moniz in the FY16 budget at $350 Million
- Includes all grid related program activities within OE, EERE and EPSA (connections to Office of Science and ARPA-E)
- Formation of the Grid Modernization Laboratory Consortium
  - DOE
  - 14 National Laboratories, 66 people
- GMLC asked to
  - Develop a MYPP
  - Align laboratory activities across the labs considering expertise and regional diversity of grid activities (DOE funded, Work for others, etc)
  - Recommend to DOE programs FY16 activities through one aligned Annual Operating Plan

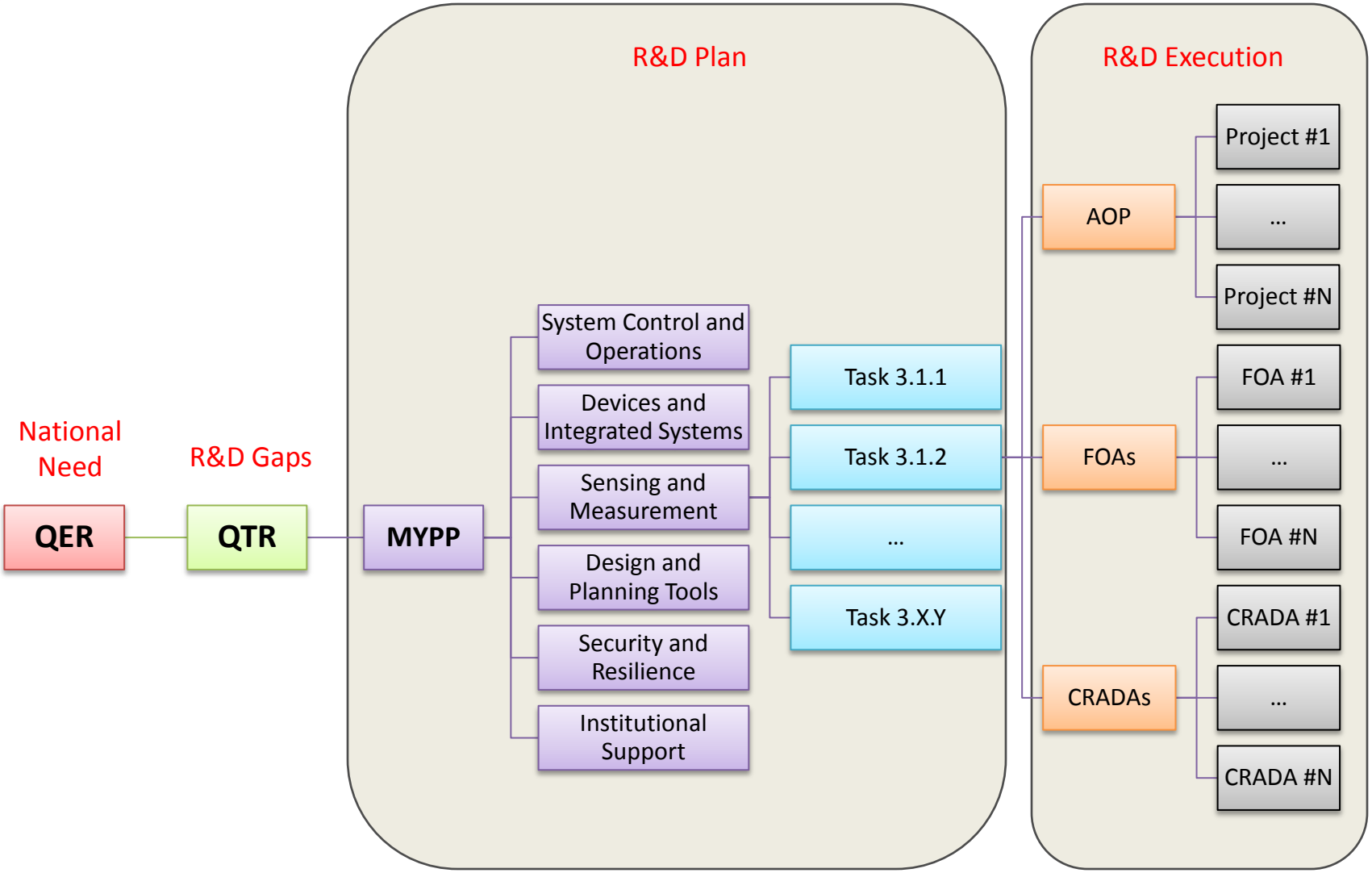
Grid Modernization Laboratory Consortium



Rosters by Laboratory

AMES	Chris	Strasburg
ANL	Vladamir	Koritarov
ANL	Jim	Kavicky
ANL	Keith	Hardy
ANL	Shrirang	Abhyankar
ANL	Mihai	Anitescu
ANL	Mike	McElfresh
BNL	Bob	Lofaro
BNL	Stephanie	Hamilton
BNL	Jae Sung	Jung
BNL	Shawn	Wang
BNL	Meng	Yue
BNL	Mike	Villaran
INL	Robert	Turk
INL	Craig	Rieger
INL	Kurt	Meyers
INL	Scott	McBride
INL	Rob	Hovsapian
LANL	Alan	Bershield
LANL	Tim	Mcpherson
LANL	Rod	Borup
LANL	Scott	Backhaus
LANL	Russell	Bent
LBNL/ LEAD	**Chuck**	**Goldman**
LBNL	Sean	Peisert
LBNL	Mary Ann	Piette
LBNL	Peter	Schwartz
LBNL	Joseph	Eto
LBNL	Sila	Kiliccote
LBNL	Steven	Lanzisera
LLNL	Tom	Edmunds
LLNL	Jamie	Van Randwyk
LLNL	Brian	Kelly
LLNL	Liang	Min
LLNL / LEAD	**John**	**Grosh**
LLNL	Phil	Top
NETL	Steve	Bossart
NETL	Paul	Ohodnicki
NREL	Gian	Porro
NREL	Jim	Cale
NREL/ LEAD	**Ben**	**Kroposki**
NREL	Vahan	Gevorgian
NREL	Marissa	Hummon
NREL	Bri-Mathias	Hodge
ORNL	Stan	Hadley
ORNL	Arjun	Shankar
ORNL	Teja	Kuruganti
ORNL	Burak	Ozpineci
ORNL	Yilu	Liu
ORNL/ LEAD	**Tom**	**King**
PNNL	Michael	Kinter-Meyer
PNNL	Paul	Skare
PNNL	Rob	Pratt
PNNL/ LEAD	**Jeff**	**Dagle**
PNNL	Landis	Kannberg
PNNL	Jeff	Taft
SLAC	Mark	Kemp
SNL	Charles	Hanley
SNL/ LEAD	**Juan**	**Torres**
SNL	Sean	Hearne
SNL	Cesar	Silva-Monroy
SNL	Ross	Guttromson
SRNL	Joe	Cordaro
SRNL	John	McIntosh
SRNL	Chip	Fisher

Connection to DOE Strategy for Grid Activities



Six Activity Areas

Sensing and Measurements	• Visualization tools that enable complete visibility of generation, loads and grid dynamics across the electric system
Devices and Integrated Systems	• Establish common test procedures and inter-operability standards for devices that can provide valuable grid services alone and/or in combination
System Operations and Power Flow	• Develop advanced real-time control technologies to enhance the reliability and asset utilization of T&D systems
Design and Planning Tools	• Create grid planning tools that integrate transmission and distribution and system dynamics over a variety of time and spatial scales
Security and Resilience	• Develop advanced security (cyber and physical) solutions and real-time incident response capabilities for emerging technologies and systems
Institutional Support	• Provide tools and data that enable more informed decisions and reduce risks on key issues that influence the future of the electric grid/power sector

MYPP Major DOE Achievements 2020

Selected three “major DOE achievements” that will integrate across 6 technical areas and substantially contribute to industry capacity to deliver on modernization outcomes in coordination with states and industry

- Lean Reserve Margin Grid Operations:
  - Develop framework for reliable ops with 10% reserve margin (33% reduction)
  - Architecture to leverage distribution-level services
  - High performance telemetry and predictive tools for precise, predictive RT operations
- Clean Resilient Distribution Feeder:
  - Design, validate and demo advanced feeder concepts
  - Demonstrate reliable feeder operations with >50% DER penetration
  - Coordinated microgrid(s) control for resilience (20% fewer outages, 50% shorter recovery time)
  - Distributed, hierarchical control for clean energy and new customer-level innovation
- Modernized Grid Planning and Analytics Platform
  - Deliver 1000x speed-up of coupled T & D planning simulator
  - Deliver new solvers, open-platform middleware and HPC resources for stake holder planning and analytics
  - Deliver new analytics and requisite data / models for quality DER valuation

MYPP- Outcomes and Impact

- This new crosscutting effort will build on past successes and current activities to help the nation achieve at least three key outcomes within the next ten years:
  - **> 10% reduction in the economic costs of power outages**
  - **> 33% decrease in cost of reserve margins while maintaining reliability**
  - **> 50% cut in the costs of DER integration**

- If achieved, these three key outcomes would yield more than $7 billion in annual benefit to the U.S. economy

- In addition, our efforts will ensure the future modernized grid is a flexible platform for innovation by entrepreneurs and others who can develop tools and services to empower consumers and help them make informed energy decisions.

Questions of the EAC?

- What role do you think the EAC can best play in support of the GMLC and the MYPP?
- How should this be structured?
- Should the EAC comment on the MYPP?