Maine Smart Grid Center

The increasing dependence of the United States on energy has created a critical need for the means to efficiently generate, transmit and distribute electrical energy from renewable energy sources. This need has been clearly identified by **President Obama** in a February 5, 2009 Washington Post Op-Ed: "And now is the time to create the jobs that remake America for the 21st century by rebuilding aging roads, bridges and levees; designing a **smart electrical grid**; and connecting every corner of the country to the information superhighway." Further, the **One Hundred Tenth Congress of the United States of America**, Title XIII – Smart Grid stated: "It is the policy of the United States to support the modernization of the Nation's electricity transmission and distribution system to maintain a reliable and secure electricity infrastructure that can meet future demand growth …"

In response to President Obama and Congress's call, the **University of Maine** is aiming to assist the state electric utilities in the implementation of a Maine Smart Grid (MSG). All major Maine electric utility companies, including Central Maine Power Company, Bangor Hydro Electric Company, Maine Public Service Company, and Eastern Maine Electric Cooperative are actively participating and will benefit from this initiative.

The integration of MSG with existing renewable energy sources such as wind power will not only satisfy the state's energy needs but also the need of other states, resulting in significant economic development for the state. MSG will be a secure digital, connected, and controllable electrical energy network that will provide reliability, efficiency, security, and access to the state's vast energy resources. It allows:

- **Consumer-Utility Communication:** Access to customized usage information and demand response programs
- **Renewable Resources:** Increased access to renewable energy
- **Self-healing:** Detects, analyzes, responds to, and restores system stability/outages
- **Security:** Mitigates and is resilient to physical and cyber attack

Maine's electric utilities are planning to invest billions of dollars in new infrastructure that would benefit from the implementation of MSG. Some of these projects are:

- **Advanced Metering Infrastructure:** for enhanced customer service and access to broader demand response programs
- **Maine Power Reliability Project (MPRP):** A high voltage transmission project for increasing system reliability within Maine
- **Maine Power Connection (MPC):** A high voltage transmission project to connect Northern Maine's existing and potential renewable generation to the rest of New England
- **Northeast Energy Link (NEL):** A high voltage DC transmission line to connect Northern Maine and Eastern Canada's renewable generation to markets in southern New England

- **Downeast Reliability Project (DRP):** A high voltage transmission line to increase reliability of electric service in Washington County that runs from Ellsworth to Harrington
- **Storage Facilities:** To provide energy storage facilities to mitigate renewable intermittencies

MSG offers the University of Maine a unique opportunity to become a critical and necessary center for providing R&D and technical training. This center will address the issues, in an integrated manner, related to:

- **Smart Devices:** Collecting data at the consumers and utilities sides
- **Advanced Communications:** Two-way real-time communications
- **Intelligent Information Processing:** Adaptive planning, forecasting, analysis
- **Electronics Control:** Secure and rapid control of smart grid components
- **Training:** Educational training of existing employees and new graduates

The objective of this white paper is to convey the need for the University of Maine to obtain funding for the development of a Maine Smart Grid Center for R&D and technical training. The first step in the implementation of MSG will be to utilize Advanced Metering Infrastructure (AMI) to demonstrate smart grid functionality. To this end, the University of Maine will initially focus its attention on coordinating smart grid demonstration projects among the participating utilities. Subsequently, the Maine Smart Grid Center will lend its technical expertise toward developing and implementing the resulting critical smart grid functions of interest to the participating utilities. One such critical topic is to investigate synchro-phasors as a possible solution to stability issues associated with integrating large amounts of renewable generation at remote locations from load centers. This is of particular interest to Maine with the potential for large amounts of wind power development in Northern and Western Maine and associated stability issues already discovered. Another issue is the research into the capability for automatic and single-pole reclosing on the 345 kV transmission lines in Maine. This item has been recommended by the Northeast Power Coordinating Council (NPCC) to increase the reliability of the transmission system in Maine. Other critical topics are research into digital communications for smart grid, integration of Intelligent Electronic Devices (IEDs) into the next generation substation design, substation cyber-security for Critical Infrastructure Protection (CIP), and studies for the redesign of Special Protection Systems (SPSs) on the Maine transmission system. A study has shown that smart gird consumption data can promote energy efficiency by 1-6%. If smart grid technologies make the United States grid just 5% more efficient, it would equate to eliminating the fuel and greenhouse gas emissions from 53 million cars.

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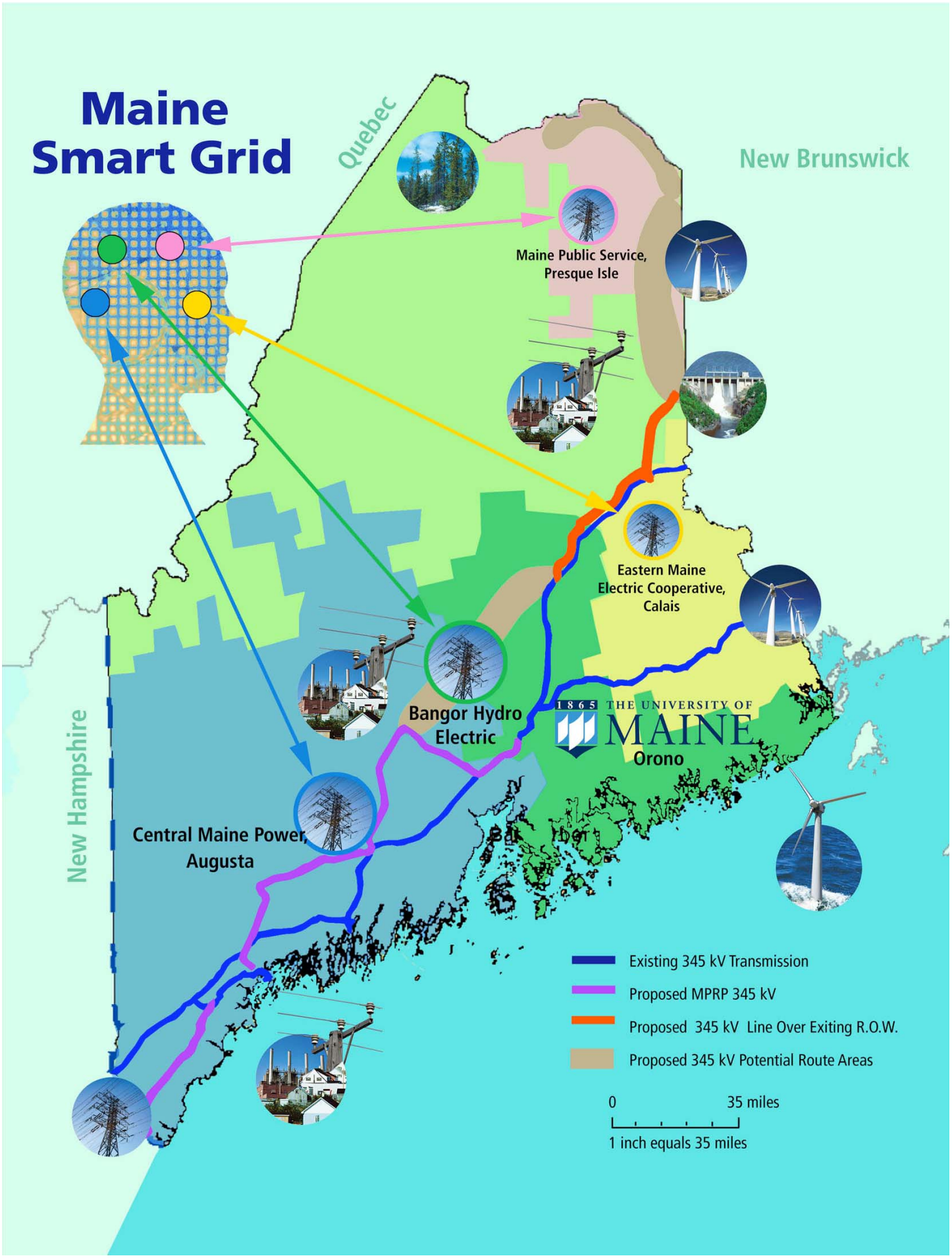
Maine
Smart Grid
Quebec
New Brunswick
Maine Public Service,
Presque Isle
Eastern Maine
Electric Cooperative,
Calais
Bangor Hydro
Electric
1865 THE UNIVERSITY OF
MAINE
Orono
Central Maine Power,
Augusta
New Hampshire
Existing 345 kV Transmission
Proposed MPRP 345 kV
Proposed 345 kV Line Over Exiting R.O.W.
Proposed 345 kV Potential Route Areas
0
35 miles
1 inch equals 35 miles