Letter from the Director

It has been a full year since the Electric Power Research Institute (EPRI) and its research collaborators have begun a series of pilot projects to test new and emerging technologies that play a role in an integrated grid.

The pilot projects are the next part of this intensive research initiative, started more than two years ago to provide utilities and energy industry stakeholders with the foundation, framework, and technology considerations to develop a business case for optimal integration of centralized and distributed energy resources. Since utilities aim to provide reliable, safe, affordable and environmentally responsible electricity, this initiative and the pilot projects inform the best ways to accommodate new technologies, renewable energy, and advanced communication in a grid that wasn’t designed to handle them.

To date, this EPRI research collaborative has initiated more than a dozen pilot projects across the United States. It’s worth noting a number of other member utilities have also embarked on projects of a similar nature. While integration of solar photovoltaic (PV) and energy storage technology is a primary focus of many of our participants, we are also testing the promise of new enabling technology such as smart inverters and standards-based connectivity platforms to look at a range of issues and address knowledge gaps.

As we embark on our second year I would like to thank our participating utility members who have worked tirelessly to make these pilots a reality. I’d also like to thank our top-notch research team who have answered the call to put research into action and truly shape the future of electricity.

In the coming year ahead we will continue to keep you informed of the latest advances in our learnings. In the meantime, I encourage you to join the integrated grid conversation by visiting integratedgrid.epri.com.

Best regards,

Mark Duvall
Director of Energy Utilization
Electric Power Research Institute
CURRENT PROJECTS

- **Alliant Energy** will design and install solar photovoltaic technologies and energy storage at its Madison, Wis., campus. The team has designed a dashboard to communicate the goals of the project to the public and expects to go live this year.

- **American Electric Power (AEP)** will install and monitor the performance and impact of four utility-scale solar generation plants connected to the distribution grid. The team will begin analysis this year.

- **Arizona Public Service Electric Company (APS)** is working closely on the preparation and field deployment of approximately 1,500 residential solar + smart inverter systems on customer homes across seven distribution circuits in Arizona. The team will begin testing this year.

- **Hoosier Energy** will install and monitor the performance and impact of two utility-scale solar generation plants connected to the distribution grid. The team will begin analysis this year.

- **Hydro One** is quantifying the impact of distributed energy storage systems if incorporated into its distribution system. Analysis will begin this year.

- **Kansas City Power & Light (KCP&L)** is exploring the potential value of installing installing infrastructure for plug-in electric vehicles.

- **Louisville Gas & Electric (LG&E)** is deploying and testing energy storage on the distribution system.

- **New York Power Authority (NYPA)** is deploying a PV + energy storage system to evaluate the performance and impact on the distribution grid.

- **Salt River Project (SRP)** will deploy approximately 1,000 residential smart inverters on customer homes. The team will begin testing this year.

- **Southern California Edison (SCE)** is quantifying the impact of distributed energy storage systems to incorporate them into distribution planning. Analysis will begin this year.

- **Tennessee Valley Authority (TVA)** is evaluating and demonstrating the impact of distributed energy storage on the grid.

- **We Energies** EPRI and We Energies are working together to identify potential opportunities for a community microgrid in Milwaukee, Wis. This year the team will complete a feasibility study.
PILOT CATEGORIES: Below are the six general categories of technologies identified as knowledge gaps in the journey to power system transformation.

- **SOLAR**
  Explore ways to integrate utility scale solar PV and the resultant benefits and costs.

- **SOLAR WITH ENERGY STORAGE**
  Evaluate the integration, benefits and costs of utility scale solar with energy storage.

- **DISTRIBUTED ENERGY STORAGE**
  Assess options to integrate distributed energy storage and evaluate the associated benefits and cost.

- **MICROGRIDS**
  Explore a variety of microgrids, integration options, and resultant benefits and costs.

- **ELECTRIC VEHICLE CHARGING INFRASTRUCTURE**
  Evaluate the integration, benefits and costs of EV charging infrastructure.

- **CUSTOMER-SIDE TECHNOLOGIES**
  Assess approaches for integration of customer-side technologies including benefits and costs.

TIME LINE: Integrated Grid Initiative pilot projects are scheduled to run through 2018. Below is a general time line of project implementation.

<table>
<thead>
<tr>
<th>KEY AREAS OF FOCUS</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
<td>Q1</td>
</tr>
<tr>
<td>PROJECT KICK-OFFS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIELD PREPARATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TECHNOLOGY INTEGRATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POWER SYSTEMS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIELD DEMO &amp; ANALYSIS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECONOMIC ANALYSIS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
About EPRI

The Electric Power Research Institute, Inc. (EPRI, www.epri.com) conducts research and development relating to the generation, delivery and use of electricity for the benefit of the public. An independent, nonprofit organization, EPRI brings together its scientists and engineers as well as experts from academia and industry to help address challenges in electricity, including reliability, efficiency, affordability, health, safety and the environment. EPRI members represent 90% of the electric utility revenue in the United States with international participation in 35 countries. EPRI’s principal offices and laboratories are located in Palo Alto, Calif.; Charlotte, N.C.; Knoxville, Tenn.; and Lenox, Mass.