

Transmission Technologies/R&D Program: Strategic/Tactical Direction

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This document is a reference for the participants in the Transmission Technologies/R&D program. It reflects Mike Heyeck's vision, which he has discussed at several occasions with Navin Bhatt and Dale Kruppen. The document also captures the guidance provided by the AEP Corporate Technology Council (CTC) at its 6/28/05 meeting.

1. Transmission Technologies To Focus On

Per Mike Heyeck, in selecting technologies to invest the Transmission R&D resources in, we should focus on the following broad technical areas:

1. Better Use of ROW

- Uprating of existing circuits
- Conductors

2. Better Diagnostics (To Assess Condition and Reduce Inspections)

- An example is the wireless technology, developed by the Dolan Tech Center.

3. Life Extension

4. Interconnected System Control

- Fully interconnected power system control: Local control plus overreaching centralized control
- Wide Area Monitoring System: Advanced visualization tools
- Phasor measurement technology (including addition of phasor measurement capability in relays)
- FACTS devices
- Advanced special protection schemes (e.g. intelligent islanding)
- Response based control strategies
- Responsive, robust, self-optimizing power delivery system
- Advanced communication/control architecture and standards
- Emergency control and restoration

II. Guidelines for Engaging in Transmission R&D Projects

The following elements are to be considered in developing the Transmission R&D Program and in selecting specific technologies and projects to be engaged in:

- **Practical:** Any new technology being considered needs to be practical to implement on the AEP system. This would likely require a good engineering judgment and/or intuition. The practicality could be assessed from the viewpoints of cost effectiveness, efficiency, value derived, reliability and safety. For example, if it is a device to be deployed, would it be cost effective, knowing how many devices may need to be installed?
- **Technology Application Versus Development:** The emphasis should be on applying newly developed technologies, rather than on developing new technologies.
- **Short-Term Versus Long Term:** The emphasis should be on newly developed technologies that can be applied within 2 years.
- **Development of Technologies Involving Long Term Payoff:** Transmission business unit should keep a watchful eye on novel ideas, concepts and technologies being pursued by the industry. It may be even necessary to engage in selected long-term projects involving development of promising technologies.
 - For this, Transmission could use the corporate technology resources, in particular Vladimir Kogan, Ali Nourai and John Schneider.
 - DOE R&D programs often focus on development of new technologies with long-term payoff. Thus, DOE should be considered a key partner for the development of technologies of interest to AEP
- **Concentrated Focus:** In the Transmission R&D portfolio, strive for fewer projects and more resources per project. Strive to compress timetables to reach conclusions on project viability as early as possible.
- **Commercialization:** Focus on business value derived from the deployment of the technology on the AEP system. De-emphasize the potential value to AEP of commercialization of a new technology.
- **Industry Leverage:** Maximize leverage of AEP efforts by joining forces with industry partners such as other utilities, vendors, universities, EPRI, DOE, national laboratories, etc.
- **System Versus Component Aspects:** Think of transmission as an interstate system.
 - Focus on technologies that span a system of components (e.g. a substation), rather than on individual components of a system.
 - Lean on vendors for component/equipment technologies.

- **Post 8/14/03 Blackout Requirements:** Focus on technologies that facilitate the implementation of requirements imposed on AEP due to the 8/14/03 blackout investigation.
- **Technical Leadership:** Maintaining technical leadership in the industry is a key part of Transmission R&D strategy.
- **Crosscutting Technologies and R&D Projects**
 - Look for synergies across multiple AEP business units in selecting technologies and R&D projects.
 - For the projects and technologies that have applications across multiple AEP business units (e.g. wireless technologies), communication processes should be in place to coordinate activities across multiple business units.
- **Exit Strategy:** There is a need to define an exit strategy. Also, for crosscutting projects, the exit strategy should be based on coordination among interested business units.

III. Industry Alliance

- **Industry Partners:** Develop and maintain alliances with a few key players from each of the following industry segments: 1) Utilities; 2) Vendors; 3) Universities; and 4) national laboratories. Communicate AEP's strategy and interests with our partners.
- **EPRI:** Carefully select those programs and projects that provide value to AEP. R&D project managers should communicate their needs to EPRI project managers as well as to the AEP representatives in various EPRI bodies, as appropriate. For reference, some (not all) AEP representatives are listed here: Bob Powers (EPRI Board), Mike Rencheck (EPRI RAC), Mike Heyeck (EPRI Power Delivery & Markets Council) and Ed Schnell (EPRI Transmission & Substation Area Council).
- **DOE:** DOE R&D programs often focus on development of new technologies with long-term payoff. Thus, DOE should be considered a key partner for the development of new technologies of interest to AEP. AEP can provide input in early stages of development of DOE R&D programs and strategies. In addition, select DOE R&D projects can provide value to AEP from the short-term application viewpoint.