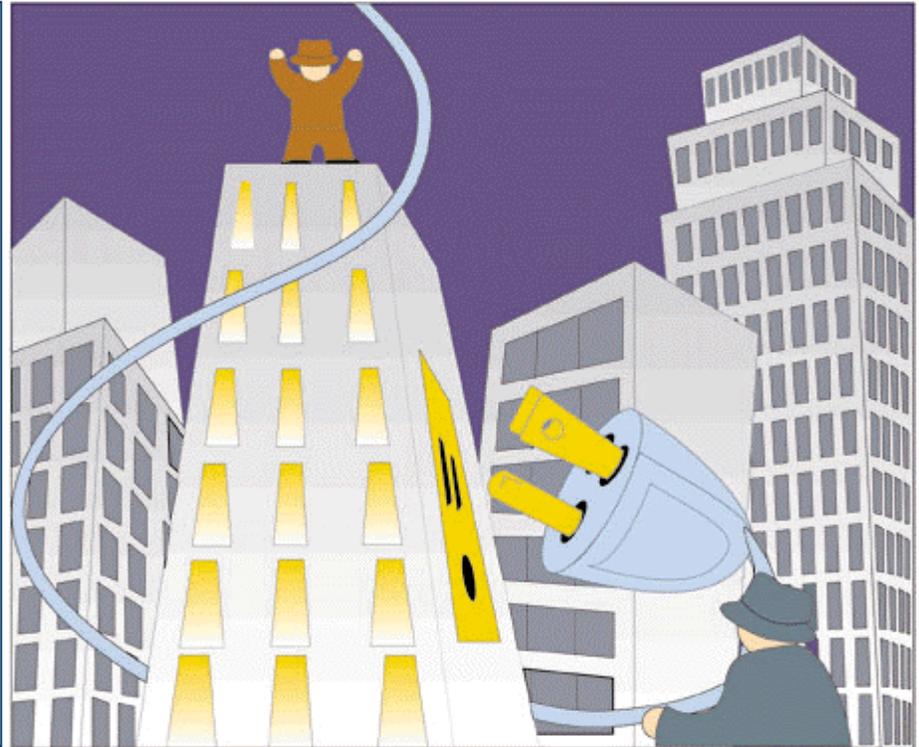


Distribution and Interconnection R&D: Strategic Roadmap Planning

*Tracks 1 and 4:
Program Mission and Goals
and
Regulatory and Institutional Barriers*



Track 1 – Program Mission and Goals

- Foundation
- Program Vision and SMARTConnect
- Program Targets and Timelines

SMARTConnect & DER Integration

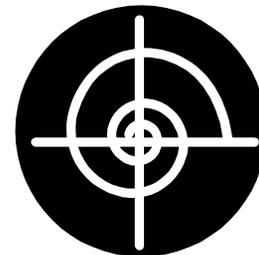
SMARTConnect™ consists of a set of technology platforms that support the development of a modernized, reliable, highly automated and more efficient electric power distribution system with fully-integrated distributed energy resources.

SMARTConnect Technology Platforms:

- DER technology controls
- Interconnection system technologies
- Electrical distribution system technologies

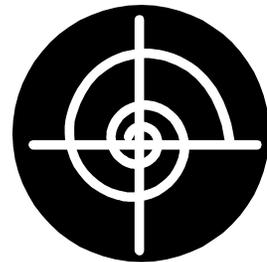
Scope of SMARTConnect

- Interconnection
- DER communications and controls
 - Billing system
 - Connect to SCADA
 - Wholesale markets
 - Information about the DER
- Distribution system
- “When economic” – some customers might not have all requirements
- Consider OpenConnect – focus on standards and requirements, not on hardware



D&I Targets and Timelines

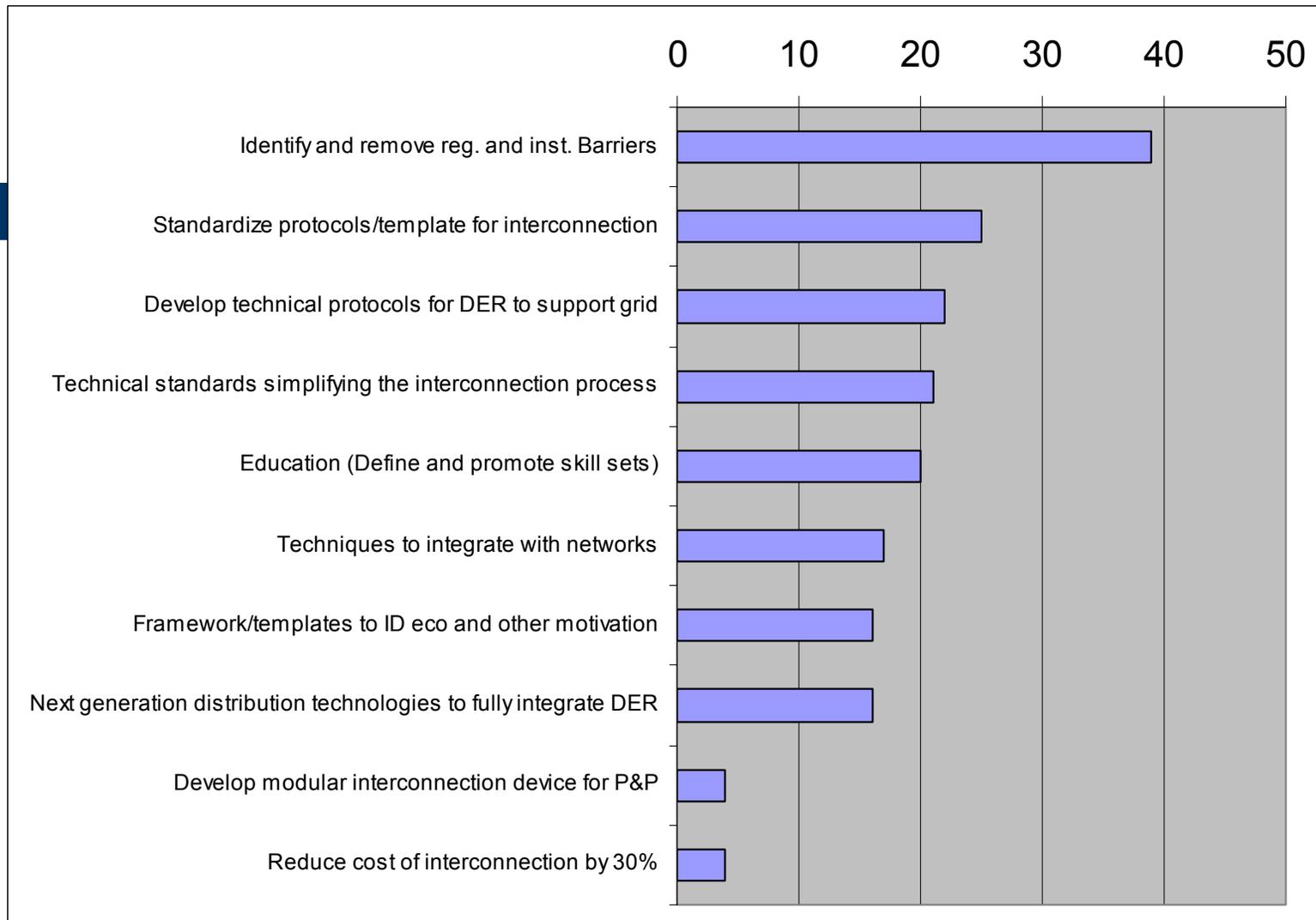
1. By 2010, develop and publish a body of technical standards facilitating the commercialization of mass-produced, certified interconnection equipment – simplifying the interconnection process.
2. By 2010, develop a modular interconnection device that allows plug-and-play interconnection of DER equipment.
3. By 2010, overall program activities will help reduce the cost of interconnection by 30 percent while improving interconnection performance.
4. By 2010, identify and remove regulatory and institutional barriers to DER.
5. By 2015, develop next generation distribution technologies that make distribution systems more efficient, adaptable, reliable, secure, and fully integrate DER.



Additional Targets Proposed

- Standardized protocols and templates established to interconnect with the grid with minimum or no site-specific engineering or design and may include standardized communication, control and measurement
- Develop technical protocol for DER to support grid
- Define and promote required skill sets to develop industry certification and training for DER system implementation
- Technologies to integrate with networks
- Develop framework and template to identify economic and other motivation for implementing enabling technologies

Voting Results



Identify and Solve Barriers to DER

- By 2010, identify and propose solutions and promote implementation activities to remove regulatory and institutional barriers to DER
- (39 votes)

Interconnection Protocols

- Standardized protocols and templates established to interconnect with the grid with minimum or no site-specific engineering or design and may include standardized communication, control and measurement
 - Does not eliminate the need for distribution system upgrades
 - 2004 draft protocols
 - 2006 testing
 - 2007 revise
 - 2008 done
- (25 votes)

DER for Grid Support

- Develop technical protocol for DER to support grid
 - Define what system (grid) conditions DER can address (by 2005)
 - Support/develop the protocol/standards for DER to address those conditions (by 2010)
- (22 votes)

Interconnection Standards

- By 2010, develop and publish a body of technical standards facilitating the commercialization of mass-produced, certifiable interconnection equipment – simplifying the interconnection process
 - Recognize that standards do not cover system impact studies
- (21 votes)

DER Education

- Define and promote required skill sets to develop industry certification and training for DER system implementation targeted at
 - Manufacturers
 - Installers
 - DER service providers
 - System operators
 - Code and regulatory authority
 - Insurance personnel
 - Consumers
 - Financial analysts
- By 2005 and beyond
- (20 votes)

Track 1 Summary

- Scope of Distribution and Interconnection R&D should include DER communications
- Continued support for barrier removal, standards development, and protocols for interconnection technology
- Introduction of targets for DER grid support and education

Track 4 - Institutional and Regulatory Barriers

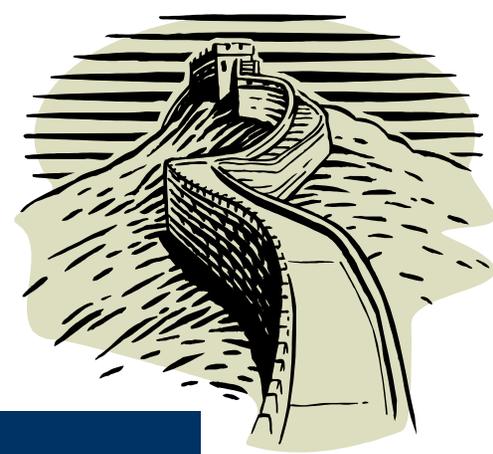


- Foundation
- Barriers that need addressing
- R&D activities to mitigate barriers
- Appropriate role for DOE

Key Input from Breakout

- Input from utilities and other major stakeholders is critical
- Barriers is a term that some find offensive, “challenges” was term used to discuss these issues

Example Institutional and Regulatory “Challenges”

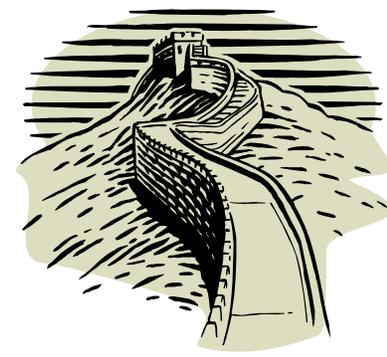


- Institutional
 - Varying interconnection and approval requirements
 - Excessive application fees, back-up or standby charges, exit fees
 - Contractual and procedural delays
 - No single utility point of contact for DER/interconnection issues
 - Selective discounting to stop DER projects from proceeding
 - Insurance and indemnification requirements
- Siting and zoning
 - Siting studies
 - Public hearings
 - Interactions with local officials
 - Increase costs and extend timeframe

Example Institutional and Regulatory “Challenges” (continued)



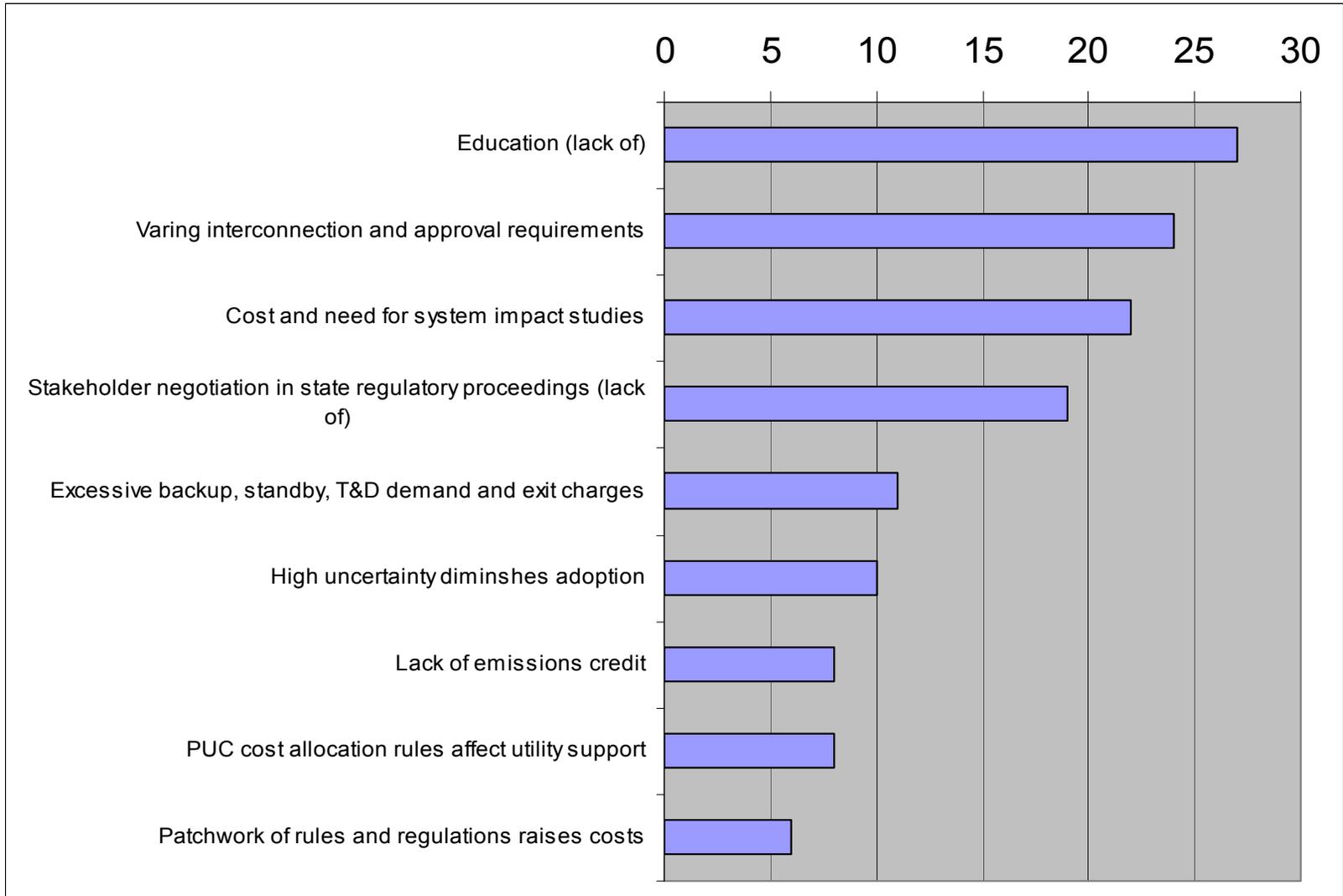
- Emission and environmental permitting
 - Environmental analysis raises costs
 - Requirements vary by state and maybe by site
 - Permit process and cost of testing can be burdensome
 - Limit technology and size choices
- DER and interconnection regulatory
 - High uncertainty diminishes adoption
 - Patchwork of rules and regulations raises costs



Additional “Challenges”

- Lack of education of professionals regarding DER and electric system operation
- Cost and need for system impact studies
- Restrictions of utility DER ownership
- Ability to establish DER tariffs and other tariffs favorable to DER
- Facilitation of stakeholder negotiation in state regulatory proceedings

Voting Results – Overcoming “Challenges”



Education is a Major Challenge

- Education of professionals regarding DER, electric system operation, and DER integration
 - Fund technology seminars for all the groups, including USCHPA, Financial, Insurance, General education
 - Engineering, including standardized training (short courses), new technology updates, videotaped short courses, distance education (i.e. internet)
 - General public education
 - Financial community
- (27 votes)

Interconnection Requirements Still a Big Challenge

- Varying interconnection and approval requirements and lack of national standards
 - Develop a uniform interconnection and approval requirements template through stakeholder consensus (building on FERC accomplishments but addressing needs of small applications)
 - Pull together experiences using existing interconnection frameworks (ex. CA, TX, NY)
 - Establish a resource center drawing from experiences
- (24 votes)

System Impact Studies: Can We Improve?

- Cost and need for system impact studies
 - Evaluate existing impact studies to determine how they can be simplified
 - Identify regional difference in system impact study requirements
 - Continue to support the development of model impact study protocols
- (22 votes)

DER Stakeholders Represented in State Proceedings

- Stakeholder negotiation in state regulatory proceedings
 - DOE should support the convening of stakeholders in states with DG proceedings through a state energy office or PUC
 - DOE should provide a workshop-style series to inform and backstop the commission and staff
 - Encourage training a “resident expert” at the PUC who informs PUC staff and keeps DER industry stakeholders aware of regulatory events/proceedings
- (19 votes)

Backup/Standby and Other Charges Continue to be a Challenge

- Excessive back-up charges, standby charges, T&D demand charges, and exit fees
 - Derive methodology for assessing and quantifying benefits of DER in distribution systems (feeders)
 - Validate methodology with selected case studies
 - Derive standard methodology for determination of unrecovered costs for exit fees, back-up/standby and demand charges, accounting for external factors such as load growth or decline, equipment requirements
- (11 votes)

Track 4 Summary

- Utilities and other major stakeholders should be represented in roadmap process
- Education, reducing cost of system impact studies, and helping DER stakeholders in state proceedings are areas where DOE could assist
- Continue focus on uniform interconnection requirements and reducing standby/backup charges