Perspectives on Wind Integration
Jim Swanson
Who is MidAmerican Energy Company?

- Iowa’s largest energy company
- 746,000 electric, 726,000 natural gas customers
- Summer peak electric load: 4,659 MW
- Subsidiary of Berkshire Hathaway Energy
• MidAmerican Energy Company is No. 1 in the U.S. in ownership of wind-powered electric generation among rate-regulated utilities

• Installing wind turbines since 2004

• Plan to have 4,048 MW installed by December, 2016
Wind Projects Owned by MidAmerican Energy Company

1. Intrepid Project (175.5 MW)
   Buena Vista and Sac counties
2. Century Project (200 MW)
   Wright and Hamilton counties
3. Victory Project (99 MW)
   Crawford and Carroll counties
4. Iowa State Fair Wind Turbine (0.5 MW)
   Polk County
5. Pomeroy Project (286.4 MW)
   Pocahontas and Calhoun counties
6. Charles City Project (75 MW)
   Floyd County
7. Adair Project (174.8 MW)
   Adair and Cass counties
8. Walnut Project (153 MW)
   Pottawattamie County
9. Carroll Project (150 MW)
   Carroll County
10. Rolling Hills Project (443.9 MW)
    Adair, Adams and Cass counties
11. Laurel Project (119.6 MW)
    Marshall County
12. Eclipse Project (200.1 MW)
    Audubon and Guthrie counties
13. Morning Light Project (101.2 MW)
    Adair County
14. Vienna I Project (105.6 MW)
    Marshall and Tama counties
15. Vienna II Project (44.6 MW)
    Marshall County
16. Lundgren Project (251 MW)
    Webster County
17. Macksburg Project (119.6 MW)
    Madison County
18. Wellsburg Project (140.8 MW)
    Grundy County
19. Highland Project (495 MW)
    O'Brien County
20. Adams Project (154.3 MW)
    Adams County
21. Highland Expansion Project (7 MW)
    O'Brien County
22. Ida Grove Project (301 MW)
    Ida County
23. O'Brien Project (250.3 MW)
    O'Brien County
How is Wind Generation Integrated into the Transmission Grid?

- MISO conducts studies of transmission system impacts
- MISO determines required transmission/substation upgrades
- Multiple projects may be evaluated in one study
- Operating guides may be used
MidAmerican building approximately 250 miles of new 345 kV transmission line in Iowa & Illinois

- Participating in four of 17 MISO Multi Value Projects planned in upper Midwest
- MidAmerican’s MVP’s scheduled to be in-service 2016-2018
MidAmerican will build and own parts of 3, 4, 7, & 16
Wind-related Research Areas of Interest to MidAmerican Energy

• Moving wind power from high-wind areas to major load centers
• Efficient tower, blade, turbine and collector system design
• Maintaining system reliability on systems with high wind penetration
• Energy storage systems to complement wind generation