Anything that happens in one area of the grid affects the others

• Generation
  – Peaking resources
  – Balancing, flexibility and ramping
  – Wholesale electricity markets

• Transmission/Sub-transmission
  – Masked load
  – Fault tolerance
  – Flexibility
  – Capital planning

• Distribution
  – Safety and reliability
  – Hosting capacity
  – Locational value
  – Monitoring, control and operation

• Beyond the meter
  – Customer choice
  – Changing behaviors
  – Desire control and manage costs
Parting Thoughts

• Distributed Energy Future
  – Increased complexity
    • Complex interactions of multiple technologies
    • Managing information and the grid
  – Increased coordination
    • Between customers, vendors and the utility
  – Technology and customer focus
    • Interoperation and automation
    • Constantly connected
    • Active decision making
Arizona Resource Needs are Changing

Long-term resource needs are changing

- Significant seasonal variations of resource need
  - Continued evening growth during high load, summer periods
  - Continued reduction in net load during the daytime, non-summer seasons
- Energy value differences throughout day
  - Low or negatively priced energy during mid-day with expensive prices during ramp periods
Low Demand for Electricity During the Day Can Result in Solar Curtailment

- Renewable resources economically curtailed to ensure grid stability i.e. marginal resource
  - While a renewable resource is curtailed, the least expensive resource to serve the next MW of load is uncurtailing the renewable resource. This makes the renewable resource the marginal resource

- Regional market (EIM) developed to help better integrate resources through regional diversity
  - Regional curtailment and negative priced data used for program’s validation and transparency

The following charts show hourly year to date wind and solar curtailment by category, if any.