Planning for the Future

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Agenda

- Ground us in where we are now
  - How we plan
  - Where that process came from
  - How it succeeds
- Highlight what we are facing
- Suggest four shifts in planning to address this future
- Outline the framework of a new planning process

Integrated Resource Planning

- The predominant structure of planning today is the Integrated Resource Plan (IRP), a form largely developed between 20 to 30 years ago
- Key components:
  - Assessment of need: load forecast minus available resources
  - Evaluation and comparison on a consistent basis of new resources
    - Supply-side options, which focus on generation, purchase and transmission
    - Demand-side options, which focus on energy efficiency and demand response measures
  - Selection based on present value utility revenue requirement and scenario risk analysis
    - Externalities included, quantitatively or qualitatively

IRP Collaboration

- A key aspect of IRP is significant public and stakeholder involvement in plan preparation and regulatory review
  - Surveys, focus groups
  - Structured information and input meetings
  - Information requests
  - Draft reviews
  - Public and stakeholder input to the Commission
- Participation improves thinking
- Process minimizes surprises: the work upfront displaces what could be far more work, and with far worse outcomes, when the utility requests cost recovery of its implemented resource decisions

Where IRP came from

- The extreme mismatch between forecasted and actual demand in the 1970s
  - Led to abandoned plants and regulatory disallowances in 1980s
  - Result was lose-lose:
    - Utilities lost money
    - Regulators lost credibility, making no one happy with the inevitabel compromises
- Energy efficiency
  - Technical work suggested great potential but significant barriers
  - Growing belief that utilities should help customers overcome these barriers
- Interest in considering external costs in the process
- NARUC and the Energy Conservation Committee were critical to the development of IRP

IRP's Successes

- Investment in energy efficiency became as legitimate as investment in generation
- More questions, better questions led to better quantitative and qualitative evaluation of choices
- Rate cases involving new resources became less controversial
- Utilities, regulators and regulatory process participants became much more conversant with the range of supply-side and demand-side technologies

But will it see us through the 21st century?

A few fundamentals

- Humanity's use of energy will grow from today because we need energy to do "work." More people = more work to be done to
  - Provide the basics of life: food, shelter, reproduction
  - Support the achievement of self-fulfillment
- The use of electricity will grow because it is a superior form of energy
- The earth receives daily from the sun more than enough energy to do all of the work humanity requires. What we lack are:
  - Sustainable ways of directly applying various forms of energy to human needs
  - Sustainable ways of converting various forms of energy into electricity
- Although we have ample energy, because of the economic, environmental and societal costs of conversion to usable forms, we cannot afford to waste energy

Shifts in technology, policy, and people

- Key technology shifts
  - Distributed, customer-side, generation
  - Storage, rolling and stationary
  - Information/communication, sensors, controls
  - Renewable central station generation
- Key policy shifts
  - Climate change and other environmental concerns and pressures
  - Needs of developing nations and equity concerns
  - Economic concerns
- Key people shifts
  - Demographic changes
    - Within national boundaries
    - Between nations
  - Belief changes

Give IRP a Goal

- Most IRPs follow some version of this standard:

  "The selection of a portfolio of resources with the best combination of expected costs and associated risks and uncertainties for the utility and its customers." (OPUC Order No. 07-002)

  - This works for a prudence decision
  - For the future, it provides no direction and, thus, no way to know whether you are making progress

- Replace this with a directional, measurable goal, for example:

  The customers and communities we serve will apply energy to meet all of their individual and business needs at the same pace that nature provides it (no faster than the rate of regeneration of what is renewable) and with no more pollutants than the rate at which the earth can recycle, absorb, or render such harmless.

Put Customers First

Reclaim the original thought: load is an outcome, not an input:

- Include in the IRP process perspectives of bills and total cost to achieve outcomes
- Create scenarios of customer uses of energy in the relevant communities
  - Possible economic changes
  - Possible behavior/belief changes
- Complement DSM “technical potential” with “what would it take” goal-oriented analyses
  - What if . . . we wanted to cut household use by half in ten years?
  - How fast could . . . all commercial office space achieve currently best in class energy input for a given output?

Include the Network

- Many risks and opportunities in coming decades involve the network:
  - Possible rise of distributed generation and storage, plug-in vehicles
  - Urban challenges: reconfiguration of living/working areas and of roads, stress on existing easements and lack of new easements, environmental issues
  - Higher demand for power quality
  - Smart grid opportunities: both electricity and other infrastructures
  - System efficiencies
    - Cost of losses
    - Opportunity of improving system capacity factor
    - Possible lost opportunities for future capabilities
- Key questions
  - What will enable operating this all as one physical system?
  - What will enable operating this all as one economic system?

Invite New Participants . . . Ask New Questions

- Effects of the electric system on other infrastructures and effects of other infrastructures on the electric system, including
  - Water and sewer
  - Other sources of energy
    - Natural gas
    - Oil
    - Wood
  - Telecommunications
  - Transportation
- Areas of potential collaboration: what and where are actions that could address risks/opportunities affecting two or more infrastructures?
- Areas of potential cooperation: what and where are joint projects that can minimize community disruption and save fuel and time?

Plan for the Future

- Start with understanding who is and will be in the community you are serving and how those people and businesses are applying and will apply energy to achieve outcomes
- Plan to meet as many as possible with the energy available in that location: e.g., design, materials, renewable sources (ground heat, sun, wind, etc.), waste heat
- Identify the capabilities of the infrastructure systems necessary for a robust, intelligent network (Smart Grid) capable of moving energy from where it is temporarily excess to where it is temporarily deficit or storable, and plan to create that network over time
- Last, inject into that network such additional energy as necessary and use the network itself to integrate any intermittency in that resource

Plan ***Differently***

Every great and deep difficulty bears in itself its own solution. It forces us to change our thinking in order to find it.
Niels Bohr

The ability to perceive or think differently is more important than the knowledge gained.
David Bohm

We cannot solve our problems with the same thinking we used when we created them.
Albert Einstein