Summary of the KCC Staff Wind Study:
A Benefit Cost Study of the Governor's 2015 Wind Challenge
(1,000 MW by 2015)

Prepared by Kansas Energy Council Staff, October 2008

Background and Overview of Study

- **Governor Sebelius, on January 21, 2005, asked the Kansas Corporation Commission (KCC) "to look at the full range of benefits that renewable energy brings to Kansas and how those relate to additional investment that may be needed" to meet the Governor's Challenge of having 1,000 MW of wind energy in Kansas by 2015.**
- **KCC staff performed a traditional cost-benefit analysis** of an investment in 736 MW of wind capacity, the additional amount needed to meet the Challenge as of January 2006. Also provided an analysis of the full Challenge amount (1,000 MW).
    - **Used Net Present Value (NPV) as criterion for cost-effectiveness:** investments with positive NPV's (NPV $\geq$ 0) are deemed cost effective; those with negative NPV's (NPV $<$ 0) are not cost-effective).
    - **Examined 32 distinct case studies** that included different combinations of the following factors: (1) utility type (high-, middle-, low-, and average-cost); (2) whether utilities decide to build their own wind capacity or buy wind from developers through power purchase agreements; (3) the internal, utility cost savings attributable to wind; and (4) whether external cost savings are included.
        - **External costs** are those resulting from the utility's decisions but not recorded in its internal accounts. Health-related costs stemming from power plant emissions (i.e., air pollution) are one example of an external cost, or **externality.**
    - **Analyzed 200,000 different forecast scenarios for each case study** in order to develop statistically robust summary NPV forecasts.
    - **Assumed that each megawatthour (MWh) of wind energy displaced a MWh of conventional generation.**
    - **Used results from the EPA's analysis of the proposed Clear Skies Initiative (2003) as the basis for estimated external cost savings (at $20/MWh)** attributable to wind energy production from reduced levels of air pollution.
    - **Supplemented cost-benefit analysis with a consideration of a potential carbon tax** and a determination of how large that tax would need to be for wind to achieve NPV $\geq$ 0.
- **The study provides economic insight based on current and forecast market conditions.** It is not intended to end the debate on wind energy economics, but rather to establish an analytical framework (model) for further discussion and discovery.

General Findings and Key Results

- **Investment in wind capacity will not significantly alter the utility's need for conventional generating capacity**. In other words, it will not enable the utility to reduce its dependence on or future investment in conventional (i.e., dispatchable and controllable) power plants.
    - **Wind energy is appropriately viewed as a substitute for conventional generating fuels (e.g., coal, natural gas, nuclear)—that is, as an alternative fuel source.**

The full report can be accessed on the Kansas Energy Council (KEC) web site, Reports page: http://www.kec.kansas.gov/reports.htm

- **Wind energy is likely to cost Kansas utilities more than electricity produced by conventional means.**
- **When utilities acquire wind energy, retail rates are likely to increase and ratepayers' bills are likely to be higher.**
  - Electric bills are likely to increase between $11.76 to $22.80 a year, as a result of the proposed investment in wind energy (assuming the average Kansas household uses 11 megawatthours (MWh) of electricity annually).
  - **Kansas households would pay an extra $341 to $661 over the 29-year term of the investment.**
- **Although wind-based electricity is likely to be more costly than electricity from conventional (fossil-fuel) resources, it may be cost-effective from a total cost or societal perspective.**
  - ***It all depends on the actual value of the external cost savings attributable to wind energy production.***
  - Updated forecasts suggest that the external cost savings need to be anywhere from $28 to $51 per MWh for an investment in wind to break even.
- **Federal carbon regulation would enhance the economic prospects of wind energy.**
  - Wind energy production would enable the utility to avoid some carbon taxation and, thus, provide an additional source of cost savings.
  - Based on updated forecasts, **the carbon tax would need to be $37 to $69 per ton of CO_2 for wind to be cost-effective (or $136 to $253 per ton of carbon).**
    - If wind energy production is credited with external cost savings of $20/MWh, the carbon tax would need to be $10 to $42 per ton of CO_2 ($37 to $154 per ton of carbon) for wind to be cost effective.
- **Investment in wind energy is characterized by a high degree of uncertainty (i.e., risk).**
  - In most cases, without a consideration of potential external and carbon tax savings, the chance of a positive net benefit is small.
- **Two distinguishing characteristics of wind-generated electricity are that it is clean and it is random (due to the variable nature of wind speed).**
  - That wind energy is clean means that society can avoid the external costs, whatever they may be, associated with energy sources that are not clean.
  - That wind is random means that wind-energy production is neither dispatchable nor controllable in the usual, operational sense and does not provide the degree of reliability demanded by customers and more readily supplied by conventional power plants.
- **The economic problem with wind is not a lack of transmission capacity.**
  - If and when wind is cheaper than the alternatives, then the need to invest in transport capacity will naturally arise.
- **Further research is needed to identify and quantify the benefits associated with reducing emissions and the associated external costs.**
- **In order to understand the benefits of wind in the future, it will be important to undertake regular updates of the NPV forecasts, using the latest available market information.**

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