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Before the Joint Committee on Energy and Environmental Policy
Regarding Costs and Effects to Ratepayers of an RPS
November 20, 2012

Chairman Knox and Committee Members:

My name is Bob Glass and I am the Kansas Corporation Commission's Chief of Economics and Rates. Thank you for allowing me to appear before you this morning on behalf of the Staff of the Commission. I am appearing today to discuss the costs and effects to ratepayers of a renewable energy standard (RES), both generally and in Kansas specifically.

Renewable Portfolio Standard (RPS) or Renewable Energy Standard (RES)

Under KAR 82-16-2(b)(8), each utility is required to submit a report to the Commission detailing compliance with the portfolio standards established in KSA 66-1258 and containing, among other things, "the calculated percentage increase in the utility's revenue requirements and retail utility rates that would be caused by compliance with the acts' portfolio requirement for the year, as determined pursuant to K.A.R. 82-16-4."[1]

Under HB 2526's new requirements, "The commission shall annually determine the annual statewide retail rate impact resulting from affected utilities meeting the renewable portfolio requirement." The Commission will establish how the calculation will be done and the Commission will report "to the governor, the senate committee on utilities and the house committee on energy and utilities" every March 1st.

The rules and regulations for the RES Act explicitly describe how the retail revenue requirement impact of the RES is to be calculated. In order to calculate the retail rate impact, the only additional information needed is the volumetric sales data. Much of this data is considered confidential, but the Commission can aggregate the filings and provide the rate impact on a statewide basis for the March 1st report.

For 2012 and projected 2013, KCP&L reported less than a 1% rate increase due to new wind generation at Spearville III and Cimarron II. Westar estimated a rate impact of 1.7% for

[1] K.A.R. 82-16-4 Retail Revenue Requirement (Specifying the methodology for calculating the retail revenue requirement attributable to compliance with the renewable energy standards requirement).

purchase power agreements (PPAs) for wind generation.[2] Because KEPCo, Sunflower, Empire, and Midwest did not add any renewable sources, this particular reporting requirement was moot for those companies this year. These increases in rates are minimal and reflect the low cost advantage of Kansas electric generation.

The comparison of new wind generation to long-existing fossil fuel and nuclear generation, which has been significantly depreciated, places wind generation in the worst possible light. Two additional factors in evaluating Kansas wind generation should be considered: (1) new wind generation compares favorably with new fossil fuel and nuclear generation, as I illustrate later; and (2) existing coal generation is experiencing increasing cost pressures from environmental regulations, which could tip the balance in favor of wind generation in the near future.

Another important aspect of the Kansas RES is that it is designed to increase renewable energy generation for Kansas consumption. Wind generation that is or will be exported to other states does not count towards the RES, and does not affect Kansas utility customer rates, but the construction and operation of these wind farms has positive economic effects on the citizens of Kansas.

The best method for meeting a Renewable Portfolio Standard (RPS) or a Renewable Energy Standard (RES) in most states, including Kansas, is with wind generation.[3] In some states with significant forests, biomass might be competitive with wind; and, in the West, geothermal is relatively cheap. Using methane from landfills is also cheap, but the resource is limited in quantity and, thus, cannot provide the necessary energy or capacity (in the case of Kansas) to make much of a dent in RPS or RES requirements. Thus, the bulk of the responsibility in nearly all states to meet an RPS or RES falls on wind generation.

Levelized Cost of Generation

The standard method for comparing the costs of different types of generation is the levelized cost of the generation. There are five basic cost components of generation: (1) investment and installation cost, (2) operations and maintenance (O&M) costs, (3) fuel cost, (4) life of the generating unit, and (5) energy generated by the unit. For wind generation, there is no fuel cost but all the other cost components are relevant. The levelized cost of generation is basically a weighted average of the cost of investment, installation, and operation of a generation unit over the expected amount of energy generated by the generation unit over the expected life of the generating unit.[4] The result is a metric of per kilowatt or per megawatt cost that can be used to compare costs of generation.

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[2] *See* Dick Rohlfs' Direct Testimony, Docket No. 11-WSEE-377-PRE, p. 4, lines 22-23.

[3] Originally, the result of legislation that required the use of renewable generation in utility generation portfolios was called a "Renewable Portfolio Standard". However, some time in the later part of the 2000s, "Renewable Energy Standard" also came into use to describe the same phenomenon.

[4] $\left[\begin{array}{c}\text{Levelized}\\ \text{Cost of}\\ \text{Generation}\end{array}\right] = \frac{\sum_{t=1}^{n} \frac{I_t + M_t + F_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{E_t}{(1+r)^t}}$

Where

I_t = Investment expenditures in the year t

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In general, comparisons of levelized costs of generation indicate that the cost of wind is less than new coal generation, new natural gas generation (both combined cycle and combustion turbine generation), and new nuclear generation. Figure 1 below from Lazard is representative of what most other researchers have found with respect to the relative costs of different types of energy generation.[5] Table 1 below Figure 1 has the actual numbers used to make the chart. Figure 1 below is an averaging across the whole United States and assumes that wind farms will have annual capacity factors of between 28 and 36 percent. Kansas has several wind farms that consistently have an annual capacity factor greater than 40 percent. This significantly raises the numerator in the levelized cost equation and results in a much lower levelized cost for wind generation in Kansas. An indication of the low cost of Kansas wind generation is the fact that private wind developers are signing PPAs in the $29 to $35 per MWh range indicating a levelized cost of much less than the national average.

M_t = Operations and maintenance expenditures in the year t
F_t = Fuel expenditures in the year t
E_t = Electricity generation in year t
r = Discount rate
n = Life of the generation unit

[5] "Renewable Energy Cost Database," Environmental Protection Agency, http://www.epa.gov/cleanenergy/energy-resources/renewabledatabase.html, and *Meeting the Energy Challenges of the Future, A Guide for Policymakers*, National Conference of State Legislatures, July 2010, p. 3, www.ncsl.org. Note that (1) Comparing wind generation to existing generation gives a different result than comparing wind to new generation. The purchase power agreements that have been signed recently indicate that wind generation is slightly more expensive than existing fossil fuel and nuclear generation; (2) A significant increase in wind generation requires an increase in transmission construction thus an additional cost of wind generation is the demand it creates for new transmission; (3) The lack of dispatchability, due to the intermittency of wind, creates the need to have additional generation available for regulation, which adds to the cost of wind generation; (4) Because of it relative newness, estimating the levelized cost of wind generation involves more uncertainty than estimating the levelized cost of traditional fossil fuel and nuclear generation.

Figure 1

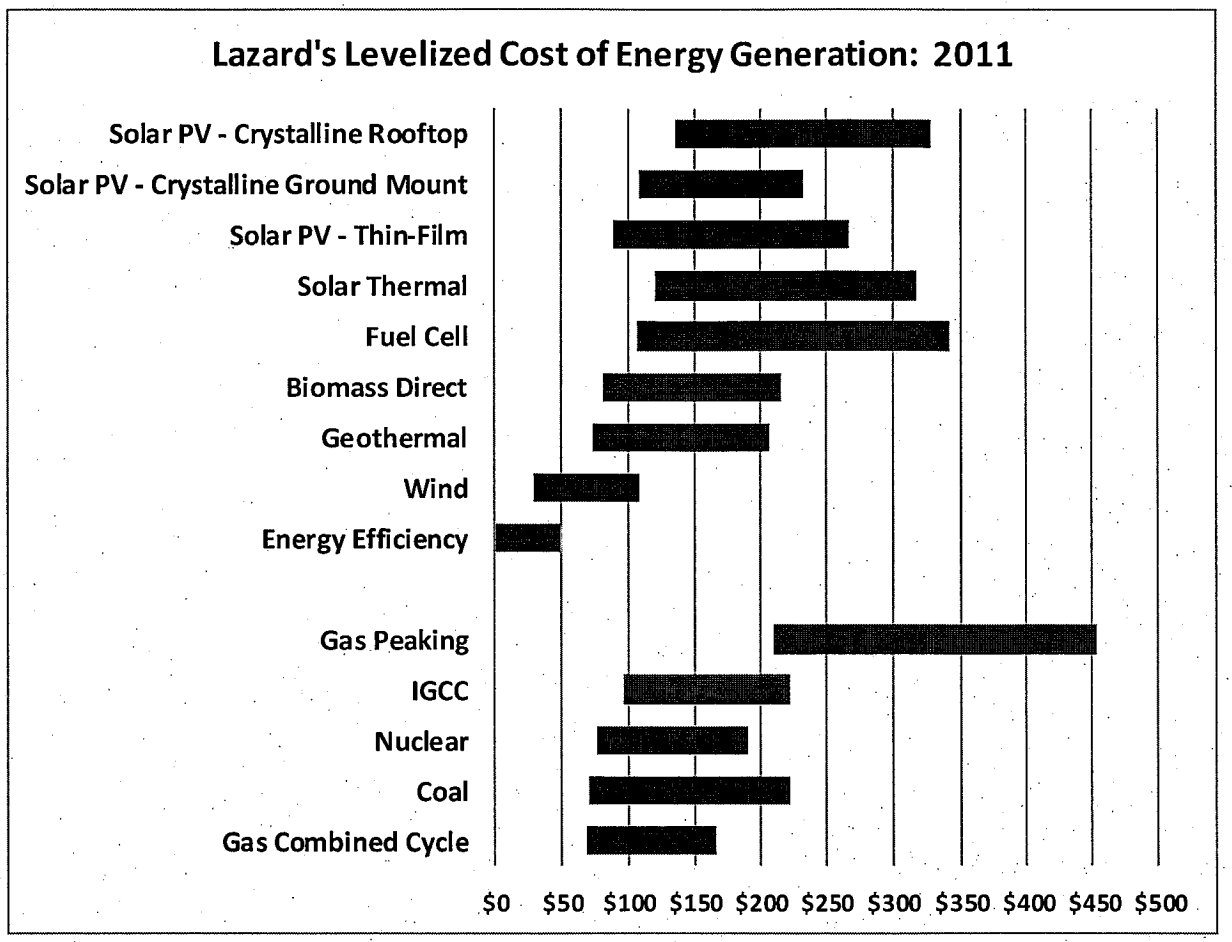
Lazard's Levelized Cost of Energy Generation: 2011
Solar PV - Crystalline Rooftop
Solar PV - Crystalline Ground Mount
Solar PV - Thin-Film
Solar Thermal
Fuel Cell
Biomass Direct
Geothermal
Wind
Energy Efficiency
Gas Peaking
IGCC
Nuclear
Coal
Gas Combined Cycle
$0 $50 $100 $150 $200 $250 $300 $350 $400 $450 $500

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Table 1

Lazard's Levelized Cost of Energy Generation: 2011		
Alternative of Generation	**Minimum Average Levelized Cost**	**Maximum Average Levelized Cost**
Solar PV - Crystalline Rooftop	$136	$192
Solar PV - Crystalline Ground Mount	$109	$124
Solar PV - Thin-Film	$89	$179
Solar Thermal	$120	$198
Fuel Cell	$107	$236
Biomass Direct	$81	$136
Geothermal	$73	$135
Wind	$30	$79
Energy Efficiency	$0	$50
Conventional of Generation		
Gas Peaking	$211	$242
IGCC	$97	$126
Nuclear	$77	$113
Coal	$70	$152
Gas Combined Cycle	$69	$97