

Economic Impacts of Renewable Energy Standards Policy Considerations
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Using publicly available data, the Department of Natural Resources provides the following estimates of the economic impacts for the following four policy options described in the Public Service Commission order dated August 5, 2010:

- A. Electric energy or Renewable Energy Credits (RECs) associated with electric energy for compliance with the Renewable Energy Standards (RES) comes from a generation facility located in Missouri.
- B. Electric energy or RECs associated with electric energy for compliance with the RES comes from a generation facility located outside of Missouri, only if the energy for compliance with the RES is sold to Missouri customers.
- C. Electric energy or RECs associated with electric energy for compliance with the RES comes from a generation facility located outside of Missouri, only if the energy for compliance with the RES is sold to retail customers located within the Regional Transmission Organization (RTO) or Independent Transmission System Operator (ISO) in which Missouri is located.
- D. Electric energy or RECs associated with electric energy for compliance with the RECs associated with electric energy for compliance with the RES comes from a generation facility located anywhere outside of Missouri irrespective of the location of the delivery of the energy.

	Generation location	Customer location	Economic Impacts Occur
Option A	Within Missouri	Within Missouri	Within Missouri
Option B	Outside Missouri	Within Missouri	Mostly outside MO with some impacts within MO
Option C	Outside Missouri	Within RTO or ISO in Missouri	Mostly Outside MO with some impacts within MO
Option D	Anywhere outside Missouri	Irrespective of location of delivery	Mostly Outside MO with some impacts within MO

RES Projections and Assumptions

The RES projections were based on 2008 electric sales by AmerenUE, Empire District Electric, Kansas City Power & Light and Kansas City Power & Light and Greater Missouri Operations obtained from PSC Staff as used in the fiscal note for the proposed rule.

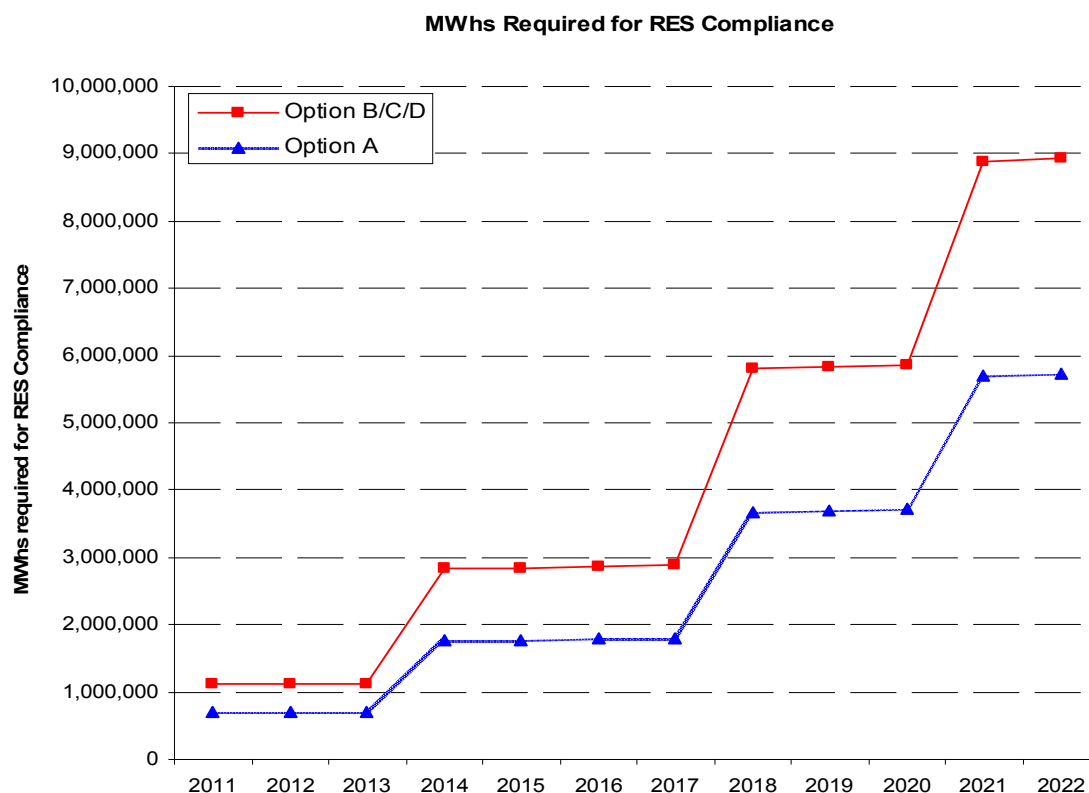
The relevant information and assumptions used in the projections are:

- 1. The annual increase in electric sales is at a rate of 0.5%
- 2. The RES requirements:
 - a. No less than 2% in each calendar year 2011 – 2013
 - b. No less than 5% in each calendar year 2014 – 2017
 - c. No less than 10% in each calendar year 2018 – 2020
 - d. No less than 15% in each calendar year beginning in 2021
- 3. At least 2% of each RES requirement shall be derived from solar energy:

- a. No less than 0.04% in each calendar year 2011 – 2013
 - b. No less than 0.1% in each calendar year 2014 – 2017
 - c. No less than 0.2% in each calendar year 2018 – 2020
 - d. No less than 0.3% in each calendar year beginning in 2021
4. RECs that are created by the generation of electricity by a renewable energy source physically located in the state of Missouri shall count as 1.25 RECs for purposes of compliance with the rule. The MWhs required for RES compliance are not different for Option B, C or D because in these scenarios the generation of renewable energy occurs outside Missouri (which is not affected by the 1.25 credit for Missouri generation).

The additional renewable generation (MWhs) or RECs required for RES compliance are estimated below for the four options – A, B, C and D - as follows:

Year	Option A (MWhs)	Option B/C/D (MWhs)
2011	690,662	1,115,388
2012	694,115	1,120,965
2013	697,586	1,126,570
2014	1,772,512	2,836,708
2015	1,781,375	2,850,892
2016	1,790,281	2,865,146
2017	1,799,233	2,879,472
2018	3,683,883	5,808,829
2019	3,702,303	5,837,873
2020	3,720,814	5,867,062
2021	5,711,790	8,876,708
2022	5,740,349	8,921,091



Model Inputs – Value of Electricity Generated to Comply with RES

Electricity Prices for West North Central Region

Year	\$/Million BTUs	cents/KWh
2011	\$22.1611	\$0.075620
2012	\$22.5985	\$0.077113
2013	\$22.9818	\$0.078421
2014	\$23.4506	\$0.080021
2015	\$23.7854	\$0.081163
2016	\$24.2972	\$0.082909
2017	\$24.8088	\$0.084655
2018	\$25.2259	\$0.086078
2019	\$25.6558	\$0.087545
2020	\$26.2924	\$0.089718
2021	\$26.9554	\$0.091980
2022	\$27.6539	\$0.094364

Source: Average Electricity Prices to all Users, West North Central Region, Annual Energy Outlook 2010 available at:

http://www.eia.doe.gov/oiaf/aeo/supplement/suptab_14.xls

The average electricity prices of all users in the West North Central region were obtained from the U.S. Department of Energy's (DOE) Annual Energy Outlook 2010 and converted

from \$/Million BTUs to cents/KWh using a conversion factor of 100/293.057. This data was used because Missouri is included in this DOE region.

The inputs for the economic impacts were computed by calculating the value of electricity by converting the MWhs required for RES compliance to KWhs and multiplying by the electricity prices in cents/KWh. The value of electricity from the four options is shown in the table below:

Year	Option A	Option B/C/D
2011	\$52,228,126	\$84,346,098
2012	\$53,525,210	\$86,440,832
2013	\$54,705,194	\$88,346,452
2014	\$141,837,375	\$226,994,954
2015	\$144,581,560	\$231,386,717
2016	\$148,430,974	\$237,547,276
2017	\$152,314,580	\$243,762,556
2018	\$317,103,006	\$500,015,029
2019	\$324,119,437	\$511,078,693
2020	\$333,822,687	\$526,378,991
2021	\$525,371,301	\$816,480,867
2022	\$541,679,960	\$841,826,195

Model Inputs -- Cost of Compliance

The estimated aggregate costs of compliance per the Public Service Commission's fiscal note for the proposed rule are:

Year	Cost of compliance
2011	\$45,598,989
2012	\$51,140,062
2013	\$51,696,417
2014	\$51,766,263

As detail and assumptions for the above cost estimates are not available due to the proprietary nature of the data, for the purposes of determining inputs for the economic modeling, the Department assumed the costs are for construction. These costs are applicable only for Option B as this option most closely resembles the proposed rule language (generation outside Missouri but sold to Missouri customers). Cost of compliance estimates are not available for Option A, C or D and hence the economic impacts of these model inputs could be estimated only for Option B.

Economic Impacts

Economic impacts are estimated as jobs, earnings, value-added and property taxes using the above data as inputs in REMI (Regional Economic Models, Inc.) Policy Insight Model as a result of an increase in goods and services produced by the industries associated with renewable electric generation.

Reference definitions:

- Direct impacts -- Occurs directly in the renewable electric generation industry.
- Indirect impacts -- An increase in demand for renewable electric generation would stimulate the businesses that supply goods and services to the industry.
- Induced impacts -- Workers employed during the construction and operation of renewable electric generation facilities spend their income on goods and services in the local economy stimulating the regional economy.
- Economic impact -- the sum of direct, indirect and induced impacts and are presented as total economic impacts.
- Jobs -- refer to all new jobs confined to the economy, whether within Missouri or outside the state. There is no leakage of jobs between economies.
- Earnings -- refer to employee compensation, wages, salaries and benefits.
- Value-added -- refers to the value of the sale of goods and services in the local economy.

The estimated economic impacts based on the model inputs and assumptions described above are:

Option A – Energy Sales Impacts

The sale of energy generated from renewable facilities located in Missouri to Missouri customers is estimated to generate the following economic impacts: 1,118 jobs, \$838.8 million in earnings, \$1,968.8 million in added value and \$7.59 million in tax revenue to the economy of Missouri. An important thing to note is that RECs generated in Option A are valued at 1.25 times since the renewable electricity generation occurred in Missouri, making these impacts lower than they would have been had there not been a 1.25 credit.

Option B -- Cost of Compliance Impacts

The economic impacts of cost of compliance are based on estimates provided by PSC staff per the fiscal note on the proposed rule. We are able to estimate economic impacts associated with costs of compliance only for Option B. The estimated economic impacts of cost of compliance includes an addition of 186 jobs, \$35.6 million in earnings, \$61.36 million in added value and \$814,980 in tax revenue to the regional economy.

Option B/C/D -- Energy Sales Impacts

Theoretically, most of the economic impacts occur in the state where the generation facility is located; however, a portion of the economic impacts are realized in Missouri. For purposes of this analysis, it is assumed that the raw materials and inputs for the generation facility are obtained within the local economy and hence the indirect impacts occur in the state where the generation facility is located. In the case of Option B, C or D, the indirect impacts occur outside Missouri because the renewable energy generation facility is located

outside Missouri. However, a small portion of the economic impacts occur in Missouri due to customer payments, such as sales taxes to the state, which is revenue to the state of Missouri. It is difficult to distinguish the economic impacts that occur in Missouri versus outside Missouri without more detailed assumptions that provide knowledge of the regional economy and the geographic location of the renewable energy generation facility. The economic impacts due to energy sales for Option B/C/D occurring outside Missouri are estimated to be an addition of 1,763 jobs, \$1.323 billion in earnings and \$3.1 billion in added value and \$11.8 million in tax revenue. The RECs generated in Option B/C/D are valued at 100% since the electricity generation occurred outside Missouri. Missouri customers could benefit if the cost of electricity generation is lower than if it were generated within Missouri.

Other Economic Impacts Reports

According to a Natural Resources Defense Council report, the economic impacts of a 100MW wind facility construction and operation in Missouri are shown below.

	Jobs	Earnings	Output	Property Taxes
100 MW MO Wind Facility Construction				
Direct	66	\$4.1 Million	\$4.7 Million	
Indirect	353	\$12.9 Million	\$41.6 Million	
Induced	155	\$5 Million	\$16.2 Million	
Total	575	\$22 Million	\$62.6 Million	
100 MW MO Wind Facility Operation				
Direct	6	\$0.4 Million	\$0.4 Million	
Indirect	9	\$0.3 Million	\$1.7 Million	
Induced	9	\$0.3 Million	\$0.9 Million	
Total	23	\$1 Million	\$3 Million	\$575,000

Source: <http://www.nrdc.org/energy/cleanmo/files/cleanmo.pdf>

On April 15, 2010 Certified Solar Solutions, LLC and Missouri Solar Applications, LLC submitted a study in Rulemaking case EX-2010-0169. The economic impacts presented in “Proposition C – The Missouri Clean Energy Initiative” are that the 15 percent renewable energy requirement by 2021 would create 13, 991 jobs in manufacturing, construction, operation and maintenance and add \$1.043 billion in earnings to the Missouri economy if all renewable energy is built and produced in Missouri. If 50 percent of the renewable energy is built and produced in Missouri, then, 9,591 jobs would be created in manufacturing, construction, operation and maintenance and \$856.6 million in earnings would be added to Missouri’s economy.

Source: http://dl.dropbox.com/u/4257769/EconImpactStudy_FinalFullReport.pdf