Application Analysis of PV Solar in Missouri

PV Solar: The Economics of Jobs and Power

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Abstract

This document begins with an analysis of the nature and proscription requirements contained within the *Proposition C* Act passed in Missouri in 2008 and more specifically the 2% PV solar "carve-out" requirement as discussed in the renewable energy standard (RES) language. From the establishment of standard data through an estimate of a 100% total PV solar build-out state wide, we can obtain an estimated set amount of equity creation through decentralized installations, as well as estimates on additional generated local and state tax income increases.

Using multiple references for substantiation, an estimate of the total jobs creation potential for the build-out of 100% of the PV solar portion of Proposition C are explored in detail from different aspects, including jobs created per estimated overall expenditure and jobs created per estimated overall capacity production factors.

Finally, a case is made as to the importance of the creation of "green" jobs in an economy currently reeling from a combination of both a loss of industrial base and a general and pervasive malaise within markets as a whole throughout the economy of the state.

Proposition C (Appendix A) a new state law which passed by referendum in November of 2008 by a plurality of 66% of the voters, requires that 15% of all electrical power generated in the state of Missouri by publically held utilities be supplied from renewable energy sources such as wind, solar, or from biological sources. This Act sets a new Renewable Energy Standard (RES) for the state. A portion of the law also requires that 2% of this specified total be produced from solar sources exclusively. This paper attempts to weigh the jobs creation and economic benefits of these decisions in terms of geographic sourcing and the bundling of Solar REC's to those systems installed within state boundaries.

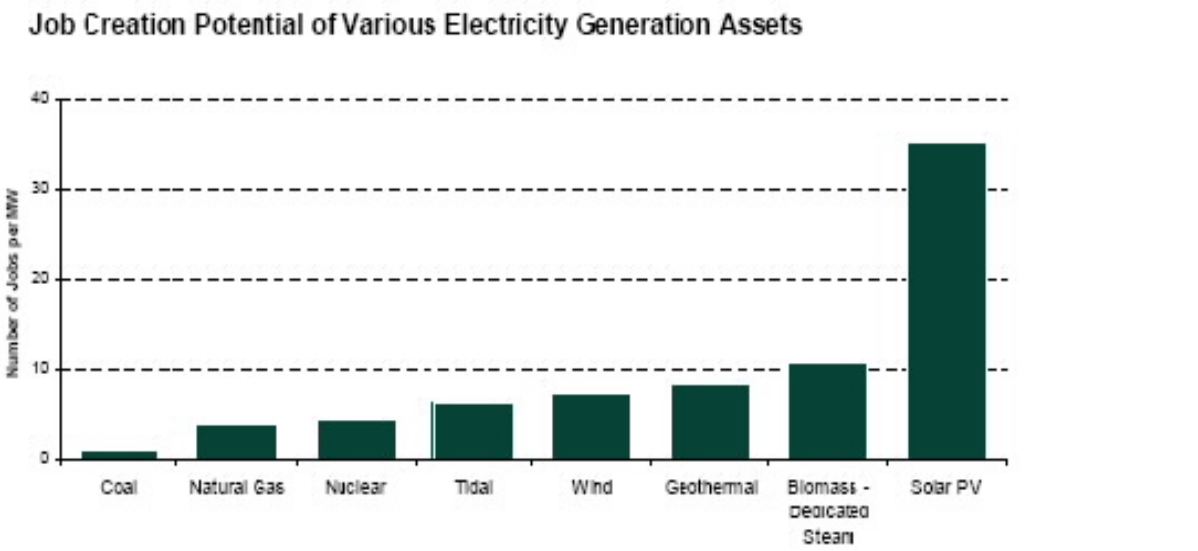
According to the most recently available data from the U.S. Energy Information Administration/Electric Power Annual 2008 report on electrical generating capacity by state (Appendix B), Missouri's total electric production is estimated at 20.7 Thousand Megawatts. Using an annual growth estimate factor of 1.33% per year and a correction/reduction of 25% for the amount of power produced exclusively statewide by publicly held utilities a total of approximately 47.822 Megawatts of solar capacity is obtained for the fulfillment of current Proposition C's solar carve out requirements. Through an interpolation of these totals we can make assumptions as to the total economic value created through capital investment and job creation. For purposes of simplicity and clarity this discussion will assume that all values are brought forward and discussed as if they occur in a first/one year scenario.

By using an average installed cost of $7.60 per watt (Appendix A) for installed solar systems we can derive an estimated total value of $363,448,215 of installed capital investment for photovoltaic (PV) systems assuming 100% of the systems are installed and operational within state boundaries. Taking an average Missouri State and county property tax rate of 8% based upon a 19% real property valuation yields a total increase of property tax value statewide of: $5,522,212. Using a sales tax rate average of 7% yields a total of $25,441,375 in additional sales tax income statewide. Thus we obtain a combined sales and property tax estimated total increase of $30,965,788 for the build-out of 100% of PV systems sold and constructed within Missouri state boundaries.

Estimating payroll tax income for a Missouri solar build-out we can assume that 25% of total project value equates to an installed labor total cost of $90,862,053. Using a flat state withholding value of 6% yields an average total state withholding income of $5,451,723 going into Missouri state tax coffers based again on 100% of the solar allocation requirements being sold and constructed within state boundaries. Total sales, property, and payroll tax income estimated to be produced by the execution of Proposition C solar component as a contribution to state income are therefore estimated at: $36,417,511. This number can also be broken down to a dollars per Megawatt installed estimated state income value creation of $761,522 per megawatt of installed PV capacity. According to a Research Report producing in November of 2001 by the Renewable Energy Policy Project and authored by; Virinder Singh with BBC Research and Consulting and Jeffrey Fehrs titled, *The Work That Goes Into Renewable Energy*. Page 20, we can use a comparison of a similar investment in coal fired energy production and can ascertain that "both wind and PV provide more than 40% in employment than coal" per dollar of investment.

This would equate to a loss of $304,608 of state income assuming that similar "clean" coal investments could even be made directly into the coal industry in Missouri, which is not a strong probability seeing as there are no significant mining operations within the state currently. As a result a strong case can be made that since almost 85% of total energy production in Missouri comes from coal fired plants, the majority of each and every energy dollar is currently being effectively exported out of the state.

Now let us examine the ability and value of the solar renewable energy market as a jobs creations conduit. Using a direct measure of jobs created according to installed generating capacity the chart below clearly indicates the strong preference of solar PV over coal in the number of jobs created per Megawatt of installed capacity, which is approximately a ten to one ratio. Using these estimates Missouri can anticipate the creation of over 1,674 jobs from the ramp-up to a 48 megawatt solar capacity by 2021.



Source: INEEL, BC Sustainable Energy Association, Renewable Energy Policy Project, Lehman Brothers research

Another collaborative study using both direct and indirect job creation methodologies comes to an almost identical conclusion; that is for every megawatt of PV capacity produced approximately 36- person year jobs are created yielding the creation of approximately 1,728 jobs per 48 megawatts.

THE WORK THAT GOES INTO RENEWABLE ENERGY

Table 3. Labor Requirements Per Megawatt of Photovoltaics[a]
(in hours)

Project Activity	Occupational Category									TOTAL by Project Activity
	Prof, Tech & Manage (0/1)	Clerical & Sales (2)	Service (3)	Agri, Fishery, Forestry (4)	Process-ing (5)	Mach. Trades (6)	Bench-work (7)	Struc-tural Work (8)	Misc. (9)	
Glass	50				50	50			50	200
Plastics	50					250				300
Silicon	1,550	200	200		3,300	200	200			5,650
Cell Manufacturer	800				1,600		600	50	150	3,200
Module Assembler	3,500				1,600		8,250	750	6,850	20,950
Wires	150					1,700				1,850
Inverters	750				1,000	1,000	1,000	1,000		4,750
Mounting Frame	500	500				150	100	150	100	1,500
Systems Integration	8,900	2,850								11,750
Distributor Contractor/	1,500	1,500							1,000	4,000
Installer	2,500							8,000		10,500
Servicing[b]	5,000									5,000
TOTAL by Occupation	25,250	5,050	200	0	7,550	3,350	10,150	9,950	8,150	**69,650**
TOTAL Person-Years	12.9	2.6	0.1	0	3.9	1.7	5.2	5.1	4.2	**35.5**[c]

a. Figures derived from a survey to determine labor requirements for a 2-kW residential PV installation.
b. Includes servicing for ten years of operation.
c. Totals for person-years do not add up due to rounding.

November (2001), *THE WORK THAT GOES INTO RENEWABLE ENERGY*, By Virinder Singh with BBC Research and Consulting and Jeffrey Fehrs1; Renewable Energy Policy Project

Another graph which displays a similar ratio of long term jobs creation of almost ten to one comparing the PV and coal industry is show below. This graph is the result of an accumulation and averaging of multiple studies over time:

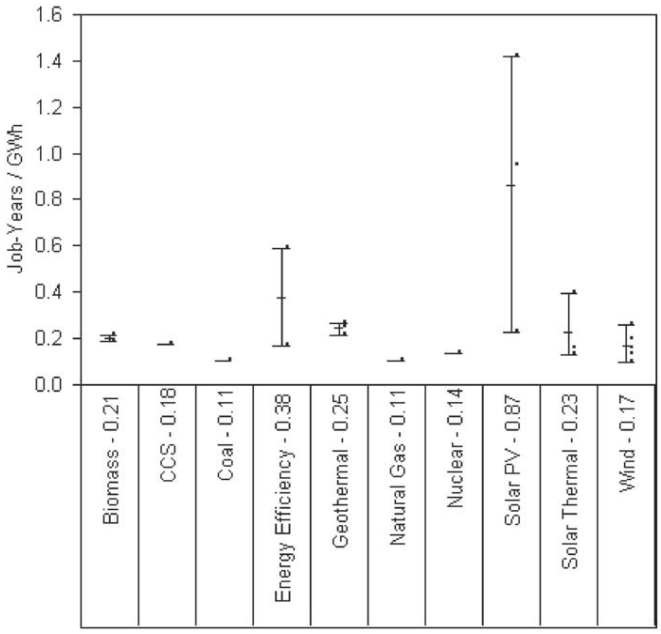


Fig. 1. Average and range of direct employment multipliers for ten different energy technologies based on the studies from Table 1. M. Wei et al. / Energy Policy (2010) p. 923.

Using another synopsis of multiple studies prepared by; prepared by Aaron Lehmer, from the Ella Baker Center for Human Rights titled; *Renewable Energy Development Creates More Jobs than Fossil Fuels,* over a comparable 10-year period the solar industry creates 5.65 jobs per Million in investment vs. 3.96 jobs created per Million in the coal industry. If we multiply and overall investment of $363,448,215 by 5.65 it yields 2053 jobs created which is not too dissimilar to our above estimate of the creation of 1,674 jobs from the creation of approximately 48 megawatts of solar generating capacity (within an 20% margin of error factor).

The above figures assume both direct and indirect jobs creation benefits including; research and development, product design, product manufacturing, sales, installation, and operations and maintenance. According to the U.S. Department of Energy there are two main reasons why renewable energy technologies offer an economic advantage: (1) they are labor-intensive, so they generally create more jobs per dollar invested than conventional electricity generation technologies, and (2) they use primarily indigenous resources, so most of the energy dollars can be kept at home.

Another significant and current publication which examines and compares multiple renewable energy jobs studies for the purpose of establishing a common metric is titled; Putting Renewable and Energy Efficiency to work: How many jobs can the clean industry generate in the US? (2009) by, Max Wei, Shana Patadia, and Daniel M. Kammena from the University of California, Berkley. This paper attempts to take into account potential job losses in the fossil fuel energy industry resulting from the growth of renewable energy into a larger market share as well as equalizing job creation per unit of produced energy. This is done through the use of common metrics to calculate lifetime average employment per unit of energy. ‘‘one-time employment factors such as construction and installation (‘‘job-years per peak MW’’) are averaged over plant lifetime to obtain an average employment number (‘‘jobs per peak MW’’) that can be directly added to ongoing employment factors such as operations and maintenance.” M. Wei et al. / Energy Policy (2010). Another equalizing methodology employed in this study is, “to allow for comparison between technologies with different capacity factors, we calculate employment per unit of energy (‘‘job-years per GWh’’) or per unit of average-MW of power output (‘‘job-years per average MW’’).” M. Wei et al. / Energy Policy (2010) p. 920.

The renewable energy (RE) studies cited in this research are generally analytical in nature, that is they are considered focusing on employment impacts in a bottom-up fashion using direct employment data vs. an input/output methodology where more complete and extensive market wide analysis are performed generating a fuller picture of industry wide effects of changing energy production patterns and usage. It should be noted however, that none of the studies "include avoided environmental costs or other potential benefits (less imported fossil fuel, reduced health care costs, etc.) that would favor green job programs… At the macroeconomic level, it has been argued that global warming is one of history's greatest market failures and that to preclude the prospect of severe economic and social consequences in the future a transition to a low carbon economy is urgently needed. Policies and programs to support this transition are one way of viewing the green jobs movement, and thus the key questions do not focus on whether or not to support ''green jobs'', but how best to do it—which policies have the greatest benefit to cost ratio, how long term benefits should be balanced against short-term costs, how economic dislocations should be minimized, and how best to position government policies in dynamic and competitive global markets." M. Wei et al. / Energy Policy (2010) p. 920 and 922.

Table 2
Comparison of jobs/MWp, jobs/MWa and job-years/GWh across technologies.

Work-hours per year	2000	Capacity factor (%)	Equipment lifetime (years)	Employment components			Average employment over life of facility							
							Total jobs/MWp		Total jobs/MWa		Total job-years/GWh			
Energy technology	Source of numbers			CIM (job-years/MWp)	O&M (jobs/MWp)	Fuel extraction and processing (job-years/GWh)	CIM	O&M and fuel processing	CIM	O&M and fuel processing	CIM	O&M and fuel processing	Total	Avg
Biomass 1	EPRI 2001	85	40	4.29	1.53	0.00	0.11	1.53	0.13	1.80	0.01	0.21	0.22	0.21
Biomass 2	REPP 2001	85	40	8.50	0.24	0.13	0.21	1.21	0.25	1.42	0.03	0.16	0.19	
Geothermal 1	WGA 2005	90	40	6.43	1.79	0.00	0.16	1.79	0.18	1.98	0.02	0.23	0.25	0.25
Geothermal 2	CALPIRG 2002	90	40	17.50	1.70	0.00	0.44	1.70	0.49	1.89	0.06	0.22	0.27	
Geothermal 3	EPRI 2001	90	40	4.00	1.67	0.00	0.10	1.67	0.11	1.86	0.01	0.21	0.22	
Landfill Gas 1	CALPIRG 2002	85	40	21.30	7.80	0.00	0.53	7.80	0.63	9.18	0.07	1.05	1.12	0.72
Landfill Gas 2	EPRI 2001	85	40	3.71	2.28	0.00	0.09	2.28	0.11	2.68	0.01	0.31	0.32	
Small Hydro	EPRI 2001	55	40	5.71	1.14	0.00	0.14	1.14	0.26	2.07	0.03	0.24	0.27	0.27
Solar PV 1	EPIA/Greenpeace 2006	20	25	37.00	1.00	0.00	1.48	1.00	7.40	5.00	0.84	0.57	1.42	0.87
Solar PV 2	REPP 2006	20	25	32.34	0.37	0.00	1.29	0.37	6.47	1.85	0.74	0.21	0.95	
Solar PV 3	EPRI 2001	20	25	7.14	0.12	0.00	0.29	0.12	1.43	0.60	0.16	0.07	0.23	
Solar Thermal 1	Skyfuels/NREL 2009	40	25	10.31	1.00	0.00	0.41	1.00	1.03	2.50	0.12	0.29	0.40	0.23
Solar Thermal 2	NREL 2006	40	25	4.50	0.38	0.00	0.18	0.38	0.45	0.95	0.05	0.11	0.16	
Solar Thermal 3	EPRI 2001	40	25	5.71	0.22	0.00	0.23	0.22	0.57	0.55	0.07	0.06	0.13	
Wind 1	EWEA 2008	35	25	10.10	0.40	0.00	0.40	0.40	1.15	1.14	0.13	0.13	0.26	0.17
Wind 2	REPP 2006	35	25	3.80	0.14	0.00	0.15	0.14	0.43	0.41	0.05	0.05	0.10	
Wind 3	McKinsey 2006	35	25	10.96	0.18	0.00	0.44	0.18	1.25	0.50	0.14	0.06	0.20	
Wind 4	CALPIRG 2002	35	25	7.40	0.20	0.00	0.30	0.20	0.85	0.57	0.10	0.07	0.16	
Wind 5	EPRI 2001	35	25	2.57	0.29	0.00	0.10	0.29	0.29	0.83	0.03	0.09	0.13	
Carbon Capture & Storage	Friedmann, 2009	80	40	20.48	0.31	0.06	0.51	0.73	0.64	0.91	0.07	0.10	0.18	0.18
Nuclear	INEEL 2004	90	40	15.20	0.70	0.00	0.38	0.70	0.42	0.78	0.05	0.09	0.14	0.14
Coal	REPP 2001	80	40	8.50	0.18	0.06	0.21	0.59	0.27	0.74	0.03	0.08	0.11	0.11
Natural Gas	CALPIRG 2002	85	40	1.02	0.10	0.09	0.03	0.77	0.03	0.91	0.00	0.10	0.11	0.11
Energy Efficiency 1	ACEEE 2008	100	20										0.17	0.38
Energy Efficiency 2	Goldemberg, 2009	100	20										0.59	

M. Wei et al. / Energy Policy (2010) p. 920 and 922

Through the use of totals from the cross comparison table above, an analysis of job creation potential over equipment lifetime and efficiency and capacity of production factors, we can obtain useful similar overall job creation numbers for use as a comparison between coal and PV power production. Total job-years/GWh for PV average around 0.95 ranging between the three studies analyzed from 0.23 up to 1.42 jobs-years/GWh. The coal study quoted indicates a value of 0.11 job-years/GWh corresponding to an almost ten-fold difference in job creation per unit of production capacity. The range of difference between these two factors equates favorably with the direct job creation ratio seen in the previously quoted studies above. M. Wei et al. / Energy Policy (2010) p. 922.

It should be noted that the numbers from the Policy study comparison consider both direct and indirect job creation benefits as well as *construction, installation and manufacturing (CIM)* information from historic data, and data on *operations, maintenance, and fuel processing*. These two sets of data are then averaged into equivalent metrics *where job-years per MW installed* are combined with *jobs per peak MW* over the plant lifetime. In this way we obtain an average direct employment factor representative over project life. This technique also allows for accurate common jobs creation measurements over multiple power productions technologies in *job-years per GWh*.

Table 4: Potential Benefit to Missouri from National Development

Missouri	Number of Firms	Investment (Millions)	New FTE Jobs
Wind	311	$1,530.8	10,260
Solar	178	$1,455.6	7,532
Geothermal	66	$ 430.8	2,907
Biomass	230	$ 314.2	2,097
Total:	785	$3,731.4	22,796

Sterzinger, G. (2008), Component Manufacturing: Missouri's Future in the Renewable Energy Industry, by Renewable Energy Policy Project (REEP)

The above chart assumes a set investment within the state as a result stabilizing the current carbon footprint within the fossil fuel production industry at today's levels, therefore encouraging all increase in electrical demand over the next ten years to be met by RE. If we divide the investment potential for solar by the number of new jobs created, a factor of approximately 5.2 jobs per Million dollars of investment is derived. Multiplying our original investment figure of $363,448,215 by 5.2/M yields 1,860 new jobs created in order to achieve the 2% solar totals required in Proposition C. This number is less than a 10% variance from our original calculations.

Another way of looking at the jobs creation potential of Proposition C (or lack thereof) is to examine the remaining unresolved issue of renewable energy credits as they relate to spurring the development of the PV industry within the state. The current discussion between the PSC and the Missouri State legislature as it relates to both the issues of geographic sourcing and of the bundling of renewable energy credits (REC's) to PV installations completed within state boundaries is crucial inasmuch as the current $2/w rebate has not been sufficient to drive substantial PV sales in its first year of institution, 2010. By the establishment of the a Solar-REC in Missouri at a minimum of between $170-$200/MWh, paybacks of 4-7 years using a typical system size of 25 kW can be realized.

	Large Commercial	Small Commercial	Residential	
System Size:	100	25	5	kW
Tax Rate:	41%	41%	34%	28% or 35% fed 6% state
S-REC Value	$200.00	$200.00	$200.00	$/MWh
System cost	$6.25	$6.75	$7.25	per rated DC Watt
Electric Rate Increase	5%	5%	5%	per year
Average Electric Cost	$0.055	$0.055	$0.065	$/KWh
PAYBACK:	**18.4**	**5.3**	**23.1**	Years

Adapted from spreadsheet supplied to the PSC by MOSEIA in April, 2010. Jefferson City, MO

At a total build-out of 48 megawatts of solar capacity this scenario would mean the construction of approximately 1,920- 25 kW projects spread throughout designated public serviced utility areas. This is an economic model the solar industry in the state can plan on, sell, and provide adequate production for in the quest for the fulfillment of the promise and intent of Proposition C to the citizens of the state for clean, safe, and long term renewable energy production over time.

Table II.1-5. Employment in China's Renewables Sector, 2007

	Wind power	Solar PV	Solar thermal	Biomass	Total
Generation	6,000	2,000	—	1,000	9,000
Manufacturing	15,000	38,000	400,000	15,000	468,000
Service	1,200	15,000	200,000	250,000	466,200
Total	**22,200**	**55,000**	**600,000**	**266,000**	**943,200**
Output Value*	25	50	40	10	125

*Output value expressed in billion yuan (1 billion yuan = $135 million).
Source: See Endnote 179 for this section.

Renner, M, Sweeney, S, Kubit, J (2008). Green Jobs: Towards decent work in a sustainable, low-carbon world; Worldwatch Institute.

Another confirmation or our jobs analysis comes from data on jobs creation and RE in China. The above chart indicates the creation of both direct and indirect jobs within the Solar PV market as approximately 8.15 jobs per 1- Million dollars of investment. Coming from a country where relatively inexpensive labor is abundant, this number compares favorably with our previous estimate of 5.65 job per Million of investment. Additionally, as the amount of RE systems are installed increase, there will inevitably be both installation efficiencies and material cost decreases over time to temper any current jobs estimate.

Three main reasons exist for the development of a renewable energy economy and a green industrial base within our country and around the world. The first has to do with national sovereignty and creating the best chance for the success of our long term democratic politic system. The second reason is based upon the (re)development of our industrial base and the ability to create meaningful and fulfilling job opportunities through the creation of sustainable development and community wealth creation. The third involves the gradual understanding of our place on earth and the creation of a *land ethic* that can begin to pervade to the very core of our founding principles.

If we can begin to see ourselves as part of the natural systems in which we are immersed (of the earth rather than living on it) we can finally begin to give the miraculous systems in which we live the proper respect and awe they deserve. In respecting these complex natural systems we develop a healthy respect for ourselves, our families, and the communities in which we live. By eliminating the concept of waste in our manmade environments and technologies we can turn to natural models which are cyclical in nature, non-wasteful, and self sustaining. Renewable energy is one of these natural models. The careful use of our natural resources over time such that wealth creation is enhanced over time rather than depleted is our efflorescent and forward looking goal, the goal for a *sustainable world*.

Table I.1-4. Energy Consumption and Energy Intensity, Selected Countries and World, 2003

Country	Energy Consumption (Million BTUs per capita)	Energy Intensity (BTUs per Dollar of Real GDP)
United States	316	8,900
Northwestern Europe*	175	7,200
Japan	163	4,400
South Korea	129	15,100
China	45	31,400
World Average	67	12,600

Renner, M, Sweeney, S, Kubit, J (2008). Green Jobs: Towards decent work in a sustainable, low-carbon world; Worldwatch Institute.

As we begin to be more aware of our energy footprint and usage we have a significant opportunity in the energy efficiency (EE) industry to put ourselves more in line with other countries energy consumption per capita, which is currently almost 5- times the world average! A combination of EE, RE, and fuel substitution can help us climb *mount sustainability*. Through the use of energy efficiency, fuel conversions to natural gas and bio fuel, and the adoption of wholesale renewable energy policies we might achieve true energy independence, significant and lasting industrial jobs creation, and an environmental management policy that is proactive rather than reactive in nature based upon the development of the green industrial sector. These issues are common sense. These issues are ones that all citizens agree with. These issues are the ones where we must have steady and consistent government incentives and policy in place if we are to have the long term creation of a stable and strong green industrial base that will become known as the next *Great Transformation,* Polanyi, K (1944).

"Green jobs span a wide array of skills, educational backgrounds, and occupational profiles… They occur in research and development; professional fields such as engineering and Architecture; project planning and management; auditing; administration, marketing, retail, and customer services; and in many traditional blue-collar areas such as plumbing or electrical wiring. Also, green jobs exist not just in private business, but also in government offices (standard setting, rule-making, permitting, monitoring and enforcement, support programs, etc.), science and academia, professional associations, and civil society organizations (advocacy and watchdog groups, community organizations, etc.)." Renner, M, Sweeney, S, Kubit, J (2008). Green Jobs: Towards decent work in a sustainable, low-carbon world; Worldwatch Institute. P. 38

December SREC Newsletter

Auction closes: Friday, December 3rd at 5pm EST

November SREC Auction Results

The most recent auction clearing prices are listed below. You can now view a complete history of our auctions on the SREC Auction History page.

November SREC Prices

District of Columbia 2010	$225.00
Delaware 2011	$259.99
Massachusetts 2010	$500.00
Maryland 2010	$320.00
New Jersey 2010	$640.00
New Jersey 2011	$640.00
Ohio 2010	$325.10
Pennsylvania 2010	$210.00
Pennsylvania 2011	$255.00
North Carolina	Coming Soon

Auction History

The above referenced graph was taken from the SREC Trading site on December 6, 2010, http://www.srectrade.com/. Clearly, pricing in other SREC states runs up to $640 per SREC from a low of $210. If Missouri wants to create a green industrial base within the state and create long term, good paying jobs, is it too much to ask that we establish an SREC in the state (of $200) that allows us to market systems at a payback of 3-7 years? The answer is up to our state representatives in 2011…

Appendix A

Table 3.1.6-2 2005 Benchmarked Parameters, 2011 and 2020 Projections for Modeling of 4-kW Residential Reference System

System Element	Units	2005	2011	2020
System Location		Phoenix		
System Size	kW	4	4.56	5.92
Module Price	$/Wdc	4.00	2.20	1.25
Conversion efficiency	%	13.5	16	20
Module size	Wpdc	100	118.5	148
Inverter Price	$/Wac	0.90	0.69	0.30
Inverter size	kW	4	4.74	5.92
DC-AC conversion efficiency	%	90	96	97
Inverter life/replacement	Years	5	10	20
Other BOS	$/Wdc	0.61	0.40	0.33
Installation	$/Wdc	1.66	0.57	0.42
Other/Indirect*	$/Wdc	1.30	1.14	1.00
INSTALLED SYSTEM PRICE	$/Wdc	8.47	5.00	3.30
Lifetime	Years	30	35	35
Degradation	%/Yr	1	1	1
System derate	%	5	5	5
O&M Cost (not including inverter replacement)	% installed price	0.5	0.3	0.2
LEVELIZED COST OF ENERGY (LCOE)	$/kWhac	0.32	0.15	0.09

*For this and other tables presented below, the "Other/Indirect" category includes design, engineering, site-related costs, permitting, and profit.

2005 benchmark cost and performance values contained here are from detailed data on more than 200 residential PV systems installed between 2000 and 2005, with emphasis on those more recently installed; Web-based price information on more than 5000 installations in 2004 and 2005; and laboratory-based measurements and modeling. Out-year projections are based on the PV industry roadmap, earlier versions of this Multi-Year Plan, and input from engineers and scientists in the DOE Solar Program and in industry.

Taken from: Solar Energy Technologies Program, Multi-Year Program Plan, 2007-2011
US Department of Energy, Energy Efficiency and Renewable Energy

Appendix B

Proposition C - the Missouri Clean Energy Initiative

Official Ballot Language Explained

Be it enacted by the people of the state of Missouri:

Chapter 393, RSMo, is amended by repealing sections 393.1020, 393.1025, 393.1030, and 393.1035, and substituting therefor three new sections to be known as sections 393.1020, 393.1025 and 393.1030, to read as follows:

This repeals Missouri's existing "voluntary renewable energy standard" which are widely recognized as meaningless, as they have no incentives for compliance or penalties for non-compliance.

393.1020. Sections 393.1025 to 393.1030 shall be known as the Renewable Energy Standard.

393.1025. As used in sections 393.1020 to 393.1030, the following terms mean:

1. "Commission", the public service commission;
2. "Department", the department of natural resources;
3. "Electric utility", any electrical corporation as defined by section 386.020;
4. "Renewable energy resources", electric energy produced from wind, solar thermal sources, photovoltaic cells and panels, dedicated crops grown for energy production, cellulosic agricultural residues, plant residues, methane from landfills or from wastewater treatment, clean and untreated wood such as pallets, hydropower (not including pumped storage) that does not require a new diversion or impoundment of water and that has a nameplate rating of 10 megawatts or less, fuel cells using hydrogen produced by one of the above-named renewable energy sources, and other sources of energy not including nuclear that become available after the effective date of this section and are certified as renewable by rule by the department; and
5. "Renewable energy credit" or "REC", a tradable certificate of proof that one megawatt-hour of electricity has been generated from renewable energy sources.

This means Investor-Owned Utilities, which control 76% of electricity generation, and include Kansas City Power & Light, Aquila, Empire, and AmerenUE.

This means only SMALL hydro-electric dams (typically sized dams are 200-300 megawatts).

393.1030.1. The commission shall, in consultation with the department, prescribe by rule a portfolio requirement for all electric utilities to generate or purchase electricity generated from renewable energy resources. Such portfolio requirement shall provide that electricity from renewable energy resources shall constitute the following portions of each electric utility's sales:

(a) No less than two percent for calendar years 2011 through 2013;
(b) No less than five percent for calendar years 2014 through 2017;
(c) No less than ten percent for calendar years 2018 through 2020; and
(d) No less than fifteen percent in each calendar year beginning in 2021.

This is called a "solar carve-out"; it's what is necessary to ensure the development of solar, secure a market in Missouri, and drive down the cost.

At least two percent of each portfolio requirement shall be derived from solar energy. The portfolio requirements shall apply to all power sold to Missouri consumers whether such power is self-generated or purchased from another source in or outside of this state. A utility may comply with the standard in whole or in part by purchasing RECs. Each kilowatt-hour of eligible energy generated in Missouri shall count as 1.25 kilowatt-hours for purposes of compliance.

This effectively helps encourages in-state development of renewables, but allows utilities to comply developing renewables elsewhere as well.

2. The commission, in consultation with the department and within one year of the effective date of sections 393.1020 to 393.1030, shall select a program for tracking and verifying the trading of renewable energy credits. An unused credit may exist for up to three years from the date of its creation. A credit may be used only once to comply with this act and may not also be used to satisfy any similar non-federal requirement. An electric utility may not use a credit derived from a green pricing program. Certificates from net-metered sources shall initially be owned by the customer-generator. The commission,
except where the department is specified, shall make whatever rules are necessary to enforce the Renewable Energy Standard. Such rules shall include:

(a) A maximum average retail rate increase of one percent determined by estimating and comparing the electric utility's cost of compliance with least-cost renewable generation and the cost of continuing to generate or purchase electricity from entirely non-renewable sources, taking into proper account future environmental regulatory risk including the risk of greenhouse gas regulation;

This policy will KEEP ELECTRIC RATES LOW, and keep them EVEN LOWER over time; however, if they ever make rates go up, they can't be more than 1% higher than they would have been without this policy in place.

(b) Penalties of at least twice the average market value of renewable energy credits for the compliance period for failure to meet the targets of subsection 1. An electric utility will be excused if it proves to the commission that failure was due to events beyond its reasonable control that could not have been reasonably mitigated, or that the maximum average retail rate increase has been reached. Penalties shall not be recovered from customers. Amounts forfeited under this section shall be remitted to the department to purchase renewable energy credits needed for compliance. Any excess forfeited
revenues shall be used by the department's energy center solely for renewable energy and energy efficiency projects;

Utilities must comply with the RES targets; if not, they're fined.

(c) Provisions for an annual report to be filed by each electric utility in a format sufficient to document its progress in meeting the targets.

(d) Provision for recovery outside the context of a regular rate case of prudently incurred costs and the pass-through of benefits to customers of any savings achieved by an electrical corporation in meeting the requirements of this section.

3. Each electric utility shall make available to its retail customers a standard rebate offer of at least $2.00 per installed watt for new or expanded solar electric systems sited on customers' premises, up to a maximum of 25 kilowatts per system, that become operational after 2009.

This rebate program will effectively lower the cost of solar by 20% or more.

4. The department shall, in consultation with the commission, establish by rule a certification process for electricity generated from renewable resources and used to fulfill the requirements of subsection 1 of this section. Certification criteria for renewable energy generation shall be determined by factors that include fuel type, technology, and the environmental impacts of the generating facility. Renewable energy facilities shall not cause undue adverse air, water, or land use impacts, including impacts associated with the gathering of generation feedstocks. If any amount of fossil fuel is used with renewable energy resources, only the portion of electrical output attributable to renewable energy resources shall be used to fulfill the portfolio requirements.