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SOLAR OUTPOST INC.
Saskatoon, SK

Benefits of Distributed Generation and Small Scale Renewable Energy Applications in Saskatchewan

October 14, 2009

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Saskatchewan's Energy Future

Renewable energy needs to be a part of our energy portfolio. Eventually non-renewable resources run out regardless if there is agreement on when this will happen. Clean energy is also a necessity not just because of the high public demand for it but also because of the increasing pressure from a climate change perspective. The coming carbon markets will dictate this necessity from an economic standpoint. Forward thinking policy should plan and account for clean renewable energy as a growing part of our energy portfolio, and introduce innovative ways to insure Saskatchewan is a leader in the industry.

Nationally Canada has made a commitment by 2020 to a 20% reduction in green house gas emissions from 2006 levels by and that 90% of our electricity be provided by non-emitting sources. Provincially similar targets are in place but the plan to get there has not been clearly laid out thus far. We need a sustainable energy policy which puts consumers, the environment, and human health first. This can be done with renewable energy as we create a new green and very profitable economy. In fact it is already happening right here in Saskatchewan.

Every normal societal transformation will roughly follow a bell shaped curve with early adopters and fast followers at one end and never adopters at the other. If we look at where renewable energy is, it is in the stage of early adopters and fast followers it is quickly moving toward mainstream acceptance. We at Solar Outpost see this in our customers and industry specialists on a daily basis. From a policy standpoint where does Saskatchewan want to be? Will we be with the early adopters and fast followers? Or will we look back when renewables are fully mainstream and try to catch up?

Distributed Generation and Renewable Energy

Renewable energy should make up a significant portion of our energy future. Utility scale technologies as well as distributed(decentralized) generation with smaller scale technologies need to be part of the solution.

Distributed generation when combined with a sound net metering policy has many hidden economic benefits. Properly considering the economic benefits of distributed generation leads to raising the value of these technologies considerably, often ten times. This is due to improved system planning, utility

construction and operation, service quality, and avoiding societal costs. Load reduction and distributed generation have the same effect on our grid system, as they both reduce the need for power at a certain node.

Some of the key benefits to distributed generation include:

- Lower grid costs and much lower grid losses
- Lower risk due to smaller project size
- Shorter lead times
- Portability
- Low or no fuel price volatility
- Better fault management
- Can help to defer investment in distribution capacity
- Provides voltage support and reactive power
- Better grid reliability

Additional benefits are very hard to put a dollar value on. Clean energy certainly has high value. How do we put a value on the air pollution that a centralized power station puts out? Some suggestions indicate that the societal costs are several times the cost of the initial investment of a coal-fired power plant. Currently there aren't costs associated with CO2 and GHG emissions.

Saskatchewan's unique opportunity

There are many great reasons in Saskatchewan to adopt an aggressive strategy for the development of our own renewable energy industry. We have some of the best inland wind energy sites in Canada, which are excellent by any standards. We are the sunniest province in the country and we have the ability to produce a large percentage of our residential power through solar generation. We currently have some of the highest green house gas and CO2 emitting power in the country. We can make a huge contribution to the reduction of GHG and CO2 emissions because we currently have such a high emitting system. We have been blessed with these excellent renewable resources and have the opportunity to be a world leader in clean energy production. Many places simply do not have the opportunity that we do in Saskatchewan to quickly grow our renewable industry.

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Wind Energy

Within the last decade the United States has drastically changed the way it views generating electricity. It now installs more wind energy than any other form of power generation. In the last few years wind energy installations have overtaken all other forms of new generating method installations on a MW installed basis. If you were waiting for the renewable revolution you missed it, it's already here. This same change is now happening in Canada.

Southern Saskatchewan has a great, unexploited wind resource. Our open prairie landscape makes for ideal sites for wind energy on any scale. Large wind farms and smaller distributed generation systems can provide a significant contribution to our energy mix. This technology was used extensively before we had a reliable transmission and distribution system in place and our residents are knowledgeable of the technology.

The development and growth of the small wind industry required the combined approach of the proper policies, public education and incentives. Without any of the three the others are ineffective by themselves. Additionally the removal of any of the three approaches would result in the industry development coming to a halt.

Saskatchewan introduced the net metering policy in October of 2007 and the renewable industry for grid tied systems under 100kW has been growing rapidly since. The Saskatchewan Research Council (SRC) and SaskPower have been key in providing incentives and education for the rapid deployment of distributed generation systems. This combined with forward thinking provincial policy to support the industry have laid the groundwork for the growth of the small wind market in the province. The private companies in Saskatchewan have used this strong foundation for growth to develop a thriving market that is part of our new green economy here in Saskatchewan. This is not an industry that is without growing pains however, and does take time to develop many of the systems we now have in place. There have been great strides made in the technology, installation and planning, and communication between utilities, inspectors, and stake holders. There are also many areas that are continuing to see progress and development. We do now have a stream lined system for efficient installation of wind energy systems throughout our windy province. It has taken years to get to the point where the industry is at now, and there are still many improvements that can be made.

Policy

Further policy developments that would further stimulate the small wind industry in Saskatchewan are needed. Currently the net metering policy doesn't allow customers to sell excess power to the grid at retail rates, it only allows the stake holder to offset their total use at a given site for the year. Access to the retail market would make the installation of a wind turbine much more attractive. We have many customers who would install larger systems if they had the opportunity to sell additional power to the grid. We have also had many customers which this policy has been a deal breaker and have decided against installing a wind turbine. An example that comes up many times is when farmers have multiple meters at one farm site. Many farmers would like to put up one system large enough to supply all of their meters, but are unable to because of this policy.

Targets for the role of wind energy need to be set. These targets should distinguish between distributed generation technologies such as small wind energy and large utility scale wind projects. We have huge potential and a vast resource waiting to be tapped. Wind energy can make up a large portion of our provinces energy needs.

Education

Further education is ongoing and people are beginning to see the benefits of owning their own wind turbine. This education needs to be promoted by private companies, utilities, and governments. Most people still don't realize that these technologies are available and economically attractive on a smaller scale than the megawatt size.

Incentive

Incentives need to continue and be monitored as the industry grows. Leveling the playing field for all power generating technologies would give the distributed generation and renewable technologies the biggest boost. With the proper sustained funding the industry will eventually flourish and be a significant contributor to our energy mix. Capital cost tax incentives as well as provincial grants are probably the biggest contributor to starting the growth of the industry and will continue to be key as the industry develops out of its infancy. Leveling the playing field by removing incentives for other forms of energy that aren't renewable and clean would be the best possible solution. This would show the true costs of all power generating options and allow for fair competition. Conversely bringing funding and incentives for renewables

up to levels that other generation systems see would also level the playing field.

Economic benefits

By the end of 2009 Solar Outpost will have installed nearly .5MW of wind energy capacity throughout the province. As we continue to grow and learn the best practices the produced power from these systems will increase, and cost per kWh will come down. The combined approach of proper policy, education, and incentives has created a new multimillion-dollar green industry in our province.

We continue to attract highly educated people to the industry and are expanding our staff constantly. There is certainly a large appetite for green energy jobs and we get many resumes from interested and highly educated people who want to work in the green industry in Saskatchewan. I have spoken with many students who ask how they can become part of this growing industry and are excited to stay here in the province. Currently there aren't enough jobs to keep them all here in the green industry without further development. I personally wanted to be part of the industry and focused my education on that goal. I was lucky enough to find a great opportunity and was able to stay in Saskatchewan. I also had the opportunity to work for one of the biggest companies in the world and move to Calgary, the choice was easy and I stayed here in Saskatchewan in this exciting new industry.

We create jobs and work with many trades people around the province. Our company relies heavily on our working relationships with the electricians, plumbers, and heavy equipment operators to name a few. These key people are often locals from the surrounding communities. The jobs created from this industry are skilled, high value jobs, and both our permanent staff as well as the contractors we rely on around the province.

Our story is just one of many companies that are now entering the wind industry in our province and creating the new green profitable economy. We see from all of the public events that we attend that there is a huge appetite for the green products and services of today and tomorrow. Saskatchewan should continue to be at the forefront of the green industry by making it a top priority in our energy future.

To truly transform our economy, protect our security, and save our planet from the ravages of climate change, we need to ultimately make clean, renewable energy the profitable kind of energy.
BARACK OBAMA, Address to Joint Session of Congress, Feb. 24, 2009

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Solar Energy

Saskatchewan is the sunniest place in Canada; we have more hours of bright sunshine per day than anywhere else in the country. We have the highest potential for generating clean energy from the sun than anywhere else in Canada. In a recent study by Natural Resources Canada titled "AN EVALUATION OF THE POTENTIAL OF BUILDING INTEGRATED PHOTOVOLTAICS IN CANADA" Saskatchewan ranked as one of the best opportunities to provide much of our residential power(88%) with building integrated photovoltaics(BIPV). The study highlights that the best opportunity for the successful deployment of solar PV is in the residential market. Due to our high intensity of green house gas(GHG) emissions per kWh produced we also have a great opportunity for large GHG reductions with clean energy technologies. With BIPV we can reduce our GHG emissions by 6 tonnes per residential installation on average in our province.

Region	Mean daily insolation for latitude tilt (kWh/m2)	Ground floor area (m2)	Yearly electricity production (MWh)	Yearly electricity use (MWh)	Electricity production/ Electricity use (%)	GHG emissions intensity (kg/kWh)	Yearly GHG emissions reductions (tonnes)
Alberta	4.73	105	7.2	7.0	103	0.911	6.6
Saskatchewan	4.99	98	7.1	8.0	88	0.84	6.0
Québec	4.33	102	6.4	22.3	29	0.0088	0.056
Ontario	4.22	102	6.2	11.8	53	0.272	1.7
Manitoba	4.55	100	6.5	15.1	43	0.0305	0.20
PEI	4.06	100	5.9	3.2	181	1.12	6.6
Newfoundland/ Labrador	3.39	97	4.8	17.9	27	0.0211	0.10
Nova Scotia	3.92	97	5.5	11.8	46	0.759	4.2
New Brunswick	4.19	93	5.6	19.3	29	0.433	2.4
British Columbia	3.80	112	6.1	11.5	53	0.0209	0.13
Territories	3.67	107	5.7	10.7	53	0.255	1.5
Canada		103	6.3	13.6	46		1.9

Figure 1 - Residential BIPV potential per household for Canada and the provinces

We have much of the framework in place to develop a successful and vibrant solar industry in the province. The main reasons for the lack of growth so far are low incentives and high initial capital investment. Using our success and knowledge gained from the small wind industry as a model, creating growth in the solar sector should be much easier.

Residential solar PV systems will benefit transmission and distribution systems greatly because the generation is now located exactly where it is needed. This gives us maximum efficiency for the interconnected system.

Smart grid technologies are easily combined with solar and wind systems and many inverters are already set up with the capability. These smart grid applications can give real time production data to the utilities to help better manage the utility grid.

Policy

The policies are in place and have been developed in the province over the past few years in the wind industry. This should allow the solar industry to grow rapidly drawing on experiences from other distributed resources. Relationships with utilities, municipalities and other industry stakeholders are all in place.

Targets need to be set for the contribution that solar PV will play in our energy future. Studies by NRCan suggest that we can provide up to 88% of all residential energy in the province with building integrated photovoltaics.

Education

Education is ongoing and people are beginning to see the benefits of owning there own solar PV systems. This education needs to be further promoted by private companies, utilities, and governments. Most people still don't realize that these technologies are available and economically attractive.

Incentive

One of the driving incentives for the small wind industry is the capital cost allowance(CCA) for business. Many farmers and business owners can use the business tax incentives to increase their rate of return when bought through a business. This is working as an excellent incentive in the wind energy industry.

Solar PV installations will mostly be within our cities and many won't be installed for businesses. Homeowners cannot take advantage of CCA for business. So one way to stimulate the residential market is to introduce a personal tax credit for a solar PV installation, the economics of a solar PV project would be increased in the same way that the CCA works for businesses. This is often one of the key factors in determining the economic viability of a renewable energy project. Further incentive targeted at solar energy will give the boost needed to grow another multimillion-dollar sector of

our green industry in the province. We now have the model in place that we know works from the small wind industry.

Cost

The initial investment has been another reason that the solar PV industry has been slower to develop than the wind industry. However prices have decreased by 15-20% for each doubling of market size following a standard learning curve, and in the last year we have seen a further 30% in price reduction.

Year	1999	2000	2001	2002	2003	2004	2005
Price (CAD/W)	11.09	10.70	9.41	7.14	6.18	5.53	4.31
Reduction		3.5%	12%	24%	13%	10%	20%

Figure 2 - Price of PV modules in Canada over time

PV systems are now getting close to producing energy at the same rate per kWh as wind energy. The integration of these systems is getting close to mainstream acceptance but it takes time to stream line a new industry. We need to develop this area now so we can effectively and efficiently integrate these systems into our buildings.

Conclusion

We have the opportunity here in Saskatchewan to have a vibrant and robust green economy. There is huge public demand for it, we have the natural resources to make it efficient and more effective than anywhere else in Canada, and it is the best plan of action for a clean profitable future for Saskatchewan. We have a great start in the small wind industry, and with continued commitment to the plan the industry will continue to grow and profit. The model is in place for the solar industry to follow and we have the opportunity to grow another multimillion-dollar sector of the green economy now. It won't happen overnight but solar PV power can contribute to a majority of our residential power when integrated into building design. Commitment to this exciting new industry from policy makers can insure that Saskatchewan is a leader and innovative place for the green industry to flourish.