# Why not US?
# Sustainable Renewable Energy


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*Energy generation is one of the largest contributor to greenhouse gas emissions, a leading factor in climate change. Renewable energy sources are critical to reducing the impact of climate change. The University of Saskatchewan has a unique opportunity to be a leader in using renewable energy sources for operations, education, and to facilitate future research. It is important to fulfill our environmental responsibility and implement a policy at the University of Saskatchewan that continues the actions already taken of making the university and its operations as energy efficient as possible while also obtaining energy from sustainable and renewable sources. Renewable energy must be derived from sources that are continuously replenished without human intervention, while ensuring that exploiting the energy resource does not negatively affect the environment. These resources must be sustainable now and for future generations, ensuring that the three pillars of sustainability are adhered to. This document will provide a framework for developing a system of secure, sustainable and renewable energy at the University of Saskatchewan that encourages best practices and sustainable energy policy development now and in the future. It presents a call to action, as well as a road map for achieving a sustainable future at the University of Saskatchewan.*


Source: http://www.usask.ca/corporate_admin/real_estate/Vision%202057.pdf

# ENVIRONMENTAL FOOTPRINT

## Climate Change & Pro-active Adaptation

To deny climate change, is to deny the University of Saskatchewan's (U of S) own commitments to sustainability and mitigating climate change (see 'Environmental Legacy and Responsibility'). The Intergovernmental Panel on Climate Change (IPCC)'s latest report states that "atmospheric concentrations of GHGs are at levels that are unprecedented in at least 800,000 years" (Pachauri & Meyer, 2014, pp. 44-47). It also outlines that "human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, and in global mean sea level rise; and it is extremely likely to have been the dominant cause of the observed warming since the mid- 20th century" (Pachauri & Meyer, 2014, pp. 44-47).

The IPCC's Sustainable Development and Equity chapter in the *Climate Change 2014: Mitigation of Climate Change* publication outlines that "without an effective response to climate change, including timely mitigation and proactive adaptation, development can be neither sustainable nor equitable."

The University Corporation for Atmospheric Research's Research Application Laboratory identifies that proactive adaptation anticipating future climate change impacts is largely found in

sectors with longer-term decision-making, including energy and public infrastructure (Romero-Lankao, 2014).

"**Human actions during the last 50 years have altered ecosystems to an extent and degree unprecedented in human history." (***Millennium Ecosystem Assessment Report,* 2001)

# Energy Usage

According to the U of S's accounting group, the institution spent a total of $6,266,634 for electricity, and an additional $4,014,901 for natural gas in the fiscal year 2013-2014, using a total of 139,150,933 kWh in terms of purchased electricity and 29,706,773,884 L of natural gas, amounts not directly billed to the institution's internal buildings. These values have been confirmed by the university's Energy and Emissions Officer, Kathryn Theede (personal communication, March 13, 2015), making the U of S a regulated emitter (Climate Change, 2013).

# Greenhouse Gas Emissions

The U of S reported a total of 161,250 MT $eCO_2$ for the fiscal year 2013/2014, further identifying that "consumed electricity is the largest major source of emissions, accounting for 55% of all emissions in 2013/14" (*2014 Greenhouse Gas Inventory Report*, 2014), equaling 89,318.50 Metric Tons of CO2 Equivalent emissions from purchased electricity (Theede, 2015). Additionally, 35.6% of University emissions originate from natural gas burned for heating (*2014 Greenhouse Gas Inventory Report*, 2014).

# Land base

The U of S owns approximately 13,385 acres of land throughout the province of Saskatchewan, which is used for a multitude of purposes. Only 1,865 acres of the U of S's land tenure is located within Saskatoon's city boundaries, with the majority of the land base being rural. Of the 13,385 acres, 5,120 acres can be categorized as farmland outside of Saskatoon, and approximately 6,400 acres are designated as research land used either directly by the institution, or by an associated institution. The rest of the institution's land holdings can be classified as Saskatoon campus, College Quarter, mineral rights portfolio, Preston Crossing, and Innovation Place (*Vision 2057,* 2009). (See figure 2.)

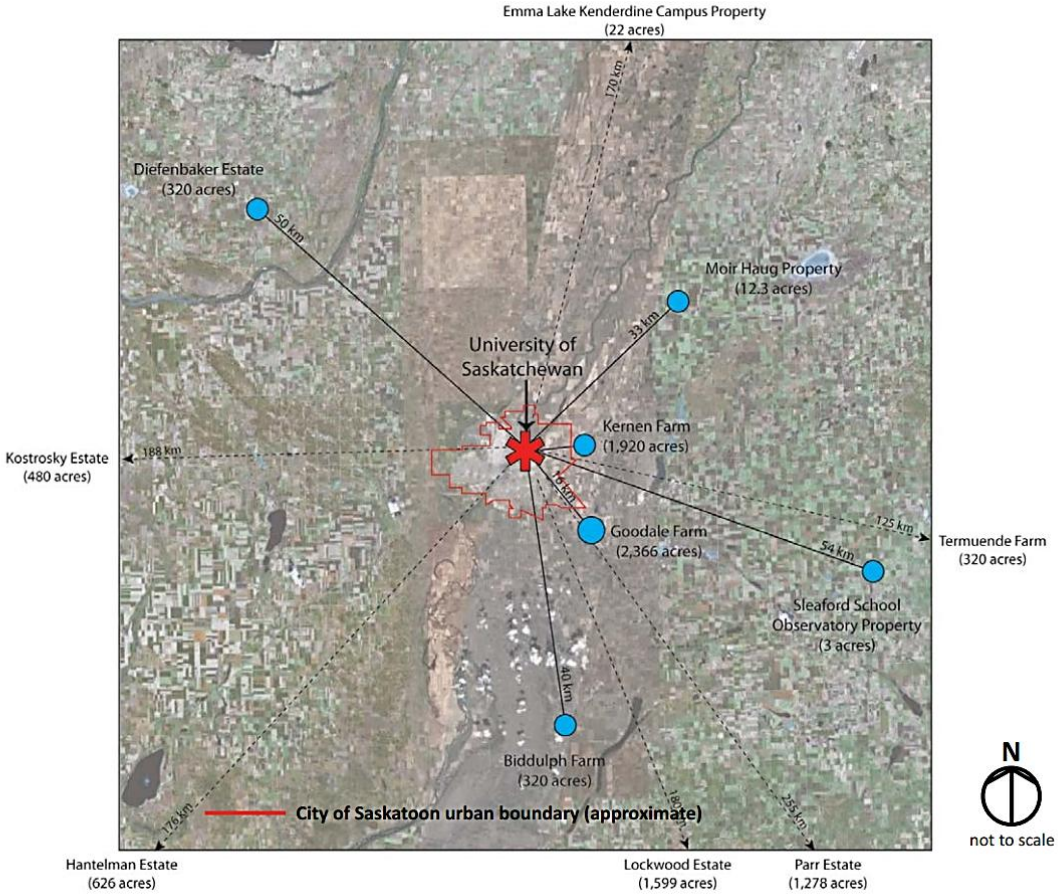


Figure 2 – University of Saskatchewan land Holdings (*Vision 2057*, 2009).

# Land Holdings - Potential for Renewables

The Canadian Centre for Policy Alternatives identifies in a 2010 publication that "with the best solar profile in Canada, and the best onshore wind profile outside of Canada's coasts and the mountaintops, Saskatchewan is well positioned to be at the forefront of wind and solar development". The University of Saskatchewan is in a unique location that allows multiple types of energy generation, and this could ultimately result in a diverse and resilient power generation capability (Bigland-Pritchard, 2010).

With the University of Saskatchewan's arsenal of land holdings within the province and these excellent natural resources, the U of S has the potential to be a leader in renewable energy (*Vision 2057*, 2009).

# ENVIRONMENTAL LEGACY & RESPONSIBILITY

## Sustainable Renewable Energy

**Renewable energy** is energy that is generated from natural processes that are continuously replenished. This includes sunlight, geothermal heat, wind, tides, water, and various forms of biomass. This energy cannot be exhausted and is constantly renewed ("What is Renewable Energy," 2015).

A **sustainable** approach is a systems-based approach that seeks to understand the interactions which exist among the three pillars (environment, social, and economic) in an effort to better understand the consequences of our actions ("Sustainability Primer," n.d.).

This document proposes that these definitions should be combined to facilitate a more comprehensive definition.

**Renewable energy must be derived from sources that are continuously replenished without human intervention, while ensuring that exploiting the energy resource does not negatively affect the environment. These resources must be sustainable now and for future generations, ensuring that the three pillars of sustainability are adhered to.**

Within these constraints, the following sources can be considered for Saskatchewan:

- Solar Thermal and Photovoltaic: Saskatoon has excellent solar insolation values compared to most of Canada (RETScreen, 2014).
- Wind: The Canadian Wind atlas shows excellent wind resources in the area around Saskatoon, a feasibility study would need to be done for optimal location (Fick, S., 2001).

- Low-impact run of river hydroelectric: The City of Saskatoon's pre-feasibility study on a low head hydroelectric project at the Saskatoon weir (Future Power Generation Projects, 2015). This could be a possible opportunity for partnership between the U of S and Saskatoon Light and Power.
- Geothermal: There is a high potential for geothermal energy in Saskatchewan; this could provide a very reliable source of energy with low operating costs and minimal environmental impact ("Geothermal", n.d.).
- Biomass: An alternative to fossil fuels biomass can come from a variety of sources including forests and crop residue, and can be converted into a number of different energy sources. Care must be taken that the source of the biomass is not over harvested for it to remain a sustainable renewable energy ("Biomass, bioenergy and bioproducts", 2014).

In addition to these natural resources the university's current heating plant could be changed to co-generation, and biomass could be used in place of natural gas. The university's large areas of land outside Saskatoon could be used for possible energy generation locations. The options for reducing our emissions through conservation and SRE generation are diverse and constantly increasing through research efforts.

# Mission Statements, Principles & Commitment

University of Saskatchewan Mission Statement:

**"The University of Saskatchewan belongs to the people of Saskatchewan. As an academic community, our mission is to achieve excellence in the scholarly activities of teaching, discovering, preserving and applying knowledge"** ("Policies", 1993).

The U of S offers courses in sustainability, allowing students to discover our impact on the environment and also how our actions affect society and the economy over a long period of time. It can be argued however, that the U of S is not applying its knowledge in its decisions and day to day operations, as required by its core mission values.

The U of S's goals also include ensuring that the university's activities are consistent with environmental responsibility, as well as further outlining the university's significant contributions to research ("Policies", 1993). These facets only further advocate for the implementation of renewable energy policies in order to develop sources of renewable energy within the university's potential.

As part of the *Energy and Water Conservation Policy* initiative, the U of S expresses its commitment to "modelling sustainability and practicing effective stewardship of institutional resources while providing an excellent learning, teaching and research environment" ("Policies", 2014).

Upon signing the University and College Presidents' Climate Change Statement of Action for Canada (UCPCCS), the university joins 27 other Canadian post-secondary schools in pledging to show leadership and take action on climate change. The UCPCCS statement outlines the main thematic discourse of this document, primarily in expressing the belief that "Canadian universities and colleges have a unique opportunity to advance society towards sustainability through teaching, research, demonstration and accelerating societal solutions beyond campus" ("Climate Change Statement of Action", n.d.).

## Campus Sustainability Plan

The *Campus Sustainability Plan* promotes sustainability throughout the university. There are a large variety of courses, projects, and initiatives available on campus to encourage environmental knowledge and respect. The idea behind the *Campus Sustainability Plan* is to interconnect sustainable living in all areas of our institution. It was developed primarily as an environmental initiative to conserve and create available education of the earth rather than the benefits of maximizing our STARS standing. Although our STARS standing will increase as a bonus, the overall impact will be to the people living, working, and learning on campus (*The University of Saskatchewan Campus Sustainability Plan*, 2012).

## Energy and Water Management Plan

The purpose of the *Energy and Water Conservation Policy* is to minimize energy and water consumption on campus and optimize sustainable practices. The plan is underway and there are always new developments being added to enhance the policy. The campus community shall

make informed choices to minimize the institution's ecological footprint associated with energy and water, with a goal of continuous improvement and reduced operating costs (Board of Governors, 2014). This plan also aligns with the *Climate Action Plan* in the way of reduction. The U of S has a target set to reduce water and energy consumption by 5% every year. ("Policies", 2014).

# STARS Credits

"The Sustainability Tracking, Assessment & Rating System (STARS) is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance" (Association for the Advancement of Sustainability in Higher Education, 2013). Table 1.1 outlines the University of Saskatchewan's rating with regards to credits that address aspects of renewable energy.

Table 1- University of Saskatchewan Renewable Energy STARS rating (Asmuss, 2015-b)

| | **University of Saskatchewan Credit Score** | **Possible Credit Score** |
|---|---|---|
| Greenhouse Gas Emissions | 2.44 | 10.00 |
| Clean and Renewable Energy | 0.00 | 4.00 |
| Sustainable Investment | 0.00 | 4.00 |
| Academic Research | 0.00 | 12.00 |
| Building Energy Consumption | 0.31 | 6.00 |
| **TOTAL** | **2.75** | **36.00** |

# Curriculum

The University Of Saskatchewan reported the following academic courses with sustainability content in their January 30, 2015 STARS report (Asmuss, 2015-a):

- 33 sustainability courses offered at the undergraduate level, with an additional 91 courses that include sustainability
- 14 sustainability courses offered at the graduate level, with an additional 16 courses that include sustainability

The implementation of renewable energy policy can further increase the institution's credit score in this particular area, improving the current 5.60/14.00 status. However, the total of 154 courses with sustainability content currently offered by the University of Saskatchewan paint a much more important picture. Out of the total 4,395 academic courses offered, 3.5 % are courses with sustainability content (Asmuss, 2015-a), a substantial percentage especially considering the University of Saskatchewan comprised curriculum ("Explore", n.d.). This particular occurrence can be interpreted in terms of the importance of sustainability education at the U of S, a subject highly focused upon. The University of Saskatchewan's own comprehensive curriculum therefore outlines that renewable energy, as an integral aspect of sustainability, is thoroughly addressed by the institution and its faculty. Additionally, the University of Saskatchewan *Campus Sustainability Plan* (2012) expresses the goals of the institution to include that U of S be recognized for leadership in environment and sustainability education, that sustainability be a guiding principle in all operations at the U of S, and that sustainability be a core value that is embedded in all U of S activities. The question remains as to why so little is done to address renewable energy, in terms of implementing the appropriate policy for its development within the institution's potential.

# Energy Security

Long term energy security should be a concern for the University of Saskatchewan as fluctuations in the price of fossil fuels will likely have a direct effect on the university. Fossil fuels are directly purchased in the form of natural gas and indirectly purchased through SaskPower's fossil fuel generated electricity (Theede, K., personal communication, March 13, 2015). By reducing the consumption of energy and increasing the supply of sustainable renewable energies (SREs), the university should be able to buffer itself from fluctuations of

fossil fuel prices (Janssen, 2002). It is critical that the university maintain a reliable source of energy so that ongoing operations and research is not negatively affected.

# Comparisons of other Universities

## University of British Columbia – STARS Gold

The University of British Columbia (UBC) is one of the founding schools of the *University and College Presidents' Climate Statement of Action for Canada,* which the University of Saskatchewan has signed (Climate change statement of action, 2010). UBC is a leader in GHG emissions reduction beginning in 2007 by reaching their Kyoto target of reducing emissions from academic buildings by six percent below 1990 levels. This was accomplished with a 35% growth in floor space and 48% growth in student enrolment. They are continuing this action with the goal of zero GHG emissions by 2050 (*Climate Action Plan*, 2010).

## Dalhousie University – STARS Gold

Dalhousie has implemented several SRE projects including: Solar wall, Solar PV/Duct system, Solar thermal pre-heating for domestic hot water and the Truro campus uses biomass for district heating. Several other SRE projects are in the planning and implementation stages (Sustainability map tour, 2015).

## Colorado State University – STARS Platinum

The first university to achieve a platinum ranking in STARS, Colorado State University has invested in a large quantity of solar panels totaling a capacity of 5561 kW, and is also using local renewable biomass for heating (Operations, n.d.). Also located at the Colorado State University is the Energy Institute, housing 160 faculty involved in energy research and education in a 65,000 square foot facility (About the Energy Institute, 2015).

## Cornell University – STARS Gold

Cornell University has a wide range of SRE projects as well as the Atkinson centre for a sustainable future- Multi disciplinary organization working towards a sustainable future including energy research at Cornell University ("Energy", n.d.).

Current renewable energy projects that are completed at Cornell University are:

- Run of river hydro electric
- Co-Generation using Natural Gas – previously coal and in the future possibly biomass.
- Solar photovoltaic electrical and thermal
- Expansion of the Combined Heat and Power Facility
- Solar Hydronic Heating
- Cooling of campus uses closed loop lake source cooling

# Research and Education

The renewable energy sector is one of the fastest growing industries; the International Energy Agency`s *Medium term renewable energy market report* (2013) predicts a 40% increase in renewable energy in the next 5 years globally. SaskPower is predicting a 2.9% annual increase in electricity demand over the next 10 years, an equivalent to adding a city the size of current day Saskatoon (SaskPower system, 2013). With these increases the university has the potential to be a leader in researching new technologies and educating the future workforces of Sustainable Renewable Energy.

Many universities in Canada are already pursuing this rapidly growing industry such as The University of British Columbia's Clean Energy Research Centre (CERC). CERC has 60 faculty members and 200 graduate students that are pursuing clean energy projects in ten different areas of research. Combined with research UBC also offers courses in clean energy including a master of engineering in clean energy (About us, 2011). The University of Saskatchewan could follow other universities examples by expanding the role the Sustainability Education Research Institute (SERI) plays by increasing focus on SRE technology and implementation in education and research.

# Saskatoon & Saskatchewan Leading Examples

While a variety of case studies with regards to renewable energy can be found through both Saskatoon and Saskatchewan, the following is a list of notable developments, which can be used as references with regards to environmental responsibility and stewardship.

## Saskatoon

- Solar Power Cooperative ("Hot Topics", 2015)

The Saskatchewan Environmental Society is currently building grounds for a Solar Power Farm in the city of Saskatoon. The base farm will be set up outside of the city. The importance of this project is for Saskatoon (along with Saskatchewan as a whole) to potentially run solely on renewable energy in the future. "A solar power cooperative is also an incredibly unique concept, as it provides people who would not normally have the ability to install solar panels on their home, the opportunity to invest in a renewable tomorrow" ("Hot Topics", 2015). Having a solar panel not only pays for itself but will also cut down a major portion of one's ecological footprint.

- Ronn LePage's Western Development Museum net zero house (Ferguson, 2011)
- Proposed hydropower generation project at the weir on the South Saskatchewan river ("Future Power Generation Projects", 2015)
- Dunsky Energy Consulting – currently working with the City of Saskatoon to "explore financing options that can help homeowners and businesses to install their own solar photovoltaic (PV) systems" ("A Bright Future for Solar", n.d.)
- Saskatoon Light and Power Landfill gas collection system collects methane from decomposing organic matter in the landfill and combusts it in an engine generator to generate electricity while reducing emissions (Clean Power Generation Initiatives, n.d.).

## Saskatchewan

- Climate change program that regulates facilities that emit more than 50,000 tonnes of GHGs annually
- Various policy options being developed to reduce emissions of greenhouse gases

(Climate Change, 2013)

- Adoption of federal greenhouse gas emission reduction target of 20% by 2020
- Saskatchewan Technology Fund
- Climate Change Foundation

("Saskatchewan Takes Real Action", 2009)

- Green Energy Project – Transforming Saskatchewan's Electrical Future ("Transforming Saskatchewan's Electrical Future," n.d.).
- SaskPower's Energy Performance Contracting – an incentive for large institutional customers to benefit from energy and facility renewals (*SaskPower 2014, 2015, 2016*, 2013).
- Saskatchewan Research Council and Cowessess First Nation have installed an 800kW wind turbine linked to a 400kW battery. This enables the ability to control the output of the turbine by using the battery to reduce the highs and lows from fluctuating wind providing a reliable base power, or alternatively to provide peak power when needed ("Wind and Storage", 2015).

# STEPS TOWARDS CHANGE

## Change System of Behavior

Sarah James and Torbjorn Lahti's *The Natural Step for Communities* (2004) outlines three change processes that have high success rates in the adoption of change proposals (pp. 182):

- Change brings about concrete results
- Change occurs systematically, throughout all or several functional areas instead of within only one area
- Change becomes institutionalized as part of the ongoing official policies and practices of the business corporation

When further considering the publication's A-B-C-D strategy, the change process that could perhaps best benefit the University of Saskatchewan has the following framework (pp. 190-192):

**A.** Raise awareness
**B.** Scrutinize and take inventory of present conditions
**C.** Brainstorm visions and solutions
**D.** Create an action plan

## Steps to Change

- **Finding the Fire Souls**
- **Education: Raising Awareness**
- **Official Endorsement of Sustainability Operating Principles**
- **Involving the Implementers** - stakeholders
- **Applying the Compass**: Sustainability Renewable Energy Framework, Inventory, Vision, Actions
- **Whole Plan Endorsement**
- **Keeping it Going**

*The Natural Step for Communities* also provides the framework of "practical steps for realizing systemic, across-the board change to sustainable practices" as outlined above (pp. 203-221). This document endorses the framework specified above as a prospect for implementing renewable energy at the University of Saskatchewan, although it is not the particular publication that is

recommended, but rather its overall framework for mitigation and implementation of sustainability solutions, which this document applies to pro-active renewable energy in particular.

# Reduce Consumption: Direct Billing & De-Centralization

## Raising Awareness

"If your organization wants to save energy, it's important that your staff become aware of the energy consumption that they are responsible for […] simple changes in people's behaviour can quickly lead to significant energy savings, but such changes will only happen if the people are aware of the energy consumption that they have the power to control" ("Drop the Clichés", 2015).

Within the University of Saskatchewan's context, raising awareness should include a direct billing system within the university's internal buildings. Such a system can better facilitate competitive reductions in electricity usage, as a derivative of an overall status of awareness with regards to individual building consumptions. This can further stimulate the reduction in energy consumption, already an initiative at the University of Saskatchewan ("Policies", 2014).

# Achieve Emissions Reduction Target

The University of Saskatchewan has created a project named *The University of Saskatchewan Climate Action Plan*. This plan is a guide that provides information on how to cut emissions on campus. Currently the University is working towards a target of reducing emissions by 20% (based on 2006/2007 levels) by 2020.

There are three scopes for GHG emission reduction:

- Scope 1 - Direct GHG emissions from sources owned or controlled by the university. (Natural Gas, Agriculture, & Fuel)
- Scope 2 - Indirect GHG emissions from the generation of electricity consumed by the university. (Electricity)
- Scope 3 - All other indirect emissions from sources not owned or controlled by the university. Reporting is optional. (Theede, 2012)

Under present conditions, it can be proposed that the University of Saskatchewan commits itself to achieving its proposed target, while following its mission of applying knowledge. Increasing this target can easily parallel the university's commitment to reducing energy consumption ("Policies", 2014).

# Assessment

The government of Saskatchewan's Ministry of Environment (MOE) "Application for ministerial determination" (2013) states that you must fill out an application in order to determine if specific projects need to complete an environmental impact assessment (EIA) before construction begins. An EIA is needed if a project contains any of the following parameters:

- New development is needed for the project to go forward i.e.: access roads, native prairie.
- Any project located on university land or within the Meewasin Valley over $20,000.

If the "technical review guidlines" (2014) determine that the project does need an EIA, it is broken down into three tiers, with tier 1 being the least stringent, and 3 being the most stringent. For example, the wind energy project planned in Chaplin, Saskatchewan, an EIA is required due to new development on land within the project area.

The EIA may need to be contracted to an environmental consulting company to comply with government regulations. However, if a co-operative agreement with the consulting company can be agreed upon in order to combine the contracted company and university students, to facilitate field experience and potential work relationships in the future, it should be considered. If an EIA is not necessary, students could provide EIA's to the University as an educational tool. If no EIA is required, it is still recommended that the University still does an impact assessment on the area in order to confirm that as the project goes ahead it will have no adverse effects on the wildlife and other biota that are found in the area, and as an educational component.

# Implementation

In order to have a renewable energy policy implemented, a policy draft would need to be written and brought forward to the policy oversight committee. The goal of the committee is to review policies from colleges or units; these policies can either be new or revisions to an existing policy. One key recommendation is to have a large stakeholder advocating for the proposed project

before the policy is sent in to the committee (Theede K., personal communication, March 17, 2015). The University of Saskatchewan states that each policy draft should include the following when submitted to the *Policy Oversight Committee* (n.d.):

- Notice of Intent Form, listing departments/units who reviewed the draft, including comments.
- Draft should follow the policy template
- The form, draft policy, and cover letter/email with a brief explanation of the policy is to be sent to the Policy Oversight Committee.

According to the University of Saskatchewan's *Multi-year Capital Plan* (2012), the institution is committed to expanding the sustainable efforts on campus for infrastructure. This is to be done through energy cost savings, as well as environmentally friendly building design. This makes renewable energy a priority on campus. A renewable energy policy can then be used as a cost effective tool in the future, as well as a strong educational tool. This is important to touch on in order to increase the success of implementation.

# Funds

Funding is available for sustainability projects through the University of Saskatchewan's (2015) *Campus Sustainability Revolving Fund* (CSRF) (2015). In order to meet the funding criteria, the project should include the following:

- Advancing the performance of the University's sustainable performance in Education, Operations, Community Engagement, or governance
- Is included in the Campus Sustainability plan and/ or Climate Action Plan
- Reduces Utility and operating costs
- Reduces campus environmental impacts
- Reduces demands on facilities and infrastructure
- Potential for future sustainability improvements

Funding can range from $1,000 to $500,000, depending on the balance of the fund. Single projects resulting in utility or operations savings can receive a maximum of 25% of the current

balance, and projects with indirect savings can receive a maximum of 5%. A letter of intent is to be completed, with a template available on the CSRF webpage. Once the letter of intent is accepted, the application process will begin with the template and application guidelines also available on the CSRF webpage.

The *Preventable Maintenance and Renewal* (PMR) *Budget* is another source of funding available to proposed projects. This budget contains $11,942,000 available for projects throughout the 2014/15 year (Norris, 2014). The University of Saskatchewan has requested $25.6 million dollars in the 2015/2016 (2014) operations forecast.

Funding can also be available through research grants, interested stakeholder groups, as well as the department that is heading the project. The Finance Services Division (FSD) has a fund application form, which allows for the request of a fund established for the specific project (FSD, 2009).

# Installation

The installation of renewable energy can be done through a company contracted out by SaskPower. After the initial installation is complete, SaskPower would complete inspections to the units, with the infrastructure maintained by the University of Saskatchewan (Theede, personal communication, 2015). If possible in contract negotiations, student involvement should be considered in the all aspects of the process (installation, inspections, and maintenance) as an educational opportunity.

# Re-assessment

After the initial installation of the renewable energy, research should be complete on the success of the project throughout its implementation period. Reports should be written, including ways to improve the operation, recommendations for the future, and the repairs needed to each piece of equipment. Once again, a student involvement plan should be considered for educational purposes.

# Connecting to the grid

There are two options available to the university for connecting to the grid, SaskPower and Saskatoon Light and power, depending on the location of the SRE source. Both companies are open to alternative energy sources being part of the grid, with various options available outlined below:

## SaskPower

- Net metering: Maximum capacity of 100kW which would offset the universities electricity use and be calculated annually, the university currently buys electricity at a bulk discount rate of $.065/kWh so the return on investment would take longer.
- Small Power Producer: Maximum capacity of 100kW with an option to sell all or none of the electricity generated, the 2015 rate is $0.104/kWh and in a 20 year contract would see a 2% increase each year. This would still offset greenhouse gas emissions and be useful in demonstrating the technology and undertaking research.
- Unsolicited Power Proposal: A submission would be made to SaskPower for review, if successful this would allow the university to build a much larger SRE source than the previous methods. For projects that are approved SaskPower currently purchase power at a wholesale rate of 5 to 6 cents per kWh (Kozoriz F. D., personal communication, March 23, 2015)

## Saskatoon Light and Power

Customer-Based Generation Program: Maximum capacity of 100kW installed with a bi-directional meter to track the amount of electricity generated and consumed. The rate that electricity will be purchased for 2015 is $0.10198/kWh, This rate will increase 2% each year (Services for Customer, n.d.).

# Call to Action!

Below are some potential ideas of what is possible:

- Solar fence for student residence and Williams building, agreement with Saskatoon Light and Power; net metering plus pay back for extra at $.106/KWh
- Solar thermal heating and cooling of building, reducing the demands on heating plant
- Building envelope optimization to reduce energy consumed by buildings
- Geothermal heating and cooling of building, reducing the demands on heating plant
- Unsolicited power producer plan for large SRE project on satellite property
- Work with City of Saskatoon on Weir hydro
- Renewable energy demonstration unit on campus, public location! 100kw solar and wind - also used for research, control for new technology - small power producer with SaskPower
- Heat plant co-generation, change fuel from Natural gas to biomass
- Solar Co-Operative
- Partnership between Ag-Bio, engineering, businesses, Sask. Polytechnic, City of Saskatoon, SaskPower
- Purchase Renewable Energy Certificates (REC) to foster growth and reduce the universities GHG impact
- Goal of net-zero GHG emissions by 2050 for the University of Saskatchewan

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