MEMORANDUM

DATE: 21 February 2016

TO: Dr. Elmore

FROM: Sara Riedesel

SUBJECT: State Universities of New York: Renewable Energy

Dr. Elmore:

The attached report along with the mentioned website have been prepared for the completion of an independent study for the Sustainability Engineering Minor at Binghamton University. This report provides insight to the renewable energy market within the State Universities of New York as of 2015. The research for this topic is on-going and will be developing more in the future.

Thank you.

STATE UNIVERSITIES OF NEW YORK: RENEWABLE ENERGY

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1. INTRODUCTION

The United States of America is one of the world's leaders in many areas, but is suffering in regards to the renewable energy market. There are three main ways an individual or business can acquire renewable energy: on-site generation, green purchasing through a power provider, and renewable energy credits (REC). Out of the three ways, renewable energy credits are the lesser known methods. Since RECs are the stock market of the renewable energy market, many people are hesitant to participate. The other issue with RECs includes the need for a tracking system. In the United States, most regions have an established system, but are extremely hard to join. New York State especially is struggling with establishing a tracking system. Without the system in place, there is no incentive for individuals or businesses to join. There is also a differentiation between mandatory and voluntary markets. The government will often set minimums for states and businesses to have a portion of renewable energy. Recently, the governor of New York mandated the public sector to lower their energy usage 20% by 2020. With this mandate, all the SUNY schools are looking for new and innovative ways to reduce their energy and get involved with renewable energy.

2. RENEWABLE ENERGY

There are many different types of renewable energy for people to choose from. The location and available resources usually define which option is best for an individual's specific site. The most common include solar, wind, geothermal, biomass, and hydroelectric. There are constantly new inventions in the renewable energy sector, but these five types of renewable are staples in the industry. Through these methods, essentially zero greenhouse gasses are produced which reduces the harmful emissions into the atmosphere that would have been there had non-renewable energy been used.

There are also three main ways an individual or business can receive green power. The first and most obvious is to personally have on-site generation. An individual can do two things with the energy produced: power their own building or sell the energy back to the grid. Often times the energy required for a location will be used then once their power needs are met, they sell the excess back to the grid. The next option for obtaining green power is to work with an energy provider. Often because of governmental mandates, power companies have to use a certain percentage of green power already. Because of this, they will often give their customers the option to purchase additional green energy at a premium cost. This is a popular option for those looking to use more renewable energy in their homes/businesses without having to go through the obstacles of owning their own renewable energy resources. However, one of the downsides to this option is that there is often a lengthy contract. In previous research, it was discovered that for residential users, the average contract was good for a year and for businesses: three years. This is a great option for those who know they want to really commit to purchasing green power, but for those who do not have a steady flow of cash and cannot guarantee they will have the extra money (but who want to do more for the environment), it is not reasonable. Yes, people are able to buy more sustainable products like energy star refrigerators, but they want to do more without the lengthy contracts. Also, the majority of the general public cannot buy their own renewable resources. This is why the third option for obtaining green power is one of the bests, but is also the most unknown. Renewable Energy

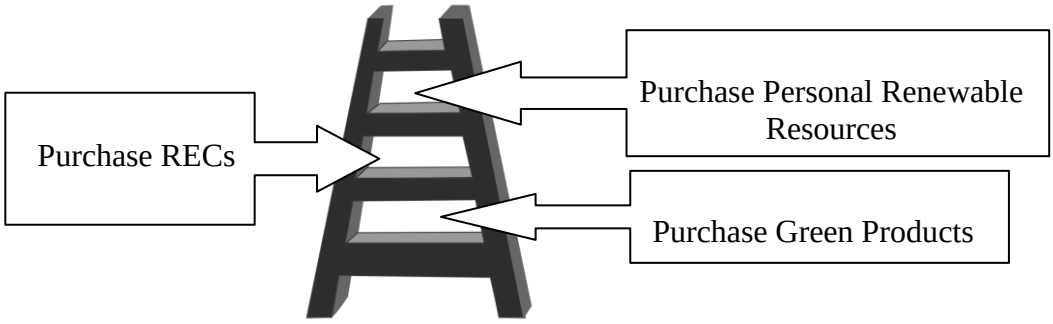

Figure 1: Sustainability Ladder

Credits/Certificates (RECs) can be purchased by everyone with no contract and are a fun and easy way to support the renewable energy sector. When looking at a household or business wanting to be sustainable, there are three steps similar to a ladder. Figure 1 shows the steps that are often taken when becoming "green".

3. RENEWABLE ENERGY CREDITS

Renewable Energy Credits/Certificates (RECs) are the stock market of renewables. When a renewable energy resource produces energy, there are two components: the physical energy flowing from the producer to the grid and the REC. Once REC is produced every 1 mega-watt hour (or 1000 kilo-watt hours). Both aspects of renewable energy can be bought and sold together or separately. The purpose of buying RECs is to claim ownership to the renewable energy produced. When a person owns a REC, they can claim full ownership of all the energy produced under the certain REC. One of the ways RECs are used is as a carbon offset. If a company wants to claim 100% clean energy, they can purchase the same amount of energy they use of "dirty energy" and that equivalent in RECs. By offsetting their use of energy with renewable energy, they can claim the production rights to the clean energy. This is how many small businesses are able to claim 100% clean energy even without their own renewable resources.

There are two markets for renewable energy purchases: mandatory and voluntary. The mandatory market exists due to policies made by the government and therefore makes up the majority of REC purchases. Each state has a Renewable Portfolio Standard (RPS) that requires businesses to produce a certain amount of renewable energy. Because it is often not realistic for each business to own their own renewable energy production system, they purchase a certain amount of renewable energy credits to offset and cover the amount required by the government. This amount varies state to state. When a business wants to go above and beyond what the government mandates, they enter the voluntary market. These two markets are specifically separate in regards to price since the mandatory market is driven by the government and the voluntary market is consumer driven. Because of this, government pricing is much higher than the voluntary market. Voluntary market is where residential, non-profits, and more come into play. As of 2015, most people have not heard of purchasing renewable energy credits and do not even have a general understanding of them. The struggle with the voluntary market is that the main people in it are businesses. There is little incentive for residential users to participate other than the reward of good feelings. For businesses, they can advertise as using a majority of renewable resources and being green. This helps them since often customers are looking for businesses that are doing their part for the environment and are

environmentally conscious. For residential users there are little incentives since they do not have consumers interested in what they are doing. Also, the government has not mandated residential users to produce renewable energy or even given rewards for those who participate in the renewable energy sector. Unless an individual is extremely passionate about the environment and investing in the world of renewables, there is no incentive for them to buy RECs.

Since Renewable Energy Credits are able to be sold separately from the physical energy produced, it is essential to have a tracking system in order to ensure RECs are not being sold and resold multiple times. For this reason, a single REC can only be sold once: from the producer to a second party. Most regions in the United States have their own tracking system. Each REC has a specific identification number and information. When it is being bought/sold, the producer must enter it into the system. The tracking system is also often managed by a company that regulates and essentially audits each REC and makes sure the producers are tracking the ownership and retirement of RECs. Once a REC is sold from the producer, it must be retired. Since RECs are essentially the stock market of the renewable sector, not a lot of people know about them or are wanting to participate since it seems overly complicated and not well developed. Even today, some regions like New York are still developing their tracking system. Figure 2 (Environmental Tracking Network of North America) shows the current tracking systems in the United States. However, even when a region has a tracking system in place and is operational, a user normally has to create an account and pay a fee to see any data. This is another discouragement for users to look into renewable energy credits since they are not able to see how the tracking works or what locations are buying/selling them. The only time an account is created is usually when an individual or business trades a very large amount of RECs and is already committed to the concept.

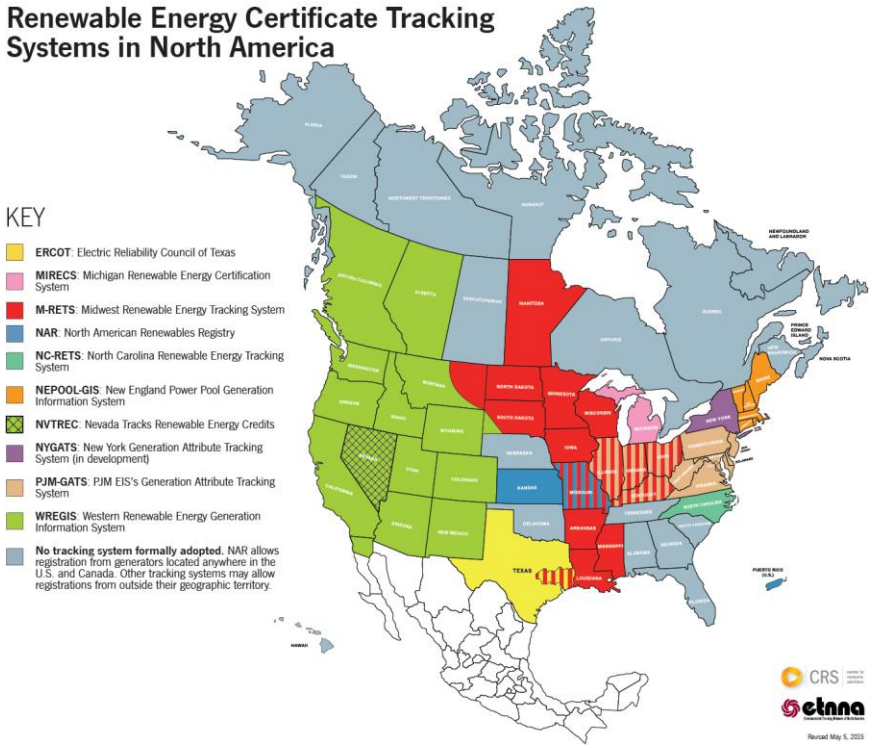

Figure 2: Renewable Energy Certificate Tracking Systems in North America

As Figure 2 clearly shows, although the majority of states in the USA have a tracking system in place, there is still a lot of work to do in the USA and Canada. Often these tracking systems are not at all user friendly and the data is nowhere close to being public information. In order for renewable energy credits to grow in popularity, which would lead to an explosion in the amount of renewable energy produced, some of the data and facts must be available to the public and the word has to get out. It would help if commercials were aired on TV and radio. With this exposure, more people would be interested in renewables and would invest more money into the industry. The previous Figure 1 showed the ladder of sustainability. Most people are stuck at the first step and are left wanting to do more for the environment, but do not have the knowledge of what to do next. With the improvement of the REC tracking systems and the advertisement of RECs, people will be able to graduate from the first step to the second. Hopefully by doing this, they will eventually go to the third step of owing their own renewable resources since they will be able to see how they can make money and save the environment at the same time.

4. NEW YORK RENEWABLE ENERGY

According to the U.S. Energy Information Administration (EIA), New York and Rhode Island are tied for the states that consume the least amount of energy per capita with 184 million Btu. The state with the highest amount of energy consumed is Wyoming with 918 million Btu per capita. In 2015, renewable energy accounted for only 17 percent of the energy used in New York. The government has set a goal of 40 percent by 2030. This energy will mainly come from New York's hydroelectric power (~80%), wind (~9%), and the remainder from solar and biomass (Cutting Pollution, Creating Opportunity). This goal will produce an excessive amount of jobs in New York and will better the environmental status. The New York government recognizes the need for renewables is not optional anymore. We need renewable energy in order to preserve the world we have today and ensure there is still a healthy Earth for future generations. Today, New Yorkers are the fifth-largest renewable energy users in the entire United States. An example of the growing sector of renewables and the effort to incorporate them into our daily lives is the increasing number of electric vehicle charging stations.

The New York REC tracking system is not fully developed and is having problem starting up. The New York State Energy Research and Development Authority (NYSERDA) established the systems called "New York Generation Attribute Tracking System" (NYGATS). As of 2015, the system had been publically reviewed, but nothing more has occurred. Because there is not an established tracking system in New York, it is extremely difficult to advertise the sale of RECs and encourage people to participate in something so new.

Since there is not an established system, other ways of tracking RECs and renewable energy efforts have developed. The Association for the Advancement of Sustainability in Higher Education (AASHE), a non-profit organization empowering the sustainability initiative, has developed a website to track, assess, and rate schools all over the world. Their program STARS stands for the "Sustainability Tracking, Assessment & Rating System". Their missions is to "Provide a framework for understanding sustainability in all sectors of higher education, enable meaningful comparisons over time and across institutions using a common set of measurements developed with broad participation from the international campus sustainability community, create incentives for continual improvement toward sustainability, facilitate information sharing about higher education

sustainability practices and performance, and build a stronger, more diverse campus sustainability community" (Stars). The program is self-reported, so there is no legitimate accountability. Each school is rated a score out of 100. Some of the categories the schools are rated on include co-curricular education, curriculum, research, operations, energy, transportation, planning, administration, engagement, and more. Some of the SUNY schools are reported on STARS, but again, this system is not widely known or advertised with only 1,000 overall schools participating.

5. STATE UNIVERSITIES OF NEW YORK

There are 61 total State Universities of New York. Out of these 61 schools, there is a mixture of private, public, and community schools. On 28 December 2012, Governor Andrew M. Cuomo issued Executive Order 88: Directing State Agencies and Authorities to Improve the Energy Efficiency of State Buildings. Since all the SUNY schools are under the state, this Executive Order affects them. The Governor said that by 1 April 2020, all State Entities shall reduce their energy usage by 20% from their 2011 rates. The New York Power Authority (NYPA) will manage this project and will help create guidelines, strategies, and milestones for all entities. Most schools are in the process of writing a Master Plan that they will have to publish for the Governor to see and evaluate. As of 2015, only 54% of the SUNY schools currently have some form of renewable energy. Although this is not the only way to reduce energy usage of fossil fuels, it is an extremely effective measure. Most of the schools are finding ways to reduce their energy usage through educating their students and faculty on energy usage, replacing lightbulbs to LEDs, and more. Of the schools that do have some sort of renewable energy it is broken down into 59% solar, 16% wind, 17% geothermal/solar thermal, 6% hydroelectric, and 2% anaerobic methane digestion. Figure 3 breaks this down into a pie chart.

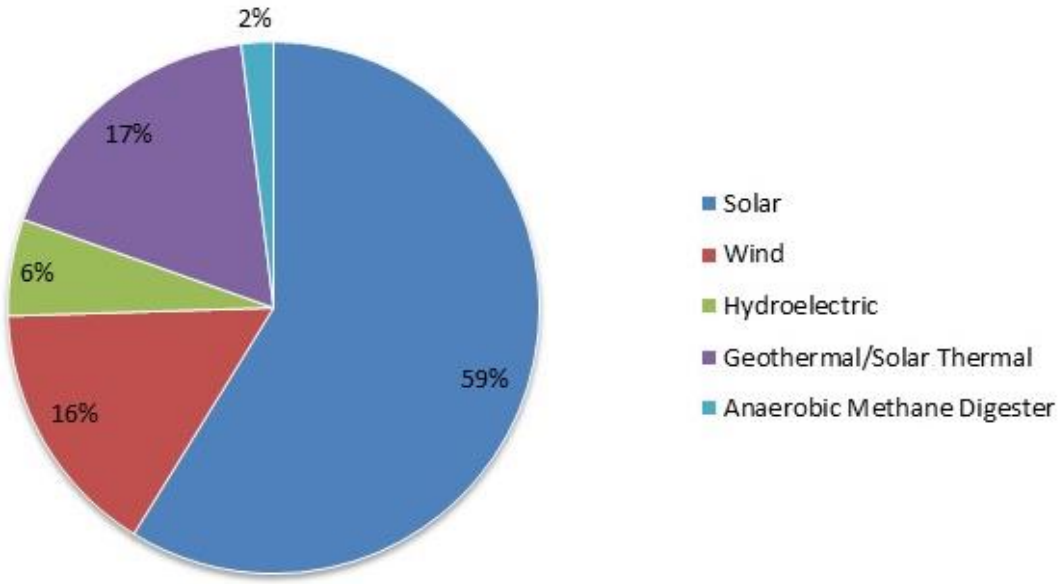

Figure 3: Types of Renewable Energy

In order to get the schools excited for the initiative, NYSERDA created the REV Campus Challenge. The Challenge "… promotes clean energy efforts by recognizing and supporting colleges and universities in New York State that implement clean energy projects and principles on campus, in the classroom, and in surrounding communities" (Championing Clean Energy Solutions in Higher Education). For the three schools that create the best ideas to invest in clean energy, they each will win $1 million to help make their plans a reality. The proposals are due by 4 April 2016 and will include the project design, business model, innovative partnerships, and curriculum integration. For any questions regarding the challenge, individuals may go to http://www.nyserda.ny.gov/All-Programs/Programs/REV-Campus-Challenge/Contact.

There is a sustainability department in SUNY, but is not fully functioning since leadership is lacking. Because of this, SUNY has not record of what each individual schools are doing to be sustainable and environmentally friendly. Currently the schools are communicating via NYCSHE, the New York Coalition for Sustainability in Higher Education. Their mission is to "unite representatives of higher education and supporting organizations with a common interest to promote and support environmental, fiscal, and social responsibility" (NYCSHE). There are 109 members of NYCSHE including multiple SUNY schools. The organization also has a blog where schools can be featured on their sustainability efforts and local events for schools and universities to attend. Since the sustainability department is not active, the colleges and universities are looking for any way to communicate with each other's' efforts.

Out of the 61 SUNY schools 33 have some sort of renewable energy (54%), 4 have electric car charging stations (7%), 23 have sustainability research (38%), and 9 have some sort of REC participation (15%). Most of the universities have some sort of renewable energy and research while the community colleges do not have either. All the information gathered on the SUNY schools is posted to **www.bingweb.binghamton.edu/~sriedes1/suny_renewable_energy**. In order for the website to be completely accurate, schools are able to contact the web administrator when new sustainability initiatives occur on each campus. Since there is no existing site where all this information is gathered, this website is extremely needed. In general, all the colleges and universities would like to do more with renewable energy, but simply do not have the funds. The challenge they all face is that they receive funds, but they are not earmarked for green projects, but are earmarked as critical maintenance. The schools will each soon submit their master plans to the governor in regards to how they will reach the 20% goal. After the governor goes through these, the hope is that he will realize each of the SUNYs are willing and ready to do more, but simply need the specifically "green" capital funds. There should be a major shift in the distribution of funds once the master plans are received.

6. CONCLUSION

The United States of America does not have the best participation in the renewable energy sector, but is slowly increasing. There are many ways to get involved in the environmental efforts, but most people only go as far as buying products that are classified as more environmentally friendly. The State Universities of New York have increased their involvement with renewable energy and sustainability efforts in the past few years. Because of Governor Andrew M. Cuomo's Executive Order, all the public sectors must decrease their energy usage from their 2011 rates 20% by 2020. Since the SUNY schools are part of the public sector, they must comply. This gives great

opportunity for students and faculty to research and better the renewable energy and environmental sector. The colleges and universities in New York State are some of the best in the world, and should be given the opportunity to research and accomplish many goals in the sustainability sector.

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