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Sustainable Vermillion Policy Report

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**Sustainable Policy Report:
Vermillion, South Dakota
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The City of Vermillion | The University of South Dakota
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**UNIVERSITY OF
SOUTH DAKOTA**

The Need for Sustainable Practices

Climate change is a global phenomenon that is all encompassing. There are no nations, cities, or towns that are unaffected by climate change. Human industrial development is accelerating climate change and without drastic practice changes, global temperature increase and sea level rise will be inevitable. The problem does not lie only from a large perspective, but is based from the cultural unsustainable practices people have become accustomed to. American culture has become one of single use. People are normalized to the idea that it is okay to buy products that are only made to be used one time and then thrown away, like plastics. In addition, fossil fuel burning for heat, transportation, and electricity is commonplace. But these practices are not sustainable. Within the next decade, the world will reach the point of no return in regards to climate change. National and global climatologists agree, the time for action is now to mitigate temperature rise. The problem needs to be addressed from the ground up; at the local level. To begin implementing more sustainable practices at the local level, a municipality needs to have a sound understanding of sustainability.

Academic perspectives and definitions of sustainability vary. One definition of sustainability offers that it is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs (Victor, 2006). This definition of sustainability is effective but it contains language that is harder to understand for people who are not accustomed to the field. From my experience as a graduate of the University of South Dakota's sustainability program, I define sustainability as the movement towards systems that are environmentally beneficial, socially just, and economically profitable to meet the needs of the present without compromising the needs of the future. There are three pillars that together, make up sustainability: environmental, social, and economic.

Environmental sustainability are the rates of renewable resource harvest, pollution creation, and non-renewable resource depletion that can be continued indefinitely. This pillar of sustainability is the largest of the three. Without a sustainable environment, a sustainable economy and social system cannot exist. Social sustainability is the ability of a social system, such as a city, to function at a defined level of social well-being indefinitely. Economic sustainability is the ability of an economy to support a defined level of economic production indefinitely. Administering sustainable practices in a city allows for climate preparedness that will in turn save money in the long run.

Current Sustainable Practices Assessment

Since September of 2018, the City of Vermillion has taken pro-active steps towards becoming more sustainable. In January of 2019, the City hired an intern from the Sustainability Department at the University of South Dakota, whose focus was on promoting sustainable practices in Vermillion. Since that time, the intern has carried out numerous tasks including giving a presentation to municipal department heads on the current status of sustainable practices being done by each department, defining sustainability, writing press releases informing the citizens of Vermillion on recycling and LED light conversion programs that the City implemented, conducted research on the possibility of a sustainable action committee, and created this sustainable policy report. Looking on into the future, the plan is to continue this internship indefinitely because it has proven to be good way to work on issues in regards to sustainability without a large financial cost.

Beyond the creation of the sustainability internship, the City of Vermillion has made significant strides to become more energy efficient, thus increasing their environmental and economic sustainability. They have done so in two major ways. One, through an LED light conversion program. Three years ago, the Vermillion Light and Power and Engineering

departments came together to solve the costly problem of inefficient street lighting to improve sustainability. Starting in 2016, the City of Vermillion began its four-year conversion program to phase out its traditional high-pressure sodium (HID) street lights and replace them with more efficient, longer lasting, Light Emitting Diode (LED) street lights. Since the beginning of the program, the City has installed over 1000 LED street lights. The major motivations for choosing LEDs to replace the traditional lights were based on improving efficiency and cutting costs.

LED lights, as compared to traditional incandescent lights, can last up to 25 times as long and use a significantly lower amount of energy. In 2015 the City of Vermillion's street lights consumed 875,416 kwh of energy at a cost of \$110,596.45. But in 2018, after three years of replacing the old lights with the new LEDs, the City's street lighting consumed 584,290 kwh of energy at a cost of only \$75,373.55. This switch to LEDs has helped cut the City's power consumption by 35% and helped save 32% on the City's electricity bill. After figuring in the lowered cost of maintaining the new lighting, the City will have an annual savings in excess of \$45,000 and the lights will pay for themselves within a 10-year span.

This year the City is entering its fourth and final year of the street lighting conversion program. By the end of 2019, the City will have replaced all street lights with the more efficient LED lighting. At the start of 2020, the City of Vermillion expects to look back on this year and see further energy and cost savings. This sustainable practice is highly affective. Efficient light conversion allows a city to save on their energy costs while also using less energy which is therefore less harmful for the environment. The second practice that Vermillion is doing extremely well at implementing is their recycling program.

For the ninth year in a row, the Missouri Valley Recycling Center in the City of Vermillion saw substantial growth. The Center is utilized by much of Clay County, including the members of the Joint Powers Solid Waste Authority, and neighboring communities such as Elk

Point and Newcastle. Two years ago, for the year of 2017, the Recycling Center saw an impressive increase of 253,555 lbs. in recycled materials at the facility from the previous year (2016). But for this past year, 2018, the Center saw an even greater increase from the previous year's growth. The number of recycled materials grew by a staggering 496,242 lbs. These numbers reflect that each year, the weight of recycled materials continues to rise. To reflect the sheer volume of material processed this past year in total; the Missouri Valley Recycling Center processed over 2.2 million pounds of recyclable materials.

The Center's immense productivity and success in processing growing amounts of materials each year is due to the ever-growing citizen involvement and participation in the Curbside Recycling Program. This simple and efficient program utilizes both blue and green recycling bins, and currently has 2,450 participants. The large, green bins are for #1 and #2 plastics, and aluminum and tin cans. The smaller, blue bins are for newspapers, magazines, office paper, junk mail, and paper board. In 2018, the program produced 337,740 lbs. of recyclable materials. This number translates to a sizable contribution of 138 lbs. of material per participant. While these two programs are highly effective and being implemented across the numerous departments of the city, other sustainable practices are more sporadic.

Before the sustainability internship's creation, the City of Vermillion never properly addressed sustainability. Although, that did not mean that the City was not already engaging in sustainable practices. The sustainability intern had each department of the City list the practices that they thought to be sustainable. Upon receiving the lists, the intern then formatted the list into a useful table:

Table 1

Department:	Library	Parks & Rec	Police	Fire/EMS	City Hall	Light & Power	Service Center/Communication Cent	Water & Waste	Water
Sustainable Practices									
LED Lighting	x	x	x	x	x	x	x	x	x
Motion Activated Lighting		x			x		x		
Used Vehicles		x	x		x				
Solar Water Heaters									
Water Con Mitigation				x				x	
HVAC System					x				
Hand Dryers					x	x			
Auto/Timer Lighting					x				
Computer Off @ Night	x				x				
Re-Purposing Used Materials	x	x	x	x					
Anti-Vehicle Idling		x	x	x					
Electronic Records						x		x	
Recycle Cans	x		x			x	x		
Recycle Cardboard	x		x				x	x	
Recycle Plastic	x		x				x	x	
Recycle Paper	x					x	x	x	

As Table 1 depicts, there are numerous sustainable practices that each department implements. Some departments are able to carry out different sustainable practices than other departments because they are in different areas. Parks and Recreation, for example, is able to implement vehicle recycling and anti-vehicle idling because they have significant vehicle usage. While a department like the library, deals very little with vehicles and instead is able to promote different forms of recycling and re-purposing used materials like books and other media. In summary, all departments are doing well to implement LED lighting, repurpose used equipment and materials, recycling cardboard, paper, plastic, and aluminum, implement automatic lighting, and promoting walkability. Inversely, there are numerous isolated sustainable practices as seen in Table 1.

Possible Sustainable Options for Future Implementation

A prominent sustainable option for the City of Vermillion to implement and invest in over the coming years are electric vehicles (EVs). According to the United States Department of Energy's alternative fuels data center, "All electric vehicles have an electric motor instead of an internal combustion engine. The vehicle uses a large traction battery pack to power the electric motor and must be plugged in to a charging station or wall outlet to charge" (AFDC, 2019). This

means that EVs are able to be truly sustainable without causing harm to the environment because they do not burn any harmful nonrenewable. The harmful part of EVs is their manufacturing processes. Currently, EVs are produced just like all other vehicles, in factories that use non-renewable resources and large amounts of water to run them. Although, once the vehicle is produced, it is highly efficient. Besides their production, there are many obstructions to EVs becoming mainstream. One of those obstructions being that there is no pre-existing infrastructure to support EVs in the United States, such as charging stations.

The solution for this overall lack of infrastructure can be found in the business models presented by an article in *Energy Policy*. The writers of the article state, "a sound business model must be built up for charging service operators, which allows them to recover their costs while, at the same time, offer EV users a charging price which makes electro-mobility comparable to internal combustion engine vehicles" (Madina, et al., 2016). They go on to explain how there needs to be private investments by the EV owners themselves and by a corporate or government entity to make them a viable sustainable option. For Vermillion, the first step would be to get in touch with electric charging station companies to weigh the costs of purchasing a charging station. From there, the City would then be able to advertise itself as an EV friendly city.

Another sustainable option is the promotion of green streets. Climate change causes extreme weather events, such as extreme rainfall, and this sustainable practice will mitigate its effects.

Green streets can incorporate a wide variety of design elements including street trees, permeable pavements, bioretention, and swales. Although the design and appearance of green streets will vary, the functional goals are the same: provide source control of stormwater, limit its transport and pollutant conveyance to the collection system, restore predevelopment hydrology to the extent possible,

and provide environmentally enhanced roads. Successful application of green techniques will encourage soil and vegetation contact and infiltration and retention of stormwater (Lukes & Kloss, 2008).

Within the realm of green streets, the City of Vermillion can introduce rain gardens. Rain gardens are made up of native shrubs, perennials, and flowers planted in a small depression, which is generally formed on a natural slope. It is designed to temporarily hold and soak in rain water runoff that flows from roofs, driveways, patios or lawns. Rain gardens are effective in removing up to 90% of nutrients and chemicals and up to 80% of sediments from the rainwater runoff (National, 2019). Specifically, for Vermillion, businesses and city buildings could have rain gardens on the roofs of buildings as well as in front. They are not only appealing to the eye but they also can produce food that can be sold at the Vermillion farmers market.

Through a phone call with the Goodcompany, an environmental company out of Washington, the city manager of Vermillion and the sustainability intern were given professional advice on other sustainable practice options to implement. They recommended that the City of Vermillion should pursue the following practices:

- Promote sustainable habitats and environments
- Ensure safe water quality
- Inventory of assets with two-time scales – short term vs long term
- Promote efficient building energy – implement efficient standards over time such as solar panels and natural heating methods
- EV conversion program for city vehicles
- Provide fleet bikes for citizens
- Toxic material mitigation

- What are chemicals the City of Vermillion uses the most – find low toxic products to replace harmful products
- Solid Waste production tracking
- Replace the Vermillion public transit vehicle with an electric or other high efficiency alternative
- Create a purchasing policy to look at the total cost of ownership of items / electric / more sustainable alternatives
- Be careful of new US building standards keep things simple – 3 big things in each framework priority and nail those – biggest scale to smallest – don't try and become certified if it required heavy time and resources

Recommendations

I recommend that the City of Vermillion should pursue the creation of an official sustainable action plan. Such a plan would allow for the City to set attainable sustainability goals and would outline specifically when these goals are to be met. I suggest that the City look into hiring a professional environmental company, like the Goodcompany, to provide a thorough assessment of Vermillion from a sustainable perspective using their expertise. Once the company makes their assessment, they will then be able to provide the framework for a formal sustainable action plan. Then, I recommend that the City look at the sustainable options outlined in this report when they begin to decide what the goals for the action plan should be. In addition, it is vitally important that the city should continue to implement the use of a sustainability intern through a continued partnership with the University of South Dakota's Sustainability program. A continuation of the internship would ensure that there is always a city employee working with the sole purpose of promoting sustainable practices. A sustainability internship is both beneficial to the City, the University, and to the student.

The City of Vermillion should continue to act promptly to address the growing threat of climate change related threats. Sustainable practice implementation helps both to mitigate these effects but also makes the City more economically efficient and a more attractive place to live. I recommend that the City continue the path that was started in September of 2018, so that even as soon as 2030, the City will be a greener and healthier place.

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