

In Eagle's Cove, we use Eagle's Cove Wind Walker Turbines® to power our entire city. Wind energy is a good source of energy because it is renewable, and it comes naturally. Eagle's Cove is a small and growing city of nearly 52,000 people. The first energy source we had was natural gas, but natural gas will run out and will not make our city "greener." Our citizens demanded a better way to get things done. They did not complain about the large windmills on the edges of the town, so we found a way to make more of them.

Wind power is simple. We installed wind turbines on our Eagle's Cove City Hall on a test basis. We made turbines five feet tall and ran the power down to the twelve-volt battery bank on the top floor that then distributed power to the city offices. Once we realized that it worked, we put the wind turbines on commercial buildings in the surrounding zones and then expanded into residential areas. The Eagle's Cove Wind Walker Turbines® are made in and sold by the City of Eagle's Cove. Requiring all new structures to have the wind turbines provides us with money to put back into the community. We gain more profit by selling our windmill products to Central Staffville and Central Valley.

We chose this power source because we already had windmills everywhere in Eagle's Cove, and they were working for us and for the citizens. The wind turbines provide energy for all the houses and businesses. There is no waste from wind power because it comes naturally and the turbines make no waste. They just make electricity. Since the wind blows at a proper rate each day and night, the wind energy is collected and stored all of the time. Wind power is also a reliable energy source because wind energy is never depleted. If the stored energy from the wind ever depletes, we still have the natural gas plants from the older sections of town that will keep Eagle's Cove from suffering any blackouts. There is no need to distribute the power from one location to the other since each building creates its own energy. That way there are no transmission lines to be taken down by inclement weather. Because we are using the wind, we are using less and less fossil fuel each day to make our energy.

There is no risk to the environment or natural resources with the use of wind power. When the larger turbines have any issues, the Eagle's Cove Wind Walker Turbines® team comes right away to repair it; this is also true of the roof-top turbines. One drawback to wind power is the need for long-

term knowledge of weather and weather patterns. Because of that, we have a team of meteorologists working closely with Eagle's Cove Wind Walker Turbines® and the City of Eagle's Cove.

Our turbines are an improvement from the large turbines in several ways. They give more power directly to the house. This is a benefit to the homeowner so that the need to pay an electric bill goes way down. Also, there are not millions of dollars going to the large power companies; that money stays in the community. The smaller Wind Walkers® are also sold in different patterns and different colors. We have several patterns, solid colors to match your house, or a custom design for an additional cost. It's exciting to the residents to be able to match the Wind Walkers® to their homes and personal tastes. Regular wind turbines are plain white and ugly; ours are different colors so that they are a beautiful addition to Eagle's Cove.

Many kinds of engineers work on our Wind Walkers®. The main kinds are electrical, manufacturing, architectural, environmental, and mechanical who does much of the quality control for our turbines. The most important engineer in our process is the mechanical engineer because he draws out the plans, makes all of the parts of the turbine work together, and makes sure it is good enough to go on top of the houses.

The problems that make our Wind Walkers® less than perfect are that installation takes a while to do because the house has to be completely built before the system can be installed. Another small issue is with single story houses. Some of the one-story houses are surrounded by two- and three-story houses. We would have to build additions to the homes so that the two-story homes did not block the wind from the one-story home. Homeowners would have to build their houses as we want them to based on energy access instead of how they want to. Another problem for homeowners would be that they have to spend about \$20,000 extra on the Wind Walkers® system with the batteries included for their power. Despite those issues, wind power is still the best energy solution for Eagle's Cove because wind makes no pollution, and if the wind doesn't blow on a certain day, there is still power for the buildings because they have all of the power stored in the batteries.

In the near future of Eagle's Cove, every home, every business, and every building will be powered entirely by wind energy. People will love it as much as we do because it is clean and green. Eagle's Cove Wind Walker Turbines® are the future of power in the universe!

Word Count: 904

Eagle's Cove
DeSoto West Middle School

Essay Source List

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At the dawn of the 20th century, the discovery of oil at Spindle Top in Beaumont, Texas revolutionized the energy and economy of the whole United States. By the beginning of the 21st century, however, the world's oil production began to peak, and it became clear that a new initiative would be necessary to produce renewable energy and offset dependence on fossil fuels. Beaumont, built originally on the success of oil, was among the first to discard its past and take on the challenge of this initiative. Now, in the year 2201, Beaumont is the nation's standard for clean and efficient power generation and distribution.

By the start of the 22nd century, Beaumont city managers realized that although fossil fuels were more economical and efficient than the solar cells of the time, solar energy would be less expensive in the long run due to decreased health and environmental impacts as well as the renewability. The city contracted with Beaumont's Lamar University to head a task force of research and engineering professionals who would hopefully be able to develop efficient as well as economical systems for generating, storing, and distributing power that would have minimal impact.

Our ground-breaking photovoltaic technology was developed through a collaboration of electrical and chemical engineers who worked to find inexpensive materials that yielded high efficiency. Electrical engineers also collaborated with civil engineers to lay out a smart grid system that would efficiently distribute power to the city and reduce waste. Hydrogen-based energy storage technology was developed and is maintained by chemical engineers. Systems engineers designed and maintain a network of sensors that monitor the entire system.

Today, Beaumont's power generation system consists mainly of two types of photovoltaic technology. Centralized power plants in the city and the roofs of many buildings utilize advanced multi-junction photovoltaics to generate energy. Beaumont also employs clear, single-layer organic photovoltaics throughout the city to generate energy. Our solar cells are based on the same technological principles as ones developed in the 21st century. First, a photon strikes an atom in the cell, exciting one of the electrons and leaving a positively charged atom behind. These electrons migrate to the anode of the cell and then travel through a wire to reunite with the positive atoms at the cathode, thus generating a current.

In the early 21st century most solar cells were inefficient largely because they could only absorb a narrow range of light wavelengths. This problem has been overcome by our innovative multi-junction solar cell technology. Multi-junction cells work by using different layers of material to capture a wider range of light wavelengths, allowing the cell as a whole to reach very high efficiencies (figure 1). While old single-layer cells reached energy conversion efficiencies of 25%, our multi-junction cells reach efficiencies exceeding 40%. Our cells are made readily available and non-toxic materials based mainly on

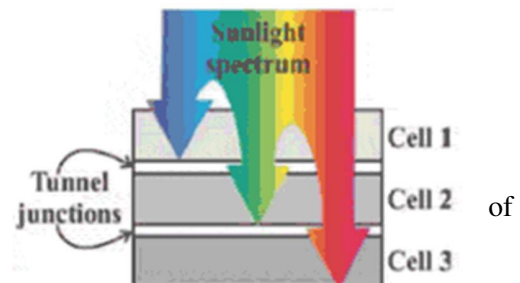


Figure 1

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gallium, which is obtained as a by-product of aluminum production.

Our city also makes use of single-layer organic photovoltaic cells. While these cells are less efficient than our multi-junction cells, they are thinner, lightweight, transparent, flexible, less expensive, and more resistant to mechanical damage, giving them a much broader range of applications. Windows and walls of buildings throughout the city are enhanced with energy-producing single-layer organic photovoltaic cells. These cells contain bulk heterojunctions in which the electron donor and acceptor regions project into each other (figure 2), increasing the surface area over which electron exchange can occur. This technology allows our organic cells to reach efficiencies of 15 percent.

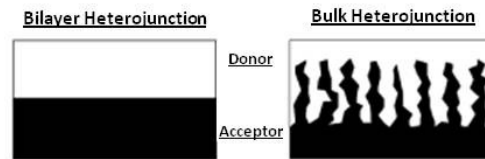


Figure 2

After our energy is generated, it is distributed using smart grid technology (figure 3). At the base of the grid, each power consumer has its own smart meter that measures power usage and relays usage data back to the grid network. Data and electricity are routed through a hierarchal system of power nodes. Nodes at the community level cover the equivalent of about 50 houses, while district and regional level nodes relay larger amounts of power to broader areas. This system of nodes relays power when and where it is needed, virtually eliminating brownouts and blackouts.

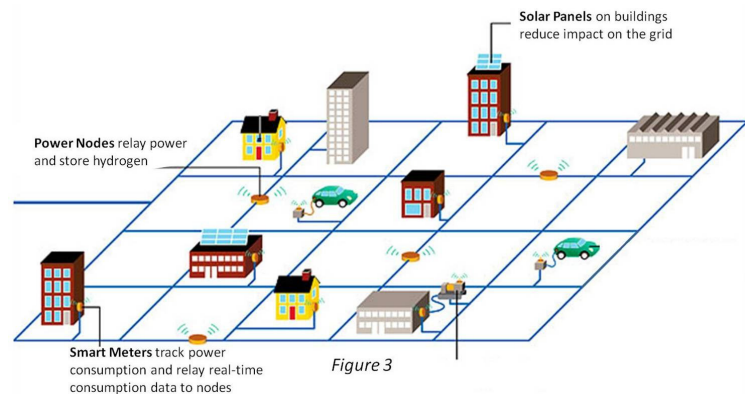


Figure 3

Beaumont's power nodes also serve as centers of energy storage. Each node houses hydrogen storage facilities which store excess electricity. Conversion of stored hydrogen to electricity via fuel cells allows a node to power its coverage area for up to a week in case of system damage, providing systems engineers ample time to identify and fix the problem without disrupting power coverage. Beaumont is connected to energy reserves through regional partnerships that can power the city during prolonged periods of cloudiness.

Beaumont's power grid utilizes a hydrogen bank storage system. First, hydrogen is generated using nano-catalysts that carry out energy efficient hydrolysis. Hydrogen is stored by bonding it to magnesium nano-clusters suspended in poly(methylmethacrylate), a material similar to plexiglass. This technology allows for storage of hydrogen at high densities, making large-scale storage feasible while greatly reducing the risk of fires or explosions. The nano-clusters bond and release hydrogen without altering their structure, allowing the same storage unit to be repeatedly reused.

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Today, our power generation system eliminates dependence on fossil fuels for electricity. Beaumont's solar cells are made of abundant, non-toxic materials and drastically reduce CO₂, SO₂, NO₂, and Hg emissions by eliminating the need to burn fossil fuels for electricity. Our hydrogen storage system provides an environmentally friendly means of storing energy that gives off only water as waste. Beaumont also has a variety of recycling programs to reuse any metallic materials from worn-out solar panels. As a whole, our power system meets the goals originally set forth by our city managers, making Beaumont an energy leader of the 23rd century.

Word Count: 992

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Hyperic Soul Essay

How do you power a world that is reliant on a dying energy source? At Hyperic Soul, we think we may have found the answer. Hyperic Soul is all about being modern and innovative in everything we do. Whether the problem at hand is how to power the city or something as small as automatically raising and lowering the flags at city hall, in Hyperic Soul we strive to better society through the use of modern technology. Previously, Hyperic Soul was using many forms of energy to power our city, most inefficient or polluting. Dr. Layne Mayes and Dr. Brooke Desrosiers, head engineers at the Hyperic Soul Electrical Field Research Center, speculated that our power sources would only last a maximum of ten more years. In Hyperic Soul, we strive to use “green” and sustainable power sources that create jobs for our citizens. The environment is very important to all the engineers and scientists at Hyperic Soul. In fact, we made it such a priority that we hired Megan Day and her team of environmental engineers to make all the technology in Hyperic Soul as environmentally friendly as possible. Our motto in Hyperic Soul is “a green life is a happy life”.

Since the year 2010, innovative companies have been trying to find ways to use waste to make power (“Turning Waste Plastics into Renewable Energy”). The early forms of this power were overly complicated and expensive. In addition, they could only convert plastic to crude oil. The original burning process was very slow and inefficient; it could only harvest a tiny amount of energy. As the Hyperic Soul engineers started to refine the waste-to-energy system, they slowly started to implement the new process to diversify Hyperic Soul’s energy sources. Every time they updated a part of the system, they would implement it at the Hyperic Soul Technology Testing Site, and if it showed to be functional, and it did not cause blackouts, they would expand the new technology further into the city. Eventually, Hyperic Soul began using totally updated power sources.

The way waste-to-energy works is not as complicated as one might think. It’s a basic two-part process that solved a majority of the energy crisis. The waste that comes from private homes, businesses, and all of Hyperic Soul is fed into a large vat where it is compressed slightly to get the air out of it. From there, it goes into an oxygenated chamber where the waste is incinerated. While the waste is being incinerated, power is produced through steam. Water is contained in a chamber next to the incinerator, and when it is heated, the energy in the steam produced creates electricity. After this entire part of the waste-to-energy process is complete, the ashes from the incinerator are fed into another chamber, this one much taller. Concentrated pressure is applied to the ashes until it is converted to bio-oil. Some of the energy from the steam goes back to continually power the process.

To create higher paying jobs for sanitation workers in Hyperic Soul, we offer free job training to move up to a better position as a junior engineer and eventually, a full-time engineer. Erin White, head trainer at the Hyperic Soul Job Training Division says, “Even people who started in a lower paying job can be engineers. And it’s all thanks to Waste-to-Energy. In 2006, for every 100 sanitation workers, 4.4 would be injured or become ill while working (“Safety in Numbers”). This number may not seem very high, but since 2006, it continued to increase until the year 2100, when we introduced our waste-to-energy power. If we had not implemented this system of greater safety in Hyperic Soul, many more lives would have been damaged or lost due to unsafe working

conditions. With the waste-to-energy system, workers can remain employed while being reassured of the safety of their job.

As with every energy source, there is the question of environmental friendliness. In early forms of waste-to-energy, there was terrible pollution and the waste that couldn't be turned into energy was disposed, creating pollution in the soil. However, with the modern waste-to-energy process, we can make more of the waste into energy. Although we have solved the efficiency problem, harvesting the energy can still pollute the air. To combat this, we put the waste-to-energy converters underground, and when the potentially polluting chemicals react with the minerals in the soil, they rejuvenate the soil. The soil surrounding the converters is changed daily so that all soil can be revitalized by the process.

Even with these great things going for waste-to-energy, there are drawbacks. Most of the potential problems have been solved by Renae Harper at the Hyperic Soul Energy Improvement Center. One minor problem is that the waste-to-energy converters are not very pleasing to the eye. We believe we have solved this issue by locating the converters underground. Another problem could be the cost. This issue is much smaller than the early waste-to-energy forms because the system has been refined to where we get much more energy from the process and it is completely self-sufficient.

In a final overview of Hyperic Soul power, our combination for 85% waste-to-energy, 10% solar, and 5% coal is the perfect fit for Hyperic Soul. If this combination were ever to fail, which is highly unlikely, we would use cold fusion power from our sister city, Intra-Genic. Waste-to-energy truly is the fuel of the future and will provide power for many centuries to come.

Word Count: 913

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