

Minnesota's Energy and Economic Plan

The Minnesota State Fair is one of the largest in the United States. Imagine if you were asked to power all of its electrical needs without burning fuels or causing any pollution. The criteria you are asked to use would be based on an Internet search of “pressurized fluid based power system, for devices such as vehicle drive trains¹”.

This power system would deliver hundreds of one thousand cubic foot air storage tanks in close proximity to the Fairgrounds, large windmills spinning air compressors, pressurizing the storage tanks to about 175 pounds per square inch. We know turbines attached to generators are being used to generate electricity. All the major power plants use turbines, even hydro-electric power plants. But instead of generating power the old fashioned way, our mechanism could be designed to be far more energy efficient.

Thousand River Environmental Energy (TREE) has designed devices that consist of pneumatic cylinders inside of hydraulic cylinders. In that design an air cylinder with a very long stroke is attached to an adjustable lever. Using that leverage to achieve the optimal working pressures of each of the devices requiring energy, in the process of generating electrical power, multiple air cylinders converting air into hydraulic oil pressure would be used to spin steeply geared transmissions attached to electric generators. This process of electrically cooking food, powering lights, fans, or electric/gas hot water heaters, would reduce natural gas usage. New generation refrigeration and air conditioning units are taken off the power grid, as this type of

¹<http://www.wipo.int/pctdb/en/wo.jsp?WO=2007146807>

technology compresses refrigerant directly from air pressure, similar to the way ice was made with the steam engine.²

All existing electric wheelchairs, golf carts, and lifts stay battery operated, as they will be charged during off peak energy hours, usually at night time. Police, fire, ambulance, delivery, and sanitation vehicles all take as much stored energy along as possible. The stored energy is contained in carbon fiber tanks, holding as much as 4000 pounds per square inch of compressed air beneath the vehicle, and in what used to be the engine compartment.

An additional rechargeable battery pack will help give these vehicles a respectable range and power for today's needs. These vehicle designs use some of the same designs used for operating electrical generators, except that hydraulic oil or possibly vegetable oil would be inside the air charged canister. In vehicle drive line applications the pressurized fluid is released against the pistons of multiple energy efficient hydraulic cylinders. Each cylinder placed at different gear ratios launches the vehicle from the start position. Once the vehicle begins to move faster, fluid is shut off to the cylinders attached to the lower gear ratios. At freeway speeds only one cylinder would remain active. As the vehicle begins to go up a hill, as many cylinders as necessary will become activated. This process begins to send much more spent fluid to a spent fluid canister, indicating to the driver how much of a negative energy loss is occurring. The opposite happens when going down a hill, indicating to the driver how much of a positive energy gain is occurring. That means how much spent fluid is being pumped back into the hydraulic accumulator tanks, either by battery power or by a hydraulic pump engaged to the driveline, similar to the regenerative hydraulic braking in some UPS trucks.³ The energy used by regenerative hydraulic

² www.memagazine.org "It's a cool story"

³ www.hybridtruck.net "Coke & UPS Embrace Hybrid Technologies"

braking enters the accumulator tanks at a rate of 70 percent of the energy recovered. Compared to electric regenerative braking, energy can be returned to the batteries at only 30 percent.

The systems we are describing have many more features. Regenerative hydraulic braking and electric regenerative braking can also capture energy from bumps on the roads. In this application, hydraulic shock absorbers are designed like a double action hydraulic pump handle. This device, attached to each axle near the wheel can be used to return spent energy to either the hydraulic accumulator tank or to the batteries. It can also engage an air compressor to return spent energy to the separate turbo boost tanks.

After the regenerative pneumatic braking⁴ system captures energy, that energy can now be released into the air cylinder inside of the hydraulic cylinder. Vehicles exposed to sunlight can gather energy with solar panels located on the trunk lids, hoods, and tops, allowing battery operated pumps to switch on, pumping spent fluid back into the pressurized accumulator tanks. When that process has been completed the sun's energy will then be used to top off the charge in the batteries, activating a battery operated air compressor which returns compressed air to the turbo boost air tanks

In other applications, a majority of rides at the Fair would be converted to this type of energy driveline, allowing regeneration of these rides during off peak energy use hours. An additional source of compressed air energy piped in from between three and five miles away would be paddle wheel type boats, anchored in strong river currents that would capture surface river currents to spin on-board air compressors, providing compressed air energy at safe pressures 24 hours a day, seven days a week. With all this equipment working properly, it's not hard to see how these devices would lower our dependence on foreign oil. They also lower the

⁴ www.hydraulicspneumatics.com

pollution levels in any city where they are implemented. This will improve health and lower health care costs. More money stays in the United States, strengthening our financial system. Vehicles and devices may be regenerated from the safety and comfort of your home. The price of products and services would be reduced. Transportation to and from the Fair would cost less.

Minnesota and the Minnesota State Fair would become more appealing to Fairgoers and out of state visitors. People would say, “Hey what about the animals?” A display could be created where horses or other animals are attached to a 20-foot-long pole, so that when the animals are getting groomed and exercised they could generate as much energy as they are comfortable with, by spinning electrical generators, air compressors, or water pumps.⁵ As these types of displays become more popular, other animal demonstrations will become more common. You will see animals operating the energy pole, where they will be automatically brushed, fed, and watered.

Children in South Africa are doing the same kind of thing in school play yards.⁶ The United States of America helped pay to have wells drilled and pumps installed with merry-go-rounds attached, so children could pump clean water for their people without using electricity. Those devices capture the kinetic energy of children’s play to power a water pump.

The Minnesota State Fairgrounds is a great location to display and educate more than one million annual State Fair visitors⁷ about the latest advances in technology, and where a permanent energy technology center should be located. This technology center would not only power the State Fair for twelve days, but would serve general neighborhood power needs in the surrounding community year-round. In high density areas, equipment would be paid for quickly

⁵www.tvnewsday.com/articles/2007/08 “WCCO Minneapolis tries for ‘human-powered’ newscast”

⁶ www.bbc.co.uk “Why pumping water is child’s play”

⁷ www.mnstatefair.org Home page

by including state and federal buildings heated and cooled with these new cutting edge green energy technologies. Both Minneapolis and St. Paul are located along the Mississippi River.



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The river was used to power saw mills and grain mills that were located in the St. Anthony Falls area, but now, instead of lowering the river's level, only the surface currents need to be harnessed. Soon all of the best technologies would be in place. Parks, libraries, and other city, state and government buildings could cut their heating and air conditioning costs, leading to lower property taxes. People living in apartments should see their rent reduced. Grocery stores, clothing stores and even the post office would have lower operating expenses, resulting in lower prices on food, clothing, and even postage stamps. Refuse can be hauled to locations nearby, and recycled or burned to create energy. Almost nothing would be hauled to landfills. The Fairgrounds provide separate bins for people to dispose of corn cobs, and within the hour horses, cattle, sheep, swine and poultry are all having lunch on the food we throw away. Cooking oils could be reclaimed or burned in diesel electrical generators, electrically melting the waste thermo plastics into shoes, toys, and tools, to be sold during our demonstrations. Plastic waste can be

⁸www.cityclicker.net/mplscard/postcardimages "St. Anthony Falls"

transformed into flip-flops.⁹ Thenakedscientists.com describes how to re-melt plastic debris and pour it into molds to make shoes and other items. Other waste reduction strategies include recycling clean cardboard and paper. Our demonstrations would show how to turn those items into other useful products.

Yet burning also has its place, if done judiciously using modern technologies. An Internet search of “Hiawatha Power Plant South Minneapolis Power Co-Op” would demonstrate similar burning technologies using waste tree branches from the Twin Cities metro area, burned at such a high temperature that 90% of the harmful contaminants are burned off.¹⁰ When that style of furnace is coupled with wood gasification boilers¹¹ using wood scraps compacted into log form, together with the fair’s discarded paper cups, plates, and even the sticks State Fair food is served on can immediately be burned during demonstrations. Not only would this be the healthiest action that could be implemented to slow global warming and avoid using landfills, it would also be the single largest program designed to lower health costs, prevent some cancers, reduce respiratory diseases and blood disorders by removing billions of tons of contaminants from our air, water and soil.

⁹ www.thenakedscientists.com “Science Questions”

¹⁰ www.neighborsagainsttheburner.org “Twin Cities Daily Planet: Green Fuel or Greenwashing?”

¹¹ www.alternateheatingsystems.com/woodboilers.htm “Wood Boilers”