



The Verdant Element



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WIND POWER

Wind is a renewable resource which is very efficient and produces no emissions. In Denmark, 20% of their power is wind generated. Globally over the last five years wind energy harvesting has increased over 32%; with large projects in Canada such as the Bear Mountain Wind Park located close to Dawson Creek becoming operational. With wind power, size matters. The most important thing to consider is rotor diameter, followed by tower height, location, and wind resource availability. Wind is a fluid and the energy it provides is a cubed factor of the wind speed. Not all wind is created equal and the higher (less dense) air has less friction. A small difference in wind speed creates a compound effect which changes the amount of energy produced dramatically. Recommended tower height is 24-37 meters (80-120 feet). Minimal average annual wind speeds of 4.0-4.5 meters per second (14.4-16.2 km/hour or 9.0-10.2 mph) for a small wind turbine are required for cost-effectiveness.

There are several types of wind turbines available on the market. Small wind turbines are classified as producing less than 100 kW of electricity and are generally found on farms and homes and are used to offset power requirements. Wind turbines that produce 20-500 watts are used for recreational purposes or to charge batteries for boats and multipurpose vehicles. Large wind turbines that can be found on wind farms can produce several megawatts of power. There are two types of wind turbines; vertical axis and horizontal axis. Horizontal wind turbines have a tail-vane which points them in the direction of the wind. Vertical axis wind turbines work with wind in any direction but are less efficient and require more ground space to support their guy wires. Although some manufacturers report that you can put a small wind turbine on the roof of a building do not do this! The resonance created by the wind turbine can cause structural damage over time.

Before you purchase a wind turbine, do your research. Not only into what type of wind turbine will work for you, but into reputable suppliers and companies. It is very difficult to compare different manufacturers as there is no standardized output rating. To be able to do a comparison you may have to do some calculations such as: finding the shear factor, energy curve, gross energy production and energy yield. There are many available resources to help you such as Retscreen (www.retscreen.net), CANWEA (www.canwea.ca), AWEA (www.awea.org), and the Canadian Wind Atlas (www.windatlas.ca).



ALTERNATIVE ENERGY DAY

On June 23 an Alternate Energy Day was held at our Fork Kent LARA office. There was a wide range of authorities on several different points of interest. People came to learn about going off-grid using solar power, wind power, solar water heaters and alternative livestock waters and geo-thermal heating and cooling. If you have questions about any form of alternative energies please feel free to call Kellie at the LARA office at 780-826-7260 or any of the following people who presented on June 23rd.

For Solar Panels and going off-grid:

SolarPanel.ca
Shane Johnson
www.solarpanel.ca
1-866-892-0132

Solar Thermal Heating:

Muriel Creek Sunshine Ent.
Greg Sawchuk
www.wsetech.com
780-812-2561

Wind Power:

Alternative Solutions Canada Corp
Dave Holmberg
www.alternativesolutionscanada.com
780-940-7744

Alternative Livestock Water:

Frostfree Nosepumps Ltd.
Jim and Jackie Anderson
www.frostfreenosepumps.com
1-866-843-6744

Geothermal:

Alf's Geothermal and Drilling
Darren Winczura OR
Brian Vitek
www.alfgeo.com
780-336-5224
780-336-5527



Producers attending Alternative Energy Day

GEOTHERMAL ENERGY

The temperature of the center of the earth is thought to be between 5300°C and 7000°C. This energy is the result of primordial heat and radioactive decay. We can use this energy for both electricity and heating/cooling. Geothermal energy is reliable, clean and renewable. The first geothermal power plant was created in 1904 in Larderello, Italy and is currently operational. The greatest geothermal resource is found along the 'Ring of Fire' where tectonic activity occurs, and there is more heat closer to the earth's surface. Iceland generates 17% of its electricity and 87% of its heating from geothermal sources.

GEOTHERMAL CONTINUED

There are many forms of geothermal energy capture. Flash geothermal is used when there is access to higher temperature sources, and hot high-pressured water is brought up to a low temperature chamber where it vaporizes and drives a turbine to produce electricity. The steam is either released into the atmosphere or once cooled injected back underground. Binary geothermal, uses hot water pumped up from underground to a heat exchanger transferring the heat to a secondary loop system containing a binary fluid (with a lower boiling point) which vaporizes and powers the turbine. In the binary system the water is in a closed structure so after the water cools it is injected back underground.

Geothermal heating (also known as GeoExchange) takes advantage of the Earth's ability to maintain a relatively stable temperature (which keeps our basements cool in summer and warmer in winter). The upper six feet of the Earth sustains a temperature around 10°C. Geothermal heating/cooling is generally composed of three parts: ground heat exchanger, heat pump unit, and delivery system of duct-work or in-floor pipes. It is a closed loop system with pipes that contain a carrier fluid (usually water mixed with a form of anti-freeze). As the fluid is pumped underground through the loop the fluid absorbs heat from the ground which upon entering your house through the foundation is extracted and is used to heat your home. The now chilled fluid is pumped back underground to be heated again by the earth. In summer the system works in reverse where the fluid is pumped underground to relinquish the heat, and then brought to the surface to run through the exchanger to cool your house. Geothermal loops consist of several different formations which depend mostly on the area.

Horizontal loops are most common especially to rural areas. A trench is dug six feet deep and 300 feet long and the piping is laid out and covered.

Vertical loops use less land space and are suited to urban areas. Vertical holes are bored into the ground 180 to 540 feet deep. The piping is inserted and then filled with bentonite grout.

A pond or lake loop can be created if a pond or dugout is appropriate in size and over eight feet deep the loop system can be submerged to the bottom of the water body.

Open loops use high capacity water wells withdrawing ground water and pumping through a heat pump discharging the cooled water back into the same aquifer through a second well. These are found on rural properties.

Geothermal heating and cooling can be used for a wide range of applications from use in homes and shops to greenhouses. They are energy efficient, for every one unit of electricity used it provides five units of heating and cooling. Geothermal has the potential to reduce heating and cooling costs by up to 75% (www.geosmartenergy.com).

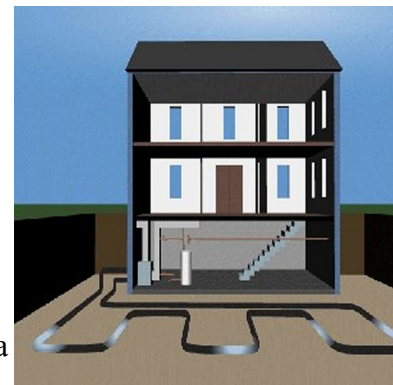


Diagram of closed loop system



Riparian Health

A riparian area is the margin between the upland and a water course. The area is influenced by water and how and where it flows and is reflected in plants, soil characteristics and wildlife. Riparian areas have a huge role in water quality, quantity and biodiversity. They provide eight key features: trap and store sediment; build and maintain banks and shorelines; store water; recharge aquifers; filter and buffer water; reduce and dissipate energy; create primary production; and maintain biodiversity.

In 2008 a study was done on riparian health province wide. It was found that 26% were unhealthy, 22% were healthy, and 52% were healthy with problems. In Alberta riparian areas make up 2-5% of the landmass.

Wetlands are an important part of our landscape. They provide us with recreation opportunities such as boating and wildlife watching. They can stabilize the flow of water acting as a natural sponge, preventing flooding in wet years and recharging ground water in dry years. They can influence local weather as they are slow to heat up and cool down. Areas with drained wetlands are up to 5°C cooler in winter. They are vital to wildlife as eight out of ten species require wetlands for some portion of their life cycle (food, water, and habitat). In Alberta 64% of our wetlands have been lost or impacted.

Cows and Riparian Areas

Cows will often stay within 300 meters of a water source. Besides water, riparian areas with trees/brush also provide shelter and shade. By not grazing riparian areas during sensitive times or providing alternative watering systems and shelter we can sustain our water source, create better utilization of pastures improving nutrient management and water quality, increase forage production, and decrease erosion of stream banks and shorelines. Animal health and performance are superior when given access to clean water. Research has shown that when cows have the option of drinking out of a trough or along an unfenced creek, 80% of cows would use the trough. Access to clean water increases animal performance and has shown improved growth in yearlings by as much as 23%.

BIZARRO

by Dan Piraro



Dugout Management

Dugouts are a good source of water but may encounter problems over their lifespan. To ensure a quality water source and increase the longevity of a dugout they should be inspected for signs of animal entry (both domestic and wild), failure of aeration, algae growth, damage to buffer areas and erosion, and water quality (turbidity, colour, smell etc). Records should be kept. Dugouts built properly (minimum 13 feet deep, 1.5:1 slope, the spoil pile either removed or leveled out and grassed, and big enough for a two year supply of water) will provide a dependable source of water. Trees around the dugout are good for snow trap, but must be setback to prevent roots from breaking through the clay liner reducing natural aeration and prevent debris from falling leaves and branches from adding organic matter to the water. Deciduous trees should be no closer than 50 meters from the bank and 20 meters for coniferous trees. Here are some trouble-shooting tips for common dugout problems:

Problem	Causes	Treatment
Black smelly water	Depletion of oxygen due to algae growth, plant decay or no aeration. Damaged or improper intake pipe.	Install or fix aeration, change diffuser at the bottom. Control weeds and algae. Physically remove decaying matter. Raise intake pipe.
Dirty water	Soil erosion, human activities, and animals such as ducks, muskrats and salamanders.	Coagulation. Plant vegetation and soil erosion control. Create a two dugout filtration system.
Algae	There are many types of algae; most common is green algae and blue-green algae (cyanobacteria which are toxic).	Aeration and prevent nutrient overloading. Algaecides or Copper Sulphate (bluestone).
Vegetation	Some types are beneficial (providing shade, take up excess nutrients, and lowering water temperature) and some are harmful	Physical removal (raking, mowing), biological control (weevils), registered herbicides, aeration/diffuser.

If you would like to complete a riparian health assessment, or would like more information please contact the LARA office at 780-826-7260 or Cows and Fish at 780-427-7940 or <http://www.cowsandfish.org/index.html>



THE GREAT DEBATE



**It takes roughly 8000
liters of water to make
one pair of denim jeans
and 1700 liters of
water to make a cotton
tee-shirt**

Water has always been a contentious issue. In Alberta 80% of the population lives where only 20% of our water resources are located. Securing a safe and sustainable water source is becoming a more prominent concern as the province is heading into allocation and changing regulations. In southern Alberta new water licenses have not been issued since 2006, with the majority of water allocation currently going to agriculture, primarily irrigation. Although much of the water returns to the water cycle many do not realize that we are exporting our water as embedded water in our marketable goods. Of the world's water sources 97% is too salty for use and of the 3% fresh water roughly only 0.3% is surface water, 30% is groundwater and the rest is snow and ice (The Atlas of Canada). Compared to surface water very little is known about groundwater. In Alberta, over half a million people rely on groundwater sources. Many countries that have a physical water scarcity and are dependent on ground water sources are depleting them at a rapid rate and are using a large portion of the water resources for irrigation. These groundwater sources are not replenishing which has dire consequences for the future. These countries are going to be forced to import water, of which a large portion will be embedded through raw and processed food.

Although many people profess that Alberta has a surplus of water, there are arguably many experts that do not agree. As seen in Southern Alberta, shortages are already occurring. In Okotoks in 1998, the local government had to find a sustainable policy of smart growth versus finite planning. They had enough water licensed to serve 24,500 people with a population of 10,000 (in 1998). This meant that they would tap out their water source within two to three years with projected population growth. Okotoks municipality became the first to develop The Legacy Plan with growth targets dependant on infrastructure and environmental carrying capacity. They based their sustainability framework on four pillars: environmental stewardship, economic opportunity, social conscience, and fiscal responsibility (<http://www.okotoks.ca/home.aspx>). By changing the way people used and thought about water, Okotoks managed to decrease water usage by 50%. So after having the population increase to over 23,000 currently, the

overall water usage has decreased and allows for the community to be within the environmental carrying capacity of the Sheep River.

As Mark Twain said “whiskey is for drinking; water is for fighting over”. Within the land-use frameworks thresholds for water quantity and quality can be set. As well, the government is currently reviewing the Water Allocation Management Systems (WAMS). There are talks of a market system for water allocation. As seen in Australia this system does not work as many producers are paying for water that they are not receiving. So now, as Alberta looks to the future I urge you to get involved; contact your MLA or your local watershed group with your concerns.



ZERO WASTE INITIATIVES

The future of farming is changing. There is now a movement towards zero waste. At the Alberta Innovates Technology Futures (AITF or previously known as the Alberta Research Council) there is a great amount of research into biofibres and biomaterials. Most of their current research is with hemp and flax to develop higher value crops, reduce waste, and provide a sustainable future. The Northern Adaptive Flax project is aimed at species that are drought tolerant, can be seeded in colder spring soils and that have a higher oil content.

Early in the new year an innovative addition will be made to the AITF as the Alberta Biomaterials Development Center (ABDC) will open in Vegreville. The ABDC will have a one ton an hour capability where the baled material (such as hemp, flax or cereals) will be quartered with a guillotine, then undergo a dry mechanical processing which is called decortication. Decortication separates the fibre into long technical fibre, hurd, and dust. The dust, which can be pelleted, can be incinerated and used for bioenergy. Hurd which constitutes approximately 50-60% of the in-feed would be further processed to create panel boards, which are then used to make furniture. In one instance a manufacturer used fibre board treated with resin in place of fibre glass to make a boat. One attractive property of this is that biofibre board is much lighter than fibre glass. Other biomaterial products include textiles (cloth made from stinging nettles), hemp-fibre insulation (www.steico.com), mats for erosion control, and hempcrete (which is hemp hurd added to cement). For more information: www.albertabiomaterials.ca or contact Richard Gibson from the Alberta Research Council at 403-210-5325. Biochar is another zero waste initiative. Using biomass, such as agriculture and forestry residues and municipal solid wastes, it is composed from the pyrolysis (carbonization) of the biomass into charcoal. Pyrolysis, which is the thermal decomposition of biomass with no oxygen present, allows for by-product gases and oils to be collected and used as a fuel source for other applications. Biochar can be used for several different applications from soil amendment and filter media to growth media for greenhouses. Biochar, as a soil conditioner, can prevent leaching of nutrients from the soil by absorbing certain nutrients reducing mobility and increasing the availability to plants, therefore reducing fertilizer requirements. Biochar also increases the soils potential for water retention reducing irrigation and increasing drought resistance. It is most beneficial to poor quality soils, improving soil acidity. Another benefit of biochar is its potential for carbon sequestration and has been shown to reduce nitrous oxide and methane emissions from soil. For more information on Biochar contact Don Harfield at 780-632-8271.

Pictures from left to right: gas and oil isolator of the continuous pyrolyzer; batch carbonizer at AITF; wheat straw biochar sample; coconut coir which is traditionally used as growth media in greenhouses; hemp field at the AITF



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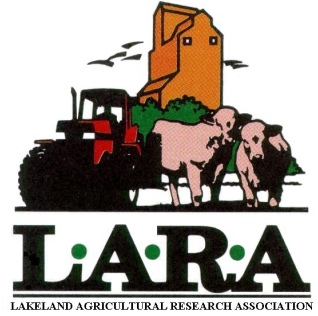
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Sustainable farming encompasses a wide range of practices and principles; combining environmental stewardship with profitability and ensuring that the family farm will be there for generations to come.



WEBSITES OF INTEREST

LARA

* <http://areca.ab.ca/lara>

Water Not For Sale

* <http://www.ourwaterisnotforsale.com/>

Okotoks Legacy Plan

* <http://www.okotoks.ca/default.aspx?cid=1115&lang=1>

Agri-Environmental Partnership of Alberta

* <http://www.agpartners.ca/content/Default.aspx/>

Geothermal Energy

* www.geosmartenergy.com

Cows and Fish

* <http://www.cowsandfish.org/index.html>

Alberta Biomaterials

* www.albertabiomaterials.ca

Alberta Innovates Technology Futures

* www.albertainnovates.ca

* www.arc.ab.ca

Alberta Agriculture Stewardship Funding

* www.growingforward.alberta.ca

Climate Change Central - Carbon Offset Solutions

* <http://www.climatechangecentral.com/>

* <http://carbonoffsetsolutions.climatechangecentral.com/>



Flax Flower From Northern Flax Trial



Water for Life; Water for All

**IF YOU ARE INTERESTED IN
COMPLETING OR UPDATING
YOUR ENVIRONMENTAL FARM
PLAN PLEASE CONTACT
KELLIE AT LARA.**

