

GREEN MATTERS

A newsletter from the Alberta Environmentally Sustainable Agriculture Council

Energy & Sustainability

From AESA Council's Chair

by Bruce Beattie

Alberta Milk Producers



Courtesy of Alberta Agriculture, Food and Rural Development

In this issue of *Green Matters* are examples of forward-looking individuals and companies who understand the relationship between energy conservation and sustainability. At the Alberta Environmentally Sustainable Agriculture (AESA) Council, we support the development of sustainable practices, both on the farm and in the processing plant. With technology and plain common sense, costs can be cut while environmental impacts are reduced.

Modern agriculture depends heavily on relatively cheap energy to run our tractors, pumps, fans and feed mills. Having electricity has become so automatic, that even during a power outage I find myself being surprised when the lights don't come on when I flick the switch. The dramatic increase in prices for fossil fuel and recent events in the United States bring home the message that these times of cheap energy are drawing to a close.

Several factors have combined to create a situation of energy demand outstripping supply in a number of U.S. states. California has been particularly hard hit, with rotating power outages over the past few months. The initial response has been to focus on searching for greater supply, rather than reducing consumption. More recently, President Bush has shown a better

appreciation of the implications of global warming, creating hopes for a focus on more efficient use of and reduced dependence on fossil fuels. It has been estimated that as little as a 1.5% reduction in use would save an amount equivalent to all the oil in the new fields in Alaska.

A recent trip to Cuba brought home to me the impact of a sudden loss of access to fossil fuels. With the loss of Soviet support and the ongoing U.S. embargo, Cuba was without fuel to run trucks and tractors. Food supply became a critical issue. Land in cities was converted to intensive production, with a combination of hand labour and organic manures, to grow fresh vegetables for urban dwellers. In the countryside, agriculture has reverted to mules and oxen to till soil, with horses and carts for transportation.

We are a very long way from the situation in Cuba, but a lesson should be learned. We need to improve our methods of conserving energy. In the future we can expect tighter energy supplies and higher prices, but also more cost-effective energy-saving technologies. Our industry will be sustainable if we are able to adopt these improved technologies – if we have both the information needed to adopt and sufficient market returns to invest in them.

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Issue No. 7, Spring 2001



Winds of Opportunity

Rising energy prices have started many people thinking about alternatives, including "green power" options like wind, solar and biomass energy. Bill Van Rootselaar was well ahead of his time when he began selling wind energy into the Alberta power grid more than a decade ago.

Van Rootselaar's mixed farm is located near Fort MacLeod, in the windy landscape of southwestern Alberta. In the late 1980s, the Van Rootselaars assessed the wind data for their area and set up a small test unit to choose a site with good wind conditions. Then they erected two wind turbines and came on stream as part of a program to allow some small, environmentally friendly projects the opportunity to sell energy to a utility. "When we started, it was very difficult for small, private operators to get into the game," he says. "But we did, in spite of all the red tape and what have you."

For landowners interested in generating power for sale into the grid, Van Rootselaar says, "I think you want to go in with your eyes wide open." Today, power generated in Alberta is sold to the Power Pool of Alberta (see "Green Power Information"). He says, "The Power Pool makes it easier for smaller units to feed into the grid." However, he notes that prices are highly variable and the system as a whole is more complex than it was a decade ago.

For Van Rootselaar, his wind energy venture has had many positive outcomes. On his farm,

"It's definitely had a positive impact in reducing our energy costs." It has also made a contribution to Alberta's energy supply by providing power during peak demand times. And it has been a learning experience. "It's not only helped me learn about wind generation but about how our whole system works in so far as generation, distribution, the power companies, the rural electrification associations, which are co-ops, and I've gotten involved in that due to this. To me it was a lot more than just putting a couple of windmills up

and producing energy. It's all the other stuff that's come out of it as well."

Fred Gallagher, president of the Canadian Wind Energy Association (CanWEA), notes that wind power generation is

not for everyone. Not every piece of land has the wind conditions needed for power generation, and the set-up costs are high – a large state-of-the-art turbine currently costs more than a million dollars.

Leasing may be a more practical option for some farmers, Gallagher says. "Leasing land to a wind energy developer with the expertise and financial backing to develop a wind energy facility allows a farmer to gain risk-free income from wind energy." He says leasing can provide "a very healthy lease payment, better than the standard for oil and gas." He also points out that wind power facilities don't occupy a lot of land – a turbine tower is about 5 m wide – so farmers and ranchers can continue to use the land for agriculture.

Wind turbines in southern Alberta

Wind energy also generates benefits to the wider community such as zero greenhouse gas emissions, conservation of non-renewable energy sources, and economic growth by contributing to the municipal tax base and providing jobs. Van Rootselaar sees the expansion of wind power facilities in the Pincher Creek area as a positive sign. He says, "A whole new business has come up because of wind power."

"A whole new business has come up because of wind power."

Green power information

If you'd like more information on energy alternatives, try starting with the following:

- For wind energy information, visit the CanWEA website at <http://www.canwea.ca>.
- Information on the Power Pool of Alberta, which operates an open, competitive spot market for all electricity traded in Alberta, is available at <http://www.powerpool.ab.ca>.
- Call the Alberta Renewable Energy Test Site at 403-329-1212 for information about on-farm uses for wind and solar power.
- The Natural Resources Canada website at http://nrcan.gc.ca/es/main_e.htm has plenty of practical information on wind, solar and biomass energy.



Crop and livestock products can be used to produce biofuels.

You've probably heard about methane being collected from municipal waste treatment systems for use as fuel. Now, some in the agricultural production and processing sectors are taking a closer look at the methane-producing potential of agricultural byproducts.

Fueling beef processing

With funding assistance from AESA's Processing Based Program, the Cargill Foods plant north of High River is assessing the feasibility of recovering methane from its wastewater lagoons. The methane would be used as a supplementary fuel in the plant's boilers, to reduce the plant's consumption of natural gas.

This beef processing plant has slaughter, fabrication, rendering and hide operations. It currently processes about 3,850 head per day. The plant uses 1.5 million imperial gallons of water daily, says Dale Paton, wastewater treatment plant superintendent. The resulting wastewater is treated in a series of steps, including a biological process that produces methane.

"Methane is generated in the plant's two anaerobic lagoons in two steps," Paton explains. First, acid-forming bacteria break down organic material into organic acids. Then, methane-forming bacteria convert organic acids into biogases – mostly methane and carbon dioxide, with small amounts of other gases like hydrogen sulfide and ammonia.

Along with reducing the plant's consumption of non-renewable energy, methane recovery would reduce air emissions, notes Sam Girgis, capital projects manager at the plant. By capturing the biogas, Cargill would lower emissions of methane, a potent greenhouse gas, and also reduce occasional odour problems from the lagoons.

The feasibility report to determine whether to proceed on the design and construction of the methane recovery system is expected later this month. Girgis says the report will answer a lot of key preliminary questions. These include "the calculated – and I want to highlight that word – the calculated or anticipated volumes of biogases that will be generated, that's the first question that we'll answer. The second one is: how much of the gas is pure methane, how much of it is other gases?" Other questions include: how should these other gases be handled before the

biogas is sent to the boiler, what kind of controls are needed in the wastewater treatment plant to control biogas generation, and what are the estimated costs for design and construction.

For more information on this project, contact Sam Girgis at **403-652-8445**.

Manure power

Another methane source attracting attention is livestock manure. It has excellent potential but it's not for every farm, explains Robert Borg, a livestock engineer from Alberta Agriculture, Food and Rural Development.

Borg says the technology to generate and use methane from manure is well known, but it requires a considerable investment of money, management and manure for success. "You need to have the economies of scale. For example, a 1200-sow farrow-to-finish operation is providing manure for a comprehensive hog manure treatment and co-generation facility in Saskatchewan."

In the Saskatchewan project, anaerobic digesters will generate methane from manure to produce electricity and heat for the hog barns. The treated liquid and solid manure will be used for fertilizer and composted to produce soil amendments.

"You need to have the economies of scale."

Energy crops for ethanol, biodiesel and more

Methane gas is just one type of *biomass* energy. Biomass is plant and animal material used for energy production. Other fuels from biomass include ethanol (see "*Reducing Processing Energy Costs*"), biodiesel (which can be made from canola oil), wood pellets and perennial grasses.

Producing crops for biomass energy could be a growing opportunity in the future. Recent developments in biomass energy technologies include: improvements in biomass combustion systems; pelleting tests of perennial grass for burning in specially designed stoves; and advances in biodiesel technology.

For more information on biomass energy, visit http://nrcan.gc.ca/es/main_e.htm, <http://www.reap.ca>, <http://www.ott.doe.gov/biofuels/> or <http://bioenergy.ornl.gov/>, or call the Alberta Renewable Energy Test Site at **403-329-1212**.

Improving Farm Energy Efficiency Today

Conserving energy isn't just about adopting new innovations. "Many proven ways to conserve energy can play a vital role in keeping your farm's energy costs down," says Murray Green, farm machinery engineer for Alberta Agriculture. "Even in crop production, early planting takes advantage of the greater amount of energy available from the sun at harvest, particularly if commodities are dried or aerated." And some measures that reduce energy costs also help other aspects of your operation, from conserving soil and soil moisture to prolonging equipment life.

Here are a few examples of options to trim energy inputs and some recent publications where you can find more information.

Field equipment

The April 2001 issue of *AgTech Center Innovator* has many practical tips to lower fuel consumption by field equipment. For example:

- **Tillage system:** The most effective way to reduce fuel costs for tillage is to till less. Reduced tillage offers other benefits such as increased crop yields (depending on the soil zone and weather), soil moisture conservation and reduced time in the field.
- **Tractor fuel efficiency:** Some ways to improve fuel efficiency are: maintaining tires at the lowest correct pressure for the load the tires are carrying; using the right fuel for the season; and performing regular maintenance. Fuel-saving measures can also prolong the life of the tractor.

For more information, see the *AgTech Center Innovator* (go to <http://www.agric.gov.ab.ca/>) then click on "Newsletters", then "AgTech Center Innovator") or call the AgTech Centre at **403-329-1212**.



Converting this high pressure sprinkler system to a low pressure system lowers irrigation energy costs.

Irrigation systems

Alberta Agriculture's Irrigation Branch has an upcoming factsheet called *Strategies for Lowering Irrigation Energy Costs*. The factsheet provides ideas on equipment selection and maintenance,

and water management to minimize energy costs for pumping water. For instance:

- **Engine efficiency:** Perform regular maintenance, adjustments and tune-ups of the engine or motor that drives the pump.
- **Sprinkler system efficiency:** Inspect the system regularly. Make needed minor repairs such as stopping leaks, replacing worn nozzles, and trimming the impeller.
- **Irrigation scheduling:** Knowing when to irrigate and the amount of water required by the crop, will result in better crops yields and less water lost to deep percolation and runoff.

For assistance with analyzing your own system, contact your local irrigation specialist (at the Alberta Agriculture district offices in Bow Island, Brooks, Lethbridge, Medicine Hat, Taber and Strathmore).

Livestock buildings

The Prairie Swine Centre Inc.'s publication called *Energy Efficiency in Hog Barns – Part 1* (available at <http://adminsrv.usask.ca/psci/energy.htm>) is aimed at hog barns, but some of the practices apply to any livestock barn. Examples of ways to enhance energy efficiency include:

- **Barn maintenance:** Clean and adjust fans, motors, shutters, thermostats and controllers several times a year.
- **Lighting:** Converting from incandescent to fluorescent lights can lead to substantial savings.
- **Manure volume:** You can reduce the amount of manure that must be removed from the hog barn by adjusting the ration through reducing crude protein levels, feeding pellets rather than meal, and feeding enzymes.

For information on reducing energy use in your own livestock facilities, contact Robert Borg of Alberta Agriculture at **403-340-5323**.

Greenhouses

Muhammad Younus of Alberta Agriculture says greenhouse heating costs can have a major effect on the livelihood of greenhouse growers. He has some energy-saving tips:

- **Building maintenance:** To keep the heat in, make sure your greenhouse is well insulated and well sealed.
- **Furnace maintenance:** Keep your furnace well maintained and operating efficiently.
- **Night temperatures:** Reduce the temperature of the greenhouse, generally by about one degree, during the night.

A binder on greenhouse energy conservation is available for \$30. Cheques are payable to the *Alberta Greenhouse Growers Association* and requests should be mailed to: Dr. Mohyuddin Mirza, Alberta Agriculture, Food and Rural Development, Crop Diversification Centre North, RR 6, Edmonton, Alberta T5B 4K3.

Bruce Beattie

Bruce Beattie sees the key role of the 29-member AESA Council as "providing a forum for all the players to sit down and discover that we've got common goals on environmental issues, and that, by working together, we can achieve a lot of those goals. AESA demonstrates the whole agriculture industry's ability to set aside any differences we might have in terms of policies and to focus on environmental issues and agree on a common approach."

Beattie is the chair of AESA Council and represents AESA on Climate Change Central (CCC). CCC is a partnership between Alberta businesses, governments and environmental agencies to help individuals and agencies find ways to reduce greenhouse gas emissions.

"The people make the program work."

On AESA Council, Beattie is the representative for the Alberta Milk Producers (AMP), a non-profit organization that puts forward the interests of Alberta dairy farmers. He is currently AMP's vice chair and a past chair, and he also chairs AMP's research committee. Beattie is active in various other organizations including the Dairy Farmers of Canada. For him, these activities are a way of giving something back to the industry that has provided him with a living and a way of life.

On their dairy farm near Sundre, Beattie and his wife Valerie have about 60 registered Holsteins and a small beef herd. Along with environmentally sound practices like growing perennial forages, soil testing, and nutrient management, the Beatties have made a conscious effort to retain wildlife habitat. For example, they have kept a 40-acre block for forest habitat for small birds and 50-foot wide forested strips as travel corridors for larger wildlife.



Roth and Ramberg Photography Inc.

Why is conserving a healthy, diverse environment important to Beattie? "I believe we have a responsibility to our children and grandchildren." Another vital reason is to maintain society's trust in the industry's ability to operate without excessive controls. He notes, "If you're making your own decisions on stewardship practices, then there's a personal commitment, a personal attachment to what you're doing. As a result, you are likely to do a better job than when somebody else tells you what to do."

AESA's initiatives are helping Alberta producers and processors to meet environmental challenges. Beattie says AESA's success is built on its human resources: "I just want to say how much of a privilege it is to work with the people on Council and our staff at Alberta Agriculture. I'm really impressed by the quality of the people; it's the people that make the program work."

Ken Ditzler

"I think good stewardship is important for farmers to conserve soil, water and air, while producing quality food products for society and future generations," says Ken Ditzler.

Ditzler and his wife Bettie practise a strong stewardship ethic on their third-generation farm near Lacombe. He says, "We have always treated the land as a valuable resource, using forages in the rotation, maintaining grassed waterways, and planting shelterbelts. We used minimum till until four years ago and then converted to zero till on most of our land. Soil and water conservation have always been important goals for us."



Courtesy of Ken Ditzler

In 1994, the Ditzlers took Holistic Management training, a natural fit with the way they farm. He says, "Holistic management considers quality of life and balancing soil, water and air in ecology and economic goals. Even before we attended the training, we had a belief in balancing quality of life, economics and conservation."

For many years, the Ditzlers raised pedigreed seed and fed cattle. Currently they rent about two-thirds of their farm to a neighbour who shares their stewardship philosophy. "On the balance of the farm, we grow hay as a cash crop and grain. We also custom graze cow-calf pairs on 350 acres of native pasture," says Ditzler.

"We have always treated the land as a valuable resource."

Along with farming, Ditzler is involved in a wide variety of activities. For instance, he's a founding member of Preserve Agricultural Land, a group of people who champion retaining good agricultural soils for agricultural use. He's been on the board of the local seed plant for about 30 years and a provincial director of the Association of Alberta Co-op Seed Cleaning Plants for about eight years. He's also treasurer of the Lacombe Community Growing Project, which grows barley for donation to the Canadian Foodgrains Bank, an international food aid and development agency.

Ditzler has been a member of AESA Council and the chair of AESA's Farm Based Committee for the Central Region since AESA started in 1997. The Farm Based Program provides funding for municipalities, agricultural organizations and other agencies for projects to encourage environmentally sound practices by farmers and ranchers. This program and other AESA activities have helped to raise awareness of key environmental issues, like water quality, and encouraged practice change.

Being a part of AESA Council has been "a very rewarding experience" for Ditzler. "The contacts made with a very diverse group of people and learning of their successes and experiences has been a good learning experience.... It gives me a sense of accomplishment to have a part in developing programs that help address the issues facing agricultural producers and processors today."

Reducing Processing Energy Costs: Good for Business & the Environment

"It was simply good business to do an energy audit," says Kerry Keating, general manager of API Grain Processors. "Our energy costs have increased by over \$2 million over the last two and a half years." API Grain is one of 33 agricultural processing companies taking part in an Alberta project offering energy audits.

An energy audit gathers details specific to the

individual processing facility on energy use and the implications of reducing energy inputs, and then tailors recommended energy-saving measures to that facility. Energy use is not only a key input cost, it's also the main source of greenhouse gas emissions for the processing industry. So an energy audit can help a processor find ways to reduce energy costs and lower greenhouse gas emissions.

The API Grain plant at Red Deer is a grain fractionation plant. It uses wheat to produce flour and wheat gluten for baked goods, ethanol as a fuel additive, and livestock feed. At the plant, DukeSolutions Canada, Inc. (an energy services company) did a preliminary walk-through audit to assess energy use and energy-saving options. Then DukeSolutions prepared a proposal and a detailed engineering plan for implementing these options.

"It seems to be a great proposal and we're very

interested," says Keating. The proposed changes include measures to improve energy efficiency and a cogeneration project to produce between 8 and 10 megawatts of power per hour. Waste heat from the plant's turbines will be used to produce steam to heat water for use in processing grain in the plant. Extra power will be sold to the Power Pool of Alberta.

Keating sees important benefits from implementing the changes. "As a ball park figure, we would be reducing our energy costs by about \$2 million through energy savings and electricity sales to the Power Pool. And our greenhouse gas emissions will be significantly reduced because we're using our waste heat."

"As a ball park figure, we would be reducing our energy costs by about \$2 million."

This project is just one way that API Grain is working to protect the environment while improving profits. Keating says, "We are committed to a goal of zero air emissions and zero effluent. We use 80,000 tonnes of wheat, so we're adding value to Alberta agriculture, and wheat stores carbon dioxide, a greenhouse gas. And we're producing ethanol. When ethanol is added at 10% to motor fuel, it reduces tail pipe emissions by about 30%. So we're helping Alberta's agriculture and the environment. That sounds like a win-win-win to me."

Partners in the cost-shared energy audit project include DukeSolutions, the Alberta Food Processors Association, Information Technology Specialists, the Office of Energy Efficiency at Natural Resources Canada, the Process Integration Division of CANMET, and AESA's Processing Based Program. For more information on the audit project, see the Fall 2000 issue of *Green Matters*.

Courtesy of API Grain Processors



API Grain is looking at cogeneration and energy efficiency options.

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Green Matters is the newsletter of the Alberta Environmentally Sustainable Agriculture (AESA) Council. AESA Council consists of 29 representatives from Alberta's agriculture and food processing industry, environmental organizations and government. Its mandate is to: identify and evaluate environmental issues facing Alberta's agriculture and food processing industry; encourage the industry to proactively address these issues; advise the Alberta Minister of Agriculture, Food and Rural Development on these issues; and direct the AESA Program.

The purpose of *Green Matters* is to provide a forum for discussion of environmental issues in Alberta's agriculture and food processing industry.

To subscribe to *Green Matters*, call 780-422-4385.

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