



# Growing Forward 2

A federal-provincial-territorial initiative

## Energy Assessments: What Are They Worth?

A large farrow to wean swine operation located in Southern Alberta had an energy assessment performed on it in 2015. Over the course of the assessment it was found that this farm had one of the largest energy footprints in the Alberta pork industry. Why did this farm have such high operating costs?



Figure 1: Swine operations have high energy demands

For this particular operation the largest energy load was attributed to lighting. The barns had T8 and T12 fluorescent tubes installed throughout and the producer kept them on 24 hours a day, 7 days a week. The original intent of keeping the lighting on 24x7 was to extend the life span of the tubes as the switching on and off of the lights every day can reduce their lifespan

significantly. Replacing the tubes was also quite difficult as they were installed in very high, hard to access locations.

After observing this practice that was intended to reduce operating costs, the energy assessor made recommendations to upgrade to LED or Light Emitting Diode lighting. By upgrading to LED this farm's power demand for lighting could be lowered substantially as the LED's can be switched off to conserve power when they are not needed without significantly lowering the bulb's life span. This would result in a savings of over 200 MWh/year (see right) and over \$25,000 for the first year.

To retrofit the existing lighting with the more efficient LED lighting required a considerable capital cost; however, they calculated that even with the large initial cost of installation, at the current electricity cost rate this upgrade would have a 101% annual rate of return of investment and a payback period of about 1 year if *Growing Forward 2* funding was utilized (see below).



Figure 2: Comparison of Power consumption for before and after recommended upgrade

| Upgrade                | Cost (\$) | Cost After Rebate (\$) | 1 <sup>st</sup> Year Savings (\$) | kWh/Yr Savings | Life (Years) | Payback (Years) | ARR Over Lifespan |
|------------------------|-----------|------------------------|-----------------------------------|----------------|--------------|-----------------|-------------------|
| LED Tube Barn Lighting | \$39,803  | \$25,999               | \$25,511                          | 201.18         | 29           | 1               | 101%              |

Figure 3: Cost savings analysis of lighting upgrade

The assessor also discussed the economic feasibility of implementing a Solar Photovoltaic System after these LED replacements are installed to first reduce the energy footprint of the barn.



Knowing your on-farm energy consumption is not always straightforward. This producer was already making efforts to reduce costs, *but by choosing to invest in an energy assessment he was able to make significantly more economical choices to reduce farm expenses.*

## What are they?



Figure 4: Energy Assessors analyze all farm energy loads

An energy assessment records and analyzes all the different energy loads and the costs associated with those loads on an agricultural operation. The assessor can provide recommendations to the producer for improving practices and technologies to reduce those energy usages, while maintaining

or increasing production. An energy assessor may be able to point out aspects of your operation that with a very small adjustment in practice or equipment could incur significant cost savings.



Figure 5: Barn lighting can make up a large percentage of farm electricity usage

Depending on the type of operation, energy assessors will evaluate electrical loads such as ventilation systems, lighting, pumps, refrigeration and any other on farm electrical equipment. Also, fuel

usage, such as natural gas and diesel, will be measured for things like space heating, water heating, manure removal and feed transportation. In short, any and all energy loads associated with farm production will be measured along with their cost of operation.

**LOWER ENERGY CONSUMPTION = LOWER BILLS**

Energy assessments become really valuable when the assessor makes recommendations to the producer on how to reduce their operation's environmental footprint as well as its energy costs.

## Actual Assessments



Figure 3: Tankless water heaters usually have smaller natural gas demands

As an example of what an energy assessment can reveal, a dairy farm found that their current methods of water heating could stand some improvements. After analyzing the costs, they decided to purchase a tankless water heater.

After only a short period of time, their natural gas consumption had dropped so significantly, 60 percent, that they received a phone call from their suppliers on the matter. Their



natural gas providers were suspicious as to how a dairy farm's consumption could drop that much in such a small amount of time.

Results from an energy assessment are not always large, but they often consist of a number of small adjustments the producer can make that, all together, can have a significant impact on energy costs.

A Greenhouse operation located near Edmonton decided to invest in an energy assessment. Overall the facility was operating at good efficiency; however, the assessors were still able to make a few recommendations in order to reduce the greenhouse's natural gas consumption.



Figure 6: Greenhouses tend to have high natural gas consumption levels

They located some leaks between the walls and roof of the greenhouse, which were sealed, saving wasted energy. This small improvement was calculated to save 60 GJ of natural gas per year and have an annual rate of return of around 33 percent.



Figure 7: Under bench heating

Another simple strategy they recommended implementing was moving the heat pipes in the nursery directly under the tables. This would keep the heat closer to the plants and would therefore allow the thermostat to be set at a lower temperature. The reduction in set point temperature would therefore reduce the amount of natural gas needed and would result in a 55 GJ/year savings with an annual rate of return of 31 percent.

| Improvement                | Cost (\$) | 1 <sup>st</sup> Year Savings (\$) | Savings (GJ/Yr) | Life Years | Payback Years | ARR over life, % |
|----------------------------|-----------|-----------------------------------|-----------------|------------|---------------|------------------|
| Sealing of Roof/Wall Leaks | \$1,300   | \$420                             | 60              | 10         | 4             | 33%              |
| Moving of Heat Pipes       | \$1,350   | \$386                             | 55              | 15         | 4             | 31%              |

Figure 8: Cost savings analysis of greenhouse improvements

A number of other small recommendations were made as well and taken all together, this greenhouse would be able to save almost \$2,000 every year just on energy expenses.

## Growing Forward 2 – On-Farm Energy Management Funding

The On-Farm Energy Management Program, as part of the Alberta Government’s implementation of *Growing Forward 2*, a federal-provincial-territorial initiative, recognizes the value of these assessments. The program offers incentives and rebates to producers for more energy efficient equipment upgrades as well as renewable energy systems like Solar Photovoltaic systems.



In order to ensure that funding being offered in the program is truly making a difference in Alberta’s energy footprint, the program strongly recommends that producers invest in a full energy assessment for their farm. To encourage this, the program provides increased cost share percentages on some equipment for those who have had an assessment done as opposed to those who haven’t.

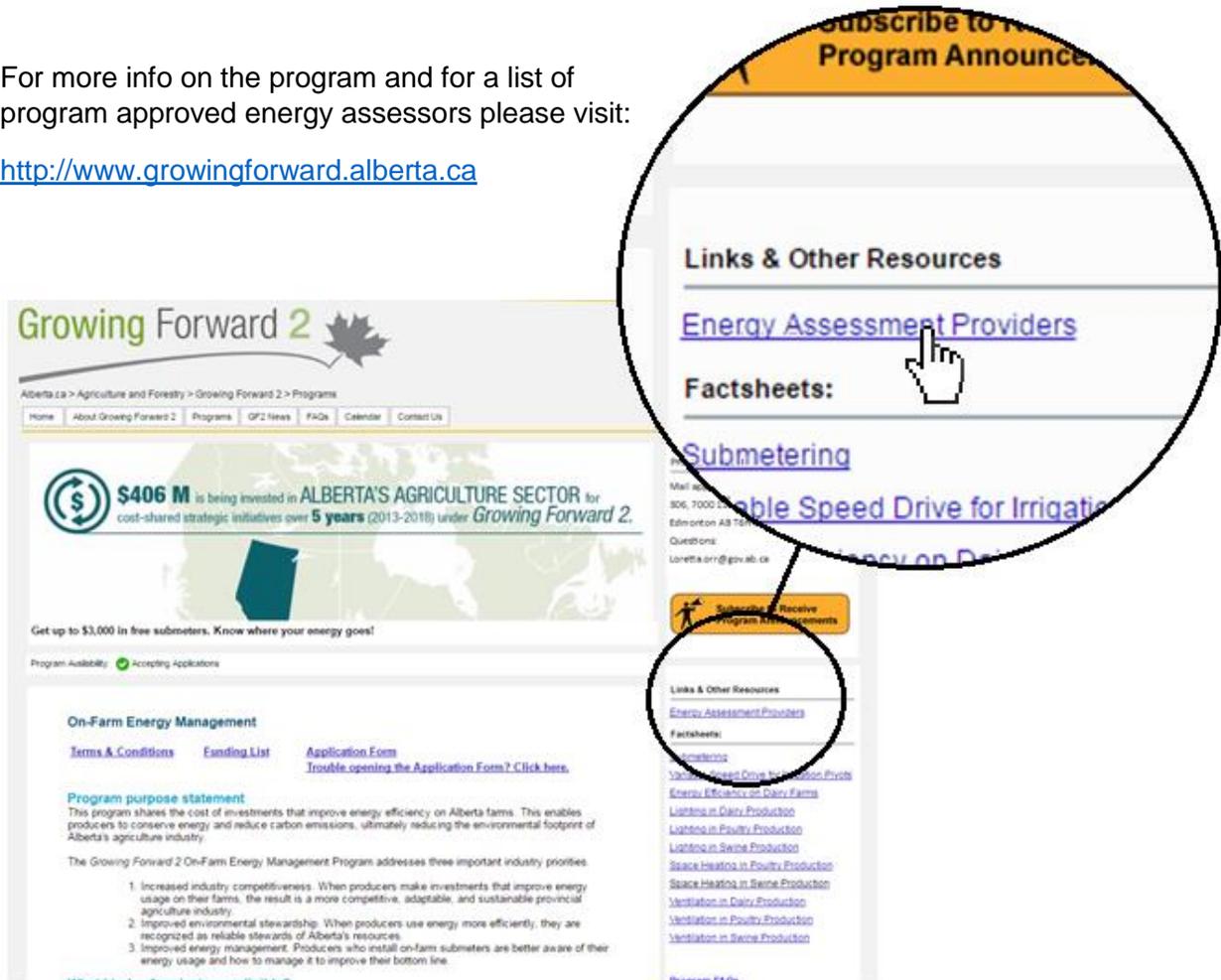
The On-Farm Energy Management Program offers cost sharing incentives for Alberta Producers towards obtaining an energy assessment from a program-approved assessor.

The results being:

- Lowered annual costs,
  - Reduced environmental footprints,
  - Greater opportunity for growth, and,
  - An increased awareness of how your farm uses energy.

For more info on the program and for a list of program approved energy assessors please visit:

<http://www.growingforward.alberta.ca>



If you are a provider of energy assessments, and would like to be approved as an Energy Assessment Provider for this Program, please contact the Program Office at **780-427-3819** for more information.