Connecting to the Grid
– Alberta’s New Micro-Generation Regulations

Solar Energy Society of Canada
– Northern Alberta Chapter
MacEwan College
2009 April 21

www.macewan.ca

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(download this presentation from www.hme.ca/presentations)
Alberta’s Micro-Generation Regulations

- What does this mean to us?
- How do we use the regulations?
- Who can use the regulations?
- Are the regulations as easy as they sound?
- Will they allow us to generate all our own electricity?
- What price will we get paid for our electricity?
- Can we make money at it?
- What will our electricity bill look like?
- What do you do if your electricity delivery company says ‘no’?
Intro: The Prime Focus of this Presentation

Prime Focus
- House-sized micropower systems
- Inverter-based micropower systems using solar or microwind
- Systems grid-connected to EPCOR and FortisAlberta in the Edmonton area
- Regulatory paperwork process for getting your micropower system approved

Not Covered
- Business-sized micropower systems
- Synchronous or induction generators
- Systems grid-connected to other electricity deliver companies not in the Edmonton area
- How micropower systems work, how to design or size them, how to find suppliers, what are the costs and economics (these subjects are covered in other presentations)

You must skate to where the puck is going …not to where it is now.

Wayne Gretzky
Three points to take away…

1. You can generate your own electricity on your house.

2. The new regulations now make it easy to:
   - get approvals
   - sell your excess electricity to the grid.

3. Solar electricity is within your budget.

5 kW solar PV system
Dave Shiflett house
near Devon
Connected to Fortis Alberta

2.4 kW solar PV system
Mel Krisher house
near Sangudo
Connected to Central Alberta REA

People who say it cannot be done
… should not interrupt those who are doing it.

George Bernard Shaw
Intro: My Goals…

- To **empower** and **envision** you to get ready to manage the energy and environmental issues coming upon us

- To help you **understand** the steps to get approval to connect your micropower system to your neighbourhood electricity grid

Every revolution is about power!

2.2 kW PV systems
Premier Gardens, California
We are solar system project developers
We are not specifically equipment suppliers
We have no vested interest in any technology

Our interest is that you choose wisely
- with your eyes wide open
- based on the facts and whether it is right for you or not.
Context: What is the Electricity “Grid”? 

- The grid is the wires and equipment that connects all our homes, farms, businesses and industries to the electricity generating plants.

Electricity fuel sources in Alberta (AESO):
- Coal – 74%
- Natural gas – 17%
- Large hydro – 4%
- Wind – 2%
- Biomass + Diesel – 1%
- Imports – 2%

Most Customers:
- House voltages: 240 and 120 V

Transmission grid from 25,000 volts to 250,000 volts

High voltage transmission tower

Delivery grid 25,000 volts and lower

Transformer and electrical delivery pole

Electrical substation

Source of image: Canadian Centre for Energy Information, 2004

In many ways our future is passing us by, and our energy riches may one day look like fool's gold.

Gary Lamphier
Edmonton Journal
Yes!
The solar electric or the microwind electric system is typically connected to the home, business, or farm.

Electricity fuel sources in Alberta (AESO):
- Coal – 74%
- Natural gas – 17%
- Large hydro – 4%
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- Imports – 2%

House voltages: 240 and 120 V

If you don't like change... you're going to like irrelevance even less.
Who is who in Alberta’s Electric Industry?

Behind The Scenes

- **Electricity Generators**
  - Some 90 big electricity generating plants in the province
  - Owned by TransAlta, ATCO Power, ENMAX Power, EPCOR, Canadian Hydro Developers and many others

- **Alberta Electric System Operator (AESO)**  [www.aeso.ca](http://www.aeso.ca)
  - Government agency that manages the transmission lines, and the wholesale electricity market

- **Alberta Utilities Commission (AUC)**  [www.auc.ab.ca](http://www.auc.ab.ca)
  - The “policeman” that makes sure that everyone is co-operating

- **Alberta Department of Energy**  [www.energy.gov.ab.ca](http://www.energy.gov.ab.ca)
  - Government department that makes the policies and regulations for the politicians
Who is who in Alberta’s Electric Industry?

In Contact With You

- **Customer and Micropower System Owner**  [www.myspace.com](http://www.myspace.com)
  - most important player (that is you)

- **Electricity Delivery Companies**
  - *Runs* the delivery system,
  - *Delivers* your electricity,
  - *Maintains* the power lines, and
  - *Gets things fixed* during a power outage

- **Energy Retailers**
  - *Sells* you your electrical energy
There are some 78 Electricity Delivery Companies… (maybe a bit fewer?)

- **2 private** Wires Owners that are Wires Operators:
  - ATCO Electric, FortisAlberta

- **9 municipally-owned** Wires Owners that are Wires Operators:
  - ENMAX Power, EPCOR D&T, Red Deer, Medicine Hat, Lethbridge, Cardston, Fort Macleod, Ponoka, Crowsnest Pass

- **6 Rural Electrification Associations** that are Wires Operators
  - South Alta REA, Central Alberta REA, Battle River REA, Rocky REA, North Parkland Power REA, Lakeland REA

- **61 (?) Rural Electrification Associations** that are Wires Owners only
Who is your Electricity Delivery Company?

- Your electricity bill is sent to you by your Energy Retailer

- Find your Electricity Delivery Company on the second half of your electricity bill

- Your bill will have
  - on the first half:
    - energy purchase and administration charges on it from your Energy Retailer
  
  - on the second half:
    - energy delivery, administration, riders and other fees on it from your Electricity Delivery Company (EPCOR D&T in Edmonton)

Until there is awareness there will be no consensus to change.  

Martin Luther King Jr. America
“Merchant Power” Generators

Connection: Electricity Delivery Company’s electricity transmission or delivery grid

Energy sales: AESO’s wholesale electricity market

- Only sells to the grid.
- Services it can sell:
  - energy,
  - power (capacity),
  - spinning reserve,
  - voltage support,
  - power quality (power factor, etc)

Alberta’s Micro-Generation regulations do not apply to Merchant Generators.

All merchant generators can always be connected under the standard connection regulations.

We can't solve problems by using the same kind of thinking we used when we created them.

Albert Einstein
Load-Offset Electricity Generators

- Used to enhance site electrical security (if a battery bank or fuel generator is included).
- The generator can be considered as a back-up to the grid.
- Can sell to the grid.
- Can buy from the grid.
- For fuel-based systems, the generator’s controls can follow the changes in on-site electricity consumption.

Canada’s Micro-Generation regulations are designed for load-offset systems only.
Solar Electricity

The technology is called "photovoltaics", but we only call it "PV".

Solar PV Cell

PV can generate any amount of electricity. Large PV systems = more PV modules.

Solar PV Module

Solar PV Array

5,000 modules
1000 kW

20 modules (120 W ea.)
2400 W PV array

55,000 modules
(200 W ea.)
11,000 kW PV array

30,000 modules, 6000 kW
Microwind Electricity

**Microwind turbines**

- **Bergey 10 kW**
- **SkyStream**
- **ARE 442 10 kW**

Knowing is not enough... we must apply. Willing is not enough... we must do.

*Johann Wolfgang von Goethe*

Windmills grind grain! They do not generate electricity.
Solar energy is the ultimate in wireless nuclear fusion … where the fusion generator is very safely stored 150,000,000 km away!

Electricity Delivery Company’s electricity delivery grid

Import meter

Export meter

Solar electric array

Inverter

All electrical circuits in a house or building

1. 500 solar PV systems in Canada???
2. 110 in Alberta?
3. 4.8 million around the world…?
4. Sells to the grid when there is a site surplus.
5. Buys from the grid when there is a site shortage.

How can you generate solar electricity into your house and also back into the grid?
What happens during a power outage?

The inverter senses that there is a power outage and turns itself off.

When power returns it turns itself on automatically.

Electricity Delivery Company’s electrical delivery grid

Import meter

Export meter

kWh

Solar electric array

Inverter

DC

AC

All electrical circuits in a house or building

©1995-2009

Making the simple complicated is commonplace.

Making the complicated simple, awesomely simple, that's creativity.

Charles Mingus
Riverdale NetZero Energy House, Edmonton

www.riverdalenetzero.ca

Solar Electric System:
- 33 m², 5.6 kW Sanyo solar PV array
- 53° tilt for annual optimum
- sells surplus to the grid almost every day

SunnyBoy 6000 W inverter
Solar Energy Development Specialists

Electricity Delivery Company’s electrical delivery grid

Import meter

Export meter

Solar electric array

Charge Controller

Battery Bank

Inverter/charger

Main breaker panel

Essential circuits

How about energy security?

This configuration has a battery bank.

You must skate to where the puck is going
…not to where it is now.

Wayne Gretzky
The inverter senses that there is a power outage. It disconnects itself from the main breaker panel but continues to run the essential circuits.

For of those to whom much is given, much is required.

Luke 12:48
2.9 kW BP Solar solar PV array, grid-connected, with battery bank

Let him that would move the world first move himself. Socrates
Greece

Peter Bull
Edmonton
Inverter, charge controllers, DC switches, meters

Charge controllers

Xantrex Inverter/charger

DC array switches

1 of 2 batteries with 60 electrochemical electrical energy storage cells

Peter Bull
Edmonton
DC to AC Inverters...

- DC to AC inverter
- AC switch
- DC switch

Wild frequency AC to DC to 60 Hz AC inverter (for a microwind turbine)
The Grid-Connection Point...

- The connection to the grid is a wire attached to a normal house or building breaker!

The solar breaker

The wire from the solar electric system

Breaker panel

If you're in a hole
...stop digging.
Where does exported electricity go to?

1 kWh

Energy Retailer, Electricity Delivery Company

Electricity is delivered to your neighbours by your local Electricity Delivery Company for their normal delivery fee.

1 kWh

Electricity Retailer sells your energy to your neighbour for full retail price.

1 kWh

Energy Delivery wires

Ordinary kWh meter

Neighbour

1 kWh supplied, 1 kWh paid for
Connecting to the Grid

Alberta's Regulatory Process for connecting Micro-Generators (MG) to the electric grid

- **brand new as of 2009 January 01**

- 6 paperwork steps to receive approvals for a house-sized solar power system
  - the system is connected to your Electricity Delivery Company

- Another 1? step to sell your electricity
  - your electricity will be sold to your Electricity Retailer
Previous Steps to Connect a Micropower System

It is still required for all generators (large or small) that are not officially “Micro-Generators” – 60 steps to connect, another 16 to sell electricity –

Any excess electricity?

Any electricity to be sold?

Burns fuel?

A wind turbine?
What is new about it all?

- Lots
  - It is much simpler and clearer now
  - There is a good dispute resolution process

- Note that micropower systems have **always** (at least since 1994) been able to connect to the grid…

They have needed to have followed the similar complex process as for large generators.

- It is an excellent step for the province to take.
What are Alberta’s Micro-Generation Regulations?

- 9 pages
  - (you normally don’t need to read them)
- developed by Alberta Energy with comments and feedback from electricity delivery companies, energy retailers, the solar PV industry and others
- is part of the Electric Utilities Act. Re-interprets parts of the Act.
- regulates grid-connected load-offset renewable electricity generators up to 1000 kW of generating capacity
- applies everywhere except Medicine Hat
- download them from hme.ca/mgregs
What do the Micro-Generation Regulations cover?

- Definitions and interpretations of key words
- The application process to be grid-connected
- The electricity metering and metering costs
- The billing and crediting of exported electricity
- The relationship dispute process
- Expiry date:
  - 2013 December 31
  - which allows the government the option to also renew it or amend it
Purpose of Micro-Generation Regulations

in my words…

- To simplify the grid-connection regulatory process
  - so that micropower systems deriving their electricity from renewable and alternate energy sources
  - will not have to go through the same complex (and appropriate) process as large generators in getting connected to the grid.

- To enable the micropower technologies that are commercially available (solar PV, microwind, biogas, Stirling engine, fuel cell…)

- To not be so out-of-step with other provinces (BC, SK, ON, QU) and other countries (Japan, Germany, Austria, Spain, Italy, France, Australia…)
Technologies that the regulations cover

- Must be a renewable or alternative energy source

- **Renewable energy**
  - Solar PV electric
  - Solar thermal electric
  - Microwind electric
  - Microhydro electric
  - Geothermal electric

- **Alternative energy**
  - Must generate electricity with an emissions rate of less than 0.418 kg/kWh
  - Stirling engine generators
  - Biomass and biogas generators
  - Fuel cells

We all want progress, but if you’re on the wrong road, progress means doing an about-turn and walking back to the right road; in that case, the person who turns back soonest is the most progressive.
Size of Micropower System

- **Three categories:**
  - **Mini** micro-generator: $< 10 \text{ kW}$ and inverter-based (mostly on houses and buildings)
  - **Small** micro-generator: $\leq 150 \text{ kW}$
  - **Large** micro-generator: $> 150 \text{ kW}$ and $\leq 1000 \text{ kW}$

- Must be connected to the low-voltage electricity delivery grid, not the high-voltage electricity transmission grid

The human heart refuses to believe in a universe without purpose.

Immanuel Kant
Small MG Application Process: <= 150 kW

Micropower System Owner

1. Submit an application form to the WO
2. Receive application from MG customer
3. WO to review if required information is complete.
4. Technical review including estimate non-standard costs, metering requirements, etc.
5. Pass all information to AUC for approval
6. Obtain signed Standardized Interconnection Agreement
7. Receive ASEO Asset ID if customer requests an interval meter
8. Install meter and data capture starts
9. Receive ASEO Asset ID, if customer requests an interval meter

Electricity Delivery Company

1. MG customer to review if cost is acceptable
2. Accept cost?
3. Yes
4. MG agreed on the contracted rate
5. Obtain electrical permit, begin construction and notify retailer, etc.
6. Customer indicates ready to sign interconnection agreement
7. Yes, notify retailer
8. Notify AESO

AUC

1. Review all documents in regards to the MG application
2. Approve?
3. No, send back to MG customer
4. Stop

Retailer

1. Setup MG customer for financial settlement
2. Negotiate contract with MG customer
3. Received notification from MG customer
4. Stop

AESO

1. Assign AESO Asset ID, if customer requests an interval meter
2. Received notification from WO
3. Stop
Large MG Application Process: > 150 kW, <= 1000 kW

**Micropower System Owner**
- Start
- Submit an application form to the WO
- Received application from MG customer
- WO to review if required information is complete
- Information complete?
- Yes
  - Meet MG Regulation and approve?
  - Yes
    - Send back application form to MG customer
  - No
    - No, send back to MG Customer
- No
  - MG customer to review if cost is acceptable?
  - Accept cost?
  - Yes
    - MG agreed on the contracted rate
    - Obtain electrical permit, begin construction and notify retailer, etc.
    - Customer indicates ready to sign interconnection agreement
  - No
    - Dispute to the AUC?
    - Yes
      - Stop and withdraw application
    - No
      - Stop

**Electricity Delivery Company**
- Notify all information to AUC for approval?
- Yes
  - Review all documents in regards to the MG application
  - Approval?
    - Yes
      - Notify WO and MG Customer the decision
      - Stop
    - No
      - Review dispute and deliver decision to participants
      - AUC Dispute Process starts
- No
  - Stop

**AUC**
-Notify AESO

**Retailer**
- Setup MG customer for financial settlement
- Negotiate contract with MG customer
- Received notification from MG customer

**AESO**
- Assign AESO Asset ID (30 DAY notice required from this point prior to interconnection)
- Received notification from WO
What are AUC’s Rules Respecting Micro-Generation?

- 3 pages
  - (you normally don’t need to read them)
- AUC’s rules describe the ways in which the AUC responds to and enforces the government regulations
  (which is good)
- download them from hme.ca/mgrules

Rule 024

Rules Respecting Micro-Generation

The Alberta Utilities Commission (AUC/Commission) has approved this rule on June 17, 2008.

Definitions

1. In these rules:
   (a) “Act” means the Electric Utilities Act;
   (b) “applicable owner” means the owner of an electric distribution system in whose service territory the relevant micro-generation unit and interconnection of that unit is located;
   (c) “Commission” means the Alberta Utilities Commission;
   (d) “customer” means a person purchasing electricity for the person’s own use;
   (e) “inverter” means an electronic device that converts DC electricity into AC electricity;
   (f) “mini micro-generator” means a micro-generation generating unit of a micro-generator which is using an inverter, or a technology which has been proven by an independent third party to act like an inverter, and has a generation capacity of no more than 10kW of electrical energy and is generating or proposing to generate electric energy solely for the customer’s own use;
   (g) “notice of application” means a notice provided by the customer to the applicable owner in accordance with section 2(1) of the regulation and in the form set out in Appendix A;
   (h) “notice of complaint” means a notice prepared by the customer and filed with the Commission in accordance with subsection 3(5) of the regulation and in the form set out as Appendix C;
   (i) “notice of dispute” means a notice prepared by the applicable owner and filed with the Commission in accordance with section 2(2) or section 4(3) of the regulation and in the form set out in Appendix B;
   (j) “owner” means the owner of an electric distribution system;
What do the AUC’s Rules cover?

- sets out the grid-connection application and approval steps
- sets out timelines for the Electricity Delivery Company to respond to grid-connection applications
- sets out a dispute and complaint process:
  - whether a micropower system qualifies under these regulations
  - who pays for “extraordinary” costs
What is Involved to Connect to the Grid?

Two basic areas of work to generate your own electricity and stay connected to the grid:

1. Getting the **paperwork** done to permit its installation

2. Buying, **installing**, and operating the solar or microwind electric system

I hope we don't have to wait until oil and coal run out … before we tackle solar power.

Thomas Edison (1847-1931)
Three Parts to the Paperwork Approvals

1. Getting municipal development, building and electrical permits
   - **Key factors of interest**: neighbourly relationships, safety
   - **Always** requires an electrical permit

2. Getting approval to physically make electrical connection to the grid
   - Electrical connection to your Electricity Delivery Company
   - **Key factors of interest**: safety, power quality

3. Selling electrical energy (not power) to the grid
   - Sell to your Energy Retailer
   - **Key factors of interest**: price of energy sold to the grid

Money talks, and until it starts telling the truth about the consequences of fossil fuels, we're kidding ourselves that we can make any significant headway against climate change.
#1. Phone your Electricity Delivery Company (EDC) and ask for their Micro-Generator grid-connection documents.

- Your Electricity Delivery Company is to send you 4 items:
  a. The AUC Application Guide with lots of great info in it;
  b. The AUC Application Form with the EDC name on the top of it;
  c. The EDC grid-connection Operating Agreement; and
  d. The EDC Terms and Conditions.

- Make sure they e-mail you all these.

- Also download all this info from www.hme.ca/connect to the grid (with no spaces)

- I do **NOT** recommend that you phone:
  - your Energy Retailer;
  - the Alberta Government, Alberta Energy or Alberta Environment.
    I have found that you get incorrect and mis-leading information if you phone them (hopefully that will improve) – and besides, it is not with them that you need to develop your grid-connection relationship.
  - the Alberta Utilities Commission (AUC).
What is the AUC Application Guide?

- 37 pages (it is good to read this)
- Developed by the AUC
- Includes all categories of micro-generation
- Includes solar PV & wind
- To be used (almost) everywhere in the province
  - except for Medicine Hat

AUC
Alberta Utilities Commission

MICRO-GENERATOR APPLICATION GUIDELINE
(Version 1.0)

July 18, 2008
What does the AUC Application Guide contain?

- Describes the grid-connection process for micro-generators
- Provides:
  - micropower information;
  - helpful recommendations;
  - flowcharts of the application process;
  - single-line diagrams;
  - the application form; and
  - the dispute forms.
What does the AUC Application Form look like?

- 1 page 😊
- Developed by the AUC
- Has the Electricity Delivery Company name on it
- To be used (almost) everywhere throughout the province
  - except for Medicine Hat
  - with small differences with FortisAlberta and Central Alberta REA
1. What size of MG system are you installing?

Please check one of the following boxes:

- **Mini-MG** – Inverter-based, 10 kW and smaller
- **Small MG** – From 0 kW to 150 kW (excluding Mini-MG)
- **Large MG** – Greater than 150 kW and less than 1 MW

(Note: For Mini MG, fields with * and ** are optional.)
(Note: For a Small MG, please fill in fields denoted with *.)
(Note: For a Large MG, please fill in fields denoted with **.)

- **Check off one square**
- **A solar PV system or a microwind turbine on a home would most likely be a mini-MG unless it was a big solar PV system**
2. Who are you?

- This is likely the easiest part.
- What happens if you put a PV system on your rented apartment? Who applies for the grid-connection?

<table>
<thead>
<tr>
<th>APPLICANT IDENTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name (Person):</td>
</tr>
<tr>
<td>** Company Name:</td>
</tr>
<tr>
<td>** Business Associate Code:</td>
</tr>
<tr>
<td>Address:</td>
</tr>
<tr>
<td>City:</td>
</tr>
<tr>
<td>Province:</td>
</tr>
<tr>
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<td>Phone:</td>
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<tr>
<td>Fax:</td>
</tr>
<tr>
<td>E-mail Address:</td>
</tr>
<tr>
<td>Preferred Method Of Contact:</td>
</tr>
<tr>
<td>Consultant Name:</td>
</tr>
<tr>
<td>Consultant Phone:</td>
</tr>
<tr>
<td>Consultant Address/City/Province/Postal Code:</td>
</tr>
<tr>
<td>Other Interested Parties:</td>
</tr>
</tbody>
</table>
### 3. Where is your micropower system installed?

#### PROJECT DESCRIPTION

<table>
<thead>
<tr>
<th>Legal Land Description:</th>
<th>Site ID:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Address:</td>
<td>Retailer Name:</td>
</tr>
</tbody>
</table>

Have you notified your Retailer about your MG project?  
Yes [ ]   No [ ]

<table>
<thead>
<tr>
<th>Generator Type:</th>
<th>Solar [ ]   Wind [ ]   Hydro [ ]   Biomass [ ]   Fuel Cell [ ]   Other [ ], specify:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generator To Utility Interface:</td>
<td>* Inverter</td>
</tr>
<tr>
<td>Generator Rated Capacity (kW):</td>
<td></td>
</tr>
<tr>
<td>Voltage Level Of Connection:</td>
<td></td>
</tr>
</tbody>
</table>

Is the energy produced to be used primarily by the Generator Owner?  
Yes [ ]   No [ ]

** Does your Generator Unit satisfy the anti-islanding requirements of CSA Standard C22.2 No.107.1?  
Yes [ ]   No [ ]

Does your generator meet the MG Regulation's Renewable/Alternative Energy Definition?  
Yes [ ]   No [ ]

Requested In-Service Date (YY-MM-DD):

#### SUPPORTING DOCUMENTS ATTACHED

<table>
<thead>
<tr>
<th>Electric Single-Line Diagram:</th>
<th>Yes [ ]   No [ ]</th>
<th>Site Plan:</th>
<th>Yes [ ]   No [ ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has an Electrical Permit been obtained?</td>
<td>Yes [ ]   Not Yet [ ]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Have you met all applicable municipal and zoning requirements?  
Yes [ ]   No [ ]

Applicant Signature:  
Date Of Application:
## 4. Describe your micropower system?

- **Get your PV or microwind supplier to provide you with this information**

### PROJECT DESCRIPTION

**Legal Land Description:**

**Service Address:**

**Have you notified your retailer about your MG project?**

<table>
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<th>Fuel Cell ☐</th>
<th>Other ☐, specify:</th>
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<th>Generator To Utility Interface:</th>
<th>* Inverter ☐</th>
<th>* Non-Inverter ☐</th>
<th>** Induction ☐</th>
<th>** Synchronous ☐</th>
</tr>
</thead>
</table>

<table>
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<tr>
<th>Generator Rated Capacity (kW):</th>
<th>** Demand (kVA):</th>
<th>Customer Annual Usage (kWh):</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Voltage Level Of Connection:</th>
<th>Phase:</th>
<th>Single ☐</th>
<th>Three ☐</th>
</tr>
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**Does your generator meet the MG Regulation's Renewable/Alternative Energy Definition?**

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**Requested In-Service Date (YY-MM-DD):**

- **Anti-islanding** – when the inverter either shuts down or disconnects the house from the grid.
- Any typical grid-connected inverter is acceptable…
- All off-grid inverters are **not** acceptable.
5. Provide some other documents

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<td>Have you met all applicable municipal and zoning requirements? Yes [ ] No [ ]</td>
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</tbody>
</table>

Applicant Signature: ____________________________ Date Of Application: ____________________________

- Electric Single-Line Diagram (to be discussed next)
- Site Plan – doesn’t always seem to be required
- Electric Permit (does not have to be done at this time) – it is highly recommended that you hire a knowledgeable and properly qualified electrician to install your system (rather than do it yourself)
- Municipal and zoning requirements…
#2. Task for your System’s Electrical Designer:

1. Prepare a SLD (example SLDs are given in the Application Guide)

2. (optional) Submit your SLD to your electrician for review and to inform them.

3. (optional) Electrical inspector…
   a) Look on the internet to see who the electrical inspectors are for your area.
   
   b) Request a review and approval of your SLD by the electrical inspector so that they are in agreement with your design
   
   c) Incorporate electrical inspector's comments into your SLD.

4. Check to ensure that all electrical components have Canadian electrical approvals – this is legally required, but some suppliers ignore it !!!

In the end we will conserve only what we love. We will love only what we understand. We will understand only what we are taught. Baba Dioum Environmentalist
This typical SLD is included in the AUC application Guide.

Get your PV or microwind supplier to provide you with this information. You can use this SLD if your system fits with it, or you can draw your own.
1. Phone municipality's permit office and ask if the following are needed: a development permit, building permit
   - Some require it, some don’t
   - Simple development and building permits are needed for most common residential solar PV applications in Edmonton

2. If required for building permit, get any structural part of the micropower system designed by a structural engineer.

3. If required, prepare development permit application: letter of intro, site plan, elevation view, prepare building permit application

4. If required, submit development permit and building permit application to municipality along with any fees

One hundred years from now, no one will care about my bank account … But the world may be a better place because I was important in the life of a child.
Paperwork #4. Application Form

#4. Submit to the Electricity Delivery Company:

- the 1-page application form (page 34 of the Guide)
- the single-line diagram (pages 25 or 26)
- other approvals for wind turbines
- municipal development permits…

● They will approve it;

or

● **Within 14 days**, they will send a notice to the AUC as to why they don’t approve it (page 35).

  – The AUC will then decide on whether your project will proceed as submitted or not.

● If you have a **complaint** then you fill out page 36 and submit it to the AUC for a decision.
This sets out what the Electricity Delivery Company wants you to agree to in connecting and operating your system safely.

It is reasonable and not too legally complex.

EPCOR D&T’s Operating Agreement is 2 pages long (only)

(Section 5.2) You cannot sell your solar-PV house without prior written consent from EPCOR D&T – and EPCOR D&T shall not unreasonably withhold their consent.

The new owner of your solar-PV house needs to have this same agreement with EPCOR D&T.
Paperwork #6. Read the Terms and Conditions

- Terms and Conditions are approved by the AUC.

- EPCOR D&T’s Ts and Cs are 28 pages long.

- Goes through what services EPCOR D&T offers you, what those will cost, and has details on your relationship with them.

- You probably are already bound by them with your house’s present connection to EPCOR D&T.

- No insurance required (that I can see).

Contact EPCOR D&T:  distgen @ epcor.ca (with no spaces)
Contact Fortis Alberta: microgen @ fortisalberta.com (with no spaces)
Costs to Connect to the Grid

- Your Electricity Delivery Company will let you know if there are any equipment costs to connect to the grid (such as transformers or line upgrades, etc.).
- For mini MG systems there should **not** be any costs.
- For larger systems there **may be** some costs (such as service or line upgrades).
- The Electricity Delivery Company’s only choice is to send a “Notice of Dispute” to the AUC **regarding** any costs. The AUC will then decide on whether the costs are legitimate or not.
- If you have a complaint about the costs then you fill out a “Notice of Complaint” and submit it to the AUC for a decision.

We have greatness within us -- innovative, giving, determined.
It is time for the best in us to come out.
Form B - Notice of Dispute
To be completed by Applicable Owner. Information required must include the following:

| Contact Person who submits the Dispute Notice: | Name: |
| Phone: |

| If Applicable Owner is represented by other party? | Yes ☐ No ☐ |
| If yes, provide Name and Contact Information: |

| Attached a copy of the MG Application Form: | Yes ☐ No ☐ |

| Type of Rejection: | ☐ Qualification (MG Regulation - Section 2.2) |
| ☐ Extraordinary costs (MG Regulation – Section 4.3) |

| If dispute is related to Section 2.2, has owner served notice on customer within 14 days? | Yes ☐ No ☐ |

| Rejection Rationale: |

| Other information attached: |

Date of submitting this notice: ________________________________
Notice of Complaint

- 1 page
- Developed by the AUC
- To be used by the micropower system owner
- To be used if the micropower system owner has a complaint against the Electricity Delivery Company
- Submitted to the AUC
- The AUC’s ruling is final.

Form C - Notice of Complaint

To be completed by customer. Information required must include the following:

| Contact Person who submits the Complaint Notice: | Name: |
| Phone: |
| If Customer is represented by other party? | Yes ☐ No ☐ |
| If yes, provide Name and Contact Information: |
| Attached a copy of the MG Application Form. | Yes ☐ No ☐ |
| Type of Complaint: | ☐ Interval Metering Costs (MG Regulation Section 3 (5)) |
| Provide Full Details of the Complaint: |
| Other information attached: |

Date of submitting this notice: ________________________________
Paperwork #7. Selling Electricity to the Grid

#7. Apply to your Energy Retailer, not your Electricity Delivery Company

- **Regulated Rate Option** Energy Retailer
  - such as ENMAX Energy, City of Lethbridge, Direct Energy Regulated Services, EPCOR Energy, Prairie Power

- **Deregulated** Energy Retailer such as
  - ENMAX Energy
  - Direct Energy
  - Alberta Energy Savings Plan

- It should be as simple as your Delivery Company calling your Energy Retailer…
  - Some Electricity Delivery Companies contact your Energy Retailer for you.
  - Some times you need to do it yourself… we’re working this out still.

- I presently am working through my first applications to FortisAlberta, ATCO Electric, Red Deer Electric Light and Power, EPCOR and Central Alberta REA and the Energy Retailers.
Selling Electricity to the Grid – what price?

- Mini MGs and small MGs
  will get paid for the energy you sell, but not the delivery of the energy.
  - Average regulated electrical energy price from EPCOR Energy in Edmonton in 2008 was \(~10.6\) ¢/kWh, which includes energy and GST only. This is what you will be paid for the electrical energy you export.
  - Average regulated delivered energy price from EPCOR RRO electricity in Edmonton in 2008 was \(~12\) ¢/kWh. This includes energy, delivery, municipal franchise fees, riders and GST. This is the price of the electricity you purchase for a house.

- Large MGs
  - will get Alberta Electric System Operator’s Electricity Market price
  - changes every hour – look for it at http://ets.aeso.ca
  - ranges between \(1\) ¢/kWh and \(99\) ¢/kWh
How does net billing work?

1. Electricity is delivered to your neighbours by your local Electricity Delivery Company for their normal delivery fee.

2. Energy Retailer sells your energy to your neighbour for full retail price.

3. Electricity paid in full
   - a discounted wholesale price,
   - a price equal to the import price, or
   - a premium feed-in (green) price.

4. Neighbour

Net billing allows exported electricity to be valued at any price, such as:

- Electrical energy credit

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How does net billing work?

1 kWh supplied, 1 kWh paid for

Energy Retailer, Electricity Delivery Company

Electricity is delivered to your neighbours by your local Electricity Delivery Company for their normal delivery fee.

1 kWh

Electricity paid in full

12.00 ¢/kWh

Import kWh

Export kWh

Bidirectional kWh meter

PV system owner

Energy Retailer sells your energy to your neighbour for full retail price.

1 kWh

Electricity paid in full

12.00 ¢/kWh

Ordinary kWh meter

Net billing allows exported electricity to be valued at any price, such as:
- a discounted wholesale price,
- a price equal to the import price, or
- a premium feed-in (green) price.

©1995-2009
How does net billing work?

1. Electricity is delivered to your neighbours by your local Electricity Delivery Company for their normal delivery fee.

2. Energy Retailer sells your energy to your neighbour for full retail price.

3. Electricity paid in full 12.00 ¢/kWh

4. Electrical energy credit 42 ¢/kWh (in Ontario now)

Net billing allows exported electricity to be valued at any price, such as:
- a **discounted** wholesale price,
- a price **equal** to the import price, or
- a **premium** feed-in (green) price.

1 kWh supplied, 1 kWh paid for

©1995-2009
How does net billing work?

Electricity is delivered to your neighbours by your local Electricity Delivery Company for their normal delivery fee.

1 kWh supplied, 1 kWh paid for

Net billing allows exported electricity to be valued at any price, such as:
- a discounted wholesale price,
- a price equal to the import price, or
- a premium feed-in (green) price.
**What does this mean to us?**

- For example, with the Riverdale NetZero house PV system:
  - 5600 W of capacity, $45,000 installed
  - 6600 kWh/year: PV electricity generated
  - 5600 kWh/year: heat + electricity consumption of a “typical” RNZ family
  - 70% of the electricity will likely be exported to the grid
  - 1000 kWh/year net surplus

- Here is how the bills would work out for EPCOR’s RRO electricity:

<table>
<thead>
<tr>
<th>Billing programme</th>
<th>export price $/kWh</th>
<th>import price $/kWh</th>
<th>value of PV electricity $/year</th>
<th>return on investment %/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alberta’s discounted rate net billing:</td>
<td>10.5</td>
<td>12.0</td>
<td>$723</td>
<td>2.9</td>
</tr>
<tr>
<td>If equal-rate net billing (=net metering):</td>
<td>12.0</td>
<td>12.0</td>
<td>$792</td>
<td>3.1</td>
</tr>
<tr>
<td>If Ontario’s RESOP feed-in tariff:</td>
<td>42.0</td>
<td>12.0</td>
<td>$2178</td>
<td>4.0</td>
</tr>
<tr>
<td>If Ontario’s Green Energy feed-in tariff:</td>
<td>80.3</td>
<td>12.0</td>
<td>$3947</td>
<td>7.7</td>
</tr>
</tbody>
</table>

*using your own money, not the banks*
Edmonton Electricity Bill with EPCOR RRO
what it is now…

- Connection fee + energy fee
- Selling electricity, delivering electricity, municipal access fees, GST
- Energy fee = amount of electricity purchased and delivered + municipal access fee + GST
- For an average household, the potential savings are $792 (81% of your bill) unless you go completely off-grid.

**Annual energy cost $792**
(81% of your bill)

Average household bill: $974 per year

Annual connection fee
($182 per year in 2008, 19% of your bill)
($228 expected in 2009)

Actual price of electricity including purchase, delivery, taxes and GST
(12 ¢/kWh) (2008 average)

Average household electricity bill

Amount of electricity used (kWh)

6600 kWh/year average

Electricity bill ($)
Edmonton Electricity Bill with EPCOR RRO
what it needs to become…

- Need much better price signals for people to conserve energy. This means “increase the electricity price”.
- This would eliminate the connection fee and make the total bill dependent on the amount of electricity you use.
- The bills for people who waste electricity would rise; the bills for people who conserve electricity would fall.

It would be revenue neutral to EPCOR Energy and D&T.

Electricity bill ($)

Average household bill: $974 per year

Annual energy cost $974
(100% of your bill)

Now you have the full potential to reduce your energy bill to $0.

Price of electricity becomes 14.76 ¢/kWh – the same as the apparent price right now!

Actual price of electricity including purchase, delivery, taxes and GST (12 ¢/kWh) (2008 average)

The bill for less-than-average users would go down ↓

The bill for more-than-average users would go up ↑

Amount of electricity used (kWh)

Average household electricity consumption

0 6600 kWh/year average

Average household electricity bill

6600 kWh/year average

0

$0

$974

Now you have the full potential to reduce your energy bill to $0.

Edmonton
Solar Energy Development Specialists
energy,inc.
What will your net **import** electricity bill look like?

- If you have a net **import** it **might** look something like this:
  - Import meter reading on Feb 01........................................... 17976 kWh
  - Import meter reading on Jan 01........................................... 17768 kWh

  
<table>
<thead>
<tr>
<th>Import reading on Jan 01</th>
<th>Feb 01</th>
</tr>
</thead>
<tbody>
<tr>
<td>17768 kWh</td>
<td>17976 kWh</td>
</tr>
</tbody>
</table>

  - Amount of electric energy you imported.......................... 208 kWh

  
<table>
<thead>
<tr>
<th>Import reading on Jan 01</th>
<th>Feb 01</th>
</tr>
</thead>
<tbody>
<tr>
<td>17768 kWh</td>
<td>17976 kWh</td>
</tr>
</tbody>
</table>

  - Export meter reading on Feb 01..................................... 368 kWh
  - Export meter reading on Jan 01..................................... 234 kWh

  
<table>
<thead>
<tr>
<th>Export reading on Jan 01</th>
<th>Feb 01</th>
</tr>
</thead>
<tbody>
<tr>
<td>234 kWh</td>
<td>368 kWh</td>
</tr>
</tbody>
</table>

  - Amount of electric energy you exported.......................... 124 kWh

  
<table>
<thead>
<tr>
<th>Export reading on Jan 01</th>
<th>Feb 01</th>
</tr>
</thead>
<tbody>
<tr>
<td>234 kWh</td>
<td>368 kWh</td>
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</tbody>
</table>

  - Net energy imported......(208 – 124 =).......................... 84 kWh

  
<table>
<thead>
<tr>
<th>Import reading on Jan 01</th>
<th>Feb 01</th>
</tr>
</thead>
<tbody>
<tr>
<td>17768 kWh</td>
<td>17976 kWh</td>
</tr>
</tbody>
</table>
  | Sub-total of Electric Energy Charges.............................. $14.69
  | Administration charge.......................... + $ 5.68
  | Jan 01 to Feb 01 84 kWh at 10.72 ¢/kWh...................... $ 9.01
  |

<table>
<thead>
<tr>
<th>Date</th>
<th>kWh</th>
<th>Rate</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr 1-Apr 1</td>
<td>4.86</td>
<td>7.213¢/kWh</td>
<td>0.35</td>
</tr>
<tr>
<td>Mar 4-Mar 31</td>
<td>147.56</td>
<td>9.036¢/kWh</td>
<td>13.33</td>
</tr>
<tr>
<td>Admin Charge</td>
<td></td>
<td></td>
<td>5.68</td>
</tr>
<tr>
<td>MicroGen Mar 04-Mar 31</td>
<td>112.97 kWh @9.036¢</td>
<td>10.21 CR</td>
<td></td>
</tr>
<tr>
<td>MicroGen Apr 01-Apr 01</td>
<td>4.03 kWh @7.213¢</td>
<td>0.29 CR</td>
<td></td>
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</tbody>
</table>
What will your net export electricity bill look like?

- If you have a net export it might look something like this:
  - Import meter reading on Jul 01…………………………….. 17976 kWh
  - Import meter reading on Jun 01…………………………….. 17868 kWh
  
  - Amount of electric energy you imported…………………….. 108 kWh
  
  - Export meter reading on Jul 01……………………………….. 667 kWh
  - Export meter reading on Jun 01………………………………. 234 kWh
  
  - Amount of electric energy you exported……………………... 433 kWh
  - Net energy imported……(108 – 433 =) …………..…………. 325 kWh CR
  - Jun 01 to Jul 01 325 kWh at 10.72 ¢/kWh…………………. $34.84 CR
  - Administration charge……………………………………….. + $ 5.68
  - Sub-total of Electric Energy Charges……………………….. = $29.16 CR
When will you be paid?

- If there is a net export of electricity, the payment for it will be credited to your account towards the next month’s bill.

- If at the end of the year you have a credit, then your Energy Retailer will send you a cheque.

- The payment schedule can be negotiated, but it is most reasonable that they only send you a cheque at the end of the year if there are any unused credits.

Example:

<table>
<thead>
<tr>
<th>Month</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>$0</td>
</tr>
<tr>
<td>Feb</td>
<td>$0</td>
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<tr>
<td>Mar</td>
<td>$10</td>
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<td>Apr</td>
<td>$15</td>
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<td>Nov</td>
<td>$15</td>
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<tr>
<td>Dec</td>
<td>$0</td>
</tr>
<tr>
<td>Year</td>
<td>$0</td>
</tr>
</tbody>
</table>
Can you make money at this?

- The intent with the micro-generation regulations: *for you to generate electricity for your own use*

- Are you permitted to have a *surplus of credit* and thus be given a cheque at the end of the year?
  - Yes… but then you are a *merchant power* generator (but then you have costs of some $3500 per year for metering and electricity sales)
  - No… if you are a “micro-generator” (and then you have zero costs for metering or electricity sales)

- The issue:
  - How do you determine whether or not your own electricity is to be used by yourself when you export 50% to 70% of it? (as with every PV system)
  - If your PV system capacity is < the capacity of the service equipment to your site, then it is “deemed” (pretended) that you use all the electricity yourself.
  - There won’t be any issue most of the time for houses… but for farms and acreages we are already seeing big issues.
#8. If you are installing a large micro-generator you will need to obtain a Business Associate (BA) code

1. Fill in BA code application form on Petroleum Registries of Alberta web site
   www.petroleumregistry.gov.ab.ca

2. Receive BA code by e-mail (1 week)

Some men have thousands of reasons why they cannot do what they want to… when all they need is one reason why they can.
If you are installing a microwind turbine

1. Read Transport Canada's "Aeronautical Obstructions" web page
2. Download Transport Canada's "Aeronautical Obstruction Clearance Form"
3. Get a 1:50,000 chart identifying the site of the wind turbine
4. Fill in and submit Aeronautical Obstruction Clearance Form and chart
5. Discuss any wind turbine siting issues with Transport Canada as necessary
6. Receive approval from Transport Canada (can take a few weeks)
For Wind Turbines: NAV Canada

- If you are installing a microwind turbine
  1. Download and read NAV Canada's "Land Use Proposals Submission Procedures" web page
  2. Download and read NAV Canada's "Land Use Proposal Submission Form"
  3. Determine if your site is more than 6 km from an airport or not
  4. Prepare supporting documents for the Land Use Proposal Submission Form
  5. Fill in and submit the Land Use Proposal Submission Form
  6. Discuss your Land Use Proposal with NAV Canada as necessary
  7. Receive NAV Canada's approval and Notice of Construction document (can take 8 weeks)
  8. Fill in and submit NAV Canada's Notice of Construction document

Service to others…
is the rent you pay for your room here on earth.  
Muhammad Ali
For Wind Turbines: Alberta Transportation

- If you are installing a microwind turbine
  1. Download and read Alberta Transportation's "Roadside Development Application instructions"
  2. Download and read Alberta Transportation's "Roadside Development Application"
  3. If necessary, fill in and submit the "Roadside Development Application"
  4. If required, receive Alberta Transportation's approval
Everyone is learning the new rules…

- The Electricity Delivery Companies, the Energy Retailers, me and you are learning the ropes of the new rules…
  - Some are doing a great job
    - ATCO Electric, FortisAlberta, Red Deer Electric Light and Power
  - Some are scrambling to get their staff trained to give you the correct information
    - EPCOR, Direct Energy, Alberta Energy Savings

- I am putting all the information that I know about onto my web space at hme.ca /connect to the grid (with no spaces) for you to get all information in one place

Anyone who thinks they are too small to make a difference…
African Proverb
What are the next steps? Renewable Incentives

- **Feed-in tariff**
  - like Ontario, South Australia, Germany, Austria, France and others

- **Subsidies**
  - like Medicine Hat’s Hat Smart green tax-shift programme, [www.hatsmart.ca](http://www.hatsmart.ca), that puts a small tax on natural gas and electricity to provide incentives for energy efficiency, solar PV and solar heating systems
  - Like Saskatchewan’s Solar Heating Initiative for Today (SHIFT) and Net Metering Programmes (35% buy-down for renewable micropower systems) See [hme.ca /shift](http://hme.ca /shift)

- **Renewable portfolio standard**
  - Requiring all Energy Retailers to have a specified portion of renewable energy in all the electricity they sell
What are the next steps?  Level Playing Field

- **Create a level playing field** for all energy sources so that the market, and **not the government**, is picking the winners.

- We need governments to
  - Eliminate their policies that provide massive public subsidies for grid-electricity and natural gas
  - Determine the full extent of the damage that coal, oil and gas are having on
    - our health care budgets, and
    - our air, lakes, rivers, groundwater, soil and wildlife habitat

- Help Alberta companies
  - realise our **huge** potential for solar electricity, solar heating, wind electricity
  - in the same way that Alberta has helped companies for the last 90 years realise our coal, oil and natural gas resources, even though they are **300 times smaller** than solar.

Socialism collapsed because it did not allow the market to tell the economic truth.  Æystein Dahle
Capitalism may collapse because it does not allow the market to tell the ecological truth.  Exxon Norway
Declining PV Prices, Increasing Grid Prices

Solar PV’s progress to parity with fossil fuels…

Solar PV Price
- unsubsidized
- no environmental side-effects

Grid-Electricity Price
- highly subsidized
- fossil fuel electricity does not pay for the damage it causes to the environment and health care

Let’s get ready for 2015…

Grid parity: Utility Solar Assessment Study
Why get your own solar system now?

- Why get your own solar PV system now if grid parity is coming soon…
  - important question… important answer…

- Society needs leadership in order for it to change
  - You are the most significant leader…
  - If you don’t do anything, it’s a sure thing that our governments won’t do anything…

- You can get your own PV system now when there is sufficient supply, or in 2015 you can get in line when everyone else wants one and then wait 5 years for delivery…

- This is already happening
  - 2 years to buy a wind turbine, 5 years to buy a fuel efficient jet, some queues for solar PV
1. Getting started: information you need to plan your system
   - You can find this out from project development consultants and equipment suppliers.
   - Much information is available (books, internet, designers, consultants, suppliers)
   - How does it work? What can you expect from it? What is the potential for solar electricity? What new products are available?

2. Selecting a designer
   - Is your supplier going to design it?
   - Who is reliable? What is their service like? What are their prices?
   - Do they know what they are talking about?
   - **What solid experience do they have?**
Steps To Get Your Solar PV System .../3,4

3. Designing a system
   - What tilt and orientation of solar array?
   - What location for the microwind turbine?
   - What size to select? (solar array or microwind turbine, inverter, wiring, switches)
   - What equipment brands to select?
   - How much room will it take up (roof, basement, yard)?

4. Getting regulatory approvals
   - Where from? See hme.ca /connecttothegrid
   - How to fill them in?
   - What costs?
   - How much time to do this?

Efficiency can save 75 percent of our electricity at a lower cost than making it at existing power plants.

Amory Lovins, 2006
Rocky Mountain Institute
Steps To Get Your Solar PV System …/5,6

5. Financing
   - Using savings, income, deep pockets, or banks?
   - How much does it cost? What is the price of its electricity? How does this compare with other prices?

6. Purchasing it
   - Who is reliable? What are their prices? What is their service like?
   - Do they sell equipment that is legal to sell???
   - How do you know you are getting a good deal?
   - What are you buying: separate equipment? whole system? energy supply? emissions reduction?
   - Only buy solar and wind equipment from dealers who are members of
     - the Canadian Solar Industries Association www.cansia.ca or
     - the Canadian Wind Energy Association www.canwea.ca

We are all faced with a series of great opportunities … brilliantly disguised as impossible situations.
Steps To Get Your System …/7

7. Installing it
- How do you find a knowledgeable installer?
- What relationship do they have with the supplier?
- Your electrician will:
  1. Take out an electrical permit and pay the permit fees
  2. Wire up your micropower system
  3. Call for an electrical inspection
- Notify your Electricity Delivery Company of completed installation

● Caution:
- Find an electrician who knows about DC electrical wiring (for solar PV), grid-connection, and wiring electricity sources.
- Make sure your electrical inspector is competent in knowing about equipment certification standards and installation, and the Canadian Electrical Code Sections 50 (solar PV) and 84 (grid-connection).
8. Commissioning it
   - Does it really work? How do you know it is working?
   - Hire your system designer or supplier to:
     - Turn on and commission your micropower system
     - Make sure it is working as designed and intended
   - Make sure your purchase contract describes what you are wanting to buy: equipment? system? energy supply? emissions reduction? and thus what will need to be commissioned.

9. Operating it
   - What do you need to do? – if anything!
   - What maintenance is there?
   - Who is supplying the documentation for your system?
   - Who is supplying your operation and maintenance training?
Celebrate and Watch Your Meter Spinning

(optional)

- **Your leadership is very important…**

- Invite colleagues, peers, local MPs, local MLAs, family and friends over to have a party to celebrate your leadership, vision, and perseverance in adding to Alberta's energy security and green advantage.

  1. Send an e-message to the media inviting them to cover your news story.

  2. Watch your micropower system generate electricity.

*In our every deliberation, we must consider the impact of our decisions on the next seven generations.*

*From The Great Law of The Iroquois Confederacy*
…we hold the future in our hands