



**Rooftop  
PV array  
-- commercial  
rooftop**



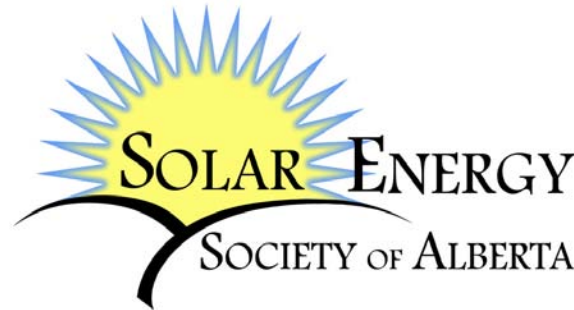
**Rooftop  
PV array  
-- parking  
canopies**

# **Commercial Solar PV Perspectives of a Designer and Developer**

[www.solaralberta.ca](http://www.solaralberta.ca)

**Edmonton**

**2018 October 04**



**East-west  
racking system**

**DC to AC Inverters**



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**howell-mayhew  
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Solar PV Systems Engineering

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**I want to acknowledge  
that we meet on the traditional lands of the  
Papaschase people and the people of Treaty Six  
and that I respect  
their spiritual relationship with these lands.**

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**As per the introductory comments in every speech of  
Hon. Mike Rann, Premier of South Australia (2008)**



# **howell-mayhew** engineering, inc.

Solar PV Systems Engineering

- ▶ I am a professional engineer
- ▶ I am a solar-electric system project developer
  - ◆ working with solar energy since 1977 and with solar electricity since 1983
- ▶ I develop, design, supply and commission solar-electric systems
- ▶ I have no vested interests in any one solar-electric technology
- ▶ I want you to make your decisions with your eyes wide open so that you can decide what may be right for you...



# Solar Electricity – A Big Step for All

The world of solar electricity is changing and growing rapidly.

Solar electricity is now becoming affordable for us in our everyday lives.

The time has now arrived for sunny Alberta to harness another of our abundant energy resources.



## Are we ready for it?

# Presentation Focus

- ▶ Only have 10 minutes... this is very brief
- ▶ Role of engineers
- ▶ Brief overview of Edmonton commercial permits for solar PV
- ▶ EPCOR Distribution and Transmission
- ▶ Electric Utilities Act Approval
  - ◆ Micro-Generation Regulation

La Maison Simons  
398 kW rooftop  
Londonderry Mall



# Commercial Solar PV in Edmonton

## ▶ 10 biggest PV systems in Edmonton

- ◆ 1<sup>st</sup>: 1064 kW IKEA (2018)
- ◆ 2<sup>nd</sup>: 636 kW La Maison Simons at Londonderry Mall (2017)
- ◆ 3<sup>rd</sup>: 462 kW Alberta Government JG O'Donoghue building (2018)
- ◆ 4<sup>th</sup>: 350 kW Alberta Government Learning Resource Centre (2018)
- ◆ 5<sup>th</sup>: 217 kW AltaPro Building (2018)
- ◆ 6<sup>th</sup>: 213 kW Mosaic NZE building (2016 ?)
- ◆ 7<sup>th</sup>: 170 kW Shaw Conference Centre (2019)
- ◆ 8<sup>th</sup>: 128 kW Landmark Homes HQ building (2015 ?)
- ◆ 9<sup>th</sup>: 124 kW EPCOR North Service Centre (2017)
- ◆ 10<sup>th</sup>: 103 kW The Edge, Gene Dub's building on 104 Avenue (2018)
- ◆ 11<sup>th</sup>: 70 kW East Campus Village, UofA (2018)
- ◆ 12<sup>th</sup>: 60 kW The University of Alberta ICE (2018)
- ◆ 13<sup>th</sup>: 52 kW The King's University (2018)
- ◆ 14<sup>th</sup>: 50 kW Queen Elizabeth swimming pool (2016 ?)
- ◆ 15<sup>th</sup>: 47 kW Brentwood apartments (2013 ?)

Several others of 50 kW to 100 kW...

# Role of Engineers in Life

- ▶ When things are done the first time then engineers are involved and take the liability, and then after a time the code's take over the liability
- ▶ In a few years it will be ho-hum and the regulations will be relaxed.

# Role of Engineers in PV Systems

- ▶ P.Eng. – Professional Engineer
- ▶ P.Tech – Professional Engineering Technologists
- ▶ Structural engineer
  - ◆ Homes
    - always required
  - ◆ Commercial
    - always required
- ▶ Racking equipment – racking company stamps it
- ▶ Attachment to the building – structural engineer stamps it
- ▶ Load on the roof – structural engineer stamps it



# Role of Engineers in PV Systems

- ▶ Electrical engineer
  - ◆ Homes
    - not required, always optional
  - ◆ Commercial
    - not certain – may depend on voltage, complexity, generating capacity

# Design and Development

## ▶ Development

- ◆ Working with clients – goals, budgets, preferences
- ◆ Electricity bills
- ◆ Economics
- ◆ Municipal permits
- ◆ Regulatory approvals

## ▶ Design

- ◆ Building drawings, energy generation, modelling software, surface area, tilt angle, orientation angle, building AC voltage
- ◆ Visual, structural attachments, electrical connections
- ◆ Equipment choices (modules, racking, inverters, cabling, disconnects)
- ◆ Provides stamped structural and electrical drawings

# Alberta Building Code Schedules

- ▶ These are form documents and may be required by the municipality for the building permit
- ▶ A-1 Letter of Commitment  
by the Owner and Coordinating Registered Professional
- ▶ A-2 Confirmation of Commitment  
by Owner and by Registered Professional of Record
- ▶ B-1 Letter of Commitment  
by the Registered Professional of Record
- ▶ B-2 Summary of Design and Field Review Requirements
- ▶ C-1 Assurance of Compliance Coordinating Registered Professional
- ▶ C-2 Assurance of Professional Field Review and Compliance

# Alberta's Safety Codes Act

- ▶ **What type of work requires a permit?**
- ▶ The *Safety Codes Act* requires that
  - ◆ all contractors in Alberta need to obtain permits
  - ◆ prior to commencing work on buildings
  - ◆ For all work that is
    - covered by the Alberta Building Code or
    - work governed by the Canadian Electrical Code.

# Edmonton Permits

- ▶ Brief overview of Edmonton commercial permits for solar PV
  - ◆ Development permit – relationship function
  - ◆ Building permit – safety function
  - ◆ Electrical permit – safety function
  
- ▶ PV technologies are changing **rapidly**
  
- ▶ The City is doing a great job in being a leader
  - ◆ working to streamline their permitting processes and
  - ◆ adapt to changing PV technologies
  - ◆ rapidly-growing number of systems.

# Key to Development Permits

- ▶ Get to know the development permit officers
  - ◆ Let them know beforehand that a big project is coming down the line
  - ◆ They can offer you extremely helpful information that will speed your application through their vetting process
  
- ▶ A development officer reviews the application based on the Edmonton Zoning Bylaw.
  - ◆ City Zoning Bylaw 12800 and any neighbourhood overlays
  
- ▶ Know the bylaw
  - ◆ Design your PV system to meet the requirements of the bylaw.
  - ◆ You can help assist the development officer in understanding how your PV system complies with the bylaw.
  - ◆ You can advocate your position if the answer is “no”.

# Building Permit

- ▶ Governed by the Alberta Building Code
- ▶ Know the building code
  - ◆ Design your PV system to meet the requirements of the building code.
  - ◆ You can help assist the building safety codes officer in understanding how your PV system complies with the code.
  - ◆ You can advocate your position if the answer is “no”.

# Electrical Code Issues

- ▶ PV technology is rapidly improving
- ▶ The Canadian Electrical Code is not very good at keeping up
- ▶ Electrical inspectors often have a tough time keeping up and need more training
- ▶ Always contact the local authority having jurisdiction prior to any construction activity and ensure your project complies with Alberta Safety Codes and local bylaws.
- ▶ Know the electrical code
  - ◆ Design your PV system to meet the requirements of the electrical code.
  - ◆ You can help assist the electrical inspector in understanding how your PV system complies with the code.
  - ◆ You can advocate your position if the answer is “no”.



# Grid Connection

- ▶ The Alberta Utilities Commission implements:
  - ◆ Alberta's electricity acts and regulations
  - ◆ the Electric Utilities Act
    - implemented through AUC Rule 007
  - ◆ the Micro-Generation Regulation
    - If you are a PV professional, you **MUST** know this regulation, **no excuses**. It is not hard to read and understand.
    - implemented through AUC Rule 024
      - ❖ If you are a PV professional, you **MUST** know this rule, **no excuses**. It is not hard to read and understand.
    - Read the Micro-Generation Notice Submission Guideline.

# EPCOR Distribution & Transmission

- ▶ EPCOR D&T is Edmonton's Wires Service Provider
  - ◆ delivers reliable electricity to all of us
  - ◆ owns, operates and maintains the electricity grid in Edmonton
- ▶ Need to contact EPCOR right away if the PV system's inverters are more than 20 kW AC
- ▶ Need to have a special protection and metering equipment if the PV system's inverters are more than 250 kW AC

# Solar Electricity

## Simple – Clean – Reliable – Affordable

### Local ... Democratic ... Now



Download other PV presentations from  
[www.hme.ca/presentations](http://www.hme.ca/presentations)  
and  
[www.solaralberta.ca/seminars](http://www.solaralberta.ca/seminars)



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