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Solar-Ready Design

How to prepare buildings for solar

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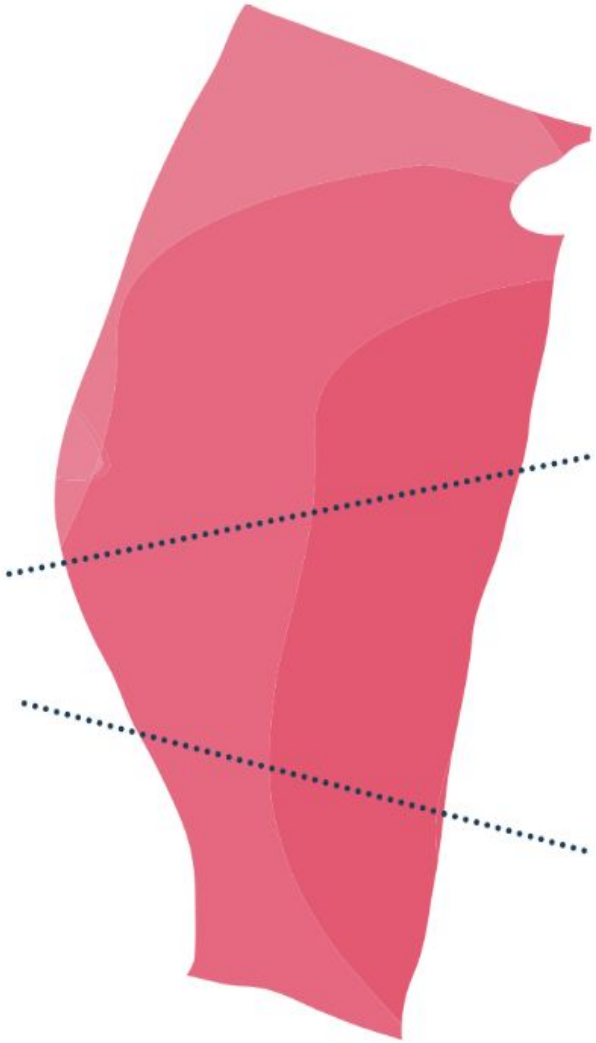
TREATY 8
Signed in 1899



TREATY 6
Signed in 1876

TREATY 7
Signed in 1877

Special thanks to the many organizations that have contributed to this presentation:

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Alberta Ecotrust Foundation

Vision and Mission

→ *Our Vision*

An Alberta where people and nature thrive.

→ *Our Mission*

We realize our vision by recognizing gaps, mobilizing resources, investing in our communities, creating partnerships, and building capacity across sectors.

ALBERTA ecotrust

What we offer

Programs & Initiatives

Grants

Impact Investing

Strategic Engagement

Alberta Ecotrust's Buildings Initiatives


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Our Funders

Calgary

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Peter Gilgan Foundation

RBC RBC Foundation

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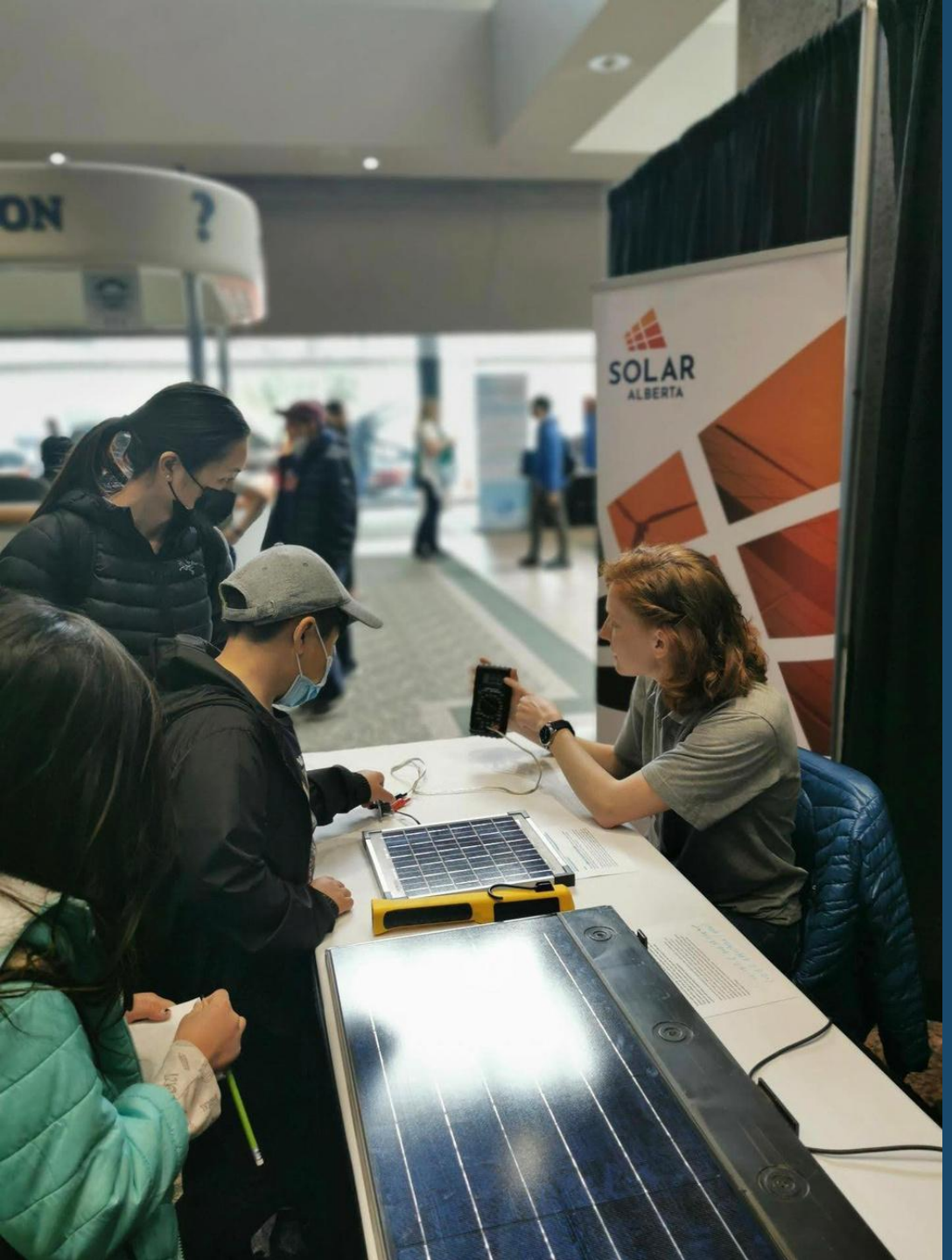

SOLAR ALBERTA

Our Mission

To accelerate Alberta's transition to a just and sustainable energy future, we advocate, educate, and serve as an industry and community hub for solar energy.

Today's Speaker

Joseph (Joe) Henke, P. Eng, CEM, REA

Program Specialist – ENBIX, Alberta Ecotrust Foundation,

Joe is Certified Energy Manager, Energy Advisor, and holds a diploma in Sustainable Energy Technology.

Prior to joining Alberta Ecotrust Foundation, he worked as a Residential Energy Advisor, and in the manufacturing industry.

Solar-Ready Design for Alberta Buildings

AGENDA

- Attendees input (Slido poll)
- Solar Trends in Alberta
- Types of Solar installs and the Microgeneration Regualtion
- Benefits from solar:
- **Introduction the *LEEP Planning and Decision Guide for Solar PV Systems***
- **Solar PV Design Best Practices**
- Alberta case studies
- Questions & Feedback

Presentation ~ 2hrs

Questions ~ 45 minutes

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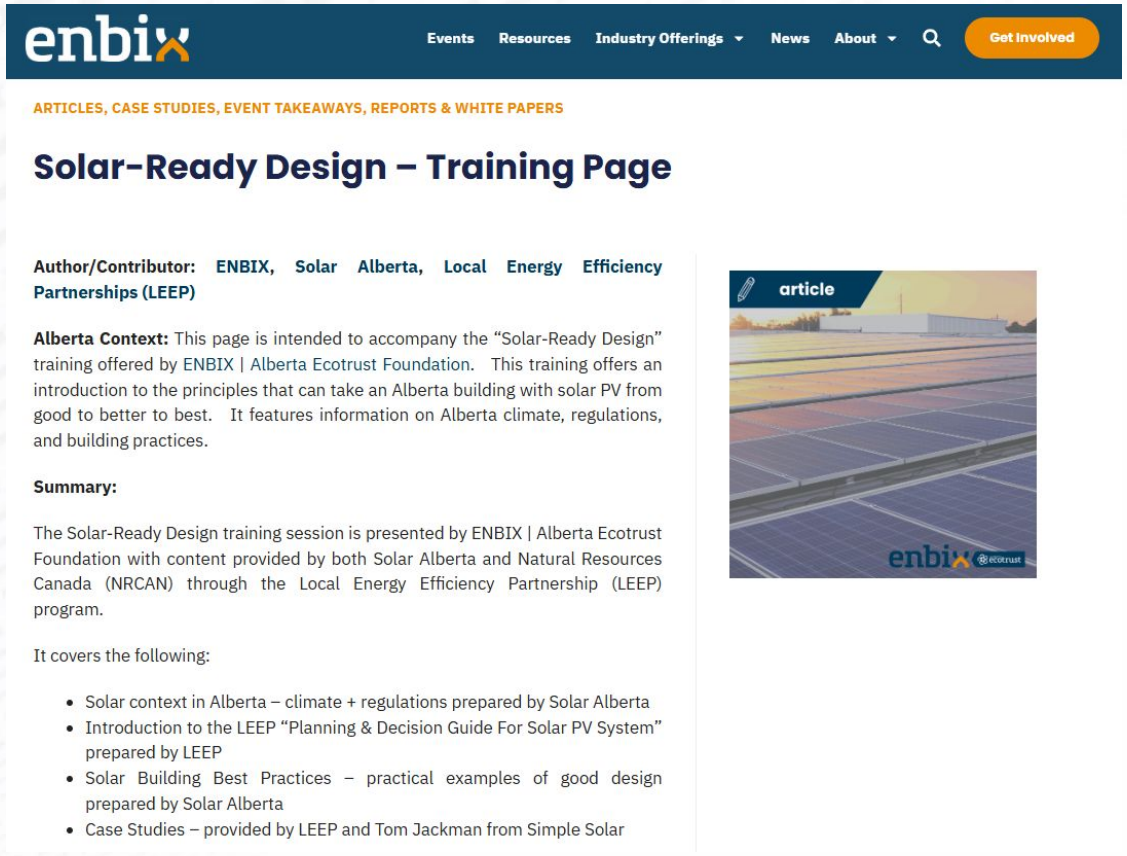
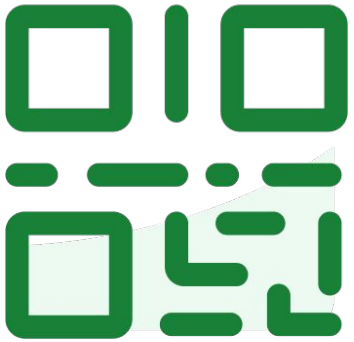
Housekeeping

- Emergency - exits
- Washrooms
- Breaks - there is no break scheduled but please feel free to come and go as you need
- Questions - you can use the Slido Q&A feature, or feel free to ask during the session.
  - I may answer some questions at the end of the session
- Phones/laptops - kindly silence any ringers. If you need to take a call please step out of the room

Solar-Ready Design Resource



https://www.enbix.ca/document/solar-ready-design-training-page/



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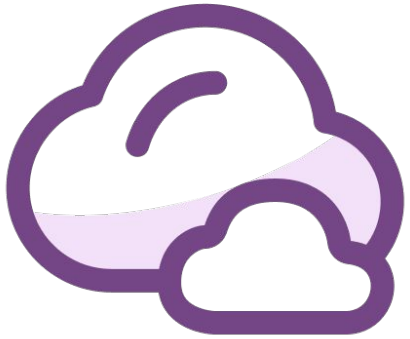
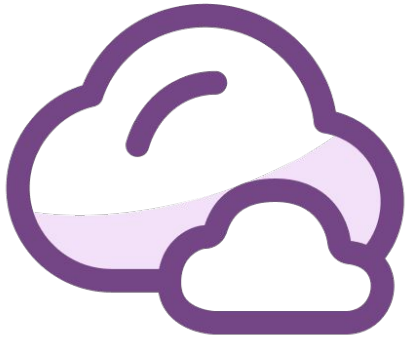


How do describe your job? (e.g., HVAC installer, designer, home builder, building official, etc.)

What types of construction are involved with? (select all that apply)

Rate your level of understanding of solar design and installation?



What is one word that describes your attitude toward solar?

How likely are you to include solar in your next project?

Solar Trends in Alberta

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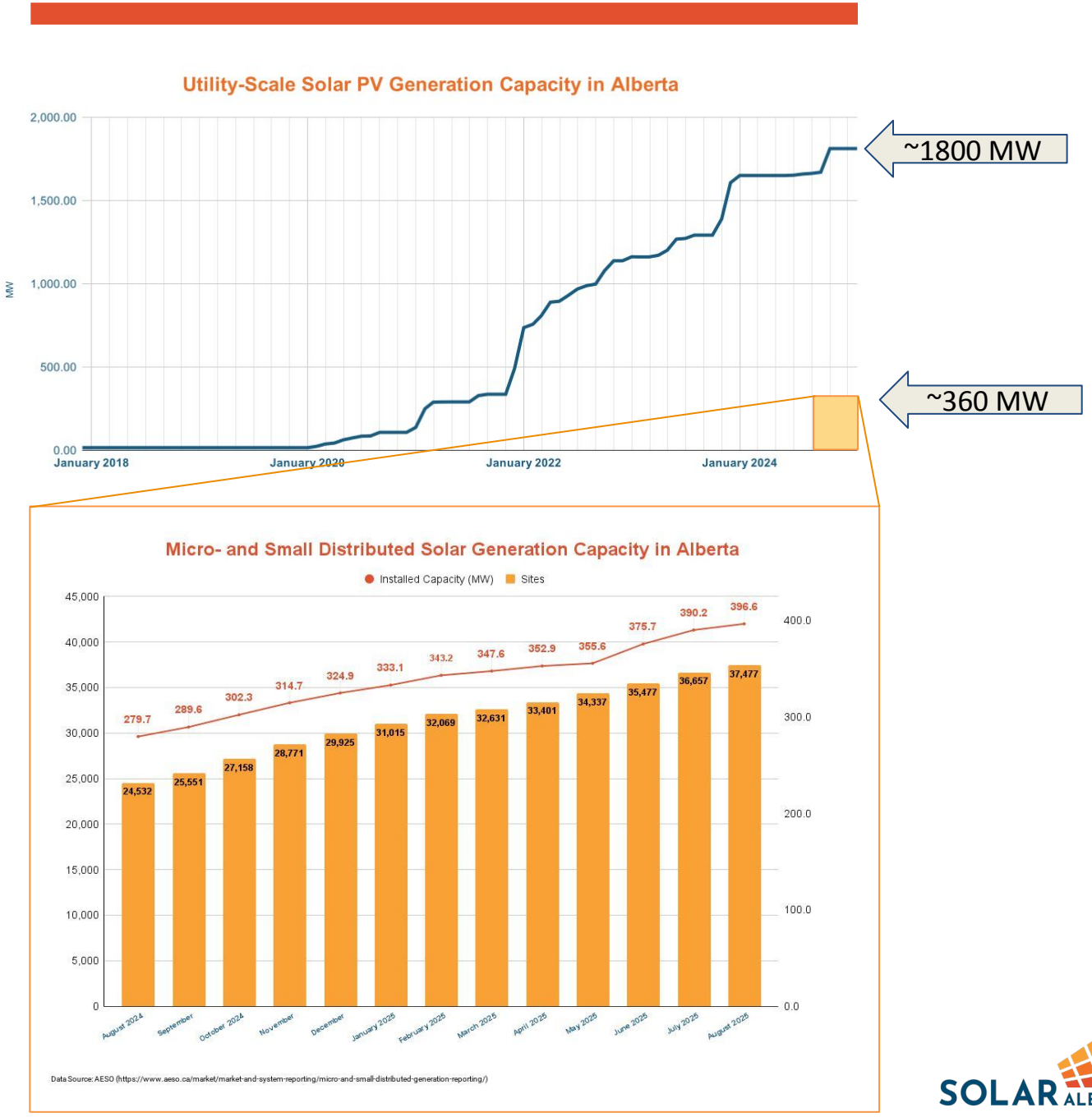
Alberta: Canada's Solar Powerhouse

In the last 10 years, Alberta has seen tremendous growth in all types of solar.

- added ~9 MW of microgeneration each month
- 1000 new installations each month



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Increase in Alberta's Renewable Generation Capacity

Figure 4: Price setter by fuel type and year (2015 to 2024)

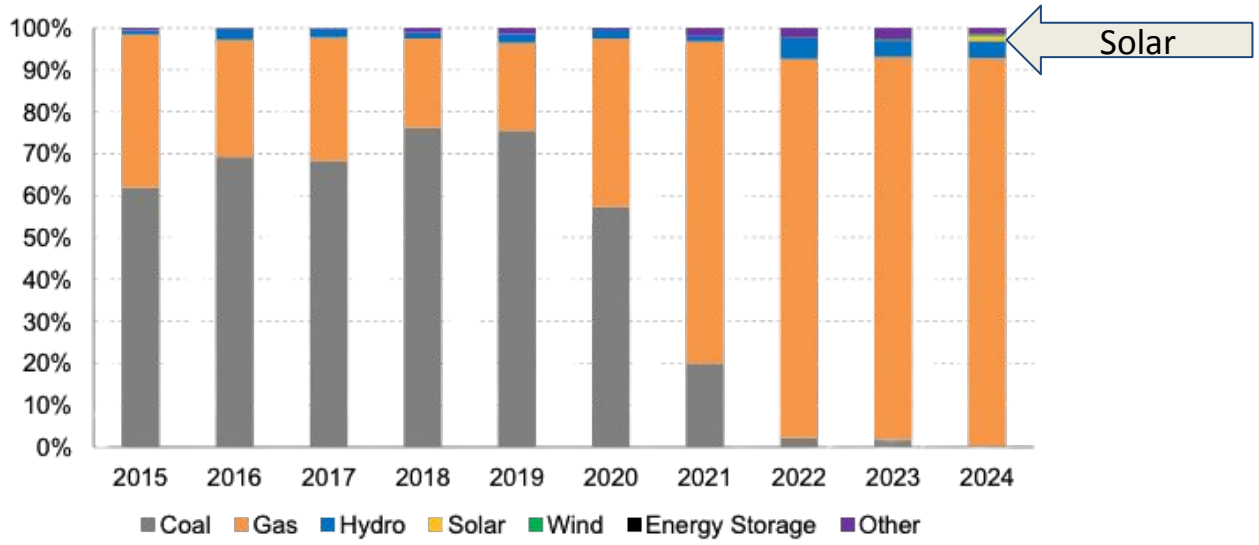
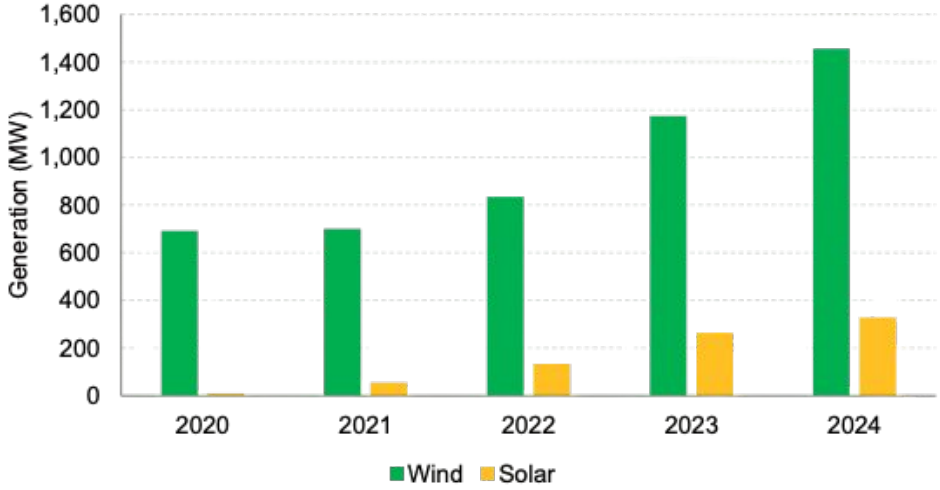


Figure 3: Average hourly wind and solar generation by year (2020 to 2024)



The Alberta Market Surveillance Administrator reports that the increased capacity of solar is putting downward pressure on the price of electricity for Albertans.

Image Source: Market Surveillance Administrator, *Quarterly Report for Q4 2024* (p. 7 & 8)
https://www.albertamsa.ca/assets/Documents/Quarterly-Report-for-Q4-2024.pdf

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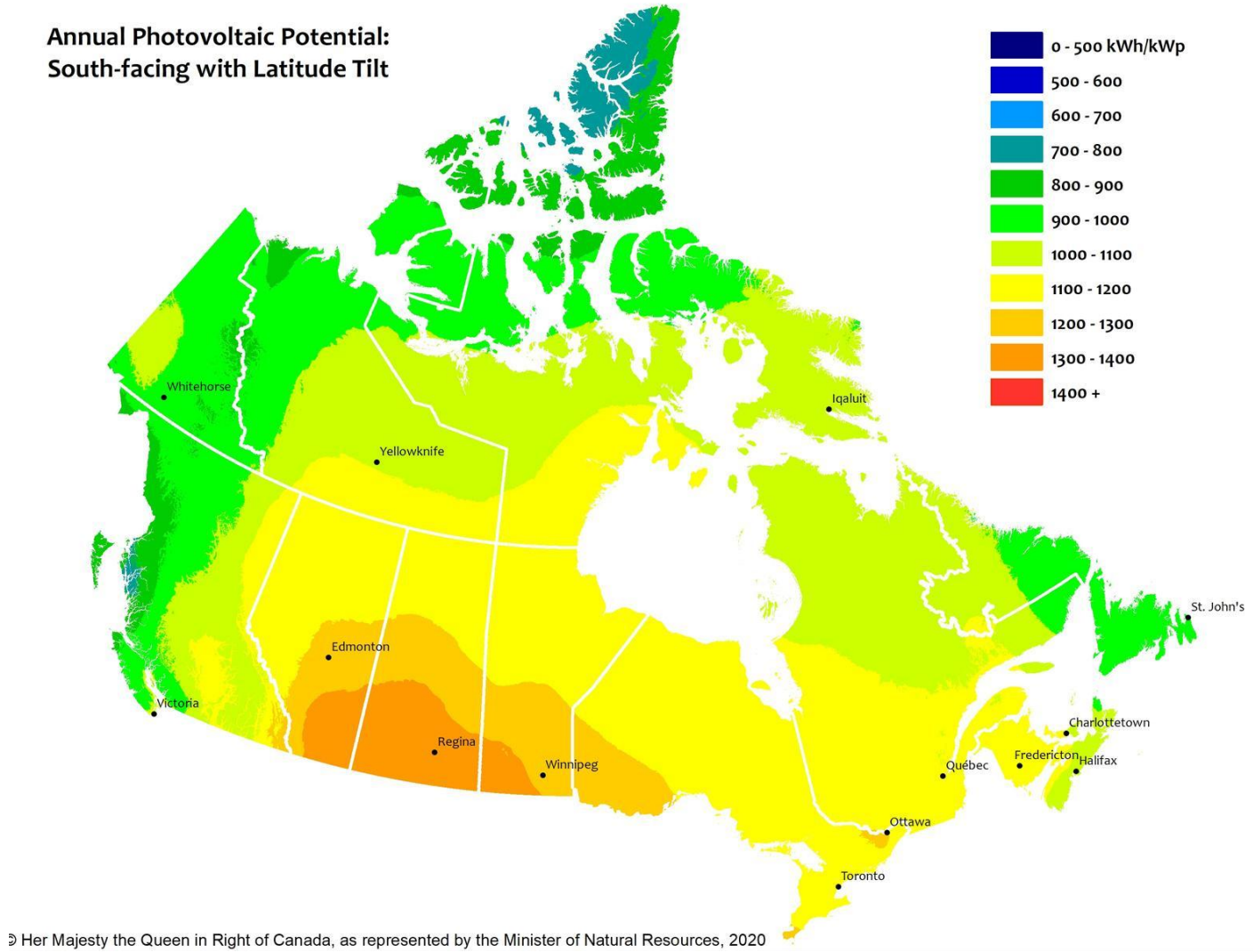
Alberta's Unique Potential

- 2nd only to Saskatchewan in PV Potential
- Electricity market enabling Power Purchase Agreements
- Favorable Microgeneration Regulation allowing for net-billing



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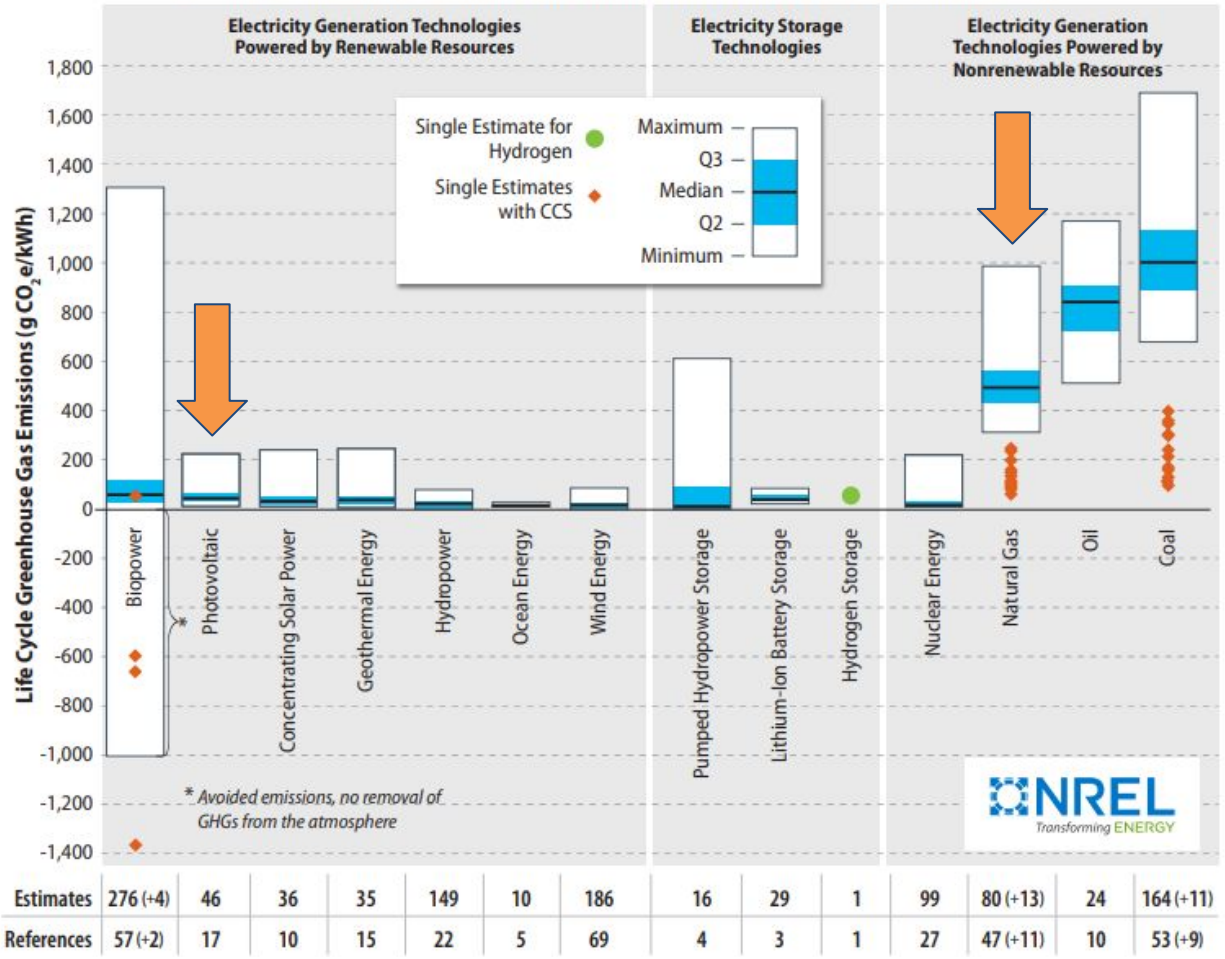
Low GHG Emissions

- ~50 g CO2eq/KWh for Solar PV
- ~400 gCO2eq/KWh for Natural gas
- 1 to 2 years for energy payback

Figure 2. Life cycle greenhouse gas emission estimates for selected electricity generation and storage technologies, and some technologies integrated with carbon capture and storage (CCS).



Source: Life Cycle Greenhouse Gas Emission from Electricity Generation : Update https://docs.nrel.gov/docs/fy21osti/80580.pdf

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Regulations & Types

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Province of Alberta

ELECTRIC UTILITIES ACT

MICRO-GENERATION REGULATION

Alberta Regulation 27/2008

With amendments up to and including Alberta Regulation 164/2024
Current as of September 27, 2024

Office Consolidation

Alberta King's Printer
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10611 - 98 Avenue
Edmonton, AB T5K 2P7
Phone: 780-427-4952

E-mail: kings-printer@gov.ab.ca
Shop on-line at kings-printer.alberta.ca

Alberta's Microgeneration Regulation

The regulation allows homes and businesses in Alberta to meet their own electricity needs by generating electricity from renewable or alternative energy sources.

Source: (https://www.alberta.ca/micro-generation)

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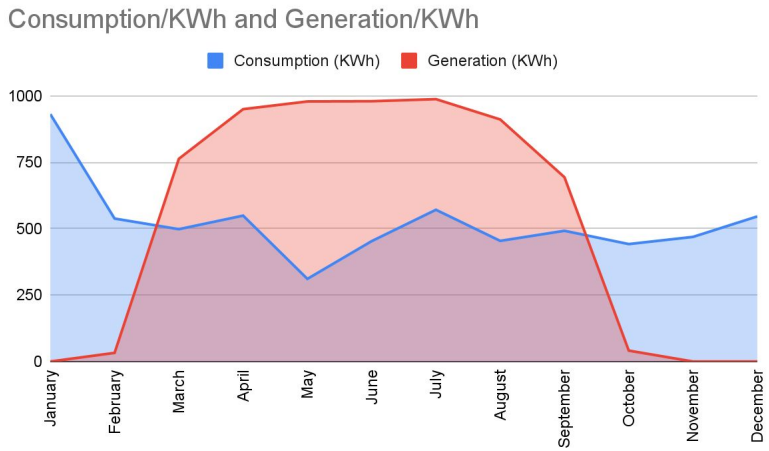
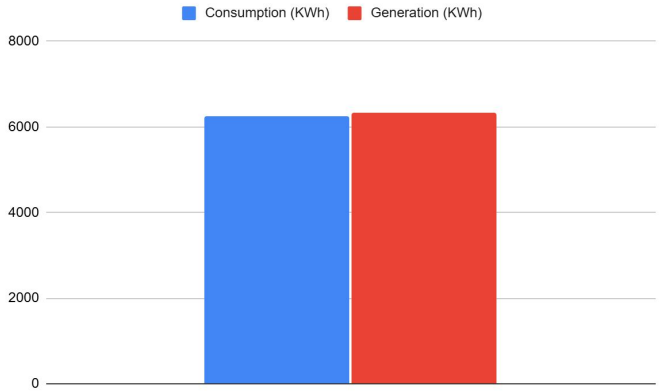
Solar System Sizing

Month to month



Annual



Net-billing looks at annual electricity usage and allows a site to export and import electricity.

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Main Types of Solar Power Plants in Alberta

Utility Scale/ Solar Farm	Greater than 5 MW for export	Paid Pool Price
Industrial Solar	Primarily meets needs of an industrial site. Can include storage and export.	Net-billing or paid pool price
Large Microgeneration	150kW to 4.99 MW for on-site supply	Net-billing or paid pool price
Small Microgeneration	Less than 150 kW for on-site supply	Net-billing
Community/Small-Scale Generation	A group of people investing as either a microgenerator for on-site supply, or as a small-scale generator for export.	Net-billing or paid pool price

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Utility-Scale Solar

Greater than 5MW

Pictured:

Top: Travers Solar Project (465MW)

Bottom: Saamis Solar Park (Upcoming, 325MW)

Source: https://www.traverssolar.ca/
https://www.ecowatch.com/urban-solar-alberta-canada.html

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Industrial Solar

Primarily meets the needs of an industrial site

Pictured: Scotford Refinery Solar Farm (58 MW)

Source: https://scotfordsolar.ca/

Large Microgeneration

150kW to 4.99MW

Pictured:

Top: Genesis Place, Airdrie (1.6MW)

Middle: Poultry Farm, Linden (175kW)

Bottom: Fenlands Recreation Centre, Banff (280kW)

Source: MCCAC, SkyFire Energy

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Small Micro-generation

Less than 150kW

Pictured (Clockwise from Top L): Chinook Centre, Calgary (80 kW), Canmore Collegiate High School (97 kW), Rooftop Solar on Single-Family Homes, Rooftop Solar on Multi-Family Row Homes

Source:
:https://retail-insider.com/retail-insider/2022/10/solar-power-pilot-project-launches-at-cf-chinook-centre-in-calgary-photos-interview/
MCCAC
Scott Goodwill on Unsplash

Community Generation

A group of people investing in a solar project

Pictured: Renfrew Solar Carport, Calgary

Source: https://www.sparkscience.ca/about-telus-spark/renfrew-solar-carp

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Examples of Solar on Farms

Source:
https://www.pv-magazine.com/2020/03/31/a-good-year-for-solar-agrivoltaics-in-vineyards/ (Jan 25, 2022) https://www.virginiamercury.com/2020/12/11/of-sheep-and-solar-fields/ (Jan 25, 2022)
https://www.virginiamercury.com/2020/12/11/of-sheep-and-solar-fields/ (Jan 25, 2022)

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Solar-Ready Design: Alberta

LEEP Contact: Clarice Kramer, clarice.kramer@nrcan-rncan.gc.ca

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Canada

Benefits of Solar PV

- Community
  - Lower emissions benefits all Albertans
  - Meets peak demand
  - Reduce grid electricity demand
- Builder
  - Increase revenue and margin
  - Increase appeal to customers - environmental and energy efficiency features are desired by new home buyers
  - Demonstrate sustainable building practices
- Homebuyer
  - Reduced cost of occupancy
  - Reduce emissions 60% – 100%
  - Visual sign of taking action for the environment
  - Hedge increased electricity prices

Benefits of Solar PV

- More Benefits
  - Scalability - systems deployed from 4 kw to >400 MW
  - Adaptably - can be fit to various locations, sites, shapes, and orientations
  - Reliability - PV systems have no moving parts and long equipment life spans
- Optional Benefits
  - resilience (off-grid, or systems with battery integration)

Benefits of Solar PV : Finical

Homebuyer - Reduced cost of occupancy = $600 per year.

Typical home using 8,000 kWh annually vs solar for net-zero electricity:

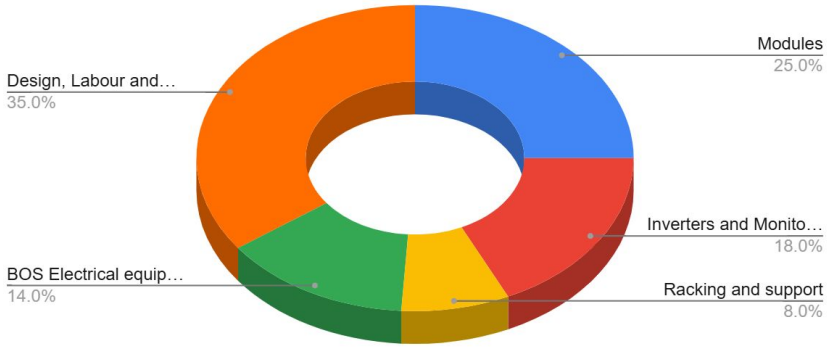
	No Solar	With Solar
Monthly Electricity Bill	$145	$59
Solar Pricing Plan		-$16
Carbon Offset Credits *		-$40
Increased mortgage payment		$91
Total Monthly Costs	$145	$94
Savings per month		$51

* carbon offsets credits are the sale of the “green attribute”

- Solar home also eligible for 25% refund on mortgage insurance

Understanding Solar PV costs

Typical Breakdown of Residential Solar PV costs



Modules	25%
Inverters and Monitoring	18%
Racking and support	8%
BOS Electrical equip. and permit	14%
Design, Labour and Supervision	35%
	100%

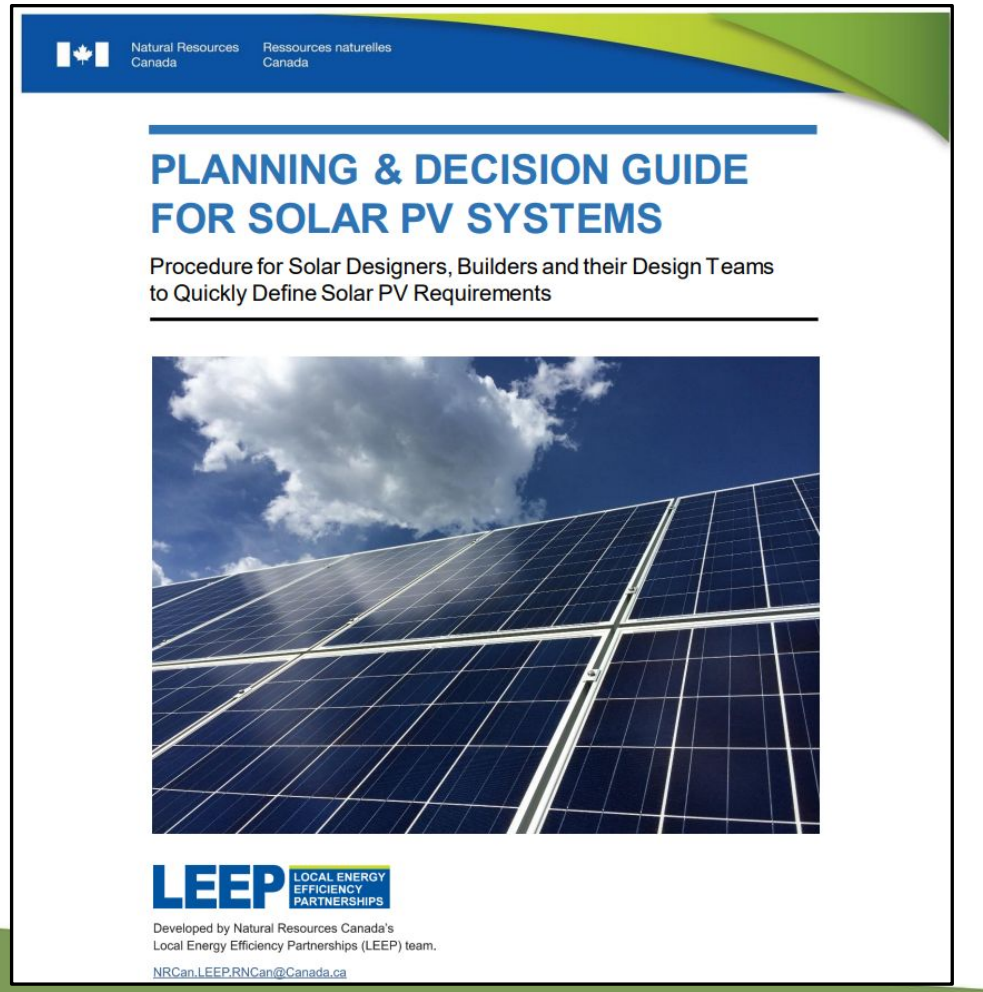
- Solar panels are only a portion of the total system costs
- Optimizing a system should address all of these costs

Install Solar during Construction!

- Easy to incorporate solar in a new build:
  - one wire from attic to mech room – located in a wall
- Minimal impact on construction process
  - solar installers are mostly on the roof, out of the way of other trades, 1-2 days onsite
- Mess, noise, debris
  - all work happens on a construction site, not an occupied home
- Solar can be financed in new home mortgage
- Builders can manage solar contractor better than many homeowners
- Planning and permitting is easier when incorporated with build project
- Better solar results achieved at no additional cost.

Solar outcomes go from Good to Better to BEST

LEEP Guides for Solar PV Systems



- Ten-step process
- Provides a worksheet / checklist
- Based on Integrated Design-Construction Team
- Very comprehensive – covers all of Canada, numerous solar scopes.

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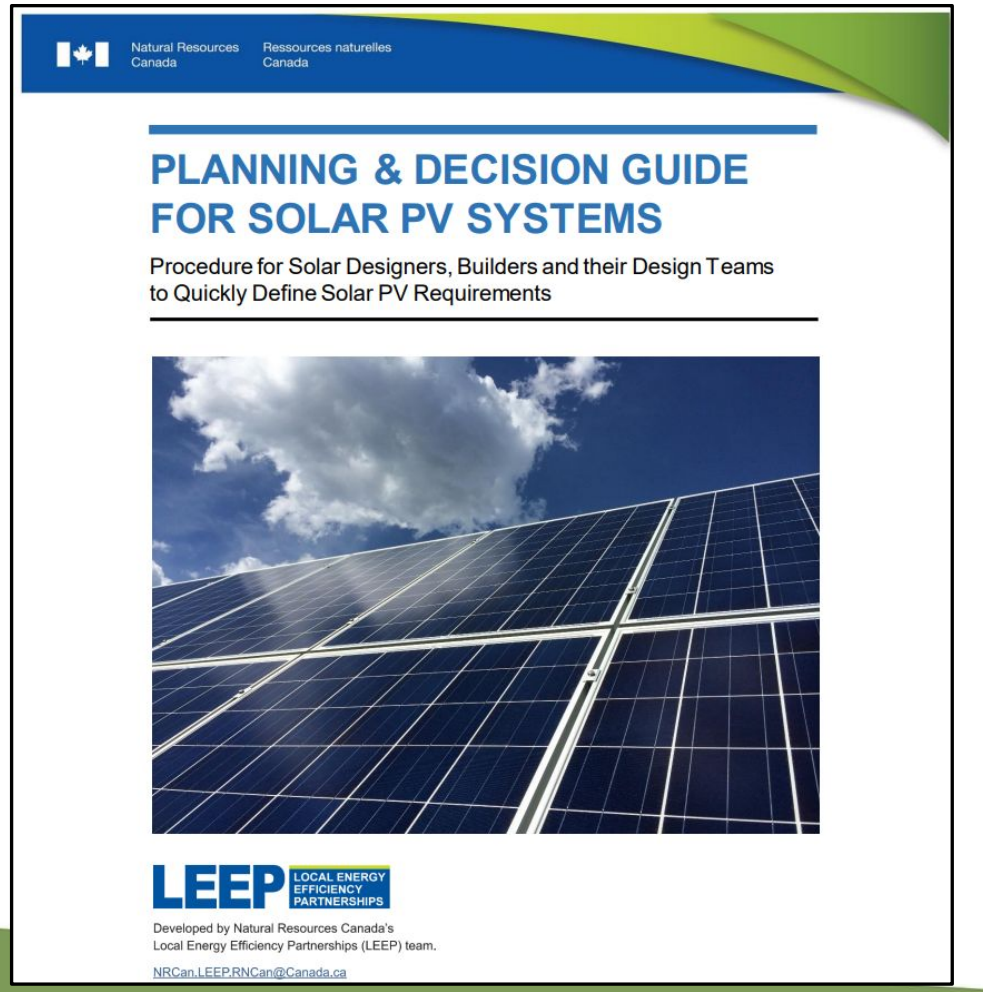
LEEP LOCAL ENERGY EFFICIENCY PARTNERSHIPS

LEEP Guides for Solar PV Systems



Scope:

The focus of this GUIDE is on solar PV-ready and solar PV-installed applications in the residential sector.

This guide covers the following applications of Solar PV technology:

- Solar PV-Ready installations in new homes, including net-zero ready homes;
- Solar PV Installations in existing and new homes, include net-zero homes;
- Grid-connected systems, as well as off-grid applications of solar PV;
- PV systems without batteries, as well as battery-ready and battery-installed applications.

This guide covers the following technologies:

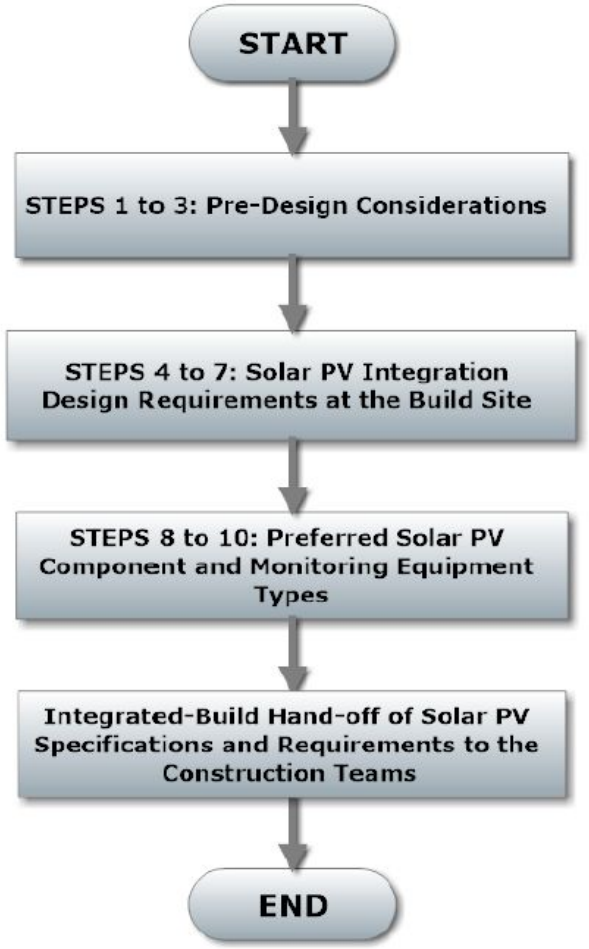
- Modular solar PV panels, based on either poly-crystalline or mono-crystalline silicon cells,
- including all-black and bi-facial modules;
- Solar PV inverter technologies, including string inverters, optimized-string inverters, microinverters, and bimodal inverters.

Exclusions include:

- Specific application requirements for Building Integrated Photovoltaic (BIPV) products are not
- covered in this guide.
- Planning for specialized requirements needed for community-wide solar PV installations,
- (e.g., use of centralized energy storage facilities, etc.) falls outside the scope of this guide.

(Page 1 of the guide)

Planning & Decision Guide for Solar PV Systems



Provides Builders a Framework that:

- Improves performance, affordability and value of the home
- Identifies team roles ensuring solar PV integrates seamlessly in construction process
- Transfers ‘lessons learned’ from one Guide-design process to others in the development

Supports PV Consultant/Installers to:

- Facilitate collaborative decision making
- Ensure PV goals are met
- Proactively address design issues to ensure PV is as effective as possible

Integrated Design and Construction Team

Builder / Architect	• Identifies solar goals • Presents building plans • Selects level of design flexibility
Solar Consultant	• Identifies solar PV annual energy production required to meet project goals. • Identifies annual and monthly solar access scores, and shading constraints using solar photographic site assessment. • Reviews plans and identifies possible changes required to meet solar PV energy production goals. • Provides annual solar PV energy production projections through appropriate modelling. • Identifies local utility requirements, determines suitable solar PV options and maximum grid • connectivity allowance for the project. • Ensures electrical service equipment capacity and design are appropriate for PV system size contemplated, advises builder and electrician of solar PV electrical requirements in advance of electrical service installation, and updates electrical plans. • Updates building plans to show physical locations of solar PV arrays, inverter(s), disconnection means, and point-of-connection to the grid. • Specifies suitable solar PV racking and attachment methods for review by builder, truss designer and structural engineer as deemed necessary by the Authority Having Jurisdiction (AHJ).

Integrated Design and Construction Team

Truss designer and structural engineer:	• Ensures structural loading and attachment requirements are suitable for the solar PV installation. • Updates structural and solar PV attachment requirements on plans.
Registered energy advisor (EA):	• Provides the building energy model. • Identifies projected building annual energy (i.e., electricity and fossil-fuel) consumption. • Identifies possible envelope and/or equipment energy-efficiency enhancements to reduce solar PV generation requirements.
HVAC design consultant	• Provides room-by-room, heating and cooling design loads used for equipment and duct sizing. • Provides detailed duct design plans to deliver energy-efficiency and comfort, and • recommendations for window selection and framing changes to minimize mechanical system impacts on interior space and aesthetics. • Provides guidance on required capacity of heating and cooling equipment based on design loads.
Electricians, Plumbers, HVAC contractors, Framers and Roofers:	• Provide helpful feedback on changes made to the plans. • Accommodate solar PV electrical requirements during service equipment selection and installation. • Provide solar PV electrical raceways between present or future array locations, solar inverter(s) and disconnection means, and the point-of-connection to the grid. • Accommodate unobstructed solar PV areas through collaborative roofing strategies, and careful placement of vents, plumbing stacks, etc.

LEEP also offers a guide on Selecting a Solar Consultant

Solar Alberta Industry Resources

Learn About Solar

How to find an installer:

1. Visit **solaralberta.ca** to use the **Installations Near You Map** and **Solar Alberta Directory** to:
   - Find installers who have agreed to abide by the **Alberta Solar Business Code of Conduct**
   - Review length of time in business, number of systems installed, and certifications of company
   - Try the **Request for Proposals/Quotes** form
2. Enquire about:
   - **Warranties** for products & workmanship
   - Maintenance & disposal **commitments**
   - **References** & proof of **insurance**
   - Do they have a **Journeyperson Electrician** or a Registered Apprentice under the supervision of a Certified Electrician to pull permits?
3. Solicit **at least 3 quotes**

The Cost of Solar

The cost of an installation will be unique and will depend on factors such as the installation size, home's geographic location, roof's design and shading, equipment and hardware specifications, and current solar incentives.

The Size of Solar

The Government of Alberta's Microgeneration Regulation stipulates that solar systems may be sized to meet all or a portion of the customer's total annual on-site electricity consumption. They may not exceed this size under that regulation. The Small Scale Generation Regulation enables a larger system size if desired (but more paperwork!).

Did you know?

- An Edmonton-based study on the roof of NAIT found that **snow only reduced solar module production by ~3%** over the course of a year.
- Approximately **95% of a solar panel can be recycled.** Solar panels are made of glass, plastic, metals and other recyclable materials, and are being integrated into standard electronic recycling systems.
- Globally, the **price of solar PV modules dropped by 90%** from 2010 to 2020!

About Solar Alberta

We are a non-profit society dedicated to accelerating a just and sustainable energy transition.

www.solaralberta.ca
hello@solaralberta.ca
780-443-7788

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APPENDIX B: Solar PV System Integration Worksheet

PART I: Pre-Design Considerations

Integrated Design Team:
Builder: _____ **Energy Advisor:** _____

PV Designer: _____ **Other trades:** _____

STEP 1: Builder's Preferred Goal for Solar PV *(circle one)*

- Option 1A: PV Ready Home
- Option 1B: PV Equipped Home
- Option 1C: Net-Zero Ready (NZr) Home
- Option 1D: Net Zero (NZ) Energy Home

STEP 2: Utility Connection Options and Constraints at the Build Site *(circle one and provide details)*

- Option 2A: Feed-in-Tariff (FIT)
- Option 2B: Net-Metering / Net Billing
- Option 2C: Net-Zero Electric
- Option 2D: Self-Use Only
- Option 2E: No Grid Connection Available

Maximum PV Array capacity allowed for grid connection: _____ kW_{peak}
Maximum PV Energy Production allowed for grid connection: _____ kWh/y

STEP 3: Confirm Solar PV Integration Design Requirements
Confirm general design requirements with Integrated Design Team using the STEP 1 & 2 decisions together with the provided "Planning Matrix" to secure Builder approval to proceed with the detailed design.

A. **Building Envelope:** Normal build / envelope upgrades *(circle one)*
B. **HVAC mechanicals:** Standard equipment / enhanced efficiency / all-electric *(circle all that apply)*
C. **PV Integration:** PV-Ready installation / Full PV Installation *(circle one)*
D. **Battery Integration:** Battery not required / Battery-Ready / Full battery installation *(circle one)*
E. **PV Inverter Type:** Inverter not required / Grid-tied inverter / Bi-modal inverter *(circle one)*

PART II: Solar PV Integration Design Requirements

STEP 4: Define Annual PV Energy Production Target *(circle one option and provide details)*

- Option 4A: No Specified Energy Target (Max. solar array area available: _____ ft² or m²)
- Option 4B: Partial energy offset Target (Nominal PV energy target: _____ kWh/y)
- Option 4C: Net-Zero Energy Usage (Nominal PV target: _____ kWh/y)

Solar photography completed to measure solar access scores and shading constraints at site: Yes / No
Measured annual solar access score: _____%. Summer: _____%. Winter: _____%.

STEP 5: Define PV Array Location(s) and Size(s) *(circle all options that apply and provide details)*

- Option 5A: House-roof mounted (array area available: _____ ft² or m²)
- Option 5B: Adjacent-structure, specify: _____ (array area available: _____ ft² or m²)
- Option 5C: Ground-mounted (array area available: _____ ft² or m²)
- Solar Access and Shading Assessment for the preferred array location(s):
  - Estimated PV Energy Production: _____ kWh/y)
  - Shading *(circle all that apply)*: External-shading: Yes / No ; Self-shading: Yes / No

STEP 6: Define Electrical Requirements for Solar PV *(circle one option and provide details)*

- Option 6A: Feed-in-Tariff (FIT) circuit breaker (C/B rating: _____A)
- Option 6B: Main-panel circuit breaker (C/B rating: _____A);
  specify main panel bus-bar rating: _____A
- Option 6C: Service Splitter with solar disconnect (solar C/B rating: _____A)

Other components: *(circle all that apply)*

- Battery Storage Required: yes / no
- Self-Use Controller Required: yes / no
- Bi-modal Inverter/Charger required: yes / no

STEP 7: Structural Impacts and preferred PV Attachment Method
Structural impacts assessed and recommended attachment method defined: No / Yes *(circle one)*
If No, arrange for structural review with input from the PV consultant.
If Yes, indicate type of assessment: Professional structural assurances provided: Yes / No *(circle one)*
Truss manufacturer assurances provided: Yes / No *(circle one)*
and, select the preferred attachment method: *(circle one option or sub-option)*

- Option 7A: Flashed anchors secured into roof sub-structure: *(select one sub-option)*
  (i) J or U-bolts; (ii) Lag-bolts into blocking; (iii) Lag-bolts into scabs; (iv) Lag bolts into top-chords*
- Option 7B: Flashed anchors secured into roof decking
- Option 7C: Standing seam metal roof clamps
- Option 7D: Ballasted systems *(only suitable on roofs with less than 7-degrees of slope)*
- Other method _____ *(specify)*

*** WARNING: DIRECT LAGGING INTO ROOF-TRUSS TOP CHORDS IS NOT RECOMMENDED BY TPIC**

PART III: Preferred Solar Components & Monitoring

STEP 8: Preferred Solar Module Technology *(select one)*

- Option 8A: Polycrystalline-Cell Modules
- Option 8B: Monocrystalline-Cell Modules (basic)
- Option 8C: Monocrystalline-Cell, All black Modules
- Option 8D: Monocrystalline-Cell, Bi-facial Modules
- Other requirements _____ *(specify)*

STEP 9: Preferred Inverter Technology *(select one)*

- Option 9A: String Inverter
- Option 9B: Optimized-String Inverter
- Option 9C: Micro-Inverter
- Option 9D: Bi-Modal Inverter
- Other requirements _____ *(specify)*

STEP 10: Preferred Energy Monitoring Approach *(Required for NZ homes; optional for others)*

- Option 10A: Monitoring not installed
- Option 10B: Basic Net-Zero Home monitoring
- Option 10C: Advanced energy monitoring of the home
- Other requirements _____ *(specify)*

PART I: Pre-Design Considerations

Integrated Design Team:

Builder: _____

Energy Advisor: _____

PV Designer: _____

Other trades: _____

STEP 1: Builder's Preferred Goal for Solar PV *(circle one)*

- Option 1A: PV Ready Home
- Option 1B: PV Equipped Home
- Option 1C: Net-Zero Ready (NZr) Home
- **Option 1D: Net Zero (NZ) ~~Energy~~ Electricity Home**

STEP 2: Utility Connection Options and Constraints at the Build Site *(circle one and provide details)*

- Option 2A: Feed-in-Tariff (FIT)
- Option 2B: Net-Metering / Net Billing
- **Option 2C: Net-Zero Electric** (Alberta limits generation to consumption over the year.)
- Option 2D: Self-Use Only
- Option 2E: No Grid Connection Available

Maximum PV Array capacity allowed for grid connection: _____ kW_{peak}

Maximum PV Energy Production allowed for grid connection: _____ kWh/y

STEP 3: Confirm Solar PV Integration Design Requirements

Confirm general design requirements with Integrated Design Team using the STEP 1 & 2 decisions together with the provided **"Planning Matrix"** to secure Builder approval to proceed with the detailed design.

A. **Building Envelope:** Normal build / envelope upgrades *(circle one)*

B. **HVAC mechanicals:** Standard equipment / enhanced efficiency / all-electric *(circle all that apply)*

C. **PV Integration:** PV-Ready installation / Full PV Installation *(circle one)*

D. **Battery Integration:** Battery not required / Battery-Ready / Full battery installation *(circle one)*

E. **PV Inverter Type:** Inverter not required / Grid-tied inverter / Bi-modal inverter *(circle one)*

Plan for net-zero electricity.

Alberta microgeneration regulation is net-billing and limits generation to usage.

Builder should arrange the installation with grid-tied inverters.

If client wants to add storage, they will need a hybrid inverter (bi-modal).

Table 3: Planning Matrix of Design Requirements for Solar PV Integration at a Build Location

Basic and Optional Design Requirements		Electrical Utility Grid Connection Option (from STEP 2)				
		2A: Feed-In-Tariff Connection	2B: Net-metering or Net-billing Connection	2C: Net-Zero Electric Connection	2D: Self Use Only Connection	2E: No Grid Connection Available [6]
Builder's Preferred Option for Solar PV Integration (from STEP 1)	1A: Solar-Ready Home	A: Normal build [1] B: Standard HVAC [3] C: PV-Ready D: No Inverter E: No Battery	A: Normal build [1] B: Standard HVAC [3] C: PV-Ready D: No Inverter **Optional:** E: Battery-Ready	A: Normal build [1] B: Standard HVAC [3] C: PV-Ready D: No Inverter **Optional:** E: Battery-Ready	A: Normal build [1] B: Standard HVAC [3] C: PV-Ready D: No Inverter E: Battery-Ready	A: Normal [1] or enhanced build [2] B: Standard [3], enhanced [2] or all-electric HVAC [4] C: PV-Ready D: Off-grid inverter-charger E: Battery-installed
	1B: Solar Equipped Home	A: Normal build [1] B: Standard HVAC [3] C: PV-Installed D: Grid-tied inverter E: No Battery	A: Normal build [1] B: Standard HVAC [3] C: PV-Installed D: Grid-tied inverter **Optional:** E: Battery-Ready or Battery installed with bi-modal inverter [5]	A: Normal build [1] B: Standard HVAC [3] C: PV-Installed D: Grid-tied inverter **Optional:** E: Battery-Ready or Battery installed with bi-modal inverter [5]	A: Normal build [1] B: Standard HVAC [3] C: PV-Installed D: Grid-tied inverter with self-use controller E: Battery installed **Optional:** E: Bi-modal inverter [5]	A: Normal [1] or enhanced build [2] B: Standard [3], enhanced [2] or all-electric HVAC [4] C: PV-Installed D: Off-grid inverter-charger E: Battery-installed
	1C: NetZero-Ready Home	A: Enhanced build [2] B: Enhanced HVAC [2] C: PV-Ready D: No inverter E: No Battery	A: Enhanced build [2] B: Enhanced HVAC [2] C: PV-Ready D: No Inverter **Optional:** E: Battery-Ready	A: Enhanced build [2] B: All-electric HVAC [4] C: PV-Ready D: No Inverter **Optional:** E: Battery-Ready	A: Enhanced build [2] B: Enhanced HVAC [2] C: PV-Ready D: No Inverter E: Battery-Ready	A: Enhanced build [2] B: Enhanced HVAC [2] C: PV-Ready D: Off-grid inverter-charger E: Battery-installed
	1D: Net-Zero Energy Home	A: Enhanced build [2] B: Enhanced HVAC [2] C: PV-Installed D: Grid-tied inverter E: No Battery	A: Enhanced build [2] B: Enhanced HVAC [2] C: PV-Installed D: Grid-tied inverter (basic) **Optional:** E: Battery-Ready or Battery installed with bi-modal inverter [5]	A: Enhanced build [2] B: All-electric HVAC [4] C: PV-Installed D: Grid-tied inverter (basic) **Optional:** E: Battery-Ready or Battery installed with bi-modal inverter [5]	**DIFFICULT TO ACHIEVE** Consider **Option 1B: Solar-Equipped Home**, with energy-efficiency upgrades [2] as an alternative	**DIFFICULT TO ACHIEVE** Consider **Option 1B: Solar-Equipped Home**, with energy-efficiency upgrades [2] as an alternative
Battery Requirements		**Battery not required**	**Battery-Ready or Battery Installation optional**	**Battery-Ready or Battery Installation optional**	**Battery-Ready or Battery Installation required**	**Battery Installation required**

Planning Matrix of Design Requirements

- the matrix connects step 1 and 2
- recommendations for design options, i.e, the output is STEP 3 in the checklist

(page 15)

PART I: Pre-Design Considerations

Integrated Design Team:

Builder: _____

Energy Advisor: _____

PV Designer: _____

Other trades: _____

STEP 1: Builder's Preferred Goal for Solar PV *(circle one)*

- Option 1A: PV Ready Home
- Option 1B: PV Equipped Home
- Option 1C: Net-Zero Ready (NZr) Home
- **Option 1D: Net Zero (NZ) ~~Energy~~ Electricity Home**

STEP 2: Utility Connection Options and Constraints at the Build Site *(circle one and provide details)*

- Option 2A: Feed-in-Tariff (FIT)
- Option 2B: Net-Metering / Net Billing
- **Option 2C: Net-Zero Electric** (Alberta limits generation to consumption over the year.)
- Option 2D: Self-Use Only
- Option 2E: No Grid Connection Available

Maximum PV Array capacity allowed for grid connection: _____ kW_{peak}

Maximum PV Energy Production allowed for grid connection: _____ kWh/y

STEP 3: Confirm Solar PV Integration Design Requirements

Confirm general design requirements with Integrated Design Team using the STEP 1 & 2 decisions together with the provided **"Planning Matrix"** to secure Builder approval to proceed with the detailed design.

A. **Building Envelope:** Normal build / envelope upgrades *(circle one)*
B. **HVAC mechanicals:** Standard equipment / enhanced efficiency / all-electric *(circle all that apply)*
C. **PV Integration:** PV-Ready installation / Full PV Installation *(circle one)*
D. **Battery Integration:** Battery not required / Battery-Ready / Full battery installation *(circle one)*
E. **PV Inverter Type:** Inverter not required / Grid-tied inverter / Bi-modal inverter *(circle one)*

Plan for net-zero electricity.

Alberta microgeneration regulation is net-billing and limits generation to usage.

Builder should arrange the installation with grid-tied inverters.

If client wants to add storage, they will need a hybrid inverter (bi-modal).

Grid Connection Options

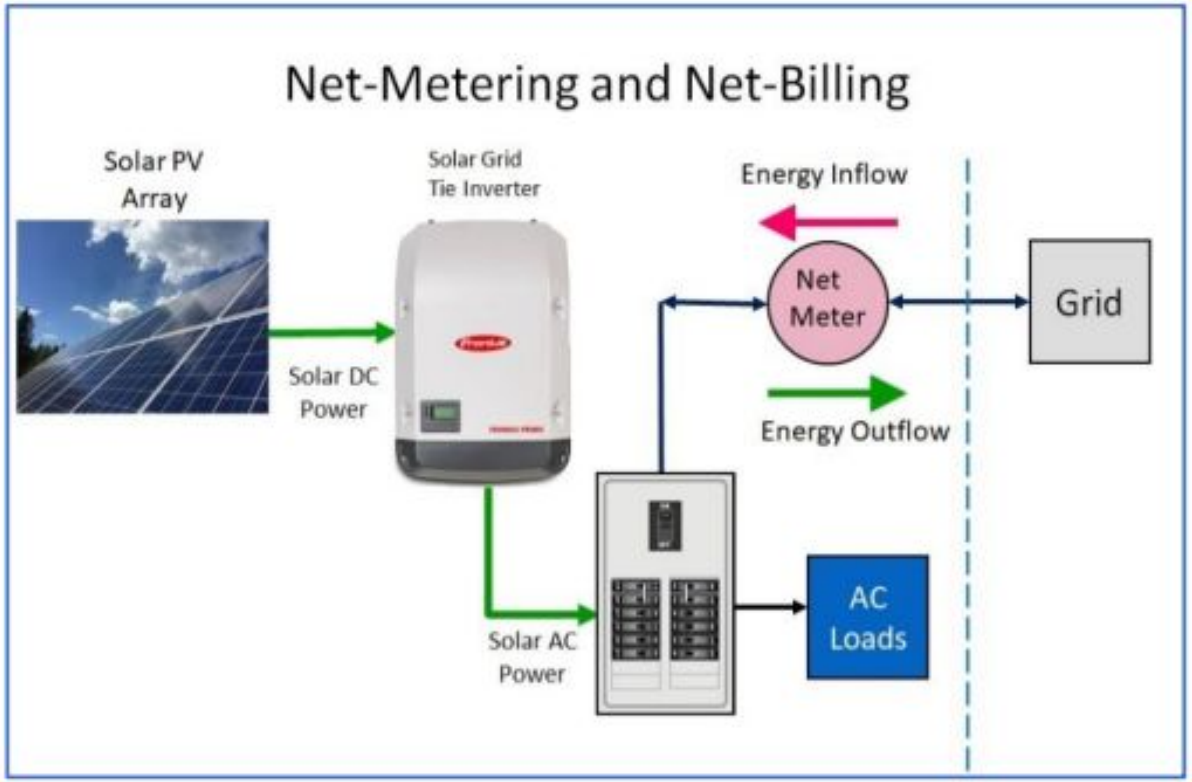


Figure 7: Electrical Configuration for Net-Metering and Net-Billing - courtesy of Riverside Energy Systems with Inverter image courtesy of Fronius

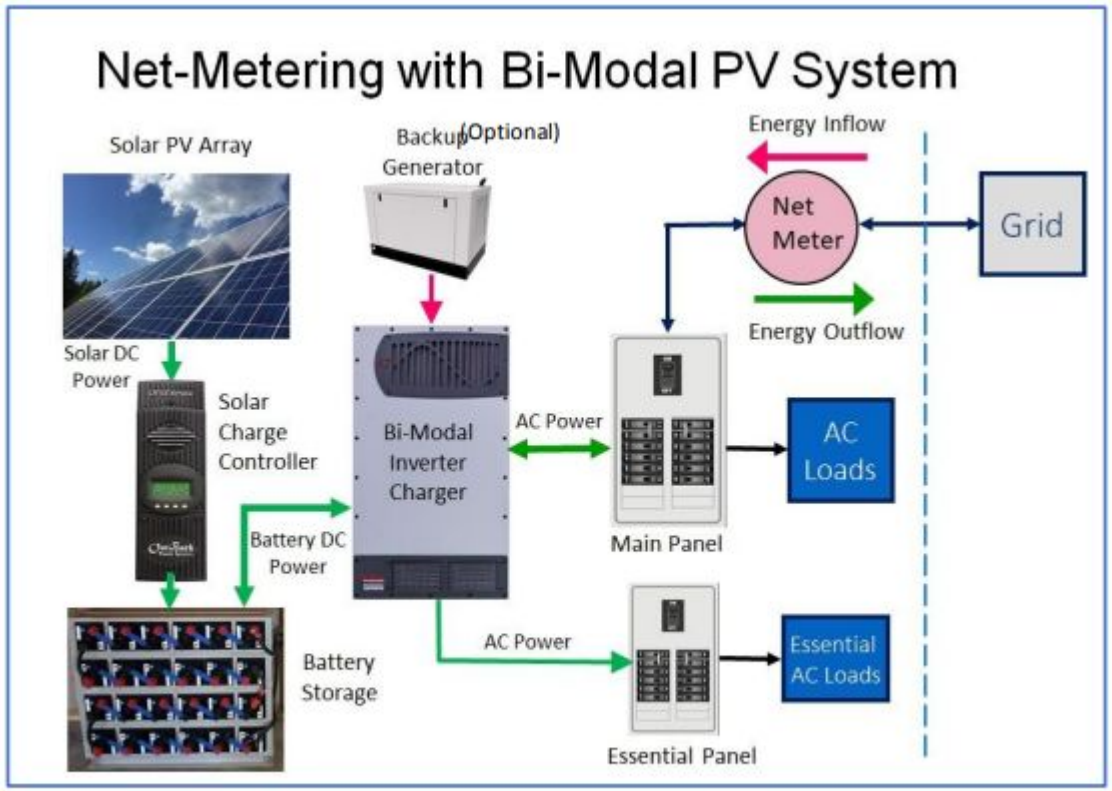


Figure 12: Net-Metering Solar PV system with Bi-Modal Inverter - courtesy of Riverside Energy Systems with equipment images courtesy of Outback Power Systems.

Here are two systems - both net-billing connections but much different levels of complexity

PART II: Solar PV Integration Design Requirements

STEP 4: Define Annual PV Energy Production Target *(circle one option and provide details)*

- Option 4A: No Specified Energy Target (Max. solar array area available: _____ ft2 or m2)
- Option 4B: Partial energy offset Target (Nominal PV energy target: _____ kWh/y)
- Option 4C: Net-Zero ~~Energy~~ Electricity Usage (Nominal PV target: _____ kWh/y)

~~Solar photography completed to measure solar access scores and shading constraints at site: Yes / No~~
~~Measured annual solar access score: _____%. Summer: _____%. Winter: _____%.~~

STEP 5: Define PV Array Location(s) and Size(s) *(circle all options that apply and provide details)*

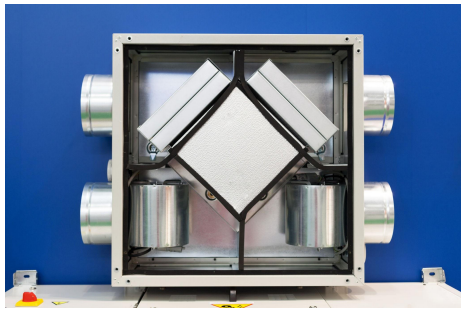
- Option 5A: House-roof mounted (array area available: _____ ft2 or m2)
- Option 5B: Adjacent-structure, specify: _____ (array area available: _____ ft2 or m2)
- Option 5C: Ground-mounted (array area available: _____ ft2 or m2)
- Solar Access and Shading Assessment for the preferred array location(s):
  - Estimated PV Energy Production: _____ kWh/y)
  - Shading *(circle all that apply):* External-shading: Yes / No ; Self-shading: Yes / No

Energy model forecasts electricity usage. Which is the generation target.

.

Solar design software forecast generation from array specifications.

Electrification Challenges






Do we know what forecasted electricity demand will be?

Potential electrical demands:

- Ventilation
- EV chargers
- Heat pumps/Air conditioners
- Electrified Hot water heaters
- hot tubs, pools, spas
- ???

Example of Solar Design Application

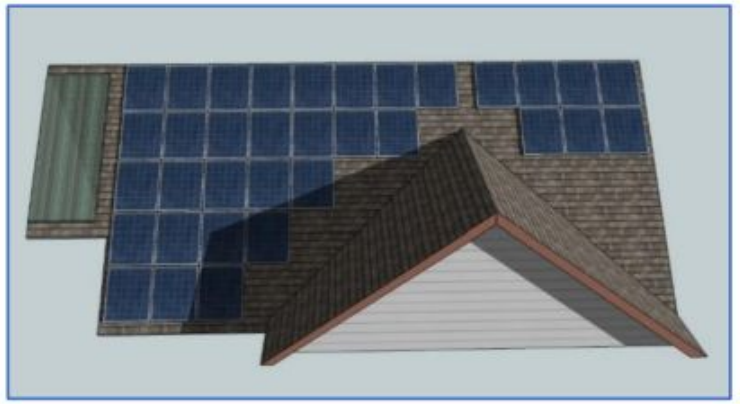


Figure 19: Example of Self-Induced Array Shading by Roof Gable - courtesy of Riverside Energy Systems

Step 5 Mounting Locations

Figure 14: Roof Mounted PV System using South and West Facing Arrays - courtesy Riverside Energy Systems

Figure 15: Outdoor Leisure Area Solar PV shelter – courtesy Lumos Solar

Figure 16: Residential Solar PV Parking Shelter – courtesy Lumos Solar

Figure 17: Residential Wall-mounted Solar PV system - courtesy of Blue Water Energy

Figure 18: Ground-mounted Solar PV Array - courtesy of Riverside Energy Systems

PART II (continued)

STEP 6: Define Electrical Requirements for Solar PV *(circle one option and provide details)*

- Option 6A: Feed-in-Tariff (FIT) circuit breaker (C/B rating: _____ A)
- Option 6B: Main-panel circuit breaker (C/B rating: _____ A);
  specify main panel bus-bar rating: _____ A
- Option 6C: Service Splitter with solar disconnect (solar C/B rating: _____ A)

Other components: *(circle all that apply)*

- Battery Storage Required: yes / no
- Self-Use Controller Required: yes / no
- Bi-modal Inverter/Charger required: yes / no

STEP 7: Structural Impacts and preferred PV Attachment Method

Structural impacts assessed and recommended attachment method defined: No / Yes *(circle one)*
If No, arrange for structural review with input from the PV consultant.
If Yes, indicate type of assessment: Professional structural assurances provided: Yes / No *(circle one)*
Truss manufacturer assurances provided: Yes / No *(circle one)*

and, select the preferred attachment method: *(circle one option or sub-option)*

- Option 7A: Flashed anchors secured into roof sub-structure: *(select one sub-option)*
- (i) J or U-bolts; (ii) Lag-bolts into blocking; (iii) Lag-bolts into scabs; (iv) Lag bolts into top-chords*
- Option 7B: Flashed anchors secured into roof decking
- Option 7C: Standing seam metal roof clamps
- Option 7D: Ballasted systems *(only suitable on roofs with less than 7-degrees of slope)*
- Other method: **anchor with butyl seal, Building-Integrated PV**

* WARNING: DIRECT LAGGING INTO ROOF-TRUSS TOP CHORDS IS NOT RECOMMENDED BY TPIC

Interconnection will be a circuit breaker in the service entrance panelboard.
The panelboard bus must be adequate for the sum of grid supply and solar generation.

Example: 125A bus with 100A grid supply
(1.25 x bus) – grid = max solar breaker
(1.25 x 125) – 100 = 56A = 50A solar breaker

.

Solar contractor can provide specs to truss supplier to include in the design and stamp.

Hardware is available for tile roofs (metal, rubber, concrete, clay).

Standing seam metal roof clamps are convenient.

Anchors with butyl pads are very popular.

BIPV solutions are also available.

Mounting

Bottom left going clockwise

- Building Integrated roof panel (BIPV)
- Rail on roof
- Wall mounted awning
- Flat wall mount
- Tilt-up ballast mount

CHE
Building-Integrated Photovoltaic System (BIPV)

PART III: Preferred Solar Components & Monitoring

STEP 8: Preferred Solar Module Technology *(select one)*

- Option 8A: Polycrystalline-Cell Modules
- Option 8B: Monocrystalline-Cell Modules (basic)
- Option 8C: Monocrystalline-Cell, All black Modules
- Option 8D: Monocrystalline-Cell, Bi-facial Modules
- Other requirements _____ (specify)

Mono-crystalline modules dominate
All black (black frames and black backsheet) readily available at similar price.
Bifacial increasingly popular; questionable efficiency gain on roof mount.

STEP 9: Preferred Inverter Technology *(select one)*

- Option 9A: String Inverter
- Option 9B: Optimized-String Inverter
- Option 9C: Micro-Inverter
- Option 9D: Bi-Modal Inverter
- Other requirements: includes generation monitoring

Micro-inverters dominate residential. Cost-effective, modular, fit under the modules.

All inverters include generation monitoring, often at module level.

STEP 10: Preferred Energy Monitoring Approach *(Required for NZ homes; optional for others)*

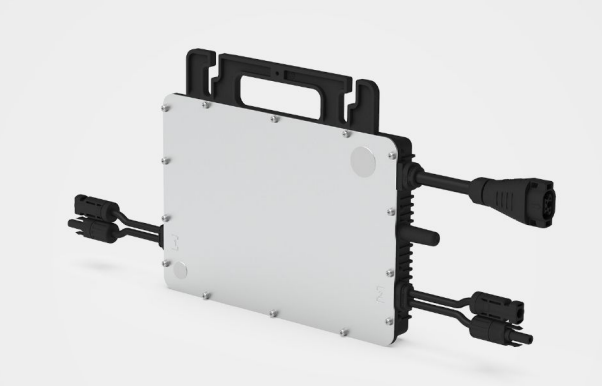
- Option 10A: Monitoring not installed
- Option 10B: Basic Net-Zero Home monitoring
- Option 10C: Advanced energy monitoring of the home
- Other requirements _____ *(specify)*

Consumption monitoring may be desired – not a major cost item anymore.
Emporia Vue with 8 circuits = $550 installed

Common Solar Panels

Mono silicon, high efficiency solar panels all black (left) versus a white back

Inverter Types



Changes DC to AC electricity

➔ AC output synchronized to grid

➔ No grid = No output

- **Micro Inverter**: low voltage, mounted under modules, pair 1 to 4 panels per inverter.
- **String Inverter**: higher voltage, fewer components, one inverter for the whole array(s)
- **Hybrid Inverter**: PV and batteries, grid transfer switch, energy management system (EMS), microgrid,

Micro-Inverter application

Micro-Inverter application

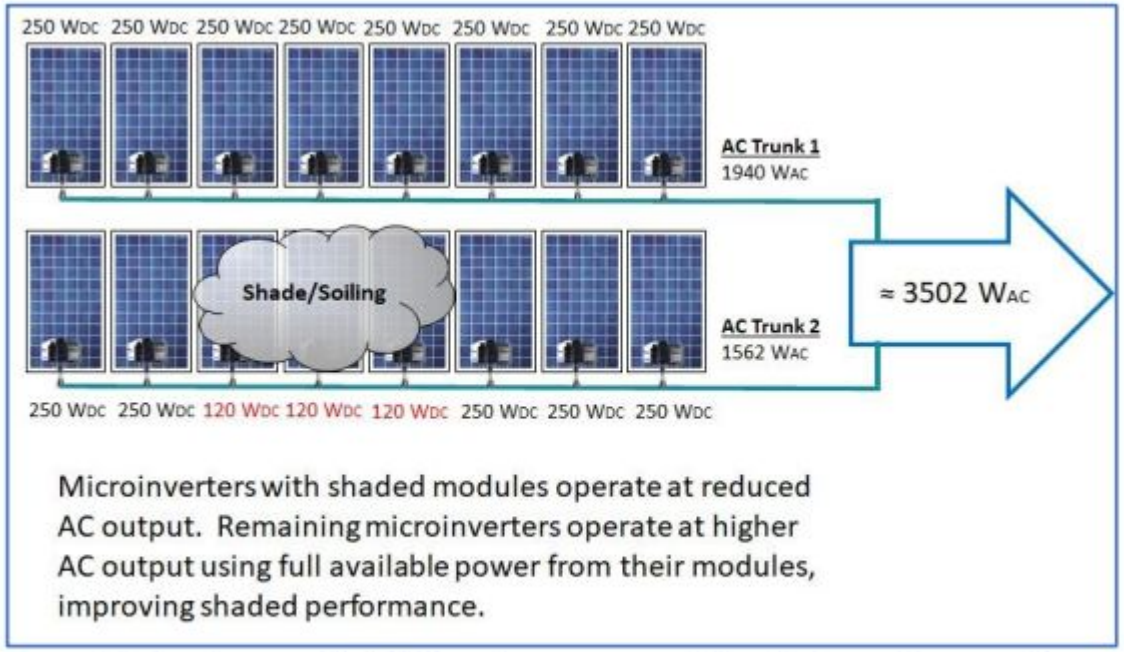


Figure 35: Microinverter – Shaded Operation - courtesy of Riverside Energy Systems with Microinverter Images Courtesy of Enphase

Micro-inverters work best when:

- Shade-tolerant design is important.
- Modules or sub-arrays will be placed in more than one orientation (azimuth and tilt).
- Multiple module technologies will be used.
- Individual module monitoring is desirable.
- Module-level Rapid Shutdown is required.
- Bringing DC power into the building is undesirable.

String Inverters Applications

String Inverters Applications

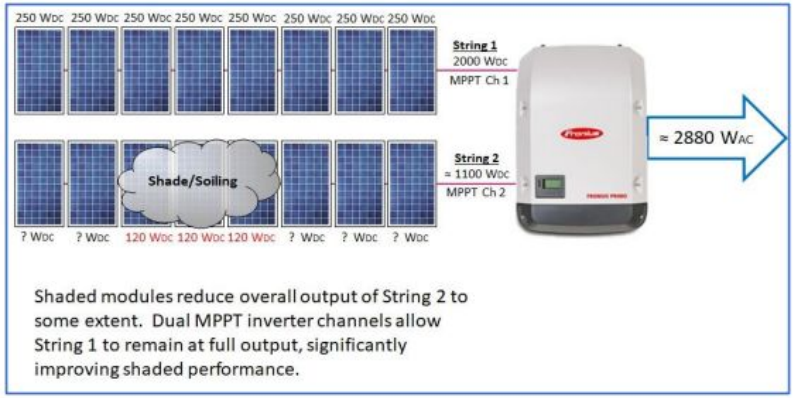


Figure 33: String Inverter with Dual MPPT Channels - Shaded Operation - courtesy of Riverside Energy Sytems with inverter image courtesy of Fronius Canada

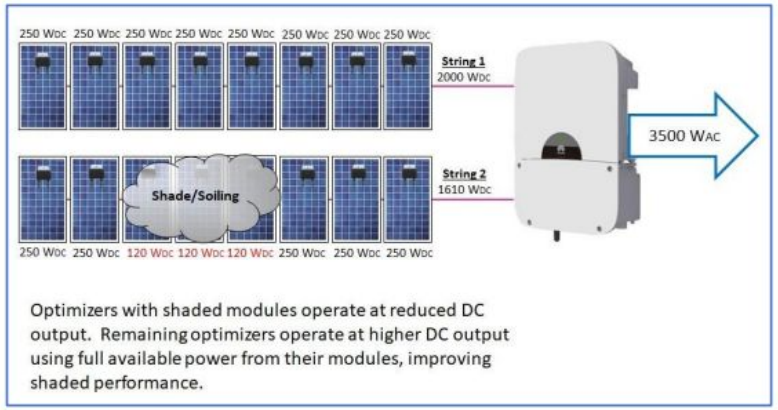


Figure 34: Optimized String Inverter - Shaded Operation - courtesy of Riverside Energy Sytems with product image courtesy of Huawei

String inverters work best when:

- Differing shade conditions between modules on the same MPPT channel rarely occurs.
- All modules on the same MPPT channel are in identical orientation (azimuth and tilt).
- Individual module-level performance monitoring is not required.
- Module-level Rapid Shutdown is not required.

Optimized string inverters are best used when:

- Shade-tolerant design is important.
- Multiple PV array orientations will be used (e.g., differently oriented roof sections).
- Multiple module technologies will be used.
- Module level Rapid Shutdown is required.
- Using different string lengths is advantageous.
- Individual module monitoring is desirable.

Solar Inverters – hybrid inverters

LEEP Guide Takeaways

- Provides a framework
- Helps structure your decision making process
- Outlines roles and responsibilities
- helps communication if all parties are using it for reference
- Contains a lot of information and specifics to help you through the process

Solar PV Design Best Practices

SOLAR ALBERTA

Design and Build

Architectural

Structural

Mechanical

Electrical

Design and Build Management

Design Phase

- Hire architects + engineers with solar experience
- Involve a solar consultant/installer early on
- Use LEEP Guide 10-step processs

Construction Phase

- Ensure affected trades are aware of solar requirements
- Plan materials staging to avoid loss, damage
- Have construction manager regularly check that trades are following the solar plan

SOLAR ALBERTA

Architectural Considerations

South-facing roof preferred, East and West okay.

3:12 or higher pitch is ideal.

Asphalt shingles and standing seam metal are good roofing materials.

Avoid complex roof shapes.

Re-consider skylights except on north-facing roofs

Architectural Considerations

A comparison of two roofs:

Top: Gabled roof

Bottom: Solar-optimized

Sources:

Top Photo: Heather MacKenzie

https://avalonhomes.com/advantages-of-a-zen-net-zero-home (Retrieved Jan. 9, 2025)

SOLAR ALBERTA

Architectural Considerations

Source: Heather MacKenzie

SOLAR ALBERTA

Architectural Considerations

Solar mounting options include facades, awning, fences, ground-mount.

Including solar in Development Permit application can streamline solar permitting.

Consider future construction in proximity to the solar project that could reduce solar power generation.

SOLAR ALBERTA

Solar Siting Recommendations

solaralberta.ca/go-solar/solar-siting-recommendations

Solar Siting Recommendations

For Project Developers

Purpose: To help project developers optimize the solar generating capacity of their projects while minimizing their broader ecological footprint.

For All Solar Projects:

Ensure you are compliant with or exceeding all regulations, codes, and permitting requirements for the jurisdiction[1] in which you are installing solar such as:

- Alberta's Microgeneration Regulation,[2] Small Scale Generation Regulation,[3] Electric Utilities Act[4]
- Edmonton's Requirements for Solar Photovoltaic Permits[5] and Calgary's Solar Collector Rules[6]
- Alberta's Designated Trades & Restricted Activities Regulation,[7] which stipulates that to pull a permit and install a solar system in Alberta, you must be a certified journeyperson electrician or a registered apprentice working under the supervision of a certified electrician
- Alberta Solar Business Code of Conduct[8]

For Rooftop Solar:

Building Orientation, Roof Design & Electrical Considerations

- See Solar Alberta's 'Is My Home Solar-Ready' checklist[9] for a quick reference and see the NRCan Planning and Decision Guide for Solar PV Systems for more detailed technical considerations.[10]

Shading/Solar Access Considerations

- Tall trees as well as existing or future buildings may cast shadows and reduce generation. However, solar panel technology can often mitigate shading issues.[11]

Wind Considerations

- A site that is particularly windy may add extra wind load to the roof installation, which will affect the amount of ballast needed for an array. Consult the Alberta Infrastructure Solar Photovoltaic Guidelines for additional information about wind and other rooftop siting/design considerations.[12]

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Structural Considerations

Ensure the roof structure can support the additional loads from solar PV:

3 psf for attached flush-mount systems

5 psf for flat roof ballasted systems

Consult with solar installer for mounting options and loads

Mechanical/ HVAC Considerations

Place roof penetrations on the north-facing roof

Alternatively, place penetrations in a confined space, not spread all over the roof.

Consider wall exhaust instead of roof

Mechanical/ HVAC Considerations

https://www.nachi.org/roof-penetrations-part3-20.htm

SOLAR ALBERTA

Mechanical/ HVAC Considerations

https://www.nachi.org/roof-penetrations-part3-20.htm

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Roof Obstructions

Sources:
https://kubyenergy.ca/blog/solar-ready-homes (Retrieved Jan. 9, 2025)
https://greenridgesolar.com/installing-solar-chimneys-skylights-vents/ (Retrieved Jan. 9, 2025)
Simple Solar

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Electrical Considerations

Further reading: NRCan's Planning and Decision Guide for Solar PV Systems (2020)

Ensure panel bus rating suitable for solar

Leave spare breaker space in panel at opposite end to main breaker

For a string inverter or hybrid inverter:

- Leave 2' x 3' wall space beside the main panel
- Provide 1" metal conduit and pull rope from attic to main electrical room

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Documentation Considerations

Provide a **written PV-ready report** at closing

Secure a copy of the **solar PV-ready report and design documentation to the wall** beside the electrical panel

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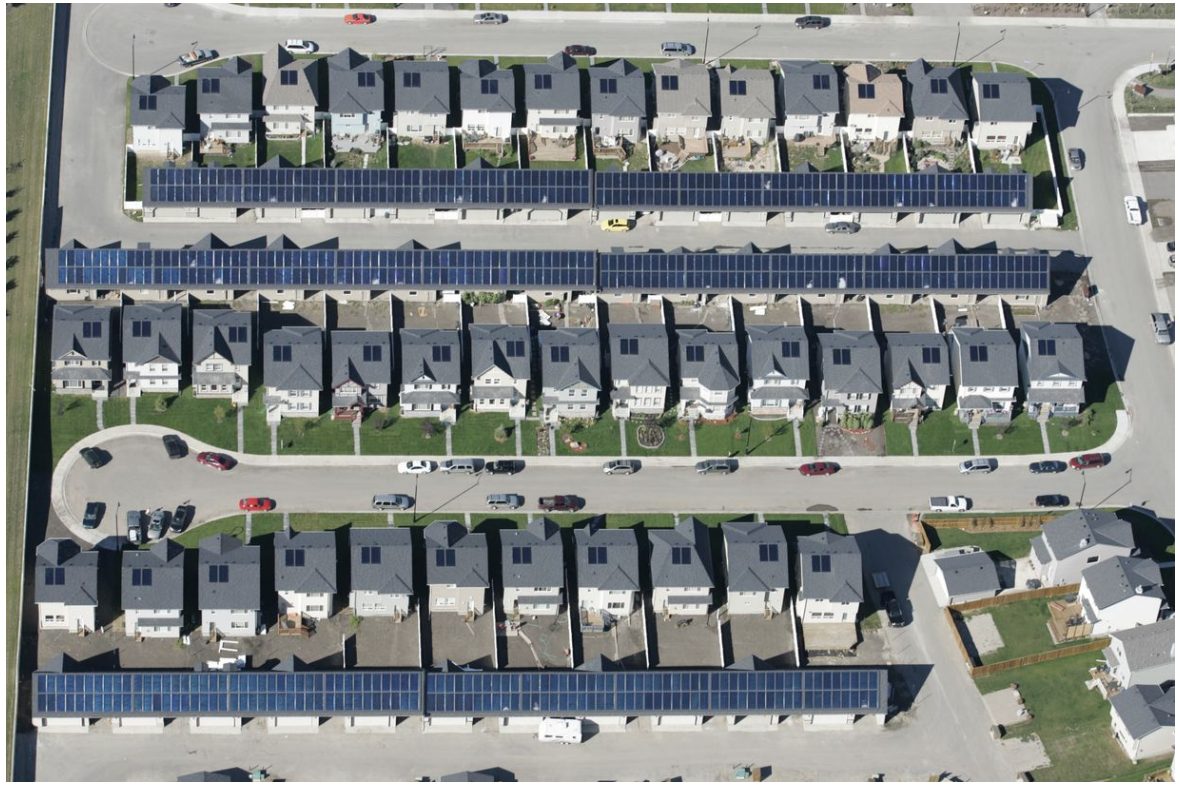
Other Solar-Related Considerations

SOLAR ALBERTA

Solar-Ready/ Solar-Integrated Community Design Considerations

1. Street orientation
2. Shading considerations
3. Electrical infrastructure
4. Ways to future-proof systems



Source: https://www.dlsc.ca/photos/NewPhotoGallery/DLSC_Large_Web_Pictures/Aerial/KL9X7800.jpg
(Retrieved January 10, 2024)

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Solar-Friendly Municipal Policies

Design variances for efficiency retrofits and solar

Bylaws/standards above and beyond federal/provincial energy codes

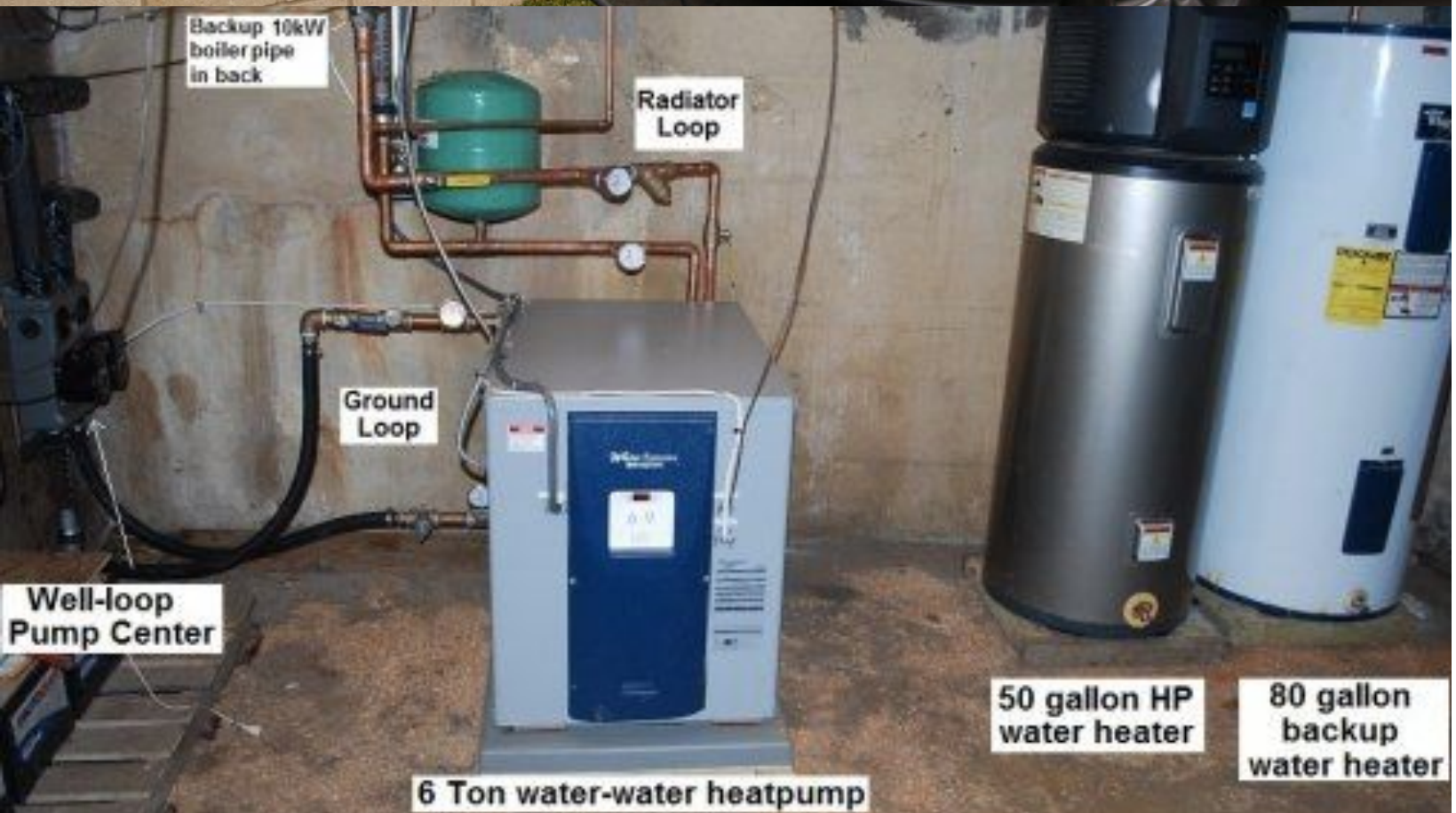
Reduce restrictive guidelines/covenants that prevent solar adoption

Don’t include the added value of solar in property tax assessments

Use Solar Alberta's **Solar Siting Recommendations**

Check out MCCAC’s **Solar Friendly Municipalities Toolkit**

SOLAR ALBERTA



Electric Appliances, EVs & Energy Storage

Sources:

Photo by Evnex Ltd on Unsplash

http://thermopump.com/ElectricHeat/what-is-an-electric-heat-pump

(Retrieved November 30, 2021)

SOLAR ALBERTA

Battery Energy Storage Systems

Sources:
Top: https://www.gslenergybattery.com/canadas-commercial-solar-battery-storage-solution
Bottom: https://www.solarwyse.ca/solar-batteries/

Case Studies

Garage Solar

FINANCIAL

Detached garage are often convenient:

- **Lower height**
- **Few roof penetrations**
- **Easy access for wiring**
- **Convenient work area**
- **Must have electrical service either servic entrance or subpanel**

Garage Solar

Project	Garage Solar Array
City	Calgary
Elec Usage (kWh/yr)	4,789 1

Investment	12,688
Savings /yr	1,439 2
GHG T/yr	2.8

Equipment	Make	Model	Watts	Qty	Total
Modules (DC)	Thornova	TSGBT54-G11	500	10	5,000
Inverters (AC)	HoyMiles	HMS quad, dual	1440, 720	2, 1	3,600
Mounting	Kinetic	Rapid Rail	Roof Tech anchors	black clamps	rodent screen
Solar Amps (max AC)					15.0 3
Overbuild					1.39

Interconnection	service entrance	sub panel
Location	House	Garage
Manufacturer	Siemens	Federal Pion
Model no	SEQ32100SM	104-8
bus bar rating	125	70
supply amps	100	40
Solar Breaker		20
max solar	56.25	47.5 4

Roof Type	asphalt shingle
Slope	4:12
Height	8' - 10'

5

Forecast (kwh)		2025
Jan	227	
Feb	302	
Mar	501	320
Apr	565	540
May	652	663 6
Jun	661	672
Jul	731	609
Aug	643	626
Sep	483	
Oct	437	
Nov	248	
Dec	185	
Total	5,635	
kWh/kW	1,127 7	

Laneway Solar

ENVIRONMENTAL

Laneway house planned for solar:

- **Electrical cables run to east and west roofs during construction.**
- **Steep, steel roof**
- **Electrical service entrance moved into laneway house.**
- **Ridge vent for attic**
- **Plumbing stack kept low on roof**
- **Skylights kept to one side**

Laneway house

Project	Laneway solar
City	Calgary
Elec Usage (kWh/yr)	7,140 1

Investment	28,250
Savings /yr	1,994 2
GHG T/yr	3.9

Equipment	Make	Model	Watts	Qty	Total
Modules (DC)	Longi	LR5-54-HPB	415	24	9,960
Inverters (AC)	HoyMiles	HMS-1600-4T	1440	6	8,640
Mounting	Kinetic	Rapid Rail	S-5U 3	black clamps	rodent screen
Solar Amps (max AC)					36.0
Overbuild					1.15

Interconnection	service entrance	sub panel
Location	laneway house	house
Manufacturer	Siemens	ITE
Model no	SEQ32200	EQ load center
bus bar rating	200	100
supply amps	200	100
Solar Breaker	2x25A 4	
max solar	50	25

Roof Type	steel 5
Slope	12:12
Height	13 - 24

Forecast (kwh)		2024	2025
Jan	270		238
Feb	431		229
Mar	691		535
Apr	803		932
May	965		1126 6
Jun	1,011		1163
Jul	1,121		997
Aug	932		942
Sep	640		
Oct	524	*386*	
Nov	306	145	
Dec	227	153	
Total	7,921		
kWh/kW	795 7		

Airdrie Ground Mount

INDEPENDENCE

Ground Mount chosen for acreage site near Airdrie:

- **Rack manually tilts to optimize solar generation.**
- **Orientation is optimized - due south**
- **Bifacial modules increase efficiency**

Airdrie Ground Mount

Project	Airdrie Ground Mount
City	Airdrie
Elec Usage (kWh/yr)	8,974 1

Investment	28,142
Savings /yr	2,812 2
GHG T/yr	4.8

Equipment	Make	Model	Watts	Qty	Total
Modules (DC)	Longi	LR7-72HGD	600	12	7,200
Inverters (AC)	Sparq	Q2000	2000	3	6,000
Mounting	Azgard	ground mount	piles 3		
Solar Amps (max AC)					25.0
Overbuild					1.20

Interconnection	service entrance	sub panel
Location	house	house
Manufacturer	Cutler Hammer	Cutler Hammer
Model no	CPM-130	CPL-116
bus bar rating	125	125
supply amps	100	60 4
Solar Breaker		50
max solar	56.25	96.25

Roof Type	
Slope	20, 45, 70
Height	2 - 15

Forecast (kwh)		2025
Jan	627	543
Feb	686	718
Mar	908	805
Apr	911	1,090
May	961	1,063 6
Jun	934	1,166
Jul	1,060	863
Aug	997	1,183
Sep	849	
Oct	848	
Nov	560	
Dec	473	
Total	9,814	7
kWh/kW	1,363	

Multi-Res BIPV

INVESTMENT

Multi-residential new construction with BIPV roof

- **Four units, each with secondary suite.**
- **Designed for all-electric, net-zero energy (no gas).**
- **Four meters = four microgen sites = four solar interconnections**
- **Garage has four subpanels, one for each unit, with solar and EV.**

Multi-Res BIPV

Project	Mulit-Res, BIPV, EV
City	Calgary
Elec Usage (kWh/yr)	52,645 1

Investment	198,147
Savings /yr	17,587 2
GHG T/yr	32.5

Equipment	Make	Model	Watts	Qty	Total
Modules (DC)	Thornova	TS-BGT54-G11	500	144	72,000
Inverters (AC)	Hoymiles	HMS-1600-4T	1440	36	51,840
Mounting	120 BIPV frames	24 Kinetic	rapid rail	roof tech anchors	3
Solar Amps (max AC)					216.0
Overbuild					1.39

Interconnection	service entrance	sub panel
Location	in each unit (4)	garage (4)
Manufacturer		
Model no		
bus bar rating	225	100
supply amps	200	50
Solar Breaker	2 x 30	20 4
max solar	81.25	75

Roof Type	CHE, asphalt
Slope	2:12, 6:12
Height	10, 30

Forecast (kwh)		2025
Jan	1,809	
Feb	3,060	
Mar	5,464	
Apr	7,001	
May	8,798	
Jun	9,097	6,047 6
Jul	9,966	9,087
Aug	8,026	9,099
Sep	5,500	
Oct	3,901	
Nov	2,080	
Dec	1,496	
Total	66,198	
kWh/kW	919	7

Case Studies

For further information on the case studies, contact Tom Jackman at Simple Solar:

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403 671 4374

SIMPLE SOLAR
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Inspiration

SOLAR ALBERTA

Spectacular Solar

- Make your solar array Special!
- Sunrise Tower, Edmonton
- Canada’s largest BIPV cladding
- 85 ft. tall mural
- 30,000 square feet, 265 kW capacity
- Awarded Guinness World Record
- Lance Cardinal, Indigenous artist
- Chandos Construction
- Mitrex proprietary BIPV solar panels

SOLAR ALBERTA

Building-Integrated Solar PV (BIPV)

Sources:
Edmonton Convention Centre in Edmonton, Kuby Energy, photo from https://kubyenergy.ca/blog/bipv-and-architectural-solar-panel-applications (Retrieved November 30, 2021)
Red Deer Polytechnic Residence, photo from https://rdnewsnow.com/2021/10/07/rdp-receives-national-award-recognizing-sustainability-for-newest-residences/ (Retrieved December 9, 2021)

SOLAR ALBERTA

Examples of Solar-Integrated Design

Source:
https://www.landmarkhomes.ca/edmonton/community/blatchford/100 (Retrieved January 10, 2024)
https://www.solarfeeds.com/mag/in-focus-designing-a-solar-pv-ready-home/ (Retrieved January 27, 2025)

SOLAR ALBERTA

Rooftop Garden/Patio Considerations

Source: Evergreen & Gold Renewable Energy

SOLAR ALBERTA

Solar Communities

- **Blatchford, Edmonton**
- **Home to Canada 1st Virtual Power plant**

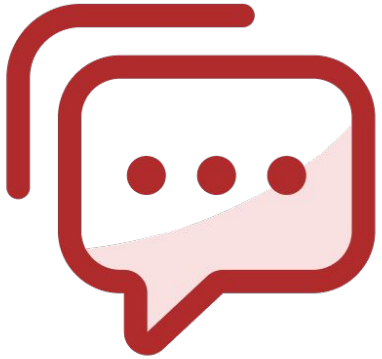
SOLAR ALBERTA

Solar on light industrial building

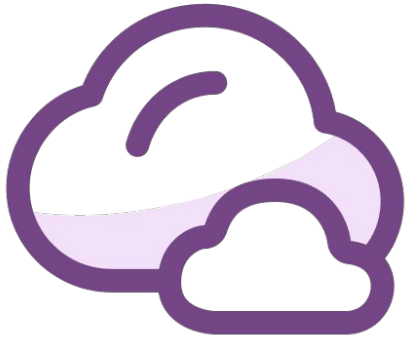
Hi-Tech Seals in Edmonton

- Two separate arrays
- East/West orientation
- One array is elevated and uses bi-facial panels over a TPO membrane

SOLAR ALBERTA



Audience Q&A



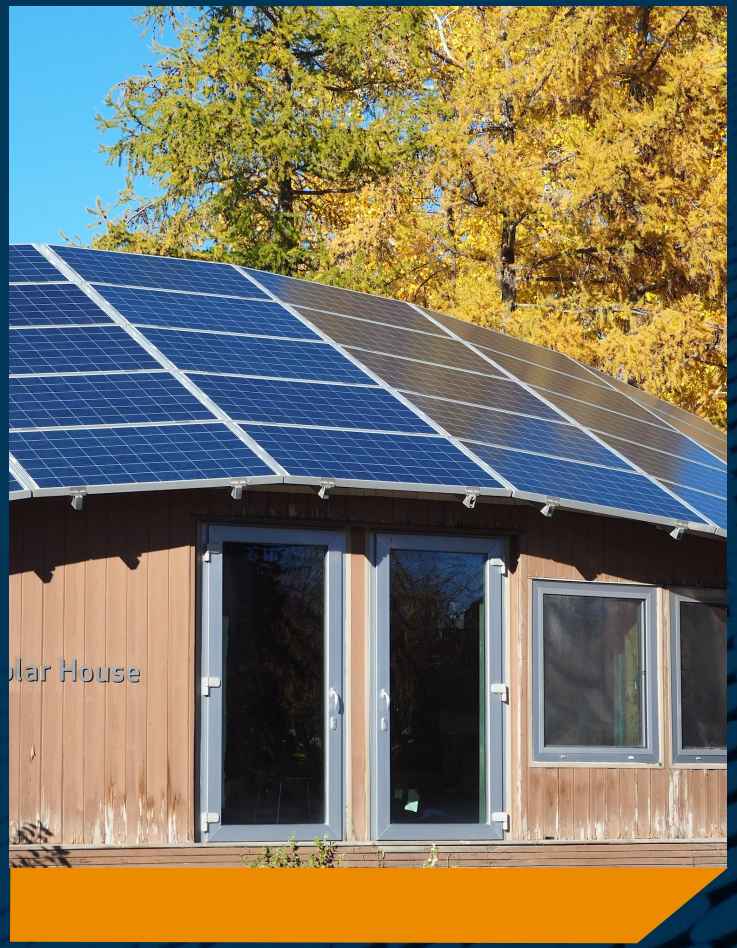
What is one word that describes your attitude toward solar?

Rate your level of understanding of solar design and installation?

How likely are you to include solar on your next project?

What Can you do next?

- Access the LEEP Guide
- Check out Solar Alberta Resources
- Talk to your teams about adding solar on your next project
- Talk to your customers
- Could solar make your buildings standout?



Thank you

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- ➔ Subscribe to our calendar
- ➔ Check out the resources page

Get Involved

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