



MUNICIPAL EXCELLENCE IN ALBERTA: TEMPLATE BYLAW FOR SOLAR ELECTRICITY GENERATION



November 30, 2018

Agenda

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- Background
- Purpose
- Review of Proposed Template Bylaw
- Discussion

Background

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- At present there are limited resources for, and a lack of capacity within, Municipalities to develop bylaws to govern the development, construction and operation of community-scale solar generation
- The ongoing consequence of this is an unnecessary administrative burden and cost for both municipalities and project proponents
- The common outcome is unnecessary delays and/or prohibitions to project development with the net-effect of missed opportunities for economic development, job creation and greenhouse gas emissions displacement.

Purpose

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This project was funded by the Community Energy Capacity Building Program.



This project is intended to

- ▣ Educate on solar PV, and the regulatory system
- ▣ Provide awareness of solar PV and potential bylaw considerations
- ▣ Provide a draft template bylaw document that Albertan municipalities can choose to base their own solar bylaw
- ▣ **Seeking Feedback on:**
 - ▣ How we get information to the municipalities on this topic?
 - ▣ Template bylaws (By December 10, 2018)

Global Solar Industry



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History	<p>Solar PV cost is plummeting Between 2009 and 2017, the levelized cost of energy for utility-scale solar PV fell by 86 percent</p> <p>Solar PV historic growth has been meteoric</p>	<p>GLOBAL 43% ANNUAL GROWTH SOLAR PV MARKET 1990-2016</p> 
Current	<p>2016 global solar PV capacity is approximately 300 GW (Gigawatts)</p>	
Forecast	<p>GLOBAL 20% ANNUAL GROWTH SOLAR PV MARKET 2017-2022</p> 	<p>Solar PV cost continues to decrease The levelized cost of solar energy is expected to continue to decrease by 25 percent between 2017 and 2022.</p> <p>Solar PV deployment continues to grow Deployment is expected to grow globally at about 20 percent per year by 2022.</p>

Alberta and Solar PV

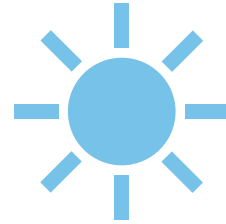
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CLIMATE LEADERSHIP PLAN

30%

ENERGY FROM
RENEWABLES
BY 2030
DEPLOYED

SOLAR RESOURCE



ALBERTA'S SOLAR
RESOURCE
SIMILAR TO
MIAMI, FLORIDA
RIO DE JANEIRO,
BRAZIL

Alberta's Current Solar PV Market

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DEPLOYMENT

43 ALBERTA
MW
DEPLOYED
TOTAL

AESO CONNECTION QUEUE

Solar PV

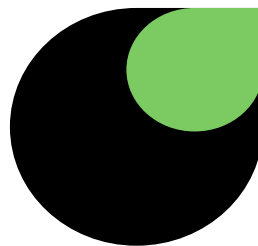
86 PROJECTS

4,547 MW

AUGUST 2018



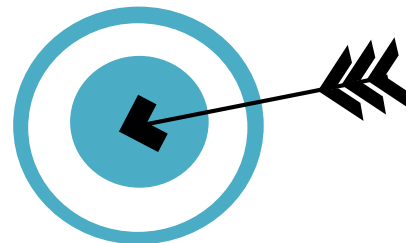
TODAY'S BUSINESSES



305 SOLAR
Alberta
based

TRAINING

16
TRAINING
PROVIDERS



K-12 Training Programs

- Lesson Plans
- Teacher Support

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PEEL

www.teachpeel.ca



BROOKS SOLAR

15 MW_{AC}

2017

FIRST
DISTRIBUTION
CONNECTED
GROUND-MOUNT
ELEMENTAL
ENERGY



SOLAR PV TEMPLATE BYLAW



SOLAS
ENERGY CONSULTING

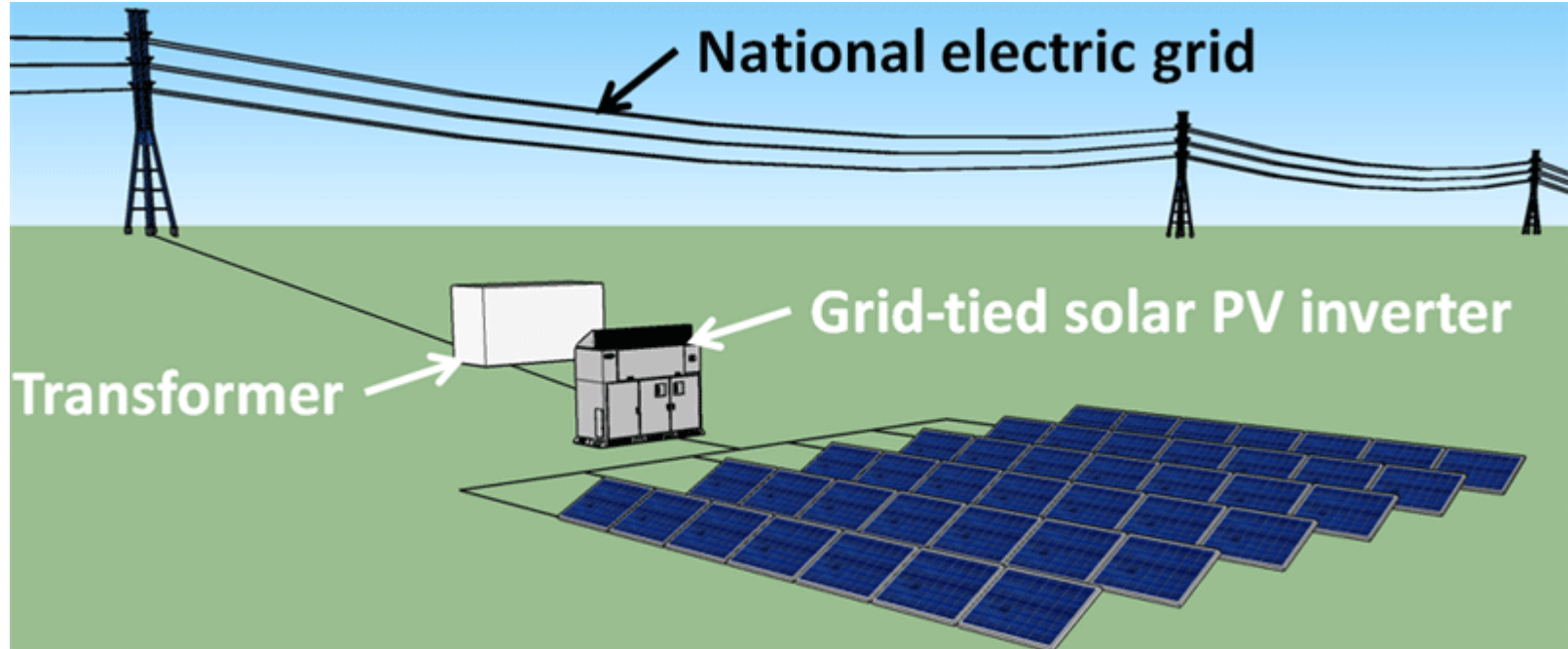
Template Bylaw Scope

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- Guidance to municipalities seeking to develop a reasonable and research-based bylaw for ground mounted photovoltaic (PV) solar systems
- The template bylaw was completed following a jurisdictional scan of existing solar bylaws in Alberta and parts of the US, as well as other sources of solar-specific regulations and guidance documents
- The template bylaw is focused on ground mount solar PV.
 - Excluded:
 - Rooftop solar development, concentrated solar technology and mobile solar installations

Anatomy of a Solar Facility

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Anatomy of a Solar Facility

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- A solar PV project is comprised of an array of solar modules mounted on a racking system with collector lines going underground and typically connecting to a central substation
- Project substation steps-up the voltage to the level of the grid or for direct connection “*behind the fence*”
- Electrical inverters convert current from direct current (DC) to alternating current (AC) for standard electric grid use
- ‘Racking’ types include: Fixed, Single-Axis Trackers (SATs), Dual-Axis Trackers (DATs)
- Fencing around the entire solar energy facility and one or more access roads
- Modern PV ‘modules’ have a life of 25 to 30 years. Other components may have shorter (inverters) or longer design life (substations)

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Inverters

- An electrical device that converts direct current (DC) to alternating current (AC)



Racking – Ground Mounted Solar PV

A ground mount system is directly anchored into the ground

Project Sizes

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- **Transmission connected**
 - ▣ Generate 25 MW to several hundred MWs
 - ▣ Transmission connected to the Alberta electrical grid (69 kV or higher)
 - ▣ These sites typically cover 100 acres or more - Usually about 5-7 acres/MW_{DC}
- **Small scale**
 - ▣ Generate about 1 to 25 MW
 - ▣ Typically municipally or locally connected at around 10 to 30 kV (distribution connected)
 - ▣ These sites typically cover 5 to 100 acres - Usually 6-8 acres/MW_{DC}
- **Microgeneration**
 - ▣ Generation behind load
 - ▣ Less than 5 MW
 - ▣ Connect at the point of use (residential, commercial, large farm, factory, industrial site)

Developer Considerations

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Access to Good Resource:

- Southern AB is among best resource in Canada

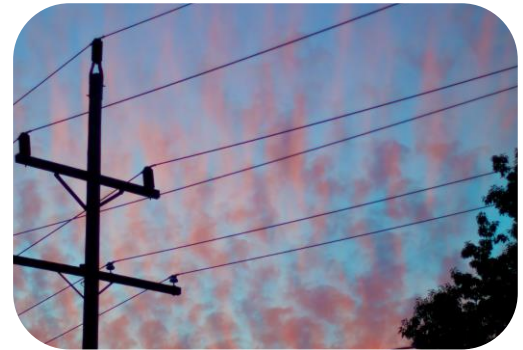


Access to suitable land:

- Land to be developed is appropriate for use

Need about 6-8 acres per MW

Land agreements are private



Access to interconnection:

- Ideally transmission or distribution lines within close proximity to land

Regulations affecting Solar Energy Facilities

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Agricultural Pests Act, R.S.A. 2000, c. A-8;

Alberta Land Stewardship Act, S.A. 2009, cA-26-88;

Alberta Utilities Commission Act, S.A. 2007, c.A-37.2;

Environmental Protection and Enhancement Act, R.S.A. 2000, c.E-12;

Historical Resources Act, R.S.A. 2000, c.H-9;

Migratory Birds Convention Act, S.C. 1994, c.22;

Municipal Government Act, R.S.A. 2000, c.M-26;

Occupational Health and Safety Act, R.S.A. 2000, c.O-2;

Public Highways Development Act, R.S.A. 2000, c.P-38;

Public Lands Act, R.S.A. 2000, c.P-40;

Radiocommunications Act, R.S.C. 1985, c.R-2;

Safety Codes Act, R.S.A. 2000, c.S-1;

Species at Risk Act, S.C. 2002. c.29;

Utilities Act, S.A. 2003 c E-5.1;

Water Act, R.S.A. 2000, c.W-3.;

Weed Control Act, S.A. 2008, c. W-501; and

Wildlife Act, R.S.A. 2000, c. W-10.

Regulatory Considerations

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Wildlife and
environmental
impacts

Sound emissions

Site Safety and
design

Emergency
Response

Visual impacts
and glare

Decommissioning
& Reclamation

Public
Engagement

Regulatory Considerations

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Wildlife and environmental impacts

- Regulated by AUC, Rule 007, Process managed by AEP-WM

Sound emissions

- Regulated by AUC, Rule 012

Site Safety and design

- Under Occupational Health and Safety Act

Emergency Response

- Managed by municipality

Visual impacts and glare

- Not regulated by AUC, but typically required as part of AUC application

Decommissioning & Reclamation

- Regulated by AEP - **Conservation and Reclamation Directive for Renewable Energy Operations**

Public Engagement

- Regulated by AUC, Rule 007

Wildlife and Environment

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Regulation and Process

- Regulated under the Alberta Utilities Commission – AUC Rule 007
- Process Owner: Alberta Environment and Parks - Wildlife Management (AEP-WM)
 - Minimum of 1-year environmental field assessments for any greenfield sites
 - Reviews each project and provides a Wildlife Referral Report

Guidelines and Setbacks

- Guidelines
 - Siting is managed through setbacks identified by AEP-WM
 - Guidance documents provided by AEP-WM
- Key setbacks include:
 - Environmentally Sensitive Areas as well as sensitive ground based vegetation
 - Native prairie and other critical wildlife habitat (nest sites, burrows, etc)
 - Wetlands, watercourses and waterbodies

Sound Emissions

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- Regulation:
 - ▣ Regulated under the Alberta Utilities Commission – AUC Rule 012: Noise Control
 - ▣ Cumulative noise regulation - One of the strictest regulations in Canada
- Process:
 - ▣ Developers must provide a Noise Impact Assessment to the AUC
 - ▣ Reports must be done by an acoustic practitioner
- Sources of noise:
 - ▣ Substation
 - ▣ Inverters
 - ▣ Construction and operations vehicles

Site Safety and Design

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Safety Considerations

- ❑ Electric shock, electrical burn and fire hazards
- ❑ All operation and maintenance requires specific training
- ❑ Road setbacks for the project ensure road risks and project risks don't interact
- ❑ Common bylaw considerations: Appropriate signage, fencing, and setbacks

Emergency Response

- ❑ Consultation must be done with local officials for emergency response planning
- ❑ Fire department is key for potential substation or electrical fire
- ❑ Each project should have an emergency response plan

Visual Simulation

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- ❑ Public engagement and stakeholder consultation is a good way to assess potential visual impacts
- ❑ Visual impact is not regulated by the AUC, but public consultation is
- ❑ Developers attempt to minimize visual impacts where commercially feasible (optimize land use and avoid potential shading)
- ❑ Important for developers and municipality to identify sensitive areas early in the consultation process (tourism views, heavily trafficked areas, important viewscales, etc)

Glare

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- ❑ Glare can be predicted for each solar energy facility and identify the number of minutes, and time of year that hazard exists
- ❑ Glare is not regulated by the AUC, however is typically requested during the information request stage
- ❑ Observation points are identified to determine any potential for hazardous glare
- ❑ Glare analysis is dependent on the elevation, tilt and orientation of the solar modules and can easily be modeled
- ❑ Glare study is recommended for any solar facility within 5 km of an airstrip. Study must incorporate flight path.



Decommissioning and Reclamation

- ❑ The project will likely operate for 25 to 30 years, after which it needs to be removed and the land returned to its previous use
- ❑ Alberta's *Environmental Protection and Enhancement Act* requires operators to conserve and reclaim specified land and obtain a reclamation certificate. Reclamation certificates are issued to operators once the site has been successfully reclaimed
- ❑ Typically, all infrastructure is removed from the ground to a depth of 2 to 3 feet
- ❑ Private landowner contracts may have unique conditions
- ❑ Major difference in risk between expired non-renewable resource (abandoned gas well) and end-of-life solar facility (ongoing resource that has a terminal value)
- ❑ Some salvage value in components (copper wires, substation components, etc) and some residual generation revenue – Typically 35% of initial capital outlay.

Public Engagement/Stakeholder consultation

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- ❑ Developers have an obligation to consult with those within 800 metres of the project, and notify those within 2,000 metres of the project.
- ❑ Potential Project impacts need to be discussed with the stakeholders.
- ❑ Alberta has rigorous consultation guidelines for appropriate public consultation (AUC Rule 7, appendix A1)
- ❑ For much smaller projects (sub-1 MW) the municipality may want proponents to do an adapted consultation program

Alberta Regulators

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Approval of utility scale
electricity generation projects

- Alberta Utilities Commission (AUC)

Environmental & wildlife
protection

- Alberta Environment & Parks (AEP)

Electrical grid owners and
operators

- Alberta Electric System Operator (AESO)
- Transmission & distribution entities (AltaLink, Fortis, Atco, local REAs)

Land use regulation

- Municipal entities

Alberta Utilities Commission (AUC)

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- Regulates the utilities sector, natural gas and electricity markets to protect social, economic and environmental interests
- Generally, projects of 1 MW or greater require AUC review and approval
- Public interest, noise, environmental impact (through AEP review), visual, historical, construction, operation, decommissioning, and social impacts are all reviewed
- Consultation adequacy with stakeholders is a focus

Alberta Environment & Parks –Wildlife Management (AEP - WM)

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- Regulates and protects wildlife and environment
- Establishes survey protocols for projects based on regional and local wildlife concerns
- Assesses potential impact on wildlife and environment through a review and sign-off (approval) process
- For larger projects, AUC requires an AEP referral report prior to final provincial approval

Alberta Electric System Operator (AESO)

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- Responsible for managing the transmission system (above 25 kV) and ensuring system adequacy
- Must receive AUC approval for the need for any new transmission or interconnection (generation)
- Does not regulate the lower voltage (at or below 25 kV) distribution electrical system

Approval Process

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Interconnection

- AESO and transmission or distribution grid owner (Altalink, Fortis, etc)

AEP - FW

- Wildlife and environmental review – AEP referral report

AUC

- Provincial review including consultation, decommissioning, and general public interest – AUC

Road impacts

- Alberta Transportation, municipality

Development/Construction Timelines

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- The interconnection process can take several years and considerable cost depending on complexity of interconnection and length of line
- Environmental surveys (typically 12 months), and review by AEP-FW (typically 6+ months), is one of the longest regulatory pieces for any project and must be done prior, not in parallel, with AUC process
- Site design and consultation work typically takes 3 to 6 months
- AUC review time can vary from about 6 to 12 months
- Construction is typically a full season, from about 6 to 10 months
 - May be season restrictions for breeding bird season, or road bans that affect construction timelines.
- Overall, a solar project takes about 2-3 years to fully develop and one more summer season to construct

Municipal Zoning & Development

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- ❑ Municipalities have the mandate to review and approve development
- ❑ A development permit ensures that the project meets the land use and zoning regulations of the municipality, as well as general public interest
- ❑ Consultation by way of a noticed meeting within the community is always required when bylaws are amended or updated
- ❑ Land Use aligns with local zoning
- ❑ Ensure public health and safety (emergency responders for fire or health)
- ❑ Responsible for roads and site access: entrances, upgrades, damage, ongoing maintenance

Solar Energy Facility (SEF) District

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- ❑ Overlay zoning district allowing solar power generation as an additional use
- ❑ Pre-existing Land Use District requirements will still apply for all uses other than SEF and associated uses
- ❑ All titled parcels upon which the SEF is located will be considered in one application for rezoning and for eventual Development Permit
- ❑ Development permit should only be approved once AUC and other permits are in hand

Road and Property Setbacks

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- Setbacks from **existing municipal road** ROWs: 10 metres
- Setbacks from **undeveloped road** ROWs: 5 metres
- Setbacks from **adjacent property** boundary: 5 metres
 - Waived if a caveat is registered on the land in favour of the project
- Setback from Alberta **Highways**: Determined by Alberta Transportation
- Setback from **residences** in compliance with the AUC Rule 012 (Noise Control)

Application Information Requirements

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A site plan

A digital file of the Solar Energy Facility layout (standard GIS format)

Visual simulations (if near sensitive features)

Summary report on the Solar Energy Facility

Equipment specifications (as available)

Engineering Drawings (as available)

Application Information Requirements Continued

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Noise Impact
Assessment (NIA)
(AUC copy is sufficient)

Confirmation of AEP
sign off
(AUC copy is sufficient)

Glare Assessment

Consultation summary
(AUC PIP is sufficient)

Electrical Lines

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All distribution lines within the facility (less than 25 kV) are to be located underground



Single above ground lines that run along developed road ways are allowed if no other line exists

Site Safety Requirements

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- Site Security Fencing (no less than 1.8 metres tall)
- Preliminary Construction Plan (ex: drainage plan, etc)
- Draft Traffic Management Plan
- Draft Emergency Response Plan
- Any other safety consideration deemed necessary by the Development Authority

Additional Considerations

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- Weed Control Management Plan
- Consideration that array clearance allows for perennial forage growth, and prevention of soil erosion
- Consideration that the site proposal is not impacting high value land (e.g. irrigated land)
- Consideration that the site proposal meets general regional and municipal planning policy and objectives

Decommissioning

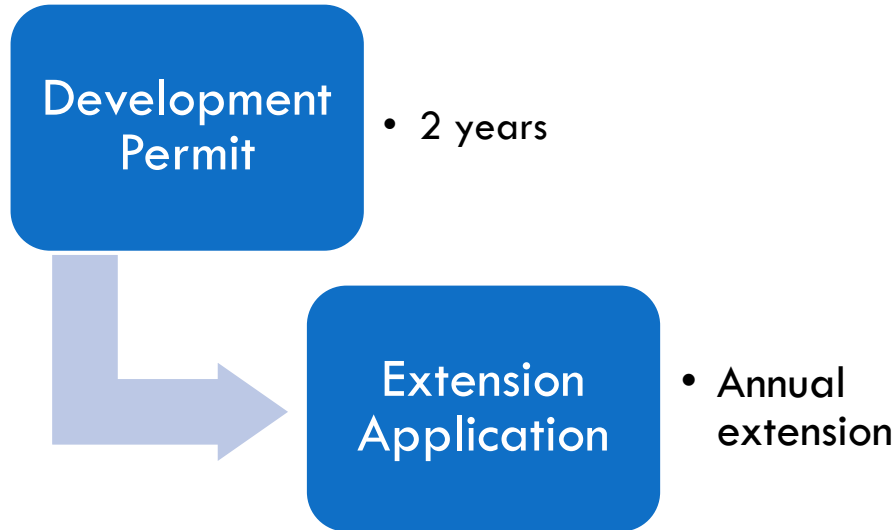
- Decommissioning Plan required at least 180 days prior to the end of commercial operation
- Decommissioned and reclamation in accordance with all applicable legislative requirements at the time of decommissioning
- Status report to be submitted to the Development Authority if power is not produced for at least one year

Decision Criteria

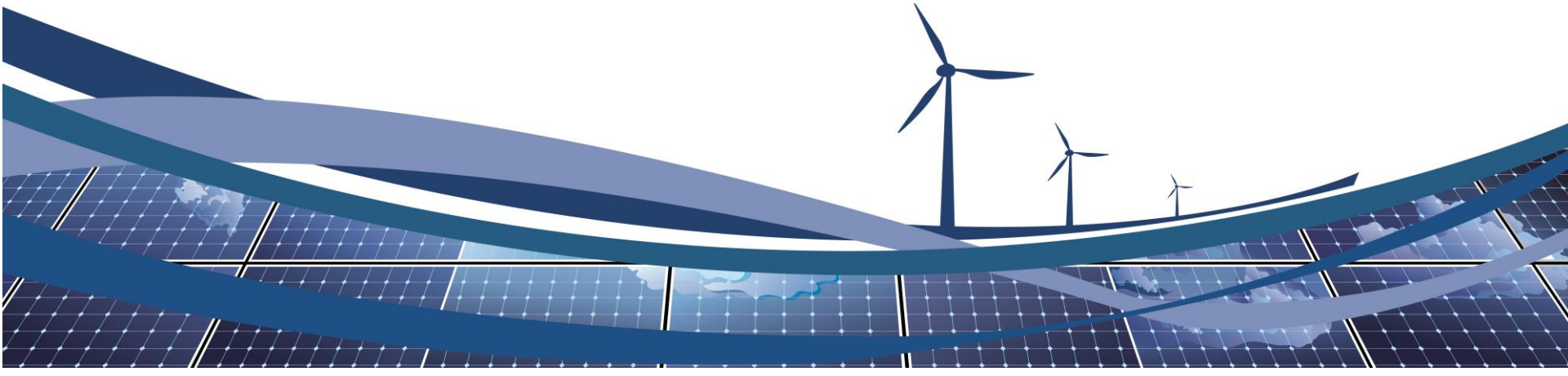
- As Solar Energy Facility (SEF) is a discretionary use, the Development Authority may approve SEF on a case by case basis having regard for:
 - ▣ Information provided in the application
 - ▣ consideration of other land uses that may not be consistent with a SEF such as prime agricultural land (irrigated), recreational, or urban land
 - ▣ Proximity to other existing land uses in the immediate area
 - ▣ Impact on underlying utilities
 - ▣ Information received after project information has been made public by the municipality
 - ▣ Consistency with the policies of the Municipal Land Use Bylaw and municipal development plan

Validity of the Development Permit

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- Construction must begin **2 years** following issuance of Development Permit
- Any portion of construction specified in the permit that is not completed in 2 years from start of construction requires a permit extension, or a new application
- Time extensions considered on an annual basis



Sources

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- Review of presently applied Alberta bylaws:
 - Vulcan County, County of 40 Mile, Cypress County, Acadia, Pincher Creek

- Review of presently approved solar projects in Alberta:
 - 2018 AUC Proceedings: Fox Coulee Solar Park, Claresholm Solar, Duchess Solar

- Review of various US regulations and government guidelines:
 - Massachusetts Department of Energy Resources (Questions & Answers: Ground-Mounted Solar Photovoltaic Systems) (2015)
 - California's Solar Access Laws (2005)
 - Butte County: Supplemental Regulations (2015), & Utility-Scale Solar Guide (2017)

Standard Definitions

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- Megawatt (MW) or Kilowatt (kW)
 - ▣ 1 MW = 1000 kW
 - ▣ A unit of energy generated (or consumed) in time
- Megawatt-hour (MWh) or kilowatt-hour (kWh)
 - ▣ An absolute measure of actual energy produced (or consumed)
- Kilovolt (kV)
 - ▣ Defined as electric potential between two points
 - ▣ Commonly - A unit used in describing electrical transmission 'capacity' on power lines

Methodology

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- A selective review of several current Alberta bylaws presently in use (e.g. Vulcan, 40 Mile)
- A selective review of US based bylaws and guidance documents (e.g. California, Massachusetts)
- In total, 11 different bylaw and reference documents for solar regulation were reviewed for this report