The RenuWell Guidebook:

Turning Liabilities into Assets

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Guidance and input from Brian Peers, MD Taber Director of Lands and Resources, Daryl Bennett of Action Surface Rights, and Doug Coreman

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Municipal Climate Change Action Centre

RenuWell

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Foreword

The RenuWell Guidebook: Turning Liabilities into Assets is intended for use by Albertans and Alberta municipalities, landowners, solar developers, land remediation experts, and oil and gas companies. The goals of the Guidebook are to outline how to: assess orphaned and inactive (abandoned or suspended[1]) oil and gas leases for small scale or community solar photovoltaic (PV) developments, both from economic and feasibility standpoints; approach the development application process; and consider ownership options.

The Guidebook is a draft document for information purposes only and is subject to revision.

We welcome inquiries and feedback, and remain available to assist anyone with questions. Comments and feedback to the draft can be submitted to the contacts listed below. Where possible and/or applicable, please accompany comments and feedback submissions with supporting data.

Please check the Project websites listed below for ongoing updates and progress related to the RenuWell Project pilots:

http://www.renuwell.ca/
https://www.mdtaber.ab.ca/p/renuwell-project
https://mccac.ca/project-showcase/municipal-district-of-taber-renuwell-project/

CONTACT INFORMATION

Comments and feedback to this draft document can be sent via email to:

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[1] Please see Glossary for description of differing well statuses

The Renuwell Guidebook

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1. Assessing the solar resource in your area

One of the most important criteria in project considerations is the quality of the solar resource in your area. While most of Southern Alberta has characteristics favourable for solar PV, there are variations across the region that can impact the economic success of a project. In order to compare the quality of the solar resource across Canada, data is available from Natural Resources Canada regarding the annual solar generation potential for every municipality across the country.[2]

The US based National Renewable Energy Laboratory provides an easy to use solar performance calculator that estimates the monthly electricity generation expected at your location for your specifically designed solar array.[3]

The World Bank also provides a very good estimate of solar output in an easy-to-use format[4]: Simply scroll the map to your location, click on the map and it will calculate an estimate of the solar resource.

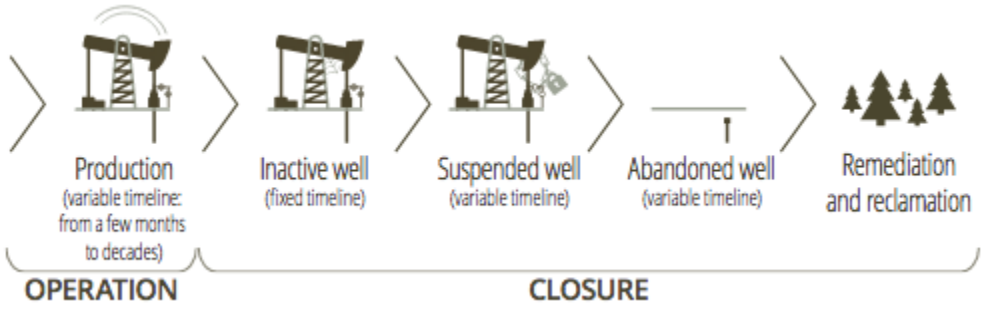
If you want more specific information, you can enter the type of solar array and specific details about the system you plan to install.

After determining whether the proposed project area is favourable for solar PV, the next step is to locate specific leases that may be suitable for development.

[2] https://nrcanphotovoltaic.blob.core.windows.net/pvsr/Photovoltaic_municipal.zip
[3] https://pvwatts.nrel.gov/
[4] https://globalsolaratlas.info/map

2. Creating an inventory of inactive and orphan wells

The next step in assessing the applicability for this model in your area requires a clear accounting of the current inventory of orphaned and inactive leases. This also means consideration of wells that are suspended which may also join the listing in the future. As mentioned earlier, and in the glossary, understanding the different statuses, as well as current land use designations and zoning, will enable you to best assess the various leases available.



Source: (2019) Pembina Institute "Landowners Primer on Unclaimed Oil and Gas Wells", p4.[5] More information about well status definitiions is available from the AER[6].

Records of leases should be available from local municipal land use managers and planners, with additional resources including:

- List of all wells in Alberta with current status[7]
- AER Abandoned well viewer[8]
- AER OneStep status viewer[9]
- Orphan Well lists[10]
- Abadata is a subscription service that takes the AER data, processes it and provides it to customers (oil and gas industry, municipalities, etc) along with an easy-to-use graphical interface.[11]

[5] https://www.pembina.org/reports/landowners-primer-on-unreclaimed-og-wells.pdf
[6] https://resource.aer.ca/stories/well-whats-the-difference
[7] https://www.aer.ca/providing-information/data-and-reports/statistical-reports/st37
[8] https://extmapviewer.aer.ca/AERAbandonedWells/Index.html
[9] https://extmapviewer.aer.ca/Onestop/Public/index.html
[10] http://www.orphanwell.ca/about/orphan-inventory/
[11] http://abadata.ca/

3. Removing leases that are not suitable for conversion

Once a listing of all potential sites has been established, weeding-out unsuitable sites is the next step. While the potential sites for this opportunity is great because of the growing number of leases on the provincial registry, without careful deliberation, poor site selection could set projects back and create unnecessary complications. We recommend removing well leases from consideration based on:

Land and site specific considerations:

- Is the size of the existing oil/gas surface lease sufficient or is additional land needed? A typical 2 acre lease will provide enough space for a 500 kW to 700 kW solar array (depending on the panel ratings).
- Avoid higher value agricultural land, especially leases that are on irrigated land. Avoiding these leases is preferable from both a land use and leasing cost perspective.
- Distance from roads and powerlines. Leases more than 250 meters from 3 -phase power lines are less desirable because the connection costs will be more expensive. These sites are also typically further from the roads and in the middle of fields where they cause interference with farming operations.
- Security considerations - remote sites are at an increased risk of vandalism or theft, whereas less remote sites have lower risk.
- Avoid leases that are prone to shading from trees, buildings or other obstructions

Risks and contamination levels:

- Oilfield infrastructure must be removed
- Phase I Environmental Site Assessment (ESA) must be completed[12] and made available before the lease is transferred to the solar operator.[13] This is important to reduce the risk of transferring reclamation liability. According to AER SED 002, the lease can only be transferred if there is no risk of contamination based on the Phase I Assessment (and Phase II if Phase I doesn't pass cleanly).[14]

[12] An excellent explanation of that should be considered in a Phase I assessment. https://www.linkedin.com/pulse/most-important-step-wellsite-reclamation-wildschut-ph-d-p-biol-/?trackingId=W7qZr40xwrtrKDe3eQ1kwA%3D%3D

[13] https://aer.ca/regulating-development/project-closure/reclamation/oil-and-gas-site-reclamation-requirements/reclamation-process-and-criteria-for-oil-and-gas-sites

[14] https://www.aer.ca/documents/manuals/Direction_002.pdf

- Topsoil and initial contouring should be completed by the oil and gas operator (or OWA) prior to obtaining the lease.
- Avoid leases with a history of known contaminants or documented spills. Be aware of previous land use practices on site (drilling sump pits).
- Gas sites have lower contamination risks, compared to oil. As well, newer sites (post-1990) were regulated with tighter environmental regulation and pose less of a risk than older sites.

Wildlife restrictions:

- Avoid sites less than 100 meters from wildlife and wetland setbacks.
- AEP restricts solar development on sites that are less than 1 km offset from named water bodies unless there is a specific exemption.
- Sensitive wildlife areas are outlined in the AEP Wildlife Directive for Alberta Solar Energy Projects.[15]

Land ownership:

- Landowner permission is required.
- Land is free of caveats, liens, receivership.
- Landowner expectations for compensation are reasonable.
- Is the surface lease subdivided from the rest of the surrounding land?
- Is the existing oil/gas operator interested and willing to continue with reclamation responsibilities?
- Is there an opportunity to partner with the landowner to reduce their electrical costs?
- At present, Alberta Environment and Parks will not allow solar projects on Crown land. They also have a strong preference to avoid projects being built in sensitive wildlife areas or on native grasslands (with the exception of brownfield sites like oil and gas leases)

Infrastructure and traffic considerations:

- Many municipalities have setback requirements from roads and road allowances. Typical setbacks are 50 meters from the road centre and exemptions are required if the solar array extends into this area.
- If in close proximity to Provincial highways Alberta Transportation authorization may be required.

[15] https://open.alberta.ca/publications/directive-aep-fish-and-wildlife-2017-no-5

Landuse and bylaw requirements:

- Beware of any bylaw restrictions, which can vary from municipality to municipality. In the case of the MD of Taber, solar arrays are a discretionary use of agricultural land.
- If the system is designed for self-consumption (micro-generation) it can be placed in almost any zoned area as per bylaws in most municipalities in Southern Alberta.[16]

[16] This information is provided from MD of Taber Land Use and planning bylaws which are adopted from the Oldman River Regional Services Commission, whom they contract for professional planning services. Many other municipalities also rely on ORRSC for guidance and they will likely have similar bylaws.

4. Determine the best candidates for community solar development

Now that you have clarity on which sites could pose additional challenges, you can begin assessing each remaining site for its community solar potential.

The MD of Taber has developed a GIS tool that assists in searching for well sites within the region.[17] This useful application will quickly remove leases on the criteria which have been outlined above and speed up the search for the most favourable locations. If you are outside of the MD of Taber, a thorough preliminary assessment using the following criteria will help you to narrow the field and choose the best pilot sites:

Land and site:

- Does it have a good solar resource, with no shading?
- Is the site near neighbours - supportive or otherwise?
- Is there a low risk of fire (brush, tall grass, no welding shops, etc)?
- Is the site less than 2.47 acres[18] which will have implications for reclamation?

Electrical system analysis:

When Alberta's electrical utility was deregulated and privatized in 1998, the rural electrical distribution system, which brings power from the substations to the end-users, was divided among two major private corporations.

- Who operates in your area?

  Distribution services for the vast majority of the rural Alberta is owned by two major utilities; Fortis Alberta in most of South of the province and ATCO Electric primarily in the North[19]. Some of the major municipalities have retained control of the distribution utility services in the urban areas.

  In addition to the major utilities, Rural Electrification Association Co-ops have retained control of the distribution services in some rural areas and, in some

[17] The MD of Taber is hosting the map at this location: https://www.mdtaber.ab.ca/p/renuwell-project. They are also considering offering enhanced GIS capability as a service to other municipalities, so please inquire if this is of interest.
[18] At present, sites under 2.47 acres apparently do not need a reclamation certificate
[19] A map of service areas and an explanation of the systems can be found on the Howell Mayhew Engineering website (http://www.hme.ca/connecttothegrid/Map%20showing%20Alberta's%20Electric%20Distribution%20System's%20Owners.pdf)

cases, they can be more approachable than the major utilities. The following link will show if you are in a REA service area: http://www.afrea.ab.ca/map-services

EQUS is the largest REA in the Alberta and their service area map can be found here: https://www.equs.ca/about-us/service-area/

- Is a 3-phase electrical power connection nearby?

  If the project is in the Fortis service area, you can get a preliminary idea of the available hosting capacity that by using their on-line hosting map[20]. For accurate and up to date information, contact Fortis directly.[21] There are several steps, including:

  1. "Pre-application Consultation" phase (preview 5 sites for $500)
  2. "Application and High Level Study" ($4,000 to Fortis and $3,000 to Altalink)
  3. "Detailed Distribution Study"
  4. "Transmission System Interconnection Study"

  The first two steps will allow you to assess whether the location you have selected is suitable for interconnection and a very rough idea of the interconnection costs. If you decide to proceed at this point, your connection capacity will be reserved and you will enter a connection queue with time constraints and escalating costs. Failure to make payments by the specified time can forfeit your place in the queue.

[20] https://www.fortisalberta.com/customer-service/get-connected/generation/hosting-capacity-map
[21] More details can be found on this page: https://www.fortisalberta.com/customer-service/get-connected/generation/distributed-generation

5. Tools and templates to accelerate the development application process

A process like this can seem daunting. What follows is an outline of considerations, resources, and templates to facilitate your progress.

Land access and leasing

Negotiating an agreement between the solar project developer and the landowner can be complicated in conventional solar development projects. In any negotiation it is important for both parties to have a clear understanding of the situation and the benefits and responsibilities that each party is willing to accept. Adding the level of detail required to include the non-traditional aspects of inactive lease re-purposing can add significant levels of complexity to this task.

In order to simplify this process, we have developed a template lease agreement that has been reviewed by a wide range of stakeholders including landowners, oil and gas operators, renewable energy developers and regulators. While this draft agreement can't anticipate all the details of any specific lease location, it does provide a very helpful starting point to begin negotiations.

Development bylaws and zoning

Bylaws and zoning are municipal jurisdiction and therefore will differ from municipality to municipality. While the information in this section is specific to the MD of Taber, it serves as a useful guide, as many aspects are generally applicable to most jurisdictions. Repurposing an oil and gas lease for solar would not require zoning changes under the current bylaws in the MD of Taber.

Consultation with Oldman River Regional Service Commission (ORRSC) provides guidelines for privately held lands: https://www.orrsc.com/members-page/

Subdivision of the land for the purposes of building solar energy systems on abandoned oil and gas leases is not generally permitted.[22]

[22] For many rural districts in agricultural areas, land cannot be sold in quantities that are less than 160 acres (¼-section). The only exception is when a portion of the land is sold along with a residential dwelling - the "homestead" - and then the homestead land is sold under a separate title to the rest of the ¼-section. The intention is to keep agricultural land available for farming and any portion of a ¼-section that is subdivided (and then has a separate title) goes up in value by a large percentage. In our case, having a solar project on an abandoned lease does not provide a way around the restrictions and allow the owner to sell off a small (i.e. 2-acre) parcel separately from the rest of the 1/4 section.

Renewable energy development is currently prohibited on Crown Lands. Alberta Energy and Parks is evaluating whether exceptions can be made to accomodate solar development on brownfield sites (like abandoned oil and gas leases).

Some Municipalities (including the MD of Taber) have bylaws to conserve native prairie grasslands, and these bylaws restrict solar development in these areas. The MD of Taber's renewable energy policy for MD-owned lands:

- Has a bylaw restricting solar development on native prairie grassland but allows development on "brownfield" sites
- Allows development on cultivated or tame grasslands

In Rural Agricultural and Rural Urban Fringe zoning areas, it is preferable to construct solar energy systems on the least productive agricultural land (poor soil quality, dry pivot corners, etc).

Solar energy systems require a development permit, except in cases where the system is associated with agriculture or grazing and does not exceed a capacity of 1.5 kW per parcel.

Within the land-use bylaws of the MD of Taber (and most other ORRSC communities), solar energy systems are classified as Discretionary Use on lands designated as:

- Rural Agricultural
- Rural Urban Fringe
- Grouped Rural Industrial

"Household Solar Energy Systems" that are primarily intended for the sole use and consumption of the landowner, resident or occupant are classified as a Discretionary Use in all designated zones. "Household Energy Systems" are sometimes used as another term for micro-generation, which gives local government specific control on approvals. Unlike microgeneration, from a municipal government perspective, "Household Energy Systems" the generation capacity is not restricted to be the same as the average annual load. These systems can be mounted on buildings or be installed as free-standing structures (i.e. ground-mounted).

Free standing, ground mounted arrays for "household solar energy" that exceed 2.44 m above the ground level require a waiver as part of the development permit approval process.

Set-back requirements for solar generation systems must be honoured (unless a waiver is issued as part of the development approval process):

- No systems can be built within 45.7 meters (150 feet) of the centre line of any municipal road right-of-way
- No system can be built within the “intersection triangle” or on a corner lot in residential areas
- Any development within 804.9 meters (a ½ mile) of a provincial highway may be subject to a roadside development permit from Alberta Transportation

Infrastructure impacts

A typical lease conversion to solar would require:

1. Conventional well closure and abandonment
2. Initial reclamation steps including restoring topsoil and seeding vegetation.
3. Solar Construction
    a. 5 truck deliveries of 40 foot shipping containers
    b. 5 person crew with crew cab for transfers
    c. 5 days to complete

Based on this work schedule, the impact to road use and infrastructure has been assessed as negligible by the MD of Taber staff. Standard agreements for electrical crossing and road approaches may be required (see forms in appendices)

Taxation

- Micro-generation systems are subject to municipal tax assessments.
- Tax exemption exists for systems that generate electricity for agricultural production (primarily applies to micro-generation).
- Systems which generate revenue by selling electricity to the grid are subject to municipal (for roads, buildings, fences, etc) and linear taxation (for the powerplant itself).
- Some uncertainty remains about how community generation systems (especially in the case of farmer owned co-ops) would be assessed.
- For utility-scale commercial projects, the tax rate is approximately $10,000/MWdc/year, based on the only available example of the Brooks Solar project in Newell County. However, as solar construction costs have dropped significantly since that project was built, this rate will likely decrease.

- Example tax calculations are included in the spreadsheet calculators.

Emergency Response Planning

Emergency response planning forms have been adapted from the planning forms required for larger-scale solar installations. An example form is included in the supporting folder from MCCAC.

Since lease conversion to solar projects will be built after the oilfield infrastructure has been removed, the Emergency Response Plan (ERP) for these small solar projects is very similar to protocols for larger solar projects. A specific ERP has been developed by the MD of Taber in collaboration with utility-scale solar developers who are building projects in the municipality. This plan has been generalized for the smaller scale projects built on repurposed leases. A template for this ERP is included in the templates folder.

A guide to emergency response for solar projects has been provided by the Canadian Solar Industry Associations (CanSIA) and this is included as an added resource.

Final Solar Decommissioning and Reclamation

Unlike oil and gas resources, solar power is a renewable resource, and with the low degradation characteristics of modern solar panels, it is expected that these projects will generate electricity for many years. Nevertheless, it would be very short-sighted to not plan for future reclamation activities to remove the solar array and return the land to other uses.

Since the solar industry is relatively new in Alberta, it has been difficult to obtain reliable information on decommissioning and reclamation costs for a solar project. Fortunately, Sunset Renewable Asset Management Inc.[23] is located in the Taber area and have provided cost estimates for decommissioning the small scale and community generation sites proposed as part of the RenuWell project.

Based on these cost estimates, municipalities could apply and collect an annual levy, over the life cycle of the project, to cover end-of-project reclamation costs. Depending on the state of the solar modules and the type racking, this annual levy could range from approximately $1,500 to $5,000 per year for a 500 kW project (assuming a 25 year lifespan).

[23] https://sunsetrenewables.com/

The detailed decommissioning cost assessment provided by Sunset Renewables is contained in the template folder.

6. Evaluating ownership options[24]

The Difference between Micro-Generation and Community Generation[25]

Micro-Generation

Micro-generation is a way for homeowners and small businesses to generate electricity for their own use, as outlined in the Micro-Generation Regulation.

Micro-generation projects:

- Use renewable or alternative energy sources like wind, solar, biomass, hydro, combined heat and power or other technologies
- Must be less than five megawatts
- Sized to the consumer's electricity needs
- Must be located on-site or adjacent to where the electricity is being used
- May result in credits on electricity bills

Project examples include solar panels powering a house, a micro-wind turbine powering a farm, or a small hydro plant powering an irrigation system.

Community Generation

Community generation provides flexibility for organizations or communities to generate electricity for sale to the grid. The Small Scale Generation Regulation sets the groundwork for community generation.

Community generation projects:

- Use renewable or alternative energy sources like wind, solar, biomass, hydro, combined heat and power or other technologies
- Are connected to the distribution system
- Are sized to fit within the local distribution system
- Are unrestricted by geographical locations within Alberta
- Supply electricity to the grid
- Result in financial compensation
- Confer social, environmental and/or economic benefits to communities

Project examples include a solar panel array owned by a community group who earns revenue from the production of electricity, or a small wind farm that creates local jobs.

Source: MCCAC Handout

The AUC defines Micro-Generation (MG) [26] as:

> The small-scale production of electricity, using renewable or alternative energy sources, by homeowners and small businesses to meet their electricity needs. Homeowners and small businesses that produce power for their own use are called micro-generators.
>
> Excess energy that micro-generators produce and don't use is sent to the electrical power grid for other customers to use. The micro-generator receives

[24] Please note that rule, regulations and developments in this area are changing and advancing regularly, so the following is based on the best available info as of January, 2020
[25] https://www.fortisalberta.com/customer-service/faqs
[26] http://www.qp.alberta.ca/1266.cfm?page=2008_027.cfm&leg_type=Regs&isbncln=9780779805471&display=html

> credits for the excess electricity sent to the electrical power grid. Delivery charges are still charged to sites generating electricity when electricity from outside sources is consumed at the site, but the delivery charges are only billed for the electricity from outside sources and not the electricity generated and consumed at the site.[27]

Fortis describes Community Generation as:

> A framework under development in the province of Alberta. The objective is to make it easy for communities to pool resources together effectively to create a distributed energy resource that will benefit the community as well as the individuals investing in it. Pooling a community's resources and efforts may make the distributed energy resource project more cost effective and viable.
> It could be a solar farm or be a collection of photovoltaic (PV) solar panels on multiple homes in the community that combine their generation for the benefit of the community.

It is important to acknowledge that while the processes for building projects under the Micro-generation Regulation are established, those for the Small Scale Generation Regulation are still in the process of being defined. The results of our research demonstrated that the same solar array could be built at exactly the same location and face very different processes and costs, depending on the regulation under which it fell. If the project is developed as a behind-the-meter "self-supply", through the Micro-generation Regulation, the process follows four relatively easy steps, and projects can be connected in as little as four weeks, according to Fortis. Fortis, however, indicates that an identical system in the same location which is distribution-connected and defined as Small Scale Generation or Community Generation follows a 7-step process (each with several substeps) and can take up to two years with more than $60K in up front costs under current processes. This complex process is required whether the solar array is 1 MW or 24 MW with a possible exception for arrays less than 150 kW.

While there have been more than 1,500 micro-generation solar projects connected since the Government of Alberta announced the Small Scale Generation Regulation and Community Generation Program (SSGR/CGP),[28] in January 2019, there have been no small-scale distributed generation solar projects activated on the grid. According to the RenuWell survey of 17 Alberta solar companies, the primary reasons for this lack of progress were related to the lengthy permitting and approval process (81%) and the cost and complexity of the interconnection process (75%). While 100% of the

[27] http://www.auc.ab.ca/Pages/micro-generation.aspx
[28] Putting power in the hands of communities, Nov. 22, 2018, Government of Alberta https://www.alberta.ca/release.cfm?xID=620855BF8D8B3-9B90-88C9-FD9330F8A9406D44

companies surveyed were interested in re-purposing inactive oil and gas sites for solar development, 58% expressed concern about the uncertain regulatory environment.

Twelve percent included additional comments expressing concern about these sites not being classified as micro-generation and therefore likely to encounter additional costs and delays when connecting as a distributed generation site.

When asked what policy changes could accelerate the re-purposing of abandoned oil and gas sites to solar, the most common response was: enable faster and less expensive connections to the distribution grid. While the interconnection process for micro-generation generally proceeds in an efficient manner, the process for small scale or community generation requires months of waiting and thousands of dollars in studies. Below, more detail is provided on the differences identified between micro-generation and community generation projects to date in terms of costs, anticipated connection and general project timelines, a chart of direct comparisons, and an example scenario.

Cost Considerations:

While there are inactive oil and gas leases throughout the province, the vast majority of well leases that are suitable for solar conversion are in the FortisAberta service area. This assessment is based on the following criteria:

Best solar resource area
Density of inactive well locations on private land
Proximity of leases to existing 3 phase distribution lines

Based on these conditions, the costs and schedules presented below only apply to FortisAlberta.

It is important to note that if inactive leases outside the Fortis service area are being considered, the costs and process for connection services may be slightly different.

Micro-generation Costs

The preliminary costs of a micro-generation project are often negligible beyond the costs of the panels and other infrastructure.[29] No “up-front” costs are paid to Wire Service Providers (such as Fortis or EQUS), as micro-generation projects do not usually

[29] https://www.fortisalberta.com/customer-service/get-connected/generation/micro-generation

require hosting capacity or high level studies, and meter installation costs and metering charges are paid by the Distribution Facility Owners (DFO) in most cases[30].

Compensation for the electricity generated from a micro-generation project is provided in the form of credits from the electricity retailer if the system is less than 150 kW. For large microgen systems (greater than 150 kW), surplus generation is credited at the hourly pool price.

The micro-generation owner pays delivery charges (distribution and transmission tariffs) only for electricity that comes from outside sources, but not for electricity that is self-generated and consumed on-site.

If the DFO requires system upgrades to safely connect the system to the grid, the micro-generation owner may be responsible for costs as determined by the DFO.[31]

Large micro-generation systems (>150 kW) may require additional costs and time from the DFO. Also, micro-generation must offset local load with common ownership (i.e. the owner of the load [electricity consumer] must own at least part of the micro-generation system to be able to qualify as microgeneration).

Community Generation Costs

For community generation, or projects that fall under the Small Scale Generation Regulation (SSGR)[32], while there can be some variation in these prices, the FortisAlberta preliminary costs for interconnection studies begin at $27,500 - $37,500. The SSGR application form can be found on the AUC website.[33]

Six main “up-front” costs occur with community generation/SSGR projects (based on FortisAlberta schedules):

1. Pre-Application[34] starting at $500
2. Distribution High Level Study (HLS) ($4,000 + GST). Examples of these studies from the DFO Fortis for our pilot sites gave estimates for connection costs with an accuracy of +100/-50%, which may not be helpful for making a business case.

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[30] http://www.auc.ab.ca/regulatory_documents/Reference/MicrogenerationNoticeSubmissionGuideline.pdf
[31] AUC submission guideline p. 12
[32] *Small Scale Generation Regulation,* Alta Reg 194/2018 [*Small Scale Generation Regulation].*
[33] http://www.auc.ab.ca/regulatory_documents/Reference/SmallScaleGeneration-Application.docx
[34] This is a very high level study where you pay Fortis $200 to give you a very preliminary estimate (called a "pre-application consultation") of the hosting capacity that is available at your location.
Fortis also offers a $500 or 5 site package deal where they give you this same quick assessment for 5 different locations https://www.fortisalberta.com/customer-service/get-connected/generation/distributed-generation

3. Transmission HLS ($3,000 + GST)[35]
4. Detailed Distribution Study ($10,000 + GST)
5. Possible Transmission System Interconnection Study ($10,000 + TFO study costs)
6. Distribution design and construction costs - varies depending on project complexity and proximity to distribution system
7. Possible charges from third parties including transmission costs

While there are no Fortis tariff rates for distribution, a generator may still be responsible for distribution charges which are payable to the billing company or retailer.[36]

Connection and Project Timelines (Based on FortisAlberta website[37])

Micro-generation (estimated time 4 weeks)

1. *Information gathering (1 week)*
   Proponent submits application with supporting documents.
   Fortis reviews documentation, assigns request numbers and requests additional info if needed.

2. *Interconnection and operating agreement (1 week)*
   Fortis creates an interconnection agreement and sends it.
   Proponent reviews the agreement, signs and returns.

3. *Permitting and construction (1 week)*
   Fortis sends counter-signed interconnection agreement.

   Proponent addresses the following:
   - Local development permit request
   - Starts consultations as per AUC Micro-generation Application guidelines (if necessary)
   - Constructs the project

[35] This step is not included in the FAQ section and seems to be a new addition in late 2019 on this page (viewed 1 Jan 2020) https://www.fortisalberta.com/customer-service/get-connected/generation/distributed-generation
[36] This is all new and the rules are not clear. The DFO's ca not currently charge DGs (Distributed Generators like Small Scale or Community Generators) for the distribution charges under the current system. However, if the DG sells their power to a retailer, it's possible the DFO can charge the retailer and then the retailer could pass the charges back to the DG as part of their contract.
However, if selling the electricity directly through a Power Purchase Agreement (PPA) you could potentially avoid this. At this point, however, we must reiterate that this is speculation based on our best available information.
[37] Microgeneration time schedule and steps were taken from the FortisAlberta website in April, 2020
https://www.fortisalberta.com/customer-service/get-connected/generation/micro-generation

4. *Energize (1 week)*

   Project owner must:

   - Ensure construction is complete
   - Schedule electrical inspection
   - Send final electrical inspection report to Fortis

   Fortis must:

   - Review inspection report
   - Issue permission to connect
   - Request bi-directional meter installation
   - Install meter
   - Notify internal and external parties that the micro-generation project is connected

Small Scale Generation or Community Generation Timeline (Estimated time 6 months to 2 years)

Pre-application phase (optional - est. 1 week)

Consultation on up to 5 locations to determine overall project feasibility related to:

1. Hosting capacity
2. Interconnection process
3. Other projects already in the connection queue

The time estimate is one week - however in reality this can take several months. Payment must be made in advance before consultation is started.

Application and High Level Study (HLS) (est. 4 weeks)

Proponent must:

1. Complete and submit application for a HLS
2. Indicate wish to proceed in writing and by paying the fees as directed
3. Submit all supporting documents
4. Pay the HLS fee of $4000 (+GST) per site
5. Possibly pay the transmission HLS fee ($3000 + GST) per site

Fortis will:

6. Review submission and assign request number
7. Send invoice for HLS fees
8. Create detailed design for the generator connection
9. Complete HLS and send results
10. Assign Key Account manager to coordinate the transmission HLS

In most of the cases we have seen, the interconnection cost estimates provided in the HLS studies are very high and they are provided with a very large uncertainty factor. In many cases, the high level of uncertainty in the estimates can seriously reduce the economic viability of the proposed project.

After this step, the project is entered into the Fortis connection queue. Any invoices not paid within 30 days of receipt, through the rest of the process will result in the project being removed from the queue.[38]

Detailed Distribution Study (12 - 16 weeks)
There are 6 phases and multiple subsections to this step[39].

1. *Phase 1 (8 - 12 weeks)*
   Proponent will:
   a. Review HLS results
   b. Sign and accept HLS within 30 days or the project will be removed from the connection queue
   c. Request Detailed Distribution Study
   d. Pay detailed study fee of $10,000 and an additional $10,000 if there is AESO Behind-the-Fence (BTF)[40] project involvement
   e. Attend meeting to review the project
   f. Prepare Protection Impact Study

   Fortis will:
   a. Send HLS for review
   b. Send invoice for HLS
   c. Advance project to the Detailed Study phase
   d. Carry out Detailed Study
   e. Complete Detailed Distribution Study and review Protection Impact Study
   f. Schedule a site check to verify distribution upgrades
   g. Collaborate to scope project and review options

2. *Phase 2 - Plan and Design (4 weeks)*
   Proponent will:
   a. Meet Fortis on-site to confirm requirements

[38] Each step in the application process moves the project your through various stages or gates in the AUC connection queue process. If you are late in paying any invoice, you lose your place and fall all the way back to the beginning of the process. It's like a high-stakes game of "Snakes and Ladders"
[39] Based on the FortisAlberta website https://www.fortisalberta.com/customer-service/get-connected/generation/distributed-generation
[40] "Behind The Fence " means the generator is connected to the distribution side of the substation where the Alberta Electrical System Operator (AESO) and the Transmission Facility Operator (TFO) can't see the generator unless it offsets all the load on the distribution side of the substation and starts pushing current back against the transmission system

   b. Send any outstanding information that Fortis requires to complete the connection design

Fortis will:

   a. Assign designer to the project
   b. Review project scope on-site, if needed
   c. Create a detailed design for interconnection

3. *Phase 3 - Complete Distribution Detailed Study (4 weeks)*

Proponent will:

   a. Review project and service agreements
   b. Review distribution work scope and cost estimates and determine whether to re-scope the project or carry on with the transmission study
   c. Must decide within 30 days or project will be cancelled

Fortis will:

   a. Meet on-site if necessary
   b. Provide estimates and quotations
   c. Wait for transmission cost estimate, if required
   d. Collaborate on next steps

4. *Phase 4 - Transmission System Interconnection Study (32 - 36 weeks)*

Proponent will:

   a. Pay Transmission Study fee (~$30,000 +GST)
   b. Attend Transmission Study meetings
   c. Answer questions and provide detailed information on project
   d. Begin Transmission Faculty Owner (TFO)[41] Study Protection and Power Flow Studies

Fortis will:

   a. Begin TFO Study Protection and Power Flow Studies
   b. Attend Transmission Study meetings
   c. Receive Quotation and Proposal from TFO
   d. Apply to AESO for a BTF application, if needed

5. *Phase 5 - Interconnection Proposal (5 weeks)*

Stage 1: Complete Transmission Study (4 weeks)

Proponent will:

   a. Receive interconnection proposal with quotation letter

[41] Transmission Facility Owners have to do studies to determine what will happen to the flow of electricity on their systems. This is electricity from the solar generator exceeds the local loads and starts pushing back against the current flow that is coming from the larger generators along the transmission wires.

b. Send signed letter with payment and approval to Fortis within 30 days or the project will be cancelled and removed from the queue

Fortis will:

a. Coordinate with TFO on the transmission cost estimate
b. Prepare the quotation letter package
c. Send invoices for the full Distribution and Transmission costs

Stage 2: Pre-Construction (1 week)

Proponent will:

a. Sign Electrical Service Agreement
b. Gather information for pre-energization checklist

Fortis will:

a. Process acceptance documents
b. Provide Electrical Service Agreement and begin work on the Interconnection Agreement and Operating Procedures
c. Start pre-energization
d. Begin work on Construction Stage
e. Request TFO to begin work on Construction Stage
f. Continue with AESO BTF process

6. *Phase 6 - Construct and Energize (up to 53 weeks):*

Stage 1: Construct and Energize (up to 52 weeks)

Proponent will:

a. Complete on-site preparations
b. Complete construction of generation site
c. Grant site access to Fortis

Fortis will:

a. Visit site to evaluate readiness
b. Contact Alberta One-Call
c. Schedule a crew
d. Complete construction

Stage 2: Energize and Commission (1 week)

Proponent will:

a. Ensure all information in pre-energization checklist is provided
b. Provide Electrical Permit
c. Provide metering certification
d. Ensure construction is complete
e. If you have load service, call billing company with Site ID to enroll site

f. Call billing company to turn on the power
g. Review and sign Interconnection Agreement and Operating Procedures

Fortis will:

a. Send generator Site ID
b. Work with proponent on pre-energization checklist
c. Finalize and sign Interconnection Agreement and Operating Procedures
d. Issue permission to connect

A Direct Comparison Between Micro-generation and Community Generation

Micro-generation

Advantages	Disadvantages
• Low upfront costs (no study costs) • Much faster connection times (usually around 1 month) • Few application steps with streamlined process[42] • DFO pays for several costs (meter, metering, studies, etc) • DFO must connect system or explain why not to AUC • Well established process with very clear rules and high level of experience in the DFOs • Distribution tariff is collected in standard method which lowers resistance and risk to DFOs • In cases where the system is supporting agricultural production, (irrigation, grain drying, etc.) may be exempt from municipal taxation • Some retailers offer solar-specific rates which can improve the	• Must be co-located with load(s) that has same ownership • Size is limited to the size of the load(s) that is being offset • Maximum size is limited to 5 MW, regardless of the size of the load(s) • Single system can be installed to offset the load from several meters, however, delivery costs are only offset on the meter where the generator is connected (no Option M[44]) • Less experience with large micro-generation (>150 kW) and extra costs and delays may occur in these cases • A retailer must be selected to manage interactions with the balancing pool • Large micro-generation receives wholesale prices for surplus

[42] Fortis Microgeneration application can be found here: https://www.fortisalberta.com/docs/default-source/default-document-library/micro-generationapplication.pdf?sfvrsn=2

[44] Option M Credits are paid to generators who are connected to the distribution network and offset Transmission system charges by providing electricity to other customers along the distribution feeder. Those customers would otherwise have to pay transmission charges to the TFO who would have to deliver that electricity from a remote location to the substation. https://www.fortisalberta.com/docs/default-source/default-document-library/option-m.pdf?sfvrsn=ab8a9f1b_12

Advantages	Disadvantages
economics for small microgeneration systems[43] ● Wholesale rates for large microgeneration systems are often higher than the average wholesale pool price because solar typically generates during hours with high electricity demand.	electricity at pool pricing (less options for PPAs etc).

Small Scale Generation/Community Generation

Advantages	Disadvantages
● Form is straightforward[45] ● No requirement to offset a load ● System size can be up to 25 MW ● More flexibility in selling the generated electricity ● Option M credits are available to offset transmission charges at the substation and can provide additional revenue	● All electricity generated must be exported to the grid - cannot partially offset local loads ● High upfront study costs ($27,500 to $57,500) ● Very high uncertainty in the interconnection costs or timelines ● All costs for connection/upgrades, meters, metering, etc borne by generator ● Very long and uncertain timelines for interconnection (6 months to 2 years) ● Immature process - few examples to follow ● Proponent under very tight timelines and all power is with the DFO ● No tariff exists for DFOs to recover delivery charges for ongoing system maintenance - increases resistance and uncertainty with DFOs

[43] Solar rate plans allow owners to select a premium retail rate when the system generation is greater than the local use and a lower rate when the owner is importing electricity. The rate class can be changed twice per year. https://www.spotpower.net/solarrate.html

[45] http://www.auc.ab.ca/regulatory_documents/Reference/SmallScaleGeneration-Application.docx

Advantages	**Disadvantages**
	• Community generation may offset some disadvantages (e.g. the DFO provides the meter and the Balancing Pool acts as the market participant), but the process is not yet defined. • Not clear whether agricultural tax exemptions can be applied

In addition to this comparison of micro-generation and distributed generation, through the SSGR/CG development path, we also intended to evaluate options for ownership through a municipality or Rural Electrification Association. The case of municipal ownership is complicated due to Section 95 of the Electrical Utilities Act (EUA) which states “No municipality and no subsidiary of a municipality may hold, directly or indirectly, an interest in a generating unit except in accordance with any or all of the provisions of this section and the regulations[46]” There are exceptions to this rule provided the municipality does not receive any benefit that would not be accessible to a private sector company in order to maintain Fair Efficient and Open Competition in electricity generation[47]

Under the provisions of the EUA, it is also difficult for Distribution Facility Owners, like REAs, to own generation facilities as it conflicts with the intention of the Act to separate these roles.

However, we did learn that there are many favourable ownership possibilities through co-op ownership. This ownership model is actively supported through the Alberta Community Co-operatives Association[48] through work that was pioneered by the Solar Power Investment Co-operative of Edmonton (SPICE)[49]

[46]Electrical Utilities Act p 58 http://www.qp.alberta.ca/documents/Acts/E05P1.pdf
[47] See page 6 of the Municipal Community Generation Challenge FAQ https://mccac.ca/app/uploads/MCGC-FAQs-FPP.pdf
[48] https://www.acca.coop/
[49] http://joinspice.ca/

7. Estimating the economic value of lease transitions

We recommend the following method to estimate the economic value of transitioning a lease to solar energy. Examples of this process for wells within the MD of Taber are provided in the excel workbook in the template folder.

1. Estimate cost of complete well site reclamation for one lease including:
    1. Roads (based on average access road distance)
    2. Powerlines (based on average connection distance)
    3. Re-contouring lease
    4. Vegetation
    5. Vegetation monitoring (4 years)
    6. Taxes and rentals for vegetation monitoring period

2. Estimate cost of new solar installation including:
    1. Roads
    2. Powerlines
    3. Site surveying
    4. Lease preparation
    5. Land acquisition cost
    6. Permitting costs

3. Calculate savings based on:
    1. Re-using roads
    2. Re-using powerlines
    3. Re-using existing survey
    4. Time savings on vegetation monitoring
    5. Savings to oil and gas company during vegetation monitoring
    6. Savings to solar operator on land acquisition and permitting

4. Estimate the economic benefit of one solar generation project:
    1. Cost of solar construction (including savings above)
    2. Primary products produced
        a. Amount of electricity generated over project lifespan
        b. Carbon emissions savings
    3. Revenue generated over project lifespan
        a. Lifetime electricity sales (including solar premium[50])

[50] Solar is produced during the day when electrical prices are generally higher. Solar production peaks when prices are usually the highest, especially in the summer.

    b. Carbon credits
    c. Option M
4. Taxes and lease rentals from solar project
5. Jobs created

5. Estimate the number of wells that are candidates for conversion:
    1. Leases within 200 m of 3-phase lines
    2. Exclude sensitive wildlife areas

6. Multiply factors from a single well analysis by the number of conversion site candidates to obtain total economic potential.

7. Segregate potential conversion sites into categories:
    1. Orphan wells
    2. Active operators
    3. Private Land
    4. MD owned land
    5. Crown Land

Typical costs for oilfield leases:

Oilfield lease costs	Range
Lease Rental	$3,000 - $6,000
Municipal taxes (oil and gas lease)	$1,500 - $2,000 (for active and suspended wells)
Reclamation costs per lease	$10,000 - $30,000 (assuming no contamination)
Abandonment costs per lease	$30,000 - $300,000 (depending on hole depth, etc.)
Lease size	2.5 acres

Typical road and powerline construction and reclamation costs:

Costs per kilometer	Construct	Reclaim
Roads	$ 64,450.00	$ 47,525.00
Powerlines (#2 ACSR)	$ 29,375.00	$ 10,000.00
*Connection	$ 81,000.00	$ 14,000.00
*Assumes 750 kVA 480 V transformer with 3 pole tap (no maintenance included)		

Summary

The energy challenges and opportunities before Albertans at this time are truly great. We face the reality that legacy infrastructure of an industry that has brought us incredible wealth may, in fact, exact high costs from the public purse and our environment. We also have the best chance in Canada to transition our energy from hydrocarbons to electrons, based on our abundant renewable solar and wind resources.

The MD of Taber and RenuWell hope this Guidebook has helped to reveal the possibilities and latent value present in aging oil and gas leases that can be repurposed for small scale solar PV developments.

We recognize this is not yet a streamlined process. Several regulations are still in early stages and will take time to roll out and implement. Agencies, utilities, electrical transmission and distribution companies, and all levels of government are questioning how to best make changes to the electricity grid to accommodate small scale and distributed energy. The current electrical grid system was designed to ensure reliability and stability for large-scale centralized generation sources and long-distance transmission to the remote load centers. Increasing distributed generation sources, means re-thinking this whole model (for a more fulsome discussion, see AUC Discussion Overview in Appendix B).

Concepts like the RenuWell project, however, are on the right track to be a solutions-based approach. Taken to scale, the benefits of this approach would be felt by land owners, municipalities, renewable energy companies, oil and gas companies, regulatory agencies, the Alberta government, and taxpayers at large. As funding is made available for remediation activities, it will be vital to seize the option to not just reclaim but to repurpose these old leases as energy generation sites.

We welcome inquiries and feedback, and remain available to assist anyone with questions. Please continue to check the Project websites for ongoing updates and progress related to our pilots and the AUC engagement process with the Allied Community Renewable Energy Interests group.

Glossary

Abandoned Well Classification
A site that is permanently dismantled (plugged, cut and capped) and left in a safe and secure condition.

Active Well Classification
A well that is currently producing oil or natural gas.

Alberta Electrical System Operator (AESO)
https://www.aeso.ca/
Non-profit entity that manages supply and demand of electricity in Alberta, including dispatching electricity, planning the system for the future, and operating the provincial power grid.

Alberta Energy Regulator (AER)
https://www.aer.ca/
"The AER provides for the safe, efficient, orderly, and environmentally responsible development of energy resources. This includes allocating and conserving water resources, managing public lands, and protecting the environment while securing their economic benefits for all Albertans.
The Government of Alberta has granted the AER authority to:

- review and make decisions on proposed energy developments,
- oversee all aspects of energy resource activities in accordance with government policies,
- regularly inspect energy activities to ensure that all applicable requirements are met,
- penalize companies that fail to comply with AER requirements, and
- hold hearings on proposed energy developments.

As the single regulator, the AER's authority includes—for energy-related development only—the *Environmental Protection and Enhancement Act* (EPEA), including reclamation and remediation activities, and the *Water Act*. The AER is also responsible for public lands and geophysical activities under the *Public Lands Act* and the *Mines and Minerals Act*."

Alberta Environment and Parks (AEP)
https://www.alberta.ca/environment-and-parks.aspx
A department of the Government of Alberta (GoA) that manages the Wildlife Guidelines for Solar and Wind Energy Projects. AEP is developing reclamation requirements for wind and solar projects. In 2018, Alberta Environment and Parks released the

Conservation and Reclamation Directive for Renewable Energy Operations. This regulation produced under the Environmental Protection and Enhancement Act and the Conservation and Reclamation Regulation requires renewable energy operators to acquire reclamation certificates after project decommissioning. Reclamation certificates are managed by both AEPand the Alberta Energy Regulator.[51]

Alberta Utilities Commission (AUC)
Regulates the utilities sector, natural gas and electricity markets to protect the social, economic, and environmental interests of Alberta where competitive forces do not. The AUC does not create legislation.[52]

Behind-the-Fence (BTF)
The generator is connected to the distribution side of the substation where the Alberta Electrical System Operator and the Transmission Facility Operator (TFO) can't see the generator unless it offsets all the load on the distribution side of the substation and starts pushing current back against the Transmission System.

Community Generation
See: Small Scale Generation Regulation (SSGR)

Community group
Includes a cooperative, a school board, a board of a public post-secondary institution or private college, an Indigenous band, a Metis settlement, a municipal authority, a society, an incorporated congregation, an irrigation district, an agricultural society, a condominium corporation, a registered charity, or an association under the *Companies Act* or *Rural Utilities Act*. To qualify as a community generating unit, the following must be demonstrated:

Community benefits agreement
A legally binding written contract between a small scale power producer and a community group in respect of a small scale generating unit that confers social, environmental or economic benefits to the community group.

Community benefits statement
A statement in writing made by a small scale power producer that qualifies as a community group. The statement must pertain to a small scale generating unit wholly owned by the community group, that sets out the social, environmental, or economic benefits flowing to the community group.

[51] See here for more detailed info: https://open.alberta.ca/publications/9781460141359
[52] http://www.auc.ab.ca/Pages/default.aspx

Electrical Distribution Facility Owner (DFO)
DFOs are entities that own and operate distribution lines, the portion of the Alberta electrical system operating at 25 kilovolts (25,000 volts) or less. These distribution lines provide service to most consumers, except for some very large industries that are directly connected to the transmission grid.[53] The four major electrical distribution companies in Alberta are EPCOR, ENMAX, ATCO and FortisAlberta. Additionally, there are six municipalities and 34 Rural Electrification Associations that manage distribution operations.

Electrical Utilities Act (EUA)[54]
This Act provides the underlying framework for the regulation of Alberta's electric industry. The Act establishes the Independent System Operator (AESO) (responsible for the safe, reliable and economic planning and operation of the Alberta Interconnected Electric System and access to the interconnected power grid) and the Balancing Pool (responsible for managing certain generation assets, managing payments, and forecasting revenues and expenses), and sets out the AESO's powers and duties.

Electrical Transmission
Throughout Alberta, 26,000 km of transmission lines bring power to over four million people.

Emergency Response Plan (ERP)
"An ERP defines the actions a company must take during an emergency. In Alberta, each company licensed by the AER must, as a minimum, have a corporate-level ERP to cover all of its operations in the province."[55]

Emission intensity
The ratio of a specific emission (such as carbon dioxide) to a measure of energy output. For the electricity sector, emission intensity is usually expressed as emissions per megawatt hour (MWh) of electricity generated.[56]

Equivalent land capability
In reclamation, equivalent land capability refers to the ability of the land to support various land uses after conservation and reclamation, similar to the ability that existed prior to an activity being conducted on the land.

[53] https://www.aeso.ca/aeso/glossary-of-terms/
[54] ELECTRIC UTILITIES ACT - Alberta Queen's Printer http://www.qp.alberta.ca/documents/Acts/E05P1.pdf
[55] https://static.aer.ca/prd/documents/enerfaqs/EmergencyPreparedness_FS.pdf
[56] https://www.aeso.ca/aeso/glossary-of-terms/

Fixed compensation
Compensation for a renewable energy land lease in which the developer provides the landowner with a static sum of compensation on an annual basis.

Fixed plus variable compensation
Compensation for a renewable energy land lease in which the developer provides the landowner with a static sum for compensation as well as royalties based on electrical generation on an annual basis.

Gigawatt (GW)
One billion watts.

Gigawatt Hour (GWh)
One billion watt hours.

Greenhouse Gas (GHG) Emissions[57]
Greenhouse gases (GHGs) are gaseous compounds in the earth's atmosphere that trap and hold heat contributing to the greenhouse effect and global warming. GHGs can be naturally occurring or caused by human activity. Quantity of GHG emissions is generally expressed in tonnes of CO_2 equivalent. Examples of GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur dioxide (SO_2) and fluorinated gasses such as chlorofluorocarbons.

High Level Study (HLS)
A very high level study where you pay Fortis $200 to give you a very preliminary estimate (called a "pre-application consultation") of the hosting capacity that is available at your location.

Fortis also offers a $500 or 5 site package deal where they give you this same quick assessment for 5 different locations.[58]

Inactive Well Classification
A well or associated facility where activities have stopped due to technical or economic reasons. Not all sites in this category are orphaned. May be reopened to produce at a later date.

MegaWatt (MW)
A million watts.

[57] https://www.sciencedirect.com/topics/earth-and-planetary-sciences/greenhouse-gas
[58] https://www.fortisalberta.com/customer-service/get-connected/generation/distributed-generation

Megawatt Hour (MWh)
One million watt hours. A megawatt hour measures the amount of electricity a generator produces in one hour.

Micro-generation[59]
Micro-generation refers to grid-tied renewable energy projects (not exceeding 5MW) where Albertans generate electricity for their own use.

As defined by the AUC: the small-scale production of electricity, using renewable or alternative energy sources, by homeowners, and small businesses to meet their electricity needs. Homeowners, and small businesses that produce power for their own use are called micro-generators.

Excess energy that micro-generators produce and don't use is sent to the electrical power grid for other customers to use. The micro-generator receives credits for the excess electricity sent to the electrical power grid. Delivery charges are still charged to sites generating electricity when electricity from outside sources is consumed at the site, but the delivery charges are only billed for the electricity from outside sources and not the electricity generated and consumed at the site.[60]

Orphan Well or Infrastructure Classification
A well or facility confirmed not to have anyone responsible or able to deal with its closure and reclamation.

In the upstream oil and gas industry, an orphan is a well, pipeline, facility or associated site for which there is no one legally responsible and/or financially able party to deal with its abandonment and reclamation responsibilities.

Orphan Well Association
The Orphan Well Association **(**OWA) is an independent non-profit organization under the Alberta Energy Regulator, and funded by the upstream oil and gas industry, to protect the public by safely decommissioning oil and gas infrastructure and returning land to its original state, particularly from sites that no longer “have a legally or financially responsible party that can be held accountable.”[61] For years the OWA has been dealing with companies declaring bankruptcy and walking away from their responsibilities to reclaim these “orphaned” sites, but as the downturn deepens, more sites are joining the list.

[59] http://www.qp.alberta.ca/1266.cfm?page=2008_027.cfm&leg_type=Regs&isbncln=9780779805471&display=html
[60] http://www.auc.ab.ca/Pages/micro-generation.aspx
[61] https://www.orphanwell.ca/about/

Pool Price
The average of 60 one-minute system marginal prices accumulated over an hour.[62]

Power Purchase Agreement (PPA)
A power purchase agreement (PPA), or electricity power agreement, is a contract between two parties, one which generates electricity (the seller) and one which is looking to purchase electricity (the buyer).

Power Pool of Alberta
The not-for-profit entity responsible for the operation of the wholesale electricity market from 1998 through 2002.[63]

Reclamation
The process of replacing soil and re-establishing vegetation on a site so it can support activities similar to those it could have supported before it was disturbed. Under the Environmental Protection and Enhancement Act, reclamation means any or all of the following:

1. The removal of equipment or buildings or other structures or appurtenances;
2. The decontamination of buildings or other structures or other appurtenances, or land or water;
3. The stabilization, contouring, maintenance, conditioning or reconstruction of the surface of land;
4. Any other procedure, operation or requirement specified in the regulations.

Reclamation Certified
Reclamation Certified (Rec Cert) well sites are those that are remediated and reclaimed to the regulatory standard of the day.

Remediation
The process of cleaning up a contaminated site to meet specific soil and groundwater standards.

Renewable Electricity Program (REP)
The REP was designed and administered by the Alberta Electric System Operator to encourage the development of 5,000 megawatts (MW) of renewable electricity generation capacity to the grid by 2030. As per a decision by the Alberta Government on June 10, 2019, the program is no longer moving forward.

[62] https://www.aeso.ca/aeso/glossary-of-terms/
[63] https://www.aeso.ca/aeso/glossary-of-terms/

Right of Entry (ROE)
A legislated process under the Surface Rights Act that allows a company the right to enter, use and take the surface of the land to conduct operations when landowner consent cannot be obtained.This process does not apply to wind and solar projects.

Solar Photovoltaic System
"A **photovoltaic system**, also **PV system** or **solar power system**, is a power system designed to supply usable solar power by means of photovoltaics (the conversion of light into electricity). It consists of an arrangement of several components, including solar panels to absorb and convert sunlight into electricity, a solar inverter to convert the output from direct to alternating current, as well as mounting, cabling, and other electrical accessories to set up a working system. PV systems range from small, rooftop-mounted or building-integrated systems with capacities from a few to several tens of kilowatts, to large utility-scale power stations of hundreds of megawatts. Nowadays, most PV systems are grid-connected, while off-grid or stand-alone systems account for a small portion of the market."[64]

Small Scale Generation Regulation (SSGR)/Community Generation
As described by Fortis, a framework under development in the province of Alberta. The objective is to make it easy for communities to pool resources together effectively to create a distributed energy resource that will benefit the community as well as the individuals investing in it. Pooling a community's resources and effort may make the distributed energy resource project more cost effective and viable.It could be a solar farm or be a collection of photovoltaic (PV) solar panels on multiple homes in the community that combine their generation for the benefit of the community. Small Scale or Community Generators are also often described as Distributed Generators (DG). The Alberta SSGR (*Small Scale Generation Regulation* - SSGR)[65] came into force on January 1, 2019.

Surface Rights Board (SRB)
The SRB is a tribunal that assists landowners/occupants and operators to resolve disputes related to the development of subsurface resources such as oil, gas, and coal or to build and operate pipelines and power transmission lines. The SRB processes do not extend to wind and solar leases.

[64] https://en.wikipedia.org/wiki/Photovoltaic_system
[65] https://www.qp.alberta.ca/documents/Regs/2018_194.pdf
Further commentary at: http://elc.ab.ca/new-small-scale-generation-regulation-aims-to-fill-the-gap-between-micro-generation-and-large-utility-companies/#_ftn1

Suspended Well Classification
A well that is not currently producing, has been safely secured, but may produce in the future.

Transmission Facility Operator (TFO)
The owner of the system of high-voltage power lines and equipment that links generating units to large customer loads and to distribution systems.[66]
The primary transmission facility owners in Alberta are:

- AltaLink Management Ltd.
- ATCO Electric Ltd.
- ENMAX Power Corporation
- EPCOR Utilities

Wire Service Provider (WSP)[67]
Conducts operations and maintenance activities on electric distribution system for a distribution system wire owner.

Well Classifications
Abandoned, Active, Inactive, Suspended, and Orphan classifications are all defined separately within the glossary.

Variable only compensation
Compensation for a wind or solar land lease where the developer provides the landowner royalties based on electrical generation on an annual basis.

[66] https://www.aeso.ca/aeso/glossary-of-terms/
[67] http://www.afrea.ab.ca/filesaf/afrea/Glossary%20of%20Terms.pdf

Appendices

Appendix A: Assumptions for Alberta solar economics

RenuWell Economic Assumptions				
Total inactive leases	155,610	(1)		
Average land area/lease	2	acres		
Total land area	311,220			
Percentage used for solar	10%			
Land area for solar	31,122	acres		
	Units	**Factor**	**Total**	
Solar generation capacity	acres/MW	5	6,224	MW (2)
Solar resource (average)	kWh/kWp	1300	8,091,720	MWh (3)
Carbon intensity	mt/MWh	0.56	4,531,363	Tonnes
Electricity price	$/MW	$ 70	$ 566,420,400	Electricity sales/year
Carbon price	$/Tonne	$ 30	$ 135,940,896	Carbon credits/year
Total revenue	Revenue	$ 100	$ 809,172,000	Total Revenue/year
Solar cost	$/kWdc	$ 1,400	$ 9,336,600,000	Construction costs
Abandonment	$/well	$ 75,000	$ 1,167,075,000	Closure costs (4)
Total economic activity			$ 10,503,675,000	
Jobs (FTE)	Jobs/MW	12.50	77,805	
jobs (permanent)	Jobs/MW	0.3	1,867	
Deferred reclamation	$/lease	$ 10,000	$ 155,610,000	

(1) From AER ST37 report (March, 2019)

(2) Current average of announced solar projects

(3) Average of NRCan statistics for municalities in high lease concentration areas

(4) Based on CAPP estimated costs - Assumes 50% full abandonment and 50% remediation only

(5) Sustaining Growth. Renewable Energy & Green Economy – Electricity – Solar Energy. https://www.calgaryeconomicdevelopment.com/industries/focus-areas/renewable-energy

Appendix B: AUC Discussion Overview

Through the course of our stakeholder consultations with Fortis Alberta, EQUS and the Alberta Utilities Commission, we have come to recognize that the interconnection challenges facing community generation projects are related to the current tariff structure that does not provide a mechanism for DFO's to recover costs from distributed generation customers in the same manner as load customers. This is part of a larger problem that exists because Alberta's regulatory and policy environment was developed to ensure the reliability and stability of the electrical grid during an era of large-scale centralized generation and long-distance transmission to remote load centers. Naturally, the business models of Alberta's DFO and TFO companies are aligned to conform to this environment and resist changes that challenge the status quo. This situation must be addressed at a systems level.

In the late 1990s, the oil industry was facing negative environmental impacts of flaring gas that was generated as a by-product of oil production. At that time, the EUB (now AER and AUC) mandated that the oil industry reduce flaring and offered electricity generation as a means to convert the "waste" gas to commercial power generation. As this process was being implemented, regulatory barriers caused by restrictions in the Electrical Utilities Act were formally addressed in the "Flare Gas Generation Regulation" which was passed in 2003. When it was observed that the distributed power generation reduced the transmission demand charges to the DFOs, the Board insisted that this benefit be returned to the generators to recognize this secondary benefit and create incentive to accelerate the use of "waste-gas" for power generation because it was in the public interest.

Once again, Alberta's energy industry is facing significant public pressure over environmental concerns. This time the concerns are related to abandoned infrastructure liabilities, negative impacts on agricultural lands and a growing pressure to reduce the GHG intensity of oil and gas operations. Repurposing abandoned oil and gas infrastructure for distributed solar generation can have a positive impact on all of these factors and it can stimulate economic development in Alberta.

As we have learned in the course of this project, the cost and complexity of connecting small-scale solar generation projects to the grid is the greatest barrier to this important initiative. Fortunately, the same combination of regulatory pressure and economic incentive that transformed Alberta's flare gas problem into a source of distributed power generation can be applied to accelerate the conversion of abandoned oil and gas liabilities into assets for the solar energy industry.

Appendix C: Differences in Energy Regulations in Alberta

CURRENT REGULATORY SYSTEM	
Oil and Gas	**Renewable**
ROE Privilege	No ROE Privilege
AER/SRB/AEP	AUC/AEP
OWA reclaims thru levy	No Orphan Association/check off
SRB orders landowner costs	No SRB jurisdiction
SRB pays unpaid compensation	No SRB jurisdiction
SRB pays damages off-lease/ROW	No SRB jurisdiction
Self-inspection for Rec. Cert.	More onerous reclamation process
MGA exemption for taxes	No MGA exemption
25 year liability past Rec. Cert.	5 year liability past Rec. Cert.
2010 Reclamation criteria	2010 Reclamation criteria
Wetland and Wildlife Directives	Wetland and Wildlife Directives
	Easier Application Process under MW

Additional Web Resources

Blog Post: Small Scale Generation Regulation (Jan 2019)
http://elc.ab.ca/new-small-scale-generation-regulation-aims-to-fill-the-gap-between-micro-generation-and-large-utility-companies/

AER Reclamation Process and Criteria for O&G sites
https://aer.ca/regulating-development/project-closure/reclamation/oil-and-gas-site-reclamation-requirements/reclamation-process-and-criteria-for-oil-and-gas-sites

Article: AB Energy UCP plans (Jul 2019)
https://www.cbc.ca/news/canada/calgary/alberta-electricity-market-1.5224131

Article: UCP - Climate rules (Nov 2019)
https://calgaryherald.com/opinion/columnists/opinion-ottawas-new-environment-minister-should-view-albertas-climate-rules-as-an-olive-branch

Article: Jobs – Transition (Nov 2019)
https://business.financialpost.com/commodities/energy/retraining-oil-and-gas-workers-sounds-like-an-easy-solution-but-the-reality-is-incredibly-complex

https://www.ourwindsor.ca/news-story/9737816-how-can-canada-fight-climate-change-and-support-the-oil-sector-/

Blog Post: Review of Canada's Energy Future 2019 Report (Jan 2020)
https://www.pembina.org/blog/why-canadas-energy-future-report-leads-us-astray

Article: Global Demand changes – Oil (Aug 2019)
https://www.weforum.org/agenda/2019/08/how-falling-demand-for-oil-is-set-to-transform-international-relations/

Article: Global Demand changes – Oil (Jan 2020)
https://www.nationalobserver.com/2020/01/16/analysis/clean-energy-reckoning-drawing-nearer-oilpatch

Articles/Publications: Orphan and Inactive Wells

Article (Jan 2015)
https://onlinelibrary.wiley.com/doi/abs/10.1111/iere.12098

Briefing Paper (Feb 2017)
https://www.policyschool.ca/wp-content/uploads/2017/03/Inactive-Oil-Wells-Muehlenbachs-1.pdf

Article (May 2019)
https://www.macleans.ca/news/canada/bankrupt-oil-companies-are-saddling-alberta-landowners-with-orphan-wells/

Articles (Dec 2019)
https://business.financialpost.com/commodities/energy/alberta-ranchers-farmers-furious-over-oil-and-gas-companies-failure-to-clean-up-their-geriatric-wells

https://business.financialpost.com/commodities/agriculture/as-alberta-energy-companies-struggle-to-pay-their-bills-farmers-ranchers-and-counties-feel-the-pinch

https://app.meltwater.com/newsletters/analytics/view/552fcbdb6b50efc90e6ddd8c/distribution/5e0b47616868f35faa2ff07f/document/tHGtnpRjEFaK8edCjz8NXLJcqJA

Articles (Jan 2020)
https://cleantechnica.com/2020/01/05/albertas-200-billion-oil-gas-clean-up-bill-will-be-footed-by-the-rest-of-canada/

https://business.financialpost.com/commodities/energy/group-cleaning-up-old-oil-wells-says-alberta-government-rules-inadequate

https://business.financialpost.com/commodities/energy/alberta-towns-say-unpaid-property-taxes-theyre-owed-from-oil-and-gas-companies-have-more-than-doubled

https://app.meltwater.com/newsletters/analytics/view/552fcbdb6b50efc90e6ddd8c/distribution/5e1f0df8807ca633a6a00a4d/document/hrxzxUEh9mvGNQAdhpcv6am91OA

https://app.meltwater.com/newsletters/analytics/view/552fcbdb6b50efc90e6ddd8c/distribution/5e18766fa013cec5f1b8085f/document/dgAq4syLETeGCWTY9aRqxafxan4

Article (Mar 2020)
https://www.cbc.ca/radio/thesundayedition/the-sunday-edition-for-march-8-2020-1.5482636/if-the-polluter-doesn-t-pay-to-clean-it-up-taxpayers-will-have-to-alberta-s-growing-oil-well-problem-1.5486689?fbclid=IwAR1qkCxpHr3bY789kGguagOo-HMf3b8QODwWoxtf89excTyY64t0smd5P3M

Articles/Publications: Landowners

Publication (Nov 2019)
https://www.pembina.org/pub/landowners-primer-what-you-need-know-about-unreclaimed-oil-and-gas-wells

Article (Jan 2020)
https://calgaryherald.com/commodities/energy/alberta-landowners-urge-farmers-to-cut-power-to-wells-with-unpaid-debts/wcm/984d13b6-ff0a-4dee-84cb-3c82ae858e0a

Article: Utilities Consumer Advocate advisory board (Mar 2015)
https://calgaryherald.com/news/local-news/province-may-disband-utilities-consumer-advocate-advisory-board

Presentation: Deregulated Market, Wire Service Provider Costs (Mar 2016)
https://actionsurfacerights.ca/wp-content/uploads/2016/03/Electrical-WSP-Costs-2015.pdf

Article: Alberta's Deregulated Electricity Market (Dec 2013)
http://www.vauxhalladvance.com/news/2013/12/04/deregulation-leaving-people-shocked/