



# Green Electricity Community Wide Procurement

Edmonton

**November 25 2019**

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## Introduction

The City of Edmonton (“the City”) published its Greenhouse Gas (“GHG”) Management Plan 2019-2030 (“Plan”)<sup>1</sup>. Under the Plan, which was published on May 22, 2018, the City is taking leadership to reduce its carbon footprint for its civic operations. The City expects that this initiative will drive forward great opportunity in advancing a low-carbon world, increased economic diversity in Edmonton and Alberta, utility savings, more efficient operations, and clean energy and air. With respect to electricity consumption, the City’s objective is to procure renewable electricity to supply 100% of its electricity consumption.

The City is interested in doing a preliminary assessment of using Renewable Energy Certificates (“REC”) and/or carbon offsets (“offsets”) to compensate for the emissions created by electricity generation that serves the entire community electricity load. This paper assesses: what would be involved in doing this; what instruments are available; and provides a preliminary cost estimate based on a set of assumptions.

For the purposes of this paper we will assume that Edmonton’s community electricity load is served by the grid as it is now and that at the beginning of each year the City purchases RECs and/or offsets to compensate for emissions from the generation consumed to serve the forecasted electricity load, with a true-up at the end of each year or that at the end of each year the City purchases RECs and/or offsets for the actual load in the year.

## Community Electricity Load

In 2018, the total Edmonton community electricity load was 7,743,317 MWh, which is approximately 7.7 TWh. City economic data indicates that annual average GDP growth rate for 2019 to 2030 is anticipated to be approximately 2.24 percent and the annual average population growth is anticipated to be 1.92 percent. For the purposes of this position paper we will assume that the City load grows over the same time period at the average of these two rates, i.e., 2.1 percent on an annual basis. This would mean that the total City load would be anticipated to be 8.5 TWh in 2023 and 9.9 TWh in 2030.

## Alberta Electricity Regulatory Framework Considerations

Alberta’s electricity market design is referred to as an “energy-only” market that only pays generators for energy they produce. Almost all generation developed in the Alberta electricity market has been

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<sup>1</sup> [https://www.edmonton.ca/city\\_government/documents/PDF/GHGManagementPlan-CityOperations.PDF](https://www.edmonton.ca/city_government/documents/PDF/GHGManagementPlan-CityOperations.PDF)

under the Independent Power Producer (IPP) model<sup>2</sup>. Perhaps most importantly, no entity is responsible for meeting long-term load serving requirements on behalf of electricity consumers. In other words, customers are responsible for securing their electricity needs and therefore the entire electricity market is open to retail competition. Electricity customers are expected to secure their own electricity needs through retail contracts, or default to a regulated rate option<sup>3</sup>. A large majority of customers purchase electricity on spot prices (i.e., in real-time), especially industrial customers. A majority of electricity customers in Alberta use retailers to meet their electricity needs, particularly industrial consumers who represent around 60% of Alberta's electric load. In short, competition and customer choice are core foundations of the Alberta regulatory framework and electricity investment is derived from electricity rate-payers.

There are a number of barriers for the City in providing offsets/RECs for electricity consumption for the entire City's load (i.e., all electricity consumers within the City) that are related to the regulatory framework of the Alberta electricity market. First, using City funding sources (e.g., property tax adders) would break the link between electricity rate-payers funding electricity infrastructure. This could result in unfair cost allocation between customers. For example, land owners with higher property tax obligations but lower than average energy use could be negatively impacted. Second and related, customers that have made green energy commitments (e.g., retail contracts with green energy retailers or installation of behind-the-meter solar generation) may be double counted and therefore the City would be paying twice for emission reductions. Ensuring no double counting will include significant efforts in verification and settlement processes. Third, large emitters (e.g., industrials) may already have carbon obligations through carbon pricing policy in Alberta. The City's activity on emissions results for all loads may result in double counting again for large emitters or could lead to cost distortions as green electricity is funded outside the electricity market framework. Fourth, the market is based on consumer choice supported by a robust retail market and generation competition. Purchasing offsets for customers outside of the existing electricity retail market will have a negative impact on retailers, especially those that offer green electricity services (e.g., electricity supply with emissions offsets). There is potential that policy from the City could be seen as unfair competition by retailers. Finally, there is a potential (as described in this paper) that not enough offsets/RECs exist in Alberta and therefore additional offsets/credits will need to be purchased outside of Alberta. Using property taxes to spend on products outside of Alberta could be viewed negatively. Overall, there are a number of considerations in the Alberta electricity sector regulatory framework that are barriers to the City's GHG emissions reduction objective.

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<sup>2</sup> Note until recently generation relied on private sector investment without government backed contracts. The previous government supported wind generation contracting by the Alberta Electricity System Operator (AESO) through the Renewable Electricity Program (REP) and solar generation contracted by Infrastructure Alberta. Further information on the successful Infrastructure Alberta solar procurement projects can be found here: <http://investors.canadiansolar.com/news-releases/news-release-details/canadian-solar-won-94-mwp-subsidy-free-electricity-contracts>

<sup>3</sup> More information on regulated rate options can be found here: <http://www.auc.ab.ca/Pages/current-rates-electric.aspx>

## Market Assessment

RECs and offsets are similar types of instruments, but there are key differences between the two instruments even though they are often referred to in the same way. Table 1, reproduced from the National Renewable Energy Laboratory (NREL) in the US, compares RECs and offsets.

**Table 1 - Comparison of RECs and Offsets<sup>4</sup>**

Basic Differences	Offsets	RECs
<b>Unit of Measure</b>	Metric tons of CO <sub>2</sub> or CO <sub>2</sub> Equivalent	Megawatt hours (MWh)
<b>Source</b>	Projects that avoid or reduce greenhouse gas (GHG emissions to the atmosphere)	Renewable electricity generators
<b>Purpose</b>	Represent GHG emissions reductions; provide support for emissions reduction activities; and lower costs of GHG emissions mitigation	Convey use of renewable electricity generation; underlie renewable electricity use claims; expand consumers' electricity service choices; and support renewable electricity development
<b>Corporate GHG Inventories and Reporting</b>	Reduce or "offset" an organization's scope 1, 2 or 3 emissions, as a net adjustment	Can lower an organization's gross market-based scope 2 emissions from purchased electricity
<b>Consumer Environmental Claims</b>	Can claim to have reduced or avoided GHG emissions outside their organization's operations	Can claim to use renewable electricity from a low or zero emissions source
<b>Additionality Test Requirements</b>	Required. Each project is tested for additionality to ensure that it is beyond business as usual. Tests include legal/regulatory, financial, barriers, common practice and performance tests. The combination of tests that is best suited to demonstrate additionality depends on the type of project.	Not required. Project additionality is not required for a renewable energy usage claim or to report use of zero-emissions power.

A REC is a tradable, market-based instrument that represents the legal property rights to the environmental benefit or attributes of electricity generated by renewable resources (i.e., non-carbon emitting). In other words, it is a measure of the non-power value in having electricity generated by renewables. RECs are denominated in terms of MWh of energy generated by renewable generation technologies and a REC is created for every MWh of electricity delivered to the grid from a renewable energy resource. Put simply, generation cannot really be renewable without the REC being associated with it.

RECs can either be bundled in with energy value of the renewable generation ("bundled REC"), such as when a party purchases renewable energy from a wind or solar generator – the purchaser gets the value of the energy and the value of the environmental attribute associated with the generation of that energy when they purchase a MWh or wind or solar generation directly. RECs can also be unbundled from the energy value of the renewable generation ("unbundled REC") and sold as a standalone product. For the

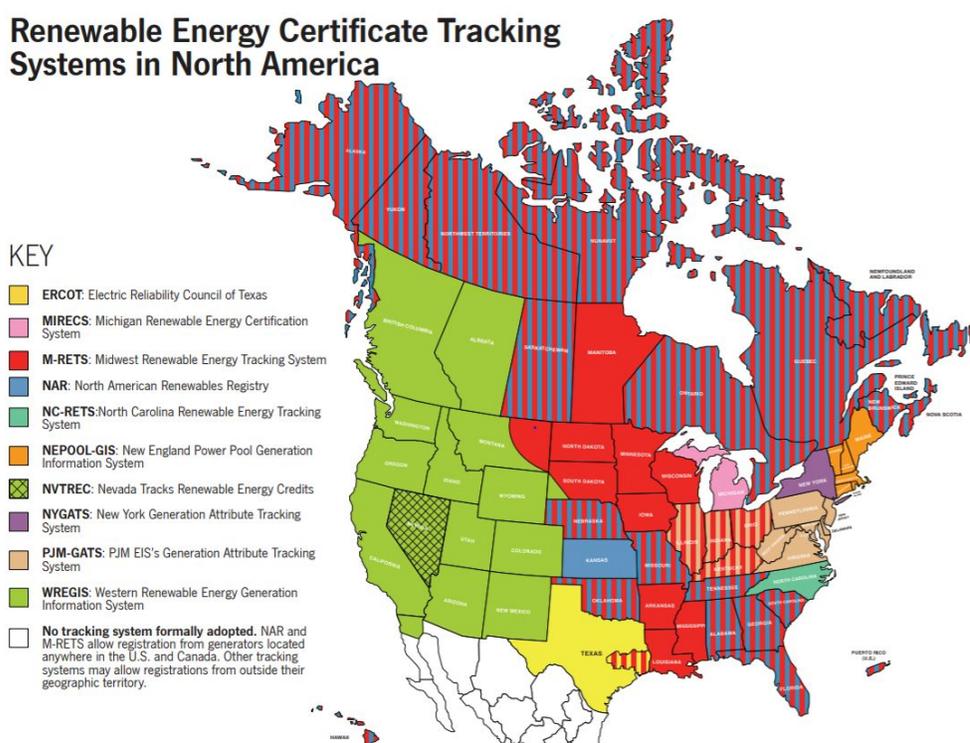
<sup>4</sup> [Offsets and RECs: What's the Difference](#), National Renewable Energy Laboratory, February 2018.

purpose of this position paper, the City will purchase unbundled RECs to compensate for emissions from the grid-supplied electricity.

There is no RECs market in Canada. Most REC “markets” in the US are really tracking systems that register the creation, transfer, export or retirement of RECs. In the US there are state Renewable Portfolio Standards (“RPS”) that require state utilities to source a certain amount of their generation from renewable sources. RECs are obtained by these state utilities for compliance purposes and this is what gives the RECs value. The purchase and sale of RECs is typically negotiated on a bilateral basis. Only RECs that are not needed for RPS compliance purposes are traded on the spot market, which is generally illiquid.

Figure 1 shows the ten North American REC markets and the geographic regions they cover.

Figure 1 - North American REC Markets<sup>5</sup>



Alberta is part of the Western Renewable Energy Generation Information System (“WREGIS”). This is a tracking system only, and WREGIS does not get involved in the pricing, purchase or sale of RECs. In order to purchase WREGIS RECs a buyer needs to work with a marketer or broker<sup>6</sup>. There are 22 Alberta-based entities holding accounts in WREGIS. These are mostly generating unit representatives, retail marketers and wholesale marketers, along with the AESO.

Offsets on the other hand, represent direct reductions in CO<sub>2</sub> emissions. Offsets are generated by projects that avoid or reduce CO<sub>2</sub>. In Alberta, the newly announced Technology Innovation and Emissions Reduction (TIER) replaces the Carbon Competitiveness Incentive Regulation (“CCIR”) in January 2020. TIER provides large emitters with a number of compliance options: on-site emissions reductions; use of emissions performance credits, use of Alberta-based emissions offsets; or pay a carbon price of \$30/tonne CO<sub>2</sub> into the TIER compliance fund (“fund credit”). The Alberta government has established an online

<sup>5</sup> National Renewable Energy Laboratory

<sup>6</sup> <https://www.wecc.org/Administrative/WREGIS%20Frequently%20Asked%20Questions.pdf>

offset registry, the Alberta Emissions Offset Registry (“AEOR”<sup>7</sup>), which tracks offsets<sup>8</sup>. Renewables only create offsets for the first 13 years of a project life in Alberta<sup>9</sup>. The cost of these offsets is negotiated between the buyer and seller away from the AEOR. There is a requirement for third-party verification of the project’s claims at reducing or avoiding CO<sub>2</sub> emissions.

## Implementation Issues

As discussed, there is no real market for RECs or offsets; however, there is a bilateral market for offsets. The purported markets are essentially tracking and registry systems that transparently display the types and quantities of instruments that are available and the price in the market is strongly influenced by the provincial carbon price (i.e., \$30/tonne).

Given the projected electrical loads of 8.5 TWh and 9.9 TWh in 2023 and 2030, respectively, this represents carbon emissions of 5.4 million t/CO<sub>2</sub> and 6.3 million t/CO<sub>2</sub>, respectively<sup>9,10</sup>. Currently, the AEOR lists approximately 7 million offsets with “active” status and 8 million performance credits, which are offsets that are available for purchase. With the existing Edmonton community electricity load of 7.7 TWh, the City would require roughly 5 million offsets per year, which is about one-third of available offsets.

It is important to note that the active offsets represent the available stock, not annual flow of offset creations. For the City to meet its annual offset emissions target, 5 million offsets need to be created each and every year. Currently roughly 3 million to 5 million credits are created each year, therefore the City’s purchase target of 5 million offsets could exceed the annual production of offsets/credits. As Canada decarbonizes, there will be competition for these offsets, which may lead to further shortages and the City being unable to purchase the required offsets without direct participation in the creation of new offsets, such as renewable generation. This scale of offset creation is very large, for example it implies roughly 2,000 MW of new installed wind capacity to meet the offset requirements.

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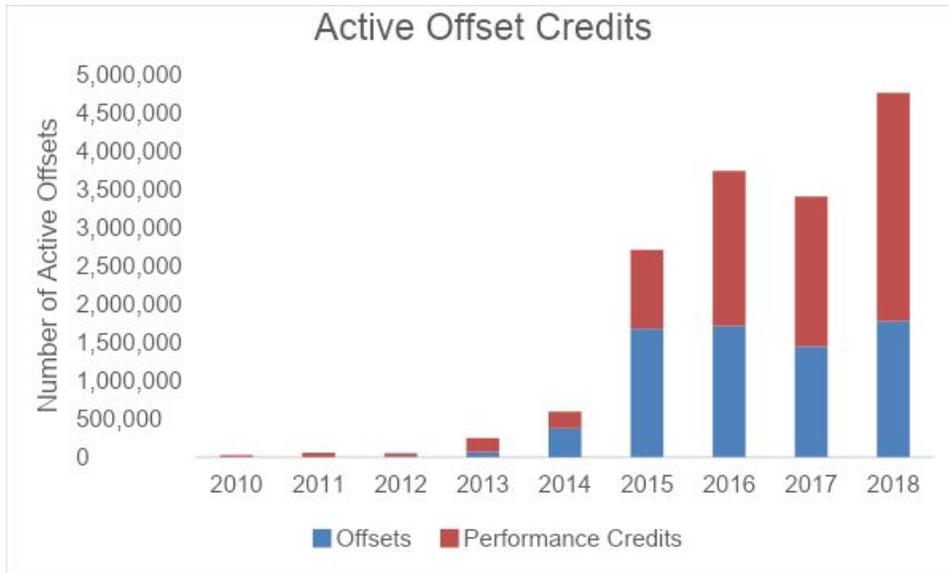
<sup>7</sup> <https://www.csaregistries.ca/albertacarbonregistries/home.cfm>

<sup>8</sup> Expectation is that time period for offsets created by renewables may be reviewed in 2020.

<sup>9</sup> Table 2 in the *Carbon Offset Emissions Handbook*, Version 1.0, March 2015, Government of Alberta. The reduction in use of grid electricity with line losses is 0.64 tonnes of CO<sub>2</sub>/MWh displaced with non-emitting generation. Note a draft discussion paper on Electricity Grid Displacement Factor was published for comment in December 2018, but it is unclear if the changes have taken place yet. The draft discussion paper recommends a displacement factor of 0.54 tonnes of CO<sub>2</sub>/MWh. <https://www.alberta.ca/assets/documents/egdf-discussion-paper.pdf>

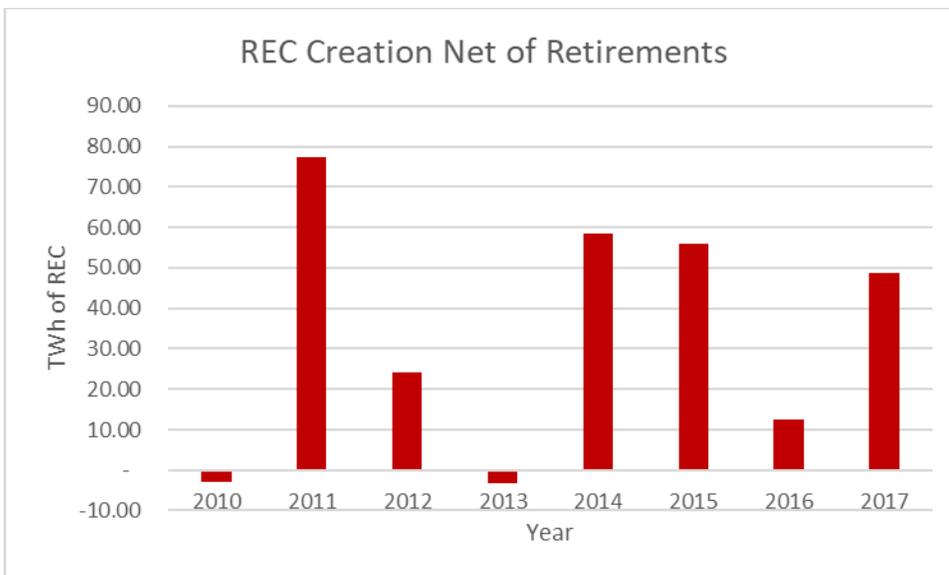
<sup>10</sup> Note that the carbon intensity of the electricity grid will fall dramatically as coal is retired or converted to gas-fired generation. If all the coal is gone (or converted), Power Advisory estimates at a high-level that Alberta electricity grid carbon intensity average is closer to 0.4 or less, which is almost surely the case by 2030.

**Figure 2 - Active AEOR Offsets**



The situation with RECs is somewhat similar. Although there are more RECs tracked on WREGIS, as Figure 3 shows, the majority of RECs are traded bilaterally for either compliance purposes or are bundled with renewable energy purchases. There is a small market in the US and Alberta for excess RECs, i.e., RECs not bundled. The lack of a consistent market REC is a serious issue and will be a serious issue in moving forward with using RECs to compensate for grid electricity from emitting sources for all of Edmonton. Trading volumes are not transparent and it will be difficult to determine if there will be sufficient RECs available for purchase in a consistent fashion.

**Figure 3 - REC Creation Net of Retirements**



## Cost Estimates

At present, the cost of a fund credit under TIER are \$30/t of CO<sub>2</sub><sup>11</sup>. This is effectively the carbon price in Alberta<sup>12</sup>. Federally, in June 2019 the Minister of the Environment and Climate Change stated publicly that the federal government had no intention of increasing the carbon price beyond \$50/t of CO<sub>2</sub>, which is what it will be in 2022<sup>13</sup>. In June 2019, the Parliamentary Budget Office published a report in which it estimated a carbon price of \$100/t of CO<sub>2</sub> would be required to meet the Paris Agreement 2030 emissions target<sup>14</sup>. There is other scholarly research that indicates a price of \$150/t of CO<sub>2</sub> will be required<sup>15</sup>. Power Advisory notes that Alberta has adopted the TIER (TIER) program and initial carbon price of \$30/tonne has been established that will not trigger the use of the federal carbon plan backstop in Alberta. The TIER program regulation allows the carbon price to be increased in future years if needed. As the federal government’s carbon price increases, there is a potential that Alberta will not be in compliance if the provincial carbon price does not match the federal price<sup>16</sup>.

Year	Projected Load (TWh)	Projected Emissions (million tonnes of CO <sub>2</sub> )	Total Offset Cost at Various Carbon Prices (millions)			
			\$30/t	\$60/t	\$100/t	\$150/t
2023	8.5	5.4	\$162	\$324	\$540	\$810

REC prices are not transparent because attributes are often sold as a bundled product with wholesale electricity products and non-regulated entities procuring on a bilateral basis with a variety of terms and conditions. Power Advisory is not aware of any publicly available unbundled REC price forecasts but past City of Edmonton purchases suggest that they have generally ranged between \$10 and \$20 per MWh. It is unclear if that pricing would continue.

<sup>11</sup> <https://www.alberta.ca/assets/documents/CEMA-fund-credit-ministerial-order.PDF>

<sup>12</sup> The carbon price is effectively a cap on the price of an offset. If the offset were priced higher, the emitter would just buy fund credits at the government-set price to offset its emissions.

<sup>13</sup> <https://beta.theglobeandmail.com/politics/video-mckenna-says-plan-has-not-changed-on-carbon-price-past-2022/>

<sup>14</sup> Closing the Gap: Carbon pricing for the Paris target, Parliamentary Budget Office, June 20, 2019.

<sup>15</sup> Taking Stock: Opportunities for Collaborative Climate Action to 2030, Policy Brief 2: The Pan-Canadian Framework on Clean Growth and Climate Change, March 2017.

<sup>16</sup> More information on the TIER can be found here: <https://www.alberta.ca/technology-innovation-and-emissions-reduction-engagement.aspx>

*This paper was prepared based on information provided by Power Advisory LLC*

## Conclusions

It might be possible to offset the emissions from Edmonton's community electricity load using carbon offsets, however, there may not be enough annual offset creations to meet the City's requirements. Further, the City will be exposed to fluctuations in the carbon price, which is heavily influenced by government policy as well as supply and demand factors. Offsetting all grid-sourced electricity with RECs is likely not practicable due to the absence of a Canada wide, transparent and consistent RECs market, and the limited availability of RECs because most RECs are used for compliance purposes (in the US) or bundled with electricity. Finally, there are general barriers for the City's purchase of carbon offsets or RECs for customers inherent to Alberta's electricity regulatory framework that is based on customer choice and market-based competition. As green electricity is already offered in the marketplace by various retailers, the City would not be able to purchase green electricity on the consumer's behalf without expressed consent. Moreover, as this would be seen as competition to the existing market, the City could be offside with a deregulated retail market. Other ways of supporting the green electricity market rather than direct procurement of RECs for Edmontonians would need to be evaluated to operationalize this concept.