# RENEWABLE ENERGY
# GLOSSARY

BUSINESS
RENEWABLES
CENTRE
CANADA

## ADDITIONALITY

A property of an action that indicates how much new renewable energy capacity it caused. In the case of power purchase agreements (PPAs), they are typically required for a project to gain financing. There is a direct connection from a buyer (non-utility company) participating in a PPA to the creation of a new renewable energy facility, hence the PPA has additionality. Additionality distinguishes PPAs from unbundled renewable energy credits, which do not provide the same path to project financing. This additionality allows PPAs to be linked to directly impacting the electricity grid, generating local jobs and positively impacting economic growth.

## AESO (ALBERTA ELECTRIC SYSTEM OPERATOR) POWER POOL PARTICIPANTS

Customers who purchase electricity from the wholesale market as a "self-retailer." To do so, they must register as an AESO power pool participant to obtain access to distribution and transmission lines.

## AGGREGATION

When multiple buyers each procure fractions of a project. This can be an approach to limit exposure to market specifics impacting an individual project and build a portfolio to smooth risk exposure. It can also allow small buyers to collaborate and achieve meaningful volume for negotiating power. The Dutch Wind Consortium (check our resources page for details) is an excellent example of an aggregated-buyer transaction.

## ALBERTA ELECTRIC SYSTEM OPERATOR (AESO)

The regulatory agency that manages and operates Alberta's power grid. AESO's mandate consists of four primary functions:

- Operate an open and competitive wholesale market.
- Direct the safe and reliable operation of Alberta's electric system.
- Plan and develop the transmission system.
- Provide customer access to the transmission system.[1]

## ALBERTA UTILITIES COMMISSION (AUC):

Alberta's independent utility regulator that regulates investor-owned natural gas, electric, and water utilities and certain municipally-owned electric utilities to ensure that customers receive safe and reliable service at just and reasonable rates.[2]

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1 AESO, "Guide to understanding Alberta's electricity market." https://www.aeso.ca/aeso/understanding-electricity-in-alberta/continuing-education/guide-to-understanding-albertas-electricity-market/

2 AUC, "Our mission" https://www.auc.ab.ca/our-mission/

## BEHIND-THE-FENCE LOAD

The amount of electricity demand in Alberta met by on-site electricity generation.

## BROWN ELECTRONS

Electricity generated by fossil fuel-based facilities. Although fossil fuel-based facilities generate them, "brown" electrons cannot be distinguished and do not differ from "green" electrons when they flow into the grid.

## BUYERS' ROADMAP

A step-by-step guide prepared by BRC-Canada to support buyers through the entire VPPA procurement process. It is an 11-step process, aided by primers and templates, that helps the buyer involve all necessary internal teams within the company and consider the interests of investors and consumers while making the procurement decision.

## BUYERS

BRC-Canada refers to non-utility corporations and organizations interested in moving towards renewable energy, and those whose scale of electricity demand fits into 5 megawatts (MW) or more, as buyers.

## CAPACITY FACTOR

The amount of energy a generating unit produces (in megawatt hours (MWh) or gigawatt hours (GWh)) relative to the energy the unit could produce at continuous full power for the same time period.[3]

## CARBON CAPTURE, UTILIZATION AND STORAGE (CCUS)

A technology that captures and uses carbon emissions for other processes or safely injects and stores the carbon in deep underground geologic formations. CCUS has an important role in decarbonizing the existing energy systems and helping achieve global energy and climate goals.[4]

## CARBON COMPETITIVENESS INCENTIVE REGULATION (CCIR)

The CCI Regulation replaced the Specified Gas Emitters Regulation (SGER) in 2018, but was replaced by the Technology Innovation and Emissions Reductions Regulation in 2020. The CCIR program used an output-based allocation system in which a common emission standard (in tonnes of CO2/MWh) is established for all electricity generators. The generators will be allotted specific allocations or emission performance credits (EPCs) to cover the amount of emissions they would produce if their

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3 Natural Resources Canada, "Annexes", Energy Fact Book 2021-2022 (2021), 138. https://natural-resources.canada.ca/sites/nrcan/files/energy/energy_fact/2021-2022/PDF/2021_Energy-factbook_december23_EN_accessible.pdf

4 Government of Alberta, "Carbon capture, utilization and storage" https://www.alberta.ca/carbon-capture-and-storage.aspx

facility operated at the common emissions standard for their industry (based on the electricity they generate). Facilities with emissions intensities higher than allocated can purchase additional EPCs, offsets or make a payment to the Climate Change and Emissions Management Fund. Consequently, facilities that produce fewer emissions can sell their extra EPCs to other regulated entities within the electricity sector or other specified industries.

## CARBON CREDITS

A type of environmental attribute (EA) that tracks the emissions reduced by the replacement of a unit of electricity generated with a renewable energy project.

## CARBON OFFSETS

A type of carbon credit that tracks the amount of carbon saved by generating energy through a renewable facility instead of some other source (fossil fuels). It is slightly more complex than renewable energy certificates (RECs) because carbon offsets track the reduction of carbon emissions from using renewable energy. This calculation requires understanding the amount of carbon that would have been emitted if the renewable source was not used to generate the electricity (for example, how much carbon was saved by producing 1 MWh of electricity generated through renewable sources, as opposed to other sources).

## CARBON PRICING

An instrument that captures the external costs of greenhouse gas emissions and internalizes them by putting a price on the carbon dioxide emitted. This is one of the most efficient mechanisms to reduce greenhouse gas emissions and drive innovation towards decarbonizing energy systems. Canada has a flexible approach to carbon pricing wherein the provinces or territories can design their pricing system based on their needs or opt for the federal pricing system.[5]

## CLEAN ENERGY BUYERS ASSOCIATION (CEBA)

An association for energy customers seeking to procure clean energy across the U.S. They have over 300 members from various sectors including commercial companies, non-profit organizations and energy providers. Through their work, they aspire to achieve a 90 per cent carbon-free electricity system by 2030.[6]

## COGENERATION OR COMBINED HEAT AND POWER (CHP)

An energy-efficient solution for delivering electricity and heat. It produces both electricity and heat from a single fuel source and can be implemented alongside renewables to achieve reliable and affordable clean energy.[7]

## CONTRACT FOR DIFFERENCE

A derivative contract where the buyer and developer (renewable energy producer) settle on the difference between the fixed contract (strike price) and the wholesale electricity market price. A virtual power purchase agreement (VPPA) is a contract for difference. This allows the seller to obtain a fixed price for the electricity.[8]

## CORPORATE OFF-TAKER

In the context of power purchase agreements, an off-taker is the party that purchases electricity from a renewable energy project developer at a negotiated rate for a specified term without taking ownership of the electricity.

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5 Environment and Climate Change Canada, "How carbon pricing works," November 22, 2022. https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/putting-price-on-carbon-pollution.html

6 CEBA, "About" https://cebuyers.org/about/vision/#

7 Nigel Bankes, Giorilyn Bruno and Cairns Price, The legal and regulatory treatment of cogeneration in Alberta (Alberta Law Review, 2015), 385. https://albertalawreview.com/index.php/ALR/article/download/407/404/431

8 World Business Council for Sustainable Development, "Overview of PPA pricing structures," Pricing structures for corporate renewable PPA, 7. https://www.wbcsd.org/contentwbc/download/12227/182946/1

## CURTAILMENT

The reduction in renewable electricity output below actual production levels by a generator. Resulting from various reasons like system-wide oversupply or local transmission constraints, this reduces the volume of renewable energy certificates (RECs) generated by the project.[9]

## DEAL STACKING

Having more than one virtual power purchase agreement made for the same project to support larger renewable projects.

## DEAL TRACKER

BRC-Canada's Deal Tracker is Canada's first public curation of announced corporate procurement of renewable energy projects. It showcases the corporate buyers fostering investment in Canada through their long-term procurement of renewable energy from new projects. Using carefully selected criteria for inclusion, the transactions in the Deal Tracker only consist of renewable energy projects announced to support the growth of renewable energy in Canada.

## DEREGULATED ELECTRICITY MARKET

A market where qualified electricity generators can make competitive offers to sell their electricity into the wholesale power pool, and qualified retailers can buy and sell electricity from the wholesale market. Customers are also allowed to choose their preferred retailer. Therefore, the deregulated market gives market participants the flexibility to enter into agreements with one another, allowing non-utility buyers to sign procurement contracts with renewable energy generators.

## DEVELOPERS

The producers or builders of renewable energy projects like solar, wind and other large-scale renewables that want to sell their energy to potential buyers.

## DIRECT/PHYSICAL POWER PURCHASE AGREEMENT (DIRECT PPA)

Like a VPPA, a direct PPA is a long-term contract where a buyer agrees to pay a developer a fixed or escalating price per unit of energy generated and acquires the associated environmental attributes. But the direct PPA will also include provisions whereby the buyer takes legal title to the electricity and is responsible for managing the electricity as a commodity.

## DISTRIBUTION SYSTEM OWNER

In Alberta, this is the default supplier assigned for larger end-use customers (those using more than 250 MWh of electricity per year) who do not purchase electricity from competitive retailers. The distribution system owner is area-specific and can set its own prices, unlike the regulated rate option for small customers.

## DOUBLE COUNTING OF AN EA

Environmental attributes (EAs) are unique in that each MWh generated can only generate one type of EA. If the generation of renewable electricity is claimed

9 Union of Concerned Scientists, "Renewable Energy Curtailment 101: The Problem That's Actually Not a Problem at All", June 25, 2019.
https://blog.ucsusa.org/mark-specht/renewable-energy-curtailment-101/

more than once, it can result in double counting, which falsely depicts the use of renewable resources.

## ECOLOGO CERTIFICATION

A voluntary, multi-attribute, life cycle-based environmental certification that helps identify products and services that have undergone rigorous scientific testing and exhaustive auditing to prove their compliance with stringent, third-party environmental standards.[10]

## ECONOMIC DISPATCH

The operation of generation facilities to produce energy at the lowest cost to customers by taking into consideration the operational limits of electricity generation and transmission. Economic dispatch is a practice in wholesale energy markets, with the primary goal being to minimize production costs while maintaining system energy balance.[11]

## ELECTRICAL GRID

An interconnected network of power lines and related infrastructure (generating stations, transmission lines and towers, substations, transformers and distribution lines) that enables electricity to move from power plants to consumers. Grids are usually interconnected for reliability, forming more extensive networks that enhance the coordination and planning of electricity supply.[12]

## ELECTRICITY UTILITY

These provide reliable and affordable electricity to their customers. Traditionally, non-utility buyers purchase their electricity from electric utilities. The common electric utility companies in Alberta are AltaGas Utility, Direct Energy, ENMAX Power Corporation, and EPCOR Energy Alberta.

## ENVIRONMENTAL ATTRIBUTES (EA)

The general term used to describe the environmental benefit associated with a renewable energy project. Each megawatt hour (MWh) of electricity generated from a renewable energy project generates an associated EA (1 MWh worth). These EAs act as a bookkeeping tool that tracks a project's positive environmental impact and governs who can 'claim' renewable electricity consumption. By systematically tracking an EA, we can ensure that we are not double counting and instead assigning the benefits of renewable generation in only one place. Different types of EAs can be generated from renewable energy projects, depending on the impact being tracked. However, the two common types of EAs associated with renewable energy projects are renewable energy certificates (RECs) and carbon credits.

## EMISSION PERFORMANCE CREDITS (EPCS)

A type of carbon credit within Alberta's Technology Innovation and Emissions Reductions (TIER) Regulation. In Alberta, large emitters are regulated under TIER and can generate EPCs through

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10 UL Solutions, "ECOLOGO® Certification Program" https://www.ul.com/resources/ecologo-certification-program#:~:text=ECOLOGO%20Certifications%20are%20voluntary%2C%20multi,%2C%20third%2Dparty%20environmental%20standards.

11 F. N. Al Farsi, M. H. Albadi, N. Hosseinzadeh and A. H. Al Badi, "Economic Dispatch in power systems," 2015 IEEE 8th GCC Conference & Exhibition, March 1-4, 2015 (2015). https://ieeexplore.ieee.org/document/7060068/authors#authors

12 MIT Climate Portal, "The Electric Grid," May 24, 2022. https://climate.mit.edu/explainers/electric-grid

renewable energy projects to manage their carbon emissions. One EPC is equal to one tonne of CO2e reduced, which is calculated relative to the best performing natural gas generator in the province.

## FIXED CONTRACT PRICE

The price set between the renewable energy generator (developer) and the non-utility buyer in a virtual power purchase agreement. The buyer and developer get certainty for the price the project receives for its electricity on the market, regardless of the floating market price.

## FIXED ELECTRICITY RATE

The deregulated market in Alberta allows end-use customers to choose their electricity rates from floating/variable rates and fixed rates. Fixed rates provide certainty by enabling consumers to secure electricity rates for long periods and protect them from market volatility like fluctuations and spikes in the energy market.

## FLOATING PRICE

The average real time locational price published by the system operator that represents the price of electricity generated within that time frame. Floating/variable rate: The deregulated market in Alberta allows end-use customers to choose their electricity rates from floating/variable rates and fixed rates. Consumers who opt for a floating rate face varied electricity costs depending on the current energy market.

## FLOATING/VARIABLE RATE

The deregulated market in Alberta allows end-use customers to choose their electricity rates from floating/variable rates and fixed rates. Consumers who opt for a floating rate face varied electricity costs depending on the current energy market.

## GENERATING CAPACITY

The amount of power (in megawatts or kilowatts) a generating unit is capable of, operating at full capacity.

## GREEN ELECTRONS:

Electrons generated by renewable facilities. Although renewable facilities generate them, “green” electrons cannot be distinguished and do not differ from “brown” electrons when they flow into the grid.

## GREEN TARIFF/UTILITY-BASED OFFERINGS

An off-site procurement option where the utilities or retailers can provide buyers with the choice of purchasing and retiring environmental attributes (EAs) generated by one or more renewable energy projects that are selling electricity to the grid. The utility will offer a price structure (or an electricity rate) that buyers have to pay to source their electricity from renewable facilities. This option is a viable solution to access clean power in a regulated electricity market.

## GREEN-E

A clean energy certification to help businesses and individuals purchase verified clean energy. Companies having Green-e certification have met rigorous sustainability and environmental criteria by adhering to various practices and policies that effectively reduce their environmental impact.[13]

## INDEPENDENT POWER PRODUCERS (IPPS)

Non-utility generators (a corporation, agency, authority or other legal entity) that own or operate facilities that generate electricity for the public. They are not public utilities and are not owned by provincial electric companies. They can sell electricity to the provincial electricity network and third-party buyers through power purchase agreements (PPAs).[14]

## INDEPENDENT SYSTEM OPERATOR (ISO)/REGIONAL TRANSMISSION OPERATOR (RTO)

Government-regulated independent entities responsible for maintaining grid stability and reliability. They manage and monitor transmission facilities, match electricity demand to supply and facilitate competition among wholesale electricity suppliers.[15] They only operate in deregulated electricity markets. For example, the Alberta Electric System Operator is the ISO/RTO in Alberta. ISOs are similar to RTOs but often operate over a smaller geographic area.

## INTERMEDIARIES

BRC-Canada refers to all service providers and project financers that would enable the successful procurement of a virtual power purchase agreement (VPPA) as an intermediary. These would involve lawyers, consultants, financial experts and others.

## INTERMITTENCY

Some energy sources cannot continuously produce energy throughout the day for the whole year. Effective technologies and strategies can be deployed to ensure reliable, cost-friendly and clean electricity.[16]

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13 Green-e, "About"
https://www.green-e.org/

14 U.S. Energy Information Administration, "Glossary"
https://www.eia.gov/tools/glossary/index.php?id=Independent%20power%20producer

15 Thomson Reuters Practical Law, "Glossary"
https://ca.practicallaw.thomsonreuters.com/6-517-6449?transitionType=Default&contextData=(sc.Default)&firstPage=true#:~:text=There%20are%20also%20independent%20system,of%20the%20US%20electric%20grid.

16 Mark Jacobson, "Renewable Energy's Intermittency is Not a Showstopper," April 20, 2022.
https://physics.aps.org/articles/v15/54#:~:text=Another%20grid%2Dstabilizing%20strategy%20is,and%20so%2Dcalled%20gravity%20storage.

## LEVELIZED COST OF ELECTRICITY (LCOE)

The total cost of generating electricity over a specified cost recovery period per unit of electricity generated, including the revenue to build and operate the generator.

## MARGINAL GENERATING UNIT

Within the merit order model, this is the most expensive generating unit that would dispatch its supply to meet demand. According to merit order, lowest cost generators are selected first to serve the load. The marginal generating unit sets the price of the whole system.

## MERCHANT MARKET

Merchant market enables the purchase and sale of electricity. Generators or power producers can sell their electricity to retailers and then retailers can further sell the electricity to consumers. Alberta is a pure merchant power market, which places the province in a unique spot to utilize opportunities through innovation and investments in the energy market. The province can take hold of the many features of merchant power markets like the carbon market, power purchase agreements and government incentives to move toward cleaner energy options.[17]

## MERIT ORDER

One of the models implemented in a wholesale energy market that enables power generators to be designated in a certain sequence to optimize the electricity supply and deliver power economically. The sequence is based on lowest marginal costs, which is the cost of producing a single megawatt hour of electricity. This means power plants that produce electricity at low prices will be the first to supply power and serve the load, after which those with higher marginal costs will be called upon until the demand is met.

## NEGATIVE PRICING

This occurs when offer prices are below $0/MWh. Supply is expected to balance demand when the pool price within the market falls below zero in order to avoid curtailment. Negative pricing can be a way to

17 McCarthy Tetrault, "Canadian Power – Alberta Regional Overview," March 3, 2021. https://www.mccarthy.ca/en/insights/blogs/canadian-energy-perspectives/canadian-power-alberta-regional-overview

manage congestion and over-generation to improve market efficiency.[18] Buyers and developers should agree on how negative pricing situations are handled, to ensure mutual interests are aligned. The Alberta Electric System Operator (AESO) currently deploys a minimum price of $0/MWh.

## NET METERING

A mechanism that allows commercial or residential customers who generate electricity from solar panels to get credits for the electricity they add to the grid. Due to these credits, they will only be billed for the net energy they use.[19]

## NET-ZERO ELECTRICITY GRID

A grid that does not release greenhouse gas emissions as a result of the generation and supply of electricity. The grid must consist of only non- or low-emitting sources, and if achieving absolute zero emissions is technologically or economically prohibitive, the remaining emissions should be fully offset.[20]

## NON-UTILITY (CORPORATE) PROCUREMENT OF RENEWABLE ENERGY

Acquisition of renewable energy and associated environmental attributes by non-utility buyers or companies. Non-utility procurement can help buyers meet sustainability goals and objectives or carbon compliance requirements.

## NON-UTILITY COMPANIES

Entities (corporate companies, universities, government agencies, etc.) that do not supply public utilities like electricity, gas or water to the public.[21]

## NOVA SCOTIA'S GREEN CHOICE PROGRAM

Nova Scotia's green tariff program allows larger commercial and institutional customers in the province to access 100 per cent of their electricity from local, new renewable energy sources to meet their demand and address scope 2 emission reduction targets. It is a collaborative innovation between the province, suppliers, the utility and large energy buyers.[22]

## NULL POWER

The power that remains once renewable energy certificates (RECs) have been unbundled and sold separately. Null power is not renewable and has similar attributes to the overall system mix from where the specified REC was removed.[23]

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18 AESO, "Negative Pricing Discussion Paper" https://www.aeso.ca/assets/Uploads/4.4-Negative-Pricing-paper.pdf

19 Solar Energy Industries Association, "Net Metering." https://www.seia.org/initiatives/net-metering

20 Binnu Jeyakumar, Achieving a Net-Zero Canadian Electricity Grid by 2035 (Pembina Institute, 2022), 1. https://www.pembina.org/reports/achieving-a-net-zero-canadian-power-grid-by-2035.pdf

21 Sara Hastings-Simon, Saeed Kaddoura, Alexander Klonick, Aletta Leitch, and Mark Porter, Plugging In: Opportunities to procure renewable energy for non-utility companies and institutions in Alberta (Pembina Institute, Rocky Mountain Institute and Calgary Economic Development, 2018), 7. https://www.pembina.org/reports/plugging-in-2018.pdf

22 Nova Scotia Green Choice Program, "About the Nova Scotia Green Choice Program." https://novascotiagcp.com

23 Green-e, "Green-e Glossary," December 12, 2022. https://www.green-e.org/glossary#:~:text=Null%20Electricity%20(or%20Power),power%20purchases%20have%20been%20removed

## OFF-SITE PROCUREMENT

Projects that are located away from the buyer's load centre. Off-site renewable energy projects can utilize any type of renewable technology, such as wind, solar PV, hydro or biomass, as long as the projects are connected to the grid. In a deregulated market like Alberta's, these projects bid into the market and sell electricity when dispatched by the relevant independent system operator (ISO) or regional transmission operator (RTO) (in Alberta, the Alberta Electric System Operator). Off-site projects do not interrupt the buyer's relationship with their utility.

## ONSITE LEASE

Similar to an onsite power purchase agreement (PPA), customers lease the energy equipment from renewable energy developers and directly receive the electricity it generates.

## ONSITE POWER PURCHASE AGREEMENT (PPA)

A long-term contract between a developer and a buyer wherein the buyer agrees to pay a fixed or escalating price per unit of energy generated. The buyer does not own the generation equipment, even though the assets are located at the buyer's facilities. A buyer would usually negotiate to obtain the environmental attributes with the electricity flowing from the project.

## ONSITE PROCUREMENT

Renewable energy projects physically located on the buyer's site. They are also referred to as "behind the meter" or "behind the fence." Any electricity produced and used directly by the buyer reduces the amount of electricity purchased from the utility. Onsite procurement can be through various renewable energy projects like ground source heat pumps, rooftop/ground-mount solar, wind power or biogas-fired combined heat and power systems.

## ONSITE SOLAR

A solar facility installed within the buyer's property where the buyer directly consumes the renewable energy it generates. There are two main ways to install solar energy onsite: installing and financing the complete system by the buyer or through onsite power purchase agreements (PPAs).

## OUTPUT-BASED ALLOCATION (OBA)

Conceptual allocation of "free emissions" distributed to greenhouse gas emitters up to the intensity standard under Alberta industrial carbon policy.[24]

## OUTPUT-BASED PRICING SYSTEM (OBPS)

One of the two-part federal carbon pollution pricing systems under the Greenhouse Gas Pollution Pricing Act. It is a performance-based system for industrial emitters to reduce their greenhouse gas emissions and spearhead innovation.

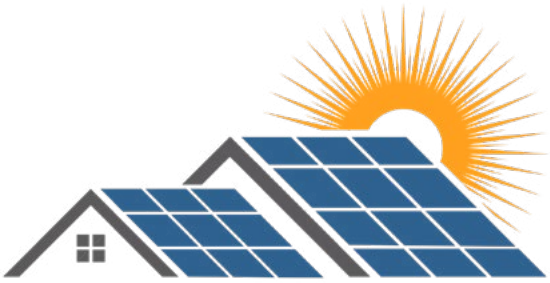
24 Government of Alberta, "Output-based Allocations Discussion Document" https://www.alberta.ca/assets/documents/Ouput-Based-Allocation-System-Discussion-Document.pdf

## PHYSICAL POWER PURCHASE AGREEMENT (PPA)

An agreement that involves the delivery of electricity and renewable energy certificates (RECs) from a renewable energy generator to a buyer. The electricity will be delivered to the buyer's site through the power grid, therefore the buyer would take legal ownership of the electrons. Physical PPAs contrast from virtual PPAs, in which only the environmental attributes are sold, not the electrons as well.

## PROJECTED SETTLEMENT VALUE (PSV)

The capture price or wholesale electricity price subtracted by the power purchase agreement (PPA) contract price. Depending on the capture price, PPAs can generate either a positive or negative cash flow for the buyer.



## REGULATED RATE OPTION (RRO)

RRO providers were maintained as a regulated retail option to provide price certainty for small-scale customers (those using less than 250 megawatt hours of electricity per year) when Alberta's electricity market was deregulated. If smaller end-use customers opt not to purchase electricity from a competitive retailer, they can purchase electricity from an RRO provider within their area. RRO providers must sell electricity to customers at the RRO price, which is set by a process defined by the Alberta Utilities Commission (AUC) and varies monthly as per the electricity price in the wholesale market.

## COMPLIANCE/REGULATORY CARBON MARKET

Driven by compliance, this carbon market results from national, regional, or international policy or regulatory requirements. Organizations can use renewable energy certificates (RECs) or carbon credits/offsets to achieve targets.

## RENEWABLE ELECTRICITY ACT (2016)

The act that established Alberta's commitment to increasing green energy within the province. It stated that by 2030, the province will generate 30 per cent of its electricity every year from renewable energy sources. This act pushed forward the development, implementation and funding of programs to accelerate renewable electricity generation in Alberta.[25] The Renewable Electricity Program (REP)

25 Government of Alberta, Renewable Electricity Act, SA 2016, c R-16.5. https://canlii.ca/t/544lj

administered by the Alberta Electric System Operator (AESO) was the primary mechanism to meet this target.

## RENEWABLE ELECTRICITY PROGRAM (REP)

A competitive and transparent bidding process administered by the Alberta Electric System Operator (AESO) that aimed to add 5,000 MW of renewable electricity capacity by 2030.[26] The program, started in 2016 and discontinued in 2019, had intended to help Alberta achieve its target of 30 per cent renewable electricity by 2030.[27]

## RENEWABLE ENERGY CERTIFICATES (OR CREDITS) (REC)

A representation of the environmental attributes of a renewable energy project. One megawatt hour of electricity generated by renewable energy is considered to generate one REC. RECs came out of a U.S. legislative requirement and were invented to track the composition of renewable electricity required to be renewable. REC creation is validated, tracked and managed by third parties. For example, voluntary buyers of RECs can purchase National Green-e RECs, which meets RE100 requirements and offsets Scope 2 emissions, which are indirect greenhouse gas emissions associated with purchased electricity, steam, heat or cooling.

## RENEWABLE PORTFOLIO STANDARD (RPS)

A regulatory mandate to promote the uptake of renewable energy. It sets a requirement for electric utilities to source a portion of their energy from renewable energy sources like solar and wind. Most provinces and territories in Canada have an RPS. Renewable energy certificates (RECs) can count towards RPS obligations.

## REQUEST FOR INFORMATION (RFI)

A formal request for gathering information from potential developers. An RFI within the power purchase agreement (PPA) journey can be the first step that provides insights into the range of options available that meet the buyer's requirements during the procurement process. RFI is a more general and high-level document than a Request for Proposal (RFP) and can help short-list suitable developers and shape the specific requirements or project details to be outlined in an RFP.

## REQUEST FOR PROPOSALS (RFP)

A formal request for bids from potential developers for a project. An RFP outlines the buyer's priorities, requirements and preferences and enables effective comparisons of the proposals.

## RETIRING AN ENVIRONMENTAL ATTRIBUTE

Claiming the environmental attributes and the use of the associated renewable energy. Retired environmental attributes cannot be re-sold or held. An organization must own the environmental attributes that they choose to retire.

26 Government of Alberta, "Renewable Electricity Program" https://open.alberta.ca/dataset/44534d21-821e-4a57-bc10-33d2642f619d/resource/1a065ede-d4da-40c3-a76d-dca78e5bab1c/download/fsrenewelectprogram.pdf

27 AESO, "Renewable Electricity Program" https://www.aeso.ca/market/market-related-initiatives/renewable-electricity-program/

## SCOPE 1 EMISSIONS

Direct greenhouse gas emissions from sources controlled or owned by an organization, like emissions from vehicles, furnaces, boilers, etc.[28]

## SCOPE 2 EMISSIONS

Indirect greenhouse gas emissions associated with purchased electricity, steam, heat or cooling. Scope 2 emissions might not physically occur at the organization's facility; however, they are still accounted for in the organization's greenhouse gas inventory because they result from the organization's energy usage.

## SCOPE 3 EMISSIONS

All indirect emissions from activities not owned or controlled by an organization, but still occurring in their value chain (including upstream and downstream emissions). It includes all emissions from sources not within the boundary of scopes 1 and 2, therefore, they are often the majority of an organization's total greenhouse gas emissions.[29]

## SELF-RETAILER

Self-retailers purchase power directly from energy producers to meet their load requirements, but do not sell electricity to other customers. In Alberta, self-retailers pay the pool price for electricity, plus a trading charge to compensate the Alberta Electric System Operator (AESO) for operating the pool market. To become a self-retailer, the customer must register as an AESO power pool participant and obtain access to distribution and transmission lines. As the self-retailing route requires attention to detail, several companies offer services to help customers administer the process, but typically only buyers with large loads benefit from self-retailing due to the added complexity and cost.

## SPECIFIED GAS EMITTERS REGULATION (SGER)

Large emitters producing more than 100,000 tonnes of GHG emissions per year were regulated under the SGER in Alberta, which was replaced by the Carbon Competitiveness Incentives (CCI) regulation (see above) in 2018. SGER required large emitters to reduce their emissions intensity on a yearly basis compared to their historical performance by purchasing offsets or paying a fee, or opting to be involved in similar programs that target emissions reduction.[30]

## SYSTEM LOAD

The energy delivered to end-use customers through the transmission and distribution system (including transmission losses). System load is important in understanding the potential for off-site power purchase agreements (PPAs) in Alberta because this is the energy demand currently met through the electricity grid.

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28 EPA, "Scope 1 and Scope 2 Inventory Guidance." https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance#:~:text=Scope%201%20emissions%20are%20direct,boilers%2C%20furnaces%2C%20vehicles

29 EPA, "Scope 3 Inventory Guidance." https://www.epa.gov/climateleadership/scope-3-inventory-guidance

30 Government of Alberta, "Specified Gas Reporting Regulation" https://www.alberta.ca/specified-gas-reporting-regulation.aspx

## TECHNOLOGY INNOVATION AND EMISSIONS REDUCTIONS (TIER)

Applicable to Alberta, the TIER regulation replaced the Carbon Competitiveness Incentive Regulation in 2020 and is at the centre of emissions management in Alberta. It enforces Alberta's industrial carbon pricing and emissions trading system and helps industrial facilities find innovative mechanisms to reduce emissions and make investments towards clean technology to stay competitive, as well as save money. TIER applies to facilities that have emitted 100,000 tonnes CO2e or more per year since 2016. Facilities with a lower emission can opt-in to TIER if they are competing against a facility regulated under TIER.[31] TIER also creates a legal framework for carbon credits to be generated and verified in Alberta by allowing companies or organizations to choose between two types of carbon credits: carbon offsets and emission performance credits (EPC).[32]

## UNBUNDLED RENEWABLE ENERGY CERTIFICATES (RECS)

The non-physical environmental attribute, or REC, that is separated from physical electricity is called an unbundled REC.

## UTILITY-SCALE SOLAR

A large-scale solar power facility that generates power and feeds into the grid and supplies a utility with electricity.

31 Government of Alberta, Technology Innovation and Emissions Reduction Regulation, Alta Reg 133/2019. https://canlii.ca/t/55qpb

32 Government of Alberta, "Technology Innovation and Emissions Reduction Regulation." https://www.alberta.ca/technology-innovation-and-emissions-reduction-regulation.aspx

## VERTICALLY INTEGRATED ELECTRICITY SYSTEM

Owns and controls all levels of the supply chain, including the generation, transmission and distribution, and retail of electricity to customers. In this system, the utilities determine the mix of resources that are used to generate electricity.[33]

## VIRTUAL POWER PURCHASE AGREEMENT (VPPA)

Also known as financial PPA or contract for differences, VPPAs are the primary structure employed to procure renewable attributes from off-site projects. VPPAs are purely a financial transaction where the buyer pays a fixed unit price to the developer under the agreement and receives the floating market price the electricity is sold at. Under a VPPA, the buyer does not own the physical electrons generated by the project. The project retains ownership of the electricity and sells it at the market price, and the buyer receives the environmental attributes (EAs) from the project.

The buyer fixes the price that the sold capacity receives for its electricity on the market, which means if the market price is lower than the fixed contract price, the buyer makes up the difference, but if the market price is higher, the buyer receives the difference. Since VPPAs are strictly financial, the buyer still needs to meet its electricity load and continues to purchase electricity for their consumption from their regular utility at the market price. Therefore, VPPAs maintain the existing relationship between the buyer and their utility provider. VPPAs are long-term contracts within the range of 10 to 20 years and are backed by buyers' credit, wherein the buyer is enabling a new renewable energy project to get built.[34]

## VOLUNTARY CARBON MARKET

The buying and selling of carbon credits not tied to a regulatory program. This carbon market is usually motivated by corporate environmental, social and governance commitments. Renewable energy certificates (RECs) or carbon credits/offsets can help organizations and companies achieve renewable energy or net-zero targets.

## WESTERN ELECTRICITY COORDINATING COUNCIL (WECC)

A regional organization that promotes the reliability and security of the electricity system in the western interconnection. They do compliance monitoring and

33 United States Environmental Protection Agency, "Regulated vs. Restructured Wholesale Electricity Markets," February 5, 2023. https://www.epa.gov/green-power-markets/power-market-structure

34 Sara Hastings-Simon, Saeed Kaddoura, Alexander Klonick, Aletta Leitch, and Mark Porter, Plugging In: Opportunities to procure renewable energy for non-utility companies and institutions in Alberta (Pembina Institute, Rocky Mountain Institute and Calgary Economic Development, 2018), 10. https://www.pembina.org/reports/plugging-in-2018.pdf

enforcement and also manage reliability planning and assessments. As Alberta is part of the WECC electricity grid, projects in Alberta can generate certified renewable energy certificates (RECs) that are tracked in Western Renewable Energy Generation Information System (WREGIS).[35]

## WESTERN RENEWABLE ENERGY GENERATION INFORMATION SYSTEM (WREGIS)

An independent, web-based tracking system for renewable energy certificates (REC) that covers the Western Interconnection territory. WREGIS is a division of the Western Electricity Coordinating Council (WECC). Tracking via WREGIS creates a traceable chain of custody and facilitates the retiring, trading or selling of RECs.[36]

## WHOLESALE ENERGY MARKET

A market that facilitates the bulk purchase and sale of energy, mainly electricity, between utility companies and independent energy producers. The deregulation of energy markets and the inception of wholesale markets has provided consumers with better reliability and price transparency for electricity. In Alberta, the Alberta Electric System Operator (AESO) plays a key role in developing and operating the province's wholesale energy market.[37]

35 WECC, "About WECC"
https://www.wecc.org/Pages/AboutWECC.aspx

36 WECC, "Western Renewable Energy Generation Information System"
https://www.wecc.org/WREGIS/Pages/Default.aspx

37 AESO, "Understanding the Market"
https://www.aeso.ca/market/market-participation/understanding-the-market/