12/01/2020

Electric Power Sector Protocol 1.0
Updates and Clarifications

The Climate Registry (TCR) published its Electric Power Sector (EPS) Protocol v 1.0 in June 2009. While The Registry intends for v 1.0 of the EPS Protocol to be a complete document, it recognizes that updates and clarifications will be necessary as the voluntary greenhouse gas (GHG) reporting program evolves. Therefore, TCR created this document to track all modifications relating to v 1.0 of the EPS Protocol. This document will be updated as new updates and clarifications are identified.

The updates and clarifications are presented in order of the chapters of v 1.0 of the EPS Protocol and not according to the dates issued. **"Issued"** is the date when the clarification was first issued and **"Effective"** is the effective date, meaning all emissions quantified on or after that date must follow these guidelines.

The updates and clarifications identified in this document will be incorporated into the next version of the EPS Protocol. Until the next version of the EPS Protocol is released, all Members and Verification Bodies should refer to the updates and clarifications listed below for the most current interpretation and explanation of EPS GHG reporting policies, processes, and activities.

If you have any questions about the updates or clarifications in this document, please contact TCR at: policy@theclimateregistry.org.

EPS Protocol	**Required Emission Reporting**	**throughout**	**Issued: 12/01/20** **Effective: 12/01/20**
	TCR is amending the EPS Protocol to change required reporting of power generation metrics to optional, to better reflect the needs of EPS reporters. All instances noting required reporting of power delivery metrics are changed to optional.		

Chapter 14.1	**Quantifying Indirect Emissions from Electricity Use**	**p. 56**	**Issued: 10/02/20** **Effective: 12/01/20**
	TCR is amending the last paragraph of Section 14.1 to incorporate the GHG Protocol's Scope 2 Guidance requirements for reporting emissions from consumed energy generation within the reporting boundary when energy attribute certificates are sold. The new text is as follows:		

	Members that generate power and have a T&D system, bulk transmission system or facilities and buildings that consume power within their reporting boundary must report only the indirect emissions associated with losses and consumption of power that is not self-generated, to avoid double counting emissions within the inventory.[27] However, Members that sell energy attribute certificates from consumed generation within the reporting boundary must account for emissions of that consumed power as though it were purchased from the grid, using a grid-average emission factor (for the location-based method) and other market-based method emission factors such as "replacement" certificates, a supplier-specific emission rate, or residual mix (for the market-based method).[27*] Operators of T&D and bulk transmission systems do need to understand how much self-generated power is flowing through the system to generate a system "loss factor" (as described in the next section). [27] World Resource Institute/World Business Council for Sustainable Development (WRI/WBCSD) GHG Protocol Corporate Accounting and Reporting Standard (Revised Edition). [27*] When the consumer that has sold certificates from renewable generation operates on a microgrid that receives electricity from directly connected generation as well as the regional grid, a prorated emission factor may be substituted for the grid-average emission factor, provided emissions from connected generation are not double counted. For more information about the location-based and market-based methods of Scope 2 reporting, see the GRP Quantification Module.

Chapters 18 - 19	**Power Generation and Delivery Metrics**	**p. 96**	**Issued: 12/01/20** **Effective: 12/01/20**
	Pending the implementation of an EPS Protocol tool in CRIS, Electric Utilities that wish to report optional power generation metrics and power deliveries in metrics accordance with the EPS Protocol must use The Registry's EPS Protocol Report tool. The tool can be found on TCR's EPS webpage. The EPS Protocol Report will be made public as part of the verification process.		

Chapter 18.1	**Compiling Data for Power Generation Metrics**	**p. 97**	**Issued: 10/2/2020** **Effective: 12/01/20**
	TCR is updating the reporting requirements for unit level power generation metrics to clarify that power generation metrics do not apply to generating facilities with negative net generation (i.e., the facility consumes more electricity that it generates), because the emissions rate would not accurately represent the emissions rate of the unit when it is generating electricity. Therefore, TCR is updating the last paragraph of Section 18.1 on page 97 to specify positive net generation and is adding a footnote. The updated text reads:		

	When reporting optional power generation metrics, net generation and emissions must be reported for all generating units. You must report power generation metrics for all owned and shared generating facilities and units with positive net generation, including those with no emissions.[42*] TCR's reporting software will then compile an entity average generation metric that includes all generation facilities and units with positive net generation. [42*]Positive net generation denotes that the facility generates more electricity than it consumes, while negative net generation denotes that the facility consumes more electricity than it generates over the annual reporting period. Examples of facilities that may have negative net generation include oil or gas peaking facilities that only have limited operations during peak load demand times of year, and facilities that are undergoing extended maintenance or decommissioning.

Chapter 18.2	**Power Generation Metrics**	**p.97**	**Issued: 10/2/2020 Effective: 12/01/20**
	TCR is updating the requirements for optional reporting of power generation metrics to clarify that unit level power generation metrics do not apply to generating facilities with negative net generation (i.e., the facility consumes more electricity that it generates), and units with negative net generation are not included in the G-4 Anthropogenic metric and G-5 Biogenic CO_2 metrics for all generating facilities combined. Therefore, TCR is updating the first paragraph of Section 18.2 on page 97 to specify positive net generation. The updated text reads: For power generators and any entity that delivers power to the grid on a positive net annual basis, facility/unit-level power generation metrics may optionally be reported under this EPS Protocol.[42**] Members that own or control non-combustion generation facilities may also report these metrics, even for power generation with low or no GHG emissions. [42**]Unit-level generation metrics will not be calculated for facilities with negative net generation, but LSEs must still report the negative net generation and associated emissions for these facilities. Negative net generation will not be included in the G-4 Anthropogenic metric and G-5 Biogenic metric for all generating facilities combined.		

Table 18.1	**Summary of Required Power Generation Metrics**	**p. 98**	**Issued: 10/2/2020 Effective: 12/01/20**
	TCR is adding an additional metric for facility/unit-level and system-wide biogenic CO_2 generation due to the inclusion of indirect biogenic CO_2 emissions in WRI's Scope 2 Guidance that was incorporated into GRP v. 2.1. Table 18.1 has been clarified to read:		

Ref	Metric	Comment	Units
EPS Metric G-1	Fossil Generation	Fossil CO_2/ Net Fossil Generation	MT CO_2/ MWh
EPS Metric G-2	Biofuels Generation	Biogenic CO_2/ Net Biogenic Generation	MT CO_2/ MWh

	EPS Metric G-3	Geothermal Generation	Geothermal CO_2/ Net Geothermal Generation	MT CO_2/ MWh
	EPS Metric G-4	Anthropogenic Generation	Anthropogenic CO_2/ Net Generation	MT CO_2/ MWh
	EPS Metric G-5	Biogenic Generation	Biogenic CO_2/ Net Generation	MT CO_2/ MWh

Chapter 18.2	**EPS Metric G-1. Metric for Fossil Generated Electricity**	**p. 98**	**Issued: 10/2/2020 Effective: 12/01/20**

The description of EPS Metric G-1 has been clarified to read:

> Metric tons of direct CO_2 emissions from stationary fossil fuel combustion for electricity generation per net megawatt-hour of fossil-generated electricity. This metric is calculated for each fossil-fuel fired electric generating facility or unit with positive net generation.

EPS Metric G-1 is designed to reflect emissions from a utility's owned or controlled fossil generation only. Therefore, footnote 44 is removed.

Chapter 18.2	**EPS Metric G-2. Metric for Electricity Generated from Combustion of Biofuels**	**p. 98**	**Issued: 10/2/2020 Effective: 12/01/20**

The description of EPS Metric G-2 has been clarified to read:

Metric tons of direct biogenic CO_2 emissions per net megawatt-hour of biogenic electricity generated.[45] The metric must include biogenic process emissions (i.e., biogenic CO_2 that is mixed with CH_4 in LFG and DG) as well as combustion emissions. Only the generation that is directly attributable to the biofuel combustion is included in this metric.[45.1] The metric is calculated for each generating facility or unit with positive net generation that uses biofuels. Biofuels here includes biogas (LFG and DG), biomass, Waste Derived Fuels (WDFs), and the biogenic component of MSW.

> [45] Direct biogenic emissions may come from stationary combustion, process emissions (like CO_2 "pass-through" for Landfill Gas) or from fugitive emissions directly related to the power generation.
>
> [45.1] Fossil emissions used exclusively for biogenic generation start-up must be used to calculate a separate metric consisting of fossil (start-up) CO_2/ net biogenic generation.

Chapter 18.2	**EPS Metric G-3. Metric for Geothermal Electricity Generation:**	**p. 99**	**Issued: 10/2/2020 Effective: 12/01/20**

The description of EPS Metric G-3 has been clarified to read:

	Metric tons of direct CO_2 emissions from process/fugitive emissions per net megawatt-hour of electricity generated for each entity-owned or controlled electric generating facility with positive net generation.

Chapter 18.2	**EPS Metric G-4. Metric for Anthropogenic Unit or Facility-level and System-wide Electricity Generation**	**p. 99**	**Issued: 10/2/2020 Effective: 12/01/20**
	In order to ensure useful unit or facility-level generation metrics are available for power purchasers and delivery metrics, the description of EPS Metric G-4 is updated to clarify that metrics will be calculated for (1) each reported unit or facility with positive net generation and (2) all positive net generation combined. The text is also updated to clarify that the equity portion of all sources of power generation are included in the denominator of the metric. Therefore, the description of the G-4 metric description on pg. 99 is clarified to read: Metric tons of direct anthropogenic CO_2 emissions for electricity generation per net megawatt-hour of electricity generated for: (1) each electric generating facility or unit with positive net generation, and (2) for all owned or controlled facilities with positive net generation combined. The numerator for this metric includes the equity share of anthropogenic CO_2 emissions from fossil fuel combustion, process emissions from SO_2 scrubbers, geothermal fugitive emissions, and all other CO_2 emissions directly related to the power generation, but no biogenic CO_2 emissions from the combustion of biomass/biofuels nor emissions from other activities onsite that are not directly related to power generation. The denominator includes the equity portion of all power generated by the EPS Member from all sources including coal, natural gas, distillate fuel, hydro, nuclear, renewables, biomass etc. This metric is calculated for each electric generating facility with positive net generation and for all owned or controlled facilities with positive net generation combined.		

Chapter 18.2	**EPS Metric G-5. Metric for Unit or Facility-level and System-wide Biogenic Electricity Generation**	**p. 99**	**Issued: 10/2/2020 Effective: 12/01/20**
	TCR is adding an additional metric for unit or facility-level and system-wide biogenic generation due to the inclusion of indirect biogenic emissions in WRI's Scope 2 Guidance and TCR's GRP v. 2.1. The following language is therefore added after the description of EPS Metric G-4 on pg. 99: **EPS Metric G-5. Metric for Unit or Facility-level System-wide Biogenic Electricity Generation:** Metric tons of direct biogenic CO_2 emissions for electricity generation per net megawatt-hour of electricity generated for: (1) each electric generating facility or unit with positive net generation, and (2) all owned or controlled facilities with positive net		

	generation combined.[45.2] Only the generation that is directly attributable to biofuel/biomass combustion is included in this metric. The numerator for this metric includes the equity share of biogenic CO_2 emissions from biofuel/biomass combustion and biogenic process emissions, but no anthropogenic CO_2 emissions nor emissions from other activities onsite that are not directly related to power generation. The denominator includes the equity portion of all power generated by the EPS Member from all sources including coal, natural gas, distillate fuel, hydro, nuclear, renewables, biomass, etc. This metric is calculated for each electric generating facility with positive net generation and for all owned or controlled facilities with positive net generation combined. [45.2] Direct biogenic emissions may come from stationary combustion, process emissions (like CO_2 "pass-through" for landfill gas) or from fugitive emissions directly related to the power generation.

Chapter 18.2	**Power Generation Metrics**	**p. 99**	**Issued: 10/2/2020 Effective: 12/01/20**
	The detail note regarding generation sources with biogenic and anthropogenic emissions (third bullet point in Section 18.2 on pg. 99) is clarified to read: For any generation source which has biogenic and anthropogenic emissions, (e.g., a wood plant with fuel oil as a starting fuel), separate anthropogenic and biogenic metrics will be developed. For biogenic sources with fossil emissions used exclusively for start-up, a separate fossil start-up metric is developed. The fossil start-up metric includes Net Generation (MWh) from power produced using biogenic sources but does not include the biogenic emissions. Co-fired sources that used both biogenic and fossil sources to generate electricity must report all fossil emissions in the fossil emissions metric (EPS Metric G-1) and system-wide anthropogenic average metric (EPS Metric G-4). The biogenic CO_2 emissions are accounted for separately in the biogenic emissions metric (EPS Metric G-2) and system-wide biogenic average metric (EPS Metric G-5).		

Chapter 18.2	**Power Generation Metrics**	**p. 99**	**Issued: 10/2/2020 Effective: 12/01/20**
	TCR is adding an additional metric for system-wide biogenic generation due to the inclusion of indirect biogenic emissions in WRI's Scope 2 Guidance and TCR's GRP v. 2.1. The last bullet in Section 18.2 on p. 99 is therefore updated to refer to the anthropogenic system-average metric and an additional bullet for the biogenic system-average metric is added as follows: • The system-wide anthropogenic average generation metric (EPS Metric G-4) includes the MWh from all power generation,		

	including biofuel/biomass power generation, but not the biogenic emissions. • The system-wide biogenic average generation metric (EPS Metric G-5) includes the MWh from all power generation, including anthropogenic power generation, but not the anthropogenic emissions.

Chapter 19	**Optional Reporting**	**p. 100**	**Issued: 10/2/2020** **Effective: 12/01/20**
	TCR is adding a footnote to the introduction to Chapter 19 to clarify that members may use a mandatory reporting method in lieu of the reporting methods for deliveries metrics detailed in this chapter. Therefore, the last paragraph in the introduction to Chapter 19 is updated to read: The following sections discuss the reporting methods that must be followed when a Member chooses to report power deliveries metrics.[45.3] [45.3] Members may use a mandatory reporting methodology in lieu of the methods in the EPS Protocol to report power deliveries metrics.		

Chapter 19.1	**Developing Power Deliveries Metrics**	**p. 100-102**	**Issued: 10/2/2020** **'Effective: 12/01/20**
	In order to encourage additional transparency and support consistent reporting over time, TCR is updating this section to allow for the disclosure of both a system-average metric (Option A) and separate metrics for different delivered products (Option B). The protocol is also updated to include optional reporting of delivery metrics for biogenic CO_2 emissions, due to the inclusion of indirect biogenic emissions in the GHG Protocol's Scope 2 Guidance and TCR's GRP V 2.1. Prior to this update, the power (MWh) from biogenic sources was included in deliveries metrics, with zero biogenic CO_2 emissions included. The protocol is updated to include parallel anthropogenic and (optional) biogenic CO_2 metrics for each category of electricity deliveries. Additionally, the protocol is updated to include optional reporting of CH_4 and N_2O metrics. Therefore, the first paragraph of Section 19.2 is removed, and the second and third paragraphs of Section 19.1 are updated to read: Members that deliver power to wholesale or retail customers have the option to report of power deliveries metrics. If reported, anthropogenic CO_2 and biogenic CO_2 emissions must be addressed separately and be quantified using the methodologies in this section.[46.1] Reported power deliveries metrics must be third-party verified. Members may optionally report CH_4 and N_2O metrics. The quantity of CH_4 and N_2O is expected to be very small for most fuel sources, so members may use simplified methods to calculate these metrics. [46.2]		

Load serving entities (LSEs) have two options for developing deliveries metrics, Option A (Single System-Average) and Option B (Product-Specific), and they may report using one, or both options. These options are intended to provide the flexibility to report system-wide emissions or break out emissions associated with individual power products (i.e., wholesale sales, retail sales and special power products). Whenever product-specific metrics are reported in accordance with Option B, end-use customers reporting to TCR will be directed to use to these more granular factors to compile their inventories in accordance with the requirements in the GRP. LSEs can develop anthropogenic and biogenic CO_2 metrics within both Option A and Option B. LSEs are currently not required to develop biogenic CO_2 delivery metrics in order to develop anthropogenic metrics under either option. Option B (Product-Specific) metrics are further broken down into Wholesale Power, Special Power, and Retail Power categories. LSEs may develop multiple metrics under Option B (e.g., reporting multiple special power products.)

The simplest metric to calculate includes all sources of power (generated and purchased or exchanged) flowing into one system mix (Option A), where the anthropogenic and biogenic CO_2 metrics for the system mix would be the metrics used for power delivered to all customers.

Option A: Single-System

Single System-Average Anthropogenic Metric	Single System-Average Biogenic CO_2 Metric

Option B: Product-Specific

Product-Specific A-W (Anthropogenic Wholesale Deliveries)	Product-Specific B-W (Biogenic CO_2 Wholesale Deliveries)
Product-Specific A-SP (Anthropogenic Special Power Deliveries)	Product-Specific B-SP (Biogenic CO_2 Special Power Deliveries)
Product-Specific A-R (Anthropogenic Retail Deliveries)	Product-Specific B-R (Biogenic CO_2 Retail Deliveries)

[46.1] If power from biogenic or anthropogenic sources is not delivered to customers, the corresponding metric does not need to be reported.
[46.2] TCR will provide default emission factors for various fuel types in its annual emission factor update.

Chapter 19.2	**Developing Power Deliveries Metrics**	**p. 102**	**Issued: 10/2/2020 Effective: 12/01/20**
	TCR is updating the protocol to allow optional reporting of delivery metrics for biogenic CO_2 emissions due to the inclusion of indirect biogenic emissions in the GHG Protocol's Scope 2 Guidance reporting requirements and TCR's		

	GRP v. 2.1. Prior to this update, the power (MWh) but not the CO_2 emissions from biogenic sources was included in deliveries metrics. The protocol is updated to include an optional parallel biogenic CO_2 metric for each category of electricity deliveries. Therefore, the fourth paragraph of Section 19.2 is updated to read: Biogenic and anthropogenic CO_2 emissions are accounted for in separate metrics. The power from all sources (MWh) is included in both the biogenic CO_2 and anthropogenic deliveries metrics, but only biogenic CO_2 emissions are included in the biogenic metric (if reported) and only anthropogenic CO_2 emissions are included in the anthropogenic metric.

Chapter 19.2	**Developing Power Deliveries Metrics**	**p. 102-103**	**Issued: 10/2/2020 Effective: 12/01/20**
	TCR is updating the protocol to allow optional reporting of delivery metrics for biogenic CO_2 emissions due to the inclusion of indirect biogenic emissions in the GHG Protocol's Scope 2 Guidance reporting requirements and in TCR's GRP v. 2.1, and allowing optional reporting of CH_4 and N_2O metrics. The metric abbreviations are also updated for clarity. Therefore the text on page 103 and in Table 19.1 on page 102 is updated to rename the D-1, D-2 and D-3 metrics to A-W CO_2, A-SP CO_2 and A-R CO_2, respectively, to include three new biogenic CO_2 deliveries metrics for wholesale (B-W), special power (B-SP) and retail (B-R) electric deliveries, and new optional anthropogenic metrics for CH_4 and N_2O as follows: EPS Metric A-W CO_2: Anthropogenic Wholesale Electric Deliveries EPS Metric A-W CH_4: Anthropogenic Wholesale Electric Deliveries EPS Metric A-W N_2O: Anthropogenic Wholesale Electric Deliveries EPS Metric B-W: Biogenic CO_2 Wholesale Electric Deliveries EPS Metric A-SP CO_2: Anthropogenic Special Power Electric Deliveries EPS Metric A-SP CH_4: Anthropogenic Special Power Electric Deliveries EPS Metric A-SP N_2O: Anthropogenic Special Power Electric Deliveries EPS Metric B-SP: Biogenic CO_2 Special Power Electric Deliveries EPS Metric A-R CO_2: Anthropogenic Retail Electric Deliveries EPS Metric A-R CH_4: Anthropogenic Retail Electric Deliveries EPS Metric A-R N_2O: Anthropogenic Retail Electric Deliveries EPS Metric B-R: Biogenic CO_2 Retail Electric Deliveries		

Chapter 19.2	**Developing Power Deliveries Metrics**	**p. 103**	**Issued: 10/2/2020 Effective: 12/01/20**
	TCR is updating the protocol to allow optional reporting of deliveries metrics for biogenic CO_2 emissions due to the inclusion of indirect biogenic emissions in the GHG Protocol's Scope 2 Guidance reporting requirements and TCR's		

	GRP v. 2.1, and allowing optional reporting of CH_4 and N_2O metrics. The summaries of the metrics are updated to specify anthropogenic deliveries for CO_2, CH_4 and N_2O, and new summaries for three new biogenic CO_2 deliveries metrics for wholesale (B-W), special power (B-SP) and retail (B-R) electric deliveries are included. The last three paragraphs on page 103 are updated to read: **EPS Metric A-W CO_2: Anthropogenic CO_2 Wholesale Electric Deliveries:** Metric tons of anthropogenic CO_2 emissions from electricity generation and purchases for the portion of electricity resold at the wholesale level. There is no requirement to derive a separate metric for wholesale power sales, but if used, the power and emissions assigned to this category are set aside and deducted from the remaining power mix delivered to retail customers. The power assigned to wholesale sales must be clearly tied to specific sources of generation and/or specific power purchases. When this metric is used, the anthropogenic CO_2 and biogenic CO_2 retail sales metrics (EPS Metric A-R CO_2 and EPS Metric B-R) must be adjusted, such that the generation and emissions assigned to wholesale sales are deducted from the remaining power mix delivered to retail customers. **EPS Metric A-W CH_4: Anthropogenic CH_4 Wholesale Electric Deliveries:** Metric tons of anthropogenic CH_4 emissions from electricity generation and purchases for the portion of electricity resold at the wholesale level. This metric is optional to report and may be calculated with simplified methods. There is no requirement to derive a separate metric for wholesale power sales, but if used, the power and emissions assigned to this category are set aside and deducted from the remaining power mix delivered to retail customers. The power assigned to wholesale sales must be clearly tied to specific sources of generation and/or specific power purchases. When this metric is used, the anthropogenic CH_4 retail sales metric (EPS Metric A-R CH_4) must be adjusted, such that the generation and emissions assigned to wholesale sales are deducted from the remaining power mix delivered to retail customers. **EPS Metric A-W N_2O: Anthropogenic N_2O Wholesale Electric Deliveries:** Metric tons of anthropogenic N_2O emissions from electricity generation and purchases for the portion of electricity resold at the wholesale level. This metric is optional to report and may be calculated with simplified methods. There is no requirement to derive a separate metric for wholesale power sales, but if used, the power and emissions assigned to this category are set aside and deducted from the remaining power mix delivered to retail customers. The power assigned to wholesale sales must be clearly tied to specific sources of generation and/or specific power purchases. When this metric is used, the anthropogenic N_2O retail sales metric (EPS Metric A-R N_2O) must be adjusted, such that the generation and emissions assigned to

	wholesale sales are deducted from the remaining power mix delivered to retail customers. **EPS Metric B-W: Biogenic CO_2 Wholesale Electric Deliveries:** Metric tons of biogenic CO_2 emissions from electricity generation and purchases for the portion of electricity resold at the wholesale level. There is no requirement to derive a separate metric for wholesale power sales, but if used, the power and emissions assigned to this category are set aside and deducted from the remaining power mix delivered to retail customers. The power assigned to wholesale sales has to be clearly tied to specific sources of generation and/or specific power purchases. When this metric is used, the anthropogenic CO_2 and biogenic CO_2 retail sales metrics (EPS Metric A-R CO_2 and EPS Metric B-R) must be adjusted, such that the generation and emissions assigned to wholesale sales are deducted from the remaining power mix delivered to retail customers. **EPS Metric A-SP CO_2: Anthropogenic CO_2 Special Power Electric Deliveries:** Metric tons of anthropogenic CO_2 emissions from electricity generation and purchases for the portion of electricity sold as a special power product. There is no requirement to derive separate metrics for special power products, but if used, the power and emissions assigned to each special product are set aside and deducted from the remaining power mix delivered to retail customers. The power assigned to each special product must be clearly tied to specific sources of generation and/or specific power purchases. When this metric is used, the anthropogenic and biogenic CO_2 retail sales metrics (EPS Metric A-R CO_2 and EPS Metric B-R) must be adjusted, such that the generation and emissions assigned to special power sales are deducted from the remaining power mix delivered to retail customers. **EPS Metric A-SP CH_4: Anthropogenic CH_4 Special Power Electric Deliveries:** Metric tons of anthropogenic CH_4 emissions from electricity generation and purchases for the portion of electricity sold as a special power product. This metric is optional to report and may be calculated with simplified methods. There is no requirement to derive separate metrics for special power products, but if used, the power and emissions assigned to each special product are set aside and deducted from the remaining power mix delivered to retail customers. The power assigned to each special product must be clearly tied to specific sources of generation and/or specific power purchases. When this metric is used, the anthropogenic CH_4 retail sales metric (EPS Metric A-R CH_4) must be adjusted, such that the generation and emissions assigned to special power sales are deducted from the remaining power mix delivered to retail customers. **EPS Metric A-SP N_2O: Anthropogenic N_2O Special Power Electric Deliveries:** Metric tons of anthropogenic N_2O emissions from electricity

	generation and purchases for the portion of electricity sold as a special power product. This metric is optional to report and may be calculated with simplified methods. There is no requirement to derive separate metrics for special power products, but if used, the power and emissions assigned to each special product are set aside and deducted from the remaining power mix delivered to retail customers. The power assigned to each special product must be clearly tied to specific sources of generation and/or specific power purchases. When this metric is used, the anthropogenic N_2O retail sales metric (EPS Metric A-R N_2O) must be adjusted, such that the generation and emissions assigned to special power sales are deducted from the remaining power mix delivered to retail customers. **EPS Metric B-SP: Biogenic CO_2 Special Power Electric Deliveries:** Metric tons of biogenic CO_2 emissions from electricity generation and purchases for the portion of electricity sold as a special power product. There is no requirement to derive separate metrics for special power products, but if used, the power and emissions assigned to each special product are set aside and deducted from the remaining power mix delivered to retail customers. The power assigned to each special product has to be clearly tied to specific sources of generation and/or specific power purchases. When this metric is used, the anthropogenic CO_2 and biogenic CO_2 retail sales metrics (EPS Metric A-R CO_2 and EPS Metric B-R) must be adjusted, such that the generation and emissions assigned to special power sales are deducted from the remaining power mix delivered to retail customers. **EPS Metric A-R CO_2: Anthropogenic CO_2 Retail Electric Deliveries:** Metric tons of anthropogenic CO_2 emissions from electricity generation and purchases per net megawatt-hour of electricity delivered to retail customers. The numerator for this metric includes the portion of CO_2 from all anthropogenic CO_2 emissions sources directly related to the owned power generation delivered to the system, plus the anthropogenic CO_2 emissions associated with all purchased power.[47] The denominator includes the equity portion of all power delivered by the Member from all sources. If you choose to report any of the other CO_2 deliveries metrics (i.e., A-W CO_2, B-W, A-SP CO_2, or B-SP metrics), then you must remove the emissions and power associated with those other products before calculating the anthropogenic retail deliveries metric. With Option A, this metric becomes the anthropogenic system-average CO_2 metric used to designate the anthropogenic carbon intensity applicable to all sales. **EPS Metric A-R CH_4: Anthropogenic CH_4 Retail Electric Deliveries:** Metric tons of anthropogenic CH_4 emissions from electricity generation and purchases per net megawatt-hour of electricity delivered to retail customers. This metric is optional to report and may be calculated with simplified methods. The numerator for this metric includes the portion of

	CH_4 from all anthropogenic CH_4 emissions sources directly related to the owned power generation delivered to the system, plus the anthropogenic CH_4 emissions associated with all purchased power. The denominator includes the equity portion of all power delivered by the Member from all sources. If you choose to report any of the other CH_4 deliveries metrics (i.e., A-W CH_4 or A-SP CH_4 metrics), then you must remove the emissions and power associated with those other products before calculating the anthropogenic CH_4 retail deliveries metric. **EPS Metric A-R N_2O: Anthropogenic N_2O Retail Electric Deliveries:** Metric tons of anthropogenic N_2O emissions from electricity generation and purchases per net megawatt-hour of electricity delivered to retail customers. This metric is optional to report and may be calculated with simplified methods. The numerator for this metric includes the portion of N_2O from all anthropogenic N_2O emissions sources directly related to the owned power generation delivered to the system, plus the anthropogenic N_2O emissions associated with all purchased power. The denominator includes the equity portion of all power delivered by the Member from all sources. If you choose to report any of the other N_2O deliveries metrics (i.e., A-W N_2O or A-SP N_2O metrics), then you must remove the emissions and power associated with those other products before calculating the anthropogenic N_2O retail deliveries metric. **EPS Metric B-R: Biogenic CO_2 Retail Electric Deliveries:** Metric tons of biogenic CO_2 emissions from electricity generation and purchases per net megawatt-hour of electricity delivered to retail customers. The numerator for this metric includes the portion of CO_2 from all biogenic CO_2 emissions sources directly related to the owned power generation delivered to the system, plus the CO_2 emissions associated with all purchased power of biogenic origin.[47]* The denominator includes the equity portion of all power delivered by the Member from all sources. If you choose to report any of the other CO_2 deliveries metrics (i.e., A-W CO_2, B-W, A-SP CO_2, or B-SP metrics), then you must remove the emissions and power associated with those other products before calculating the biogenic retail deliveries metric. With Option A, this metric becomes the biogenic system-average metric used to designate the biogenic carbon intensity applicable to all sales. [47] If wholesale power is resold and accounted for separately under the wholesale metric below, then the emissions and power associated with wholesale sales can be subtracted from the numerator and denominator, respectively. [47]* Direct biogenic emissions may come from stationary combustion, process emissions (like CO_2 "pass-through" for Landfill Gas) or from fugitive emissions directly related to the power generation.

Chapter 19.3	**Accounting for Unbundled RECs and Energy Attribute Certificates**	**p. 106-111**	**Issued: 10/2/2020 Effective: 12/01/20**

TCR is updating the entirety of Section 19.3 to incorporate market-based Scope 2 accounting, based on the GHG Protocol's Scope 2 Guidance and TCR's GRP v. 2.1. Under the market-based method for Scope 2 accounting, organizations use emission factors conveyed through contractual instruments between the organization and the electricity or product provider. Supplier-specific emission factors, as defined in this section, are one of the tools organizations may use to calculate their market-based Scope 2 totals. Justification for each change is provided below.

- The terminology "Green" or "special power" certificates is updated throughout the text for consistency with the term used in GRP v. 2.1, "energy attribute certificates."

- The methodology for calculating deliveries metrics is updated to incorporate the purchase and sale of unbundled certificates in any metrics developed by LSEs in order to align with the intent of market-based reporting and customers' use of power deliveries metrics. Accounting for purchased certificates in deliveries metrics is optional, but accounting for sold certificates in the metrics is required. LSEs are no longer required to report an "unadjusted" metric alongside an "adjusted" metric. LSEs may optionally disclose metrics unadjusted for certificate sales as additional information.

- Section 19.3.2 is updated to incorporate eligibility criteria for energy attribute certificates from GRP v. 3.0, which replaces the eligibility requirements of green and special power certificates listed in Step 1 of this section.

- The first paragraph of the Section 19.3.2, along with the text under Step 1 and Step 3 are updated to clarify that information about energy attribute certificates must be provided to the verification body and is not reported in CRIS. (It has never been reported in CRIS in practice).

- Step 2 in Section 19.3.2 is updated to include biogenic emissions from energy attribute certificates in the development of the deliveries metrics.

- Step 4 in Section 19.3.2 is updated to provide step-by-step methods for calculating delivery metrics adjusted for certificate purchases, and required adjustment methodologies to account for certificate sales in delivery metrics.

- The example in Section 19.3.3 is updated to incorporate a methodology for accounting for certificate sales.

- Section 19.3.4 is revised to reflect the concept of a residual mix and the role it plays in regional emission factors.

Therefore, the entire text of Section 19.3 on pages 106-111 is updated to the following:

The purchase and sale of Renewable Energy Certificates (RECs), Tradable Renewables Credits (TRCs), Tradable Renewable Energy Certificates (TRECs), "Green Tags", and other energy attribute certificates are common practice in the EPS. These certificates are used by electricity providers to meet mandatory or voluntary commitments to provide renewable energy to their customers.[47]**

This section of the EPS Protocol discusses how energy attribute certificates are incorporated into power deliveries metrics, including:

- A brief overview of energy attribute certificates and the practice of trading these certificates) (Section 19.3.1); and,
- An accounting methodology for calculating delivery metrics adjusted for certificate purchases, and the required adjustment methodology to account for certificate sales in delivery metrics (Section 19.3.2).

19.3.1 Overview of Energy Attribute Certificates

Many LSEs purchase and/or sell energy attribute certificates linked to special types of power generation.[48, 48.1] Energy attribute certificates convey information about energy generation to entities involved in the sale, distribution, consumption, or regulation of electricity. These certificates are often "unbundled," or sold separately from the underlying physical electricity associated with the generation source and are used to substantiate a utility's generation claim or a consumer's energy consumption claim.

Electronic renewable energy tracking systems register information about generated renewable energy and issue certificates to the generator. Certificates may then be retired by the generator or transferred to and retired by other account holders in the electronic tracking system. Renewable energy certification programs such as Green-e Energy in North America certify that the renewable energy associated with a certificate meets environmental and consumer protection standards that have been developed through a multi-stakeholder process.[48.2]

Accounting for the purchase of energy attribute certificates from zero or low emissions generation provides a way for LSEs to lower the carbon intensity of one or more electricity products delivered to customers.

On the other hand, if a LSE chooses to sell unbundled energy attribute certificates, they may not allow their customers to claim the emissions attributes of the associated generation. Instead, they must replace the

emissions from the underlying power with emissions representing the residual mix of the grid, or a grid-average emission rate in absence of a residual mix, to determine the carbon intensity of electricity products delivered to customers.

Electricity end users may use their electricity supplier's electricity deliveries metric (emissions rate) to calculate their Scope 2 emissions, and also have the option to directly purchase and retire additional energy attribute certificates that meet the quality criteria outlined in the GRP for their Scope 2 reporting.

19.3.2 Accounting for Unbundled RECs and Energy Attribute Certificates

This section provides the required methodology for LSEs to incorporate purchases and sales of unbundled energy attribute certificates into their deliveries metrics.[48.3] Unbundled certificate sales are required to be reflected in deliveries metrics, but unbundled certificate purchases are optional to incorporate. Purchased certificates must be verifiably linked to a specific source of generation in deliveries metrics.

The methodology in this section must not be used when the certificates are bundled with the renewable power or low emissions generation. In this case, the power flows into the LSE's system (whether generated or purchased), and the benefits of the low emissions power (generated or purchased) are inherently reflected in the metric. All specified purchases of power must include certificates with the electricity to ensure that the emissions from the specified power are not double counted as both specified power emissions and through the methodology to incorporate unbundled certificates.

It is essential that energy certificates are only applied to one set of corresponding emissions, and that certificates are not double counted. LSEs that create and sell energy attribute certificates (associated with any portion of their generation) are required to provide a full accounting of those certificate purchases and/or sales to their verification body using the four-step process outlined below.

This section presents the adjustment methodology for the CO_2 metrics, but the methodology can be applied similarly to the optional CH_4 and N_2O metrics.

Step 1: Determine Eligibility of Energy Attribute Certificates

To apply purchased unbundled certificates to a delivery metric an LSE must demonstrate to its verification body that its certificates meet TCR's eligibility criteria for electricity listed in the GRP Quantification Module.[48.4] Certificates must be purchased from an entity that is different and distinct from the LSE's own organization (i.e., not included within your organizational boundaries).

There are no limits on the number of certificates that may be used in this capacity. Certificates used to meet a LSE's Renewable Portfolio Standard (RPS) or another state policy (if applicable) may only be applied to metrics in the following ways:

- Application to a retail power metric (or system-average) only; or,
- Application to a retail power metric and a special power product comprised of 100% renewable electricity, or where the LSE is delivering voluntary certificates in addition to certificates reported towards a RPS or similar state policy. In this case, a percentage of the special power product content may be satisfied by certificates reported towards a RPS or similar state policy, only up to percentage of the RPS, with the condition that the retail metric includes at least the same percentage of certificates reported to the RPS. For example, an LSE with a 20% RPS obligation may apply certificates reported for the RPS for up to 20% of their 100% renewable special power product, as long as certificates reported for the RPS are also applied to at least 20% of their retail product. If the same LSE offers a special power product option including 30% voluntary RECs, they may apply certificates reported for the RPS for up to 20% of their special power product, and apply voluntary RECs for an additional 30% of the special power product.

Step 2: Accounting for GHG Emissions from Green or Special Power Technologies

Any anthropogenic or biogenic CO_2 emissions attributable to the underlying power source that certificates represent must be accounted for in deliveries metrics reported to TCR. Anthropogenic CO_2 emissions must be accounted for in anthropogenic metrics, and biogenic CO_2 emissions must be accounted for biogenic metrics. This reporting should include all direct emissions operationally related to the generation of the underlying electricity. Examples include the anthropogenic process CO_2 emissions from some forms of geothermal energy production and biogenic CO_2 emissions from landfill gas combustion for electricity generation.

LSEs will need to assign these CO_2 emissions to the energy attribute certificates that they intend to apply to their reporting year inventory in the same way as they would report emissions for bundled power (generated or purchased). When the power generation represented by RECs or other certificates has associated CO_2 emissions, LSEs should use site-specific emission factors or default emissions factors as described in in Table 14.1 in this EPS Protocol to calculate emissions for the RECs or other certificates when the generation type has associated CO_2 emissions.

Step 3: Reporting Energy Attribute Certificates

When including energy attribute certificate purchases in deliveries metrics, LSEs will need to provide the following information to their verification body:

- Number of certificates and MWh represented;
- Relevant serial numbers or identification numbers associated with certificates;
- Renewable energy facility or facilities that created the certificate;
- Type of technology used to create the certificate;
- Name of the grid region or country served by the renewable energy facility;
- Anthropogenic and biogenic GHG emissions associated with the underlying power;
- Vintage or dates for certificate power generation;
- Registry or tracking system used for certificate registration and date of retirement; and,
- Intended use of certificate – for green power product or for system average metric/RPS requirement.

If LSEs sell any unbundled certificates, whether from generated or purchased power, they must provide the following information about the sold certificates to their verification body:

- Number of certificates created and sold (MWh) during emissions year;
- Name of registry(ies) or tracking system(s) used for certificate registration; and,
- Relevant serial numbers or identification numbers associated with certificates;

Step 4: Adjusting Emissions Metrics to Account for Certificate Purchases and Sales

When accounting for purchased energy attribute certificates in a delivery metric, LSEs must apply a CO_2 emissions rate consistent with each certificate's underlying generation source to the power (MWh) represented by purchased and retired certificates. This emissions total will displace the CO_2 emissions associated with an equivalent amount of power (MWh) from their generated or other purchased power.

If certificates are sold, the CO_2 emissions rate of the MWh represented by the sold certificates will reflect another market-based emission rate from the local

	residual mix, the local grid average rate (if the residual mix is unavailable), or purchased unbundled "replacement" energy attribute certificates. There are two options for accounting for purchased and sold energy certificates in each deliveries metric**.** The Aggregated Method applies an average CO_2 emissions intensity rate to delivered power, after the power associated with certificate purchases and sales is removed. The Detailed Method uses a detailed accounting of specified and unspecified sources of delivered power to adjust emissions for certificate purchases and sales. Summary data from the Detailed Method worksheet is automatically publicly disclosed, and Members may choose to opt in to publicly disclose the worksheet used to calculate metrics using the Detailed Method. The steps for each method are applied in the same way for the system-average metric, and for each product-specific metric (i.e., retail sales, wholesale and special power product metrics). Accounting for sold certificates is required, and accounting for purchased certificates is optional. **Aggregated Method** Accounting for purchased and sold energy attribute certificates for each delivery metric using the Aggregated Method involves the following steps. 1. Identify: a. Total net MWh and the associated CO_2 emissions for all specified and unspecified sources of generated and/or purchased delivered power, without accounting for certificate purchases and sales.[48.5] b. The CO_2 emissions rate that corresponds with all delivered power identified in Step 1a (i.e., metric tons of CO_2 from generated and purchased power per MWh of delivered power). *c.* Number of sold energy attribute certificates and corresponding "replacement" CO_2 emissions.[48.6] *d.* Number of purchased energy attribute certificates and corresponding CO_2 emissions.[48.7] *Note: If attributes from purchased certificates are replacing attributes from sold certificates, only identify the delivered MWh represented by the purchased/sold certificates, and only identify the CO_2 associated with the replacement certificates for steps (c) and (d).* 2. Calculate CO_2 emissions for power that is not represented by purchased or sold certificates:

	a. Subtract MWh represented by purchased and sold certificates from total net MWh identified in Step 1a. b. Apply the CO_2 emissions rate in Step 1b to the remaining power that is not represented by purchased and sold certificates. 3. Calculate total adjusted emissions: a. Sum CO_2 emissions from certificates purchases and sales. b. Add to emissions from remaining power calculated in Step 2. 4. Divide total adjusted CO_2 emissions by total MWh delivered to calculate the adjusted delivery metric. **Detailed Method** Accounting for purchased and sold energy attribute certificates for each delivery metric using the Detailed Method involves the following steps: 1. Identify: a. Source and quantity (MWh) of delivered power whose emissions attributes will be replaced with purchased energy attribute certificates. b. Number of sold energy attribute certificates and corresponding "replacement" CO_2 emission factors. c. Number of purchased energy attribute certificates and corresponding CO_2 emission factors.[48.8] d. Net MWh and corresponding CO_2 emission factors for each specified and unspecified source of generated and/or purchased delivered power that is not replaced with purchased or sold certificates.[48.9] 2. Calculate "replacement" CO_2 emissions for power whose energy attribute certificates have been sold: a. Apply an appropriate "replacement" market-based CO_2 emission factor (i.e., the relevant residual mix emission rate, local grid-average emission rate, or emission rate from replacement certificates) to the number of sold energy certificates. 3. Calculate CO_2 emissions from purchased energy attribute certificates: a. Apply the CO_2 emission factor associated with any purchased certificates to the number of purchased certificates. 4. Calculate CO_2 emissions for generated and purchased delivered power that is *not* represented by purchased or sold certificates: a. Apply CO_2 emissions factors identified in Step 1d to their corresponding sources of power, *excluding any power whose certificates have been sold and any power that is replaced with purchased certificates*.[48.10]

5. Sum CO_2 emissions in Step 2-4[48.11] and divide by total delivered MWh to calculate the delivery metric.

Note: For certificates with associated biogenic CO_2 emissions, the biogenic CO_2 emissions will only be used to calculate a biogenic CO_2 metric.

Example 19.2 in Appendix A at the end of this EPS Updates & Clarifications document illustrates how this calculation works in practice.

19.3.4 Implications for the Regional Average Emission Factors

Currently eGRID subregional emission factors do not factor out voluntary purchases, which results in energy attribute certificates being reflected in both the subregional emission rate and claimed by entities that own and retire the certificates, such as LSEs reporting deliveries metrics. There is therefore some double counting of these certificates between multiple organizations in the market-based method of Scope 2 reporting. However, as not all GHG emitters participate in The Climate Registry's Carbon Footprint Registry, the quantity of certificates reported by EPS members is likely to represent an insignificant percentage in emissions terms of the regional average power mixes. As subregional residual mix emission factors are developed, entities reporting their market-based Scope 2 emissions will have the opportunity to report using residual mix emission factors and therefore avoid double counting of certificate claims.[49]

[47**] Electricity customers also use RECs in quantifying their market-based indirect emissions.

[48]Energy attribute certificates are sometimes also referred to as green tags, green energy certificates, or tradable renewable certificates.

[48.1] The approach taken in this section applies to all eligible energy attribute certificates that can be verifiably linked to a specific source of generation (including renewable and non-renewable generation).

[48.2] More information about Green-e Energy is available here: https://www.green-e.org/programs/energy

[48.3] Methods for end users of electricity to account for direct purchases of energy attribute certificates are addressed in the GRP.

[48.4] TCR's eligibility criteria to prevent double counting includes providing documentation of permanent retirement of energy attribute certificates in an electronic tracking system in a dedicated, named retirement subaccount for a particular emissions year. LSEs may use a private electronic tracking system to meet this eligibility criteria as long as they provide a public report of the information in the private tracking system as a public document in CRIS. LSEs required to make retirements for a mandatory program may use the naming convention for that program.

[48.5] Refer to Section 19.1 for further guidance on establishing customer categories and assigning power generation and purchases to specific customer categories. You should not include any emissions from non-power generation sources (e.g., mobile combustion, fugitive emissions). Report only CO_2 emissions (not CO_2e).

	[48.6] To calculate "replacement" CO_2 emissions for power whose energy attribute certificates have been sold, apply an appropriate market-based CO_2 emission factor (i.e., the relevant residual mix emission rate, local grid-average emission rate, or emission rate from replacement certificates) to the number of sold energy certificates. [48.7] To calculate CO_2 emissions from purchased energy attribute certificates, apply the CO_2 emission factor associated with any purchased certificates to the number of purchased certificates. [48.8] If total CO_2 emissions are provided with the certificate instead of an emission factor, you can skip this step and enter record the emissions to complete Step 3 instead of calculating them. [48.9] For generation units with CEMs, it is only necessary to derive the emissions rate from total MWh and CO_2 emissions if certificates from this power have been sold, or if purchased certificates will replace any of this power. [48.10] LSEs may choose any source of specified or unspecified power to replace with purchased certificates. [48.11] Add CO_2 emissions from generation units with CEMs as long as certificates from this power have not been sold and purchased certificates have not been used to replace any of this power. [49]Residual mix emission factors are third party developed factors representing subnational or national energy production, factoring out voluntary purchases to prevent double counting of these claims.

Appendix A: Example 19.2

Adjusting Deliveries Metrics to Account for the Purchase of Energy Attribute Certificates

USA Electric Company chose to report its power deliveries metrics to TCR and has used the method in Chapter 19 of the EPS Protocol to develop three metrics. The anthropogenic metric calculations are summarized below. Since there were no biogenic emissions, biogenic deliveries metrics are not calculated.

Electricity Product	MWh	Scope 1 + Scope 3 CO_2 Emissions (MT)	Anthropogenic Deliveries Metric (lbs/MWh)
Green Power Program Deliveries	1,500,000	150,000	220.46
Retail Electric Deliveries	80,000,000	24,000,000	661.387
Wholesale Electric Deliveries	1,200,000	600,000	1102.31

USA Electric Co. purchased 1,000,000 RECs from a wind power generator during the reporting year, and retired these on behalf of customers of its Green Power Program to develop an adjusted metric for this product using the Aggregated Method. The adjustment for the Green Power Program is shown below. The metrics for retail and wholesale electric deliveries remain the same as in the table above.

The steps used to calculate the Green Power Program metric according to the Aggregated Method are outlined below.

1. Identify:
    a. Total net MWh delivered to Green Power Program customers and associated CO_2 emissions: 1,500,000 MWh, total emissions: 150,000 MT CO_2.
    b. CO_2 emissions rate for all power delivered to Green Power Program customers: 150,000 MT CO_2 divided by 1,500,000 MWh = 0.1 MT CO_2/MWh
    c. Sold certificates and corresponding “replacement” CO_2 emissions: no certificates sold
    d. Purchased certificates and corresponding CO_2 emissions (if any): 1,000,000 MWh with zero CO_2 emissions.
2. Calculate CO_2 emissions for power that is *not* replaced with purchased/sold certificates: 1,500,000 MWh minus 1,000,000 MWh = 500,000 MWh, multiplied by average emissions rate (0.1 MT CO_2/MWh) = 50,000 MT CO_2
3. Calculate total adjusted emissions from purchases/sales (zero emissions in this example) and all remaining power from Step 2: 50,000 MT CO_2
4. Calculated adjusted emissions metric: 50,000 MT CO_2 divided by 1,500,000 MWh = 0.03 MT CO_2/MWh, converted to 73.49 lbs CO_2/MWh

Electricity Sources	MWh	Scope 1 + Scope 3 CO_2 Emissions (MT)
Purchased Renewable Energy Certificates	1,000,000	0
Remaining Power Sources in the Portfolio	500,000	50,000
Total	**1,500,000**	**50,000**

Green Power Program Adjusted Anthropogenic Deliveries Metric: 73.49 lbs/MWh

The resulting adjusted metric (73.49.75 lb/MWh) is included in TCR's reporting software and listed on TCR's public website for use by reporters who purchase electricity from the Green Power Program.

Adjusting Deliveries Metrics to Account for the Sale of Energy Attribute Certificates

Consider the wind power generator (Wind Power Co.) who sold the aforementioned 1,000,000 unbundled energy attribute certificates. This entity is a LSE located in North Dakota and wishes to report a system-average deliveries metric. Wind Power Co. delivered 3,000,000 MWh of wind power to retail customers, and sold certificate s for 1,000,000 MWh of their total delivered power. Wind Power Co. must calculate "replacement" emissions for the power whose associated energy attribute certificates were sold. To do this they apply the eGRID2018 MRO West emission factor (1,000,000 MWh multiplied by 1,239.8 lb CO_2/MWh = 1,239,800,000 lb CO_2/MWh, converted to 562,365 MT CO_2) and calculate their anthropogenic system-average deliveries metric as shown below.

Electricity Sources	MWh	Scope 1 + Scope 3 CO_2 Emissions (MT)
Delivered wind power whose energy attribute certificates have been sold	1,000,000	562,365
Remaining delivered power (certificates retained)	2,000,000	0
Total	**3,000,000**	**562,365**

System-average Anthropogenic Deliveries Metric: 413.27 lbs/MWh

Adjusting Deliveries Metrics for Certificate Purchases and Sales Using the Detailed Method

A utility in North Dakota wishes to develop system-average deliveries metrics. The chart below shows the sources of their delivered power, purchased and sold certificates, associated emission factors, and resulting anthropogenic and biogenic emissions.

The utility sells all 50,000 certificates from its wind generation, and thus uses the MROW grid average emission factor (1,239.8 lb CO_2/MWh = 0.562 mt CO_2/MWh) as a "replacement"

emission factor. The utility purchases 20,000 unbundled solar RECs and wishes to retire them on behalf of their customers, to replace the energy attributes from a portion of their coal generation (20,000 MWh of total delivered 120,000 MWh from coal).

Source of Delivered Power	Delivered MWh	MWh to be replaced with purchased certificates	Anthropogenic Emission Factor (mt CO_2/MWh)*	Biogenic Emission Factor (mt CO_2/MWh)*	Anthropogenic Emissions (mt CO_2)	Biogenic Emissions (mt CO_2)
Hydro	10,000	-	0	0	0	-
Biomass	20,000	-	0	0.8	0	16,000
Coal	120,000	20,000	0.9	0	90,000	-
Wind (Certificates sold, so MROW EF applied)	50,000	-	0.562	0	28,100	-
Purchased certificates (Solar)	-	20,000 (To be applied to coal emissions)	0	0	0	0
Total	**200,000**	**-**	**-**	**-**	**118,100**	**16,000**

*The anthropogenic and biogenic emission factors used in this example are for illustrative purposes. Reporters should identify a generator-specific emission factor or refer to The Climate Registry's most recent Default Emission Factor Document for fuel-specific default emission factors.

Anthropogenic system-average deliveries metric: 1,301.83 lbs CO_2/MWh

Biogenic system-average deliveries metric: 176.37 lbs CO_2/MWh

The steps used to calculate the anthropogenic system-average deliveries metric according to the Detailed Method are outlined below.

1. Identify:
    a. Power whose emissions attributes will be replaced with purchased energy attribute certificates: 20,000 MWh of the total 120,000 MWh of coal generation will be replaced with certificates from solar generation.
    b. Number of sold certificates and corresponding "replacement" emission factors: The MROW emission factor (0.562 mt CO_2/MWh) is used for the 50,000 MWh of wind generation since all attribute certificates have been sold.
    c. Number of purchased certificates and corresponding CO_2 emission factors: The purchased solar certificates represent 20,000 MWh with zero emissions.
    d. Net MWh and corresponding CO_2 emission factors for each source of delivered power that is not represented by purchased or sold certificates: 10,000 MWh of hydro with an emission factor of zero mt CO_2/MWh; 20,000 MWh of biomass with

an anthropogenic emission factor of zero mt CO_2/MWh; 100,000 *remaining* MWh of coal with an emission factor of 0.9 mt CO_2/MWh.

2. Calculate "replacement" CO_2 emissions for power whose energy attribute certificates have been sold: Applying the MROW emission factor to the 50,000 MWh of wind power results in 28,100 mt CO_2.
3. Calculate CO_2 emissions from purchased energy attribute certificates: There are zero CO_2 emissions associated with the solar certificates.
4. Calculate CO_2 emissions for delivered power that is not represented by purchased or sold certificates: 90,000 mt CO_2 from 100,000 MWh of coal generation and zero anthropogenic emissions from generation from biomass.
5. Sum CO_2 emissions from Steps 2-4 (28,100 + 0 + 90,000 = 118,100 mt CO_2) and divide by total delivered MWh (200,000 MWh) to calculate the anthropogenic deliveries metric: 1,301.83 lbs CO_2/MWh.

The biogenic system-average deliveries metric is calculated in the same manner as above using biogenic emission totals instead of anthropogenic emissions totals. 16,000 mt biogenic CO_2 divided by total delivered MWh (200,000 MWh) results in a biogenic deliveries metric of 0.08 mt CO_2/ MWh, or 176.37 lb CO_2/MWh.