

Understanding MCE's GHG Emission Factors – Calendar Year 2015

Summary

A key environmental metric for the MCE program continues to be the attributed greenhouse gas (GHG) emissions profile associated with retail electric energy deliveries to its customers. This paper describes the methodology used to calculate such GHG emission rates for the MCE program. Based on this methodology, the calendar year (CY) 2015 GHG emissions rates attributed to MCE's retail electric energy deliveries are as follows:

Light Green Service (Minimum 50% Renewable):	331 lbs CO₂e/MWh (CY 2014 = 334 lbs CO₂e/MWh)
Deep Green Service (100% Renewable):	0 lbs CO₂e/MWh (CY 2014 = 0 lbs CO₂e/MWh)
Total MCE CY 2015 Portfolio:	323 lbs CO₂e/MWh (CY 2014 = 324 lbs CO₂e/MWh)

Background

A key tenet of MCE's mission is to reduce energy-related greenhouse gas emissions (GHGs) through the development and use of various clean energy resources. MCE has committed to assembling a power supply portfolio that exceeds the renewable energy content offered by PG&E and provides customers with a "cleaner" energy alternative as measured by a comparison of the attributed portfolio GHG emission rate (or "emission factor") published by each organization. MCE compares its emission factor to that of PG&E on an annual basis.

The period addressed in this emission factor comparison is the calendar year 2015 (CY 2015). The time lag in reporting comparative emissions statistics is necessary to facilitate the compilation of final electric energy statistics (e.g., customer energy use and renewable energy deliveries) and to allow sufficient time for data computation, review and audit before releasing such information to the public. For example, PG&E's CY 2015 emission factor was published on February 9, 2017.¹ This is the most current available emission factor for PG&E. Going forward, the timeline associated with PG&E's emission factor availability is not expected to change significantly. MCE will complete an emissions rate comparison following PG&E's publication of its annual emissions statistic.

In each calendar year, MCE will endeavor to procure GHG-free energy supplies in sufficient quantities to ensure that MCE provides its customers with an electric energy supply that generates fewer attributed GHG emissions per megawatt hour than the incumbent utility.² MCE's future purchases of GHG-free energy supplies will be primarily based on its annual Integrated Resource Plan, reasonable projections of PG&E's emission rate, budgetary impacts and rate setting objectives. To the extent that MCE undertakes inclusion activities (for new member communities) within a particular calendar year, achieving planned clean energy targets may be more challenging than usual due to inevitable uncertainties related to customer participation and actual energy use within new member communities – accurately predicting customer energy use during the first several months following account enrollment is particularly challenging, as participation rates tend to remain unstable while new customers gain familiarity with the CCA service model. MCE's growing commitment to renewable energy resources, many of which produce electric power on an intermittent basis, compound planning uncertainty and may contribute to variances relative to noted planning targets (for renewable and carbon-free energy delivery).

¹ <http://www.pgecurrents.com/2017/02/09/pge-cuts-carbon-emissions-with-clean-energy-2/>

² MCE will complete such purchases to the extent that available GHG-free energy products will not necessitate out-of-cycle rate adjustments or impose material budgetary impacts. If such consequences would result from the incremental procurement of GHG-free energy products, MCE will seek Board approval prior to engaging in related transactions.

With regard to PG&E's projected emissions rate, MCE will take into consideration a variety of factors, including: 1) planned increases in Renewables Portfolio Standard procurement obligations; 2) retail sales reductions due to ongoing CCA formation activities; 3) regulatory and legislative changes; and 4) other publicly available information regarding PG&E's anticipated procurement activities. *Certain extenuating circumstances, such as higher than anticipated hydroelectric production or advanced completion of renewable generating facilities (which result in higher than expected renewable energy deliveries during a particular calendar year), cannot be reasonably foreseen and may contribute to unfavorable emissions comparisons between MCE and PG&E during limited periods of time.* To the greatest extent practical, however, MCE will pursue increasing clean energy targets that promote the achievement of MCE's internal planning targets, which were recently set at 100% GHG-free by 2025, consistent with MCE's adopted 2017 Integrated Resource Plan (February 2017).

About Emission Rates

Portfolio emission rates are based on the attributed emission impacts associated with the use of specific fuel sources, which are consumed/combusted when generating electric power. An attributed emission rate reflects the proportionate use of various fuel sources and resource types within a utility's supply portfolio. To the extent that procured/delivered energy supplies are produced by generating resources that are known to emit GHGs during production of electric energy, such resources will increase the utility's attributed portfolio emission factor. Conversely, the inclusion of resources that do not emit GHGs (or emit relatively small GHG quantities during power production, as is the case with geothermal resources included within MCE's resource portfolio) will reduce the utility's portfolio emission factor. In general, renewable energy resources, which use fuel sources like wind and sunlight (solar), have been identified as non-polluting or GHG-free.³ Similarly, hydroelectric and nuclear generators, which do not involve GHG-emitting combustion processes, are also considered to be non-polluting or carbon-neutral (i.e., the net emissions impact associated with electric power production is less than or equal to the status quo).

Because of widely varying opinions and computations focused on the environmental impacts associated with specific generating technologies, it is important to identify an industry-accepted or prescribed standard when determining the emission impacts attributable to generating facilities included within a utility's supply portfolio. Currently, there is no prescribed standard for retail-level GHG emissions reporting, but California has committed to developing such a standard through the implementation of Assembly Bill 1110 (AB 1110, Ting), which will impose a uniform retail-level GHG emissions reporting methodology, the results of which will be reflected in each retail seller's annual Power Content Label. Beginning with the 2019 operating year (with reporting to occur in 2020, following the conclusion of 2019 operations), California consumers will receive a modified Power Content Label, which will include an emissions factor associated with each available retail electricity option that was offered by the customer's service provider during the noted operating year. Specific details related to the AB 1110 emissions calculation methodology are currently under development via a broad stakeholder process being administered by the California Energy Commission. MCE is actively participating in this process and will provide related updates to MCE's Governing Board.

³ Certain fuel sources, including landfill gas, are reflected as having zero GHG emissions due to the positive environmental impacts achieved through the conversion of methane to carbon dioxide (during energy production). California's Emissions Performance Standard treats such generating resources in a similar manner. In fact, CPUC Decision 07-01-039 notes, "the record shows that electric generation using biomass (e.g., agricultural and wood waste, landfill gas) that would otherwise be disposed of under a variety of conventional methods (such as open burning, forest accumulation, landfills, composting) results in a substantial net reduction in GHG emissions". This Decision further indicates that, "trading off methane for CO2 emissions from energy recovery operations leads to a net reduction of the greenhouse effect".

In the meantime and in the interest of consistency and accuracy during MCE's annual emissions calculations, it incorporates statistics prepared by the California Air Resources Board (CARB) and certain of its suppliers when determining emissions associated with its energy supply portfolio. In particular, CARB's published emission rate for unspecified sources, or "system power", provides an unbiased, publicly available reference that can be incorporated in instances where specific generating sources cannot be identified. Application of standards such as this will facilitate an "apples to apples" comparison of emission factors associated with unknown energy sources, including those procured by MCE, PG&E and other electric utilities.

MCE also maintains membership with The Climate Registry (TCR), which provides access to the policies, procedures and GHG accounting guidelines endorsed by this organization. The TRC describes itself as:

A non-profit organization governed by U.S. states and Canadian provinces and territories. TCR designs and operates voluntary and compliance GHG reporting programs globally, and assists organizations in measuring, verifying and reporting the carbon in their operations in order to manage and reduce it.

Through its membership in TCR, MCE has access to information and documentation, which has contributed to the development of the emissions calculation methodology described herein. MCE has also incorporated guidance provided by the U.S. Environmental Protection Agency (U.S. EPA) and the Center for Resource Solutions (CRS, which administers the Green-e Energy program) when determining its attributed portfolio emission rates; other organizations have independently developed alternative methodologies, which borrow from multiple protocols, some of which may not be aligned with The Climate Registry, U.S. EPA and/or CRS. As one could reasonably suspect, certain differences between such methodologies have contributed to confusion and consternation during emission rate comparisons. Implementation of AB 1110 should serve to resolve such issues. Note that PG&E was a founding member of TCR, joining in 2008, and uses TCR's methodology when compiling its annual emission statistics.

For certain MCE customers that are also members of TCR, MCE has prepared the attached Emission Factor Certification template, which can be used by such customers when completing voluntary reports for TCR. Looking ahead, MCE will continue to update (and post on its website) this certification template so that it can be readily accessed and used by MCE customers.

Calculating GHG Emissions Associated with Unspecified Sources

Not all electric energy purchases are associated with specific generating facilities. Many industry contracts identify the use of "system power", a term of art that is regularly used in the utility industry to define electric energy that is produced and delivered to the grid by various generating resources not under contract with particular buyers. Such delivery arrangements provide increased flexibility for energy sellers which often results in reduced energy prices for buyers. While there are certain economic and operational efficiencies that may relate to the use of system power, there are also complications that can surface when attempting to quantify GHG emissions attributable to energy volumes associated with unspecified generating sources. Many load-serving entities (LSEs) within California rely heavily on the use of system power to fulfill their respective service obligations. PG&E's 2015 Power Content Label indicated the delivery of 17% of total supply from unspecified, or market, sources; MCE sourced 24% of its retail deliveries from unspecified power. It is therefore important to identify an emission factor for such deliveries that can be referenced by LSEs when compiling emission statistics.

As previously noted, CARB has established an emission factor for unspecified generating sources to facilitate GHG calculations and reporting associated with the use of system power and power purchases from generation "portfolios", which do not create direct relationships between specific electric generators and energy buyers. The

CARB emission rate for unspecified power purchases is currently set at 0.428 metric tons CO₂e/MWh, or 943.58 pounds of CO₂e/MWh. This emission rate is publicly available and can be referenced in section 95111(b)(1) of CARB's February 2015 update to the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions: <http://www.arb.ca.gov/cc/reporting/ghg-rep/regulation/mrr-2014-unofficial-02042015.pdf>. MCE staff previously engaged CARB in discussions and email exchanges to confirm the appropriate use of this emission rate for all unspecified/system power purchases; CARB advised MCE to use this published emission factor when determining GHG emissions associated with such purchases. Based on MCE's review, CARB has not recently updated the aforementioned emission factor, but staff will continue to monitor this item and will update its future emission factor calculations in consideration of any adjustments that may be made by CARB to this statistic.

Identification of a credible, publicly available system power emission factor is particularly relevant for MCE, which relies on the use of system power to meet some of its customers' non-renewable energy requirements. CARB's emission factor for unspecified sources has been applied by MCE when determining total emissions associated with system power purchases. It is also noteworthy that PG&E appears to have applied a similar factor when calculating emissions associated with unspecified generating sources.

Determination of MCE's Total Portfolio Emission Factor

For CY 2015, MCE's supply portfolio was heavily weighted towards non-carbon emitting/carbon-neutral resources. Sixty-five percent of MCE's energy supply was attributable to various RPS-eligible renewable energy and hydroelectric purchases, which are considered to be very low- or non-GHG producing resources for purposes of MCE's emissions calculations. The following table summarizes MCE's aggregate energy purchases, which includes both Light Green and Deep Green sales volumes, for CY 2015. It is important to note that all "zero carbon" energy volumes are attributable to hydroelectric generating sources located within the Western U.S.

2015	MWh Purchased	% Total
Total Renewable Energy¹	903,643	53.3%
RPS – Eligible Renewable	903,643	53.3%
Non-RPS Eligible Renewable	0	0.0%
Zero Carbon	192,413	11.3%
Natural Gas	194,185	11.5%
System Power	405,033	23.9%
Total	1,695,274	100%

¹Includes both bundled and unbundled renewable energy sources. Note that MCE's reported RPS percentage (as communicated to the CPUC in applicable reporting templates) may differ from this statistic due to Green-e Energy rules related to MCE's Deep Green product. However, all of MCE's renewable energy purchases during the 2015 calendar year were produced by RPS-eligible generators (meaning, generators that received RPS certification by the California Energy Commission, including associated RPS identification numbers for each facility).

When determining MCE's aggregate attributed portfolio emission factor, the aforementioned CARB emission rate for unspecified sources, which equals 0.428 metric tons CO₂e/MWh, was applied to MCE's system power purchases – 405,033 MWh during the 2015 calendar year. MCE also procured 194,185 MWh from Calpine's Delta Energy Center, which emits approximately 0.380 metric tons of CO₂/MWh. Due to the emission characteristics attributable to MCE's other power sources, all other energy volumes were attributed an average emission factor just above zero (less than 2 pounds of CO₂e/MWh; this is based on the proportionate inclusion of geothermal electricity within MCE's resource mix, which has a small emissions impact approximating 70 pounds of CO₂e/MWh). As such, MCE's portfolio emissions for the 2015 calendar year totaled 248,009 metric tons or approximately 547 million pounds of carbon dioxide equivalent. These emission totals were divided by MCE's

aggregate retail energy deliveries of 1,695,274 MWhs, resulting in an MCE portfolio emissions rate of 0.146 metric tons CO₂e/MWh, or 323 pounds/MWh, for CY 2015. The following table provides additional detail regarding these emissions computations for MCE’s CY 2015 supply portfolio.

2015 Calendar Year	MWh Purchased	% Total	Emission Rate (metric tons CO ₂ e/MWh)	Total Emissions (metric tons)	Emission Rate (lbs CO ₂ e/MWh)	Total Emissions (lbs)
Total Renewable Energy	903,643	53.3%	0.001	865	<2	1,907,080
RPS – Eligible	903,643	53.3%	0.001	865	<2	1,907,080
Non-RPS Eligible Renewable	0	0.0%	0.000	0	0	0
Zero Carbon	192,413	11.3%	0.000	0	0	0
Natural Gas	194,185	11.5%	0.380	73,790	838	162,679,571
System Power	405,033	23.9%	0.428	173,354	944	382,179,810
Totals	1,695,274	100%	0.146	248,009	323	546,766,462

Based on these calculations, it has been determined that MCE’s CY 2015 aggregate portfolio emission factor (of 323 pounds/MWh) was approximately 20% lower than PG&E’s reported 2015 emission factor of 405 pounds/MWh.⁴ Note that MCE has elected to use CO₂e, or carbon dioxide equivalent, when expressing the emissions intensity of its power supply portfolio to retail customers. The determination was made based on available statistics reflected in CARB’s Mandatory Reporting Regulation, which express the emissions intensity of system power using the CO₂e metric instead of CO₂, which is more commonly used when expressing the emissions intensity associated with Natural Gas and Geothermal power sources. Because system power purchases represented 24% of MCE’s total power mix in 2015, or 65% of MCE’s carbon-emitting power mix, MCE has opted to report its emission factor as CO₂e, which reflects the impacts of multiple greenhouse gasses, such as carbon dioxide, nitrous oxide and methane, in a single unit of measurement.

Determination of MCE’s Light Green and Deep Green Emission Factors

While certain stakeholders may be interested in MCE’s previously discussed aggregate emission factor, there is also an interest in clearly understanding the specific emission factors attributable to MCE’s retail supply options, which were available during CY 2015: Light Green (minimum 50% renewable energy content) and Deep Green (100% renewable energy content). As such, MCE has calculated product-specific emission factors, which may be useful to certain customers who want to better understand the direct environmental impacts attributable to energy consumption within their respective households and/or businesses. It is important to note that any MCE customer may choose to “zero out” attributed energy-related emissions by voluntarily selecting the Green-e certified Deep Green 100% renewable energy option. For more information regarding Deep Green enrollment, customers are encouraged to visit: <http://www.mcecleanenergy.org/100-renewable/>.

Light Green: MCE diligently plans for and procures electricity to provide clean power supply for Light Green customers. During CY 2015, MCE delivered a total of 1,650,343 MWh to Light Green customers of which 858,712 MWh (52.03% of total) were supplied from California Renewables Portfolio Standard (RPS) eligible sources, including biomass, landfill gas, geothermal, small hydroelectric, solar and wind – these RPS-eligible renewable energy volumes were used to demonstrate compliance with California’s RPS and were retired through the Western Renewable Energy Generation Information System (WREGIS) consistent with applicable regulatory guidelines. MCE also delivered 192,413 MWh (11.66% of total) from non-polluting hydroelectric generators. The aforementioned resources, which comprised 63.69% of MCE’s Light Green supply portfolio, were all determined to be carbon-free, low-carbon or carbon-neutral based on specified fuel sources. The balance of Light Green resource requirements were supplied from specific natural gas generators and unspecified sources, or “system power”. In the case of

⁴ PG&E’s final CY 2015 emission factor, as reported at <http://www.pgecurrents.com/2017/02/09/pge-cuts-carbon-emissions-with-clean-energy-2/>.

electricity produced via the combustion of natural gas, MCE procured a total of 194,185 MWh, or 11.77% of total supply, from Calpine's Delta Energy Center; such volumes were assigned a GHG emissions factor of 837.76 lbs. CO₂/MWh, consistent with guidance provided by the generator owner/operator. For system power purchases, which totaled 405,033 MWh, or 24.54% of total Light Green purchases, the California Air Resources Board (CARB) has assigned an emission rate of 943.58 lbs. CO₂e/MWh – MCE applied this emission factor to all system power volumes when compiling its Light Green emissions statistic for 2015. This emission rate is publicly available via CARB's website. CARB previously advised MCE to use this published emission factor when determining GHG emissions associated with system power purchases. For purposes of determining MCE's Light Green emission factor for the 2015 calendar year, total portfolio emissions were determined to be approximately 547 million pounds. The total of 547 million pounds of CO₂ equivalent was divided by the total delivered Light Green electricity volume of 1,650,343 MWh, resulting in a 2015 Light Green emission factor of 331 lbs. CO₂e/MWh.

Deep Green: Deep Green is a voluntary, 100% renewable energy supply option that is available to all customers within the MCE service territory. During the 2015 calendar year, MCE supplied a total of 44,931 MWh to Deep Green customers, all of which was supplied by RPS-eligible generators. However, due to Green-e Energy certification requirements, only 23.3% (the requisite RPS renewable energy procurement mandate during the 2015 calendar year) of the aforementioned Deep Green supply was retired and included within MCE's RPS compliance report (substantiating the delivery of an RPS-compliant resource mix to Deep Green customers); the balance of Deep Green supply was produced by RPS-eligible generators and was retired on behalf of participating customers consistent with Green-e Energy requirements – "Green-e is the nation's leading independent certification and verification program for renewable energy and greenhouse gas emission reductions in the retail market", which is administered/monitored by the San Francisco-based Center for Resource Solutions; all renewable energy volumes were retired through the WREGIS system.⁵ As a result of the 100% renewable energy supply that was delivered to Deep Green customers, the emission factor was determined to be zero pounds of CO₂e/MWh.

Consistent with its adopted Integrated Resource Plan, MCE does not engage in procurement transactions with nuclear generating facilities and, at this point in time, will rely exclusively on renewable energy resources and hydroelectricity to ensure delivery of a comparatively cleaner energy supply.⁶

As previously noted, MCE will continue to update subsequent annual emissions factors based on currently available data, including actual energy purchases and CARB's then-effective emission rate for unspecified sources. Any questions regarding this information should be forwarded to info@mcecleanenergy.org. Additional information regarding MCE's emission factors can be located at www.mcecleanenergy.org.

⁵ Information as posted on the Green-e website: <http://www.green-e.org/about.shtml>.

⁶ By comparison, PG&E's 2015 Power Content Label reflected the proportionate use of 23% nuclear-generated electricity.