MARIN ENERGY AUTHORITY

781 Lincoln Avenue
Suite 320
San Rafael, CA 94901

1 (888) 632-3674
mceCleanEnergy.com

Marin Energy Authority
Technical Committee Meeting
Monday, May 13, 2013
9:00 A.M.

San Rafael Corporate Center, Boro Room
750 Lindaro Street, San Rafael, CA 94901

Agenda – Page 1 of 1

1. **Board Announcements (Discussion)**
2. **Public Open Time (Discussion)**
3. **Report from Executive Officer (Discussion)**
4. **MEA Greenhouse Gas Emissions Analysis and Reporting (Discussion/Action)**
5. **Board Member & Staff Matters (Discussion)**
6. **Adjourn**

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Understanding MCE's GHG Emission Factors

Summary

One environmental metric for the Marin Clean Energy (MCE) program is the greenhouse gas emissions profile of the MCE supply portfolio. This paper describes the methodology used to calculate GHG emissions rates for the MCE program. Based on this methodology, the current GHG emissions rates for the MCE supply portfolio and retail service options are as follows:

Light Green Service: **389** lbs CO2e/MWh
Deep Green Service: **0** lbs CO2e/MWh
Total MCE Portfolio: **374** lbs CO2e/MWh

Background

A key tenet of MCE's mission, and a charter objective of the agency, is to reduce energy related greenhouse gas emissions (GHGs) through the development and use of various clean energy resources. As such, MCE has committed to assembling a power supply portfolio that not only exceeds the renewable energy content offered by the incumbent utility, Pacific Gas & Electric Company (PG&E), but also provides customers with a "cleaner" energy alternative, as measured by a comparison of the portfolio GHG emission rate (or emission factor) published by each organization. This comparison will be performed on an annual basis in consideration of each utility's most recently published emission factor. Due to typical timelines affecting the availability of such information, the current comparison will generally reference data that was published 12 to 24 months prior to the current calendar year. This waiting period 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 and review before releasing such information to the public. For example, PG&E's 2011 emission factor was recently published in February 2013 – this is the most current available emission factor for PG&E; similarly, MCE's 2011 emission factor should be considered current until data for the 2012 calendar year can be analyzed, reviewed and finalized. For purposes of this document, the aforementioned emission factor comparison will focus on the 2011 calendar year.

For subsequent years (post-2011), MCE will procure GHG-free energy supplies in sufficient quantities to ensure that MCE provides its customers with a cleaner electric energy. The noted future purchases of GHG-free energy supplies will be based on reasonable projections of PG&E's emission rate, which will take into consideration planned increases in Renewables Portfolio Standard procurement obligations and any other publicly available discussion of PG&E's planned procurement activities and/or projections. Through this ongoing process, MCE will ensure the procurement (and delivery) of energy supplies that generate fewer GHG emissions per megawatt hour than the incumbent utility.

About Emission Rates

Portfolio emission rates reflect the proportionate use of various fuel sources and resource types within a utility's supply portfolio. To the extent that selected resources emit GHGs while producing electric energy, such resources will increase the utility's portfolio emission factor. Conversely, the inclusion of resources that do not emit GHGs will reduce the utility's portfolio emission factor. In general, renewable energy resources, which use fuel sources like wind and solar energy, have been identified as non-polluting or GHG-free. 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). Consistent with its adopted Integrated Resource Plan, MCE does not engage in procurement

transactions with nuclear generating facilities and will rely exclusively on renewable energy resources and hydroelectricity to ensure delivery of a comparatively cleaner energy supply.[1]

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 standard when determining the emission impacts attributable to generating facilities included within a utility's supply portfolio. To avoid the potential for perpetual policy and accounting changes that could result from the use of ad hoc (and potentially inaccurate) emission calculations for certain generating resources, MCE decided to incorporate statistics prepared by the California Air Resources Board's (CARB) 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. With regard to the aforementioned emission rate for unspecified sources, CARB has assigned a rate of 0.428 metric tonnes carbon dioxide equivalent per megawatt hour (MT CO2e/MWh), or 943.58 pounds CO2e/MWh (lbs CO2e/MWh). This emission rate can be referenced in section 95111(b)(1) of the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions: http://www.arb.ca.gov/cc/reporting/ghg-rep/regulation/mrr-2012-clean.pdf. Application of standards such as this will facilitate an "apples to apples" comparison of emission factors posted by MCE and other electric utilities, including PG&E.

MCE has also joined The Climate Registry, "a nonprofit collaboration among North American states, provinces, territories and Native Sovereign Nations that sets consistent and transparent standards to calculate, verify and publicly report greenhouse gas emissions into a single registry." Through its membership, MCE has access to the policies, procedures and GHG accounting guidelines endorsed by this organization and can incorporate such guidelines when determining its portfolio emissions factor. Also, for certain MCE customers that are also members of The Climate Registry, MCE has prepared the attached Emission Factor Certification template, which can be used by these customers when completing voluntary reporting efforts to The Climate Registry. 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 from 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 specific buyers, instead of specific generating facilities. Such delivery arrangements provide increased flexibility for energy sellers which often result in reduced energy prices for buyers. While there are certain efficiency improvements that result from the use of system power, there are also complications that can surface when attempting to quantify GHG emissions associated with energy production from unspecified generating sources. Because many load-serving entities (LSEs) within California rely heavily on the use of system power to fulfill their respective service obligations, it is important to identify an emission factor for related energy 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. MCE staff 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 recent communications with CARB staff, CARB has no eminent plans to update this factor. MCE will continue to monitor this item and will

[1] Conversely (and according to its September 2012 Power Content Label bill insert), PG&E's published 2011 power mix included 22% nuclear generation.

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 the same factor when calculating emissions associated with unspecified generating sources.

Determination of MCE's Total Portfolio Emission Factor

For the 2011 calendar year, MCE's supply portfolio was heavily weighted towards non-carbon emitting resources. In fact, over 60% of MCE's energy supply is attributable to various renewable energy and hydroelectric purchases, which do not emit GHGs. The following table summarizes MCE's aggregate energy purchases, including both Light Green and Deep Green sales volumes, for the 2011 calendar year. It is important to note that all "zero carbon" energy volumes are attributable to hydroelectric generating sources located within California and throughout the Western U.S.

2011	MWh Purchased	% Total
RPS - Eligible Renewable	51,525	27.8%
Non- Eligible Renewable	14,000	7.5%
Zero Carbon	46,500	25.1%
System Energy	73,468	39.6%
Total	185,493	100%

When determining MCE's aggregate portfolio emission factor, the aforementioned CARB statistic of 0.428 metric tons CO2e/MWh was applied to MCE's system energy purchases, which totaled 73,468 MWh during the 2011 calendar year. All other non-emitting resources were assigned an emission factor of zero. As such, MCE's portfolio emissions for the 2011 calendar year totaled 31,444 metric tons or approximately 69 million pounds. These emission totals were divided by MCE's aggregate energy deliveries of 185,493 MWhs, resulting in an MCE portfolio emissions rate of 0.170 metric tons CO2e/MWh, or 374 lbs/MWh, for the 2011 calendar year. The following table provides additional detail regarding these emissions computations for MCE's 2011 supply portfolio.

2011 Calendar Year	MWh Purchased	% Total	Emission Rate (metric tonnes CO2e/MWh)	Total Emissions (metric tonnes)	Emission Rate (lbs/MWh)	Total Emissions (lbs)
RPS - Eligible Renewable	51,525	27.8%	-	-	-	-
Non- Eligible Renewable	14,000	7.5%	-	-	-	-
Zero Carbon	46,500	25.1%	-	-	-	-
System Energy	73,468	39.6%	0.428	31,444	944	69,322,741
Totals	185,493	100%	0.170	31,444	374	69,322,741

Based on these calculations, it has been determined that MCE's 2011 aggregate portfolio emission factor was approximately 5% lower than PG&E's reported 2011 emission factor of 393 lbs/MWh.[2]

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 associated with MCE's retail supply options: 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

[2] PG&E's final 2011 emission factor, as reported at http://www.pgecurrents.com/2013/02/20/pge%E2%80%99s-clean-energy-reduces-greenhouse-gas-emissions/.

better understand the direct environmental impacts resulting from energy consumption within their respective households and/or businesses. It is important to note that any MCE customer may choose to "zero out" energy-related emissions by voluntarily selecting the Deep Green option, which provides participating customers with a 100% renewable energy supply. For more information regarding Deep Green enrollment, customers are encouraged to visit: https://mcecleanenergy.com/deepgreen.

Light Green: MCE diligently plans and procures electricity to ensure the cleanest possible power supply for Light Green customers. During the 2011 calendar year, MCE delivered a total of 178,139 MWh to Light Green customers of which 50,054 MWh (28.1% of total) were supplied from qualifying, California Renewables Portfolio Standard ("RPS") eligible sources, including biomass, landfill gas and wind. An additional 8,117 MWh (4.6% of total) were supplied from other wind resources, many of which have been certified as Green-e Energy eligible by the Center for Resource Solutions (CRS). MCE also delivered 46,500 MWh (26.1% of total) from non-polluting hydroelectric generators. The aforementioned resources, which comprised 58.8% of MCE's total Light Green supply portfolio, were all determined to be carbon-free or carbon-neutral based on specified fuel sources. The balance of Light Green resource requirements were supplied from unspecified sources, or "system power." This CARB emission rate of 943.58 lbs CO2e/MWh was multiplied by total system power deliveries (73,468 MWh, or 41.2% of total), resulting in total Light Green portfolio emissions of 69.3 million pounds of CO2 equivalent. As this total represented the entirety of emissions associated with MCE's Light Green power supply portfolio, the amount of 69.3 million pounds of CO2 equivalent was divided by the total delivered Light Green electricity volume of 178,139 MWh, resulting in a 2011 Light Green emission factor of 389 lbs CO2e/MWh.

Deep Green: A voluntary, 100% renewable energy supply option that is available to all customers within the MCE service territory. During the 2011 calendar year, MCE supplied a total of 7,353 MWh to Deep Green customers. A total of 1,471 MWh (20% of total) were supplied from qualifying, California RPS-eligible wind sources. An additional 3,574 MWh (48.6% of total) were supplied from other wind resources, which have been certified as Green-e Energy eligible by the CRS. The balance of Deep Green electricity supplies (2,309 MWh, or 31.4% of total) were procured from solar resources located in California's Central Valley. As a result of the 100% renewable energy supply that was delivered to Deep Green customers, the emission factor was determined to be zero lbs CO2e/MWh.

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.com. Additional information regarding MCE's emission factors can be located at www.mcecleanenergy.com/.

MCE Emission Factor Certification Template, as provided by The Climate Registry:

May 8, 2013

[Member] may use the Marin Energy Authority's (MEA) 2011 emission factor in their voluntary greenhouse gas report submitted to The Climate Registry. Please note that MEA's Marin Clean Energy (MCE) program, the first operating Community Choice Aggregation program in California, offers two distinct retail supply options: 1) Light Green, which is the default retail supply option that delivers a minimum 50% renewable energy to MCE customers; and 2) Deep Green, a voluntary retail supply option that delivers 100% renewable energy to participating MCE customers.

With respect to the Light Green retail supply option, the 2011 emission factor was determined to be 389 pounds of carbon dioxide equivalent per megawatt hour (lbs CO^2e/MWh). For the Deep Green retail supply option, the 2011 emission factor was determined to be zero lbs CO^2e/MWh, as a result of MCE delivering 100% renewable energy to participating customers. When considered in aggregate, MCE's total portfolio emission factor, which reflects the procurement of resources sufficient to supply all MCE customers (both Light Green and Deep Green), was determined to be 374 lbs CO^2e/MWh for the 2011 calendar year – this statistic has been calculated for informational purposes only. In reporting to The Climate Registry, [Member] has selected the appropriate emissions factor corresponding with the retail supply option(s) under which [Member] received electric service during the 2011 calendar year.

MEA has calculated its 2011 emission factor of 389 lbs CO^2e/MWh for the Light Green product and zero lbs CO^2e/MWh for the Deep Green product based on the following independently developed methodology:

1. Light Green retail electricity product: The Marin Energy Authority diligently plans and procures electricity to ensure the cleanest possible power supply for Light Green customers. During the 2011 calendar year, MCE delivered a total of 178,139 MWh to Light Green customers of which 50,054 MWh (28.1% of total) were supplied from qualifying, California Renewables Portfolio Standard (RPS) eligible sources, including biomass, landfill gas and wind – these RPS-eligible renewable energy volumes will be used to demonstrate compliance with California's RPS and will be retired through the Western Renewable Energy Generation Information System (WREGIS) consistent with applicable regulatory guidelines. An additional 8,117 MWh (4.6% of total) were supplied from wind resources not qualifying for California's RPS – these renewable energy volumes will also be retired through the WREGIS system. MCE also delivered 46,500 MWh (26.1% of total) from non-polluting hydroelectric generators. The aforementioned resources, which comprised 58.8% of MCE's Light Green supply portfolio, were all determined to be carbon-free or carbon-neutral based on specified fuel sources. The balance of Light Green resource requirements were supplied from unspecified sources, or "system power", for which the California Air Resources Board (CARB) has assigned an emission rate of 0.428 metric tonnes CO^2e/MWh, or 943.58 lbs CO^2e/MWh. This emission rate is publicly available and can be referenced in section 95111(b)(1) of the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions: http://www.arb.ca.gov/cc/reporting/ghg-rep/regulation/mrr-2012-clean.pdf. MEA staff engaged CARB in discussions and email exchanges to confirm the appropriate use of this emission rate for all unspecified/system power purchases; CARB advised MEA to use this published emission factor when determining GHG emissions associated with such purchases. For purposes of determining MCE's Light Green emission factor for the 2011 calendar year, the

aforementioned CARB emission rate of 943.58 lbs CO^2e/MWh was multiplied by total system power deliveries (73,468 MWh, or 41.2% of total), resulting in Light Green portfolio emissions of 69.3 million pounds of CO^2 equivalent. As this total represented the entirety of emissions associated with MCE's Light Green power supply portfolio, the amount of 69.3 million pounds of CO^2 equivalent was divided by the total delivered Light Green electricity volume of 178,139 MWh, resulting in a 2011 Light Green emission factor of 389 lbs CO^2e/MWh.

2. Deep Green retail electricity product: The Marin Energy Authority offers the Deep Green, 100% renewable energy retail supply option on a voluntary basis. During the 2011 calendar year, MCE supplied a total of 7,353 MWh to Deep Green customers. A total of 1,471 MWh (20% of total) were supplied from qualifying, California RPS-eligible wind sources – these RPS-eligible renewable energy volumes will be used to demonstrate compliance with California's RPS and will be retired through the WREGIS consistent with applicable regulatory guidelines. An additional 3,574 MWh (48.6% of total) were supplied from wind resources not qualifying for California's RPS – these renewable energy volumes have been retired through the WREGIS system. The balance of Deep Green electricity supplies (2,309 MWh, or 31.4% of total) were procured from solar resources located in California's Central Valley – these renewable energy volumes have been retired through the WREGIS system. As a result of the 100% renewable energy supply that was delivered to Deep Green customers, the resultant emission factor was determined to be zero lbs CO^2e/MWh.

To determine MCE's total portfolio emission factor for the 2011 calendar year, which reflects the procurement of resources sufficient to supply both Light Green and Deep Green customers, MCE's total portfolio emissions of 69.3 million pounds of CO^2 equivalent were divided by total retail sales to all MCE customers (both Light Green and Deep Green), which equaled 185,493 MWhs.[1] The resultant emission factor for MCE's total supply portfolio was determined to be 374 lbs CO^2e/MWh.

With respect to the noted renewable energy and hydroelectric purchases included within MCE's Light Green and Deep Green energy supply portfolios, MEA has retained all pertinent transaction records, including applicable renewable energy certificates received through WREGIS, to substantiate its procurement activities and emission factor calculations. When determining the aforementioned emission factors, MEA has only reflected the impacts of renewable and carbon-neutral/carbon-free resources for which it owns and possesses applicable renewable energy certificates and/or transaction records. All applicable renewable energy certificates are held in MEA's WREGIS account until such time that certain certificates must be "retired" to demonstrate mandatory and/or voluntary compliance. Any questions regarding the previously noted emission factors and/or related calculations should be directed to the following point of contact:

Kirby Dusel
kirby@paradigmec.com
Marin Energy Authority
781 Lincoln Avenue, Suite 320
San Rafael, California 94901
1 (888) 632-3674

[1] The sum of MCE's Light Green and Deep Green energy sales may not equal total reported MCE retail sales due to numeric rounding.