



# The Greenhouse Gas Benefits of Renewable Energy Purchases

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Renewable energy certificates (RECs) are required to demonstrate use of a megawatt-hour (MWh) of renewable energy generation in the U.S. Consumers who buy or own RECs can make two types of statements associated with the greenhouse gas (GHG) benefits of their renewable energy purchase or use. First, they can say that they are using electricity with the emissions profile of the renewable generation—zero emissions for resources like wind, solar, and hydropower. Second, they can say that their generation avoids GHG emissions on the grid equal to the emissions of what would have otherwise been generated.

This fact sheet outlines the limitations associated with the two statement types and provides guidance on communicating the GHG benefits of a renewable energy purchase.

## Carbon footprint claims and Scope 2 emissions reporting

*“I buy 100% zero emissions wind energy.”*

*“By purchasing renewable energy, I’ve reduced my carbon footprint by X tons of CO<sub>2</sub>-e.”*

By purchasing RECs—either standalone, through green power offerings, through a direct power purchase agreement, or by generating renewable energy onsite and keeping the RECs—consumers are contractually switching the generation sources of their power to renewable ones. As a result, a purchaser of wind or solar RECs, for example, can claim zero emissions for the portion of their electricity consumption covered by those RECs.

The emissions associated with purchased electricity are defined as “Scope 2” indirect emissions by the World Resources Institute (WRI) as a part of *The GHG Protocol Corporate Standard*.<sup>1</sup> The rules for Scope

2 GHG accounting can be found in *The GHG Protocol Scope 2 Guidance: An Amendment to the GHG Protocol Corporate Standard*.<sup>2</sup> The Guidance identifies two methods for calculating Scope 2 emissions—a market-based method and a location-based method. All renewable energy purchases and direct and onsite renewable energy use are reflected in market-based Scope 2 emissions. The location-based method assigns the average emissions rate of electricity generated to all consumers in a region. We recommend that the market-based number be used to calculate a total carbon footprint.

Using this method, MWh of electricity consumed are multiplied by emissions factors that are associated with the electricity product purchased or used. Renewable energy products that are supported by RECs represent the highest quality data source for the emissions associated with renewable electricity consumption—zero emissions.<sup>3</sup> Example Scope 2 calculations for a renewable energy purchase are provided below.

## Avoided GHG Emissions and Equivalency Claims

*“The renewable energy I purchase avoids X tons of CO<sub>2</sub>-e annually.”*

*“The renewable energy I purchase has a greenhouse gas benefit equivalent to taking X cars off the road for one year.”*

In most regions, REC purchasers can claim that emitting generation was displaced or avoided on the grid as a result of the renewable generation they are using. Estimating the amount of avoided grid emissions involves establishing what resources were likely displaced by the generation of the renewable energy, and finding the difference between the emissions factor of those

resources and the emissions factor of the purchased RECs. In most cases, the emissions of the resources likely displaced are represented by the non-baseload or marginal emission rate in the area of the REC generator.

There are some important limitations to this type of claim. Avoided grid emissions are not equivalent to absolute reductions on the grid or global reductions (unlike carbon offsets). Avoided grid emissions are only a calculation of the emissions displaced by the renewable generation. Avoided grid GHG emissions cannot be used to adjust one's carbon footprint or for Scope 2 emissions calculations.

A further limitation on this type of claim is that avoided grid emissions are not necessarily caused by the REC purchase or purchaser. Rather, the generation used by the purchaser results in avoided emissions. In public statements, avoided grid emissions should always be associated with the renewable energy

generation itself or the supply for the renewable energy product, rather than the purchaser's action.

In regions with a cap-and-trade program that covers the electricity sector, the avoided GHG emissions associated with renewable energy generated in that region are zero, since the level of emissions is fixed by the cap. However, it is possible to retain the grid GHG benefits of renewable energy in these regions by retiring carbon allowances in association with renewable energy purchases. Certain cap-and-trade programs include mechanisms to retire allowances on behalf of voluntary renewable energy purchasers at no cost to the purchaser (e.g. California and most Regional Greenhouse Gas Initiative states). Green-e requires that allowances be retired on behalf of purchasers of Green-e certified renewable energy in these regions, so that consumers of Green-e certified renewable energy can make claims about the emissions effect of their renewable energy.

## Example Scope 2 Calculations

### Activity Information

Location of electricity consumption: Dayton, OH

eGRID subregion: RFC West

A. Total Electricity Consumption = 100 MWh

B. Nebraska Wind RECs Purchased = 95 MWh

### Market-based Scope 2 Emissions

C. Adjusted Consumption = 5 MWh (A - B)

D. Residual Mix Greenhouse Gas Emission Rate for RFC = 1,248.99 lbs/MWh<sup>A</sup>

Market-based Scope 2 Emissions = **2.8** tCO<sub>2</sub>e (C \* D / 2204.62)

<sup>A</sup> Available from Green-e

<sup>B</sup> Available from EPA's eGRID database

### Location-based Scope 2 Emissions

F. Regional grid average emissions factor for RFC West: 1,386.55 lbs/MWh<sup>B</sup>

Location-based Scope 2 Emissions = **62.9** tCO<sub>2</sub>e (A \* F / 2204.62)

### Example Supplemental Report of Avoided Grid Emissions

E. Non-baseload Greenhouse Gas Emission Rate for Nebraska (MRO West) = 1965.21 lbs/MWhC

Avoided Grid Emissions = 84.7 tCO<sub>2</sub>e (B \* E / 2204.62)

<sup>C</sup> Available from EPA's eGRID database

## NOTES

1. The GHG Protocol Corporate Standard defines 3 scopes of emissions or categories for emissions in one's carbon footprint. Scope 1 emissions are direct GHG emissions from sources that are owned or controlled by the reporting entity. Scope 2 emissions are indirect emissions from the generation of purchased electricity, steam, heat or cooling. Scope 3 emissions are all other indirect emissions. See <http://www.ghgprotocol.org/standards/corporate-standard>.
2. For full guidance and executive summary, see: [http://www.ghgprotocol.org/scope\\_2\\_guidance](http://www.ghgprotocol.org/scope_2_guidance), or <http://www.wri.org/publication/ghg-protocol-scope-2-guidance>. Also see Green-e's Guidance on Scope 2 accounting and reporting here: [http://www.green-e.org/getcert\\_re\\_stan.shtml#scope2](http://www.green-e.org/getcert_re_stan.shtml#scope2).
3. See Table 6.3 page 50 of the GHG Protocol Scope 2 Guidance.



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