Guidance for ARRA Smart Grid Program Metrics and Benefits		
Guidance ID	G-005	
Metric	CO_2 Emissions and Pollutant Emissions	
Smart Grid Category	All	
Metric Type	Impact	
Issue Date	July 23, 2010	
Revision and Date	Revision 1, July 27, 2011	

Data to be reported and how it will be used

The U.S. Department of Energy (DOE) seeks to understand changes in emissions related to changes in vehicle miles driven, central electricity generation, and peak electricity generation reported by Smart Grid Investment Grant (SGIG) recipients. "Participants" refers to SGIG recipients for the remainder of the document. In a previous version of this guidance, DOE stated that Participants are required to estimate CO_2, SO_2, NO_X, and PM-2.5 emissions by any means that a Participant deemed fit. "Emissions" refers to CO_2, SO_2, NO_X, and PM-2.5 emissions for the remainder of the document. However, due to feedback from SGIG recipients, DOE is revising this guidance to reduce reporting uncertainty and burden.

Emissions estimation is no longer *required* (mandatory) of Participants, but it is *requested* (optional) of Participants that have experience and expertise in estimating emissions related to vehicle fuel use or electricity generation. DOE decided to change emissions reporting from being a required impact metric to a requested one because DOE will estimate the changes in emissions using the impact metrics that most Participants are already reporting. These impact metrics are related to electricity generation, transmission, distribution and vehicle use, and will be discussed in detail in this document.

Background

In a previous version of this guidance, DOE stated a goal of understanding emissions reduction from changes in vehicle miles driven, central electricity generation needed to serve load, and peak electricity generation. This document updates the previous guidance, providing guidance on impact metric reporting that is required of Participants and optional, requested impact metrics reporting of selected Participants. In the event that a Participant cannot estimate any of the impact metrics that are pertinent to its project, then the Participant should contact the Metrics and Benefits Team for further guidance.

Data to be reported

To reduce the reporting burden for Participants, DOE requires Participants to report the emissions-related impact metrics that they agreed to report in their Metrics and Benefits Reporting Plan. DOE requests Participants to report emissions data if they have experience and expertise in measuring or estimating emissions from electricity generation or wholesale purchase, peak load, distribution line loss, distribution feeder load, and vehicle use.

DOE defines required and requested data as follows:

Emissions-related impact metrics (Required): Participants reporting impact metrics for their advanced metering infrastructure (AMI), distribution system, and transmission system projects can meet the required reporting of emissions-related impacts with impact metrics reflecting electricity supply, consumption, and losses, as well as vehicle use, which they already plan on reporting. These impact metrics are summarized in Table 1.

Table 1. Emissions-related impact metrics, by project type

Project type	Emissions-related impact metrics*
AMI	Hourly customer electricity usage Monthly customer electricity usage Annual net electricity production or supply (total generation and supply – exports) Peak load and mix: direct load control dispatched at peak (optional) Peak load mix: interruptible/curtailable (industrial/commercial) Peak load mix: other DR program dispatched at peak (optional) Meter operations vehicle miles Meter operations vehicle miles avoided
Distribution	Distribution feeder load: aggregated average real load Distribution losses: Average losses as % of load Total cumulative MWh of losses Avoided distribution losses: total cumulative MWh of avoided losses Distribution operations vehicle miles Distribution avoided operations vehicle miles (mirror)
Transmission	Annual generation or supply dispatch Avoided annual generation or supply dispatch Transmission losses Avoided transmission losses Transmission operations vehicle miles Avoided transmission operations vehicle miles (mirror)

*Impact metric names have not yet been finalized and might differ slightly in the impact metric reporting forms which DOE will provide to Participants.

Reporting EPA eGRID sub-region for *electricity* emissions-related impact metrics

Participants are required to identify the EPA Emissions & Generation Resource Integrated Database (eGRID) sub-region (Figure 1) for their service territory. The EPA eGRID is a dataset of air emissions for electric power generation in the United States. DOE will use emission factors specific to each Participant's eGRID sub-region to calculate emissions related to these *electricity* emissions-related impact metrics:

- Hourly customer electricity usage
- Monthly customer electricity usage
- Annual net electricity production or supply (total generation and supply – exports)
- Peak load and mix: direct load control dispatched at peak (optional)
- Peak load mix: interruptible/curtailable (industrial/commercial)
- Peak load mix: other DR program dispatched at peak (optional)

- Distribution feeder load: aggregated average real load
- Distribution losses: Average losses as % of load
- Total cumulative MWh of losses
- Avoided distribution losses: total cumulative MWh of avoided losses
- Annual generation or supply dispatch
- Avoided annual generation or supply dispatch
- Transmission losses
- Avoided transmission losses

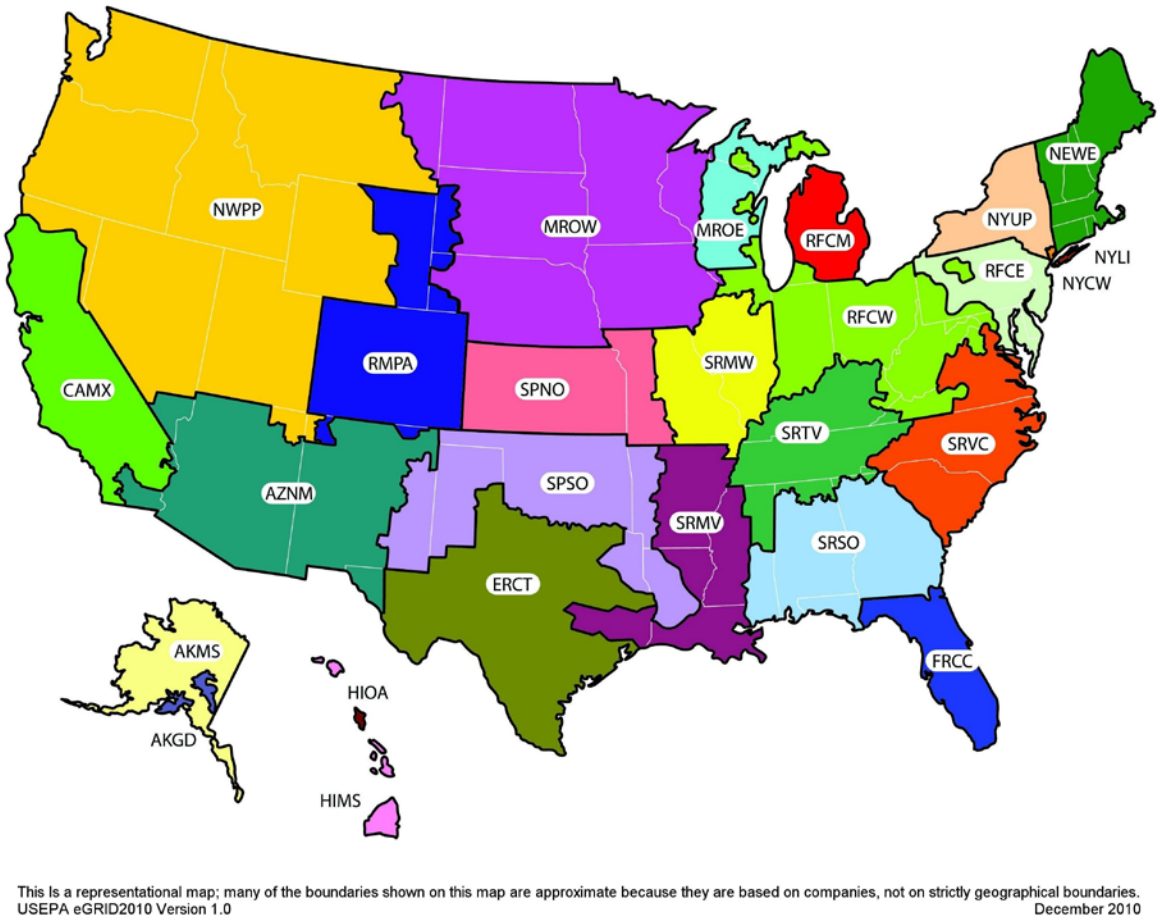

Figure 1. EPA eGRID sub-regions. This figure is included in the impact metrics reporting forms.

Projects are required to select the EPA eGRID region in the impact metrics reporting form, as shown in Figure 2.

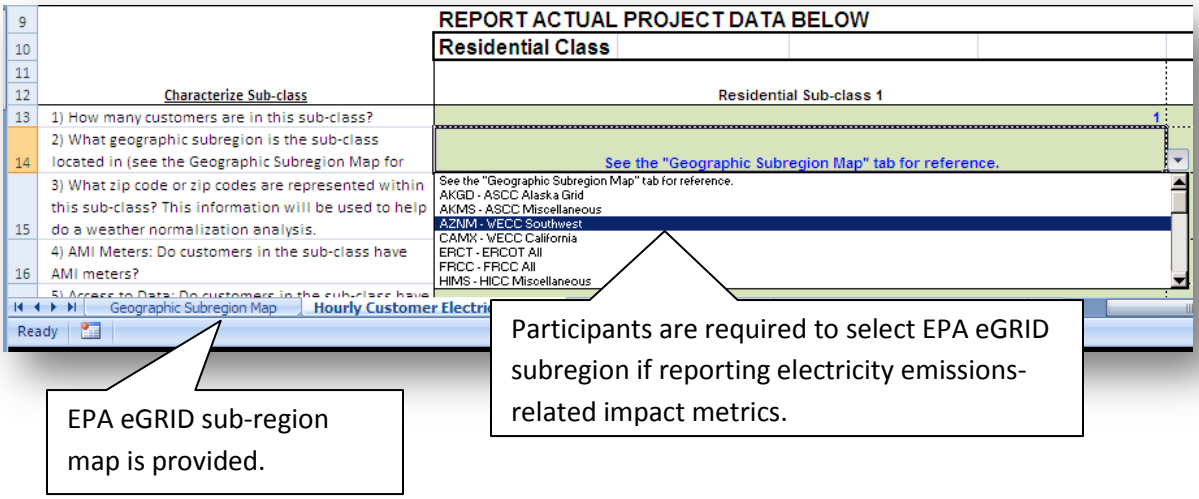

Figure 2. Excerpt of "Impact metric template for 8760 Data" to illustrate selection of EPA eGRID sub-region. (The actual format of the template might differ from this preliminary version.)

Reporting vehicle type for *vehicle* emissions-related impact metrics

For each of the following impact metrics that are reported, Participants are required to identify the type of vehicle (Table 2) that is dispatched on the majority of the (avoided) miles reported:

- Meter operations vehicle miles
- Meter operations vehicle miles avoided
- Distribution operations vehicle miles
- Distribution avoided operations vehicle miles (mirror)
- Transmission operations vehicle miles
- Avoided transmission operations vehicle miles (mirror)

This information will enable DOE to estimate vehicle emissions, which vary depending on the type of vehicle. Participants using a vehicle type that is not defined in Table 2 for the majority of the (avoided) miles reported should contact the Metrics and Benefits Reporting Team for additional guidance.

Table 2. Vehicle type, gross vehicle weight, fuel, and example models

Vehicle type*	Gross vehicle weight (lbs)	Fuel
Gasoline car	Unspecified	Gasoline
Gasoline light duty truck class 1	≤ 6,000	Gasoline
Gasoline light duty truck class 2	6,001 – 8,500	Gasoline
Diesel car	Unspecified	Diesel
Diesel light duty truck class 1	≤ 6,000	Diesel
Diesel light duty truck class 2	6,001 – 8,500	Diesel
Class 6 diesel truck	19,501-26,000	Diesel
Medium heavy duty diesel truck (Class 7)	26,001-33,000	Diesel
Heavy-heavy duty diesel truck (Class 8A)	33,001-60,000	Diesel
Class 8B Diesel truck	> 60,000	Diesel

*This information is included in the impact metric reporting forms which DOE will provide to Participants to aid Participant selection of vehicle type used for the majority of the (avoided) miles reported for their AMI, Distribution system, and Transmission system projects.

Measured or estimated emissions (Requested): In addition to reporting their emissions-related impact metrics, Participants may, at their option, also report emissions data if they have experience and expertise at measuring or estimating emissions from electricity generation or wholesale purchase, peak load, distribution line loss, distribution feeder load, and vehicle use.

DOE is requesting emissions estimates from these Participants because, given their knowledge and data on their own utility, their emissions estimates might be more accurate that those that DOE will calculate. DOE expects that Participants reporting emissions will include the following documentation, depending on whether the reported emissions are measured or estimated:

- *Measured emissions:* Emissions measurement method and technology used.
- *Estimated emissions:* Estimation assumptions and fuel or technology-based emissions factors used.