



DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

Request for information: Accounting Conventions for Non-combustible Renewable Energy Use

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy (DOE).

ACTION: Notice of Request for Information (RFI).

SUMMARY: The Department of Energy (DOE) gives notice of a Request for Information: “Accounting Conventions for Non-Combustible Renewable Energy Use” regarding using an alternative methodology for calculating source energy from non-combustible renewable resources in analysis that informs DOE, Office of Energy Efficiency and Renewable Energy (EERE) products, reports, and standards – such as the Home Energy Score. The current approach uses the equivalent average heat rate of fossil fuels to convert renewable electricity to source energy (approximately 9,500 BTU/kWh), while the proposed approach would use the heat content of electricity (3,412 BTU/kWh). This proposed change would better represent the lack of fuels used in generating renewable electricity, and would result in a slightly lower site-to-source ratio than the current approach.

DATES: Written comments and information are requested on or before March 14, 2016, no later than 5:00 pm (ET).

ADDRESSES: Interested persons are encouraged to submit comments, which must be submitted electronically to EERE.Analysis@ee.doe.gov. Please visit <https://eere-exchange.energy.gov/> for the full RFI and to ask and view responses to questions regarding this RFI.

FOR FURTHER INFORMATION CONTACT: Requests for additional information may be sent to Steve Capanna, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: 202-586-7367. E-mail: Steve.Capanna@hq.doe.gov.

SUPPLEMENTARY INFORMATION:

Background

EERE publishes reports, tools, and standards that include analyses that examine the impact of energy efficiency measures on total energy savings, and that compare energy savings between different types of technologies. A commonly used methodology for this is to convert the “site energy” into source energy (or “primary energy”) using a site-to-source ratio. For electricity, this essentially converts the energy used in a building (in kilowatt-hours, kWh) into the equivalent amount of fuel required to generate that electricity (typically in British Thermal Units, BTU).

The site-to-source ratio accounts for the useful energy lost in converting, transmitting, and distributing energy carriers. As a result, the source energy can be three times the size of the equivalent site energy, depending on location and electricity generation technology used. The benefit of using source energy as a metric for determining the impact of energy efficiency measures and technologies is that it is a more equitable “apples-to-apples” comparison of energy use than looking at site energy alone.

Typically, analyses use electricity energy data provided by the Energy Information Administration (EIA) in their Monthly Energy Review to calculate a site-to-source ratio. Using

this EIA document, the total energy content of fuels used to generate electricity is divided by the total amount of electricity consumed by end users to calculate the site-to-source ratio.

Accounting for the total source energy of electricity produced from combustible fuels (e.g., coal, natural gas, oil) is relatively straightforward as the energy content of these fuels is known.

However, for non-combustible renewable resources (i.e., wind, solar, hydro, and geothermal) because there is no “fuel” used, a choice must be made to determine how to account for the primary energy of electricity generated from these sources.

The current “fossil fuel equivalency” accounting convention used by the EIA to calculate the reported source energy number, assumes that non-combustible renewable electricity (RE) generation has the same source energy per kWh as the average of fossil fuel electricity. This factor, equivalent to a heat rate, represents the average amount of fossil fuel energy required to produce a kWh of electricity. Alternatively, the factor can be thought of as the amount of fossil energy displaced by a kWh of RE. The most recent value reported by EIA in Table A6 of the Monthly Energy Review is 9,541 BTU/kWh, which is equivalent to a generation efficiency of roughly 36%.

The “captured energy” alternative convention accounts only for the energy output from a non-combustible generator. This assumes that the conversion from energy resource (e.g. sunlight, wind, water, etc.) into electricity is 100% efficient. The energy content of electricity generated from a non-combustible source using this accounting convention is 3,412 BTU/kWh, which is a unit conversion.

An example comparison of the two methods of calculating source energy and site-to-source ratios using 2014 data is presented in the table below. Using the captured energy approach decreases the site-to-source ratio from 2.98 to 2.77 as compared to the fossil fuel equivalency approach.

Comparison of different methodologies of non-combustible renewable energy accounting on site-to-source ratios, using 2014 data.^a							
Method	RE Gen. (TWh)_b	Conversion Factor (BTU/kWh)	RE Source Energy (Quad)	Non-RE Source Energy (Quad)^c	Total Source Energy (Quad)	End Use (Quad)^d	Site-to-Source Ratio^e
Fossil Fuel Equivalency	475	9,541 ^f	4.53	35.21	39.74	13.32	2.98
Captured Energy	475	3,412 ^g	1.62	35.21	36.83	13.32	2.77

^a 2014 data from December 2015 edition of EIA's *Monthly Energy Review* (<http://www.eia.gov/totalenergy/data/monthly>) Tables 7.1, 7.2a, 7.3a, and A6. 1 Quad = 10¹⁵ BTU.

^b Includes wind, solar photovoltaic, solar thermal, geothermal, and hydro generation

^c Coal, petroleum, natural gas, and nuclear generation from Table 7.2a is converted to Quads using the heat contents from Table A6. Wood, waste, other gases, and other generation source energy used as reported in Table 7.3a.

^d End use energy is calculated as net generation of electricity (13.97 Quads) plus imports (0.16 Quads) minus transmission & distribution losses (0.82 Quads), as reported in Table 7.1 and converted to Quads using 3,412 BTU/kWh.

^e Note that ratios reported here were calculated without independent rounding.

^f As reported in Table A6.

^g A constant unit conversion, Table A6.

The fossil fuel equivalency approach to calculating RE source energy may be sufficient when the level of RE generation is small. However, with generation from RE resources increasing due to the continued trend of de-carbonizing the grid, the importance of the RE source energy accounting methodology also increases. EERE believes that using the “captured energy” approach most accurately reflects how RE generation differs from other types of conventional generation, and is therefore the best way to include it when accounting for the benefits of energy efficiency measures and standards.

Purpose

The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, government agencies, and other stakeholders on issues related to the proposed modification to the accounting of RE source energy. EERE proposes to replace the fossil-fuel equivalency approach with the alternative captured energy approach presented above. This would impact the site-to-source ratios used in analyses that inform EERE reports, standards, and evaluations. This methodological choice is important as renewable generation continues to grow and accounts for more significant portions of the nation's electricity production. This is not announcing a proposed rule or policy change at this time, and is solely an effort to gather information from stakeholders to help inform EERE on whether a change to the source energy calculation should be proposed.

Request for Information Categories and Questions

1. Describe your organization and its relationship to any EERE products, analyses, or standards.
2. Please provide comment on the proposed change in methodology from the current "fossil fuel equivalency" (e.g. 9,541 BTU/kWh) to the "captured energy" approach (e.g. 3,412 BTW/kWh) discussed in the background section. What are the advantages and disadvantages of each? How might it affect you/your organization?

3. Please describe any alternative methodology not discussed in the background section that you think merits consideration, along with the advantages and disadvantages.

4. Please describe any other important aspects of primary energy and site-to-source ratio methodologies for EERE to consider. What are these aspects and why are they important?

Request for Information Response Guidelines

Responses to this RFI must be submitted electronically to EERE.Analysis@ee.doe.gov no later than 5:00 pm (ET) on March 14, 2016. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e., zipped) to ensure message delivery. Responses must be provided as a Microsoft Word (.docx) attachment to the email, and no more than 20 pages in length, 12 point font, 1 inch margins. Only electronic responses will be accepted.

Please identify your answers by responding to a specific question or topic if applicable.

Respondents may answer as many or as few questions as they wish. EERE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

Respondents are requested to provide the following information at the start of their response to this RFI:

- Company / institution name;
- Company / institution contact;

- Contact's address, phone number, and e-mail address.

Confidential Business Information

Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well marked copies: one copy of the document marked “confidential” including all the information believed to be confidential, and one copy of the document marked “non-confidential” with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include: (1) A description of the items; (2) whether and why such items are customarily treated as confidential within the industry; (3) whether the information is generally known by or available from other sources; (4) whether the information has previously been made available to others without obligation concerning its confidentiality; (5) an explanation of the competitive injury to the submitting person that would result from public disclosure; (6) when such information might lose its confidential character due to the passage of time; and (7) why disclosure of the information would be contrary to the public interest.

Issued in Washington, DC on February 9, 2016.

Kathleen Hogan,
Deputy Assistant Secretary.

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