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HTTP Response Header Field: Carbon-Emissions-Scope-2

Abstract

This document defines the "Carbon-Emissions-Scope-2" HTTP response
header field for reporting the amount of carbon emissions associated
with processing a given HTTP request, as calculated according to the
Scope 2 protocol outlined in ISO 14064-1:2006.

Status of This Memo

This Internet-Draft is submitted in full conformance with the
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1. Introduction

The growing awareness of the environmental impact of internet usage
has led to increased interest in measuring and reducing the carbon
footprint of web-based services. One way to achieve this goal is to
report the carbon emissions associated with the processing of HTTP
requests, so that service providers and consumers can make more
informed decisions about their use of the web.

This document defines the "Carbon-Emissions-Scope-2" HTTP response
header field [RFC9110][RFC9112], which allows servers to report the
amount of carbon emissions associated with the processing of a given
HTTP request, and the building of the corresponding HTTP response,
as calculated according to the Scope 2 protocol outlined in
[ISO14064-1]. The Scope 2 protocol provides a standardized method
for quantifying and reporting the greenhouse gas emissions
associated with the consumption of purchased or acquired
electricity, steam, and heating or cooling. By reporting the carbon
emissions associated with the processing of a request, web service
providers can give consumers greater visibility into the
environmental impact of their service.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
"SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and
"OPTIONAL" in this document are to be interpreted as described in
BCP 14 [RFC2119][RFC8174] when, and only when, they appear in all
capitals, as shown here.

2. Header Field Definition

The "Carbon-Emissions-Scope-2" header field is a response header
field that indicates the amount of carbon emissions associated with
the processing of a given HTTP request, as calculated according to
the Scope 2 protocol outlined in [ISO14064-1]. The value of this
header field MUST be a non-negative decimal number expressed in
grams of CO2-eq (carbon dioxide equivalent).

A server MAY include the "Carbon-Emissions-Scope-2" header field in any response to an HTTP request. If a server includes the header field in a response, it indicates that the reported emissions are associated with the processing of the request, including any server-side processing and any use of energy by third-party services involved in serving the request.

The header field MAY be included in any response status code. However, it is particularly useful in responses that include a representation of a resource, such as a web page or image, where the processing and delivery of the representation is likely to result in significant carbon emissions.

The syntax of the "Carbon-Emissions-Scope-2" header field is as follows:

```
Carbon-Emissions-Scope-2 = grams-co2
grams-co2 = 1*DIGIT [ "." 1*3DIGIT ]
```

Figure 1: Syntax for the "Carbon-Emissions-Scope-2" header field.

The "grams-co2" value is the number of grams of CO2 emitted associated with the processing of the corresponding HTTP request, as calculated according to the Scope 2 protocol outlined in [ISO14064-1].

3. IANA Considerations

This document requests the registration of the "Carbon-Emissions-Scope-2" HTTP response header field in the "Hypertext Transfer Protocol (HTTP) Response Header Fields" registry maintained by the Internet Assigned Numbers Authority (IANA).

The registration template for the "Carbon-Emissions-Scope-2" header field is as follows:

Header field name: Carbon-Emissions-Scope-2

Applicable protocol: http

Status: standard

Author/Change controller: IETF

Specification document(s): This document

Related information: None

Figure 2: Registration template for the "Carbon-Emissions-Scope-2" HTTP
response header field.

4. Security Considerations

The use of the "Carbon-Emissions-Scope-2" header field does not
introduce any new security risks beyond those associated with the
transmission of any HTTP response header field. However, it is
important to note that the accuracy of the reported carbon emissions
depends on the accuracy of the data used in the Scope 2 calculation,
as well as the accuracy of any assumptions made in the calculation.
As such, an attacker could potentially attempt to manipulate the
reported emissions by tampering with the data or assumptions used in
the calculation, or by interfering with the energy sources used by
the server or third-party services involved in serving the request.

To mitigate these risks, it is important for servers to use accurate
data and assumptions in their Scope 2 calculations and to protect
the integrity and availability of their energy sources.
Additionally, it may be useful to provide transparency and
verification mechanisms to ensure the accuracy of reported
emissions.

5. References

5.1. Normative References

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC
           2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174,
           May 2017, <https://www.rfc-editor.org/info/rfc8174>.

5.2. Informative References

[ISO14064-1] ISO, "Greenhouse gases -- Part 1: Specification with
           guidance at the organization level for quantification and
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[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
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[RFC9110] Fielding, R., Ed., Nottingham, M., Ed., and J. Reschke,
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[RFC9112] Fielding, R., Ed., Nottingham, M., Ed., and J. Reschke, Ed., "HTTP/1.1", STD 99, RFC 9112, DOI 10.17487/RFC9112, June 2022, <https://www.rfc-editor.org/info/rfc9112>.

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