

Environmental impact resource file specification for InfraCO2

The file specification of the environmental impact of resources defines the structure and field and values of the resource data for emissions database for infrastructure construction InfraCO2 at https://co2data.fi/api/co2data_infra.json. The database resources represent generic inputs (materials, products, transport and machinery) to infra construction and each input has descriptive data and indicators. Main indicator for each input is Global warming potential (GWP).

The specification is used and maintained by Finnish Environment Institute and based on a building construction resource file specification of national building code agencies of Sweden and Finland.

This document

The environmental impact resource file specification exists to help developers understand the content and structure of the data file.

This document might have translated versions. Any discrepancies between interpretations of different language versions should be resolved against the English version.

The structure of the document is built loosely on the structure of the file.

In examples the JSON code can be abbreviated with required fields omitted. Such abbreviations are marked with three dots, "...".

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Root object

The JSON file consists of a root object with one or two objects and three fields.

```
{
  "Location": "FI",
  "Culture": "fi-fi",
  "Version": "0.1.02",
  "Publisher": "SYKE, Finland",
  "PublishDate": "2022-11-26T13:13:46.835Z",
  "Resources": [
    ...
  ]
}
```

The root object of the file.

Fields

Location

Content

The field contain the ISO 3166 two-letter subculture code associated with a country or region of the country or region that the dataset is valid for. "FI" for Finland or "SE" for Sweden.

Not required

The Location field is NOT required. However, if this field is omitted the corresponding fields for Location are required on all Resource objects within the file.

Culture

Content

The culture field is a string conforming to one of the language and culture codes of RFC 4646. The RFC 4646 format for the culture name is <languagecode2>-<country/regioncode2>, where <languagecode2> is the language code and <country/regioncode2> is the subculture code. For example, es-CL for Spanish (Chile), en-US for English (United States), and en-AU for English (Australia). RFC 4646 is a combination of an ISO 639 two-letter culture code associated with a language and an ISO 3166 two-letter subculture code associated with a country or region.

At the writing of the current revision of this document, the actually used codes are confined to one of 'fi-fi', 'sv-se' and 'en-gb'.

One deviation from the RFC 4646 is allowed; the entire culture code can be in any case. That is; sv-se, SV-se and sv-SE are all considered equal and accepted in this specification, even though RFC 4646 only accepts the last example.

Not required

The field is not required. However, if this field is omitted the corresponding fields for Culture are required on all Category and Resource objects within the file.

Version

Content

The field contain the published version identifier on the format major.minor.revision, where the major and minor has two digits and the revision has three digits.

As how the version number is produced is left to the publisher and hence not defined in this document. However, it is a requirement that one published version that follows another published version has a higher version number than the previous one.

```
"Version": "01.00.000",
```

Example of Version. The example denotes a major version of 1, a minor version of zero and no revisions.

Not required

The Version field is NOT required. However, if this field is omitted the corresponding fields for Version are required on all Resource objects within the file.

Publisher

Content

The field is a string with max length 50 characters in UTF-8 that in a short form describes the publisher.

Not required

The Publisher field is NOT required. However, if this field is omitted the corresponding fields for Publisher are required on all Resource objects within the file.

PublishDate

Content

The field contain the date of the published version in ISO8601 format (adopted in Sweden as SS-ISO 8601:2011 and in Finland as SFS-EN 28601).

```
"PublishDate": "2021-01-02T02:00:03.23Z",
```

Example of PublishDate.

Not required

The PublishDate field is NOT required. However, if this field is omitted the corresponding fields for PublishDate are required on all Resource objects within the file.

Resources

Content

The other object is named Resources and contains an array of resource data.

For any resource in the file the file describes the data as a whole. The specification has no provisions for partial data objects.

Not required

The Resources node is NOT required, though, it can be considered to be required, even though it is not formally designated as such by this specification; a file that defines generic resources that has no resources might be a bit pointless.

However, any external parsing of the file must accept that Resources might not exist in a file.

Resources node

The Resources node is an array that holds zero or more Resource objects.

Resource

The Resource object describes a generic resource in respect of climate and environmental impacts. The Resource object is comprised of a large number of fields.

This object can also be delivered standalone through API, if and when the national publisher hosts an API solution. Any API related information is out of the scope for this specification.

```
...
{
  "ResourceId": "7100000001",
  "Version": "0.1.01",
  "ProductSystemId": 7,
  "ProductSystemResourceId": "",
  "Name": "valmisbetoni, C20/25, ei huokostettu",
  "UpdatedTime": "2022-11-26T13:13:46.835Z",
  "InventoryUnit": "m3",
  "WasteFactor": 1.05,
  "DataItems": [
    . . .
  ],
  "Material": {
    "Recycled": 0
  },
  "Categories": [
    . . .
  ],
  "Report": "INFRA_kuivatuotteet_R01.01.pdf",
  "ReportURL":
  "https://co2data.fi/infra/reports/INFRA_kuivatuotteet_R01.01.pdf"
},
...
```

An example of the Resource object.

Fields

ResourceId

Content

The ResourceId field is generally used as a key in a database. It is an unsigned 8 byte integer (U_INT64), comprising of 10 digits where the first digit is the ProductSystemId.

Required

The ResourceId field is required.

Version

Content

The field contain the published version identifier on the format major.minor.revision, where the major and minor has two digits and the revision has three digits. This is the published version, rather than the version of the resource. The SourceVersion may differ from the Version field in some cases, and in generic terms the Version field is the field to be used for versioning.

As how the version number is produced is left to the publisher and hence not defined in this document. However, it is a requirement that one published version that follows another published version has a higher version number than the previous one.

```
"Version": "01.00.000",
```

Example of Version. The example denotes a major version of 1, a minor version of zero and no revisions.

Not required

The Version field is NOT required. However, if this field is omitted the corresponding field for Version is required on the root object of the file.

ProductSystemId

Content

The ProductSystemId field is an integer between 1 and 20 that describes the type of data and the sender. Currently two ProductSystemResources are used for generic data; 6 and 7 where 6 is Swedish average, published by The Swedish National Board of Housing, Building and Planning, and 7 is Finnish average, published by Finnish Environment Institute (SYKE).

Required

The ProductSystemId field is required.

ProductSystemResourceId

Content

The ProductSystemResourceId field is an UUID, Universally unique identifier, of the resource. This is meant to be used as a resource identifier for systems that rely on a UUID (or Guid) for keeping identity and can hence be seen as an alternative key.

Not required

The ProductSystemResourceId field is required and must be universally unique.

PublishDate

Content

The field contain the date of the published version in ISO8601 format (adopted in Sweden as SS-ISO 8601:2011 and in Finland as SFS-EN 28601).

```
"PublishDate": "2021-01-02T02:00:03.23Z",
```

Example of PublishDate.

Not required

The PublishDate field is NOT required. However, if this field is omitted the corresponding field for PublishDate is required on the root object of the file.

Location

Content

The field contain the ISO 3166 two-letter subculture code associated with a country or region of the country or region that the dataset is valid for. "FI" for Finland or "SE" for Sweden.

Not required

The Location field is NOT required. However, if this field is omitted the corresponding field for Location is required on the root object of the file.

Publisher

Content

The field is a string with max length 50 characters in UTF-8 that in a short form describes the publisher.

Not required

The Publisher field is NOT required. However, if this field is omitted the corresponding field for Publisher is required on the root object of the file.

Name

Content

The field is a string with max length 80 characters in UTF-8 that in a short form describes the resource.

Required

The Name field is required.

Names

Content

The field is an array of Names, with a key-value pair of a string of 2 characters for the key and a value string with max length 80 characters in UTF-8 that in a short form describes the resource.

The key is an ISO 639 two-letter culture code associated with a language and the value is the name of the resource in the keys language.

Not required

The Names field is NOT required.

UpdatedTime

Content

The field contain the date of when the resource was last updated in ISO8601 format (adopted in Sweden as SS-ISO 8601:2011 and in Finland as SFS-EN 28601). This field can be used to check if a new version of a resource has changed in respect to the previous version of the resource.

Required

The UpdatedTime field is required.

InventoryUnit

Content

The field contains the unit used for the measurements of the resource. This value is typically used as the “per” part of the GWP data, for example kg CO₂e/**kg** (where the bold kg is the InventoryUnit). Examples include kg, MJ and m2.

Required

The InventoryUnit field is required.

WasteFactor

Content

The field is a float of 1 or larger that describes the generic relation of waste on the construction site.

Not required

The WasteFactor field is NOT required.

Dataltems

The Dataltems is an array of Dataltem objects.

Required

The Dataltems array is required.

```
...
  "DataItems": [
    {
      "PropertyId": 1,
      "PropertyName": "Global Warming Potential",
      "PropertyUnitCode": "kg CO2e /m3",
      "DataValueItems": [
        {
          "DataModuleCode": "A1-A3 Fossil",
          "Value": 210
        }
      ]
    }
  ]
}
```

```

    ]
  },
  {
    "PropertyId": 2,
    "PropertyName": "GWP per kg",
    "PropertyUnitCode": "kg CO2e /kg",
    "DataValueItems": [
      {
        "DataModuleCode": "A1-A3 Fossil",
        "Value": 0.088
      }
    ]
  }
],
...

```

A continuation of the excerpt of an example of the Resource object, the DataItems and DataValueItems arrays.

DataItem

The DataItem contains information on environmental data for the resource.

PropertyId

Content

The field is an integer typically used as a key in a database. It is also a key to in a simplistic way find the correct data value items for a specific environmental value.

Required

The PropertyId field is required.

PropertyName

Content

The field is a UTF-8 encoded string with a max length of 50 characters. It can be used to find the correct data value items for a specific environmental value.

Required

The PropertyName field is required.

PropertyUnitCode

Content

The field is a UTF-8 encoded string of a maximum of 20 characters that has the unit of the calculated values.

Required

The PropertyUnitCode is required.

DataValueItems

This is an array of DataValueItem objects.

Required

The DataValueItems is required.

DataValueItem

A data value item has two fields.

DataModuleCode

Content

The field is a string in UTF-8 encoding of a maximum of 30 characters. It contains the kind of value that the Value field has.

Required

The DataModuleCode field is required.

Value

Content

The field is a float. It is the actual environmental indicator value.

Required

The Value field is required.

--end dataItems--

Material

This array contains information on materials used.

Content

The Material field contains a MaterialItem.

Not required

The Material field is NOT required.

MaterialItem

The MaterialItem object has one field.

Recycled

Content

This is the percentage of recycled materials in the resource.

Not required

The Recycled field is NOT required.

Resources categories

Categories

The Categories is an array of ResourceCategory objects.

Required

The Categories array is required.

```
...
  "Categories": [
    {
      "CategorySystem": "group",
      "Title": "betoni"
    },
    {
      "CategorySystem": "subgroup",
      "Title": "valmisbetoni",
      "Group": "betoni"
    }
  ],
...

```

A continuation of the excerpt of an example of the Resource object, the Categories array.

ResourceCategory

CategorySystem

Content

The field is a string in UTF-8 encoding of a maximum of 127 characters. It describes what category system that is used.

Not required

The CategorySystem field is NOT required.

Code

Content

The Code field contains a code associated with the current category. It is a string with a length of maximum 50 characters in UTF-8.

Not required

The Code field is NOT required.

Title

Content

The Title field is the name, title, heading or other significant human readable text associated with the current category. It is a string with a length of maximum 255 characters in UTF-8.

Not required

The Title field is NOT required.

Group

Content

The Group field is the name, title, heading or other significant human readable text associated with the parent of the current category. It is a string with a length of maximum 255 characters in UTF-8.

Not required

The Group field is NOT required.

--end Categories---

Report

Content

The field is a string of characters in UTF-8 with a max length of 127 characters that contains the file name of the environmental impact report for the generic resource.

Not required

The Report field is NOT required.

ReportURL

Content

The field is a string of characters in UTF-8 with a max length of 512 characters that contains a unified resource locator, (URL) to the environmental impact report for the generic resource.

Not required

The ReportURL field is NOT required.