Methodological approach “Carbon footprint” service

Tracking changes to the document

Version	Date	Action	Author
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1. Introduction

Assessing carbon footprint is a complex operation that cannot be equated with a simple accounting calculation. There is no single, universally recognized method; several standards coexist, each defining its own scope, levels of granularity, and calculation assumptions.

In this context, every organization must make trade-offs. These decisions depend on the availability and quality of internal data, strategic priorities such as operational management and regulatory compliance, and confidentiality and security requirements designed to limit the risks of reverse engineering. They are also influenced by the organization's level of maturity in addressing environmental issues.

Despite these constraints, it remains essential to understand and control the footprint generated, while providing our customers with the necessary management tools to assess and optimize the environmental impact of their use of cloud services.

2. How do we measure the carbon impact of your cloud services?

Our methodological approach therefore aims to provide a consistent estimate of our clients' carbon footprint. Rather than seeking absolute precision, which is unrealistic given the diversity of uses and available data, we prioritize clarity of assumptions and robustness of the principles applied.

Our ambition is to provide each customer with a useful and understandable estimate of their carbon footprint, while remaining true to the spirit of transparency: explaining the choices and trade-offs necessary to transform customer data into carbon footprint estimates, the benchmarks and emission factors on which we rely, and possible developments, as this approach is set to evolve as new data and standards emerge.

2.1 Scope

- **Temporal Coverage Scope:** the approach applies to the 36 most recent months available starting from January 2024.
- **Geographical Coverage:** the proposed estimate initially covers only the eu-west-2 and cloudgouv-eu-west-1 regions (SecNumCloud). Other regions will be included in subsequent versions, enabling global coverage (WW).
- **Service Coverage:** not all cloud services are included yet. The methodology will evolve to gradually expand the scope. The services currently covered are:
  - Virtual Machines
  - GPUs
  - Storage

Other services, which can be managed, will be gradually integrated to reflect OUTSCALE's entire portfolio of cloud services.

2.2 Guiding principles

- **Consistency and comparability**: a uniform approach across clients and over time.
- **Pragmatism:** a useful estimate, even if it is neither exhaustive nor perfectly accurate.
- **Transparency:** regarding methodological choices.
- **Scalability:** method designed to be enhanced (more services, improved benchmarks, broader coverage).

2.3 Methodological approach

2.3.1 Selected emission sources

We have chosen to focus our analysis on a targeted selection of emission sources that consider three key aspects :

- **Significant impact** : the selected sources represent the primary sources of greenhouse gas emissions related to the client's activities. They enable the majority of the carbon footprint to be captured, in accordance with the principle of materiality.
- **Data availability** : we prioritized sources for which reliable, traceable, and usable data were available to ensure the robustness of the calculations.
- **Identifiable levers of action** : the selected sources offer room for implementing optimization strategies (energy, sustainable procurement, etc.).

Only emissions directly attributable to activities related to the cloud services offered to customers are included. Certain categories of emissions (e.g., support functions, non-service-related activities) are excluded.

Selected carbon emissions sources
• Data center power consumption: energy used to power servers, storage devices, network equipment, and cooling systems in data centers • Hosting • Network • Equipment deployed in data centers • Maintenance of equipment deployed in data centers

Our approach to estimating the carbon footprint of our clients' cloud services is driven by a commitment to transparency. Below, we outline the methodological choices, the decisions made, the references, and emission factors used. This approach is set to evolve and improve as new data and standards emerge.

CARBON EMISSIONS SOURCES	METHODOLOGICAL APPROACH CALCULATION	EMISSION FACTORS
Electricity (Electricity consumption of Datacenters)	Overall electricity consumption per data center X per data center PUE X Emission factor AIB https://www.aib-net.org/facts/european-residual-mix/2022 (location based)	Physical emission factor
Hosting	Amount of “hosting” purchases in k€ for the reference year X Monetary emission factor associated with hosting	Monetary emission factor
Network	Amount of “network” purchases in k€ for the reference year X Monetary emission factor associated with the network	Monetary emission factor
Hardware	Carbon footprint of each piece of equipment or generic carbon footprint by type of equipment (if data unavailable) / number of years of depreciation from the date each piece of equipment entered into service	Physical emission factor
Hardware Maintenance	Amount of “equipment maintenance” purchases in k€ for the reference year X Monetary emission factor associated with equipment maintenance	Monetary emission factor

2.3.2 Emissions factors used : a hybrid approach

To estimate a customer's carbon footprint in a realistic and operational manner, we used a combined approach based on two types of emission factors: monetary and physical. This method allows for adaptation according to the nature of the available data and should seek a higher level of accuracy whenever possible. However, the factors used are estimates and involve margins of uncertainty that must be explicitly taken into account.

Monetary emissions factors express emissions in tCO_2eq per unit of expenditure (€) and vary depending on the categories of expenses (e.g., purchases of goods, services, energy). These monetary ratios (expressed in kg CO2eq/€) are particularly useful when physical data (quantities, weight, volumes) are not available.

- The monetary emissions factors used come from three distinct sources : the ADEME carbon base, the American environmental data archive CEDA (Comprehensive Environmental Data Archive), and the American Environmental Protection Agency (EPA) archive.

Physical emission factors convert physical units (km, kWh, kg, etc.) into emissions using physical emission factors (expressed in kg CO2eq/physical unit). This approach is more precise as it relies on technical or operational data directly linked to the activity.

- The physical emission factors used are based on the evaluation of the "carbon emission" of equipment provided by our manufacturers for data center hardware (Product Carbon Footprint hardware) and on the energy mix by country for Europe (AIB).

This hybrid approach should enable the production of a customer carbon footprint estimate that is both realistic and adapted to the constraints related to data availability and quality.

2.3.3 Focus on datacenters’ electricity data

Our methodological approach to calculating the impact of electricity consumption in data centers is deliberately based on a "location-based" perspective. The French electricity mix is mainly dominated by nuclear power, followed by hydropower, then wind and solar energies. This makes France a country that is significantly decarbonized compared to other European countries.

OUTSCALE has chosen partners who are respectful and committed to a process of eco-responsibility and sustainability, and who are 100% supplied by renewable energy in France via guaranteed certificates of origin. As part of our environmental reporting for our customers, we have chosen to adopt a “location-based” rather than a “market-based” approach, which would have been much more favorable (almost 0 tCO2 eq for scope 2), in order to comply with ADEME guidelines. The emission factor used for France's energy mix comes from the AIB source and is updated for each reference year. The estimate of the carbon footprint linked to the electricity consumption of data centers is therefore based on the data center's electricity consumption, its PUE (Power Usage Effectiveness, energy efficiency indicator) - confidential data provided by our data center partners - and the emission factor of France's energy mix.

2.3.4 Focus on hardware and maintenance data

We apply environmental depreciation to equipment located in data centers as well as to their maintenance. In line with ADEME methodology, the carbon impact of purchased equipment is spread over five years, similar to an accounting depreciation approach. This provides a more comprehensive and realistic view of the equipment fleet. Conversely, the GHG (Greenhouse Gas Protocol) includes the carbon impact of capital goods purchased only in the year of the balance sheet (investments for the current financial year), which can create a very large variability in the carbon footprint. With regard to equipment maintenance, this is based on the actual duration of our equipment maintenance contracts, which may vary depending on the equipment.

2.3.5 Customer carbon footprint estimation

Past years

For previous years, we have adopted a retrospective approach to provide a consistent estimate of the carbon footprint associated with our customers. The customer carbon footprint calculated in this way is not identical to the company's overall carbon footprint: some emission items have been deemed not directly attributable to customers, while others have been refined to better reflect their actual usage. The first step is therefore to establish the reference customer carbon footprint.

Secondly, we have developed an internal model to allocate this customer carbon footprint between our various services and customers. This allocation is based on relevant activity indicators and consistency rules that we have defined in order to best reflect the relative contribution of each service and each customer. OUTSCALE's infrastructure is a public cloud-type service infrastructure where its computing resources (processing power, memory, storage, networking, etc.) are shared between different customers.

The allocation model is presented in such a way as to ensure continuous improvement and enable adaptation to future developments. This approach takes into account the absence of a single, universally recognized standard in this field. The objective is to produce robust, consistent, and comparable estimates from one year to the next. These estimates must remain aligned with the methodological standards established and recognized by the professional community.

This retrospective approach enables us to provide a consolidated and consistent view of our clients' carbon footprint for years N-1 and N-2, based on effectively consolidated and validated data.

The start date for data collection is January 2024. Data is displayed and stored for a period of 3 years. Beyond this period, it will be the customer's responsibility to ensure that the necessary data is exported via API for previous years.

Current year

Estimating the carbon footprint for the current year presents particular challenges. This is because all the data needed to consolidate a full year is only available after a time lag, making it impossible to perform an immediate retrospective calculation.

To overcome this difficulty, a forecasting approach is used. This is based on an analysis of consolidated data from the last 24 months and should enable us to anticipate the evolution of the carbon footprint for year N.

This method guarantees the production of a consistent and usable estimate, even in the absence of definitive data.

3. Conclusion and future outlook

Our approach aims to provide a useful and transparent estimate of our clients' carbon footprint. However, it is based on a number of choices and constraints that should be kept in mind.

- **Estimative nature**: the results presented should be considered as estimates. They provide a coherent and comparable order of magnitude, but do not constitute an exact and exhaustive measurement.

- **Variability of frameworks**: there is currently no single, universal standard for calculating carbon footprints. Several methodologies and emission factor databases coexist, which can lead to discrepancies among different actors.

- **Partial scope**: certain cloud services and geographic areas are not yet covered by the current methodology. The scope will be progressively expanded to include an increasing portion of our activities.

- **Expected improvements**: our approach is designed to evolve. It will be enriched by the integration of new services, better data availability, regular updates of emission factors, and the refinement of our allocation models.

Beyond these limitations, the information produced now offers customers several concrete prospects:

- **better understand the environmental impact associated with their cloud usage,**
- **track the evolution of their carbon footprint from one year to the next,**
- **identify opportunities for reduction, and**
- **integrate this data into their own sustainability initiatives.**

In summary, our methodology is based on a logic of continuous improvement. It will evolve as standards advance, the available data matures, and our clients' expectations change. The goal is to strengthen the robustness and relevance of estimates and to provide a decision-making tool for environmental transition strategies.

4. Limitation of liability

The figures corresponding to the customer's CO2 emissions related to the cloud service are based on the best available data and are provided as estimates. OUTSCALE makes no express or implied warranty, including, without limitation, the completeness and accuracy of the information or any implied warranty of fitness for a particular purpose or merchantability. OUTSCALE shall not be liable to any customer benefiting from these estimates as a result of their use by the latter.

5. Access to information

Available to our clients in France starting November 5, 2025.
The information is accessible via cockpit and API. You will find details in the public API documentation and in the cockpit.

6. Glossary

Emission Factor
An emission factor is a value that allows for the estimation of the quantity of greenhouse gases (GHGs) or pollutants emitted by a given activity, product, or service. It is typically expressed in kilograms of CO_2 equivalent (kg CO_2e) per unit of activity.

Energy Mix
An energy mix refers to the distribution of different energy sources used to meet a country's needs. It reflects the relative share of each type of energy in total consumption. An energy mix typically includes a combination of fossil fuels (such as coal, oil, and natural gas), renewable sources (such as wind, solar, hydroelectric, and geothermal), and nuclear energy.

CO2 Emissions (kgCO2eq)
It refers to the amount of greenhouse gas emitted during an activity, expressed in kilograms of carbon dioxide equivalent, to compare the climate impact of different gases over a given period.

PUE (Power Usage Effectiveness)
PUE is a key indicator used to measure the energy efficiency of data centers. It represents the ratio of the total energy consumed by a data center to the energy used directly to power the IT equipment (servers, storage, networks). It allows the energy efficiency of data centers to be estimated and, by extension, their environmental impact.

Energy Consumption
This refers to the electrical energy consumed by servers and associated infrastructure (networks, cooling, etc.) to ensure the proper functioning of cloud services. Energy consumption is a key factor because the production and use of electricity are often associated with CO2 emissions, depending on the energy sources used (fossil, renewable, etc.).

Location-Based
Emissions are calculated based on the average carbon intensity of the electricity mix in the grid where the electricity was consumed. Thus, for a French company, the average French electricity mix would be considered, for a German company, the average German electricity mix, etc.

Market-Based
The emissions considered are related to the carbon intensity of the production methods or electricity contracts chosen by the company. In several frameworks, the market-based method allows for Scope 2 emissions to be set to zero (emission factor = 0 gCO_2e/kWh if a green energy contract). If the source of the electricity cannot be traced, then the residual mix is used by default.