

VISA

Visa Consulting & Analytics (VCA)

Data-Driven Capabilities for Sustainability



Visa's Sustainability Index

Measuring the carbon footprint of purchases

Most goods and services that we purchase have an associated pollutive impact on the environment. There are several ways to measure that impact, one of them being the so-called 'carbon footprint'. However, measuring the carbon footprint of any given goods or services is difficult without granular data relating to the environmental impact from human activity and consumption. Therefore, there is demand for quantitative data-driven methods to measure greenhouse gas emissions and develop tangible ways to reduce them. Our focus is on using transactional data to understand the level of carbon dioxide (CO₂) emissions associated with the goods or services being purchased.



Did you know that the average carbon emission per individual worldwide equates to 4.6 metric tonnes of CO₂ per year¹?

How can individuals and businesses reduce their carbon footprint and what role could financial institutions play in facilitating their net zero journey? Financial institutions can play a big role in helping individuals and businesses across sectors to reduce their emissions through:

Providing them with a better understanding of how their purchases impact the environment

Providing them with options to offset the emissions originating from their expenditure

Encouraging environmentally friendly behavior

Enabling a smooth transition into a more resilient and sustainable economy for future generations

We present a solution that Visa has developed to shed some light on the carbon footprint of retail purchases.

¹ Crippa, M., Guizzardi, D., Solazzo, E., Muntean, M., Schaaf, E., Monforti-Ferrario, F., Banja, M., Olivier, J.G.J., Grassi, G., Rossi, S., Vignati, E., GHG emissions of all world countries - 2021 Report, EUR 30831 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-41547-3, doi:10.2760/173513, JRC126363



Why use Visa's network (VisaNet) to measure carbon footprint?

At Visa, we have developed a solution to approximate the CO2 emissions associated with every purchase. Combined with external sources on carbon emission of various sectors and products, our tool estimates the general carbon emissions intensity per purchase and helps individuals and businesses to better understand the impact of their transactions on the environment.

Moving money globally



Source: Visa Inc.



Our vision is to be the best way to pay and be paid for everyone, everywhere.



Constructing and visualizing the carbon footprint from purchasing

By combining VisaNet data, which indicates the share of consumption by sector at the merchant category code (MCC2) level, with external information on sectoral emissions (drawn from UK government’s DEFRA3 database), we can establish an approximation of the CO2 emission per US\$ at MCC level. Based on this approximation, and by multiplying the spend amount by the MCC carbon intensity, we can calculate the net CO2 (kg) emitted for the good or service that is being purchased.

Worked example

Consider an individual’s monthly purchases using the hypothetical figures in the example below. This person spends about US\$1,000 per month, and different categories have different carbon intensities. At the end of the month, the individual can see a summary and detailed breakdown of his or the CO2 emissions relating to each purchase category and get insights on how to reduce his or her impact.

Visualizing CO2 emissions for different purchasing categories

	Food/Groceries	Retail	Travel	Fuel/Utilities	Entertainment	Services	Government	Total
Monthly spend in category (US\$)	168	106	44	152	80	421	78	1,049
Kg CO2 emissions per US\$	0.2	0.2	0.3	1.7	0.2	0.2	0.02	
Net Kg CO2	34	21	13	258	16	84	2	428



2 Visa Inc. Merchant Data Standards Manual. 1 November 2021. <https://usa.visa.com/content/dam/VCOM/download/merchants/visa-merchant-data-standards-manual.pdf> Accessed 21 June 2022.

3 Gov.uk Department for Environment, Food & Rural Affairs. UK’s Carbon Footprint. 4 November 2021. UK’s carbon footprint - GOV.UK (www.gov.uk). Accessed 21 June 2022.





Our index does not estimate the exact carbon footprint of consumption. It is difficult to do this without item-level purchase information and end-to-end supply chain visibility. However, as a benchmarking tool, it can provide consumers with guidance on how to make more informed sustainable purchases, based on the relative carbon emission intensity of different sectors.

Therefore, the Visa Sustainability Index was developed as a framework to score the approximate CO2 emission for each retail transaction by Visa cardholders. The framework is a generic benchmarking tool, not an exact calculation of consumer carbon footprint and should only be used as a proxy to understand relative CO2 emissions at a sectoral level.

The strength of our approach lies in the ability to compare emissions based on the purchasing activity of Visa cardholders using big data and analytics. It also encourages greener consumer behaviors in a direct and relevant way. Having a raw CO2 emissions amount in Kg is not very meaningful without a reference to determine if this is a 'high' or 'low' CO2 emission profile. Therefore, our score provides both a carbon footprint measure and a point scale to help cardholders understand how their carbon footprint compares to their peers' (information they would have had to spend a lot of effort to piece together on their own, if at all). It also aims to deliver a positive and tangible message to consumers on how they can become better aware of the CO2 emissions of their transactions.



Benefits and limitations of our approach

Benefits of our approach

- 1 The carbon footprint calculation used by the Visa Sustainability Index is derived from a global transactional dataset, and enables the benchmarking of emissions relating to purchasing using Visa products, and provides insight for consumers. This sets our method apart as it uniquely combines VisaNet share-of-spend information with public datasets on carbon intensity, mapped to each MCC.
- 2 The carbon intensity multipliers provide a means to compare the carbon emissions of a given purchase relative to lower CO2 intensity purchases from MCCs associated with lower emission levels. We relate this information to spend amounts to provide a meaningful breakdown of top emission contributors.
- 3 The product level mappings from the DEFRA3 database enable us to refine the model with basket-level information, so more granularity is possible as line-item-level data becomes available.
- 4 We include the share of spend using Visa products in the calculation, which is unique to our approach. We also aim to relate this back to the national emissions figures (CO2 Emissions per Dollar GDP) published in the EDGAR^{1,4} database.

Limitations of our approach

- 1 The model is meant to be used as an approximation tool. It is not an exact measure of the carbon footprint of a purchase.
- 2 The model currently does not account for the differences in carbon intensity for different countries. Since we use the DEFRA figures (a UK-specific database⁵) to map MCCs to Classifications of Individual Consumption for Purpose (COICOP⁶), we assume that a Kg of meat bought in the UK has the same carbon intensity multiplier as a Kg of meat bought in Singapore (or in any other country where we provide the Visa Sustainability Index). However, our method does localize CO2 emissions by country and currency, by relating the VisaNet share of spend to CO2 Emissions per Dollar GDP as published in the EDGAR^{1,4} database. This unique localization approach enables us to estimate a more realistic carbon emission number through mapping individual sector contributions to CO2 per US\$ GDP.
- 3 We currently map the carbon intensity per US\$ to MCC. We acknowledge that MCCs are not as granular as the COICOP categories. In addition, merchants may inadvertently be tagged to the incorrect MCC (for example, due to ambiguity or duplication in classifications), in which case the inferences output from this approach will not be accurate until datasets are corrected at source.

⁴ Crippa, M., Guizzardi, D., Muntean, M., Schaaf, E., Solazzo, E., Monforti-Ferrario, F., Olivier, J.G.J., Vignati, E., Fossil CO2 emissions of all world countries - 2020 Report, EUR 30358 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-21515-8, doi:10.2760/143674, JRC121460. The EDGAR database of atmospheric research provides an independent estimate of greenhouse gases for each world country, based on a robust and consistent methodology stemming from the latest IPCC guidelines and most recent activity data.

⁵ Following the latest update released in September 2020, emission data are now available for fossil fuel based CO2 emissions for each country for the periods of 1970 to 2019 while national emissions for other GHGs are available from 1970 until 2015. We use the indicator outlining emissions as ton CO2/1K\$ converted to kg/USD GDP dollar spent. Gov.uk Department for Environment, Food & Rural Affairs. UK's Carbon Footprint. 4 November 2021. UK's carbon footprint - GOV.UK (<http://www.gov.uk>). Accessed 21 June 2022.

⁶ Eurostat. Glossary: Classification of Individual Consumption by Purpose. 12 December 2019. [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary%3AClassification_of_individual_consumption_by_purpose_\(COICOP\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary%3AClassification_of_individual_consumption_by_purpose_(COICOP)). Accessed 21 June 2022. COICOP is a standard for categorising household related expenditure. This standard has also been used for tagging consumption to emission factors and other spend indicators at a global level. The challenge with reconciling multiple standards is that there is no one-size-fits-all definition. Household expenditure & the COICOP standard were chosen as the most representative proxy for merchant categories, which are also consumption driven. Part of our exercise is to reconcile the two standards by making assumptions about the underlying supply chains that merchants tagged on key MCCs would be partaking in.

Scoring methodology



Overview

We measure the carbon footprint of purchases by following three key steps:

Step 1: Mapping the MCCs to purchased item level information from UN COICOP categories to obtain CO₂ intensity multipliers

Step 2: Calculating VisaNet share of spend by MCC and industry sector

Step 3: Measuring individual MCC contributions to CO₂ emission per 1 US\$ GDP to estimate country conversion factors

Step 1 COICOP to MCC mapping

The DEFRA3 database uses the COICOP6 standard to tag industry sectors and line items related to household consumption and approximate their CO₂ emissions. The financial sector, by contrast, uses approximately 1000 standard MCCs² to tag merchants and transactions to industry sectors. The majority of Visa accepting merchants are tagged to MCCs. Therefore, the first step in this exercise is to reconcile the two standards by mapping each MCC to the relevant COICOP categories based on the nature of the line items for each MCC.



Step 2 Calculating VisaNet share of spend by MCC and industry sector

After mapping COICOP categories to MCCs, we compute the VisaNet share of spend by industry sector to approximate individual MCC contributions to national CO2 emissions. The example below breaks down the calculation steps. Using illustrative data, we assume that the total monthly expenditure in each country was driven by the following categories. To calculate the carbon intensity per dollar spent, we combine the % share of spend (A_i) with the normalized CO2 intensity per dollar spent, as derived from the COICOP-MCC multipliers (w_i).

MCC Name	Total spend in Singapore (M US\$)	% share of spend (A _i)	COICOP mapping	COICOP mapping COICOP CO2 intensity (kg/US\$)	Normalized intensity multiplier (w _i) Mock data set
Veterinary services	20	12.5%	Veterinary	0.16	0.52x
Hotels	40	25%	Restaurants & hotels	0.15	0.49x
Women's fashion	10	6.25%	Clothing & footwear, garments	0.11	0.36x
Food & grocery	30	18.75%	Food & non-alcoholic beverages	0.11	0.36x
Fuel	40	25%	Gasoline, diesel and other oils	1.2	3.93x
Heating, plumbing, utilities	20	12.5%	Central heating repair, house maintenance	0.1	0.32x

(COICOP/ Avg COICOP 0.305 kg/US\$)

Step 3 Country conversion factors (localization)

The calculation assumes that expenditure from Visa products equates to an average value of CO2 per 1 US\$ GDP spent provided by the EDGAR worldwide atmospheric database. If the average CO2 emission per 1 US\$ GDP spent in each country is C kg per 1 US\$ GDP, we firstly identify a conversion factor (*country*) factor to determine the ratio between emission intensity and share of spend, if the weighted sum of individual MCC contributions average to the EDGAR C kg per US\$ GDP in Country X. We refer to this constant as a country conversion factor.

$$\sum_{i=mcc\ 1}^{mcc\ 1000+} A_i * w_i * \text{country} = C \quad \left(\text{kg per 1 US\$ GDP spent on cards for any Country X, taken from EDGAR}^4 \text{ database} \right)$$

A_i = % share of spend for MCC category i
 w_i = carbon intensity weight for category i

After finding out the constant value by filling in the carbon intensity (w_i) from COICOP and share of spend (A_i) from VisaNet, we can work out the carbon intensity per MCC as Kg per 1 US\$. A country conversion factor accounts for **Scope 1**, **Scope 2** and **Scope 3** emissions (see next section) which cannot be easily measured. For example, purchasing goods in Jamaica will have a different average carbon intensity (C) than the UK due to differences in energy production methods and the share of imported goods. As more granular data becomes available in more countries, we will eventually eliminate the country conversion factor from the Visa Sustainability Index calculation. The current frequency of refresh for the calculation is annual, depending on how regularly external databases are updated.



Sustainable Business Advisory

Helping businesses become greener with data

With data being a core pillar for ensuring the sustainable financing and operations of businesses, there is a clear need to create quantitative measurements for companies working towards net zero. How do we enable enterprises of all sectors and sizes to achieve their sustainability goals? How do we achieve consistency and transparency in ESG reporting?

The challenge here is that there is no clear path to net zero, so there is a need to create objective measures that businesses can use to measure progress on their decarbonization journey, relative to their peers across the world.

Understanding CO2 emissions of enterprises

For publicly listed companies, reporting CO2 emissions is becoming a mainstream practice and is mandatory in some countries. Private companies are slowly following suit. Industry emissions are typically classified into **Scope 1**, **Scope 2** and **Scope 3**. The greenhouse gas protocol standard⁷ classifies emissions as follows:

Scope 1

Direct greenhouse gas emissions originating from company operations such as running boilers and vehicles.

Scope 2

Indirect emissions from buying electricity, cooling buildings and other processes that a third party manages on their behalf.

Scope 3

These are the hardest to quantify as they refer to all emissions that the company is directly or indirectly responsible for up and down the value chain. For example, buying products from suppliers and emissions of products originating from a company after customers use them. This typically is the biggest block to accurate ESG quantification.

⁷ Greenhouse Gas Protocol. Standards. <https://ghgprotocol.org/standards>. Accessed 21 June 2022.





Visa's Sustainability Index can assist in quantifying the magnitude of Scope 3 emissions relating to Visa-based purchasing activity

We have developed a novel sustainability index to help organizations of all sectors and sizes to report on their Scope 3 emissions. With unique transactional input from VisaNet, we can provide a novel spend-based reporting framework to quantify CO2 emission at a business and sectoral level.

As businesses use corporate or individual Visa products for travel purchases, office expenses, or other internal processes, all such purchases can be analyzed and combined to calculate Scope 3 emissions. As described in the earlier section, as more data becomes available, the accuracy of the reporting improves.

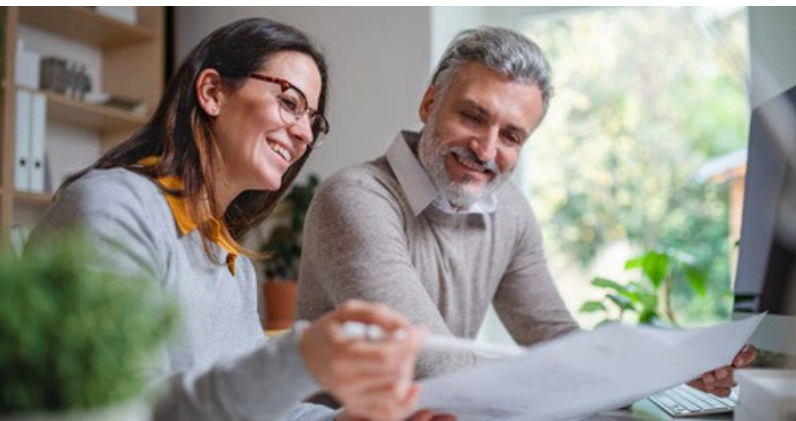
However, there is a need to develop quantitative frameworks to enable businesses to be assessed more holistically than just through analysis of Visa-based purchases. Businesses should be able to juxtapose calculations with their target goals to form a tangible ESG strategy. Therefore, we also propose a method to develop multiple criteria by which we can conduct a quantitative assessment of businesses' progress towards net zero. As more granular data becomes available, such frameworks can be refined.

Sustainable Business Scorecard

In this report, we highlight another framework co-developed with ENGIE⁸ Impact, a sustainability consulting firm, to understand the decarbonization stewardship of businesses as a whole which includes data management, net-zero commitments and actions taken towards reducing emissions. Under this Sustainable Business Scorecard, we follow three key dimensions:

- 1 **Evidence:** Emissions data and verification
- 2 **Commitment:** Are there set timelines or tangible targets for the reduction of emissions?
- 3 **Action:** How are businesses performing against the targets that they set? Have they undertaken specific actions to reduce emissions by transforming their operations?

Scorecard component	Description of component
CO2 Emissions data	<ul style="list-style-type: none"> • Collate emissions data and quality by Scope 1, 2, and 3 • The extent to which data has gone through review and verification
Commitment	<ul style="list-style-type: none"> • Do they have net zero targets with a defined timeline? • Sector-specific commitments like food waste reduction or green energy initiatives
Action	<ul style="list-style-type: none"> • Emissions reduction progress • Strategies for renewable energy, efficiency, waste, and chain management • MCC and product-specific strategies for decarbonization • External recognition and sustainability awards from credible entities



Consistency is a challenge in sustainability reporting

The types of datasets available to report on CO2 emissions vary widely. Finding consistent credible sources of emissions data, which are also audited, is a challenge. Therefore, there is a need to develop more reporting frameworks with data-driven tools to attain more homogeneity in ESG reports published by companies of all sectors and sizes.*

* Financial institutions are realising the need to adopt sustainability reporting standards. Here is one such example from the ISSB: <https://www.ifrs.org/groups/international-sustainability-standards-board/>

⁸ <https://www.engieimpact.com/>



Applications in sustainable finance and for regulators

There is no universal approach to assessing the holistic decarbonization stewardship of an organization, however the Sustainable Business Scorecard enables a relative comparison of the efforts of different organizations. Some downstream applications we foresee are summarized below, where better and more reliable data sources will be needed to ensure that companies are investing the correct effort and resources on their path to net zero.

Engaging regulators with quantitative and consistent reporting of CO2 emissions and net zero commitments for brands

Data-Driven approaches to develop rewards for spend on brands taking steps to lower their emissions impact

Opportunity to use the Visa Sustainability Index to approximate corporate Scope 3 emissions

Nudging companies of all sectors and sizes to action and motivating them to transform their supply chains to achieve or approach carbon neutrality



Conclusion and next steps

Through Visa's Sustainability Index, we aim to provide individuals and businesses with greater awareness of the carbon emissions in relation to their card transactions to encourage more environmentally friendly behaviour. In addition, the Visa sustainability advisory is aimed at providing businesses of all sectors and sizes with an initial framework by which they can assess their company operations. The goal is also to enable financial institutions to provide help to such businesses by encouraging greener operations and financing efforts. We envision that this effort is creating a stepping stone towards better transparency in sustainability reporting as well as providing resiliency for the development of greener economies for the future.



Frequently used third-party data sources

Sustainability tracking and scoring resources:

1. CDP, directory of CDP scores⁹
2. World Business Council for Sustainable Development (WBCSD)¹⁰ - there are six different pathways each with their own metrics and resources

Alliance and certification websites:

1. **Science Based Targets Initiative (SBTi)**
SBTi is stringent in that each sector has specific climate targets, no universal framework for all businesses.¹¹
2. **Task Force on Climate-Related Financial Disclosures (TCFD)**
TCFD is the Task Force on Climate-related Financial Disclosures. It was formed by the Financial Stability Board, an international body that seeks to strengthen and protect global financial markets from systemic risks such as climate change.¹²
3. **RE100**
RE100 is the global corporate renewable energy initiative bringing together hundreds of large and ambitious businesses committed to 100% renewable electricity.¹³
4. **EV100**
Over 120 of the world's leading companies are making commitments across over 98 markets to transition their fleets to EV and install EV charging for staff and customers by 2030.¹⁴
5. **EP100**
EP100 is a global initiative led by the international non-profit Climate Group, bringing together over 120 energy smart businesses committed to measuring and reporting on energy efficiency improvements. Energy efficiency is essential as it can deliver over 40% of the reduction in energy related emissions needed to achieve global climate goals. Taking energy efficiency from the boiler room to the boardroom, members are reducing emissions whilst improving competitiveness and inspiring others to follow their lead.¹⁵
6. **BCA Green Mark**
The BCA Green Mark 2021 (GM: 2021) is an internationally recognised green building certification scheme tailored for the tropical climate. It encourages the industry and professionals to collaborate and develop green building solutions, raising Singapore's built environment's sustainability standards.¹⁶

Company-specific data source

Revenue data:

1. Annual reports and financial stats

Emissions data:

1. ESG reports
2. TCFD disclosure reports
3. Official company webpages

⁹ Disclosure, Insight Action. Data and Insights. <https://www.cdp.net/en/search>. Accessed 27 June 2022

¹⁰ WBCSD. Climate Action. <https://www.wbcsd.org/Imperatives/Climate-Action>. Accessed 27 June 2022

¹¹ Science Based Targets. Companies Taking Action. <https://sciencebasedtargets.org/sectors>. Directory of companies on SBTi: <https://sciencebasedtargets.org/companies-taking-action#table>. Accessed 27 June 2022.

¹² TCFD. Recommendations of the Taskforce on Climate-Related Financial Disclosures. Published 15 June 2017. <https://assets.bbhub.io/company/sites/60/2021/10/FINAL-2017-TCFD-Report.pdf>. Accessed 27 June 2022.

¹³ RE100 Climate Group. Technical Guidance. <https://www.there100.org/technical-guidance>. Member list for RE100: <https://www.there100.org/re100-members>. Accessed 27 June 2022.

¹⁴ The Climate Group. EV100, Making electric transport the new normal by 2030. Overview of how to join: <https://www.theclimategroup.org/join-ev100>. Member list for EV100: <https://www.theclimategroup.org/ev100-members>. Accessed 27 June 2022.

¹⁵ The Climate Group. EP100. What is energy productivity? The overview, technical guidance and joining process is outlined here: <https://www.theclimategroup.org/ep100>

¹⁶ BCA Green Mark. Assessment criteria is available here: <https://www1.bca.gov.sg/buildsg/sustainability/green-mark-certification-scheme/green-mark-assessment-criteria-and-online-application>

