The Path to Climate Neutrality

Measuring: the Basics

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United Nations Climate Change
Global Climate Action

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Housekeeping

1. Please mute yourself
2. Questions at the end
3. We will go over 1 hour if you need us to
4. Recording of the session
5. This is an introductory session

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Measure

Calculating greenhouse gas emissions

Measure: Terminology

1- GHG inventory/carbon footprint

Greenhouse gas emissions that are attributable to the organization

2- Carbon[1]

Generally understood as “carbon equivalent” or CO2e, includes all GHGs, not only CO2 or carbon-containing ones

3- Emission sources

Activities that generate GHG emissions.

4- Emission factors

Conversion factors from activities to GHG emissions.

1 Note that this term can have other meanings for other organizations

Measure: Key principles

1- Completeness

All relevant emission sources must be included.

2-Consistency - Comparability

The same approach must be used year after year.

3- Transparency

All information (including assumptions and approximations) must be publicly disclosed.

Measure: GHG Protocol and its Scopes

Scope 1 – All Direct Emissions from the activities of an organisation or under their control.

Burning of fuels, driving owned cars.

Scope 2 – Indirect Emissions from electricity/heating/cooling purchased and used by the organisation.

Purchasing electricity, heat, steam, cooling

Scope 3 – All Other Indirect Emissions

Everything else! Business travel, commuting, waste, water, purchased goods and services of all types

Scope 3 is usually the biggest and the most complex, but also very important to work on

Measure: Why different scopes?

Scopes		Sources
Scope 1	You control, you decide	· Generating electricity · Generating heat – non-electric · Business travel – owned company vehicles · Industrial processes emissions
Scope 2	Be efficient!	· Purchasing of electricity · Purchasing heat · Purchasing steam
Scope 3	You can influence	· Business travel – flights · Business travel – public transport · Waste & Wastewater · Transmission and distribution losses · Food consumption Difficult but important!!

Measure: Scopes 2 and 3

Scope 2

Formally, organizations must report Scope 2 electricity-related emissions based on market-based and location-based method.

For Climate Neutral Now purposes and our calculator, we use location-based method and emissions will be zero if there is a renewable energy contract or guarantee of origin in place.

Scope 3

The GHG Protocol has detailed guidance on how to determine which emission sources to include in Scope 3.

For Climate Neutral Now purposes, we encourage organizations to include all scope 3 sources where it is feasible to make an estimation.

Measure: Emission factors

GHG emissions = activity level x activity emission factor

GHG emissions = 4000 kWh/year x **0.596 kg CO2e/kWh** / 1000

= 2.38 tonsCO2e/year

DEFRA Emission Factors

- Conversion factors allowing calculation of GHG emissions from a range of activities
- Developed by UK Government's Department for Environment, Food & Rural Affairs (DEFRA)
- They are the basis for our simplified calculator, except for electricity-related emissions.

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Demonstration of use of the calculator

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Challenges of measuring: our approach

Challenge 1: Home Office/Remote working

Approaches to estimation of these emissions are being presented in different fora.

Our approach: aligned with EcoAct's Homeworking emissions whitepaper

Emissions depend on:

1. Location and season (heating/cooling)
2. % working time
3. % working remotely

Challenge 2: Co-Working spaces

This occurs when an organization shares spaces, either in a building or in the same floor, with other organizations.

Our approach: allocate according to the % floor surface rented/used by your organization of the total rented/working space

Allocated impact = whole building x allocation factor

Example: Organization A rents 200 m2 of space in a building with a total of 2000 m2 of rented space.

Allocation factor: 200/2000 = 0.10

Electricity consumption = 15000 kWh x 0.10 = 1500 kWh for organization A

Water consumption = 2000 m3 x 0.10 = 200 m3 for organization A

Challenge 3: Third-party verification

Requirement for higher levels of recognition under Climate Neutral Now, and to ensure best practice.

But costly and complex for SMEs and organizations that are getting started.

Recommendation:

1. We will go over 1 hour if you need us to

1. Get started on your own if you don't have the resources for third-party support or verification.
2. Develop a self-declared inventory.
3. Improve in following years.
4. Look for potential opportunities for low-cost options coming up.

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Hearing from One Carbon World

Experience and challenges

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Questions & Answers

Thank you

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Measuring:
The Basics

Using the GHG emissions calculator

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General

Disclaimer

- Self-assessment of your emissions
- Not verified GHG inventory
- Bronze level

Your entries

- Input only the relevant sources for you
- Only use the white cells

Emission factors (Third party publicly available)

Examples:

- IPCC: refrigerants
- DEFRA: transportation
- International Civil Aviation Organization (ICAO): flights

See the calculator

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Fuels

Do **NOT** include here the combustion of fuels in **transportation** devices

We used 2 LPG cylinders (88 litres) for heating in the reporting year

2 * 88 = 176 litres per year

https://commons.wikimedia.org

Fuels

Combustion of fuels in owned or controlled stationary equipment such as boilers, furnaces, burners, turbines, heaters, incinerators, engines, flares, etc.

Do NOT include here the combustion of fuels in transportation devices such as automobiles, trucks, buses, trains, airplanes, boats, ships, barges, vessels, etc.

Please enter the amount for each applicable fuels

Type	Fuel	Unit	Factors	Amount	kg CO2e
Gaseous fuels	Compressed Natural Gas	liters	0.44327		-
Gaseous fuels	Liquefied Natural Gas	liters	1.15041		-
Gaseous fuels	Liquefied petroleum gas	liters	1.55537	176.00	273.75
Gaseous fuels	Natural gas	cubic metres	2.02266		-
Gaseous fuels	Natural gas (100% mineral blend)	cubic metres	2.03017		-
Liquid fuels	Diesel (average biofuel blend)	liters	2.54603		-
Liquid fuels	Diesel (100% mineral diesel)	liters	2.68787		-
Liquid fuels	Fuel oil	liters	3.18317		-
Liquid fuels	Gas oil	liters	2.75776		-

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Refrigerants

In the reporting year, we had a leakage on our AC and we used **3kg** HFC-134a to replace it.

https://eggertcoolingandheating.com/what-is-freon

Refrigerants and others

From **leakage from air-conditioning and refrigeration** units or the release to the atmosphere of other gases that have a global warming potential. The entry refers to the amount of refrigerant gas used to recharge the equipment

Please enter the amount for each applicable refrigerant

Emission	Unit	Factors	Amount (Kg)	kg CO2e
HFC-32	kg	675		-
HFC-134a	kg	1,430	3	4,290.00
R404A	kg	3,922		-
R407C	kg	1,774		-
R410A	kg	2,088		-
HCFC-22/R22 = chlorodifluoromethane	kg	1,810		-

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Owned vehicles

We have one car:

https://commons.wikimedia.org

Large, diesel

check the vehicle mileage in the beginning and end of the year

Or, 200km per week ->
200 * 52 = **10.400km**/year

Passenger vehicles: please enter the total distance for each type of vehicle

Type	Fuel	Factors	Distance (km)	kg CO2e
Small car	Diesel	0.13721		-
Medium car	Diesel	0.16637		-
Large car	Diesel	0.20419	10,400	2,123.58
Average car	Diesel	0.16844		-
Small car	Petrol	0.14836		-

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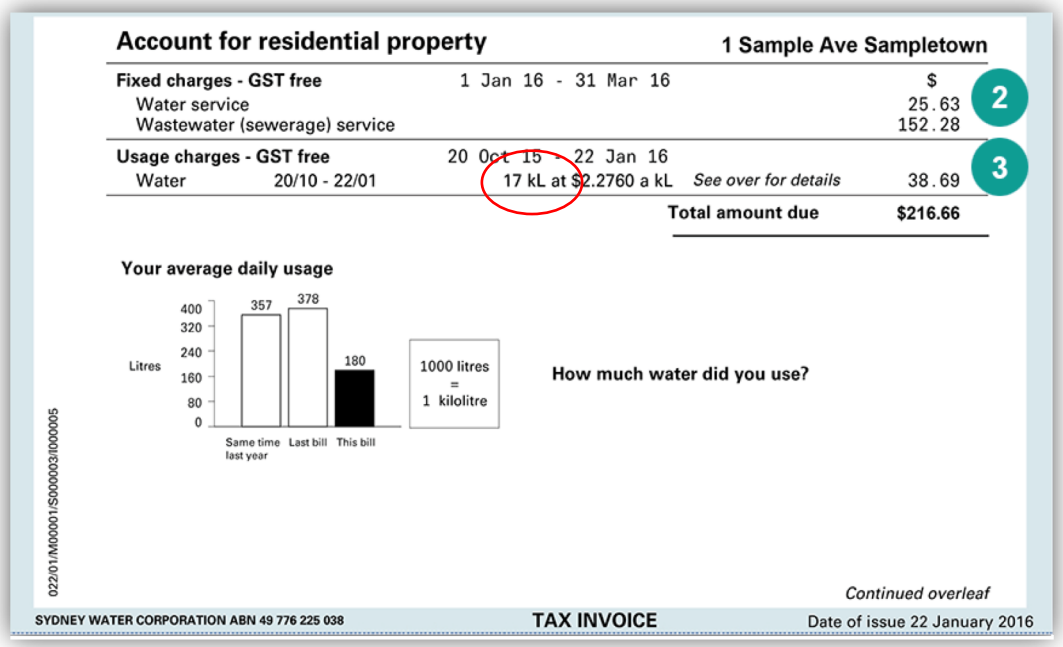
Water

I just have access to one bill on the reporting year. It was 17.000 liters for 3 months
17.000 * 4 => 68.000 liters /1000 **=> 68 m³** in a year
70% of the water supplied returns to the sewage system = 68 * 70% => **47.60 m³**



Account for residential property — **1 Sample Ave Sampletown**

Fixed charges - GST free	1 Jan 16 - 31 Mar 16		$
Water service			25.63
Wastewater (sewerage) service			152.28
Usage charges - GST free	20 Oct 15 - 22 Jan 16		
Water 20/10 - 22/01	17 kL at $2.2760 a kL	*See over for details*	38.69
		Total amount due	**$216.66**

2

3

Your average daily usage

How much water did you use?

022/01/M00001/S000003/I000005

Continued overleaf

SYDNEY WATER CORPORATION ABN 49 776 225 038 — **TAX INVOICE** — Date of issue 22 January 2016

https://www.sydneywater.com.au/

Water supply

Water delivered through the mains supply network.

Please enter the amount

Type	Unit	Factors	Amount	kg CO2e
Water Supply	cubic metres	0.34400	68.00	23.39

Water treatment

Water returned into the sewage system through mains drains

Please enter the amount

Type	Unit	Factors	Amount	kg CO2e
Water Treatment	cubic metres	0.70800	47.60	33.70

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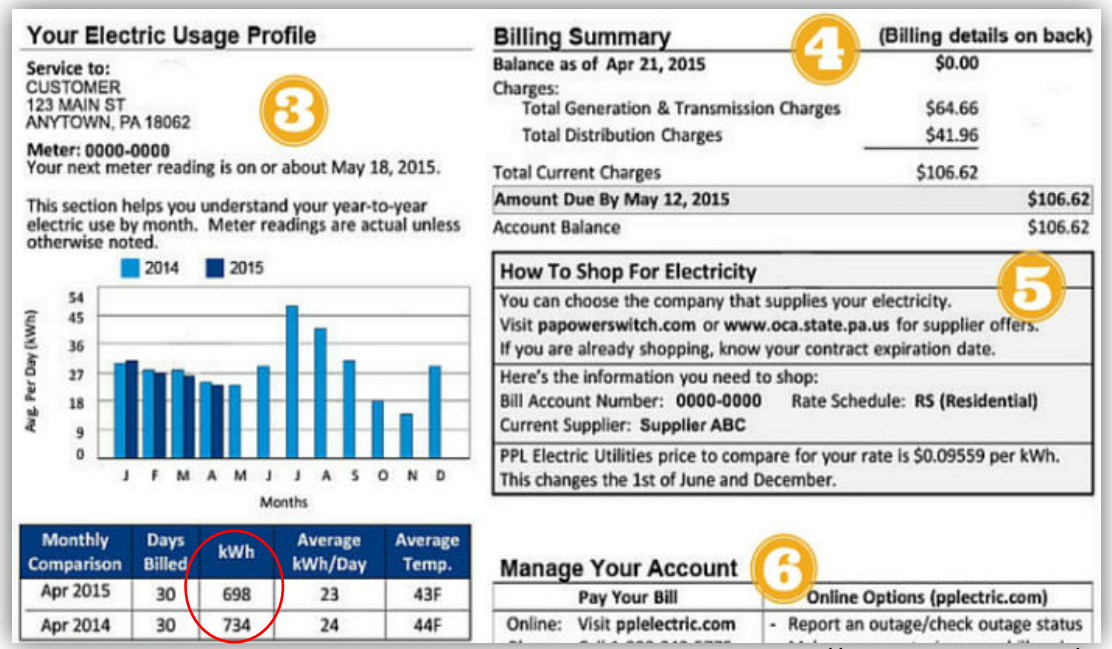
Electricity, heating, cooling

In the reporting year the total electricity consumption was **9.000 kWh**



Your Electric Usage Profile

Service to:
CUSTOMER
123 MAIN ST
ANYTOWN, PA 18062

Meter: 0000-0000
Your next meter reading is on or about May 18, 2015.

This section helps you understand your year-to-year electric use by month. Meter readings are actual unless otherwise noted.

Monthly Comparison	Days Billed	kWh	Average kWh/Day	Average Temp.
Apr 2015	30	698	23	43F
Apr 2014	30	734	24	44F

Billing Summary (Billing details on back)

Balance as of Apr 21, 2015	$0.00
Charges:	
Total Generation & Transmission Charges	$64.66
Total Distribution Charges	$41.96
Total Current Charges	$106.62
Amount Due By May 12, 2015	$106.62
Account Balance	$106.62

How To Shop For Electricity

You can choose the company that supplies your electricity.
Visit papowerswitch.com or www.oca.state.pa.us for supplier offers.
If you are already shopping, know your contract expiration date.

Here's the information you need to shop:
Bill Account Number: 0000-0000 Rate Schedule: RS (Residential)
Current Supplier: Supplier ABC

PPL Electric Utilities price to compare for your rate is $0.09559 per kWh.
This changes the 1st of June and December.

Manage Your Account

Pay Your Bill	Online Options (pplectric.com)
Online: Visit pplelectric.com	- Report an outage/check outage status

https://www.pplelectric.com/

Electricity and heating

Market-based emissions from the generation of purchased electricity, heat, steam or cooling.

Electricity Grid

Electricity used by an organisation at sites owned/controlled by them.

Activity	Country	Unit	Factors	Amount	kg CO2e
Electricity	United Kingdom of Great Britain and Northern Ir	kWh	0.2520	9,000.00	2,268.20

Heat and steam

Emissions within organisations that purchase heat/steam energy for heating purposes or for use in specific industrial processes.*

Activity	Type	Unit	Factors	Amount	kg CO2e
District heat and steam	District heat and steam	kWh	0.17		-

*** For heating from other sources, please use the tab 'Fuels'**

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Material use

We bought a fridge weighted **158kg**
158kg / 1000 = 0.16 t

We used 10 boxes of A4 paper = 12.5kg * 10 = **125 kg**
125 kg / 1000 = 0.13 t

Material use

All materials consumed in the reporting period
Please enter the amounts in tonnes for each of the material used in the reporting period

Activity	Waste type	Factors	Amount (tonnes)	kg CO2e
Plastic	Plastics: average plastics	3,116.29		-
Plastic	Plastics: average plastic film	2,574.16		-
Plastic	Plastics: average plastic rigid	3,276.71		-
Plastic	Plastics: HDPE (incl. forming)	3,269.84		-
Plastic	Plastics: LDPE and LLDPE (incl. forming)	2,600.64		-
Plastic	Plastics: PET (incl. forming)	4,032.39		-
Plastic	Plastics: PP (incl. forming)	3,104.73		-
Plastic	Plastics: PS (incl. forming)	3,777.95		-
Plastic	Plastics: PVC (incl. forming)	3,413.08		-
Paper	Paper and board: board	750.26		-
Paper	Paper and board: mixed	853.57		-
Paper	Paper and board: paper	919.40	0.13	114.92
Other	Glass	843.00		-
Other	Clothing	22,310.00		-
Other	Food and drink	3,701.40		-
Organic	Compost derived from garden waste	113.31		-
Organic	Compost derived from food and garden waste	116.13		-
Electrical items	WEEE - fridges and freezers	3,814.37	0.16	602.67

https://ebay.de
https://pixabay.com/vectors/fridge-kitchen-refrigerator-158792/

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Waste

We disposed 200kg of paper in the reporting year
200kg / 1000 = 0.2 tonnes

https://commons.wikimedia.org

Waste disposal
Add the amout for each type of waste

Please enter the amounts for the applicable waste type

Waste type	Factors	Amount (tonnes)	kg CO2e
Organic: food and drink waste	626.9073		-
Organic: garden waste	578.9916		-
Organic: mixed food and garden waste	587.3768		-
Paper and board: board	1041.8361		-
Paper and board: mixed	1041.8361		-
Paper and board: paper	1041.8361	0.20	208.37
Plasterboard	71.95		-
Plastics: average plastic film	8.9344		-
Plastics: average plastic rigid	8.9344		-
Plastics: average plastics	8.9344		-
Plastics: HDPE (incl. forming)	8.9344		-

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Waste

A reference to estimate the weight of your waste

Type of waste generated	Bin size	Typical weight when full
General residual waste	240 litre	30 kg
General residual waste	140 litre	20 kg
General residual waste	80 litre	18 kg
Recyclables (highly variable)	1100 litre	60 kg
Recyclables (highly variable)	240 litre	16 kg
Recyclables (highly variable)	140 litre	8 kg
Organic bin	140 litre	38 kg
Organic bin	240 litre	100 kg
Bag of mixed waste	240 litre	3.5-6.5 kg

https://www.epa.ie/pubs/forms/wreport/nwr/Reporting%20on%20waste%20generated%20by%20on-site%20activities.pdf

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Material use x waste disposal

An example of paper life cycle

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Home office

In the reporting year, a full time employee worked from home in Germany. The heating was used during 5 months of the year.

Home Office

The emission factors consider the energy consumption of the workstation, lighting, and cooling or heating
Find further comments on the cell's title

Assumptions:
48 (working weeks) * 5 days per week = 240 working days per year
240 (days/year) * 8 hours = 1,920 working hours per year
1,920 Working Hours / 12 = 160 working hours per month

Type of home office	Country	Unit	Consumption kWh/hour	Factors	Number of employees	Working time (For full-time: 100%)	% working from home (e.g. 50% from home)	Number of months	kg CO2e
With heating	Germany	kWh	5.15	0.37	1	100%	100%	5	1,506.81
No heating/No cooling	Germany	kWh	0.15	0.37	1	100%	100%	7	61.44
		kWh	-	-					-

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Flights

The ICAO calculator

One Way/Round Trip	Cabin Class	Number of Passengers
One Way	Economy	1

Leg	From City/Airport	To City/Airport
1	FRA	GLA
Delete All Location(s)	Delete Leg	Add New Leg

Reset | Compute

Metric (KG / KM) | Standard (LBS / MI)

Total

Dep Airport	Arr Airport	Number of passengers	Cabin Class	Trip	Aircraft Fuel Burn/journey (KG)[ab]	Total passengers' CO2/journey (KG)[c]
FRA	GLA	1	Economy	One Way	5272.6	125.5

Flight Stage Detail

Dep Airport	Arr Airport	Distance (KM)	Aircraft	Aircraft Fuel Burn/leg (KG)[a]	Passenger CO_2/pax/leg (KG)
FRA	GLA	1083.0	319, 320, 321, 32A, E90	5272.6	125.5

https://applications.icao.int/icec

Flights

Individuals flying for work purposes

Please use the *ICAO Calculator* and add the information below. In case you have many flights, send an email to climateneutralnow@unfccc.int asking for support

ICAO calculator

Origin (city or IATA code)	Destination (city or IATA code)	Class	Single way / return	kg CO2e
FRA	GLA	Economy	Single way	125.50

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Report

- GHG emissions report

Category		Emission source category		t CO2e
GHG Protocol Standards: Corporate Scope -1 and 2, Value Chain - Scope 3	Scope 1	Direct emissions arising from owned or controlled stationary sources that use fossil fuels and/or emit fugitive emissions	Fuels	0.27
			Refrigerants	4.29
		Direct emissions from owned or controlled mobile sources	Passenger vehicles	2.12
			Delivery vehicles	-
	Scope 2	Location-based emissions from the generation of purchased electricity, heat, steam or cooling	Electricity	3.29
			Heat and steam	-
			Electricity for Evs	-
			District cooling	-
	Scope 3	Fuel- and energy-related activities	All other fuel- and energy related activities	-
			Transmission and distribution losses	-
		Waste generated in operations	Waste water	0.03
			Waste	0.21
		Purchased goods	Water supplied	0.02
			Material use	0.73
		Business travel	All transportation by air	0.13
			Emissions arising from hotel accommodation associated with business travel	-
			All transportation by sea	-
			All transportation by land, public transport, rented/leased vehicle and taxi	-
		Upstream transportation and distribution	Freighting goods	-
		Employees commuting		-
		Food		-
		Home office		1.57
Total Emissions				12.67

The report is automatically updated as you input the data in each tab

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Thank you!

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One Carbon World

Carbon Footprint Practitioner

Introduction to One Carbon World

- One Carbon World (OCW) is a **not-for-profit and carbon neutral organisation**, whose core business is to promote voluntary climate action

- We are a **resource partner with the United Nations Climate Neutral Now Initiative** and we help organisations measure, verify, reduce and compensate their unavoidable emissions to create a greener Earth

- We have achieved commitment for reduction or offsetting for **20 millions tons of CO2 from the atmosphere**

- We offer an International Certification to recognise Carbon Neutrality, as apart of our in-house **Carbon Neutral International Standard Program**

*One Carbon World was created to offer organisations an easy, **straight-forward process** and **serve as a climate partner** for our clients.*

Some of our partners

- Ørsted
- NHS Digital
- BUPA
- UK Embassies

High profile events

- ATP Tennis Finals
- SailGP

A global challenge

- **Measure and reduce** GHG emissions in line with the climate science.
- Organizations under increasing pressure to **demonstrate action**.
- **First understand and measure**, this is the starting point so you can **make a plan** of how to achieve reduction targets and goals.
- That first step is measuring the **carbon footprint** and baseline.

*At One Carbon World we keep this process streamlined and robust, and we're on hand for **support and guidance** at every stage of the journey!*

The Solution: A Consultative Approach

- Technical Call
  1 – OCW-Assessment
  2 – Self-Assessment Verification
- Data Collection
- Calculation or Verification
- Carbon Footprint Report
- Next Steps – Reduce – Contribute

Thank You

One Carbon World

MEASURE | REDUCE | CONTRIBUTE

hello@onecarbonworld.com