SUPPLY CHAIN SUSTAINABILITY SCHOL **SSEN Climate** Academy #1 An Overview of **Climate Change** & Carbon

James Cadman, Action Sustainability



## SSEN Climate Academy

 This is the first of six sessions in the SSEN Climate Academy: An Overview of Climate Change & Carbon There are five more *Climate Change* sessions: • Net Zero – 2<sup>nd</sup> February Climate Adaptation – 9<sup>th</sup> February Climate and Nature – 16<sup>th</sup> February Climate and People – 23<sup>rd</sup> February Climate and Resource Efficiency – 2<sup>nd</sup> March

## Session 1 - Agenda

✓ Scene setting: Chris Burchell Explanation of climate change Your Questions and Answers By the end you will know what climate change is how it is caused and what we can do about it

## House Rules

• Use the chatbox for questions



Share your feedback



Slides will be shared







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# Audience Poll

SECTION 1: Understanding climate science and where carbon emissions come from

## Greenhouse Gas Effect





## Scene Setting: The last 800,000 years

#### Atmospheric CO<sub>2</sub> concentration Our World in Data Global average long-term atmospheric concentration of carbon dioxide (CO<sub>2</sub>), measured in parts per million (ppm). Long-term trends in CO<sub>2</sub> concentrations can be measured at high-resolution using preserved air samples from ice cores. Homo Sapiens Agricultural World 400 ppm civilisation emerges 350 ppm 300 ppm 250 ppm 200 pp 150 ppm 100 ppm 50 ppm 0 ppm 600,000 BCE 400,000 BCE 800,922 BCE 200,000 BCE 2018 Source: EPICA Dome C CO2 record (2015) & NOAA (2018) OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY



## Scene Setting: The last 200 years



**Source:** HadCRUT4, NOAA, NASA and Cowtan & Way datasets; IPCC (2018) *Chapter 1 - Framing and Context*. **Notes:** 'Observations' are the average of the four datasets above as in IPCC-SR1.5 including for the full year of data for 2018.



## Sharp increase in CO<sub>2</sub> emissions by global region



Source: Our World in Data based on the Global Carbon Project OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY Note: This measures CO<sub>2</sub> emissions from fossil fuels and cement production only – land use change is not included. 'Statistical differences' (included in the GCP dataset) are not included here.



### Scene Setting: The last few years



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## Annual CO<sub>2</sub> emissions by country, 2019

### Annual CO2 emissions, 2019

Carbon dioxide (CO<sub>2</sub>) emissions from the burning of fossil fuels for energy and cement production. Land use change is not included.



Source: Global Carbon Project; Carbon Dioxide Information Analysis Centre (CDIAC) Note: CO<sub>2</sub> emissions are measured on a production basis, meaning they do not correct for emissions embedded in traded goods. OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY



- 1. China: 10.2 billion tCO<sub>2</sub>
  - 28%

Our World in Data

- **2. USA**: 5.3 billion tCO<sub>2</sub>
  - 15%
- **3.** India: 2.6 billion tCO<sub>2</sub>
  - 7%
- 4. Russia: 1.7 billion tCO<sub>2</sub>
  5%
- **18. UK**: 370 million tCO<sub>2</sub>
  - 1%
- **73.** Ireland: 37 million tCO<sub>2</sub>
  - 0.1%

## Per capita CO<sub>2</sub> emissions

### Per capita CO<sub>2</sub> emissions, 2019 Our World Carbon dioxide (CO<sub>2</sub>) emissions from the burning of fossil fuels for energy and cement production. Land use change is not included. World 2.5 t 7.5 t 15 t >50 t <0t 5 t 10 t 20 t 1t No data

Source: Our World in Data based on the Global Carbon Project; Gapminder & UN Note: CO2 emissions are measured on a production basis, meaning they do not correct for emissions embedded in traded goods. OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY



ł	•	USA:	16 tCO <sub>2</sub> pp
	•	Russia:	11.5 tCO <sub>2</sub> pp
)	•	Ireland:	<b>7.6 t CO<sub>2</sub> pp</b>
	•	China:	7.1 tCO <sub>2</sub> pp
	•	UK:	5.5 tCO <sub>2</sub> pp

• India: 1.9 tCO<sub>2</sub> pp But who's the highest?

in Data

• Qatar at 38.7 tCO<sub>2</sub> pp !!

## Cumulative CO<sub>2</sub> emissions

### Cumulative CO2 emissions

Cumulative carbon dioxide ( $CO_2$ ) emissions represents the total sum of  $CO_2$  emissions produced from fossil fuels and cement since 1750, and is measured in tonnes. This measures  $CO_2$  emissions from fossil fuels and cement production only – land use change is not included.



Source: Our World in Data based on the Global Carbon Project

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

Our World in Data 1. USA: 400 GtCO<sub>2</sub> (25%)

- 2. EU-28: 370 GtCO<sub>2</sub> (22%)
- 3. China: 230 GtCO<sub>2</sub>
- 4. Russia: 115 GtCO<sub>2</sub>
- 5. Germany: 92 GtCO<sub>2</sub>
- 6. United Kingdom: 78 GtCO<sub>2</sub>



## Where do GHG emissions come from?



OurWorldinData.org – Research and data to make progress against the world's largest problems. Source: Climate Watch, the World Resources Institute (2020). Licensed under CC-BY by the author Hannah Ritchie (2020).



- Industry 29.4%
- Agriculture & Forestry 21.1%
- Buildings 17.5%
- Transport 16.2%

## **SECTION 2: Carbon literacy**



## Some fundamentals – Global Warming Potentials: GWP

- It's all relative...
  - CO<sub>2</sub>:1
  - CH<sub>4</sub>: 28
  - N<sub>2</sub>O: 265
  - SF<sub>6</sub>: 23,500
  - HFCs: 4 12,400
  - PFCs: 6,630 11,100
  - NF<sub>3</sub>: 16,100
  - Expressed as "tonnes of CO<sub>2</sub> equivalent"; tCO<sub>2</sub>e







## Comparing apples and pears: travel and food



## How to calculate a carbon footprint



• KgCO<sub>2</sub>e ("equivalent") takes into account all the main GHGs emitted: CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, etc.



## **Operational Boundaries – Scopes**



- Direct emissions are emissions from sources that are owned or controlled by the reporting company
- Indirect emissions are emissions that are a consequence of the activities of the company but occur at sources owned or controlled by another company



### Use the Carbon & Energy Hierarchy



AVOID: don't use energy if you can avoid the need

REDUCE: use less by smart design, more efficient equipment, less materials, and better behaviours

SWITCH to low carbon and renewable sources of energy and materials

COMPENSATE/ REMOVE the residual remaining emissions when all other actions have been taken



SECTION 3: Taking action: from global cooperation to individual behaviour

## **Global Cooperation**

## The backstory...















## Paris Climate Change Agreement

Nations Unies

Conférence sur les Changements Climatiques 2015

COP21/CMP11

Paris France

- Significant progress on Kyoto
- Global engagement

UNITED NATIONS

**PARIS CLIMATE** 

22 APRIL 2016 -

ING CEREMONY

- Nationally Determined Contributions
  - UK's is 68% reduction by 2030 vs 1990

### The Law!

- UK Climate Change Act target of 100% reduction by 2050 – 'net zero'
- Scotland has legislated to hit net-zero by 2045
- Wales' target to reduce by 95% by 2050 but aiming for net zero
- Ireland has legislated to hit net-zero by 2050
- New intermediate target for UK of 78% by 2035 vs 1990 baseline



Source: BEIS (2020) Provisional UK greenhouse gas emissions national statistics 2019; CCC analysis Notes: Emissions shown include emissions from international aviation and shipping (IAS) and on an AR5 basis, including peatlands. Adjustments for IAS emissions to carbon budgets 1-3 based on historical IAS emissions data; adjustments to carbon budgets 4-5 based on IAS emissions under the Balanced Net Zero Pathway.



## Individuals

## Carbon Reduction Actions – at Home

#### At home

- Keep an eye on the thermostat wear a jumper in winter!
- Insulate your house: attic, walls, windows and doors
- Switch to a provider of renewable energy such as SSE Airtricity, OVO, Good Energy or Ecotricity
- Use your equipment as efficiently as possible eco modes

#### Diet

- Eat less meat and dairy; try other options
- Reduce food waste only buy and cook what you need
- If you can, compost any food waste you do make

#### Travel

- Work from home, if you can, even if only part of the week
- Get public transport as much as you can
- Use a more efficient car better mpg, or hybrid or even EV!
- Drive more smoothly and maintain your car
- Fly less often get the train where you can: New network of sleeper trains planned:
   <a href="https://www.theguardian.com/travel/2021/jun/22/new-network-of-european-sleeper-overnight-trains-planned">https://www.theguardian.com/travel/2021/jun/22/new-network-of-european-sleeper-overnight-trains-planned</a>

#### At the shops

- Buy efficient equipment that can be maintained for a long lifetime, e.g. washing machine
- Don't always buy the latest model think of the materials and waste as well as carbon
- Resist fast fashion put it in the wardrobe and the fashion will come around again in 25 years!
- Avoid unnecessary packaging wherever you can, and recycle as much as you can











Some of your DoNation pledges



Peter Major pledged Tap it 24th Jun 2021

At the moment, I buy roughly 4 bottles of water a week. Over the next two months, I pledge to pledge reduce my bottle buying by half, and instead drink from a reusable bottle.

#### Pledge status

✓ 7kg of CO₂ pledged



Deborah Lauder pledged Eat up 1st Jul 2021

Currently, I throw away a lot of food. Over the next 2 months, I will minimize the food waste for 3 people in my home.

Pledge status

245kg of CO<sub>2</sub> pledged

🔵 40 days left

Pledge confirmed



lan Barfoot pledged Just hanging 23rd Jun 2021

I tend to use a tumble dryer from time to time, and I do about 15 washes a week. For the next two months, I pledge to hang dry my washing instead.

> Laura Hain pledged Tintin 7 days ago

I pledge to become a recycling ninja for the next two months, and master my recycling habits. At the moment I recycle only when I can be bothered.

### Pledge status

6kg of CO<sub>2</sub> pledged

- ) 53 days left
- Pledge confirmed



I usually travel around by scooter or moped. I pledge to switch to walking for 5 journey(s) a week over the next two months. For each journey, I'll be walking (I may also skip on sunny days) for about 40 minutes.

#### Pledge status

Økg of CO<sub>2</sub> pledged

22 dave loft



Rachael Robbins pledged Degrees cooler 6 days ago

For the next two months, I will turn down my heating by 1°C.

Pledge status

53kg of CO<sub>2</sub> pledged

54 days left

) Pledge confirmed

### Our collective impact

5,451

1,592 supporters

373,212kg



## The end of the training... for now...



### ...but the beginning of your carbon reduction plans!....





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# Audience Poll

## Questions, Answers and Feedback





## Thank you!

James Cadman

- Lead Consultant at Action Sustainability
- james@actionsustainability.com
- <u>www.actionsustainability.com</u>
- @Action\_Sustain



