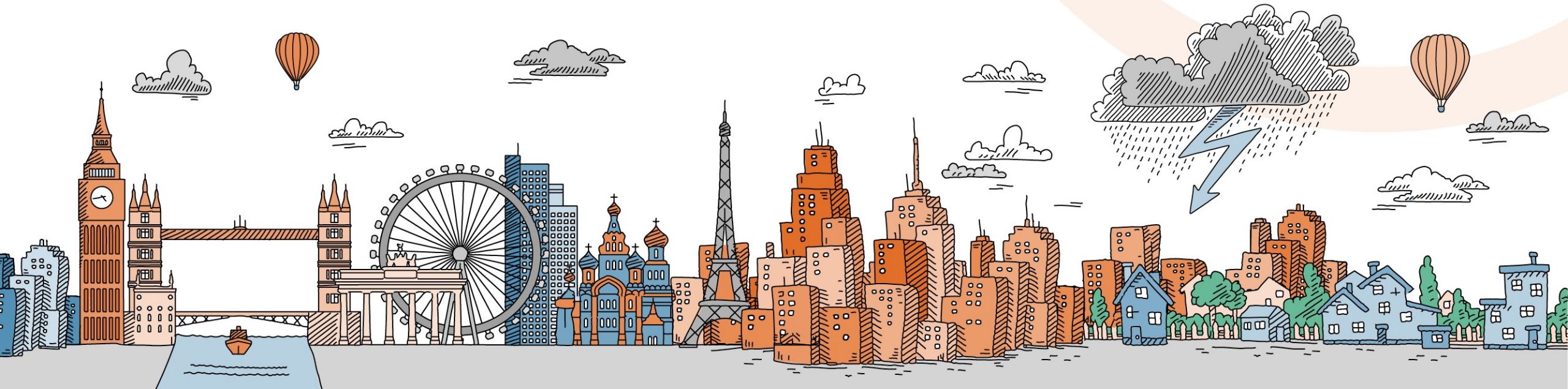


Setting Sub-national Carbon Budgets For Sheffield

Quantifying implications of the Paris Climate Change Agreement for Sheffield



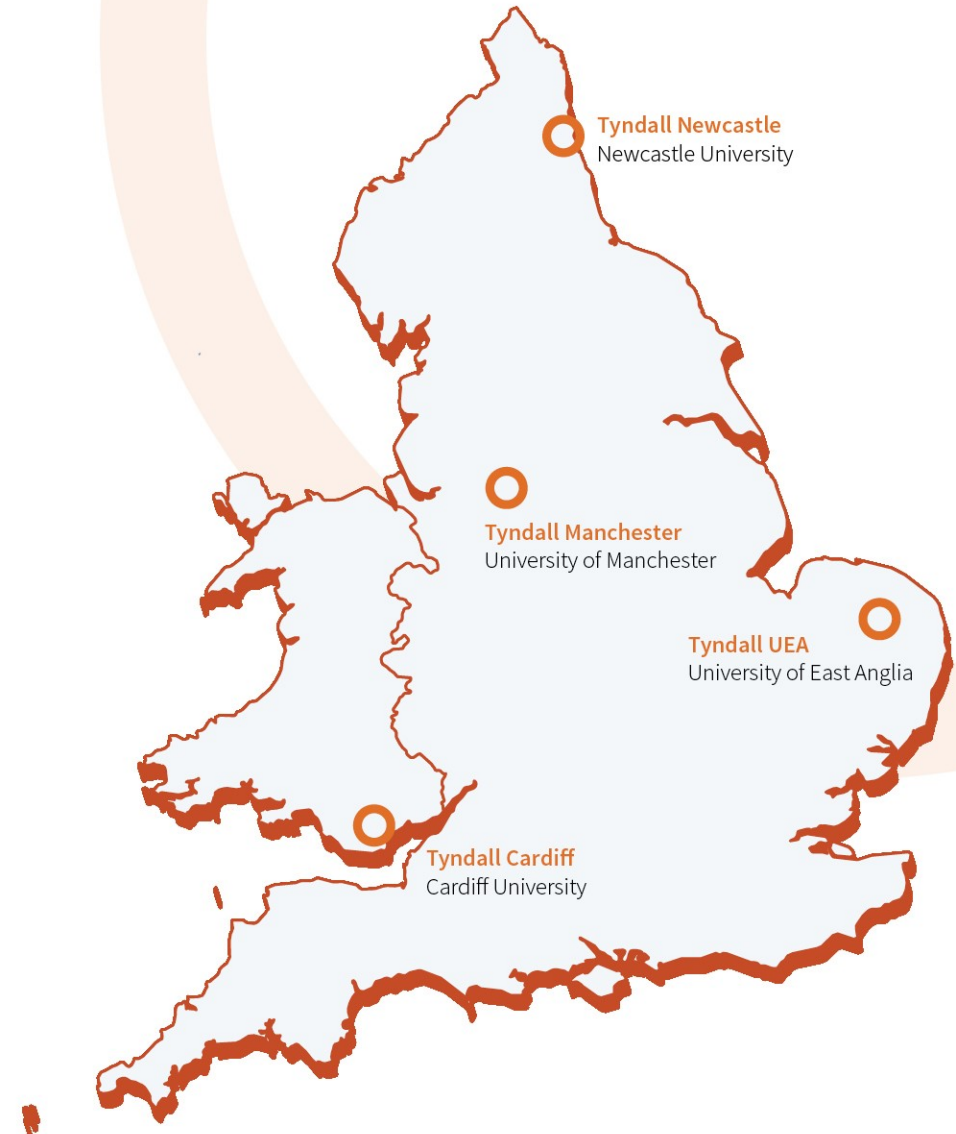
Founded in 2000

Cutting edge, interdisciplinary research,
policy focused research on:

- Advancing the fundamental analysis of emissions reduction from energy
- Understanding climate impacts, risks, and adaptation
- Public perceptions of climate change
- The governance of climate negotiations and policymaking

www.tyndall.ac.uk

@tyndallmanc @cwjonez



Setting City Area Targets and Trajectories for Emissions Reduction (SCATTER)

- BEIS funded project to develop climate change targets and mitigation pathways for cities in 2018
- Collaboration with GMCA and Anthesis Group
- Work by Carly McLachlan, Kevin Anderson, Jaise Kuriakose and John Broderick on **carbon budget setting**
- Climate change targets aligned with Paris Agreement

Setting Sub-national Carbon Budgets

Downscaling the Paris Agreement to local carbon budgets



Key Points

- Climate change action = restricting CO₂ emissions
- Carbon budgets set policy for restricting CO₂ emissions
- Urgent and profound change in energy provision

Paris Agreement Framework

“keeping a global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°C.”

Common but differentiated responsibility - informs the fair (equitable) distribution of global emissions between nations at different stages of economic development.

Carbon Budgets

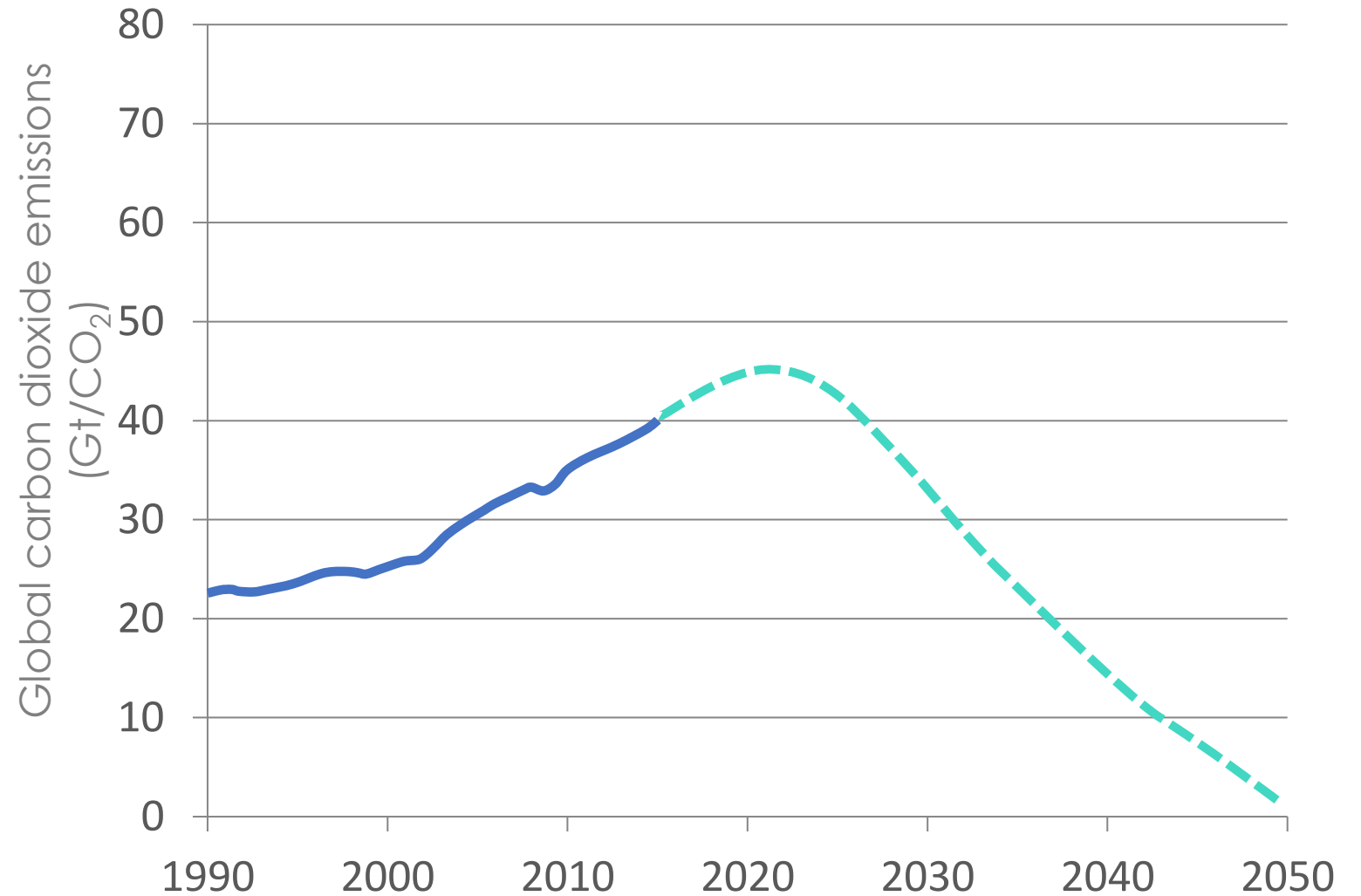
Translating global temperature targets into local action



Carbon Budgets

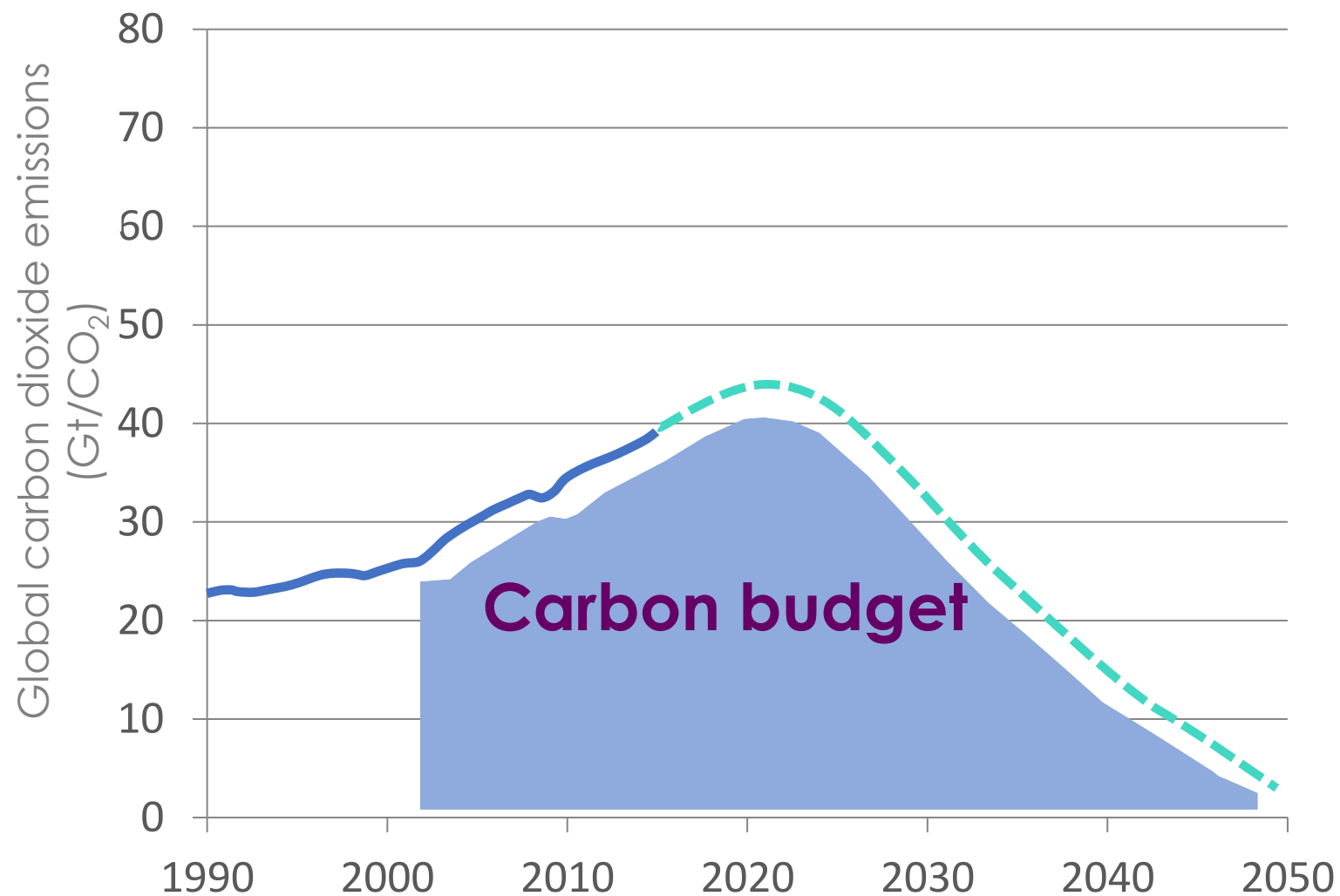
*For climate change goals
(e.g. 1.5°C to 2°C)*

*...it's not long-term
targets (e.g. 80% by 2050)
that matter...*



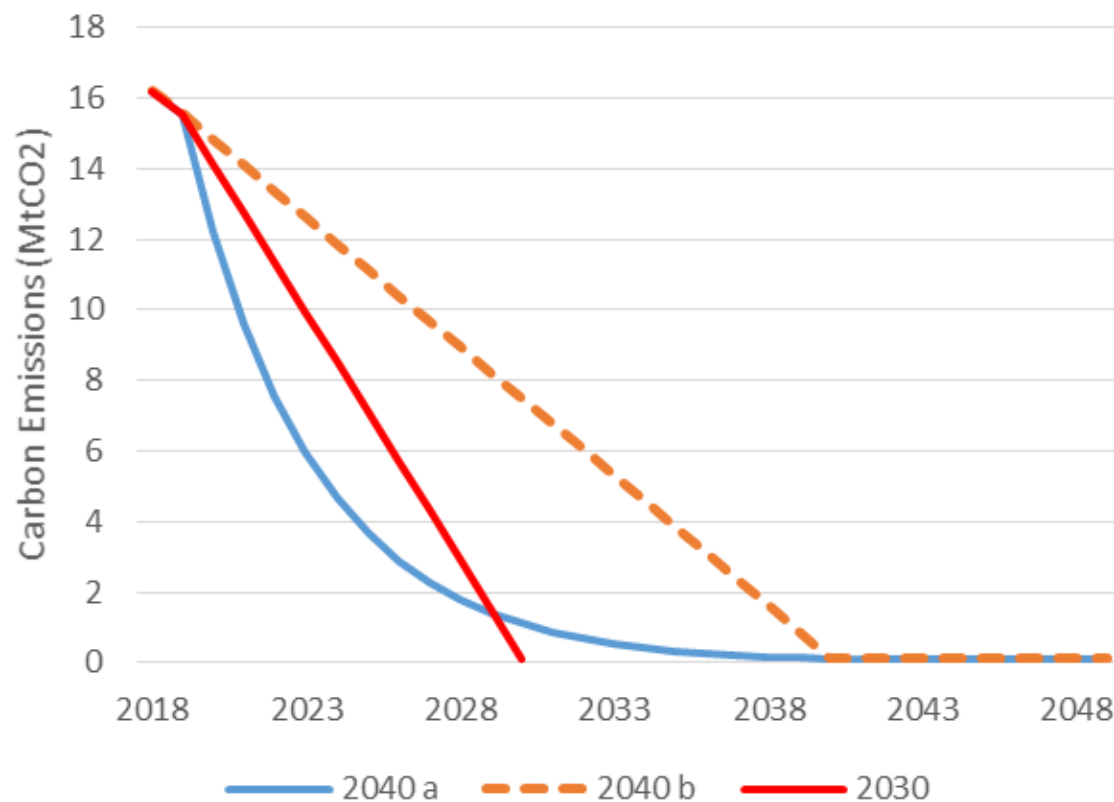
Carbon Budgets

...but the cumulative CO₂ emissions, *the area under the curve*



Carbon Limits & Target Years

- The same end point target can have different climate change implications.
- Earlier 'zero' year can have more CO₂
- CO₂ emissions in the red scenario are 20% higher than in blue



Features of Tyndall Carbon Budgets

1. A global carbon budget that means we “...keep well below 2°C ...and to pursue efforts to limit the temperature increase to 1.5°C.”
2. We do not assume substantial uptake of **carbon dioxide removal technologies** /negative emission technologies (NETs) – i.e we don't include NETs until they are deployed at scale.
3. Clear representation of **equity** issues:
 - i. Allowance for cement production for development
 - ii. Deforestation is considered as global overhead
 - iii. Emissions peak in developing parties by ~2025
4. Carbon offsetting is not used to meet the CO₂ budget

Energy CO₂ Carbon Budgets

Source of Emissions	Relation to Carbon Budget
International and Domestic Aviation CO ₂	UK national budget
Shipping CO ₂	UK national budget
Electricity use (all sectors within Local area) CO ₂	Local carbon budget - Consumption based (Scope2)
Land transport direct CO ₂	Local carbon budget
Commercial and industrial energy use direct CO ₂	Local carbon budget
Domestic energy use direct CO ₂	Local carbon budget
Imported goods	Not included in Local budget
LULUCF CO ₂	Not included in Local budget – separate recommendation made
Non-CO ₂ greenhouse gas emissions	Not included in Local budget – separate recommendation made

Recommended Allocation

- Three allocation approaches considered
 - Population
 - Gross Value Added
 - Average recent annual CO₂ emissions (Grandfathering)
- Recommended carbon budgets based on Grandfathering
 - Most widely applicable allocation
 - Best accounting for energy intensity, population, economic structure
 - Common recommended budget allows compatibility within different administrative structures

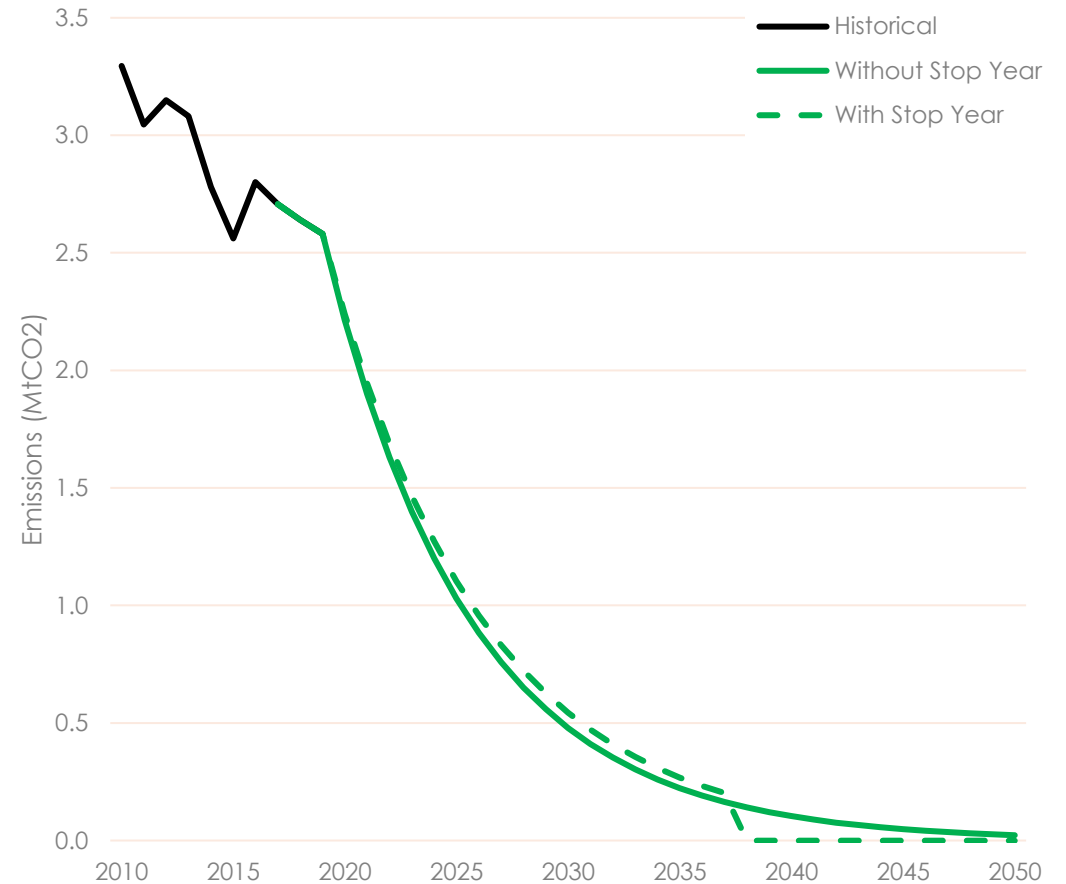
Sub-National Carbon Budgets for Sheffield City

Results



Results

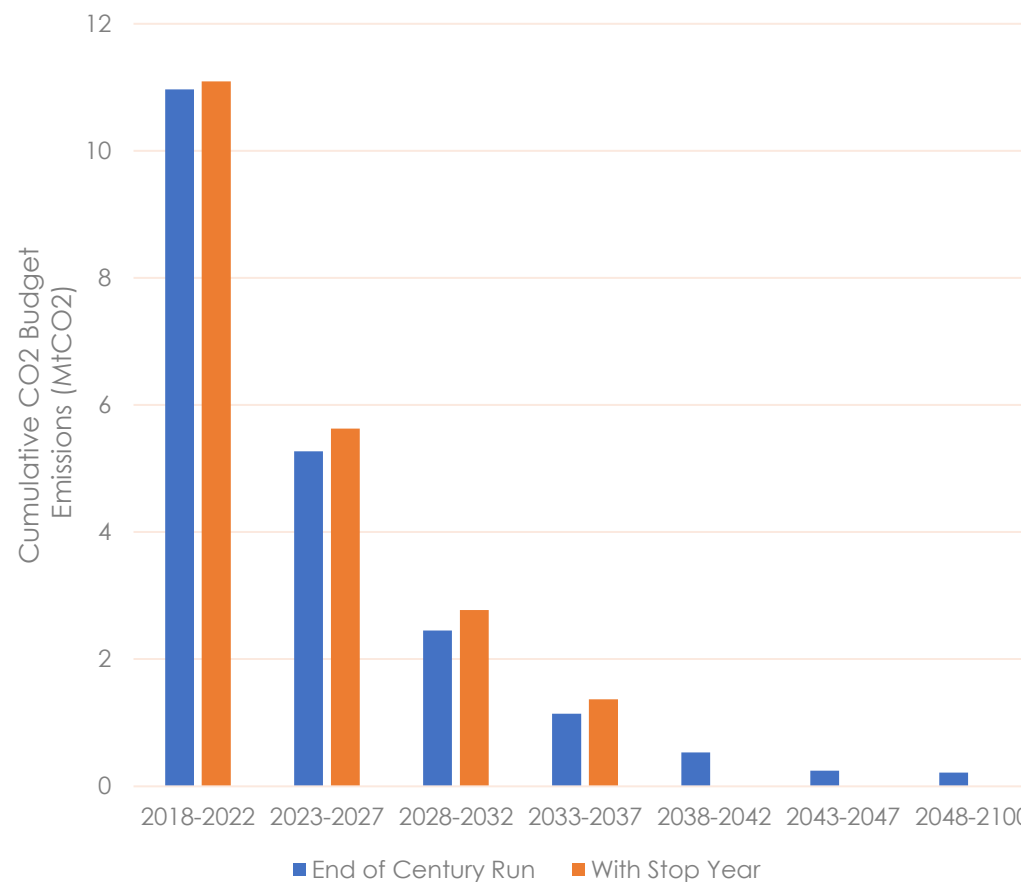
- 1) Limit CO₂ to 16 million tonnes (MtCO₂) for the period of 2020 to 2100.
- 2) Immediate programme of CO₂ emission cuts averaging 14% per year



5-Year Carbon Budgets

	Recommended Budget – End of Century	Recommended Budget – Stop Year
2020	14%	13%
2025	60%	57%
2030	81%	79%
2035	91%	90%
2040	96%	100%
2045	98%	100%
2050	99%	100%

Table 1: Change in annual CO₂ emissions compared to 2015



Key Recommendations

- 1) Stay within a maximum carbon dioxide budget of 16 million tonnes (MtCO₂)
- 2) Initiate an immediate programme of CO₂ mitigation to deliver cuts in emissions averaging 14% per year to deliver a Paris aligned carbon budget.
- 3) Reach zero or near zero carbon no later than 2038.
- 4) *Seriously consider strategies to limit aviation and shipping growth*
- 5) *promote the deployment of low carbon electricity generation within the region and where possible influence national policy on this issue.*
- 6) *Ensure high levels of CO₂ sequestration continues through reforestation, forestry yield improvements and forestry management.*

Thank you

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Context

- The primary driver of long term global warming is carbon dioxide emissions (CO₂)
- Global temperatures relate to increased cumulative CO₂ emissions from human activity (primarily energy use)
- Significant loss of ecosystems and biodiversity, increased human health/economic impacts at 1.5°C, greater again at 2°C
- Global warming of 1.5°C at between 2030 to 2052
- Urgent and wide scale change in the energy sector is needed
- Carbon budgets inform strategies limiting CO₂ emissions inline with meeting climate change goals

Intergovernmental Panel on Climate Change Special Report on 1.5C (2018)

Allocating Carbon Budgets

