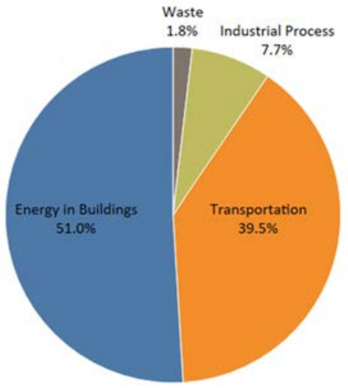
Climate Goals and Benchmarking

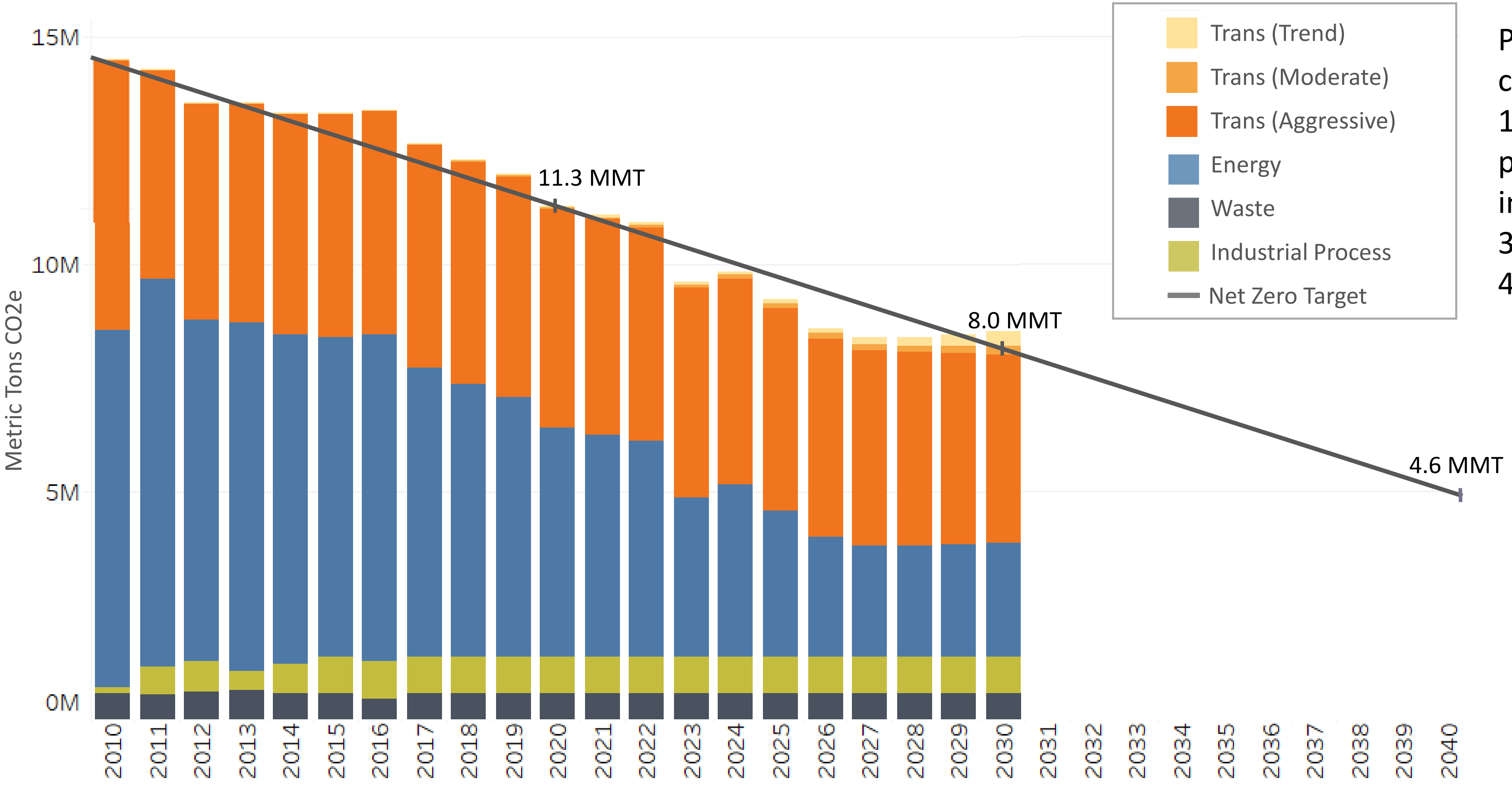
May 22, 2019

Outline

- City of Austin Goal Trajectory
- Definitions
- 1.5C Report
- Deadline 2020 Report
- City Benchmarking



Austin Community GHG Emissions

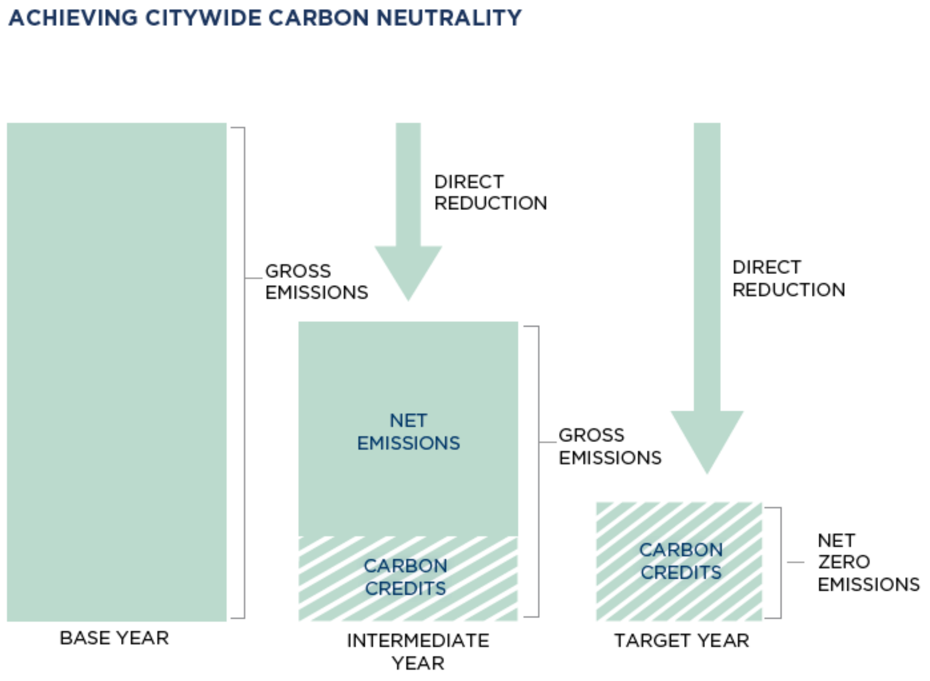


Population is currently 1.25 million & projected to increase by 31% by 2030 & 44% by 2040

Defining Carbon Neutrality (from C40)

At a high-level, the process of achieving carbon neutrality should include the following steps:

- Develop an evidence-based climate action plan setting the city on a pathway to meeting carbon neutrality by 2050 or earlier;
- Set an ambitious interim GHG emissions reduction target based on a robust GHG emissions inventory, e.g. BASIC, BASIC+, a business-as-usual trajectory that accounts for projected population and economic growth, and a breakdown of GHG emissions reduction opportunities by sectors;
- Prioritise and accelerate transformational climate actions;
- Engage other governments, businesses and communities in the planning and delivery of climate actions to ensure fairness, accessibility, and equitable distribution of benefits;
- Establish, monitor, and update estimates of target year residual emissions in line with GHG emissions inventory updates and/or climate action plan progress reporting, and
- Reduce or compensate for residual emissions to eliminate net emissions and achieve net-zero emissions.



Defining Negative Emissions (from C40)

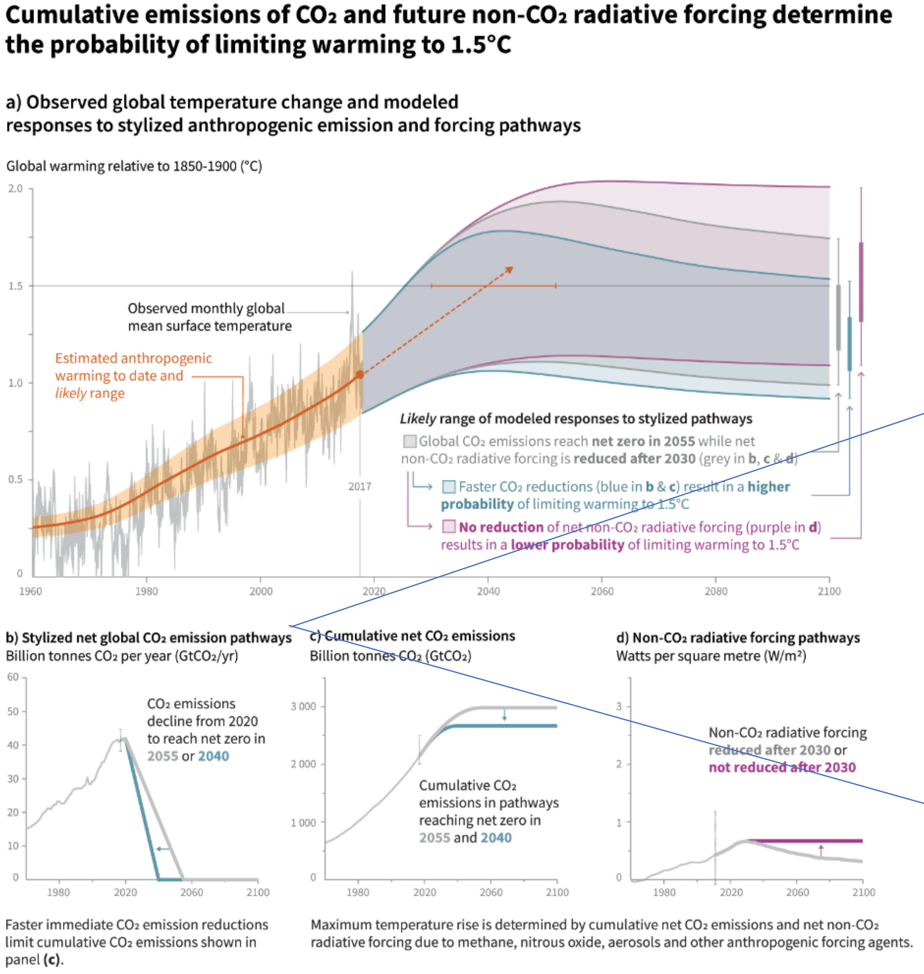
These technologies are largely **yet to be tested and proven, none have been** adopted at large scale. Caution should be taken regarding potential ecological and ethical risks of these technologies until further research and testing on proves them to be effective and safe.

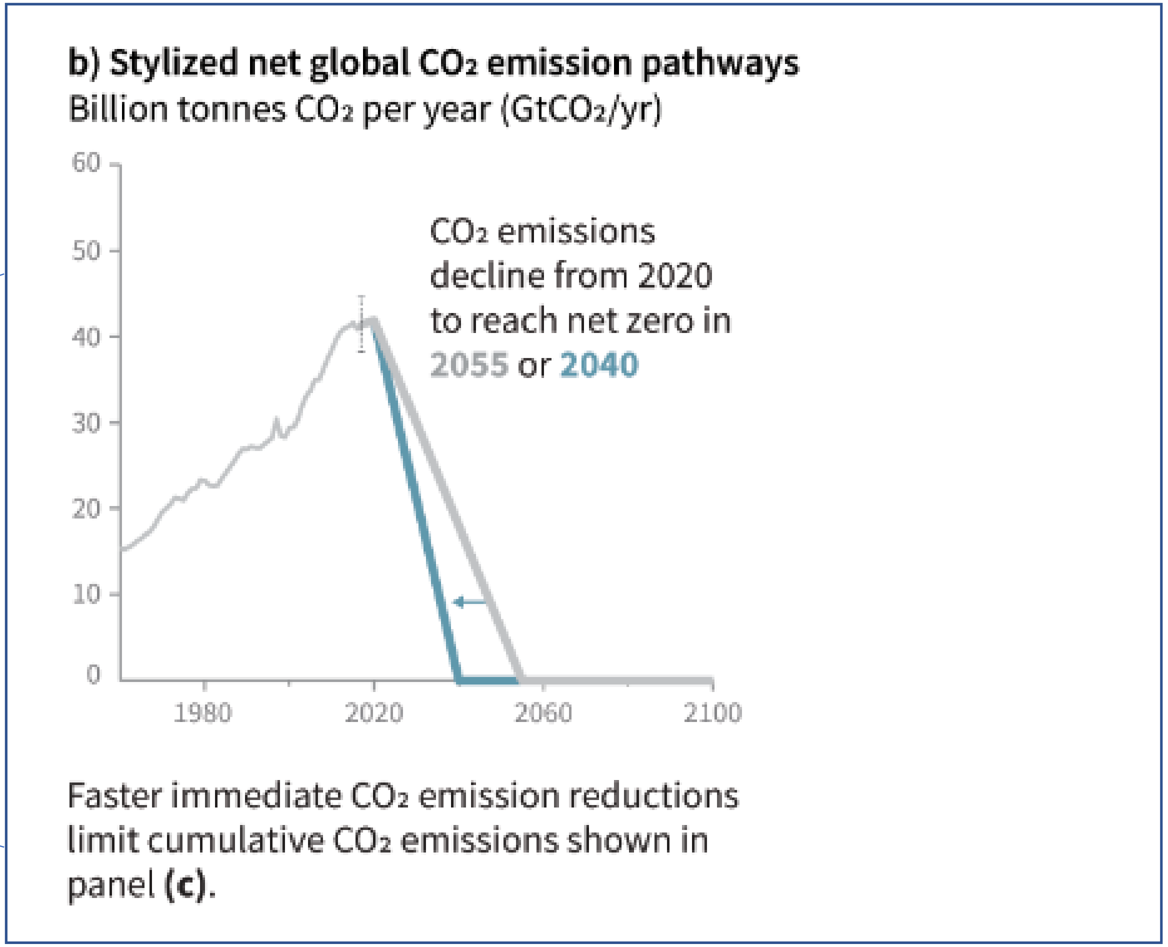
Examples of these technologies:

- **Direct air capture and sequestration** (DACS): chemical process by which CO_2 is captured directly from the ambient air, with subsequent storage.
- **Bioenergy with carbon capture and storage** (BECCS): applying carbon dioxide capture and storage (CCS) technology to a bioenergy facility. Depending on the total emissions of the BECCS supply chain, carbon dioxide may be removed from the atmosphere.
- **Adding biochar**[51] to soils as opposed to burning as a fuel.
- **Enhanced weathering**: enhancing the removal of CO_2 from the atmosphere through dissolution of silicate and carbonate rocks by grinding these minerals to small particles and actively applying them to soils, coasts or oceans.
- **Plant engineering**: selectively breeding certain plants for traits that increase CO_2 storage in soil.

https://www.ipcc.ch/site/assets/uploads/sites/2/2018/12/SPM-for-cities.pdf

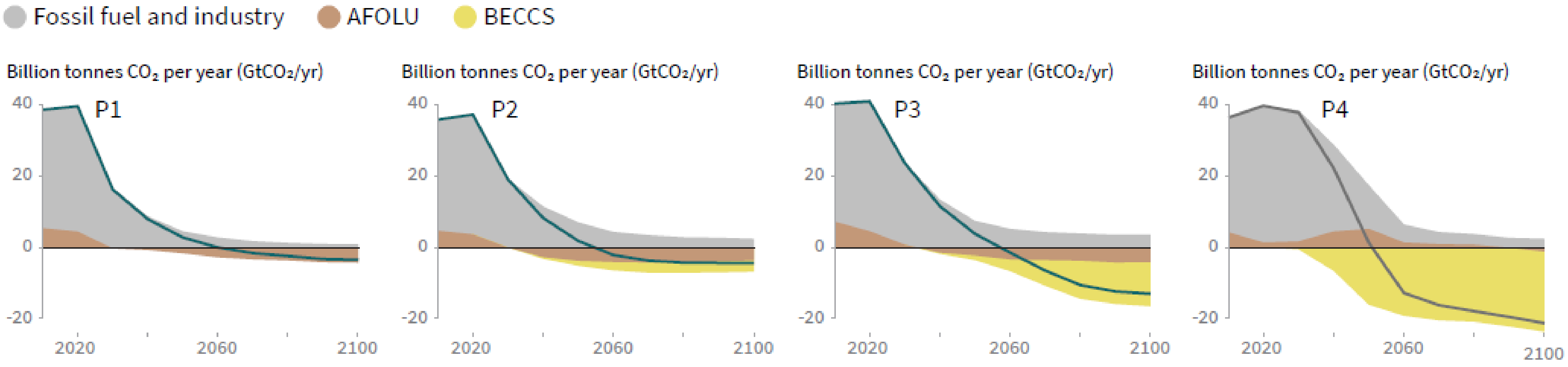
IPCC 1.5º Special Report





IPCC 1.5º Special Report

Breakdown of contributions to global net CO_2 emissions in four illustrative model pathways



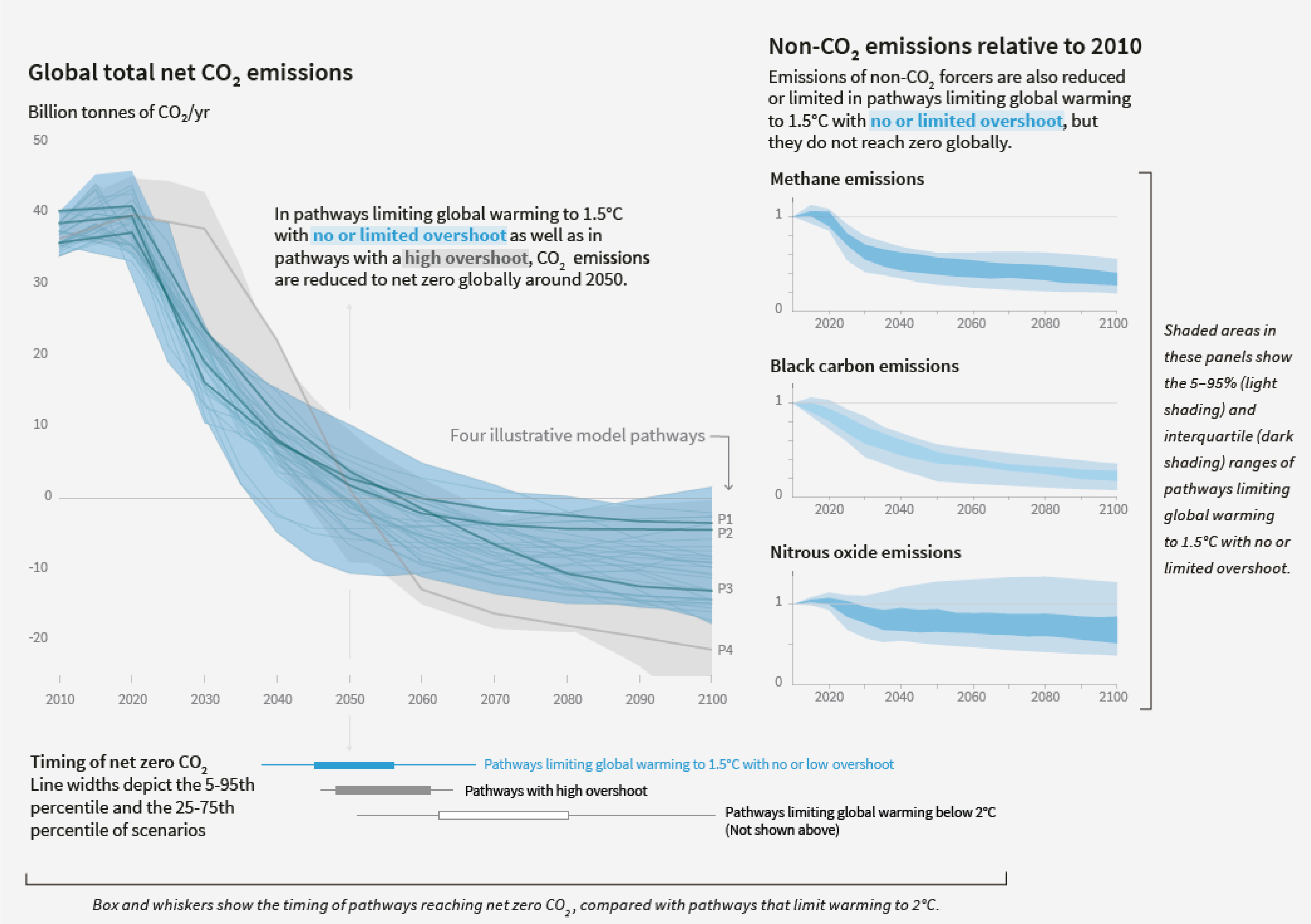
P1: A scenario in which social, business, and technological innovations result in lower energy demand up to 2050 while living standards rise, especially in the global South. A down-sized energy system enables rapid decarbonisation of energy supply. Afforestation is the only CDR option considered; neither fossil fuels with CCS nor BECCS are used.

P2: A scenario with a broad focus on sustainability including energy intensity, human development, economic convergence and international cooperation, as well as shifts towards sustainable and healthy consumption patterns, low-carbon technology innovation, and well-managed land systems with limited societal acceptability for BECCS.

P3: A middle-of-the-road scenario in which societal as well as technological development follows historical patterns. Emissions reductions are mainly achieved by changing the way in which energy and products are produced, and to a lesser degree by reductions in demand.

P4: A resource and energy-intensive scenario in which economic growth and globalization lead to widespread adoption of greenhouse-gas intensive lifestyles, including high demand for transportation fuels and livestock products. Emissions reductions are mainly achieved through technological means, making strong use of CDR through the deployment of BECCS.

IPCC 1.5° Special Report



https://www.c40.org/other/deadline_2020

1 GLOBAL BUDGET 1870-2100

Emissions today:
C40 Cities: **2.4 $GtCO_2e$**
Global: **47 $GtCO_2e$**

Remaining global emissions budget to 2100:
387 $GtCO_2e$ for 1.5 degrees

How much of this remaining budget should be allocated to C40 cities?

2.4 $GtCO_2e$

47 $GtCO_2e$

387 $GtCO_2e$

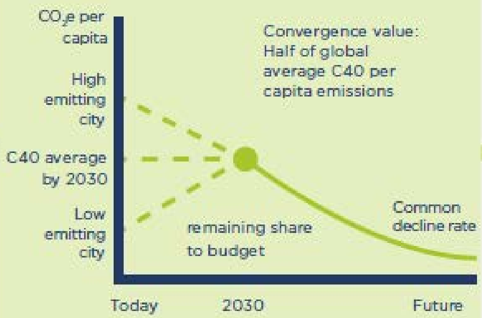
2 ESTIMATING THE C40 CITY SHARE OF THE BUDGET

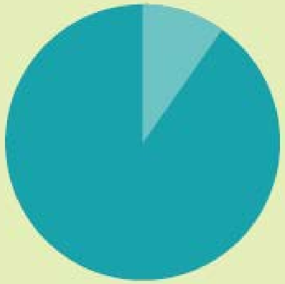
CONVERGENCE AND CONTRACTION

Our chosen method for developing a "fair share" budget for the C40 cities. This takes into account the issues of:

Equality **Responsibility** **Capacity**

This budget is calculated by assuming cities' per capita emissions (and those of the rest of the world) converge linearly to a common value, then everyone declines to zero at a common rate depending on the remaining budget.





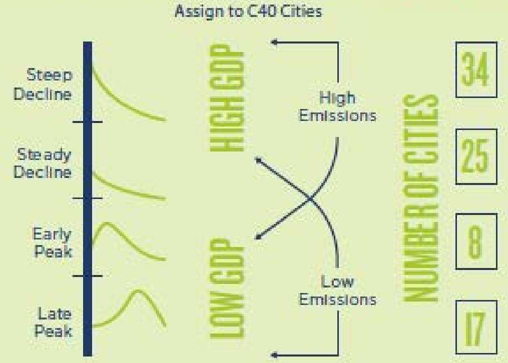
C40 Share =6% of Global Budget by 2100

22 $GtCO_2e$

3 C40 BUDGET

This method gives us a budget of 22 $GtCO_2e$, 6% of the global budget to 2100.

Now, how do C40 cities collaborate to ensure this collective budget is not exceeded?



4 TARGET TRAJECTORY

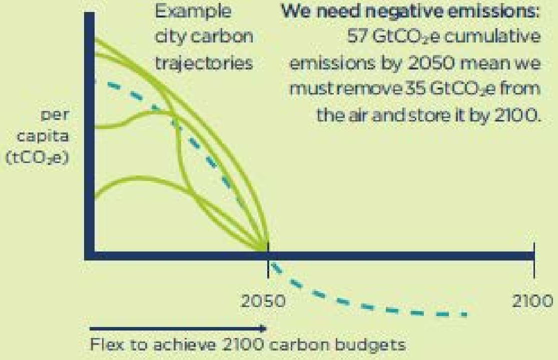
Each city is assigned one of four per capita emissions reduction trajectory typologies based on their current emissions per capita and GDP per capita. The characteristics of these four trajectories are flexed to share the burden between cities and achieve rapid emissions reductions across cities.

5 CLIMATE ACTIONS TO DELIVER TRAJECTORY

C40 – ARUP PARTNERSHIP CLIMATE ACTION PATHWAYS MODEL (2CAP)

The 2CAP model is used to investigate the actions required by cities, and the external factors (such as electrical grid decarbonisation)necessary to achieve each city's target trajectory.

What actions give a Target Trajectory?



We need negative emissions:
57 $GtCO_2e$ cumulative emissions by 2050 mean we must remove 35 $GtCO_2e$ from the air and store it by 2100.

34,000 ACTIONS IN PLACE BY 2030

ZERO CARBON ENERGY BY 2050

14,000 ACTIONS INITIATED BY 2020

-35 $GtCO_2e$

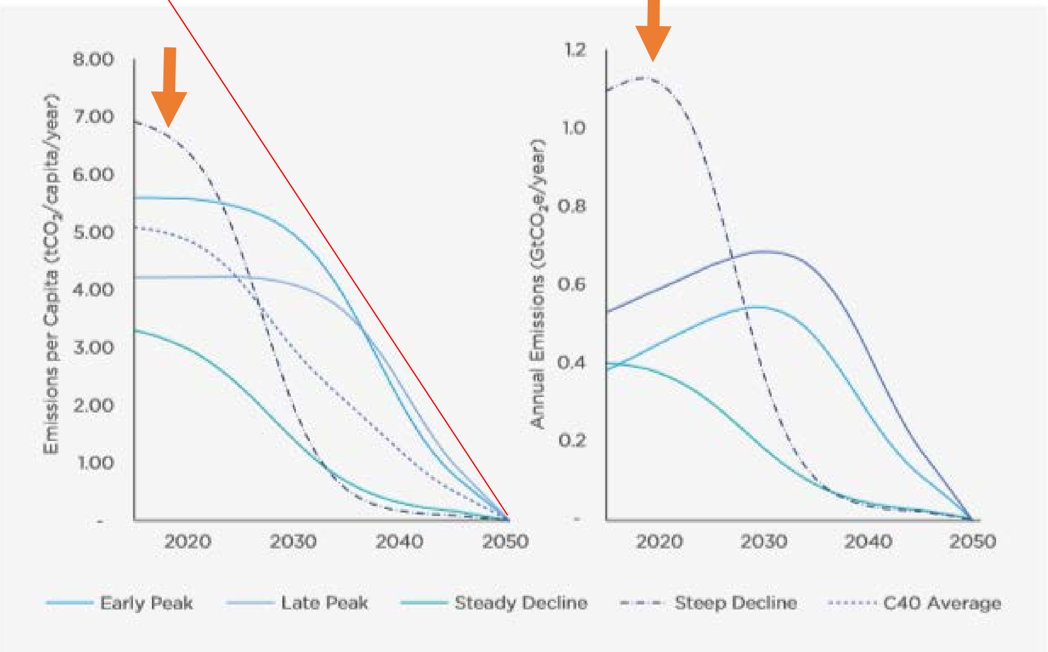
NEGATIVE EMISSIONS REQUIRED BETWEEN 2050 AND 2100

Approximate Austin Pathway from 10 tons / person (currently) to 0 by 2050

Table 1. Assigned emissions per capita reduction typologies for select C40 cities. Based on self-reported data via GPC. Cities marked with * reported via CDP.

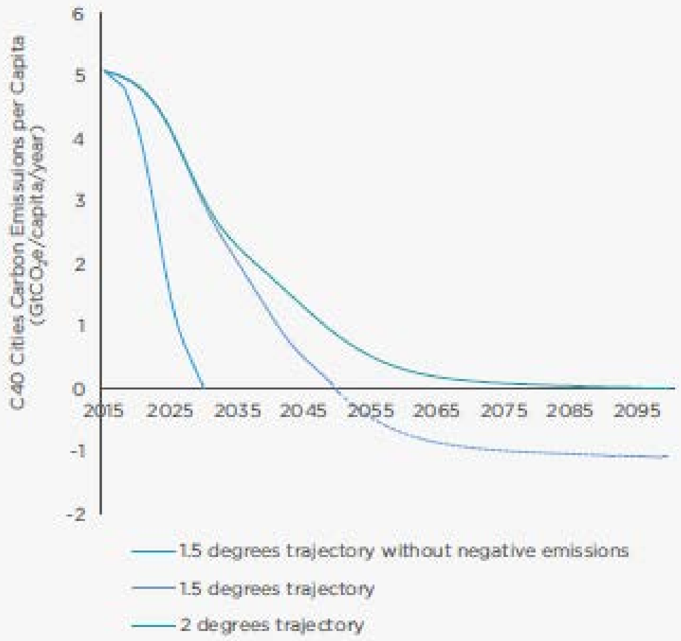
GHG/Capita	GDP/capita	Assigned typology	Example cities
High	High	*Steep Decline*	*Toronto* *Melbourne* *New York City*
	Low	*Early Peak*	*Cape Town* *Durban**
Low	High	*Steady Decline*	*Stockholm* *Seoul** *London*
	Low	*Late Peak*	*Quito* *Caracas** *Amman*

10 Figure 8. Projected average emissions per capita (left) and total annual emissions (right) for the four typologies under the 1.5 degree scenario.



USA in "steep decline" category

Figure 10. C40 cities' emissions per capita trajectories to 2100 to remain within 1.5 and 2 degree budgets.



1. **C40 Research presents the first significant pathway for relating the ambition of the Paris Agreement to action on the ground.** One that would allow C40 cities, representing 650 million people and 25% of the world's GDP, to deliver their own emissions trajectories consistent with limiting global to 1.5 degrees.

2. To stay within 1.5 degrees, average per capita emissions across C40 cities would need to drop from over 5 tCO_2e per capita today to around 2.9 tCO_2e per capita by 2030. Doing so would keep cities on a trajectory consistent with either 1.5 or 2 degrees of warming, it is only after 2030 that these trajectories diverge.

3. **Mayors can deliver or influence just over half of the savings needed to put C40 cities on a 1.5 degree trajectory, a total of 525 $GtCO_2e$ by 2100.** Either through their own direct action or through collaborating with partners such as the private sector.

4. **Deadline 2020:** Action in the next four years will determine if it is possible for cities to get on the trajectory required to meet the ambitions of the Paris Agreement. If sufficient action is not taken over this period, limiting temperature increases to below 1.5 degrees will be impossible. C40 cities collectively delivered nearly 11,000 climate actions between 2005 and 2016. In the four years to 2020, an additional 14,000 actions are required. This represents an additional 125% in less than half the time.

5. Wealthier, high carbon cities must deliver the largest savings between 2017-2020. As of 2017, cities with GDP over $15,000 per capita must begin to reduce their per capita emissions immediately. Of the 14,000 new actions that are required from 2016-2020, 71% should be taken by cities that need to immediately decrease per capita emissions.

6. As C40 cities age and grow they will need to invest in renewing and expanding infrastructure, and working to enhance the lot of their citizens. From 2016 to 2050, over $1 trillion of this investment is required across all C40 cities to meet the ambition of the Paris Agreement through new climate action. **$375 billion of this investment is needed over the next four years alone** to take the climate action required.

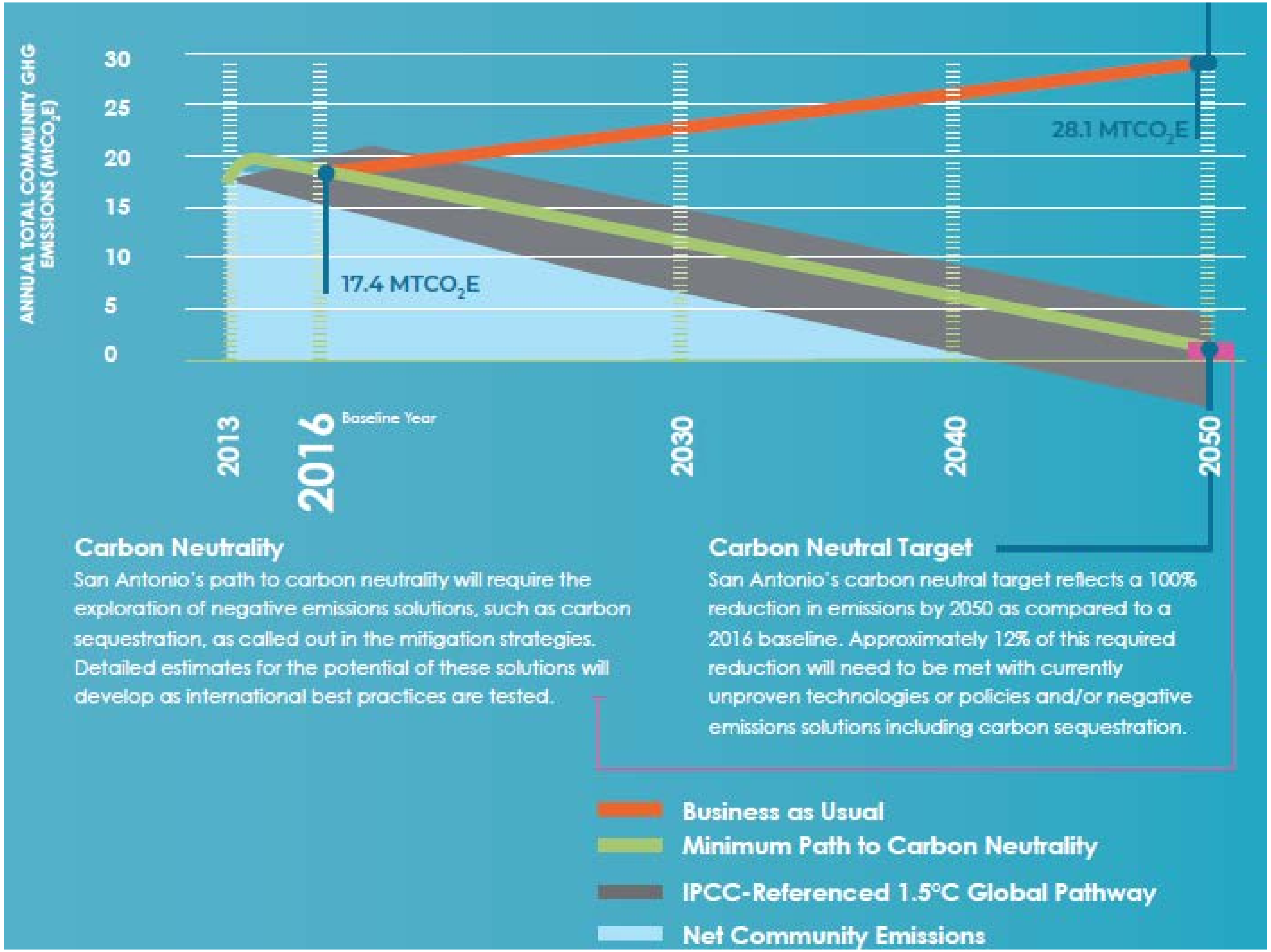
7. If action involving city governments can deliver just over half of the GHG savings needed, then action to deliver structural changes from outside cities (i.e. electrical grid decarbonisation), must start to have a significant impact from 2023 at the latest. This will become the dominant driver of urban GHG reductions after 2030.

8. Substantial carbon sequestration will be required by national governments if cities are to stay on a 1.5 degree trajectory post 2050.

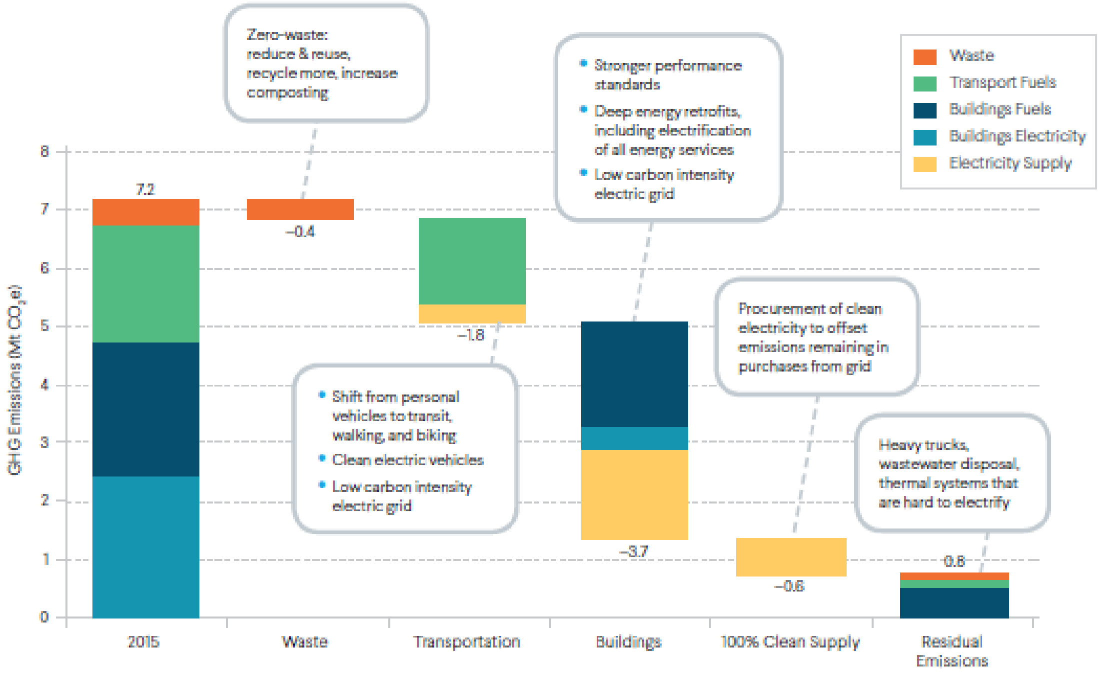
9. **If all cities adopted the roadmap set out in this report for C40 cities, it would deliver 40% of the emission reductions required to keep temperature rise below 1.5 degrees:** Action by C40 cities can have huge magnification. If all cities with a population greater than 100,000 adopted the ambition for C40 cities set out in this report, there would be the potential to save 863 $GtCO_2$ globally by 2050. By 2100, they could have saved up to the equivalent of 40% of the reductions necessary for a 1.5 degree scenario.

San Antonio

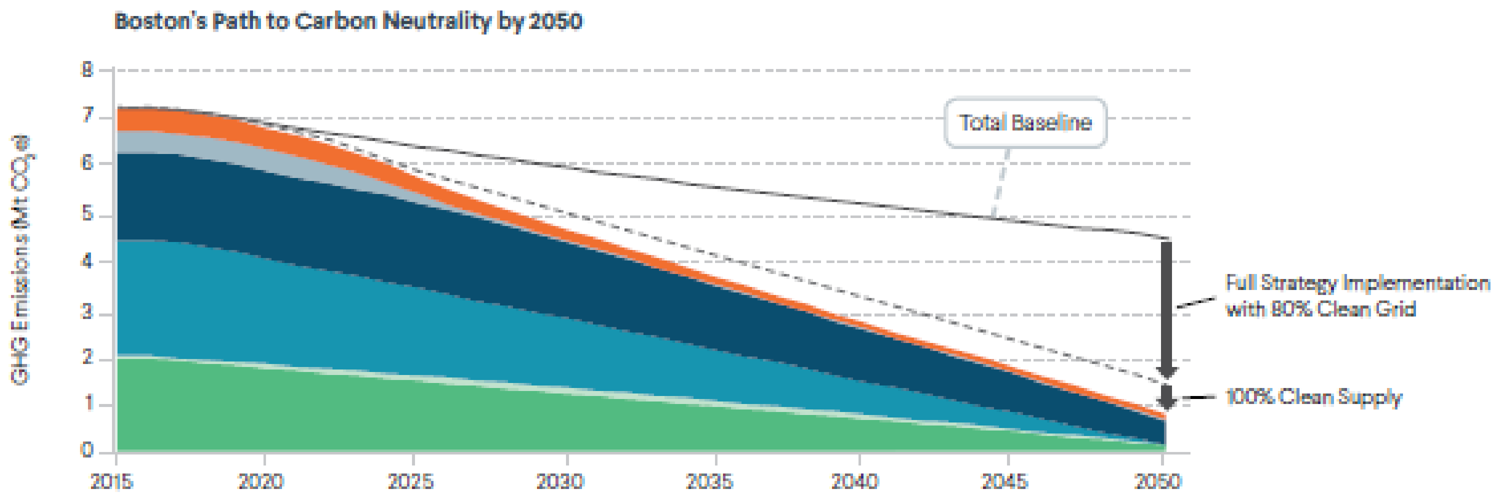
https://saclimateready.org/wp-content/uploads/2019/01/SACR-REPORT_FINAL_spreads-1-25.pdf



Carbon Free Boston



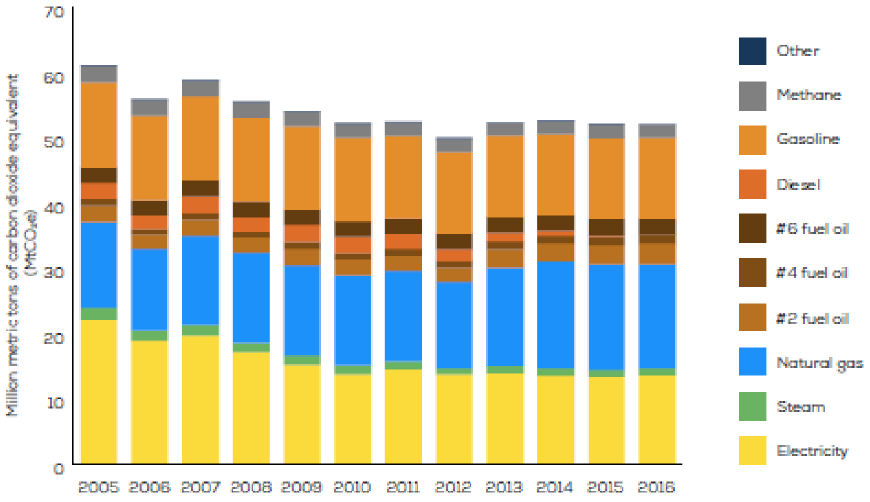
https://www.greenribboncommission.org/document/executive-summary-carbon-free-boston/



Aligning New York City with the Paris Climate Agreement

https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/1point5-AligningNYCwithParisAgrmt-02282018_web.pdf

CITYWIDE ANNUAL GHG EMISSIONS BY SOURCE



*GHG emissions from nitrous oxide and jet fuel account for less than 1% of citywide GHG emissions

GHG Impact of 2020 Climate Actions

Actions NYC must take by 2020 have prolonged impacts to 2030 and beyond.

① NECESSARY NEAR-TERM ACTIONS WITH MEASURABLE GHG IMPACT

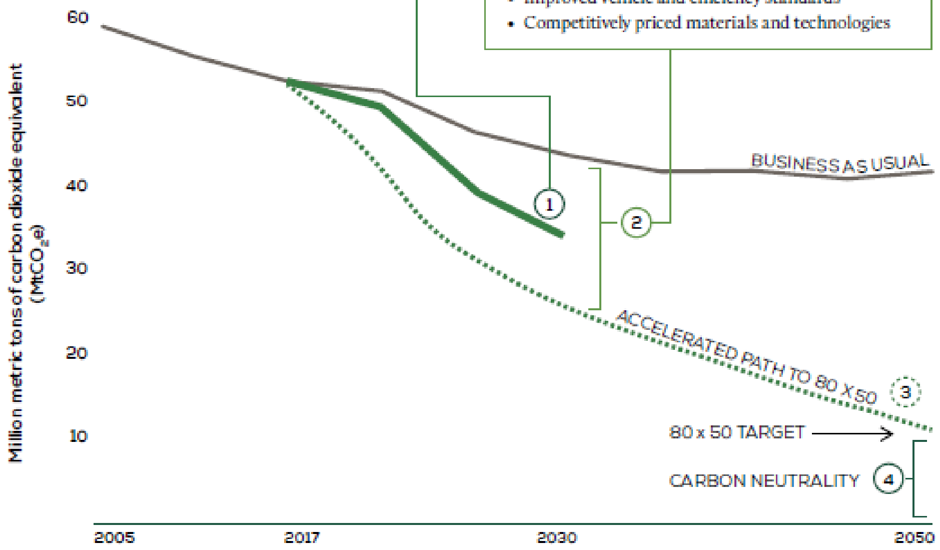
This plan includes 16 near-term actions with associated GHG reductions that can be measured. These actions will result in an estimated 10 million metric tons of CO_2e reductions by 2030. Examples include:

- Building energy performance mandates
- Advanced building codes
- 100% renewable electricity in City operations
- Electric vehicle (EV) infrastructure
- Sustainable transportation
- Organics separation

② NECESSARY NEAR-TERM ACTIONS THAT ENABLE, ACCELERATE, OR MULTIPLY GHG REDUCTIONS

With the measurable near-term actions alone, NYC will not achieve the GHG reductions necessary to be on an accelerated 80 x 50 trajectory that aligns with a 1.5 degree outcome. The remaining 15 near-term actions will enable, accelerate, or multiply GHG reductions to push NYC closer to the accelerated trajectory. Examples include:

- Carbon pricing
- Enhanced climate change communications
- Workforce able to deliver climate objectives
- PACE financing program
- Improved vehicle and efficiency standards
- Competitively priced materials and technologies



③ ACCELERATED PATH TO 80X50

Reaching the City's long-term climate objectives will require persistent effort and constant reevaluation of progress and strategies.

④ CARBON NEUTRALITY

The development of a global cities protocol for carbon neutrality will inform how NYC can reach carbon neutrality through offsetting remaining emissions after all technically feasible in-city emission reductions are achieved.

END