



Zero Carbon Cities: City Carbon Budgets in 2022

Date: June 2022
Location: Manchester
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“We cannot set the right priorities with the wrong compass”

Background

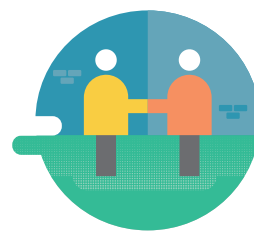
In 2019, a collection of European cities came together to work collaboratively as they recognised that they would need to change how they operate if they are to achieve the caps on carbon necessary to align with the Paris Agreement. The cities aimed to learn more about how to use carbon budgets as a way to measure how it does this. As part of the zero carbon cities project partners were given briefings to help them understand the different concepts and practices used in cities which had started to use carbon budgets or climate proofing of the municipal budget. They also learned about tools available and potential working paths for cities wishing to think differently about their approach to carbon budgeting.

Since that time, the entire political context has changed drastically. Before we take a closer look at the cities that have now used new budgetary frameworks to evaluate their climate impact and better plan their climate strategy, we should review what has changed in the two years of the ZCC project and consider what the new challenges are in cities that need to be addressed. Climate budgeting cannot be an additional administrative process, it needs to orientate the decision-making and clarify the investments to be made. As we had identified, it should also ensure much more transparency on decision-making and facilitate the democratic debates around local strategies.

Carbon budgets and/or Climate budgeting should serve 4 overarching objectives

- Increased transparency on the progress achieved and on the remaining efforts to be done to reach climate neutral cities, thus ensuring that the climate strategy can be accountable
- Clearly present the different options of investment and decrypt the basis of the decisions to be made
- Share the responsibility between actors and mobilise all actors
- In the municipality, show the current and potential impact of each department, thus ensuring that the climate strategy is an embedded strategy of the whole city

In addition, after an in-depth analysis of ZCC cities needs, the network focussed on the following 4 themes, for which the carbon budget exercise should be used:



**CITIZEN
ENGAGEMENT**



**TRAVEL AND
TRANSPORT**



**URBAN
IMPACT**



**CLIMATE CHANGE
EDUCATION**

Science-based targets can support cities in defining their strategy by identifying and leveraging on their own strengths, and on the most impactful actions. As the ZCC network has shown, this can only be achieved if adapted to the local context and to the local available data.

Since beginning of this conversation 2 years ago, the context has evolved drastically. Not only has the coronavirus pandemic impacted on city priorities, it has also redesigned economic strengths and weaknesses in and across geographical areas. It has demonstrated the importance of better understanding the current situation and that the climate emergency is just one of the many emergencies cities have to face simultaneously. The multiple and permanent crisis management mode might require a new compass. It also advocates for a more general economic planning process, meaning that climate budgeting, if taken in isolation from other emergencies, will fall short in proposing clear directions for investment, for new governance, and for adaptation.

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4. What’s next for “science-based” targets in cities?

1. The changing context

Recovery and resiliency plans

As a way to maintain the EU economy and to absorb the massive economic downturn due to the coronavirus pandemic, the EU has injected significant funds into the economy via an unprecedented “recovery and resiliency” package. Unfortunately, climate transition was not an identified element of the recovery plans designed by member states for transforming/supporting their economic recovery. As a result, acceleration of the climate transition has not happened and, in reality, most of the investment has not been on greening our industry, our energy supply, or changing our consumption patterns.

Importantly, during the crisis, it has been clear that cities were and remain at the forefront of the immediate crisis management and that good local governance is an asset in uncertain times. It can be considered as a turning point in how cities are seen by the EU institutions.

Energy and peace crisis

Energy markets were broken before the Russian invasion of Ukraine, with price surges from Summer 2021, but the war has considerably worsened the security of supply, especially in some EU Member States. Not only are the price increases hugely impacting the EU economy, but it is pushing many EU households into energy poverty. Although, social measures to protect the most vulnerable have been put in place as a response to this crisis, the European Commission is looking for longer term measures it can take.ⁱ

This new political context places climate action at the centre of everything. Responding to the energy crisis will require us to significantly reduce our energy usage and switch to renewables. The war is also revealing how dependant we are on fossil fuels, not only for heating and mobility but also for producing goods, including food.

It is more important than ever to have long-term planning in place as, in times of extreme political volatility, we need to have a clear view of the landing point to set clear objectives.

The answers from the EU (Mission Climate Neutral cities and new legal/financial framework)

One of the very important elements in the changing landscape is the launch of the [EU Mission for 100 Climate Neutral Cities](#). Not only will the selected cities have to develop a “science-based” strategy, but they will have to commit to reach climate neutrality by 2030. Most importantly, they must design a Climate City contract which will be based on precise targets, an action plan, AND a new governance model for the city. This approach will test how the 100 cities, with additional EU financial support and access to a vast pool of expertise, will take the journey. Both Tartu and Frankfurt (who was originally part of the ZCC network) will benefit from the programme but other ZCC cities can become follower cities and integrate the [NetZeroCities](#) programmes (the platform which will implement the Mission).

As for the [EU legal framework](#), with the aim to reduce EU dependency from Russian oil and gas, the fit for 55 package, will be amended to increase all targets: 13% of energy efficiency by 2030; 45% of renewable production by the same date. The higher the mid-term national targets are, the more important the 2030 cities targets are becoming to align the strategic planning between different levels (for consistency and leverage).

Selected cities for the 100 Climate Neutral Cities Programme:

EU CITIES



The latest IPCC report (March 2022)

In the wake of the Russian invasion of Ukraine, the latest IPCC report that was published has not got the coverage it deserved. For cities, this report is a clear milestone. Not only because the report describes solutions, summarised into designing new cities that will be transformed into liveable places where we produce goods within the limit of the planet boundaries; but also, because the report emphasises that the more societies are cohesive and inclusive, the more they will be equipped to face the climate change impacts and conduct the transformation of the local ecosystem. Sufficiency is also a very important chapter which is advocating to have a broader approach on all our resources, and not only being “carbon” driven policies.

In conclusion, during the life of the ZCC network, the debates have deepened. Climate strategies are not only about Climate, but are about new prosperity for cities within the planetary boundaries that protect Earth’s life-supporting systems (Donut theory). All crisis’ are linked, so are the answers. And solutions exist, they all lie within a new territorial organisation of the production/ consumption of what we need, in full cooperation with other territories of the region.

2. Using the carbon budget, feedback from cities

Carbon budgets or climate-mainstreaming of municipal budgets, were widely promoted a couple of years ago. At the municipal elections in France in June 2020, many new Councils decided to have a “climate budget” as a way to show their commitments to drive their cities transition.

The most advanced guidebook produced on this has been developed by the institute I4CE looking at 5 local authorities in France which have tested different methodology.ⁱⁱ

However, for the moment, the exercises in these cities have not led to massive changes in decision-making due to the many crisis and conflicting priorities hitting the municipal agenda during the same period.

Manchester

Manchester started its climate journey in 2010 with its 10 year strategy – Manchester: A Certain Future. It achieved 41% reductions in that period and was supported by additional policy documents including the city’s ‘Our Manchester Strategy 2015’ which states the city will play its full part in limiting impacts on its pathway to zero carbon. Manchester established an independent agency – Manchester Climate Change Agency – to lead on production and implementation of its Climate Change Framework which takes a science-based approach and aims to be zero carbon by 2038. Progress is monitored by the Manchester Climate Change Partnership (MCCP) made up of sector representatives from across the city.

The 2020-2025 Framework document was refreshed as part of the ZCC project. The city use ‘Scatter’ (Setting City Area Targets and Trajectories for Emission Reductions) which was developed to help Local Authorities to measure and model area-wide carbon emissions. This provides an evidence base and scale of action needed across multiple sectors: buildings, energy, transport in order to achieve carbon neutrality by 2038.

“Bleu Climat” in Paris

For the past few years, Paris has been evaluating the impact that its budget has on climate actionsⁱⁱⁱ which is used for their Climate debates and Climate academy. It proved to be a useful tool to mobilise all departments and to have a sound basis for consultations, debates and education materials.

The Paris evaluation is a robust and scientifically based exercise, and very few cities have such a detailed document presented to the Municipal council for adoption but we can see a trend emerging with other cities in Europe having developed similar annual progress reports. These cities will be the backbone of the EU Mission “Climate-neutral and smart cities”.

Tampere Climate Budget

Tampere is aiming to reach climate neutrality by 2030 and has done a breakdown of the target by sector fixing precise climate budget (GHG emissions) maximum budget for each sector. This translates into municipal investment plans to reach this reduction in emissions. It has been a joined up piece of work between the financial and climate departments.

Clermont-Ferrand Carbon Budget

Equally, the same approach has been used in Clermont-Ferrand and specifically applied internally with each municipal department having a maximum carbon budget per year which is decreased year on year - the first edition will be done in 2023. Interestingly, in parallel, a Citizen Convention for the future of the city has been organised to define 40 priority actions (cultural, social, democratic) out of which one is to ask the municipality to implement a carbon budget to monitor progress. The citizens will vote in June 2022 to choose between the 40 priorities.^{iv}

3. The new Compasses

As explained, carbon budget or climate mainstreamed municipal budgets are falling short when there are multiple crisis and competing demands to deal with. In parallel to the develop of the Carbon budget, the city of Clermont-Ferrand also worked on criteria to assess the “regenerative impact” of investments done by the municipality^v.

The city of Valencia, has identified that once the targets are set the roadmap should be designed around some “structural projects” and other “emblematic projects”. In their case, one structural project is to redesign the whole city’s car use. The emblematic one, is a project that people can relate too, that changes the way we think about combatting climate change, in their case, it is the “solar requiem” whereby they installed solar generation plant in each of the cemeteries, providing shade (under the solar panels) and light (with the electricity produced).

Doughnut of social and planetary boundaries

To better know the cities metabolism, and where these projects could be, Kate Raworth’s “Doughnut” approach has been attracting many cities. This compass is proposing a “social floor” and “planet” ceiling. The tool is particularly appealing for use with citizens, for example helping to focus citizen workshops.

The Brussels region has used it to evaluate the current footprint of the Brussels economy and population on the planet. Using this new tool helped them to identify what could be the structural projects to concentrate on. They have produced very useful guidebooks to translate the Doughnut into a city (only in French so far^{vi}).

Other similar tools also exist, what is remarkable is that they are increasingly used by many cities to start new conversations with citizen. The appetite is big and more toolkits to help municipalities to use visioning exercises^{vii} should really be considered as a priority for EU support.

2050 roadmaps

The Vienna strategy is one of the most complete exercises for phasing out fossil dependency and becoming climate neutral. The new Municipal council has increased the ambition to reach climate neutrality in 2045^{viii}. This is only possible because they started to plan their energy transition more than 2 decades ago. This has given them a sound database and deep knowledge of all their housing stock and their ecological footprint. They have embedded climate responsibility at the highest level within the administration (with a transversal climate directorate overseeing all departments) and at the political level. This shows that once a city has started the budgeting exercise, the key for success lies in ensuring political back up and the right governance.

Security/vulnerabilities compasses

This is what the pandemic taught us - we have no real idea about our vulnerabilities and neither are we able to describe our supply chains. This is a huge obstacle to the design of a meaningful transition pathway. We see for example, that in Germany, there are delays in delivery of heat-pumps (of more than a year in some case) along with electric buses, cars etc. All our pathways towards climate neutrality are relying on good supply chains and trained workforces. If the Commission has launched a vulnerability check exercise for Member States^{ix}.

Municipalities need to have a better overview on their own vulnerabilities in order to adapt and plan better their development.

Conclusion : Beyond Carbon budgeting

One critical area that needs to be address is the human resources gaps in local governments. Having scientific targets can be the first steps, but monitoring progress and taking daily decisions on what actions needed require staff resources to ensure that the strategic planning exercise is implemented (and does not end up in a drawer). A recent study shows that 2.5 jobs per year to 2030 should be created in climate departments to coordinate actions and strategy implementation^x.

Carbon budgeting has been a breakthrough in the field of municipal planning, it gives a "deadline" and changes the vision of the cities role to mobilise wide partnerships across all local actors to transform the city. This breakthrough can only deliver if municipalities are given the means to endorse this role of "economic transition planner" further.

Thanks to the wonderful teams of the 6 cities of the ZCC network to have done this exploration journey! (Frankfurt left the group at midterm of the project but did nevertheless contribute to the project)



MANCHESTER



BISTRITA



FRANKFURT



TARTU



VILVOORDE



ZADAR

- i. <https://www.bruegel.org/publications/datasets/national-policies-to-shield-consumers-from-rising-energy-prices/>
- ii. <https://www.i4ce.org/download/climate-assessment-of-local-authority-budgets-methodological-guide/>
- iii. <https://www.paris.fr/pages/paris-pour-le-climat-2148#bleu-climat>
- iv. <https://clermontparticipatif.fr/pages/convention-citoyenne>
- v. <https://territoireengagetransitionecologique.ademe.fr/clermont-ferrand-met-en-place-une-evaluation-socio-environnementale-dune-programmation-pluriannuelle-dinvestissement-5-2-1/>
- vi. <https://donut.brussels/les-rapports/>
- vii. <https://www.citiesoftomorrow.eu/>
- viii. <https://www.digital.wienbibliothek.at/wbrup/download/pdf/3905161?originalFilename=true>
- ix. https://ec.europa.eu/info/strategy/strategic-planning/strategic-foresight/2020-strategic-foresight-report/resilience-dashboards_en
- x. <https://www.localstaff4climate.eu/>

Guidance for Setting Carbon Budgets for Cities

Dr Christopher Jones (University of Manchester)¹
November 2021

Cities can take a science based approach to setting climate change targets by adopting a carbon budget. Carbon budgets indicate how much carbon dioxide (CO₂) will be emitted globally for a particular level of global warming. The Intergovernmental Panel on Climate Change (IPCC) produce global carbon budgets that are used to set national policy commitments on limiting greenhouse gas emissions. Carbon budgets can be used to define long term targets but they also show how targets need to be recalibrated based on the progress being made and therefore interim targets can be set to avoid exceeding the total budget.

Downscaling the global carbon budget to cities or regions can therefore enable them to take proportionate action in line with keeping global warming well below 2°C of change. Doing this is challenging because a number of decisions need to be made in allocating shares of the global budget. This allocation not only needs to determine shares that match the world's agreed climate change target (the Paris Agreement), but also should consider equity and fairness. Equity is a part of the Paris Agreement on climate change which defines common but differentiated responsibility and respective capabilities between participants in the agreement. Essentially this acknowledges that countries have made different contributions to global warming so far (historic carbon emissions) and some are at a further stage in economic development than others and are therefore more capable of transitioning to low carbon options more quickly.

Researchers at the University of Manchester's Tyndall Centre for Climate Change Research developed a pragmatic method for cities to calculate a local carbon budget that is aligned with the goals of Paris Agreement in terms of the level to limit climate change to and its equity principles.

Research published in Anderson et al [1] is used to select national carbon budgets based on the IPCC remaining global carbon budget in [2]. Three allocation approaches have been identified that use datasets which might be available to local regions and cities to designate a share of the national carbon budget:

- Population based (per-capita) allocation
- Economic based allocation
- Recent emissions (grandfathering) allocation

¹ All views contained within this report are attributable solely to the author and do not necessarily reflect those of researchers within the wider University of Manchester or the Tyndall Centre for Climate Change Research.

Why carbon budgets are used for science based climate change targets:

Changes in the earth's atmosphere is the primary driver for our warming world. We have a climate change problem because humans release more greenhouse gases than natural systems or our own technology can remove. So instead of a stable concentration of carbon dioxide, methane etc, in our atmosphere the levels of these heat trapping gases have been building up in our atmosphere (CO₂ concentrations for example are ~140% of the levels in the 19th Century). For 'stock' emissions like carbon dioxide, that retain their effect on our climate long term (over 100 years), carbon dioxide releases not balanced out by an equivalent removal adds to the atmospheric concentration. This is why climate scientists say that the temperature will only stop increasing when net emissions of CO₂ are zero – i.e. we're not adding more than can be removed.

Concentrations of CO₂ in our atmosphere are around 415 ppm (parts per million) and when they reach around 430 ppm there is a good chance the earth will be 1.5°C warming than it was back in the 1800s when the concentration was just 280 ppm. The more additional CO₂ we release than is removed the faster we'll reach 430 ppm. At our current pace (if CO₂ emissions stayed where they are) we'd reach 430 ppm sometime around 2030. The IPCC have said that we need to have halved our rate emissions by 2030 globally for this not to happen.

How much CO₂ we can output to the air in total before hitting an atmospheric concentration, and therefore a temperature change, has been quantified and is referred to as the 'global carbon budget'.

Setting a Carbon Budget for Cities and Regions

Carbon budget setting has two key steps:

- 1) National carbon budget data
- 2) Use local data to downscale for national data

1) National Carbon Budgets

The starting point is the national carbon budget. There are various ways to calculate a national carbon budgets depending on if or how equity principles are applied. For the work in Manchester national CO₂ emissions carbon budget for 2020 to 2100 based on Anderson et al [1] have been used. This method is publically available and clearly sets out the process for determining allocation.²

Budgets for URBACT Zero Carbon Cities based on Anderson et al [1] is shown below. Note that these budgets have not been adjusted for international aviation and shipping emissions as has been done for the UK and Sweden. This requires further information on national aviation and shipping emissions. However without this adjustment cities and regions can get an indication of their share of the global carbon budget.

Country	2020 to 2100 MtCO ₂ Budget
Romania	675
Belgium	870
Germany	7,021
Italy	3,093
Croatia	157
Estonia	160
UK	3,703

2) Local Data to Downscale National Budget

To allocate a share of this budget the following datasets are needed depending on the allocation method to assign a proportion to a city or region:

- Population data at local and national level
- Economic activity data (e.g. GVA or GDP) at local and national level
- CO₂ emissions data for energy use and transport at local and national level

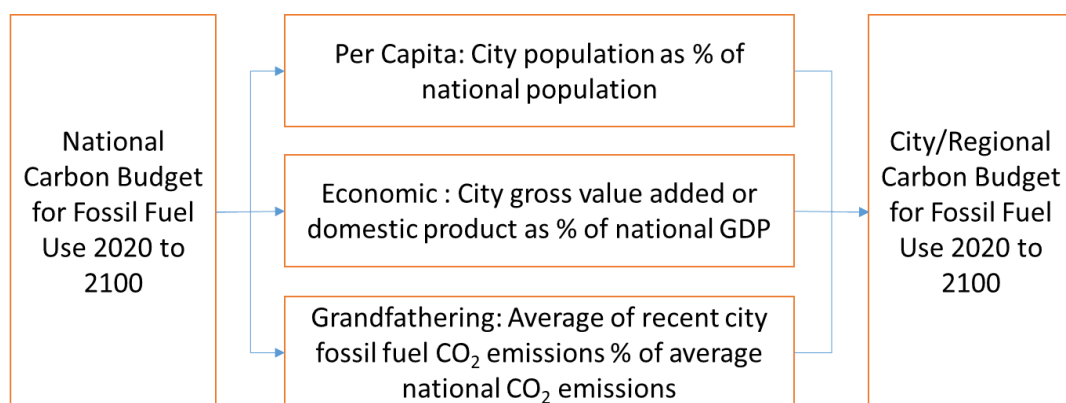
No allocation principle is perfect and each approach has its advantages and disadvantages as shown in the table below:

Allocation Principle	Method	Advantages	Disadvantages
Per-capita	Carbon budget is shared equally based on the relative proportion of the city's	Low data requirement. Easy to communicate and follows equality principle	May not be a fair/equitable distribution if per-capita carbon

² <https://www.tandfonline.com/doi/full/10.1080/14693062.2020.1728209?scroll=top&needAccess=true>

	population to the national population		emissions are uneven in a country
Economic	Carbon budget is shared based on city's proportion of national GDP	Areas with more economic activity get a largest proportion of budget reflecting their role in the economy	The carbon intensity of economic activity may vary within a country. Areas with high energy intensity industries (e.g. steel or chemical production) may get a smaller budget than areas with high economic output for lower energy use (e.g. financial services)
Grandfathering	Carbon budget is shared based on city's proportion of average national CO ₂ emissions	Typically accounts for underlying structural issues, such as the carbon intensity of current infrastructure in an area	Gives greater emissions budgets to areas with current high emissions. Requires data on energy use and transport at local level.

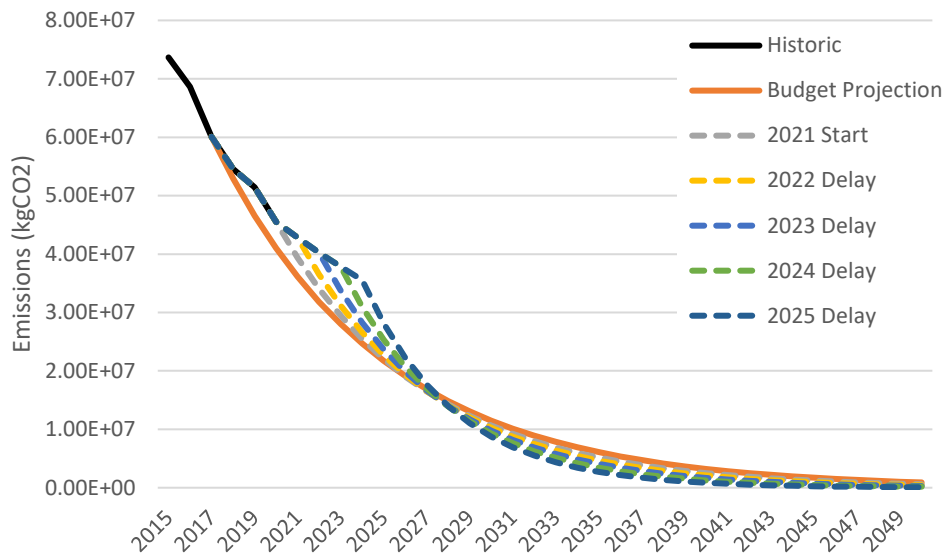
For 2020 carbon budgets 2019 is the recommended baseline year. For all three allocation measures a 5 year average (i.e. 2015 to 2019 inclusive) of these datasets can be used to improve how representative the values are. This is particularly important for the grandfathering (recent emissions) allocation approach which is more affected by factors such as weather (i.e. heating and cooling demand).



Notes on Carbon Budgets:

The carbon budget is the total amount of fossil fuel carbon dioxide that a city or region can release within the city from 2020 to the end of the 21st Century (2100).

Like the global carbon budget, how the budget is used (spent) is a policy decision depending on the pathway for transition to low carbon. Doing so entails the trade-offs between using more of the budget in the near term and having less available in subsequent years. The figure below gives an illustration of this:



The carbon budget is measured in CO₂ only, following the IPCC available global carbon budget which is a CO₂ budget [3]. This is ~98% of the total greenhouse gases from direct emissions of fossil fuel use. The other 2% of emissions (primarily methane) from energy use will also reduce however as fossil fuel use is curbed to meet the carbon budget. Progress in meeting the carbon budget should therefore report emissions using the CO₂ not CO_{2e} emissions factors for energy use. Non-CO₂ greenhouse gases remain important and the IPCC global carbon budgets assume that emissions from gases such as methane also reduce over time. If they do not the global carbon budget reduces [2]. As such, although not yet quantified, city level strategies that reduce methane emissions make a valuable contribution and are complimentary to the carbon budget.

Land use carbon emissions are also not included in these carbon budgets. The budgets assume that land use carbon emissions balance out over the century. This has a policy implication in that to complement strategies to meet carbon budgets cities support local and global efforts to stop and then reverse net carbon emissions from land use (e.g. deforestation and forest degradation).

References

- [1] K. Anderson, J. F. Broderick, and I. Stoddard, "A factor of two: how the mitigation plans of 'climate progressive' nations fall far short of Paris-compliant pathways," *Clim. Policy*, vol. 20, no. 10, pp. 1290–1304, Nov. 2020, doi: 10.1080/14693062.2020.1728209.
- [2] V. Masson-Delmotte *et al.*, "Summary for Policymakers," 2018.
- [3] R. J. Millar *et al.*, "Emission budgets and pathways consistent with limiting warming to 1.5 °C," *Nat. Geosci.*, vol. 10, p. 741, Sep. 2017.

Zero Carbon Cities Workshop Programme

Workshop Session Details

Governance – City Delivery Models	
Date of Session	26th May 2021
Contributor(s)	Sam Nicholson, Manchester City Council Karine Hertzburg, Municipality of Oslo

Workshop session content

Focus	Cities have a key role to play in reducing carbon emissions. This paper looks at examples of Governance models in place in cities which support municipalities to deliver their zero carbon ambitions, specifically those used by Manchester City Council and the City of Oslo.
Background	<p>Cities account for 70% of global emissions, so in order for the world to meet the commitments of the Paris Agreement, to prevent global temperatures rising more than 1.5% above pre-industrial levels, the role of cities is crucial. Cities must now put the structures in place to support the implementation of their local climate strategies.</p> <p>ZCC partner cities each have a zero carbon ambition as set out in their SECAPs and Climate Action Frameworks. As part of the project, city partners are updating their climate action strategies to include a science based approach to emission reduction targets which will help cities to align their strategies to the Paris Agreement and measure progress going forward (see Masterclass 01 paper).</p> <p>Municipalities are complex bodies and have common issues to overcome in order to implement their zero carbon action plan. High on the list are political constraints and changes in leadership along with capacity and resources around staffing, expertise, and funding.</p> <p>Different cities have different approaches and this paper looks at two examples of structures in place that are supporting the implementation of city climate action strategies, specifically Manchester and Oslo.</p>

Case Study 1 – Manchester:

Structure

- Zero Carbon Framework 2020-2025 with target to be zero carbon by 2038.
- Independent agency in place, Manchester Climate Change Agency, to develop climate action framework for the city and support its implementation.
- Stakeholder Group, Manchester Climate Change Partnership (MCCP), supporting implementation of climate action framework.
- High level of support at both political and officer level.
- Municipality as a member of the MCCP has its own specific climate action plan covering 5 workstreams: Building and Energy; Travel and Transport; Recycling and Waste, Consumption and Suppliers; Climate adaptation.
- Governance structure in place with zero carbon team co-ordinating city response to its action plan and providing expert advice to support delivery of actions in the plan.
- Each workstream in the action plan has a senior officer lead who reports on progress to the Zero Carbon Co-ordination Group made up of Senior Management Team members and led by the City Treasurer.
- Each workstream has 2 actions (i) decarbonisation and (ii) enable and influence including creating policy and infrastructure to support action.

Case Study 2 – Oslo:

Structure

- Climate strategy to 2030 with target of -95% by 2030 on direct emissions and interim target of -52% by 2023 for whole city. Focus on energy reduction.
- National climate agency in place which provides robust data on emissions to cities.
- Climate budget set.
- 5 tools to reduce GHG: set target, public procurement (linked to construction and buildings: Transport via policy;
- Capture carbon emissions and move to circular economy.
- Climate budget sits under the Dept of Finance and is submitted for approval as part of the financial budget setting process. This gives leverage to climate action and allocated to officers for reporting.
- Continuous process and regular reporting.
- All city departments have responsibility for implementation and climate strategy within their department.

Implementation: Things to Consider

There are a range of governance models in cities and municipalities will need to consider the best approach to supporting SECAPs implementation. Things to consider in your city include:

- What formal strategies and policies in place to guide action.
- What is the level of political commitment to respond to these strategies and is it enough to support city response and action.
- Where this area of work sits within the organisation, is it led by a specific team or is it cross cutting.
- What resources are available in terms of staffing and knowledge and skills base, what are the gaps and how can these be addressed.
- Level of stakeholders engagement and contribution.
- What budget is available to support the work and are there other funding opportunities.
- What governance structure is needed to drive action on the strategies.

Impact (Monitoring and evaluation)

Once you have established a structure to support city implementation of strategies, you will need to establish and monitoring and reporting mechanism to track progress – data is needed. This will depend on the governance model chosen but a formal process of accountability will be needed including:

- Regular meetings of key people.
- Designated areas of responsibility which includes monitoring and evaluation.
- Use of diagrams and graphs to show statistics data and impact of actions.
- The use of targets and help to trigger action now and start to look at what needs to happen in the future.

Conclusions

In conclusion:

- Planning for zero carbon should set the premise for city planning and development.
- Start with emission sources we can control and influence (e.g. transport).
- Budget is key to building ownership and responsibility.
- Reporting is key.
- International co-operation is important for scale up, e.g. link to C40 helps to move faster on the plan.

Both the Manchester and Oslo city governance models have the same key components:

- Climate strategy in place and political support.
- A carbon budget.
- An external agency with whom it works.
- A governance structure with reporting mechanisms to monitor progress.

Further Information

<https://www.manchester.gov.uk/>

https://www.manchester.gov.uk/info/500002/council_policies_and_strategies/3833/zero_carbon_manchester

<http://www.manchesterclimate.com>

<https://www.klimaoslo.no/2020/06/10/oslos-new-climate-strategy/>

<https://www.oslo.kommune.no/>



Zero Carbon Cities Workshop Programme

Workshop Session Details

Carbon Budgets and Science Based Methodologies	
Date of Session	8th December 2020
Contributor(s)	Laura Parry, CDP

Workshop session content

Focus	<p>The paper provides an introduction to science-based methodologies for carbon budgeting, including:</p> <ul style="list-style-type: none"> • The role that cities play in reducing carbon emissions. • What to look for in science-based methodologies. • An overview of 3 methodologies evaluated by the Science-based targets network.
Background	<p>Cities account for 70% of global emissions, so in order for the world to meet the commitments of the Paris Agreement, to prevent global temperatures rising more than 1.5% above pre-industrial levels, the role of cities is crucial.</p> <p>The Paris Agreement is a legally binding treaty and for the countries who are signatories, and in order to uphold national commitments, our urban areas need to undertake major changes.</p> <p>In addition, many local Mayors are looking to go faster than their national governments in reducing carbon.</p> <p>Science based targets for cities are emission reduction targets that are in line with the goals of the Paris Agreement and the IPCC's Special Report on Global Warming of 1.5 °C. This means limiting global temperature increase to 1.5 °C above pre-industrial levels. The implication is that we have to reduce greenhouse gas emissions by 45% by 2030 and achieve net zero by 2050.</p> <p>Although regional, national and international policy, standards and regulations have a large part to play, cities across the world are developing their own targets.</p> <p>Various methodologies are being developed to help understand where we need to make changes, and to what level, in order to meet our targets.</p> <p>This paper introduces the topic, helps cities to understand what approach is most suitable, and gives an overview of 3 methodologies that have been evaluated by the Science-Based targets network.</p>

Setting a Science Based Target

By setting targets cities will have a clear view of the scale and pace which they need to reduce GHG emissions.

Key principles:

- Led by the climate science.
- Equitable – take into account historical contribution to climate change.
- Complete – take into account emissions from a variety of sources (at least Scope 1 & 2).

Climate Science

- Do you have a clear global target of 1.5 degrees?
- Do you have a defined carbon budget.

Equity

- Does your target look into national level considerations?
- Does your target consider historical contribution to climate change?

Scope of Targets

- Scope 1 – take place within the city boundaries.
- Scope 2 – occur due to grid-supplied electricity, heat, steam or cooling within the city boundaries.
- Scope 3 – occur outside of the city boundary as a result of activities taking place within the city boundary.

As you can see, though our city target will be a number, there are a range of considerations that can affect that number. The important point is that we are aiming to get as close as we can to understanding the change we need to make to adapt to the challenge.

What methodology do I need?

Your city may already have done some work on developing a target as part of your carbon reductions plans

- Is your target aligned with the latest climate science? It may have been set several years ago or based upon different assumptions.
- Have you considered the principles sketched out above? If not, then you may need to revisit the figures.
- If you've not got a target – have you at least got a Greenhouse Gas Emissions inventory? If not, you'll want to look at a methodology that includes this.
- If you already have a target, then have you adopted a methodology to provide support for your zero carbon plans.

What Methodologies are available?

- Deadline 2020: this approach has been developed by the C40 Cities Climate Leadership Group.
- One Planet City Challenge (OPCC): this approach has been developed by the World Wide Fund for Nature (WWF).
- Tyndall Centre: developed for local authorities by the Tyndall Centre, specifically in the UK (but can be used elsewhere when other data is available).

Working with your existing Climate Change Action Plans

Signatories of the Covenant of Mayors for Climate and Energy have committed to prepare and implement a Sustainable Energy and Climate Action Plan (SECAP) that covers the period from 2020-30.

Do you need to revisit your existing SECAP and look at including new targets, which in turn may impact on your existing action plans?

By developing your plan at a city level in line with the Paris Agreement, it may help with leveraging regional and national funding, when it comes to delivering on those areas which are outside of direct city control.

Implementation: Things to consider

There is not a single approach to adopting Science Based Targets but the following steps might be useful.

1. Understand where you are in terms of your existing targets and strategies.
2. Do you need to update your Greenhouse Gas Inventory?
3. What are your existing strategies and policies and at what point are they due a refresh?
4. Have you developed the governance structures within your city to broaden your plan beyond the public sector?
5. Have you got access to technical experts locally (within the municipality, university or other agency) who can support your work?
6. Are you looking to investigate these methodologies further?

Impact (Monitoring and evaluation)

Once you have set science-based targets you will also need to report on it regularly.

There are a number of tools available to help with this, and also a number of organisations where you can log your progress.

In assessing what needs to be done, you may need to break down your carbon budget into smaller areas, so that you can address the issues that have the most impact.

Case studies/examples

Case studies for the 3 methodologies discussed above can be found in the document Science Based Targets: A Guide for Cities (November 2020, Science Based Targets Network). See link below.

Conclusions

This paper briefly outlines the value of science based methodologies in helping cities to understand how they can contribute to the Paris Agreement and that there are a number of methodologies that can be adopted for this purpose.

Further Information

<https://sciencebasedtargetsnetwork.org/science-based-targets-for-cities/climate-tools-for-cities/>

<https://www.ipcc.ch/sr15/chapter/spm/>

Zero Carbon Cities Workshop Programme

Workshop Session Details

Translating the Paris Agreement into Local Action Part 1	
Date of Session	9th July 2021
Contributor(s)	Dr Christopher Jones, Tyndall Centre Manchester

Workshop session content

Focus	This paper aims to improve understanding of the key features of local climate change targets and the key considerations in target setting.
Background	<p>Climate change is a global issue but it has diffuse and highly localised causes. The 2015 UN Paris Agreement on Climate Change formally acknowledges sub-national actors such as cities as key contributors to climate change outcomes. This is in part because city level stakeholders are closely involved with energy use, product and services consumption and waste at the end use stage where significant greenhouse gas emissions occur.</p> <p>Understanding climate action at a local scale requires contextualising the global challenge at the local level through a science based approach to defining the scale and urgency of the challenge. It is challenging to transition to a low carbon city rapidly, but if this transition is too slow there is a greater contribution to increased climate risks. Carbon budgets give a measure of the quantities of carbon dioxide that can be released before there is an increase in the earth's average temperature. Considering a city's share of this carbon budget allows an understanding of how fast the transition to low carbon systems need to be; emissions need to fall fast enough for a city to keep within its carbon budget. Cities can then develop strategies based on playing their part to keeping global temperatures from rising.</p> <p>This paper considers how cities can meet the challenge of climate action by first of all setting targets for changing local area greenhouse gas emissions at a rate proportionate to the climate challenge.</p>

City context: the process (how)

Climate change targets are set with a number of considerations:

- Setting acceptable levels of climate risk (e.g. 1.5C or 2C outcomes).
- Align with global, national and regional aims (or international standard).
- Meeting local demands for climate action.
- Balancing with economic development and other priorities.

They may be the product of transposing a national or global target into the local context directly (such as net zero 2050) or based on a city setting its on target via a science based target method or some other approach.

However the targets are set there are important considerations for cities to consider when adopting climate change goals:

- Appropriate to the goal. An example of this is if targets are set with the ambition of keeping to 1.5C of climate change then this would imply targets to reduce emissions significantly by 2030 and almost entirely in the following decades.
- Milestones. Limiting climate change means keeping within a global carbon budget and this means emissions falling consistently over time. Milestone/ interim targets mark out this pathway.
- Measurable. Carbon emissions targets need an accurate baseline for current emissions and a way to reliably monitor change over time. This will depend on data availability at the local level. It may mean that targets have to be applied differently to different sources of emissions depending on data availability.
- Stakeholder buy-in. Typically no single organisation in a city has control over all sources of emissions. Local authorities need collaboration with local businesses, community, public service providers, transport providers etc to change emissions within a city. Targets that a wide range of stakeholders can understand and support can contribute to forming partnerships for achieving emissions reductions.

Implementation

The Tyndall Carbon Budget method is a way of setting a local area carbon budget that offers cities a science based climate change target aligned with the goals of the Paris Agreement.

A national carbon budget is sub-allocated to city local authority areas by one of three methods:

- Population basis (per capita).
- Economic basis (contribution to GDP national GDP).
- Recent emissions (grandfathering).

National carbon budgets can be devised in a number of ways. The Tyndall Carbon Budgets use the method set out in Anderson et al (2020) <https://www.tandfonline.com/doi/full/10.1080/14693062.2020.1728209> which uses a global carbon budget and equity principles consistent with the Paris Agreement.

Following this method cities can calculate their share of the remaining global carbon budget for the Paris Agreement goal of 'well below 2C of global warming'.

Case study - Manchester

Sub-national climate change targets are increasingly being seen around the world with initiatives like C40 Cities, the Race to Zero, and the Science Based Targets Network.

Manchester is an example of the Tyndall Carbon Budget method applied to setting a science based target for a city and how this affects policies in the city.

The city has a carbon budget for energy CO₂- emissions (primarily energy used in buildings and transport) and 5-year mile-stone goals as well as an overall ambition to be carbon neutral by 2038 at the latest.

Manchester also has a local stakeholder group, the Manchester Climate Change Partnership (MCCP) with a diverse range of stakeholders including university, football club, social and commercial landlords. The carbon budget is manifested in planning and strategy documents by the City Council and in targets set by MCCP stakeholder organisations in the city.

Similar approaches have also been adopted in West Midlands Combined Authority and Leeds City Region in England, UK.

Further information

<https://sciencebasedtargetsnetwork.org/take-action-now/take-action-as-a-city/>

<https://carbonbudget.manchester.ac.uk/>

<https://www.tandfonline.com/doi/full/10.1080/14693062.2020.1728209>