



# **PRACTICAL IMPLEMENTATION GUIDE: CARBON OFFSETTING**

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Funded by the **European Union** 

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## INTRODUCTION

1

Urbanisation and its impact on urban systems and services, industrialisation, transportation, buildings, energy and waste sectors significantly contribute to GHG emissions within cities and urban areas. According to the latest Report on Mitigation of Climate Change released by the Intergovernmental Panel on Climate Change (IPCC) in 2022, cities accounted for 67-72% of GHG emissions of the global share in 2020<sup>1</sup>. Population growth, expansion of urban land use, and increased demand for infrastructure and services within the urban areas will further increase the GHG emissions levels by 2050, thereby exacerbating the global climate crisis - unless this GHG trend is stopped and reversed. In this context, local governments have a key role and responsibility in taking effective action<sup>2</sup> to contribute to the Paris Agreement goals, and help ensure that the global average temperature rise remains well below 2 degrees Celsius (°C) compared to pre-industrial levels, and strive to limit the increase to 1.5°C. The window for achieving the latter seems to have already closed.

ICLEI's definition of climate neutrality in its **Climate Neutrality Framework** is: "Climate neutrality in the context of local and regional governments is defined as the targeted reduction of greenhouse gas (GHG) emissions and GHG avoidance **in own operations and across the community in all sectors** to an absolute net-zero emission level at the latest by 2050. In parallel to this, it is critical to adapt to climate change and enhance climate resilience across all sectors, in all systems and processes.

The <u>GreenClimateCities</u> (GCC) Program - ICLEI's global climate impact program - provides a process



methodology for local and regional governments to implement the Climate Neutrality Framework, with resources and a standardised reporting approach. This enables effective climate action and tracking progress over time.

ICLEI's Climate Neutrality Framework (see Fig.1) outlines three key pillars to achieve climate neutrality in a territory.

The main pillar, from the climate change mitigation perspective, is the immediate and drastic reduction and avoidance of greenhouse gas emissions and other pollutants. This necessitates a shift from polluting sources, such as fossil fuels, to sustainable and renewable energy. Prioritizing resource conservation and efficient use is key to optimizing resource efficiency by avoiding unnecessary resource consumption and reducing waste production and promoting reuse strategies. A combination of these aspects is crucial to achieving this pillar's goal.

The second pillar - **divest, repurpose and reinvest** - addresses a sustainable approach to financial investments. It implies moving away from polluting industries and practices, while repurposing investments towards the climate neutral target and reinvesting into clean, sustainable solutions and infrastructure. These solutions, for example, can encompass energy efficiency advancements, local renewable energy deployment, sustainable mobility and transportation, waste management solutions, carbon sequestration initiatives, and resilience projects. Avoiding and preventing current and future investment "lock–in" to infrastructure that promotes



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<sup>1</sup> These estimates derive from a consumption-based accounting and include both direct emissions, deriving from urban boundaries, and indirect emissions from outside urban boundaries. They are related to the production of electricity, goods and services consumed in cities.

<sup>2</sup> IPCC, 2022: Annex I: Glossary [van Diemen, R., J.B.R. Matthews, V. Möller, J.S. Fuglestvedt, V. Masson-Delmotte, C. Méndez, A. Reisinger, S. Semenov (eds)]. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.020.

fossil fuels or other environmentally harmful activities is necessary to focus investments on sustainable solutions that ensure the long-term alignment with the climate-neutrality goals.

The third pillar focuses on **offsetting and compensation** of GHGs that cannot immediately be avoided, removed or reduced. Local governments shall aim to mitigate direct government operations and community-wide emissions through all feasible measures, such as levers, incentives, regulations, advocacy, before considering offsetting. Local governments often cannot achieve net-zero emissions for their entire territories and communities as these require contributions from different governmental spheres and levels, citizens, business and industry (mostly voluntary at this stage).

ICLEI emphasises the importance of setting sciencebased or science-informed targets for net-zero, ideally, also using a consumption-based approach to understand and address Scope 3 emissions. This is necessarily ambitious, as it reflects taking responsibility for own emissions, and thereby also being accountable and transparent. Carbon offsetting is often considered a short-term strategy to compensate for residual greenhouse gas (GHG) emissions from sectors that are challenging to decarbonize. These sectors, such as energy, heavyduty transport, and high-emission industries, face significant obstacles in reducing emissions due to technological limitations, high costs, and other barriers. However, it's crucial to emphasize that the primary focus must be on directly reducing emissions at their source. Only after exhausting all feasible mitigation efforts, including technological advancements, policy measures, and financial investments, should carbon offsetting be considered as a supplementary option. This approach ensures that the responsibility for emission reductions remains with the actual emitters, rather than relying on external measures.

Offsetting unavoidable emissions may be a viable option through UN-backed or voluntary schemes, starting with government operations and expanding to achieve community-wide net-zero. For some cities, net zero emissions targets may therefore incorporate offset mechanisms<sup>3</sup>, provided that:

- Offsetting is the last resources after all viable measures were taken to reduce emissions.
- Offsets meet high quality standards that ensure additionality, permanence and low risk of reversal. See guiding principles outlined in section below.

This document provides a holistic overview and practical guidance on opportunities for carbon offsetting. Based on research and experiences shared by local governments and their cities, this implementation guide offers urban policymakers some basic knowledge they need to assess carbon offsetting as a tool in their climate action toolbox. It presents a comprehensive analysis of the principles, methodologies, advantages, and potential drawbacks associated with carbon offsetting strategies. Furthermore, it outlines how cities can strategically integrate such initiatives and methodologies into their broader greenhouse gas emissions reduction frameworks.

<sup>3</sup> Fong, W.K. et al., 2014: Global Protocol for Community-Scale Greenhouse Gas Emission Inventories: An Accounting and Reporting Standard for Cities. World Resources Institute (WRI), Winnipeg, Canada, C40 Cities, and Local Governments for Sustainability (ICLEI), Bonn, Germany, Retrieved at <u>https://ghgprotocol.org/sites/ default/files/standards/GPC\_Full\_MASTER\_RW\_v7.pdf</u>

# 2 CONTRIBUTION OF CARBON OFFSETTING IN ACHIEVING CLIMATE NEUTRALITY

### 2.1 Carbon Offsetting Definition

Before delving into the role of carbon offsetting in achieving climate neutrality, it is essential to first outline critical definitions provided by the international organisations.

In the Sixth Assessment Report of the Intergovernmental Panel on Climate Change Working Group III (Climate Change Mitigation), offsetting in climate policy is defined as "The reduction, avoidance or removal of a unit of greenhouse gas (GHG) emissions by one entity, purchased by another entity to counterbalance a unit of GHG emissions by that other entity"<sup>4</sup>. Similarly, the UNFCCC defines offsetting as "climate action that enables individuals and organisations to compensate for the emissions they cannot avoid, by supporting worthy projects that reduce emissions somewhere else."<sup>5</sup>

While offsetting mechanisms and characteristics typically target the private sector, it may provide sub-national governments with an instrument that allows them to balance out residual emissions by "developing, funding or financing carbon credit projects that avoid or sequester GHG emissions outside of the city GHG accounting boundary"<sup>6</sup>.

In the European context, carbon offsetting generally refers to the practice of an entity compensating for its greenhouse gas emissions. Considering that most currently traded carbon credits focus on emissions reduction projects rather than removals; to scale up carbon removals and provide a transparent and credible certification for carbon removal alternatives, the European Commission has recently approved the EU Carbon Removal Certification Framework<sup>7</sup>.

This guide primarily uses the term "carbon emissions" for readability purposes. However, it is important to highlight that this refers to carbon dioxide equivalent (CO2e), which encompasses the warming potential of all greenhouse gases. In the context of subnational governments, climate neutrality is defined as achieving netzero greenhouse gas emissions within their direct control or territorial responsibility of reporting entity. This may involve utilizing offsets, as a method to balance the emissions that remain after accounting for the entity's actions, to ensure a comprehensive approach to carbon neutrality.



<sup>4</sup> IPCC, (2022). Annex I: Glossary. (IPCC AR6 WGIII

<sup>5</sup> UNFCCC, Carbon Offsetting Platform https://offset.climateneutralnow.org/aboutoffsetting

<sup>6</sup> Fong, W.K. et al., 2014.

<sup>7</sup> European Commission (2022) COM(2022) 672 final. Proposal for a Regulation of the European Parliament and of the Council establishing a Union certification framework for carbon removals. European Commission, Brussels, retrieved at <a href="https://www.google.com/url?q=https://climate.ec.europa.eu/eu-action/certification-permanent-carbon-removals-carbon-farming-and-carbon-storage-products">https://www.google.com/url?q=https://climate.ec.europa.eu/eu-action/certification-permanent-carbon-removals-carbon-farming-and-carbon-storage-products</a> en&sa=D&source=docs&ust=1716544716405202&usg=AOv-Vaw04THoKYXiUZfUfpw-PE-oR

<sup>8</sup> IPCC, 2021: Annex VII: Glossary [Matthews, J.B.R., V. Möller, R. van Diemen, J.S. Fuglestvedt, V. Masson-Delmotte, C. Méndez, S. Semenov, A. Reisinger (eds.)]. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 2215–2256, doi:10.1017/9781009157896.022.

### 2.2 General Guiding Principles and Criteria

To ensure the quality of the carbon offsetting strategy, this should adhere to principles that prioritise achieving climate neutrality, that in the ICLEI's Carbon Neutrality Framework, requires employing a people-centred approach, and focusing on delivering benefits in terms of resilience and adaptation to climate change. From this point of view, carbon offsetting projects endorsed by ICLEI should prioritise environmental and social safeguards, with a central focus on vulnerable groups, gender equality, and biodiversity concerns. The activities performed should actively contribute to community well-being, ensuring that the pursuit of climate-neutral societies remains sustainable and fosters an equitable and just transition for all. ICLEI's five local development pathways provide relevant guidance and instruments for cities in developing their climate neutrality strategies. Oxford Offsetting Principles include additional recommendations when engaging with the private sector in carbon markets and offsetting initiatives. It is important to note that strong collaboration between local, regional, and national governments is key, as local governments can directly operate projects at the local level or facilitate private sector engagement while addressing local needs. They can also help meet the Nationally Determined Contributions (NDCs) and facilitate national programs by identifying opportunities in which to involve local communities or raise awareness of the importance of such schemes<sup>9</sup>.

When embarking on offsetting, local governments should prioritise the following guiding principles:

- **Prioritise reduction** Aggressive emissions reduction is the cornerstone of the strategy. The primary areas of focus are implementing a sustainable energy and transport infrastructure, upgrading energy efficiency, and avoiding methane leakages.
- Limit use of offsetting Offsetting should be considered only as a complementing and the last option. It should by no means replace emission reduction efforts. Its appliances should be limited, to correspond to the individual and collective target.
- **Credible and impactful offsetting** Only high-quality offsets are used, namely projects prioritising demonstrable carbon removal capacity through natural or technological means with strong permanence and co-benefits for the city. For instance, the EU Carbon Removal Certification Scheme, mentioned above, defines high-quality carbon removals as those projects that meet the following criteria: quantification,

additionality, long-term storage, and environmental sustainability<sup>10</sup>. In addition, for further guidance, cities may consider referring to the <u>Oxford Offsetting Principles</u>.

 Transparency and accountability - Comprehensive documentation and disclosure of activity data, emission sources, emission factors, and accounting methodologies are key for effective verification. This ensures citizens and local stakeholders have access to the same data sources and obtain similar results. A user-friendly online platform tracks emissions progress, and reports are published regularly through platforms such as the <u>CDP-ICLEI Track</u>, <u>Common Reporting Framework of the Global Covenant of Mayors</u>, and <u>Carbonn</u> that can potentially flow into the UNFCCC's Global Climate Action Portal (<u>GCAP</u>) to identify

data gaps, inconsistencies and inaccessibility of data that slow down climate action<sup>11</sup>. Cities may consider publishing their carbon reduction emissions progress in their publicly available websites.

<sup>9</sup> Fonseca, B., & Mogyorósy, E. (2022). Carbon markets assessment for the "Benin Energy Plus" project, retrieved from <u>https://tap-poten-tial.org/wp-content/uploads/2022/07/1703-carbon-market\_kg\_v2.pdf</u>

<sup>10</sup> COM/2022/672 final.

<sup>11</sup> UNFCCC Secretariat. (2023, June 4). Recognition and Accountability Framework Draft Implementation Plan with respect to Net-Zero Pledges of non-State actors and Integrity Matters (version 0.1 – for stakeholder engagement). Retrieved from <u>https://unfccc.int/sites/default/files/</u>resource/Integrity\_Matters\_recommendation\_8\_UNFCCC\_draft\_implementation\_plan\_v0-1\_04062023.pdf

### 2.3 Why Should a City Consider Carbon Offsetting?

To accelerate the pace of transition to net GHG emissions, according to the latest assessment report of the IPCC, it is necessary to reduce CO2 and other GHG emissions substantially and rapidly and restore natural ecosystems to enhance the Earth's capacity to absorb CO2 from the atmosphere. Offsetting allows cities to a compensate for hard-to-abate emissions. It will enable them to compensate for local emissions by developing carbon sinks within their territory or supporting projects that reduce or remove GHG emissions elsewhere (See paragraph 3.2 on Types of offsets).

Following the pillars of the ICLEI Climate Neutrality Framework (Fig. 1), emissions offsetting can play a meaningful role in accelerating and achieving climate neutrality in cities as it allows cities:

#### a. Addressing unavoidable and hard-to-reduce emissions

Despite efforts to cut emissions in urban settings, some remain unavoidable (e.g., heavy industrial processes, waste treatment, and transportation) due to difficulties in transforming their processes towards net-zero. Here, carbon offsetting enables cities to balance these by investing in emission reduction projects elsewhere, like reforestation or renewable energy initiatives, thus allowing them to complement reduction efforts.

#### b. Accelerating transition to sustainable energy

Investing in carbon offsetting projects will aid the shift to clean energy. For instance, cities can invest in renewables in regions lacking funding, boosting global renewable infrastructure growth. However, it should be proven that these projects are truly additional, and they would not be implemented without the investment of the city. Such projects that they are beyond any reduction included in the city's regulations and commitments towards net zero targets<sup>12</sup>.

#### c. Supporting sustainable development

Many offset projects cut emissions and aid sustainable development<sup>13</sup>. For example, investing in clean cooking stoves reduces emissions and improves air quality, health, and community empowerment, however, it is important to evaluate the extent to which the projects are additional and their potential risk of over-crediting<sup>14</sup>.

#### d. Raising awareness, funding, and setting a positive example

Following increased efforts in emissions reduction, offsetting initiatives concerning residual emissions are a means to take responsibility for those emissions and raise awareness about climate change's urgency. Cities demonstrate commitment to sustainability, urging broader participation. City-led carbon offsetting, provided it follows strong environmental-integrity principles, may set a positive example, inspiring others to tackle their carbon footprints and join global climate action<sup>15</sup>. However, it's important to recognize that not all carbon offsetting initiatives yield positive outcomes. Therefore, it's crucial to ensure that offsetting efforts adhere to strong environmental integrity principles.

<sup>15</sup> UNFCCC, Guidelines for the review of the national communications of Parties included in Annex I to the Convention, Part I: The review process. Retrieved from <a href="https://unfccc.int/sites/default/files/resource/CNN%20Guidelines.pdf">https://unfccc.int/sites/default/files/resource/CNN%20Guidelines.pdf</a>



<sup>12</sup> C40 and the New York City Mayor's Office of Sustainability (2019), Defining carbon neutrality for cities & managing residual emissions. Cities Perspective & Guidance. accessible at: <u>https://www.c40knowledgehub.org/s/article/Defining-carbon-neutrality-for-cities-and-managing-residual-emissions-Cities-perspective-and-guidance?language=en\_US</u>

<sup>13</sup> UNFCCC, Carbon Offsetting Platform https://offset.climateneutralnow.org/aboutoffsetting

<sup>14</sup> Öko-Institut e.V., INFRAS, Stockholm Environment Institute (SEI), & Carbon Limits. (2016). How additional is the Clean Development Mechanism? Analysis of the application of current tools and proposed alternatives (CLIMA.B.3/SER/2013/0026r). Retrieved at <u>https://climate.ec.europa.eu/system/files/2017-04/clean\_dev\_mechanism\_en.pdf</u>

### 2.4 Misconceptions, Concerns and Limitations of Carbon Offsetting

Despite the international recognition of carbon offsetting as a complementary tool to reach climate neutrality, especially when undertaking mitigation actions within a short time frame is challenging, the effectiveness of carbon offsetting is under increasing scrutiny by academic voices and campaigners, as it still presents ambiguities and controversies that need to be addressed by the legislators. Below is an overview of some the **limitations** that have been so far recognised:

- Lack of robust quantification of emissions reductions and removals, meaning that figures on amount of emissions are overestimated. The overestimation of emissions reduction potential from projects on REDD+/ nature-based solutions or renewable technology, e.g., clean cookstoves, leading to over-crediting and associated low credit prices, that undermine climate change mitigation.<sup>16,17</sup>
- Lack of uniform standards for offsetting practices leading to low-quality credits, namely those that offer dubious additionality, or do not guarantee long-lasting/permanent carbon storage.
- Inconsistency and conflicting legislation lead, on the one hand, to over-reliance on carbon offsetting and risk of deterring emissions reductions or mitigation<sup>18</sup> and, on the other, to greenwashing claims<sup>19,20</sup>;
- **Price instability:** The pricing of carbon credits is less stable on voluntary markets compared to mandatory markets (see paragraph below on "What are the carbon markets"), with prices varying based on different project categories. Therefore, this limits the local government's capacity to access carbon markets.

<sup>16</sup> Hooker H., Wentworth J. (2024), UK Parliament POST, "Carbon Offsetting", retrieved at <u>https://researchbriefings.files.parliament.uk/</u> <u>documents/POST-PN-0713/POST-PN-0713.pdf</u>

<sup>17</sup> Gill-Wiehl, A., Kammen, D. M., & Haya, B. K. (2024). Pervasive over-crediting from cookstove offset methodologies. Nature Sustainability, 7(2), 191-202. Retrieved at:<u>https://www.nature.com/articles/s41893-023-01259-6.epdf?sharing\_token=hL91rucIoCgBhN-bvbaDAydRgN0jAjWel9jnR3ZoTv0PY5koFksowKMxA7MIi6wx9OA04W8v\_UKPTy7CKTglfUCvTI93MdjiaHTsUGRasUK2DG7Mxl-7htCwwOiKlSXJL-qkrLRw6h9BbxA17jIEjcKoqw2E6ucNSM00hdlxKJSKKG9tCl4u\_QsBZMRGAHY8\_c7Rkm3aAxc1oOKbZDAjvyYqa-608R4kAF1p2JLxE90HR0UxpGv\_tvIylLks5PVezAXSO-Hwmbp5-s5IFL\_eVmYn4sJFnojXPv8yeAn1HJFj5cqpOF36-6Y\_a77kvExesG6dHN-vOBQ7JoT6fIXhM1WG9vXMC\_hEQ8CzYcaAZHJYPVw%3D&tracking\_referrer=www.theguardian.com</u>

<sup>18</sup> Carbon Gap Policy Tracker (2023) retrieved at <u>https://tracker.carbongap.org/policy/eu-climate-law/</u> (accessed on 30.05.2024) 19 Axelsson, K., Wagner, A., Johnstone, I., et al.. (2024) Oxford Principles for Net Zero Aligned Carbon Offsetting (revised 2024). Oxford: Smith School of Enterprise and the Environment, University of Oxford. Retrieved at

https://www.smithschool.ox.ac.uk/sites/default/files/2024-02/Oxford-Principles-for-Net-Zero-Aligned-Carbon-Offsetting-revised-2024.

<sup>20</sup> Öko-Institut e.V., INFRAS, Stockholm Environment Institute (SEI), & Carbon Limits. (2016).

### BOX 1: A FEW COMMON MISCONCEPTIONS AND RECOMMEN-DATIONS ABOUT CARBON OFFSETTING

#### **MISCONCEPTIONS:**

#### Offsetting replaces reducing emissions

This is a major misconception. Offsetting is a complementary strategy alongside actual emission reductions, not a replacement. The ultimate goal should always be to reduce emissions at the source as much as possible. Offsetting shouldn't be seen as an excuse to continue emitting freely. After all other reduction efforts have been implemented, it should be a last resort for unavoidable. Entities relying heavily on offsets for their sustainability claims might be accused of "greenwashing".

# 2. Offsetting is a substitute for personal action

Sometimes offsetting is viewed as an alternative to reducing one's carbon footprint. While it can help, personal emissions reduction remains crucial.

### RECOMMENDATIONS:

#### 3. Offsets are not a one-time fix

Offsetting is an ongoing process. As an entity's emissions profile changes, the need for offsets might fluctuate. Regular monitoring and evaluation are crucial to ensure the effectiveness of offsetting strategies.

#### 4. All carbon credits are not equal

Significant variation exists in the quality and effectiveness of carbon offset projects. Some projects deliver genuine and long-term emission reductions or removals, while others may have questionable benefits or be prone to leakage (emissions occurring elsewhere due to the project). It's crucial to choose high-quality, verified offsets.

# 5. Offsets do not directly remove existing carbon dioxide

Most currently available carbon credits come from projects that reduce future emissions, not directly remove existing CO2 from the atmosphere. While carbon removal technologies are emerging, they are still under development and have yet to be widely used in offset projects.

### 2.4.1 Addressing Offsetting Limitations

The landscape of carbon markets and climate action is evolving to address limitations and inconsistencies associated with traditional GHG emissions offsetting. Several international and European policy developments aim to enhance the effectiveness and integrity of these mechanisms, moving beyond the sometimes problematic practices of the past.



#### Strengthening International Carbon Markets (Article 6.4)

At the international level, COP28 saw significant progress in reforming the voluntary carbon market. Article 6.4 of the Paris Agreement establishes a new Crediting Mechanism for Emission Reductions (ERs), replacing the Clean Development Mechanism<sup>21</sup>. This new mechanism aims to address previous shortcomings by:

- Increasing Transparency Clearer rules and guidance will enhance transparency in how ERs are generated and traded, reducing ambiguity and potential for misuse.
- Improving Integrity A strengthened Supervisory Body will oversee carbon credit projects, reducing the risk of double-counting (where the same emission reduction is claimed by multiple parties) and mitigating potential socio-environmental harms to local communities. This oversight aims to ensure projects deliver real and measurable benefits.
- Facilitating Compliance and Mitigation Article 6.4 enables countries and non-state actors to use ERs to meet their Nationally Determined Contributions (NDCs) and net-zero targets, or to contribute to emission reductions in host countries through results-based climate finance or domestic mitigation pricing

schemes<sup>22</sup>. This provides flexibility and incentivizes participation in emissions reduction efforts.

#### Non-Market Approaches (Article 6.8)

Recognizing that market-based approaches alone are insufficient, Article 6.8 of the Paris Agreement introduces Non-Market Approaches (NMAs). NMAs encompass strategies that do not involve trading carbon credits. These can include:

- Fiscal Measures Carbon pricing and emissions taxes to discourage pollution at the source. These measures create economic incentives for emissions reductions, complementing market-based approaches.
- Collaborative Efforts International cooperation on technology transfer, capacity building, and policy coordination. This fosters global collaboration and accelerates the development and deployment of clean technologies.
- Sub-National Engagement Empowering local and regional governments, as well as the private sector, to

contribute to NDCs<sup>23</sup>. This recognizes the crucial role of all levels of governance and the private sector in achieving climate goals.

ICLEI advocates for Parties to include **"sustainable and integrated urban and territorial development planning, design, standardization, and construction" as a cross-cutting non-market approach.** The recommendation would increase public and private urbanization investments and facilitate the engagement of private sectors and society in offsetting emissions<sup>24</sup>.

<sup>21</sup> The Clean Development Mechanism was established through the Kyoto Protocol with the aim to facilitate cross-border collaboration to mitigate GHG emissions while funding emissions-reducing projects in developing countries.

<sup>22</sup> UNFCCC/PA/CMA/2022/10/Add.2. Annex 1.

<sup>23</sup> UNFCCC, United Nations Framework Convention on Climate Change, COP26 Outcomes: Market mechanisms and non-market approaches (Article 6). <u>https://unfccc.int/process-and-meetings/the-paris-agreement/the-glasgow-climate-pact/cop26-outcomes-market-mechanisms-and-non-market-approaches-article-6#How-can-the-private-sector-be-involved?-</u>

<sup>24</sup> See ICLEI's proposal on Article 6.8 proposed Parties at the Workshop at SB68 in June 2023, retrieved from https://unfccc.int/sites/ default/files/resource/SB58\_Art.6.8\_ICLEI\_0.pdf and ICLEI's submission to the Call for Inputs to the 5th meeting of the Glasgow Committee on Non-market Approaches (A.6.8), available here <u>https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202404111659---Art6.8\_ICLEI\_April2024.pdf</u>

#### EU Carbon Removal Certification Framework

In the European context, the EU Carbon Removal Certification Framework addresses the specific challenge of ensuring the quality of carbon removal projects. This framework establishes clear rules and standards for certifying carbon voluntary carbon removal market markets<sup>25</sup>, enabling:

- Transparency and Comparability The framework allows for better comparison of carbon removal offers, facilitating informed decision-making for buyers of carbon removal credits.
- It assists organizations in substantiating credible carbon removal claims, preventing greenwashing and ensuring that claims about carbon neutrality are backed by verifiable removals.

At the municipal level, the challenges of carbon offsetting are even more pronounced. Cities operate with tighter budget constraints and must allocate limited public funds carefully, often facing higher transaction and administrative costs than larger corporations. Moreover, local governments must ensure that offset projects not only deliver global emissions reductions but also align with community priorities, such as improving urban air quality and safeguarding local land use, which can be difficult when offsets are generated by projects located far from the city. In addition, integrating offsets into existing greenhouse gas inventories can be complex, requiring rigorous verification and transparent accounting to avoid issues like double counting or mismatches between local emissions profiles and global offset projects.

Offsetting citywide emissions can be more complex due to challenges in accurately measuring emissions from these diverse sources and the need for extensive coordination with various stakeholders. Therefore, while offsetting is a valuable tool for managing municipal emissions, it is less straightforward when applied to the entire city.

# **3** CARBON OFFSETTING IN CITIES

### 3.1 Offsetting Pathways

Standard guidelines on the approach that cities may adopt to address residual emissions are missing, and the terminology around offsetting vary across different organisations. However, the Info Kit drafted by the European Commission for the implementation of the EU Cities Mission<sup>26</sup> serves as a helpful guide. It outlines two offsetting pathways to tackle residual emissions: (I) implement carbon sinks within the city territory; (II) use carbon credits that finance projects reducing or removing emissions elsewhere<sup>27</sup>. Based on the Recommendations included in the Info Kit, cities are encouraged to (I) strive to achieve the greatest possible reduction of emissions within their territory, (II) limit their residual emissions to no more than 20% of the baseline greenhouse gas inventory by 2030, and only for emissions sources in which mitigation is hard to be achieved.

The approaches cities may undertake vary depending on the technical characteristics of their hard-to-abate sectors, their financial capacity, and their socio-political context. Cities shall prioritize projects aligned with their

<sup>27</sup> Ibid



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<sup>25</sup> COM/2022/672 final.

<sup>26</sup> The European Cities Mission (2021), also named "100 Climate-Neutral and Smart Cities by 2030" is the project issued by the European Commission to support more than 100 European cities to achieve climate neutrality by 2030, offering guidance, resources and strategies towards climate neutrality. The Net Zero Cities project (https://netzerocities.eu/) is the operative arm of the mission. The Info kit for cities interested in participating in the call for expression of interest (EOI) outline the initial guidance for implementing the mission within the cities selected. Retrieved from <a href="https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities\_en">https://netzerocities.eu//interested</a>

objectives and procurement criteria, based on the level of support from local stakeholders<sup>28</sup>.

On this line, local governments may offset their residual emissions either by implementing carbon sinks or by investing/purchasing carbon credits.<sup>29</sup> The pathways outlined have been complemented by the interviews conducted with the cities of Turku, Bogota´ and Melbourne. In addition, see paragraph 3.2 on the specific types of projects for offsetting.

### 3.1.1 Deployment of Carbon Sinks

Carbon sinks, powerful anthropogenic interventions, are designed to sequester carbon dioxide from the atmosphere and durably store it in geological, terrestrial, and ocean reservoirs or products<sup>30</sup>. These interventions have a crucial role in climate change mitigation and can be divided into two categories: "nature-based" removals and "technological" removals. (See paragraph 3.2). These are also typically called carbon dioxide removal (CDR) or negative emission technologies (NETs)<sup>31</sup>.

Cities may implement solutions allowing sequestering of CO2 from the atmosphere within their territorial boundaries to balance their residual emissions. When implementing solutions that sequester CO2 within a city's boundaries to balance residual emissions, cities should include the greenhouse gas reductions from these projects in the citywide emissions inventory (e.g., reduced overall emissions)<sup>32</sup>. However, these in-boundary carbon sinks shall not be treated as carbon offsets. Offsets, by definition, involve compensating for emissions through projects located outside the city boundary.

It is advisable for cities to implement nature-based carbon removal solutions as they are also associated with multiple socio-environmental co-benefits, such as reduced air pollution, increased climate resilience, and health and well-being.

30 IPCC, 2022. Annex I: Glossary. (IPCC AR6 WGIII).

<sup>28</sup> Fong, W.K. et al., (2014).

<sup>29</sup> Based on the C40 and the New York City Mayor's Office of Sustainability (2019), and the EU Cities Mission approach

<sup>31</sup> Gunther P., Ekardt F. (2023). The Priority of Nature-based over Engineered Negative Emission Technologies: Locating BECCS and DACCS within the Hierarchy of International Climate Law. <u>https://www.sciepublish.com/uploads/pdf/202309/01/af2e916243ae0b12ae9239da1d-20cd49.pdf</u>

<sup>32</sup> C40 and the New York City Mayor's Office of Sustainability (2019) and European Commission, Directorate-General for Research and Innovation, (2024).

### **BOX 2: CASE-STUDY 1 - CITY OF TURKU**

Aligned with the recommendations provided in the EC Info Kit for addressing residual emissions, the City of Turku has chosen to invest in enhancing natural carbon sequestration within its city boundary.

Turku, as one of the EU Cities Mission, is committed to achieving climate neutrality by the year 2029 at the latest. To reach its objective, the municipality strives to reduce emissions by at least 90% compared to 1990 levels through mitigation actions, with the remaining 10% of emissions being compensated for by enhancing existing natural carbon sinks.

In consideration of the key emitting sectors identified in 2020 (road transport 25%, electricity consumption 25%, and district heating 19%), Turku's primary mitigation measures comprise the implementation of a carbon-neutral energy system, low-carbon sustainable mobility, and urban structure.

On top of their mitigation efforts, Turku´s carbon emissions reduction strategy focuses on local afforestation and other (Nature-based solutions) that leverage the natural capacity of Turku's 4.000 hectares of forest to absorb emissions. Specifically, in line with the Forest Management Plan (2019-2029), Turku's efforts will focus on preserving forest ecosystems by:

- Turku is aiming to increase the protected areas towards the EU's biodiversity strategy's target. The City of Turku will expand the area of its own protected areas by 25% by 2029.
- Imposing a maximum of 40% of the felling rate

of annual tree growth.

These measures proved effective in capturing CO2 (the carbon net sink registered in 2023 was 9,7 kt CO2) and providing additional co-benefits related to the preservation of biodiversity.

Turku's main challenges in enhancing carbon sinks include engaging diverse stakeholders and needing clear legislative guidance on municipal-level compensations. Many forest areas are privately owned, making it difficult to incentivize landowners to repurpose land for carbon capture. Additionally, the national policy framework for carbon compensation fails to provide clear guidance to local governments or incentives for involving other stakeholders.

" One challenge for us is that we play by different rules; for instance, the calculation methodologies and permissible claims vary between cities and private companies. Thus, we must speak different languages with different stakeholders - Miika Meretoja, Senior Specialist, Green Transition, City of Turku.

To overcome these challenges, Turku is currently committing to some new initiatives, e.g., the **"Kuntanielu project**", which seeks to lay the foundation for municipal-level offsetting and increase the land use sector's net carbon sink. Additionally, the municipality is working on developing a model for engaging the Turku groups and other companies in carbon sink and biodiversity actions.

### 3.1.2 Use of Carbon Credits on Carbon Markets

The second pathway for cities is using carbon credits in the carbon markets. Cities may purchase or invest in carbon credit projects developed outside their territorial boundary<sup>33</sup>, ensuring they meet the Guiding Principles and Criteria mentioned in paragraph 2.2 and that demonstrate credible contribution to climate neutrality (i.e., using and retiring credible and verifiable credits/certificates or validated under rigorous standards by accredited third-party auditors).

The first part of the following chapter provides a brief overview of **carbon markets**, while the second part explains **the options available for cities when using carbon credits**.

#### What are the carbon credits?

A carbon credit entails a tradeable certificate or a permit certified by governments or independent certification bodies representing a metric tonne of carbon dioxide equivalent (CO2e) that is avoided, reduced, or sequestered outside the GHG accounting boundary (or geographic boundary as a proxy for GHG accounting boundary). It can be used to compensate for a metric ton of residual GHG emissions occurring within the accounting boundary.

The purchaser of an offset carbon credit can "retire" it to claim the underlying reduction towards their own GHG reduction goals. Carbon credits are cancelled once purchased to avoid double counting.

#### What are the carbon markets?

Domestic and global carbon offset markets are categorised as either compliance or voluntary.

**Compliance or mandatory markets** are mandated and regulated by international, regional, and subnational carbon reduction programs, such as the <u>European Union's Emissions Trading Scheme (EU-ETS)</u>, <u>California</u> <u>Carbon Market</u>, <u>Article 6 of the PA</u>, and the <u>Kyoto Protocol</u>. These markets adhere to a cap-and-trade mechanism, where only a set number of 'allowances' (permits for GHG emissions) are allocated. This cap limits a country or industry's GHG emissions<sup>35</sup>.

In contrast, **voluntary offset markets (VCMs)** operate independently, allowing any entity to acquire carbon offset credits voluntarily. This creates more diversity and flexibility in GHG reductions, but it also leaves substantial room for misuse and greenwashing<sup>36</sup>.

At present, there is no centralized market for voluntary carbon credits. Project developers can sell credits directly to buyers via brokers or exchanges or sell to retailers who resell them to buyers<sup>37</sup>. Voluntary carbon markets include the recently developed <u>EU Carbon Removal Certification Framework</u> and the UNFCCC Article 6.4 Mechanism (see paragraph 2.3.1 above).

<sup>37</sup> Fonseca, B., & Mogyorósy, E. (2022).



<sup>33</sup> C40 and the New York City Mayor's Office of Sustainability (2019).

<sup>34</sup> Broekhoff, D., Gillenwater, M., Colbert-Sangree, T., and Cage, P., (2019). "Securing Climate Benefit: A Guide to Using Carbon Offsets." Stockholm Environment Institute & Greenhouse Gas Management Institute. Retrieved at <u>https://www.offsetguide.org/high-quality-offsets/per-manence/</u>

<sup>35</sup> Fonseca, B., & Mogyorósy, E. (2022).

<sup>36</sup> Trouwloon, D., Streck, C., Chagas, T., & Martinus, G. (2023). Understanding the use of carbon credits by companies: A review of the defining elements of corporate climate claims. Global challenges, 7(4), 2200158. Retrieved at <u>https://onlinelibrary.wiley.com/doi/full/10.1002/gch2.202200158</u>

Offset programs were instituted to guarantee the adherence of carbon offsets to quality requirements and to facilitate buyers in acquiring, transferring, and utilising these offset opportunities. They serve three pivotal roles:

- 1. formulating and endorsing standards that establish criteria for the quality of carbon offset credits,
- 2. scrutinising offset projects against these standards (often involving third-party verifiers), and
- **3.** managing registry systems responsible for the issuance, transfer, and retirement of offset credits.

Here are a few examples of voluntary carbon-offsetting programs:

- <u>UN Carbon Offset Platform</u>: The UN platform, managed by the UN Climate Change Secretariat, issues verified and certified emission reductions (CERs) for greenhouse gas (GHG) mitigation projects in developing countries.
- <u>Verified Carbon Standard</u>: an international voluntary GHG offset program run by the non-profit organisation Verra, issuing Verified Carbon Units (VCU) to projects reducing or removing GHG emissions.
- <u>Gold Standard</u>: An international voluntary carbon offset program issuing Verified Emission Reductions (carbon credits) for projects advancing climate action and the SDGs.<sup>38</sup>

For further guidance on the carbon markets, refer to Fonseca, B., & Mogyorósy, E. (2022).

#### How can cities make use of carbon credits?

When offsetting through carbon credit projects outside their territorial boundaries, cities must ensure accurate and transparent reporting of net and gross GHG emissions. This can be achieved by adhering to established frameworks like the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC Standard), which provides guidance on distinguishing between in-boundary emissions and those offset or mitigated through external projects. Furthermore, reporting to platforms like CDP-ICLEI Track can help cities demonstrate their climate action leadership by disclosing emissions, mitigation measures, and offsetting activities in a standardized and internationally recognized format. Such reporting practices enhance credibility, facilitate peer benchmarking, and ensure alignment with global climate goals.

Note:

- **Gross emissions** refer to all relevant emissions within a GHG accounting boundary (or geographic boundary as a proxy) and excluding any GHG emissions reductions from carbon credits purchased or sold.
- **Net emissions** refer to gross emissions less all applicable GHG emissions reductions claimed from carbon credits purchased outside the GHG accounting boundary (or geographic boundary as a proxy) and adding GHG emissions from sold carbon credits resulting from projects within the GHG accounting boundary (or

geographic boundary as a proxy).<sup>39</sup>

Following the C40 guidance<sup>40</sup> cities may consider three approaches to tapping into the carbon markets, as outlined in the paragraph below.

<sup>38</sup> Ibi

<sup>39</sup> C40 and the New York City Mayor's Office of Sustainability (2019). 40 Ibid.

### **BOX 3: CITY EXAMPLE ON DEVELOPING CARBON CREDITS PROJECTS: MEXICO**

Mexico City has supported the development of a forest carbon project located within the city but owned the community (ejido-property), and that therefore could be considered as the development emission reductions of the city. of a project "outside of the accounting boundary".

In this case, it is important to consider that emissions from NbS that are not included in the GHG accounting boundary, can be accounted for as contribution to net

#### Developing carbon credit projects а.

Cities may directly develop carbon credit projects **outside of the city GHG accounting boundary** at a local and regional level. Independently of whether or not these projects generate or not tradable carbon credits, this option implies that cities are responsible for managing this kind of project for the entire duration of its lifetime, hence facilitating the process for getting projects underway. An example of such a project is in Mexico City (see box 3).

#### b. Investing in carbon credits projects

Cities may also invest in carbon credit projects outside the city GHG accounting boundary or commit to buying a certain amount of carbon credits. This approach supports project developers in getting upfront investment to kickstart their projects or to finance their carbon credit registration costs. Examples of this approach are provided in Box 4.



### BOX 4: CITIES EXAMPLES OF INVESTING IN CARBON CREDIT PROJECTS: MANNHEIM - FREETOWN COLLABORATION

In the spirit of boosting the city-to-city collaboration when engaging in emissions offsetting, the municipalities of Mannheim and Freetown (both cities are involved in the Global Parliament of Mayors) are aiming to use emission certificates with a twofold purpose: to allow companies from Mannheim to compensate for their unavoidable emissions, to provide climate investments for projects contributing to climate protection and SGDs achievements in Freetown. Through this project, Mannheim aims to develop a roadmap outlining efficient means for municipalities to collaborate with the private sector to achieve their climate objectives through international partnerships. The roadmap will provide transparent and high-quality offsetting projects. The projects developed in Freetown will focus on waste to energy, solar water heating, and clean cooking.

41 Oechsner, S. (2023). Green People's Energy For Africa. "We are in new territory here – Financing municipal climate projects with emission certificates." Green People's Energy for Africa, 28 August 2023. Available at: <u>https://gruene-buergerenergie.org/en/format/feature/we-are-in-new-territory-here-financing-municipal-climate-projects-with-emission-certificates/</u>

#### c. Purchasing carbon credits

The third option available to cities implies purchasing carbon credits outside the city GHG accounting boundary from projects developed locally, nationally, or globally. In this case, carbon credit projects need to be registered through a credible and well-established carbon credit provider, e.g., Verra or Gold Standard.<sup>42</sup>

Carbon offsets should be approached with a clear purpose to avoid the perception that any residual emissions can simply be negated through credit purchases. A robust approach is exemplified by Stockholm, where carbon capture and storage (CCS) technology is used alongside biofuel combustion to power the district heating system. The city finances this infrastructure by selling credits on the voluntary carbon market but does not use these credits to offset its own citywide emissions. Instead, the project contributes to negative emissions or carbon sequestration, aligning with broader climate goals.

Cities can fund offsetting through municipal budgets, potentially using funds to address community-wide emissions or emissions from businesses operating locally, however need to ensure that these offsets are part of a broader strategy that also focuses on direct emissions reductions. Alternative models include introducing carbon levies, establishing voluntary business contributions, or creating community offset funds. External grants, international partnerships, and public-private collaborations can further expand financing options for offsetting initiatives.

42 Ibid.



### **BOX 5: CASE-STUDY 2 - CITY OF MELBOURNE**

The City of Melbourne has a dual climate objective, addressing residual emissions at a municipal and organisational level. At the municipal level, the municipality aims to achieve climate neutrality by 2040, although it is currently evaluating its overall emissions. Conversely, at the organisational level, Melbourne has been certified as carbon neutral for council operations by the Australian Federal Government since 2012. This certification encompasses all City of Melbourne facilities, as well as major contracts and services.

In the reporting period 2022-23, the municipality's estimated residual emissions at the organisational level accounted for 12,175 tCO2e, mainly deriving from operational assets, municipal buildings, waste emissions, and fuel emissions associated with municipal vehicles and contractors.

Melbourne's approach consists of purchasing carbon offset credits on the voluntary market to compensate for its residual emissions. The municipality's offset procurement strategy ensures due diligence, meaning that credits purchased generate valuable and evidence-based effects. The enforced selection criteria enforced require projects to:

- Align with the Oxford Principles for carbon offset purchasing, encompassing additionality, permanence, and integrity, as well as the United Nations Sustainable Development Goals (UN SDGs).
- Generate social and economic co-benefits

for local indigenous communities, such as recognition and employment enhancement.

 Ideally, these projects should be national-based and nature-based. When these projects are unavailable on the market, the municipality opts for credits from international projects as long as they generate similar benefits.

The municipality relies on Verra and Gold Standard carbon offset programs to purchase guaranteed high-quality credits. The Australian Federal government dictates this. Moreover, the city consistently guarantees that brokers deliver transparent and accurate information about the project's impacts:

"We want brokers to go into a lot of detail about transparency. (...) the more information they can provide on projects the better it is for us, because it means we can do our own due diligence once those quotes come in to check the project. We do not rely on the certification scheme, and we do not rely on the material that the brokers provide. We do our own investigation as well" -Nicholas Carrazzo, Energy Innovation and Carbon Accountant, Climate Change and City Resilience for the city of Melbourne.

Melbourne's most significant challenges in purchasing offsets stem from market dependency. Projects that meet all the criteria are sometimes unavailable, and the costs can occasionally be prohibitively high.

### **BOX 6: CASE-STUDY 3 - CITY OF BOGOTÁ**

In 2018, the City of Bogotá estimated an amount of 11 million tonnes of CO2eq net emissions, accounting for 4.1% of national emissions. These emissions are mainly derived from transportation (48%), energy consumption (19%), and the manufacturing and construction industries (15%), followed by a smaller share of solid waste disposal (13%) and domestic wastewater management (5%).

Bogotá's commitment to fighting climate change is mainly represented by **Agreement 790** (2020), which declares the Climate Emergency a public management priority requiring urgent action, and the Climate Action Public Policy (**Plan de Acción Climática**), which outlines the roadmap for Bogotá to achieve climate neutrality by 2050. The plan establishes emissions reduction targets of 15% by 2024, 30% by 2027, 50% by 2030, and complete neutrality by 2050.

The present administration is pursuing the 2027 target through the exclusive implementation of mitigation measures, notably tree planting and urban greening. Yet, to achieve climate neutrality by 2050, Bogotá plans to incorporate offsetting as a complementary strategy to address the anticipated 20% of residual emissions stemming primarily from waste and building sectors.

Given the mitigation commitments and budget allocation already in place, the city currently needs to be able to undertake offsetting actions. Nevertheless, the city foresees participating in Colombia's national ETS (currently under development) for carbon credit purchases to offset residual emissions. To allow this, the Treasury Secretariat is presently involved in formulating reference framework documents under the Climate Action Public Policy to enable the city to allocate funds to acquire carbon offsetting in the long run.

At this stage, the municipality is focused on transmitting crucial premises to relevant stakeholders for their coherent and legitimate participation in the offsetting market. These include:

- Bogotá and its stakeholders (private companies and organisations) will only purchase carbon credits (and not sell them), ensuring compliance with the city's mitigation commitments. This stance reflects Bogotá's transition from a non-Annex 1 nation under the Kyoto Protocol to having independent mitigation goals.
- Bogotá will exclusively purchase offset projects that contribute to the preservation of forests, jungles, and watersheds at regional and national levels, offering the city environmental benefits.
  Bogotá and its stakeholders willing to purchase credits will need to align to the Colombia ETS guidelines and the national sectoral carbon budgets (NDCs) currently in progress.

"The city must ensure alignment between private sector accomplishments within national sectoral budgets and local district goals for mitigation. It's crucial that stakeholder participation in the Emission Trading Scheme (ETS) does not compromise the city's mitigation efforts, enabling it to achieve its climate goals." - Ricardo Delgado, Climate Change Expert, Secretariat of Environment.

### 3.2 Types of Offsets

As mentioned above, offsetting encompasses different methods for preventing, mitigating, or removing remaining GHG emissions from the atmosphere.

#### a. Nature-based removals

Nature-based removals boost natural processes that sequester CO2 from the atmosphere and store it in geological or natural sinks.

#### **Examples**

Afforestation/reforestation enhances forest management and plants new areas of woodland.

Ecosystem restoration reestablishes and enhances the capacity of valuable ecosystems such as peatlands, forests, and coastal wetlands to sequester carbon and ensure that carbon already stored in these areas is not released into the atmosphere.

Soil carbon sequestration is a process by which carbon dioxide (CO2) is removed from the atmosphere and stored in the soil, primarily through the decomposition of organic matter and carbon fixation by plants through photosynthesis.

Urban NBS solutions:

In the urban areas, cities may support the implementation of different types of solutions:

- Street trees and green pavement
- Urban green spaces agriculture
- Habitat preservation and remediation
- Green Buildings

Nature-based removal projects offer numerous social, economic, and environmental co-benefits. They enhance our ability to adapt to adverse impacts of climate change, particularly in terms of flood and erosion control, and contribute to local cooling, regulation of air and water flows, and protection or enhancement of depletable natural resources. Importantly, they provide opportunities to improve health, safety, and social welfare, and support economic development and technological diffusion. Nature-based carbon removals can be part of nature-based solutions (NbS) that address urban challenges while benefitting biodiversity.

Nature-based approaches have undergone extensive testing for decades, requiring relatively low implementation costs and energy demand. However, these solutions might be susceptible to "reversal"<sup>43</sup>, namely, to the effects of extreme weather, wildfires, pests, and other factors that might reintroduce carbon into the atmosphere<sup>44</sup>, and might pose challenges when quantifying the associated CO2 emissions removed. Regional and international offset schemes on compliance and voluntary markets mitigate the reversal risk, through buffer pools that compensate for any reversal<sup>45</sup>.

<sup>45</sup> California Air Resources Board (2021), California's Compliance Offset Program , accessed at <u>https://ww2.arb.ca.gov/sites/default/</u> files/2021-10/nc-forest\_offset\_faq\_20211027.pdf (30.05.2024)



<sup>43</sup> Edenhofer, O., Jacobsen, J. B., Díaz Anadón, L., van Aalst, M., Cartalis, C., Dessai, S., ... & Soussana, J. F. (2024). Towards EU climate neutrality: Progress, policy gaps and opportunities. Retrieved at <u>https://climate-advisory-board.europa.eu/reports-and-publications/to-</u> wards-eu-climate-neutrality-progress-policy-gaps-and-opportunities

<sup>44</sup> Krajcic J. and Ibbott S. Report on What is a carbon credit? What does scientific research say about the role of carbon offsets? And how do I know if I'm doing the right thing? As the business of carbon offsets booms, we explore the truth behind the pledges, separating fact from fiction. META.<u>https://meta.eeb.org/2023/07/19/3-things-you-should-know-about-offsetting/</u>

#### b. Technological removals

Technological removals imply the anthropogenic removal of CO2 from the atmosphere and its storage underground. This category includes, among others, bioenergy-type technologies with carbon capture and storage (BECCS), and direct air capture with geological carbon storage (DACCS).

#### **Examples**

Bioenergy with carbon capture and storage (BECCS) sequester CO2 emissions during the combustion of bioenergy fuels.

Direct air carbon capture and storage (DACCS) is a chemical process that sequesters and stores CO2 from the surrounding air via chemical agents.

Although in recent years there has been a surge in popularity surrounding carbon removal technologies, primarily due to their potential to mitigate CO2 emissions from industry and waste management sectors for more extended periods compared to nature-based carbon removals<sup>46</sup>, researchers have voiced numerous concerns regarding their efficacy. Despite the potential of technologies like BECCS and DACCS to reduce emissions, their high costs hinder progress in their development and deployment. Hence, only a handful of plants are operational, thus capturing only minimal amounts of CO2 annually.

In offsetting alternatives beyond cities' territorial boundaries, the UNFCCC identifies various potential projects, including technologies to prevent or mitigate CO2 emissions. This process encompasses a range of solutions spanning renewable energy production, enhanced energy efficiency in buildings, and the distribution of sustainable cookstoves to communities in developing nations. Investments in renewable energy (RE) projects generate quantifiable carbon offsets by displacing fossil fuel-based energy and reducing grid emissions. Crucially, the RE project must demonstrate additionality. Proving the project wouldn't have happened without the city's investment. Also, emissions reductions must be accurately quantified through baseline establishment, monitoring, and leakage assessment, and certified by reputable standards. Importantly, these projects can also deliver valuable co-benefits, such as local job creation, improved air quality, biodiversity conservation, and community development.

In addition to renewable energy (RE) offsets, other reduction-based offsets can include energy efficiency projects, transportation emission reductions (e.g., electrified public transit or bike-sharing systems), waste management and methane capture, industrial process optimization, fossil fuel switching (e.g., coal to natural gas), and leak prevention in gas operations.

These projects reduce emissions by implementing cleaner, more efficient technologies or practices. While reduction-based offsets play a transitional role by avoiding emissions, they must meet criteria such as additionality, robust monitoring, and alignment with global climate goals to ensure credibility and effectiveness.



<sup>46</sup> Agora Industry, (2024) press release, Europe's 2040 climate ambition should build more on renewables, electrification and circularity accessible at <u>https://www.agora-industry.org/news-events/europes-2040-climate-ambition-should-build-more-on-renewables-electrification-and-circularity</u> (30.05.2024)

# 4 DEVELOPING AN EMISSIONS OFFSET STRATEGY FOR YOUR CITIES

Achieving net-zero emissions is a critical goal, but even with aggressive reduction efforts by cities, some emissions remain unavoidable. This chapter outlines a City Action Strategy for Offsetting as a potential step-by-step approach for utilising carbon offsetting as a tool alongside reduction efforts to achieve net-zero goals.

The City Action Strategy for Offsetting highlights a potential roadmap for achieving net-zero emissions. By prioritising aggressive reduction, ensuring transparency, and focusing on high-quality carbon removal projects, cities can effectively utilise offsetting as a tool toward a sustainable future.

#### a. **Prioritising Reduction and Building Transparency**

Conduct a comprehensive assessment of city-wide emissions sources. Develop ambitious and measurable targets aligned with net-zero goals. Implement initiatives to directly reduce emissions (clean energy, sustainable transportation, energy efficiency). Establish a platform for tracking and visualising the city's emissions profile. Adopt a recognized framework for transparent emissions reporting. Launch campaigns to inform citizens about climate change, offsetting limitations, and the importance of reduction.

### **BOX 7: QUANTIFYING AND TRACKING EMISSIONS**

Quantifying and tracking emissions is the first step we recommend a city undertake to set a GHG emissions reduction target and identify the target year for residual emissions.

- The Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) provides a clear and robust framework for assessing and reporting city-wide emissions sources.
- In addition to the GPC platform, cities may share their data on recognized international reporting
  platforms, such as the CDP-ICLEI Track and Common Reporting Framework of the Global Covenant of
  Mayors, to monitor and publicly report their GHG emissions.

To align with the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) Standard, cities should ensure that carbon offsets are reported accurately in their GHG inventories. The GPC emphasizes the importance of third-party verification for carbon credits, ensuring that only certified credits (e.g., from Gold Standard or Verra) are included. Additionally, residual emissions can be offset through these credits, and cities should report them separately to demonstrate progress toward climate neutrality while maintaining transparency and adherence to the GPC's rigorous accounting principles.

#### b. Evaluating and Refining Offsetting Practices

Assess the credibility and effectiveness of existing offset options and projects. Analyse project methodologies for adherence to rigorous standards (VCS, Gold Standard). Develop a plan to transition away from projects that no longer meet the city's criteria. Establish a board to provide input on offset project selection and ensure alignment with community values.

#### c. Building a Credible and Impactful Offset Portfolio

Identify potential projects that contribute to carbon removal. Prioritise projects that demonstrably remove carbon dioxide from the atmosphere. Select projects utilising methods for long-term carbon storage. Choose projects that generate additional environmental and social benefits (e.g., improved air quality, habitat restoration, job creation). Allocate the budget to support developing and deploying new carbon removal technologies.

Cities can search for credible carbon offsets through trusted platforms and registries that adhere to internationally recognized standards which list a variety of verified projects across sectors like renewable energy, forestry, and methane capture. Online marketplaces also offer verified carbon credits, ensuring transparency and environmental integrity. Additionally, cities can work with consulting and offset providers who specialize in helping identify suitable projects that align with their climate goals and meet rigorous verification standards.

### **BOX 8: WHAT TO TAKE INTO CONSIDERATION**

Variables to take into consideration before embarking on carbon offsetting projects:

- Time horizon;
- Geographical sourcing for offsetting and associated co-benefits;
- Capital costs associated with each potential option.

#### d. Continuous Monitoring and Improvement

Publish regular reports on emissions reduction progress and offset portfolio impact. Maintain ongoing communication and collaboration with the board. Continuously evaluate and adapt the strategy based on new data, best practices, and stakeholder feedback.



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# 5 KNOWLEDGE GAPS AND FUTURE CONSIDER-ATIONS

Despite the growing interest in carbon offsetting, there are still significant knowledge gaps and uncertainties surrounding its implementation, particularly regarding the long-term effectiveness of certain projects and the clarity of reporting standards.

Future advancements in research, policy clarity, and standardized frameworks will help cities address these uncertainties, providing clearer guidelines and tools to assess and utilize carbon offsetting effectively. As the market for carbon credits matures, cities will benefit from improved transparency, enhanced quality control, and better access to data, enabling them to integrate offsetting into their climate strategies with greater confidence.

# **6 CONCLUSION AND RECOMMENDATIONS**

Cities are on the front lines of the fight against climate change, and achieving net-zero emissions is crucial. While aggressive emissions reduction efforts are the primary focus, some residual emissions remain unavoidable. Transparently reported and credible carbon offsetting may offer opportunities to finance emission reductions efforts beyond the usual mandates and typical levers of control that a city may have.

**Carbon offsetting** is an option for cities to consider. By allowing cities to compensate for emissions that are difficult or impossible to eliminate entirely, offsetting helps them achieve their climate neutrality goals more quickly. In addition, many offset projects provide additional co-benefits beyond just carbon reduction.

Opportunities associated with carbon offsetting for cities include the emergence of new technologies like carbon capture and storage or use. These technologies offer the potential for permanently removing carbon dioxide from the atmosphere, providing in most cases a more lasting solution than some traditional offset projects. However, they come with an additional and often significant energy consumption need to be realised. Another opportunity lies in the development of standardised frameworks for carbon offsetting. Robust standards and verification processes can ensure the credibility and effectiveness of offset projects, giving cities greater confidence in their investments.

Yet, in addition to the limitations associated to offsetting, listed in paragraph 2.4 above, cities might consider that one major threat is the possibility of over-reliance on offsets. Offsetting should be a complementary strategy, not a replacement for aggressive emissions reduction efforts within the city itself. Prioritising local reductions ensures that cities tackle the root causes of their emissions problem. Another threat is the potential for "greenwashing," which undermines the credibility of legitimate offsetting efforts and makes it harder for cities to achieve their climate goals.

In conclusion, this guide emphasises that to navigate challenges; cities should prioritise aggressive emissions reduction and only subsequently choose high-quality offset projects with strong environmental integrity and permanence. When offsetting cities should invest in local projects whenever possible to maximise co-benefits, promote transparency about offsetting's limitations, collaborate with stakeholders in developing the strategy, and continuously monitor and adapt the program based on new data and best practices. By following these recommendations, cities can leverage carbon offsetting as a valuable tool to complement their core emissions reduction strategies and accelerate progress toward a sustainable future.

# ANNEX 1. GLOSSARY

Additionality	Based on the IPCC terminology, GHG emissions reductions or removals are additional if these would not have occurred in the absence of the offsetting intervention. <sup>47</sup>
Carbon credit	A carbon credit entails a tradeable certificate or a permit certified by governments or independent certification bodies representing a metric tonne of carbon dioxide-equivalent (CO2eq) that is avoided or sequestered outside the GHG accounting boundary (or geographic boundary as a proxy for GHG accounting boundary) and can be used to compensate for a metric ton of residual GHG emissions occurring within the accounting boundary. The purchaser of an offset credit can "retire" it to claim the underlying reduction towards their own GHG reduction goals. <sup>48</sup>
Carbon dioxide equivalent / Co2 equivalent	The amount of carbon dioxide (CO2) emission that would cause the same integrated radiative forcing or temperature change, over a given time horizon, as an emitted amount of a greenhouse gas (GHG) or a mixture of GHGs <sup>49</sup> . For readability purposes, the text in this guide primarily uses the term "carbon emissions".
Climate neutrality	Climate neutrality in the context of local and regional governments is defined as the targeted reduction of greenhouse gas (GHG) emissions and GHG avoidance in own operations and across the community in all sectors to an absolute net-zero emission level at the latest by 2050. In parallel to this, it is critical to adapt to climate change and enhance climate resilience across all sectors, in all systems and processes. To achieve climate neutrality local and regional governments should set a clear goal and advance rapidly following a holistic and integrated approach that leads to a wide range of co-benefits for sustainable development, such as creating socio-economic opportunities, reducing poverty and inequality, and improving the health of people and nature <sup>50</sup> .



<sup>47</sup> IPCC, 2022. Annex I: Glossary (IPCC AR6 WGIII).

<sup>48</sup> Broekhoff, D., et al. (2019).

<sup>49</sup> IPCC, 2018: Annex I: Glossary [Matthews, J.B.R. (ed.)]. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 541-562. https://doi.org/10.1017/9781009157940.008.

<sup>50</sup> Arikan, Y., Carreño, C., & van Staden, M. (2020)

Carbon offsetting	"The reduction, avoidance or removal of a unit of greenhouse gas (GHG) emissions by one entity, purchased by another entity to counterbalance a unit of GHG emissions by that other entity," <sup>51</sup> (IPCC, 2022). "Climate action that enables individuals and organisations to compensate for the emissions they cannot avoid, by supporting worthy projects that reduce emissions somewhere else." <sup>52</sup> (UNFCCC) "Carbon offsetting aims to compensate for residual emissions generated within an entity (e.g. industry or city), namely those emissions that persist on an annual basis, despite efforts to reduce them within value-chain or set boundaries." <sup>53</sup> (Race to Zero, 2022) "() the practice of an entity compensating for their greenhouse gas emissions." <sup>54</sup> (EC, 2022)
Carbon sinks	Any process, activity or mechanism which removes CO2 from the atmosphere. <sup>55</sup>
Double counting	Two or more reporting entities claiming the same emissions or reductions in the same scope, or a single entity reporting the same emissions multiple times. <sup>56</sup>
Emission factor(s)	A factor that converts activity data into GHG emissions data (e.g. Kg CO2e emitted per litre of fuel consumed, kg CO2e emitted per kilometre travelled, etc.) <sup>57</sup>
Geographic or accounting boundary	A geographic boundary that identifies the spatial dimensions of the inventory's assessment boundary. This geographic boundary defines the physical perimeter separating in-boundary emissions from the out-of-boundary and transboundary emissions <sup>58</sup> .
Greenhouse gas inventory	A quantified list of a city´s GHG emissions and sources. <sup>59</sup>
Mitigation	A human intervention to reduce emissions or enhance the sinks of greenhouse gases. In climate policy, mitigation measures are technologies, processes or practices that contribute to mitigation, for example, renewable energy technologies, waste minimisation processes, and public transport commuting practices. <sup>60</sup>

<sup>51</sup> IPCC, (2022). Annex I: Glossary (IPCC AR6 WGIII).

<sup>52</sup> UNFCCC, Carbon Offsetting Platform.

<sup>53</sup> United Nations Climate Change High-Level Champions. (2022). Race to Zero lexicon 2.0. Retrieved from <u>https://climatechampions.</u> <u>unfccc.int/wp-content/uploads/2022/06/R2Z-Lexicon-2.0.pdf</u>

<sup>54</sup> COM(2022) 672 final.

<sup>55</sup> United Nations Framework Convention on Climate Change, Article 1, Definitions <u>https://unfccc.int/resource/ccsites/zimbab/conven/</u> text/art01.htm#:~:text=%22Sink%22%20means%20any%20process%2C,greenhouse%20gas%20from%20the%20atmosphere

<sup>56</sup> Fong, W.K. et al., (2014).

<sup>57</sup> World Resource Institute, Sustainability Dashboard methodology. <u>https://www.wri.org/sustainability-wri/dashboard/methodology</u> 58 Fong, W.K. et al., (2014).

<sup>59</sup> Ibid.

<sup>60</sup> IPCC, 2018: Annex I: Glossary [Matthews, J.B.R. (ed.)

Negative emission technologies (NETs)	Also known as carbon dioxide removal (CDR) are necessary to compensate for emissions in hard-to-abate sectors in order to reach net-zero goals. Researchers have introduced several methodologies to distinguish between the different NET approaches, most notably the distinction between "engineered" and "nature- based" removals. Engineered removals typically include, inter alia, two NETs: bioenergy with carbon capture and storage (BECCS), and direct air carbon capture and storage (DACCS). <sup>61</sup>			
Net zero CO2 emissions	Condition in which anthropogenic carbon dioxide (CO2) emissions associated with a subject are balanced by anthropogenic CO2 removals. [Note 1: Carbon neutrality and net zero CO2 emissions are overlapping concepts. The concepts can be applied at global or sub-global scales (e.g., regional, national and sub-national). At a global scale, the terms carbon neutrality and net zero CO2 emissions are equivalent. At sub-global scales, net zero CO2 emissions is generally applied to emissions and removals under direct control or territorial responsibility of the reporting entity, within and beyond the direct control or territorial responsibility of the reporting entity. Accounting rules specified by GHG programmes or schemes can have a significant influence on the quantification of relevant CO2 emissions and removals. Note 2: In some cases, achieving carbon neutrality may rely on the supplementary use of offsets to balance emissions that remain after actions by the reporting entity are taken into account.			
Residual emissions	Those emissions that persist on an annual basis, despite efforts to reduce them within value-chain or set boundaries <sup>63</sup> . The JRC's conceptual framework for residual emissions offers useful guidance by categorizing emissions into levels based on their potential for reduction and the costs involved, helping to identify where offsetting is most appropriate. This framework distinguishes between emissions that should be prioritized for direct reduction and those that might be offset after all practical mitigation efforts are exhausted.			
Scope 1, Scope 2, and Scope 3 emissions	Emissions responsibility as defined by the GHG Protocol, a private sector initiative. 'Scope 1' indicates direct greenhouse gas (GHG) emissions that are from sources owned or controlled by the reporting entity. 'Scope 2' indicates indirect GHG emissions associated with the production of electricity, heat, or steam purchased by the reporting entity. 'Scope 3' indicates all other indirect emissions, i.e., emissions associated with the extraction and production of purchased materials, fuels, and services, including transport in vehicles not owned or controlled by the reporting entity, outsourced activities, waste disposal, etc. <sup>64</sup>			
Terms such as 'residual,' 'unavoidable,' 'hard to reduce,' 'immediately reducible,' 'difficult or impossible to eliminate entirely,' and 'lack of direct influence and control' are used interchangeably in this guide. However, it is important to note that, in different contexts, these terms may refer to distinct concepts that require further				

differentiation, which is beyond the scope of this guide.

<sup>64</sup> Fong, W.K. et al., (2014).



<sup>61</sup> Gunther P., Ekardt F. (2023).

<sup>62</sup> IPCC, 2021: Annex VII: Glossary.

<sup>63</sup> United Nations Climate Change High-Level Champions. (2022). Race to Zero lexicon 2.0. Retrieved from <u>https://climatechampions.</u> <u>unfccc.int/wp-content/uploads/2022/06/R2Z-Lexicon-2.0.pdf</u>

# **BIBLIOGRAPHY**

- Agora Industry, (2024) press release, Europe's 2040 climate ambition should build more on renewables, electrification and circularity accessible at <a href="https://www.agora-industry.org/news-events/europes-2040-climate-ambition-should-build-more-on-renewables-electrification-and-circularity">https://www.agora-industry.org/news-events/europes-2040-climate-ambition-should-build-more-on-renewables-electrification-and-circularity</a> (30.05.2024).
- Allwood J.M., V. Bosetti, N.K. Dubash, L. Gómez-Echeverri, and C. von Stechow, 2014: Glossary. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Arikan Y., Carreño C., and Staden van M. (2020). ICLEI's Climate Neutrality Framework. ICLEI Local Governments for Sustainability. Retrieved from <a href="https://e-lib.iclei.org/publications/ICLEIs\_Climate\_Neutrality\_Framework.pdf">https://e-lib.iclei.org/publications/ICLEIs\_Climate\_Neutrality\_Framework.pdf</a>
- Axelsson, K., Wagner, A., Johnstone, I., et al.. (2024). Oxford Principles for Net Zero Aligned Carbon Offsetting (revised 2024). Oxford: Smith School of Enterprise and the Environment, University of Oxford. Retrieved at <a href="https://www.smithschool.ox.ac.uk/sites/default/files/2024-02/Oxford-Principles-for-Net-Zero-Aligned-Carbon-Offsetting-revised-2024.pdf">https://www.smithschool.ox.ac.uk/sites/default/files/2024-02/Oxford-Principles-for-Net-Zero-Aligned-Carbon-Offsetting-revised-2024.pdf</a>
- Broekhoff, D., Gillenwater, M., Colbert-Sangree, T., and Cage, P., (2019). "Securing Climate Benefit: A Guide to Using Carbon Offsets." Stockholm Environment Institute & Greenhouse Gas Management Institute. Retrieved at <u>https://www.offsetguide.org/high-quality-offsets/permanence/</u>
- C40 and the New York City Mayor's Office of Sustainability (2019), Defining carbon neutrality for cities & managing residual emissions. Cities Perspective & Guidance. accessible at: <a href="https://www.c40knowledgehub.org/s/article/">https://www.c40knowledgehub.org/s/article/</a> Defining-carbon-neutrality-for-cities-and-managing-residual-emissions-Cities-perspective-and-guidance?language=en\_US
- California Air Resources Board (2021), California's Compliance Offset Program, accessed at <u>https://ww2.arb.ca.gov/sites/default/files/2021-10/nc-forest\_offset\_faq\_20211027.pdf</u> (accessed 30.05.2024)
- Carbon Gap Policy Tracker (2023) retrieved at <u>https://tracker.carbongap.org/policy/eu-climate-law/</u> (accessed on 30.05.2024)
- Edenhofer, O., Jacobsen, J. B., Díaz Anadón, L., van Aalst, M., Cartalis, C., Dessai, S., ... & Soussana, J. F. (2024). Towards EU climate neutrality: Progress, policy gaps and opportunities. Retrieved at <a href="https://climate-advisory-board.europa.eu/">https://climate-advisory-board.europa.eu/</a> reports-and-publications/towards-eu-climate-neutrality-progress-policy-gaps-and-opportunities
- European Commission (2022). Proposal for a Regulation of the European Parliament and of the Council establishing a Union certification framework for carbon removals. (COM/2022/672 final). Retrieved at <a href="https://www.google.com/url?q=https://climate.ec.europa.eu/eu-action/certification-permanent-carbon-removals-carbon-farming-and-carbon-storage-products/certification-permanent-carbon-removals-carbon-farming-and-carbon-storage-products\_en&sa=D& source=docs&ust=1716544716405202&usg=AOvVaw04THoKYXiUZfUfpw-PE-oR</a>
- European Commission, Directorate-General for Research and Innovation, (2024). EU missions, 100 climate-neutral and smart cities : cities on a journey to climate neutrality, Publications Office of the European Union. <u>https://data.europa.eu/doi/10.2777/169604</u>
- Fong, W.K. et al., (2014). Global Protocol for Community-Scale Greenhouse Gas Emission Inventories: An Accounting and Reporting Standard for Cities. World Resources Institute (WRI), Winnipeg, Canada, C40 Cities, and ICLEI Local Governments for Sustainability (ICLEI), Bonn, Germany, Retrieved at <a href="https://ghgprotocol.org/sites/default/files/">https://ghgprotocol.org/sites/default/files/</a>

standards/GPC\_Full\_MASTER\_RW\_v7.pdf

- Fonseca, B., & Mogyorósy, E., (2022). Carbon markets assessment for the "Benin Energy Plus" project, retrieved from https://tap-potential.org/wp-content/uploads/2022/07/1703-carbon-market\_kg\_v2.pdf\_
- Gill-Wiehl, A., Kammen, D. M., & Haya, B. K. (2024). Pervasive over-crediting from cookstove offset methodologies. Nature Sustainability, 7(2), 191-202. Accessible at <a href="https://www.nature.com/articles/s41893-023-01259-6">https://www.nature.com/articles/s41893-023-01259-6</a>. epdf?sharing\_token=hL91rucloCgBhNbvbaDAydRgN0jAjWel9jnR3ZoTv0PY5koFksowKMxA7Mli6wx9OA04W8v\_UK PTy7CKTglfUCvTI93MdjiaHTsUGRasUK2DG7Mxl7htCwwOiKISXJL-qkrLRw6h9BbxA17jIEjcKoqw2E6ucNSM00hdlxK JSKKG9tCl4u\_QsBZMRGAHY8\_c7Rkm3aAxc1oOKbZDAjvyYqa608R4kAE1p2JLxE90HR0UxpGv\_tvlylLks5PVezAXSO-Hwmbp5-s5IFL\_eVmYn4sJEnojXPv8yeAn1HJEj5cqpOF36-6Y\_a77kvExesG6dHNvOBQ7JoT6flXhM1WG9vXMC\_ hEQ8CzYcaAZHJYPVw%3D&tracking\_referrer=www.theguardian.com
- Günther, P., & Ekardt, F. (2023). The priority of nature-based over engineered negative emission technologies: locating BECCS and DACCS within the Hierarchy of International Climate Law. Ecological Civilization, 1(1), 10004. <u>https://www.sciepublish.com/uploads/pdf/202309/01/af2e916243ae0b12ae9239da1d20cd49.pdf</u>
- Hooker H., Wentworth J. (2024), UK Parliament POST, "Carbon Offsetting", retrieved at <u>https://researchbriefings.files.</u> parliament.uk/documents/POST-PN-0713/POST-PN-0713.pdf
- ICLEI, Local Governments for Sustainability (2023). Towards COP28 Art 6.8 PA in-session workshop, retrieved at https://unfccc.int/sites/default/files/resource/SB58\_Art.6.8\_ICLEI\_0.pdf
- ICLEI, Local Governments for Sustainability, (2024), Inputs to the 5th meeting of the Glasgow Committee on Non-market Approaches (Article 6.8) retrieved at <u>https://www4.unfccc.int/sites/SubmissionsStaging/</u> <u>Documents/202404111659---Art6.8\_ICLEI\_April2024.pdf</u>
- IPCC, 2018: Annex I: Glossary [Matthews, J.B.R. (ed.)]. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 541-562. <a href="https://doi.org/10.1017/9781009157940.008">https://doi.org/10.1017/9781009157940.008</a>.
- IPCC, (2019). Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems. Retrieved from <u>https://www.ipcc.ch/srccl/</u>
- IPCC, 2021: Annex VII: Glossary [Matthews, J.B.R., V. Möller, R. van Diemen, J.S. Fuglestvedt, V. Masson-Delmotte, C. Méndez, S. Semenov, A. Reisinger (eds.)]. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 2215–2256, doi:10.1017/9781009157896.022.
- IPCC, 2022: Annex I: Glossary [van Diemen, R., J.B.R. Matthews, V. Möller, J.S. Fuglestvedt, V. Masson-Delmotte, C. Méndez, A. Reisinger, S. Semenov (eds)]. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.020
- IPCC, (2023). Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups



I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 1-34, doi: 10.59327/IPCC/AR6-9789291691647.001

- Krajcic J. and Ibbott S., (2023). Report on What is a carbon credit? What does scientific research say about the role of carbon offsets? And how do I know if I'm doing the right thing? As the business of carbon offsets booms, we explore the truth behind the pledges, separating fact from fiction. META fro European Environmental Bureau. <a href="https://meta.eeb.org/2023/07/19/3-things-you-should-know-about-offsetting/">https://meta.eeb.org/2023/07/19/3-things-you-should-know-about-offsetting/</a> (Accessed 11.03.25).
- Oechsner, S. (2023). Green People's Energy For Africa. "We are in new territory here Financing municipal climate projects with emission certificates." Green People's Energy for Africa, 28 August 2023. Available at: <u>https://gruenebuergerenergie.org/en/format/feature/we-are-in-new-territory-here-financing-municipal-climate-projects-withemission-certificates/</u> (accessed 9.04.2025)
- Öko-Institut e.V., INFRAS, Stockholm Environment Institute (SEI), & Carbon Limits. (2016). How additional is the Clean Development Mechanism? Analysis of the application of current tools and proposed alternatives (CLIMA.B.3/ SER/2013/0026r). Retrieved at <a href="https://climate.ec.europa.eu/system/files/2017-04/clean\_dev\_mechanism\_en.pdf">https://climate.ec.europa.eu/system/files/2017-04/clean\_dev\_mechanism\_en.pdf</a>
- Pan, H., Page, J., Shi, R. et al. Contribution of prioritized urban nature-based solutions allocation to carbon neutrality. Nat. Clim. Chang. 13, 862–870 (2023). <u>https://doi.org/10.1038/s41558-023-01737-x</u>
- Trouwloon, D., Streck, C., Chagas, T., & Martinus, G. (2023). Understanding the use of carbon credits by companies: A review of the defining elements of corporate climate claims. Global challenges, 7(4), 2200158. Retrieved at <u>https://onlinelibrary.wiley.com/doi/full/10.1002/gch2.202200158</u>
- UNFCCC, United Nations Framework Convention on Climate Change, Carbon Offsetting Platform <u>https://offset.climateneutralnow.org/aboutoffsetting</u>
- UNFCCC, United Nations Framework Convention on Climate Change, COP26 Outcomes: Market mechanisms and non-market approaches (Article 6). <u>https://unfccc.int/process-and-meetings/the-paris-agreement/the-glasgow-climate-pact/cop26-outcomes-market-mechanisms-and-non-market-approaches-article-6#How-can-the-private-sector-be-involved</u>
- UNFCCC, Guidelines for the review of the national communications of Parties included in Annex I to the Convention, Part I: The review process. Retrieved from <u>https://unfccc.int/sites/default/files/resource/CNN%20Guidelines.pdf</u>
- UNFCCC Secretariat. (2023, June 4). Recognition and Accountability Framework. Draft Implementation Plan with respect to Net-Zero Pledges of non-State actors and Integrity Matters (version 0.1 – for stakeholder engagement). Retrieved from <u>https://unfccc.int/sites/default/files/resource/Integrity\_Matters\_recommendation\_8\_UNFCCC\_draft\_implementation\_plan\_v0-1\_04062023.pdf</u>
- UNFCCC, United Nations Framework Convention on Climate Change, Secretariat, (2022).UNFCCC/PA/CMA/2022/10/ Add.2.Annex1, <u>https://unfccc.int/sites/default/files/resource/cma2023\_10a02E.pdf#page=33</u>
- United Nations Climate Change High-Level Champions. (2022). Race to Zero lexicon 2.0. Retrieved from <a href="https://climatechampions.unfccc.int/wp-content/uploads/2022/06/R2Z-Lexicon-2.0.pdf">https://climatechampions.unfccc.int/wp-content/uploads/2022/06/R2Z-Lexicon-2.0.pdf</a>-



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UTMC has received funding from the European Union's Horizon Europe programme under the Grant Agreement n°101095976 — Call: HORIZON-MISS-2021-CIT-02 — Project name: Global Knowledge Exchange Centre (GKEC) for Urban Climate Neutrality



Funded by the European Union