BEYOND SMART CITIES

URBAN GREENHOUSE GAS INVENTORY SPECIALIST TRAINING COURSE

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GHG AND CLIMATE CHANGE SPECIALIST CURRICULUM

SETTING GOALS AND TRACKING EMISSIONS OVER TIME

FOR GHG & CLIMATE CHANGE PROFESSIONALS

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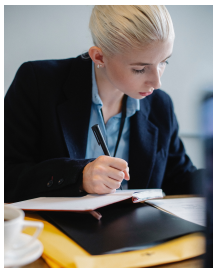
WHAT SHOULD YOU LEARN



- Setting goals and evaluating performance
- Aligning goals with the inventory boundary
- Tracking emissions over time and recalculating emissions

INTRODUCTION

This chapter shows how inventories can be used as the basis for goal setting and performance tracking. Further guidance on setting a mitigation goal and tracking progress over time can be found in the GHG Protocol Mitigation Goal Standard,82 which has been designed for national and sub-national entities, as well as cities.

- Developing GHG inventories, setting goals, and tracking progress are part of an interconnected process.
- Setting reduction or "mitigation" goals can help cities focus efforts on key emission sources, identify innovative mitigation solutions, demonstrate leadership and reduce long-term costs

SETTING GOALS AND EVALUATING PERFORMANCE

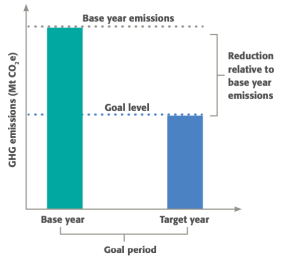
The type of goal provides the basis against which emissions and emissions reductions are tracked and reported.

Goal type		Example	Minimum inventory need
Base year emissions goals	Single-year goal	London (UK): By 2025 60% GHG emissions reduction on 1990 levels	Inventory for 1990 and 2025
	Multi-year goal	Wellington (New Zealand): Stabilize from 2000 by 2010, 3% GHG emissions reduction by 2012, 30% by 2020, 80% by 2050	Inventory for 2000, 2010, 2012, 2020 and 2050
Fixed level goals		Carbon-neutral is another type of fixed level goal type. Melbourne (Australia) set a target to achieve zero net carbon emissions by 2020, and plans to achieve the goal through internal reductions and purchasing offsets.	Inventory for 2020. In the case of Melbourne, current inventory required to determine quantity of offsets necessary to cover remainder of emissions, as well as GHG inventory in 2020.
Base year intensity goals	Per capita goal	Belo Horizonte (Brazil): 20% GHG emissions reduction per capita until 2030 from 2007 levels	Inventory for 2007 and 2030
	Per GDP goal	China is the major country adopting GHG emissions reduction per unit of GDP goal for cities. For example, Beijing: 17% reduction per unit of GDP in 2015 from 2010 levels.	Inventory for 2010 and 2015
Baseline scenario goals		Singapore pledged to reduce GHG emissions to 16% below business-as-usual (BAU) levels by 2020 if a legally binding global agreement on GHG reductions is made. In the meantime, Singapore started implementing measures to reduce emissions by 7% to 11% of 2020 BAU levels.	Inventory for 2020 and a projected BAU inventory for 2020

Users with a multi-year goal shall report whether the goal is an average, annual, or cumulative multi-year goal. In general, there are four goal types:

1. Base year emissions goals
2. Fixed level goals
3. Base year intensity goals
4. Baseline scenario goals

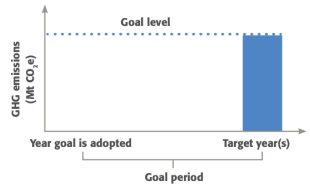
BASE YEAR EMISSIONS GOALS



- Base year emissions goals represent a reduction in emissions relative to an emissions level in a historical base year.
- They are framed in terms of a percent reduction of emissions compared to a base year emissions level, and therefore correspond to an absolute reduction in emissions.

FIXED LEVEL GOALS

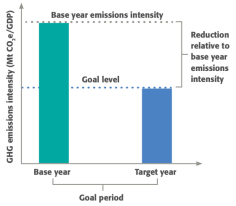
- Fixed level goals represent a reduction in emissions to an absolute emissions level in a target year. For example, a fixed level goal could be to achieve 200 Mt (million tonnes) CO2e by 2020.



- The most common type of fixed level goals are carbon neutrality goals, which are designed to reach zero net emissions by a certain date
- Fixed level goals do not include a reference to an emissions level in a baseline scenario or historical base year.

BASE YEAR INTENSITY GOALS

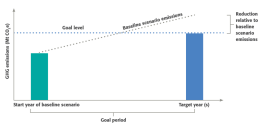
- Base year intensity goals represent a reduction in Figure 11.3 Example of a base year intensity goal emissions intensity relative to an emissions intensity level in a historical base year. Emissions intensity is emissions Base year emissions intensity per unit of output.



- Examples of units of output include Reduction GDP, population, and energy use. Intensity goals are framed relative to in terms of a percent reduction of emissions intensity base year compared to a base year emissions intensity, and therefore emissions correspond to an absolute reduction in emissions intensity.

BASELINE SCENARIO GOALS

- Baseline scenario goals represent a reduction in emissions relative to a baseline scenario emissions level.
- They are typically framed in terms of a percent reduction of emissions from the baseline scenario, rather than an absolute reduction in emissions.



- A baseline scenario is a set of reasonable assumptions Target year Base year and data that best describe events or conditions that are 22 most likely to occur in the absence of activities taken Goal period to meet a mitigation goal
- All goal types, except for fixed level goals, require a base year GHG inventory and a GHG inventory in the target year for evaluation of results.

EVALUATING PERFORMANCE AGAINST GOALS

- To ensure transparency and meaningful and accurate reporting of progress made towards their goals, cities should report both net and gross emissions separately.
- Gross emissions include all relevant emissions within a GHG accounting boundary (or geographic boundary as a proxy) and exclude 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).
- Cities should update emissions reduction trajectories periodically, estimate target year gross emissions, and consider new strategies to reduce their gross emissions as much as possible.

CARBON NEUTRALITY

- Carbon neutrality can be defined at a global level, country level and city level. At a city level, carbon neutrality can be said to be achieved when the amount of GHG emissions produced within a city's GHG inventory boundary in a certain year is equal to the amount of GHG removals within the same defined inventory boundary for the same time period.
- Depending on the target design, some cities may include the use of offsets as part of reaching a carbon neutral target. Carbon neutrality targets are needed to prevent the accumulation of GHGs in the atmosphere and limit the global average temperature rise.
- Cities should separately report both emissions and removals to determine their progress towards a carbon neutrality goal. Carbon neutrality should be achieved by demonstrating net-zero GHG emissions in all relevant scopes – in accordance with the target set by the city – within the boundary on an annual basis

ALIGNING GOALS WITH THE INVENTORY BOUNDARY

- Mitigation goals can apply to a city's overall emissions or to a subset of the gases, scopes, or emission sectors identified in the inventory boundary .
- The results of a compiled GHG inventory, along with a mitigation assessment and any of the city's specific mitigation interests, should determine which parts of the inventory boundary are included or excluded in the goal.
- Cities may choose to set a sectoral goal as a way to target a specific sector, sub-sector, or group of sectors.
- Cities may follow the GHG Protocol Mitigation Goals Standard to set goals separately for each scope, in order to minimize double counting the same emissions in the same goal.
- If cities choose to set a combined scope 1 (territorial) and 2 goal, then cities should use the BASIC/BASIC+ framework, or include an adjusted scope 2 total reflecting energy consumption net of energy production occurring in the city.

ADJUSTMENTS TO IDENTIFY ENERGY CONSUMPTION EMISSIONS NET OF ENERGY PRODUCTION

To determine emissions from grid-supplied energy consumption net of in-city energy production, cities may subtract energy generated in the city from total scope 2 emissions and/or adjust regional emission factors to subtract energy generated in the city.

To adjust the activity data to identify grid-supplied energy consumption net of in-city energy production, a city may follow the equation below.

Grid-supplied energy consumption of net in-city prodution (MWh) =
Grid-supplied energy consumption (MWh) - In-city grid-supplied energy production (MWh)

If a city generates and delivers to the grid more energy than it uses from the grid (e.g. the city is a net generator compared with consumption), it should report zero net energy consumption emissions (shall not be negative emission). If a city uses more grid-supplied energy than it produces, then it would deduct the MWh hours of generation from its MWhs of production, and multiply the remaining MWhs by a location-based emission factor. If all emissions from electricity generation are accounted for, any residual consumption will be served by electricity generated outside of the city boundaries.

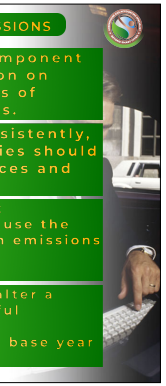
Even with an adjustment of activity data, there may be further double counting in the form of the location-based emission factors (applied to any consumption net of production). Because these factors represent an average of all energy generation in the region, they will therefore inherently include emissions from any energy generation located in the city. Cities may attempt to address this by also adjusting the emission factor, which would require the city to identify the total emissions and total generation (in MWh) represented in the regional grid average emission factor as shown below:

$$\text{Adjusted emission factor} = \frac{\text{Total regional emissions (tonnes } CO_2e) - \text{emissions from city generation (tonnes } CO_2e)}{\text{Total generation (MWh)} - \text{city generation (MWh)}}$$

From there, a city may deduct the emissions and generation produced in-boundary.

TRACKING EMISSIONS OVER TIME AND RECALCULATING EMISSIONS

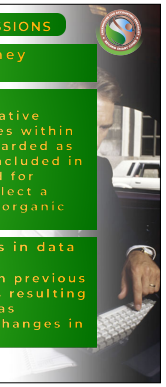
- Tracking emissions over time is an important component of a GHG inventory because it provides information on historical emissions trends, and tracks the effects of policies and actions to reduce city-wide emissions.
- All emissions over time should be estimated consistently, which means that as far as possible, the time series should be calculated using the same methods, data sources and boundary definitions in all years.
- . Using different methods, data or applying different boundaries in a time series could introduce bias because the estimated emissions trend will reflect real changes in emissions or removals as well as the pattern of methodological refinements.
- Cities may undergo significant changes, which will alter a city's historical emissions profile and make meaningful comparisons over time difficult. In order to maintain consistency over time, historic emissions data from a base year inventory will have to be recalculated.



TRACKING EMISSIONS OVER TIME AND RECALCULATING EMISSIONS

Cities should recalculate base year emissions if they encounter significant changes such as:

- Structural changes in the inventory boundary.
  This may be triggered by adjustment in a city's administrative boundary, or changes in inclusion or exclusion of activities within the city boundary. For example, a category previously regarded as insignificant has grown to the point where it should be included in the inventory. But no emissions recalculations are needed for activities that either did not exist in the base year, or reflect a natural increase or decrease in city activities (known as "organic growth").
- Changes in calculation methodology or improvements in data accuracy.
  A city may report the same sources of GHG emissions as in previous years, but measure or calculate them differently. Changes resulting in significant emission differences should be considered as recalculation triggers, but any changes that reflect real changes in emissions do not trigger a recalculation.



TRACKING EMISSIONS OVER TIME AND RECALCULATING EMISSIONS

Discovery of significant errors
A significant error, or a number of cumulative errors that are collectively significant, should also be considered as a reason to recalculate emissions.

In summary, base year emissions—and emissions for other previous years when necessary—should be retroactively recalculated to reflect changes in the city that would otherwise compromise the consistency and relevance of the reported GHG emissions information. Once a city has determined its policy on how it will recalculate base year emissions, it should apply this policy in a consistent manner.

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