

Cities Climate Action Report Card - Appendix A

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1. Limitations of the Framework

The Cities Climate Action Report Card Framework assesses the transparency, integrity, and leadership of city climate action towards net zero. Here, we specifically define integrity for the climate action context, referring to the quality, credibility, and comprehensiveness of a city's approaches to climate change mitigation and net zero. In the CCARC Framework, *Integrity* is operationalized as an evaluation criteria against which we assess a city's *Alignment* with practices that have been deemed "high integrity" according to best practices defined through scientific and expert consensus processes, such as the United Nations' High-Level Expert Group (UN HLEG) on Net-Zero Commitments of Non-State Actors. However, we acknowledge that "integrity" is a fundamentally normative concept and cities may be engaging in climate action in ways that do not align with our integrity framework. Similarly, not all cities may value transparency or view it as beneficial. Cities may strategically or selectively communicate if they operate in contexts that are politically or publicly opposed to climate action. Cities that are resource constrained may also choose to prioritize implementation over communication about implementation. On the other hand, the UN HLEG Integrity Matters report and UNFCCC Recognition and Accountability Framework are mounting pressure for non-state actors to be held accountable to their commitments and for these actors to demonstrate that they are not engaging in greenwashing or window-dressing practices through their commitments and plans. Accountability requires consistent and comparable information from all actors. In developing the framework, the CCARC took both of these views into account and sought to develop a framework that balances between these tensions. Some parties may view the final framework as too punitive, while others may view it as not stringent enough. While the framework could be applied to any city, we believe it is most appropriate for cities that are already engaging in climate mitigation action or are considering engaging in climate action.

The CCARC framework used the HLEG Integrity Matters and GCoM Integrity Matters for Cities, States, and Regions reports as a starting point for developing the framework. The reports establish standards and provide recommendations for high integrity action for non-state actors, including cities. In converting to an evaluation framework, these standards and recommendations must be converted to criteria and indicators against which city action can be assessed. We assign numeric values to these assessments to inform cities of areas where they are falling behind and areas where they are exceeding and to understand patterns in performance across cities. This conversion of normative recommendations to an evaluation framework means that the choice of indicators and point values will give more weight to certain topics. The number of Alignment indicators by evaluation criteria and category are shown in SI Table 1.

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SI Table 1: Count of Indicators by Type and Category

Category	Integrity	Leadership	TOTAL
Targets	14	4	18
Plans	22	7	29
Implementation	14	2	16
TOTAL	50	13	63

SI Table 1 shows that there is the greatest number of indicators on the “plans” category, followed by targets. Each Integrity evaluation criteria is assessed for both Transparency and Alignment. This distribution of indicators generally reflects the distribution of recommendations in the HLEG and GCoM Integrity Matters reports, which heavily emphasized target setting and planning. However, as critical years for climate action draw nearer, implementation is becoming increasingly important compared to the pre-implementation steps of target setting and planning. To reflect this trend, the CCARC team intentionally incorporated more indicators focused on implementation where possible, placing greater emphasis on detailed implementation planning within city climate action plans and progress tracking for both targets and plans. The final framework has the most indicators on climate action planning, with the same number of indicators on *Integrity* criteria for target setting and implementation and slightly more indicators on *Leadership* evaluation criteria for target setting compared to implementation. To prevent weighting issues when aggregating scores across indicators and comparing cities, we reported the aggregated *Integrity Alignment* scores by category as the average of all *Alignment* scores on *Integrity* evaluation criteria within each category. Thus, the uneven weighting across categories does not affect the final scores. We also do not aggregate *Leadership* scores, as we found that high *Leadership* scores were significantly associated with city capacity and county-level income and could bias the evaluation towards wealthier, higher-capacity cities.

The assessment of the CCARC framework relies on publicly available documents, reports, and other communications on city climate action. We emphasize transparency for the general public and not just climate-oriented or regulatory audiences. Because of this perspective, we assign higher *Transparency* scores for information found in city-produced documents and communications. To collect this data, the CCARC evaluation team conducted online desk research. We considered resources in all languages, using translation software (DeepL and Google Translate) to search for sources and convert sources to English as needed. For the assessment of Montevideo, assessment was conducted by a fluent Spanish speaker on the CCARC team. Although this process allows us to include more cities in the assessment, there is the possibility for bias due to imperfect translation. We also acknowledge the potential for bias due to our reliance on resources and communications made available online. The CCARC assessment may be biased if cities are communicating about climate action through other mediums, such as mail or in-person meetings.

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2. Target Alignment and Progress Assessment Methodology

The target alignment and progress tracking assessment in the CCARC relies on the “pro-rated” linear emissions reductions methodology developed in Hsu et al. (2020). This methodology has been used to assess target ambition and progress towards subnational targets in previous reports (“GLOBAL CLIMATE ACTION 2022 Progress and Ambition of Cities, Regions, and Companies”, “GLOBAL CLIMATE ACTION 2023 Ambition of Cities, Regions, and Companies”, “Doubling Down on Climate Action: Cities and Regions Must Put in 2x the Work to Stay on Track with Climate Goals”), and studies (Song et al. 2024). This method uses a linear assumption to annualize targeted and achieved emissions reductions and compares this to the annualized emissions reductions required by global goals, national targets, and city targets. The target alignment and progress tracking analyses are conducted in the CCARC assessment Microsoft Excel workbooks.

Target Ambition

To assess the alignment of target ambition with global goals to limit warming to 1.5°C with limited or no overshoot and climate mitigation targets set at the national level, we first estimate the “pro-rated” emissions reductions implied by the self-declared, city-wide interim and net zero targets based on the annualized linear reduction trend between a city’s baseline year and target year. The data required for this process includes the baseline year, target year, targeted percentage reduction, and in some cases, baseline year emissions. Several assumptions were made during this process. For interim targets, most cities report targets in the form of absolute emissions reduction targets, with the components required for the analysis. For net zero targets, carbon neutrality targets, and other targets using equivalent terminology, we find that most cities (with a few exceptions) do not report the targeted percentage reduction. If we were not able to identify a specific percentage reduction reported by the city for their net zero target, we assumed the percentage reduction for these targets was 100%. This is a more lenient assumption towards cities in terms of target ambition. Two cities, Lagos and Nairobi, reported baseline scenario targets rather than absolute emissions reduction targets. Baseline scenario targets aim for a reduction in emissions compared to projected emissions in a given target year.

For both cities, we were able to convert these targets into the same format as absolute emissions reduction targets using the baseline year for the projected emissions scenario, baseline year emissions, and projected emissions in the target year. Both cities directly reported all the information necessary for this conversion. The same process was used for Nigeria’s conditional and unconditional targets established in their NDC, but we did not have enough information to do this for China’s interim 2030 peaking target (for Hong Kong’s assessment). Montevideo reports their interim targets in the format of “maintaining emissions below a certain level”, although these levels are not determined by projected emissions scenarios. These targets were confirmed in a similar method to the baseline scenario targets, using the targeted emissions levels and baseline year emissions levels to estimate the targeted percentage reduction. This follows a similar format to Uruguay’s interim emissions reduction targets, which were also expressed as levels and separated by gas for CO₂, CH₄, and N₂O. These targets

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were converted into the format of a percentage greenhouse gas emissions reduction target for CO₂, CH₄, and N₂O using the global warming potential values, targeted emissions levels, and baseline emissions levels for each gas as reported in the NDC. The result of this process was a comparable estimate of annualized, targeted emissions reductions for each city target.

To assess the alignment of city targets with global goals, we used the global percentage emissions reductions required to align with scenarios to limit warming to 1.5°C (>50%) through immediate action with no or limited overshoot, according to scenarios from IPCC AR6 Working Group 3. These estimates are presented in the form of a percentage emissions reduction in global emissions from 2019 to 2030 and 2050 (Table TS.2). The estimates of required emissions reductions are stated for CO₂ only and all greenhouse gases, including CO₂, CH₄, N₂O, and fluorinated gases (HFCs, PFCs, SF₆, NF₃) (IPCC AR6, WGIII, Summary for Policymakers). Specifically, the scenario requires a 45% decrease and 85% in GHG emissions from 2019 to 2030 and 2050, respectively, and a 50% decrease and 100% in CO₂ emissions from 2019 to 2030 and 2050, respectively. These global “targets” were converted to annual, prorated emissions reductions in the same format as described above for city targets, using the baseline year (2019), targeted percentage reduction, and target year (2030 or 2050). To assess the alignment of city targets with global goals, we compared the annualized target reductions of city targets to the annualized target reductions required by these global scenarios. We compared the city’s net zero target to the 2050 required reduction. For interim targets, we used city interim targets for 2030 or the interim target with the target year closest to 2030. We also considered the greenhouse gas coverage of city targets, comparing CO₂ only targets to the CO₂ only global thresholds and any targets covering gases beyond CO₂ to the GHG global thresholds. However, all cities in the assessment were compared to the GHG global thresholds, as none were unambiguously targeting CO₂ only. For cities with conditional and unconditional targets, we used conditional targets to assess global target alignment, which is more lenient towards cities.

The assessment of the alignment of city targets with national climate targets follows a similar process. The only difference is that annualized target ambition is compared to the annualized ambition of national targets. For national targets, we primarily rely on mitigation targets in each country’s Nationally Determined Contribution (NDC), as well as any higher ambition targets established in national plans and long term strategies (listed in individual city data collection workbooks). National targets are converted to annualized percentage reduction targets in the same format as city targets. To compare city and national targets, we compare all targets based on target year, using targets with the same or most similar target year. There were only two instances where cities and countries had different target years, and in both cases the city interim targets were set for 2035 and the national targets were set for 2030. The prorated emissions reduction methodology allows for comparison between targets with different target years, although we aimed to compare targets that were as similar as possible. For cities and countries with conditional and unconditional targets, we compared conditional to conditional and unconditional to unconditional wherever possible. In one case, Lagos, the city’s targets are not conditional, while the country (Nigeria) has set conditional and unconditional goals. Here, we compared city targets to unconditional targets, which is more lenient towards the city.

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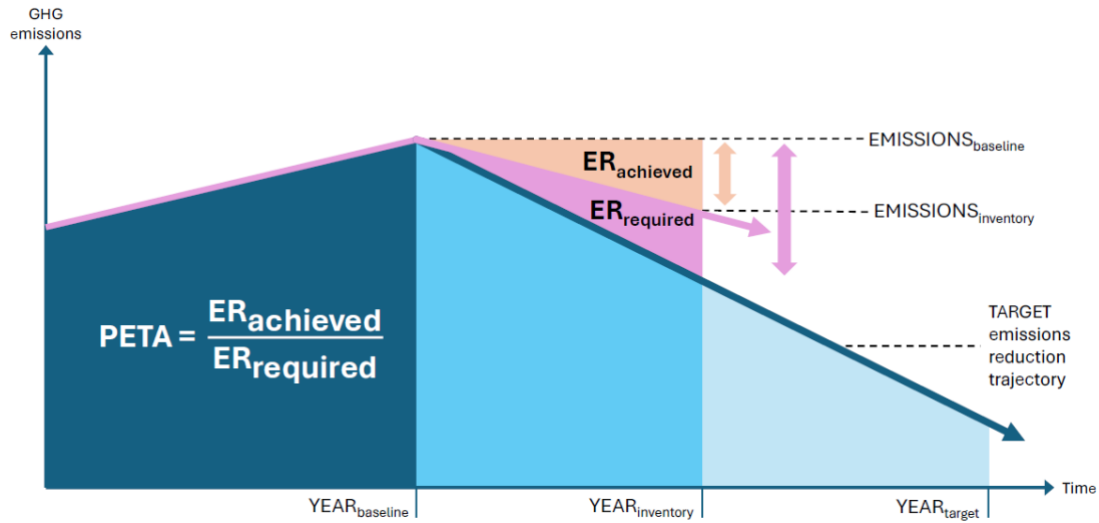
Target Progress

We assess a city's progress towards their interim and net zero targets using a similar methodology to the one described above for assessing target alignment. We estimate progress through two measures: the total percentage reduction in emissions reduction from the baseline year and the pro-rated emissions target achievement (PETA). This progress tracking assessment is only possible if a city has reported an updated emissions inventory since the baseline inventory, with scope and greenhouse gas coverage that is comparable between the baseline inventory and the updated inventory. We were not able to assess progress for Freetown, because they have not released an updated emissions inventory, and Nairobi, which has released an updated emissions inventory but uses a different method than the baseline year inventory and is not comparable.

We estimate the total percentage reduction using city-wide emissions reported in the baseline year and most recent inventory year. This number is used to determine if cities have increased or decreased their emissions since the baseline year. We estimate the prorated emissions target achievement using a similar methodology to the target alignment analysis described above to evaluate if a city is “on track” or “not on track” towards their targets. We consider a city to be on track if their annualized rate of achieved emissions reductions exceeds the annualized rate of emissions reductions required by their self-declared targets. First, we calculate the annualized, achieved emissions reductions using the baseline year, baseline year emissions, most recent inventory year, and most recent inventory emissions. The annualized emissions reductions required by each target are calculated in the same method as the target alignment assessment, described above. The PETA) is estimated as the ratio between annualized achieved emissions reductions and annualized targeted (“required”) emissions reductions. SI Figure 1 provides a visual representation of the PETA metrics (Song et al. 2024). PETA values greater than or equal to 1 indicate that the city is reducing emissions at or above the rate required to achieve their target and is deemed “on track,” while a PETA value less than 1 indicates that the city is not reducing emissions at the rate required by their targets and is deemed “off track.”

SI Figure 1: Illustration of Prorated Emissions Target Achievement Calculation (Song et al., 2024)

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3. Distribution of Category and Indicator Scores Across Cities

SI Table 2. City Contextual Variables and Group Assignments

City Name	Gross National Income Per Capita in USD (ISO)	GNI/Capita Group	City Budget Per Capita in USD	City Budget/ Capita Group	Special Jurisdiction Status
Chapel Hill, NC	\$80,300 (USA)	Above Median	\$1,370	Below Median	No
Copenhagen	\$73,360 (DNK)	Above Median	\$9,467	Above Median	No
Freetown	\$560 (SLE)	Below Median	\$3	Below Median	No
Halifax, NS	\$53,930 (CAN)	Above Median	\$2,141	Above Median	No
Hiroshima	\$39,030 (JPN)	Above Median	\$3,117	Above Median	No
Hong Kong	\$55,200 (HKG)	Above Median	\$13,060	Above Median	Yes
Lagos	\$1,930 (NGA)	Below Median	\$105	Below Median	Yes
Melbourne	\$63,140 (AUS)	Above Median	\$3,762	Above Median	No

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Mexico City	\$12,100 (MEX)	Below Median	\$1,563	Above Median	Yes
Montevideo	\$19,530 (URY)	Below Median	\$576	Below Median	No
Nairobi	\$2,110 (KEN)	Below Median	\$72	Below Median	Yes
Warsaw	\$19,730 (POL)	Below Median	\$473	Below Median	Yes

SI Table 3: Paired t-test Results for Difference in Means for Cities Above and Below the Sample Median GNI/Capita

Outcome Variable	Mean Value for Cities Above Median GNI/Capita	Mean Value for Cities Below Median GNI/Capita	t-score	p-value
Target Integrity Score	9.666667	8.833333	1.0709	0.3147
Plan Integrity Score	11.66667	16.83333	-2.4251	0.0375**
Implementation Integrity Score	10.33333	9.50000	0.52763	0.6139
Total Integrity Score	31.66667	35.16667	-1.0747	0.3214
Total Transparency Score	43.50000	45.83333	-1.0423	0.3232
Total Leadership Score	15.16667	10.00000	3.5146	0.0091***

p<0.1*, p<0.05** p<0.01***

SI Table 4: Paired t-test Results for Difference in Means for Cities Above and Below the Sample Median Annual City Budget/Capita

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Outcome Variable	Mean Value for Cities Above Median City Budget/Capita	Mean Value for Cities Below Median City Budget/Capita	t-score	p-value
Target Integrity Score	9.333333	9.166667	0.20328	0.8431
Plan Integrity Score	12.33333	16.16667	-1.6002	0.1407
Implementation Integrity Score	11.000000	8.833333	1.4971	0.1818
Total Integrity Score	32.66667	34.16667	-0.44031	0.6715
Total Transparency Score	43.50000	45.83333	-1.0423	0.3232
Total Leadership Score	15.333333	9.833333	4.0931	0.0040***

p<0.1*, p<0.05** p<0.01***

Table 3. Paired t-test Results for Difference in Means for Cities with Special Jurisdictions^ and Cities without Special Jurisdictions

Outcome Variable	Mean Value for Cities with Special Jurisdiction	Mean Value for Cities without Special Jurisdiction	t-score	p-value
Target Integrity Score	9.000000	9.428571	0.59331	0.5685
Plan Integrity Score	17.60000	11.85714	-2.7514	0.0255**
Implementation Integrity Score	11.000000	9.142857	-1.4043	0.1969
Total Integrity Score	37.60000	30.42857	-2.5437	0.0395**

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Total Transparency Score	45.20000	44.28571	-0.37244	0.7197
Total Leadership Score	11.80000	13.14286	0.61889	0.5513

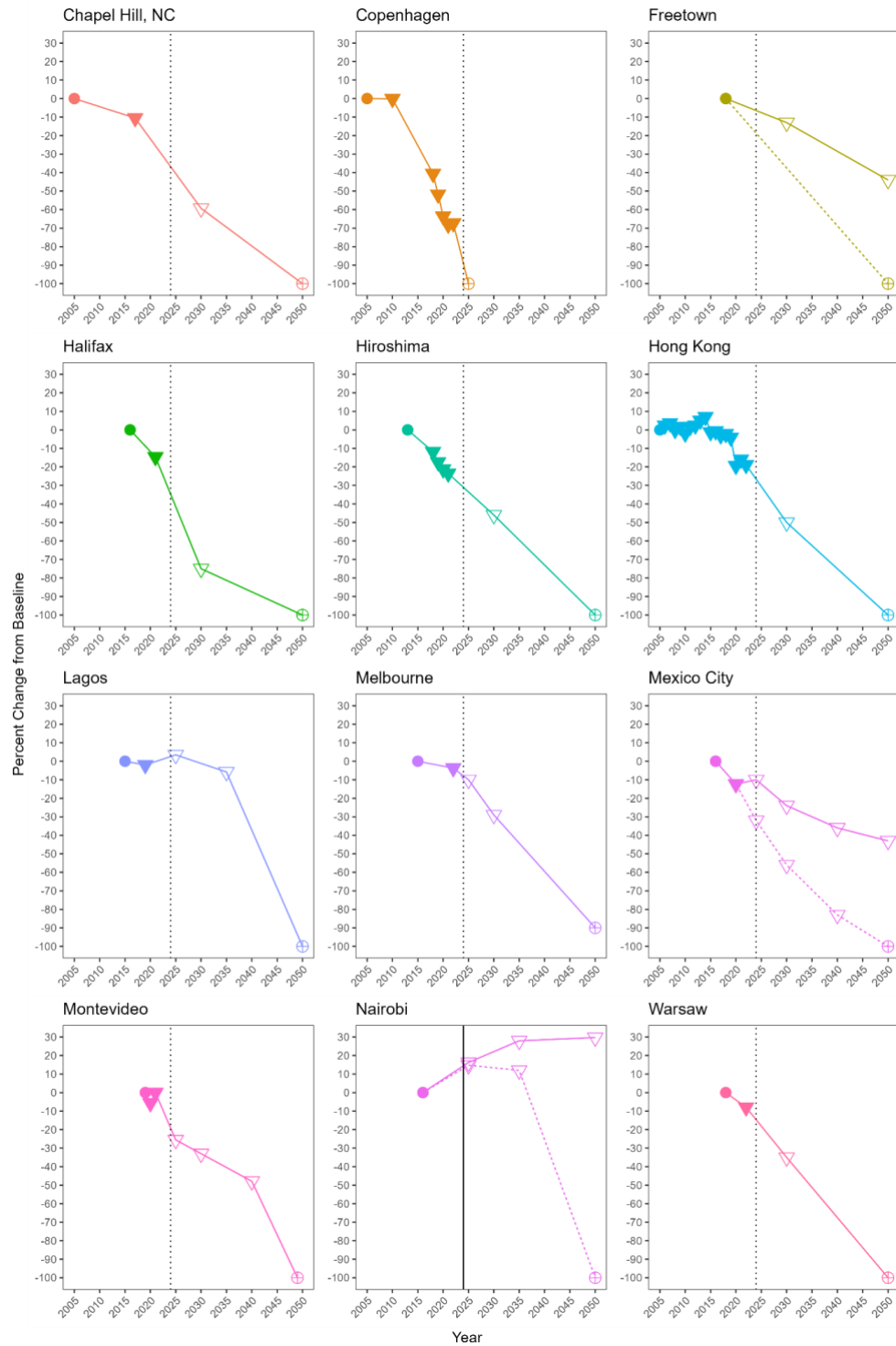
p<0.1*, p<0.05** p<0.01***

^ Cities with special jurisdictions are defined as those with greater jurisdictional powers compared to other cities or a greater degree of autonomy compared to other cities within the same country (ex. cities whose governments are combined with regional governments, cities with special administrative statuses)

4. Achieved and Targeted Emissions Reductions - Alternative Figure

SI Figure 2: Achieved and Targeted Emissions Reductions by Focus City - All Inventories

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