

# U.S. cities underestimate greenhouse gas emissions by nearly 20 percent on average

Gurney, et al., *Nature Communications*, 12(1), 1-7, <https://www.nature.com/articles/s41467-020-20871-0>



## Science Question

How accurate are US urban self-reported greenhouse gas inventories?  
Is the accuracy sufficient to support existing policy pledges?  
What would an alternative system/approach be?

## Analysis

City boundaries were used to extract individual urban FFCO<sub>2</sub> emissions from Vulcan version 3.0. 48 US urban self-reported inventories (SRIs) were compared to Vulcan where SRI methods were documented and allowed for direct comparison. Sector differences were isolated where possible. A variety of difference statistics were calculated.

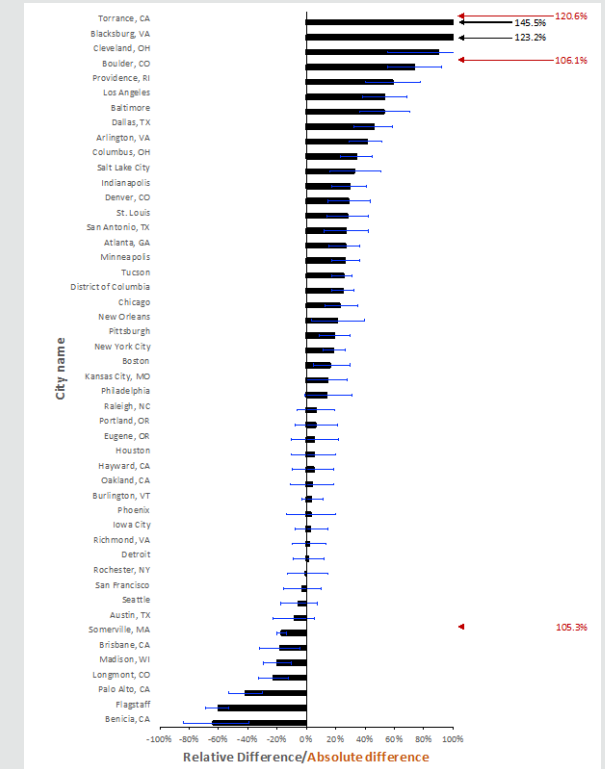
## Results

1. The mean relative difference (RD) is +18.3% (Vulcan > SRI) with a mean absolute (unsigned) relative difference (MAD) of 29.1%
2. The summed difference across all 48 cities is 19,076,760 tC/year, a value nearly equivalent to the 2015 Massachusetts state emissions
3. The most common differences are related to SRI omission of petroleum fuel use and point source emissions in the industrial/commercial sector, different accounting perspectives on marine shipping and airborne emissions, and different methods in onroad emission estimation.

## Significance

The bottom-up Vulcan approach combined with top-down atmospheric measurements offers a prototype system that could be scaled to provide every US city with a state-of-the-art monitoring and reporting information system.

This will save cities resources and allow them to focus on emissions mitigation policies.



Sector-based individual city FFCO<sub>2</sub> emissions relative difference (RD) between the Vulcan version 3.0 and self-reported inventories (SRIs). Black: total emissions RD; red: mean across-sector absolute relative difference (MASAD). Scale capped at 100%.

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