

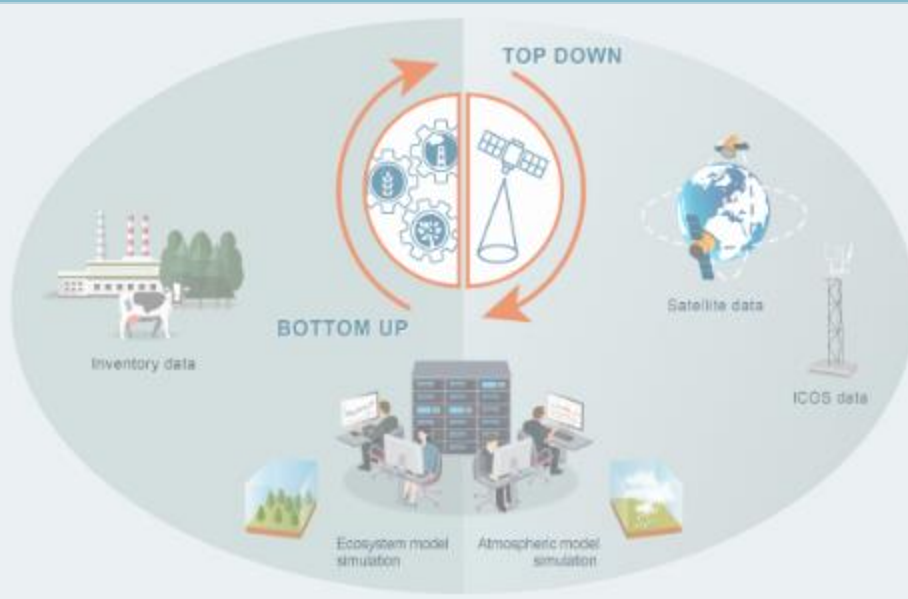


Messages from the synthesis: fossil CO₂

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By Teleconference



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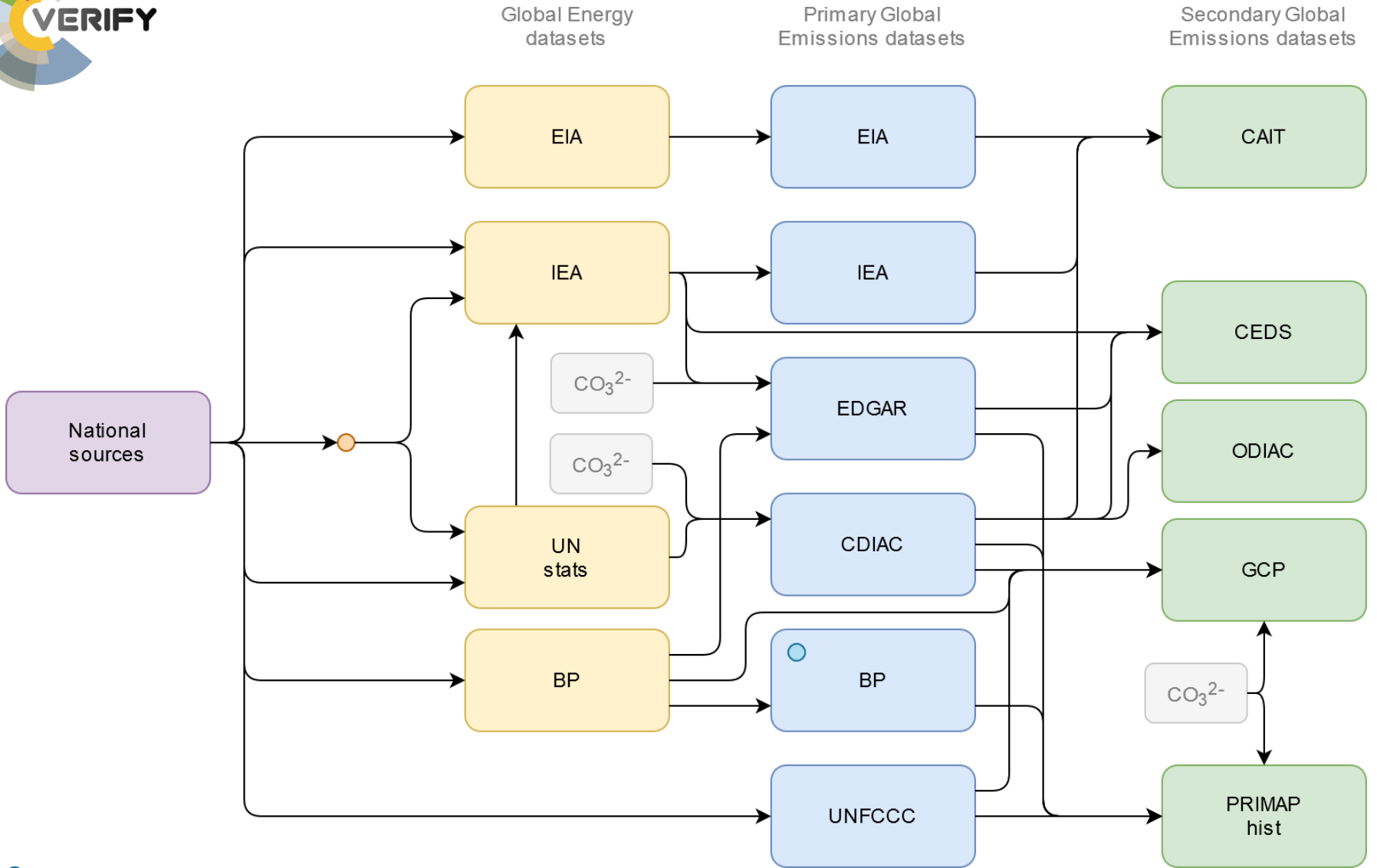
T5.1 RECONCILIATION OF BOTTOM-UP EMISSION ESTIMATES

- This WP will identify the key structural uncertainties between independent bottom-up emission estimates (WPs 2, 3, and 4) and the official UNFCCC emission inventories together with WP6. The task will identify differences in system boundaries, biases, assumptions, and identify missing data (D5.1). This could lead to convergence of some datasets through harmonisation, but some difference may persist and potentially be later resolved when reconciling top-down and bottom-up products. Key sub-tasks feeding into WP6 will be:
 - T5.1.1 CO₂ from fossil fuels, cement production and industry, (M1-M6) (CICERO). Identifying differences in system boundaries, energy data, energy content, emission factors, methodology (tier 1/2/3), and similar. Quantify the approximate magnitude of these differences, and implications for verification.



WHAT CAN OTHER DATASETS PROVIDE THAT IS NOT PROVIDED BY NGHGI'S?

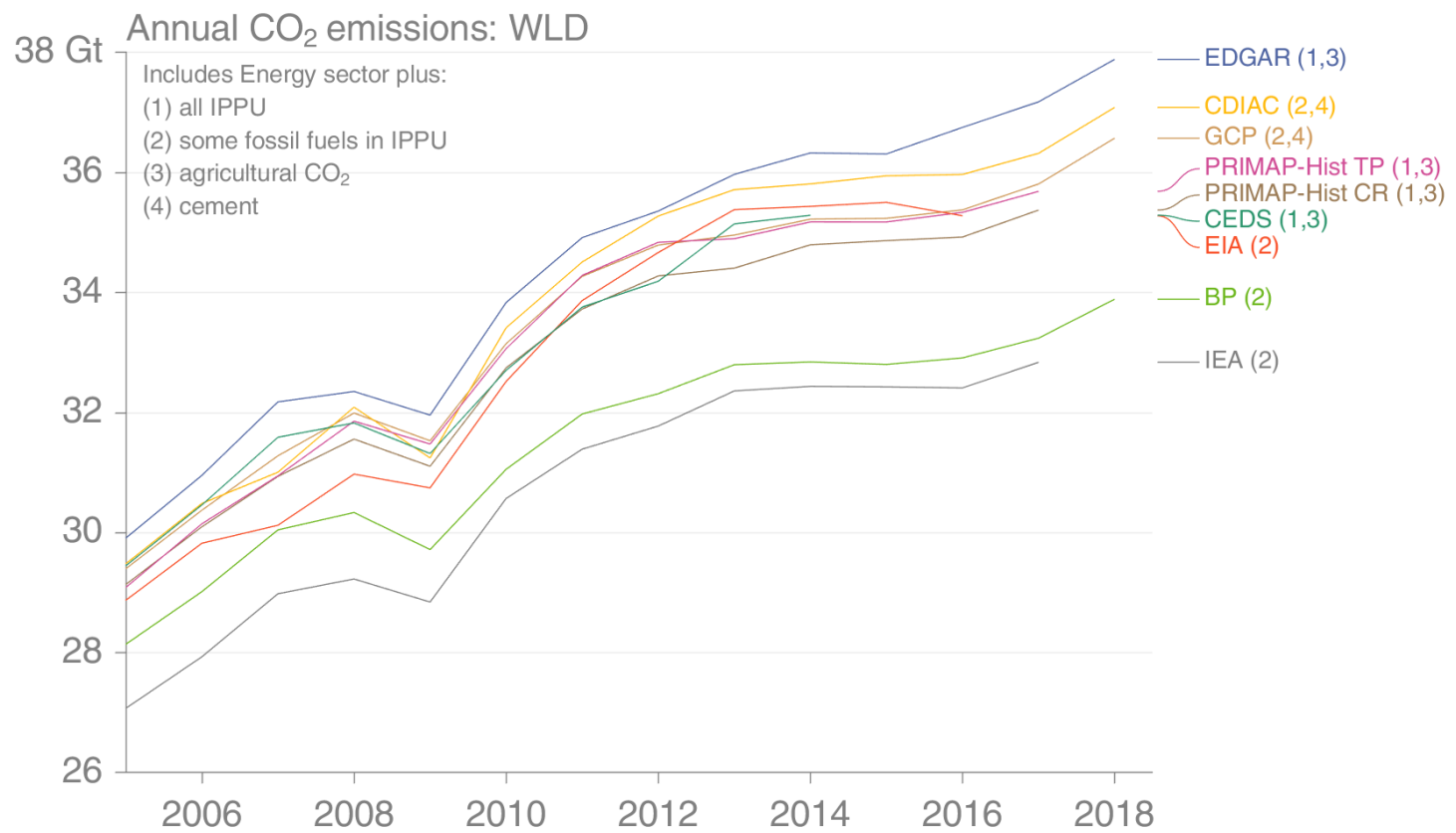
- Longer time-series: Estimates before 1990
- Estimates for non-Annex-1 countries and global
- Estimates with lower lag
- Higher temporal resolution
- “Real-time” estimates



- BP uses non-fuel shares from IEA
- Common questionnaire

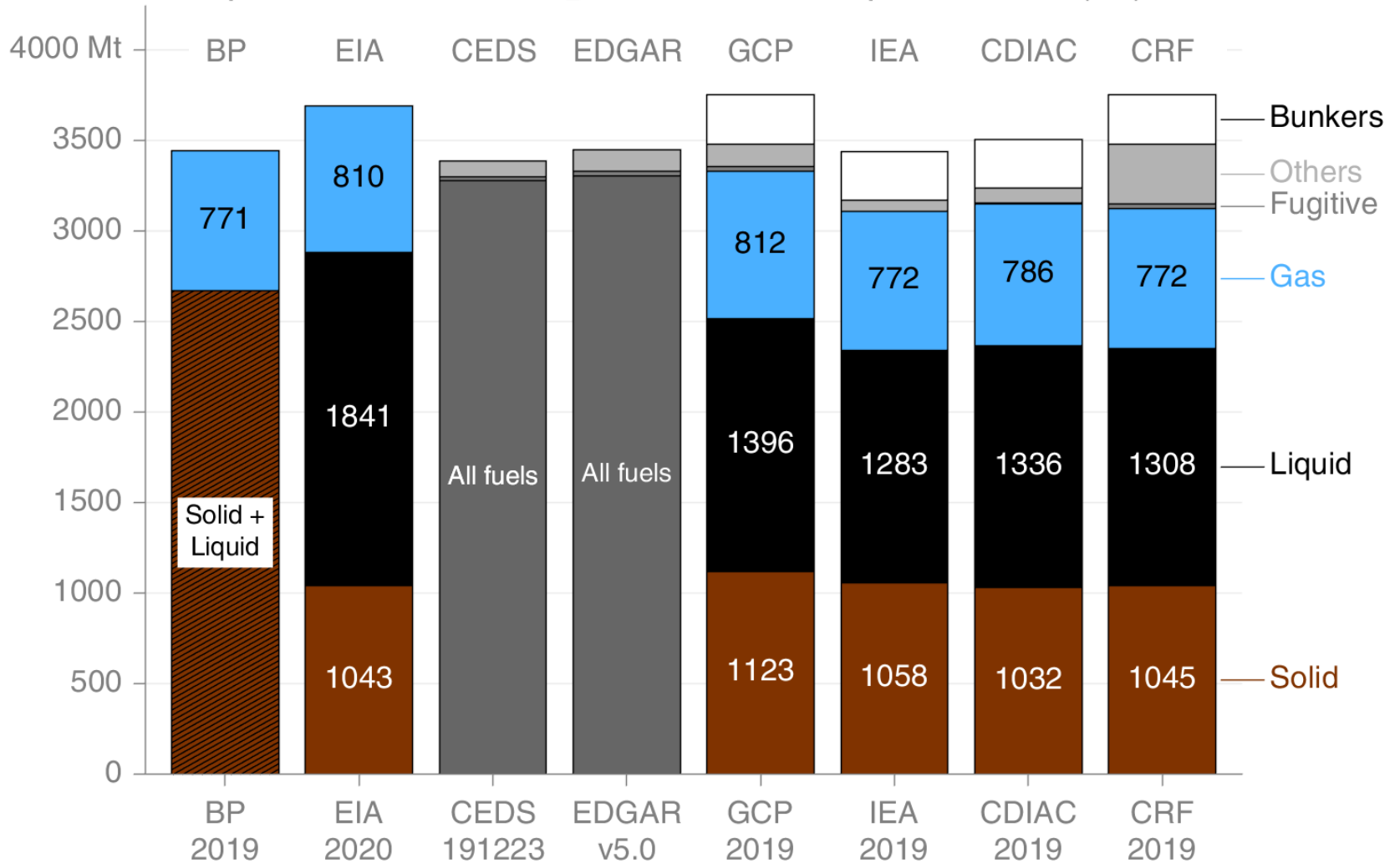


WORLD



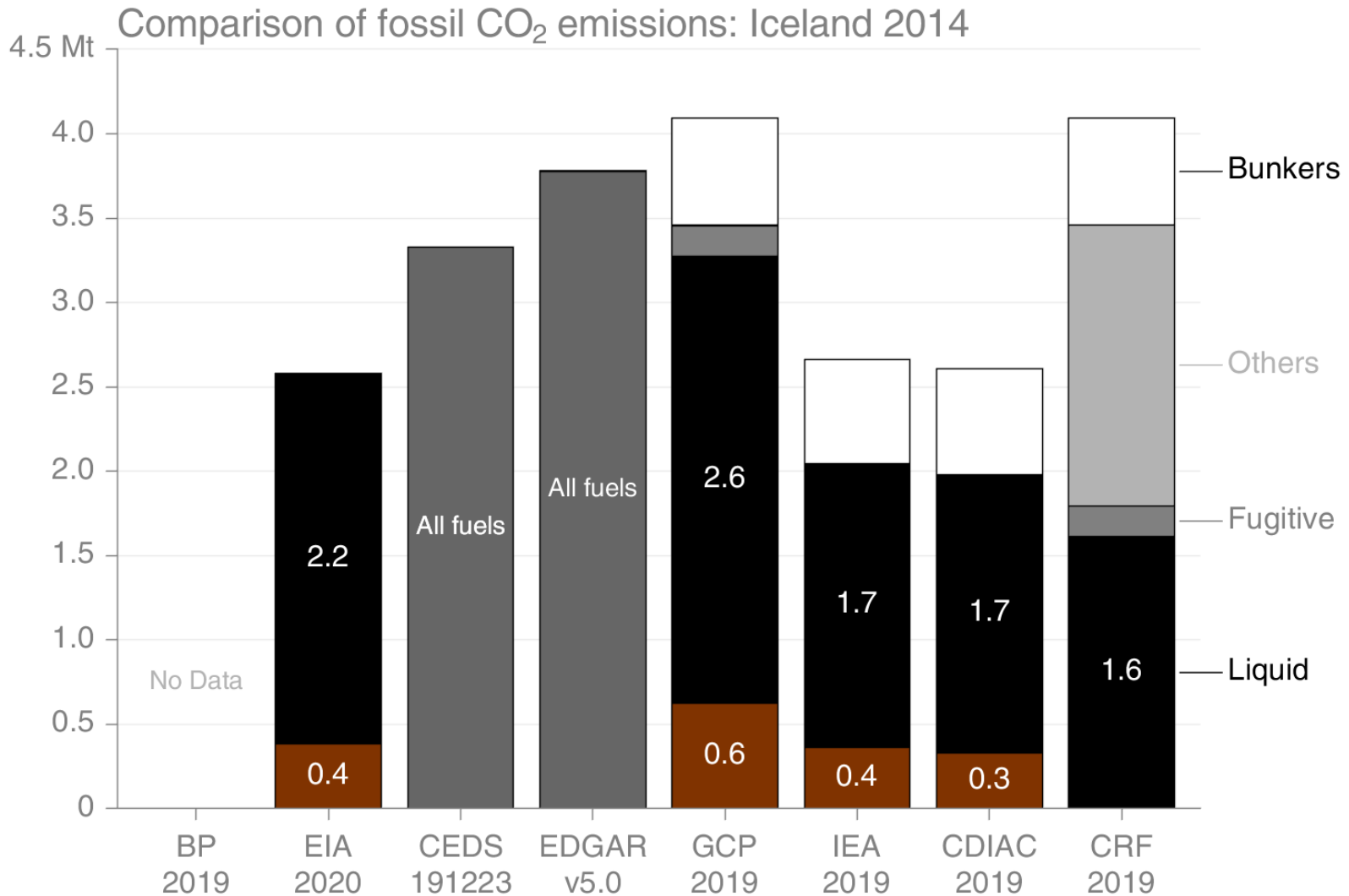
EU27+UK

Comparison of fossil CO₂ emissions: European Union (28) 2014





ICELAND





A comparison of estimates of global carbon dioxide emissions from fossil carbon sources

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Abstract. Since the first estimate of global CO₂ emissions was published in 1894, important progress has been made in the development of estimation methods while the number of available datasets has grown. The existence of parallel efforts should lead to improved accuracy and understanding of emissions estimates, but there remains significant deviation between estimates and relatively poor understanding of the reasons for this. Here I describe the most important global emissions datasets available today and – by way of global, large-emitter, and case examples – quantitatively compare their estimates, exploring the reasons for differences. In many cases differences in emissions come down to differences in system boundaries: which emissions sources are included and which are omitted. With minimal work in harmonising these system boundaries across datasets, the range of estimates of global emissions drops to 5 %, and further work on harmonisation would likely result in an even lower range, without changing the data. Some potential errors were found, and some discrepancies remain unexplained, but it is shown to be inappropriate to conclude that uncertainty in emissions is high simply because estimates exhibit a wide range. While “true” emissions cannot be known, by comparing different datasets methodically, differences that result from system boundaries and allocation approaches can be highlighted and set aside to enable identification of true differences, and potential errors. This must be an important way forward in improving global datasets of CO₂ emissions. Data used to generate Figs. 3–18 are available at <https://doi.org/10.5281/zenodo.3687042> (Andrew, 2020).

1 Introduction

Since the first known estimate of global anthropogenic emissions of CO₂ was made in the early 1890s, methods have substantially improved, detail has increased, and additional emissions sources have been included. Meanwhile, with international agreements to mitigate climate change, the production of such estimates has grown beyond the realm of scientific enquiry to become a critical input to policy.

Fossil CO₂ emissions occur when fossil carbon compounds are broken down via combustion or other oxidation processes. Most of these fossil compounds are in the form of fossil fuels, such as coal, oil, and natural gas. In addition are fossil carbonates, such as calcium carbonate and magnesium carbonate, which are used as feedstocks in several important industrial processes – including cement production – and whose decomposition also leads to emissions of CO₂.

Every year several global emissions datasets are updated and present different estimates of CO₂ at both national and global levels, but there is little information available about why these estimates differ, and sometimes the range between these estimates is merely assumed to represent uncertainty, suggesting that no more can be known. In fact, there are core reasons why the estimates from these different datasets differ, but these are largely buried in the documentation and have not previously been comprehensively analysed; these will be discussed in detail in this article.

The accumulated global emissions of carbon dioxide are drawing precariously close to the best estimates of the total budget available before the world crosses certain temperatures agreed to in international negotiations (Nauels et al., 2019). A detailed understanding of these different annual estimates – to unravel the “range is uncertainty” tangle – is

REAL-TIME EMISSIONS ESTIMATES

CO₂ EMISSIONS VARIATION(%)

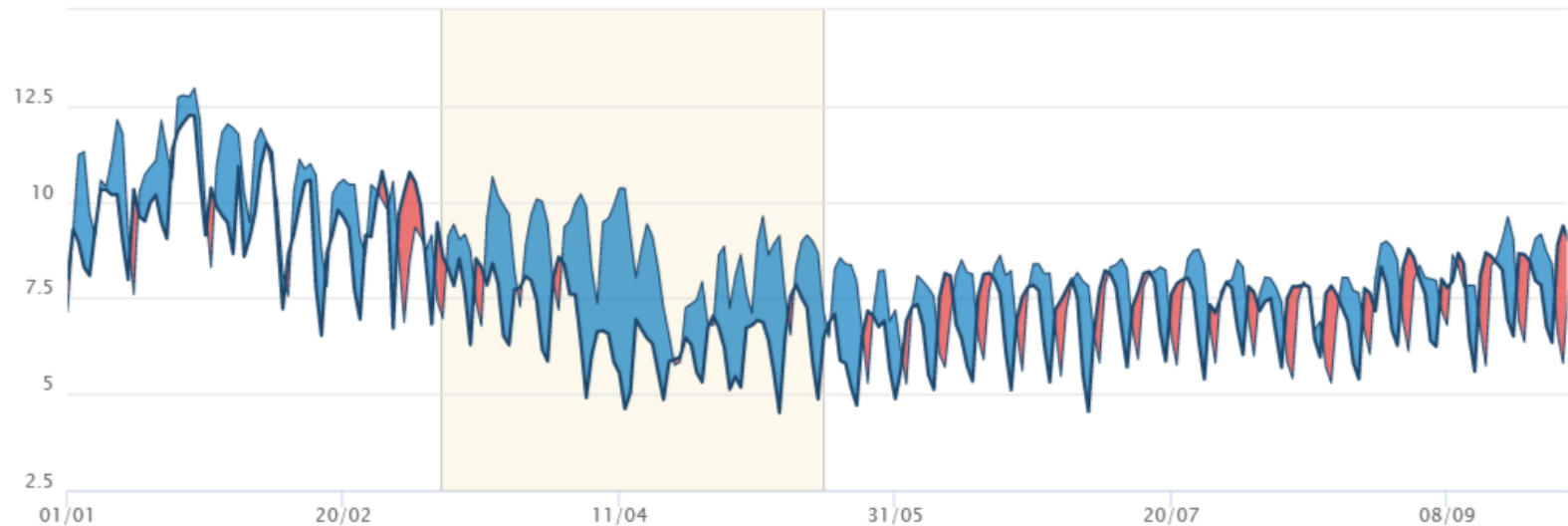
January, 1st → September, 30th 2020 vs January, 1st → September, 30th 2019

LEGEND — 2020 — 2019 CO₂ emissions : ● Decrease ● Increase ○ Lockdown period

EU27 & United Kingdom

Jan, 1st > Sep, 30th 2020 / Jan, 1st > Sep, 30th 2019

-218.52 MtCO₂ (-9.44 %)





Thank you for your attention!



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