Substantial improvements from prior version! Credit authors for very positive changes in a new manuscript. Many comments/questions follow but overall the topic, product and description seem to definitely qualify for publication in ESSD.

Line 92: "IPCC has been addressing uncertainty from the beginning of its creation." From the beginning or from its creation but not both.

Line 94: "emissions are considered to be fully uncorrelated" uncorrelated by type, sector, NIR? Uncorrelation represents a key assumption, reader needs better explanation. Later the authors describe situations (e.g. monthly or using IPCC definitions of fuel type) where correlation exists and benefit. Some clarity initially about what they mean by 'uncorrelated' and why that is important will help many readers.

Lines 99-108, definitions and treatment of so-called super power plants. Clear discussion but reader needs to know if definitions derive from these authors or from other prior work. If other work, needs citation? Supplement implies the power plant distinctions arise from these authors but this reader suspects someone else prior has done similar assessment? E.g. the concept of 'super power plants' does not originate here? Not sure that 7.92 kg m-2 s-2 (grid number 30) to 7.85 kg m-2 s-2 (estimate) for grid number 31 represents a 'step function'? Seems rather more arbitrary?

Line 135: "emissions are on an annual national level" word missing here? Emissions are <defined>, or emissions are <reported>?

Line 142: something wrong or missing in this second line:
"$UCsector\_j, UCsector\_j < 100\% \cup UCsector\_j > 230\%$ "

Line 149: "logarithmically" or log-normally?

Line 169, Figure 1: very helpful figure but again this confusion of logarithmically versus log-normally.

Line 241, Table 2: very helpful, particularly to help readers understand how authors aggregated multiple IPCC sectors into 7 groups for IFS. Should each group have a 'total' line, to show consistency / difference of EDGAR 4.3.2_FT2015 to CHE_EDGAR_ECMWF_2015? Should Table 2 include a bottom line summary for all sectors and all groups, again for comparison purposes? E.g. to show <very minor> changes? Italics not very effective to show differences. Group 7 OTHER 1.B.1.a Coal Production 0.0 vs 7.0 - not a very big difference (e.g. not worth italicizing?)

Zenodo link works well, thank you.

Line 295, Figure 2: hard to compare WDS versus LDS because vertical scales differ substantially?

Line 304: "For example, by following Oda et al. (2019) to characterize spatial patterns of the" not a complete sentence?

Line 306, Figure 3: would this be more informative in relative (%) terms rather than in absolute (kg m-2 s-2) terms?

Line 330: word missing here?

Line 356: proof-readers will catch this but vice versa rather than vice a versa?

Line 390 and following: "≜ " pardon my ignorance but what does this symbol mean? Other readers may have same question?

Line 418, 419: "Second, try to harmonise data inclusion or omission across datasets to have more clarity in the discrepancies." Not a complete sentence?

Line 446: "CHE_EDGAR-ECMWF_2015 the highest one." Not true? Where statistically-significant differences occur (e.g. following your upper and lower limits), CHE_EDGAR-ECMWF_2015 often lower than other three? Better to emphasize this statement (Line 456, 457) "Overall, there is quite good agreement in emission budgets and uncertainties from different sources of emission data.". Statistically, this reader accepts the latter statement but not the former?

Line 459, Figure 6 (might apply to earlier figures as well): Use formal panel labels for graphics included within one Figure? Country labels here (e.g France, in standard text font) tend to get lost with page breaks.

Line 476: just to confirm (after reading prior paragraph): lower uncertainties = less uncertainty = improvement in reliability of the central estimate?

Line 497: "(i) countries total" here you need the additional apostrophe (as you used earlier): countries' total?

Line 508: "usually quite small in Megatonne." Megatonne does not need capitalization?

Line 520: "fluxes (large-scale model BIAS mitigated by biogenic CO2 flux adjustment scheme BFAS) were considered" reader needs definition of these two new acronyms?

Line 542: "checked w.r.t. their spatial location" again, proof-readers will know but I suspect Copernicus journals to not allow these colloquial abbreviations.

Additional comments:

Supplement details (in this order): super power plant definition and selection (S1); coal emissions (S2); uncertainty calculation details (S3); the CHE uncertainty tool (S4); geographic assumptions (S5); and fuel assumptions (S6). Main text refers to S1, then S3, then S4, then (not until later at Line 232) S2. Later S5 followed by S6. Does order matter here?

Use of the IFS 50-member ensemble proves efficiency and skill of approach. Will other modeling centres follow suit? If / where computational resources prove different (better or worse) would author recommend more (or fewer) groups, more (or fewer) ensemble members, etc? Recommendations seems to focus on future European developments (e.g. CoCO2) but authors should address a wider range of institutions and readers, at least with final recommendations?