Review ESSD-2022-246

Many small text errors (typos, singular/plural, tense errors, etc.), too many to mark. One hopes very good proofreaders from Copernicus will catch most of those? If making changes in response to reviewer comments, authors could engage native English speaker to make small corrections?

Authors frequently refer to 'SI' by which they mean 'Supplemental Information'. For Copernicus journals, however (ESSD included) SI more commonly refers to Special Issue. These authors should clarify by making easy substitution of 'Supplement' for every use of 'SI'?

Line 139: This refers to Table S1? Authors could / should improve reader understanding by specifying which Supplement Figure or Table in each mention in main text.

Line 161: "France to Germany due to different systems for odorized gas (Entsog, 2022c, b)." Presumably, 'odorized' refers to safety requirements, e.g. different countries impose different chemical addition requirements that serve to inhibit opposite exchanges?

Lines 162, 163: Authors raise interesting potentially-troubling factor: flow irreversibility. Readers needs better understanding of magnitude and frequency of this barrier? Occurs at every 'upstream' (back toward Russia) node? Only in flows across specific edges? Close look at Figure S2 clearly implies some 'loops': how do or would mono-directional flows work in those cases? Perhaps a serious barrier? Topic gets worthy mention later (e.g. line 270 in Challenges and Uncertainties section (good) but again sans quantification?

Line 183, 184: "assumes a daily balance of the pipeline network, which might over simplify gas balancing processes," not clear how this possible oversimplification would impact overall calculations? Could authors provide an estimate? Would these errors prove systematic (e.g this work always lower or higher than validation products) or would they prove random? Valid point but not clear about impact?

Line 184, item 3): awkward, not clear what the authors intend?

Lines 186-188: valid concern, credit the authors for mentioning social geopolitical issues. Again, do authors expect these to prove negligible? Serious? Disqualifying? Pertinent to this topic but hardly unique to this particular approach?

Line 194: a bit confusing, I think authors mean 'largest consumers of Russian gas'?

Line 201, 202: countries with "large" shares but with small domestic consumption presumably pass through much of their RU gas? E.g. large imports but equally large exports? How does reader check this in EUGasSG? Not clear. One needs both EUGasSG and EUGasRP?

Line 205: Necessity to group like countries very clear, but this represents another further source of uncertainty? Not itemized above or below?

Line 215 and following: Interesting approach. Readers must assume, or need assurance (?) that Dutch TTF price data are open and easily accessible? These data merit listing in text and figure itemizations of important data sources?

Line 234, Section 4.4: Good discussion, follows directly (and, necessarily) from prior data collection and analysis, but - as projections - here we really need uncertainties? Authors could preface entire section with a disclaimer about, e.g plus/minus 10%, 20%. Something?

Line 253 This reader misses in this section a summary of strengths, uncertainties, and validations of EUGasSG data? Promote your work? What new have you discovered and provided, with what strengths and weaknesses. Otherwise, this section moves directly to gap analysis without assuring readers that we start from a good fresh skillful basis?

Line 254: Fair enough, but applies not only to international LNG sources?

Line 255: “country-dependent” yes, but earlier authors informed readers of necessity of combing groups of countries based on population size and proximity to Russia. Do those earlier groupings no longer apply here? Or, should authors add something about modifying country-by-country dependencies?

Line 260: If (admittedly) we rarely achieve “perfect cooperation”, and if even best cooperation might prove vulnerable to distinct within-country events (e.g. strikes), don’t these real-world issues introduce a further degree of uncertainty? At this summary of skillful analysis, authors owe readers a word of advice on how much to trust this work? Please do not let readers make their own assumptions?

EEGasSG easy to download, open and use but many data show 15 or more significant figures? Not believable, particularly given flow and sector uncertainties. This represents a float vs int problem? Unfortunately, authors reduce their credibility by expressing their data to obviously false precisions?

References: Confusing appearance? Some names in all-caps (e.g. 370, 372), others standard? Not clear the alphabetical organization in too many cases, e.g. Line 343 why Nuclear … here, Line 382 why ‘EDF …’ here, etc.

Line numbers absent in Supplement so hard to comment. But, under Supplement ‘Power sector’ section, reader finds (two lines below): analyze the diurnal capacities (75% and 95% as moderate and severe cases) for those alternative electricity sources. Properly, ‘diurnal’ refers to daily as ‘nocturnal’ refers to nightly; for a full 24-hour period the authors should specify ‘diel’? Not a common usage but more correct than current?