

Misleading intentions? Questioning the effectiveness and biases of Eurobarometer data for energy sustainability, development and transition research

Gatto, Andrea; Panarello, Demetrio

Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:

Gatto, A., & Panarello, D. (2022). Misleading intentions? Questioning the effectiveness and biases of Eurobarometer data for energy sustainability, development and transition research. *Energy Research & Social Science*, 93, 1-4.

<https://doi.org/10.1016/j.erss.2022.102813>

Nutzungsbedingungen:

Dieser Text wird unter einer CC BY Lizenz (Namensnennung) zur Verfügung gestellt. Nähere Auskünfte zu den CC-Lizenzen finden Sie hier:

<https://creativecommons.org/licenses/by/4.0/deed.de>

Terms of use:

This document is made available under a CC BY Licence (Attribution). For more information see:

<https://creativecommons.org/licenses/by/4.0>



Perspective

Misleading intentions? Questioning the effectiveness and biases of Eurobarometer data for energy sustainability, development and transition research

Andrea Gatto^{a,b,*}, Demetrio Panarello^c

^a Wenzhou-Kean University, Wenzhou, Zhejiang Province 325060, China

^b Centre for Studies on Europe, Azerbaijan State University of Economics (UNEC), Azerbaijan

^c University of Bologna, Department of Statistical Sciences "Paolo Fortunati", Via delle Belle Arti 41, 40126 Bologna, Italy



ARTICLE INFO

JEL classification:

C8
O19
Q01
Q56

Keywords:

Data quality
Sustainability
Energy policy
Transition
EU Eurobarometer

ABSTRACT

Ensuring data quality is a pivotal and resurgent issue in research. The ascending importance of natural resource and energy sustainability, development and transition in social science scholarship has led to a soaring of databases exploring detailed dynamics. Nevertheless, international organisations and development agencies have not necessarily managed to reply effectively to the arising needs, which stimulates a request for reliable environmental and socioeconomic data. This perspective paper aims at highlighting key flaws in institutional data quality from sustainability, development and transition science, focusing on energy. To this end, the 2019 Eurobarometer 91.4 survey about Europeans' attitudes toward the EU energy policy is examined. Indeed, the EU Eurobarometer collocates amongst the most pertinent databases though is affected by a number of data frailties. As potentially biased information may then be used to formulate assumably inappropriate policy recommendations, this article foresees a set of solutions to address this relevant matter, proposing a reform in the survey administration methods.

1. A data quality conundrum

Institutional data are widely reputed to be the most reliable and accessible open-source databases. However, evident data quality problems related to these organisations' exercises have been extensively debated (e.g. [1–3]). This is the case for the World Development Indicators (WDI) critique, which contributed to the World Bank (WB)-International Monetary Fund (IMF)'s data reform and monitoring [4–6]. More recently, further commentaries involved additional brand-new data from the same development agency – the Regulatory Indicators on Renewable Energy issued by the WB – and were the repository of renewed discussions [7,8].

The methodological choices behind data collection and characteristics can be responsible for misleading policy, practical and research interpretations. This issue is particularly delicate when dealing with socioeconomic and environmental policy research. The threat becomes even more tangible when working with sustainability, development and transition studies [9]. Missing values are listed amongst the riskiest consequences of data collection issues in these domains, as some

observations may be missing non-randomly – i.e. when the missing data are related to observed and unobserved characteristics of the sample, so that the fact that an observation is missing is still relevant information to be taken into account [10]. Consistent data loss requires, *inter alia*, targeted data treatment and data imputation strategies to avoid biased estimates [11–13].

2. The EU Eurobarometer

The Eurobarometer is a polling tool used by the EU institutions and agencies since 1974, aimed at providing a “barometer” of Europeans' public opinion and attitudes on EU-related sociopolitical matters over time, by means of regular surveys administered to representative samples of citizens from all the EU countries [3]. From that moment, a set of Eurobarometers on EU citizens' perceptions regarding diverse environmental and consumption issues has been issued [14–17].

Amongst international sociological surveys, the Eurobarometer is known for its regularity of publications, wide geographical coverage, timeliness, and extensive range of covered topics. Nevertheless, using

* Corresponding author at: Wenzhou-Kean University, Wenzhou, Zhejiang Province 325060, China.

E-mail addresses: agatto@kean.edu (A. Gatto), demetrio.panarello@unibo.it (D. Panarello).

institutional data such as the Eurobarometer imposes notable caveats. The main issues concern the presence of long and complicated questions, translation inaccuracies and biases related to the self-reporting nature of the employed data collection techniques [18,19]. Indeed, in international surveys, it is necessary to consider the peculiarities of each country. This implies that questions must be appropriately explained and defined in every language, albeit translations into several languages are sometimes unavoidably imprecise, with the result of getting non-perfectly comparable measures. Due to this, international questionnaires are usually more complex and verbose than national ones. Moreover, as many questions are regularly repeated to track the evolution of citizens' opinions in the EU, when a translation error is found, it is not possible to improve the wording, as the new measures would turn out to be incomparable with the previously collected ones. On top of that, the posed questions are likely to carry noticeable biases related to self-reporting.

Face-to-face interviews are often preferred for the completeness of the final responses and to get better cooperation and more immediate reactions [20]. Though, when dealing with social and environmental issues, this type of interview may carry the problem of declaring the most obvious or socially acceptable response due to the threat of social stigma from a less conventional or expected reply [21]: how many interviewees would clearly assert or declare in person that sustainability is not a desirable goal?

The presence of social desirability, overreporting and justification biases in surveys have been widely assessed in other delicate domains, such as delinquent behaviour [22], drinking behaviour [23], voting behaviour [24], religious attendance [25], disability [26], physical activity and body weight [27], sustainable purchasing [28], and sustainable development [29].

3. Getting data rid of sustainable development rhetorics

It is possible to derive some results in environmental, energy and climate change fields connected with sustainability and transition queries. For this scope, one can analyse the 2019 Eurobarometer 91.4 survey about Europeans' attitudes toward the EU energy policy [15], which was chosen as it is one of the most complete recent surveys measuring EU citizens' perceptions on renewable energy, sustainability issues and related topics, administered in all the 28 EU countries (i.e., including the United Kingdom, which was still a member of the EU in 2019). Being this a Special Eurobarometer, this kind of information is not published on a periodical basis: specifically, this has only been collected *una tantum*, making it even more difficult to detect potential biases, as well as to compare citizens' perceptions over time. The latter matter is especially relevant in light of the recent geopolitical developments – see the COVID-19 pandemic and the invasion of Ukraine – which may have played a role in altering citizens' attitudes and perceptions concerning the EU energy policy. The slowness of institutional data in capturing changes in Europeans' thinking is another major issue that needs to be pointed out, which may be partially solved with the aid of big data technologies [30].

Table 1 reports Eurobarometer respondents' agreement with selected energy-related statements, expressed on a 4-point Likert scale with the possible answers being “Totally agree”, “Tend to agree”, “Tend to disagree” and “Totally disagree”. Such questions are particularly relevant as they refer to quite delicate topics concerning the role of the EU in promoting sustainable energy solutions. In the analysed example, the vast majority of respondents declare to be concerned about the EU policy on sustainable energy, possibly due to social desirability, overreporting and justification biases. Even though such data shall still be useful to evaluate cross-country differences, these might well be biased due to translation inaccuracies and cultural differences concerning taboo topics, which are difficult to identify and evaluate: noteworthy differences exist between countries in the proportion of respondents stating to agree with the selected statements. Moreover, a sizeable

Table 1

Eurobarometer 91.4: respondents' agreement with selected energy-related statements (N = 27,438).

Question	Obs.	Totally agree/tend to agree		Missing observations	
		Percentage	Country range	Percentage	Country range
<i>QB2</i>					
The EU must secure access to energy to all EU citizens	26,721	94.36 %	75.28 %–99.79 %	2.61 %	0.20 %–8.32 %
The EU must ensure access to clean energy	26,514	93.61 %	81.28 %–99.56 %	3.37 %	0.30 %–9.33 %
The EU must ensure access to affordable energy	26,606	92.34 %	72.34 %–99.70 %	3.03 %	0.40 %–8.22 %
Cooperation between EU States should be further strengthened to give all Europeans access to secure, financially affordable and clean energy	26,576	94.61 %	82.05 %–99.59 %	3.14 %	0.39 %–8.41 %
<i>QB4 - It should be the EU's responsibility to...</i>					
Support measures to increase the energy performance of buildings	26,537	92.16 %	81.11 %–99.49 %	3.28 %	0.60 %–9.00 %
Encourage more investment in renewable energy	26,705	93.30 %	80.39 %–99.79 %	2.67 %	0.49 %–7.94 %
Encourage more investment in energy research and innovation	26,552	94.65 %	82.18 %–99.80 %	3.23 %	0.40 %–9.93 %
Empower cities and local communities to move toward clean energy	26,608	92.56 %	81.17 %–99.59 %	3.03 %	0.40 %–8.44 %
Support non-EU countries in moving to cleaner energy systems	26,282	87.14 %	76.67 %–98.94 %	4.21 %	0.50 %–10.23 %
<i>QB5 - It should be the EU's responsibility to...</i>					
Ensure that increased competition in EU energy markets translates into more competitive and affordable prices for consumers	26,415	93.09 %	80.89 %–99.69 %	3.73 %	0.59 %–9.10 %
Address energy poverty and ensure a fair energy transition so	26,530	93.74 %	83.17 %–99.57 %	3.31 %	0.49 %–9.87 %

(continued on next page)

Table 1 (continued)

Question	Obs.	Totally agree/tend to agree		Missing observations	
		Percentage	Country range	Percentage	Country range
that no citizen or region is left behind					
Facilitate consumers' choice of energy sources and suppliers	26,502	91.91 %	79.16 %–99.38 %	3.41 %	0.97 %–9.88 %
Empower consumers to produce and consume their own energy	26,271	89.77 %	76.65 %–98.78 %	4.25 %	0.79 %–9.50 %

Note: Descriptive statistics are computed by excluding the “Don't know” answer.

proportion of missing values may be observed for each statement, possibly due to flaws in the survey administering methods. In addition, this proportion always varies considerably between countries, denoting potential differences in data collection strategies across Europe.

Rhetorical questions and tautological queries on environmental, socioeconomic and change topics do not help to formulate sound sustainable development policies. The problem becomes even more evident when it comes to transition and change explorations. Above all, the aforesaid flaws may impose severe limitations or even lead to misunderstandings when examining such impactful and vast topics – see ecological and energy transition or COVID-19. This hazard imposes a need for adjusted, more heterogeneous and extensive empirical data [31,32].

4. Beyond narratives – an open call for sustainability science data

The increasing attention devoted to sustainability and transition research has led to the need for large empirical databases disentangling environmental and socioeconomic determinants and data [33]. Nevertheless, social sciences keep lagging behind when it comes to resource and energy research; one of the main deficiencies may be attributed to energy ministries and statistical agencies lacking proper qualitative energy data collection, above all on consumption patterns. Sometimes, these organisations do not collect any social science data on energy at all [34,35]. Revised techniques for both qualitative and quantitative data collection are topical. To this end, high standards in data quality are key to avoiding data collection biases and blind faith in institutional data and sustainable development narrative [3].

International surveys such as the Eurobarometer, regularly administered to representative samples of citizens from all the EU countries, are extremely useful to discover and keep track of the progress of European integration and the yet present differences in public opinion and cultures [36]. However, the resulting measures cannot always be considered fully reliable, thus feeding the heated scientific and political debates. Albeit assessing the impact of the mentioned biases on the quality of the collected data is a challenging task, something can still be done to reduce or even avoid their presence. In addition, Eurobarometer data are sometimes used to formulate policy recommendations. Nonetheless, most of the time, these data are only eligible to be used in an exploratory way; such data have great importance for exploratory analyses and upcoming policymaking formulation but they cannot cover any confirming role in decision-making [37,38]. Adjusting the fuzziness of the Eurobarometer data shall, hence, be regarded as an EU policy priority.

A feasible solution would be to increase the anonymisation of the whole survey process, also by reducing/easing the presence of the

interviewer and other witnesses [39]: self-administration could indeed minimise the social desirability bias [25]. Proposing different question wordings (even along with the existing ones, for comparability reasons) is also shown to be able to reduce overreporting and nonresponse biases [24]. Social sciences need an integrated approach to energy and resource data which will encompass both data collection reforms and new kinds of data [40]. In this purview, establishing rules and regulations and looking at best practices will be premier recommendations for eliciting standards and protocols and achieving improved data management and governance [38,41].

National and international organisations, ministries and statistical offices are called to fulfil this gap and propose remedies. In the last few years, one of the largest government official energy statistics bureaus in the world, the US Energy Information Administration (EIA), has been solicited to generate new social science data for energy research [34,42]. Ensuring data quality for sustainability, transition and development research is more important than ever. Indeed, energy policy issues are especially relevant for the EU nowadays, in light of the ongoing energy and geopolitical crisis [43] and high-quality data referring to such aspects may greatly help policy-makers in formulating future pathways concerning the renewable energy and transition domains. Another crucial step to fostering this change and modelling robust research and policy will be for decision-makers to lobby and take concrete action to spread open data acceptance, investments and use, above all in resource and energy research [44].

This position paper shed some light on sustainability data flaws from international organisations' databases and the urgency of comprehensive reform, proposing possible recommendations. However, as it shall be clear, each reform or additional step for improving data quality would imply increased costs and investments, as well as risks associated with privacy, ethics and data breaches [3,44].

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data can be retrieved from the EU Eurobarometer.

References

- [1] C. Drago, A. Gatto, A robust approach to composite indicators exploiting interval data: the interval-valued global gender gap index (IGGGI), in: IPAZIA Workshop on Gender Issues, Springer, Cham, 2018, pp. 103–114.
- [2] A.L. Holbrook, M.C. Green, J.A. Krosnick, Telephone versus face-to-face interviewing of national probability samples with long questionnaires: comparisons of respondent satisficing and social desirability response bias, *Public Opin. Q.* 67 (1) (2003) 79–125.
- [3] H. Schmitt, The eurobarometers: their evolution, obvious merits, and ways to add value to them, *Eur. Union Polit.* 4 (2) (2003) 243–251.
- [4] A. Gatto, F. Busato, Energy vulnerability around the world: the global energy vulnerability index (GEVI), *J. Clean. Prod.* 253 (2020), 118691.
- [5] M. Jerven, Data and Statistics at the IMF: Quality Assurances for Low-Income Countries. Background Paper, Independent Evaluation Office of the International Monetary Fund, Washington DC, 2016, Feb, 25.
- [6] J.R. Hollyer, B.P. Rosendorff, J.R. Vreeland, Democracy and transparency, *J. Polit.* 73 (4) (2011) 1191–1205.
- [7] A. Gatto, C. Drago, When renewable energy, empowerment, and entrepreneurship connect: measuring energy policy effectiveness in 230 countries, *Energy Res. Soc. Sci.* 78 (2021), 101977.
- [8] J. Urpelainen, RISE to the occasion? A critique of the World Bank's regulatory indicators for sustainable energy, *Energy Res. Soc. Sci.* 39 (2018) 69–73.
- [9] Y.S. Ho, A. Gatto, A bibliometric analysis of publications in ambio in the last four decades, *Environ. Sci. Pollut. Res.* 28 (45) (2021) 64345–64359.
- [10] N.C. Guan, M.S.B. Yusoff, Missing values in data analysis: ignore or impute? *Educ. Med. J.* 3 (1) (2011) e6–e11.
- [11] A.R.T. Donders, G.J. Van Der Heijden, T. Stijnen, K.G. Moons, A gentle introduction to imputation of missing values, *J. Clin. Epidemiol.* 59 (10) (2006) 1087–1091.

- [12] T.F. Johnson, N.J. Isaac, A. Paviolo, M. González-Suárez, Handling missing values in trait data, *Glob. Ecol. Biogeogr.* 30 (1) (2021) 51–62.
- [13] E.R. Sadik-Zada, A. Gatto, Civic engagement and energy transition in the Nordic-Baltic Sea Region: parametric and nonparametric inquiries, *Socio Econ. Plan. Sci.* (2022), 101347.
- [14] J. de Boer, H. Aiking, Exploring food consumers' motivations to fight both climate change and biodiversity loss: combining insights from behavior theory and eurobarometer data, *Food Qual. Prefer.* 94 (2021), 104304.
- [15] European Commission, Eurobarometer 91.4, 2019. *GESIS Data Archive, Cologne. ZA7575 Data file Version 1.0.0, 2020*, <https://doi.org/10.4232/1.13429>.
- [16] European Commission, in: Flash Eurobarometer 388. Attitudes of Europeans Towards Waste Management and Resource Efficiency, Report, Flash EB Series, 2014, p. 388.
- [17] European Commission, in: Special Eurobarometer. Attitudes of European Citizens Towards the Environment, European Commission, 2008, p. 295.
- [18] P. Bréchon, A breakthrough in comparative social research: the ISSP compared with the Eurobarometer, EVS and ESS surveys, in: *The International Social Survey Programme 1984-2009: Charting the Globe*, Routledge, 2009, pp. 28–43.
- [19] M.L. Félonneau, M. Becker, Pro-environmental attitudes and behavior: revealing perceived social desirability, *Rev.Int. Psychol. Soc.* 21 (4) (2008) 25–53.
- [20] M.F. Schober, The future of face-to-face interviewing, *Qual. Assur. Educ.* 26 (2) (2018) 290–302.
- [21] R.M. Schuetzler, J.S. Giboney, G.M. Grimes, J.F. Nunamaker Jr., The influence of conversational agent embodiment and conversational relevance on socially desirable responding, *Decis. Support. Syst.* 114 (2018) 94–102.
- [22] M.D. Krohn, A.J. Lizotte, M.D. Phillips, T.P. Thornberry, K.A. Bell, Explaining systematic bias in self-reported measures: factors that affect the under-and over-reporting of self-reported arrests, *Justice Q.* 30 (3) (2013) 501–528.
- [23] B.G. Embree, P.C. Whitehead, Validity and reliability of self-reported drinking behavior: dealing with the problem of response bias, *J. Stud. Alcohol* 54 (3) (1993) 334–344.
- [24] J.O. Dahlgaard, J.H. Hansen, K.M. Hansen, Y. Bhatti, Bias in self-reported voting and how it distorts turnout models: disentangling nonresponse bias and overreporting among danish voters, *Polit. Anal.* 27 (4) (2019) 590–598.
- [25] S. Presser, L. Stinson, Data collection mode and social desirability bias in self-reported religious attendance, *Am. Sociol. Rev.* (1998) 137–145.
- [26] N. Black, D.W. Johnston, A. Suziedelyte, Justification bias in self-reported disability: new evidence from panel data, *J. Health Econ.* 54 (2017) 124–134.
- [27] L. Pagani, D. Panarello, Evaluation of a program for promoting physical activity and well-being: friuli venezia Giulia in movimento, *METRON* 80 (1) (2022) 97–120.
- [28] J. Cerri, F. Testa, F. Rizzi, M. Frey, Factorial surveys reveal social desirability bias over self-reported organic fruit consumption, *Br. Food J.* 121 (4) (2019) 897–909.
- [29] B. Roxas, V. Lindsay, Social desirability bias in survey research on sustainable development in small firms: an exploratory analysis of survey mode effect, *Bus. Strateg. Environ.* 21 (4) (2012) 223–235.
- [30] M. Hajjali, Big data and sentiment analysis: a comprehensive and systematic literature review, *Concurr. Comput. Pract. Experience* 32 (14) (2020), e5671.
- [31] L. Aldieri, A. Gatto, C.P. Vinci, Panel data and descriptor for energy econometrics—an efficiency, resilience and innovation analysis, *Qual. Quant.* (2022) 1–8.
- [32] D. Panarello, A. Gatto, Decarbonising Europe – EU citizens' perception of renewable energy transition amidst the European Green Deal, *Energy Policy* (2022), <https://doi.org/10.1016/j.enpol.2022.113272>.
- [33] A. Gatto, The energy futures we want: a research and policy agenda for energy transitions, *Energy Res. Soc. Sci.* 89 (2022), 102639.
- [34] B.K. Sovacool, S.E. Ryan, P.C. Stern, K. Janda, G. Rochlin, D. Spreng, L. Lutzenhiser, Integrating social science in energy research, *Energy Res. Soc. Sci.* 6 (2015) 95–99.
- [35] B.K. Sovacool, Diversity: energy studies need social science, *Nature* 511 (7511) (2014) 529–530.
- [36] M.M. Pagliuca, D. Panarello, G. Punzo, Values, concern, beliefs, and preference for solar energy: a comparative analysis of three european countries, *Environ. Impact Assess. Rev.* 93 (2022), 106722.
- [37] B.L. Zaki, F. Nicoli, E. Wayenberg, B. Verschuere, In trust we trust: the impact of trust in government on excess mortality during the COVID-19 pandemic, *Public Policy Adm.* 37 (2) (2022) 226–252.
- [38] R. Pardo, F. Calvo, Attitudes toward science among the european public: a methodological analysis, *Public Underst. Sci.* 11 (2) (2002) 155.
- [39] I. Krumpal, Determinants of social desirability bias in sensitive surveys: a literature review, *Qual. Quant.* 47 (4) (2013) 2025–2047.
- [40] J. Love, A.C. Cooper, From social and technical to socio-technical: designing integrated research on domestic energy use, *Indoor Built Environ.* 24 (7) (2015) 986–998.
- [41] L. Liu, M. Workman, S. Hayes, Net zero and the potential of consumer data-United Kingdom energy sector case study: the need for cross-sectoral best data practice principles, *Energy Policy* 163 (2022), 112803.
- [42] American Academy of Arts & Sciences, *Beyond Technology: Strengthening Energy Policy Through Social Science*, Cambridge, MA, 2011.
- [43] M. Mišák, The EU needs to improve its external energy security, *Energy Policy* 165 (2022), 112930.
- [44] S. Pfenniger, J. DeCarolis, L. Hirth, S. Quoilin, I. Staffell, The importance of open data and software: is energy research lagging behind? *Energy Policy* 101 (2017) 211–215.