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Citizens call for sufficiency and regulation — A comparison of European citizen assemblies and National Energy and Climate Plans

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ABSTRACT

There is a growing body of scientific evidence supporting sufficiency as an inevitable strategy for mitigating climate change. Despite this, sufficiency plays a minor role in existing climate and energy policies. Following previous work on the National Energy and Climate Plans of EU countries, we conduct a similar content analysis of the recommendations made by citizen assemblies on climate change mitigation in ten European countries and the EU, and compare the results of these studies. Citizen assemblies are representative mini-publics and enjoy a high level of legitimacy.

We identify a total of 860 mitigation policy recommendations in the citizen assemblies' documents, of which 332 (39 %) include sufficiency. Most of the sufficiency policies relate to the mobility sector, the least relate to the buildings sector. Regulatory instruments are the most often proposed means for achieving sufficiency, followed by fiscal and economic instruments. The average approval rate of sufficiency policies is high (93 %), with the highest rates for regulatory policies.

Compared to National Energy and Climate Plans, the citizen assembly recommendations include a significantly higher share of sufficiency policies (factor three to six) with a stronger focus on regulatory policies. Consequently, the recommendations can be interpreted as a call for a *sufficiency turn* and a *regulatory turn* in climate mitigation politics. These results suggest that the observed lack of sufficiency in climate policy making is not due to a lack of legitimacy, but rather reflects a reluctance to implement sufficiency policies, the constitution of the policy making process and competing interests.

1. Introduction

In 2022, the IPCC mentioned “sufficiency” for the first time as a crucial strategy alongside others (such as efficiency and renewable energies) in its climate change mitigation report and its summary for policy makers [1]. This reflects the growing body of scientific evidence on sufficiency as an inevitable strategy for mitigating climate change [2,3]. However, it is rare to find sufficiency-oriented policies in current climate policy, [4] and the process of implementation is contested and conflicted [5]. In addition to barriers related to the growth-based economic system, societal organisation and cultural norms [6–9] which impede sufficiency, the legitimacy of sufficiency policy is still a matter of debate. As early as 1995, the social scientist Joseph Huber wrote: “It might be true that less is better. But if the vast majority of people at their current stage of development do not believe

this, no policy can be based on it, at least not a sensible and non-violent policy” [10] (translated by the authors). This problem is still relevant today. Some argue that sufficiency policies would restrict individual lifestyle choices illegitimately [11] or that a huge cultural shift would be necessary to gain consent for sufficiency policies [12,13]. Others argue that a reduction in consumption and production levels is inevitable and that sufficiency policies would increase the overall wellbeing of many people and would make “a good life easier” [14]. Empirical research on the public perception and legitimacy of sufficiency policies is thus essential.

To fill this research gap, we analyse the role of sufficiency policies in the recommendations made by citizen assemblies (CAs). We cover all the European countries that conducted a CA on climate change mitigation up to the end of 2022 (Austria (AT), Germany (DE), Denmark

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(DK), Spain (ES), Finland (FI), France (FR), Ireland (IE), Luxembourg (LU), Scotland (SC), and the United Kingdom (UK)) and one CA at EU level. We compare our findings with results from a similar analysis of sufficiency policies in the National Energy and Climate Plans (NECP) of the same EU member states [4].

CAs are a form of deliberative democracy that consist of randomly selected citizens. By applying quotas along socio-economic criteria, these mini-publics are typically set up to reflect the heterogeneity of the society in which they operate, thus ensuring that they are representative. This, in turn, bestows a high level of legitimacy to their decisions. The NECPs are road-maps for 2030 for EU member states on the pathway to a “clean energy transition”. The analysis of the sufficiency policies of the CAs and the comparison to the results of the NECPs shed light on the legitimacy of sufficiency policies in two crucial spheres of policy making: the institutional policy making process (NECPs) and public opinion (CAs).

2. Conceptual background: Sufficiency and citizen assemblies

2.1. Sufficiency

We define sufficiency as a strategy for reducing, in absolute terms, the consumption and production of end-use products and services through changes in social practices in order to comply with environmental sustainability while ensuring an adequate social foundation for all people. This definition consists of three characteristics that are present in most definitions of sufficiency: (1) sufficiency is understood as a strategy for achieving mainly (but not solely) environmental goals of sustainability, (2) sufficiency pursues sustainability goals by absolute reductions in consumption and production and (3) sufficiency implies a focus on social innovation to change social practices and individual behaviour [15–17].

2.1.1. Sufficiency: a strategy

Sufficiency definitions encompass the idea that sufficiency aims to reduce environmental damage and thus can be understood as a strategy, such as efficiency or the expansion of renewable energy, to pursue these goals [17]. Even if sufficiency sometimes “seems to get a role of an end in itself” [16], such as sufficiency as an organising principle for society [6,18] or a way of living, this is still a specific strategic approach to pursue sustainability goals. Sufficiency as a sustainability strategy has been derived from a critique of environmental unsustainability by various disciplines: ecological economics [6,12,19,20], political ecology [18,21] and ecological philosophy [22,23] (for an overview see [16]). In addition to the environmental dimension, sufficiency is also regarded as a strategy for achieving social goals [23–25].

2.1.2. Sufficiency: absolute reduction in consumption and production

One crucial aspect of the sufficiency strategy is to operationalise social and environmental sustainability goals by reducing consumption and production in quantitative terms to generalisable levels [15,17]. In the literature, it is emphasised that consumption levels should not fall below a minimum level of a social foundation and that reduction should address over-consumption that is environmentally destructive [26,27]. In some cases, sufficiency is conceptualised as a strategy to also address deprivation [24] or – taking up the doughnut economy – to ensure a social foundation [28]. As most sufficiency literature is written by researchers from the Global North and analyses or targets the Global North, the reduction of overconsumption issue is more dominant in the literature. Furthermore, a conceptualisation of sufficiency as a strategy to directly address deprivation would lead to overlaps to other concepts that are more grounded in social politics. In political ecology, the concept of “sustainable livelihood” – which derives from and applies to the Global South to a larger extent – approaches sustainability with a much stronger focus on social and cultural means [29,30].

By focusing on the quantitative dimension of consumption and production, sufficiency is connected to the concept of “consumption corridors” [31–34]. Furthermore, sufficiency can be distinguished from other sustainability strategies by this quantitative dimension: “efficiency” is used to achieve *relative* savings, and “consistency” [10] is the substitution of fossil processes with “green” processes in order to close material and energy loops. Both aim to improve technical processes and products without addressing total volumes.

2.1.3. Sufficiency: change in social practices

The third characteristic of our sufficiency definition is its focus on change in social practices. Sufficiency does not primarily focus on technological innovations, as the strategies of efficiency or consistency do, but on social innovations. Depending on the academic background of the authors and the scope of their definition of sufficiency, these innovations are described as changes in lifestyle and behaviour [11,35–37], new institutional framework conditions aiming for changes in social practices [4,18,38,39] or a new logic of societal organisation [6,22,40] (for an overview see [17]). These changes aim to implement new modes of production and consumption that are less resource intensive [17].

2.2. Citizen assemblies

2.2.1. Definition and historical development

“Citizen assemblies” or “citizen councils” are terms for a comparably new form of deliberative democracy [41,42]. The members are selected randomly and this is often weighted along socio-economic criteria. CAs usually meet over several months or years, receive scientific input and/or are supported by experts in the related field. They take place on all political levels, from local to international [41]. The development of CAs builds on previous forms of deliberative democracy – the citizen jury [43] and the planning cell [44] were developed independently from each other in the early 1970s. Since 2015 the number of CAs in total and especially on climate change mitigation increase significantly [45,46]. The role of the CA is currently, in most cases, a deliberative one: this represents a low level of citizen engagement within the traditional concept of the participation ladder [47]. However, future integration of CAs into the process of policy making in a more binding way, such as holding a national referendum on the recommendations made by the CA, is under debate [45].

2.2.2. Legitimacy of citizen assemblies

Public engagement in energy and climate policy is a field of diverse practices and processes ranging from deliberative processes, community energy projects, transition town groups and maker/hacker-spaces, characterised as ‘ecologies of participation’ by Chilvers et al. [48]. Chilvers et al. [48] emphasise that CAs are a specific form of participation because of a fixed model of participation, a fixed subject (representative mini-public) and a fixed object (in our case: climate change mitigation) and suggest that CAs should be complemented by a broader mix of participation options. Nevertheless, CAs can support parliaments and councils in decision-making processes by deliberating on important public questions and endow certain strategies with legitimacy and meaning.

Legitimacy and representation are core concepts of social and political science [49]. In the literature, approaches to legitimacy are often differentiated as prescriptive (also normative) or descriptive (also empirical) [50]. The descriptive approach is connected to Max Weber’s work on the legitimacy of authority and analyses the preferences and beliefs of people concerning the legitimacy and acceptability of the government and political order. From a prescriptive perspective, a political order can be legitimised on the basis of the socially constructed and normative criteria that it fulfils [51, p. 253]. These criteria are often differentiated as input criteria and output criteria [52]. Input criteria refer to the representation of the will of the majority in the

decision making process (e.g. through democratic elections or participation). Output criteria are fulfilled when public welfare increases (e.g. autocrats who fight poverty).

In a world of dynamic transformations, new forms of democratic representation, such as deliberative mini-publics, can support the quality of governance [53]. From a prescriptive perspective, CAs and their decisions can be regarded as a highly legitimised form of deliberation, mainly due to two input criteria. First, compared to *self-selective* forms of participation and even elections, participation in a CA ideally does not rely on individual interests, capacities and abilities, but is *aleatoric* and thus expected to be more inclusive and authentic [54]. Second, the sample of members is set up according to quotas for various socio-economic criteria (e.g. income, age and race). As the term *mini-public* suggests, CAs are an approach for depicting the general public in miniature and thus represent the common will to the best extent possible. Thus, in comparison to parliaments, CAs are usually more representative. However, as the members are not elected, CAs do not actually represent the people. Some studies suggest that CAs are quite representative [55] but, nevertheless, are met with more distrust than trust [55,56], while others suggest that mini-publics are indeed effective at generating support among the broader public [42, 3]. Consequently, King and Wilson [41] suggest improving the public perception and legitimacy of CAs through public events and PR, such as radio interviews during the assembly.

In our analysis we approach legitimacy from a descriptive perspective, as we analyse the recommended policies and their approval rates. Based on the prescriptive legitimacy and the highly representative nature of CAs, we consider the policy recommendations made by the CAs as an indicator for the legitimacy of policies on climate change mitigation. We discuss the limits to this approach in our discussion (Section 5.3).

3. Material and method

Our method follows the approach of the previous analysis of the EU countries' European National Energy and Climate Plans (NECPs) and Long-Term Strategies (LTS) [4] with an adaptation concerning the sufficiency types. This allows us to compare the results from both the CAs and the NECPs for the countries where both documents exist (AT, DE, DK, ES, FI, FR, IE, LU).¹ This approach leads to a thematic focus on sufficiency as a climate change mitigation strategy, as the NECPs and LTS are about energy and climate policies and we have analysed all sufficiency policies related to this focus in our previous study of these documents. For this reason, we have only extracted sufficiency policies related to climate mitigation from the documents of the CAs. Some of the documents touch adjacent sustainability topics that we excluded from our analysis.

3.1. Data sources: documentation from the CAs

The published recommendations of eleven national CAs on climate change mitigation form the basis for our analysis: one CA at EU level and ten CAs in European countries (eight EU Member States, UK and SC). Our cut-off date was 20 October 2022 and for our research, we scanned two databases with overviews of mini-publics of different kinds which cover the years until 2019 and 2021 respectively [57,58] and searched explicitly for (more recent) relevant CAs in European countries. Table 1 gives an overview of the analysed reports with links to the original sources and further contextual information about the CAs. The documents differ in length (from 16 pages (FI) to 556 pages (UK)) and language (English, German, French or Spanish). The six authors

were able to analyse all the documents in their original language. The documents were published between 2018 and 2022. All the CAs were composed in such a way that they are representative of the population. Between 30 (LU) and 200 (EU) people participated in the meetings of the respective CAs. The scope and topics of the CAs also vary. Some CAs had clear (but different) targets including a target year (FR, AU, LU, UK, DE, DK), one CA revised existing government plans (FI), some had rather narrative targets (IE, ES, SC), and the EU CA covered the broad topic of "Climate change and the environment/Health" and included many recommendations on this nexus.

3.2. Keyword analysis

As a first step in analysing the sufficiency policies in the documents of the CAs, we investigated whether the CAs use the concept of sufficiency explicitly. We thus conducted a keyword analysis on the term *suffic** (reports in English), *Suffiz** (German), *sobriété* (French) and *suficien** (Spanish) to see if the CAs use this term and, if so, how often. We further checked that any mentions did not refer to other uses of the term (e.g. self-sufficiency).

3.3. Process for sufficiency policy extraction

In most cases the CAs did not use the concept of sufficiency explicitly, so we had to interpret and ascribe different policies to the sufficiency strategy. To do this, we used qualitative content analysis [70,71] which we conducted in our team of the six co-authors. We assigned an author to each country, and that author was responsible for reading and coding all the documentation from that country. To analyse the documents, we developed concept-driven ("deductive" or "a-priori") categories.

In an initial step, we coded the recommendations into two categories: (1) sufficiency policies, based on our sufficiency definition (Section 2.1) divided into (a) pure sufficiency and (b) sufficiency with overlaps with other mitigation strategies, and (2) other mitigation policies. Pure sufficiency could be, for example, an advertising ban on climate-harmful products; a policy with an overlapping strategy could be investment in rail infrastructure that makes rail travel faster and more attractive (sufficiency) but also less carbon-intensive (if it includes electrification). We excluded recommendations on other topics, such as health (e.g. in the EU CA) or governance (e.g. the perpetuation of CAs). This categorisation allowed us to calculate the share of sufficiency policies in all the mitigation policies. In our previous study on the NECPs we had not counted the total number of mitigation policies; however, this information was necessary to enable comparisons so we completed that task for all the countries that had both an NECP and a CA. This allowed us to compare the shares of sufficiency policies in the NECPs and the CA recommendations. The sufficiency policies were extracted into a database where they were categorised and coded in more detail.

To achieve a consistent approach to coding policies (Inter-coder reliability), we included iteration steps to align the coding procedure. Every entry in the database was subsequently reviewed by another person from within our team. This reviewer also read the relevant CA source document and coded the policies. The results were compared and consolidated in bilateral coder meetings. Five of the six co-authors had already gained a common understanding of coding sufficiency policies in documents through the mentioned previous similar analysis of all the NECPs and LTS [4].

3.4. Categorisation of sufficiency policies

We extracted 332 sufficiency policies (pure and with overlaps with other mitigation strategies), inserted them into our database and categorised all the entries (in a similar way to our analysis of the NECPs) [4] by

¹ The results for the NECPs of these eight countries are quite close to the results of the 27 NECPs of all EU member states, as we further discuss in Section 5.3.

Table 1

Overview of the analysed documents and characteristics of the CAs.

Country/EU	Austria	Denmark	Finland	France	Germany	Ireland	Luxembourg	Spain	United Kingdom	Scotland	European Union
Source	[59]	[60]	[61]	[62]	[63]	[64]	[65]	[66]	[67]	[68]	[69]
Language	DE	EN	EN	FR	DE	EN	DE	ES	EN	EN	EN
No. of pages	100	96	31	460	101	178	16	107	556	204	27
Publication year	2022	2022	2022	2021	2021	2018	2022	2022	2020	2021	2022
No. of citizens	84	99	33	150	160	100	30	100	108	105	200
Scope of CA - topic/theme	climate neutrality	recommendations for the governmental climate action plan	carbon neutrality with focus on just transition; discussion of given set of measures by the ministry	min. 40 % reduction in GHG emissions compared to 1990	achieve Paris Agreement targets (1.5°)	IE to become a leader in climate protection	climate neutrality	a safer and more just Spain in climate change	net zero	tackle the climate emergency in an effective and fair way	climate change and the environment/health
Target year	2040	2030/2050	2035	2030	NA	NA	2050	NA	2050	NA	NA
Decision making on recommendations	consensus with the possibility to state serious objections (100 % or close)	voting (majority)	NA, see scope	voting (majority)	voting (majority)	voting (majority)	consensus	voting (majority)	voting and priority setting	voting (majority)	voting but % not given in report (NA); recommendations have at least 70 % approval rate
Initiator/commissioner (editor if different to aforementioned)	Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (editor: ARGE Klimarat Osterreich)	Ministry of Climate, Energy and Utilities	Ministry of the Environment of Finland	Conseil Économique Social et Environnemental	Verein BürgerBegehren Klimaschutz e.V. (editor: ifok GmbH, nexus Institut, IPG Institut)	The Citizens' Assembly	Ministerium für Energie und Raumentwicklung, Abteilung für Raumentwicklung (editor: Biergerkomitee Lëtzebuerg 2050)	Ministerio para la transición ecológica y el reto demográfico	House of Commons (with involve; SORTITION FOUNDATION; mySociety) (editor: Climate Assembly UK)	Scotland's Climate Assembly	EU COM (editor: Conference on the Future of Europe)

- **sector:** agriculture and nutrition, buildings, mobility, production and consumption and cross-sectoral. Where a policy was relevant to two sectors, it was assigned to the sector in which the majority effect takes place;
- **policy instrument type:** according to the eight categories defined by UNFCCC [72] (multiple coding possible): economic (e.g. taxes, tradeable certificates, market reform), fiscal (e.g. subsidies and grants, tax exemptions and public expenditure for infrastructure), voluntary agreements, regulation (laws, standards and product identification), information, education (institutional), research and development, other (e.g. governmental plans or digitalisation strategies) and the additional category “not specified”; and
- **sufficiency type:** (1) sufficiency and substitution; (2) reduction; and (3) ensuring social foundation.

Policies coded as *sufficiency and substitution* aim at replacing the use of certain services with less energy-intensive services, implying changes in social and behavioural practices (e.g. modal shift). *Reduction* policies aim at reducing energy service levels, such as distance travelled or heated living space. The third category, *ensuring social foundation*, was newly introduced for this analysis to identify whether CAs also consider sufficiency policies to ensure an adequate social foundation for all people (see section 2.1). In our previous analysis of NECPs and LTS, we used a fourth sufficiency type called *general, sufficiency-supporting* for mitigation policies that aim at reducing GHG emissions in general (e.g. emissions taxes, education on climate change) and were not connected to any specific strategy: sufficiency, efficiency or a shift to renewable energy. In this CA analysis we focus specifically on sufficiency policies and omit those of the “general” type. In all results and figures of this article that compare the CAs with our results from the NECP and LTS analysis, we excluded the *general* sufficiency type from the NECP and LTS dataset as well for a consistent database.

Table 2 illustrates these sufficiency types with examples.

3.5. Far-reaching policies to achieve deep sustainability

In addition to the CA policy database which can be found in the supplementary material and the following qualitative and quantitative analysis, we also present exemplary policies from the database for all sectors and a variety of countries to illustrate the recommendations made by the CAs (see section 4.4). Our selection includes policy recommendations with the potential to be far-reaching in terms of achieving deep sustainability. The presented policies are exceptional and cannot be found in political practice. Although they are not currently in place, their implementation seems to be possible. The selection is based on our expert view on sufficiency policies which we gained through similar analysis [4,73].

3.6. Approval rates

Many of the documents from the CAs include approval rates on individual recommended policies, which reflect how many citizens agreed to each recommendation. Six of the CAs applied majority voting and stated the approval rates in the reports (Table 1). In our sufficiency database we deleted policy entries with less than 50 % approval rates because these cannot be considered as a recommendation (only relevant for the UK and one policy from DE). The CAs in AT and LU aimed to achieve consensus, and the members in AT could state serious objections, so the approval rates for these countries are 100 % or very close. In the EU CA, recommendations had to be approved by at least 70 % of the citizens but exact approval rates are not given, so we categorised these as not applicable (termed as “NA”).

In the UK, there were two different voting procedures. First, there were five different voting options (strongly disagree, disagree, don't mind/unsure, agree and strongly agree). To calculate the approval

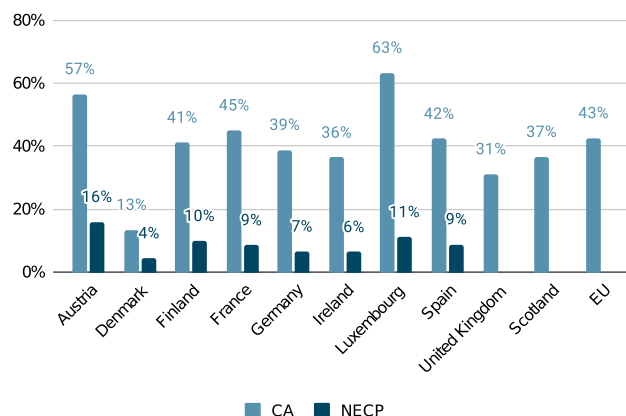


Fig. 1. Share of sufficiency policies in total climate-mitigation policies by country (CA and NECP).

Note: UK, SC and EU did not submit an NECP.

rates, we excluded the “don't mind/unsure” votes and calculated the share of votes that strongly agreed and agreed. If this was higher than 50%, we included it in our database. Second, the members of the UK CA were asked for their preferences for different mitigation options. These options were all included in the database as it was not stated in the documentation whether the citizens agreed or not. In these cases, the approval rate is categorised as “NA” in our database. The Finnish CA is different, as described above: the citizens had to develop statements on policies already included in a Climate Change Policy Plan. Approval rates on CA recommendations are therefore “NA”.

4. Results

4.1. Keyword analysis

The term “sufficiency” (or its respective translation in French, German or Spanish) appears in only two of the analysed CA documents. In the French CA, “sobriété” is mentioned 31 times, mostly in the context of either energy or digital sufficiency and it is not clearly defined whether it refers to energy saving *per se*. In the document from AT, “Suffizienz” is mentioned once. Others do not explicitly mention the term but do propose many sufficiency policies.

4.2. Findings by country

From the initial screening, we derived 860 mitigation policies in total, of which 332 (39 %) are sufficiency-related. The number of proposed total sufficiency policies varies from 4 (IE) to 59 (FR) (Fig. 2a), and the share of sufficiency policies in the recommendations made by the CAs ranges from 13 % (DK) to 63 % (LU) (Fig. 1). When only considering those countries that also produced an NECP (which excludes SC, the UK and the EU), the total number of policies in the CAs is 596, of which 240 (share of 40 %) are sufficiency-related. The NECPs of the countries with a CA list 812 policies, 66 of which are sufficiency-related (8 %). We find the share of sufficiency policies in all climate mitigation policies to be consistently higher by a factor of three to six in the recommendations made by the CAs than in the NECPs (Fig. 1).

4.3. Sectoral distribution

In the recommendations made by the CAs, sufficiency policies in the sectors of mobility and agriculture and nutrition play a key role, also influenced by the coding of modal shift as sufficiency (more details

Table 2
Examples of coding of sufficiency types.
Source: Based on [4, p. 5].

Sector	Policy example	Sufficiency type	Explanation of sufficiency type categorisation
Buildings	support co-living concepts that reduce the privately used area	sufficiency and substitution	policies are unlikely to lead to an absolute reduction in used area but a substitution, e.g. through the increase of other used area
	reduce per capita living space/heated floor area	reduction	policies aim for an absolute reduction
	ensure adequate living space	ensuring social foundation ^a	policies aim to meet the basic need for living space
Mobility	modal shift to motorised modes (e.g. promotion of public transport, related infrastructure)	sufficiency and substitution	policies aim at travelling from A to B in a more sustainable manner but not at an absolute reduction in km travelled
	modal shift to active modes (e.g. promotion of cycling and walking, related infrastructure)	reduction	policies aim at travelling from A to B in a more sustainable manner and are likely to reduce the amount of km travelled
	aim for shorter travel distances, like 15-minute city planning	reduction	policies aim for an absolute reduction in km travelled
	free public transport for low-income groups	ensuring social foundation ^a	policies secure access to mobility for everyone
Production/Consumption	reduce packaging material in supermarkets so that consumers have to bring their own increase reparability and/or the life-time of products	sufficiency and substitution reduction	policies do not lead to an absolute reduction of resources but a substitution longer product life-times mean fewer products sold and less resource inputs needed
	make sustainably-produced basic goods cheaper than non-sustainable ones through subsidies and internalisation of external effects	ensuring social foundation ^a	ensure affordability of sustainably-produced goods for all income groups
Agriculture/Nutrition	reduction of meat consumption/incentives for plant-based diet	sufficiency and substitution	policies aim at a less GHG-intensive food consumption but not at an absolute reduction of food
	reduction of food waste	reduction	reduction of food waste leads to an absolute reduction in food demand and therefore also food production
	reduce prices/taxes for non-luxury food complying with the “planetary health diet”	ensuring social foundation ^a	ensure healthy and climate-friendly nutrition for everyone
Cross-sectoral	decoupling of pension funding from economic growth	sufficiency and substitution	substitute the funding which is based on growth by a system which is independent from growth and therefore also more sufficiency-oriented
	ban highly damaging goods	reduction	reduction of goods

^aNote: Policies to ensure social foundation are not included in our analysis results (see Section 4.6).

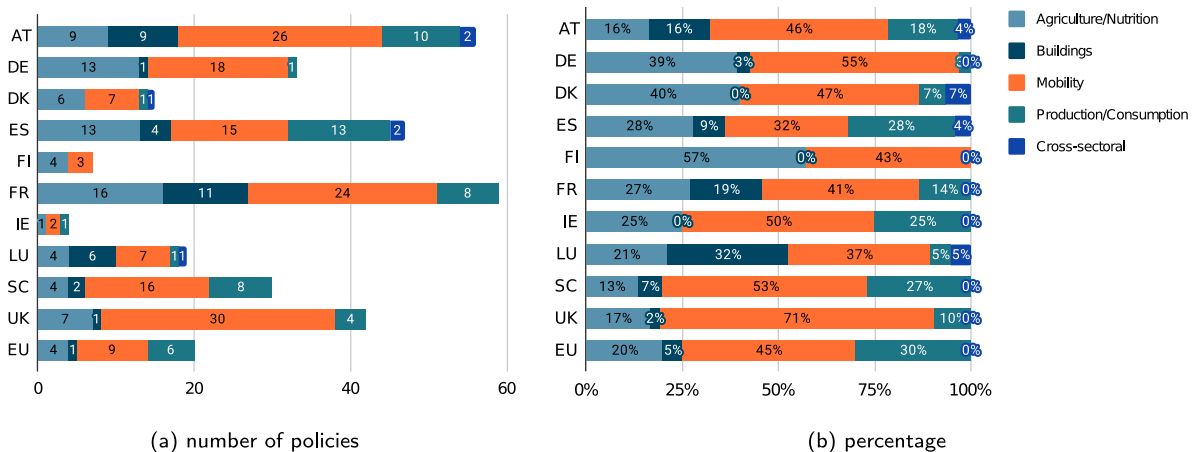


Fig. 2. Sufficiency policies by country and sector.

see [4]). We find a high variance in the building sector, which in some cases is marginal (DK, FI, IE: 0 %; DE, UK, EU: 1 %) but in others higher (FR: 11 %; AT: 9 %; LU: 6 %; Fig. 2(b)). In total, except from cross-sectoral policies, the building sector has the lowest share of policies, slightly lower than the production and consumption sector (Fig. 3). The share of proposed cross-sectoral sufficiency policies is marginal, in most countries 0, in few countries 1 or 2.

Comparing the focus on sufficiency by sector in the CAs with NECPs, we find a substantially more balanced sectoral distribution of

sufficiency policies in the CA recommendations (Fig. 3). When omitting policies that generally promote sustainability without a distinct connection to a specific strategy (efficiency, consistency or sufficiency) and only analysing sufficiency policies, in the NECPs, the mobility sector dominates by far with 70% of all policies. The recommendations made by the CAs include a much higher share of policies for agriculture and nutrition and for buildings. In the production and consumption sector sufficiency policies account for a similarly share in both document types.

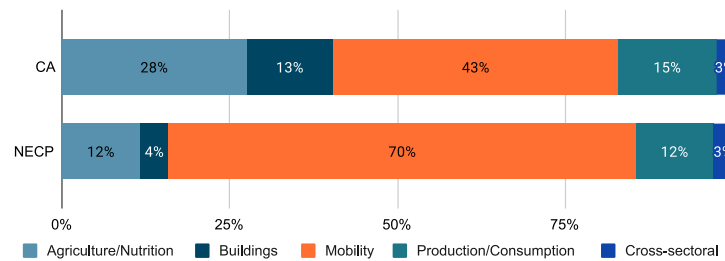


Fig. 3. Sufficiency policies in the CAs and NECPs by sector.

Table 3
Examples of far-reaching measures from various CA reports for all sectors, selection by the authors.

Sector	Policy	Instrument type	Approval rates	Country/Reference
Agriculture/ Nutrition	Prohibit the marketing of climate harmful and unhealthy products	regulation	94 %	DE [63, p. 68]
	New animal feedstock directives covering the reduction of animal livestock (regulate maximum livestock unit per hectare)	regulation	93 %	DE [63, p. 66]
Buildings	Villages must also receive support in the future if they want to grow less and are located away from the development zones. At present, population growth is one of the few ways for a municipality to improve its financial situation.	fiscal	100 %	LU [65, p. 14]
Mobility	Discourage air travel by introducing a frequent flyer tax or levy (tax to increase as people fly more often)	economic	78 %	SC [68, p. 43]
	Reduction of standard work week to 30/32h, i.e. 4 days to reduce commuting trips	not specified	93 %	ES [66, p. 74]
Production/ Consumption	Prolonged lifetime of electric appliances: min. warranty time of 10 years, obligation for manufacturers to provide replacement parts	regulation	91 %	DE [63, p. 41]
	Mandatory energy saving tariffs/progressive energy tariffs	regulation	100 %	AT [59, p. 64]
Cross-sectoral	Restrict advertisements for products with negative climate impact, ban on all highly damaging goods	regulation	100 %	AT [59, p. 69]

4.4. Examples of far-reaching policies

In order to provide an insight into the content and shape of the policies recommended by the CAs, we present in Table 3 exemplary far-reaching policies by sector using different instrument types. The selection is an excerpt from the database and was derived through the combined experience of the authors (Section 3.5). A list of all policies is provided as supplementary material.

4.5. Sufficiency type

We differentiate three sufficiency types: (1) sufficiency and substitution (e.g. mode shift policies); (2) reduction (e.g. aiming at absolute reductions); and a new category (3) ensuring social foundation (categories explained in Section 3.4). We observed few explicit CA policies relevant to the third category, probably because sufficiency policy is not the same as social policy (the policy field responsible for addressing deprivation and ensuring a social foundation) and furthermore because policies targeting the social foundation are not typically covered by climate change mitigation-focused CAs. Furthermore, the approach of ensuring a social foundation is part of some of the policies that we found (e.g. free or very cheap public transport for everyone) but within this research we did not have the capacity to dig deeper into the CA recommendations to see which social impacts or distributional effects the found policies have or are intended to have. Therefore, we decided to exclude the third category from the results.

In our analysis of sufficiency types by sector (Fig. 4(a)), we find that in the CA recommendations the share of sufficiency types varies widely by sector, similar as in NECPs [4]. In the CAs, clear reduction-focused policies dominate in the building sector (83 %), often focused on the reduction of new build and soil sealing. Reduction-focused policies also have a substantial share in the agriculture and nutrition sector (46 %,

often focusing on the reduction of food waste) and production and consumption (60 %). The share of reduction policies in the mobility sector (often relating to car, parking and flight restrictions) is somewhat smaller (37 %), albeit absolute numbers are still a factor 3 of NECP policies in this sector and higher than for all other sectors in CAs. Substitution policies have highest shares in the mobility sector (mainly modal shift policies) and in agriculture and nutrition (mainly dietary shift policies).

Overall, policies are more equally distributed between sufficiency types in the recommendations made by the CAs than in the NECPs, where policies of the substitution type dominate more strongly (Fig. 5), driven by the high share of mobility policies in the NECPs and their focus on mode shift measures. However, there are strong sectoral differences in CAs (Fig. 4(a)). In general, the recommendations made by the CAs include a much higher number of sufficiency policies. For sectors, where the share of reduction-focused policies in CAs is smaller or equal than in the NECPs (agriculture and nutrition, production and consumption), their total number is still higher by a factor of two to six.

We also find variations between countries Fig. 4(b): the reduction type is most frequent in AT, ES, SC, UK and the EU with over 50 % and lowest in DK (20 %).

4.6. Instrument types

Overall, we find that the instrument types proposed most often for sufficiency policies in the CAs are regulatory (119), followed by fiscal (92) and economic (43) (Fig. 6(a)). Voluntary agreements (0), educational (4) and R&D instruments (5) appear very rarely in CA recommendations. Regulatory instruments are the most recommended instrument type in almost all sectors, especially in the buildings and the agriculture and nutrition sector. Fiscal, regulatory and economic policies are dominant in the mobility sector. Most of these mobility policies

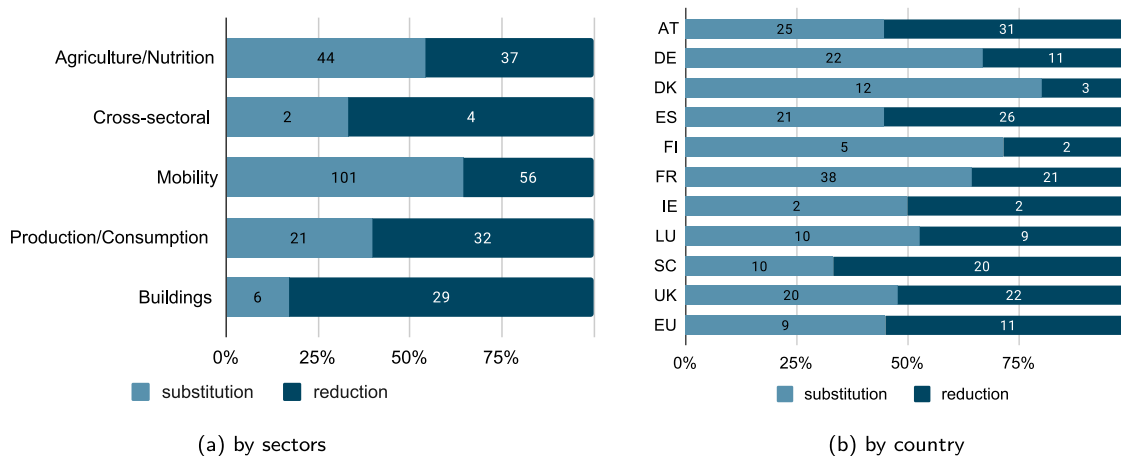


Fig. 4. Share of policies by sufficiency type (bar labels: absolute number of policies)

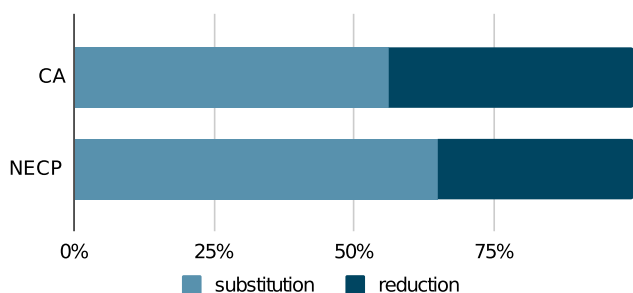


Fig. 5. Share of policies by sufficiency type in the recommendations made by the CAs and in the NECPs.

address large infrastructure investment needs and include regulatory and incentive approaches to encourage modal shift. Proposals for 55 policies (including 20 in the mobility sector and 22 in the agriculture and nutrition sector) do not specify the instrument type.

The share of economic instruments is similar in most countries (around 10–20 %), as also low shares of voluntary agreements, information, education, R&D and other measures (Fig. 6(b)). There are, however, noticeable differences between countries for fiscal and regulatory instruments. While some countries (AT, DE, ES, FR, EU) have a very high share (>30 %) of regulatory policies, others rely less on this approach (DK, FI with >15 %). DK, ES, IE, LU and the UK have a significant share (>20 %) of “not specified” policies. As the total number of recommendations in the CA reports of IE and FI is with 4 and 7 very small, their respective shares of instrument types should be interpreted cautiously.

The finding that the members of the CAs proposed regulatory policies more often than any other instrument type (34 %) and prominently for all sectors is contrary to the finding in NECPs (11 %, Fig. 7). In contrast, the NECPs rely more on fiscal instruments (29 % in comparison to 22 %) and economic instruments (19 % in comparison to 11 %). The share of “other” instruments is three times higher in the NECPs than in the CAs, as they include a number of policy plans that do not clearly specify instruments. Voluntary agreements, educational policies and R&D play a minor role in both the CAs and the NECPs.

4.7. Approval rates

We find very high approval rates within the CAs for the proposed policies. Depending on the instrument type, around 20–40 % of policies are proposed by consensus, 75 % have approval rates of >90 %, and

90 % of the policies are supported by a majority of >70 % (Fig. 8). The average approval rate of all 306 policies, for which approval rates were accounted, is 93 %. This finding is similar for all instrument types, but there is some variation. At the upper end of the approval curve are the many regulatory policies and very few R&D and educational policies. Approval rates are also high for all sectors: highest in the building sector, somewhat lower in the mobility sector, but still very high (Fig. 8(b)). The very few cross-sectoral policies also have high to medium approval rates.

5. Discussion

5.1. Key findings

5.1.1. Sufficiency policy is central in CA recommendations

On average, 39 % (Fig. 1) of all mitigation policies recommended by the CAs are sufficiency policies. This share can be considered high. First, because the total number of mitigation policies entails besides sufficiency also efficiency, consistency (renewable energies) and general mitigation policies, which are not connected to any specific strategy (such as education on climate change in schools). Second, because the share of sufficiency policies in the recommendations of the CAs is three to six times higher than in the NECPs. The high share of sufficiency policies indicates that sufficiency plays a central role in most recommendations made by the CAs, which contrasts with the findings in the NECPs. The fact that sufficiency as a term is only used in the CAs from FR and AT indicates that sufficiency is not used as a theoretical concept in most CAs. However, policies with a sufficiency orientation seem to be intuitive, plausible and necessary for the members of the CAs.

However, the share and characteristics of the recommendations varies significantly between the countries. In the case of FI and IE, which are outstanding in different characteristics (e.g. sufficiency policies by sector or by instrument type), this is due to a very low number of total recommendations, which makes the country-specific results for these countries less meaningful than for other countries. DK is outstanding with a comparably low share of sufficiency policies (13 % Fig. 1). To identify the reasons for this is beyond the scope of this study, since it would require a further in-depth analysis of the CA in DK. However, even if not systematically investigated, it seems that DK has a comparably high share of general mitigation recommendations such as information and education on climate change, that are not directly connected to one of the mitigation strategies.

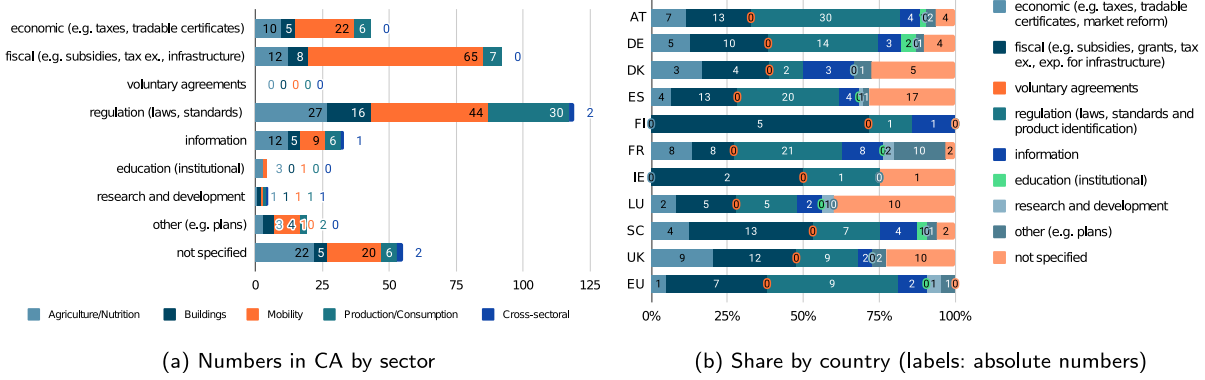


Fig. 6. Sufficiency policies by instrument type.

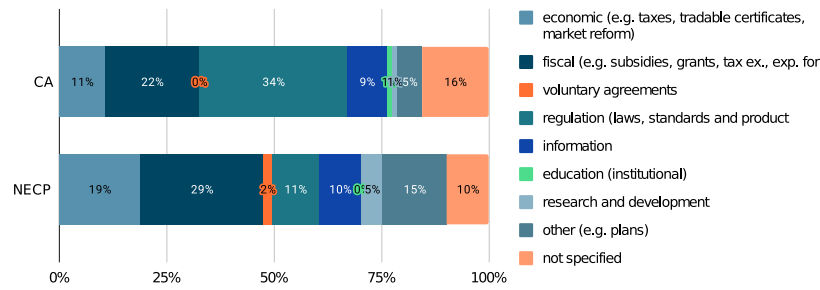


Fig. 7. Share of instrument types in the recommendations made by the CAs and the NECPs.

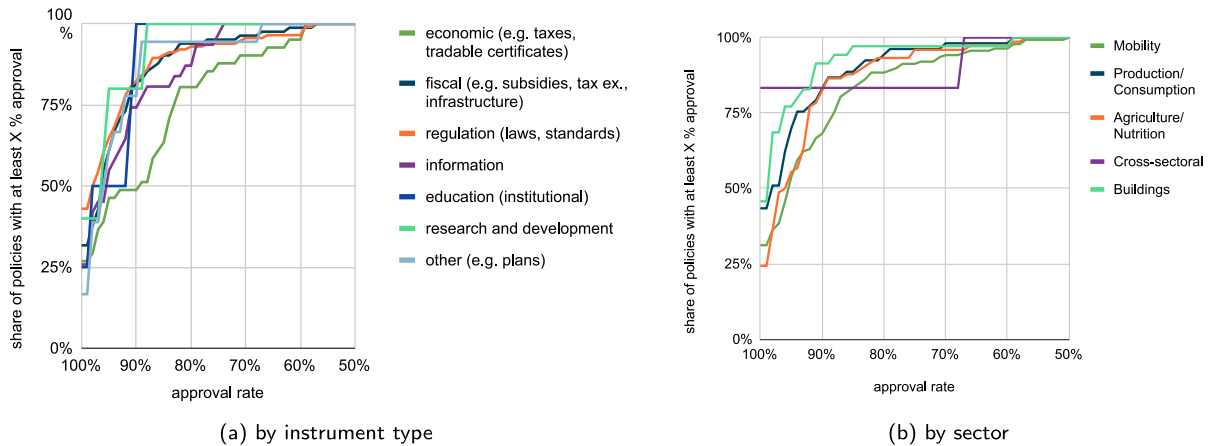


Fig. 8. Approval rates of sufficiency policies in CA recommendations.

5.1.2. Sufficiency and regulatory policies enjoy high legitimacy

The second key finding is the high approval rates for most sufficiency policies and especially for regulatory policies. This indicates that sufficiency policies are not *per se* lacking legitimacy in current European societies. In contrast, in a mini-public such as the CAs, even comparably far-reaching sufficiency policies are seen by a majority as a legitimate and inevitable part of climate mitigation.

Looking deeper into the approval rates and the instrument types, we make three further observations. First, the recommendations made by the CAs and the NECPs both focus mainly on structural changes in framework conditions (economic, fiscal and regulation) rather than targeting individuals (e.g. via information campaigns). Second, the share of economic sufficiency policies in the NECPs is nearly twice as high as the share in the CAs. Conversely, the share of regulatory policies is three times higher in the recommendations made by the CAs (Section 4.6). Third, economic policies attract the lowest approval rates, whereas the approval rates for regulatory policies are among the highest (Fig. 8).

It is apparent that the NECPs employ instrument types that are comparably less popular in the CAs, while at the same time refraining from regulation, which is the central instrument type proposed by CAs. The focus on economic and fiscal policies and the restricted use of regulatory policies in the NECPs can be interpreted as a more market-based approach. This emphasises the freedom of individual consumption choices, is characterised by a strong belief in market mechanisms, and criticises (regulatory) state interventions [74,75]. Thus, the recommendations made by the CAs may be interpreted as a call for a *regulatory turn* in climate politics, where the state should set clearer, more sufficiency-oriented rules instead of relying on market-based interventions. The recommendations can also be interpreted as a critique of a fixation on approaches of *green growth* and *green modernisation*, which address mainly technological solutions and applying predominantly economic and fiscal instruments [76]. This call for a greater focus on sufficiency including more regulatory policies is supported by representative surveys in Germany and France [77].

5.1.3. Sufficiency policy gap in the building sector

A third key finding is, that it seems to be difficult to identify and/or recommend sufficiency policies in the building sector. The building sector stands out in various dimensions. It has the lowest share of sufficiency policies (3 % in NECP, 13 % in CAs, Fig. 3), the highest share of reductive policies (Fig. 4(a)) and the highest policy approval rates (Fig. 8(b)). In addition, only five countries (LU, FR, AT, ES) account for a significant number and share of the policies in the building sector (Fig. 2(b)). Noticeably, these are also the countries with the highest share of sufficiency policies in all mitigation policies (Fig. 1). It seems that sufficiency policies in the building sector are the most ambitious and most difficult ones.

One explanation for the low share of policies in the building sector could be the ownership of the infrastructure. Like most social practices [78], the social practice of housing is influenced by the infrastructure [79,80]. In our data, the high relevance of infrastructural policies can be seen in the high share of fiscal policies, which are dominated by the mobility sector (65 of 92, Fig. 6(a)). Compared to the mobility sector, which entails the most policies, most of the building sector's infrastructure is in private ownership rather than public ownership. Consequently, the influence of policies on infrastructure in the housing sector is more indirect than in the mobility sector. The infrastructure of agricultural sector is also largely in private ownership, but still the share of policies recommended by the CAs is much higher (28 %) than in the building sector (3 %) (Fig. 3). A possible reason is that most agricultural sector policies do not address the infrastructure (of food production), but food consumption. The social practice of food consumption is less dependent on the infrastructure than the social practice of housing and can thus more easily be addressed by policies that are not related to the infrastructure.

Sufficiency policies in the building sector may also be more difficult to implement than in other sectors because the mode of housing is culturally perceived as a highly private issue in which the state should only intervene in exceptional circumstances [81]. The dominance of private ownership in the building sector and the cultural norm of housing as a private issue may also explain why many of the recommended policies address regulations for new construction (sufficiency type: reduction). These policies do not intervene in existing living situations and, therefore, conflict less with cultural norms and current housing practices, and are less dependent on restructuring the existing infrastructure.

These specific challenges faced by the building sector may explain why we mainly find such policies in those CAs with a higher sufficiency focus. Interestingly, the approval rates for the policies in the building sector are the highest. This indicates that sufficiency in the housing sector may not be an obvious low hanging fruit, but nevertheless has the potential to gain majority support.

5.2. Hypotheses on reasons for stronger sufficiency orientation in the CAs than in the NECPs

The findings reveal significant differences between the sufficiency orientation in the NECPs and the recommendations made by the CAs. An assessment of the reasons for this difference is beyond the scope of this study and should be a subject for further research (Section 5.3). Nevertheless, we suggest some hypotheses to explain the difference.

First, two formal aspects may influence the sufficiency orientation of the NECPs and the recommendations made by the CAs. The NECPs follow a template structure with chapters on *decarbonisation* (including a sub-chapter on renewable energies), *energy efficiency*, *energy security*, *internal energy market* and *research, innovation and competitiveness* [82]. This structure encourages a focus on policies dealing with technical

mitigation options. Even if legally difficult,² a revision of the structure of the NECP templates to include sufficiency in a separate chapter might encourage an increasing focus on sufficiency policies.

A second aspect that could explain the variations in the results is the difference in scope between the CAs and the NECPs [83]. The aim of the NECPs is to report on the current state of governmental policies and planning as a road-map for the reduction of a defined amount of CO₂ emissions by 2030. In comparison, the scope of the CA recommendations is in most cases much wider and may focus on (perceived) gaps in current policies. The timeline for the recommendations made by the CAs varies between 2030 and 2050. Some CAs do not even state a specific timeline. As a consequence, the NECPs may prioritise policies with a high and easily calculated mitigation potential. In contrast, the CAs might be more open to policies with impacts that are difficult to quantify or implement. However, even in the long-term strategies of the EU member states [84], which have a much wider scope than the NECPs and a timeline up to 2050, sufficiency policies are very rare [4]. Thus, it is interesting that this wider scope of the CAs leads to a strong sufficiency-orientation and not (primarily) to high-tech upscaling or geoengineering. This can also be interpreted as a critique of the current energy and climate mitigation policies in these countries. In addition to these formal aspects, the diverging role of the CAs and the NECPs in the political system may influence the sufficiency orientation of the recommendations. The recommendations made by the CAs are not legally binding but *only* deliberative. CAs have less time, expertise and capacities than professional policy makers to evaluate all the possible consequences of their suggested recommendations [45]. This means that the CAs might be less reluctant or less aware of problematic side-effects relating to their suggested policies and that responsible policy makers might be more cautious of straying from well-known paths. Uncertain economic consequences, in particular, may alienate policy makers from sufficiency policies, as jobs and economic growth remain the key important indicators for (perceived) prosperity and a benchmark for the re-election of policy makers [85,86]. Analyses of the economic and macroeconomic effects of sufficiency policies are rare. However, an assessment of sufficiency scenarios indicates positive macroeconomic effects [87].

Furthermore, policy makers and members of the CAs are influenced in different ways by interest groups [45]. Citizens do not run the CAs alone: expert consultants, the facilitators or other steering bodies might influence the discussions and decisions made in the CAs. An analysis of the French CA suggests that these bodies do influence the process, but do not impair the citizens' agency, creativity and freedom of choice [42], which is supported by more general findings from research on "deliberative polling" [88]. On the other hand, CAs are less affected by lobbying groups because they are less relevant in a political system than parliaments or because of differences in their organisational form (random selection, no party structure etc.).

Sufficiency policies aim to reduce the overall levels of consumption and production, which can, in some cases, conflict with the interests of certain industries. At the same time, economic power is a crucial factor for the success of lobbying activities and, to some extent, the re-election of policy makers depends on macroeconomic development and the performance of powerful economic actors [86,89]. As a consequence, where the influence of such interest groups exists, this may hinder substantial sufficiency policies.

Last but not least, in contrast to professional policy makers, the members of the CAs are not elected, but randomly selected, their membership in the CA is not remunerated and they are selected only

² NECP documents and their regular updates follow from the Directive EU/2018/1999 [82]. This lays down a reporting schedule up to 2030 including the reporting template. It would be difficult to change the content of reporting and policy targets in an ongoing process. In addition, EU legislation is typically a lengthy inter-institutional process.

for a short and limited period of time. Unlike party political policy makers, they are less influenced by previous decisions, discussions and compromises, with all the associated positive and negative effects. Members of the CAs are also less affected by possible negative media coverage and declining approval ratings, as their decisions have little impact on their future careers. This might increase their openness towards controversial or innovative directions and policies.

5.3. Limitations

We identify various limitations to our findings. Even though the CAs use various approaches to ensure representative participation, their recommendations cannot be assumed to represent the views of the general public. The formation of opinion works differently in such mini-publics than in the general public [90,91]. As a consequence, public support for the recommendations made by the CAs may vary. In France, for example, a study on the opinions and attitudes towards climate change found the CA to be broadly representative of the French population and a high level of support among the respondents for most of the policies recommended by the CA [55]. This indicates that the recommendations attracted high levels of generalisability and legitimacy. Nevertheless, the same study found that the French population did not perceive the CA as representative and regarded it with distrust. Similarly, the NECPs are not a perfect representation of national climate change mitigation policies. However, due to their highly representative nature, the recommendations made by the CAs can be regarded as valuable indicators for the legitimacy of climate change mitigation policies and the recommendations of the NECPs as valid documents for actual policy making. Further analysis, such as media analysis or representative questionnaires, could complement the perspective.

Furthermore, the scope of the comparison of the recommendations made by the CAs with the NECPs is limited to the eight countries in which both document types exist. However, a comparison of the results of the eight NECPs of this study with the 27 NECPs of all EU member states indicates a high generalisability. Admittedly, the average of the total number of sufficiency policies is higher for the eight NECPs of this study than for all 27 NECPs [4, p. 5]. This might be, because the share of sufficiency policies in the 27 NECPs is even lower than in the eight NECPs or because the eight NECPs are more detailed and thus comprise overall more mitigation policies. Despite this difference in total numbers, the characteristics, such as the distribution of policies among sectors, sufficiency types or instrument types, of the eight NECPs equals more or less the characteristics of the average of all 27 NECPs (see figures in Appendix A and [4]).

The comparability of CA documents is limited by differences in scopes and structure as already mentioned in Section 3.1. For example, FI and IE have comparably small numbers of policies (Fig. 2(a)). By way of explanation, in FI the policies were defined by the parliament in advance and in IE the CA was not only on the topic of climate change mitigation but also on four other topics. Members in IE thus had only two weekends to debate on climate [64] while, for example, the French CA had eight sessions over one and a half years solely on the topic of climate change.

5.4. Further research

Further research with different approaches, such as media analysis, representative questionnaires or similar analysis of other policy documents, could complement and extend insights on the sufficiency focus of policies e.g. to different political parties. Further (qualitative) research could explore the reasons for differences in the sufficiency-orientation in the NECPs and the recommendations made by the CAs to better understand the influences on the development of sufficiency policies in different political contexts.

As CAs are a form of deliberative democracy, the impact of CAs is the subject of several studies, indicating content specific impacts [42,

92–94]. In some countries most recommendations have already been implemented or are in the planning stages (FR, [95]), while in other cases certain recommendations were rejected with reference to responsibility at higher political levels (SC [96], AT [97]). The EU conducted a feasibility study on the policies recommended by the CA [98]. An in-depth impact analysis of sufficiency policy recommendations made by the climate CAs on actual policy making could help to better understand the process of implementation. Which recommended policies were adopted? How were the policies changed during the implementation process? Which policies were rejected, and why?

Moreover, the findings pose questions about the organisation of democracy in the face of socio-ecological crises [45]. Considering the fact that fast and far-reaching policies are necessary to mitigate climate change, biodiversity loss and other socio-ecological crises, this study points to the need for further research on the kind of reforms that may be necessary to current democratic systems to support and advance sustainability policies.

Additionally, a sufficiency-specific research gap was identified in the building sector. In the recommendations of both the CAs and the NECPs, the building sector had the fewest policy recommendations. The development of sufficiency policies clearly faces specific barriers in this sector. More research on the barriers and the potential for successful sufficiency policies in the building sector is needed.

Another research need arose with our intended fourth sufficiency type “ensuring social foundation”. We found that there are only few explicit policies on that but it would be worth the effort to analyse all sufficiency policies that we found on their social impacts and distributional effects.

6. Conclusion and policy implications

The analysis of sufficiency policy recommendations made by citizen assemblies (CAs) and policies in the National Energy and Climate Plans (NECPs) of European countries reveals significant differences in terms of sufficiency orientation. The recommendations made by the CAs are characterised by a higher share of sufficiency policies with a higher share of regulatory policies, less focus on economic instruments, a more equal distribution of sufficiency policies between sectors and high approval rates for sufficiency and regulatory instruments.

We conclude that the CAs are much more supportive of sufficiency policies and assess them as legitimate. Thus, a lack of legitimacy would not appear to be the main obstacle to the implementation of sufficiency policies. The main influencing factors may rather be the nature of the policy making process (with its focus on short-term impacts and re-election), the influence of powerful actors with competing interests, or uncertainties about the economic (and other) effects and consequences. In contrast, CAs can be more open towards innovative and potentially controversial topics. This underlines the value of such forms of deliberation, especially in times of existential environmental crises that require deep structural change. The CAs appear to use this greater openness to propose and endorse sufficiency and regulatory policies, which are approved by vast majorities. Our findings encourage policy makers to implement a greater number of robust sufficiency policies and to be less hesitant about implementing regulatory sufficiency policies.

CRedit author statement

All authors participated in discussions on the conceptualization and the content of the paper. **Jonas Lage:** Conceptualization, Methodology, Investigation (IE, ES, LU, UK, SC), Data Curation, Writing – original draft (sections: 1, 2, 5, 6), Writing – review & editing. **Johannes Thema:** Methodology, Investigation (AT, DE, ES, EU), Writing – original draft (section 4), Writing – review & editing, Visualization. **Carina Zell-Ziegler:** Methodology, Investigation (FI, FR, DE, EU), Data Curation, Writing – original draft (section 3), Writing – review & editing. **Benjamin Best:** Investigation (AT, FI, FR, SC), Writing – original

draft (section 2.2), Writing – review & editing. **Luisa Cordroch:** Investigation (DK, IE, UK), Writing – review & editing. **Frauke Wiese:** Investigation (DK, LU), Writing – review & editing.

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Declaration of competing interest

The authors report that there are no competing interests to declare. We have no relation to any citizen assembly.

Data availability

No data was used for the research described in the article

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Appendix A. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.erss.2023.103254>.

We provide two documents as supplementary materials:

- (A) Four figures that compare CAs with NECPs at the same country base also with numbers for all 27 NECPs of EU member states in order to analyse the generalisability of the results of the 8 NECPs of this study for all 27 NECPs.
- (B) A XLSX file with the following data as supplementary material. The XLSX file contains the database with categorised policies from the CAs and the pivot analysis tables and figures included in this study.

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