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Review

Climate club politics - the challenges of making a small group work on a global issue

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ABSTRACT

Climate clubs have gained popularity in both politics and academic studies. Yet, they are also controversial, as the term "club" comes with the notion of elitist decision-making. Also, it seems that both academic thinking and political expectations often fail to recognize the gap between the arguably idealized potential of climate clubs and what they actually achieve, i.e., the reality of existing clubs. This review article examines the large spectrum of grey and academic publications on climate clubs. Based on this literature analysis, it discusses the controversies that come with the launch and implementation of climate clubs along three broad themes: (1) Effectiveness and efficiency; (2) Membership constellations; (3) Equity concerns and internal dynamics. I conclude that climate clubs depict a challenge that we face overall in climate governance: On the one hand, we need a rapid transformation and decarbonization, and stringent climate clubs could help us with that. On the other hand, the qualitative and normative dimension of the global transformation towards a healthy "net zero" planet includes justice, equity, and social concerns, which often require profound, long-term changes and inclusive approaches.

1. Introduction

In times of stagnant multilateral climate processes, "clubs" have become a compelling endeavor. A huge number of climate "club-like" alliances have emerged. One prominent example is the "Climate Club" initiated by the G7 and the German government in 2022 [1]; others are, e.g., the Powering Past Coal Alliance (PPCA) or the Clean Energy Ministerial (CEM). They demonstrate the club concept's political relevance and show the consideration of political momentum(s) for the launch of a climate club [2]. At the same time, during the past decade, academic interest in (climate) clubs has also increased exponentially. Despite the growing number of clubs and the proliferating research, it appears to remain somewhat opaque, what the real value of existing clubs is, and, ultimately, whether their outcomes merit the significant efforts that go into their establishment. Climate clubs often seem to start with the expectation that they could drive the pace for international climate policy. At the same time, they are expected to fulfill other hopes, such as increased global equity, access to finances, and other club benefits like knowledge dissemination [3–6]. Yet, when they are implemented as technical forums and exchange networks, they often seem to disappoint these hopes. At the heart of climate club thinking and practice, I find three trade-offs, broadly themed as follows:

(1) *Effectiveness and efficiency*: Climate club literature often conceptualizes clubs as being more effective and efficient climate policy providers and pace makers. However, existing club initiatives seem not to confirm this. They excel in awareness raising, capacity building, and policy support.
(2) *Membership constellations*: Clubs are often conceptualized as smaller and exclusive groups of actors. However, existing club initiatives often strive to grow and regard a wider coverage of members as key to success. Yet, a large size and larger inclusiveness seem to affect the originally expected club functions and negatively influence efficiency.
(3) *Equity concerns and internal dynamics:* Being a small group of actors that creates rules and sets (e.g., industrial) standards for the whole world is often seen as a main club function by club concept authors. However, such activities have important equity concerns. Additionally, a club's internal dynamics could perpetuate existing inequalities between countries of the Global South and North.

This review article is structured around these three trade-offs. Reflecting on them can help further the development of the club concept and provide us with an idea as to how academic research,

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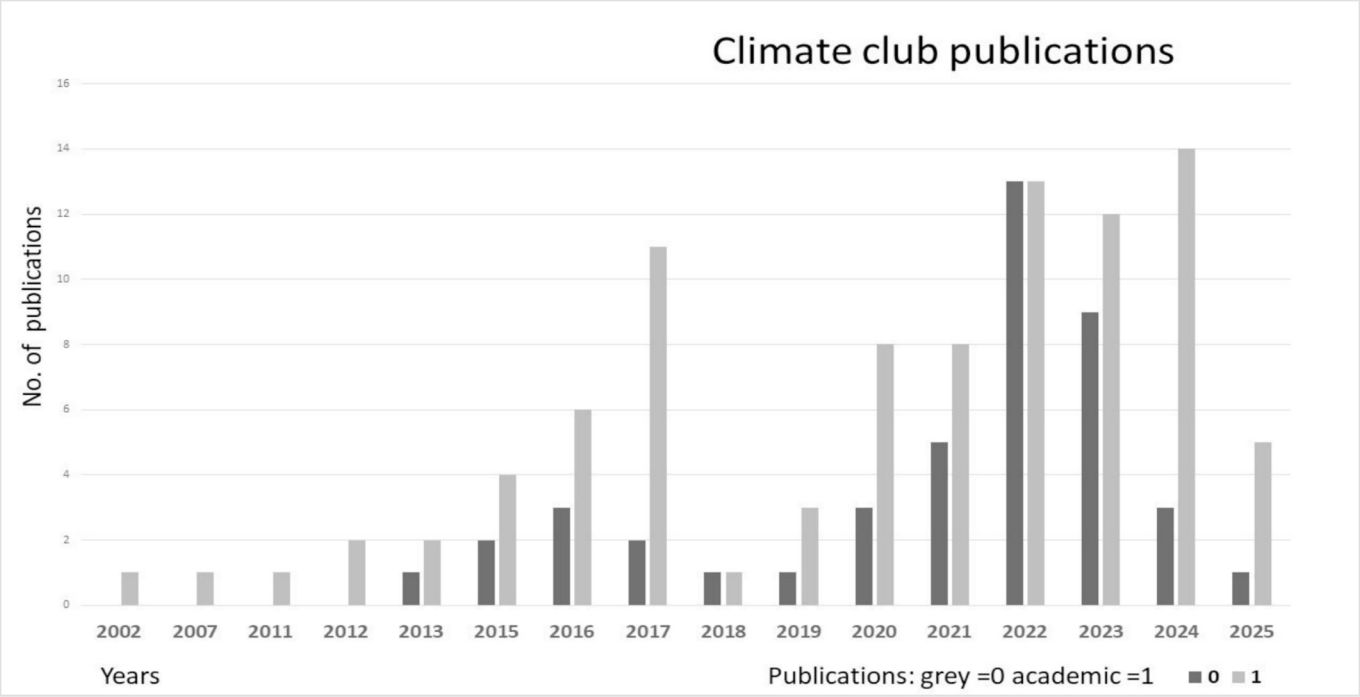


Graph 1. Publications on climate clubs since 2009.

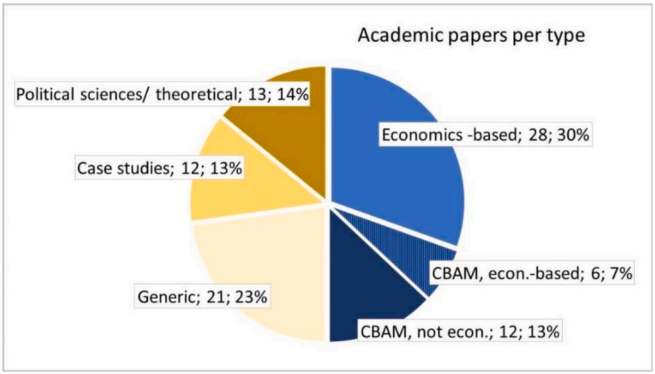
practical political expectations, and climate club design, could progress in the future.

Methodologically, this work is based on the qualitative and comparative analysis of academic and grey literature on climate clubs. The purpose of this review process was to group existing texts according to broader common themes, namely the three above-described trade-offs. The literature review is based on a google Scholar screening for the keyword "climate club." I selected 136 publications, which exclude, e.g., off-topic- publications, posters, PowerPoint presentations, and short media articles.[1] To be included, publications must contain at least a significant discussion or analytical part. These were complemented with information from more practice-based observations, e.g., taken from the climate clubs' websites, to attempt a 'reality' check of the conceptual discussion.

2. Climate clubs in the literature

(Economic) club governance is a concept that has been around for at least sixty years [7]. It was rediscovered for climate policy and politics with the hopes that climate clubs could overcome some of the problems that arise in the negotiations under the United Nations Framework Convention for Climate Change (UNFCCC). In this paper, I employ a broad understanding of clubs and define them as "voluntary climate alliances that stand for the hope of making quicker progress where multilateral governance struggles, because they involve fewer actors, can focus on a specific (climate) topic, and exclude those who do not want to play by the group's rules." I use the term climate clubs for the whole spectrum of cooperative alliances, including the various types of clubs that some authors have established[2] [8–10].

In the past decade, literature has increased strongly, and I find that



Graph 2. Classification of academic papers into five broader types, including no. of papers and percentage of total academic articles; Source: Author.

[3] The paper classifications are described in the appendix.

peaks in the number of publications seem to coincide broadly with political developments. Many texts were published after the Paris Agreement's adoption or its coming into force (2015–2017), and around the proposal or launch of the "Climate Club" by the G7 in 2021/2022 (see Graph 1).

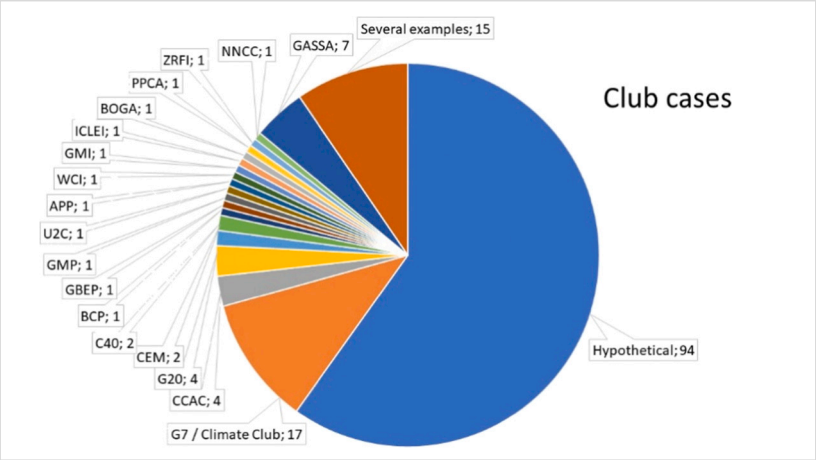
Graph 2 shows that the majority of the academic publications are economics-focused, apply a club-modelling approach, and many examine Carbon Border Adjustments Mechanisms (CBAMs). Only a few texts realize a political science-based theoretical contribution or qualitative studies of existing club cases (see Graph 2).

3. Three trade-offs in climate club thinking and politics

Bringing the literature scan together with more practical observations and online information of existing climate clubs helps to reveal three broader challenges that raise questions about some of the principal prerogatives of the club concept. The following subsections discuss the three trade-offs found in climate club literature and climate club politics

[1] Articles published by mid-2025.The number of existing articles is likely higher, since not all articles are listed by google Scholar. I have also excluded articles in other languages, e.g., nine articles in German.

[2] In this short article, it is not possible to assess what cases qualify as clubs at all or what club typology is useful. I seek to discuss arguments that fit generally all club variations.



- Hypothetical case(s)
- Names several examples, but no in-depth cases
- Group of 7 / Climate Club
- Global Arrangement for Aluminum and Steel (GASSA)
- No new Coal Compact (NNCC)
- Zero Routine Flaring Initiative (ZRFI
- Powering Past Coal Alliance (PPCA)
- Beyond Oil and Gas Alliance (BOGA)
- Local Governments for Sustainability (ICLEI)
- Western Climate Change Initiative (WCI)
- Businesses for Climate Platform (BCP)
- Global Methane Initiative (GMI)
- Under 2 Coalition (Under 2C)
- Global Methane Pledge (GMP)
- Global Bioenergy Partnership (GBEP)
- Asia-Pacific Partnership on Clean Development and Climate (APP)
- C40 Cities Climate Leadership Group (C40)
- Clean Energy Ministerial (CEM)
- Group of 20 (G 20)
- Climate and Clean Air Coalition

Graph 3. Club cases considered in the sampled club literature; Source: Author.

in detail.

3.1. *Effectiveness and efficiency: What are clubs actually good for?*

Climate club concepts suggest that, in theory, small(er) groups can be more *effective* than large(er) groups, because, with fewer or more homogenous members, they can carry out more *efficient* decision-making processes. Climate club authors often compare clubs against the UNFCCC or its treaties (the Kyoto Protocol and the Paris Agreement) [6,11–14]. A club's more *effective outcome* could show in more ambitious goals compared to those negotiated under the UNFCCC, e.g., attainment of high levels of abatement [12], the phase out of fossil fuels, (facilitation of) ambitious climate commitments, direct greenhouse gas reductions [12,13,15–17], or stronger financial or reporting commitments etc. Thus, climate clubs' effectiveness is often linked to ambition and goal-setting in climate policy. *Efficiency* refers to the idea that clubs reach the desired outcomes quicker and implement their objectives with more efficiency because with fewer, and more like-minded members, decision-making is easier as a smaller number of priorities have to be considered. Clubs could minimize free-riding because they can, in principle, exclude climate policy laggards [12,14,18–20]. According to some authors, clubs' more efficient processes could provide a solution to the problem of gridlocked negotiations under the UNFCCC (Victor, 2015, Nordhaus, 2015). Another reason why clubs might have both a stronger effectiveness and efficiency is that they create membership benefits, ranging from financial to non-monetary advantages. These incentivize members to join and stay in the club [21,22]. Club benefits also make members more agreeable to the common objectives. In principle, within the club, consensus for strong institutions, such as the use of incentives for participation and compliance, could be reached more easily.

Most climate club literature assesses clubs' potential effectiveness and efficiency with an economics-focused perspective. Many texts evaluate how clubs can create more effective outcomes than the UNFCCC and model or discuss more efficient cooperation processes in climate clubs [16,23–26]. A majority of publications analyze a potential, but hypothetical, climate club. They optimize clubs' designs (e.g., joining of members, penalties, emissions reductions).[3] (see Graph 3).

In texts that focus on potential clubs, authors often discuss particular instruments and whether/how they could make the club effective or not. Market instruments and carbon pricing are the most popularly discussed by clubs authors; i.e., carbon pricing instruments in general [27–31], taxes [20,32], linking of emissions trading systems or Article 6 of the Paris Agreement [29,31,33,34], and most prominently, the (EU) CBAM and tariffs.[4] Some authors focus on (hypothetical) clubs in specific sectors, e. g. sustainable aviation fuels [35], agriculture [36,37], and steel [38,39]. Even though these studies often take data and observations (e. g., on sector or political developments, emissions) from practice, the suggested clubs and their instruments have yet to come into existence.

Literature that models how climate clubs can create effective outcomes and have efficient decision-making processes builds the conceptual groundwork for club thinking. It provides an idea of what clubs could be good for, or what their "value" could be. At the same time, this literature, by evaluating the potential rather than the actual contributions of climate clubs to global climate governance [13], often provides a general picture of clubs as "pace makers". It propagates a certain club type that was proposed by Nordhaus (2015) and typologized similarly by Falkner et al. (2022) as a transformational club: a club type that requires members to install binding rules and sanctions but is at the same time the politically least feasible club model (Falkner et al., 2022).

In practice, a glimpse into the political landscape of existing clubs shows that at least for climate, there are no transformational or Nordhaus-climate clubs. Also, there is no climate club that implements tariffs or a CBAM.[5] Existing clubs do not confirm the image of clubs as pace makers in climate policy. It seems that existing clubs have

[3] Texts that focus on potential/ hypothetical clubs and club design optimization are referenced in the appendix for the purpose of keeping the text short and readable.

[4] Texts that focus on CBAMs (in general) or the EU CBAM in particular are referenced in the appendix for the purpose of keeping the text short and readable.

[5] The EU is not a climate club, and the EU CBAM functions as a binding domestic climate policy instrument.

difficulties with creating more effective outcomes than the UNFCCC: For example, the few studies that examine existing clubs, like Forner and Díaz (2023) who examined 93 climate alliances, found that very concrete or even numeric goals are rare. Only a minority of their cases pursued the achievement of targets at country level or the adoption of such policies. In some clubs, members already join in compliance with the club's goals. For instance, Koppenborg (2025) finds that most of the Powering Past Coal Alliance's members either had no coal in their energy mix at the time of joining or were already far advanced at achieving the coal phaseout.

It is very difficult to accurately evaluate the degree to which actual emissions reductions are achieved by clubs and, specifically, which percentages can be attributed to their activities. Most studies realize a more general assessment of their mitigation achievements because there is not enough data available [4,40–43]. They arrive at mixed conclusions. For example, under the Global Methane Pledge, 160 countries agreed to the overall target of reducing 30% of their methane emissions by 2030. However, apparently, members struggle to achieve this objective: after four years into its conception, only a few members have formulated concrete plans of implementation, and even fewer have demonstrated verifiable methane emissions reductions [44].

Also, the (process) efficiency of clubs can be questioned. Some authors observe difficult and slow decision-making processes in clubs [4,45]. For instance, Unger et al. (2020) found that members of the Climate and Clean Air Coalition (CCAC) noted that with growing membership, it became more challenging to agree on common objectives. In this regard, very large clubs seem to face similar problems as the UNFCCC [4]. Clubs sometimes start with an ambitious vision (such as the phaseout of fossil fuels or the ban of flaring emissions), but then, compliance and achievements vary strongly among members [41]. Koppenborg (2025) finds a mixed depth in the commitments clubs make. The examined clubs adopted rather shallow obligations and required a low scope of intervention from members to achieve the objectives (e.g., the phaseout of fossil fuels).

Research finds that many climate clubs concentrate on raising awareness, knowledge sharing, technical exchange, capacity building, and support policy making in different contexts [40,42,46]. Yu et al. (2021) describe CEM's main function as a policy facilitator that supports members through information provision, technical assistance, and training activities. Further, climate clubs seem to be successful in finding a niche, e.g., a specific sector, industry, technology or pollutant [42,43]. They often specialize in fields that are difficult to handle under the UNFCCC or topics that are otherwise neglected. They create attention and political momentum for these areas [6,41,42,46]. For example, the CCAC, during many years, actively pushed for the implementation of the Montreal Protocol and is now seeking momentum to integrate short-lived climate pollutants into the NDCs under the Paris Agreement (Unger et al., 2020). Yu et al. (2020) describe that members saw the CEM as an enabler of the Paris Agreement. Many existing clubs resemble technical forums or “discussion clubs” [47].

3.2. *Membership: Clubs struggle to be both exclusive and inclusive at the same time*

By definition, a club distinguishes participants from non-participants. This includes an implicit understanding that “not everybody” can belong to the group and that a club is, per se, smaller than ‘all’. Membership can be assessed along two major axes: first, *size*, as in the number of members, and second, the assumed *relevance* that members have for achieving the objective of the club. Most authors are not very concrete when they discuss the size of a club, and positions differ on what would be an optimal number of members, ranging from small one-digit numbers to begin the club [16] to approximately 20 [15] to no specific number [18,48]. Some authors argue in favor of small numbers and low participation [49].

Climate club concepts often include an understanding that a club must include relevant, i.e., the 'right' or 'key' actors [16,26,50]. There are different approaches to determine *relevance*: e.g., in terms of greenhouse gas emissions (GHG) (Naím 2009; Hovi et al. 2017); vulnerability to climate change; capability from an economic, political, or knowledge perspective; power, leverage and representation [24]. Capacities, resources, and technologies are needed in order to enable a club's activities. It can be argued that countries in the Global South, which suffer most from climate change, must have a say and be represented in a club. They further legitimize the climate club's mission and provide additional on-the-ground knowledge for e.g., project activities. Also, different government levels (national- subnational) and transnationality (private sector, scientific and civil society members) can add to the club's capability in achieving its objectives.

In literature, there is an emphasis on what members would make a club efficient and enable it to make progress in climate policy (e.g., Hovi et al. 2017). Some authors also focus on which countries would be good member candidates for clubs, such as, e.g., China, the EU, and the USA [38,51–54]. China, the USA, and the EU are considered important because they cover 43.5% of global emissions [55] and hold strong political and economic power, which could, in principle, enable a club to create significant climate policy progress. For example, if these three agreed on a common emissions reduction instrument, it would cover almost half of the world's emissions, and they could pressure other countries to implement similar measures. A similar argumentation is used for clubs based on the G7 and G20.[6]

There is another, more practice-based perspective that several authors take. They start their analysis with a specific country's or region's perspective and evaluate how participating in a club (most of the time, a hypothetical, future club) could benefit that country.; e.g. African countries/ South Africa [36,56], Saudi Arabia [57], Canada [58], Brazil [59], Turkey [60], AOSIS [61], East Asia [62]. The problem is, however, that these analyses leave open what club sizes and membership constellations are actually feasible and successful in practice, and how members behave in the club, e.g., whether they really contribute to problem-solving or rather block decisions.

In practice, a glimpse into the landscape of existing climate clubs shows that they take on all kinds of sizes and membership constellations; e.g., the Climate and Clean Air Coalition (223 members), the Clean Energy Ministerial (29 members) or the Beyond Oil and Gas Alliance (15 members).[7] The interesting aspect, however, is that climate clubs tend to be dynamic: Often, they start small and then grow. Many of them pursue growth or membership strategies, arguably to increase their relevance. For example, the *Climate Club* started with only G7 countries, but then the initiator country, Germany, directly targeted Global South countries to make them join the club to increase representativeness, and it grew to 46 members [1]. Large cooperative alliances are often regarded as being inclusive as they have low entry barriers and almost no membership costs (e.g. CCAC, the Global Methane Pledge, Under2Coalition) [4]. Clubs like the CCAC or the Under2Coalition also grew quickly through the joining of non-state partners (e.g., scientific, private sector, subnational members). Some clubs' instruments and objectives work better the more members the club has: E.g., a carbon market is economically more efficient with more members and phase-out policies ultimately target an all-encompassing implementation. Forner and Díaz (2023) and Koppenborg (2025) find that Europe, Canada, the USA, and Japan are represented most often in clubs. Industry-focused alliances typically consist of the G7, further EU countries and a few selected other countries, while

[6] Texts that discuss G7 and/or G20 are referenced in the appendix for the purpose of keeping the text short and readable.

[7] Some of these alliances have “associated” participants or offer other forms of not full-participation options. Numbers here contain only full listed members (https://www.ccacoalition.org/content/our-partners, https://www.cleanenergyministerial.org/who-we-are/, https://beyondoilandgasalliance.org/who-we-are/)

China is notably absent from most clubs [63].

Nevertheless, growth and a large club size often comes with new challenges. With growing membership, also the diversity of interests involved grows and potentially negatively affects the efficiency of the decision-making processes [4,46]. Large inclusive clubs may also suffer from reduced attractiveness, as e.g., available financial resources have to be shared among many partners, which is problematic, because funding tends to be short in climate clubs (Yu et al., 2021). Authors have observed that in large clubs, some members become inactive over time [4]. Low entry barriers or opt-in/−out -options make the club attractive (Yu et al., 2021), but also mean that it is difficult to exclude laggards and free-riders.

This situation hints at a trade-off: On the one hand, exclusive membership promises easier decision-making processes, fewer parties among whom to share club benefits, and ultimately the option to leave those out of the club that do not want to be ambitious. On the other hand, an inclusive club design might be necessary to satisfy representativeness and equity concerns, e.g., including those that are already suffering the impacts of climate change. A large and diverse membership might also enrich the club's problem-solving capacity, e.g., if members increase the available knowledge and methodological experience. Being sufficiently exclusive to attract members while at the same time inclusive to cater to representativeness concerns might be difficult to achieve [45,64]. In practice, many clubs seek a pathway on the midground, being neither completely exclusive nor completely inclusive. For instance, Huseby et al. (2024) suggest a semi-exclusive club, where in principle any country can join, but a membership fee excludes those countries unwilling to pay. However, this is a very difficult line to walk as there is no golden number that signals a club's optimal membership or at which point it becomes inefficient.

3.3. *Equity concerns and internal dynamics: Should small groups make rules for the whole world?*

In section 3.2, I argued that a club by definition does not treat all actors equally, as it distinguishes between in- and outsiders. However, clubs' characteristics lead to further equity and justice implications, two of which I discuss in the following.

First, *Climate club concepts* typically build on the idea that clubs could set rules that affect the whole world. The potential for rule-making and standard-setting is a main function of clubs [13]. Climate clubs often emerge because there is a global regulative gap or because countries' domestic approaches to mitigating global warming differ significantly [65]. Different decarbonization rules and costs all around the world might trigger carbon leakage. By creating common rules among trading partners, e.g., accounting standards, carbon border taxes (e.g., such as the EU CBAM) [66–68], clubs could be a solution to carbon leakage [47].

In practice, e.g., clubs that focus on the steel sector illustrate these thoughts. There is no (binding) common definition for decarbonized steel, or a rule for how to measure the carbon content of a ton of steel, and countries have started to create unilateral measures. Thus, many industry-focused clubs were launched to work on standardizing methodologies for emissions accounting and finding common definitions (e.g., Industrial Deep Decarbonization Initiative (CEM IDDI), G7 Industrial Decarbonization Initiative, Breakthrough Agenda, First Movers Coalition) for clean steel. For example, the negotiations carried out by the EU and the USA between 2021 and 2024 on a Global Arrangement for Sustainable Steel and Aluminum (GASSA) came close to creating rules that would have taxed all imports of steel with emissions above a certain threshold and a definition for clean steel [69]. The cooperation had been initiated by the EU and the USA, but was meant to become a club that would include more members. In principle, this endeavor could have been overall positive for global emissions mitigation.

At the same time, the fact that a small, voluntarily assembled group of countries (or other actors) makes rules that may then apply to the global community has important implications for equity and justice. As noted above, clubs are free to create their own membership rules and strategies. In an extreme case, minilateral climate clubs could become "elitist" (…and) "self-serving" [70] and perpetuate global inequalities [71]. Such justice-related concerns have been neglected in the literature so far. Only approximately 10% of the accessed literature mentions justice or equity concerns and even fewer researchers concretely examine justice or equity concerns for climate clubs [3,8,11,26,33,47,71–77]. In practice, especially industry-focused clubs seem to have a G7-dominated membership in [63]. If a club with a critical mass of politically and economically powerful members (e.g., the EU, USA, China) creates decarbonization standards and rules, these would likely have a global impact. For example, if the above-mentioned GASSA had progressed and established definition for clean steel imports, this definition could have become a globally used standard, simply because GASSA's founders, the USA and the EU, are (together with China) the largest markets for steel. This leads to legitimacy problems if countries that were not part of the negotiations, still have to apply such a definition, because they depend on exporting to the U.S. and EU markets. In this way, club activities can disproportionately affect especially Global South countries [71]. Experts expect an unequal distribution of impacts for some instruments often linked to club thinking, such as the EU CBAM [36,78–80]. Global South countries do not have the same capabilities to comply with the EU CBAM's rules. In a nutshell, clubs could also be seen as mechanism to force others 'to do something', tapping into the fear that clubs become a place where 'Rich countries are turning to climate, industrial deals with 'friendly' countries. (…)' and could have the purpose of "increase(ing) pressure on non-participating countries, particularly developing countries that export more carbon-intensive products, to adopt stricter climate measures" [81].

Second, *conceptually*, clubs as voluntary alliances, are free to design their internal structures and procedural arrangements according to their needs and priorities. While the global treaty of the UNFCCC focuses on creating a public good for the whole world when it focuses on climate change mitigation, a club, in principle, has first of all a select group's (its members') interests as its main objective [8]. For example, for the operation of internal bodies or for the distribution of funding, they are not bound to any moral, sustainability, or equity-based standards, unless members agree on such aspects in their statutes etc.. They bear the risk of being "procedurally unjust", fostering "opaque decision-making", and side-lining core norms of the UNFCCC (common but differentiated responsibilities) [47,70]. Their internal dynamics might perpetuate existing global (in)equities. However, at his point it is important to say that a club could also choose to establish internal procedures that improve existing inequalities. E.g., some authors suggest that a club could create a dividend that is then distributed to low-income economies [72].

In practice, the existing clubs have informal or formalized procedures, and their legal foundations vary significantly. Many, like the CCAC or the Under2Coalition, have a Memorandum of Understanding which members sign, but which is not legally binding. Some have established rules regarding their governing bodies. For instance, the CCAC commits to "an effort to maintain gender and geographic diversity" [82]. In most of the project programs of the CCAC, countries eligible for official development assistance receive funding [83]. At the same time, a club could prefer giving countries from which it expects higher financial contributions stronger (informal) decision-making powers. Some clubs distribute important financial revenues: E.g., the Global Methane Hub raised over 300 million USD for reducing methane emissions in 2024 [84], the CCAC had a budget of over 81 million USD (between 2022 – mid-2025) [85]. Some authors found that clubs also act as broker for countries to access other funding sources e.g., from the Green Climate Fund [46].

4. Conclusion and implications

Existing climate clubs often seem to disappoint expectations. I argue

that this notion is linked to three main trade-offs that come with the club concept's realization in practice.

First, a large majority of the literature that examines clubs' potential effectiveness paints an image of clubs as pace makers for global climate policy. Yet, there is little evidence that existing clubs really make pace, as studies find that their role rather lies in raising awareness, technical exchange, capacity building, supporting policy making, and establishing a niche for neglected topics. Measures often proposed by economics-based literature, such as penalties for laggards or strong positive financial incentives, come with a lack of political feasibility, and thus, until today, no such climate club exists. Existing climate clubs seem to be attractive because they are voluntary and bear little risk of clashing with domestic priorities. While existing clubs and cooperative alliances might support a more long-term transition towards net zero, it is questionable whether they will trigger a quick decarbonization. However, it can also be argued that, as clubs do not follow the theoretical recipe offered by the economic literature, it is not very surprising that they do not fulfill the expectations.

For the academic discussion to gain a more accurate picture of what clubs are good for and what not, it would be useful to integrate the research strand on clubs' potential effectiveness better with the growing body of qualitative analyses on club cases. For example, research could start with examining what efficiency in climate clubs actually is. Do we evaluate a club's emissions reductions based on its launch date or assess its performance against the individually set objectives? How can we account for more unspecific targets and activities, such as capacity building, that might achieve emissions reductions in the future?

Second, each individual context and multiple conditions determine what an optimal club membership would be. Consequently, existing clubs might not have membership constellations that lead to ideal (climate) outcomes. For example, they still might include members who block ambitious action. Neither the original club idea of exclusivity nor a very inclusive, “open to all”-approach seems applicable in practice. We know that G7 and EU countries seem to be present in most clubs, and it seems that most clubs follow a strategy of membership growth. This information poses more questions than answers, especially on the dynamics among and within clubs. We need to examine whether some club members are more influential than others or what strategies clubs pursue not only for targeting new members, but also, for limiting membership, e.g., whether they have criteria that explicitly or implicitly leave particular countries out. For instance, in the above-named case of GASSA, the USA aimed for the exclusion of China. Furthermore, it would be helpful to know more about countries' priorities within clubs and which, or whose, interests are reflected (most) in the club's decision-making. In particular, the relation between financial donors and priority topics pursued by the club is an issue of notice here. For example, some donors provide earmarked funding or prescribe the purpose of their donation. Beyond the discussed club benefits, another motivation for countries to join a club could be that they want to get other countries to “do something,“i.e., make stronger commitments. For example, in the case of GASSA, the EU also might have hoped that the launch of a steel club would make others, e.g., China, produce cleaner steel to ensure their access to the EU and the U.S. markets. However, such theses need empirical evidence. Case studies that trace the founding and implementation processes of clubs could help finding out more about members' motivations and positions in clubs.

Third, the original club idea that a small group of members might do “good” for the whole world leads to serious equity concerns. On the one hand, this is because not all countries that might be affected by the club's activities have the capabilities to cope with its effects. On the other hand, clubs as voluntary actors are basically spaces where new rules and power structures for internal processes are established. Clubs as experimental, voluntary, and informal actors could be either perpetuators of inequalities or vehicles of change for the Global South and North. This is important because clubs can become powerful entities, e.g., if they have significant finances or create far-reaching standards.

Yet, we know little about clubs' internal procedures and power dynamics, for instance, whether clubs apply rules for equity, just distribution, and sustainability. Global justice and legitimacy have received little attention in the academic discussion on clubs [42,47]. Furthermore, we need to know more about whether existing clubs actually create standards and norms for a global community and what the factors for success and failure of such activities are. Clubs' internal procedures and rules require careful consideration and fine-tuning for the integration of equity and sustainability concerns. Also, majority voting systems and veto rights may require tailor-made solutions that go beyond the UNFCCC's “everybody must agree”-approach.

The discussion above is not only relevant for climate clubs but can also be applied to clubs for trade, security, or energy. Comparative studies might help to gain new perspectives on climate clubs and examine the interlinkages of these topics. Further, the three trade-offs are also connected and interdependent. For example, a club with a large, more inclusive membership policy might have better chances to create internal procedures that integrate equity and justice concerns, because Global South countries are part of the discussion and might demand such rules (e.g., representation in a steering committee).

Overall, I argue that many of the discussed challenges originate in the fact that existing clubs are often not so different from multilateral processes such as the UNFCCC negotiations. Even clubs display a high diversity of interests that collide [45,46,69]. Members bring their own domestic priorities also to the negotiation space within a club. They are limited by domestic policies and structures, such as, e.g., electoral cycles and budget constraints, which significantly shape the club's launch and its implementation [69].

In a sense, climate clubs thinking and practice reflect a dilemma that we are facing in the overall global transition towards net zero emissions: Mitigation (and adaptation) of climate change must happen as quickly as possible: One would like to see rapid, large, and measurable emissions reductions; countries committing to ambitious targets and stringent climate policies; and harmonized global standards and transparency rules that strengthen the global cooperative approach. Clubs seem to promise fulfilling this. At the same time the normative extent and depth of the global transformation that is needed for a healthy “net zero”-planet includes adjusting existing inequities, long- term transformation, and a process where everybody has a say. Climate cubs' reality is a mini stage for this: Academics conceptualize a quick moving ambitious club, but practice struggles with realizing this.

The debate on climate clubs is also challenging because of the heterogeneous use of the term “clubs” in both academia and policy: In spite of the many attempts to categorize clubs (from pseudo clubs or voluntary clubs [9,10] to economic, transformational, bargaining, and normative clubs [8]), there is no consistency, which makes expectations around clubs more blurry. It is also possible that in political practice, in media reporting, and in societal debates, simply the use of the term “club” raises false expectations of clubs being either a savior of quick action, increased finances, etc., or a division into friends and non-friends. Is it then futile to use and further work with the concept of climate clubs? No, but when discussing clubs, it is important to be aware of the repercussions that exist at the science policy interface. I strongly agree with those authors who argue that climate clubs by no means are a panacea for climate change mitigation [8]. A first step towards avoiding false expectations is avoiding the use of the term “club” for all forms of cooperation other than bilateral agreements. Further, understanding of the role of climate clubs should be deepened through research on the above-discussed aspects: integration of knowledge of potential effectiveness and qualitative data of existing clubs, club membership constellations including power dynamics and membership strategies, and justice concerns within clubs and through their activities.

CRediT authorship contribution statement

Charlotte Unger: Writing – review & editing, Writing – original

draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

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.

Appendix

Additional information on club literature.

Texts that discuss future, potential or hypothetical clubs, including those that have an economics- or political sciences- and policy-based approach [3,5,8,10–12,14,18–20,22–39,47–52,54,57,61,62,64,65,72–74,86–132].

Texts that discuss CBAMs (in general) or EU CBAM, academic and grey literature [2,20,25,27,28,30,32,33,36,39,51,67,68,72,89,91,93,94,100,121,122,127,128,131–139].

Texts that focus on G7 and/or G20 based clubs [39,45,46,53,58,71–73,75,77,89,92,131,135,138,140–143].

Description of paper types classified for Graph 2.

"Political science/ theoretical": These papers focus on providing a conceptual or theoretical contribution and are mostly political (or social) sciences-based.

"Economics based": These papers focus mainly on providing an economic model and/or contain economics-based assumptions (e.g., on cost or outcome-efficiency).

"CBAM economics-based".

These papers focus on carbon border adjustment mechanisms, often the EU CBAM, and do so by applying economic models.

"CBAM non-economics-based".

These papers focus on carbon border adjustment mechanisms, often the EU CBAM, but do not apply economic models and/or focus mainly on the political implications of the instrument.

"Case studies".

These papers mainly study one or more existing climate clubs and provide empirical (more or less) in-depth evidence; some of them include also conceptual approaches.

"Generic".

This category includes all papers that could not be fit clearly into one of the above categories.

Overall, these categories represent a very broad clustering of papers. Some texts cannot be classified 100% as just one type. They were organized according to the most dominant theme and/or the theme that was discussed most extensively.

Data availability

The data for this research can be shared upon reasonable request to the author.

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