Energy Research & Social Science 129 (2025) 104384

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

Original research article

Let's meet at the (climate) club: The contributions of the Global Bioenergy Partnership (GBEP) to sustainable bioenergy governance

Stavros Afionis [a,*]

[a] Cardiff University, School of Law and Politics, United Kingdom

ARTICLE INFO

Keywords:
Climate clubs
Polycentric governance
Minilaterism
Sustainability indicators
Bioeconomy

ABSTRACT

As global energy and climate governance is becoming increasingly polycentric, climate clubs have been put forward as a promising tool that could help move climate action forward. Recent decades have witnessed a proliferation of climate clubs and club-like arrangements. While theoretical work has focused on the different forms of climate clubs and the various roles they (could) play in this context, the empirical record of climate clubs has received less scholarly attention. This article seeks to contribute to filling this gap by evaluating the role in global climate and bioenergy governance of the Global Bioenergy Partnership (GBEP), a government-driven international initiative established in 2006 to promote the sustainable and efficient use of bioenergy and biomass. This study presents a framework of four criteria (operational structure, governance functions, club benefits and legitimacy) and applies it to interview data to assess GBEP's contributions to bioenergy governance. First, while GBEP is supported by a structured secretariat and has attracted a diverse membership, funding constraints have recently led to real financial pressures. Second, while GBEP fulfils a range of important governance functions, such as capacity-building or sustainability indicator-setting, its low agenda-setting powers and policy development capabilities have not allowed it to play a larger role in global bioenergy governance. Third, GBEP offers a range of important but limited benefits to its members, mainly due to its modest financial means. Finally, GBEP occupies a unique niche in the global bioenergy governance space, but fluctuating support from its members has limited its political weight.

1. Introduction

The purpose of this study is to utilize the climate club concept as an analytical category to evaluate the role in global climate and bioenergy governance of the Global Bioenergy Partnership (GBEP).[1] GBEP brings together public, private, and civil society stakeholders in a joint commitment to facilitate global dialogue and cooperation on bioenergy research and innovation, provide technical assistance and capacity-building, plus communicate research evidence and other policy-relevant information to policymakers. Currently, 23 countries and 16 international organizations have joined GBEP as partners, while 35 countries and 18 international organizations and institutions have been granted observer status [see Table S3 in Supplementary Material].

GBEP's origins can be traced back to efforts in the early 2000s to re-engage the US with climate negotiations following its rejection of the Kyoto Protocol by the then Bush Administration. The UK had been particularly active in this endeavour and used its double presidency of the G-8 and the EU in 2005 to reinvigorate international climate cooperation. Consequently, one of the main outcomes of the G-8 Gleneagles Summit in July 2005 was the adoption of the Gleneagles Plan of Action, which contained a large set of commitments in a multitude of areas such as, inter alia, energy efficiency, buildings, transport, cleaner fossil fuels and renewables. To implement the bioenergy-related commitments taken by the G-8 in the 2005 Gleneagles Plan of Action, it was agreed, among others, to launch a Global Bioenergy Partnership (GBEP) that would promote sustainable and efficient use of bioenergy and biomass, "particularly in developing countries where biomass use is prevalent" ([1], p.6). GBEP was formally launched in May 2006 during the 14th session of the UN Commission on Sustainable Development (CSD-14) in New York.

To the best of my knowledge, GBEP has so far received scant attention in the academic literature, even though it is among the main

* Corresponding author at: School of Law and Politics, Museum Avenue, Cardiff, CF10 3AX, United Kingdom.
E-mail address: AfionisS@cardiff.ac.uk.

[1] These governance spheres are usually conceptualized as a regime complex. The sustainable energy regime complex, which includes bioenergy, is situated between the energy regime and the climate change regime.

https://doi.org/10.1016/j.erss.2025.104384
Received 5 March 2025; Received in revised form 23 September 2025; Accepted 7 October 2025
Available online 17 October 2025

multilateral bodies that have been set up to assist with bioenergy governance [2]. This study contributes to the literature both empirically, as well as theoretically. First, by providing empirical insights into the important role played by climate clubs in environmental and energy governance, focusing on the specific case of GBEP. Second, by presenting a framework of criteria against which to assess the contributions of climate clubs to the development and function of the climate change regime.

This study is motivated by the following research question, namely which are the contributions GBEP makes to climate change and bioenergy governance. It argues that while GBEP plays an important role in this sphere of international collaboration, lack of adequate funding, among others, has undermined its capacity to play a larger role in the governance of bioenergy. The remainder of this article is structured as follows. After Section 2 on research design and methods, section 3 provides an overview of the existing literature on the role climate clubs perform in climate governance. Section 4 outlines the analytical framework, while section 5 presents the results of this study. Finally, section 6 discusses their policy and academic relevance.

2. Methods

A three-pronged approach was undertaken to gain a deeper understanding of the role of GBEP in global bioenergy governance. First, relevant secondary data from partnership documents, published reports and scientific studies were scrutinized with a view to develop a clear understanding of the current state of research on this topic and identify existing empirical and theoretical gaps in the literature. Second, evidence from interviews with GBEP stakeholders was collected, recruiting participants through a combination of firstly, purposive and then snowball sampling techniques. Notably, several of the interviewees have served as GBEP focal points or representatives for their countries or organizations respectively. Primary data were gathered through 17 semi-structured in-person, online and email interviews carried out from October 2024 to February 2025 (see Table S1 in Supplementary Material for the full list).

Finally, the third stage of the research involved transcribing interview recordings and analysing the collected data via thematic analysis, in accordance with the steps suggested by Nowell et al. [3]. First, the transcripts were repeatedly read to ensure familiarization with the depth and breadth of their content. Second, transcripts were coded to identify pieces of data judged as relevant to answering the research question. Third, the extracted codes were sorted and collated into themes (e.g., funding, transparency, benefits). Fourth, the coded data extracts for each theme were reviewed and refined to ensure they formed a coherent pattern. Finally, the themes were defined and named, which allowed "identifying the story that each theme told while considering how each theme fit into the overall story about the entire data set in relation to the research question" ([3], p.10).

3. Theoretical background

Defining climate clubs is not an easy undertaking. As Unger et al. [4] point out, "in the academic debate, no agreement on a definition of climate clubs, or on what their specific function is or should be, exists" (p.3). As a starting point, climate clubs are conceptualized as any grouping with fewer members than the UNFCCC that aims to promote climate-related activities outside the UNFCCC arena, like for example the promotion of renewable energy sources [5,6]. Building on these definitions, Koppenborg [7] adds the following prerequisites. First, while climate clubs should start with fewer members than the UNFCCC, they should at least have three members to distinguish them from bilateral climate initiatives. Second, while they can also include non-state actors, states should be in a leading position. Finally, there should be "a degree of institutionalization in the form of a secretariat or, at least, a website that lists members and ongoing activities" (p.5). Weischer et al. [6] make an important addition to this last point, by stating that for a grouping to be considered a climate club it should not have "reached the degree of institutionalization of an international organization" (p.177). Based on the above, GBEP has the makings of a climate club, as also argued for by Weischer et al. [6].

As Huseby et al. [8] note, "climate clubs could come in various forms and shapes" (p.3). Theoretical work has therefore explored, inter alia, the different forms of climate clubs and the various roles they (could) play in the context of international climate cooperation. One strand of this research considers the design of climate clubs, seeking to establish typologies of different club models based on their differences in nature and purpose. Stewart et al. [9] distinguish between classic clubs, which produce tangible, clear and readily excludable benefits (e.g., new technology), and pseudo-clubs whose benefits are more diffuse, less readily excludable, and potentially less easily quantifiable (e.g., reputational benefits) [see also [10]]. Falkner et al. [11] propose three types of climate clubs (normative, bargaining, transformational), whereas Weischer et al. [6] identify two major kinds of clubs, namely dialogue forums and implementation groups. A related strand of this theoretical literature, more aspirational in nature, focuses on how climate clubs could assist with breaking the international deadlock in climate negotiations and catalyse greater (transformative) climate action. Nordhaus [12] advocates for the formation of a climate club whose members would be bound by ambitious climate change mitigation goals, as well as being willing to use trade sanctions in the form of a comprehensive tariff on imports as the penalty for countries with more lenient climate policies. Similarly, Weischer et al. [6] argue that "transformational clubs" should offer their members significant, exclusive, and mutually attractive economic, trade, investment, and other benefits.

In contrast to theoretical advancements, fewer scholars have assessed the empirical record of climate clubs. As Unger and Thielges ([13], p.2) note, "research lacks in-depth qualitative case study analyses of existing clubs", pointing therefore to a lacuna in the literature on the specific nature of their climate governance contributions. The available evidence suggests that two distinct positions in the literature have so far emerged. On the one hand, there are scholars who argue that existing climate clubs have only enabled incremental change, thereby being equally unsuccessful as the UNFCCC in catalysing greater climate action [6]. This is for example the conclusion reached by Andresen [14] after evaluating various climate clubs, such as the Major Economies Forum on Energy and Climate (MEF) and the Climate and Clean Air Coalition (CCAC). On the other hand, there are scholars who stress that climate club minilateralism is unlikely to cut through fractious climate politics and pave the way for greater long-term ambition, arguing instead that clubs should be evaluated based on what can be plausibly expected of them in the present circumstances. Unger and Thielges [13], for instance, caution against viewing climate clubs as an alternative to international agreements that could somehow take over the responsibility for ambitious greenhouse gas cuts. Climate clubs could instead make other sorts of contributions by facilitating political dialogue and bargaining in the context of multilateral negotiations, producing sufficient incentives for membership, and remedying multilateralism's legitimacy crisis (see e.g., [7]). Indicatively, examining the International Renewable Energy Agency (IRENA), Urpelainen and Van de Graaf [15] conclude that it has been recognized as a major provider of epistemic services to its members. Yu et al. [16], looking at the Clean Energy Ministerial (CEM), found that it has been recognized by its stakeholders for its cost-efficient capacity-building activities.

This later stance has gained significant traction in the literature over the past few years, and as a result the debate has since moved on to identifying the various governance contributions of climate clubs, as well as the benefits that accrue to their members. Writing about a decade ago, Visseren-Hamakers [17] argued that "the literature is inconclusive regarding the roles of partnerships in the international governance of sustainable development" (p.147). Since then, however, a small corpus of research has been produced on this topic, discussing the fundamental

design and governance features that would enable climate clubs to complement the multilateral climate regime, the governance functions they perform, as well as the benefits they present to their members. Providing an outline of this body of literature will be the focus of the following section.

4. Towards a framework for explanation

Most climate clubs are geared towards knowledge-sharing and/or production. A small number pursue collective targets or policies, and an even smaller number have established national-level targets or policies [18]. To deliver on their objectives, several prerequisites need to be satisfied. This paper therefore proposes an analytical framework comprising of four sets of criteria through which to evaluate and examine climate club governance contributions. This framework synthesizes and extends the existing body of work on this topic and comprises of: (1) operational structure; (2) governance functions; (3) club benefits; and (4) legitimacy (see Table 1).

4.1. Operational structure

An adequate organizational architecture is paramount if climate clubs are to play a positive role in global climate and bioenergy governance. For such an architecture to be viable, several criteria have been put forward in the literature. First, scholars agree on the importance played by the size and composition of climate club membership. Widerberg and Pattberg [19] note that climate clubs should aim to bring together a critical mass of ambitious and influential actors from across levels of governance that are most relevant in addressing the problem at hand. For example, if the aim of climate action is to reduce deforestation, "then countries with large forest covers and problems with deforestation should be represented" (p.47). If the aim is to reduce greenhouse gas emissions, then climate clubs should include or influence countries accounting for a large share of global emissions. Relevant membership and adequate size increase a clubs' collective potential to make a contribution to international climate governance [7].

Second, capacity for action is equally important, as climate clubs should possess the requisite technical and financial means to undertake their envisaged functions. Dedicated and diversified funding streams, plus a varied pool of experts that can be called upon to provide specialized knowledge and guidance to members are prerequisites for effective action [20]. Equally, for a climate club to constructively promote a sustainable future, endowment with a strong governance structure in the form of a bureau and a dedicated secretariat is essential. For Forner and Díaz [18], for such a structure to ensure dynamism and engagement, it would need to include "full-time staff with an administrative structure, steering committees, and other related bodies" (p.32).

Table 1
Criteria for evaluating climate club governance contributions.

Criteria	Indicator
Operational structure	Club membership and size
	Administrative infrastructure
	Technical and financial club capacity
Governance functions	Agenda setting
	Policy development
	Implementation
	Metagovernance
	Improving participation
Club goods	Political
	Material
Legitimacy	Transparency (*input*)
	Participation (*input*)
	Evaluation (*input*)
	Complaint & Response (*input*)
	Niche (*output*)
	Effectiveness (impact) and Equity (*output*)

4.2. Governance functions

As Van Huijstee et al. [21] note, partnerships are established in the first place "as a response to the limited problem-solving capacity of governments", and are therefore expected to engage in various governance functions to "respond to this deficit" (p.79). The literature ascribes several partly overlapping functions that climate clubs may fulfil (see e.g., [21]). This paper follows Visseren-Hamakers [17], who has distinguished the following five functions. First, *agenda-setting*, which refers to the ability of an actor to influence decisions on which issues will capture the attention of political decision-makers. Second, *policy development*, which is about "the process of deciding on a course of action in a policy area" ([22], p.292), and could include, among others, standard harmonization, or the development of sustainability standards. Third, *implementation*, which focuses on the capabilities of a climate club to contribute to or enable the implementation of policies and strategies in support of sustainable development. Examples include the promotion of knowledge and capacity building, monitoring, as well as the provision of technology and financial resources [23]. Fourth, *metagovernance*, which refers to the ability of a partnership for "strategic steering and coordination in the governance system" with the aim of bolstering cooperation on a specific issue ([17], p.147). Fifth, *improving participation*, which involves broadening and improving the participation of relevant actors with a stake in a policy area, or as Van Huijstee et al. [21] aptly summarize, "giving voice to unheard groups" (p.79).

4.3. Club goods

For a climate club to be successful in its mission, it needs to be producing specific benefits (club goods) that are reserved to its members, and which act as an inducement for members to remain part of the club, as well as for others to join it [24]. According to Yu et al. [16], such benefits can be either political or material. *Political benefits* (non-monetary in nature) include enabling members to reach consensus, build trust, gain reputational capital, or exert increased influence in the climate change regime. *Material benefits* refer to tangible rewards that are equated with monetary or resource gain, and can include access to technology R&D, knowledge and intellectual property sharing, capacity building, access to climate finance, preferential trade or investment arrangements or access to emissions trading programmes [5,25].

4.4. Legitimacy

Legitimacy refers to the acceptability and appropriateness of the rules and decisions of a governance mechanism in the eyes of governments and citizens. The distinction between normative and sociological legitimacy is one that has been commonly employed in the literature, even though these two forms can be, and often are, interrelated (see [26]). Normative legitimacy focuses on whether global governance arrangements conform to procedural (input) or performance (output) norms (see e.g., [8]). Sociological legitimacy on the other hand is concerned with how these aspects are perceived by relevant audiences [27], which can include "both state and societal actors, from government elites to ordinary citizens" ([26], p.586). It is this second (sociological) understanding of legitimacy that this study adopts. In other words, the focus here is not on what ought to be viewed as legitimate, based on conformity with normative principles and standards, but on whether the exercise of authority by a governance mechanism is perceived as legitimate by stakeholders.

Another common differentiation is between input and output legitimacy. Input legitimacy concerns the quality of decision-making arrangements and, as a concept, it is closely linked to that of accountability [28]. Various frameworks and initiatives have been developed with the aim of enhancing the accountability of actors to their stakeholders. One of the more prominent attempts to operationalize actor accountability is the Global Accountability Framework, which was

developed by the charity One World Trust [29]. It puts forward four core dimensions that make international actors more accountable to their stakeholders: transparency, participation, evaluation, and complaint and response mechanisms. As noted, these four dimensions enable an actor "to give an account to, take account of, and when necessary be held to account by, stakeholders" (p.11). Transparency refers to the disclosure of information necessary for stakeholders to monitor an actor's activities. As Widerberg and Pattberg [19] note, "an initiative that communicates its actions and results in an open and transparent manner is more accountable than an initiative with opaque communications" (p.48). Participation is all about who is allowed at the table and on how equal terms [30]. For example, Unger and Thielges [13] argue that a core input legitimacy test is whether climate clubs include those countries that are vulnerable to climate change, as well as state and non-state actors who could contribute economic, political, or knowledge resources. Evaluation refers to accountability-holders being able to assess whether the actor who is held to account is achieving its goals and objectives, as well as meeting agreed standards [31]. Finally, complaint and response mechanisms enable stakeholders to hold an actor to account for failing to achieve its objectives (e.g., non-compliance), or by "querying a decision, action or policy and receiving an adequate response to their grievance" ([29], p.24).

Output legitimacy of international governance focuses primarily on perceived effectiveness, as well as on whether decision-making outputs are perceived as equitable [30]. Effectiveness can be measured in various ways such as, for example, by taking into account factors like behavioural change, the nature of norm-creation by institutions, or the problem-solving quality of outputs (e.g., climate club contributions to addressing climate change) [32]. Tallberg and Zürn [26] point attention to the output, outcome and impact of policymaking, while Karlsson-Vinkhuyzen and McGee [32] bring all this together by noting that outcomes "usually contribute to impact effectiveness" (p.60). When setting up climate clubs, countries generally avoid setting any quantifiable targets, preferring instead to take on no or few obligations, which makes it difficult to assess climate club success or effectiveness [19]. While it is possible that they generate climate benefits through, for example, their efforts to improve energy efficiency policies or promote renewable energy, lack of transparency or quantitative data considerably hinder evaluation [32]. What is possible though, as Unger and Thielges [13] point out, is to place "the focus on exploration of the political practice, where we can consider clubs contributions that are difficult to quantify, e.g., generation of support for policies" (p.4). Moving on to equity, output legitimacy for Nasiritousi and Faber [33] "stems from what is produced by an institution and the effect that this has in terms of … the fair distribution of benefits" (p.381). Karlsson-Vinkhuyzen and McGee [32] concur, by noting that outputs should be equitable and meet principles of distributive justice.

Linked to output legitimacy, scholars have also highlighted the importance of ensuring that climate clubs do not result in forum-shopping, fragmentation or contestation over core UNFCCC principles, norms, rules, and regulations. Widerberg and Pattberg [19] refer to this as "institutional fit" (p.45), whereas Unger and Thielges [13] use the term "niche" (p.14). Part of the reason for stressing this point, as noted by Weischer et al. [6], is that climate clubs have often been formed because of political interest, instead of after a process of "systematic analysis of needs and gaps in the current landscape" (p.184). Another reason for emphasising institutional fit is rooted in the debate on whether climate clubs complement or conflict with the UNFCCC, much of which was waged following the establishment in 2005 of the Asia Pacific Partnership on Climate Change (APP). As van Asselt [34] notes, the concern at the time had been that this US initiative aimed at avoiding, or even subverting, the UNFCCC.

Tying all this together, Widerberg and Pattberg [19] argue that to avoid delegitimizing and/or disrupting the UNFCCC process, climate clubs should fulfil a twofold purpose: first, they should offer a useful or even necessary supplement to the UNFCCC in accordance with its core norms, and second be problem driven, by which they mean that they should be clearly linked to a specific governance gap, thereby reducing duplication and overlap to the extent possible. I would therefore argue here that output legitimacy should also consider institutional fit (or niche) as part of it. Given that output legitimacy is basically all about the "consequences of decisions" ([35], p.186), then any climate club outputs that are perceived as falling short of targeting specific governance gap(s) or fulfilling a functional need, or are viewed as undermining the UNFCCC [19], will create an "opportunity for opponents to delegitimize" the actor in question "with reference to these limits" ([26], p.594).

5. Results

5.1. Operational structure

For climate clubs to make a positive contribution to international climate action, the participation of members that are acknowledged as "relevant", "right" or "key" is a decisive criterion ([13], p.41). GBEP has witnessed steady growth in terms of club membership and size over the past two decades and currently includes 39 Partners (23 national governments and 16 organizations) and 53 Observers (35 national governments and 18 organizations). Its membership covers most of the bioenergy produced in the world (81.3 %),[2] while GBEP Partners alone account for the vast majority of modern bioenergy, including liquid biofuels [36]. It is therefore important that GBEP includes as members a range of countries (both developed and developing ones) with the requisite resources and skills to effectively support GBEP in its efforts to assist poorer developing countries embarking on a transition to sustainable bioenergy sources.

Moving on, GBEP is supported by a formal administrative structure that includes a steering committee, various technical working groups and task forces, as well as a secretariat. The steering committee, GBEP's central decision-making body, usually meets once a year and its chairmanship is shared between two co-chairs, one from a developed country and one from a developing country. The Steering Committee governs the policies, procedures and activities of the partnership. Its functions include providing strategic guidance, direction and instructions for actions to the secretariat, accepting new partners and observers, as well as periodically reviewing GBEP's organizational structure and programme of collaborative activities. The Steering Committee is assisted by a secretariat hosted at the FAO headquarters in Rome, Italy, which consists of a handful of full-time staff, assisted by a small number of interns. The small size of the secretariat undoubtedly presents a challenge, but interviewees expressed the view that GBEP was equipped with a competent and dedicated secretariat (e.g., INT#5, INT#9, INT#16).

The Steering Committee, assisted by its secretariat, oversees the work of various technical working groups and task forces carrying out the main activities of the partnership. First, there is the Technical Working Group, which discusses and develops the GBEP programme of work, plus makes suggestions to the steering committee about further partnership activities. Second, there is the Task Force on Sustainability, whose focus since its establishment in 2011 has been on developing a set of twenty-four voluntary sustainability indicators for bioenergy (see further below). Third, there was the GBEP Task Force on GHG Methodologies (now defunct), which focused on developing a common methodological framework for assessing greenhouse gas emissions associated with bioenergy, plus making GHG lifecycle analyses more transparent. Finally, there is the Working Group on Capacity-Building, composed of several sub-groups or Activity Groups (AGs) working on

[2] This figure was calculated using the FAOSTAT domain on bioenergy. Global bioenergy production on average between 1990 and 2022 amounted to 40,409,241 TJ, with GBEP's partners and observers accounting for 32,862,455 TJ, i.e., 81.3 % of the total.

a diverse range of topics, such as sustainable modern wood energy, biogas, advanced liquid biofuels, clean cooking and others.

In terms of technical capacity, GBEP is fortunate in that it can tap on both internal and external sources of technical expertise. In addition to the knowledge possessed by the secretariat itself, as well as that of GBEP's partners and observers, being hosted by FAO allows GBEP to also make use of the extensive in-house expertise of the former's bioenergy and other groups (INT#2). In addition, GBEP can also rely on FAO's extensive network of decentralized offices around the world. As noted by an interviewee, whenever GBEP "goes to a country, they are there to help [GBEP understand] the local context, contact local government officials, and things like that" (INT#1). Based on all the above, the same interviewee argued therefore that "on a technical basis, [GBEP is] covered!" (INT#1). The added value of GBEP's close organizational link to FAO was captured by several other interviewees as well, who noted that GBEP benefits not only from FAO's legal status, but also from its multifaceted support and expertise (INT#9, INT#12, INT#13).

Turning to financial capacity, the picture is less rosy. GBEP has historically been funded mainly by the Italian and German governments, which for the 2007–2024 period accounted for 53 and 27 % respectively of GBEP's funding, with additional funding provided by Brazil, the Netherlands, Sweden, UK, USA, FAO and the European Commission (through Horizon 2020) [37]. Since its establishment, the GBEP Secretariat has managed a total budget of approximately $12 million, but in recent years it has hampered financially as its budget has decreased from an average of between $600–800 thousand annually during the first decade or so of GBEP's existence, to an average of $450 thousand since 2019, which represents "the minimum budget that would allow the continuation of the GBEP regular activities" [38]. Consequently, a central issue in Steering Committee discussions since 2019 has involved identifying solutions to GBEP's funding difficulties so as to secure the continuation of the partnership and the implementation of its programme of work (see e.g., [38]; also, INT#8). It should be noted at this point that the funding situation is currently less precarious (INT#1, INT#2).

5.2. Governance functions

Agenda-setting is the first main function that a climate club can perform in decision-making processes [17,21]. GBEP's ability to directly influence the bioenergy agenda is restricted by its limited human and financial resources, meaning that this is not a goal the GBEP Secretariat can actively pursue (INT#1, INT#2). Visseren-Hamakers [17], for example, did not discern any observable direct contribution by GBEP in this area. According to interviewees, GBEP is only able to exercise some indirect influence on agenda-setting at the international level through its efforts to promote the sustainable production and use of bioenergy. Several interviewees noted, for instance, that GBEP has invested in ensuring its work is recognized by the G-7/8 and G-20 countries by seeking to secure a mention to GBEP in their communiqués and statements (e.g., INT#5, INT#6, INT#8). This has frequently been the case, with GBEP for example receiving a specific reference by the 2023 India G-20 Summit [37]. In addition, these bodies have turned on occasion to GBEP for policy and technical guidance. As noted by an interviewee, the G-20 "was working on a roadmap on clean cooking and [GBEP] supported [it] by providing technical input. So, [GBEP] kind of indirectly influences the process" (INT#2). Furthermore, it was also noted that GBEP may also seek to indirectly influence the global agenda through capitalizing on its links with more influential international bodies, like FAO, IRENA or IEA, which can more successfully advocate for issues to be placed on the global agenda (INT#9, INT#16).

A second major function performed by climate clubs is policy development, which involves "developing public or private policy" ([17],p.147). GBEP has been particularly active in this arena, primarily through the development of its sustainability indicators for bioenergy (see [39] for details), a set of 24 indicators grouped under the three pillars of sustainability (i.e., environmental, social and economic) which intend to guide analysis, inform decision-making and facilitate the sustainable production and use of bioenergy at national levels [40]. These indicators were developed by GBEP's Task Force on Sustainability from 2008 to 2011, and since their launch they have been implemented in fifteen countries, both developing as well as developed, such as Vietnam, Paraguay, Japan, Germany, Italy and the Netherlands ([41], see also Supplementary Material). A significant body of literature has discussed the strengths and limitations of the GBEP Sustainability Indicators, as well as the lessons learned from their technical implementation on the ground (see e.g., [42]). Their scientific and technical impact has been considerable, as GBEP's work has been "taken up by the standard ISO 13065:2015 (Sustainability criteria for bioenergy), and in many non-governmental schemes, e.g. Roundtable on Sustainable Biomaterials (RSB), and the International Sustainability & Carbon Certification (ISCC)" ([43], p.260]).

However, interviewees were of two minds about the policy impact the GBEP Sustainability Indicators have had so far on bioenergy governance. On the one hand, many argued that they were comprehensive and, despite some limitations, enabled a holistic sustainability evaluation of a nation's development of bioenergy (e.g., INT#4, INT#6, INT#7, INT#11, INT#15). Even in countries where the indicators were not directly applied for various reasons, they were still used as an informational tool to support policy development (e.g., INT#3, INT#10, INT#11). For example, a developing country interviewee mentioned how their government took some of the GBEP indicators into account when developing its policy framework for bioenergy, to evaluate whether "bioenergy production would affect the income of the farmers or affect food security" (INT#3).

On the other hand, several criticisms were also raised towards the indicators. For instance, some interviewees doubted their technical robustness (INT#9) or argued that they were in urgent need of an update if they were to play a role in informing policy (INT#10). Another main criticism put forward was that GBEP had spent an excessive amount of time and energy to developing and promoting a tool the implementation of which is relatively time-consuming and far beyond the financial means of most developing countries. Indeed, a couple of interviewees noted that their countries would have wanted to implement the GBEP indicators but were unable to do so due to lack of internal or external funding. "We were looking for funding, but we could not find. It is not easy at all to find funding to implement the GBEP indicators" (INT#3). For several interviewees, this presented a major barrier that explained why the GBEP indicators have so far only been implemented in a limited number of developing countries (e.g., Colombia, Vietnam, Indonesia, Paraguay). One interviewee thought that the indicators were GBEP's "Achilles heel", criticising the fact that GBEP for most of its existence has had as its primary objective the development and promotion of a framework that "no one really uses," and continued by saying that "the only time countries have tried to apply them is when they have been fully subsidized to do so with a grant" (INT#9). Another noted that GBEP was "stagnating" and, as a result, their country had "lost interest in [it]" (INT#10). Finally, an interviewee from a developing country believed that GBEP had "lost its way, as it kept focusing on the sustainability indicators, which were quite burdensome and quirky, and were quickly ignored by the international community, by regulators, and by the private sector in favour of private sustainability certification schemes (RSB, etc)" [INT#17].

Another criticism put forward was that the indicators did not respond to countries' priorities and needs. Some developing country interviewees noted that a goal for many countries, given their surplus biomass potential, was to develop into exporters of bioenergy and reap the associated benefits (e.g., INT#11). "What happens is that many governments, especially in developing countries, take their environmental priorities and measuring protocols from developed countries. So, for example, I export to Europe, [and] I have to measure things in such a way. So, they lose sight of looking into themselves and the evolution of

the sector for internal evaluation purposes" (INT#7). To be fair though, there is very little GBEP can possibly do to respond to this criticism, with a quick look back at its history being needed to understand why this is the case. GBEP represents one of the most important international efforts to create global biofuels standards to date. However, due to disagreements between GBEP's European and non-European partners (mainly the US, Brazil and Canada) during the late 2000s, GBEP was prevented from developing global sustainability performance standards that could be used to satisfy EU sustainability requirements [44], yielding instead an indicator framework that functions "as a measurement tool and does not regulate conduct" ([45], p.143). GBEP itself stresses the informational nature of its indicators, making it clear that they do not constitute a standard, are not legally binding, and "shall not be applied so as to limit trade in bioenergy in a manner inconsistent with multilateral trade obligations" ([39], p.1). An interviewee recalled the debate that took place in GBEP's earlier years: "I remember once, at the beginning, I kind of asked that this [i.e., an indicator] is not comparable, and one person said, no, these are not meant to be comparable! These are only meant to show to countries how their bioenergy sector is evolving!" (INT#7).

A third major function performed by climate clubs is implementation, which involves "contributing to or enabling implementation of sustainability measures 'on the ground'" ([17], p.147). For instance, GBEP supported the development of the 2015 Regional Strategy on Bioenergy by the Economic Community of West African States (ECOWAS), which seeks to promote modern and sustainable forms of bioenergy in the region. Subsequently, GBEP actively collaborated with ECOWAS in implementing projects aimed at strengthening the capacity of countries in the region, such as Togo and Ghana, to assess bioenergy sustainability via the GBEP indicators. Such capacity-building activities have been much appreciated in the region, with an interviewee noting: "The approach for me is always to train the trainers on the indicators at the national level. Train the trainers, so that they can duplicate the training even without the support of GBEP" (INT#14). Note at this point that the GBEP Secretariat has also organised training on the indicators in a small number of other countries as well, namely Cuba, Jamaica, and the Philippines.

GBEP's greatest impact, however, has been in the countries where its sustainability indicators have been actually applied. In Indonesia, for example, the implementation of the indicators led to a government target to ensure that 60 % of palm oil mills were equipped with methane capture facilities by 2030. In Vietnam, they informed policy on anaerobic digestion as a method for reducing greenhouse gas emissions from agricultural production, while in Paraguay they have been used to assist investment and policy decisions in the bioethanol and wood energy sectors [46]. Referring specifically to Indonesia, for instance, an interviewee noted that when GBEP implemented the indicators there, using palm oil mill effluent (POME) to produce biogas was one of the main suggestions. This was "a recommendation that [Indonesia] took up and have improved a lot the use of this biogas technology. So, this is another big success" (INT#1).

In addition, GBEP has also carried out a significant number of knowledge promotion and capacity building activities in developing countries. To offer but one example, GBEP launched a project in 2023, in collaboration with Rwanda and Uganda, to support the increased use of ethanol for clean cooking (INT#2, INT#11). Arguably, however, GBEP's most important capacity-building initiative has been the Bioenergy Week, which takes place on an annual basis in a different region of the world. These events bring together a large network of bioenergy stakeholders, including international experts, policymakers, industry leaders, researchers and students, to exchange views on the latest trends, technologies, priorities and challenges in the bioenergy sector. Several interviewees stressed their importance in facilitating networking opportunities and promoting knowledge exchange. One interviewee, for example, shared how the contacts they made in one of the GBEP Bioenergy Weeks led to a technical cooperation agreement with a major developed country that generated significant capacity building and technology transfer benefits (INT#3).

Steering and coordination (metagovernance) is the fourth major function that could be provided by climate clubs. Visseren-Hamakers [17] mentions that while GBEP aims to promote international consensus on bioenergy and sustainability issues, the influence it has had on such debates has been modest. Recently, GBEP has sought to play a more active coordinating role in bioenergy governance. In 2023, it established a Cross-Initiative Coordination (CIC) group on bioenergy, which "aims to amplify the activities of international organisations working on bioenergy by aligning and complementing their efforts" [47]. Its main priority for 2024 had been to work together with several UN and other international organizations on a joint statement on bioenergy for sustainable development. This joint statement was issued in June 2024, during the 11th GBEP Bioenergy Week, held in Rome, Italy, and called for responsible and sustainable implementation of bioenergy systems to adequately address climate change and critical development challenges [48]. GBEP's lead in this endeavour was viewed as a positive contribution towards enhancing dialogue and coordination between the endorsing partners (e.g., INT#9, INT#16). An interviewee even described it as "unique", as they had not been aware of any other similar initiative aiming to forge consensus between international actors per se in the bioenergy governance space (INT#9).

Improving participation is the fifth major function performed by climate clubs. GBEP was acknowledged as inclusive and genuine about enabling the participation of diverse stakeholders in its activities. A barrier that was identified though was lack of capacity to more actively pursue this objective. For example, even though it provides funding for developing country partners and observers to attend its meetings, this budget is limited and is therefore largely allocated on a rotational basis (INT#1, INT#2). GBEP's Bioenergy Weeks deserve special mention at this point, as they attract widespread participation from diverse groups. An interviewee from a country that has organised a Bioenergy Week in the past noted: "During the Bioenergy Week here we involved everybody, and GBEP was really pleased about this. From academia, from local government, from sugarcane, corn, coconut growers, investors, sugar mills, energy producers, and others" (INT#3). Finally, GBEP has sought since 2021 to promote youth participation through training and learning opportunities for young people, aimed at raising awareness on sustainable development, food security, climate change, and renewable energy. As part of these efforts, the GBEP Youth Award, which forms an integral component of GBEP's annual Bioenergy Weeks, celebrates outstanding research on bioenergy conducted by students and early-career researchers. Several interviewees praised GBEP's efforts in this area, with one of them noting: "Every time you can get young people … to talk to each other, to share experiences, it is always positive" (INT#9).

5.3. Club benefits

The adequate performance of governance functions by climate clubs can provide a range of benefits to their members. Various political benefits (non-monetary in nature) accruing to GBEP members were put forward. A first benefit related to the importance of members having a seat at the table and thus being able to provide their own inputs into GBEP decision-making and influence the shaping of rules and standards. In this way they can either ensure that their considerations are taken into account (INT#10) or prevent the adoption of decisions that clash with their perceived interests (INT#9). The lengthy negotiations on the development of the GBEP sustainability indicators serve as a case in point. The initial draft contained more than 24 indicators, but "intense debates resulted in the removal or consolidation of some indicators ([45], p.142). A second benefit is that GBEP enables the development of a mutual understanding of bioenergy issues, which was seen as instrumental in contributing to trust and consensus building. As noted, GBEP provides a space for members to come together, understand each other's perspectives and find a middle ground (e.g., INT#1, INT#4, INT#6, INT#7). A third benefit involved the potential to gain reputation and

influence through being a GBEP member. The GBEP Bioenergy Weeks were seen as important in this respect, as having "a variety of stakeholders attending, from government, research, NGOs … gives [countries] an important platform to showcase their progress in the bioenergy space (INT#12). Another interviewee noted that GBEP Bioenergy Weeks allowed their country to share its policies and practices with third parties, with these interactions subsequently leading to policy diffusion and/or transfer (INT#3). Finally, networking opportunities were much prized by GBEP's members, as participation in Bioenergy Weeks and other GBEP events allowed them, among others, to reach specific governments they were interested in interacting with (INT#13).

Moving on to material benefits, it has already been noted that GBEP's budget is limited and only allows it to support event attendance for some of its developing country members. While some interviewees viewed monetary gains as limited or even non-existent, for others – especially from the developing world – the opportunity to travel and interact with their peers was very much welcomed. One of them, for example, emphasized the fact that in GBEP's Bioenergy Weeks "there was the opportunity for a field visit" (INT#11). Such field visits to local bioenergy facilities come with many benefits, such as allowing hosting countries to showcase their most relevant, innovative and often locally developed national bioenergy technologies, as well as promote capacity-building and knowledge-sharing (INT#2). Although overall, direct financial benefits may be small, there are indirect ones that were viewed as equally if not more important. As a result of engagement with GBEP activities, some developing countries secured funding from developed countries or organizations to apply the GBEP sustainability indicators or organise capacity building and other activities, while others formed bilateral cooperation agreements with their counterparts, attracted investments or received attention from investors (INT#3, INT#7, INT#8, INT#12). Applying the indicators, for instance, required extensive capacity building and technical assistance to train local stakeholders in their use (INT#14). There was consensus among interviewees of the value of GBEP's capacity building and knowledge transfer initiatives, such as workshops, study tours or public forums, many of which had often been funded by external entities like, for example, the US Grains Council. Just to offer one example, GBEP's efforts to support the increased use of ethanol for household energy in African countries were viewed in a very positive light, as they addressed real developing country needs (INT#11, INT#14).

5.4. Legitimacy

Starting with input legitimacy, transparency was unanimously identified as one of GBEP's strongest qualities. Several interviewees mentioned that they always had access to all the information they required, that the agendas of meetings and points of discussion were made available in advance, and that GBEP made a systematic effort to keep the public informed of its activities, primarily through its website (e.g., INT#1, INT#6, INT#13). Similarly, GBEP's participatory decision-making style also drew positive feedback. GBEP was viewed as a platform where "the issues of developing countries can be heard", and which makes a sustained effort to have developing countries "at an equal level with developed countries" by, for example, having its various Activity Groups co-led by developed and developing country members (INT#7). Turning to evaluation, the GBEP Secretariat submits an annual report on its activities and programme of work to the G-7/G-8 and to the G-20, which have repeatedly renewed its mandate since 2005. Furthermore, the GBEP Secretariat develops an annual Programme of Work (PoW) outlining the activities carried out by the partnership. Partner and observer countries and organizations will then review the progress of GBEP's initiatives and assess its impact during GBEP's annual steering committee meetings (INT#1). Finally, with respect to complaint and response mechanisms, no cases were brought up by the interviewees. Only one mentioned that "we had some minor ones, but nothing major" (INT#10). In terms of GBEP's complaint response mechanism, if members have any concerns, complaints or require clarifications, they can approach the secretariat via their GBEP focal points or, if for whatever reason this is not possible, via their FAO representatives in Rome, with this flexibility being highlighted as "another reason why [GBEP] being part of FAO really helps" (INT#1).

Moving to output legitimacy, most interviewees thought that GBEP's niche was that it stood alone among other fora on bioenergy for providing a platform and a voice to underrepresented countries who are otherwise absent in other initiatives on bioenergy [e.g., INT#1, INT#2]. This focus on working closely with developing country governments to support their transition from traditional towards more modern sustainable bioenergy was much appreciated, as other international bodies were seen as either more market-oriented (e.g., the Council on Ethanol Clean Cooking or the Biofuture Platform) [INT#12], research-oriented [e.g., the International Renewable Energy Agency (IRENA), INT#11] or OECD-focused (e.g., IEA Bioenergy) [INT#13, INT#16]. In addition, it was regularly emphasized that being hosted by the FAO provided GBEP with a comparative advantage. Among others, it was noted that "having FAO-backed statements" allowed it to be more "authoritative" and to be "taken more seriously" (INT#12).

Turning to impact, effectiveness and equity, GBEP, like most climate clubs, lacks any sort of binding targets or systems of formal reporting, making it necessary therefore to focus attention on "club contributions that are difficult to quantify, e.g., generation of support for policies", as per Unger and Thielges ([13], p.4). In this sense, most interviewees expressed their support and appreciation for the work of GBEP, with outcomes perceived to be both legitimate and just. In addition to offering valuable epistemic services to its member states, its capacity-building initiatives and efforts had provided stakeholders with important lessons and policy recommendations. As noted by an interviewee, "in terms of effectiveness, if you think of effectiveness in terms of results divided by input or resources, I think they are pretty effective, because they work with a minimal budget and minimal resources, but are still able to engage with countries, disseminate what they do, [and] have some influence…" (INT#5). However, as already noted, GBEP's focus on prioritizing the promotion of its indicators has been met with criticism, with various interviewees arguing that from a problem-solving quality perspective, the impact of this output has so far been limited. The fact that the indicators have not been widely implemented, led an interviewee to argue that GBEP has now downgraded to "a small community of practice that had its relevance in keeping bioenergy debates on, especially for less 'vanguardist' topics like wood biomass use in low-income countries. But wasn't really having an impact on global climate and energy governance for years already. In fact, the Biofuture Platform had to be established because of GBEP's low relevance in that sphere" (INT#17).

Another interesting finding was that GBEP seems to lack adequate visibility in the international arena, even though it is one of the main multilateral bodies in the global bioenergy governance space. For example, an interviewee from a major global organization which supports and represents a wide range of actors in the bioenergy sector, noted that they came to know about GBEP only "four or five years ago", when they came across a webinar or a report on the GBEP sustainability indicators (INT#12). The same interviewee noted that "this is a particular challenge for the sector, because there are a lot of good organizations that work on bioenergy [and] sometimes, we do not know each of them, for a variety of reasons". Another interviewee, a senior official from an African country, noted that they were not very sure how well GBEP was known in their region, arguing that if GBEP were to engage in "more awareness-raising, their impact would increase" (INT#14). They went on to say that GBEP "should have a slot in events organized at regional and national levels, to come and share knowledge there in such fora [sic]". Engaging in such impact-generating activities, however, was deemed difficult due to the small size and resources of the secretariat (INT#1).

6. Discussion and conclusion

Since 2006, GBEP has provided a forum for a range of public, private and civil society stakeholders to advance sustainable bioenergy as part of the global climate and sustainable development agenda. This paper sought to identify the contributions GBEP has made to climate change and bioenergy governance over the two decades of its existence through its efforts to expand modern, reliable and sustainable use of bioenergy. The answer to the research question that has guided this paper is that even though GBEP has played an active role in the bioenergy governance space, various factors have undermined its capacity to play a larger one. GBEP has a number of achievements to its credit, especially in the areas of sustainability indicator-setting, capacity building, and awareness raising and information exchange. However, its small size, lack of adequate funding, low agenda-setting powers, fluctuations in the interest of its members, as well as disagreements over its policy development priorities, have prevented GBEP from exerting greater influence in the global bioenergy arena. These finding are significant as they address a lacuna in the literature on this field, namely the lack of studies examining the empirical record of climate clubs and club-like arrangements.

Evaluating and interpreting the results allows for several conclusions or inferences to be drawn, both about the utility of the framework employed by this study, as well as with respect to the strengths and weaknesses of GBEP. To begin with, this paper has proposed and applied a novel framework of explanatory variables for the study of climate club contributions to climate change and bioenergy governance. While it has proved a useful heuristic for examining the governance contributions of climate clubs, it, should be noted at this point that to augment the utility of the framework it is important to also consider how the criteria relate to one another. To give some examples, the literature has highlighted the significance of membership and adequate size in increasing a club's collective potential to effectively contribute to governance in a policy domain [4,19]. Findings revealed that the fact that GBEP comprises a diverse range of members has led to increased impact, primarily through its capacity development activities. Its Bioenergy Weeks for instance have facilitated interaction opportunities among a large network of bioenergy stakeholders, while its diverse capacity-building activities, such as workshops, webinars, study tours and public forums, have facilitated the exchange of experiences among its diverse membership. These contributions are perceived as valuable by developing countries in particular, which view GBEP as an important collaborative platform that can support them in their efforts to integrate bioenergy into their broader development strategies, thereby augmenting GBEP's legitimacy in the process. Another example involves GBEP's close organizational link to FAO, which effectively enhances and augments the former's technical capabilities, creates some limited or informal opportunities for influencing agenda-setting, as well as increases its legitimacy base. A final example relates to the consequences of policy development choices. Climate clubs should constantly be seeking to further enhance the policy relevance and impact of their pursuits in order to avoid fluctuations in group membership, i.e., some members losing interest and/or dropping out. Several interviewees contended that GBEP erred in putting all its eggs in one basket in developing its bioenergy sustainability indicators, citing time and cost as implementation barriers, as well as their poor alignment with the bioenergy trade priorities and needs of some of its members. GBEP has acknowledged that many of its members have limited resources to carry out the in-depth, data- and capacity-intensive process required for implementing the indicators and has responded by developing a Rapid Implementation Framework (RIF), which is a step in the right direction as it facilitates a less resource-intensive measurement of the GBEP indicators [49].

What does the future hold for GBEP, both in terms of opportunities and challenges? To start with, GBEP possesses several advantages, the foremost being its relationship to FAO. If GBEP can leverage its position within FAO to develop a goal or goals that could allow it to exploit its niche(s) more fully, it could then exert greater influence on the governance of bioenergy. GBEP has shown signs of being proactive by, for example, convening the cross-initiative coordination (CIC) group on bioenergy, which culminated in various international bioenergy actors coming together to issue a joint statement on the role bioenergy should play in support of climate and development goals. GBEP could further strengthen its role in metagovernance by capitalizing on CIC's success and making it a permanent feature of the bioenergy governance landscape. In such a crowded and fragmented governance environment, a space that allows international actors working on bioenergy to coordinate and complement their activities and avoid duplication is surely needed.

Second, the current international political environment is conducive to bioenergy deployment and innovation. Countries worldwide are increasingly leveraging the Sustainable Development Goals (SDGs) as a framework for building a more resilient and sustainable future. To attain the SDGs, transitioning towards a bioeconomy has emerged as an attractive policy idea in recent times [2]. Sustainable bioenergy is a component of the bioeconomy, hence by tapping into recent interest in the latter, GBEP can enhance its utility by assisting governments identify solutions to the various problems they face, ranging from energy security and rural development to socioeconomic development and climate change mitigation and adaptation. Again, GBEP has shown signs of being proactive. For example, its recent focus on ethanol for clean cooking in African and Asian countries could potentially make a positive contribution to this target, even though it should be kept in mind that clean cooking is a crowded policy space with numerous competitors.

There are, however, risks and challenges along the way. First, as already noted, the global bioenergy space is an increasingly crowded one, characterized by a growing number and variety of collaborative mechanisms [50]. In the global bioenergy governance space, for instance, we have witnessed the creation of the Biofuture Platform in 2016 and of the Global Biofuels Alliance in 2023. Such fragmentation has the potential to result in proliferation of international bodies with overlapping mandates, goals and activities exhibiting different degrees of compatibility, intersecting target membership, as well as political quarrels and rivalry [51]. Second, and relatedly, their ever-growing number has inevitably led to competition for political and financial resources from both their state and nonstate members [19]. As already noted, GBEP in recent years had to carry out its activities with the lowest annual funds so far in its history, while it has also struggled to secure regular funding from a diverse range of donors. As Unger and Thielges [13] note, the role of climate clubs in "supporting, guiding, and orchestrating climate action is also shaped by their funds" (p.41). In such an increasingly constrained financial environment, climate clubs may lag behind in their ability to produce large-scale benefits to their members, meaning that the projects they pursue may therefore only have little discernible impact on the ground.

To conclude, this paper suggests a few areas for future research. First, there is space for more studies assessing the empirical record of climate clubs and the specific nature of their governance contributions. Second, as the number of climate clubs keeps increasing, comparative analyses of these global governance arrangements and their overlaps merits further investigation. Finally, and relatedly, we have seen in recent years the launch of several other climate clubs in the international bioenergy arena, such as the Biofuture Platform in 2016 or the Global Biofuels Alliance in 2023, which raises questions around why countries would advance the overall degree of fragmentation at the international level by creating additional cooperative arrangements with (potentially) overlapping functions.

CRediT authorship contribution statement

Stavros Afionis: Writing – review & editing, Writing – original draft, 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.

Acknowledgments

I would like to thank all the interviewees who contributed their time to this project. I would also like to thank the anonymous reviewers, as well as Florentine Koppenborg, Stacy D. VanDeveer, Naghmeh Nasiritousi, Gunilla Reischl, Christin Heinz-Fischer, and Charlotte Unger for their helpful comments on a draft of this paper that was presented at the 2025 General Conference of the European Consortium for Political Research (ECPR), hosted by the Aristotle University of Thessaloniki (Greece).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.erss.2025.104384.

Data availability

The data that has been used is confidential.

References

[1] G-8, The Gleneagles communiqué: Climate change, energy and sustainable development, Available: https://g7.utoronto.ca/summit/2005gleneagles/communique.pdf, 2005.
[2] M.G. Bastos Lima, The Politics of Bioeconomy and Sustainability: Lessons from Biofuel Governance, Policies and Production Strategies in the Emerging World, Springer, Cham, 2021.
[3] L.S. Nowell, J.M. Norris, D.E. White, N.J. Moules, Thematic Analysis: Striving to Meet the Trustworthiness Criteria, Int J Qual Methods 16 (1) (2017) 1–13.
[4] C. Unger, K.A. Mar, K. Gürtler, A club's contribution to global climate governance: the case of the Climate and Clean Air Coalition, Palgrave Commun. 6 (2020) 99.
[5] J. Hovi, D.F. Sprinz, H. Sælen, A. Underdal, The Club Approach: A Gateway to Effective Climate Co-operation? Br. J. Polit. Sci. 49 (3) (2019) 1071–1096.
[6] L. Weischer, J. Morgan, M. Patel, Climate clubs: Can small groups of countries make a big difference in addressing climate change? Rev. Eur. Community & Int'l Envtl. L. 21 (3) (2012) 177–192.
[7] F. Koppenborg, Phase-out clubs: an effective tool for global climate governance? Environmental Politics (2025) 1–23.
[8] R. Huseby, J. Hovi, T. Skodvin, Protecting future generations through minilateralism: Climate clubs and normative legitimacy, Politics and Governance 12 (2024) 7674.
[9] R.B. Stewart, M. Oppenheimer, B. Rudyk, Building blocks: a strategy for near-term action within the new global climate framework, Clim. Chang. 144 (2017) 1–13.
[10] J.F. Green, The strength of weakness: pseudo-clubs in the climate regime, Clim. Chang. 144 (1) (2017) 41–52.
[11] R. Falkner, N. Nasiritousi, G. Reischl, Climate clubs: politically feasible and desirable? Clim. Pol. 22 (4) (2022) 480–487.
[12] W. Nordhaus, Dynamic climate clubs: On the effectiveness of incentives in global climate agreements, Proc. Natl. Acad. Sci. 118 (45) (2021) e2109988118.
[13] C. Unger, S. Thielges, Preparing the playing field: climate club governance of the G20, Climate and Clean Air Coalition, and Under2 Coalition, Clim. Chang. 167 (2021) 41.
[14] S. Andresen, Exclusive approaches to climate governance: More effective than the UNFCCC? in: T.L. Cherry, J. Hovi, D.M. McEvoy (Eds.), Toward a new climate agreement Routledge, 2014, pp. 155–166.
[15] J. Urpelainen, T. Van de Graaf, The International Renewable Energy Agency: a success story in institutional innovation? Int. Environ. Agreem.: Politics Law Econ. 15 (2015) 159–177.
[16] B. Yu, S. Bernstein, M. Hoffmann, Building durable climate clubs: Lessons from a comparative study of the APP and CEM, Chinese Journal of Population, Resources and Environment 19 (2) (2021) 117–124.
[17] I.J. Visseren-Hamakers, Partnerships and sustainable development: The lessons learned from international biodiversity governance, Environ. Policy Gov. 23 (3) (2013) 145–160.
[18] J.M. Forner C., Díaz, A review of intergovernmental cooperation on the mitigation of climate change, World Resources Institute, 2023, pp. 1–44. Available: https://www.wri.org/research/review-intergovernmental-cooperation-mitigation-climate-change.
[19] O. Widerberg, P. Pattberg, International cooperative initiatives in global climate governance: Raising the ambition level or delegitimizing the UNFCCC? Global Pol. 6 (1) (2015) 45–56.
[20] K.W. Abbott, B. Faude, Hybrid institutional complexes in global governance, Rev. Int. Organ. 17 (2) (2022) 263–291.
[21] M.M. Van Huijstee, M. Francken, P. Leroy, Partnerships for sustainable development: A review of current literature, Environ. Sci. 4 (2) (2007) 75–89.
[22] J. Lucas, A. Smith, Multilevel policy from the municipal perspective: A pan-Canadian survey, Can. Public Adm. 62 (2) (2019) 270–293.
[23] S. Oberthür, L. Hermwille, T. Rayner, A sectoral perspective on global climate governance: Analytical foundation, Earth System Governance 8 (2021) 100104.
[24] J. Hovi, D.F. Sprinz, H. Sælen, A. Underdal, Climate change mitigation: a role for climate clubs? Palgrave Commun. 2 (1) (2016) 16020.
[25] R. Falkner, A minilateral solution for global climate change? On bargaining efficiency, club benefits, and international legitimacy, Perspectives on Politics 14 (1) (2016) 87–101.
[26] J. Tallberg, M. Zürn, The legitimacy and legitimation of international organizations: Introduction and framework, Rev. Int. Organ. 14 (2019) 581–606.
[27] R. Gampfer, Minilateralism or the UNFCCC? The political feasibility of climate clubs, Global Environmental Politics 16 (3) (2016) 62–88.
[28] T. Risse, M. Kleine, Assessing the legitimacy of the EU's treaty revision methods, JCMS J. Common Market Stud. 45 (1) (2007) 69–80.
[29] M. Blagescu, L. de Las Casas, R. Lloyd, Pathways to Accountability: The GAP Framework, One World Trust, 2005. Available: http://www.lasociedadcivil.org/wpcontent/uploads/2014/11/pathways_to_accountability.pdf.
[30] S.I. Karlsson-Vinkhuyzen, A. Vihma, Comparing the legitimacy and effectiveness of global hard and soft law: An analytical framework, Regulation & Governance 3 (4) (2009) 400–420.
[31] R.O. Keohane, Global governance and legitimacy, Rev. Int. Polit. Econ. 18 (1) (2011) 99–109.
[32] S.I. Karlsson-Vinkhuyzen, J. McGee, Legitimacy in an era of fragmentation: The case of global climate governance, Global Environmental Politics 13 (3) (2013) 56–78.
[33] N. Nasiritousi, H. Faber, Legitimacy under institutional complexity: Mapping stakeholder perceptions of legitimate institutions and their sources of legitimacy in global renewable energy governance, Rev. Int. Stud. 47 (3) (2021) 377–398.
[34] H. van Asselt, The Continuing Relevance of the Asia-Pacific Partnership (+) for International Law on Climate Change, CCLR 11 (3) (2017) 184–186.
[35] J. Corbett, X. Yi-Chong, P. Weller, Small states and the 'throughput'legitimacy of international organizations, Camb. Rev. Int. Aff. 31 (2) (2018) 183–202.
[36] GBEP, Partners and observers, Available: https://www.fao.org/in-action/global-bioenergy-partnership/about/partners-and-observers/en, 2025.
[37] GBEP, GBEP programme of work for the biennium 2023 2024: Funding arrangements and links with international fora, BEP 28th Steering Committee meeting, FAO Headquarters, Rome, 2023.
[38] GBEP, 25th Meeting of the GBEP Steering Committee - Co-Chairs Summary, 2022.
[39] GBEP, The Global Bioenergy Partnership Sustainability Indicators for bioenergy, Available: https://www.fao.org/3/cc7026en/cc7026en.pdf, 2011.
[40] T. Pirelli, A. Chiumenti, M.M. Morese, G. Bonati, S. Fabiani, G. Pulighe, Environmental sustainability of the biogas pathway in Italy through the methodology of the Global Bioenergy Partnership, J. Clean. Prod. 318 (2021) 128483.
[41] G. Pulighe, T. Pirelli, Assessing the sustainability of bioenergy pathways through a land-water-energy nexus approach, Renew. Sust. Energ. Rev. 184 (2023) 113539.
[42] T. Hayashi, E.C. van Ierland, X. Zhu, A holistic sustainability assessment tool for bioenergy using the Global Bioenergy Partnership (GBEP) sustainability indicators, Biomass Bioenergy 66 (2014) 70–80.
[43] H.M. Junginger, T. Mai-Moulin, V. Daioglou, U. Fritsche, R. Guisson, C. Hennig, D. Thrän, J. Heinimö, J.R. Hess, P. Lamers, The future of biomass and bioenergy deployment and trade: a synthesis of 15 years IEA Bioenergy Task 40 on sustainable bioenergy trade, Biofuels Bioprod. Biorefin. 13 (2) (2019) 247–266.
[44] S. Renckens, G. Skogstad, M. Mondou, When normative and market power interact: the European Union and global biofuels governance, JCMS: J. Common Mark. Stud. 55 (6) (2017) 1432–1448.
[45] Y. Naiki, Trade and bioenergy: explaining and assessing the regime complex for sustainable bioenergy, European Journal of International Law 27 (1) (2016) 129–159.
[46] GBEP, Sustainable bioenergy in national and international contexts, Available: https://www.fao.org/in-action/global-bioenergy-partnership/tools-andresources/multimedia/video-detail/sustainable-bioenergy-in-national-and-internationalcontexts/en, 2021.
[47] GBEP, GBEP Newsletter #30, Available: https://fao.sitefinity.cloud/in-action/globalbioenergy-partnership/news-and-events/news/news-detail/gbep-newsletter–30/en, 2023.
[48] GBEP, Joint Statement on Sustainable bioenergy for climate and development goals, Available: https://www.fao.org/climate-change/news/news-detail/sustainable-bioenergy-forclimate-and-development-goals/en, 2024.
[49] GBEP, Rapid Implementation Framework for the GBEP Sustainability Indicators for Bioenergy: Handbook, Available: https://www.fao.org/3/cc7024en/cc7024en.pdf, 2021.
[50] S. Bößner, F.X. Johnson, Z. Shawoo, Governing the bioeconomy: what role for international institutions? Sustainability 13 (1) (2020) 286.
[51] J. Urpelainen, T. Van de Graaf, Your place or mine? Institutional capture and the creation of overlapping international institutions, British Journal of Political Science 45 (4) (2015) 799–827.