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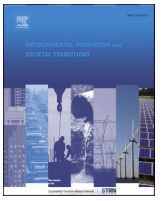

Challenge accepted: Sub-national government authorities and the legitimacy of co-creative redevelopment projects in fossil-industrial regions

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ABSTRACT

Regions reliant on declining fossil fuel production often grapple with upcoming deindustrialisation, economic decline, and deterioration of liveability. In attempts to address these issues proactively, local change agents, including sub-national government authorities, increasingly collaborate to develop new, more sustainable and just regional pathways. A potential yet not uncontested stepping stone towards such pathways is co-creative asset redevelopment. In this paper, we focus on the role of sub-national government authorities in co-creative redevelopment. Particularly, we zoom in on the legitimacy challenges that these authorities face and must address for co-creative redevelopment to have transformative capacity. We draw on insights from the case of GZI Next in Emmen, the Netherlands, and identify six challenges, amongst others intra-organisational conflicts of interests, accountability issues, and competing claims to the right to a just transition. We reflect on these challenges and how to overcome them and propose avenues for future research.

1. Introduction: co-creative redevelopment in fossil-industrial regions

Regions with a strong dependence on fossil fuel exploitation face upcoming deindustrialisation, economic decline, and deteriorating regional liveability, when production declines or dries up completely (Coenen et al., 2018; Harrahill & Douglas, 2019; Loewen, 2022; Markey et al., 2022). These are complex, systemic issues that cannot be addressed with single or unilateral interventions. Instead, collaborative actions and integrated, systemic interventions are needed to alleviate existing economic dependencies, facilitate the creation of new paths, and steer towards more sustainable and equitable regional futures (Martin & Sunley, 2006; Dawley, 2014; Coenen et al., 2018; Hölscher et al., 2018; OECD, 2019; Isaksen et al., 2022; Grillitsch et al., 2023). One particularly promising avenue in this regard is the co-*creative redevelopment* of traditionally dedicated fossil fuel assets, infrastructures, knowledges and capabilities

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(Rodhouse, et al., 2023; Sillak & Vasser, 2023).

Co-creative asset redevelopment is grounded in two converging trends. The first is the increasing adoption of co-creative formats in addressing regional problems. With co-creation, we refer to intentionally collaborative experimentation processes in which two or more regionally embedded actors, such as public authorities, businesses, non-for-profit organisations, research institutes, and communities participate to develop innovative solutions to regional problems (Ansell & Torfing, 2021; Itten et al., 2021; Ansell et al., 2022; Elkjær & Horst, 2023). The second trend is the emergent recognition of the value potential of soon-to-be-redundant fossil industrial assets and infrastructures. This, in turn, is driven by both increasingly potent narratives of declining production volumes and by growing societal concerns on the negative impacts of fossil fuel activities (see, for example, Van Dokkum et al., 2023). Fossil industrial players now anticipate that many dedicated fossil fuel assets and infrastructures will lose their original function in the coming years, and they are increasingly incentivised to explore the potential of repurposing these assets and infrastructures for more sustainable energy activities (Capobianco et al., 2022; Spezakis and Xydis, 2022).

Co-creative redevelopment could act as a stepping stone or even catalyst for regional transitions. It can contribute to regional diversification towards more sustainable activities (Martin & Sunley, 2006) and is also expected to be more cost-efficient, easier to accept and swifter to implement than more rigorous transition paths and activities (Spezakis & Xydis, 2022; Carbon Limits & DNV, 2021; OECD, 2019). Nevertheless, the notion that redevelopment could accelerate the regional energy transition is not without criticism. Fossil-fuel-based assets and infrastructures, as deeply intrinsic fossil system components, are often considered lock-ins, and for good reason: they are generally rigid in form, function, and location. These characteristics may work to narrow the range of possibilities considered in innovation processes, instead of encouraging the more out-of-the-box, exploratory, and potentially disruptive thinking that is generally seen as essential for meaningful transformation (Loorbach, 2022). Moreover, because redevelopment inherently relies on the involvement of incumbent actors, there is a risk that visions of redevelopment for sustainable and just transitions become used as shields to protect vested interests and perpetuate further injustice (Heffron & McCauley, 2022). Indeed, because visions for redevelopment generally arise from regime structures and are closely linked to the interests of regime players, there is a good chance that these visions reproduce and further consolidate the (unjust) status quo (Avelino et al., 2016). This also raises the question of whether the interests of incumbent parties in co-creation truly stem from an intention for change, or whether perhaps this is another form of 'capture' (De Geus et al., 2022; Gaede and Meadowcroft, 2016; Pel, 2016), that is, an example of regime players adopting governance innovations such as co-creation in ways that quietly neutralise, rather than substantially address societal concerns about the role and power of the fossil actors in (regional) society.

Can co-creative redevelopment of fossil assets, infrastructures, knowledge, and capabilities drive just regional energy transitions? Or should the notion of co-creative redevelopment be dismantled in the same manner that other (elements of) old fossil fuel systems and supply chains are to be disrupted, dismantled, terminated, or phased out (Turnheim & Geels, 2012; Johnston & Hielscher, 2017; Andersen & Gulbrandsen, 2020)? Answering these questions requires further research into how co-creative redevelopment can and should be organised, how issues of politics, agency, power, and legitimacy are managed within co-creative redevelopment projects, and – not in the least – how co-creative redevelopment can come to act as a long-term driver of other energy transition activities in the region. While these topics are too broad to be explored within the scope of a single paper, we aim to modestly contribute to the evolving debate by focussing on how co-creative redevelopment can be legitimately organised in attempts for broader regional change.

We start from the premise that, for co-creative redevelopment to be transformative, it must be seen as legitimate by involved actors as much as by external stakeholders. After all, when co-creative redevelopment is believed to be illegitimate, it is unlikely to become accepted, supported, and adopted by a wider range of actors, which would most certainly limit the extent to which it could contribute to structural, transformative change. Legitimacy, as understood in this context, refers to a (shared) belief in the rightfulness and justness of a particular form of organisation. Amongst others, such legitimacy beliefs are based on perceptions of alignment between this organisation and existing rules, laws, and regulations; democratic procedures, public values, justice notions and principles; and other cultural-cognitive frameworks (Rodhouse, 2025). Legitimacy beliefs do not simply emerge; they must be actively constructed, fostered and defended. This also implies that legitimacy beliefs are not static. Over the course of asset redevelopment, things will happen that can and will challenge legitimacy beliefs, in and outside the group engaged in co-creation. New partners enter, new knowledge and information becomes available, or new and unexpected issues come up. It is up to the co-creators to constantly realign and re-establish shared beliefs in the legitimacy of their activities in the face of such challenges.

This paper focuses on these challenges to legitimacy in co-creative asset redevelopment. Although we recognise that the address of these challenges is a collective responsibility of all co-creators, we primarily centre on the role and perspective of the sub-national governmental authorities involved. These authorities have a unique position in co-creative redevelopment (Harrahill & Douglas, 2019; Borrás & Edler, 2020; Elkjær & Horst, 2023): their established position, their mandated roles, and their administrative and democratic relationship with citizens make that they have a unique responsibility for safeguarding public interests in these initiatives, while also bearing unique political accountability for their involvement and investments. If public interests are inadequately safeguarded, if co-creative redevelopment proves insufficiently contributing to regional goals and ambitions, or if government involvement is used to unjustifiably claim legitimacy for continued fossil industry presence in the region (see, for example, Radtke & Beer, 2024), these participating governmental authorities will face considerable public and political backlash. In other words, their involvement is contingent upon and interacting with the legitimacy of the co-creative process itself. Despite this distinct role and position for sub-national government authorities, the emerging literature on co-creative asset (re)development has yet to pay specific attention to these actors (Henderson, 2015; Arena et al., 2020; Morgan & Henderson, 2023; Sillak & Vasser, 2023; Van Dokkum et al., 2023).

Our research question therefore is, 'What legitimacy challenges arise for sub-national government authorities when engaging in co-creative fossil fuel asset redevelopment projects, and how to address these challenges to enhance the transformative capacity of such

projects?'. Our insights are drawn from an exploratory single case study, namely, GZI Next in Emmen.

In the remainder of this paper, we introduce co-creative redevelopment projects as new and informal arenas for regional transition governance. We also discuss the political dynamics in and around such projects, and how these might create a variety of legitimacy issues, especially for sub-national government authorities (Section 2). In Section 3, we introduce our case study, and in Section 4, we outline the case study methodology. In Section 5 we present the six legitimacy challenges that we identified in the case. We then discuss these challenges in light of evolving transition studies literature, while also reflecting on the wider implications of our insights for (governmental) co-creators in asset redevelopment in fossil-industrial regions (Section 6). We conclude the paper with avenues for future research (Section 7).

2. Legitimacy challenges for government authorities in co-creative redevelopment projects – a theoretical exploration

2.1. From asset management to transition arenas

Traditionally, asset management in fossil industries is a closed process, marked by the default choice – or obligation – to abandon or decommission assets such as reserves, platforms, pipelines, treatment plants, and refineries at the end of their economic life. This is typically planned long in advance by the asset-owning organisation and involves only a few trusted experts, companies, and regulatory authorities (Sillak & Vasser, 2023). Decommissioning decisions normally pay limited attention to new value that end-of-lifecycle assets could generate (Mulholland et al., 2019).

This is now changing. An emergent trend amongst fossil industrial asset owners is to investigate opportunities for repurposing and redevelopment in new, sustainable, and innovative ways (Arena et al., 2020; Capobianco et al., 2022; Spezakis and Xydis, 2022). The advantages of repurposing are firstly, that it can be more cost-effective than decommissioning (Capobianco et al., 2022); secondly, that it supports the development of new value-generating activities, while decommissioning mainly signifies value loss for asset owners (Leporini et al., 2019); and thirdly, that it can offer fossil industrial parties a new purpose and social licence in a carbon-neutral world (Arena et al., 2020; Capobianco et al., 2022).

Attempts at redevelopment involve doing new and different things, not only in finding novel functionalities for the assets in question but also in experimenting with new, inclusive and even co-creative project formats (Basile et al., 2022; Coenen et al., 2018; Rinscheid et al., 2021; Sillak and Vasser, 2023; Zagonari, 2023). In redevelopment, asset management processes are increasingly opened up to be more inclusive of local stakeholders and their viewpoints (Coenen et al., 2018; Morgan & Henderson, 2023). This increased openness offers opportunities for regional change agents to bring in their own issues and concerns, and to explore how they could further their regional transition agenda in and through asset redevelopment. Consequently, co-creative redevelopment projects increasingly function as tangible sites for upcoming change, around which diverse actors can mobilise themselves to discuss, negotiate, collaborate, and steer on wider regional transitions. It is in that sense that co-creative redevelopment projects are turning into regional transition arenas (Morgan & Henderson, 2023; Bridge & Gailing, 2020; Avelino et al., 2016). Interestingly, experimenting with repurposing concrete fossil-industrial sites and assets is but one of the aims in these arenas. Other aims are experimentation with building new relationships and forms of regional governance and the coproduction of new and shared regional pathways and futures (Sillak & Vasser, 2023).

Because co-creative asset redevelopment projects become settings for regional governance and decision making on public values, interests, and futures, it is essential to critically reflect on the legitimacy of these types of projects. Amongst others, this requires explicit attention to how legitimacy may be impacted by the political dynamics in these projects, related to the different interests, relationships, and power of co-creating actors.

In Section 2.2, we highlight three key political dynamics that we expect to be of relevance to the legitimacy of co-creative asset redevelopment, as identified in the literature.

2.2. The politics and legitimacy challenges of co-creative redevelopment projects

2.2.1. Co-creative redevelopment can contribute to (dis)empowerment and (in)equality

Ideally, co-creation is grounded in principles of mutuality, reciprocity, and equality (Turnhout et al., 2020), offering opportunities to reconfigure governance by moving from exclusive, elite-dominated arenas to inclusive environments fostering deliberation, dialogue, and participation (Healy & Barry, 2017, p. 453). In practice, however, co-creators often possess varying levels of resources, agency, and influence, leading to power imbalances in co-creation (Avelino et al., 2016; Turnhout et al., 2020). In line with broader critiques on transition governance, co-creation can reproduce pre-existing inequalities and reinforce positions of influence for elite actors (Hendriks, 2009; De Geus et al., 2022). This issue is particularly acute in co-creative redevelopment projects, where pre-existing legacies and power dynamics heavily influence governance (Bridge & Gailing, 2020). Incumbent fossil fuel companies hold significant advantages through asset ownership, expertise, and regulatory knowledge. Additionally, stringent regulations surrounding end-of-life infrastructures leave little space for public participation, further entrenching inequalities (Avelino, 2017). Unlike innovation within protected 'niches', where innovation(s) can long be shielded from such aspects and public participation can be embraced more freely, co-creative redevelopment must explicitly address these issues of entrenched power, incumbency and institutionalized procedure in the innovation process (De Geus et al., 2022). Whether this is even feasible is debated. Incumbents, heavily invested in existing production methods and infrastructure, are often perceived as more committed to maintaining the regime than destabilizing it with novel solutions (Turnheim & Geels, 2012; Avelino et al., 2016). This skepticism raises concerns that co-creative projects are examples of 'capture' (Geels and Schot, 2007; Pel, 2016; Gaede and Meadowcroft, 2016; De Geus et al., 2022), or are mere window-dressing for

reputational gains, rather than fostering genuine structural change (Radtke & Beer, 2024).

2.2.2. Co-creative redevelopment projects are part of a complex, multi-level governance system

Regional transition governance is known to be dispersed, taking place across levels, scales, and arenas (Avelino et al., 2016). Co-creative redevelopment projects are but one of the multiple arenas in which actors meet to give shape to their regional future. In recent literature, there has been increasing attention to the way in which more informal arenas, such as co-creative redevelopment projects, interact with more formal governance structures (De Geus et al., 2022). These informal governance practices may intervene with existing policies, institutions, and democratic procedures. This has raised questions on, amongst others, the influence of private change agents, their closeness to formal procedures, and the need for democratic legitimacy in these more informal arenas (Hendriks, 2009; De Geus et al., 2022).

Moreover, apart from meeting in the co-creative redevelopment arena, co-creators will also meet each other (and other actors) in other regional governance arenas. These arenas will be characterised by other issues, interests, and power dynamics. Consequently, actors will almost inevitably experience disparities in interests, influence, and perspectives, which may lead to conflicts. It can be challenging to prevent these conflicts from spilling over into the co-creation process, potentially hindering collaboration or exposing co-creative redevelopment to broader strategic power plays that may hinder its transformative capacity. Another key consideration is the need for actors in co-creative redevelopment projects to legitimise their efforts at these other arenas, and possibly also higher levels of governance, to secure support and resources both for the project itself and for the broader regional transformation that should follow if co-creation proves successful (Raven et al., 2016).

2.2.3. Co-creative redevelopment projects create shared socio-spatial imaginaries with political consequences

A third way in which political dynamics manifest in co-creative redevelopment is through the process of placemaking, that is, the creation and enactment of socio-spatial imaginaries (Watkins, 2015; Chateau et al., 2021) or place frames (Murphy, 2015; Nygaard, 2024). In a narrow sense, one could relate such placemaking (Murphy, 2015; Nygaard, 2024) to the (re)making of the concrete locations of fossil assets and infrastructures. However, co-creators in redevelopment projects generally have aims, goals, expectations, and ambitions that extend far beyond the immediate material sites, assets and infrastructures that are up for redevelopment. Co-creative redevelopment projects thus serve as forums where actors can come together to contrast, negotiate, compromise and come to agree on shared understandings of the techno-material, economic, and even cultural futures for the region (Binz et al., 2020; Rodhouse et al., 2023).

Processes of placemaking in co-creative redevelopment are inherently political and involve competition and conflict between differing understandings of place and society, possibly existing at different levels of governance, that need to be somehow resolved in a shared vision, frame or imaginary (Rodhouse et al., 2023; Nygaard, 2024). Frame alignment typically involves obscuring differences and emphasising similarities between different understandings of place and society (Pierce et al., 2011). While necessary for collaboration, this process of abstraction generally works to obscure the heterogeneous nature of places and communities. Placemaking thus involves a necessary but ultimately unrepresentative simplification of 'place'. Once established, shared understandings of place and community can come to play a powerful guiding and performative role in regional transitions (Chateau et al., 2021). This comes with legitimacy issues, not in the least in terms of representation and recognition of place and community. Imaginaries will hardly be seen as legitimate if they are the result of undemocratic processes, or if they are felt to be largely unreflective of people's own experience and understanding of their living environment (Nygaard, 2024).

2.3. The unique role of sub-national government authorities in co-creative asset redevelopment

The political dynamic and potential legitimacy challenges of co-creative redevelopment discussed above are relevant to all involved co-creators. They are, however, particularly significant for sub-national government authorities due to the unique role that these authorities have within and outside of co-creation. These authorities have an established position and mandate within the traditional government system, must safeguard their democratic relationship with citizens, and need to implement established policy targets related to energy project development. Moreover, in contrast to most other co-creators, they are politically accountable for the outcomes of co-creative redevelopment.

Compared to other co-creators, sub-national government authorities also face far greater expectations regarding their roles and responsibilities in transitions (Braams et al., 2021). This often creates internal tensions and concerns about legitimacy, particularly when such expectations, for example about governmental participation in co-creation, conflict with the valued traditions, role perceptions, and normative frameworks that civil servants and local politicians have long relied on (Braams et al., 2021; Torfing et al., 2019). How these expectations are enacted in co-creative redevelopment may also introduce new legitimacy challenges. For instance, governments may perceive co-creation as illegitimate if they lack the time, capacity, or skills to meet these expectations (Tuurnas, 2015; Torfing et al., 2019; Itten et al., 2021; Sillak et al., 2021; Ansell et al., 2022). Other governmental challenges to legitimacy arise when public interests are not safeguarded, if co-creative redevelopment fails to contribute to regional goals, or if government involvement is used to unjustifiably legitimize continued fossil fuel presence.

Despite the distinct role and high stakes for these authorities, the emerging literature on co-creative asset (re)development has not yet zoomed in on these actors (Henderson, 2015; Arena et al., 2020; Morgan & Henderson, 2023; Sillak & Vasser, 2023). To the best of our knowledge, this is the first study that combines different literatures on co-creative redevelopment of fossil industrial assets, the role of sub-national government authorities in regional change, and legitimacy. It is both in this synergy of perspectives as in the exploratory nature of the new phenomenon of co-creative asset redevelopment that our contributions lie.

3. Case introduction: GZI Next

GZI Next is a co-creative redevelopment project in Emmen, the Netherlands (Fig. 1). It is located on the site of a former natural gas treatment plant [GZI] of the Nederlandse Aardolie Maatschappij [NAM], which was closed in 2017.

At the time of closure, the owners of the GZI site – NAM and Energie Beheer Nederland [EBN] – saw opportunities for the redevelopment of the 35-hectare area. The site had various advantageous qualities, such as a pre-assigned industrial purpose in local zoning plans, a well-maintained and regionally well-connected underground gas pipeline system, and an existing connection to regional electricity transmission infrastructure, which made it suitable for many renewable energy-related activities. The owners also realised that there were opportunities to align the project with other regional goals. That is why, end of 2017, NAM brought the opportunity of reuse to the attention of multiple regional stakeholders, amongst which the municipality of Emmen and the Province of Drenthe.

Like other parts of Drenthe, Emmen was confronted with declining employment in the gas sector. With the exploitation of gas reserves in the Northern Netherlands rapidly decreasing, economic revitalization was high on the governmental agenda. Both the municipality and province recognised that the redevelopment of GZI could contribute to local reemployment and to regional economic growth.

With these opportunities in mind, NAM invited twenty-eight regional stakeholders for a brainstorm on the future of the site. Given the size of the site, the participants of the session believed that multiple activities could be developed simultaneously. Following the brainstorm session, an emergent and over time expanding consortium including NAM, EBN, the municipality of Emmen, the Province of Drenthe, Shell, Engie, Emmtec/GETEC services, New Energy Coalition [NEC], Gasunie New Energy, and Gasunie Transport Services [GTS] (see appendix A for an overview of involved actors in the project over time) continued to investigate the feasibility of three

Fig. 1. Location GZI Next in Emmen, Northern Netherlands.

suggested options. These were 1) electricity generation by use of Solar PV, 2) hydrogen production via electrolysis, and 3) biogas production via bio-digestion. Also explored was the idea to develop an on-site Field Lab for students at vocational schools, where they could learn from and experiment with processes and technologies on the site. Ideas for the synergetic development of the various energy activities soon emerged. The co-creators felt that the site could become an 'energy hub': a location where various forms of energy generation, conversion and storage were developed in integration, with the aim of creating new regional energy supply and storage solutions. GZI Next, as the project was named, became the first pilot for this 'hub-concept'.

The co-creators worked on business development for each of the activities in separate working groups (Solar, Hydrogen and Green Gas), while the municipality of Emmen took charge over the educational Field Lab. In addition, the consortium regularly organised core group meetings, in which working group representatives provided updates on their progress, shared insights, and flagged potential showstoppers. The core group addressed overarching issues that related to the hub, identified opportunities for regional value generation, and worked on the systemic regional embedding of the hub. Also, it investigated the reproducibility of the hub-concept, as some of the co-creators were interested in turning other soon-to-be-redundant natural gas sites in the Northern Netherlands into energy hubs too, thereby contributing to the just and green regional transition.

Within the core group, four different co-creative activities were undertaken:

1. **The development of the hub's societal value proposition:** while activities on site had their own value propositions, the energy hub also had an overarching societal value proposition, though what this value proposition entailed was subject to different expectations. Over the course of project development, the core group needed to balance the useful ambiguity of 'societal value' – which enabled different parties to connect to the project and envision opportunities to realise their own ideas and interests in the future hub – with the increasing need for concrete and delineated value goals in project development. Over time, it became clear that not all societal value expectations could be realised, and so-called expectational value conflicts emerged. Addressing and synthesizing expectational value conflicts was an essential co-creative activity in the practical operationalisation of the hub concept (Rodhouse et al., 2023).
2. **The development of a communications plan for GZI Next:** early on in project development the co-creators realised that part of their plans, primarily large-scale bio-digestion, and to a lesser extent hydrogen production, could become controversial. For the sub-national government authorities involved, the plans were also politically sensitive, as elected representatives of their organisations would have to assume a certain degree of political accountability for how activities on the terrain would unfold. That is why in 2019, these governments proposed a strategic communications plan that would prevent uncareful or fragmented communication. After receiving endorsement from the rest of the consortium, communications specialists of NAM and the municipality of Emmen took the lead and co-developed a communications plan for the project.
3. **The development of a Strategy Note to formally embed GZI Next in municipal policy:** in 2019, as the first of the three working groups (i.e., Solar PV) was preparing for subsidy and permits, some co-creators expressed concerns over complex and lengthy administrative procedures. Despite uncertainty about the responsible authority for hydrogen and green gas permits, there was a consensus that a municipal policy note could streamline procedures. Project developers also believed that acceptance of this note by the Municipal Council would signify crucial political support for GZI Next's further development. They co-developed what was later named the Strategy Note Energy Hub GZI Next Emmen, with which they aimed to clarify GZI Next's alignment with local, provincial, and national policies.
4. **The lobbying, networking, and advocacy to gain external support for the energy hub concept:** the energy hub concept was novel and unproven, and therefore, external support and regulatory flexibility were required to succeed. To secure backing, consortium partners presented and promoted the hub as a solution for regional issues in various forums and networks. They also created a lobbying fiche, that is, a one-pager outlining the legal and regulatory challenges that hindered energy hub development, which was applicable not only to GZI Next but also to future hubs in the Northern Netherlands. This fiche was to guide engagements of the (political) co-creators with higher-level authorities like RVO and the Ministry of Economic Affairs and Climate. With their lobbying and networking activities, the consortium aimed to facilitate the trans-local diffusion of the hub concept.

Despite that each of these four co-creative activities were carried out within the same project context, sometimes even in the same phases of project development, they were characterised by their own dynamics and unique unknowns, tensions, and challenges for governments.

4. Methodology

The choice for a single case study followed the exploratory nature and aim of the research (Yin, 2009). The case was selected because it was an asset redevelopment project in which the change agents, including sub-national government authorities, made an explicit commitment to contribute to sustainable regional socio-economic change.

The study was longitudinal and qualitative in nature. The first author followed the group of co-creators (see Appendix A) over the course of two years (December 2018-October 2020). In addition to observations during project meetings (N=19), data sources included semi-structured interviews with project developers and critical external stakeholders (N=21), working documents produced in the project, such as team meeting slides, a communication plan and a strategy note (N=19), relevant public documentation such as recordings of Council (Committee) meetings in which the project was discussed (N=3), and online news messages covering the project (N=7).

Eleven co-creators were invited over the course of time. Nine of these were able to participate. The backgrounds of the interviewees

were as follows: governmental (N=3), private business developer (N=3), grid operator (N=2), and network organisation (N=1). All interviews lasted 60–90 minutes and all but one (which was carried out online) were conducted in a face-to-face setting. Interviewees were asked about their organisation's motivations for participating in the project and were asked to share their perspective on how to co-create value in the project. They were stimulated to reflect on ongoing developments, activities, and challenges in project development, as well as on their learning process in accomplishing activities and addressing challenges with the other partners. In addition, the first author was given access to notes from interviews with project developers and critical external stakeholders (N=12), which were carried out by external consultants hired to research societal value opportunities for the project in the timeframe of the research. As the themes and items discussed in these secondary interviews at least partially overlapped with the interests of the authors in this project, these secondary interviews were treated as a relevant data source and used to validate insights from the self-gathered data.

Data analysis was inductive. We started with a (re)immersion in the data, rereading the raw data sources and taking in the initial ideas, descriptions and observation commentaries made by the researcher at the time of data collection. We then proceeded with the coding process, which consisted of various steps. The first step in coding involved extracting text fragments from the data that provided information on the dynamics, opportunities, and difficulties in and of co-creation in GZI Next. Each text fragment was given a descriptive code. In the second coding step, codes were grouped into meaningful categories (Elliott, 2018). This resulted in 21 distinctive co-creation themes. Each of these themes was given a description/coding rule, which were then used to re-examine the raw data sources (see Appendix B for final codes and description/rules). In this process, some codes were altered, refined, added, or removed. In addition to the co-creation themes, the selected text fragments in the sample were all specific to one or more of the above mentioned four separate co-creative activities (See Appendix B). The third step in the analysis involved developing a detailed narrative for each of these co-creative activities, describing how and when the identified themes influenced the co-creation dynamics in and around these activities. These narratives led to the inductive realisation of the relevance of the governmental perspective on legitimacy and ultimately resulted in the identification of six critical legitimacy challenges for involved sub-national government authorities. These six challenges were shared with the involved co-creators for validation and reflection. Fig. 2 visually summarizes the coding and analysis process.

5. Results: legitimacy challenges for government authorities in co-creative redevelopment

5.1. Challenge 1: balancing co-creation and interference in public perceptions

In line with existing research (Tuurnas, 2015; Torfing et al., 2019; Itten et al., 2021; Sillak et al., 2021; Ansell et al., 2022), we found that sub-national government authorities in GZI Next faced significant financial and human resource limitations in co-creation. Civil servants recognised this as a major obstacle to driving transitions and safeguarding public value. They also expressed concerns about how these constraints might hinder their future reliability as co-creation partners.

Capacity constraints were most prevalent during the development of the Strategy Note. Initially, municipal civil servants were tasked with drafting a policy note on GZI Next that was set to become part of the municipality's formal strategy. However, they soon acknowledged not having the human resources to complete it within the required timeframe. They then sought to outsource the work, but due to budgetary limitations, this plan was abandoned too. Ultimately, another party in the consortium funded an external consultant to facilitate the draft of the Note, on behalf of and with input from all consortium members.

The decision to co-write the Strategy Note offered relief but also sparked concerns about perceived private interference in policy formulation. Civil servants worried that local politicians and residents would consider the Note a piece of municipal policy and would find such private interference problematic. To mitigate this, civil servants deliberately renamed the document 'Strategy Note', and made sure to emphasize that it would not introduce new policy commitments.

> "*We should be sure the note is more like… look how well our plans fit into the existing policies of various governments and look what's possible here. That is enough*" (Civil servant Municipality of Emmen).

> "*You raise a good point. The nuance is that we're writing this as a consortium and offering it as advice to the municipality, and not that we are writing policy on behalf of the municipality*"[1] (GZI Next project leader NAM)

The Strategy Note was presented as a joint piece of advice from GZI Next to the Municipal Council Committee in September 2019. The civil servant presenting it was transparent about its authorship and purpose, clarifying that it imposed no obligations on the municipality, such as for granting permits. Ultimately, the Strategy Note was adopted without further questions.

5.2. Challenge 2: different legitimacy understandings

The second challenge in GZI Next involved reconciling the distinct legitimacy understandings of the co-creators. This tension surfaced prominently during the development of the communications plan by specialists from both NAM and the municipality of Emmen.

Early in the process, different preferences emerged in terms of the content of the communications plan. NAM's communications team preferred a concise, flexible plan, adaptable to feedback from residents. In contrast, the municipal team, accustomed to a more

[1] Quotes used in this section to illustrate the challenges were translated from Dutch.

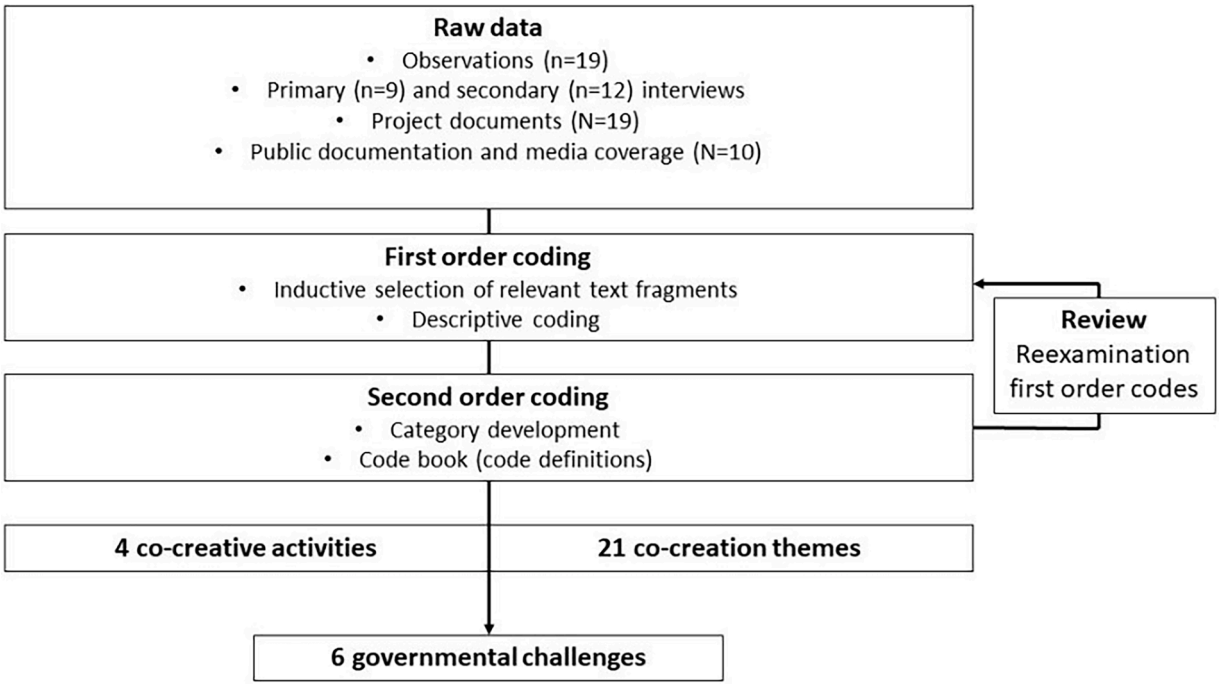

Fig. 2. Visual representation of the analysis process.

bureaucratic and politically sensitive environment, sought greater detail, particularly regarding roles and responsibilities of different co-creators in collaboration and communication. They believed that more clarity would secure joint commitment to the project and ensure political sensitivities were properly addressed.

Another important difference concerned the definition and demarcation of relevant 'society'. NAM focused on 'neighbours' or communities close to GZI Next, while the municipality preferred the broader term 'citizens'. More than just a matter of distance to the project, this difference revolved around legitimacy of procedural aspects: citizens, unlike neighbours, have specific rights regarding how and when they should be informed on municipal activities, including non-discriminatory communication. This had implications for the kind of distribution channels the municipality could use and the language proficiency level that it needed to respect in news messages on the project. For instance, the municipality had to push back when NAM initially sent project letters only to nearby residents, which excluded households with 'no advertising' stickers on their door and people living further away from the project.

The pace of communication was a last, important, point of contention. NAM wanted to inform neighbours as soon as possible, fearing delays might spark resistance against the project. However, the municipality insisted on first briefing the Municipal Executive and Council, following established procedures. This was critical for maintaining democratic procedure.

> "*Just now, I had a meeting with one of the executives, and he said: 'we really need to get going now'. And then we have to wait on the municipality of Emmen, because they can't get going yet"* (Communications specialist NAM).

And,

> "*The Municipal Council is our client, and we have to inform them. So, if the NAM starts communicating about all sorts of developments before the Council is… brought up to speed… there is a political-administrative process that needs to be adhered to here… (…) Soon, we will present the project to the Council, so that they get informed of all that is going on. The right steps are being taken, but it is challenging to find the right timing."* (Communications specialist municipality of Emmen (1)).

> "*It's difficult. Because things are happening, people see that things are happening, but you can't communicate because the Council is not yet brought* (Braams et al., 2021) *up to speed"* (Communications specialist municipality of Emmen (2)).

Despite these challenges, the co-creators successfully navigated their differences. Both sides showcased great willingness to learn from each other and from the collective process, and both sides recognised the value each brought to the table: NAM's experience in community engagement and the municipality's expertise in managing political stakeholders. This collaboration resulted in a draft communications plan, which was adopted by the consortium (though not necessarily also consistently put in practice afterwards).

5.3. Challenge 3: incorrect role expectations

Confirming findings of other scholars (such as Braams et al., 2021; Sillak and Vasser, 2023; Torfing et al., 2019), the third challenge concerned dealing with incorrect role expectations that other co-creators held for sub-national governments. A critical aspect of the

societal value proposition was to establish clarity on the roles, rights, and responsibilities of the various co-creators in value creation and capture. At the end of 2018, therefore, the co-creators in GZI Next explicitly discussed roles, rights and responsibilities. At this point, it became clear that there were different ideas on the role of government authorities in co-creation. Some of the initial expectations were about those authorities taking the lead in activities such as permitting, subsidies, political management, and citizen participation. Involved civil servants, on the contrary, saw at least some of these as constituting undesirable conflicts of interest, and considered their own contribution more in terms of being a linchpin between the project and the region.

One explanation for the initial misalignment in expectations may be that the non-governmental co-creators implicitly and unconsciously viewed governmental authorities as rather homogenous entities, while the involved civil servants experienced their organisations as heterogenous and diverse, consisting of different departments, sections, and bodies that had strictly separated roles and responsibilities. The internal heterogeneity of government authorities is not arbitrary. In fact, in governmental organisations different tasks and responsibilities are purposefully assigned to different bodies and departments, to ensure the public interest is secured in an independent and proper manner. Hence, for the civil servants from the municipality and province, the fact that they were actively involved in GZI Next did not automatically mean that there was a broad and established political support for the project, nor did it necessarily mean that permits would be granted more easily. The challenge for the civil servants involved was thus to manage these too simplistic role expectations held by other co-creators, amongst others by creating awareness of the internal dynamics of governmental organisations.

5.4. Challenge 4: intra-organisational conflicts of interest

Another key challenge for the sub-national government authorities involved in GZI Next was how to position themselves in co-creation while managing relations and goals in other arenas. Particularly challenging was that co-creating parties were not always aligned on other issues. Moreover, government authorities often had other interests in other arenas, that were not necessarily furthered by the collaboration. While the sub-national governments aimed to align their own different interests for regional benefit, this was not always successful.

One significant arena in which the co-creators found themselves on opposite sides involved ongoing oil and gas extraction activities. Amongst others, tensions arose between the Province of Drenthe and the involved fossil industrial parties over controversial issues, like compensation for extraction-induced earthquake damages, new permits for continued extraction, and the injection of wastewater from the production of oil into empty gas fields. These tensions sometimes forced governments to make strategic considerations and prioritise their interests in either the more conflicted extractive arenas, or in the more collaborative regional redevelopment arenas such as GZI Next. As an example, at some point the Province of Drenthe decided not to appeal against the Ministry's approval of new gas extraction near Assen, because it did not want to endanger relationships with, and support from, the national government and the fossil industrial industry for a broader, collaboratively developed economic strategy for the region's post-gas future, called Drenthe 4.0.

> *"Drenthe wants more from the Minister with Drenthe 4.0, this involves much larger interests. The public gain from a probably unsuccessful appeal does not outweigh the negative effect on the relationship, just now that a conversation about Drenthe 4.0 has started"*[2] (Provincial deputy of Drenthe).

In Drenthe 4.0, GZI Next was showcased as a model for repurposing fossil assets, diversifying the region's economic profile, and promoting green economic development. The strategy was presented to the Ministry of Economic Affairs and Climate in hopes of securing funding and support. Although the Ministry expressed vocal support and seemed particularly excited about the potential of GZI Next, it did not provide new financial resources. In the months that followed, GZI Next received increasing attention at the national level, amongst others in the Dutch parliament. However, it was approached here only as a pilot project for infrastructure redevelopment in general, and the wider plans in and for Drenthe 4.0 did not receive much attention. In a way, the project became decoupled from Drenthe and its regional goals at the national level. Sub-national government authorities were disappointed, especially when it also became clear that the fossil industrial companies that had contributed to drafting up Drenthe 4.0 were unwilling to invest more in the broader plan, beyond their specific investments in GZI Next. Of course, this outcome was frustrating for the province, especially considering its earlier decision not to pursue an appeal against further gas extraction in the region.

> "*I had hoped the big companies would say: 'We're going to invest, and the profits will come later.' But unfortunately, that did not materialise*"[3] (Provincial deputy of Drenthe).

5.5. Challenge 5: competing claims to a just transition

The fifth challenge relates to the necessary institutional entrepreneurial activities in co-creation. Sub-national government authorities experienced that they had to convince the national government, not just of the innovative potential of GZI Next, nor just of the essentiality of co-creative redevelopment for the region's future, but also of their claims on the right to and support for a (just)

[2] Quote given to RTV Drenthe. Available at: https://www.rtvdrenthe.nl/nieuws/14690102/shell-papers-drenthe-koos-voor-nam-bij-energietransitie-nam-koos-voor-zichzelf

[3] ibidem

transition for the region.

The sub-national governments primarily articulated their claim through the above-mentioned economic strategy, Drenthe 4.0. Drenthe 4.0 outlined the estimated economic decline, including the loss of 7000 jobs, because of the cessation of gas extraction in Groningen. However, despite the severity of the issue and urgency conveyed, Drenthe 4.0 failed to attract national funding or wider support. This was most likely a consequence of the abstract nature of the strategy. Still, the failure to gain financial and other support is noteworthy when one compares the situation of Drenthe with that of Groningen, the neighbouring province. In Groningen, state-level support for a just transition took on very substantial proportions when the Dutch state agreed to invest 1.15 billion euros in the National Programme Groningen (NPG) in 2021 for a new economic impulse in the region. Such a large investment was seen as justified in light of the public and political consensus that the residents of Groningen had suffered major injustices as a consequence of gas extraction in their region. These injustices were not only related to the negative socio-economic and health impacts of extraction-induced earthquakes. They also reflected the widely accepted awareness of the failure of the national government and involved industry partners to respond to growing concerns and protect citizens, while leaving them in prolonged unclarity and stickiness of repair, compensation and home reinforcement procedures (Parlementaire enquêtecommissie aardgaswinning Groningen, 2023).

Consequently, regarding Groningen, there seemed to be a shared understanding that perceived injustices needed to be addressed, beyond mere compensation for damages. In contrast, Drenthe did not receive much attention in national public and political debates – even though the province tried to tie into these debates, as some of its residents were also affected by extraction-induced earthquakes and the region faced significant economic decline. In comparison to Groningen, the issues in Drenthe seemed relatively smaller. Essentially, the way in which Groningen did make a widely recognized rightful claim on a just transition might have limited Drenthe to establish a similar claim via Drenthe 4.0. Another factor that possibly has compromised the perceived legitimacy of Drenthe's claim on a just transition might have been the collaboration with the natural gas industry in Drenthe 4.0, especially with companies that are still widely associated with the damage caused by gas extraction.

> "*In addition, the question is what impression this manifesto makes on the ministries. (…) Has consideration been given to why the government would be impressed by this action? (…) for comparison: in Drenthe, a total of seven thousand (direct and indirect) jobs are lost because of turning off the gas tap. In Groningen, this concerns approximately fifty thousand jobs.*[4] *Will Drenthe make an impression with this manifesto and the scale of the problem it addresses, in addition to the other consequences of the gas decision?*"[5] (Civil servant Municipality of Emmen).

And,

> "*Due to all the commotion surrounding the NAM and gas extraction, I quietly wonder: is the NAM the right case to display for this campaign? Has the deputy already checked this with the ministries? If not, then it would be a good idea to do so.*"[6] (Civil servant Municipality of Emmen).

Interestingly, Drenthe demonstrated far greater success in legitimising it's claim on a just transition by 'upscaling', that is, by collaborating with neighbouring regions in formulating their claim. Under the banner of the Northern Netherlands, the provinces of Friesland, Groningen, and Drenthe jointly lobbied for funding from the European Just Transition Fund, securing €330 million for allocation until 2027.[7] Similarly, the co-creators tied their plans for hydrogen initiatives at the GZI Next site to a broader vision of the Northern Netherlands as a future hydrogen valley, successfully strengthening their case for European support and subsidies.[8]

5.6. Challenge 6: accountability for intangible regional value

The last challenge is how to steer on the creation of the often indirect and intangible value for the region in a co-creative redevelopment project – a challenge that arose during the development of the project's societal value proposition.

Sub-national government authorities chose to engage in the project for its opportunities to generate economic spillovers, such as attracting new businesses, fostering green economic activities, maintaining energy-related employment, and facilitating local knowledge creation.

> "*[GZI Next] is a catalyst for employment growth. Perhaps not directly on the site itself, but today I had conversations with someone from the New Energy Coalition, and they said that because we have received this hydrogen valley subsidy grant, there are already three commercial parties from abroad that are exploring our region, and one has already settled here. We see that there is potential, I want to emphasize that. (…) we can take advantage of the opportunities in terms of retaining knowledge and employment, or even expanding these*"[9] (Alderman of Economy and Emancipation for the Municipality of Emmen)

[4] Most news articles reporting on the issue of job losses due to closure of gas activities report that 20.000 jobs are at risk in Groningen. That number – 20.000 – has been powerfully used in national and regional policy discussions, yet, according to some economists, is a high overestimation: https://www.rtvnoord.nl/nieuws/199819/rtv-noord-checkt-verliest-groningen-20000-banen-als-de-gaskraan-dicht-is

[5] internal communications Drenthe 4.0/Reactie Gas 2.0. Obtained at https://www.ftm.nl/document/21205975?projectId=1

[6] Ibidem

[7] Territoriaal plan voor een rechtvaardige transitie Noord-Nederland. Available at: Just Transition Fund [EU] - Provincie Groningen

[8] Known as HEAVENN, subsidised by the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership). It concerns a subsidy of 20 million euros with a public-private co-funding of 70-80 million euros.

[9] Council Committee Meeting EBM, September 12, 2019

Despite the consortium's support for the goal to generate regional socio-economic value, it proved challenging to steer on such value creation in the project. Many of the expected socio-economic benefits were only loosely tied to the direct activities on the GZI Next site, complicating the process of concretely measuring progress against specific goals. This became particularly evident during a societal value workshop in November 2019. External consultants, who had been tasked with identifying additional societal value opportunities for GZI Next, presented various scales at which value could be generated by GZI Next, amongst which were the 'project site', the city of 'Emmen', the province 'Drenthe', and the region 'Northern Netherlands'. A consortium member reflected on the increasing complexity of creating value: "*At the lowest level, that of the sub-project, it is relatively easy to realise value. We're talking about concrete amounts of energy produced. When you are looking to integrate project components to create more value… other requirements come into play. That is more difficult. And when you look at value generated outside the site itself… The difficulties and uncertainties become increasingly prominent when you climb that value ladder*".

The further up the 'value ladder' one went, the more intangible the expected value became, with increasing external factors and uncertainties making it hard to define measurable goals. Moreover, neither the energy business development co-creators nor the governmental partners had experience in developing a societal value proposition for a redevelopment project, and their inexperience added to their struggles to incorporate societal value into project planning and evaluation effectively. Lastly, also complicating were uncertainties around the commercial aspects of the sub-projects, such as changing subsidy requirements and shifts in project membership, which made commercial co-creators hesitant to commit to any sort of societal value prior to having a clear business case.

> "*Let's take a step back. I mean… basically, the internal business case is leading. If there is no business case, then we won't develop this project. I think that applies to all internal parties. And if additional regional value is created in the process, then that's great*" (Commercial co-creator in GZI Next).

One of the conclusions of the consultants was that, because of these dynamics, it seemed that technological rationalities and micro-economic developments rather than societal value potential were driving decision making in the hub. This was problematic for sub-national government authorities, as their involvement in and political endorsement of GZI Next implied that they were politically accountable for the project's social deliverables. This problem was acknowledged by the other co-creators and ultimately addressed with a set of governance rules for developers on the site.

6. Discussion & recommendations

6.1. Discussion of results

Co-creative redevelopment and re-use of fossil assets and infrastructures is a promising yet not uncontested avenue for economic reorientation in fossil industrial regions. On the one hand, co-creative redevelopment projects could function as critical stepping stones in a cost-effective, acceptable, and accelerated regional energy transition. On the other hand, concerns are that this sort of projects work to maintain current power relationships and reinforce existing inequality and injustice in regional energy systems. In an aim to contribute to the ongoing debate on this matter, we explored the political dynamics of co-creative redevelopment and particularly aimed to understand the diverse legitimacy challenges for sub-national government authorities in co-creative asset redevelopment projects.

Our research question was, 'What legitimacy challenges arise for sub-national government authorities when engaging in co-creative fossil fuel asset redevelopment projects, and how to address these challenges to enhance the transformative capacity of such projects?'.

We applied this research question to the case of GZI Next, in which an old gas purification plant was redeveloped in a co-creative fashion to trigger a sustainable and just transition for the region. We identified six critical legitimacy challenges for the sub-national government authorities involved in the project. These were:

1. Balancing co-creation and interference in public perceptions
2. Diverging legitimacy understandings
3. Incorrect role expectations
4. Intra-organisational conflicts of interest
5. Competing claims to a just transition
6. Accountability for intangible societal value

We have sketched a picture of how co-creative redevelopment was shaped by these challenges. Specifically, we showed that these challenges forced co-creators to continuously reassess the legitimacy of their co-creative activities, of the proposed hub's contributions to regional society, and of the diffusion of the hub-concept. The case also highlights the unique role of sub-national government authorities in actively safeguarding, reclaiming, and remaking legitimacy in response to these challenges.

Sometimes, addressing challenges and re-establishing legitimacy beliefs in the project proved relatively straightforward. Particularly when legitimacy challenges were directly tied to the concrete activities in co-creative redevelopment, a shared willingness to learn from and collaborate with one another often sufficed to establish a shared understanding of legitimacy. This was the case, for instance, when it came to respecting existing notions of legitimacy tied to administrative-political procedures and timelines as they intersected with co-creation (challenge 2) as well as to demarcating governmental roles in co-creation (challenge 3). At other times, legitimacy challenges proved more complicated to address. A key finding, as anticipated, is that the greatest legitimacy challenges seem to stem from the region's fossil-industrial history, in which co-creators remain entangled (challenge 4 and 5). These challenges

were difficult to address within the scope of co-creation as they extended beyond the site of redevelopment and posed a more serious barrier to the transformative capacity of co-creative redevelopment in and for Drenthe.

In what follows we would like to highlight three insights from the case that are relevant for transitions literature: firstly, the preconditions for and caveats to a pioneering role of incumbents in these types of projects; secondly, the embeddedness of co-creative redevelopment in multi-level and multi-arena governance; and, thirdly, the role of spatial imaginaries in legitimation.

6.1.1. Fossil incumbents pioneering in and with co-creative redevelopment projects

Firstly, the case demonstrates that fossil fuel incumbents can assume a pioneering role in co-creative redevelopment projects and are willing to actively direct such projects towards greater sustainable, economic value for the region. While this role is partly a natural consequence of their asset ownership and command over technologies, specific preconditions in this case also appeared crucial for fostering a genuine commitment to new ways of working, new project values, and ultimately, a sincere exploration of the possibility of 'endogenous renewal' (Hoffman & Loeber, 2016) through this kind of activities.

The idea to redevelop the gas purification plant arose from clear economic drivers. Gas reserves in smaller fields in the region were depleting, and with diminishing returns, continuing its operation was simply financially unviable. In 2018, the plant was closed. Around the same time, the Dutch government announced its decision to phase out gas production at the Groningen field by 2025. This not only signalled the inevitable decline of much of the gas production activities in the North of the Netherlands but also provided an incentive to asset owners to start forward looking experiments with redeveloping their assets. A critical precondition, in the wake of the Groningen disaster, was the need for the gas industry to rebuild its social licence to operate in the North of the Netherlands, amongst others via more inclusive and collaborative operating models. For NAM in particular, what seemed to have played a critical role was that NAM's right to exist in a post-gas production future was explicitly questioned not just by external actors but also internally, by its employees, executives, and shareholders. In other words, a rather unique combination of economic rationale, political clarity, and public scrutiny drove an 'existential crisis' and thus a sense of urgency for endogenous renewal within the industry, and GZI Next was a first exploratory effort towards this. As it turns out, under these preconditions, incumbent fossil parties can be sufficiently motivated to lead in the co-creative redevelopment of their asset base and knowledge with the intent to contribute to new regional value creation.

Nevertheless, several critical issues warrant the attention of sub-national government authorities and other co-creators. One key concern is that while fossil incumbents may wish to explore the opportunities to contribute to regional transitions with co-creative asset redevelopment, they may not necessarily also perceive a broader responsibility for regional issues and problems that are not directly related to or impacted by fossil fuels and asset redevelopment (challenge 4). It also appears essential to remain critical of how commercial and social value creation are related and prioritised by different stakeholders over the course of project development. Another – related – issue is that it can be particularly difficult to connect specific project choices to concrete societal value outputs. This makes it hard to establish ex-ante how co-creative redevelopment projects contribute to new and sustainable economic growth (challenge 6). Hence, even though fossil industrial parties are willing to pioneer in and with co-creative redevelopment, there is no guarantee that this will also contribute to wider economic growth or accelerate a regional transition. This is problematic, because - at least for sub-national government authorities - the legitimacy of co-creative asset redevelopment seems built on the notion that it will contribute to these things.

6.1.2. The legitimacy of co-creative redevelopment in and across governance arenas

The case, secondly, highlights that co-creative redevelopment projects are part of a complex multi-level governance system, requiring co-creators to navigate various levels, scales, and arenas to shape regional futures (Avelino et al., 2016). To achieve broad support, they must actively establish legitimacy for their activities in these other arenas. Yet at the same time, the interactions with these arenas also create new challenges regarding influence, interests, and legitimacy. Amongst others, we observed that legitimacy challenges arise for sub-national government authorities when and where formal and informal decision-making processes intersect in co-creative redevelopment projects (challenge 1, 2 and 3) (De Geus et al., 2022; Braams et al., 2021). When co-creation overlaps with traditionally public tasks, or when authorities are expected to carry out activities that might conflict with their public mandates and obligations, legitimacy may be at risk and clarification of boundaries and expectations is required. Close collaboration between sub-national authorities and specific private actors – while known to be facilitative of co-creation – can also raise concerns about unequal and undesirable access of these private actors to formal decision-making processes (De Geus et al., 2022). We also observed that conflicts between co-creators in other governance arenas can influence decision making on redevelopment, and vice versa, making it difficult for sub-national authorities to balance their diverse and sometimes conflicting values and public interests. This balancing act can be particularly challenging in fossil-industrial regions, where sensitive and often not yet fully resolved conflicts on harmful extractive activities persist and trust between actors is difficult to re-establish (Coenen et al., 2018).

6.1.3. The role of socio-spatial imaginaries in legitimation of co-creative redevelopment

A third dynamic we want to zoom in on is the role of socio-spatial imaginaries in legitimising co-creative redevelopment. In the GZI Next case, socio-spatial imaginaries were continuously invoked by the co-creators to both justify and guide the project. However, when multiple imaginaries were employed simultaneously, tensions and contradictions often arose that complicated legitimation. At the level of co-creative activities, for example, co-creators initially relied on differing understandings of legitimizing audiences for the project (challenge 2). Business developers framed 'neighbours' as the local communities immediately surrounding the site, while governments adopted a much broader view of 'citizens' as individuals with democratic rights and expectations of transparent and non-discriminatory information-sharing. These differing interpretations of the project's legitimising audiences created subtle tensions in

co-creative activities.

At the level of the 'hub', we identified three higher-order socio-spatial imaginaries that were used to legitimise the project over time. First, there was the image of 'Emmen,' in which the purification plant was both a key characteristic of the town's history and its proposed future. In Emmen, the GZI was an element that had 'always been there' providing direct jobs to 150 employees, since 1988. It was a silent illustration of the friendly relations between the industry and the town, a place of energy-related activity that could continue to be a part of people's life – perhaps even providing them with clean energy – long after the treatment plant's characteristic tall chimney and flaring stacks had been knocked down. Second, there was the imaginary of Drenthe as a region struggling economically, in which the project was seen as critical to retain gas and energy related employment and kick-off a 'fourth wave' of energy-related economic activity. Third, there was a more distant image of the Northern Netherlands, an area characterised by its tense history with gas extraction, from which it still had a closely connected gas infrastructure that would soon be largely redundant. In this imaginary, GZI Next was championed as a replicable model for energy hub development that could facilitate decarbonisation of big industry in the region. While these imaginaries represented overlapping regions (Nygaard, 2024) and were generally treated as complementary by the co-creators, their differing assumptions regarding the hub's potential over time led to ambiguity and disagreements over the project's purpose and societal value contributions (Challenge 6) (Rodhouse et al., 2023).

Lastly, at the national level, tensions arose when Drenthe's imaginary – tied to its request for support for a just and sustainable transition, or Drenthe 4.0 – implicitly had to compete for legitimacy and support with the dominant image of Groningen. The failure to get substantial financial support for Drenthe 4.0 stands in contrast with the mobilizing power of this other, powerful regional imaginary in the national energy discourse. Drenthe could partially address this competition between regional imaginaries by engaging in upscaling – that is, by adopting and aligning with a higher-order imaginary or scale frame in legitimation, in this case of the Northern Netherlands, that played down inter-regional differences (also see the work of Van Lieshout et al., 2011).

6.2. Recommendations for practice

How can sub-national government authorities as well as other co-creators deal with these complex challenges to enhance the legitimacy and transformative capacity of co-creative redevelopment? We would like to give three pointers here.

6.2.1. Recommendation 1: reimagine co-creative redevelopment projects as primarily being about redeveloping relationships

Firstly, we would like to recommend co-creators to view co-creative redevelopment projects less as efforts to generate innovative infrastructure solutions, or to repurpose fossil-industrial assets, and more as platforms for restoring trust and strengthening complex relationships in fossil-industrial regions. Such a focus on relationships would by no means be less transformative, considering that the transformative potential of co-creative redevelopment lies in the repeatability of the concept. Wider adoption of co-creative redevelopment will not ensue when failures to deliver societal value are perceived as intentional prioritisation of commercial interests over regional needs. Reestablishing trust and goodwill and rebuilding longer-term relationships in and through redevelopment projects are thus essential prerequisites to the transformative capacity of co-creative asset redevelopment projects.

6.2.2. Recommendation 2: establish legitimacy as an explicit goal in co-creative asset redevelopment

We observed that legitimacy in co-creative redevelopment often remains implicit, being placed on the agenda only when threatened. This leads to more reactive and defensive strategies, rather than to proactive discussions on the meaning and making of legitimacy for co-creative redevelopment. We recommend co-creators, and especially sub-national government authorities, to raise potential concerns for legitimacy, such as for political accountability for societal outcomes and adherence to administrative and democratic procedures, early on in co-creative redevelopment. This could help set clear boundaries between formal and informal decision making in the region from the beginning and w also stimulate the timely adoption of societal value priorities and the development of relevant public value metrics. Ideally, these metrics would go beyond outputs like energy produced or jobs created to also include input (i.e., financial and in-kind contributions by the different co-creators) and throughput (i.e., established safeguards and governance for ensuring public values are prioritised) to ensure political accountability as well as public transparency.

6.2.3. Recommendation 3: explicate and contrast diverse socio-spatial imaginaries for legitimacy

Lastly, our research points to the important role of (differences between) socio-spatial imaginaries in legitimation of co-creative redevelopment. Whether or not these differences were acknowledged proved to be essential for the constructiveness with which legitimacy issues were addressed. When tensions between these imaginaries were made explicit and discussed (e.g., challenge 2), space for learning and compromise emerged. However, when (differences between) imaginaries were left implicit, or when co-creators assumed some sort of natural compatibility between these diverse socio-spatial imaginaries of different regions or scales, legitimacy issues persisted or even hindered legitimation. We thus recommend co-creators to actively map, discuss, and strategically select the socio-spatial imaginaries upon which different legitimacy beliefs for co-creative redevelopment projects are to rest. What seemed to have been somewhat successful in the GZI Next case was the organization of a dedicated, facilitated workshop in which tensions between different scalar imaginaries were surfaced and explored.

7. Conclusion

In this paper we explored legitimacy challenges in and of co-creative redevelopment in the case of GZI Next. Our contention is that these challenges need to be addressed appropriately for co-creative asset redevelopment to be seen as legitimate and potentially

transformative. We took the perspective of sub-national government authorities. We identified six critical challenges that these authorities had to address to ensure that co-creation contributed to regional development and transition goals.

Overall, we made three contributions to the ongoing debate on the potential of co-creative redevelopment to contribute to regional transitions. Firstly, we provided detailed insights into the sort of legitimacy issues that characterize co-creative asset redevelopment in fossil-industrial regions. Secondly, we illustrated the role of sub-national government authorities in continuously safeguarding and remaking legitimacy in response to these different legitimacy challenges. Thirdly, in our reflections on the case we contribute insights to the evolving transitions literature, amongst others on the possibility of incumbent actors becoming initiators in regional transitions and on the role of socio-spatial imaginaries in legitimation of co-creative asset redevelopment. Fourthly, and lastly, we provide recommendations for co-creators, and especially sub-national government authorities, for legitimate co-creative redevelopment activities.

Of course, this study was exploratory in nature, and thus more research is needed to validate and expand our findings. Amongst others, we call for more research on the simultaneous processes of destruction and creation in co-creative redevelopment projects, which we did not get the chance to explore in this study. We would also like to encourage more research on the role of (competing) socio-spatial imaginaries in claiming support for a just transition.

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CRediT authorship contribution statement

T.S.G.H. Rodhouse: Conceptualization, Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing. **E.H.W.J. Cuppen:** Conceptualization, Writing – review & editing, Supervision, Project administration, Funding acquisition. **U. Pesch:** Conceptualization, Writing – review & editing, Supervision, Funding acquisition. **A.F. Correljé:** Conceptualization, Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Toyah Rodhouse reports financial support was provided by Dutch Research Council. If there are other authors, they 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 A. Overview of involved actors in GZI Next 2017–2022

Organisation	Background	Time involved	Working groups
NAM	Oil & gas extraction in the Netherlands, a joint venture of Shell and Exxon.	Pre-2017 (GZI) - present	Solar (working group lead), hydrogen (working group lead in early project initiation phases), and bio-digestion
EBN	State-participant in oil, gas & geothermal extraction in the Netherlands, 100% state-owned	Pre-2017 (GZI) - present	Bio-digestion (JV partner in later project development phases)
Municipality of Emmen	Local government	2017-present	Bio-digestion
Province of Drenthe	Provincial government	2017-present	
New Energy Coalition	Network organisation involved in training, business development support, and lobbying for the energy transition in the Northern Netherlands	2017-present	Bio-digestion (working group lead in early project initiation phases) and hydrogen
Gasunie Transport Services	National transmission system operator for gas and part of Gasunie N.V.	2017-present	Bio-digestion
Gasunie New Energy	Business developer, part of Gasunie N.V.	2017-present	Bio-digestion and hydrogen
Emmtec / GETEC Park.Emmen	(energy) Services and infrastructure provider for the large multi-client (chemical) industrial site in Emmen	2017-present	Hydrogen
Engie	Dutch branch of a multinational corporation for oil, gas, and low-carbon energy production and supply	2017-present	Bio-digestion (project executor, JV partner)
Shell	Multinational oil and gas corporation with a growing renewable energy production and retail portfolio. One of the mother companies of NAM.	2018-present	Solar (project executor), Bio-digestion (project executor, JV partner) and Hydrogen

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Organisation	Background	Time involved	Working groups
NOM	Regional investment and development corporation (publicly owned) in the Northern Netherlands	2017	
Rika biofuel developments	Biogas plant developer	2017–2018	Bio-digestion (executor)
Ludan Energy Overseas	Internationally operating business developer, amongst others in waste-to-energy solutions.	2017–2018	Bio-digestion (executor)

Appendix B. Coding overview

Code label	Code Description/rule	Societal value proposition	Communi-cation plan	Strategy Note	Institutional work
Awareness of the administrative-political procedures	Labelled when: excerpts describe situations in which co-creators express (experiencing) (un)awareness of the rules, (democratic) procedures and sensitivities of the administrative processes of involved governments				
Financial and human capacity constraints of sub-national governments in transitions	Labelled when: excerpts mention the shortage of manpower, knowledge, and financial resources of the involved governments.				
Necessity and added value of collaboration in the regional energy transition	Labelled when: excerpts reflect on collaboration as a necessary precondition in the energy transition, or as of added value for themselves or the project				
Insufficient human resources other partners in the regional energy transition	Labelled when: excerpts describe the shortage of manpower or financial resources of non-governments struggle with the regional energy transitions; often related to the shrinking organisations and lay-offs because of phasing out natural gas production in the region				
Collective learning from tensions in external communication	Labelled when: excerpts include mentions of learning from tensions, perspectives, or conflicts between co-creators on external communication				
Alignment and commitment issues	Labelled when: excerpts refer to matters of (mis) alignment between co-creators, primarily in terms of the degree of their involvement and commitment of the project				
Intangibility of social value	Labelled when: excerpts refer to difficulties measuring the various socio-economic value contributions and outputs of the project.				
Different ways of working, cultures, and procedural preferences	Labelled when: excerpts mention the different cultures of the co-creators involved, including how these result in different preferences for ways of working and procedures				
Internal coordination (for learning) within governments	Labelled when: excerpts describe the necessary coordination between different departments within the government to facilitate the hub, in particular, how learning lessons about co-creation are shared and institutionalised (or not) within the own organisation				
Tensions between different government roles	Labelled when: excerpts mention tensions between different role expectations for governments and their employees, amongst others project participant, policy writer, and possible permitting authority				
Preparing in permitting procedures	Labelled when: excerpts describe the activities of the consortium in preparing for (challenges, accelerating) permits for the sub-activities of the energy hub				
Conflicts of interest	Fragments are given this label when they contain concrete conflicts between interest of different project developers, or between group interests and the individual co-creator's interests				
Collective learning from conflicts of interest	Labelled when: excerpts include mentions of learning from conflicts of interests in co-creation				
Fragmentation of activities/ insufficient coordination & communication	Labelled when: excerpts describe lack of coordination and communication between co-creators and between different sub-activities in the hub				
Legitimacy through involvement governments	Labelled when: excerpts mention the involvement of local governments as important for legitimacy and social acceptance of the project				

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Code label	Code Description/rule	Societal value proposition	Communi-cation plan	Strategy Note	Institutional work
Decision making mandates	Labelled when: excerpts include discussions on the different mandates and responsibilities of the different co-creators as well as of the different working groups, core group, and steering group.				
Changing consortium partners	Labelled when: excerpts describe the departure or entry of project developers to the project, including the impact of this on co-creation and project design				
Removing institutional barriers	Labelled when: excerpts describe discussions on lobbying efforts to remove barriers to redevelopment posed by existing policies, regulations, and subsidy and licensing rules				
Lobbying for financial support	Labelled when: excerpts describe discussions on lobbying for financial support from higher-level governments for the (various sub-activities of) redevelopment (of energy hub and region)				
Recruiting external support	Labelled when: excerpts describe the activities of the consortium in recruiting support from parties outside co-creation, including higher-level governments and other industry				

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