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GLOBAL TRANSITION, LOCAL REALITIES

Governance tensions in energy transition value chains

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Summary

Dutch and European Union climate and supply-security goals depend on developments in resource-producing countries[1], where mining has long caused tensions

The Netherlands and the European Union (EU) are simultaneously pursuing climate, supply-security, and development goals. Climate policy, such as the binding renewable energy and hydrogen targets under the Fit-for-55 package, drives fast-growing demand for critical minerals and green hydrogen. However, most of these inputs come from outside the EU. The Netherlands imports them directly and indirectly embedded in batteries, solar panels, and other components. To secure their supply, European and Dutch resource strategies have developed quickly over the past years. At the same time, the Netherlands has committed to the Sustainable Development Goals and to policy coherence for development. Dutch policy should therefore not undermine sustainable development elsewhere. Mining has caused tensions in producing countries before, with negative effects for people and the environment (Dagnachew and Solf 2024; de Haes and Lucas 2024). Whether this is now different matters for Dutch policy, because secure supply depends on development in those countries.

Producing countries pursue their own development priorities, such as domestic value addition and a larger fiscal and social return from mining. The International Energy Agency (IEA 2026) shows that producing countries that capture too little of the value increasingly restrict exports, and projects without local support face delays or cancellation, which disrupts supply and makes prices volatile (Boafo et al. 2025). The IEA (2025a) and the UN Secretary-General's Panel on Critical Energy Transition Minerals (2024) therefore treat fairer benefit-sharing as a condition for stable supply, not just as a matter of justice. The National Raw Materials Strategy reflects this by treating sustainable raw material chains as a precondition for secure supply. On paper, these goals point in the same direction. The question for Dutch and EU policymakers is how far secure supply depends on producing countries' development priorities being met, and what Dutch and EU engagement can do about it. This report examines how these goals play out in practice in four resource-producing countries: green hydrogen in Egypt and South Africa, and lithium mining in Ghana and Nigeria. It combines these case studies with a review of academic and policy literature, and uses the Justice–Direction–Responsibility (JDR) framework as an analytical lens: who gains and who bears the costs of the transition (justice), whose priorities shape projects (direction), and who is responsible for outcomes (responsibility).

The global energy transition is reshaping relationships between countries that produce critical minerals and green hydrogen and the countries that consume them (resource-consuming countries)

These relationships create both opportunities and tensions around how transition benefits, burdens, and development opportunities are distributed. Global energy value chains are not only market structures, they are also sites where different development priorities and interests meet

[1] In this report, resource-producing countries are significant sites of extraction, processing or early-stage manufacturing of energy transition inputs; resource-consuming countries are primarily importers and users of these inputs in their own transitions. The categories are relational, can overlap within a country, and do not map neatly onto income groups (see Box 1).

and are negotiated. Resource-consuming countries, particularly the EU and the Netherlands, increasingly depend on partnerships with producing countries for access to critical minerals and green hydrogen. Across the four cases, this report finds that governance is fragmented across actors, institutions, and scales: no single actor takes responsibility for the social, economic, and environmental costs of resource extraction, which means these costs have not been addressed systematically. Our findings provide insight into how the EU and the Netherlands could engage with these tensions through international partnerships, investment, trade, and development cooperation.

New opportunities do not always translate into meaningful local outcomes

Across the four case studies, and in line with the wider literature, the energy transition creates new opportunities for investment, industrialisation, and international cooperation in resource-producing countries. However, these opportunities do not always translate into outcomes that are valued locally, in terms of jobs, energy access, community benefit, and industrial development. In South Africa, for example, about 20,000 job opportunities are expected at Coega Special Economic Zone, but most are temporary. The cases are early-stage and the sample is small, so the patterns identified are indicative of these four cases rather than conclusive. Their consistency across different governance contexts and commodity types, combined with the broader literature, suggests they reflect structural features of how transition value chains are currently organised rather than isolated project-level failures.

Formal governance mechanisms are in place, but outcomes for communities remain uneven

All four cases contained substantial formal governance arrangements put in place to manage projects and their local impacts, including consultation requirements, environmental safeguards, and benefit-sharing commitments, although how specific and binding these are varies. Ghana's lease sets a revenue share for communities and Nigeria's Mining Act requires Community Development Agreements, whereas in Egypt and South Africa the local content and socio-economic goals are mostly ambitions, not obligations. Some of these mechanisms functioned as intended: Ghana's constitutional requirement for parliamentary ratification of mineral agreements forced the lease of a lithium mine into public scrutiny and allowed for a formal, transparent process. Others, such as Egypt's centralised permitting model and South Africa's Strategic Integrated Project and Special Economic Zone status, mainly made it faster for developers to obtain approvals. Yet across the cases, the presence of these mechanisms did not automatically improve the outcomes experienced by affected communities.

In most cases, consultations with affected communities were described as informational rather than participatory; benefit-sharing funds were too layered and slow to be visible to communities; and promised jobs, electricity discounts, and infrastructure improvements were framed as future outcomes rather than conditions attached to the project approval. In Ghana, for example, communities near the site already bear costs, and compensation is documented but not yet paid, before any ore has even been mined. Taken together, these findings point to a recurring gap between procedural governance and substantive outcomes. The case evidence suggests that this gap reflects not only implementation capacity in producing countries, but also how projects are designed and financed from the outset, with development and community benefit conditions introduced later in the process rather than built in from the start.

Transition objectives are not always aligned with producing countries' own development priorities

Across the four cases, producing countries consistently set out ambitions for industrialisation and local value addition in national strategies, policy documents, and stakeholder interviews, although how firmly these are formulated varies. Nigeria makes local processing a condition for new mining licences, and Ghana's Green Minerals Policy commits to adding value to lithium before export. South Africa has several strategies with localisation and industrialisation pillars for the hydrogen sector, none of them binding. Egypt's national strategy envisages domestic value creation in later phases, but no binding local-content requirement is in place. These national ambitions are not the only priorities at stake. Communities around extraction sites in Ghana are concerned first with land and compensation, and most residents surveyed in Egypt in 2024 want the hydrogen to be used domestically.

However, infrastructure, financing arrangements, and offtake agreements are primarily designed to serve the decarbonisation and supply-security objectives of consuming countries, not these domestic or local ambitions. In Egypt and South Africa, green hydrogen production is destined predominantly for European markets, with domestic energy needs playing little role in project design. In Ghana and Nigeria, lithium leaves the country as unprocessed concentrate or raw ore, with refining and value addition happening abroad. The tools producing countries would need in order to capture more of the value chain, such as export conditions, local content requirements, and domestic processing mandates, are constrained by the investment and trade frameworks that consuming countries bring to these relationships. This gap between national and local development priorities and how value chains are designed remains unresolved across all four cases.

Decisions, benefits, and impacts are separated across global value chains

The four cases reveal a disconnect between where decisions are made, where economic value is captured, and where environmental and social impacts are experienced. Producing countries carry many of the transition's immediate burdens, such as land displacement, water stress, and weakly enforced benefit-sharing. Strategic decisions, including financing, partnership, and market-access decisions, and much of the value generated remain concentrated downstream, closer to consuming markets. Existing EU due-diligence frameworks address company-level risks, not governance conditions or development outcomes in producing regions, which leaves accountability for those outcomes diffuse.

Consuming-country instruments are stronger on supply security than on supporting producing countries' own development priorities

The cases and policy analysis in this report point to an asymmetry: the instruments consuming countries use are enforceable where supply security and market access are at stake, and largely voluntary where producing-country development is concerned. As a result, producing countries' own national rules and ambitions, such as those described above, are not backed by the instruments that shape these value chains. The two hydrogen cases illustrate this at project level. In Egypt, a long-term offtake through the German-backed H2Global mechanism secured demand, while the domestic value-addition ambitions in the national hydrogen strategy carry no equivalent enforcement. In South Africa, European finance, including the SA-H2 Fund supported by the Dutch and Danish governments, backs the Coega investment, while the local content and socio-economic goals remain aspirations rather than enforceable obligations. At the level of instruments, offtake contracts and trade agreements carry legally binding terms, EU Strategic Partnerships and the EU's Global Gateway carry development ambitions without enforceable conditions, and due-diligence

frameworks address corporate conduct rather than development outcomes. These are not only implementation gaps; they reflect competing objectives, described below as three governance tensions.

These findings combine into three governance tensions that supply-security instruments alone do not address

Read through the JDR framework, the findings above combine into three recurring governance tensions, one for each dimension. First, there is a tension between formal commitments and substantive outcomes. For example, in Nigeria, the 2007 Mining Act requires Community Development Agreements with host communities, but no one at the extraction site in Komu could confirm that one exists. Second, a tension between export orientation and domestic development priorities. In Egypt, a long-term offtake agreement through the German-backed H2Global mechanism secured export demand whereas, in a 2024 survey in Suez and Port Said, most residents preferred domestic use. Third, a tension between dispersed accountability and concentrated impacts. In Ghana, the Ewoyaa lithium mining lease has been ratified and the project is moving towards a final investment decision, while nearby communities already bear costs, including a moratorium on long-term crop planting and construction and compensation that is documented but not yet paid, before any ore has been mined. No single actor answers for these costs. All three can be read as expressions of the same fragmentation of governance across the value chain, where rules, finance, and accountability sit with different actors in different countries. These tensions are not necessarily caused by Dutch and EU engagement, but supply-security instruments do not address them. The case evidence suggests that doing so would mean embedding development conditions in investment, trade, and partnership frameworks.

Project terms and earlier financing decisions shape who benefits

Across the cases, the terms set when a project is negotiated, financed, and approved shape how benefits, costs, and risks are distributed. One project did include such terms: Ghana's sliding-scale royalty and the 1% community revenue commitment in the ratified Ewoyaa lease. Other mechanisms, such as land-for-land compensation in Ghana, local content and domestic supply requirements in Egypt, and licence conditions requiring projects to share surplus power and water in South Africa, were proposed by stakeholders but are not in place. Consuming countries take part in these early decisions through finance, partnerships, and market access, but accountability does not extend to those decisions: due-diligence rules apply where materials enter the EU, not where projects are developed, and they cover the operating company and the licensing government, not the earlier financing and partnership decisions. Conditions on local value addition, moreover, work only where the infrastructure and capacity to meet them exist.

The central question for consuming-country policymakers is therefore not only how to secure the resources the transition needs, but also how the conditions attached to finance, partnerships, and trade shape development opportunities and governance outcomes in producing countries. For the Netherlands, two channels stand out. Dutch public finance, such as FMO, Invest International, and the SA-H2 Fund behind the Coega project, can attach conditions on local value addition, benefit-sharing, and community participation to the projects it supports. At EU level, the Netherlands can push for trade agreements and Strategic Partnerships that leave room for producing countries' own value-addition rules, provided the infrastructure and skills to meet them are in place. Where they are, local processing can build industrial capability.

1 Introduction

1.1 Challenges and opportunities of the global energy transition

The global energy system is undergoing a transition towards cleaner energy, but progress so far is insufficient. Fossil fuels still supply roughly 80% of primary energy (IEA 2024), emissions have not yet peaked globally (Friedlingstein et al. 2026), and investment in clean energy falls short of what climate targets require (IEA 2024). Nevertheless, the direction of travel is clear: the share of fossil fuels such as coal and oil is starting to decline, while renewable energy sources (solar, wind, hydro, geothermal, and green hydrogen) are expanding rapidly alongside energy efficiency measures. This is not a strictly technological shift; replacing coal with solar or wind requires changes to the markets infrastructure, and institutional arrangements through which energy is produced and consumed. The transition also has to be compatible with the wider 2030 Agenda for Sustainable Development (UN 2015). Alongside affordable and clean energy (SDG 7), this includes clean water (SDG 6), decent work (SDG 8), reduced inequality (SDG 10), and life on land (SDG 15). The extraction and production that the transition depends on can support these goals, but can also undermine them.

This transition is driven by multiple factors, including the need to mitigate climate change by reducing greenhouse gas emissions (Yu et al. 2024), the aspiration for economic resilience, primarily through reduced import dependence and capturing the competitive opportunities of emerging clean industries, and the desire to enhance energy security (Kim et al. 2025; Li et al. 2026). The rapidly declining cost of renewable energy technologies and the potential for green jobs are also crucial economic drivers (IRENA and ILO 2026). Policy frameworks such as the Paris Agreement and national renewable energy targets provide further direction and incentives for clean energy development.

Despite these drivers, the transition also brings significant challenges. Technologically, the intermittency of some renewable sources requires improved energy storage solutions and grid flexibility, particularly in regions with limited renewable energy potential (IRENA 2024). Additionally, the high upfront cost of renewable energy infrastructure remains a significant barrier, particularly in low- and middle-income countries (LMICs), where higher costs of capital make capital-intensive projects more expensive to finance (Montague et al. 2024). Politically, progress is also hindered by a lack of supportive policies and resistance from fossil fuel interests (Gazmararian and Tingley 2026). Socio-economically, the impact on jobs in traditional energy sectors and the uneven distribution of transition benefits risk leaving many behind (Carley and Konisky 2020; Barreto et al. 2024). Beyond these technological, political, and socio-economic hurdles, the energy transition is also reshaping global patterns of resource extraction and trade, as the shift towards renewable technologies drives a surge in demand for new resources, such as the critical minerals and materials needed to build them.

This demand for resources presents new opportunities, but also significant challenges, and shifts dependencies within and between regions. Supply chains for the critical minerals that underpin renewable technologies are concentrated in a small number of producing countries (IEA 2025a). Some producing or refining countries are using this concentrated control over supply as strategic

leverage, adopting explicit 'energy dominance' strategies to secure geopolitical or economic advantage. Consuming countries are adapting to this concentration of supply, for example through diversification strategies aimed at improving energy security.

In many low- and middle-income countries, including several in Africa, extraction projects (e.g. critical mineral mining and green hydrogen production) are frequently framed by governments and developers as development opportunities, promising access to basic services, economic growth, and poverty reduction for frontline communities. Frontline communities are those living in closest proximity to extraction and production sites, and therefore most directly exposed to their environmental, social, and economic consequences.

Different actors, however, frame these projects differently. Consuming countries emphasise supply security, producing countries industrial development and sovereignty, and affected communities environmental and livelihood protection. These competing priorities are not yet navigated adequately by existing frameworks of international cooperation, such as the EU's Strategic Partnerships on raw materials, Global Gateway, and the Just Energy Transition Partnership with South Africa.

These competing priorities also raise important questions of justice: who benefits from these resources, who bears the environmental and social costs of extracting them, and who has a say in how projects are designed and governed? Where institutional capacity and bargaining power are limited, governments and communities are more exposed to how the resulting costs and benefits are distributed. This report examines four such projects in depth, focusing on how the global energy transition is experienced and governed in resource-producing countries: green hydrogen production in Egypt and South Africa, and lithium mining in Ghana and Nigeria.

For the EU, and the Netherlands specifically, navigating these competing priorities is a concrete policy dilemma. Ambitious EU and Dutch climate policy, such as binding renewable energy and hydrogen targets under the Fit-for-55 package, is driving substantial demand for critical materials and green hydrogen. Simultaneously, broader EU and Dutch commitments to sustainable development, including the Sustainable Development Goals (SDGs), create parallel objectives around poverty reduction, decent work, sustainable economic development, and reduced inequality. Meeting all at once is not automatic: more demand means more extraction and production in countries where costs and benefits are unevenly shared. Instruments such as the Critical Raw Materials Act, the Global Gateway initiative, Dutch bilateral partnerships, and development finance through Invest International shape how Europe engages with the countries that supply the resources it consumes.

Securing the flow of materials to Europe is not enough to secure supply. Producing countries that capture too little of the value increasingly restrict exports: the Democratic Republic of Congo (DRC) has imposed a cobalt export quota, and Zimbabwe and Mozambique have restricted exports of lithium and graphite (IEA 2026). Projects that lack local support also face delays or cancellation. When trade relations are not seen as beneficial in producing countries, supply becomes less stable through export restrictions, local opposition, and delays, which leads to supply disruptions and price volatility (Boafo et al. 2025). The IEA's Global Critical Minerals Outlook (IEA 2025a) and the UN Secretary-General's Panel on Critical Energy Transition Minerals (2024) have both identified fairer benefit-sharing and more equitable trade conditions as strategic priorities, not only as justice imperatives but as conditions for supply chain stability. A central question of this report is therefore

what the experiences and development priorities of resource-producing countries reveal about the justice-related challenges of the global energy transition, and what these imply for Dutch and EU engagement with producing countries. The four countries studied in this report are all so-called 'combination countries' in Dutch policy, where trade, development cooperation, and climate and energy partnerships converge (see section 2.2).

Addressing this question matters because the transition offers a potential pathway to address longstanding justice-related challenges, while also carrying the risk of deepening existing inequalities or creating new ones. Frontline communities and countries already disadvantaged within the current energy system face a higher likelihood of bearing the transition's environmental and economic costs, while access to its benefits, including cleaner energy, employment, and industrial opportunities, tends to follow existing structures of wealth and institutional capacity (Carley and Konisky 2020). Understanding how these dynamics play out in producing countries is therefore important not only from a justice perspective, but also for actors in consuming countries seeking to develop durable and mutually beneficial transition partnerships, which is key for a resilient supply of resources needed for the energy transition.

Text box 1. A note on terminology: Producing and consuming countries

The terms ‘resource-producing countries’ and ‘resource-consuming countries’ are used to describe different positions within emerging energy-transition value chains. ‘Producing countries’ refers to countries that are significant sites of extraction, processing, or early-stage manufacturing of energy transition inputs (e.g. critical raw materials, hydrogen and hydrogen derivatives). ‘Consuming countries’ refers to countries that are primarily importers and users of these materials and resources in domestic energy transitions.

These categories are analytical entry points rather than fixed classifications. Countries may occupy both positions within different value chains, and their position may change as value chains evolve. The categories do not map neatly onto income groups. Critical mineral production, for example, is not concentrated only in lower-income countries: a significant share of mining and an even larger share of processing and refining capacity is located in upper-middle-income countries (UMICs) and high-income countries (HICs), with China dominating refining across several key minerals. HICs such as the United States, Australia, Chile, and Canada account for roughly a quarter of critical material production (de Haes and Lucas 2024). Equally, consumption is not limited to HICs: demand for solar panels, batteries, and electric vehicles is growing quickly in many LMICs and UMICs, including China.

This report nevertheless focuses on a particular relationship between these positions: that position between higher-income resource-consuming countries and lower-income resource-producing countries, where energy transition value chains intersect with questions of development and international cooperation. The terms are therefore a relational description, not an income-group map. In this report, 'resource-producing countries' (or simply producing countries) refers primarily to the four African producing countries, from which case studies are included, and 'resource-consuming countries' (or consuming countries) refers primarily to the EU and the Netherlands, whose policy the report addresses. The four case studies come from countries labelled 'combination countries' in Dutch foreign policy, making them particularly relevant to examining how energy-transition engagement interacts with development and broader international-policy objectives (see section 2.2).

1.2 Research objectives

This study has two related objectives. First, we examine how the global energy transition reshapes relationships between resource-producing and resource-consuming countries, and how these dynamics are experienced and governed in producing countries, in particular by frontline communities. Second, building on these empirical findings, the study reflects on what these dynamics imply for policymakers in resource-consuming countries, who have to meet climate and supply-security goals while also contributing to development in the countries that supply them. It looks at Dutch and EU engagement with resource-producing countries in particular, including how Dutch climate, supply-security, and development policies could be aligned with each other in ways that respond to producing countries' development priorities. This includes considering how trade, finance, international cooperation, and partnership arrangements may interact with the development priorities and constraints identified in the case studies. We explore the implications through three stylised international engagement profiles for the Netherlands (van Dam et al. 2025), discussed in Chapter 5. The report does not seek to prescribe a single approach to Dutch or EU engagement but provides insights into the governance tensions and options to consider when shaping international transition partnerships.

To address these objectives, the report combines a literature review, policy analysis, and four in-depth case studies of critical raw materials mining and green hydrogen production (green hydrogen in Egypt and South Africa, lithium mining in Ghana and Nigeria), analysed through the JDR framework (see Chapter 2). It aims to answer the following research questions that guide and inform the analysis:

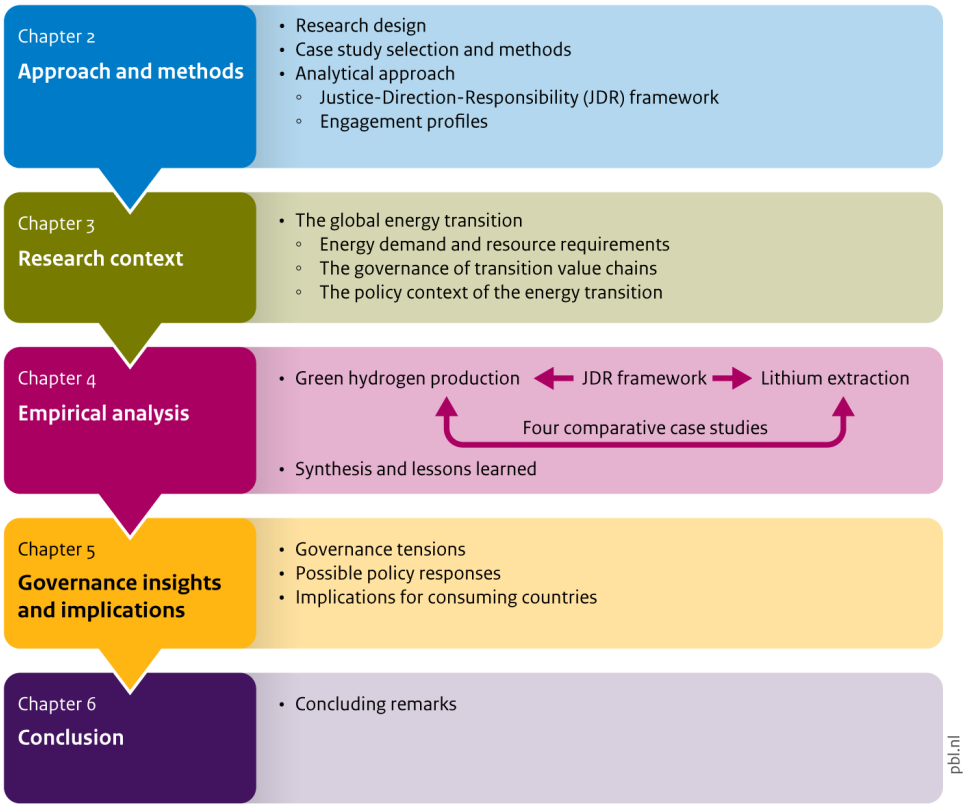
1. How are the benefits, burdens, and opportunities for participation associated with critical mineral and green hydrogen projects distributed in the case study regions, and for whom?
2. How are global energy transition value chains for critical minerals and green hydrogen in the case studies structured between producing and consuming countries, and what shapes their direction?
3. How are responsibilities allocated across actors and scales in the case studies, and where do accountability gaps arise?
4. Which structural features of current transition governance shape how benefits and burdens are distributed between producing and consuming countries, as observed in the case studies?
5. What insights do the case findings reveal about the development priorities and constraints of resource-producing countries and communities, and what does this mean for Dutch and EU partnership frameworks and for aligning Dutch climate, supply-security, and development policies?

The research questions are answered chapter by chapter. Research questions 1, 2, and 3 are addressed through the JDR coding of the four case studies in Chapter 4 (justice, direction, and responsibility respectively; see Table 2). Research question 4 is addressed through the cross-case synthesis, interpreted against the literature, in section 5.1. Finally, research question 5 is addressed in two steps: the priorities and constraints of producing countries and communities are described in Chapter 4 and brought together in section 5.1, and the implications for Dutch and EU partnership frameworks are developed through the engagement profiles (section 5.2) and the cross-cutting considerations (section 5.3) and drawn together in Chapter 6.

1.3 Report content and structure

This introduction is followed by five chapters (as summarised in Figure 1 below). Framed around our main research questions, Chapter 2 describes the research design, the case study selection, and the analytical framework (JDR) and engagement profiles that structure the analysis. Chapter 3 sets out the global context, covering material demand, value chains, and the policy landscape. Chapter 4 then presents the four producing-country case studies, synthesises their findings through the JDR dimensions and draws lessons. Chapter 5 turns to resource-consuming countries. It identifies three governance tensions, explores Dutch engagement, including at EU level through three stylised engagement profiles, and draws out three considerations that hold across the profiles. Chapter 6 returns to the central question set out in the introduction.

Figure 1
Report content and structure



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2 Approach and methods

This chapter describes how the research was carried out. It sets out the research design (2.1), the selection of cases and methods (2.2), and the analytical approach, including the JDR framework and the engagement profiles used in Chapter 5 (2.3).

2.1 Research design

The research is structured into four interlinked components. First, we conducted a desk-based literature and policy review to map key debates, including the drivers of the energy transition, emerging material and energy demand patterns, and evolving policy responses in both consuming and producing regions. The literature review covered peer-reviewed research on energy transition governance, resource justice, and critical mineral and green hydrogen value chains, alongside reports from international organisations. The policy review covered the EU and Dutch instruments most directly relevant to the report's scope, including the Critical Raw Materials Act, the Corporate Sustainability Due Diligence Directive, Strategic Partnerships, and Global Gateway, as well as the national strategies and governance frameworks of the four case study countries. This phase provides the contextual and conceptual grounding for the analysis, helps distinguish findings specific to individual projects from dynamics documented more widely, and identifies recurring themes and gaps in existing knowledge.

Second, the study draws on four in-depth case studies of critical raw materials and green hydrogen production contexts in selected producing countries (green hydrogen in Egypt and South Africa, and lithium in Ghana and Nigeria). These cases are treated as embedded empirical illustrations of broader value chain dynamics rather than isolated country studies. Each case is analysed in relation to governance arrangements, actor constellations, and observed distributional outcomes along transition value chains of the case study countries.

Third, we carried out a comparative synthesis across cases as well as literature and policy material. This synthesis forms the core analytical step of the research. It identifies recurring patterns, similarities, and divergences across contexts in how transition value chains are governed and how outcomes are distributed between producing and consuming regions.

Finally, the study uses three illustrative international engagement profiles for the Netherlands (van Dam et al. 2025) to translate the governance tensions identified in the synthesis into policy implications for resource-consuming countries.

Across the first three stages, our analysis is guided by the JDR framework (see section 2.3). This framework provides a consistent analytical lens for comparing and interpreting findings across cases and across the literature. It helps organise observations around three interrelated dimensions: distributional outcomes and inclusion (justice), the type and orientation of transition pathways (direction), and the allocation of roles and obligations across actors (responsibility). This approach allows for an integrated analysis of how resource transition pressures translate into governance dynamics and distributional outcomes across producing and consuming regions, and how these dynamics can be interpreted through recurring patterns across cases.

2.2 Case study selection and methods

We selected case studies to capture key positions within emerging global energy transition value chains. The selection logic was guided by three interrelated criteria. First of all, we placed the focus on two value chains that are crucial to the energy transition: critical raw materials and green hydrogen. Green hydrogen is emerging as a key energy carrier essential for decarbonising hard-to-abate sectors, such as heavy industry and long-haul transportation. Within critical raw materials, lithium underpins the electrification of transport and the deployment of battery energy storage systems, both of which are fundamental to the global energy transition. We selected the value chains because they serve as enablers for the broader energy transition and are characterised by rapidly expanding global demand, high levels of geopolitical interest, and strong cross-border interdependencies between producing and consuming regions that are all relevant for the EU and Dutch context.

Second, within these value chains, we selected cases to represent upstream production contexts in LMICs, where resource extraction, land use, and infrastructure development are closely linked to global demand from consuming regions. This allows for a deeper analysis of how global value chain pressures materialise in producing-country settings.

Third, within this structure, we also selected cases to ensure meaningful variation across different geographical and institutional contexts, thereby enabling a comparison of how similar value chain dynamics unfold under different governance arrangements and socio-political conditions.

The four cases are drawn from countries identified in Dutch policy as 'combination countries' (Ministerie van Buitenlandse Zaken 2022), i.e. countries where multiple strands of engagement (trade, development cooperation, and climate/energy partnerships) converge. These countries, specifically Egypt, Ghana, Nigeria, and South Africa, are included as analytically relevant settings where global value chain dynamics intersect with dense and multi-layered policy engagement, while also offering meaningful variation (see Table 1).

It is important to note that our selection was primarily guided by analytical relevance to global value chain dynamics rather than by the presence of specific Dutch- or EU-funded projects or formal bilateral partnerships. Nonetheless, we did explicitly give attention to contexts where governance arrangements, investment flows, and policy frameworks reflect broader EU and Dutch strategic engagement with producing regions.

Methods in the case studies

All four studies are qualitative case studies. Each combines a review of policy and project documents with fieldwork, mostly interviews, which allowed findings to be cross-checked across sources. The scope differs per case (see Table 1 and Appendices 1-4 for more detail).

Table 1
Summary of the case studies

Country	Case	Sector	Description	Methods
Egypt	Egypt Green Hydrogen Project (Ain Sokhna, SCZone)	Green hydrogen	Located within the Suez Canal Economic Zone, the Egypt Green Hydrogen Project is one of the most advanced large-scale green hydrogen and renewable ammonia initiatives in the Middle East and North Africa (MENA) region. The project is under development.	10 expert interviews, document review, and an exploratory survey of eight respondents.
Ghana	Ewoyaa lithium project	Critical raw materials	Situated in the Mfantseman Municipality of Ghana's Central Region, the project forms part of a broader lithium-bearing pegmatite corridor within the Cape Coast geological belt. The project is in the pre-production phase.	15 interviews across three affected communities, Ewoyaa, Afrengua and Krampakrom, alongside a literature analysis.
Nigeria	Oyo's lithium extraction	Critical raw materials	Located in the Oke-Ogun region of Oyo State, which is one of Nigeria's emerging lithium-rich states. Extraction is active but largely informal and artisanal.	Field observations with 9 interviews and a policy review.
South Africa	Coega green ammonia project	Green hydrogen	Located at the Coega Special Economic Zone (SEZ) in Nelson Mandela Bay, Eastern Cape, this project is South Africa's most advanced green hydrogen initiative to date. The project is at the front-end engineering design (FEED) stage.	Interviews and one focus group (20 participants in total) with civil society, academia, government and businesses.

To support comparability across cases while allowing sensitivity to local contexts, all case studies followed a common research protocol. This included a shared set of research questions, a common analytical framework (JDR framework; see section 2.3), and guidance on the types of evidence to be collected through document review and qualitative fieldwork. Following completion of the individual case studies, the research team held a comparative synthesis workshop to discuss findings, clarify concepts and terminology, and validate the cross-case interpretation. This process provided a consistent structure for examining broader patterns in governance arrangements, transition pathways, and distributional outcomes, while allowing researchers to adapt data collection to country-specific conditions and project realities, thus preserving the contextual richness of the individual cases.

2.3 Analytical approach

Approach

The analysis combines evidence from the literature, policy documents, and case study material, which we subsequently analysed using a structured comparative approach. This allows for the identification of recurring patterns across different resource and governance contexts, while also preserving the specificity of each case.

Within the comparative synthesis (third component), the analysis proceeded in two steps, followed by a policy-translation step (see 'Engagement profiles' below). First, we systematically organised empirical material from the case studies using the JDR framework as an analytical structuring device. This structuring step ensured comparability across heterogeneous cases without reducing them to a single explanatory model. The results of this step are presented in Chapter 4.

Second, we interpreted the coded empirical patterns through iterative comparison with insights from the academic literature and policy analysis. This interpretive step allowed for the identification of higher-order governance tensions and recurring dynamics across cases. The framework is thus used to organise evidence, which is then situated within broader debates on global energy transition governance and value chain reconfiguration, as presented in Chapter 5. This approach enabled synthesis across diverse empirical settings while maintaining analytical sensitivity to context. It also allows the study to move from case-specific observations to broader governance implications in global energy transition value chains.

The JDR framework

This report applies the JDR Framework (Oates and Minderhoud 2026; Oates and Verveld 2024) (see Figure 2) as an analytical lens for interpreting how transition pathways are shaped and governed. The framework provides a common language for coding and comparing observations across cases. It does not seek to determine whether specific projects are ‘just’ or ‘unjust’. Rather, it supports a systematic interpretation of empirical material across three dimensions:

- **Justice: What is at stake, and for whom?** This dimension examines how benefits, burdens, risks, and opportunities associated with transition projects are distributed across groups, places, and generations. It not only considers distributional outcomes, but also procedural aspects of participation and recognition of different perspectives and interests.
- **Direction: What kind of change is being pursued?** This dimension examines the objectives and pathways underlying transition strategies. It asks whether projects primarily reproduce existing systems, seek to improve them, or contribute to broader structural changes. In the context of global energy value chains, this includes examining whether transition projects are primarily oriented towards external decarbonisation objectives, domestic development priorities, or combinations of both.
- **Responsibility: Who is expected to act, and on what grounds?** This dimension examines how responsibilities for shaping and governing transition outcomes are understood, allocated, and negotiated across actors and scales.

Importantly, the three dimensions are not completely analytically distinct but closely connected. For example, choices about the direction of transition pathways shape who gains and who bears costs, and understandings of justice can both influence which pathways are considered legitimate and determine which actors are expected to act and how.

Figure 2
JDR concepts for analysing sustainability transitions (Oates and Minderhoud 2026)



Source: PBL

The conceptual development of the JDR framework, including its theoretical foundations and reflection questions, is elaborated on in a separate publication (Oates and Minderhoud 2026). For the purposes of this study, the framework is used as an analytical tool and operationalised through the following questions, which are tailored to the empirical cases:

- For 'justice', the analysis examined how benefits and burdens associated with transition projects are expected to be distributed, including the implications for local communities, environmental impacts, participation in decision-making, and the recognition of different interests and priorities.
- For 'direction', the analysis considered the objectives shaping transition projects, including the balance between global decarbonisation goals, energy security objectives, and producing-country ambitions for industrial development and value creation.
- For 'responsibility', the analysis examined different forms of engagement, ranging from securing supply and managing risks to actively shaping how value is distributed along value chains and supporting producing-country development priorities. It looked at both formal responsibilities and how different actors (governments, companies, investors, consumers, and affected communities) influence transition pathways from different positions of power, capacity, and interest.

Engagement profiles

How the Netherlands and the EU could respond to the tensions identified in the cases cannot be derived from the case evidence alone, because the answer also depends on political choices about the Netherlands' role in the world. The study therefore uses the three international engagement profiles developed in van Dam et al. (2025): Global Leadership, European Partnership, and National Self-Interest. Each profile reflects a different way of reconciling global sustainability, geopolitical resilience and international cooperation.

The profiles serve as an analytical lens. They are not scenarios, forecasts, or recommendations, and they are not ranked. We developed the profiles for Dutch policy choices in general, not for transition value chains specifically. They were therefore applied here by asking, for each governance tension in section 5.1, what responding would look like under each profile, which instruments it would mobilise, and what trade-offs it would accept, drawing on the literature and policy review (section 5.2, Table 3). Section 5.2 also discusses two channels through which the Netherlands can influence how value chains develop (Dutch public finance and EU-level instruments), and section 5.3 identifies three considerations from the cases that hold across all three profiles. In short, the JDR framework structures what is observed in producing countries, the profiles structure how consuming countries could respond, and together they answer research question 5.

3 The global energy transition: Context, value chains, and policy landscape

This chapter sets out the context for the case studies. It describes how rising energy demand translates into demand for critical raw materials and green hydrogen, and into pressures on the places where they are produced (3.1), how the resulting value chains are governed (3.2), and the policy frameworks of consuming and producing countries that shape them (3.3). The patterns it describes are examined empirically in chapters 4 (and interpreted in chapter 5).

3.1 Energy demand and resource requirements

Global electricity demand is projected to rise rapidly, especially in LMICs

By 2050, global electricity demand is projected to increase substantially, driven by population growth, industrial expansion, and the electrification of various sectors, including transportation and heating. For scenarios that aim to meet the goals of the Paris Agreement, studies (Dagnachew et al. 2025a; IEA 2025b) project that electricity demand will rise by up to 55% by 2050 relative to 2020. Growth is expected to be particularly rapid in LMICs: in regions such as Africa, South and Southeast Asia, and Latin America electricity demand could increase two- to ten-fold between 2025 and 2050, compared with more modest growth of 30 – 50% in North America, Europe and parts of Asia (IEA 2025b; Dagnachew et al. 2025a). Unless stated otherwise, the projections in this section are from Paris-aligned scenarios. Achieving universal access to clean energy in LMICs not only has implications for social and economic development, but also plays a critical role in global efforts to reduce carbon emissions and combat climate change.

Meeting this growing electricity demand will require a rapid expansion of renewable energy infrastructure, which drives increasing demand for critical raw materials

In scenarios consistent with the goals of the Paris Agreement, solar and wind become the dominant sources of new power generation capacity by 2050, while energy carriers such as hydrogen and biofuels also expand substantially. For example, in 2025, solar and wind made up 3.5% and 3% of the global electricity mix, respectively. This share is expected to rise to 30 – 35% for solar and 20 – 30% for wind by 2050. Similarly, hydrogen and biofuels, which serve as both fuels and industrial feedstocks for hard-to-abate sectors, are projected to grow twenty- to a hundred-and-fiftyfold over the same period (Dagnachew et al. 2025a).

The energy transition is therefore not only a shift in energy sources, it is also a large-scale physical transformation requiring new infrastructure, materials, and land. Wind turbines, solar panels, batteries, and electrolysers require lithium, cobalt, nickel, graphite, copper, and rare earth elements, and demand for energy-transition minerals is projected to increase steeply (IEA 2025a). For lithium, demand more than triples by 2040 under current policies (IEA 2026). Mining is less concentrated than refining, and new mine supply increasingly comes from countries such as the DRC and Zambia (IEA 2026). Refining, however, is dominated by a few countries: the top three

refiners account for an average 86% of the market (IEA 2025a), and China and Indonesia accounted for over three quarters of recent growth in refined supply (IEA 2026). Concentrated refining creates supply risks for consuming countries. The land, water, and social pressures of extraction fall on the countries where mines are located, which are often not the countries that refine the resources.

The associated resource demand will generate significant environmental and social pressures, particularly in producing regions

While the benefits of renewable energy and decarbonisation are global, the land, water, mineral, and infrastructure requirements are concentrated in specific producing regions. These pressures can be particularly significant where extraction takes place in areas facing existing water scarcity, biodiversity pressures, or dependence on land-based livelihoods (de Haes and Lucas 2024).

Green hydrogen is illustrative of these dynamics. Its production is highly land-intensive: it requires large contiguous areas for renewable electricity generation, electrolyser plants, transport infrastructure, and, at arid coastal sites, desalination plants. Several prospective exporters have earmarked a few percent of their land area for green hydrogen production (Dejonghe and Van de Graaf 2025; Dagnachew and Solf 2024). Water is also a critical input at multiple stages of green hydrogen production: purification, electrolysis, and process cooling. Water demand ranges from 20 to 130 kg per kg of hydrogen produced, depending on the electricity source (Alkhalidi et al. 2024). While high renewable energy potential makes many prospective export sites attractive for green hydrogen production, these locations frequently face severe water scarcity. This drives dependence on seawater desalination, raising the prospect of brine discharge harming coastal ecosystems (Dejonghe and Van de Graaf 2025).

3.2 The governance of transition value chains

The material shifts identified in the preceding section are not only technical changes in how energy is produced; they also reshape global production and development relationships. As demand for renewable energy, critical raw materials, and related infrastructure grows, it influences where value is created, where resources are extracted, and how benefits and risks are distributed across regions. The resulting relationships are organised through global value chains: cross-border networks of firms, governments, investors and other actors through which resources and technologies move from production to end use, and through which value is created and shared.

Global value chains connect resource-consuming and resource-producing countries in different ways

Producing countries may seek to use natural resources and renewable energy potential to generate revenues, employment, industrial development, and domestic energy supply. For example, Indonesia's restrictions on raw nickel exports have been used to encourage domestic smelting capacity, sharply raising export revenues, while countries including Namibia, Zimbabwe, and Ghana have introduced measures to ban or restrict exports of unprocessed lithium and other critical minerals to retain more of the value chain domestically. Consuming countries, meanwhile, seek reliable access to the materials, energy, and technologies required for their own energy transitions. Many European governments leverage the energy transition as part of a broader strategy to achieve strategic autonomy and secure access to critical raw materials, pursued in part through new industrial partnerships and investment relationships with LMICs (AIV 2025). For example, the Lobito Corridor, a railway linking copper and cobalt deposits in Zambia and the DRC to the Angolan port of Lobito, is financed by the US and EU to secure critical raw materials as part of broader

efforts to strengthen access to critical raw materials in a region where China has played a significant role in infrastructure development (Carrai 2025).

Firms and investors shape these relationships, for example through decisions about where to invest, which technologies to deploy, and where to locate different stages of production (Swilling et al. 2022). International financial institutions and development finance institutions, such as the European Investment Bank and the Dutch FMO and Invest International, shape which projects are considered viable and how they are structured, including through blended finance that combines public or philanthropic money with private investment (Kintzi 2025; Swilling et al. 2022). Influence over value chains is unevenly distributed: a small number of firms, financiers, and governments, often based in Western countries or in China, are able to shape which projects go ahead and on what terms. Green technology rivalries add a further layer, as major economies compete for leadership in battery production, solar panel manufacturing, and hydrogen (Dagnachew et al. 2025b).

Grassroots organisations, cooperatives, and local communities pursue decentralised, locally-grounded approaches, aiming to meet social and energy needs that may not be addressed by large-scale projects (Akizu et al. 2017), but typically operate at a scale that limits their influence on value chain governance. For example, in the Indigenous village of Kasepuhan Ciptagelar in Indonesia, villagers without grid access initiated community-managed micro-hydro systems that combined Indigenous knowledge with external scientific and technical support to secure locally distributed electricity (Pratiwi and Juerges 2022). Additionally, in the DRC's Lualaba province, cobalt cooperatives have attempted to channel funding from downstream buyers into locally-governed investment in health, safety, and child protection (Fair Cobalt Alliance (FCA) 2025).

Global value chains are governed through fragmented arrangements

Together, these relationships produce a system in which different parts of the transition are distributed across space and governed through fragmented and overlapping institutional arrangements. These include national regulation, trade policy, investment regimes, social and environmental standards, corporate and industrial strategies, financing conditions, and international partnerships. Coordination across firms, financiers, and policymakers often focuses on managing risk, ensuring compliance, and enabling project delivery within existing market and institutional structures, with less systematic attention to how value creation and distribution are organised across space (Herdlitschka et al. 2026). As a result, decarbonisation efforts are often implemented through established supply chain configurations, which can shift pressures and responsibilities towards actors and places with fewer resources and weaker bargaining positions (Iskander and Lowe 2020; Karaosman et al. 2024).

Global value chain governance involves choices about who benefits, who decides, and who is responsible

How decisions made in consuming regions shape development trajectories, environmental impacts, and investment opportunities in producing regions, and how choices made in producing countries, such as export restrictions or value-addition requirements, in turn affect the supply available to consuming regions, is as much a governance question as a technological or economic one. At the core of these debates are questions about who is able to influence transition pathways, how responsibilities are allocated across actors and scales, and how competing development priorities are reconciled in practice. The literature therefore raises questions that go beyond technical efficiency and emissions reductions, towards how the governance of transition value

chains can be structured to address distributional questions alongside technical and emissions objectives (Gualandris et al. 2024; Oates and Verveld 2024).

Transition value chains can reproduce existing inequalities while simultaneously creating opportunities for producing countries

The literature raises concerns that existing patterns of international production may be reproduced in emerging transition value chains, with resource extraction and environmental pressures concentrated in producing regions while financing, technology development, processing, and other higher-value activities remain concentrated elsewhere (Akizu et al. 2017; Chatterjee et al. 2024; Höffken et al. 2021; Tunn et al. 2024). Research on large-scale renewable projects, for example, has identified projects that supply energy to high-income regions while doing little to address energy poverty in host countries (Van de Graaf et al. 2020). Some authors describe these patterns as 'green colonialism' or, in specific domains, 'hydrogen colonialism' (Galan and Lindner 2025). In particular, the concentration of capital, technology, and decision-making capacity in high-income countries can reinforce established inequalities in access to land, resources, and development opportunities (Carley and Konisky 2020; Romero-Lankao et al. 2023).

These dynamics manifest in different ways. The acquisition of land and resources for renewable energy and mineral projects can result in the displacement of communities from communal or customary lands, often with limited compensation or recourse. These patterns are reflected in the concentration of green technology patents and other high-value activities in a small number of economies (e.g. the EU, US, Japan, and China), while many producing countries occupy lower-value positions in emerging value chains, despite being suppliers of raw materials (Gevaert et al. 2023; Tunn et al. 2024).

At the same time, the transition also creates opportunities for producing countries to pursue local value addition, industrial development, employment, and economic diversification, and may provide opportunities to build infrastructure, technological capabilities, and stronger positions within emerging global value chains (Swilling et al. 2022). Whether these opportunities materialise depends partly on how value chains are governed and on the capacities, capabilities, and bargaining positions of different actors. Participation is one factor: studies find that the energy transition often proceeds with limited participation of affected communities, with implications for who benefits and who bears the costs (Romero-Lankao et al. 2023). As governance increasingly spans multiple jurisdictions and actors, decision-making tends to be concentrated among technical, financial, and policy actors, often based in consuming regions, who tend to approach transition planning primarily through technical and economic, rather than social and governance, considerations (Gevaert et al. 2023; Höffken et al. 2021; Romero-Lankao et al. 2023). This can limit the extent to which communities in producing regions are able to shape the design, location, or conditions of projects that directly affect their land, livelihoods, and development pathways.

Responsibility for governing transition outcomes is distributed across actors and scales

At the global level, high-income countries are commonly associated with responsibility for the broader financial and institutional conditions of the transition. This includes delivering on climate finance commitments, supporting reforms in international financial institutions to strengthen the voice of producing countries, and avoiding the assumption that policy models developed in high-income contexts are universally applicable (AIV 2025; Höffken et al. 2021). Firms and investors involved in energy and resource value chains are also attributed the responsibility to address the social and economic impacts of their projects, including through local skills development and

benefit-sharing (Galan and Lindner 2025; Measham et al. 2024; Swilling et al. 2022). A recurring theme is the importance of recognising and including communities most directly affected by energy transition projects.

3.3 The policy context of the energy transition

Governments of consuming and producing countries, and multilateral fora, are responding to this reconfiguration through governance and policy mechanisms. This section gives an overview of the key frameworks for consuming countries (the EU and the Netherlands), for producing countries (particularly in Africa), and for the instruments that connect them.

Global climate and energy frameworks set the objectives that drive demand for hydrogen and critical raw materials

At the heart of the global push towards clean energy is the Paris Agreement (UNFCCC 2016), signed by nearly all countries in 2015, which commits nations to limit global warming to well below 2 °C compared to pre-industrial levels, while encouraging efforts to restrict the increase to 1.5 °C. While climate commitments initially drove the transition, energy security has since become a further driver. The price shocks and supply disruptions that followed Russia's invasion of Ukraine, together with the vulnerability of oil flows through the Strait of Hormuz, accelerated the push to reduce dependence on fossil fuel imports and the geopolitical vulnerabilities they create. Industrial competitiveness is a third driver: major economies now compete for leadership in technologies such as batteries, electrolysers, and solar manufacturing.

The EU has translated these commitments into binding legislation. The European Climate Law sets legally binding targets to reduce greenhouse gas emissions by at least 55% by 2030 and to reach climate neutrality by 2050. The Fit-for-55 package, including the revised Renewable Energy Directive (RED III), sets additional binding renewable energy targets. For hydrogen, RED III is the main regulatory driver: renewable fuels of non-biological origin (RFNBOs), including green hydrogen[2], must make up at least 42% of the hydrogen used in industry by 2030 and 60% by 2035, with a combined 5.5% sub-target for RFNBOs and advanced biofuels in transport by 2030 (European Commission 2018, 2022). These targets are legally binding for Member States, unlike the indicative figures in the Hydrogen Strategy for Climate-Neutral Europe. REPowerEU, a Commission Communication launched in 2022 in response to Russia's invasion of Ukraine, adds a target of 10 million tonnes of domestic renewable hydrogen production and 10 million tonnes of imports by 2030 (European Commission 2018).

Resource-consuming countries seek supply security

The EU has adopted the Critical Raw Materials Act (CRMA) and the Net Zero Industry Act to secure domestic extraction and processing of these materials. The CRMA frames criticality around supply disruption risk and import diversification and designates 'strategic projects' to fast-track permitting and financing for priority supply chains. The Act includes sustainability conditions: strategic projects

[2] In this report, green hydrogen refers to hydrogen produced by splitting water through electrolysis, using electricity from renewable sources. Under EU rules, it counts as an RFNBO only if the renewable electricity meets additional criteria on additionality and on temporal and geographic correlation with the electrolyser.

must demonstrate that environmental and social impacts are monitored and minimised, and, for projects in developing countries, that they are mutually beneficial, adding value in the host country and not only securing supply for the EU (European Commission 2024). The IEA similarly identifies copper, lithium, nickel, cobalt, graphite, and rare earth elements as bottleneck risks for the energy transition (IEA 2025a). The growing strategic importance of critical minerals has increased the engagement of major economic powers, including China, the USA, the EU, and the UK, with mineral-rich African countries.

The Netherlands is connected to upstream production of lithium and green hydrogen through finance directed at green hydrogen infrastructure in producing countries, its role as an importer and transit hub for critical raw materials and their derivatives, downstream demand for lithium in industry and mobility, and participation in bilateral and EU-level partnerships. Its policy frameworks (the Dutch Africa Strategy, the Hydrogen Strategy and the National Raw Materials Strategy (the *Nationale Grondstoffenstrategie*)) reflect the same dual ambition as the EU: securing supply while supporting sustainable development in partner countries. The Raw Materials Strategy also explicitly recognises supply security and resilient value chains as essential elements of future raw material policy. These strategies set out ambitions rather than binding obligations, so their implications for producing countries depend on how, and whether, they are translated into project-level conditions.

Resource-producing countries in Africa share ambitions for value capture

Countries with abundant reserves look at critical raw materials as an economic development opportunity, an opportunity for a more just trade system, or as geopolitical leverage (Boafo et al. 2025; Boretti 2025; Nakanwagi 2023). Recent policy agendas from producing regions reflect this, emphasising domestic value addition, regional industrialisation, and stronger fiscal and social returns from mining (Sasmal 2025; African Union 2022). African Development Bank documents the gap these agendas respond to: Africa holds 7% of global nickel reserves but under 2% of refining capacity, and supplies roughly 64% of global manganese ore while contributing minimally to refined output. In steel, it accounts for about 4% of global production despite large high-grade reserves, and so imports processed products made from its own raw materials, and 29% of bauxite reserves but under 1% of alumina refining (AfDB 2025). The African Green Minerals Strategy (AMDC 2024), drafted by the AU's African Minerals Development Centre and adopted by the African Union in February 2025, explicitly links mining to climate-smart industrialisation and regional value chains. It builds on the African Mining Vision of 2009 and is a continental policy framework rather than a binding instrument, so implementation depends on national policy (Usman and Csanadi 2025).

Cooperation instruments seek to connect objectives of consuming and producing countries

The EU's approach to critical minerals and green hydrogen sits within a broader agenda shaped by the European Green Deal, the CRMA and REPowerEU. That agenda balances decarbonisation with reduced dependence on third countries. Two instruments shape the EU's engagement with resource-producing countries: Strategic Partnerships on raw materials and Free Trade Agreements (FTAs).

Since 2021, the European Commission has concluded sixteen Strategic Partnerships on raw materials with countries spanning all income levels, from Canada and Norway to Namibia, Zambia, the DRC, and Rwanda (European Court of Auditors 2026; European Commission 2026). The agreements are structured around four pillars: the development and integration of raw material

value chains; research and innovation; environmental, social, and governance standards; and financial and investment instruments. Their core function is to connect EU manufacturers to extraction and processing projects abroad, with value chain upgrading in the partner country framed as a longer-term outcome. They are political declarations (non-binding memoranda of understanding) that create no legal rights or obligations, and the Commission concludes them without ratification by Member States. In part because they are non-binding, their development promises remain voluntary and unenforceable (Dünhaupt et al. 2025; Küblböck et al. 2025).

By contrast, the EU's Free Trade Agreements are legally binding and increasingly include Energy and Raw Materials chapters that secure EU access to critical raw materials and limit measures producing countries might use to encourage domestic processing, such as export taxes, local content requirements, and dual pricing (charging different prices domestically and for export) (Küblböck et al. 2025; Dünhaupt et al. 2025). Where a Strategic Partnership and a trade agreement pull in different directions, the binding agreement prevails, and the partnership's development promises give way. The EU–Chile arrangement illustrates this. The EU–Chile Interim Trade Agreement includes an Energy and Raw Materials chapter and sits alongside a Strategic Partnership that frames value chain upgrading in Chile as an outcome. The trade agreement, however, limits the tools Chile could use to achieve it: it allows export duties only for firms that commit to local processing, which does little to ease the constraint in practice, as this exception applies narrowly and guarantees no actual increase in domestic processing (Dünhaupt et al. 2025).

A remaining challenge is to align the frameworks of consuming countries with the interest of producing countries

The frameworks described above reflect different priorities, but they are not necessarily opposed. Governance arrangements that credibly deliver economic returns to producing countries (for example processing opportunities, fiscal revenues, and technology transfer) may also be a condition for the stable and sustained supply of critical minerals and green hydrogen. The UN Secretary-General's Panel on Critical Energy Transition Minerals (2024) and UNCTAD (2024) both identify fairer trade rules and equitable benefit-sharing as strategic priorities for closing the investment gap. Aligning the frameworks would mean considering how criticality assessments and trade agreements can reflect producing countries' own development priorities, including support for value creation beyond raw material exports (Runganga et al. 2025). How far consuming-country frameworks and producing countries' development priorities are aligned in practice is examined through the case studies and discussed and interpreted in Chapter 4 and 5, respectively.

4 Perspectives from producing countries: Findings from four case studies

Chapter 3 showed that extraction is concentrated in producing regions, while higher-value activities such as technology development, financing, processing, and manufacturing often sit elsewhere. This fourth chapter examines whether that pattern holds in emerging energy transition value chains and how it is experienced and governed in producing countries. It summarises the four case studies (see Table 1) that form the empirical basis of the report, two on green hydrogen (Egypt and South Africa) and two on lithium (Ghana and Nigeria). They range from large, state-backed export initiatives to a single ratified mining lease and a loosely regulated artisanal site, but all contribute to global transition value chains, with demand largely coming from outside the producing countries. Section 4.1 summarises each case, based on the respective background report El Garhy (2026), Owusu (2026), Olusoga (2026), and Lijfering (2026), with detailed summaries in Appendices 1-4. Section 4.2 synthesises the cases through the JDR framework and draws lessons.

4.1 Case study results

Egypt: Green Hydrogen Project (Ain Sokhna, SCZone)

Egypt aims to leverage its strategic location, abundant sunshine, and wind resources to establish itself as a regional hub for the production and export of green hydrogen and its derivatives, such as green ammonia.[3] The country seeks to attract foreign investment and earn foreign currency while gradually integrating hydrogen into its domestic industry. Egypt's existing ammonia facilities and logistics could significantly reduce the cost and complexity of scaling green ammonia, compared with greenfield projects. A National Council, functioning under the Prime Minister with a direct presidential mandate, is responsible for decision-making and facilitating project approvals. This centralised structure enables faster decision-making. The national strategy, developed in collaboration with the European Bank for Reconstruction and Development, outlines a phased approach to 2040, with the goal of enabling domestic hydrogen use. Additionally, an incentive law is intended to attract investors. While the objectives on paper include national and local value addition, these benefits are projected to materialise at a later stage and thus have not yet been observed.

The case study found that the early phase of Egypt's hydrogen initiative diverges significantly from its long-term goals. This early phase is heavily export-oriented, with most initial production aimed at Europe and Asia. Domestic utilisation remains minimal, largely because Egyptian industry relies on subsidised natural gas, which is considerably cheaper than green hydrogen. As a result, domestic integration remains deferred, leaving the project dependent on external demand and public

[3] The findings synthesised in this section can be found in El Garhy (2026).

financial support, most notably a German-backed offtake agreement, rather than a viable home market.

Who gains from this situation depends on a firm's position in the chain. The consortium combines an international developer (Scatec), Fertiglobe (conversion and offtake), a local contractor (Orascom Construction), and two state bodies. Smaller Egyptian firms (small and medium enterprises, or SMEs) are outside that circle, although interviewees saw potential roles in local manufacturing and in supplying components for electrolysers and renewable energy systems. Scale, access to finance, and limited technical capacity keep them out. Additionally, construction jobs are temporary by nature, ending at commissioning, while durable revenue lies in operation and offtake, precisely where local firms are absent. In a 2024 survey of residents of Suez and Port Said, 63% said hydrogen produced there should mainly be used inside Egypt, against 14% who preferred export. As an industry stakeholder put it, shipping out raw hydrogen means shipping out the value with it as well. Furthermore, decision-making is quite concentrated: the National Council coordinates approvals; the Sovereign Fund facilitates land and permits; incentives come from Law No. 2 of 2024. This helps explain how quickly the Ain Sokhna project advanced, but it also means decision-making remains relatively opaque and stakeholder participation is limited, and residents have no clear point of entry.

Ghana: Ewoyaa lithium project

Ghana's ambition for its lithium resources centres on value addition, to process more lithium domestically, move into the battery supply chain, and keep a larger share of the revenue for both the state and for its mining communities.[4] The country pursues this through its existing mining framework. Under the Constitution, minerals are held in trust for the people, and each agreement requires parliamentary ratification. Under Section 43 of the Minerals and Mining Act (Act 703), the state holds a 10% free carried interest in mining projects at no cost. Mineral royalties flow to the consolidated fund, with 20% allocated to the Minerals Development Fund (MDF), which distributes to communities indirectly through district assemblies, traditional authorities, and national institutions rather than paying them directly. The Ewoyaa lease adds a separate project-level community development fund of 1% of annual gross revenue for the settlements inside or next to the lease area: Ewoyaa, Afrengua, and Krampakrom.

On the ground, there is a clear gap between this ambition and the reality of the project. The lease delivers spodumene concentrate, shipped abroad for refining, so no value addition occurs within the project itself. That is partly structural: refining lithium into battery-grade chemicals requires reliable power, chemical processing capacity, and technical skills that Ghana does not currently have, and that exists in only a small number of industrialised countries. Price volatility further erodes the remaining leverage. Spodumene prices collapsed after 2022 (from USD 8,500 to USD 785), falling far below the USD 1,587 assumed in the 2023 feasibility study, and the developer, Atlantic Lithium, argued the project was no longer viable at the 10% royalty the government sought. The resulting dispute delayed ratification for twenty months and cost most of Atlantic Lithium's Ghanaian workforce their jobs. Parliament ultimately ratified the revised lease in March 2026, after Ghana's 2025 royalty regulations replaced the fixed rate with a sliding scale that moves

[4] The findings synthesised in this section can be found in the background report by Owusu (2026).

with the price. As of that ratification, no Final Investment Decision has been taken, and no ore has been mined. A government negotiating under these conditions was in no position to impose domestic processing as a condition of the deal.

Communities have borne costs of the project since before production began. According to respondents, a stop-work moratorium bans long-term crop planting and construction, imposed without prior discussion, and, in Krampakrom, announced by notices painted directly on people's walls. Charcoal production, Ewoyaa's main income source, collapsed after the company cleared trees during prospecting; renting farmland elsewhere has become unaffordable, and a youth leader estimated that roughly 90% of Krampakrom's young men have considered or attempted illegal mining. Compensation is documented but not paid: crops have been counted, bank accounts opened, and identity cards issued, yet no amount has been communicated, and nothing has been transferred, with the unsigned lease cited as the reason for every delay. Benefit sharing remains opaque in a specific sense: the Minerals Development Fund passes through several institutions with no reporting of how much arrived, when, or what it has funded, and communities learned about the 1% fund from NGO workshops rather than from the company itself.

Consultation runs through a Compensation Negotiation Committee whose members are largely not farmers, and uses crop prices benchmarked against Tarkwa and Obuasi. Respondents perceived the consultation process as unsafe for speaking freely. Relocation talks are underway, but replacement farmland is unresolved. Respondents report being told they will receive money rather than land, and a Krampakrom youth leader observed that in the resettled communities she had visited, households that insisted on land-for-land fared best, yet no elder has demanded it in the compensation negotiations.

Value addition is not misunderstood locally. People know the lithium will leave, and that the three channels through which value might return, compensation, jobs and the 1% fund, are either deferred, blocked by certification requirements, or without any governance structure at all.

Nigeria: Oyo's lithium extraction, Komu

With its mineral resources, including lithium, Nigeria aims to diversify its economy away from oil, attract investment, and add value domestically while establishing a formalised, revenue-generating sector that benefits host communities.[5] Various layers of governance, however, reveal clear tensions. The Constitution grants ownership of all minerals to the Federal Government, while state governments control land and local security, resulting in two distinct authorities operating over the same territory. The Federal Government governs mining through the 2007 Mining Act and its regulations, which provide mechanisms for licensing, host-community agreements, and pathways to formalise artisanal and small-scale mining. Oyo State works in parallel through its Roadmap for Sustainable Development (2023-2027), which uses a state-owned company, the Pacesetter Mineral Development Company, to acquire and manage mineral titles, and seeks to formalise informal mining, and through Executive Order No. 001 of 2023, aimed at protecting mining communities from insecurity, exploitation, and environmental harm.

[5] The findings synthesised here can be found in the background report by Olusoga (2026).

The two levels do not add up to one coherent system. A community elder described the Oyo State government as dissatisfied with mining under federal licences on land the state administers. Another respondent described a push by a community leader to have locally approved operators licensed instead and said that some federally licensed companies have stayed away from Komu because of the dispute. Enforcement appears weak: informal trade continues despite a visible security presence, which the case study attributes to overlapping federal and state mandates and suggests may also reflect tacit tolerance. The state's own mining agency acknowledges that illegal mining persists and treats it as an ongoing enforcement problem.

Until now, artisanal mining in Komu has remained largely informal. Respondents said foreign buyers, including Chinese nationals, are the usual buyers, and people at the site were reluctant to disclose trading practices. The mining population includes people from elsewhere in Nigeria and from Benin and Togo. A sector expert said artisanal miners often work under more powerful actors and receive comparatively minimal returns. Several respondents said gains concentrate among local elites and individuals directly involved in mining. A miner referred to annual payments to traditional authorities for access, and one respondent believed leaders live well from mining gains. As one interviewee put it, 'whoever seeks to fight for the community is immediately kicked against [sic]'.

The story of the land follows a similar pattern. One respondent recounted that the mined areas were farmland that the federal government acquired after minerals were discovered. The person credited with the discovery was reportedly compensated, but many farmers, especially those on leasehold, were displaced with limited evidence of compensation. No effective Community Development Agreement could be identified, despite the 2007 Act requiring one, and awareness of formal governance mechanisms among community members is limited. Enforcement of licensing rules and of those obligations is weak despite a police station at the entrance to the site, which suggests state presence without regulatory effect. All respondents raised safety concerns, including kidnappings and restricted movement. One respondent said relocation of households near the site is under discussion, and was reluctant to say who is responsible. The study could not establish whether the insecurity is linked to mining. As a result, while Komu is drawn into the global lithium supply chain, the promised benefits of formalisation, value addition, and protective frameworks are weak and insufficiently distributed.

South Africa: Coega green ammonia project

South Africa aims to harness green hydrogen for multiple objectives: positioning the country as a global player in green hydrogen markets, attracting significant foreign investment, and fostering domestic industry and job creation while ensuring a just transition.[6] The policy framework is structured accordingly. The national Just Transition Framework (2022) established by the Presidential Climate Commission outlines key fairness principles, placing those most affected at the centre of decisions (naming the poor, women, people with disabilities, and youth explicitly), and organising the transition around the three tenets of distributive, procedural, and restorative justice. These principles are translated into actionable measures through the Just Energy Transition Investment Plan (JET-IP). Meanwhile, the Hydrogen Society Roadmap and the Green Hydrogen

[6] The findings synthesised here can be found in the background report by Lijfering (2026).

Commercialisation Strategy (GHCS) emphasise the sector's focus on exports and investor attraction. The GHCS contains no binding provisions on domestic energy security or local beneficiation, and its socio-economic element remains aspirational.

In practice, according to the case study, the gains from the hydrogen project remain uncertain. The flagship designation is meant to facilitate offtake negotiations, but projected benefits have yet to materialise. Globally, only a small fraction of announced hydrogen projects worldwide have reached a final investment decision, and Sasol withdrew from its Boegoebaai project despite ZAR 350 million in allocated funding. The project is estimated to create approximately 20,000 jobs, but a large share of these is projected to be in temporary construction roles rather than sustainable employment, and the skilled positions require training that the country currently lacks at scale. The assumptions behind these figures are opaque. The co-benefits that make the project attractive locally, such as discounted surplus electricity and additional municipal water from the desalination plant, rest on developer intentions rather than enforceable agreements. Earlier renewable energy programmes show why that matters; in the Renewable Energy Independent Power Producer Programme (REIPPPP), many communities near project sites still face high costs and unreliable supply.

Community engagement with affected populations has been regarded by community members and civil society informants as inadequate. Consultations took place, but announcements did not reach the surrounding communities. Meetings were held in places residents could not easily get to, were conducted in English without adequate translation, and were followed by little or no feedback. Civil society informants report that community members first learned of the project through media coverage, and their questions about water and energy were passed between the developer and the municipality without answer. Women are frequently absent from consultations because of gender norms and travel safety, and fishing communities, whose livelihoods depend on the coastal waters affected by desalination, receive limited targeted attention. Informants say communities are often treated as homogeneous, with traditional leaders or ward councillors frequently used as proxies for consent. By the time consultation starts, studies are complete and agreements largely settled, so the discussion is no longer whether the project proceeds but how benefits are shared, which is why communities are now calling for free, prior and informed consent (FPIC). The final investment decision is pending, and the case study treats alignment with local priorities as an open, ongoing process.

4.2 Synthesis and lessons learned

Across the four cases, lithium extraction and green hydrogen production both require extensive physical infrastructure that intensifies pressure on land, water, and spatial resources. The projects are presented as contributions to climate mitigation and to energy security in importing countries, but all four are at an early stage, and the costs documented so far fall locally. The hydrogen cases show water competition and ecosystem pressures. The lithium cases show land loss and livelihood effects: farmers displaced in Komu, and livelihoods suspended and compensation unpaid at Ewoyaa under the moratorium. Economic gains are concentrating among a narrow set of actors. In several cases, consultation processes inform rather than involve.

4.2.1 Synthesis

Table 2 sets out the recurring dynamics across the four cases, organised by the three dimensions of the JDR framework: what each dynamic is, what it means analytically, and where it appears in the case evidence. The dynamics recur to varying degrees, across different commodities, governance contexts, and stages of project maturity. Read together, the dimensions suggest how they interact: direction dynamics such as downstream demand and export orientation set the conditions under which justice questions arise, and responsibility gaps appear to determine whether those questions get addressed. The table is not exhaustive, it captures the patterns that recur consistently enough across the cases to be treated as recurring dynamics.

Table 2
Synthesis of main findings from case studies coded according to the JDR framework

Dynamic	Finding	Illustrative examples from the case studies
JUSTICE		
Development promises with uncertain benefit distribution	Governments and companies often frame projects with development-oriented expectations, including promises of employment, infrastructure improvements, electrification, industrialisation, and technology transfer. So far these are largely expectations: whether, when and for whom they materialise remains uncertain.	Developers of the Coega project emphasise job creation and discounted electricity provision as key benefits. Ghanaian lithium reforms emphasise future 'value addition' and community development benefits linked to mining expansion.
Uncertain local value capture	While projects often promise jobs, revenues, and infrastructure improvements, it remains uncertain how much of the long-term economic benefit will actually stay in the producing regions or communities.	In the Coega project, many expected jobs are temporary construction roles, and the lasting roles need specialised skills the country does not yet train at scale, so they may go to workers from outside the area. In Komu, mining dating back to 1998 has reportedly produced little visible community development despite ongoing mining activity.
Heavy infrastructure requirements	These sectors require extensive physical infrastructure, including ports, desalination plants,	The Coega project depends on integrated port, desalination, renewable energy, and export infrastructure. Hydrogen production in Ain Sokhna requires large renewable installations

Dynamic	Finding	Illustrative examples from the case studies
	railways, processing facilities, renewable energy parks, roads, pipelines, or transmission systems. Such development increases pressure on land, water, and spatial resources.	and water infrastructure in an already water-stressed context.
Limited influence of affected communities and recognition gaps communities and recognition gaps	Communities affected by projects often have limited influence over project design, timing, compensation, or benefit-sharing, even where consultations formally occur. This reflects not only an absence of voice but also the design of institutional channels. Recognition of customary land use and of specific groups is often weak.	Communities around Ewoyaa described consultations as largely informational rather than participatory, saying they were told what will happen rather than asked. The company communicated only positive narratives, while NGOs provided deeper context on the Community Development Fund, community rights and environmental risks. According to interviews, respondents perceived the consultations as unsafe for speaking freely. In Komu, the absence of formal Community Development Agreements, along with internal fragmentation, limits structured participation. In the Coega project, marginalised groups such as fishers and women were insufficiently represented in decision-making.
Environmental externalities	Extraction and hydrogen production carry significant environmental concerns, including water stress, contamination risks, land degradation, and pressures on biodiversity.	The Ain Sokhna project relies on desalination in a water-stressed region, raising concerns about brine disposal and competition for water. The Coega project also involves desalination and large-scale water-energy infrastructure with implications for municipal water allocation, the Coega SEZ environmental assessment has been contested.
Deferred benefits and immediate burdens	Benefits from these projects are often delayed, while their adverse impacts arrive early.	In Ewoyaa, Ghana, land acquisition for mining begins before production, but farmers face unresolved compensation issues, while a moratorium has halted essential activities, including the cultivation of cash crops. Consequently, the community is enduring ongoing and accumulating burdens in the absence of any extraction or production. In Coega (South Africa), promised jobs and electricity are framed as future outcomes. In Komu (Nigeria), long extraction has brought

Dynamic	Finding	Illustrative examples from the case studies
		little development, leaving a persistent mismatch between how long mining has run and what communities have gained.
DIRECTION		
Global imperatives and dependence on governance abroad	Projects are presented as necessary contributions to climate mitigation, energy security, or the global low-carbon transition, often using international sustainability narratives. As consuming countries rely on these projects for supply, they increasingly depend on governance outcomes in producing countries that they do not control.	Green hydrogen projects are presented as vital contributions to global decarbonisation efforts and net-zero targets. Lithium extraction is justified through its crucial role in producing batteries and renewable technologies that are essential for the energy transition.
Export orientation driven by downstream demand	Project business cases are designed around foreign buyers, so economic models and infrastructure are built primarily for exporting raw materials or energy carriers, often with limited integration into domestic industrial or energy systems.	Hydrogen projects in Egypt and South Africa are predominantly oriented toward export markets in Europe and Asia; Ain Sokhna is structured around export through the Suez Canal corridor. Lithium in Ghana and Nigeria feeds global battery supply chains linked to EV demand elsewhere; Ewoyaa lithium is planned for export as spodumene concentrate for processing abroad.
Risk of enclave development and weak integration into local economies	Projects may become economically and spatially disconnected from surrounding regions, operating as export-oriented zones with limited integration into local economies or livelihoods.	The SCZone hydrogen developments in Egypt resemble an internationally connected industrial green corridor that prioritises export logistics. In Komu, lithium extraction links directly to foreign buyers while remaining weakly connected to formal local development structures.
Constrained value addition ambitions	Producing countries pursue industrial upgrading and value addition agendas; however, their ability to reshape global value chains is constrained by financing structures, contractual	The African Mining Vision reflects a continental effort to shift from raw extraction toward beneficiation and local value creation, but implementation is constrained by global supply chain structures and investment dependencies. In Ghana, communities cannot connect the project to the country's stated

Dynamic	Finding	Illustrative examples from the case studies
	arrangements, and prevailing international standards.	beneficiation goals; in Egypt, an industry stakeholder notes that exporting raw hydrogen exports the value, with higher-value processing happening abroad.
Optimistic revenue plans and volatile markets	Because project business cases depend on projected export revenues, market conditions shape what is built. Commitments are made in optimistic, high-price conditions. When prices fall, or finance and buyers prove hard to secure, projects stall and deals get reopened.	In green hydrogen, only a small share of announced projects has reached a final investment decision, and several South African projects have been delayed or withdrawn (for example Sasol's Boegoebaai pilot). In Egypt, more than USD 100 billion has been announced while few projects advance, held back by a finance-and-offtake dependency. In Ghana, falling lithium prices created the risk that the project's fiscal terms would be reopened, delaying it and weakening trust in the deal.
Technological pathway lock-in	Early-stage choices about large-scale, export-oriented infrastructure can lock in specific technological configurations and limit the flexibility of future domestic energy system pathways.	Green hydrogen projects designed primarily for export (e.g. in Egypt) prioritise large-scale electrolysis, desalination, and export infrastructure. This can hinder alternative pathways such as decentralised renewable energy integration or enhancement of domestic grid support.
RESPONSIBILITY		
Fragmented governance and weak delivery of formal frameworks	Responsibility is spread across multiple institutions, scales, or actors, creating coordination gaps, unclear accountability, and weak enforcement. Comprehensive rules can exist on paper while delivery on the ground is weak.	In Nigeria, authority over minerals, land, and enforcement is divided between federal and state actors, creating governance gaps. In Egypt and South Africa, strong national coordination speeds projects up but limits local oversight and participation. In Ghana, formal oversight bodies exist, but no respondent reported engagement by government officials or findings from the Environmental Protection Agency.
Accountability asymmetry	Downstream actors significantly influence demand narratives but are often weakly tied to local outcomes.	EU and global demand frameworks (hydrogen and battery supply chains) shape investment decisions but are weakly linked to outcomes in producing regions. In Ewoyaa, the project has been ratified by Parliament and is moving towards a final investment decision while community compensation disputes remain

Dynamic	Finding	Illustrative examples from the case studies
		unresolved. In Komu, trade is conducted by individual dealers, respondents were reluctant to disclose trading practices, and foreign buyers are reported as the usual buyers.
Weak enforcement of benefit-sharing commitments	Weak enforcement of benefit-sharing agreements and due-diligence frameworks creates large gaps between commitments made and what is actually delivered.	In Ewoyaa, benefit-sharing expectations exist (royalties, infrastructure, jobs) but enforcement and timing stay uncertain before production. In Coega, electricity discounts and job projections depend on future operational arrangements, so benefits are promised only if certain conditions are met. In Komu, a miner referred to annual payments to traditional authorities for access; no formal benefit-sharing arrangement could be identified.
Justice as a downstream add-on	Financing and investment are settled first. Benefit-sharing, participation, and local value are treated as things to handle later, not as conditions the project must meet to go ahead. As add-ons, they are weakly binding and easily deferred.	In South Africa, the SA-H2 Fund and EU finance are built to de-risk investment, while benefit-sharing and energy access are framed as downstream, and the strategy's social goals stay aspirational rather than enforceable. In Ghana, fiscal terms were fixed before community benefits, which reach people only indirectly through a slow revenue fund. In Egypt, project design follows investment and export logic, with no requirement for local content or a domestic share.
Transnational accountability gap	No single actor assumes full responsibility across the entire supply chain, leading to diffuse responsibility rather than its complete absence.	In Egypt, projects sit inside global hydrogen and investment frameworks, yet no single actor is accountable for the cumulative local impacts. In Nigeria, minerals reach international markets despite no traceability or enforcement at the extraction stage.

4.2.2 Lessons learned

New opportunities do not always translate into local benefits, and communities have limited influence over how projects are designed

Governments and developers present the projects as sources of jobs, energy access, water and revenue. So far, these benefits are deferred, uneven or not yet backed by enforceable commitments. At Coega, about 20,000 job opportunities are expected, but most are temporary construction roles, the skilled permanent roles require training the country lacks at scale, and the discounted electricity and municipal water rest on developer intentions. At Ain Sokhna, employment is concentrated in construction, with fewer long-term opportunities. At Ewoyaa local communities already bear costs, such as land loss and loss of livelihoods, and the benefit-sharing fund is opaque. At Komu, the ore is sold to foreign buyers, and the profits are described as concentrating among a narrow group of local elites, intermediaries, and foreign buyers.

Formal mechanisms existed in all four cases, but they did not by themselves secure outcomes for communities. Parliamentary ratification opened the Ewoyaa lease to public scrutiny, yet compensation is documented but not paid. Nigeria's 2007 Mining Act requires Community Development Agreements, but no one could confirm one at Komu. At Coega, the Green Hydrogen Commercialisation Strategy lists local content and socio-economic development among its pillars, but neither is backed by binding provisions.

In all four cases, communities have limited influence over project design, timing, compensation and benefit-sharing, even where consultation formally occurs. Consultation informs rather than involves: Ewoyaa community members said they were told what will happen rather than asked, and at Coega announcements did not reach the surrounding communities and no feedback followed. At Ain Sokhna, decision-making is relatively opaque and stakeholder participation is limited. Some groups are less visible than others: women and fishing communities at Coega, and farmers at Ewoyaa, where, according to a Krampakrom youth leader, the Compensation Negotiation Committee is made up largely of people who are not farmers.

Transition objectives are not always aligned with producing countries' own development priorities

The two green hydrogen projects are framed by governments and developers as contributions to global decarbonisation and net-zero targets, and the two lithium projects are justified by lithium's role in batteries and renewable technologies. Both framings are factually accurate, yet they do not encompass the full range of impacts at a local level. When a project is justified primarily by its role in global decarbonisation, the case evidence suggests that success is measured in export volumes, avoided emissions and security of supply, and local development outcomes are not part of the assessment.

Economic models and infrastructure across the four cases are primarily designed around exporting raw materials or energy carriers, with limited integration into domestic industrial or energy systems. Both green hydrogen projects are export-oriented, focusing on international markets rather than local energy needs, while the critical raw materials cases show a persistent focus on extraction for global supply chains with less emphasis on local value addition or industrial development. The transition does create real economic opportunities, in job creation, local procurement, and potentially value-added processing, but the case evidence suggests these do not automatically materialise. Whether producing countries can capture them depends on financing

structures, contractual arrangements, and governance conditions that currently tend to favour export infrastructure over domestic integration, leaving them with limited leverage to move up the value chain. Market conditions also limit what producing countries can require: falling lithium prices weakened Ghana's position when negotiating the Ewoyaa lease, and Egyptian industry's reliance on subsidised gas makes domestic hydrogen uncompetitive.

Decisions, benefits, and impacts are dispersed across value chains

Because decisions, benefits and impacts are dispersed across value chains, the perspectives of consuming and producing countries diverge. The narratives that make a project fundable and politically defensible in consuming countries may differ from the criteria by which communities in producing countries judge whether it is worth having. Consuming countries depend on outcomes they do not directly govern. They can set certification and sustainability requirements for imports, but whether farmers in Ewoyaa are compensated, whether Egyptian SMEs enter the supply chain, or whether Nelson Mandela Bay gains water and power depends largely on decisions taken in the producing countries and on the terms agreed with developers and financiers. Demand-side actors shape which projects go ahead and on what terms, but they answer politically to their own constituencies, not to the communities where projects are located. This may help explain why they remain only loosely connected to local economic and social results, and why local compensation and value carry less weight in their decisions.

Responsibility is also fragmented within the producing countries. In Nigeria, authority over minerals, land and enforcement is divided between federal and state actors, and informal trade continues despite a visible state security presence. In Egypt and South Africa, strong national coordination speeds projects up but limits local oversight and participation. At Ewoyaa, the project advances under formal approval while compensation disputes remain unresolved. At Coega, the investment architecture is designed to mobilise finance and de-risk infrastructure, while justice provisions are framed as downstream considerations, and Strategic Integrated Project and Special Economic Zone status centralise decisions nationally.

Impacts also arrive before benefits. At Ewoyaa, communities have borne costs since before production began, through a stop-work moratorium on long-term crop planting and construction and the loss of charcoal income, while compensation is documented but not yet paid and the benefit-sharing channels (the Minerals Development Fund and the 1% commitment) can only follow production. The timing of compensation is thus tied to project milestones and not to when impacts begin.

Project design and financing shape who benefits

The cases show that the terms set when projects are negotiated, financed and approved can shape how benefits, costs and risks are distributed. One example has been adopted in Ghana. Ghana's 2025 royalty regulations introduced a sliding scale for spodumene, which shares price risk between the state and the company and allowed the revised Ewoyaa lease to be ratified, and the lease also commits 1% of gross revenue to the catchment communities. Other terms were raised by individual respondents and stakeholders, or are implied by how projects are financed, but are not in place. At Ewoyaa, a Krampakrom youth leader pointed to land-for-land compensation rather than cash, which she had seen work best in resettled communities elsewhere and which preserves the asset that farming households depend on. Arranging finance for compensation at the start of the project, independent of future revenue, could also narrow the gap between when impacts and benefits arrive. In Egypt, an industrial sector expert proposed minimum local content requirements, explicit

SME participation conditions and a mandated domestic share of production. A domestic share would only work alongside energy pricing reform, since subsidised gas keeps hydrogen uncompetitive for Egyptian industry. In South Africa, the developer's intentions to supply discounted surplus power and municipal water could be written into binding offtake and licence conditions rather than left as statements, and the structure of the Just Energy Transition Investment Plan (JET-IP), which is mostly loans rather than grants and sends most grant money to foreign implementing entities, shows how financing design determines who captures value before any project begins.

What these examples have in common is that they attach conditions at the point where a project is negotiated or financed, when a licence, a lease or a finance package is agreed, rather than afterwards. These patterns are consolidated into governance tensions in chapter 5.

5 Policy reflections for consuming countries

Although the four case studies differ in geography, resource type and governance context, they reveal recurring patterns when global decarbonisation objectives meet local development objectives. This chapter considers these findings from the perspective of resource-consuming countries. It identifies three governance tensions across value chains (5.1), reflects on how a consuming-country like the Netherlands (and the EU) might position itself in relation to them (5.2), and draws out three considerations that hold across these positions (5.3). Chapter 6 returns to the central question of the report.

5.1 Governance tensions

Across the four case studies, a common pattern emerges (one that is also acknowledged in the literature): while the energy transition creates new opportunities for investment, industrialisation, and international cooperation, translating these opportunities into locally-valued outcomes remains challenging. This raises the question of why this gap persists despite being recognised in both science and policy.

Viewed together, the literature review, policy analysis, and empirical findings reveal three recurring governance tensions: between export orientation and domestic development priorities, between formal commitments and substantive outcomes, and between dispersed accountability and concentrated local impacts. These are referred to here as governance tensions because they are made visible through the application of the JDR framework, and they concern how competing objectives are defined, translated into rules and projects, implemented by different actors, and ultimately shape outcomes across places. Broadly, the first tension concerns direction, the second justice, and the third responsibility.

Tension between export orientation and domestic development priorities

A first tension concerns the purpose of the transition itself: whether it is primarily oriented towards global decarbonisation through export supply, or towards domestic development and structural transformation in producing countries. This tension is visible not only at the project level, but also in the policy frameworks that shape them.

This tension is illustrated in the EU's Critical Raw Materials Act, which combines the objective of securing and diversifying EU access to critical raw materials with sustainability provisions intended to support mutually beneficial partnerships and value creation in partner countries. However, analysts argue that supply security remains the Act's organising logic, while development objectives are pursued mainly through specific partnership and project-level provisions. This matters because the Act's main tools (strategic project status, permitting, financing) are built to serve supply, so development conditions enter mainly through individual projects and partnerships and not through the Act's overall design. Where those provisions are weak, producing countries' development priorities are not secured, and benefit-sharing, which supports stable supply, is left to case-by-case negotiation. Civil society organisations have raised related concerns, arguing that the Act relies too

heavily on procedural compliance, audits and certifications rather than substantive outcomes, and that its sustainability conditions are difficult to enforce in practice (Human Rights Watch 2023). Similarly, across the four case studies, producing countries consistently articulate ambitions around industrialisation, local value addition, skills development, and broader economic diversification. However, these ambitions are only partially reflected in the actual organisation of value chains. There is often a gap between recognising local value addition as a desirable objective and actively addressing the conditions under which it might occur. Policy and project design pay less attention to what specific forms of value addition are feasible, what institutional and technology capacities and infrastructure are required, how existing market structures shape opportunities, and how external actors influence these conditions. Instead, infrastructure investments, financing structures, and offtake agreements tend to be shaped by external demand conditions and export requirements rather than domestic development priorities. Much of that external demand originates in consuming countries and is expressed through their instruments. At Ain Sokhna, a long-term offtake through the German-backed H2Global mechanism supports the investment, and EU rules on carbon border adjustment and renewable hydrogen certification shape how the hydrogen is produced and certified (El Garhy 2026). South African green hydrogen is targeted at markets including the Netherlands and Germany, where demand is supported by subsidies and policy incentives (Lijfering 2026). These instruments set conditions on the product and its supply; the case studies do not identify local-development conditions attached to them.

This structural imbalance is compounded by project-level barriers: deployment stalls when offtake agreements are uncertain, risk allocation between public and private actors is unresolved, regulatory frameworks are incomplete or unstable, and project development capacity is too thin to meet lender requirements. The result can be value chains designed around the needs of consuming countries, with domestic development objectives accommodated ex post or treated as secondary co-benefits.

Supply chain governance has already begun shifting from voluntary corporate social responsibility towards binding due-diligence requirements. The Corporate Sustainability Due Diligence Directive (CSDDD) (European Parliament and Council of the European Union 2024) and the EU Battery Regulation (European Union 2025) establish requirements for companies to identify and address environmental and social risks and impacts associated with their operations and value chains. These instruments go beyond reporting alone. At the same time, their governance logic operates largely through companies and their obligations within EU markets and global chains of activity, rather than directly determining the development conditions of extraction and processing projects in producing countries. Other instruments, such as Strategic Partnerships and Global Gateway, partly address producing-country objectives, but analysts have noted that objectives remain fragmented across policy areas and can be weighted towards EU supply security and export infrastructure rather than partner-country industrialisation (Vandome 2024; Tröster et al. 2025).

At the Dutch level, the Dutch Africa Strategy explicitly commits to equal partnerships and to supporting producing countries' own value-addition priorities. Its long-term agenda, however, sets out two goals side by side: increasing African value chain participation, and securing EU and Dutch access to critical raw materials, without specifying how the two are to be integrated (The Ministry of Foreign Affairs 2023). Consuming and producing-country frameworks currently reflect different, and not always aligned or compatible, sets of priorities.

There is a tension between formal commitments and substantive outcomes

A second tension concerns the relationship between formal governance arrangements and their coverage and implementation in practice. Across all cases, governance frameworks are present and often extensive. These include environmental and social safeguards, consultation requirements, local content provisions, benefit-sharing mechanisms, and sustainability commitments embedded in both national policy and international investment practice.

However, the existence of these mechanisms does not guarantee that they shape outcomes in meaningful ways for the local community. Even where such provisions are designed with intent to promote inclusion, equity, or sustainability, their effectiveness can be limited by how they are operationalised. Requirements may be weakly enforceable, defined at a level of abstraction that is difficult to translate into project-level decisions, or dependent on institutional capacities that vary significantly across contexts. In addition, different governance instruments often operate in parallel rather than in an integrated way, meaning that consultation processes, environmental safeguards, and benefit-sharing mechanisms are not necessarily aligned or mutually reinforcing.

Existing value chain structures are often treated as neutral starting conditions rather than as outcomes of historical institutional, economic, and political processes, with infrastructure, finance, technology, market access, standards, investment patterns, and bargaining power seemingly unevenly distributed to start with. The largest share of value is captured downstream, in the processing and manufacturing centres and consuming economies where finance, technology, standards, and market access are already concentrated, while producing regions retain a minority of revenues and jobs. Within producing countries, the gains that do accrue are frequently captured by actors aligned with an export-oriented accumulation model rather than distributed broadly (Kalt et al. 2023). Because these actors often hold substantial bargaining power in setting project terms, formal compliance may reinforce existing arrangements rather than alter them.

As a result, governance can be seen as operating through a dual system: a formal layer that establishes procedural legitimacy and compliance, and a substantive layer in which outcomes are shaped by formal and informal power asymmetries, fragmented institutional responsibilities, and uneven enforcement capacity. This results in a recurring gap between what governance systems state and what they are able to deliver. Concretely, this might mean compliance with formal requirements is sufficient for project approval even where distributional or participatory outcomes remain limited. Formal compliance can thus coexist with, and in some cases obscure, persistent inequalities in how benefits and burdens are distributed across global energy transition value chains.

There is a tension between dispersed accountability and concentrated impacts

A third tension concerns the spatial, political, and temporal separation between where and when decisions are made, where and when value is captured, and where and when impacts are experienced. The four case studies show that the material and environmental burdens of the energy transition, including land use change, resource extraction, water stress, and livelihood disruption, are concentrated in producing regions, while many of the economic and political benefits are realised in consuming regions. They also arrive at different times. Costs such as land acquisition, restrictions on land use and lost livelihoods are borne locally when a project is developed, while the benefits that justify it (jobs, revenues, compensation, electricity) are deferred to production and operation. At Ewoyaa, communities are bearing costs before any ore has been mined, and at Coega, jobs and discounted electricity are framed as future outcomes.

Because governance arrangements are largely organised at national or sectoral levels, they can struggle to address these cross-border distributional effects. This creates a misalignment between the scale at which transition value chains operate and the scale at which governance and accountability are exercised. It also creates a misalignment in time: financing and project terms are settled first, while benefit-sharing and compensation are left for later, when they are weakly binding and easily deferred. Responsibility for outcomes is dispersed across multiple actors and jurisdictions, while exposure to impacts remains highly localised. This separation can weaken feedback loops between decision-making and lived consequences and limits the extent to which burdens can be systematically addressed through existing governance frameworks.

5.2 Possible policy responses

The governance tensions identified in the preceding section provide a basis for reflecting on the position of resource-consuming countries. The tensions are not necessarily a direct consequence of EU and Dutch engagement with producing countries, similar tensions are widely documented in mining-affected areas more generally. Still, where the governance tensions identified above are left unaddressed, they can create social conflict, regulatory instability, and project delays that can disrupt supply chains (Boafo et al. 2025). For consuming economies in high-income regions, this is not only a justice concern but also a supply security risk; governance failures that destabilise production translate directly into supply disruptions, price volatility, and project cancellations.

The tensions identified above do not point to a single policy response. How resource-consuming countries like the Netherlands navigate these tensions is ultimately a political choice, one with significant consequences for its international relationships. Geopolitical pressures and competing interests make this navigation increasingly complex, but they also make it more consequential. They raise a more fundamental question about how resource-consuming countries understand their role in global transition value chains: are these primarily market-based structures in which governments seek to secure reliable supplies, or are they also sites of development governance in which consuming countries have a responsibility to shape how benefits, burdens and opportunities are distributed?

To explore this question, this study uses three stylised international engagement profiles developed for the Netherlands (van Dam et al. 2025) (see Figure 3). The first, Global Leadership, positions the Netherlands as an advocate for international solutions to environmental and developmental challenges, emphasising shared responsibility and global cooperation. The second, European Partnership, focuses on collaboration primarily through the EU, promoting collective action and coordination among European countries. The third, National Self-Interest, prioritises Dutch and European interests in international decision-making, particularly around competitiveness, strategic autonomy and supply security.

These profiles do not describe mutually exclusive futures or provide recommendations. They illustrate different possible ways of responding to the underlying governance tensions identified in section 5.1. Table 3 summarises the policy implications for each governance tension per profile.

Figure 3
Potential International engagement profiles for the Netherlands (adapted from van Dam et al. 2025)



Bron: PBL 2025

Global Leadership

This first profile treats the energy transition not only as a climate challenge, but also as a development and governance challenge. It builds on the Netherlands' existing commitments to both climate and international development goals, such as the EU's Fit-for-55 framework and the SDGs. The Netherlands actively seeks to shape the conditions under which transition value chains operate, recognising that value chains are not merely market structures but also sites where development trajectories, environmental and social impacts, and distributional outcomes are produced. In response to the tensions identified in section 5.1, this profile places particular emphasis on aligning global decarbonisation objectives with local development priorities and on strengthening accountability across producer–consumer relationships.

Within this perspective, instruments such as strategic partnerships, development cooperation, trade policy, and due diligence frameworks are used not only to secure supply, but also to support broader development outcomes. This could involve supporting local value addition and industrial development in producing countries through technology transfer, infrastructure investments, and financing arrangements that enable domestic processing and manufacturing (Adegboye et al. 2025; Blot 2024). It may also involve strengthening requirements around participation, benefit-sharing, and community rights through more robust implementation and enforcement of procedures such as FPIC (Netherlands Commission on Environmental Assessment 2025), moving towards more binding requirements around participation and benefit-sharing, and stronger mechanisms for verifying outcomes at community level (Herdlitschka et al. 2026).

More broadly, this profile recognises that governance outcomes are shaped by the wider international rules under which value chains operate, as well as the power asymmetries that affect how these rules are realised in practice. Consequently, it places greater emphasis on issues such as policy space for industrial development, international tax cooperation, transparency in financial flows, and reform of global governance institutions (Heffron 2020; Mathai 2025). In the specific context of raw materials and energy partnerships, this implies aligning the EU's binding trade instruments with its partnership commitments, so that Free Trade Agreements are better aligned with partnership commitments on value addition and industrial development (Küblböck et al. 2025). It also suggests recognising that protected policy space for countries to pursue their own domestic agendas is necessary but not sufficient. Without parallel support for capital, technology,

and skills transfer, the right to pursue industrial policy remains nominal, i.e. unlikely to translate into meaningful economic upgrading in practice (Dünhaupt et al. 2025).

This profile broadly corresponds to what the literature describes as moving beyond 'do no harm' towards actively creating social and developmental value within transition value chains (de Haes and Brink 2025). Such an approach would likely require substantial political engagement, coordination capacity, and potentially greater acceptance of short-term costs or supply uncertainties in pursuit of longer-term development and governance objectives.

European partnership

The second profile locates responsibility primarily within collective European action. Rather than pursuing an independent governance agenda, the Netherlands seeks to shape transition value chains through EU institutions, regulations, and external partnerships. Governance influence is exercised indirectly through the EU's market power and regulatory capacity.

This profile responds to the tensions identified in section 5.1, primarily through coordinated European frameworks. Instruments such as the Critical Raw Materials Act, strategic partnerships, the Battery Regulation, and the Global Gateway initiative become central mechanisms for linking supply security with broader sustainability and development objectives. Within this approach, partnerships with producing countries are framed as mutually beneficial arrangements that combine resource access with capacity building, technology transfer, infrastructure investment, and support for local processing industries (Blot 2024; Dejonghe and Van de Graaf 2025).

Compared with the Global Leadership profile, the emphasis here is less on actively reshaping global governance structures, and more on improving existing governance arrangements through collective European leverage. Development objectives are incorporated into value chain governance, but typically through standardised frameworks that can be applied across multiple partner countries.

The main advantage of this approach lies in scale: acting through the EU provides greater bargaining power and access to larger financial and regulatory instruments. However, reliance on collective action can reduce flexibility and make it more difficult to tailor governance arrangements to specific producing-country contexts. Existing arrangements illustrate some of these trade-offs: partnership commitments tend to be non-binding and sit alongside trade agreements that carry legal force, financing draws heavily on private capital mobilisation, and formal channels for community and civil-society input remain limited (Dünhaupt et al. 2025; Küblböck et al. 2025; El Garhy 2026; Lijfering 2026; Olusoga 2026; Owusu 2026).

National self-interest

This third and final profile treats the international dimensions of the energy transition primarily through the lens of domestic competitiveness, strategic autonomy, and supply security. The central objective is to secure reliable access to resources needed for the Dutch and European transition, while minimising economic and geopolitical risks.

Within this perspective, governance is primarily understood as a mechanism for reducing uncertainty and ensuring uninterrupted supply. Policy attention focuses on diversification of suppliers, support for domestic and allied production, strategic stockpiling, trade agreements, and

compliance with existing regulatory requirements. Due diligence frameworks and sustainability standards remain relevant, but are largely viewed as instruments for managing legal, reputational, and investment risks rather than for shaping development outcomes in producing countries (Heffron 2020).

Under this profile, questions concerning local value addition, industrial development, or broader distributional outcomes are primarily considered matters for producing-country governments and market actors. Where governance interventions occur, they tend to focus on securing continued access to resources, for example through trade agreements that limit export restrictions, and on preventing disruptions to supply chains. Openness here is selective. It means open access to producing countries' resources, combined with strategic measures at home such as diversification, stockpiling and support for domestic and allied production. This logic closely resembles the security-of-supply and strategic-autonomy narratives that have become increasingly influential within European raw-materials policy debates (Herdlitschka et al. 2026).

The principal advantage of this approach is its clarity and focus on short-term resilience and competitiveness. However, it may leave underlying governance tensions unresolved and increase exposure to political contestation, community opposition, and reputational risks if local development concerns are perceived to be secondary to resource access. In the context of partnerships, this approach prioritises trade frameworks that secure resource access, which can simultaneously constrain the policy tools, such as export conditions and local content requirements, that producing countries use to pursue domestic value addition (Dünhaupt et al. 2025; Küblböck et al. 2025). Where producing-country development priorities are not addressed, however, the resulting governance gaps may themselves affect the reliability of supply that this profile prioritises.

Table 3
Illustrative policy implications for each governance tension per profile

	Global Leadership	**European Partnership**	**National Self-interest**
Export orientation and domestic priorities	Actively supports producing-country industrialisation and local value addition through enforceable rather than declaratory commitments, as well as finance (FMO, Invest International) designed to support local value addition. Direct engagement with producing countries through partnerships and multilateral instruments; potential to influence project-level governance conditions.	Domestic development objectives in producing countries are recognised but indirectly addressed through EU-wide instruments. Plays agenda setting role for pressing FTA-partnership alignment. Influence channelled through EU frameworks; shaping occurs via collective EU leverage.	Domestic objectives dominate; producing-country development is secondary or treated as externality. Limited upstream influence; interaction mainly via market transactions and compliance demands.

	Global Leadership	European Partnership	National Self-interest
Formal commitments and substantive outcomes	Strengthens enforceability of standards beyond compliance, including project-level monitoring and outcome-based conditions. Embedded in governance networks with shared responsibility across producing and consuming contexts.	Governance improvements depend on EU-level regulatory harmonisation and enforcement capacity. Shared positioning within EU-led external governance systems; intermediate agency.	Governance is largely procedural (compliance-based), with limited intervention in outcomes. Higher reliance on external governance outcomes shaped elsewhere; limited shared agenda-setting with producing countries.
Dispersed accountability and concentrated impacts	Attempts to rebalance value chain asymmetries through flanking instruments, finance conditionality, and multilateral coordination. Pairs protected policy space with active capability support. High potential for integrated approaches linking Dutch/EU climate goals with producing-country development priorities (but coordination-intensive).	Redistribution of benefits and burdens is addressed through standard-setting rather than active bilateral intervention. Alignment depends on EU-level framing of external partnerships; may dilute context-specific adaptation.	Distributional impacts are addressed primarily through reputational risk management rather than structural intervention. Low cross-scale alignment; objectives primarily defined domestically with limited integration of producing-country development agendas.

5.3 Practical implications for consuming-country engagement

For consuming countries, the question is how far to use their influence to shape whether the opportunities the transition creates for producing countries materialise. The debate differs on this. For example, some approaches emphasise access to clean energy and critical raw materials; others emphasise more balanced partnerships; while more transformative perspectives focus on addressing the underlying structural conditions shaping inequalities in the global economy (Dejonghe and Van de Graaf 2025). These differences are also reflected in the policy frameworks discussed in chapter 3, which combine objectives around supply security, sustainable sourcing, international cooperation, and development but do not always specify how these objectives should be reconciled in practice.

The three profiles outlined above reflect different understandings of the role of consuming countries in global energy transition value chains, and therefore different political choices about how the Netherlands might respond to the governance tensions. The profiles differ less in the instruments available to consuming countries than in how those instruments are used and how responsibility for outcomes is understood. The same instruments, including finance, partnerships, trade rules, due-diligence requirements and multilateral cooperation, can serve different purposes depending on the profile.

Dutch public finance and EU-level instruments are two channels for influencing how value chains develop

For the Netherlands, this raises a more practical question: where can national policy influence the conditions under which transition value chains develop, and where is influence primarily exercised through European institutions? Dutch public finance and EU-level trade and partnership instruments provide two particularly relevant channels. Through public finance, institutions such as FMO and Invest International can attach conditions to projects they finance, potentially linking financial support not only to environmental and social safeguards but also to objectives such as local value addition, benefit-sharing or community participation. The scope of such influence is necessarily limited to projects and investments in which these institutions are involved. At EU level, the Netherlands can seek to shape strategic partnerships, raw-materials policy and trade agreements, including the extent to which these frameworks preserve policy space for producing countries to pursue domestic value addition and industrial development. These channels also involve trade-offs. More stringent conditions may increase project costs or reduce the pool of viable investments, while greater policy space for producing countries may constrain some forms of supply-security or market-access policy. The profiles therefore represent different ways of weighing and combining these considerations rather than discrete policy packages.

Across all three profiles, the case studies nevertheless point to three cross-cutting considerations concerning how these governance tensions are addressed.

European due-diligence rules attach to companies, not to the conditions under which projects are developed

The first consideration concerns the relationship between European rules and outcomes at the point of production. As set out in section 5.1, due-diligence frameworks such as the CSDDD and the Battery Regulation operate primarily through companies and their supply chains. They require companies to identify and address social and environmental risks, but do not directly govern all of the conditions under which extraction and production projects are developed. The case studies did not examine compliance with these frameworks directly. They do show that formal safeguards and consultation requirements coexisted with limited change in what communities experience. Read against the design of the frameworks, this suggests that compliance is assessed at the level of the company and its processes and may not reach all of the conditions affecting communities at the point of production.

Accountability currently covers the operating company and the licensing government, and does not necessarily extend to the earlier decisions that shape projects

The second consideration concerns where accountability for outcomes is located, and where it might be exercised more effectively. Across the cases, producing-country strategies set out ambitions for local value addition and development, while the export-oriented elements are the better-secured part of the arrangements (for example, the Ain Sokhna offtake agreement) and local

value addition remains largely at the level of ambition. Accountability mechanisms currently primarily concern the company operating the mine and the government that licenses projects, but do not necessarily extend to earlier decisions about financing, investment, partnerships, and market access. The cases therefore suggest that consuming-country engagement can influence outcomes not only through corporate due diligence, but also through the conditions attached to these earlier decisions, at the point where a licence, a lease or a finance package is negotiated. Practical examples of this might include binding local-content or value-addition requirements, enforceable community consent and benefit-sharing conditions, and a closer and explicit alignment between supply-security objectives and producing-country development priorities.

Conditions on local value addition work only where the capabilities to meet them exist

The third consideration concerns the relationship between policy conditions and the capabilities needed to meet them. Requiring local processing where energy, water, transport, technical skills, or market access are inadequate does not automatically produce processing: it may instead stall the project or result in formal compliance without substantive change. Where the infrastructures are available, however, local processing can genuinely build industrial capability. For example, Morocco moved from exporting phosphate rock to producing fertiliser and, more recently, into producing battery materials; Guinea's alumina projects build power generation into the investment itself (AfDB 2025). The sequencing of infrastructure, skills, investment, and value-addition requirements therefore matters. For consuming countries, this means that expectations around local value addition need to be considered alongside supporting the investments and capabilities required to make them viable.

Taken together, the cases and the policy review suggest that consuming-country, including Dutch and European, engagement currently combines different types of commitments with different degrees of enforceability. Partnerships and financing arrangements may express ambitions around development and value addition, while trade agreements can impose binding constraints on the policy tools available to producing countries (Küblböck et al. 2025; Sasmal 2025). This creates a need to consider these instruments together rather than as separate policy domains.

6 Concluding remarks

This report set out to understand what the experiences and development priorities of resource-producing countries reveal about the justice-related challenges of the global energy transition, and what these imply for Dutch and EU engagement with producing countries. Four case studies in Africa provided the empirical basis, analysed through the JDR framework. They suggest that the assumption that climate, supply-security, and development goals can be served together, and the idea that supply is secure once trade agreements and offtake contracts are in place, cannot be taken for granted.

Three governance tensions recur across the cases: between export orientation and domestic development priorities, between formal commitments and substantive outcomes, and between dispersed accountability and concentrated impacts. Export-oriented project design leaves producing countries' own development ambitions secondary. Formal safeguards and benefit-sharing arrangements exist without by themselves securing outcomes for communities. And the costs of projects fall mainly in producing regions, and before the benefits arrive, while decisions and accountability sit elsewhere. For consuming countries, these tensions are not only features of producing-country governance. They are also shaped by consuming-country demand, finance and rules, and by the way supply security and partner-country development are pursued side by side in EU and Dutch policy without a clear way of reconciling them.

Consuming countries might position themselves in relation to these tensions in different ways, depending on how they understand their role and responsibilities. A Global Leadership profile might actively seek to influence value chain conditions through fair financing and equal partnerships, for example, while a National Self-Interest profile might place greater emphasis on ensuring the reliability of supply domestically. Regardless of which profile is favoured, three considerations shape the effectiveness of consuming countries' engagement. First, governance at the point of consumption does not automatically change conditions at the point of production: due-diligence rules apply where materials enter the EU, not where projects are developed, so increasingly stringent European rules can coexist with limited change at the point of extraction. Second, important decisions are also made before projects reach the stage at which due-diligence requirements apply. Accountability covers the operating company and the licensing government, but not the earlier financing, partnership and market-access decisions in which consuming countries take part. And third, conditions on local value addition work only where the infrastructure and capacity to meet them are in place.

These considerations matter for security of supply itself, because supply is only secured if they are addressed. The IEA (2026) shows that producing countries that capture too little of the value increasingly restrict exports, and the IEA (2025a) identifies fairer benefit-sharing and more equitable trade conditions as conditions for stable supply. Where rules do not reach the point of production, where earlier financing and partnership decisions escape accountability, or where local value addition lacks the capacity to materialise, supply remains exposed to the conflict, delays and cancellations that follow. The central question for consuming-country policymakers is therefore not only how to secure the resources the transition needs, but also how the conditions attached to finance, partnerships and trade shape development opportunities and governance outcomes in producing countries. For Dutch policy, this points to considering the instruments that serve climate and supply security objectives together with those that serve development objectives, so that the

conditions attached to them take producing-country priorities into account. How far to act on this, and in what ways, is a political choice, and the three profiles describe different answers to it. This report does not rank them. It instead makes visible the choices and trade-offs that sit behind different ways of engaging in the global energy transition.

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Appendices

Appendix 1: Green hydrogen in Egypt: The Ain Sokhna Suez Canal Economic Zone

Egypt's flagship green hydrogen project at Ain Sokhna illustrates a recurring tension in early-stage energy transition initiatives: a national strategy that commits to domestic value creation and industrial integration, but a policy and financing architecture that in practice drives production predominantly towards European and Asian export markets. The case raises questions about accountability, local benefit, and what it means for a consuming-country to be a primary source of demand and public support.

This summary draws on a case study report (El Garhy 2026) based on expert interviews, a review of policy and project documents, and a small exploratory survey conducted in early 2026. Detailed project data is limited, and the sector is moving fast, so some findings rest on high-level sources.

Table 4
Summary of the Egypt Green Hydrogen Project - Ain Sokhna case study

Country	**Egypt**
Commodity / vector	Green hydrogen and green ammonia
Project	Egypt Green Hydrogen Project, Ain Sokhna (among the most advanced in the region; pilot phase of the national strategy)
Location	Ain Sokhna, in the Suez Canal Economic Zone (SCZone); on the coast next to Ain Sokhna Port, close to European shipping routes and an existing ammonia industry
Consortium	Led by Scatec, with Fertiglobe (ammonia offtake and conversion), Orascom Construction (local construction and engineering), the Sovereign Fund of Egypt (land and permits) and the Egyptian Electricity Transmission Company (grid)
Stage	Under development, long-term offtake secured; among the most advanced large-scale hydrogen projects in Egypt
Scale	About 203 MW of solar and wind; a 70 MW electrolyser; roughly 70,000 tonnes of green ammonia a year for export
Estimated investment	About USD 520 million
Export markets	European markets, shipped as green ammonia from Ain Sokhna Port
Governance and international	Steered by the National Council for Green Hydrogen and its Derivatives (2022), under the Prime Minister; fast-tracked through the 'golden licence' and the incentives in Law No. 2 of 2024; located in the SCZone Long-term offtake through the German-backed H2Global mechanism; European Union rules shape how the project is produced and certified, including the Carbon Border Adjustment Mechanism and the standards for certifying renewable hydrogen (Renewable Fuels of Non-Biological

Country	Egypt
	Origin); the national hydrogen strategy was developed with support from the European Bank for Reconstruction and Development

Background and context

Egypt runs on natural gas, which provides about three quarters of the country's electricity and roughly half of its total energy; industry buys it at subsidised prices. The grid is ageing in parts, and transmission and system losses, including electricity theft, run at around 20-23%. Water is scarce, so any large hydrogen plant on the coast must rely on desalination. What Egypt does have is strong sun and wind, a location beside the Suez Canal and Europe, and an established ammonia industry, together casting it as a hydrogen exporter rather than a domestic user.

The Egypt Green Hydrogen Project at Ain Sokhna is one of the most advanced schemes in the region and the country's flagship pilot. It sits in the Suez Canal Economic Zone next to Ain Sokhna Port, bringing renewable power, electrolysis, ammonia conversion, desalination, and export together on a single site. A consortium led by Scatec runs it, alongside Fertiglobe, Orascom Construction, and two state bodies: the Sovereign Fund of Egypt and the electricity transmission company.

National policy and just transition commitments

The National Council for Green Hydrogen and its Derivatives, created in 2022, sits under the Prime Minister with a direct presidential mandate, allowing it to coordinate ministries and push projects through quickly. At Ain Sokhna this has worked: land, permits, and inter-agency coordination were streamlined, and the project advanced at a pace a more decentralised system would struggle to match. The trade-off is that decisions are made by a small group, with limited transparency and little stakeholder participation, which raises questions about accountability.

The country's main framework is the National Low-Carbon Hydrogen Strategy, developed with international partners, including the European Bank for Reconstruction and Development. It sets out a phased path towards 2040: pilot projects first, then large-scale expansion and export growth, and eventually domestic industrial use. Domestic value creation is part of the long-term strategy. On the ground, the early phases look different: export-oriented development already dominates, and domestic integration has been deferred. Law No. 2 of 2024 reinforces this pattern, offering tax breaks, financial support, preferential land, and fast-track approval through a ‘golden licence’, measures effective at mobilising investment, but designed to attract foreign capital rather than secure local benefit. The strategy's commitment to domestic value is not yet matched by binding requirements on projects, such as a minimum local-content share or a guaranteed portion of output for the home market, which stakeholders in the study identify as the missing piece.

Market orientation and viability

Ain Sokhna is built for export. Its roughly 70,000 tonnes of green ammonia a year are destined for European markets, and across the national pipeline as much as 90% of early production is intended for export. The reason domestic use stays low is price: Egyptian industry runs on subsidised natural gas, which is far cheaper than green hydrogen, so there is little incentive to switch and little home demand to build on.

What makes Ain Sokhna viable where others stall is a secured buyer. The project has a long-term offtake agreement through the German-backed H2Global mechanism, which absorbs much of the market risk and unlocks early investment. Most Egyptian projects lack this. The sector is caught in a finance and offtake dependency: lenders want confirmed buyers before they commit, and buyers want confirmed supply, so despite a very large pipeline of announced projects only a handful have reached an advanced stage. Egypt's existing ammonia industry gives it an advantage: one industry expert suggests it could cut capital costs by up to 30–40%. The challenge is therefore not only limited access to financing, but also securing the bankable market conditions, particularly long-term offtake agreements, that make investment decisions possible.

Energy, water, and environment

Ain Sokhna is expected to use its own renewable power, about 203 MW of solar and wind feeding a 70 MW electrolyser. This dedicated setup reflects the state of the wider grid as much as a design choice: with ageing infrastructure and losses of a fifth or more, the national network cannot reliably support large, energy-hungry hydrogen plants. The risk is that these dedicated green energy corridors become parallel systems serving export projects, with limited integration into the national grid.

Water is the other constraint. The project relies on desalination, which adds energy use and cost and raises the question of brine disposal. Water, land around the Gulf of Suez, and renewable power are all in competition with agriculture, households, and other industry. Ain Sokhna is expected to cut more than a million tonnes of CO_2 a year, but the larger trade-off is at system level: steering renewable power, public money, and infrastructure towards export hydrogen can crowd out domestic energy access and affordability.

Jobs, skills, and affected communities

The local economic benefit is narrower than the headline ambition. Most jobs come during construction and are temporary; permanent roles require specialised skills, so the lasting employment effect is modest. Small and medium-sized local firms struggle to participate, as the projects are large and capital-intensive, international developers dominate, and local companies have limited access to finance and technical capacity. Value therefore concentrates among large international and industrial players.

Local views point in the other direction. In a survey of residents in Suez and Port Said, 63% said hydrogen produced in the Suez Canal zone should mainly be used inside Egypt, while only 14% favoured exporting it. Stakeholders make the same case in policy terms, arguing that real local value requires clear rules: a minimum local-content requirement, room for smaller firms, or a set share of output reserved for the domestic market. As things stand, participation in planning is limited.

Financing, foreign investment, and policy uptake

What the financing picture adds to the above is a question of who ultimately sets the terms. Ain Sokhna is a roughly USD 520 million project, and the long-term offtake agreement through the German-backed H2Global mechanism reduces market risk and has enabled early-stage investment. Instruments from both sides shape the project. On the European side, the H2Global offtake secures demand, and EU rules (the Carbon Border Adjustment Mechanism and the standards for certifying

renewable hydrogen) set conditions on how the hydrogen is produced and certified. On the Egyptian side, Law No. 2 of 2024 offers tax reductions, financial support, preferential land and fast-track approval, which have been effective in mobilising investment and are oriented toward attracting foreign investment and enabling large-scale export projects. The case study does not describe any of these instruments as requiring local content or a domestic share of output. As a result, even as Egypt states an ambition of building value at home, current project configurations remain primarily export-oriented, with domestic integration limited and deferred.

Conclusion

The Ain Sokhna case shows how a project can be simultaneously technically advanced, financially viable, and yet still misaligned with the producing-country's development priorities. Egypt's strategy envisions a transition from export platform to domestic industrial user of hydrogen, but the current governance architecture, centralised decision-making, investment incentives oriented towards foreign capital, and an absence of binding local-content or benefit-sharing conditions does not support that trajectory. The case also illustrates the role of consuming countries: European demand and German-backed finance are the primary drivers of the project's viability, yet neither comes with conditions that reinforce Egypt's own domestic ambitions. At the same time, Egypt possesses many of the enabling conditions to become a regional green hydrogen hub. Realising this potential will depend on complementary policies that strengthen local value creation, industrial integration, skills development, and inclusive governance.

Appendix 2: Lithium in Ghana: The Ewoyaa project

Ghana's Ewoyaa lithium project raises a question familiar across African extractive industries: can a national policy that explicitly aims for value addition and industrial upgrading deliver, when the project on the ground exports raw concentrate for processing abroad? This case examines whether Ghana's formally strong governance architecture can deliver on its domestic ambitions, and what fair benefit-sharing looks like for communities whose primary concern is not industrialisation but land.

This summary reflects a case study report (Owusu 2026) based on documentary analysis and fifteen interviews across three affected communities – Ewoyaa, Afrengua, and Krampakrom – carried out before production began. The findings therefore capture how people experienced the project during approval and early development, not its operating record.

Table 5
Summary of Lithium in Ghana: The Ewoyaa project case study

Country	**Ghana**
Commodity	Lithium, in the form of spodumene concentrate
Project	Ewoyaa Lithium Project (Ghana's first lithium mine; a flagship critical-minerals project)
Location	Mfantseman Municipality, Central Region, about 100 km southwest of Accra; affected communities include Ewoyaa, Afrengua, and Krampakrom
Developer	Barari DV Ghana Limited, a subsidiary of Atlantic Lithium
Stage	Mining lease laid before Parliament in July 2024 and since ratified; the project is moving from approval into implementation, and the study's findings reflect the pre-production phase
Scale	Open pit mine on a lease of about 42 square kilometres, granted in October 2023 for a term of up to 30 years
Product and export market	Spodumene concentrate – a lithium-bearing ore concentrate of roughly six percent lithium oxide – exported for refining in international processing markets rather than processed in Ghana
State and benefit-sharing terms	The state may take a 10% free carried interest (an ownership stake it holds without paying for); 20% of mineral royalties are directed to the Minerals Development Fund for mining-affected communities
Governance and international framework	Governed under existing mining law, the 1992 Constitution and the Minerals and Mining Act of 2006, rather than a dedicated critical-minerals law; mineral agreements require ratification by Parliament; no significant foreign state involvement in financing or offtake, distinguishing this case from the hydrogen projects

Background and context

Ghana is one of Africa's leading mining countries, built largely on gold, and mining is central to its economy, providing a large share of export earnings and tax revenue. That long history is double-

edged. At the national level it has delivered revenue; at the local level it carries a record of lost land, environmental damage, and disputes over how little of the value reaches host communities.

Lithium is essential to the batteries used in electric vehicles and energy storage, and demand is rising sharply. The difficulty for a producer like Ghana is that most of the value in lithium is created not at the mine but further down the chain, in refining the ore into battery-grade chemicals, which is a capital-intensive process concentrated in a handful of industrialised countries. Ghana's stated ambition is to capture more of that value at home. Whether that ambition reaches the ground is a key question the study examines.

The Ewoyaa Lithium Project lies in the Mfantseman Municipality of the Central Region, about 100 kilometres from Accra, and is developed by Barari DV Ghana Limited, a subsidiary of Atlantic Lithium. It is an open-pit mine designed to produce spodumene concentrate, a lithium-bearing ore concentrate that is shipped abroad for refining.

National policy and just transition commitments

Ghana governs lithium through its existing mining law rather than a dedicated critical-minerals regime. The starting point is constitutional: minerals are held by the President in trust for the people, making them national property and placing mining deals under public scrutiny. Mineral agreements must be ratified by Parliament before they take effect, forcing deals into the open and allowing political and civil-society contestation. The Ewoyaa lease has now been ratified, moving the project from negotiation to delivery.

The framework also sets out how the country is meant to benefit. Under the Minerals and Mining Act of 2006, the state may take a 10% free carried interest, and a separate law directs 20% of mineral royalties into a Minerals Development Fund for mining-affected communities. Beyond revenue, value addition is a central theme of Ghana's lithium policy: the Minerals Commission has publicly pushed for local processing and for moving the country into higher-value parts of the battery supply chain.

The picture is different on the ground. The Ewoyaa lease is for spodumene concentrate destined for refining abroad, so the value-addition ambition is not built into the project itself. The benefit-sharing fund is widely seen as too layered to be visible: payments pass through several institutions and arrive late, indirectly, or unclearly, leaving communities unable to connect the mine to local development. The study notes this is not unique to lithium; it mirrors long-standing patterns in Ghana's gold sector, where formal frameworks exist but benefits reach communities unevenly. Ghana has the architecture and the ambition; what it has not yet demonstrated is delivery.

Market orientation and viability

Ewoyaa is, for now, an export project at the raw end of the chain. Its product is spodumene concentrate shipped to processing markets abroad, so the higher-value steps and most of the profit happen elsewhere. This is the central tension the study identifies, between Ghana's ambition to add value at home and where value in the lithium chain is actually captured. It is not a Ghana-specific problem: across Africa, governments from Zimbabwe to Namibia have tried export bans and local-processing requirements to retain more of the chain, with mixed results and investor resistance.

Viability is also exposed to a volatile market. Lithium prices have swung sharply, and the study notes a recurring pattern in which governments negotiate deals when prices are high, then watch project economics weaken when prices fall, putting agreed fiscal and value-addition commitments under pressure. The lease is ratified and the project is moving ahead, but the same price volatility that shapes its economics also shapes how much room Ghana has to insist on domestic processing.

Land, water, and environment

For a mine like Ewoyaa, the critical resource is land, not power. The communities most exposed depend on farming, and their first concern is what happens to that land. Residents in the host community and in Krampakrom, where relocation has been discussed, worry about losing farmland and whether compensation will be fair and prompt. In a setting where land is livelihood, the study finds that delays or doubts overcompensation weigh more heavily on how people judge the project than almost anything else.

Environmental concerns are present but expressed in everyday rather than technical terms, predominantly worries about water and dust, often drawing on what people have seen mining do elsewhere in Ghana. The study does not document detailed environmental assessments at the community level; rather, it shows that environmental risk is understood through lived experience and proximity, and that this shapes how far people trust the project.

Jobs, skills, and affected communities

Communities expect jobs and local development, but these expectations are high and loosely defined rather than grounded in firm commitments. People across the three communities anticipate employment, infrastructure, and better livelihoods, yet these hopes rest on general ideas about what mining should bring rather than on specific promises about Ewoyaa. Some communities also fear benefits will concentrate in the main host village and bypass the others.

Engagement has been real in form but thin in substance, a pattern the study ties to Ghana's wider mining sector. Consultations have happened, but residents describe them as one-way: telling communities what will happen rather than asking what they want, with main decisions appearing settled in advance. Information about the project is widespread but shallow, circulating informally so that people know the mine exists without understanding its scope, timing, or consequences. The result is fragile trust that depends on delivery, that is, on fair compensation and visible benefit, rather than on formal approvals. A project can hold every permit and still meet local resistance.

Financing, foreign investment, and policy uptake

The deal itself defines how Ghana shares in the project: a 10% free carried interest for the state, and a fifth of mineral royalties earmarked for affected communities through the Minerals Development Fund. On paper, this ties extraction to national and local benefit. In practice, the community share is hard to see, travelling through several institutions, and tending to arrive late, in fragments, or without communities knowing what it paid for.

This is where Ghana's aims and the project's design differ. The country's policy supports value addition and a larger share of the chain, but the ratified lease commits Ewoyaa to exporting concentrate for processing abroad, with nothing in the arrangement requiring refining, local

processing, or a guaranteed domestic share. As a result, how much Ghana ultimately captures depends on commitments that have not been written into the project.

Conclusion

Ewoyaa is a milestone: Ghana's first lithium mine, taken through constitutional and parliamentary process and now ratified. It highlights the distance between stated ambitions and outcomes. Ghana's policy aims for value addition at home, a real share of revenue for mining communities, and minerals held in trust for the people. On the ground, the project exports raw concentrate, the community benefits are not evident, participation is procedural, and trust is fragile and conditional on what is actually delivered. The obstacles seem structural: high-value processing mostly sits offshore in a few industrialised countries, the lithium market is volatile, and Ghana is governing a new transition mineral with frameworks that were initially built for gold. The study concludes that ratification changes the test from negotiation to delivery, but the deal itself does not carry Ghana there: compensation remains unpaid, benefit flows remain untransparent, and value addition was never written into the lease.

Appendix 3: Lithium in Nigeria: The Komu mining site, Oyo State

The Komu case is a site already integrated into global lithium supply chains, where both national policy ambitions and community protection frameworks exist on paper but appear weakly operationalised or absent. Where Egypt and Ghana show the gap between stated ambitions and project reality, Komu illustrates a situation where conditions for formal governance, such as functioning agreements, enforceable rights, and community voice, are not fully in place.

This is a summary of a case study report (Olusoga 2026) based on field observations and interviews with community members, elders, artisanal miners, a mining-association representative, and a sector expert, alongside a review of federal and state mining policy. Fieldwork was challenging: miners and residents were cautious, partly because of ongoing disputes over mining rights and tensions between state and federal authorities, so the findings are qualitative and indicative rather than exhaustive.

Table 6
Summary of Lithium in Nigeria: The Komu mining site, Oyo State case study

Country	Nigeria
Commodity	Lithium, in the form of lithium-bearing ore, largely artisanally mined
Site	Lithium extraction at Komu (the Agate mining camp), a mix of formal and informal operations rather than a single corporate project
Location	Komu community, Itesiwaju Local Government Area, Oke-Ogun region, Oyo State; near the border with the Republic of Benin
Operators	Dominated by artisanal miners and individual dealers, often working under more powerful actors; no single named developer. Nigeria's most advanced lithium investments are in Nasarawa State, not Oyo
Stage	Active but largely informal extraction; formal development is held back by disputes over mining rights and by federal and state tensions, leaving much of the lithium untapped through formal channels
Scale	No defined project scale; extraction is diffuse and artisanal rather than governed by a single lease or corporate investment plan
Product and market	Raw lithium-bearing ore, traded on site by individual dealers and sold to foreign buyers, including Chinese nationals, with minimal local processing or value addition
State and benefit-sharing terms	Operators are required by law to sign Community Development Agreements with host communities; in Komu the study found little evidence these are in place or enforced
Governance and international framework	All minerals are vested in the Federal Government under the 1999 Constitution; licensing is federal under the Nigerian Minerals and Mining Act of 2007 and its 2011 Regulations; Oyo State operates in parallel through a 2023–2027 development roadmap and a 2023 executive order; authority is fragmented between federal and state actors, creating accountability gaps neither level fills; no foreign state involvement in financing or offtake

Background and context

Nigeria is trying to use critical minerals to break its dependence on oil. Lithium, essential to the batteries in electric vehicles and energy storage, is central to that hope, and the government has begun signalling interest in formalising mining and drawing investment into domestic processing. However, this remains challenging. Nigeria's solid-minerals sector is marked by widespread informal and artisanal mining, weak enforcement, and limited protection for host communities, bringing risks of environmental harm, lost livelihoods, and conflict.

Komu is one of the places where this plays out. It is a rural community in the Itesiwaju Local Government Area of Oyo State, in the Oke-Ogun region near the border with Benin, where livelihoods rest on subsistence farming, coal production, and artisanal mining. Within it, the Agate mining camp hosts a mix of formal and informal lithium operations in a weakly regulated setting. Nigeria's most advanced lithium investments are elsewhere, in Nasarawa State; Oyo represents an earlier, less-regulated phase of the country's entry into global lithium supply chains.

National policy and just transition commitments

On paper, Nigeria has a full set of rules to guide mineral extraction and refining. The Constitution vests all minerals in the Federal Government, and the Nigerian Minerals and Mining Act of 2007, with its 2011 Regulations, sets out licensing, environmental safeguards, and community protections. Operators are required to conduct environmental impact assessments, restore land, and sign Community Development Agreements with host communities, alongside other obligations. The same law is meant to formalise artisanal and small-scale mining, bringing informal diggers into the system. Nigeria's Energy Transition Plan of 2022 adds the strategic framing, treating lithium as important both to clean energy and to moving the economy beyond oil.

Oyo State has gone further than most. Its 2023–2027 development roadmap makes solid minerals a pillar of economic diversification and establishes the state-owned Pacesetter Mineral Development Company to acquire and manage mining titles. The roadmap commits to formalising informal mining, supporting small-scale miners, and moving toward value addition and downstream processing. A 2023 executive order reinforces this, treating illegal mining as a security threat, seeking to protect communities from exploitation, physical and environmental harm, requiring community consent and Community Development Agreements, and giving traditional rulers a role in validating that consent.

The ambition is clear at both levels: formalise the sector, protect communities, and keep more of the value domestically. On the ground in Komu, there was no evidence of a functioning Community Development Agreement, awareness of these mechanisms was low, and informal artisanal mining still dominates. The frameworks are comprehensive on paper but enforcement varies, pulled in different directions by a federal government that owns the minerals and a state government that controls the land; a jurisdictional split that presents challenges for accountability.

Market orientation and viability

At the Komu site, lithium is traded raw. The study observed an active market, a weighing station, and bags of ore stacked for sale, but the trade is run by individual dealers rather than companies, and the usual buyers include foreign nationals, among them Chinese buyers, who connect Komu directly to international supply chains with minimal formal traceability. Almost none of the value is

added locally: the ore leaves as ore, and the higher-value steps of refining and processing happen elsewhere.

Formal development, by contrast, is largely stalled. Disputes over mining rights, including a community push to have locally approved actors licensed instead of federally approved companies, have kept some licensed firms away, and ongoing litigation has left much of the lithium untapped through formal channels. The site is commercially active, but informally so, and its direction is being decided less by market economics than by an unresolved contest over authority and rights.

Land, water, and environment

The areas now mined were once farmland, acquired by the federal government after minerals were discovered. The person credited with the discovery was reportedly compensated, but many farmers, especially those who leased rather than owned the land, were displaced with little sign of broader compensation or any stake in what followed. In Komu, all respondents raised safety concerns, and several saw few visible benefits; the land account came from one respondent.

Environmental harm was not a prominent local concern. Residents generally felt the mining site, set some distance from where people live, did not directly affect them; the main visible environmental issue they raised was deforestation linked to coal production. The burden people described most often was insecurity: kidnappings, restricted movement, and reports of armed groups in remote parts of the state (not clear whether these are linked to mining activities in Komu), to the point that relocating nearby households is under discussion, primarily for safety.

Jobs, skills, and affected communities

Mining has produced some income opportunities, but benefits appear unevenly distributed. Mining in the area goes back decades, yet residents told the study they see few visible benefits, with gains concentrated among community leaders and those directly involved in the trade. The possibility remains that artisanal miners often work under larger actors and retain a comparatively smaller share for value. Near the mining camp are some visible improvements (better water, higher housing costs, the occasional rooftop solar panel), but the study could not tie any of this to a benefit-sharing arrangement from lithium specifically.

Formal channels for community benefit are largely missing. No one the study spoke to could confirm that a Community Development Agreement existed, even though the law requires one. A long-running split between rival traditional factions, dating to 2006, makes it hard for the community to bargain collectively or hold anyone to account; as one resident put it, those who try to fight for the community are pushed aside. The reach of policy is limited even among those closest to it, as the sector expert interviewed was unaware of parts of the Oyo State roadmap.

Financing, foreign investment, and policy uptake

There is no conventional project financing in place. Value flows through informal trade, where individual dealers buy and sell at the site, foreign buyers acquire the ore, and money reportedly passes to traditional authorities in return for access. The state has tried to insert itself through the Pacesetter Mineral Development Company, but in Komu the formal economy of the mine is limited, and the informal one is more prevalent.

This situation highlights the difference between policy design and on-the-ground reality. Federal and state frameworks call for formalisation, community development agreements, and a move towards domestic processing, yet this is not consistently reflected in Komu. Enforcement varies despite a visible police presence, and no functioning agreement exists, while high-value processing, and much of the value remain with offshore buyers.

Conclusion

Komu illustrates the integration of a Nigerian community into global lithium supply chains and highlights the extent to which anticipated benefits have (or have not) been realised. Nigeria's ambitions are detailed: formalise artisanal mining, protect host communities, and keep more value domestically, with Oyo State adding its own measures on top. On the ground, extraction occurs largely informally, with ore sold raw to foreign buyers. The distribution of benefits appears limited to a few individuals, and some farmers have reported uncompensated displacement. Additionally, the community-benefit mechanisms outlined in the law are not acknowledged by the community. The study concludes that comprehensive frameworks may not lead to equally effective governance when there are conflicting interests. Informal trade tend to reward those controlling access, the community faces divisions that hinder collective bargaining, processing primarily happens abroad, and a federal government that owns the minerals alongside a state government that controls the land creates challenges for enforcement throughout the value chain.

Appendix 4: Green hydrogen in South Africa: The Coega Green Ammonia Project

South Africa's Coega project is particularly ambitious and, in some ways, the most instructive of all cases considered in this report. South Africa is a country with a progressive just transition policy framework, a sophisticated industrial base, and significant natural advantages, yet the project design risks reproducing a pattern seen across many green hydrogen producing countries: export-oriented, less strongly tied to domestic benefit, and reportedly little community engagement. The case raises the question: if the governance conditions for a just transition exist on paper but are not sufficiently integrated into the design and implementation of the project, what potential justice outcomes could result from green hydrogen investments?

This summary draws on a case study report (Lijfering 2026) combining policy documents and a literature review with interviews and a focus group with participants from civil society, academia, government, and business, carried out in early 2026. As the developer did not respond to multiple requests for participation, these findings foreground the perspectives of civil society, community, and desk research alongside policy and project documents.

Table 7
Summary of Green hydrogen in South Africa case study

Country	**South Africa**
Commodity / vector	Green hydrogen and green ammonia
Project	Coega Green Ammonia Project
Location	Coega Special Economic Zone, Nelson Mandela Bay, Eastern Cape; next to the deep-water Port of Ngqura
Developer	Hive Hydrogen South Africa, a joint venture of Hive Energy (UK) and Built Africa (South Africa)
Stage	Front-end engineering design (FEED) stage, as of March 2026. The final investment decision is pending
Scale	3.5 GW of dedicated renewables (1,230 MW solar in the zone; 1,000 MW Carissa wind facility near Beaufort West); 1,200 MW electrolyser; 1 million tonnes of green ammonia a year
Estimated investment	USD 5.7 billion
Export markets	Europe, East Asia and North America; fertiliser feedstock, with shipping fuel as an emerging use
State and benefit-sharing terms	Developer intentions on surplus electricity and municipal water are not backed by enforceable agreements; the GHCS has no binding provisions on domestic energy security or local beneficiation
Governance and international framework	Designated as a Strategic Integrated Project and located in a Special Economic Zone; The SA-H2 Fund, set up by the Dutch and Danish governments and anchored by Invest International, is among the key backers; EU Global Gateway package (EUR 4.7 billion, March 2025) and EUR 11.5 billion clean trade and investment partnership (late 2025); named an EU flagship by Commission President von der Leyen, October 2025

Background and context

South Africa runs on coal, which supplies about 80% of the country's energy, against 13.7% from renewables and 4.6% from nuclear. The grid is not always reliable, with regular load shedding and widespread energy insecurity. Youth unemployment stands at 46% for those aged 15 to 34. The country already produces hydrogen at scale through Sasol, but from coal, making Sasol its second largest single source of CO_2. South Africa also holds about 80% of the world's platinum group metal reserves, including the iridium that electrolysers require. In this context, green hydrogen is increasingly framed not only as a decarbonisation pathway, but also as a vehicle for green industrialisation and broader socio-economic transformation.

The Coega Green Ammonia Project is the country's most developed green hydrogen scheme and its designated 'Lighthouse project'. Hive Hydrogen South Africa is building it inside the Coega Special Economic Zone, next to the deep-water Port of Ngqura. The final investment decision is still pending, and the timing of construction and first exports depends on it.

National policy and just transition commitments

South Africa has worked on hydrogen since 2007 and has a clear just transition policy of its own. The Presidential Climate Commission's Just Energy Transition (JET) Framework puts fairness at the centre, defining a just transition as one that protects the people most affected: the poor, women, people with disabilities, and youth. The Just Energy Transition Investment Plan (JET-IP) translates these principles into a programme for 2023 to 2027, with three priorities: renewable energy in the electricity sector (specifically solar and wind), new energy vehicles (NEVs), and green hydrogen.

Two documents steer the sector: the Hydrogen Society Roadmap (2022) and the Green Hydrogen Commercialisation Strategy (2023). Both aim to make South Africa a global hydrogen supplier, leaning heavily on exports and foreign investment. The Commercialisation Strategy lists six pillars, among them localisation and socio-economic development, and includes language on stimulating domestic demand for green steel, transport, and aviation fuel.

While commitments for benefit sharing exist on paper, their enforcement and effectiveness may be limited. The Commercialisation Strategy sets no binding requirements for domestic energy security or local beneficiation, and its socio-economic pillar cannot be enforced. South Africa has spelled out what a fair transition should look like, but the socio-economic development elements are currently not enforced.

Market orientation and viability

Coega is designed to produce one million tonnes of green ammonia a year, almost all of it destined for Europe, East Asia, and North America, where it will be used as a feedstock for fertiliser and, increasingly, as shipping fuel. The reason to produce solely for export is the cost: green hydrogen made in South Africa currently runs at an estimated USD 4 to 6 per kilogramme, against USD 1 to 2 for fossil fuel-based hydrogen. At that price it only sells in markets where European and Asian subsidies close the gap, which is precisely what schemes such as REPowerEU and the European Hydrogen Bank aim to do.

That export logic also introduces uncertainty, as offtake agreements for green hydrogen have not yet been established at a large scale. This is why many of the announced green hydrogen projects

have been put on hold; by the end of 2024, only 4% of clean hydrogen projects announced worldwide had reached a final investment decision. South African projects have been no exception – Sasol withdrew from its Boegoebaai pilot in 2025 even after ZAR 350 million had been set aside for it.

Energy, water, and environment

Coega will run on its own dedicated power: 3.5 GW of renewables, including a 1,230 MW solar farm inside the zone and a 1,000 MW wind facility near Beaufort West, feeding a 1,200 MW electrolyser. Plants like these are deliberately oversized so the electrolyser never loses power, which means they will often generate more electricity and clean water than they use. The developers say they will sell that surplus to the local municipality at a reduced rate and fund new transmission lines, which would matter greatly in Nelson Mandela Bay, where supply is not always consistent. However, earlier programmes show the risk of assuming such spillovers, with communities living next to earlier renewable projects still facing high prices and unreliable power. The delivery of benefits may depend on the inclusion of binding agreements, which is yet to be confirmed in the case of the Coega project.

Water is another constraint. To avoid placing additional pressure on limited freshwater resources, Coega plans to build its own desalination plant, with extra desalinated water potentially lifting municipal supply by up to 25%. The project also plans to direct the leftover brine to the nearby Cerebos salt works rather than the sea, thereby aiming to minimise risks for marine life and coastal fishing. On land, the Coega SEZ assessment has been challenged over the clearing of rare fynbos and the port and bunkering activities' proximity to the African penguin colony on Bird Island, underscoring the importance of safeguarding ecosystems so that GH_2 development does not come at the expense of future generations.

Jobs, skills, and affected communities

Jobs are Coega's biggest selling point: the project is linked to roughly 20,000 job opportunities, a powerful promise in a region where youth unemployment is severe but the headline number is hard to verify. A large share are expected to be temporary, tied to construction of the plant; permanent operating roles are far fewer. The same pattern has been observed in Chilean green hydrogen projects and South Africa's solar PV sector, where employment for local workers has primarily remained mostly short-term and low-skilled.

The better-paid technical roles require skills that are not yet produced at scale within the country. Vocational training is limited and often comes with costs, making it less accessible for many, particularly in rural communities which generally have less access to specialised education than cities. Moreover, women are still underrepresented in technical roles. Donors, including Germany's development agency GIZ, are helping build training capacity, although the system is still developing.

Community engagement was regarded by local community members as inadequate. As one community mobiliser explained: ‘While a public participation meeting was organised, the announcement of the meeting was disseminated through online platforms and libraries in cities, which didn’t reach the communities in the direct surrounding of the green hydrogen developments. The consultation, which less than 30 people attended, included a majority of participants not from directly affected communities, making the process largely unrepresentative’. The meetings ran

mostly in English, with little translation into isiXhosa or Afrikaans, and little follow-up, leaving participants uncertain as to whether their inputs were considered and interpreted correctly. In response, affected communities and advocacy groups are increasingly calling for the implementation of FPIC principles, enabling communities to accept or reject proposed developments before key investment decisions are finalised.

Financing, foreign investment, and policy uptake

Coega carries a price tag of USD 5.7 billion, with most early financing coming from Europe, of which a substantial amount from the Netherlands. The SA-H2 Fund, set up by the Dutch and Danish governments and anchored by the Dutch development bank Invest International, is among the key backers. The project also sits inside a wider EU push on green hydrogen, including the Global Gateway investment package, and was named an EU flagship by the European Commission in October 2025.

This is where South Africa's own just transition commitments meet foreign interests, and where potential risks of exclusion of communities may arise. The policies that move Coega forward, such as its Strategic Integrated Project status and special economic zone designation, are designed to speed approvals and reassure investors, rather than participation. The national just transition commitments are not attached to the project as conditions, and the study found no mechanism that holds the companies or the European financiers to them. Because the ammonia is processed and exported, how much value stays in South Africa will depend on deals that have not yet been struck.

Conclusion

South Africa has a sophisticated industrial base and a green hydrogen project with genuine co-benefit potential. The Coega case illustrates that while GH_2 development can contribute to national economic development and global decarbonisation objectives, its socio-economic implications are neither predetermined nor inherently aligned with local priorities. Alignment is an ongoing process contingent on how competing objectives are negotiated in practice and an effective energy transition should consider local contexts and perspectives.