



Working paper

# Nexus assessment of Indonesia's energy sector

Does the electricity sector deliver for the economy, environment and society?

**Balgis Inayah, Hamidah Busyrah, Aidy Halimanjaya, Muhammad Ichsan Saif**  
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## Abstract

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Indonesia's electricity sector aims to achieve economic transformation, environmental sustainability and social inclusion ('energy nexus' objectives), but progress has been limited. This research paper examines key drivers, existing gaps and potential pathways to achieving more coordinated and joined-up policy-making that incorporates nexus objectives in a transition towards more sustainable sources of power. By systematically examining policy documents and conducting interviews with respondents at the national, operator and project implementation levels, the study finds that energy policies predominantly focus on achieving economic targets, with limited attention to environmental and social objectives. This is reflected in the dominance of coal among energy sources for the electricity sector and in the problematic incentives relating to coal subsidies. The findings reveal inconsistencies, capacity limitations and weak safeguards that hinder the harmonisation of energy nexus objectives.

Based on gaps identified, the study highlights the need for improved institutional arrangements, capacity building, policy reforms and ending fossil fuel subsidies to promote a more coherent and integrated nexus approach at the national level. Promoting public participation, introducing complementary measures for local resources and collaborating with regional associations are important at the operator level. At the project implementation level, establishing monitoring frameworks and adopting best practices that are aligned with nexus objectives and integrate the views of all stakeholders would make a vital contribution towards achieving a sustainable and inclusive energy transition.

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# Acronyms

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<b>EIA</b>	Environmental Impact Assessment
<b>GDP</b>	gross domestic product
<b>GESI</b>	Gender Equality and Social Inclusion
<b>IPP</b>	Independent Power Plant
<b>JETP</b>	Just Energy Transition Partnership
<b>KEN</b>	Kebijakan Energi Nasional (National Energy Policy)
<b>KIIs</b>	key informant interviews
<b>MEMR</b>	Ministry of Energy and Mineral Resources
<b>MOF</b>	Ministry of Finance
<b>MSOE</b>	Ministry of State Owned Enterprises
<b>RENSTRA KESDM</b>	<i>Rencana Strategis Kementerian Energi dan Sumber Daya Mineral</i> (Strategic Plan of the Ministry of Energy and Mineral Resources)
<b>RPJMN</b>	<i>Rencana Pembangunan Jangka Menengah Nasional</i> (National Medium-Term Development Plan)
<b>RUEN</b>	<i>Rencana Umum Energi Nasional</i> (National Energy General Plan)
<b>RUPTL</b>	<i>Rencana Usaha Penyediaan Tenaga Listrik</i> (Electricity Supply Business Plan)
<b>PLN</b>	<i>Perusahaan Listrik Negara</i> (State Electricity Company)
<b>PLTS</b>	<i>Cirata Pembangkit Listrik Tenaga Surya Cirata</i> (Cirata Floating Solar Power Plant)
<b>PLTA UCPS</b>	<i>Pembangkit Listrik Tenaga Air Upper Cisokan Pumped Storage</i>

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# Executive summary

Indonesia's electricity sector aspires to support economic transformation, social inclusion and environmental sustainability, following the country's commitment to achieving a 32% reduction in emissions against a business-as-usual scenario by 2030, rising to 43% with international assistance (enhanced Nationally Determined Contribution targets, updated September 2022). However, the country is not yet delivering on many of its economic, social and environmental goals. Access to affordable, reliable and clean electricity in some parts of the country is still limited. Coal is still considered less expensive than renewable energy sources and is the predominant source of electricity generation, making the electricity sector the country's second-largest emitting sector. Technical, economic and political constraints tend to slow the energy transition in the electricity sector. Indonesia must address the linkages between energy poverty alleviation, the changing economics of power generation options and the social and environmental impacts of fossil pollution as it seeks to build a power system fit for its development needs and climate goals.

This paper aims to identify challenges and opportunities for a more coordinated, coherent and 'joined-up' policymaking process for delivering Indonesia's energy transition goals in the electricity sector. The question of whether there exists joined-up (or nexus) policymaking incorporating objectives of economic transformation, environmental sustainability and social inclusivity in Indonesia's energy transition has been little studied in the literature. Discussion on the energy transition for Indonesia's electricity sector revolves around the technical and financing aspects of technologies and infrastructure for renewable energy production. This paper aims to provide new evidence on ways to bring nexus thinking into policymaking for the electricity sector, which may help Indonesia to achieve its goal of delivering prosperity for all within planetary boundaries.

The assessment in this paper covers the three nexus elements – environmental sustainability, economic transformation and social inclusion – and identifies drivers, gaps and opportunities for reflecting these in Indonesia's policies, regulations, plans and strategies for electricity transition at three levels: (1) the national policy level, (2) the operator level and (3) the project implementation level. The assessment was based on policy and project document review, complemented by interviews and a validation workshop with stakeholders.

- At the national policy level, the documents assessed include the national medium-term development plan for 2020–2024 (*Rencana Pembangunan Jangka Menengah Nasional – RPJMN*); the 2020–2024 strategic plan of the Ministry of Energy and Mineral Resources (*Rencana Strategis Kementerian Energi dan Sumber Daya Mineral – RENSTRA KESDM*); and presidential regulation No. 112/2022 on renewable energy acceleration.
- At the operator level, the assessed documents were the 2021–2030 electricity supply business plan (*Rencana Usaha Penyediaan Tenaga Listrik – RUPTL*); accountability reports; and the procurement policy for electricity generation.

- At the implementation level, the assessment covers: the operating procedures for environmental and social assessments; and progress reports on two national renewable energy projects, the Cirata Floating Solar Power Plant (PLTS Cirata) and Upper Cisokan Pumped Storage Hydropower Plant (PLTA UCPS).

## Key findings/messages

### National policy level

- The focus of energy policies has been primarily on their economic objectives, particularly on meeting electricity demand and generating public revenues. There has been less attention on alignment with climate goal commitment targets, on making electricity accessible to the most vulnerable people or remote populations, or on social inclusion objectives such as job security and gender equality.
- There are inconsistencies in the government's energy transition strategies, which aim both to diversify sources of electrical power (increasing the share of renewable energy) and to develop value addition in coal production (potentially locking the economy into the fossil fuel sector). Institutional, governance and financing issues are key to these inconsistencies.
- A lack of capacity to integrate or quantify social and environmental elements in national energy policies means that less attention has been paid to these aspects during the implementation and assessments of medium-term plans and strategies for the energy transition.
- There is a lack of joined-up and coherent policy reforms covering capacity building, institutional arrangements and incentives for a faster transition to renewables, contributing to the lack of joined-up policy making which currently tend to overlook social inclusion objectives such as job security and gender equality.

### Operator level

- Similar to national energy policies, the strategies of the state electricity company (*Perusahaan Listrik Negara* – PLN) are focused on driving economic gains from the sector, with less attention to environmental and social aspects. Overlapping mandates and lobbying by different stakeholders in the electricity sector underpin the challenges in ensuring that all three nexus elements receive due consideration.
- Coal remains the dominant energy source in the 35,000MW electricity infrastructure development acceleration programme designed to meet growing electricity demand. The PLN views the country's current electrification system as unstable, making it difficult to prioritise renewable energy. This indicates a contradiction between national government transition goals and their operationalisation.
- Unless the expectations for the PLN to contribute to government revenues are relaxed, there will be few incentives for the operator to move towards more renewable energy sources. There are also problematic incentives around coal subsidies, with the PLN having the right to purchase domestic coal below market rates.



- Vague accountability mechanisms and social and environmental safeguards are driven by universal corporate standards rather than by government mandates, resulting in the weak implementation of strategies to achieve nexus objectives. This might explain the low utilisation of local energy resources and limited local job and sub-contracting opportunities in power generation activities.

## Implementation level

- The compliance and consistency of energy projects with the national and operational energy policies and accountability mechanisms is unclear, which tends to make the achievement of energy nexus objectives out of sight at the project implementation level.
- In their current form, the project implementation plans of two renewable energy projects investigated for this study consider nexus objectives but do not provide enough information on whether procedures for mitigating environmental and social risks are being implemented or are effective.
- Different views on the presence of environmental and social objectives at the project implementation level were gathered from stakeholders: project developers said that strong environmental and social safeguards are in place; communities raised concerns about observed negative environmental and social impacts during project development (e.g., construction) stage; and project implementors suggested that environmental and social standards adopted are influenced more by the project investor or lender than by national/PLN policy guidance. The projects need ongoing documentation for in-depth monitoring to help inform project developers, investors and communities on how best to reflect nexus objectives in energy projects within the local context.

## Recommendations

### National policy level

- Strengthen institutional arrangements by establishing a coordinating body that can promote effective coordination and close multi-stakeholder collaboration between relevant agencies and institutions.
- Conduct a comprehensive assessment of the current energy system and policies to identify gaps, opportunities and challenges in terms of achieving energy nexus outcomes.
- Design a detailed, practical and cohesive plan to integrate energy nexus objectives into existing energy system development plans, with clear links to electricity operator and major energy projects plans.
- Build institutional capacity to identify systemic problems and develop strategies that can lead to energy policy reforms and influence governance mandates.
- End fossil fuel subsidies to create a level playing field for renewable energy which could be done by reviewing domestic market obligation (DMO) price benchmark policy for power generation and making a strategic plan to end this policy.

## Operator level

- Collaborate more with local communities and promote public participation in implementing sustainable energy practices (e.g., collective monitoring from community participation to strengthen operator accountability mechanisms, including discussions with affected communities about renewable energy development).
- Introduce complementary measures to support local linkages in energy projects (e.g., jobs, procurement).
- Work with regional associations (e.g., the Indonesian Solar Association) to increase renewable energy development and accelerate electricity connections in remote and lower-income regions.

## Project implementation level

- Formulate a monitoring and evaluation framework based on the target nexus outcomes to track the progress and impacts of renewable energy projects.
- Learn from best practices at the project level to adopt safeguard standards from investors/lenders, particularly on risk management and impact monitoring of energy transition projects for the electricity sector.
- Integrate the views of investors, developers and local communities on developing, adapting, documenting and monitoring environmental and social safeguards at all stages of project implementation.

# 1 Introduction

## 1.1 Background

### **Indonesia's electricity sector aspires to support economic transformation, social inclusion and environmental sustainability.**

The electricity supply is essential to economic activity and the vast majority of social services, including industrial and commercial activity, agricultural production, healthcare, education and telecommunications (ESCAP, 2020; ADB, 2020a). Indonesia's population growth and economic development have rapidly increased demand for electricity in the industrial and household sectors, albeit with a brief hiatus during the Covid-19 pandemic (ADB, 2020a).

### **However, the sector is not yet achieving many of its economic, social and environmental goals.**

Many Indonesians do not yet have access to affordable, reliable and clean electricity. The government aims to raise the country's electrification level to 100% in an effort to encourage economic and social development (Indonesia Investments, 2020). Yet, a heavy dependence on coal-fired power plants means that the electricity generation and heating sector has become the second-largest source of greenhouse gas emissions in Indonesia, after land use change and forestry, contributing 34% of the country's total emissions in 2019 (Ritchie et al., 2020); without decarbonisation efforts, it is projected to become the largest source of emissions by 2030 (IESR, 2021). To build a power system that is fit for the country's development needs and meets climate constraints, Indonesia needs to address the linkages between alleviating energy poverty, the changing economics of different electricity generation options, and the social and environmental impacts of pollution from burning fossil fuels (Streimikiene et al., 2021).

### **Indonesia has set targets for increasing renewable energy generation and reducing greenhouse gas emissions, though these are not yet consistent with limiting the temperature rise to 2°C – let alone 1.5°C.**

Indonesia has published a transition agenda for the energy sector – including the electricity sector – within its national energy policy (*Kebijakan Energi Nasional* – KEN), which states that, as part of its energy security agenda, the country's energy mix targets for renewable energy are 23% by 2025 and 31% by 2050 (President of the Republic of Indonesia, 2014). The government has also promulgated a National Energy Grand Plan (Presidential Regulation No. 22/2017) that mandates the target of 23% new renewable energy in the national energy mix by 2025 and a 1% reduction in energy intensity per year (MOEF, 2022). These targets are aligned with the country's commitment to achieving its enhanced Nationally Determined Contribution (updated September 2022) of a 32% reduction in emissions against a business-as-usual scenario by 2030, rising to 43% with international assistance (ibid).

**Indonesia's electricity sector offers a green investment opportunity, contributing to GDP growth and employment opportunities.** Accelerating the deployment of renewable energy could increase Indonesia's GDP by between 0.3% and 1.3% in 2030, mainly as a result of higher overall levels of investment in the energy sector (IRENA, 2017). Additionally, the Global Green Growth Institute (GGGI, 2020) estimates that by 2030 around 2.12 million direct renewables-related jobs will be created, as well as 0.88 million indirect and 0.89 million induced jobs. Beyond the renewable energy sectors, this has spillover effects in terms of employment and economic value added to the wider economy (ibid). One study highlighted that economic development is favourable for improving environmental indicators, and will eventually lead to sustainable energy development, and that renewable energy sources should be encouraged by the government to reduce emissions in the short run (Sugiawan and Managi, 2016).

**The huge potential for renewable energy in Indonesia is overshadowed by complex challenges.** Earlier studies suggest that technical, economic and political constraints mean that it is unlikely that renewable energy alone will displace the major contribution of fossil fuels to the national energy mix for the electricity sector in the near future (IESR, 2021). At the time of writing, Indonesia has an energy surplus thanks to coal, which discourages the shift towards renewable energy (Nangoy and Suroyo, 2021). However, there are other significant impediments to the energy transition, including subsidies for fossil fuels, regulated fossil electricity tariffs, unattractive renewable energy tariffs and lower investment in renewables (IESR, 2019a; 2021). The energy surplus increased due to the economic slowdown resulting from the Covid-19 pandemic (ADB, 2020a), while the demand for coal exports increased due to Russia's invasion of Ukraine (Shofa, 2022; Guenette and Khadan, 2022), further hindering the transition. Technical issues related to geographic conditions, fragmented grids and limited technical capabilities may be influential but are not the main impediments (IESR, 2019b).

**Earlier political economy analyses suggest that unpredictable policies and lack of inter-ministerial policy coordination have constrained the transition towards renewable energy.** Indonesia has experienced multi-faceted principal-agent problems, in particular, on how the PLN – which has sole authority for managing electricity transmission and distribution – has been managing the different policy priorities of various principals. The principals include: the Ministry of State-Owned Enterprises (MSOE); the Ministry of Energy and Mineral Resources (MEMR); the Ministry of Industry, which is the intermediary between domestic and foreign renewable energy organisations; and the Ministry of Finance (MOF), which manages the electricity subsidies (Halimanjaya, 2019). The complex regulatory system, demonstrated by the mixed governance approach of the power sector between central and regional governments, difficulties in negotiating power purchase agreements and compliance requirements (e.g., local content requirements), have been identified as significant hurdles to the development of renewable energy projects (Bridle et al., 2018). An overview of the political economy is discussed in more detail in section 2.2.

## 1.2 Purpose and relevance

**Nexus policymaking, which incorporates multiple objectives of economic transformation, environmental sustainability and social inclusivity, in Indonesia’s energy transition efforts, particularly for the electricity sector (hereafter, ‘the energy nexus’), has been little studied.** Discussions on the energy transition for the electricity sector in Indonesia focus heavily on the technical and financing aspects of technologies and infrastructure for renewable energy production and creating jobs to ensure economic growth (see BKPM, 2021).

**This paper aims to provide new evidence on how to bring nexus thinking into policymaking for the electricity sector, which may help Indonesia to achieve its goal of delivering prosperity for all within planetary boundaries.** It assesses to what extent the nexus objectives are embedded in the national vision for the transition towards more sustainable electrical power by examining Indonesia’s key energy transition plans and policies and the implementation of these at national, regional and local levels. It also looks at how energy transition efforts aim to achieve emission reduction goals while simultaneously supporting productivity within and between sectors and ensuring that the gains from the transition are passed on to the most vulnerable households and workers. In this context, this paper’s specific objectives are to:

1. assess the incorporation of the three nexus elements within Indonesia’s policies and regulations as well as within strategies and plans for electricity transition at the national policy, operator and implementation levels
2. assess the consistency or gaps in incorporating the nexus elements within policies and regulations as well as within strategies and plans for electricity transition at the national policy, operator and implementation levels
3. identify drivers, synergies, gaps and trade-offs when incorporating nexus elements in electricity transition efforts at the national policy, operator and implementation levels.

**This analysis is timely in view of the increased attention on Indonesia’s clean energy transition efforts following the country’s G20 presidency and its announcement of a new Just Energy Transition Partnership (JETP).** In 2022, Indonesia launched its Country Platform for the Energy Transition Mechanism as a framework to finance the upgrading of its energy infrastructure and accelerate its drive to achieve net-zero emissions in a just and ‘affordable’ manner (Fiscal Policy Agency, 2022). International funding was pledged by the Asian Development Bank and Climate Investment Funds. As G20 president, Indonesia launched the Bali Energy Transitions Roadmap, a product of the G20 Energy Transition Working Group, to produce more concrete results from the G20 meetings and to strengthen the sustainable global energy system and the just energy transition in the context of sustainable recovery (MEMR, 2022). This was followed domestically by Presidential Regulation No. 112/2022 on Acceleration of Renewable Energy for Electricity Supply, which details the early retirement of coal-fired power plants with several exemptions (President of the Republic of Indonesia, 2022). Indonesia and an array of international partners, co-led by the US and Japan among the G7 countries, also announced

during the G20 summit that they had agreed on a \$20 billion financing deal that will help the country accelerate its transition to a low-carbon economy through JETP (Dlouhy and Sink, 2022; Jong, 2022). Indonesia must now capitalise on this remarkable political momentum and maintain its efforts to fully decarbonise its energy sector.

**Indonesia is in the design and planning phase of its electricity transition and is attempting to secure financial support.** This provides a window of opportunity for the government to identify effective policy instruments and institutional capacity needs for the early retirement of coal-fired power plants and the expansion of renewable electricity alongside domestic economic transformation and social inclusion agenda goals (Trend Asia, 2022). An assessment of the design and implementation of plans and policy frameworks is, therefore, needed to ensure that the country is on the right path, with joined-up thinking across the three nexus elements.

### 1.3 Research questions

Based on the aim and objectives explained above, the main research questions for this study are:

1. **National policy-level:** are all nexus elements (economic transformation, environmental sustainability and social inclusion) incorporated within Indonesia's main national policies and strategies for its electricity sector?
2. **Operator-level:** if nexus elements have been incorporated within the main nationally relevant policies and strategies for the electricity sector, to what extent have these been adopted at the operator level?<sup>1</sup>
3. **Implementation-level:** how have these national and operational-level electricity sector policies, strategies and plans been implemented at the firm/project level?<sup>2</sup>
4. **For future reflection:** what are the strengths, challenges and opportunities for pursuing nexus policymaking for Indonesia's electricity sector?

The rest of this paper is organised as follows. The next section provides some contextual background on Indonesia's electricity sector, particularly recent developments in electricity demand and prices. It will discuss its performance and describe the relevance of the sector for each of the elements in the Nexus agenda, informed by an existing political economy analysis. The third section explains the proposed approach and method for the assessment used to answer the research questions above. The fourth section summarises the analytical findings, while the fifth draws conclusions and recommendations.

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1 For the operator level analysis, the operator refers to PLN that has sole authority for managing electricity operation, including its sub-holdings.

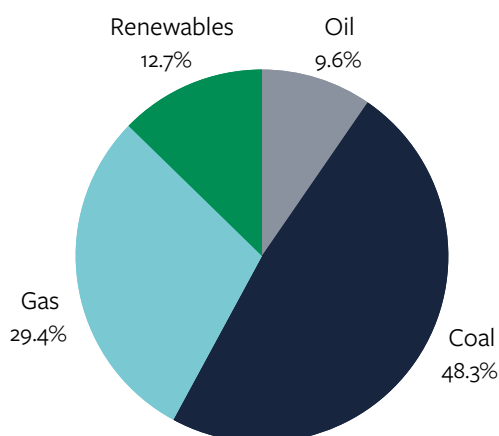
2 For the implementation level analysis, it refers to the implementation of the project related to renewable energy power plants developed by the firms/developers. Details of assessment levels will be further explained in Section 3.2.

## 2 Indonesia's electricity sector: an overview

### 2.1 Electricity sector

Between 2015 and 2030, energy demand in Indonesia is predicted to increase by 80% while demand for electricity is projected to triple (BKPM, 2021). In the decade between 2011 and 2020, electricity consumption increased from 159.9 terawatt-hours (TWh) to 242.6TWh (National Energy Council, 2021). Compared to the value in 2019, electricity consumption declined slightly in 2020 due to decreased activity in industry and the commercial sector during the pandemic (ibid). Fossil fuels remain the main source of energy, with coal, gas and oil accounting for approximately 84% in 2021 (IISD, 2022). The electricity mix in particular remains dominated by coal (IISD, 2022). Figure 1 shows the 2020 energy mix for electricity generation. Only 12.7% came from renewable energy sources (Ministry of Energy and Mineral Resources, 2021). This indicates that a rapid transformation has to be achieved in the electricity sector to meet the target of 23% by 2025 (IISD, 2022; IESR, 2021).

**Figure 1** Energy mix for electricity generation in 2020



Source: Authors, based on data in RUPTL 2021–2030 (Ministry of Energy and Mineral Resources, 2021)

In 2020, households were the biggest electricity consumers, followed by industry, the commercial sector and transportation. In households, electricity demand was 112.7TWh (46.4%) of the total national electricity demand (National Energy Council, 2021). In industry, the electricity demand was 71.5TWh (29.5%), and in the commercial sector, 58.2TWh (24%). Transportation accounts for the remainder of 0.3TWh (0.1%) (ibid). It is important to note that many households and firms in Indonesia still lack access to electricity, but that expanding the grid is not always feasible in a

country with 13,000 islands. The central government, therefore, also envisions a major role for decentralised renewable generation (solar, wind and micro-hydropower) accompanied by small battery energy storage systems (IESR, 2021).

Volatility in international markets has had significant implications for the public finances and energy bills in Indonesia. Ministerial Decree No. 139.K/HK.02/MEM.B/2021 of 2021 established a domestic market obligation (DMO) on coal suppliers, obliging them to sell 25% of their Indonesian production for domestic consumption (National Energy Council, 2021; IESR, 2021). This decree also set the price of coal used to supply power to the public at \$70 per tonne. This policy secures domestic coal for PLN based on its financial capability, without requiring additional subsidies from government or an increase in its basic tariff to consumers (National Energy Council, 2021). However, the disparity between international and local market coal prices grew in 2021 because of rising global demand, so that many coal producers prefer exporting at international prices instead of fulfilling the DMO (IISD, 2022; IESR, 2021). This resulted in a short-lived export ban in January 2022 during which PLN was required to purchase coal at the market price (IISD, 2022). Fossil fuel prices remain volatile due to varying rates of post-pandemic economic recovery and Russia's invasion of Ukraine (Smith et al., 2021). In the absence of policies that artificially lower the price of coal, renewable energy in Indonesia is looking increasingly competitive.

## 2.2 Political economy of the electricity sector in Indonesia

Political economy challenges remain in terms of the application of nexus elements to Indonesia's electricity sector transition policies. The pursuit of multiple economic, social and environmental goals, which can be in tension with one another, often leads to conflicting policies (Sugiawan and Managi, 2016). There has been little national debate around how to reconcile or prioritise competing goals, nor how to navigate the interests of different stakeholders in a fair and inclusive way. Moreover, any ambition to achieve the energy nexus is inhibited by deep structural political economy problems. A study by Octifanny and Halimanjaya (2022) identified six political economy issues hindering Indonesia's achievement of net-zero emissions (Figure 2). The following discussion elaborates on these challenges.

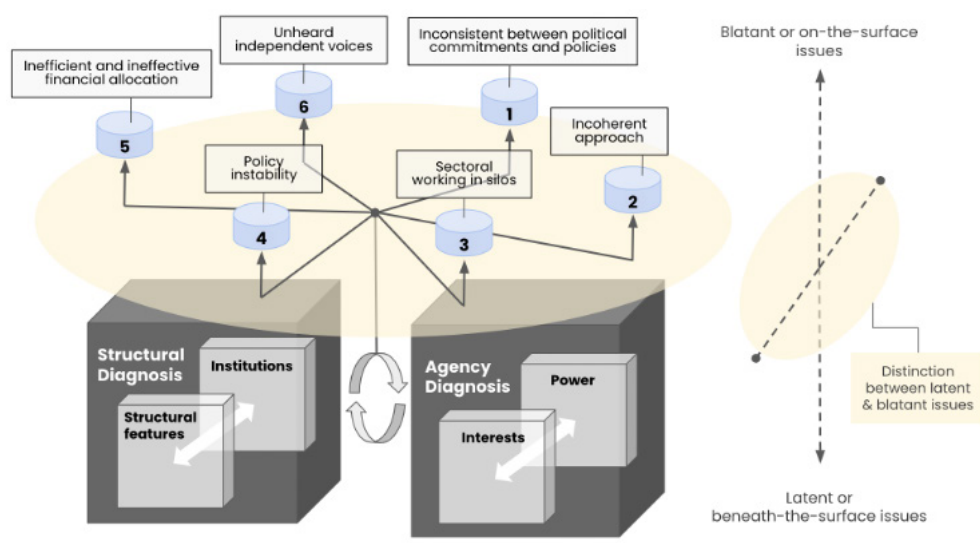
**First, the political commitment to climate action is inconsistent and unambitious.** This is most apparent with respect to coal. Presidential Regulation No. 117/2021 on phasing out coal has not been fully implemented (Chatterjee and Pande, 2022), and Indonesia continues to lavish generous subsidies and incentives on coal miners and power plant operators (Jong, 2021). Moreover, the PLN aims to start shutting down coal-fired power plants, phasing them all out by 2055 and losing 50GW of capacity. Yet, at the same time, it is building 21GW of new coal plants that will have an operating life until 2065 (Jong, 2021).

**Second, Indonesia lacks a coherent strategy for achieving net-zero,** in part because of the inconsistent political commitment. Indonesia has set targets for renewable energy as a share of total power supply, but these are not consistent with the temperature targets of the Paris



Agreement and are not backed up by detailed policies and plans. Despite a commitment to phase down coal in the Glasgow Climate Pact and a presidential decree governing the early retirement of coal-fired power plants, Indonesia has no clear restrictions on building new plants. By not setting a clear deadline for ending the construction of new coal plants, the government is sending mixed signals around the energy transition (Jong, 2022).

**Figure 2** Political economy issues hindering Indonesia from achieving net-zero through the energy transition of electricity sources



Source: Octifanny and Halimanjaya (2022)

**Third, both government and non-government actors are addressing the energy transition for the electricity sector in silos.** Poor and siloed communications and governance are exacerbating the inconsistency of Indonesia's regulations and policies in achieving the energy transition (Halimanjaya, 2019). A lack of coordination across ministries to agree on shared priorities is common (Colenbrander et al., 2022). For example, MEMR is simultaneously responsible for reducing emissions and creating jobs in coal mines, creating conflicting incentives for civil servants within this agency. Moreover, there are inconsistent regulations, strong oppositional incumbency, and low capability at the implementation level, leading to further challenges in realising synergies (Sekarintias et al., 2023).

**Fourth, Indonesia does not have a stable and joined-up policy framework that can support decarbonisation of the electricity sector.** It is likely that current policies will experience reversals as a result of political change (Halimanjaya and McFarland, 2014). There is limited confidence that Indonesia's strategies and commitments for the energy transition are being immediately and clearly applied within a robust governance system (Climate Action Tracker,

2022). Fiscal policies related to Indonesia's renewable energy for electricity were developed rapidly, under the pressure of changing policy priorities and leadership of MEMR, MOF and other key ministries (Halimanjaya, 2019).

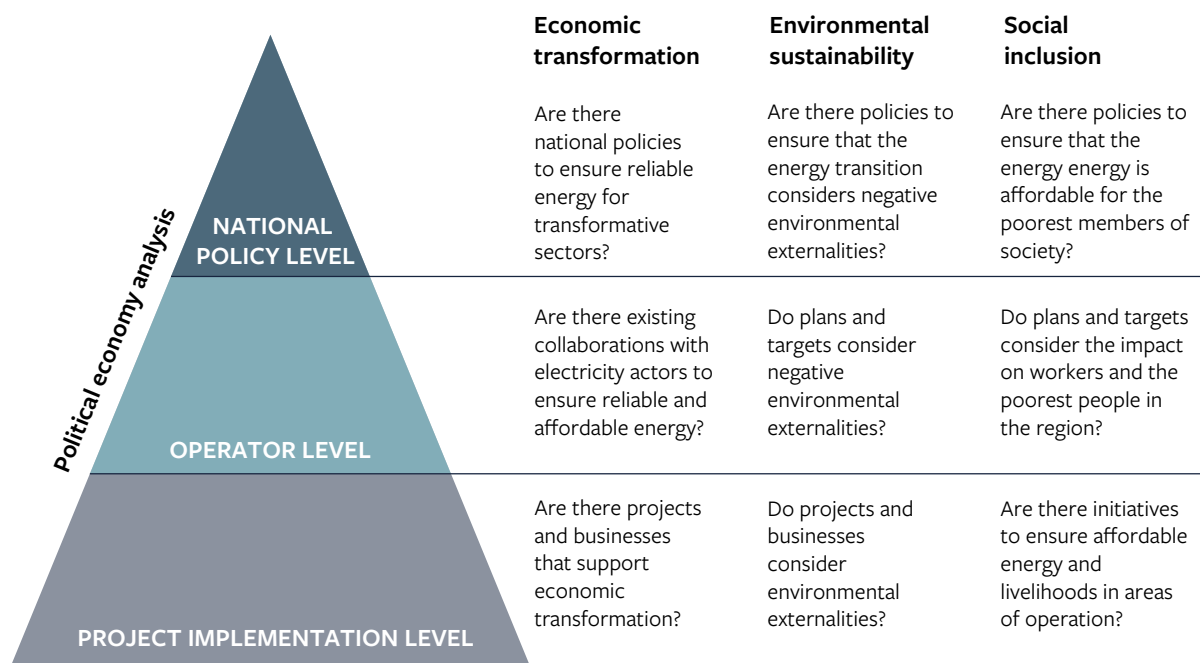
**Fifth, the budget allocation does not reflect energy policies and targets.** The budget subsidy given to PLN is regulated in Law 30/2007 on Energy, enabling the government to offer facilities and capital, tax, or fiscal incentives for developing renewable energy until renewables become economically competitive (ADB, 2020b). However, abundant coal subsidies mean that the price of electricity from coal-fired and gas-fired power plants does not reflect the actual electricity generating costs, especially since there are high external costs (IISD, 2017). The allocation of public resources in favour of fossil fuels largely explains why renewables continue to be uncompetitive in Indonesia. These budgetary choices are hindering the decarbonisation and energy transition and result in inefficiency in energy use. The subsidies are often untargeted, and they make it difficult for renewable energy to compete with electricity produced by burning fossil fuels (Simanjuntak, 2021).

**Sixth, there are significant opportunities for inclusivity to incorporate independent and marginal voices more effectively in developing energy transition policies.** Consultation processes and stakeholder engagement can be used to involve communities in developing strategies for the transition of the electricity sector. In this context, the media could be one channel for connecting views from the population in remote areas to central government decision makers. But there is currently little news coverage of people living at the frontiers of climate change and being affected by air pollution from coal-fired power plants, as well as of poor rural communities who lack access to affordable and sustainable electricity (Bräuchler, 2019; Saraswati and Beta, 2021; Masduki and d'Haenens, 2022). Media outlets could be encouraged to throw light on these issues.

# 3 Methods

This paper uses data and information from scientific journals, grey literature and policy documents. Primary data were collected through key informant interviews (KIIs), primarily using a qualitative approach. This paper investigates whether joined-up thinking has been applied in incorporating the three nexus elements in national energy development plans. Figure 3 depicts the methodological approach used in this paper.

**Figure 3** The three tiers of the energy nexus assessment



## 3.1 Conceptual framework: the ‘nexus’

Figure 4 depicts the relationships between the three energy nexus elements and the assessment levels. The scope of the three nexus elements is described below, including definitions and assessment indicators. *The keywords used to search documents (Section 3.2) are in italics.*

### Economic transformation

An economic transformation can be defined as a dynamic process that results in increased productivity through high-value activities and enhances human and physical capital (Colenbrander et al., 2022; Diwakar, 2022; Breisinger and Diao, 2008). In this assessment, we examine how

energy transition policies contribute to economic transformation, particularly improving broader economic output and productivity that leads to increased value addition and diversification (including digitalisation) and reduces the economy's dependency on extractive industries.

Sub-elements:

- **Energy diversification:** adopting *new strategies* for replacing fossil fuels with sustainable energy sources for electricity at different levels to drive the *energy transition*, meet *electricity demand* and increase *energy efficiency*.
- **Electrification:** providing *reliable and sufficient electricity supply* from renewable energy sources for *households* and *transformative sectors* (e.g., *electric vehicle industry, agriculture and fisheries*).
- **Affordable electricity:** reducing prices for *electricity consumption* from clean energy by shifting *subsidies* and *incentives* from fossil fuels to renewables.
- **Job creation:** promoting the *generation of jobs* due to the *transition from fossil fuels to renewable energy*.

### Environmental sustainability

Economic and social activity is environmentally sustainable if it protects ecosystems and conserves natural resources, including through minimising waste products (Diwakar, 2022; Colenbrander et al., 2022). In this assessment, environmental sustainability is defined by the consideration of negative externalities (emissions) in energy and electricity policy development and business plans and their implementation.

Sub-elements:

- **Renewable energy:** prioritising *renewable energy* in the development, planning and operation of power plants.
- **Carbon emissions:** cutting *greenhouse gas emissions* from electricity.
- **Environmental degradation:** mitigating the *environmental impacts* of electricity production, such as *land use change, biodiversity loss, local water quality and air pollution*.
- **Green programmes:** enhancing *innovation in environmental management and control programmes* to achieve *low carbon development*.

### Social inclusivity

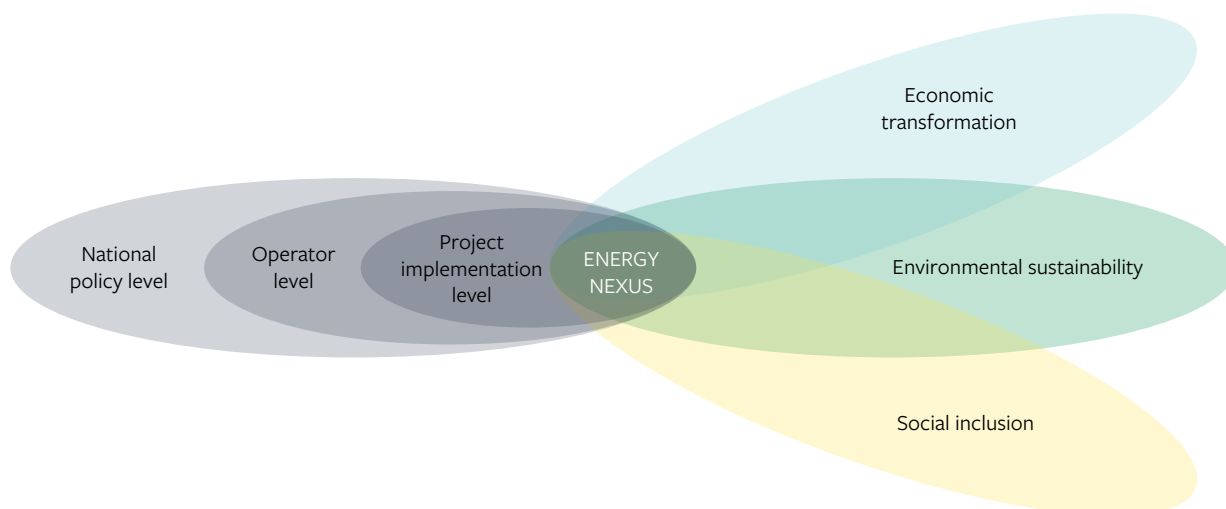
Social inclusivity ensures that individuals and groups who are disadvantaged on the basis of age, gender, disability, race, ethnicity, origin, religion or social status can take part in society through enhanced opportunities, equal access to resources and having their voice listened to and their rights respected (United Nations, 2016; World Bank, n.d.). Social inclusivity in this assessment

is defined as the promotion of access to information, energy, jobs and social benefits for a wider range of disadvantaged individuals, groups and generations, including acknowledging intersectionality.

Sub-elements:

- **Job security in precarious workplaces:** mitigating *job losses* in non-renewable energy sectors by *reskilling* and *upskilling* workers from disadvantaged groups and by providing *employment security* and *benefits through long-term contracts*.
- **Access to electricity in rural areas:** providing sustainably sourced and *affordable electricity* in rural areas for *households, public facilities* and *small-scale household enterprises*.
- **Gender equality and social inclusion (GESI):** promoting *gender mainstreaming* in *employment* and *electricity access* across *marginalised groups* in *urban and rural areas*.
- **Social packages and incentives:** Providing *social benefits*, such as *direct subsidies for poor households* and *public facilities, social security programmes* and *community participation in renewable energy programmes*.

**Figure 4** Energy nexus elements and assessment levels



Source: Illustration by authors

### 3.2 Methodological approach

Information was collected from documents at the national policy, operator and project implementation levels. The study team used outline scanning and a keyword search to locate relevant information in the documents. For the outline scanning method, we first examined the outline or section of the documents for relevant nexus elements or sub-elements. We then reviewed that section. Outline scanning is applicable when a document cannot be searched electronically. For the keyword search of each document, we used specific keywords that reflect nexus elements and sub-elements. The keywords used are in italics in the definitions of the sub-

elements in Section 3.1. A limitation of the keyword search is that some relevant information contains none of the keywords. The authors attempted to mitigate this limitation by scanning some policy documents<sup>3</sup> – both related and not directly related to energy issues – more thoroughly than in the outline scanning.

KIIs were then conducted to collect information on issues around triggers, enablers and coordination of joined-up nexus policymaking, planning and project implementation in the electricity sector. KIIs were also conducted to validate the information that we gathered through the desk research and literature review. The KIIs were conducted online and offline in a semi-structured interview format, each lasting about 45–60 minutes.

The study team interviewed 37 respondents from various parties ranging from the central government, regional governments, electricity operators, project developers and implementers, research institutions, think tanks and non-governmental organisations (NGOs). The KII respondents were selected predominantly by purposive and snowball sampling based on the knowledge and connections of the study team (Annex 1 presents a list of respondents.)

The study team analysed the interview data using qualitative content analysis. The detailed content of interview notes and transcripts was coded using a protocol that enabled the study team to identify the ways in which different groups of actors discuss the energy nexus elements and their indicators in the study. Interviews were recorded digitally and documented in English as detailed notes. Once completed, a simple spreadsheet template was used to draw together themes and keywords (codes) from the interview data. The data were triangulated based on common concepts for the three nexus energy elements found in the literature review, policy and project document review, as well as interpretation of these concepts by interview respondents.

### 3.2.1 First assessment tier: national policy level

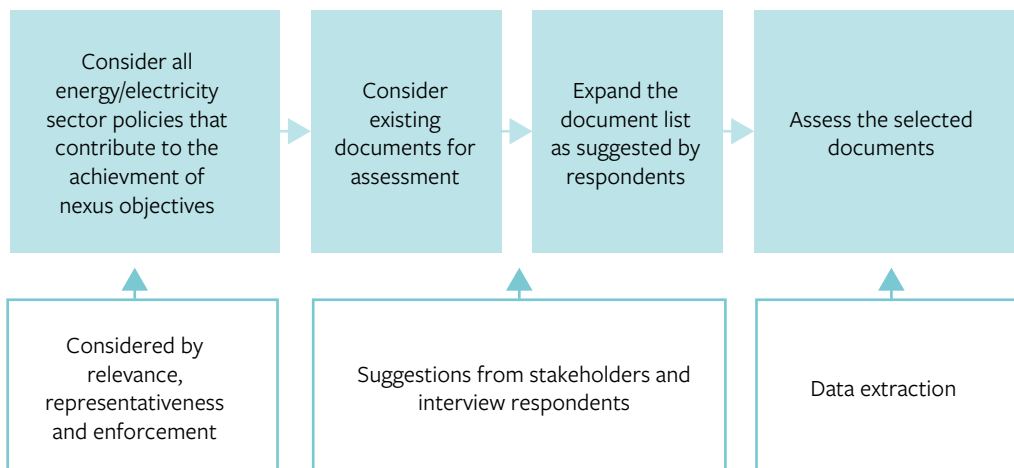
Figure 5 outlines the process and criteria for selecting policies. Policies were selected if they met the following predetermined indicators: relevance, significance and enforcement. *Relevance* is defined as the appropriateness of a policy to the electricity sector in Indonesia, which includes whether the policy still applies. *Significance* refers to the importance and degree of coverage and influence of the policy, as assessed by the study team based on indications from relevant stakeholders in determining past and future electricity development in Indonesia. *Enforcement* is the degree to which the policy has been enforced, which includes whether the policy was implemented under a plan and with a dedicated budget.

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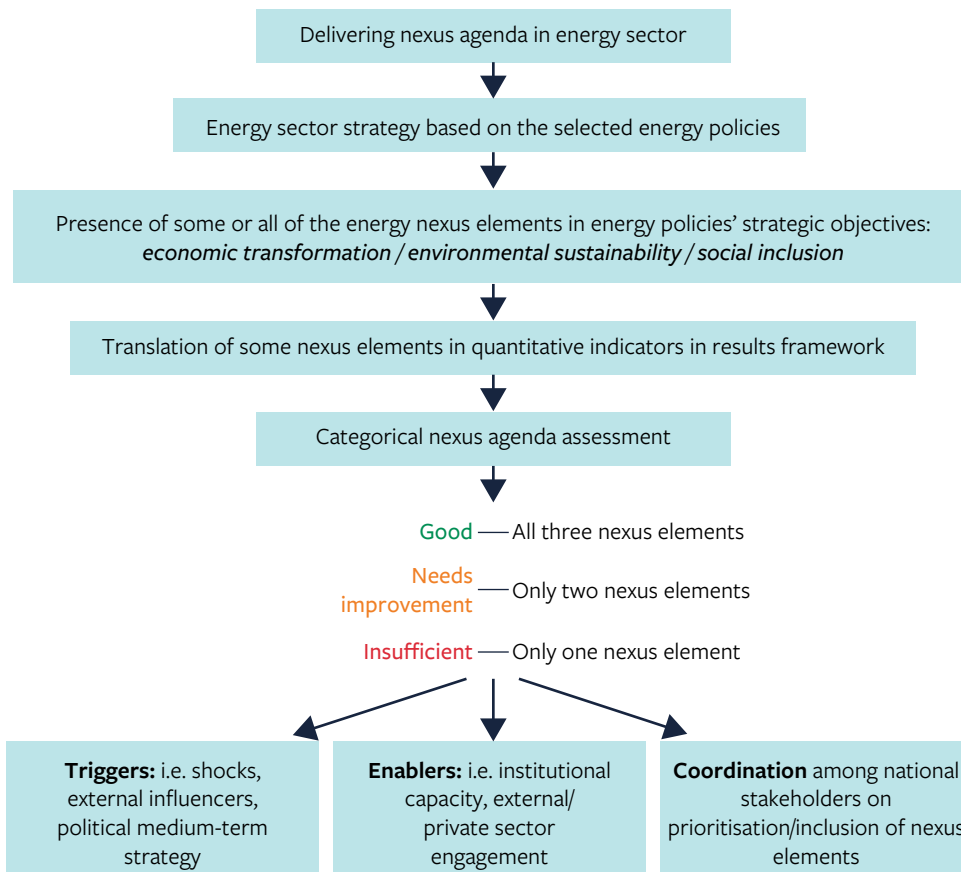
3 Based on the study team's judgement, other related documents were selected for further scanning through their title and relevance, if these related documents are mentioned or referred to in the main documents assessed.

Furthermore, policies were selected and assessed during the data extraction phase. We considered the availability of information on the energy nexus in each document before deciding whether the study team would be able to assess the document.

**Figure 5** Process for selecting and assessing policies for Indonesia’s electricity sector



**Figure 6** First assessment tier: National policy level

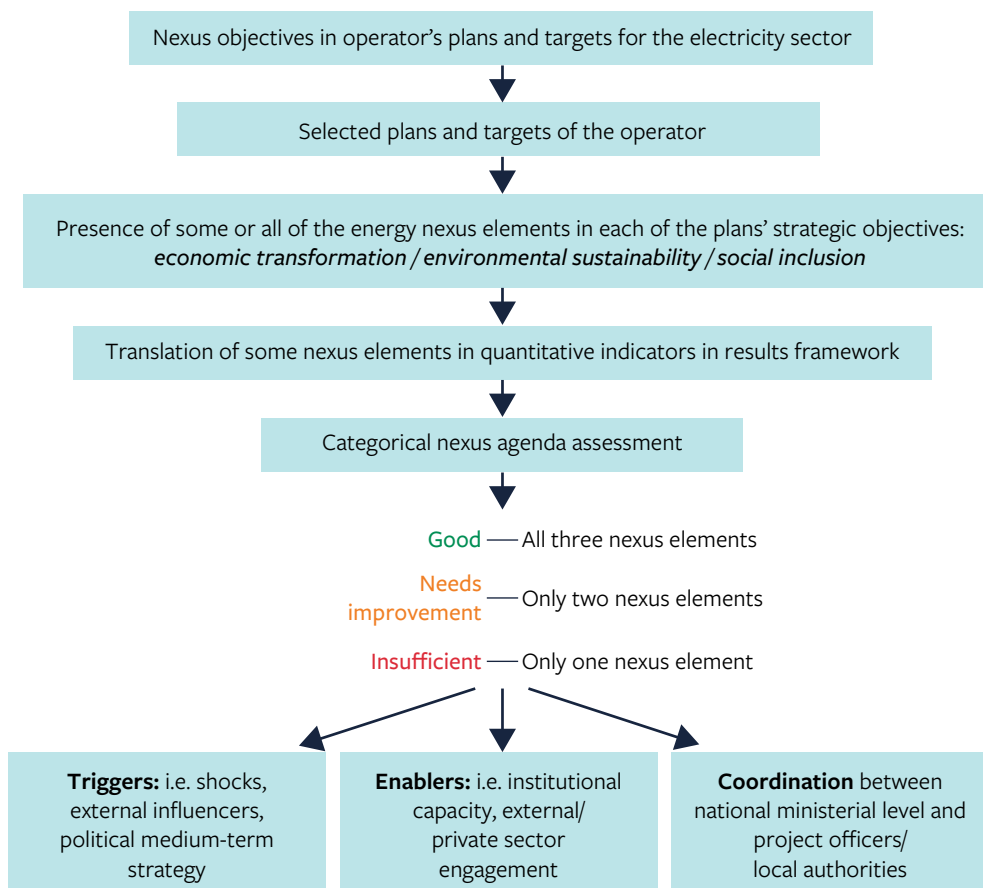


Once all the policy documents had been identified and the search for keywords completed, the study team asked specific questions and used specific criteria that covered the sub-elements of each energy nexus element to identify which energy objectives and targets were contained within each selected policy: good joined-up policymaking (e.g., all three nexus elements are present), policy prioritisation that needs improvement (i.e., only two nexus elements), or siloed policymaking that is insufficient for nexus thinking (e.g., only one nexus element). This process is illustrated in Figure 6.

### 3.2.2 Second assessment tier: industrial operator level

The aim of this second assessment tier was to identify the level of adoption and consistency of national nexus policies on electricity transition in the strategic plans and targets at the operator level, specifically the PLN. This state-owned enterprise has the sole authority to manage electricity transmission and distribution in Indonesia.

**Figure 7** Second assessment tier: operator level



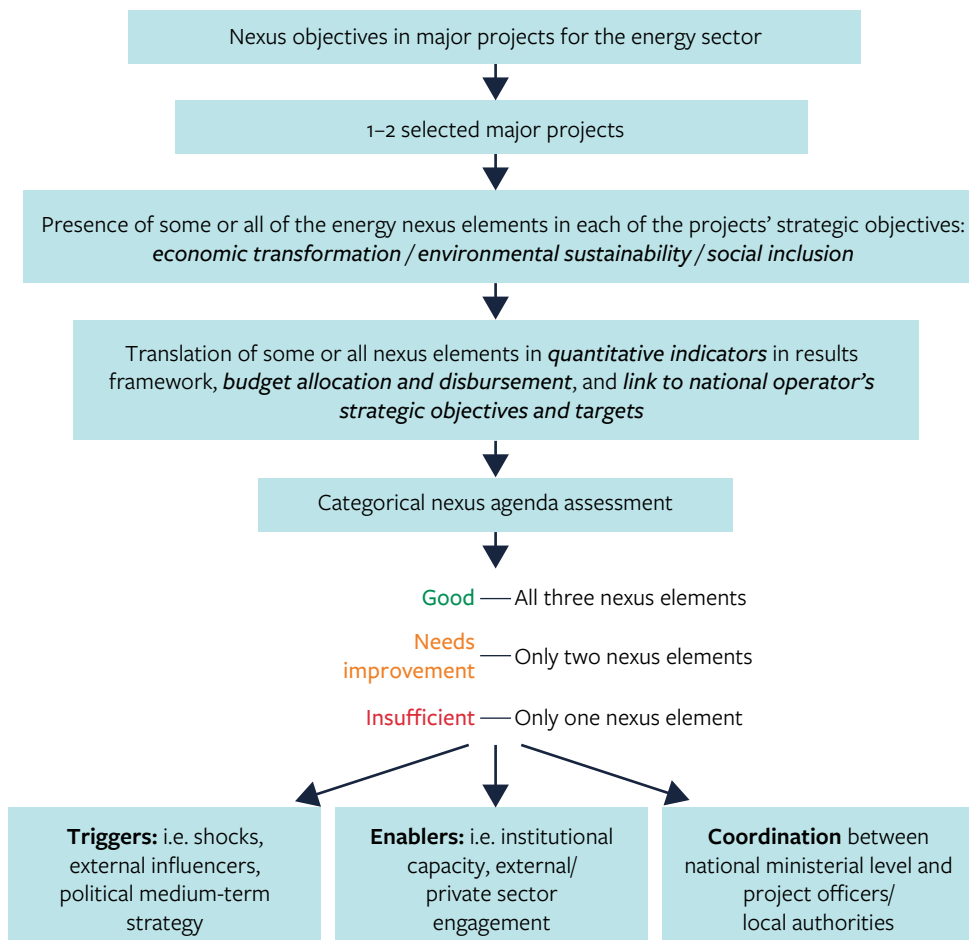


The documents assessed included the 2021–2030 electricity supply business plan (RUPTL) and other relevant strategic, technical and procurement plans, as well as the sustainability reports published by the PLN. Data was extracted from these documents using the keyword search described above. Assessing the presence of the energy nexus elements and identifying the drivers of inclusion and exclusion were done in the same way as was done for the first tier. This process is illustrated in Figure 7.

### 3.2.3 Third assessment tier: project implementation level

The aim of the third assessment tier was to examine the presence (or absence) of energy nexus elements in the objectives and plans for major national projects within the energy sector, particularly the electricity sector (Figure 8). This assessment reflects the level of adoption and consistency of the energy nexus in national energy policies and operator plans and targets at the project implementation level.

**Figure 8** Third assessment tier: Project implementation level



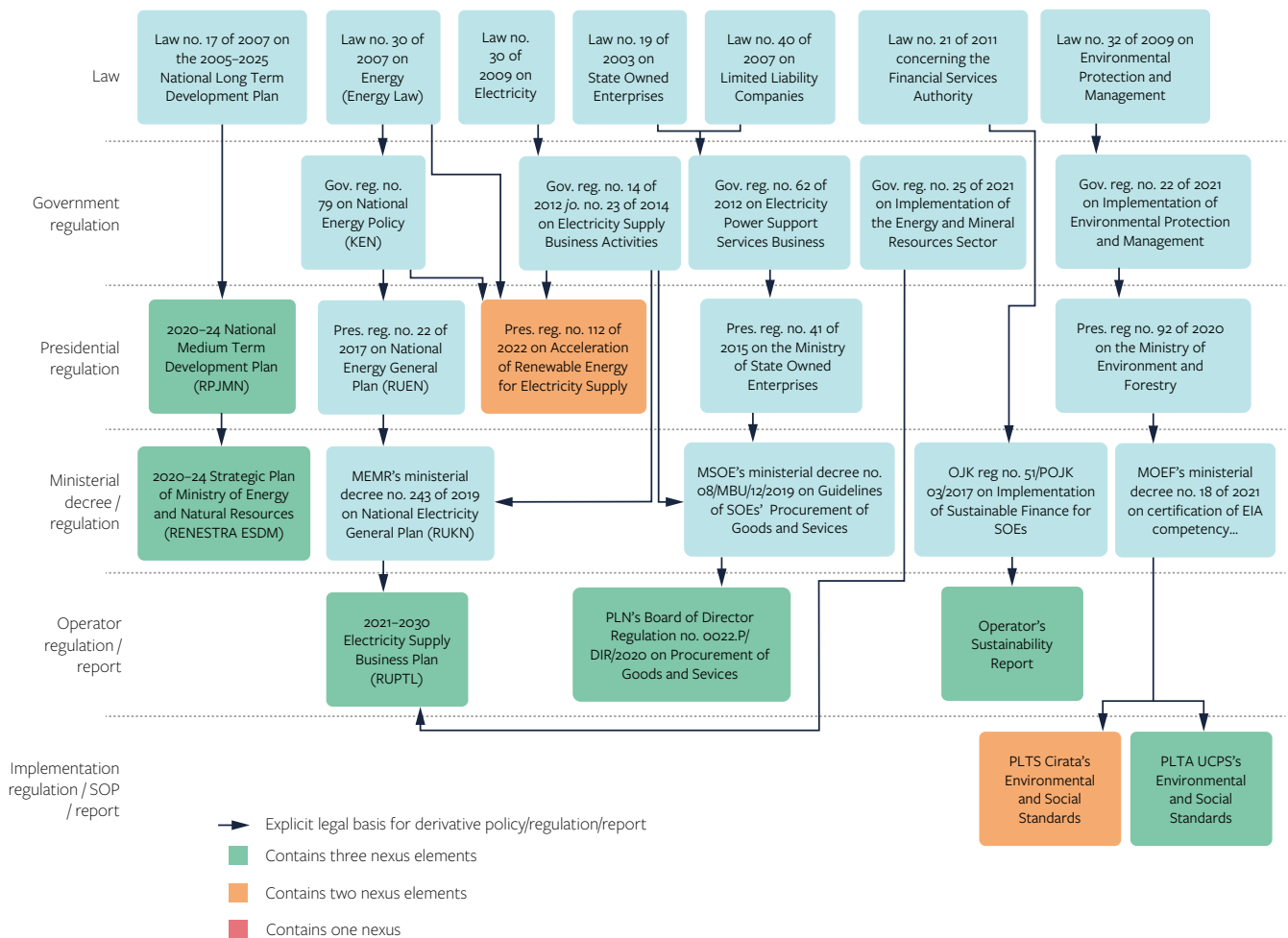
The selection criteria for projects for the assessment were as follows: (1) existence of a green economic plan, (2) project initiatives on renewable energy, and (3) publicly available project documents for assessment. Thus, this study was limited to projects with accessible documentation.

For the third assessment tier, data were extracted from project documents and the nexus assessment completed in a similar way to the first and second tiers. However, at the project level, this paper investigates not only the quantitative indicators in the results framework, but also linkages to national and operational strategic objectives and targets, and budget allocation and disbursements to such projects.

# 4 Findings and analysis

The position and the level of the documents used in the nexus assessment of Indonesia’s energy sector are shown in Figure 9. The hierarchy in the figure indicates how the regulations and policies are linked.

**Figure 9** Energy and electricity policies and regulations



At the national policy level, documents assessed included the 2020–2024 national medium-term development plan (RPJMN), the 2020–2024 strategic plan of the Ministry of Energy and Mineral Resources (RENSTRA KESDM) and Presidential Regulation No. 112/2022 on renewable energy acceleration. At the operator level, the assessment scope was centred on the government mandate published in RUPTL, accountability reports and the procurement policy for electricity generation. At the implementation level, the assessment covers the operating procedures for environmental and social assessments and the progress information published for two national renewable energy projects: Cirata Floating Solar Power Plant (*Pembangkit Listrik Tenaga Surya Cirata* – PLTS Cirata) and Upper Cisokan Pumped Storage Hydropower Plant (*Pembangkit Listrik Tenaga Air Upper Cisokan Pumped Storage* – PLTA UCPS). Annex 2 contains details of the nexus assessment of policy and project documents.

## 4.1 National policy level

**Nexus goals in the electricity sector are not fully reflected in national policies, as economic objectives dominate the shape of the strategic plan for the sector. In particular, the assessment shows that while the RPJMN identifies all three nexus objectives, specific strategies to achieve environmental sustainability and social inclusion goals are weak.**

Three of the seven development agendas that cover the energy and electricity sectors are: strengthening economic resilience, strengthening energy and electricity supply infrastructure, and improving low carbon development. Under these agendas, there are identifiable objectives to increase access to reliable and efficient energy and electricity supply. However, specific strategies in the document mostly focus on energy diversification and expanding electrification targeted to meet the electricity demand that is conducive to economic transformation and is expected to increase government revenues. The strategies do not appear to align much with achieving climate goal commitments or making electricity accessible to the most vulnerable and remote populations. This is demonstrated by the strategies to expand the electricity distribution network and increase renewable energy generation capacity, without addressing the surplus of electricity produced by coal power plants (e.g., lowering electricity sourced from coal would help Indonesia achieve its energy mix target).

**There are inconsistencies between RENSTRA KESDM (ministerial level) and other national energy transition policies but not RPJMN.** RENSTRA KESDM is the elaboration of the MEMR vision which is complemented by the national targets and plans in RPJMN. RENSTRA KESDM explicitly mentions all nexus energy elements, but it does not set consistent targets to address all nexus goals, particularly in terms of the target for the renewable energy share against the target in the national energy general plan (Rencana Umum Energi Nasional – RUEN), a presidential regulation. The RENSTRA target for renewable energy share by 2030 is 19.5%, lower than the RUEN target of 23%. The Indonesian government’s policy for developing renewable energy is also considered to be inconsistent with the national strategic direction of the downstream coal programme, which considers coal production to be adding value.

According to the interviews conducted, **institutional and governance issues are the main causes of the inconsistencies among the energy transition policies.** Different national stakeholders in the electricity sector do not proactively coordinate, and there is uncertainty about inter-agency policymaking arrangements for formulating coherent energy development agendas. Consequently, specific nexus targets or sub-elements are included inconsistently. This is mainly because unified energy and electricity policy reforms, capacity building and the institutional arrangements needed to build renewable energy sources all seem to be missing. As a result, some of the other sub-elements have been overlooked, particularly those related to social inclusion, such as job security and gender equality. The social aspect considered in Indonesia's energy development is geared more towards affordability, while effects on employment have been little considered to be the priority due to limited data available to the Ministry of Manpower to prepare employment programmes to support the energy transition.

**The existing legal framework for accelerating the development of renewable energy also neglects the social inclusion element, which is, by contrast, a key objective of its energy transition funding mechanisms.** Presidential Regulation No. 112/2022 mentions only two elements (i.e., economic transformation and environmental sustainability) and is inconsistent with Indonesia's recent JETP funding mechanism aimed at addressing social consequences associated with energy transition, including training and alternative job creation for affected workers and new economic opportunities for affected communities. Moreover, the regulation lacks detailed plans, strategies and specific targets. It is unclear how the regulation contributes to achieving the renewable energy mix targets or access for vulnerable groups to modern energy, job creation and health.

**The high degree of involvement of the financial and business sectors in the energy policymaking, including in the said presidential regulation, has created contradictions between the plan and its implementation.** An interview with a policy expert indicated that regulation enforcement and compliance requirements have loopholes that tend to allow financial and business sectors, typically big firms from extractive industries, to implement social and environmental standards less rigorously. Presidential Regulation No. 112/2022 seems to consider only the business side of renewable energy power plant development, particularly on retiring coal-fired power plants and setting electricity prices by using the highest benchmark and dealing prices between independent power plants (IPPs) and PLN. The regulation has given very little attention to other potential nexus outcomes that renewable energy power plants may contribute, such as creating jobs, reducing environmental degradation, ensuring GESI and increasing the social benefits of electricity transition.

**In general, the relatively greater focus on the economic rather than the environmental and social aspects of national energy policies may lead to a slowing down of the energy transition in the electricity sector.** Insistence on and incentives for faster transition that consider environmental and social outcomes seem to be missing in the current energy policies and regulations. A lack of capacity to involve, integrate or quantify social and environmental

targets in national policies means that less effort has been given to these two aspects during the implementation and impact assessments of medium-term plans and strategies for the energy transition.

## 4.2 Operator level

**The government's mandates for the PLN to secure guaranteed and reliable electrical energy drive the PLN's strategic focus on contributing to economic outcomes, with scant attention towards environmental and social aspects of power generation.** The impact of overlapping mandates and the lobbying by different stakeholders in the electricity sector are evident in conflicts of interest built into PLN's governance arrangements, weak environmental and social key performance indicators used to assess the PLN's performance, and the costs imposed by PLN's procurement policies.

**The PLN is accountable to three different ministries regarding electricity provision in Indonesia.** The MSOE, the MEMR and the MOF all exert significant influence over the PLN and issue it with mandates determining how the energy nexus objectives are to be accommodated. The PLN accepts these, but as a business it must make a profit that contributes to the country's revenue, so it prioritises those mandates that focus on increasing economic profit through diversifying electricity generation to meet the electricity demand and increase the electricity consumption.

**The PLN mandate to prioritise renewable energy in the energy transition for the electricity sector seems unlikely to be realised.** Evidence shows that the 35,000MW electricity infrastructure development acceleration programme implemented to meet the growing electricity demand still uses coal as the dominant energy source. The programme, rolled out in 2015, calls for 117 new coal-fired power plants, with only 2,000MW coming from renewable energy sources. Based on interviews, the PLN views the electricity system in Indonesia as not ready for the transition because the current electrification system is still unstable, making it difficult to prioritise renewable energy. From the PLN's perspective, sourcing electricity from coal may be more attractive due to its relatively low production costs, the availability of familiar technology, and its historic contribution to the operator's revenue targets compared to renewable energy sources. In this context, it is unclear whether increasing electrification through energy diversification is aimed primarily at meeting the electricity demand for economic transformation or at driving revenue. Without relaxing the expectations for the operator to contribute to government revenues, facilitated by coal subsidies, there might be less incentive to implement the electricity transition to renewable energy. Currently, the PLN has the right to purchase domestic coal below market rates, effectively creating coal subsidies.

**Vague accountability mechanisms for the PLN's electricity generation and provision standards are driven by universal corporate standards rather than by government mandates, resulting in soft implementation of strategies for achieving the nexus objectives, particularly those targeting environmental and social outcomes.** For instance, there is no regulatory framework in place for monitoring the performance of renewable energy power plant projects with large capacity, despite their potential to contribute to electricity transition efforts. This paper's assessment of PLN reports suggests that implementation seems to particularly miss social inclusion objectives, particularly on maximising instrumental local resources, both natural and human.

**Further evidence of the weak environmental and social governance of the electricity sector is evident in the low utilisation of local energy resources and limited job creation from power generation activities.** According to the Energy Law and the Job Creation Law, local resources should comprise at least 30% of the resources needed. However, some interviewees mentioned that potential energy renewable sources are not properly deployed in several regions. At the operator level, financing is often cited as one of the biggest obstacles; another obstacle is the absence of firm regulations related to infrastructure development of renewable energy, other than solar and wind, including geothermal and small-scale hydro. Hence, investment towards transmission and distribution of electricity for deploying potential yet intermittent renewable energy sources at scale remains muted.

**In terms of employment, due to structural factors, direct job creation from renewable projects might be limited, but indirect jobs may emerge from the economic productivity boost and diversification that reliable energy access from renewable energy projects may provide in remote and lower-income regions of the country.** For instance, direct job creation for the local population may be challenging since they may not be able to compete with external candidates who are highly skilled in renewable energy projects. In addition, the skill levels of the local labour force tend to be tapped only for short-term construction labour, with a risk of trapping them in a cycle of insecure and precarious jobs. In the absence of a holistic approach to upskill the local labour force to the level required by the renewable energy sector, workers may gain fewer direct job opportunities from the transition. Nevertheless, indirect jobs may be created to the extent that the renewable project may provide reliable energy supply to labour-intensive economic activities (e.g., businesses, storage and processing of agricultural products).

**The procurement policy that is in place to ensure that local resources are used is crucial, yet it is thought to hinder the development of renewable projects.** This policy is known as the local content regulation, which requires the use of local resources to promote domestic enterprises, and use of local material and human resources in the electricity sector. According to the regulation, at least 40% of construction materials and 30% of labour must be sourced locally. This is intended to promote the growth of domestic manufacturers who fabricate locally the equipment and components needed for renewable energy plants, supporting job creation and thus boosting the local economy. However, a technical issue with the local content regulation

arose in the case of a PLTS Cirata project, hampering project development. In particular, domestic manufacturers are often unable to produce the components, or do not meet the required technology standards, or are selling at a price higher than market average.

**The additional bureaucracy associated with complying with the complex local content requirement increases the costs of developing renewable energy projects.** The developer on the PLTS Cirata project decided to import solar modules, although the floaters were produced locally. Developers may have to pay higher prices for locally manufactured equipment and parts than those obtained from global suppliers because the technical standards set by local manufacturers are lower. This poses a barrier, as the private sector and other investors may be reluctant to invest in the renewable energy sector due to the increased costs and the restrictions associated with complying with the regulations. It also makes it more challenging for renewable energy projects to compete with traditional fossil fuels, which the government often subsidises.

**A small local subcontractor interviewed indicated that it could not compete with outside subcontractors in the procurement of construction materials and construction labour for PLTS Cirata.** The project procurement system set the labour cost lower than the prevailing minimum wage in the region where PLTS Cirata is located due to pressure from the market to undercut the price, resulting in the local contractor withdrawing from the bidding process. This puts local players in an unfavourable position – forced to lower their prices for local construction labour if they want to compete. This demonstrates that the sub-element for social benefits in the energy nexus could be regarded as being applied superficially. Even though the development stage of this renewable energy project has created many jobs, including for local workers, the low wages offered by the project developer do not reflect a fair operationalisation of the economic and social benefits. The local content regulation needs to be applied fairly and monitored regularly as the project develops if it is to achieve a sustainable and inclusive energy transition for the electricity sector.

**Despite its incorporation of the three energy nexus elements, the local content regulation often encounters resistance from many parties, especially those in the private sector.** The inability of local authorities and communities to manage and control local resources and skills may be impeding acceleration of the development of renewable energy. The PLN's procurement regulation indicates that it is the responsibility of the company to protect labour and the environment during the construction of a renewable energy power plant. The regulation is crucial as it is based on the principle of social equity benefits in producing power plants. However, the government and PLN must also introduce complementary measures to support the procurement regulation's aim of ensuring that local content can be utilised, such as providing targeted training, attracting foreign direct investment to enable knowledge transfer and skill development, and using guarantees and/or feed-in tariffs to reassure developers about returns.



**Generally, Indonesia having nexus objectives at the operator level does not guarantee that it will stop using coal, or that it is on track to achieve an inclusive and sustainable energy transition.** Electricity provision is influenced by government mandates that are certainly aimed at obtaining maximum economic benefit for the government from electrification utilising renewable energy. Accountability mechanisms for the utilisation of potential local resources have hardly been implemented because the quality of these resources is low, hindering the development of renewable energy. These challenges are the main impediments to ensuring that all three nexus elements are incorporated in and integrated with electricity provision and generation. It will remain difficult to translate the nexus objectives into implementation as long as the governance structures for incentives, accountability mechanisms and procurement of local content continue to work against the nexus and favour the status quo.

### 4.3 Implementation level

**The consistency between national energy policy, operationalisation policies and accountability mechanisms in project implementation remains unclear, which puts achievement of energy nexus objectives out of sight.** Even adopting energy nexus objectives at the project implementation level does not necessarily address environmental and social risks as most renewable energy projects are still under development, and it is difficult to see how they comply with relevant policies and regulations concerning the nexus objectives. Two renewable energy power plant projects whose development plans are assessed against the nexus objectives in this study are PLTS Cirata and PLTA UCPS. The nexus objectives are considered in the projects' environmental impact assessment (EIA) documents but not comprehensively covered.

**The PLTS Cirata project developer claims that its standard operating procedures for environmental and social safeguards are solid, yet local communities have raised concerns about environmental and social impacts.** The project is aimed at increasing the supply of electricity and contributing to meeting the target for the renewable energy mix. The environmental and social objectives covered in the EIA document focus on mitigation of the decreasing air quality, community unrest, and loss of livelihood that are being caused by the development of the power plant. Other environmental and social impacts, such as those on water quality, the reservoir's aquatic ecosystem and the local fisheries community, are not mentioned. Creating jobs for local people is considered in the project's EIA document, but implementation on the ground does not yet reflect the plan according to an informant from one of the local communities. To date, the project has had little impact as it is still under development.

**Although renewable energy projects can result in benefits being shared with the surrounding communities, several impacts that have emerged during the construction phase of the PLTS Cirata project need to be further managed and monitored.** The fisheries community is one of the sectors most affected by the project. The catch radius of the fishers is shrinking because 10% of the Cirata reservoir is now a restricted area, with all water activities including fishing banned while the floating panels and the main facilities of the reservoir are being

installed. Specific routes for water transport by residents for tourism and daily use have been closed for the project. As compensation, the developer is running a community empowerment programme with training in micro, small and medium-sized entrepreneurship for those affected, including women, which is considered to be aligned with the national programme to develop local entrepreneurs. However, the direct and short-term impact on those affected is unclear, given that they have lost their livelihoods and are now being forced to quickly adjust their source of income based on the new and immature skills gained from two weeks of training. Employment displacement has forced the fishing community to shift from earning a livelihood by fishing to other sectors. Offering business training as a practical solution could be seen as a simplification of the structural issues resulting from the project, such as land loss and livelihood displacement.

**The safeguards and standards adopted are driven by the investors in and the lenders to the project; it is they who determine how the energy nexus impact of the project development will be managed and monitored.** One interviewee mentioned that the lenders influence the level of environmental and social safeguarding implemented on a renewable energy project.

Apart from the two projects assessed in this study, only a few lenders consider environmental and social elements to be essential considerations in project development. For other non-multilateral lenders, profits are often the top priority; there is a tendency to ignore environmental and social impacts, and risk mitigation measures are minimal. Relying solely on Indonesia's statutory EIA standards is not enough to eradicate environmental and social problems.

**The investors in and lenders to a project also determine the extent to which the documents for that project relating to environmental and social safeguards and standards can be accessed by the public.**

There has been limited public access to PLTS Cirata project documents or information. It raises concerns and questions regarding the standards adopted by the project, despite the developer's claims that its environmental and social safeguards are strong. The PLTA UCPS project, by contrast, provides full public access to its project plan documents, including its EIA documents. The document assessment conducted in this study found that the PLTA UCPS project incorporates all three elements of the energy nexus. This is likely due in part to the project being sponsored by a large multilateral development bank that requires high environmental and social safeguards for its projects. Further assessment of the PLTA UCPS project was constrained by the inability of the study team to talk to the developer due to limited access to communication.

**Another concern with the PLTS Cirata project development plan relates to its stated objective of increasing the supply of electricity to meet demand that is not geographically targeted.** According to its EIA document, the project aims to increase the electricity supply for the Java, Madura and Bali regions. However, there has been a surplus of electricity in these regions, while other remote areas in Indonesia still lack access to electricity. This begs questions about where major renewable energy projects are being located, and whether they are meeting electricity access objectives.

**The environmental and social nexus elements are represented in both projects, but in ways that appear merely there to meet an obligation to comply with the EIA regulations and investor-imposed standards.** Implementation of strategies to ensure an energy nexus outcome is the responsibility of the developer and the contractor, who should consider any potential structural problems that may be exacerbated by the project and how to mitigate them in a meaningful way. Considering that the PLTS Cirata and PLTA UCPS projects are still under construction, these findings may serve as initial learning and should be considered in any future adjustments to the project implementation plans. In their current forms, the implementation plans *consider* the nexus objectives but do not provide information on whether the mitigation procedures for addressing the environmental and social costs are being implemented and, if so, whether this is being done effectively. Additionally, the projects need ongoing documentation for in-depth monitoring, not limited to checklist-based instruments, to verify the different views of the various stakeholders involved in and affected by the projects' implementation.

# 5 Conclusion and recommendations

## 5.1 Conclusion

**The economic aspect of the nexus objectives dominates all policymaking levels for Indonesia's energy transition, mainly driven by a narrow focus on meeting the national electricity demand and the GDP target of being a developed country by 2045, regardless of the social and environmental impacts.** Such a heavy focus on economic targets alone may slow up the transition towards more sustainable sources of energy for the electricity sector, which has long-term development implications. Revenue targets from electricity operation disincentivise transition to renewable energy. The inability to integrate social and environmental target outcomes in these policies means there is less incentive to measure the contribution of the energy transition to these aspects. In policy documents assessed for this paper, there has been no viable calculation of the environmental and social assets and costs over the short, medium and long term.

**The presence of energy nexus objectives at all levels does not guarantee that strategies to achieve them will be implemented; the strategies might have achievable objectives but tend to be neglected in practice.** At the national policy level, there are inconsistencies between policies and uncertainty about inter-agency arrangements and coordination of policymaking that hold back coherent energy development agendas. There are also gaps in the policymaking process that allow less rigorous implementation of social and environmental standards. At the operator level, there are distinct inconsistencies in governance mandates and targets between national, ministerial and operator agencies involved in energy transition efforts. Furthermore, complex procurement regulations from the government and PLN have hindered renewable energy development in the electricity sector. At the project implementation level, standard operating procedures for environmental and social safeguards tend to have weak enforcement, considering that most renewable energy projects are still under development. The lack of interest in ensuring that project risk mitigation measures are implemented casts doubt on whether the projects will achieve multiple objectives of electricity transition and inclusive development.

**There is still scope for joined-up policymaking to deliver the electricity transition in a transformative, inclusive and sustainable way.** Nexus objectives will be hard to achieve while the structure of incentives and accountability mechanisms continue favouring the status quo. An entry point is harmonising national energy policy, operationalisation procedures and project-level accountability mechanisms.

## 5.2 Recommendations

### 5.2.1 National policy level

Implementing the nexus objectives and targets requires a multi-faceted approach:

- Strengthen institutional arrangements by establishing a coordinating body that can promote effective coordination and close multi-stakeholder collaboration between relevant bodies to reinforce the joined-up policymaking for an inclusive, sustainable and transformative transition in the electricity sector.
- Conduct a comprehensive assessment of the current energy system and policies to identify gaps, opportunities and challenges to successfully implement energy nexus. The assessment should use targeted indicators, such as the current energy mix, energy demand and supply (especially in areas with low access to electricity), infrastructure and policies. It needs to map the institutions' capacities and governance as well as the power dynamics, which are often neglected even though they often hinder the development of a project if they are asymmetric.
- Design a detailed, practical and cohesive plan to integrate the energy nexus objectives into the existing energy system development plans, with links to operator (PLN) and major energy projects' plans. The integrated, authoritative document should explicitly replace previous, conflicting regulations, following the change of political leaders in the coming year. This plan should include strategies for improving the implementation of the social and environmental elements to create both a medium and a long-term sustainable impact.
- Build institutional capacity to identify systemic problems and develop strategies that can lead to energy policy reforms and influence governance mandates for electricity transition efforts at all levels as the PLN is obtaining different mandates and suffering with lobbying groups/interests. National and regional governments need to build capacity in particular to quantify social and environmental costs and benefits and to monitor and evaluate the effectiveness of medium- and long-term plans and strategies in the electricity sector.
- End fossil fuel subsidies to create a level playing field for renewable energy which could be done by reviewing DMO price benchmark policy for power generation and making a strategic plan to end this policy. Fossil energy subsidy funds will be much more beneficial if they are diverted to the most vulnerable communities, building education and health facilities, developing renewable energy, and accommodating the impact of the energy transition for workers in the affected fossil energy industry.

### 5.2.2 Operator level

The presence of nexus objectives at the operator level does not guarantee that Indonesia will be on track to achieve an inclusive and sustainable energy transition if serious issues of overlapping governance mandates, weak accountability mechanisms and complex procurement policies continue to hinder the development of renewable energy in the electricity sector. Some recommendations are needed to address the issues.

- Collaborate more with local communities and promote public participation in implementing sustainable energy practices. This would create a supportive environment for the nexus elements and enable co-creation at the local level, leading to a more equitable distribution of social and environmental benefits. Community participation in and collective monitoring of renewable energy projects would assist operators in achieving transparency in strengthening accountability mechanisms of operators. This involves discussions with the affected communities about renewable energy development or early retirement of coal-fired power plants.
- Introduce complementary measures to support the aim of procurement regulation to ensure the local content can be utilised, such as providing targeted training, attracting foreign direct investment to enable knowledge transfer and skill development and using guarantees or feed-in tariffs that reassure developers about returns.
- Work together with regional associations (e.g., the Indonesian Solar Association) to increase renewable energy development and accelerate electricity connections in regions, particularly lower-income regions. Associations related to technology or with cooperatives (e.g., renewable energy cooperatives) that have certifications for renewable energy development will be required to ensure the standards of implementation for skills and technology improvement to meet sustainable, inclusive and transformative energy goals.

### 5.2.3 Implementation level

Given that most of the renewable energy projects in Indonesia are still under development, it is important to ensure that ongoing project development and implementation reflect the energy nexus outcomes.

- Formulate a monitoring and evaluation framework based on the target nexus outcomes to track the progress and impacts of renewable energy projects. The framework should include achievement metrics but not focus solely on quantitative measurements without an in-depth (re)evaluation. Systematic project monitoring and evaluation provides accountability to the national government and a feedback loop to inform the adjustment of energy nexus targets.
- Learn from best practices at the project level and adopt standards from investors/lenders, particularly on risk management and impact monitoring. Plans must meet the requirements of a strong EIA.
- Conduct in-depth monitoring to document different stakeholders' views on project implementation as the project develops. This is to ensure that concerns from relevant stakeholders or impacted communities are considered in assessing the costs and benefits of the project in the local context.

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# Appendix 1 List of respondents

The tables below present a list of stakeholders at national, subnational, operator and project levels related to national energy policy and energy projects in Indonesia.

No.	Stakeholder group	Institution
1	National government	Ministry of Energy and Mineral Resources
2	National government	President's Staff Office (KSP)
3	National government	Coordinating Ministry for Maritime & Investment Affairs
4	National government	Ministry of Manpower
5	National government	Ministry of Manpower
6	National government	Ministry of Manpower
7	National government	Ministry of Energy and Mineral Resources
8	National government	Ministry of Development Planning
9	Local government	Department of Energy and Mineral Resources (ESDM) South Sumatera
10	Local government	Regional representatives of South Sumatera
11	Local government	Regency government of Muara Enim
12	Local government	Bappeda Kutai Kartanegara
13	Local government	Bappeda Purwakarta
14	Local government	ESDM Purwakarta
15	Local government	ESDM West Java Province
16	Local government	Department of Energy and Mineral Resources (ESDM) East Kalimantan
17	Local government	Bappeda Kaltim
18	Research Institute / Think tank	Think Policy
19	Research Institute / Think tank	Institute for Energy Economics and Financial Analysis (IEEFA)
20	Research Institute / Think tank	IESR
21	Research Institute / Think tank	IRID
22	Research Institute / Think tank	UNPAD research centre
23	Research institute / Think tank / University	Pusat Studi Lingkungan Unmul
24	NGO / CSO	Lingkar Temu Kabupaten Lestari (LTKL)
25	NGO / CSO	WIME
26	NGO / CSO	JATAM
27	NGO / CSO	Forum Rakyat Kutai

28	SOE	PLN National
29	SOE	PLN Power Plants (PLTU) Muara Enim
30	SOE	PLN Power Plants (PLTU) Muara Enim
31	SOE	PT Indonesia Power Suralaya
32	SOE	PLN Nusantara Power & UP Balikpapan
33	SOE	PLN Samarinda
34	SOE	PT SMI
35	SOE	PT SMI
36	Private	Local contractor of PLTS Cirata project
37	Private	PT Pembangkitan Jawa Bali Masdar Solar Energi

# Appendix 2 Nexus assessment tables

Evidence level in tables:

- **High** confidence if the evidence shows information that covers 9 or more of 12 sub-elements from all three nexus elements.
- **Medium** confidence if the evidence shows information that covers 5 to 8 sub-elements (out of 12) from all three nexus elements.
- **Low** confidence if the evidence shows information that covers 1 to 4 sub-elements (out of 12) from all three nexus elements.

## Table A. Assessment of energy nexus at the national policy level

The assessment covers the objectives and the translation of objectives in the government agenda and regulation in the electricity sector. Policies covered:

1. RPJMN 2020–2024 (national strategic development plan as an important part of achieving long-term development plan)
2. RENSTRA 2020 - 2024 (translated national strategic development plan or strategic plan by MEMR)
3. Perpres 112/2022 (presidential regulation as a derivative policy of law and government regulation on the energy and electricity sector)

Policy	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
1. RPJMN	1.1 Does the policy have explicit/clear objectives for all the three nexus elements in the electricity sector?	Whether or not reference is made to all three nexus in the strategic objectives	<b>Reference to all three nexus elements</b>	Economic aspect overly dominates the national strategic plan for the electricity sector. RPJMN presents three energy nexus elements, but environmental sustainability and social inclusion are weak. Economic transformation to emerge from generating electricity supply to meet the growing electricity demand is expected to create a multiplier effect on state revenue, environmental sustainability and social benefits.	<ul style="list-style-type: none"> <li>• Three of seven development agendas of RPJMN that covers energy and electricity sectors are strengthening economic resilience, infrastructure and low carbon development with the objectives to increase access and supply of equitable, reliable, and efficient energy and electricity. [RPJMN Page 1.4 - 1.7, 1.36]</li> <li>• Factors supporting the objectives include the sustainability of energy and electricity supply, energy and electricity access and affordability and adequate energy and electricity supply. [RPJMN Page VI.15 - VI.16]</li> <li>• The importance and focus of energy national policies is more towards the economy as the environmental and social contexts are indirectly considered due to complex trade-offs. [Interview - R01F]</li> <li>• There needs to be a big 'if' to eventually implement a transformative, sustainable and inclusive energy transition for the electricity sector in Indonesia. [interview - R02M]</li> </ul>	Medium

Policy	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
1. RPJMN	1.2 To what extent are energy sector objectives translated into sub elements of the nexus framework?	Whether or not there are sub elements for all three nexus in the strategic objectives	<b>Sub elements available for each of all three nexus elements</b>	<ul style="list-style-type: none"> <li>• Strategy to achieve economic transformation through the electricity sector is focused on increasing electrification to meet increasing demand, which in turn is expected to increase government revenues from the sector.</li> <li>• Strategy to achieve environmental sustainability through the electricity sector is focused on energy diversification and electricity expansion, which is presumed to increase the share of renewable energy and reduce GHG emissions.</li> <li>• For social inclusion, strategies are focused on making electricity affordable, but there has been less attention to other aspects of social inclusion, such as labour market impacts (e.g., safety nets for actual/potential laid off employees from fossil fuel sector, or needed upskilling needed by local labour force to participate in new renewable energy projects).</li> </ul>	<ul style="list-style-type: none"> <li>• Energy development strategies include expanding the electricity distribution network, development and utilisation of new and renewable energy, increasing renewable energy generators capacity, coal domestic market obligation (DMO) to increase RE development. [RPJMN Page II.4 - II.6]</li> <li>• The low-carbon development as a strategy to reduce GHG emissions from the energy and electricity sectors is carried out through three core programmes: renewable energy, energy efficiency, and substitution of fuel oil. [RPJMN Page VII.7, VII.21, VII.30]</li> <li>• The social aspect that is considered in Indonesia's energy development is more towards its affordability, employment has not been involved due to limited data to prepare employment programmes to support the energy transition [Interview - NG06M]</li> <li>• So far what has been seen is that the renewable energy target in the energy mix is difficult to achieve as it becomes a big homework for the country. The priority programme is still to meet energy demands for the electricity sector, making it missed in suppressing the use of fossil fuel energy. [Interview - NG08M]</li> </ul>	Medium

Policy	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
2. RENSTRA	2.1 Does the policy have explicit/clear objectives for all the three nexus elements in the electricity sector?	Whether or not reference is made to all three nexus in the strategic objectives	<b>Reference to all three nexus elements</b>	Inconsistency is found between Renstra KESDM and other national energy policies than RPJMN. Renstra explicitly mentions all nexus energy elements, yet there have been inconsistent targets, particularly in terms of renewable energy share target against the National Energy General Plan (RUEN) target. The Indonesian government's policy on renewable energy development is also considered inconsistent with the strategic direction of the downstream coal programme for value-added creation of coal production.	<ul style="list-style-type: none"> <li>• The five policy directions and strategies in the framework of fulfilling access to, equitable, reliable, efficient and sustainable supply of energy and electricity: (1) diversification of energy and electricity to meet needs, (2) increasing the efficiency of energy and electric power utilisation, (3) strengthening and expanding energy and electricity supply services, (4) improving energy and electricity governance, and (5) development of funding and financing policies. [RENSTRA Page 62-63]</li> <li>• There are two targets for renewable energy share by 2030: Renstra target is 19.5% and RUEN target is 23%. [RENSTRA Page 128]</li> <li>• There are inconsistencies on government strategies that aim to diversify sources of electrical power (i.e., increasing the share of renewable energy), but developing value additions in coal production (i.e., may lock in the economy to fossil fuel sector). [Interview - R03M]</li> <li>• Regulations from different national stakeholders that are not synchronised in the electricity sector are one of the reasons for the non-advancement of renewable energy in Indonesia. Energy and electricity policy reforms, capacity building, and institutional governance are needed to build renewable energy in the Indonesian context. [Interview - NG02M]</li> <li>• Institutional and financing issues are considered to be the greatest challenges in formulating policies for the energy development agenda in Indonesia in incorporating energy nexus. [Interview - NG08M]</li> </ul>	High

Policy	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
2. RENSTRA	2.2 To what extent are energy sector objectives translated into sub elements of the nexus framework?	Whether or not there are sub elements for all three nexus in the strategic objectives	<b>Sub elements available for each of all three nexus elements</b>	Uncertain arrangements among agencies on formulation of energy development agenda leads to nexus targets or sub elements written in more than one agenda. This applies in Renstra KESDM which causes some of other nexus sub elements to be overlooked, particularly those related to social inclusion elements such as job security and GESI.	<ul style="list-style-type: none"> <li>• Diversification of energy and electricity strategy targets by 2024 include increasing renewable energy generating capacity of 19.35 GW, reducing 142 million tons of GHG emissions, increasing the renewable energy share by 19.5% in the energy mix. [RENSTRA Page 123-125]</li> <li>• Strengthening and expanding energy and electricity supply strategy targets in 2024 include increasing electricity subsidies for poor and vulnerable households, electrification ratio for on and off grids, and providing public electric vehicle charging stations. [RENSTRA Page 127-128,139]</li> <li>• Different agendas in the strategic plan document are connected and not stand alone. The agendas were formulated not by sector but based on issues and then policy directions and targets. However, the national government is aware that there will be several activities and targets written on more than one agenda. [Interview - NG08M]</li> <li>• The involvement of the Ministry of Manpower in the policymaking related to energy transition for the electricity sector has not been realised. There is no policy yet about the roadmap and funding to prepare energy transition in regards to employment. [Interview - NG04F.]</li> </ul>	High
3. Perpres 112/2022	3.1 Does the policy have explicit/clear objectives for all the three nexus elements in the electricity sector?	Whether or not reference is made to all three nexus in the strategic objectives	<b>Reference to two nexus elements</b>	The existing legal framework for renewable energy acceleration does not include explicit social inclusion objectives, which contradicts the objective of energy transition funding which explicitly aims to address a just and inclusive energy transition. One of the legal frameworks is the Perpres 112/2022 which only explicitly indicates two nexus objectives (e.g., economic transformation and environmental sustainability) and has been concerned for its contradiction with the country's recent JETP funding mechanism.	<ul style="list-style-type: none"> <li>• Consideration of accelerating the achievement of renewable energy targets in the national energy mix in accordance with the national energy policies and reducing greenhouse gas emissions through early retirement of coal-fired power plants (PLTU) which prohibits the construction of PLTU. However, the PLTU construction has been included in the 2021 to 2030 Electricity Supply Business Plan (RUPTL). [Perpres Page 1, 6, 8]</li> <li>• Consideration for the purchase price of electricity by PLN from a power plant that utilises renewable energy sources consists of the highest benchmark price and dealing price, with or without taking into account the location factor. [Perpres Page 8]</li> <li>• There might be challenges in securing grants and loans from the Just Energy Transition Partnership (JETP) to support the Perpres and the energy transition strategies. The JETP stipulates that there should be no more construction of new PLTU, but in the Perpres, construction of PLTU is still allowed in industrial areas. [media]</li> <li>• There is inconsistency in the regulation for energy transition in the electricity sector between the government plans and its implementation. [Interview - R02M]</li> </ul>	Low

Policy	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
3. Perpres 112/2022	3.2 To what extent are energy sector objectives translated into sub elements of the nexus framework?	Whether or not there are sub elements for all three nexus in the strategic objectives	<b>Sub elements available for two nexus elements</b>	<p>Strategies for achieving the energy mix target are not specified, partly due to exceptions provided in the energy policymaking for the involvement of the financial and business sectors in weakening the implementation of environmental and social mitigation standards.</p> <p>Strategy in the Perpres 112/2022 concentrates on early retirement of coal-fired power plants and electricity prices using highest benchmark and dealing price, making other strategies for jobs creation, reduction of environmental degradation, ensuring GESI, and increasing social benefits are neglected.</p>	<ul style="list-style-type: none"> <li>• There is a lack of specific strategies or milestones in the Perpres to achieve the renewable energy mix; measures of prioritising the purchase of electricity from renewable energy power plants, and the ability of the community to pay the electricity as consumers. [media]</li> <li>• The regulation does not cover the social aspect that needs to be considered in the development of renewable energy power plants. Additionally, detailed plans, strategies and targets for identified objective (i.e., heavily focus on contribution to economic transformation) are not specified in this regulation. [Based on what have been seen in the regulation document]</li> <li>• There is a room provided for exceptions, called ‘loopholes’, for the involvement of the financial sector and business sector in the energy sector, which drives inconsistency in energy and electricity national policies. [Interview - R01F]</li> <li>• If the government continue to be dependent on the fossil fuel sector for revenues, high transaction costs of investing on renewable sources of energy, and be less inclusive (e.g., higher representation of businesses than local communities in crafting regulations), it will be difficult for Indonesia to implement the energy transition at the national and especially local level. [Interview - R01F]</li> </ul>	Low



## Table B. Assessment of energy nexus at the operator level

The assessment concentrates on the objectives and translation of the objectives, accountability mechanism, and procurement policy related to operations in the electricity sector. Scopes covered:

1. Operationalisation of government mandate
2. Accountability reports
3. Procurement tools and policy

Scope	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
1	1.1 Does the operationalisation of government mandate have explicit/clear objectives for all the three nexus elements in the electricity sector?	Whether or not reference is made to all three nexus in the strategic objectives	<b>Reference to all three nexus elements</b>	<p>Overlapping government mandates for the electricity provision drive the main RUPTL's objective economic transformation for energy development in Indonesia, and much less so on achieving environmental sustainability and social inclusion outcomes.</p> <p>Although in the RUPTL, the three energy nexus elements are reflected, the focus is on how to drive economic incentives for the country, making social and environmental aspects receive weak attention.</p>	<ul style="list-style-type: none"> <li>• PLN strives to ensure the availability, affordability and accessibility of electricity by increasing generating capacity to accelerate electrification supporting rural and village regions and prioritising the use of local energy resources, especially renewable energy. PLN's electrification effort also covers business areas, including special economic zones (SEZ), industrial areas, etc. [RUPTL - Page II-1, II-3, II-48, II-54, V-23, V-161]</li> <li>• PLN's role in the EV sector lies in preparing a charging system infrastructure or known as a Public Electric Vehicle Charging Station (SPKLU) as the demand for EV is growing. [RUPTL - Page II-33]</li> <li>• The direction of energy transition efforts from PLN focus on utilisation of new technology in using coal (e.g., ultra supercritical boilers and implementation of co-firing). In effect, there is still more coal in the energy mix. [Interview - S04F]</li> <li>• The electricity system in Indonesia itself is not ready yet for the transition since the current electrification system is unstable, making it difficult to prioritise renewable energy. [Interview - S01F, S06M]</li> <li>• PLN is being tied to three different ministries for the electricity provision in Indonesia: Ministry of State-Owned Enterprise (MSOE), Ministry of Energy and Mineral Resources (MEMR) and Ministry of Finance (MOF), in which PLN gets a mandate as an entity with sole authority to manage electricity, including incorporating an energy mix with increasing shares of renewables, but also as a company that needs to maintain profit to contribute to the country's revenue (wherein higher profits may be more achievable through relatively cheaper coal rather than renewable sources). [journal article]</li> </ul>	Medium

Scope	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
	1.2 To what extent are objectives translated into sub elements of the nexus framework?	Whether or not all three nexus elements are translated into sub elements	<b>Sub elements available for each of the three nexus elements</b>	<p>The strategy to prioritise the utilisation of renewable energy to achieve the energy transition for the electricity sector is questionable. Energy diversification in the RUPTL is translated into several strategies to achieve the three nexus outcomes, but hardly touching on local job security, GESI and social benefits.</p> <p>Also, the 35,000MW electricity infrastructure development acceleration programme to meet the growing electricity demand shows that coal is still dominating as the energy source, showing a contradiction between government mandate and the actual operationalisation.</p>	<ul style="list-style-type: none"> <li>• Power generation capacity development is carried out in accordance with government policies, for example in the development of new and renewable energy (EBT), as well as the 35,000MW programme. [RUPTL - Page V-49]</li> <li>• The RUPTL targets in the next ten years to meet the national energy and electricity capacity, utilising new and renewable energy, increasing the efficiency and performance of the electricity system through generating capacity development of renewable energy of 21,000 MW for 2021–2030, and electrification for rural electricity programme and for 15 SEZ until 2030.</li> <li>• In addition, the projections of PLN’s GHG emission reduction in 2030 for three different scenarios of business-as-usual, optimal and low carbon are 433 million tons, 363 million tons, and 335 million tons, respectively. [RUPTL - Page III-14, V-23, V-121, V-161]</li> <li>• PLN has developed 7,149 units of SPKLU for two-wheeled electric vehicles in 3,348 locations by August 2019 and is now creating a roadmap for the development of electric vehicle infrastructure to determine the estimated number and location of SPKLUs needed. [RUPTL - Page II-33]</li> <li>• - That 35,000MW program, rolled out in 2015, calls for building 117 new coal-fired power plants, with only 2,000 MW coming from renewable energy sources. [media]</li> <li>• The electricity price from renewable energy sources will be based on the base electricity generating cost, which will be based on the infrastructure and energy source availability of the area. [Interview - NG03]</li> <li>• The strategy to use/utilise local potential resources in renewable projects is acknowledged in the national energy law. However, this strategy is lacking in the operationalisation stage through the RUPTL. [Interview - R04M]</li> </ul>	Medium

Scope	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
2.	2.1 To what extent the accountability mechanism is consistent with the government mandate in reflecting the three nexus?	Whether or not the consistency demonstrates the three nexus presence	<b>Demonstrate all three nexus elements</b>	Harmonised framework between government mandates and accountability mechanisms for electricity provision and generation is vague. Accountability mechanism towards energy sustainability is treated separately from government mandates as it is driven by universal corporate standards, yet serves similar objectives for energy transition. Accountability reports of PLN represent three nexus elements, however, there is a doubt in its implementation particularly related to the utilisation of local potential resources, both human and natural resources.	<ul style="list-style-type: none"> <li>• PLN is committed to continuing to encourage sustainable economic performance by distributing economic value gains to stakeholders and contributing to encouraging the local economy through job creation and community empowerment. [PLN Sustainability Report 2021]</li> <li>• PLN's focus in managing the environment is to prioritise the development of new and renewable energy, fuel switching and exhaust gas utilisation, as well as the use of low-carbon and efficient technology. [PLN Sustainability Report 2021 - Page 118]</li> <li>• Responsibility is also applied to management principles in accordance with universal corporate standards and to the implementation of corporate social responsibility for social and environment. [PLN Annual Report 2021 - Page 72, 183]</li> <li>• Local potential resources for jobs creation and utilisation of local energy resources are missing from the electricity generation activities, suggesting potential violations of the Energy Law and Job Creation Law, which indicates that local potential resources in energy projects should be optimally utilised. [Interview - NG07M]</li> <li>• Coal is considered less expensive than renewable energy sources, and it is still assumed to be the relevant source of energy for electrical consumption. [Interview - NG03M]</li> <li>• Operations for Distribution of generated electricity is not utilising the potential resources available in the particular area, limiting the sector's contribution of local economic development. [Interview - R04M]</li> <li>• PLN has an existing green energy programme. However, there are limited discussions around energy transition among PLN employees, with many of them still not being aware of the need for transition. [Interview - S03M]</li> </ul>	Low

Scope	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
3.	3.1 Does the procurement policy incorporate the three nexus for agreement with contractors?	Whether or not the three nexus objectives are considered	All three nexus elements considered	<p>Local content regulation on procurement policy in electricity generation considers three nexuses but is limited only to the material content of the construction, local labour supply, and standard environmental procedures. The regulation is crucial as it is based on the principle of social equity benefits in producing power plants. Nevertheless, in the implementation, local content regulation often encounters resistance from many parties, especially the private sector, because it is seen as hindering renewable energy development</p>	<ul style="list-style-type: none"> <li>• The primary energy procurement process (consisting of renewable energy and non-renewable energy) to meet the needs of the power plants to be built is determined based on the RUPTL. [PLN Board of Directors Regulation No. 022.P/DIR/2020 - Page 78]</li> <li>• For work that has the potential to cause environmental disturbances, provisions for environmental sustainability are required in accordance with applicable rules and regulations. Also, the initiating business entity must have a location permit/environmental permit/borrow-to-use permit for forest areas and other necessary permits and/or have prepared a pre-feasibility study/feasibility study on the proposed work. [PLN Board of Directors Regulation No. 022.P/DIR/2020 - Page 28, 35]</li> <li>• The rights and obligations of the Goods/Services Provider in implementing the Agreement/Contract include taking steps to protect the environment and society from pollution, noise and other damage caused by the activities of the Goods/Services Provider. [PLN Board of Directors Regulation No. 022.P/DIR/2020 - Page 105]</li> <li>• Protection of labour for outsourcing and continuity of work implementation, one of which is in the event of unilateral termination of the Agreement/Contract or non-performance of the contract, then for labour protection and continuity of work execution, Goods/Services Users can exercise professional judgement so that labour and work execution can keep going. [PLN Board of Directors Regulation No. 022.P/DIR/2020 - Page 86]</li> </ul>	

## Table C. Assessment of energy nexus in implementation level

The assessment focuses on the objectives, standard operating procedure (SOP), and implementation activity and progress report related to projects in the electricity sector. Projects covered:

1. PLTS Terapung Cirata (Floating Solar Power Plants)
2. PLTA UCPS

Project	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
1. PLTS Terapung Cirata	1.1 Does the project implementation plan have explicit/clear objectives for all the three nexus elements in the electricity sector?	Whether or not reference is made to some or all of three nexus themes in the strategic objectives	<b>Reference to two nexus elements</b>	Energy nexus objectives in the national energy policy, operationalisation policies and accountability mechanisms are not thoroughly translated in the project implementation. The PLTS Cirata development highly aims to increase the availability of electricity supply and contribute to the renewable energy mix target which still mostly reflect the economic transformation objective, with less attention to environmental and social implications of project implementation.	<ul style="list-style-type: none"> <li>● As part of PLN's target to diversify its portfolio towards renewable energy, through its sub holding company, PJB, the development of 145 MW Cirata Floating Solar Power Plants (PLTS Terapung Cirata) is now under construction to achieve renewable energy mix target of 23% by 2025. [PTLS Cirata EIA Document - Page 1-2]</li> <li>● The development of floating PLTS Cirata is to increase the availability of electricity in the Java-Madura-Bali electricity system by prioritising the development of new RE. [PTLS Cirata EIA Document - Page 1-5]</li> <li>● Floating PLTS Cirata project is in line with PLN's Green Transformation Program, namely the development of large-scale renewable energy generators. The electricity generated by the PLTS Cirata will enter the PLN transmission network which will be utilised by the surrounding community. [media]</li> <li>● Floating PLTS Cirata project has the potential to reduce carbon dioxide emissions by 214,000 tonnes per year. [media]</li> </ul>	Low

Project	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
1. PLTS Terapung Cirata	1.2 To what extent are implementation operating procedures in the electricity sector translated into sub elements of the nexus framework?	Whether or not the procedures have some or all of three nexus themes and are translated into sub elements	<b>Sub elements available for two but not all nexus elements</b>	The standard operating procedures for environmental and social safeguards of the renewable energy development are weakly enforced in the project implementation. PLTS Cirata project only focuses on mitigation of the environmental and social impacts related to decreasing air quality, community unrest and loss of livelihood due to the power plant development. Other environmental and social impacts are not extensively covered.	<ul style="list-style-type: none"> <li>• Activities of PLTS Cirata development will be managed and monitored according to the Environmental Management Plan (RKL) and Environmental Monitoring Plan (RPL) to minimise significant environmental and social impacts. [PTLS Cirata EIA Document - Page 6-1]</li> <li>• Social impacts considered to be managed and monitored are community unrest and loss of sources of livelihood related to land acquisition and closure of access to the restricted area of the Cirata Reservoir which will be addressed by conducting socialisation and providing compensation in accordance with the applicable laws and regulations as well as providing training and access to economic activities that can replace the lost sources of livelihood. [PTLS Cirata EIA Document - Page 5-20 – 5-21]</li> <li>• The conflicts occurring in the development area are often solved by the developers using money as compensation, in fact, it is often not what the local community wants. [Interview - R04M]</li> <li>• Decreasing air quality is the highlighted environmental impact of PLTS Cirata project development, particularly during the construction phase due to transportation of equipment and materials which will be addressed by covering the truck's trunk with tarpaulin and watering the roads in residential locations that are passed by trucks. [PTLS Cirata EIA Document - Page 5-22]</li> <li>• The EIA and ESIA standards in Indonesia are still low and not very detailed, allowing the environmental and social issues to occur. [Interview - R04M]</li> </ul>	Low

Project	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
1. PLTS Terapung Cirata	1.3 Does the project activity and progress report by internal and media reflect the existence of three nexus?	Whether or not the three nexus themes are considered	<b>Only one element considered</b>	Impacts of the project implementation have not been seen much as the project is still under development, except for the employment opportunities during the construction phase which is also concerning the local communities. The employment opportunities for local people are considered in the project's Environmental Impact Assessment (EIA) document but is not fully implemented on the ground (at least at the current construction phase of the project).	<ul style="list-style-type: none"> <li>• The project is experiencing delays in completion and was cancelled to operate at the end of 2022. The progress of the construction of the Cirata Floating PLTS until the first week of January 2023 has only reached 37.22%. The PLTS is then targeted to operate in September 2023. [media]</li> <li>• Regarding employment opportunities and reducing unemployment and poverty, PT PMSE / PJB will make guidelines regarding workforce recruitment which prioritises community members, especially those potentially affected, to work on the project. [PTLS Cirata EIA Document - Page 5-23]</li> <li>• At subcontractor level, there is no opportunity for local companies, despite having capabilities, to become legal subcontractors of the project. Winning open tender bids is difficult, especially in the context of lower wage offered by international contractors (e.g., Chinese company). This contributes to the local labour content issue in the project implementation. [Interview - P01M]</li> <li>• There is an expectation from communities and local subcontractors that the floating PV project may absorb 30% of local casual labourers. However, only 10% of the locals work on the project. [Interview - LG05M]</li> <li>• There are not many studies investigating the impacts on the environment from the development of Floating PLTS, considering that the development of Floating PLTS is relatively new. However, there is an observable project impact on aquatic ecosystems (both flora and fauna) and water quality. A cross-agency coordination may need to be in place to monitor compliance for risk mitigating measures from business actors and apply sanctions to those who violate it as follow-up supervision. [journal article]</li> </ul>	Low

Project	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
2. PLTA UCPS	2.1 Does the implementation plan have explicit/clear objectives for all the three nexus elements in the electricity sector?	Whether or not reference is made to some or all of three nexus themes in the strategic objectives	<b>Reference to three nexus elements</b>	Investors or funders of the project development determine whether the implementation considers the standards in the implementation phase. Compared to PLTS Cirata, PLTA UCPS has higher standards of environmental and social safeguards and has objectives that capture the three energy nexus themes as it is the PLN's project with the World Bank.	<ul style="list-style-type: none"> <li>• The development of Hydropower Plant (PLTA) Upper Cisokan Pumped Storage (UCPS) with a capacity of 1040MW and a 500kV Transmission Line aims to significantly increase the peak capacity of the power generation system in the Java-Bali network in an environmentally and socially sustainable manner and strengthen the institutional capacity of the state electricity company (PLN) project implementing institutions in planning, development, and operation. [Project's ESIA document - Page 4]</li> <li>• The development of PLTA UCPS provides socio-economic benefits such as cheaper and more efficient provision of peak load of electricity capacity in the Jawa-Bali network, access to remote hamlets and villages as a result of construction of new roads and bridges during the construction phase. [Project's ESIA document - Page 29]</li> <li>• During the operational time of PLTA UCPS, it is expected to have positive impacts on local people who were affected by the project development through the redirection of economic activities that were initially dominated by agriculture, towards higher-income services and trade. On the one hand, strengthening the rural base sector (agriculture, livestock, fisheries and forestry), and on the other hand, growing services and trade. [Project's ESIA document - Page 29]</li> <li>• When it comes to international investors or funders from development banks such as World Bank, ADB, they have a requirement for environmental social safeguard with high standards for renewable energy projects that they have funded. [interview - R04M]</li> </ul>	



Project	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
2. PLTA UCPS	2.2 To what extent are implementation operating procedures in the electricity sector translated into sub elements of the nexus framework?	Whether or not the procedures have some or all of three nexus themes and are translated into sub elements	<b>Sub elements available for each of the three Nexus elements</b>	PLTA UCPS project in its ESIA and SCMP documents highlight almost all sub elements from all three nexus that are aligned with the objectives following the high standards of environmental social safeguard from the World Bank.	<ul style="list-style-type: none"> <li>• In a pumped storage scheme, the system is run as a pumping station where electricity from the power system is consumed and water is pumped to the upper reservoir and stored. This scheme will also provide a number of additional services to the network. The flexibility and speed of operation of hydropower turbines supports frequency control, enabling reduced system operating costs and increased system-wide efficiency. [Project's ESIA document - Page 4]</li> <li>• The development of PLTA UCPS complies with and aligns with the environmental and social standards (ESS1 - ESS10) of the World Bank's Environmental and Social Framework (ESF) 2018. [Project's ESIA document - Page 1]</li> <li>• PLN has been conducting environmental monitoring twice a year since 2012 as part of their commitment to environmental permits and 'RKL/RPL'. This includes sampling water quality, groundwater quality, noise, air quality, and conducting biodiversity and social surveys. [Project's ESIA document - Page 8]</li> <li>• PLN will refine and finalise the GHG emission calculation according to ESS3 as part of the economic analysis to be completed prior to the World Bank assessment. [Project's ESIA document - Page 29]</li> <li>• This Labor Management Procedures (LMP) is part of the Social and Community Management Plan (SCMP) developed by PLN to manage labour under the project of construction of 1040 MW UCPS and 500 kV transmission line. The LMP sets out the Project's approach to meeting national requirements as well as the World Bank's Environmental and Social Framework, particularly ESS 2 on Labor and Working Conditions and ESS 4 on Community Health and Safety. [Project's Social Community Management Plan (SCMP) document - Page 84]</li> </ul>	

Project	Question	Assessment criteria	Assessment	Summary statement	Evidence	Confidence level
2. PLTA UCPS	2.3 Does the project activity and progress report by internal and media reflect the existence of three nexus?	Whether or not the three nexus inclusion is considered	All three nexus elements considered	Despite the presence of all three nexus elements in the implementation plan, the impacts of project operationalisation have not been seen as it is still under development. The assessment is not able to provide information whether the mitigation procedures for addressing environmental and social costs are certainly implemented and effective.	<ul style="list-style-type: none"> <li>• PLTA UCPS is targeted to operate in 2027 through a funding collaboration between PLN and the Ministry of Finance through a Subsidiary Loan Agreement (SLA) scheme, in which PLN receives funding from the International Bank for Reconstruction and Development (IBRD), which is part of the World Bank as well as from the Asian Infrastructure Investment Bank (AIIB) in the form of co-financing with the World Bank. [media]</li> <li>• PLN has carried out a series of forest conservation activities in the UCPS hydropower catchment area and its surroundings. These forest conservation activities include carrying out reforestation/planting activities, forest management (plant maintenance, regulation of plant species to support catchment areas, monitoring of forest areas, and management of biodiversity. [media]</li> <li>• PLN has developed a Stakeholder Engagement Plan (SEP) which outlines a systematic approach to promote inclusive infrastructure development by ensuring the meaningful participation of stakeholders throughout the project cycle, from planning, construction to operation. [Project's ESIA document - Page 27]</li> <li>• In collaboration with local governments and other entities, the PLN has implemented economic assistance and livelihood restoration programmes such as the formation of cooperatives and various capacity building programmes that benefit those who are affected by the project. Several programmes are designed to empower women's groups which have a positive impact on increasing the role of rural women in generating income and managing businesses. [Project's ESIA document - Page 26]</li> </ul>	Low

**Table D. Summary of energy nexus assessment**

No.	Level	Summary statement
1	National policy	<b>The presence of energy nexus elements does not mean much in national policies.</b> The importance and focus of energy national policies are still more towards the economy, outweighing the environmental and social aspects. Energy development strategic plans are developed based on the main urgent issue in the electricity sector which is to meet the demand. Also, the consistency between national policies regarding sustainable energy transition is questioned whether they have the same energy targets as they are derived from different laws.
2	Operator	<b>The nexus presence does not guarantee Indonesia's electricity operator will stop using coal.</b> Electricity sector in Indonesia still heavily focuses on the economic side to increase the availability of electricity regardless of its energy sources. Mandates and influence from the MEMR and MSOE also contribute to the challenges in ensuring all three energy nexus elements are given equal attention.
3	Implementation	<b>The inclusion of energy nexus elements in the implementation level does not necessarily address environmental and social risks.</b> The safeguard standards adopted in the projects determine how the implementation impacts will be managed and monitored by considering the three nexus which can be different depending on who the developers and investors are. Solely relying on Indonesia's EIA standards will still allow the environmental and social issues to occur.
4	Across level	<b>Nexus inclusion is apparent across all levels of documents but remains questionable in actual implementation.</b> There has been inconsistency in terms of transition direction to increase renewable energy portion in the national energy mix, while coal is still extensively utilised. Coordination between national stakeholders, local governments, operators and project developers is poor in terms of transition planning and governance due to complex political economy issues.