# Missing the 23 Per Cent Target: Roadblocks to the development of renewable energy in Indonesia

GSI REPORT

IISD International Institute for Sustainable Development

Global Subsidies Initiative

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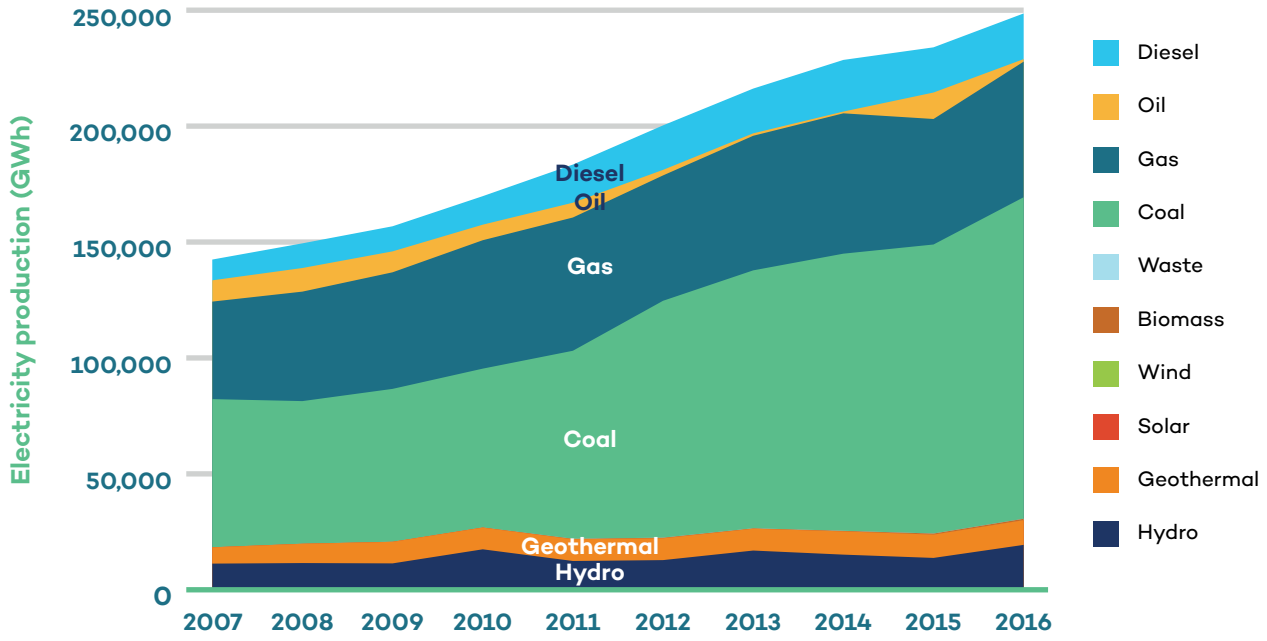
# Executive Summary

On January 25, 2017, Indonesian Minister of Energy and Mineral Resources (ESDM) Ignasius Jonan stated, "Indonesia is resolved to increasing its new and renewable energy mix to 23 per cent in 2025 in line with its commitment to reducing its greenhouse gas emissions it had made during the COP 21 conference in Paris in 2015 (Tempo, 2017). The commitment to increase renewable energy was made as part of a package of measures to tackle climate change in Indonesia's Nationally Determined Contribution (NDC) that pledged to reduce emissions by 26 per cent against the business-as-usual scenario by 2020 and 41 per cent if international support is granted.

With this high-level commitment to a marked expansion of renewable energy—together with the international context of falling renewable energy prices—one might expect that renewable energy in Indonesia would be booming. However, since 2007 most of the increase in electricity production has come from coal (Figure ES1) and the share of renewable electricity production has remained relatively static, at around 12 per cent of total




generation.

**Figure ES1: Indonesian Electricity production by source (2007-2016)**

*Source: Ministry of Energy and Natural Resources, 2016.*

Between 2007 and 2016 hydro and geothermal capacity increased by 39 and 67 per cent respectively. But overall installations pale in comparison to coal, while solar remains almost nonexistent (45 MW total) as shown in Figure ES2 (Ministry of Energy and Natural Resources, 2016).

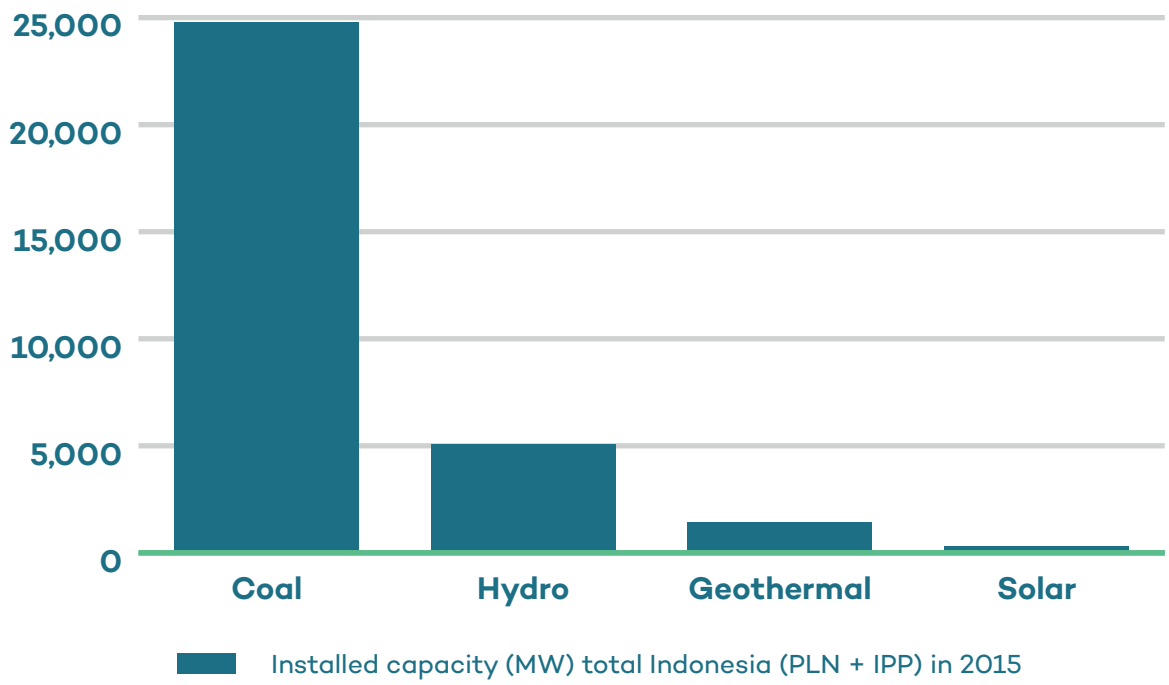



**Figure ES2: Indonesian Energy Capacity Selected Sources 2015 (MW)**

*Source: Perusahaan Listrik Negara (PLN), 2016.*

This report seeks to answer the question of why renewable energy deployment, particularly wind and solar, has not taken off in Indonesia. To understand the forces shaping the sector, and what can be done to remedy the situation, IISD conducted interviews with politicians, civil servants, industry representatives, renewable energy developers, civil society organizations, international donors and other stakeholders. A total of 26 interviews took place, revealing the roots of the problem, the broader political economy of the energy sector and some possible ways forward.

## Core Findings

**The most striking finding from the interviews with experts was that none of the respondents believed that the target of 23 per cent of the energy mix coming from renewables by 2025 target would be met. This finding alone should ring alarm bells. A change is needed if Indonesia is to meet its renewable targets and avoid a coal-dominated energy system in the coming decades.**

Figure ES3 represents the current share of renewable energy in the primary energy supply mix, including the share of renewable energy in transportation and electricity generation. The figure shows that the highest percentage of renewable energy was achieved in 2014, reaching 7 per cent of the total primary energy mix. A linear extrapolation of this trend would lead to a maximum of 12 per cent of renewable energy share by of 2025—far below the 23 per cent target.

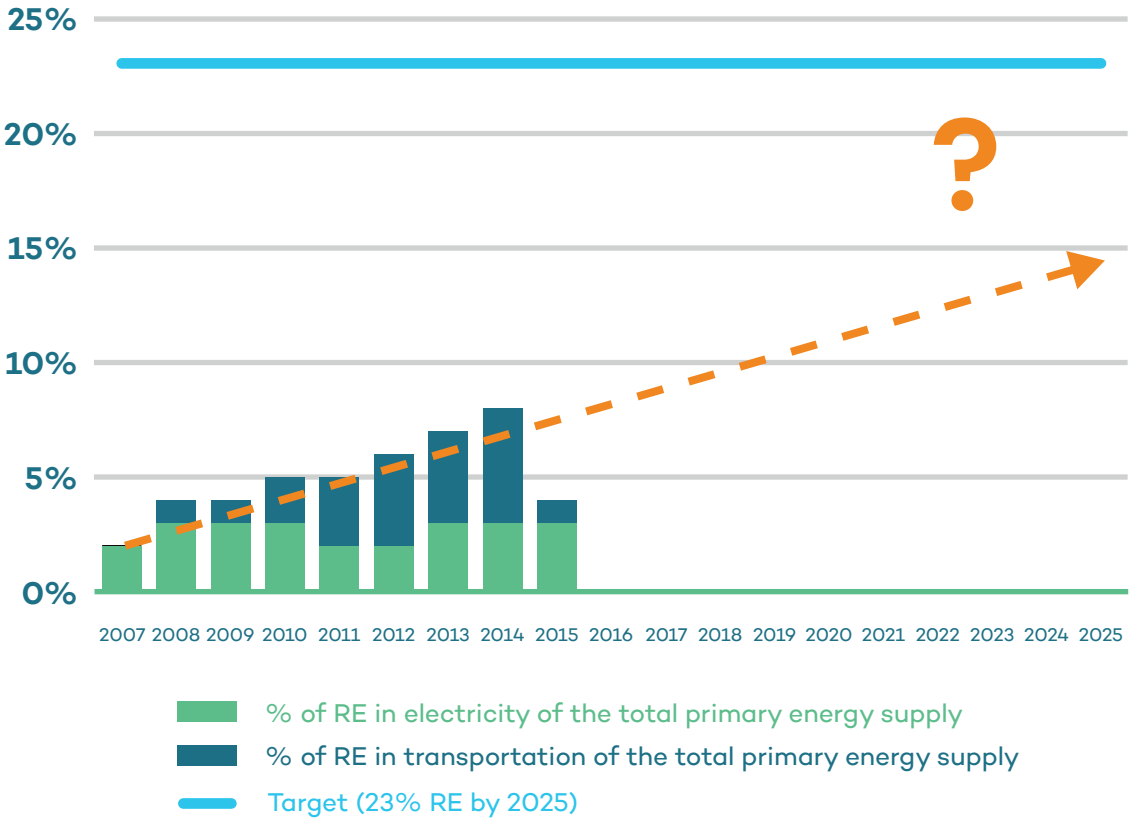



**Figure ES3: Share of renewable energy in Indonesia's primary energy supply mix 2007–2015**

*Source: Created by the authors with data from PLN (2016).*

The respondents observed a series of "roadblocks" for renewable energy projects:

- The most important of these is that power purchase prices are simply too low to allow developers to recover their investments and make reasonable profits, especially since the introduction of Regulations 12/2017 and 50/2017 capping power purchase prices at 85 per cent of the local average generation cost (BPP).
- Frequent changes to policy, regulatory delays and patchy implementation of government policy by PLN all play a role in further undermining investor confidence and increasing project development risk.
- Developers are also concerned that the new system of pricing does not provide any recognition of the environmental benefits of renewable energy, and in fact favours fossil sources. By subsidizing and financially supporting the coal industry, the government of Indonesia is indirectly and artificially decreasing the average generation cost of electricity. Since renewable energy prices are now linked to these prices through the BPP, unsubsidized renewables are competing against subsidized coal generation.
- Industry stakeholders also believed that the broad remit and power of PLN present a number of conflicts of interest. PLN's role as fuel supplier to diesel generators means it stands to lose a revenue stream if remote diesel generators are sidelined. PLN owns and operates the majority of fossil fuel generation capacity and ha an interest in maintaining the status quo to avoid stranded assets.

A final barrier is the nature of support and influence across key stakeholders. Those most unequivocally in favour of supportive policies for renewable energy exercise relatively little influence over policy-making in the sector. Actors that are more influential are either moderately supportive but not particularly engaged, conflicted about whether greater support for renewable energy would positively or negatively affect them, or outright opposed to developments that could undermine their own business models. A summary of the positions of key actors is presented in Figure ES3.

On a positive note, continuing global price declines in the renewable energy sector are gradually eroding the cost gap between renewables and fossil fuels. Almost all the actors would support increased renewable generation at no extra cost. The regulations capping renewable energy power purchase agreements (PPAs) to average grid prices provide a benchmark that renewable energy will find difficult to meet. There are however, a few viable projects being developed. The learning-by-doing effects of these projects will eventually bring down costs further to the point where a virtuous circle of increasing competitiveness can help to bring forward a wholesale energy transition, however, this could be greatly accelerated with stronger incentives for renewable energy.

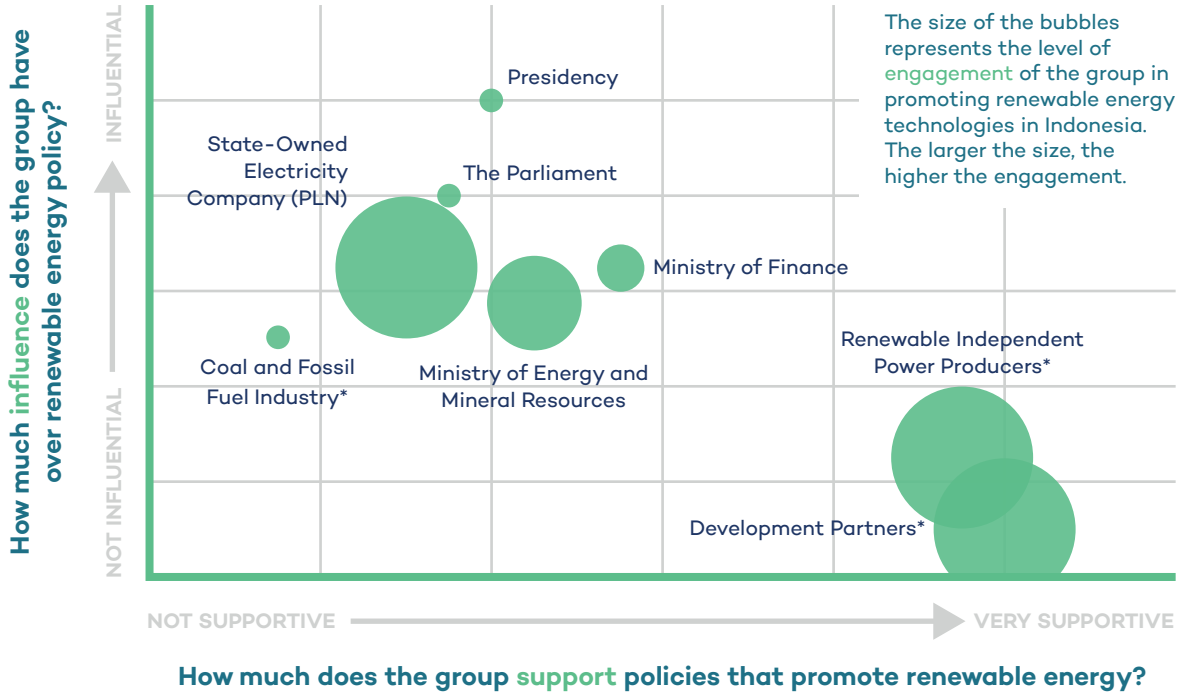



**Figure ES4: Relative support for policies promoting renewable energy, influence and level of engagement of stakeholder group**

*Source: Authors' diagram.*

A focused effort to identify and promote opportunities where renewables are the cheapest option—and remove barriers to deployment of competitive projects—could include:

- Maintain policy stability, remove regulatory barriers and streamline processes for consent and permitting.
- Ensure that off-grid electrification projects use lowest-cost technologies: in practice this would mean taking steps to transition from diesel to solar and hydro for microgrids where viable.
- Re-evaluate whether trade and local content requirements are delivering value or unnecessarily increasing prices.
- Proactively support the development of good sites where large-scale renewable energy projects are likely to come in below wholesale (BPP) prices and develop these sites through renewable energy auctions.
- Level the playing field for renewable energy by phasing out subsidies to fossil fuels including coal and increasing understanding of the externalities of fossil fuels.
- Many of these measures can also be supported through international financial and technical assistance, for instance by accessing NDC support mechanisms.

Finally, noting the unique position of PLN as a powerful player in the energy sector, the single buyer of electricity and the largest owner of fossil-fuelled generation assets, it may be that the internal contradictions of these roles prevent PLN from being a driving force for renewable energy. Government action may be necessary to either fundamentally change PLN's incentives so that its interests are better aligned with renewable energy or take steps to ensure that PLN implements energy policy, even if that policy is not aligned with its own interests.

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# 1. Introduction

Indonesia has committed to increase its renewable energy capacity to 23 per cent of total energy resources by 2025 (Tempo, 2017, see Box 1). The commitment to increase renewable energy was made as part of a package of measures to tackle climate change in Indonesia's Nationally Determined Contribution (NDC).

With the country's ambitious international climate commitments and national targets for renewable energy, the future of coal development should be in question and renewable energy should be booming. However, electricity production from renewable energy has remained relatively flat at around 12 per cent of electricity supply between 2007 and 2016. Over the same period, electricity production has increased by around 70 per cent, and production of electricity from coal has more than doubled to meet this rise (Ministry of Energy and Natural Resources, 2016).

Globally, investment in power capacity is increasingly moving toward renewable technologies. Wind, solar, biomass, waste-to-energy, geothermal, small hydro and marine sources accounted for 138.5 GW, representing 55 per cent of all capacity added globally in 2016. Investment in renewables was more than double that of fossil-fuelled capacity. The most investment is currently allocated to wind and solar, which accounted for USD 114 billion and USD 112 billion respectively in 2016, representing more than 90 per cent of all renewable energy investment.

In Indonesia, the situation is very different—most renewable investment in recent years has been in hydro and geothermal. Wind and solar appear to be almost absent: official figures record just 21 GWh of solar photovoltaic (PV) production and 5.7 GWh of wind production, less than 0.01 per cent of the total (Ministry of Energy and Natural Resources, 2016). In 2016 modern renewable energy use (excluding biomass used for heating and cooking) accounted for only 5.2 per cent of total primary energy, far below the 23 per cent goal.

Looking just at the electricity sector, the vast bulk of generation is derived from coal and gas (see Figure 1 below). Increases in electricity production since 2007 have been largely met by increases in coal generation. An increase in the share of renewable generation of electricity is a prerequisite if the 23 per cent target is to be met; however, recent history shows no sign of a marked increase in renewable energy generation relative to the overall increase in demand. While there is some growth in generation of renewables in terms of absolute amount, it is not surpassing relative growth from fossil fuel energy sources.

Yet there have been some increases in installed renewable energy capacity in Indonesia. Between 2007 and 2016 hydro capacity increased by 39 per cent to 5.1GW, geothermal capacity by 67 per cent to 1.6 GW. Solar and wind energy have not yet seen significant levels of deployment, but small numbers of projects have installed. The total installed capacity for solar is reported to be 16 MW in 2016. However, over the same period, production from thermal (mainly coal-powered) steam generators rose from 12 GW to 29.8 GW.

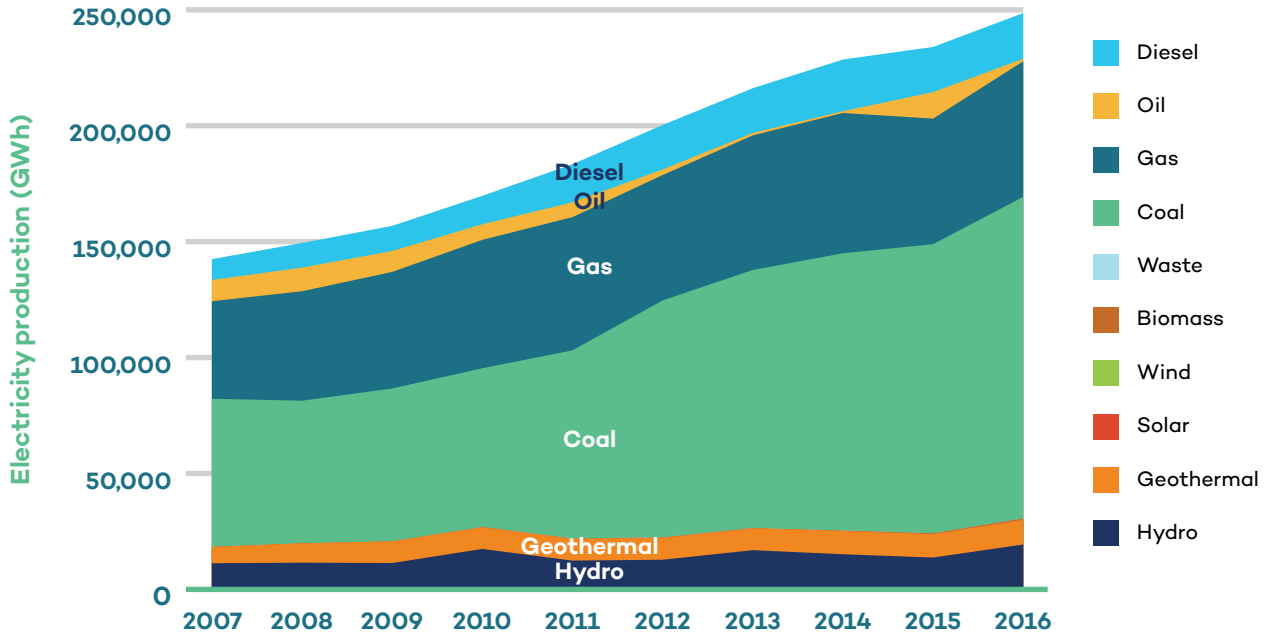



**Figure 1. Indonesian Electricity production by source (2007–2016)**

*Source: Ministry of Energy and Natural Resources, 2016.*

The solar and wind revolutions that have sent shockwaves through global energy investment have not yet had an impact on the energy market in Indonesia. The immediate question is "why not?" The simple answer in the case of wind is that low wind speeds in much of the archipelago, particularly inland, reduce the potential sites; however, there are still many undeveloped viable sites in coastal regions (EMD, 2017). The same certainly cannot be said for solar radiation, where there is significant potential throughout the country.

Hence the question remains "What dynamics and barriers hold back the renewable sector in Indonesia?" The lack of new renewable energy capacity also calls into question whether the target of 23 per cent renewable energy by 2025 can be met. Figure 2 shows the current share of renewable energy in the primary energy supply mix, including its share of transportation and electricity generation. It shows that with the current trend, the share of renewable energy in the total mix might reach just above 10 per cent. If the 23 per cent target is to be met, swift action will be needed to identify and address the barriers so that wind and solar in particular will be a key part of the solution (see Box 1).

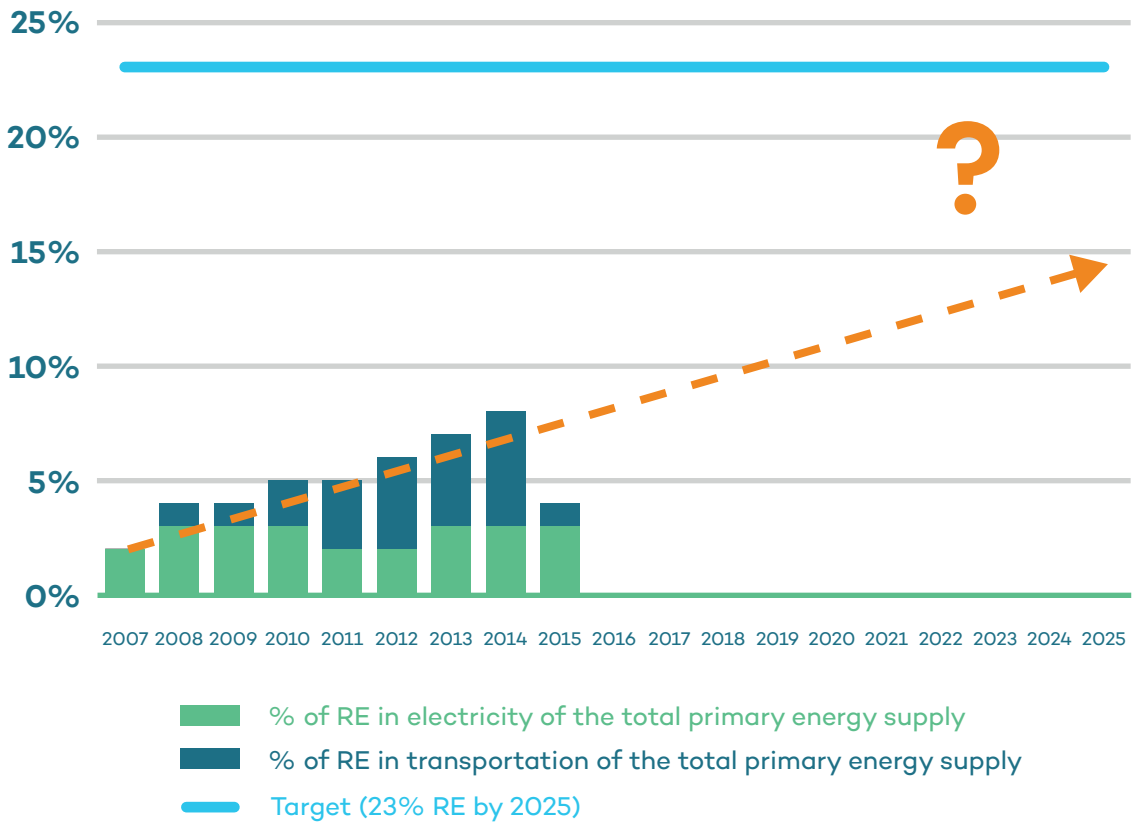



**Figure 2. Share of renewable energy in Indonesia's primary energy supply mix (2007–2015)**

*Source: Authors' figure based on data from PLN, 2016.*

## Box 1: The 23 Per Cent Energy Target

There is some uncertainty around exactly what is included in the 23 per cent energy target. The target was enshrined in law by regulation 79/2014, which mandated that renewable energy and "new" energy should provide at least 23 per cent of energy by 2025 (President of the Republic of Indonesia, 2015). This regulation defines "new energy sources" as any energy generated by using "new technologies," a term that includes renewable energy technologies, but also nuclear or even new technologies based on coal-to-liquid or coal-to-gas processes. The media, however, defines the 23 per cent target as the renewable energy share used for electricity and transportation in the total primary energy mix (Tempo, 2017).

While technological innovation in the energy field is welcome, meeting the 23 per cent target from coal-based energy sources would not bring the same kind of environmental benefits as fulfilling the target based solely on renewable energy generation. The regulation itself provides no guidance on the acceptable proportions of renewable and "new energy." Within this "new energy" it is also not clear what fraction might be expected to come from non-renewable sources.

For the purposes of this report, it is assumed that the bulk of the target is to be met from renewable energy technologies, to the extent that fossil fuel-based sources provide a negligible impact on the delivery of the target.

This report seeks to answer the question of why renewable energy investment has stalled in Indonesia. It proposes solutions to break the deadlock and remove the roadblocks to meet the country's renewable energy target.

To answer these questions, a team of IISD researchers conducted a total of 26 interviews with politicians, civil servants, industry representatives, renewable energy developers, civil society organizations, international donors and other stakeholders. The interviews revealed the roots of the problem, the broader political economy of the energy sector and some possible ways forward. This report sets out the methodology applied by the study—outlined in detail in Annex 1—and presents the findings of this research.

# 2. Roadblocks to the Development of Renewable Energy in Indonesia

According to official statistics, Indonesia generates less than 0.1 per cent of its electricity from wind and solar (Ministry of Energy and Natural Resources, 2016). However, many manufacturers, developers and investors believe that there is the potential to develop renewable projects across Indonesia and have attempted to work within the existing system to deliver projects.

At the project level, it is often a combination of factors that render a project financially unviable. This section explores common factors that were considered by interviewees to have contributed to reducing the number of renewables project in Indonesia.

If these roadblocks were to be removed there is a significant pipeline of projects at various stages of development that could help deliver the renewable capacity needed to meet the 23 per cent renewable energy target.

## 2.1 Technical Constraints and Geographical, Environmental Factors

Several technical factors are often proposed to explain the lack of renewable energy deployment, including the **intermittent nature of the resource, the many grids scattered across Indonesia's islands, lack of available land close to population centres and the limited capacity of electricity grids.**

Indonesia's unique geography creates technical constraints for renewable energy projects that will require special technical solutions. The availability of good sites places restrictions on the types of projects that are technically feasible and influences the cost of renewable electricity. Indonesia, an archipelago of more than 13,000 islands, faces unique challenges for designing, constructing and operating electricity networks. In many countries, the end state for electricity networks is for every significant settlement to be connected to a single national grid. In Indonesia, this would be impossible. In the foreseeable future, there will continue to be the need to operate a range of large and small grids in addition to off-grid systems. The variable output from large-scale renewable generation is easier to accommodate in larger grids such as Java's, where demand and supply are aggregated across large number of consumers and generators. The geographical factors that have influenced grid design have placed constraints on potential renewable generators connecting into these networks. This problem can be overcome through a combination of developing expertise on grid management, upgrading grid hardware, the addition of storage in the network and further integration of regional grids through increased deployment of transmission networks.

Wind resources are also not evenly distributed across the country. Typical mean wind speeds at 80 metres above ground are in the region of 3–4 metres/second (m/s) in inland sites and 5–6 m/s at coastal sites (IRENA, 2017; EMD, 2017). Many of the sites with the best resources are in the heavily populated areas of Java, while many of the areas where low-cost land is available are either far from population centres with only weak grid connections or poor wind resources. However, many sites could still be developed. A lack of sites is not yet a constraint for wind, although the constraints that do exist may restrict the potential for very large projects.

Indonesia benefits from globally significant geothermal resources and favourable solar resources right across the country. Solar can be deployed inland and transmitted to population centres as long as the grid infrastructure is available to support this. Geothermal resources exist on all of Indonesia's major islands, and the current level of generation is estimated to be equal to less than 5 per cent of the available potential (Poernomo et al., 2015).

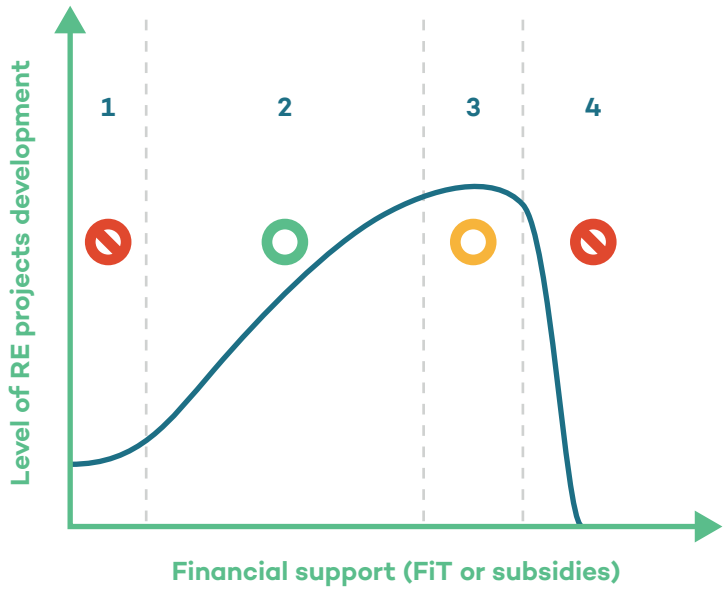
Energy generation technologies, notably solar PV, are competitive for electricity generation, but when the costs of providing energy storage are taken into account they are not able to provide power at tariffs competitive with grid electricity costs. The ongoing fall in the cost of PV and development of affordable electricity storage technologies are reducing the gap between grid tariffs and off-grid power, but there is still some way to go before parity is reached.

These factors are important in determining the available capacity of individual sites and projects but there are many sites where all the major renewable energy technologies are technically viable. It is the financial, regulatory and, at a high level, political factors that are holding back deployment. Subsequent sections review these constraints and their impacts.

## 2.2 Renewable Energy Prices and Tariffs

**The price paid to renewable energy generators is the single most significant factor that influences the financial viability of projects.** Over the years, Indonesia has developed a number of mechanisms to provide attractive prices for renewable generators. Feed-in Tariffs (FiTs) were proposed under a range of ministerial regulations including 04/2012, 17/2013, 12/2014, 17/2014 and 27/2014 (Asian Development Bank, 2015).

Setting tariffs at a rate that could satisfy renewable energy developers and PT PLN is challenging. All countries using feed-in tariffs have struggled to set tariff rates at a level that provides a fair return but not excessive profits. In some countries, failures by regulators to reduce tariffs in line with falling renewables costs have led to booms in installations but also spiralling subsidy costs. For example, a feed-in tariff in Northern Ireland actually brought down the provincial government as the true extent of the scheme's runaway costs became known (BBC, 2017). Figure 3 represents this difficulty to set up the right support policies.




**What is the right level of support?**

**1.** Support is insufficient to attract investors at large scale.

**2.** Support measures become more and more attractive to investors. RE projects pick up.

**3.** The attractiveness of the support measure to investors causes that there are more projects in the pipeline than the regulator or utility can afford.

**4.** Support measures become too expensive for the regulator or utility and no more projects are approved.

**Figure 3. The relationship between support policies and project development**

*Source: Authors' diagram.*

PLN has historically (and understandably) been reluctant to risk increasing its costs through purchasing renewable power above market rates. On an annual basis, the Ministry of Finance will provide subsidies to cover for any gap between actual revenue requirement and actual sales in order to maintain PLN's financial sustainability. Under the current policy, revenue requirement is the actual spending until the end of the year plus a certain percentage of profit margin. However, there is no clear allocation on how much new renewable energy can be purchased by PLN from new or developing independent power producers (IPPs) beyond next year, and no mechanism for approval from parliament.

Feed-in tariff legislation in Indonesia established rates but did not provide a clear mechanism for PLN to recover the additional costs. Other countries such as China have established renewable energy surcharges to cover the increased cost of renewable energy (Ming, Ximei, Na, & Song, 2013). As a result, PT PLN were

reported to be unable or unwilling to sign power purchase agreements at the published rates (Horn & Sidharta, 2017). Regulations 12/2017 and 50/2017 attempted to address the costs to PLN by capping renewable power purchase prices at 85 per cent of the local average generation cost (BPP, Indonesian acronym for *biaya penyediaan pokok*). Any renewable power generated at these rates would therefore reduce average costs, adding renewable energy at no additional cost. Figure 4 represents the price caps per region according to regulations 12/2017 and 50/2017 and compares them with the national average price (BPP). It should also be noted that the BPP does not differentiate areas in a region where there is a main grid despite some areas in that region are not connected. The main grid rate in this case is the one applied.

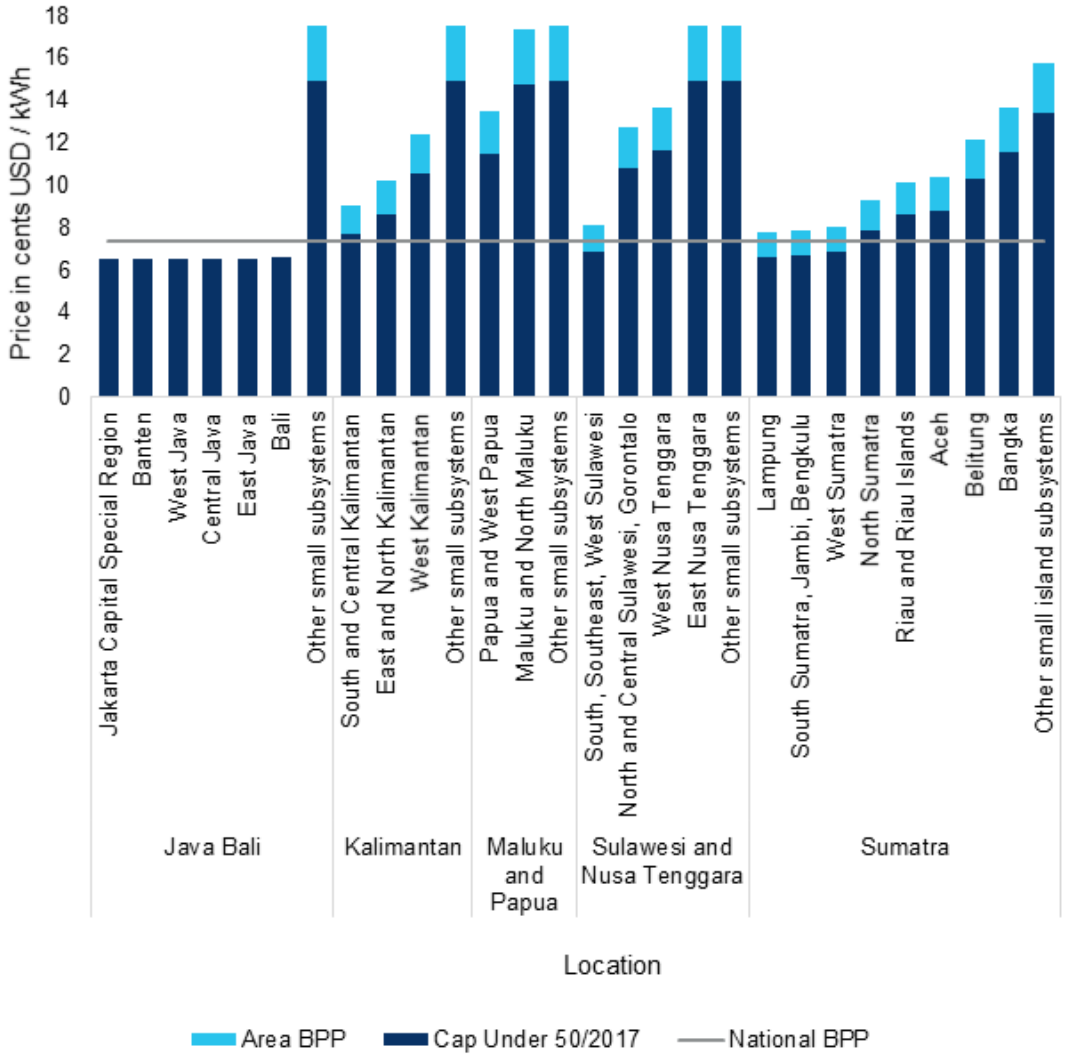



**Figure 4. Caps on power purchase prices under regulation 50/2017**

*Source: Authors' diagram using data from Ministry of Energy and Mineral Resources, 2017a.*

However, interviews with developers and investors indicate that the price caps are themselves a serious barrier to renewables development, particularly in the Java–Bali region where the majority of power is generated and consumed. Higher prices in other regions may be enough to finance some projects, but the lack of strong grids and infrastructure means these are likely to be relatively small. In Java–Bali, the tariffs available under the 85 per cent cap are deemed unviable for renewable energy developers.

A small number of power purchase agreements are reported to have been signed including 283 MW of small renewable projects in May 2017 (Newsbase, 2017) and 640MW of hydro and geothermal projects in November

2017 (Aisyah, 2017b). However, some respondents are skeptical that these projects will actually be built. By capping prices, the risk to PLN was reduced significantly, but it also removed incentives for project developers.

The development of a steady pipeline of projects has been shown to provide opportunities for cost reduction through "learning by doing" (Huenteler, Niebuhr, & Schmidt, 2016). Alternative mechanisms that allow an element of market price discovery, such as reverse auctions, allow a quantity of renewable generation to be procured at the lowest cost the market can provide. Subsequent auctions can then be used to procure additional quantities. Quantities can be determined based on a combination of the anticipated cost of the technology and potential of the technology to become cost effective in the future. Reverse auctions have proved very powerful tools to reduce costs as companies compete to deliver substantial amounts of capacity (Eberhard, 2013).

Renewable energy auctions have already been used in Indonesia. In May 2017 a pre-qualification process was announced to develop 167.5 MW of solar projects in Sumatra (Newsbase, 2017). The bids received for these projects will shed light on the current market prices for solar power. The greater deployment of auctions offers an opportunity to observe price changes and adjust policy accordingly. However, it is important to realize that the cost of small remote projects is quite different to large projects with good infrastructure. The current auctions have not yet explored the cost of large-scale projects on good sites. Future auctions could seek to promote these kinds of projects.

The capped prices for renewable energy meet the objective of maintaining low tariffs and avoiding subsidies, but they threaten the development of a viable renewable energy industry. Alternative policy mechanisms such as reverse auctions also cap prices, by reducing the risk of overspending on renewables subsidies. They have also provided faster-than-expected cost reductions in other countries and could do the same in Indonesia.

### Box 2: 10 Months to Lower Wind Power Prices by 30 Per Cent in India

India's experience with reverse auctions has been remarkable for its large tender sizes and developer responses. Before its first reverse auction for wind power in February 2017, the secretary general of the Indian Wind Turbine Manufacturers Association predicted that tariffs would remain above 4 Indian rupees (INR), or USD 0.062 / IDR 845, per kWh. He said, "Wind is a very mature sector with a lot of sophisticated engineering and hardware, and has been in business for 30 years. So one knows the costs and has learned how to handle feed-in tariff mechanism and project IRRs. Unlike solar, wind sector has not seen massive cost reduction." The lowest existing FIT in India was INR 4.16 per kWh. Surprisingly, developers offered 2.6 times the capacity requested, and amid this competition the winning bids came in at INR 3.46, or USD 0.054/IDR 730, per kWh. The winning developers and state-owned Solar Energy Corp. of India (SECI) signed power purchase agreements for a total of 1,050 MW (in 250 and 50 MW units) in July 2017. A further 1 GW of wind was successfully auctioned in October 2017 with bids as low as INR 2.64 (USD 0.041/IDR 557) per kWh (Chandrasekaran, 2017). Though not directly comparable, it is significant that Indian wind auction results are below BPP prices, indicating that at least on good sites with few technical and regulatory barriers renewables can be competitive.

An SECI representative said that the corporation was planning to tender 4 GW of wind capacity in the 2017–18 fiscal year, plus 5–6 GW per fiscal year thereafter until 2022 until a total of 60 GW is reached. India's wind reverse auctions have also resulted in a shift from FITs to reverse auctions across the country. In May 2017, the Karnataka Electricity Regulatory Commission indicated its intent to reduce its FIT from INR 4.5 per kWh to a cap of INR 3.61 per kWh, and to select developers based on reverse auction.

## 2.3 Policies and Regulations

**Respondents listed a lack of policy stability, difficulties in the negotiation of power purchase agreements and other regulatory issues (such as the local content requirements) as the main hurdles stopping the development of renewable energy projects.** Regulatory changes increase project development costs due to the expense of understanding and complying with regulations and can also render some projects unviable if there is no practical way of complying with the technical constraints of the project. If frequent changes become the norm then the additional risk associated with regulatory change will also be built into project margins (Barradale, 2010).

Costs are low where processes are streamlined, very stable and have been in place for a long time. However, many respondents told stories of projects held up for years by difficulties in the negotiation of power purchase agreements and other regulatory hurdles. Particular frustration was voiced regarding the cancellation of the proposed feed-in tariff rates with the consequent capping of power purchase prices and the frequent update of policies driven by governance changes in the involved ministries. Policy changes of this type place high costs on developers as they line up viable projects under one set of rules only to find that these were impossible to develop under the revised rules.

The inclusion of local content requirements for energy projects was reported to increase project costs at the same time that developers were facing policy changes that reduced tariffs. Ministerial Decree 5/2017 includes provisions to gradually increase local content requirements from 40 per cent in 2017 to 60 per cent in 2019 (Singgih, 2017a). Due to the relatively small scale of solar manufacturing in Indonesia, it is unlikely that local production is competitive with international prices. Mandating local production of solar panels raises prices for developers, reducing the number of viable projects. The local content requirements are intended as a part of industrial policy to create local industries. However, there is a real risk that local content requirements combined with the gap between local production costs and international production costs will prevent the solar industry from becoming competitive in the short to medium term. Requiring local content also increases costs and makes it more difficult for the 85 per cent cost target to be met by developers, adding to an already difficult policy viability assessment. Policy-makers should think carefully about whether the benefits of local content requirements outweigh the costs to the energy sector. There are also reports that international companies have tried to establish manufacturing capacity in Indonesia, and it has been difficult to obtain the necessary agreement that their output qualifies under the local content rules (see Box 3).

There is currently a sense among developers and prospective investors that regulations change rapidly and their experiences with real projects may be variable. Regulatory processes should be developed in consultation with developers to guarantee some basic levels of service and increase confidence in the regulatory system. Such a move would yield an immediate dividend, as more projects would be developed in the new climate of certainty.

### Box 3: Canadian Solar and Local Content

Canadian Solar, a large manufacturer and project developer, invested in a 60 MWp per year module manufacturing facility. Following completion of the facility, initial efforts to receive accreditation of the facility under the local industrial content (TKDN) scheme were rejected, despite significant efforts to develop local manufacturing capacity.

A key goal of local content requirements is to incentivize investment in manufacturing capacity and jobs in manufacturing. Placing additional restrictions on who can invest undermines the objective of the policy and risks reducing supply and increasing project costs further.

*MWp is a measure of the peak electricity production of solar modules under standard operating conditions.*

## 2.4 Subsidies and Externalities

**The importance of the coal industry means that coal mining groups have a very close relationship to the government, and the sector has received considerable government support in the form of loan guarantees, tax exemptions and price supports.** A GSI study from 2017 (Attwood et al., 2017) found that the government provided at least IDR 9 trillion (USD 664 million) in fiscal supports to the coal industry in 2015. This indicates that the industry is capable of influencing policy.

By subsidizing the coal industry, the government of Indonesia is indirectly and artificially decreasing the average generation cost of electricity in the country. Since renewable energy prices are now linked to these prices through the BPP, unsubsidized renewables are effectively being asked to compete against subsidized coal generation. A GSI estimate found that if all subsidies to coal were removed, the price of electricity from coal could rise by as much as IDR 68 per kWh (USD 0.05/kWh) (Attwood et al., 2017). Setting tariffs for renewables based on subsidized costs of coal is creating an unequal playing field for renewables.

Energy use comes at a financial cost, but there are also "external" costs in the form of impacts on the environment or society that are not currently factored in. Reorienting the fiscal system or otherwise promoting policies that increase prices on activities associated with environmental "negatives" like pollution, and reducing charges on activities that provide social benefits, like employment, is becoming increasingly common as economists look beyond financial costs. Currently, electricity prices are set to reflect the generation cost, and the impacts of burning fossil fuels on health and climate change are not reflected in these prices. In a country where around 88 per cent of its electricity capacity comes from fossil fuels, and mostly coal, there is a strong argument for factoring the cost of environmental harm into the price of electricity (Ministry of Energy and Natural Resources, 2016).

The World Health Organization (WHO) lists air pollution as the most harmful environmental carcinogen, killing more people every year than passive smoking (World Health Organization, 2013). Emissions from coal are associated with respiratory illness, acid rain, and the contamination of water and food with mercury and persistent organic pollutants (POPs), such as dioxins and polycyclic aromatic chemicals (PAHs) (HEAL, 2013). To evaluate the health cost linked to air pollution in Indonesia, a study developed by Greenpeace based on results by Harvard University, found that coal power generation caused 6,500 premature deaths a year (Greenpeace, 2015). Despite the ethical and technical difficulties of estimating the cost of a human life, the Institute for Health Metrics and Evaluation (IHME, 2016) estimates a mean "Value of a Statistical Life" (VSL) from a survey of middle-income countries of USD 383,440. The report by Attwood et al. (Attwood et al., 2017) considers both previous values and estimates the cost of health due to air pollution in Indonesia at USD 0.02 per kWh.

The costs of climate change are calculated considering the cost of CO2 emissions, valuing changes in net agricultural productivity, human health and property damages from increased flood risk and changes in the energy system. These estimates range between USD 0.05 per kWh (Interagency Working Group on Social Cost of Carbon, 2010) and USD 0.26 per kWh (Westphal et al., 2015).

The use of trading systems and pollution charges is one approach to correcting market failures. However, many countries take account of external costs less formally by adopting policies that promote clean technologies. The system of establishing a benchmark (BPP) price for generators does not take into account any recognition of the environmental benefits of renewable energy. In fact, since the coal industry receives support from the government, the energy market actually favours more polluting coal over cleaner renewables. There is a clear case for renewable energy to attract some sort of premium to reflect the technology's positive environmental impact.

## 2.5 Rent Seeking on Fossil Fuel Supply Contracts

**Maintaining low electricity tariffs and low generation costs is a key objective for the electricity sector, yet expensive diesel generators are still seen as a good option for rural electrification.** There is still a large amount of generation from costly diesel generators in many grids across Indonesia. As renewable energy prices fall, renewables are increasingly becoming the most cost-effective technology for remote areas. A recent study from the Carbon Trust found that even based on 2016 costs, the levelized cost of energy for mini-grids operating on solar PV, micro-hydro, biomass or diesel was broadly equivalent and that the economics of renewables were particularly favourable in remote areas where local diesel prices may be above USD 1 per litre (Jennings, 2017).

There is an opportunity to use renewable energy to drive rural electrification. The 2,500 village program aims to provide access to electricity to approximately half a million households in areas that currently have no or limited access to electricity, mainly in Papua or West Papua (Jennings, 2017).

Some respondents suggested that PLN provides PPAs for diesel and gas-powered projects in remote grids at rates above regional grid averages. Pertamina, the state-owned fuel supplier, is also involved in remote power applications through its subsidiary Pertamina Power. In some cases, PLN acts both as a purchaser of the power and as fuel supplier to power generation projects. This relationship creates a potential conflict of interest. Some respondents suggested that guaranteed diesel sales resulting from installation of generators allow various middlemen involved in the distribution of liquid fuels, including in some cases subsidiaries of PLN, to make consistent profits from fossil fuel-based projects. The replacement of diesel with renewable systems would result in fuel supply reductions and a loss of profits. This is likely to be opposed by those who stand to lose out and could lead to resistance to renewable energy projects.

There is a risk that regardless of the technical and economic merits of the technology, the vested interests that benefit from fuel supply contracts will continue to lobby for fossil fuel-based electrification. One of the key strengths of renewable energy is that it requires very little maintenance and no fuel inputs. This also means it does not offer the same opportunities for rent seeking, and it is likely to provoke opposition from those benefiting from a continued reliance on diesel and gas. Policy-makers should monitor the development of off-grid generation to ensure that decision making reflects the costs and benefits of the technology

There is also evidence of rent seeking further up the supply chain. In 2015 it was reported that Petral, a company supplying fuel to Pertamina, engaged in price manipulation estimated to have artificially increased the cost of oil and gas on procured on contracts by around USD 18 billion (IDR 250 Trillion) (Tempo.Co, 2015). There has also been some criticism of the lack of transparency over the negotiations of power purchase agreements between PLN and IPPs, suggesting that private project-specific negotiations do not necessarily secure best value or allow open competition compared to auctions or open tenders (WRI, 2010).

# 3. The Political Economy of Renewable Energy Policy in Indonesia

The lack of renewable energy development in Indonesia is not primarily due to technical constraints—it represents a political equilibrium. To understand why renewable energy development has stalled, it is necessary to consider the political economy of renewable energy in Indonesia. This section presents a review of the major groups involved in the sector with a focus on their influence on—and support of or opposition to—additional policies to promote renewable energy.

An analysis of the motivations and relative influence of the key actors identifies an impossible balancing act between access and affordability for consumers, low subsidy cost and renewable energy deployment targets (see Box 4). It is currently possible to satisfy only two of these objectives. The balance of power in the Indonesian electricity market is prioritizing lower prices and low subsidies over meeting the renewable energy targets.

The slow progress persists because some of the more influential and engaged actors believe that the current equilibrium best serves their interests. Section 3.4 outlines some of the forces and actions that might overcome the inertia that has led to the lack of progress toward the targets.

## 3.1 The Key Actors

Interviews were conducted with 26 actors involved in the renewable energy sector in Indonesia. They could be divided into eight main interest groups, depending on their roles and objectives. The groups considered are: the Presidency, the Ministry of Finance (MoF), the parliament (DPR), the Ministry of Energy and Mineral Resources (MEMR), PLN (Perusahaan Listrik Negara, the state-owned utility), renewable energy independent power producers (IPPs), development partners and the coal industry. We briefly consider below the objectives and attitudes of each group toward renewable energy, the knowledge and capabilities of that institution, along with the extent of their engagement and influence, and the interests that they have. Table 1 summarizes the main characteristics of these groups.

### The Presidency

The President and his office can be extremely influential and are generally supportive of renewable energy. The Presidency is responsible for defining the National Energy Strategy (KEN)[1] and validating the General National Energy Plan (RUEN) (Cabinet Secretary of the Republic of Indonesia, 2017). The renewable energy vision plays an important role in these documents, suggesting that the president is personally supportive of the renewable energy agenda. Our discussions with this team made clear the support that the president has for a renewable energy future for Indonesia. However, his framing of the issues is important. As one senior official put it "The President wants prosperity for the people; we need infrastructure for that; energy is a milestone toward that goal."[2] In other words, energy policy is one part of a broader push to improve infrastructure and boost growth, the source of energy—whether renewables or otherwise—would appear to be a lower priority, at least in the short term.

The Presidency is focused on delivering affordable energy for the people and concerned that renewables could increase costs. As almost all respondents mentioned, the president is heavily constrained and primarily oriented toward the immediate impact on ordinary Indonesians. Staff from the president's office argued that renewable energy was good and could increase access, but it has to be economically sustainable. As one put it "We cannot make it [renewable energy] sustainable if next door [coal-based electricity] is 4.5 c [per kWh]." This may reflect

1 The 23 per cent renewable energy target was included in the KEN by Jokowi's predecessor. Legally, the KEN is a government regulation, which are in the hand of President, so that Jokowi can adjust the target without consulting the DPR.

2 Interview with senior staff in President's office, April 2017.

the belief of senior officials that certain types of renewable energy, notably solar, are not economically viable in the regions that have significant coal-fired electricity capacity.

### The Parliament (DPR)

The Indonesian parliament (Dewan Perwakilan Rakyat, or DPR) has a key role in laying down the legislative framework for renewable energy and in approving the budgets for line ministries and for PLN that determine whether renewable energy developments can take place. There is a wide range of different views among the 560 parliamentarians. Some are strongly in favour of renewable energy; however, many are closely allied with the fossil fuel industry, notably the coal interests. Most are extremely sensitive to the price of electricity for their constituents and regions. Moreover, it is widely recognized that the in-depth technical knowledge of many members of the DPR is not high. Consequently, many DPR members are not familiar with the details of the energy sector—their main knowledge is of the prices, which are paid by businesses and voters within their regions and the quality of service that they receive.

The process for passing legislation and budgets in the DPR has been criticized as taking place behind "closed doors," indicating a lack of transparency (Sherlock, 2012). A number of respondents raised the political process as a potential barrier to renewable energy policy-making, as it places a layer of uncertainty between elected representatives and the decisions made by the DPR. Several high-profile corruption cases of former energy sector policy-makers suggest that the capture and distribution of rents has been a notable feature of the energy sector, at least in the past (The Jakarta Post, 2016).

One respondent—a representative of the renewables sector who had been asking parliament members to support renewables policies—told us that the response they had received from DPR members was "The government didn't push the agenda so why should we push?" This highlights a need for senior support from government before parliament members are willing to back key pieces of legislation. As another respondent put it, "There isn't anyone pushing for renewable energy except NGOs, the World Bank and industry."

Several respondents cited the rejection of a budget for renewable energy subsidies for PLN in August 2017 as an example of the lack of support for renewable energy in the DPR. PLN split its accounts and separated out the funding that would be required to support the expansion of renewables through offering higher feed-in-tariffs. A request was put to parliament for IDR 1.3 trillion (USD 96 million) but this was rejected. Numerous respondents argued that had the government really wanted it to this budget could have passed. Some respondents suggested that, by separating out the renewable component, which had previously been part of PLN's operational costs and therefore its general request for annual subsidy, PLN reduced its overall request for subsidy from parliament, while providing a mechanism through which parliament could reject funds for renewable energy developments that PLN did not wish to make. Indeed, we were told that forcing things through parliament was a common way of stopping things from happening.

Overall, the DPR therefore has an important influence. Our judgement is that, on balance, it is not very supportive of renewable energy despite commitments like the 23 per cent target and the NDC. However, given the huge number of other issues facing parliament, most DPR members are not deeply engaged in the issue.

### The Ministry of Finance

The Ministry of Finance (MoF) provides fiscal governance and manages the state budget, having a critical role in determining eventual financial support to renewable energy sources. From the ministry perspective, renewable energy that came at no or little additional cost would be welcomed. However, our interviews suggest that MoF's priority is to keep subsidies low, which is at odds with additional spending on renewable energy. The MoF already supports renewable energy technologies in the forms of fiscal incentives, such as tax policies and financing, notably for geothermal energy (Attwood et al., 2017). However, the MoF remains reluctant to increase the subsidies to PLN to cover greater incentives to renewable energy in the form of, for example, feed-

in tariffs.

The Ministry of Finance's principal concern is with the financial health of the sector. In September 2017, the Minister of Finance wrote a letter to the Minister of Energy and Mineral Resources and the President Director of PLN expressing concern about PLN's finances and level of indebtedness (Singgih, 2017b). PLN has a very high level of indebtedness, and so the Ministry of Finance wishes to ensure that PLN has enough cash to cover its interest payments.

The Ministry of Finance is almost the only branch of government that favours increasing electricity tariffs—subject to what is politically feasible—since this would reduce the size of the subsidy which the ministry needs to provide to PLN. However, if there is a significant gap between planned and actual subsidy required, the unplanned amount will be delayed, and PLN must borrow from local banks to fill the cash gap. One respondent suggested that recent Ministry of Finance support for a USD 1.2 billion syndicated investment loan from local banks was provided to help ease the pressure on short-term borrowing by PLN (Aisyah, 2017a).

### Ministry of Energy and Mineral Resources

The Ministry of Energy and Mineral Resources (MEMR) is the principal body responsible for energy policy in Indonesia, and the energy minister has a significant amount of power to shape energy policy. Several people pointed to the stark difference in approach between the current minister, Jonan Ignasius, and his predecessor, Sudirman Said. Said was a well-known advocate for renewable energy and issued a set of generous FiTs for renewables in an attempt to stimulate the sector. By contrast, Ignasius is an investment banker by background and is generally regarded as being closely aligned with PLN and somewhat skeptical about the advantages of renewable energy.

The personalized nature of policy is further illustrated by the relative power of different Directorate Generals within the ministry. Under Said, the renewables directorate, EBKTE, played a role in formulating policy. However, several respondents told us that, under the current minister, EBKTE has been sidelined, with regulations on renewables being drafted by the Electricity Directorate General, or even by PLN.

Like all sectoral ministries, MEMR is also sometimes in conflict with the Ministry of Finance. Several respondents told us that MEMR issued regulations on FiTs without prior consultation with the Ministry of Finance, despite these regulations having fiscal implications. There is no obligation for the ministry to coordinate and no mandate for the Coordinating Ministry of Economic Affairs to play a role on these issues.

The current minister appears to be committed to maintaining low electricity prices, and this is reflected in renewable energy price benchmarks. Numerous respondents recounted the impact of Ignasius's trip to Abu Dhabi in 2016, where he found renewables available for USD 0.03-0.04 /kWh compared with USD 0.145 / kWh in Indonesia (Solarplaza, 2017). This appeared to convince the minister that much lower prices are feasible in Indonesia, and therefore led him to conclude that investors are attempting to gain excessive profits by demanding very high FiTs.

Our overall assessment of the MEMR is that it is does not oppose the development of renewable energy, but that, at present, it wishes to see such resources developed at much lower costs.

### PLN

The scale and scope of PLN's operations and responsibilities make it an enormously influential actor. PLN acts as a single buyer of electricity; generator; transmission and distribution grid operator; fuel supplier to generators; grid developer; and a range of other responsibilities. This role creates potential for conflict of interest and perverse incentives. The development of ministerial regulations 12/2017 and 50/2017 are an example of PLN's influence. Rather than implement the FiT policy and risk building up operating losses, PLN instead

refused to sign power purchase agreements and eventually ministerial regulations 12/2017 and 50/2017 were implemented that effectively capped FiT rates relative to regional average generation tariffs (PwC, 2017). As one former senior official put it "PLN doesn't need the energy minister – they are the regulator and executors and have a monopoly."

There are several reasons why the creation of a more supportive policy framework for renewable energy may not be aligned with PLN's interests:

- The potential increase in costs of procuring renewable energy over fossil fuels creates the real prospect that PLN will be left with unrecoverable costs. PLN is currently making a large loss each year before subsidies. Increased costs for renewables could increase this demand for subsidies worsening the financial position of PLN (Sanchez, Toft, Bridle, & Lontoh, 2016).
- PLN is the owner and operator of around 54 per cent of Indonesia's coal power capacity (PT PLN, 2016). Renewable energy could render this capacity as stranded assets.
- Faced with the prospect of a potential trade-off between grid stability and additional renewable energy, respondents suggested that PLN prioritizes stability and therefore the size of projects that it will permit to connect to the grid. As one respondent put it "projects are small, considered unreliable and have grid implications—so PLN don't like them."
- As a large state-owned enterprise (SOE) with a very established business model, renewables can be disruptive to PLN. We were told there are relatively few PLN staff that have the skills and knowledge about renewables necessary to implement major expansion.

In summary, there are numerous reasons for PLN to be reluctant to accommodate large volumes of new renewables on the grid and few reasons for them to expand renewables. Without a mechanism that provides a direct benefit for PLN they are likely to remain indifferent or opposed to increases in renewable energy.

### Renewable Energy Independent Power Producers

The single most important factor that determines the return that renewable independent power producers (IPP) make on their investments is the price agreed in the power purchase agreement (PPA). Developers therefore have a clear incentive to push for the highest possible price. However, as noted above, projects cannot start unless there is a willingness from PLN to sign the PPA. These costs vary by type of renewable, scale, location and over time, as new technologies are developed. It is difficult for the government and PLN to know what the appropriate price should be to maximize value for money. In principle, competitive bidding or auction mechanisms can help to reveal true costs, but these are not always appropriate or feasible, particularly for resources that require large prior investments.

In our interviews, IPP developers complained bitterly about recent changes in pricing policies. The general consensus, across almost all forms of renewable energy, was that current prices were not realistic and that very few projects would go ahead under the current tariffs in Java and Bali because of the 85 per cent of BPP rule. Several respondents said that the new regulations had pushed efforts toward more remote regions where a higher share of BPP or a higher BPP provides better returns (see Figure 4).

A second important concern of IPPs is the level of uncertainty surrounding investments in the sector. A frequently cited example was a regulation passed in early 2017 that states that geothermal PPAs can only be negotiated once a resource is proven. Geothermal exploration is extremely risky—it is often the case that drilling shows that a resource is not sufficient or appropriate for exploration, but undertaking such drilling can cost millions of dollars. It has therefore long been the practice that PPAs for geothermal have been agreed in advance so that an investor knows that if they are successful they will be able to exploit the resource profitably. Delaying these negotiations until a resource is proven means that investors have very little incentive to undertake exploration.

A key interest for all investors is maintaining control over their investment. A number of respondents pointed to the recent shift from a build-own-operate model to a build (own)-operate-transfer approach in which the asset is handed over to PLN. Naturally, this changes the incentives for investors, since it means that they must recoup their initial costs and make their return in a limited period, thereby increasing the price that is acceptable to the investor. In some circumstances, this requirement stops investment entirely.

Furthermore, PLN is requiring that some generation projects be developed as jointly owned projects, with PLN holding a 51 per cent share. Investors claimed that this was part of a systematic attempt by the government to ensure greater PLN and SOE ownership of the sector. All the private investors to whom we spoke claimed that they would not invest because of a minority shareholding requirement.

Finally, IPPs complain about the high costs of doing business in Indonesia. This refers not only to the costs associated with the bureaucracy but also the costs of inputs. For example, as noted above, Indonesia is attempting to develop the production of solar PV panels. The members of the solar panel producers association (APAMSI) focus on assembling imported solar PV panels, with one company producing solar PV panels. As a result, the local industry cannot yet meet the demand for such panels; however, local content regulations are driving up prices (Aprilia, 2017), making solar installations less attractive.

IPPs have an interest in arguing for higher prices, greater certainty, strong ownership and lower costs. While in some cases there may be strong evidence to support their claims, one would expect IPPs to make these arguments. What is more revealing, however, is the impression that most IPPs have relatively little influence over policy. Hence, although they are extremely knowledgeable on the issue, highly engaged and obviously very supportive of renewable energy development, they have not yet been collectively able to shift outcomes significantly in favour of policies that are more supportive of renewables.

### Development Partners and Civil Society

**Development partners have played a supportive role in the development of policies and in facilitating investment in renewable energy for many years.** The World Bank and the Asian Development Bank, as well as JICA and KfW, have lent extensively to the sector over the years. Similarly, bilateral partners, including GIZ, Sweden, Denmark,[3] Canada, the United Kingdom and others have supported the development of policies and provided technical assistance and support for pilot projects and private investment.

Environmentally focused civil society groups are also strongly in favour of renewables, driving public engagement on the impacts of fossil fuel energy sources, in terms of the environment and climate change in particular. They are able to draw attention to issues and highlight the benefits for Indonesians of a shift to renewables.

The level of engagement of development partners and civil society with renewable energy is relatively high, since an important part of their role is to support Indonesia in meeting the Sustainable Development Goals and Indonesia's Nationally Determined Contribution to the Paris Agreement. However, the total funding supplied by development partners in Indonesia is relatively small. The multilateral development banks have a degree of influence due to their ability to provide significant capital at concessional rates and more broadly crowd in private investment. Similarly, the expertise provided by individual bilateral donors and civil society groups is generally regarded as useful in building the knowledge and capacity in the sector. However, the influence of these players is low, given that total financing from development partners is a tiny proportion of all financing and the evidence suggests that policy often deviates substantially from the recommendation of such partners and civil society.

3 This report was sponsored by the governments of Sweden and Denmark.

## Coal and Other Fossil Fuel Interests

The coal industry is a significant player in Indonesia's electricity market; coal represents around 45 per cent of Indonesia's total power capacity (PT PLN, 2016). Indonesia is the fifth largest coal producer in the world and the second largest coal exporter (IEA, 2017a), with coal contributing positively to the state's budget in the form of royalties. Policies that reduce the importance of the coal industry risk the flow of coal royalties and thousands of jobs in the sector. The coal industry has a clear interest in avoiding measures that provide a premium for cleaner forms of energy. The influence of the industry means that it is likely that it can communicate these concerns effectively to policy-makers.

The coal industry faces a number of threats, including falling global demand, electricity sector overcapacity in some areas of Indonesia and concerns around pollution. In 2017, the Indonesian government announced plans to prioritize coal supply to the domestic market (IEA, 2017a, 2017b), notably for the generation of electricity. The coal industry is preoccupied with ensuring that coal is considered a cheap domestic resource and does not see renewable energy as a replacement for coal.

Beyond the coal industry, oil and gas generators are also potential competitors for renewables. According to the latest RUPTL (Ministry of Energy and Mineral Resources, 2017b), oil and gas generators are considered to be a key solution to rural electrification, at least as a transition source. There is the possibility that Pertamina and other oil and gas interests could become opponents to renewable energy if fossil fuel-based off-grid energy starts to impact on their sales.

**Table 1. Summary of objectives, knowledge and engagement of key energy sector actors**

| Interest group | Brief description | Objectives, attitudes and support for renewable energy | Knowledge, capabilities and influence | Interest and engagement |
|---|---|---|---|---|
| **The Presidency (Joko Widodo)** | Joko Widodo has been the president since 2014. The main focus of Jokowi's mandate is to ensure domestic growth and prosperity. | On energy, Jokowi has focused on energy security, maintaining low electricity prices, reducing subsidies and universal access to electricity.<br>The target of 23 per cent of RE by 2025 was defined by Jokowi's predecessor in the KEN (National Energy Policy). His attitude to RE is positive, as long as the price is low. | The knowledge of the Presidency about RE is high and has very strong influence, being able to revoke regulations issued by the MEMR or other ministries. As a result, it has the highest influence and capabilities to increase the share of RE. | The Presidency is supportive but has limited engagement with renewable energy policy. The need to balance many competing priorities aside from energy, most notably the need to ensure economic growth and development of infrastructure has led to a lack of decisive action to ensure delivery of the renewable energy target. The need to deliver on energy access priorities also has an impact on renewables if they are perceived as a more expensive alternative to other fuels. |

| Interest group | Brief description | Objectives, attitudes and support for renewable energy | Knowledge, capabilities and influence | Interest and engagement |
|---|---|---|---|---|
| **The Peoples Representative Council (DPR)** | The DPR is formed of 560 elected members representing 10 political parties and a wide range of political beliefs. The functions of the DPR include budgeting, legislation and oversight. | Some representatives and parties have historical or financial ties to fossil fuel related industries. Many parliamentarians are also strongly opposed to consumer price increases. | The parliament is potentially very influential on energy policy. The parliament as a whole has a say over spending and policy decisions that will shape the sector. The knowledge and capabilities of parliamentarians are very variable. | Energy is a relatively minor issue for most parliamentarians. Issues that concern the public, such as energy pricing, do affect their decisions which can act against renewables. Overall influential but not deeply engaged, or overall supportive. |
| **Ministry of Finance (MoF)** | The Ministry of Finance is responsible for supporting the Presidency in running the state finances, in providing fiscal governance and managing the state budget. The current minister is Sri Mulyani Indrawati. | The MoF promotes renewables in the forms of fiscal incentives, such as tax policies and financing. However, the objective of the MoF is to minimize subsidies to PLN to assure that public money is assigned to cover basic needs, such as grid development. | As part of its many duties, the MoF defines fiscal policies and decides on the fiscal transfers awarded to PLN. It can also decide whether to assign state financial support to a specific sector, as RE, so that their power to determine the future of RE is high. | The MoF is engaged with issues related to the cost of support measures and remains broadly opposed to measures that would require additional subsidies. The MoF does not view the achievement of renewable energy targets as a key measure of their performance. |
| **Ministry of Energy (MEMR)** | The Ministry of Energy and Mineral Resources is responsible for supporting the Presidency's commitments on energy. The current minister is Ignasius Jonan. | MEMR's objective is to meet the Presidency's energy targets by defining appropriate policies. MEMR is traditionally more inclined to support coal and fossil-fuelled electricity production. On the other hand, the EBKTE is in favour of RE and EE, and works in promoting it. | MEMR's knowledge on RE is high. It is responsible for policy, and for approving PLN procurement plans, which play a crucial role in the future development of the electricity sector. Implementation of policies and procurement plans is left to PLN, limiting MEMR's authority. | The MEMR is strongly engaged with issues around renewables. MEMR balances energy security and cost against the need to meet renewables targets. Currently the calls from PLN to avoid measures that increase costs are thought to have reduced support for renewables. |
| **State-owned electricity company (PLN)** | PLN is a vertically integrated state-owned electricity company operating most of the generation capacity, transmission and distribution network. PLN is the single buyer of electricity responsible for issuing all PPAs with IPPs. | The focus on reducing costs gives PLN no incentive to invest in expensive RE that may also require additional infrastructure investment. Current PLN strategy is built around coal. | PLN's knowledge of the electricity sector is very high, although limited to business-as-usual operations, where fossil fuels dominate.<br>PLN is a de facto policy-maker in Indonesia with an effective veto on policy implementation. PLN is believed to be influential with current MEMR leadership. | PLN has a very clear interest to avoid policies that worsen their financial position. For this reason, renewable energy policies that would increase PLN's costs are opposed. |

| Interest group | Brief description | Objectives, attitudes and support for renewable energy | Knowledge, capabilities and influence | Interest and engagement |
|---|---|---|---|---|
| **Renewable energy Independent Power Producers (IPPs)** | International and local investors, including major players in the fossil fuel sector, state-owned enterprises (Pertamina), equipment suppliers, project developers, auditors and consultants. | Main objective is to sell renewable electricity at a profit. They have a positive attitude to the development of RE, but their willingness to invest depends on the supporting policies and regulations. | Very high knowledge on project finance, policies, permitting, technical requirements and PPA negotiations. They also know the technologies and the cost evolution. Their influence depends on degree of relevant political connections. | Very high level of engagement as a supportive policy environment is viewed as critical for success. |
| **Development partners and civil society groups** | International actors supporting RE and offering funding and/or technical support. They include: foreign countries, international development banks, international cooperation agencies. Also includes METI, the Indonesian Renewable Energy Society, and other local groups with an interest to grow renewables. | This group very much in favour of a stronger focus on RE by the Indonesian government and is strongly supportive of Indonesia meeting its commitments under the SDGs and Paris Agreement, through extensive technical assistance and advice. Civil society groups also carry out advocacy in favour of RE. | This group has excellent knowledge of RE. Their influence is determined by its financial support to projects in Indonesia and by the quality of their ideas and the ability to share useful experience with their Indonesian counterparts and other stakeholders. However, this group is generally not a deciding factor in determining RE policy. | A high level of engagement, the promotion of a transition to low-carbon energy is a priority for these groups. |
| **Coal and fossil fuel industry** | Coal is one the main industries in Indonesia and source of revenues for the government. State-owned and private companies, local and international, form this group. | Coal is a key pillar of energy security and has a very important role in the energy mix. The industry's interest is to maintain their hegemony. The group has a neutral or negative attitude to renewables. Some coal producers, such as Adaro, have a subsidiary working on RE. | This group is an expert in the coal mining sector and in coal power generation, but unless they have interests in RE through subsidiaries, their knowledge of the RE industry is limited. As a group of major Indonesian business conglomerates, there are important linkages between the companies and senior members of the government. | The coal industry could be a main loser from a shift to renewables, but the industry faces a number of more immediate threats including falling global coal consumption, changes to contracts or changes on regulations that directly affect operations. They do not currently view renewable energy as a major threat so do not strongly engage with renewable energy policy-making. |

## 3.2 The Political Equilibrium

To understand the relations between the different actors involved in the development of renewable energy, Figure 5 visualizes them in an influence-interest-engagement plot based on the assessment of the motivations, ideologies, capabilities, resources and the degree to which renewable energy policy is central to their operations. The analysis is based on interview responses and supported by literature review. The assessment is qualitative and subjective but provides a useful tool for understanding the actors and their influence.

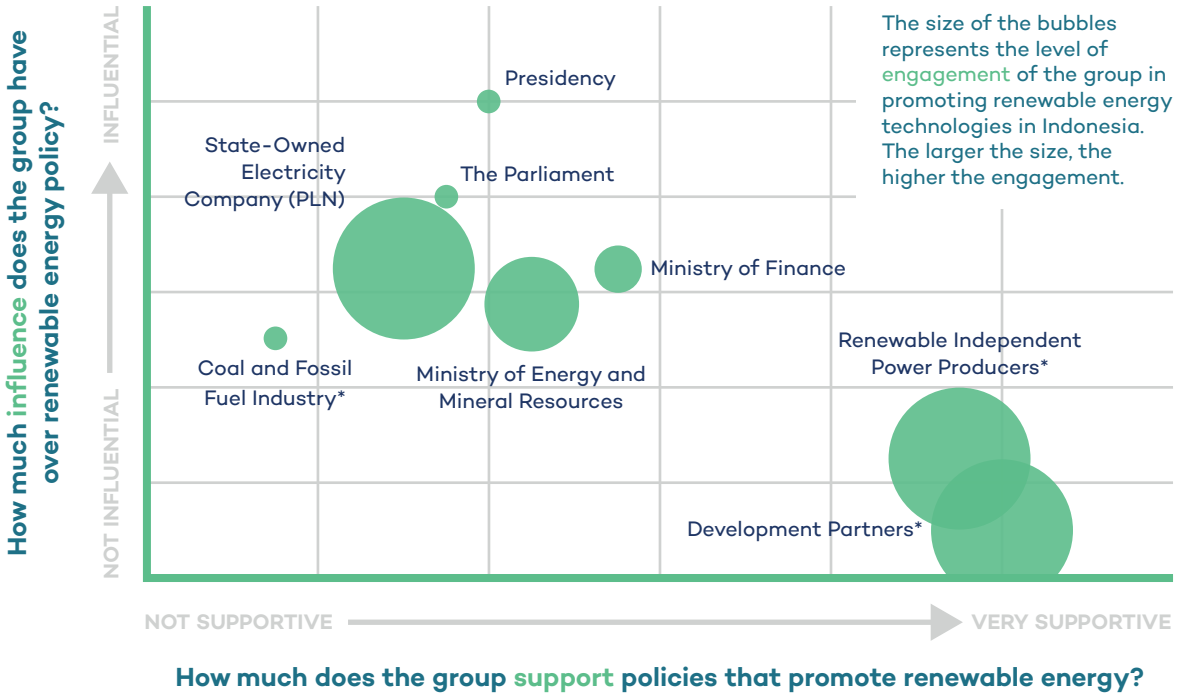



**Figure 5. Relative support for policies promoting renewable energy, influence and level of engagement of stakeholder group**

*Source: Authors' diagram.*

Support for policies that promote renewable energy is highest among groups who have direct interests in the development of clean technologies: IPPs and development partners. However, our interviews suggested that these groups probably exert relatively little influence over energy policy.

The Presidency and the parliament have enacted policies that support renewable energy, but support for renewable energy is a relatively low priority compared to other issues. As a result, the failure to deliver a rate of installation compatible with meeting the renewable energy target has not prompted policy-level action to ensure the target is met.

The Ministry of Energy and Mineral Resources and the Ministry of Finance are both much more influential than IPPs and development partners, but they have mixed opinions on the case for supporting renewable energy. MEMR priorities appear to be maintaining low electricity prices and increasing access to electricity. Current thinking within the MEMR suggests that these priorities are best served by the deployment of fossil-fuelled electricity, notably coal, which is also favoured by MoF for cost reasons.

PLN is a key actor with significant influence on policy, having effectively a de facto veto on whether electricity sector policies are implemented. PLN has to comply with its main mandate of supplying electricity to an increasing number of Indonesians at a low price, which means keeping consumer tariffs low and investing in new low-cost electricity generation, distancing PLN from a renewables-focused future.

Overall, our analysis suggests the most important and influential actors have ambiguous or less favourable views on the need for a shift to more supportive policies for renewables, while those that are in favour tend to have much less influence. As a result, the outcome is likely to be one in which the current rhetoric supporting renewables development is maintained, but where the actions taken are much more limited. Box 4 summarizes the situation facing renewables as not merely the outcome of a power struggle between those for and against investment in the sector but as the outcome of an Indonesian "energy trilemma."

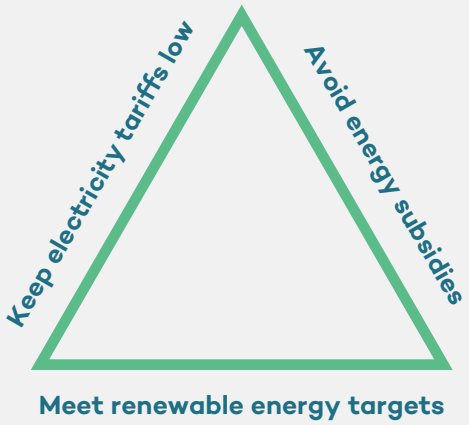
### Box 4: The Indonesian energy trilemma

The fundamental political challenge facing renewable energy development is that policy-makers need to meet three mutually incompatible objectives:

1. The need to meet three mutually incompatible tariffs low.
2. The need to keep subsidy costs low.
3. The need to meet the renewable energy targets.

Most of the actors would like to be able to meet all of these conditions, but, in practice, it is only ever possible to meet two of the objectives. For example, it would be relatively straightforward to meet the renewable energy targets if PLN was willing to sign power purchase agreements with renewables developers at prices that reflect the current costs of renewables. However this might require an increase in electricity prices, which is politically unpalatable. Such a price increase could be avoided if subsidies were increased—but this is incompatible with good fiscal management.

**Figure B4.1: The Indonesian energy trilemma**




1 There are, of course many other objectives of Indonesian energy policy—for example, ensuring energy security, and widening energy access—but we focus here on the issues that constrain renewable energy development.

## 3.3 The Prospects for Meeting the 23 Per Cent Target

The most striking finding from the interviews with experts was that none of the respondents believed that the target of 23 per cent of the energy mix coming from renewables by 2025 target would be met. This alone should ring alarm bells among policy-makers. If there is confidence that projects will go ahead, this capacity will be delivered to meet the targets. If there is no confidence that the government will act to meet targets, investments will not be made—not only will the target be missed, but any information on the sector will be viewed with suspicion, reducing the ability of the government to influence events.

A key perceived impact of the policy to cap power purchase prices was that it prevented renewable energy projects from moving forward in much of the country, particularly in Java. On the one hand, this is likely to push developers to look areas in the east where there is the greatest need for energy access investments. On the other hand, the focus on areas with less developed infrastructure means that projects are likely to be smaller and more expensive. Overall, respondents believe that this policy will lead to much less PV installed and much smaller scope for low-cost, large-scale projects that have been transforming energy sectors around the world.

There is also a growing understanding of the shortcomings of a coal-dominated electricity sector. The recent announcement by Energy and Mineral Resources Minister Jonan that no new coal generators will be given permits on Java marks a change in the logic that Indonesia should look first to coal (Jensen, 2017). However, at the highest political levels the case that renewable energy can really replace fossil fuels has not yet been convincing. Respondents believe that more still needs to be done to secure political commitment to renewables. Some respondents suggested that the inconsistency between the target and what is actually happening on the ground would provide an opportunity for another round of policy-making—even and improvement—if the president and other senior politicians choose to prioritize renewable energy.

## 3.4 How Might Things Change?

The section above provides a somewhat gloomy prognosis for the development of renewable energy in Indonesia. However, our political economy analysis also provides some insight to the way in which change might happen in this field. The logic of the energy trilemma suggests three ways in which things might change:

1. Making electricity price increases more acceptable.
2. Reframing subsidies to renewable energy as investments in the future from an economic, health and climate change standpoint.
3. Reducing the (relative) costs of renewable energy.

The first two of these pathways suggest a reassertion of the priority given to renewable energy by the government. The last pathway implies either technological or policy mechanisms for reducing costs, or external factors that increase the costs of fossil fuels. We assess briefly the feasibility and likelihood for each of these changes.

### A New Vision for Renewables

One possible way in which renewable development could be boosted would be if the government reasserted its commitment to the renewable targets and goals it has set and made clear its determination to achieve these targets. This would start with designing and—crucially—implementing plans consistent with the targets. As one advocate for renewable energy put it: "Someone needs to remind the President 'You promised the people renewable energy'—it is in the Presidential vision document."

The renewable resources at Indonesia's disposal are immense. Table 2 shows a summary of government estimates for renewable resources. Indonesia has a particular strength in geothermal energy; its unique position on the "Ring of Fire" presents the possibility of abundant cheap energy in the future. Solar and wind energy are very large but diffuse resources. The potential for hydropower, including mini and micro-hydro, as well as energy from biomass, is also very significant. The renewable resource potential underlines the opportunities to meet electricity needs through renewables. By way of comparison, PLN's procurement plan, the latest RUPTL, targets an additional 80.5 GW of new capacity over from 2016–2025 (Ministry of Energy and Mineral Resources, 2017b). The resources are available for capacity additions of this scale to be met by renewables.

**Table 2: Renewable Energy Resources in Indonesia**

| Source | Potential power generation |
|---|---|
| Hydropower | 75 GW |
| Geothermal | 29 GW |
| Biomass/biogas | 32.6 GW |
| Solar Photovoltaic (PV) | 207.8 GW |
| Wind Power | 60/6 GW (3-6 m/s) |
| Ocean | 17.9 GW |

*Source: PwC, 2017.*

As a G20 member with growing influence on the world stage, Indonesia's potential for renewable deployment has a useful political appeal. This, along with the country's key role in combating climate change, was what motivated the initial commitments on renewable energy. Such considerations are still likely to be important for whoever wins the presidential election in 2019, but our interviews suggest that, over the next two years, domestic priorities are likely to have a much higher resonance.

More significant in the short term is the fact that renewables could enable the government's commitment to achieve almost 100 per cent electricity access. As one former senior official put it "the most convincing argument is that the Gini [a measure of inequality] is 0.41 and going up." The issue of social equity and, in particular, disparities between regions, has strong political resonance in Indonesia, and several respondents highlighted renewable energy as a solution to energy access challenges. For example, the government is devoting significant resources to the electrification of 10,300 remote villages by 2019 to hit the 97 per cent electrification target.[4] In many remote areas, off-grid renewable energy provides a lower effective cost of energy than all other options for the consumer.

Meeting the access targets would have only a small impact on the achievement of the 23 per cent target for the energy mix, because the projects in remote regions tend to be small and consumption low. For the renewable energy target to be met, generation must move beyond off-grid niche areas into the mainstream. However, at present, relatively few large-scale commercial projects have been able to secure power purchase agreements that allow them to recover their costs, so very few projects have gone ahead. The pressure to keep consumer tariffs low and avoid subsidies has prevented the implementation of policies that would allow these projects to proceed.

The other factor that might significantly change the status quo would be if the price of renewable energy continues to fall, both absolutely and relative to other sources of energy. Even though not all of these price reductions are applicable to Indonesia—and costs related to deployment are inherently local—there is nevertheless a constant downward pressure on renewable energy project costs. Even with no action taken, it is likely that renewable energy projects will slowly become more viable across Indonesia. As noted above, the disparity between prices in Indonesia and elsewhere in the world, particularly for electricity from solar PV, was said by several respondents to have been a catalyst for the Ministerial Decree 12/2017, which caps the prices paid for solar PV.

If the cost of renewable energy technologies continues to decline, there is a possibility that Indonesia will reach a tipping point where the trilemma becomes a virtuous circle, as the increasing use of renewables lowers costs, which thereby allows both subsidies and prices to fall. There are several reasons why solar projects in other parts of the world have been able to achieve very low prices, including:

- These projects are generally large, allowing for lower per unit costs and more profit.
- They are in areas with excellent solar resources.

4 These targets were under the initiative formerly known as the Program Indonesia Terang (EBTKE, 2016)

- There are simple processes for planning and permitting.
- Developers are offered simple access to infrastructure and grid connections.
- There is a high level of confidence among developers that projects will go ahead.
- There are no barriers to the import of technology.

Unfortunately, almost none of the conditions that have enabled low-cost solar PV elsewhere are currently present in Indonesia.

In effect, renewable energy is being asked to be competitive with fossil fuels but without the concerted support that has been applied in other countries (see Box 5 on Germany). The result is an impasse, under which there is no immediate prospect of an increase in consumer tariffs or subsidies that could fund a wholesale transition of the type seen in Germany and many other countries.

The other way in which renewables might develop more quickly would be if their relative cost were to decline because of increases in the price of fossil fuels. Oil and coal prices fell dramatically from 2014–2015 and, for oil, remain relatively low. However, there is no guarantee that this will continue. Coal prices rose sharply in mid-2016 and have continued to rise in 2017, while oil prices have also steadily risen during the last two years. Rising fossil fuel prices might make renewable energy relatively more attractive, but this impact is likely to be limited for two reasons. First, coal-fired power stations are long-lived investments. Consequently, for power stations that have already been commissioned, rising coal prices damages their profitability (or that of PLN), but will not quickly lead to a change in source of energy. Second, since Indonesia is a net importer of oil, increases in the price of oil tend to increase subsidy costs.

It is important not to draw the wrong conclusion from the political economy analysis above. Renewable energy is advancing in Indonesia. For example, the installed capacity of geothermal power has almost doubled in the last 10 years (PwC, 2017) and the government plans to support the rapid expansion of a wide variety of sources of renewable energy over the next decade (Ministry of Energy and Mineral Resources, 2017b). The ideological or conceptual commitment to renewable energy is not in doubt and this is almost certain to result in a steady rise in installed capacity over the next few years.

### Box 5: A radical policy shift in Germany

Countries that have rapidly increased the generation of renewable energy have done so due to a concerted effort. Perhaps the most famous example of this is the German "Energiewende" (Energy Transition). Germany was one of the first countries to embrace the mass deployment of wind and solar to transform the German energy mix, initially offering large premiums to renewable generators before ramping these back as costs fell (Kreuz, & Müsgens, 2017). Power purchase prices for commercial-scale installations fell approximately tenfold between 2004 and 2017, eventually falling to EUR 4.91 cents per kWh (Figure B5.1) as technological improvements and increased project deployment experience reduced costs.

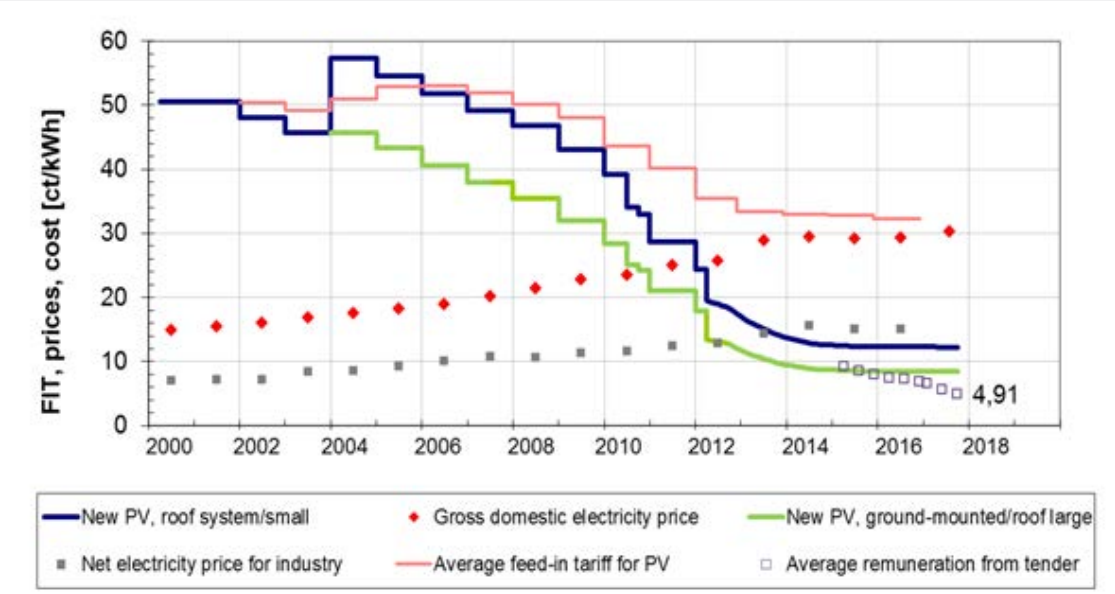



**Figure B5.1. Feed-in tariff for PV power as a function of commissioning date, average remuneration of the bidding rounds of the Federal Network Agency and electricity prices up to 2016 and with estimates thereafter.**

*Source: Wirth, 2017.*

The resulting influx of generation caused wholesale power prices to fall and led to the restructuring of a number of German utilities, radically reshaping the energy sector in the process. A restructuring on this scale required that consumer tariffs increase and subsidies to renewable energy were put in place. Germany's policies brought down renewable energy prices, not only in Germany but also at a global level. In 2017, the cost of transitioning to a renewable energy powered electricity sector is far lower than during Germany's transition. However, the process still requires a transitional period of increased costs while an effective industry develops. In short, it is a case of short-term pain for long-term gain.

# 4. Conclusions and Recommendations

Although the political economy analysis might suggest otherwise, renewable energy is advancing in Indonesia. For example, the installed capacity of geothermal power has almost doubled in the last 10 years (PwC, 2017) and the government plans to support the rapid expansion of a wide variety of sources of renewable energy over the next decade (Ministry of Energy and Mineral Resources, 2017b). The ideological or conceptual commitment to renewable energy is not in doubt, and this is almost certain to result in a steady rise in the installed capacity over the next few years.

However, our assessment of the objectives, capacity and interests of the key actors in the sector suggests that it is highly unlikely that Indonesia will be able to increase renewable energy's share of the overall energy mix to 23 per cent by the deadline. The fundamental interests of the different actors conflict with this goal. Politicians and ordinary Indonesians do not wish to see further increases in electricity prices, making it difficult for them to make the necessary investments in renewables without larger subsidies. The government does not wish to increase its subsidies to PLN due to the fiscal impact that this would have. Without higher tariffs or increased subsidies, MEMR and PLN cannot offer better power purchase agreements to renewable developers, who in turn slow down or defer investments.

Our interviews suggest two general ways in which this trilemma might be broken. First, the government could reassert its commitment to the vision of a renewable future and ensure that implementation plans and resources are consistent with that vision. Given the incentives outlined above, it would seem unlikely that this will happen before the 2019 presidential election. However, there is no reason why it might not happen thereafter, or, indeed, be part of the vision offered by candidates.

Second, as renewable technologies become cheaper and more established, the balance between renewables and other energy sources will gradually shift in the favour of the former. However, without a set of complementary policies and appropriate support, this process may be a very slow one. As one very senior former official put it "It will improve, but only *poco-poco*" [an Indonesian dance which entails going backwards and forward without making much progress].

Since there is widespread support for "no extra cost" renewables, policy-makers can focus on a number of measures could be put in place immediately, and still have an impact on the long-term cost of renewable energy. A focused effort is needed to identify and promote opportunities where renewables are the cheapest option and remove any barriers to deployment of competitive projects. Some specific measures could include:

- Maintain policy stability, remove regulatory barriers and streamline processes for consent and permitting.
- Ensure off-grid electrification projects use lowest-cost technologies. In practice this would mean taking steps to transition from diesel to solar and hydro for microgrids where viable.
- Re-evaluate whether trade and local content requirements are delivering value or unnecessarily increasing prices.
- Proactively support the development of good sites where large-scale renewable energy projects are likely to come in below wholesale (BPP) prices and develop these sites through renewable energy auctions.
- Level the playing field for renewable energy by phasing out subsidies to fossil fuels including coal.

If sufficient political will can be generated by the realization that the target will be missed, the first step to resolving the problem is a renewed commitment to the target and development of a detailed plan to achieve it. Such a plan would involve addressing the roadblocks identified by this report: overcoming technical challenges through support of technologies that work within the technical constraints; removing policy roadblocks; phasing out fossil fuel subsidies and reforming energy pricing to take account of negative environmental externalities of fossil fuel use.

The unique position of PLN as a powerful player in the energy sector—the single buyer of electricity, and the largest owner of fossil fuel generation assets—may present internal contradictions. Government action may be necessary to either fundamentally change PLN's incentives so that its interests are better aligned with renewable energy or take steps to ensure that PLN implements energy policy, even if that policy is not aligned with its own interests.

Finally—yet importantly—if concerns over pollution from coal, as have been seen in China and India, appear in Indonesia, the political wisdom of supporting a coal-based energy policy could also be turned on its head, changing the positions of these key actors. The Presidency has an important role in this debate. There is an opportunity for civil society and the research community to continue to highlight the societal harms caused by reliance on fossil fuels, particularly in terms of the impacts on urban air pollution. Raising awareness over the failure to meet the renewables target and the health risks from increased coal use can help to create pressure on policy-makers, particularly the Presidency and the parliament, to support policies that are supportive of renewable energy.

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# Annex 1: Methodology

To understand the dynamics of the Indonesian electricity market, the role of various stakeholders in policy-making and the forces shaping the sector, a political economy analysis was conducted. This analysis gathered data on the current challenges facing the sector; reasons stakeholders believed that renewables development was being constrained; what stakeholders expected to happen in the future; and what action they suggest should be taken.

An analytical framework was developed based on similar frameworks in the literature and the context-specific factors identified. Numerous toolkits and guides for political economy analysis are available in the literature including (e.g., DFID, 2009; Hudson, Marquette, & Waldock, 2016; OECD, 2015; USAID, 2016). The framework that was developed works through four stages of analysis described in table A1 below.

**Table A1: Political Economy Framework**

| | | |
|---|---|---|
| 1 | **Problem Identification** | Identification of the problem to be evaluated is a crucial step to guide and define the scope of the research. |
| 2 | **Diagnosis** | The diagnostic element is the core of the analysis and is broken down into three elements:<br>• Systemic factors that determine the operating environment for all actors. These are generally slow to change and create the "rules of the game."<br>• The motivations, decision logic and power of market actors to gain insight into how and why they react to events.<br>• Market dynamics, complexity and uncertainty; to what extent is the area rapidly evolving and fluid or stuck in an intractable equilibrium. |
| 3 | **Prognosis** | The third component of the analytical framework is "Prognosis." This aspect is often overlooked in project planning frameworks that frequently move straight from diagnosis to prescription. However, spending time honestly assessing the prognosis is key to designing effective interventions. The consideration of the likely outcomes if nothing changes helps cast light on whether interventions could change the course of events or if the forces preventing change remain insurmountable. |
| 4 | **Interventions** | The final component of the framework explores interventions. In particular, it draws together the work from the preceding components to propose actions that may shift the positions of one or more actors and help to deliver the intended outcomes. |

This framework was used to develop interview questions: 26 semi-structured interviews were then conducted with a wide range of energy sector stakeholders. These actors could be classified in seven main interest groups: the Presidency, the Ministry of Finance (MoF), the Ministry of Energy and Mineral Resources (MEMR), PLN (Perusahaan Listrik Negara, the state-owned utility), independent power producers (IPPs), development partners and the fossil fuel industry. The interviews also collected the point of view of some civil society groups.

The interviews provided a great amount of information on both the barriers to renewable energy development and the underlying causes of these barriers. This information is presented in the paper. First, the paper examines the roadblocks that renewable energy projects face. These may be thought of as the practical manifestation of the problem or the symptoms of a lack of political support for renewable energy. These roadblocks provide a summary of the key issues that policy reformers should address to increase renewable energy development. The second part of the analysis presents a summary of the underlying political economy that prevented the adoption

of policies that effectively promote renewable energy and explores how each group is motivated to safeguard its own interests and how these align or conflict with policies that would promote a greater deployment of renewable energy.

One key aspect of using data gathered through interviews is that it is not possible to provide formal references for many of the findings of the research. Where possible, issues raised in the research have been validated with additional sources. However, much of the analysis presented in the subsequent sections emerges from the information provided by interviewees, and as such the findings represent what we heard. In light of this, the information presented here should be viewed as an accurate summary of the perceptions and views of industry stakeholders that may contain occasional inaccuracies or omissions. We have attempted to minimize these, but the nature of this qualitative type of analysis does present difficulties. Regardless, the viewpoints expressed present a picture of how the issue of increasing the development of renewables in Indonesia is perceived by key stakeholders.

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