

Alternating Currents:

Indonesian Power Industry Survey 2018

July 2018 – 2nd edition





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Foreword



The development of energy and resources as a whole - and the electric power industry in particular - holds major importance for the continued economic growth of Indonesia. As an organisation which represents more than thirty members operating various power plant projects in Indonesia, the Independent Power Producers Association of Indonesia (“APLSI”) is pleased to work with PwC Indonesia (“PwC”) on this report, “Alternating Currents: Indonesian Power Industry Survey 2018”, based on a survey of stakeholders in the Indonesian power industry. This second edition of our survey aims to understand investors’ views of the impact of frequent changes in regulation and the Government of Indonesia (the “Government”)’s plans for development of the power sector in Indonesia.

In furtherance of the development of the country’s power industry, this report is also aimed at acknowledging the role of the private sector in supporting the growth and reliability of the Indonesian electric power sector. This is in line with the country’s goal of achieving an electrification target of 100% by 2024, for which at least 43.5 GW of new power generation needs to be constructed.

Along with the state power utility, Perusahaan Perseroan (Persero) PT Perusahaan Listrik Negara (“PLN”), the private sector will play a significant role in the realisation of power projects across Indonesia. However, inevitably there are challenges in achieving these ambitious plans, including regulatory, technical, socio-economic, and cultural aspects which together still stand as barriers towards achieving the Government’s goals.

Recently, the challenges may have increased, with some uncertainty arising from numerous changes to the regulations for investment by Independent Power Producers (“IPPs”). Many perceive that these changes may not have enhanced the investment climate for the sector, as was intended, but instead worsened it. The Government has implicitly acknowledged such difficulties by amending some of the regulations and rolling-back the timeframe for completion of the 35 GW programme to 2024, from 2019 originally.

To respond to such challenges and to accelerate the deployment of power generation capacity sufficient to provide power to every Indonesian, APLSI is eager to work alongside all stakeholders to shape the Indonesian power sector regulatory landscape. We hope that this report will serve as a positive contribution from the private sector. It is also our wish that this report may serve as constructive input for stakeholders in making decisions for the positive development of the Indonesian power industry. We thank PwC for their work on the survey, and we look forward to future cooperation.

Arthur Simatupang
Executive Chairman

Glossary

Term	Definition
APLSI	Independent Power Producers Association of Indonesia (<i>Asosiasi Produsen Listrik Swasta Indonesia</i>)
BOC	Board of Commissioners
BOD	Board of Directors
BOO	Build-Own-Operate
BOOT	Build-Own-Operate-Transfer
BOT	Build-Operate-Transfer
BPP	Generation Costs (<i>Biaya Pokok Pembangkitan</i>)
COD	Commercial Operation Date
FM	Force Majeure
GDP	Gross Domestic Product
GIIA	Global Infrastructure Investor Association
Government	Government of Indonesia
GW	Gigawatt (1,000 MW)
GWp	Gigawatt peak
IEA	International Energy Agency
IEEFA	Institute for Energy Economics and Financial Analysis
INAGA	Indonesian Geothermal Association (<i>Asosiasi Panas Bumi Indonesia</i>)
IPO	Initial Public Offerings
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
IRR	Internal Rate of Return
kWh	Kilowatt hour
LAKIN	Performance Report (<i>Laporan Kinerja</i>)
LCOE	Levelised Cost of Electricity
METI	Indonesian Renewable Energy Society (<i>Masyarakat Energi Terbarukan Indonesia</i>)
MoEMR	Ministry of Energy and Mineral Resources (<i>Kementerian Energi dan Sumber Daya Mineral</i>)
MoEMR Regulation No. 10/2017	Minister of Energy and Mineral Resources Regulation No. [Reference Number]/[Issuance Year]
MW	Megawatt (1,000 kW)
MWh	Megawatt hour (1,000 kWh)
PLN	The state-owned electricity company (<i>Perusahaan Perseroan (Persero) PT Perusahaan Listrik Negara</i>)
PPA	Power Purchase Agreement
PV	Photovoltaic
PwC	PwC Indonesia, a member of the PwC global network
RUEN	National Energy Plan (<i>Rencana Umum Energi Nasional</i>)
RUKD	Regional Electricity Plan (<i>Rencana Umum Ketenagalistrikan Daerah</i>)
RUKN	National Electricity Plan (<i>Rencana Umum Ketenagalistrikan Nasional</i>)
RUPTL	Electricity Supply Business Plan (<i>Rencana Usaha Penyediaan Tenaga Listrik</i>)
T&D	Transmission and Distribution
TWh	Terawatt hour (1,000,000,000 kWh)

Introduction

Welcome to the second edition of the PwC Indonesia Power Industry Survey in association with the APLSI. The survey goes to the heart of the challenges and opportunities being considered by investors in the Indonesian power sector.

We have titled this year's report "Alternating Currents" – reflecting survey respondents' perception of the impact on investment of frequent changes in regulation and the Government plans for development of the sector.

In this report, we look ahead to the future of the power sector in Indonesia and take a hard look at the key challenges the power sector faces today. The changes that lie ahead are of great potential significance – new technologies, unforeseen possibilities and different ways of generating, distributing, storing and using electricity will all play their part.

However, equally important, and more urgent, is how the Government and PLN will address the many pressing challenges that constrain Indonesian power sector development. The investment requirement is substantial, and the private sector will play an indispensable role. In the past year, the Government has been actively regulating the power sector in an attempt to encourage such investment and manage cost and risks for PLN at the same time.

While some of these regulatory changes are understandable, on balance it seems that changes to the IPP investment framework may not have enhanced the development of the Indonesian power sector. Indeed, they may have undermined it.

Until these issues are resolved, investment in power systems may remain subdued in Indonesia. In this report, we look at these and other issues.

Methodology

The purpose of the survey is to help inform the public and private sectors in Indonesia and abroad about Indonesia's power industry and to highlight some of the challenges to the country attracting optimal investment and achieving the industry's full potential.

The survey questionnaire, jointly designed by PwC and APLSI, was distributed to over 100 IPP owners and investors, power developers, PLN, and government agencies in late 2017 and early 2018. The survey questionnaire included both quantitative and qualitative data sections. Because of the incomplete nature of certain quantitative responses, we have been unable to utilise all data in its entirety in this report.

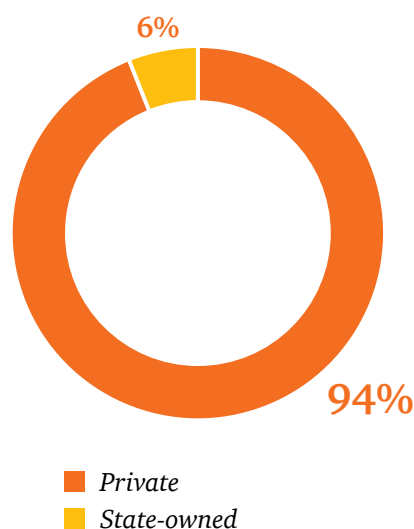
We received 31 responses from a range of domestic and international market participants, representing 31 unique companies. 94% of respondents were from the private sector (see Figure 1 below).

Some responses were gathered face-to-face, with clarifying questions asked in order to interpret results. A follow-up face-to-face discussion was held with several APLSI members as well as discussing some findings with the Indonesian Renewable Energy Society (*Masyarakat Energi Terbarukan Indonesia* – “METI”) and the Indonesian Geothermal Association (*Asosiasi Panas Bumi Indonesia* – “INAGA”) before finalising this report in order to re-confirm results and discuss the latest market developments.

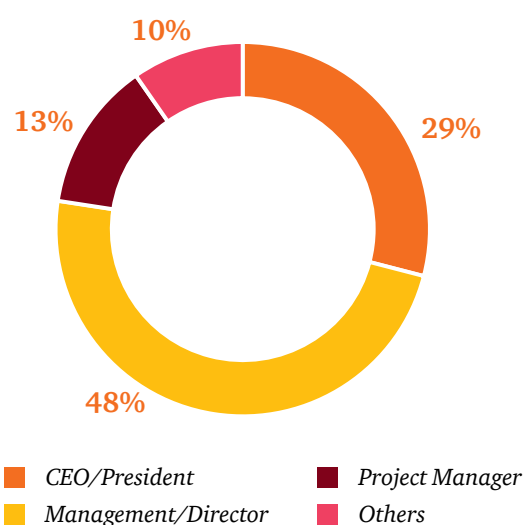
Note: In this report, we have compared responses from this year's survey to the previous year's responses taken from our 2017 report where applicable.

Figure 1 – Survey respondents' backgrounds

Private vs. State-Owned Enterprises



Job Title



Key Results

An alarming deterioration in investor confidence.....

- 96% of respondents believe that the 2017-2026 Electricity Supply Business Plan (Rencana Usaha Penyediaan Tenaga Listrik 2017 – the “2017 RUPTL”) was not designed to adequately anticipate and respond to the current and future challenges in the power sector;
- 94% of respondents believe that regulatory uncertainty is a major barrier to investing in new large-scale power generation;
- 71% of respondents believe that the lack of standard bankable PPAs with appropriate risk allocation is also a major barrier to investing in new large-scale power generation;
- 75% of respondents believe that there is a lack of transparency and 89% said there is insufficient predictability in the procurement of new power capacity in Indonesia; and
- Only 39% of respondents think that the regulatory and legal framework in Indonesia is supportive of private investment (compared to 89% in 2017).

....but opportunities still remain

- Early 2017 government regulations are viewed negatively by respondents, but the amendments made since then are viewed relatively positively;
- Affordability is seen as the main priority in the energy trilemma, as such any low-cost sources of power generation are welcome; and
- Despite concerns, 65% of investors surveyed still plan to make an IPP investment within the next 12 months.

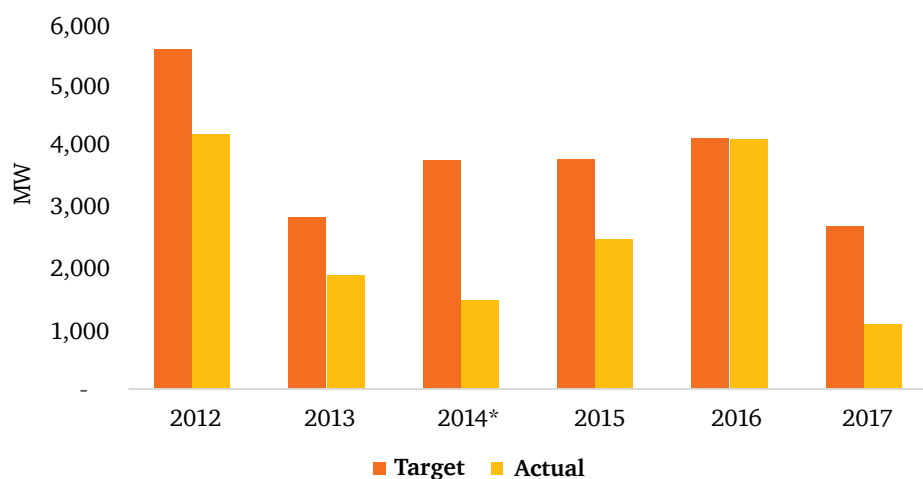
Indonesia is facing a huge electricity demand challenge. Per capita power consumption and the electrification ratio have risen rapidly in recent years. However, existing infrastructure is insufficient to meet the entire current demand, before even considering growth in the coming decade. In addition, Indonesia's regulatory landscape is not yet viewed by survey respondents as promoting private investment in the power sector.

In 2015, the Government launched an ambitious plan for 35 Gigawatts ("GW") of new capacity to be built by the end of 2019. However, implementation has been slow and, based on the 2018-2027 RUPTL (the "2018 RUPTL"), the Government plans for the completion of the 35 GW to be delayed until 2024-2025 – with only 20 GW of new capacity now planned to be built by the end of 2019.

The Government revised down the electricity demand assumptions in the 2018 RUPTL. The estimated total demand in 2026 has been revised downwards by 15.7%, as compared to the 2017 RUPTL. As a result, PLN and IPP investors are now expected to construct only 56 GW of generating capacity by 2027, a significant reduction compared to the proposed 78 GW in the 2017 RUPTL. This is a major change in assumptions over a 12-month period.

Without doubt, 56 GW is still an ambitious target to achieve, especially given historical average capacity expansion of about 3 GW/year (Figure 2). So the question remains: ***"is the current regulatory and legal framework fit to achieve needed investments?"***

Figure 2 – Actual vs. target capacity installation for 2012-2017



Source: RUPTL 2012 Summary, 2013, 2015, 2016, 2017 and Laporan Kinerja Kementerian Energi dan Sumber Daya Mineral 2012-2017 [2012-2017 Performance Report of Ministry of Energy and Mineral Resources].

* Source of Target: RUPTL 2013

Our report examines industry opinion on this question as well as a range of other important challenges facing the sector in the near term. Some of the key findings of our survey are as follows:

Regulation and reform; too many changes

61% of survey respondents believe that the regulatory and legal framework in Indonesia is not supportive of private investment. Respondents believe that some of the regulations implemented in 2017 regarding risk allocation in Power Purchase Agreements (“PPAs”), restrictions on share transfers, and IPP tariffs have had a negative impact on investors’ future plans. There have been reports of difficulty in achieving financing of projects as a result of these changes.

Despite some of the regulations of particular concern being later revoked or amended in order to make the investment environment more conducive for private investors, the sheer number of regulations issued in 2017 increased investor concern. Based on the survey, 94% of respondents view regulatory uncertainty as a major barrier to investing in large-scale generation. In addition, 71% of respondents answered that lack of consistent policies and vision across government institutions is another major barrier to investing in large-scale power generation capacity.

During 2017 regulations were issued reforming the tariff regimes by benchmarking tariffs to the PLN average electricity generation cost (*Biaya Pokok Pembangkitan* – “BPP”) on a region-by-region basis. This new tariff-setting regime may not support the Government’s stated plan of increasing the renewables share of the power generation energy mix from 12% in 2017 to 25% by 2025. This is because the implied new tariffs are generally significantly lower than previous regulations, impacting the economic viability of projects in most regions (although this does ultimately depend on the geographical area in which they are operating).

Stakeholder priorities; cost is king

Governments and industry across the world are well aware of the ‘Energy Trilemma’ – the trade-off between “security of supply”, “affordability” and “sustainability/clean power”. Survey participants ranked “affordability” as the foremost priority in 2018, followed by “security of supply” and then “sustainability/clean power”. This is a noticeable change compared to the previous year, when respondents viewed “security of supply” as the main priority. Given these priorities, we would expect the policy focus to remain on coal (which is abundant and cheap in Indonesia) in the short term. This is consistent with the increasing focus on providing affordable energy based on statements from the MoEMR and PLN in the past 12-18 months.

In the future, survey participants view that “affordability” will remain the top priority. This view is consistent with the Government’s plan to reduce retail electricity tariffs. PLN stated that an electricity tariff decrease will be possible in the next two years due to the new regulations implemented by the MoEMR¹. However, the Government could be increasing the affordability of electricity at the cost of future power system reliability and availability if it discourages new investment.

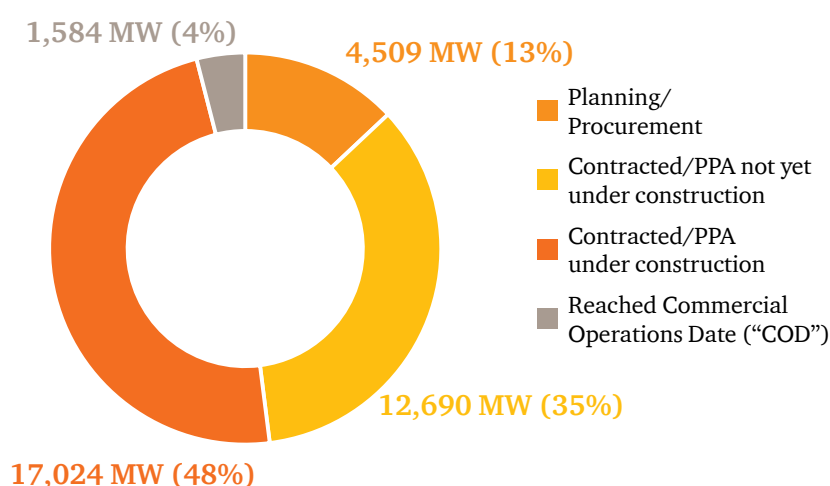
¹ <https://www.cnnindonesia.com/ekonomi/20171129182301-85-259016/pln-janji-tarif-listrik-turun-dua-tahun-lagi>

Challenges; lack of transparency in procurement

48% of respondents believe that lack of transparency in procurement and bidding of new projects is a major barrier to investing in large-scale generation. Fundamentally, transparent procurement means the companies that win the bids are those with the best product at the best price achieving the best outcome. Therefore, it is key for the Government to increase transparency throughout the procurement process right up to the final awards. An increase in transparency could be positive for businesses as well. Access to project information, as well as past procured contracts, allows businesses to make more appropriate bids. This leads to an increase in competition and more competitive tariffs.

As mentioned above, another big challenge is the management of the 35 GW programme. This concern is likely driven by the overall limited progress in the contracting of projects within the programme. As of April 2018, out of the original planned capacity, only 4% has come online, 35% has been contracted but is not yet under construction, 48% has been contracted and is under construction, and 13% is still being planned. In particular, there is no guarantee that the 35% of contracted projects which have not yet entered the construction phase will be able to successfully raise finance.

Figure 3 – Progress of 35 GW programme as of April 2018



Source: <https://m.detik.com/finance/energi/d-3973308/begini-perkembangan-terbaru-proyek-35000-mw>

Demand and technology shaping the landscape; renewables continue to catch up

PwC has identified a number of global megatrends shaping the economy and landscape of the power sector. Three things stood out as the most influential on the Indonesian power sector according to survey respondents, namely: population growth, megacities, and new disruptive technologies.

The first two trends are demand-driven. Simultaneous population growth and urbanisation lead to a rise in the number of power customers and rising electricity demand per customer. The Government faces the challenge of how to meet the rising demand, at a reasonable cost, while still maintaining Indonesia's power sector as an attractive investment opportunity.

At the same time, survey participants are also aware of the changing global power climate with cheaper renewable energy options (becoming available). The advancement of renewable power generation and battery storage could be a game-changer in the Indonesian power landscape. Within the next two years, based on the 2018 RUPTL, approximately 1,300 Megawatts ("MW") of renewable power projects are expected to be developed.

Mini-grid and off-grid solutions could potentially be viable solutions to rural electrification, adding further impetus to renewable energy sources. This is particularly relevant for a wide-spread archipelago nation such as Indonesia. Even so, ongoing issues related to current tariffs, scalability, location, and local community acceptance make new technologies even harder to implement.

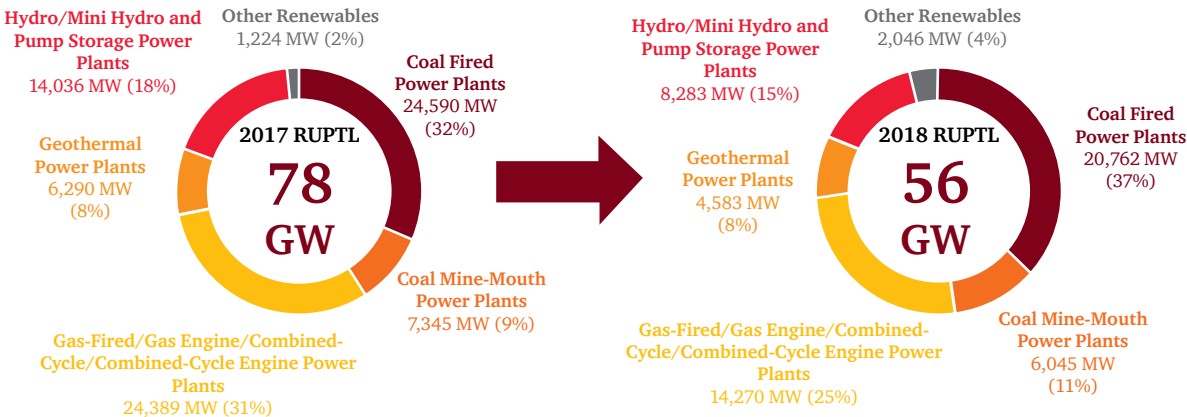
1. Electricity Planning

96% of respondents believe that the 2017 RUPTL was not designed to adequately anticipate and respond to the current and future challenges in the power sector

The RUPTL constitutes a ten-year electricity development plan for the operating areas, or *Wilayah Usaha*, of PLN. The RUPTL is based on the Electricity General Plan (*Rencana Umum Ketenagalistrikan*) which consists of the National Electricity General Plan (*Rencana Umum Ketenagalistrikan Nasional* – “RUKN”) and Regional Electricity General Plan (*Rencana Umum Ketenagalistrikan Daerah* – “RUKD”). The RUPTL contains demand forecasts, future expansion plans, electricity production forecasts, fuel requirements, etc., and also indicates which projects are planned to be developed by PLN and IPP investors, respectively. The procurement route for IPPs to build power plants is also based on the RUPTL. As such, the RUPTL is a very important document for all investors in the Indonesian power sector.

The 2018 RUPTL, which was issued in March 2018, aims to achieve an electrification ratio for Indonesia of 100% by 2024. PLN’s target of 78 GW of new power generation capacity by 2026 has been revised down to 56 GW by 2027 in the 2018 RUPTL. One of the main reasons for PLN’s move to decrease the planned capacity generation is the decrease in the expected average energy demand growth rate from 8.3% in the 2017 RUPTL to 6.9% in the 2018 RUPTL, thus reducing the estimated total electricity demand in 2026 from 483 Terawatt hours (“TWh”) to 407 TWh (a 15.7% decrease).

Figure 4 – New Power Generation Capacity (2017 RUPTL vs. 2018 RUPTL)



In addition, PLN's Gross Domestic Product ("GDP") growth forecast used in the 2018 RUPTL remains optimistic. It is above the International Monetary Fund's forecast of 5.3% (versus an average of 5.9% in the 2018 RUPTL until 2022)². Overly optimistic assumptions could result in both investment in unnecessary capacity and underutilisation of assets. A recent Institute for Energy Economics and Financial Analysis ("IEEFA") report demonstrated how the 2017 RUPTL had the potential to force PLN into paying USD 16.2 billion for idle capacity³.

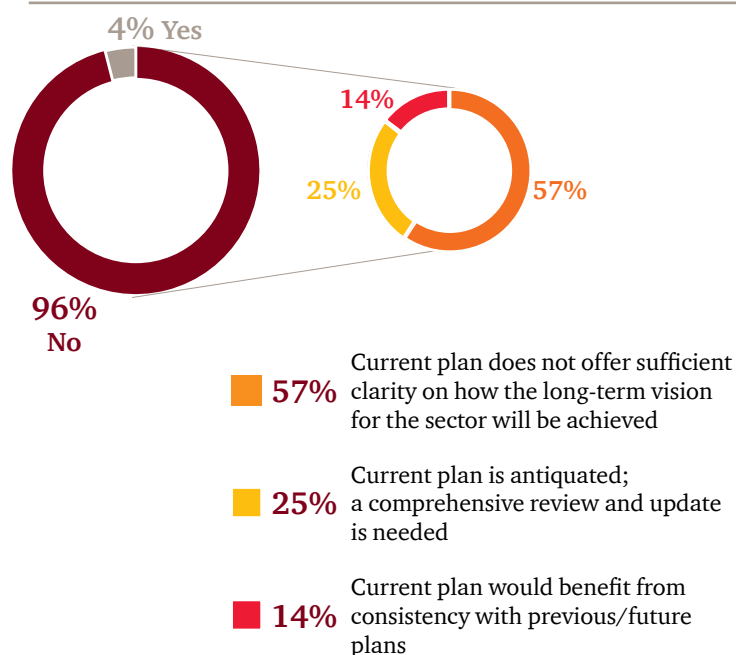
Despite the fact that our survey was conducted before the 2018 RUPTL was released, survey respondents already had strong views on the 2017 RUPTL that shine some light on the matter. 96% of the respondents stated that the 2017 RUPTL does not adequately anticipate and respond to the current and future challenges in the sector (Figure 5). The main concern is that the document does not provide a clear vision for future planning. One respondent commented that:

"data needs to be transparent – dispense with the smoke and mirrors"

Based on interviews conducted, there were a number of reasons why the RUPTL does not offer sufficient clarity:

1. planned Transmission and Distribution ("T&D") routes are not geographically accurate;
2. supply seems to be projected to create a certain target reserve margin, and is not necessarily in line with actual proposal developments;
3. the RUPTL does not support the long-term strategy and policy of the Government; and
4. project CODs are not accurate.

Figure 5 – In your view, is PLN's Electricity Supply Business Plan (RUPTL) 2017 – 2026 designed to adequately anticipate and respond to the current and future challenges in the sector?



Other respondents (25%) have said that the 2017 RUPTL would benefit from an overhaul, and is antiquated, since there is a lack of clarification of the status of ongoing projects. METI commented that "the RUPTL, which should be based on Indonesia's National Energy Plan (*Rencana Umum Energi Nasional* – "RUEN"), is not consistent with the RUEN. In addition, in most cases the RUPTL does not sufficiently prioritise the use of renewable energy."

Other respondents argue that the RUPTL would benefit from consistency from year-to-year. The current document does not provide a clear vision of future planning since the data presented and projections have been shown to change rather abruptly and extensively from year-to-year. One respondent noted that the RUPTL is "too easy to change" because there is neither the obligation nor desire for PLN to develop Indonesia's power sector based on the RUPTL.

² <https://knoema.com/yubthm/indonesia-gdp-growth-forecast-2013-2015-and-up-to-2060-data-and-charts>

³ <http://ieefa.org/ieefa-report-indonesia-policy-electricity-generation-buildout-java-bali-means-us16-billion-unnecessary-coal-costs/>

2. Investor Confidence

- 61% of respondents view the regulatory and legal framework as not supportive of private investment
- Only 39% of respondents feel that the regulatory and legal framework in Indonesia is supportive of private investment
- Only 25% of respondents believe there is sufficient transparency in the procurement of new power capacity
- Only 11% of respondents believe there is sufficient predictability in the procurement of new power capacity in Indonesia

Respondents feel that the framework put in place by the Government is not supportive of private investment. Compared to last year, there was a huge drop from the 89% who believe that the Government is supportive of private investment to only 39%. There was also a significant drop concerning the capacity of the investment environment to underpin the expansion of generation capacity. This was largely attributed to new regulations implemented last year, especially MoEMR Regulation No. 10/2017, MoEMR Regulation No. 12/2017, and MoEMR Regulation No. 42/2017 (see Section 4 – “Regulations”), as well as the new tariffs. This lack of a supportive regulatory and legal framework in Indonesia causes investor uncertainty.

Figure 6 – Is the regulatory and legal framework in Indonesia generally supportive of private investment?

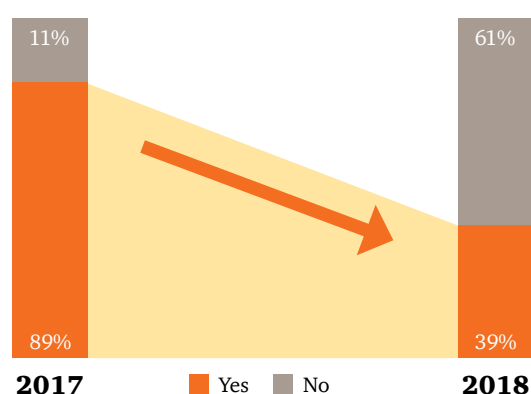


Figure 7 – Is the regulatory and legal framework in Indonesia creating a conducive investment environment to specifically underpin the expansion of generation capacity?

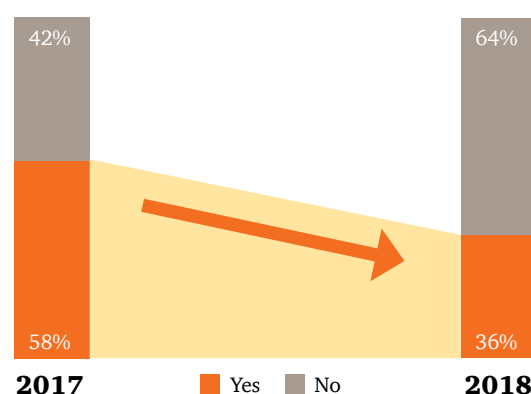


Figure 8 – Is there sufficient transparency in the procurement of new power capacity in Indonesia?

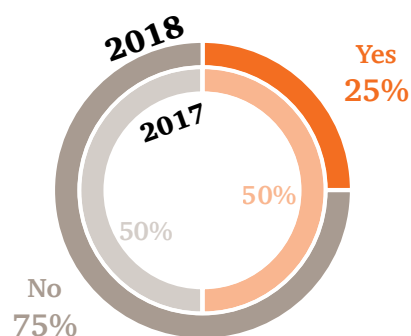
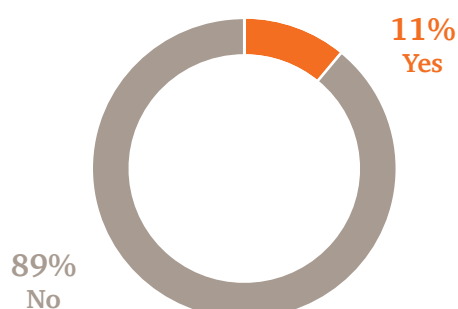


Figure 9 – Is there sufficient predictability in the procurement of new power capacity in Indonesia?



The general consensus this year is that the power sector greatly lacks both transparency and predictability (see Figures 8 and 9). The survey results are alarming, with only 25% of respondents believing there is sufficient transparency compared to last year's 50%. This is most likely due to the cancelled/postponed projects in the RUPTL, which were foreseen by savvy market commentators in previous years. The market has also still been waiting for progression on key procurement processes, such as the Sumatera Solar Photovoltaic ("PV") tenders, and the results of the mass pre-qualification process for renewables developers. Cases such as these create a large amount of uncertainty in the market.

89% said that there is insufficient predictability in the procurement of new power capacity in Indonesia. This is consistent with the comments on the RUPTL that the RUPTL does not provide a clear vision of future planning and the RUPTL is "too easy to change".



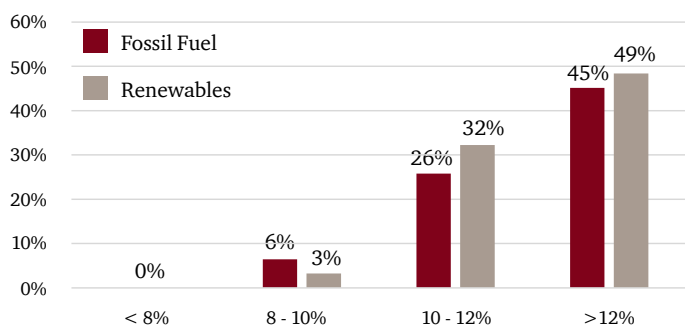
Photo source: PT UPC Sidrap Bayu Energi

3. Investor Returns

- *The survey results imply respondents expect USD equity returns of over 15% in Indonesian IPPs*
- *Vietnam and the Philippines are also viewed as attractive investment destinations*
- *Despite concerns, 65% of investors surveyed still plan to make an IPP investment in Indonesia within the next 12 months*

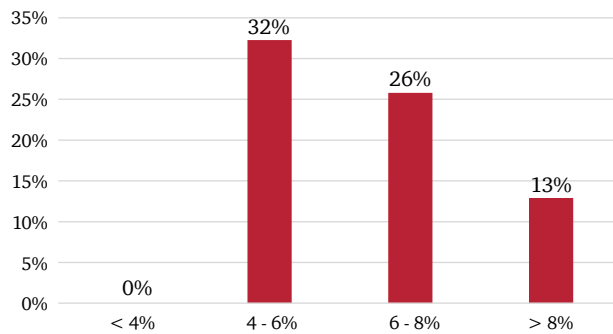
To meet Indonesia’s rising electricity demand, the Government needs private sector investment in new PLN-led projects to accelerate capacity growth. However, the risks embedded in investing in the Indonesian power sector as well as investors’ general lack of confidence in the regulatory and legal framework could hinder private sector investment or drive the private sector to require high returns on power projects. This, in turn, drives up electricity prices.

Figure 10 – What is your required Project Internal Rate of Return (“IRR”) to invest in Indonesian Fossil Fuel/ Renewable IPPs



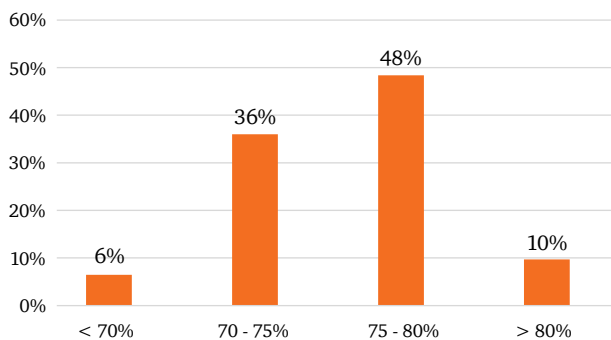
Note:
 16% and 23% of respondents said this question is not applicable for renewables and fossil fuels, respectively, as they do not invest in the respective sectors.

Figure 11 – What is your (USD) cost of debt for investment in IPPs assuming a 10-15 year tenor, and recourse to sponsor?



Note: 29% of respondents preferred not to answer the question.

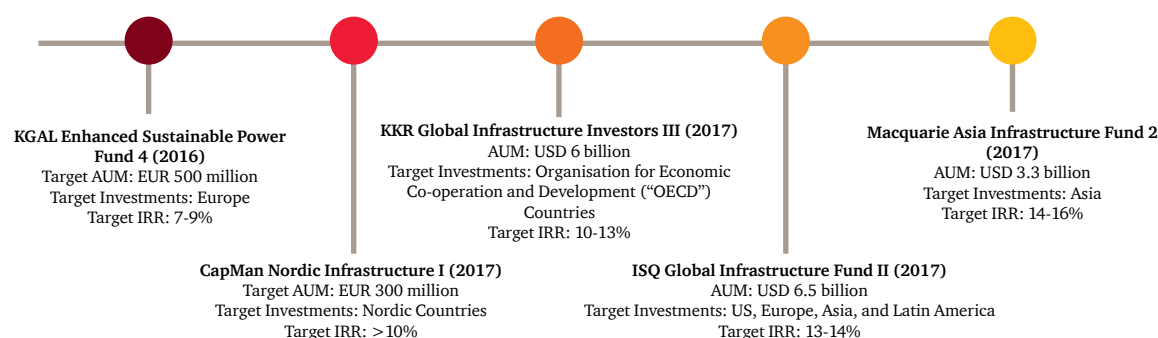
Figure 12 – What is your target gearing (debt-to-capex ratio) for investment in IPPs?



More than 70% of respondents expect a Project IRR of over 10% for fossil fuel IPPs in Indonesia and more than 80% expect that IRR for renewables projects. Some respondents indicate slightly higher IRRs for renewable energy projects since there is often higher technology risk for renewables (and for geothermal, also exploration risk), and Government guarantees are less available for renewable projects. However, there were a few respondents that are willing to invest in projects with a lower IRR perhaps reflecting the ability of some developers to access high leverage and low-cost debt (Figures 11 and 12).

More than 50% of the respondents can borrow debt at interest rates between 4-8% in USD. We believe the lower end of the interest rate range would be driven by Export Import Credit Agency financing, which implies some political backing and is exempt from withholding tax.

Using a standard Weighted Average Cost of Capital formula, this would imply expected equity returns range from around 15% to 30% for power generation projects in Indonesia. A precise calculation is not possible given changing leverage and marginal tax rates over the course of a typical project financed development.

Figure 13 – Infrastructure Funds Targeted Gross IRR

Source: *inframationnews.com*

*AUM = Assets Under Management

Figure 13 shows a range of infrastructure funds and their target returns in recent years. On average, according to a report by PwC and the Global Infrastructure Investor Association ("GIIA")⁴, the level of (equity) return targeted by infrastructure funds globally was only 10.6% in 2016. Thus, Indonesia's expected equity return on power projects is at the higher end of the spectrum for infrastructure projects, even compared to other emerging countries. This higher required return for investing in the Indonesian power sector likely reflects investment risks, particularly the risk of regulatory change. Therefore, if the Government focused on improving predictability and transparency in policies, regulations, and procurement, it may be able to reduce the return required by investors and, in turn, electricity prices.

Only just over a quarter of the respondents feel that Indonesia is an attractive market in which to invest compared to other South East Asian countries, as seen in Figure 14. Exactly half seem neutral about investing in Indonesia.

This raises the question as to what can be done about increasing investment within Indonesia, as the country competes with other attractive emerging Asian markets such as the Philippines and Vietnam (Table 1), although we note that IPPs in Vietnam also have their own bankability problems with PPAs⁵.

⁴ Global Infrastructure Investment, "The Role of Private Capital in the Delivery of Essential Assets and Services" by PwC and GIIA.

⁵ <http://vietnamnews.vn/economy/376101/red-tape-hindering-power-plant-projects.html#tpvj6x56z0Klf2se.97>

Figure 14 – How attractive is the Indonesian power sector compared to other Asian emerging markets?

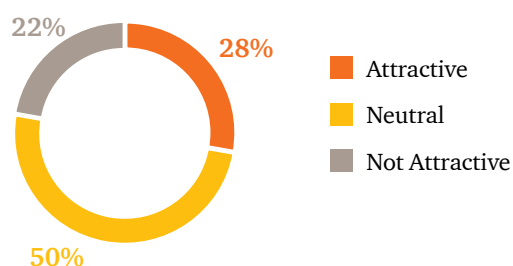


Table 1 – What is the most attractive emerging Asian market you would consider or have considered for similar investments other than Indonesia?

Philippines	26%
Vietnam	23%
Thailand	6%
Myanmar	6%
Laos	6%

**Respondents who answered “others” are not shown*

In order to increase investment, many respondents point to the need for a “reliable and practical plan for potential investors”, which “would be [a] great help for enhanc[ing] the investment for Indonesia”. Respondents have also pointed to the need for consistent and transparent policy-setting. These ideas have been echoed several times throughout the survey and will be expanded on in greater detail in Section 5 – “Energy Policy and Market Design”.

Having said this, 65% of the respondents still plan to invest in an Indonesian IPP opportunity during the next 12 months.

Some local respondents believe that while Indonesia may follow cycles of “ups and downs” with regards to regulation, the Government is a more sympathetic and flexible long-term partner in power investment than governments in some neighboring countries. This highlights the importance of international investors having the right local partners to mitigate risks.

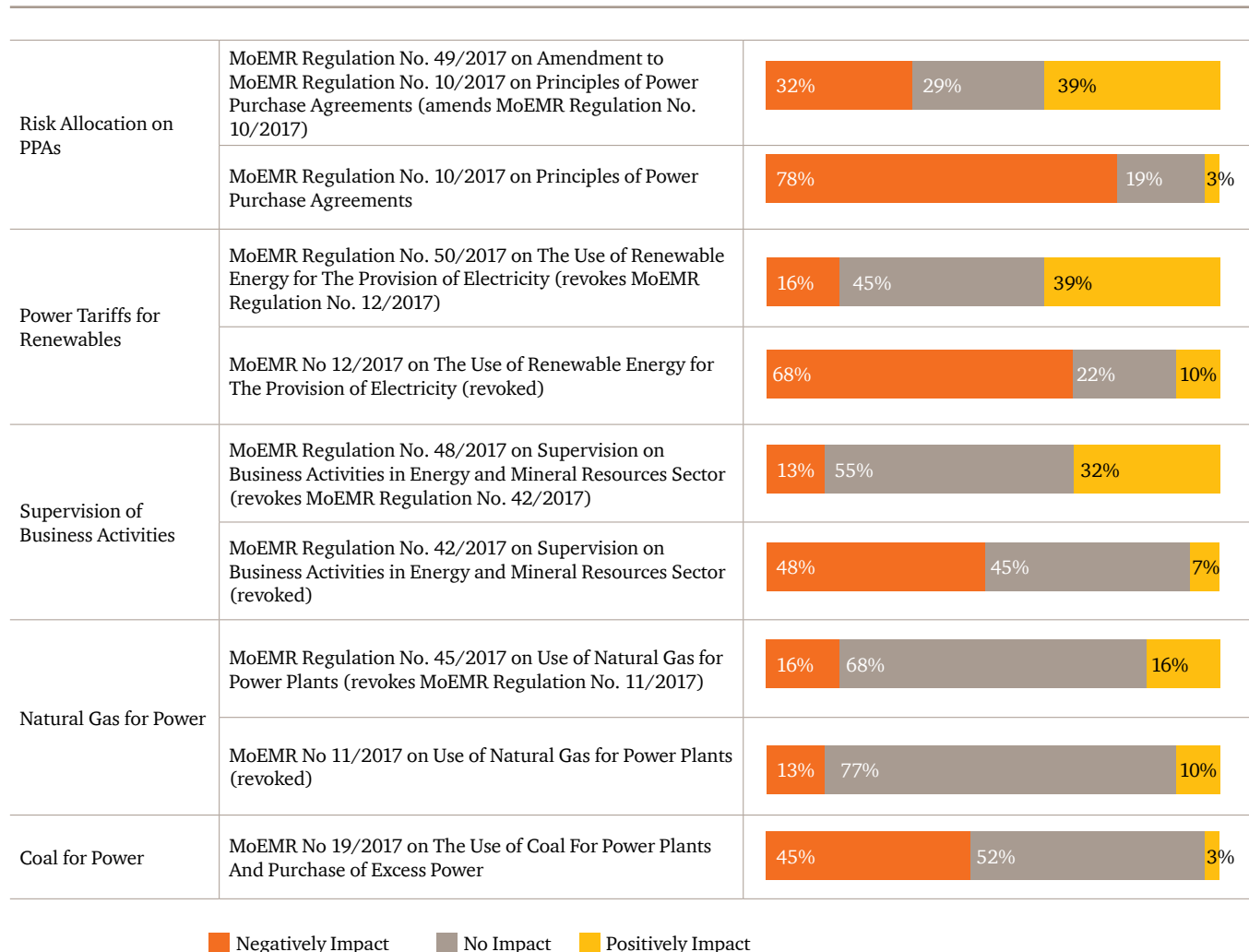


4. Regulations

- *Most regulations issued in 2017 were expected to have a negative impact on respondents' future projects*
- *In contrast, amendments or revocations of new 2017 regulations were viewed as positive*
- *The amendments did not fully resolve the perceived issues with the new regulations, only addressing some of the more controversial clauses*

According to respondents, there were too many regulations issued, amended and revoked last year. In 2017, the MoEMR passed 58 regulations in the energy and mining sectors, of which around 20 directly affected the power sector. However, because of an industry backlash against many of these new 2017 regulations, some of them were amended later in the same year or in 2018. The industry's response is apparent as most of the regulations viewed more positively than negatively by survey respondents are revocations or amendments of previous regulations (see Figure 15). This constant tinkering with regulations has a clear negative impact on investment appetite – investors in long-term capital intensive industries are looking for certainty.

Figure 15 – Which of the following regulations will impact your future projects?



The only regulations with more than 30% of participants responding positively were MoEMR Regulation No. 49/2017, MoEMR Regulation No. 50/2017, and MoEMR Regulation No. 48/2017. All of these were revisions of earlier highly-criticised regulations issued in 2017. Unfortunately, this is very much a case of “two steps backward, one step forward” for Indonesian power industry development. Full details of all regulations are included in PwC’s Power Guide⁶.

6 PwC Indonesia, Power in Indonesia: Investment and Taxation Guide, November 2017 – 5th edition (www.pwc.com/id).

For example, MoEMR Regulation No. 10/2017 (1) introduced Build-Own-Operate-Transfer (“BOOT”) for geothermal and hydro projects, (2) shifted Force Majeure (“FM”) risk to developers, (3) implemented stricter penalties and incentives, and (4) restricted transfer of ownership rights of the project before the COD (although share transfer to an affiliate in which more than 90% of shares are held by the Sponsor is allowed). This regulation was disliked by power sector players for the re-allocation of risks and potentially making new projects un-bankable. Some IPP developers believe there are serious bankability issues with the latest version of the PPA due to, among others, transfer of risk on Natural FM events and restriction on share transfer before COD as prescribed in MoEMR Regulation No. 10/2017 and its amendments⁷.

The amendment, MoEMR Regulation No. 49/2017, was welcomed by investors as it mitigated the issue of Government FM risk. Further, MoEMR Regulation No. 10/2018 went further in undoing the provisions regarding Government FM and Changes in Laws and Regulations FM established in MoEMR Regulation No. 10/2017, partially answering investor and lender concerns on unfair risk allocation to project developers in these areas. However, several issues under MoEMR Regulation No. 10/2017 still remain, such as the risk of Natural FM events which could affect IPPs securing funding.

MoEMR Regulation No. 50/2017, which revokes MoEMR Regulation No. 12/2017 on the Use of Renewables for the Provision of Electricity, also only revised the more controversial parts of the previous regulation. MoEMR Regulation No. 12/2017 sets an 85% price cap of the respective local BPP for power generation from renewable power sources, such as solar, wind, hydropower, biomass, and biogas (except for geothermal and waste-to-energy) if the local BPP is higher than the national BPP. For geothermal and waste-to-energy, the price cap is 100% of the local BPP if the local BPP is higher than the national BPP.

Under MoEMR Regulation No. 50/2017, players in the renewables power sector are able to negotiate a purchase price with PLN if the respective local BPP is less than or equal to the national BPP. Furthermore, under the new regulations, hydropower is not subject to the 85% price cap. While investors in hydropower generation welcomed MoEMR Regulation No. 50/2017, the same cannot be said for other renewable energy players (solar PV, wind, biomass, and biogas) as they are still subject to the 85% price cap in the event the local BPP is higher than the national BPP. One survey respondent stated:

“[there is] unfair competition of our technology vs. hydro projects, which receive preferred treatment without [known] rationale”

MoEMR Regulation No. 48/2017, which revoked and replaced MoEMR Regulation No. 42/2017 just three weeks after its publication, also only revised the more controversial parts of the previous regulation. The main aim of MoEMR Regulation No. 42/2017 is to increase the level of the MoEMR’s supervision in the energy and minerals sectors by having full control over any changes in the Board of Commissioners (“BOC”) or Board of Directors (“BOD”) and share transfers (including Initial Public Offerings – “IPO”).

MoEMR Regulation No. 48/2017 removes the requirement that share transfers and any changes in the BOC or BOD have to be approved by the MoEMR. The regulation now only requires IPPs to report their latest shareholder structures and BOC or BOD composition within three months of MoEMR Regulation No. 48/2017 coming into effect. Also, any further changes to the BOC or BOD only need to be reported to the MoEMR. However, MoEMR Regulation No. 48/2017 still requires the MoEMR’s approval in case of an IPO of geothermal companies.

⁷ <http://industri.bisnis.com/read/20180419/44/786433/adaro-gand>

These regulations and their amendments imply that the Government does not have clear regulatory objectives or processes for stakeholders. One respondent even commented that:

“They don’t move the goalposts, they move the stadium! And change the sport!”

The regulatory uncertainty caused by these regulations is likely harming the perception of the investment environment in Indonesia and the Government’s ability to develop much needed electricity infrastructure to support the country’s economic growth. It is imperative that the Government discuss draft regulations with the relevant stakeholders in a transparent manner before implementation to avoid damage to investor confidence and unworkable regulations.



Photo source: PT Adaro Power

5. Energy Policy and Market Design

- 94% of respondents believe that regulatory uncertainty is a major barrier to investing in new large-scale power generation
- 71% of respondents believe that the lack of a standard bankable PPA with appropriate risk allocation is also a major barrier

As discussed in Section 3 – “Investor Returns”, investors’ high expected return may be needed to compensate for the risks involved in the Indonesian power sector. The respondents’ concerns mostly revolve around policies and regulations implemented. Having appropriate regulation and a well-designed regulatory strategy is important for the Government, companies, and investors in Indonesia.

It is also important for regulators to consider the interests of power sector players to create a more level playing field. Some respondents argued that “the market structure is broken” and noted that the fact that PLN serves as a regulator and market participant is unfair to private players.

Table 2 – The major barriers to investing in new large-scale generation

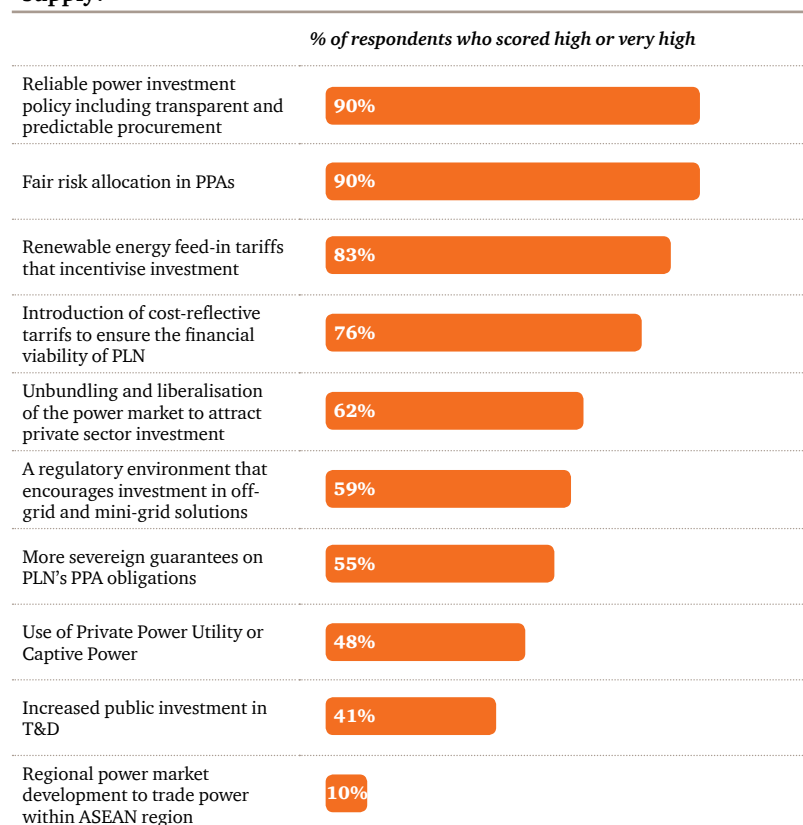
	2018	2017
Regulatory uncertainty (e.g. land acquisition, tariffs, procurement selection process, etc.)	94%	83%
Lack of standard bankable PPAs with appropriate risk allocation (including currency)	71%	57%
Lack of consistent policies and vision across Government institutions to promote investment	71%	N/A
Time delay in conclusion of PPAs and permits	65%	63%
Lack of coordination between Government institutions in timely and efficient decision making	58%	73%
Lack of transparency in procurement and bidding of new projects	48%	50%
Adequacy of Renewable Energy incentives based on Local BPP	45%	50%
Unavailability of Government guarantees	45%	57%
Obtaining finance	32%	67%
T&D information not ready/accurate	32%	37%
Access/affordability to primary energy	29%	43%
Access to skills	19%	N/A
Slow expansion of T&D infrastructure	19%	N/A
T&D infrastructure aging/badly maintained	16%	N/A

*N/A = Question was not asked in previous survey

Regulatory uncertainty is seen as the main barrier to investment (and is a risk that consistently comes top of the list when we survey or speak with power companies or developers/investors worldwide). This is consistent with Indonesia, where regulatory uncertainty tops the list as the most important barrier to making large-scale investments (see Table 2), as deemed by 94% of survey respondents. The sheer number of regulations implemented, amended, and revoked are seen to cause uncertainty.

There is also an increase in concern about the lack of standard bankable PPAs with appropriate risk allocation, from 57% to 71% of respondents. In fact, METI deemed the number as surprisingly low, considering most of their members are currently unable to secure funding for new renewables projects under the new PPAs. As discussed in Section 4 – “Regulations”, the main bankability issues in PPAs follow from (1) MoEMR Regulation No. 48/2017 on the transfer of ownership rights and (2) MoEMR Regulation No. 10/2017 (amended by MoEMR Regulation No. 49/2017 and MoEMR Regulation No. 10/2018) on Natural FM and risk allocation to project developers.

Figure 16 – How important will the following energy policy levers be in helping to increase electrification and improve reliability of power supply?



Some respondents also complained about stricter penalties on the “deliver-or-pay” obligation of IPPs, although they acknowledged this was standard in other countries already (e.g. Japan). Lastly, some respondents have challenges with the Build-Operate-Transfer (“BOT”) or BOOT structure (vs. a Build-Own-Operate or “BOO” structure before). According to METI, BOT or BOOT may be a standard project structure, but forcing it in all cases can cause legal issues, especially in renewables projects. For example, when project assets are embedded with plantation assets or other commercial land, the owner cannot easily commit to transferring such assets to PLN at the end of the concession period since often projects lease the land from the plantation or mill owners.

A large majority of respondents believe that a reliable energy policy is key to improving electrification given its knock-on impact on the ability of officials to make honest decisions without fear of prosecution.

“Clear legal guidelines for existing mechanisms [would] avoid the necessity for risky decision-making by regional leaders or PLN officers. Today we are in a state of paralysis because nobody dares to approve anything that is not clearly regulated – and hardly anything is clearly regulated.”

Reliable policy includes increasing predictability in the procurement process – currently it is not unheard of for tender timelines and technical specifications/commercial structure of a project to be changed midway.

Further, 90% of respondents also feel that there needs to be fair risk allocation in PPAs, which is likely a response to MoEMR Regulation No. 10/2017 (as amended by MoEMR Regulation No. 49/2017 and MoEMR Regulation No. 10/2018). MoEMR Regulation No. 10/2017 allocated certain Changes in Law and Regulations FM, Government FM and Natural FM risks to Sponsors, rather than to PLN as had happened historically. The provisions relating to Government FM were amended under MoEMR Regulation No. 49/2017 while Changes in Law and Regulations were amended under MoEMR Regulation No. 10/2018, but the risks relating to Natural Disaster FM remain with Sponsors (see Section 4 – “Regulations”). This remains a source of concern to banks.

Renewable energy tariffs that incentivise investment would also help increase electrification. Respondents believe that the Government should set tariffs consistent with the risk involved (rather than benchmarking to PLN’s average electricity generation cost). The new tariffs introduced in MoEMR Regulation No. 12/2017 (revoked by MoEMR Regulation No. 50/2017) generally lowered tariffs paid to private developers, causing some renewable power plant projects to become less commercially viable. This is because BPP is relatively low for many parts of the country, compared to the current costs of many renewables technologies. The net impact may be less interest in renewables investment.





Photo source: PT Adaro Power

6. The “Energy Trilemma”

Affordability is now considered the main priority in the Energy Trilemma, reflecting the current policy focus on cost

The trade-off between the three classic energy objectives of “security of supply”, “affordability”, and “sustainability” has long been recognised as a central dilemma, or ‘trilemma’, for energy policy. The energy supply that might be the most affordable may not be the most secure and/or the most sustainable and vice versa. As the World Energy Council points out, “delivering policies which simultaneously address energy security, universal access to affordable energy services, and environmentally sensitive production and use of energy is one of the most formidable challenges facing the government and the industry.”⁸ In Indonesia’s case, “affordability”, which is the respondents’ main concern, should not, in theory, be an issue since Indonesia has abundant natural resources such as coal, oil, gas, and renewables (Table 3, Table 4, and Figure 17). However, the lack of scalability, lack of adequate infrastructure, and high building costs in certain areas of the Indonesian archipelago drive up the price of installing and generating power.

Table 3 – Indonesia’s Coal Reserves in 2017

Region	Resource	Reserve	Total
Java	99	–	99
Sumatera	50,757	11,279	62,036
Kalimantan	75,772	15,562	91,334
Sulawesi	269	–	269
Maluku	8	–	8
Papua	136	–	136
Total	127,041	26,841	153,882

Source: Laporan Kinerja Kementerian Energi dan Sumber Daya Mineral 2017 [2017 MoEMR Performance Report], page 143

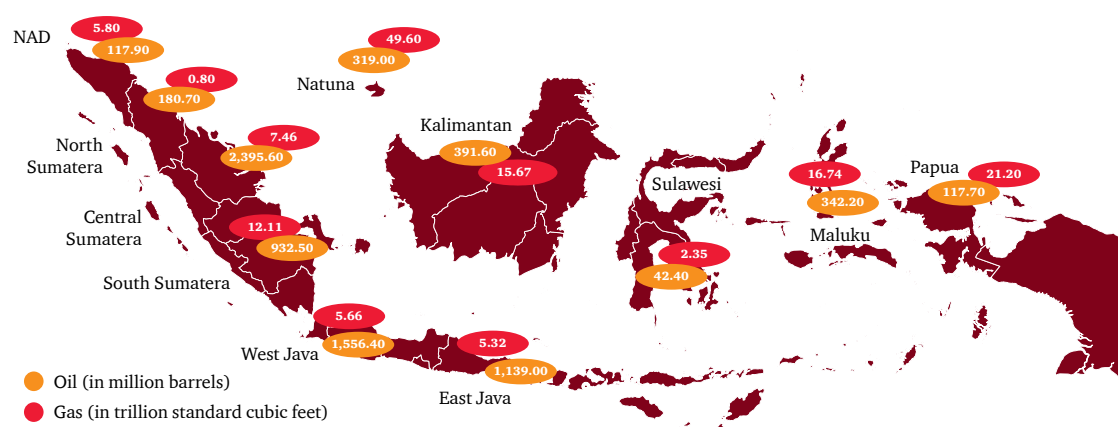
Table 4 – Renewable Energy Resources in Indonesia

Source	Potential Power Generation
Hydropower	75 GW
Geothermal	29 GW
Biomass	33 GW
Solar PV	208 GWp (4.80 kWh/m ² /day)
Wind Power	61 GW (3 - 6m/s)
Ocean	18 GW

Source: Buku Statistik EBTKE 2016 [2016 EBTKE Statistics] published by the Directorate General of New and Renewable Energy and Energy Conservation

⁸ <http://www.worldenergy.org>

Figure 17 – Map of Indonesian Oil and Gas Reserves as of 1 January 2017



Source: Laporan Kinerja Direktorat Jenderal Minyak dan Gas Bumi 2017 [2017 Performance Report of Directorate General of Oil and Gas], p. 53-54.

Crude oil has traditionally played a large role in Indonesia's energy supply and export. However, Indonesia is now a net oil importer. The increasing oil prices and reliance on imports have driven Indonesia's energy mix away from diesel power plants. PLN aims to significantly reduce the use of oil in Indonesia's energy generation in the future from 5.8% in 2017 to 0.4% by 2023.

Coal has historically been and still remains Indonesia's most important source of fuel for electricity and a driver for economic growth. In 2017, coal accounted for 57.2% of Indonesia's power generation fuel mix and coal mining made up 2.3% of total Indonesian GDP. Indonesia's abundance of coal seems to favour investments in coal-fired power plants. Based on the 2018 RUPTL, coal-fired power plants account for 37% of the increase in installed capacity by 2027, compared to 32% in the 2017 RUPTL.

We put the question of this 'energy trilemma' to our survey participants. We asked them to assess how much they prioritise each dimension of the trilemma, but also forced them to make trade-offs between the different elements, in reflection of the real-life trade-offs that exist. This year, "affordability" seems to be the main issue,

a shift from the previous emphasis on "security of supply". The view of survey respondents is consistent with the Government's commitment to keep electricity prices affordable.

Looking at Table 5, respondents seem to prioritise "affordability" (6.1), over "security of supply" (5.1), and "sustainability/clean power" (3.8). This is in line with the Government's push towards providing affordable energy for the people. As the Minister for Energy and Mineral Resources, Ignasius Jonan, stated in May 2018:

*"... We [the Government] must take into account people's purchasing power. If we set high electricity prices to the developers, it will result in high electricity prices for the people..... We [the Government] must ensure electricity prices are affordable for the people."*⁹

In contrast to last year's survey, which saw "sustainability/clean power" as the main priority in the next five years, 2018 survey respondents seem to view that "affordability" will still remain the top priority by 2023 (although the importance of "security of supply" and "sustainability/clean power" are catching up).

9 <http://koran.bisnis.com/read/20180508/430/792676/energi-terbarukan-jonan-pilih-tarif-listrik-terjangkau>

Table 5 – The Energy Trilemma – Today and in 5 years**Within the Energy Trilemma where would you place Indonesia 2018 and 2023?**

Today	2018 Survey*	2017 Survey	2018 Indonesia Index	2017 Indonesia Index	Global Index**	In 2023	2018 Survey*	2017 Survey	2018 Indonesia Index	2017 Indonesia Index	Global Index**
Security of Supply	5.1	5.6	84	100	100	Security of Supply	4.9	4.5	89	76	100
Affordability	6.1	5.3	100	95	92	Affordability	5.4	4.6	100	78	83
Sustainability/clean power	3.8	4.1	64	73	61	Sustainability/ clean power	4.7	5.9	87	100	81

* Maximum cumulated score of 15

** Global index is from PwC's 14th Global power & Utilities Survey, 2015.

However, due to decreasing energy generation costs from renewable sources (see Section 7 – “Renewables and Technology Development”) as well as the advancement in storage technologies, we see less of a trade-off between “affordability” and “sustainability/clean power” in the future. The energy trilemma may become less problematic. Despite renewable energy generation technology currently reshaping the generation mix in dynamic emerging power markets such as India and China, some respondents believe PLN is “marching in the opposite direction”. However, in interviews, respondents acknowledged that PLN has always been in a difficult position as it faces conflicting objectives: to maintain or improve profitability while minimising the Government subsidy, to keep power prices low, to maximise renewables deployment, and to increase the electrification ratio.

The fact that sustainability and environmental impact are not sufficiently emphasised by PLN or the Government has raised some international concern, as seen from a recent IEEFA report¹⁰ which stated that:

“Indonesia is an outlier, on the brink of committing to a coal power lock-in without having demonstrated that its policymakers have a good understanding of the [current] trends.”

10 Brown, Melissa, Perusahaan Listrik Negara (PLN): A Power Company Out of Step with Global Trends, IEEFA, 2018.



7. Renewables and Technology Development

Reduction in the cost of renewable energy generation and the availability of cost-efficient storage technology are expected to have the largest impact on the Indonesian power sector

As the International Energy Agency (“IEA”) recently headlined, “renewable electricity generation grew by an estimated 6% in 2016 and now represented around 24% of global power output. For the first time, renewables accounted for more than half of new additions to power capacity and overtook coal in terms of world cumulative installed capacity.” Hydropower remained the largest source of renewable power, accounting for around 70%, followed by wind (16%), bioenergy (9%) and solar PV (5%). Around 45% of new renewable additions globally came from Solar PV with the commissioning of an estimated 70-75 GW. Onshore wind grew by 50 GW and the remainder came from hydropower and offshore wind development.¹¹

86% of respondents believe that reduction in the cost of renewable energy generation would have the biggest impact on the market (Figure 18). Solar and wind power generation are becoming increasingly competitive ways to meet new generation needs. In some parts of the world, renewable power technologies are now the cheapest source of power generation, with some projects bidding two cents per kWh¹² (Figure 19).

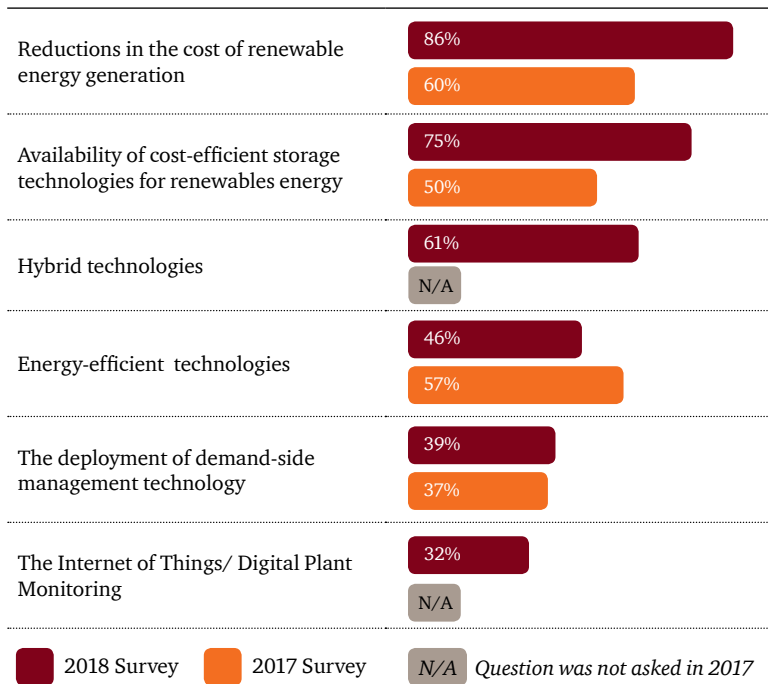
According to Bloomberg New Energy Finance,¹³ there could be a significant drop in 2018 in the global average selling price of solar modules of up to 35%, due to plans announced by China in June 2018 to curtail utility-scale PV projects and caps on distributed generation. This could see China only installing 30-35 GW in 2018, compared to 57 GW in 2017, which may mean there is overcapacity in manufacturing.

¹¹ IEA, Tackling Clean Energy Progress 2017, July 2017, p. 24.

¹² <https://electrek.co/2017/11/16/cheapest-electricity-on-the-planet-mexican-solar-power/?ref=hvper.com>

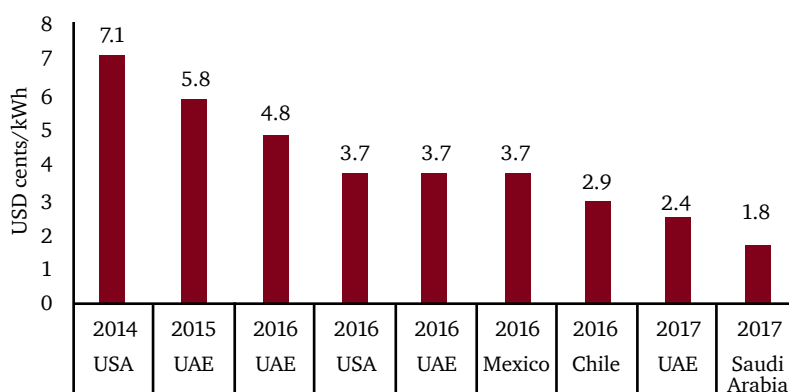
¹³ Bloomberg, “Chinese Burn Will Only Make the Solar Industry Stronger”, 5 June 2018.

Figure 18 – Which of the following technology developments do you expect to have the biggest impact on your market?



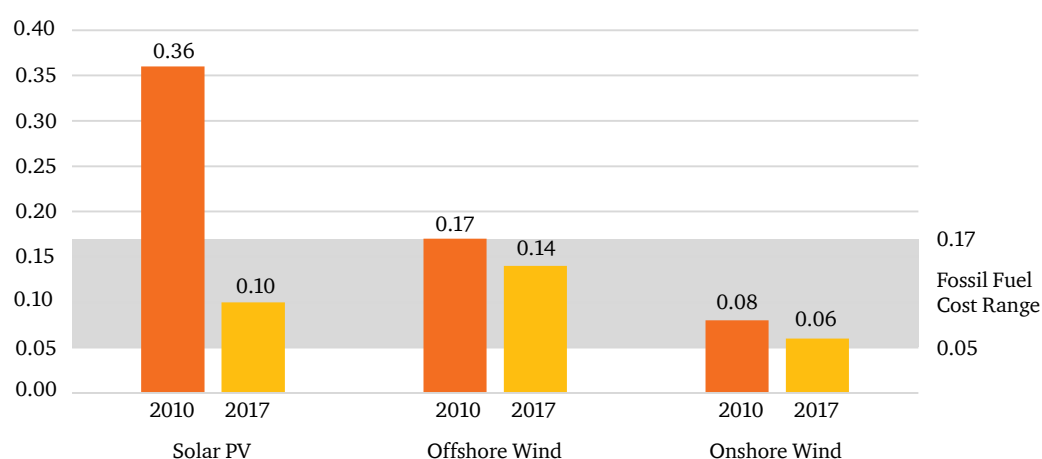
Moreover, according to the International Renewable Energy Agency (“IRENA”), an intergovernmental organisation to promote adoption and sustainable use of renewable energy, the global weighted average Levelised Cost of Electricity (“LCOE”)¹⁴ for most renewable energy generation is already lower than the high-end range (USD 0.05 - USD 0.17) for fossil-fuel power plants in many countries (Figure 20).

Figure 19 – Solar PV Power Project Bids



Source: Bloomberg & Electrek

¹⁴ The LCOE of a given technology is the ratio of life time costs to lifetime electricity generation, both of which are discounted back to a common year using a discount rate that reflects the average cost of capital. In this report, all LCOE results are calculated using a fixed assumption of a real cost of capital of 7.5% in OECD countries and China, and 10% in the rest of the world. All LCOE calculations exclude the impact of any financial support.

Figure 20 – Global LCOE from utility-scale renewable power generation technologies 2010-2017 (in USD)

Source: IRENA, *Renewable Power Generation Costs in 2017*

The decreasing price of renewables could complement the Government’s agenda to provide affordable energy for the people, regardless of the power generation source. If costs of generating electricity from renewables could compete against fossil fuel-fired power plants, we could see renewables contribute a bigger portion of Indonesia’s future energy mix.

However, according to the IEA, cost reductions for renewables, on their own, will not be enough to secure efficient decarbonisation of electricity supply. It is necessary to make structural changes to the design and operation of the power system to ensure adequate incentives for investment and to integrate high shares of variable wind and solar.¹⁵

Recent regulations have not been welcoming of investments in renewables generation since they were subject to MoEMR Regulation No. 12/2017 (amended by MoEMR Regulation No. 50/2017) which reduced tariffs (see Section 4 – “Regulations”). METI stated that:

“[the tariffs] are discriminatory against renewables.....if the goal is to reduce power costs, then why only reduce the price of renewables [but not oil/diesel-fired power plants]?”

To be fair, PLN only uses diesel power plants for power generation in remote areas or isolated islands and as a buffer until a more economical power generation alternative is available. In addition, diesel power plants are rarely offered to IPPs in any case, so direct comparison with renewables IPP prices are difficult.

75% of respondents also believe that the availability of cost-efficient storage technologies for renewables could also impact the market. This is apparent since the development of cheap energy storage is a critical step in moving towards intermittent energy generation, such as solar, hydro, and wind sources. Storage technologies are especially important in smaller island grids, as incorporating those small island grids into the national electricity grid would be more expensive. METI noted that batteries were likely “the next big thing” for renewables but that commercial viability of this technology was still “some years away”.

¹⁵ International Energy Agency, 2016 World Energy Outlook: Executive Summary, 2016, p.4



8. Energy Access

As an archipelago nation, the availability of affordable off-grid solutions is a key driver in increasing electrification rates in rural areas

Given that close to 5% of the population of Indonesia is without access to electricity and many of those who are connected suffer frequent supply interruptions, it is unsurprising that expansion of power generation and T&D networks is both a top priority and a major challenge. According to the 2018 RUPTL, PLN projects electricity demand to grow at 6.9% p.a. until 2027, reaching a total of 434 TWh of electricity consumed in 2027, compared to 223 TWh in 2017. By 2024, the Government expects that the entire population of Indonesia will have access to electricity.¹⁶

Table 6 – What are the main barriers to improving the electrification rates in rural areas in Indonesia?

	2018	2017
Affordable off-grid solutions	55%	47%
Cost-reflective tariffs and PLN subsidy arrangements	55%	N/A
Difficult logistics, e.g. roads and ports in remote areas	48%	63%
Business model/billing issues for off-grid solutions	39%	N/A
Infrastructure funding	39%	73%
Cost of connecting new customers to the grid	35%	50%
Funding for off-grid solutions	29%	N/A
Limited available generation capacity	29%	67%
Population growth	10%	10%

N/A: Question was not asked in previous survey

¹⁶ 2018 RUPTL.

We asked survey participants to explore the barriers to electrification. Affordable off-grid solutions and cost-reflective tariffs seem to be the main issues. Indonesia's geography as a nation of islands makes it challenging to supply affordable electricity to certain areas and, therefore, off-grid systems more cost-competitive than extending the national grid network in the majority of cases.

However, affordable off-grid solutions reflect the fact that technology in remote locations is generally expensive, suffering from high logistic costs and no economies of scale. At the same time, tariffs are limited by customers' willingness to pay, which may be more or less than the typical PLN retail price. In theory, subsidies may be available under MoEMR Regulation No. 38/2016, however, it is unclear if any funding has been disbursed.

For the roll-out of the grid itself to increase electrification, PLN remains constrained by low end-user tariffs and limited Public Service Obligation subsidies, giving it a limited incentive to invest in "last-mile" T&D.



Photo source: PT UPC Sidrap Bayu Energi

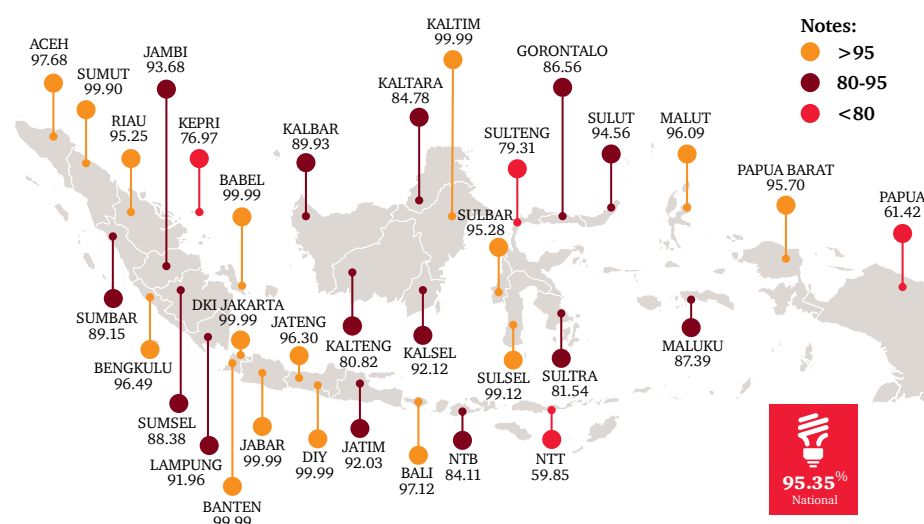
9. Megatrends, Growth, and Infrastructure

- *Population growth and urbanisation are top megatrends, as they drive future energy demand*
- *New disruptive technologies, especially energy storage, are expected to have an impact on Indonesia's energy mix*

Indonesia continues to be a bright spot for global economic growth. Current growth remains ahead of many other countries. PwC projects Indonesia will have a larger GDP than that of Germany, Russia, Brazil and Japan by 2030 (in purchasing power parity terms) and have the world's fifth largest GDP by 2030 and fourth largest by 2050, respectively.¹⁷

Despite being a growing global economic power, Indonesia's energy consumption is considered low. Electricity consumption in 2017 was 1.02 MWh per capita, which was relatively lower than neighbouring economies (see Figure 22). Similarly, in terms of access to the grid, the picture is mixed, with the electrification ratio in the western part of the country being as high as 99.99% (DKI Jakarta, Jabar, Banten, DIY, Kaltim and Babel), and in the eastern part of the country being as low as 59.84% (NTT) (see Figure 21). The national average in 2017 was 95.35%.

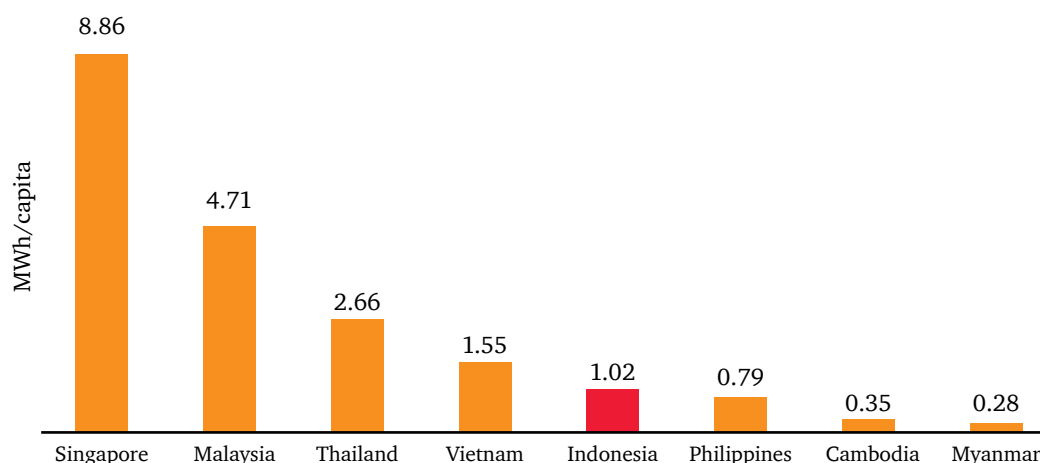
Figure 21 – 2017 Electrification Rates in Indonesian Provinces (in %)



Source: 2017 Performance Report of MoEMR

17 PwC, "The World in 2050: How will the global economic order change by 2050?", February 2017.

Figure 22 – 2017 Electricity Consumption per capita in major ASEAN Countries



Source: BMI 3 July 2018 and 2017 Performance Report of MoEMR

Alongside economic growth, population growth is also adding to energy demand. By the end of 2017, Indonesia had an estimated population of over 260 million people, making it the fourth most populous country in the world. This number is expected to continue growing at a rate of 1% per annum to 296 million by 2030. The energy demand is also subject to the rise of Indonesia's middle class, which currently accounts for over 70 million people.

In addition, the nation's fast-growing population also adds to the pressure on urban areas. Indonesia currently has at least 11 cities of over a million residents (medium-sized cities) with Jakarta considered a megacity (with a population of over ten million). The number of large cities with populations of more than one million is expected to increase.

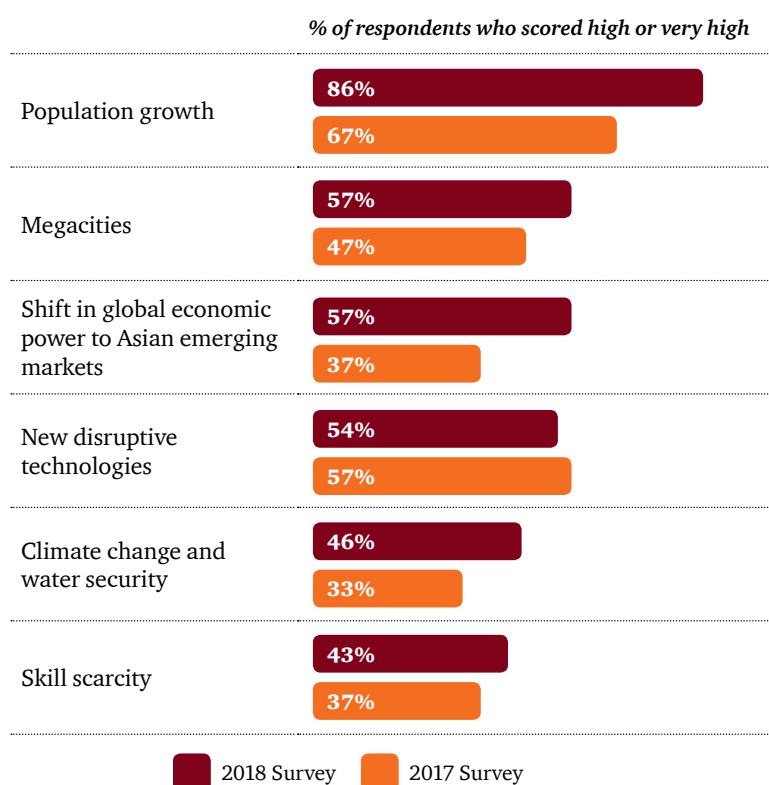
An era of rapid technological change is coming at a pivotal time in the expansion of Indonesian power infrastructure. In particular, the prospect of more affordable off-grid energy is tantalisingly close. Global commentators believe that battery storage technologies will begin to scale up commercially and undergo continuing cost reduction in the next few years. In Indonesia, this presents the possibility that small, remote mini-grids could be technically self-sufficient and rely on intermittent sources of power. Also, although an established technology, rapid cost reductions for PV modules threaten to disrupt rural power markets (as discussed in Section 7 – “Renewables and Technology Development”).

All of these trends pose major infrastructure challenges and opportunities for the power sector. However, no single megatrend dominates power sector challenges in Indonesia, according to the power sector executives and stakeholders interviewed. As is evident from Figure 23, population growth (86%) and megacities (57%) represent the greatest perceived challenges to the power sector.

Climate change and water scarcity is at the lower end of the agenda for survey respondents. This comes despite Indonesia signing up to the targets under the Conference of Parties 21 agreement at the high-level signature ceremony in New York, on 22 April 2016.¹⁸ Under the Government Intended Nationally Determined Contribution made based on this agreement, Indonesia has committed itself to reduce 29% of its emissions versus a 'Business As Usual' scenario with its own efforts (and up to a 41% reduction with international assistance) by 2030.¹⁹ This would likely require a significant reduction in the fossil fuel intensity of the fuel mix. It was not clear whether respondents are skeptical of the global or Indonesian commitment, or whether they are simply underestimating its impact.

Surprisingly, skill scarcity is at the bottom of the agenda, despite skill scarcity being a major area of commentary recently in Indonesia.²⁰

Figure 23 – Which of the following global and Indonesia megatrends will have a significant impact on the power sector?



¹⁸ http://unfccc.int/paris_agreement/items/9444.php

¹⁹ http://www4.unfccc.int/submissions/INDC/Published%20Documents/Indonesia/1/INDC_REPUBLIC%20OF%20INDONESIA.pdf

²⁰ <https://www.nytimes.com/2016/12/18/world/asia/indonesias-dire-need-for-engineers-is-going-unmet.html>



Photo source: PT Bhimasena Power Indonesia

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