A Coherent Fiscal Policy Framework for Promoting Renewable Energy and Energy Efficiency in Indonesia

Final Report

April 2015

Low Carbon Support Programme to Ministry of Finance, Indonesia

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Acknowledgements

The Report has been prepared by a team comprised of John Ward and Cor Marijs of Vivid Economics from the United Kingdom and Fabby Tumiawa and Eriell Salim from Indonesia. It was managed within the United Kingdom Low Carbon Support Programme to the Ministry of Finance Indonesia by Paul Butarbutar. Work occurred in close collaboration with the Centre for Climate Change and Multilateral Financing Policy (PKPPIM) in the Fiscal Policy Agency (BKF) Ministry of Finance Indonesia in the initial stages under the leadership of its Director Dr. Irfa Ampri and in the latter stages with leadership of Dr Syurkani Ishak Kasim, with management supervision by Bp Ramadhan Harisman. The lead counterpart in PKPPIM was Dr. Joko Tri Haryanto.

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Inquiries Regarding this Paper

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Preface

This Report presents a Coherent Fiscal Policy Framework for Promoting Renewable Energies and Energy Efficiency in Indonesia. The Report is presented in two parts with Part A addressing the promotion of renewable energies while Part B addresses the promotion of enhanced energy efficiency.

Part A. Promoting Renewable Energies

The world is embracing renewable energy. In recent years around 40 per cent of all of additional power generation capacity added in the world was to harness renewable energy. Increasingly, renewable energy is proving to be a cost-effective solution to meeting the world's energy needs.

Indonesia has massive potential to become a global renewables leader with potential to exploit more than 200 GW of renewable power along with scope to become a leader in the bio-economy of tomorrow. To realise this potential Indonesia has set ambitious targets. By 2050 it is planned that more energy will come from renewable sources than from any fossil fuel source. Realising these targets can help ensure improved health and well-being of citizens, ensure that more households are able to access reliable sources of energy, improve energy security, as well as deliver on Indonesia's emissions reduction objectives.

The Ministry of Finance has a crucial role to play in facilitating this transition. Prudent, well-calibrated policies and incentives provided through a stable and well-understood regulatory regime can provide the necessary stimulus for renewable energy development. At the same time the Ministry is mindful of the need for budgetary discipline and for any support to be provided in a targeted and coherent fashion.

Part A of this strategy document provides a roadmap for Indonesia's future renewable energy deployment. It sets out a series of proposals to ensure that renewable energy represents an attractive investment option, for which finance can be found and where investors are confident of the long-term prospects for the industry.

The Ministry of Finance has identified three pillars that can provide the basis for the country's continued development: enhanced budget sustainability, improved macroeconomic stability; and superior international competitiveness. A coherent renewable energy strategy can deliver against all of these objectives. Fossil-fuel subsidies have been a major driver of budget fragility, while and increasing reliance on imports of conventional transport fuels highlights Indonesia's energy insecurity.

A coherent approach to renewable energy development rests on three separate, but related, pillars. First, the project economics of renewable energy investments must be appropriate to allow investors to make appropriate – but not excessive – returns. Second, finance must be readily available for good investment opportunities on reasonable terms. Finally, and underpinning each of the other pillars, the political economy context must provide investors with the confidence that they are investing within a stable regulatory regime.

The Ministry of Finance can provide support to each of these three pillars but in ways that are financially disciplined and respect the macroeconomic context of the country. The strategy sets out a number of proposals that can achieve this, including an enhanced and

transparent set of fiscal incentives for renewable energy, a more stable and transparent renewable power pricing model; and the establishment of an independent energy regulator.

Part B. Promoting Energy Efficiency

Many countries are increasingly recognising that economic and environmental objectives can frequently be aligned. Countries that pursue inclusive growth can do so in a way that yields environmental gains. Enhancing energy efficiency is a perfect example: pursuing greater efficiency is both a rational approach to promoting economic growth and enhancing energy security, and can also make a valuable contribution to reducing emissions.

In Indonesia, the importance of energy efficiency is magnified by the recent budgetary situation. Until fuel subsidy revisions in late 2014 some 20 per cent of the national budget was consumed by energy subsidies. If current energy supplies are used more efficiently then expenditures on subsidies will fall, freeing up resources for education, infrastructure and our other development priorities.

Indonesia has set some of the most ambitious energy efficiency targets in the region. However, at present, on a number of metrics, the country is not yet fully on track to meet these targets. Performance lags a number of regional peers. The barriers that must be overcome are regulatory and financial, and there must also be improvements to the capacity of key stakeholders across the country.

Part B of this strategy paper proposes important steps towards rectifying this situation and ensuring the development of a sound and coherent approach to promoting energy efficiency in Indonesia. It sets out a series of specific and practical policy options to be pursued across all sectors of the economy that can help to enhance energy efficiency. While the Ministry of Finance's primary focus is on fiscal policies, the paper identifies the importance of an integrated approach combining fiscal, regulatory and administrative instruments.

Energy efficiency can help to deliver on key economic objectives. More rational energy use can support budget consolidation. Studies point to a sustained improvement in economic growth from greater energy efficiency, while reducing the energy costs of export industries can provide them with an important advantage in competitive international markets. This makes energy efficiency of key importance to the Ministry of Finance.

Indonesia has considerable potential to improve energy efficiency performance yet further. International comparisons show that a number of peers are outperforming Indonesia on key metrics. Various factors are responsible for holding back available opportunities, including a regulatory regime that is not as supportive as it might be, challenges in accessing finance, and a series of capacity weaknesses.

To unlock these opportunities, it is crucial to have a coherent fiscal framework which rewards improvements in energy efficiency and penalises wasteful energy use, within a context in which enhanced budget sustainability remains crucial. To this end, the strategy sets out a series of priority interventions across all sectors of the economy which include sustaining reductions in energy subsidies; new fiscal incentives for investments in energy efficient capital equipment; and enhanced financing opportunities for energy efficiency investments. These proposals build on international best practice while being firmly rooted in the specifics of the Indonesian context. To maximise the effectiveness of these fiscal policies, it is crucial

that they are implemented alongside regulatory and administrative policies in the domain of the Ministry of Energy and Mineral Resources.

Executive Summary

Part A. Promoting Renewable Energies

This report presents a strategy for improvement of the fiscal and broader policy framework to support renewable energy in Indonesia. The existing policy framework is already stimulating some growth in renewable energy, but it is not nearly sufficient to reach ambitious targets and the associated benefits that reaching these targets would bring. Part A of this report presents a series of essential policy reforms, inspired by international best practice but tailored to our context, which can push the market to realising the country's full potential.

Increased renewable energy deployment provides strong benefits to the country including through improved budget sustainability and stronger macroeconomic performance. Greater deployment of renewable energy can help reduce reliance on fossil fuel imports and the challenges to the trade account caused by fluctuating fossil fuel prices. In many periods Indonesia has subsidised fossil-fuel forms of energy more heavily than renewable energy, so a switch to renewable energy offers the prospect of helping to consolidate the budget; while in many rural areas, renewable power can be deployed at lower cost than conventional diesel generation. Increased renewable energy deployment generates high quality jobs and entirely new industries. These benefits can be realised at the same time as helping to improve the environment and health of citizens in the most polluted cities, while also contributing towards ambitious goals to reduce carbon dioxide emissions.

Indonesia's targets for renewable energy in the energy mix are ambitious, but the country is not yet on track to meet them. In the beginning of 2014, Parliament passed the National Energy Policy which sets targets for renewables in the energy mix at 23 per cent by 2025 and 31 per cent by 2050. At present, around five per cent of the energy mix is renewable. Policy planning therefore emphasises capacity additions of renewable power generation and increased deployment of biofuels. Studies show that Indonesia has high potential for additional renewable power generation from hydro, geothermal, biomass, solar, wind and ocean sources.

The share and growth of renewables are lagging behind international peers. Indonesia typically has both a smaller share of renewables in total final energy consumption than many other countries and is in the relatively small subset of countries that has seen a decline in renewables in recent years, if hydropower and traditional biomass are excluded. Countries including the Philippines and Thailand perform much better on these aspects.

To realise the renewables potential and achieve targets, the existing fiscal and broader policy framework is in need of reform. As international experience proves the combination of tax incentives and feed-in tariffs, for which there are arrangements in place, can significantly boost renewable energy deployment. However, key elements of current fiscal policy appear to function inadequately. Incentives that appear available on paper are not always easy to access in practice, while frequent changes in feed-in tariffs create investor uncertainty and can hold back investment. Other technology-specific incentive provisions, such as the Geothermal Fund Facility, are facing implementation challenges.

The Report identifies 14 policy reforms that could improve the fiscal and broader renewable energy policy framework, based on a review of international experience.

The lessons from international best practice are that renewable energy policy must be transparent and accessible, sustained and consistent, adjustable, context-specific, inclusive, provide adequate value from subsidies, guarantees market access and long-term contracts, and provide for differentiation between support levels. At present the policy framework cannot justly claim the unequivocal application of these principles to its various elements. The proposed reforms, summarized in Table 1 provide a pathway to overcoming the barriers and challenges to achieving a policy framework that conforms to international best practice.

A smaller number of these policy reforms represent immediate and high priority areas for Indonesia to take forward. While all of the policy proposals outlined are important, there are a number that represent particular priorities, notably: maintaining the abolition of energy subsidies, consolidating and automating fiscal incentives, implementing the Geothermal Fund Facility, and introducing renewables targets for PLN and MEMR. These priorities have been identified by considering the expected impact on renewables deployment, whether or not it can be achieved with limited additional fiscal resources and whether or not the proposal is within the control of the Ministry of Finance.

Table 1 Key policy reforms for renewable energy policy in Indonesia

Policy reform	Issue	Term	Key departments	MoF priority
Project economics				
Rationalise and reduce fossil fuel energy subsidies	The subsidies send the wrong price signal and reduce flexibility to support renewables	Short term	MoF	High
Consolidate and automate available fiscal incentives	Current application processes for tax incentives are lengthy and uncertain	Short term	MoF	High
Improve and stabilise renewable power pricing regimes	Unplanned changes to renewable power pricing regimes create uncertainty for investors and for some technologies a pricing regime is lacking	Short term	MoF, MEMR	Medium
Introduce net-metering	Net-metering allows for distributed generation	Short term	MoF, MEMR	Medium
Enforce application of the biofuels price formula stipulated by MEMR	Current pricing policy does not allow cost recovery for producers	Short term	Min SOEs, MEMR	Medium
Access to finance				
Prioritise the provision of guarantees to renewables and remove support for coal-fired power generation	Government guarantees have thus far mainly been awarded to coal-fired projects	Short term	MoF	Medium
Accelerate the implementation of the Geothermal Fund Facility	Geothermal development suffers from considerable resource risk hampering access to capital	Short term	MoF, MEMR, PIP	High
Continue PIP's management focus on supporting renewables	Despite intentions, no funds have been disbursed to renewables projects to date	Short term	PIP	Medium

Increase Ministry of Finance engagement in co-ordinating support from international development partners for renewables through creating a national database	At present, support from development partners lacks tracking and coordination	Short term	MoF,	Medium
Political economy				
Introduce renewable energy targets for MEMR and PLN, consistent with the new KEN	It is unclear how the renewable energy targets in the KEN will be met	Short term	MoF, MEMR	High
Use government budgets to promote a supportive enabling environment for renewable technologies	A lack of government provision of renewables infrastructure and services forms a barrier to renewables investment	Short term	MoF, MEMR	Medium
Reverse foreign ownership constraints for <10MW projects to allow for transfer of skills and technology	Indonesia risks losing access to foreign investment, skills and technology	Short term	MEMR	Low
Establish an independent energy market regulator	Uncertainty over what happens if there is a dispute raises risk	Medium term	MoF, MEMR	Medium

Part B. Promoting Energy Efficiency

Part B of the report sets out a way to improve the fiscal – and broader policy – framework to support energy efficiency in Indonesia. This analysis shows that a step change to implementing international best practice that is relevant to the Indonesian context opens up the possibility of meeting ambitious energy efficiency goals and becoming recognised as a leader across the region and the international community.

Sustained improvements in energy efficiency can promote budget consolidation and sustainability, improve macroeconomic performance and improve the competitiveness of the economy. It can also support efforts to contribute to solving the global problem of climate change. Energy efficiency improvements can reduce the need for energy subsidies, freeing-up public resources to be spent on health, infrastructure, education and other pressing needs. If Indonesian firms reduce their spending on energy, they can become more competitive in international markets. Both of these benefits suggest that stronger energy efficiency performance can improve the macroeconomic performance and growth rate of the economy, in line with the international evidence presented in this paper. At the same time, greater energy efficiency can reduce the amount of money poor Indonesians spend on energy, helping to alleviate poverty while also improving the environment in some of Indonesia's most congested cities, where air pollution levels remain above internationally recognised safe limits. These benefits to citizens, firms and taxpayers can all be achieved while also helping to make progress towards ambitious goals to reduce emissions by 26% on Business as Usual (BAU) levels by 2020.

Indonesia's current performance in improving energy efficiency is moderate compared to its peers. Energy consumption has grown at over 3 per cent p.a. in recent years, driven by growth of the economy and population. The transport and commercial sectors have seen marked increases in energy consumption. Controlling for these factors, it

can be seen that Indonesia's energy efficiency is mid-ranking for the region: being more successful than some (Thailand, Vietnam) but less successful than others (Malaysia and the Philippines).

The lack of energy efficiency improvement means that Indonesia is not currently on track to meet its ambitious energy efficiency targets. In the draft National Energy Conservation Master Plan (RIKEN), a target was set of achieving a decline in energy intensity (the amount of energy required to produce one unit of GDP) of 1 per cent per annum to 2025. This implies that energy consumption would be 19.6 per cent lower in 2025 than under a BAU scenario. Other strategy documents have targeted a 15.6 per cent fall in energy consumption by 2025. Studies show that these are the most ambitious energy efficiency targets in the region. The most recent evidence suggests that the economic downturn has pushed the country off-track from these targets.

But there is sufficient market potential to meet the targets. Studies suggest that the available energy efficiency opportunity is worth up to US$ 5 billion (IDR 45 trillion) to the economy and that Indonesia has the second largest market potential in the region. Benchmarking across a range of sectors, on both the energy demand and energy supply-side, further illustrates the opportunity, including in the iron and steel, ceramics and glass sectors.

The current regulatory and policy framework needs revision. Some aspects of the current policy framework are well-formulated, including the mandatory energy management arrangements for firms consuming more than 6,000 tonnes of oil equivalent per annum. However, there is also a need to acknowledge weaknesses in the current policy settings: market studies consistently rank Indonesia's regulatory framework as less supportive to energy efficiency investment than others in the region. The consultation exercise conducted for this study indicates that those regulatory and policy challenges are compounded by difficulties in accessing capital to undertake energy efficiency investments and a range of capacity challenges.

The Report's approach to improving the policy framework consists of 19 recommendations that tackle all of these barriers. A combination of fiscal and non-fiscal measures – some to be implemented in the short-term, others in the longer-term – will, as a package, provide a coherent and long-lasting approach to realising energy efficiency potential. These recommendations are summarised in Table 2 along with their justification, the key departments that will need to be involved, and the priority level for the Ministry of Finance.

A smaller number of these policy reforms represent immediate and high priority areas to take forward. While all of the policy proposals outlined are important, there are a number that represent particular priorities, notably: reducing energy subsidies**,** establishing fiscal incentive for energy efficiency investment in industry and buildings**,** implementing the energy efficiency fund**,** and introducing a demand side management programme for PLN**.** These priorities gave been identified by considering the expected impact on improving energy efficiency, whether or not it can be achieved with limited additional fiscal resources and whether or not the proposal is within the control of the Ministry of Finance.

Table 2 19 key recommendations for energy efficiency policy in Indonesia

Energy efficiency sector	Recommendation	Issue	Fiscal?	Term	Key departments	MoF priority
Generic	Adopt a phased removal of energy subsidies	Current energy subsidies reduce incentive for energy-users to reduce energy use	Yes	Medium-term	MoF	High
	Accelerate the establishment of the energy efficiency revolving fund	Access to capital is a significant barrier to undertaking energy efficiency improvements	Yes	Short-term	MoF, PIP	High
	Introduce a monitoring framework for MEMR to track progress towards national energy efficiency goals	There is a lack of coordination of energy efficiency measures and it is unclear what progress is being made towards achieving energy efficiency goals	No	Short-term	MEMR	Low
	Launch a publicity campaign to educate users about the benefits of energy efficiency	The population is unaware of the benefits available to them from pursuing energy efficiency	Yes (small fiscal outlay)	Short-term	MEMR, MoF	Low
	Increase MoF engagement in coordinating support from international development partners for EE through creating a national database	International climate finance is not centrally coordinated and tracked, which may result in misallocation of funds	No	Medium-term	MEMR, MoF	Medium
Industrial energy efficiency (and energy sector)	Implement a fiscal incentive framework for industrial and business energy efficiency measures	Currently no fiscal incentives in support of Regulation No. 70/2009	Yes	Short-term	MoF, MEMR	High
Appliances	Accelerate the establishment of energy efficiency labelling and the use of Minimum Energy Performance Standards	Consumers are unaware of the benefits of energy efficient appliances	No	Short and medium-term	MEMR	Low
	Implement an appliances rebate system reducing the cost of energy efficient appliances for consumers	In absence of subsidies, there is insufficient incentive to invest in energy efficiency appliances	Yes	Short-term	MEMR, MoF	Medium

Appliances/ Buildings	Reform government procurement systems to promote energy efficient technologies	Government bodies are currently unable to finance energy efficiency measures	Yes	Short-term	MoF, MEMR, Ministry of Public Works, Government Procurement Agencies of Goods/Services (LKPP)	Medium
	Introduce a demand-side management programme managed by the utility	Demand-side management programmes have proven successful in overcoming barriers to energy efficiency investments	No	Medium-term	PLN, MEMR, MoF	High
Buildings	Building on the Jakarta experience, make building codes compulsory for new and renovated buildings	Building owners and tenants do not factor energy consumption performance into decisions	No	Short-term	MEMR	Low
	Introduce tax incentives for the most energy efficient buildings	Energy subsidies reduce the financial incentive to improve energy efficiency	Yes	Short-term	MEMR, MoF	High
	Expand MEMR audit programme to buildings and integrate with energy efficiency Revolving Fund	Building owners are unaware of potential for energy savings	Yes	Short-term	MEMR, PiP, MoF	Low
	Provide information on energy performance at the point of sale	Building owners are unaware of potential for energy savings	No	Short-term	MEMR	Low
Transport	Introduce vehicle efficiency standards and reduce the sulphur content of our fuel	Without standards there is too little incentive to improve vehicle efficiency	No	Medium-term	MEMR, Ministry of Transport	Low
	Set tax rates on vehicles dependent on energy use	Penalising heavy fuel use provides a strong incentive to purchase efficient vehicles	Yes	Short-term	MoF, Ministry of Transport	Medium
	Provide information on energy performance of vehicles	Consumers are unaware of the energy performance of vehicles and so do not factor it into their decision-making	No	Short-term	MEMR, Ministry of Transport	Low
	Accelerate the public transport initiatives identified in the RAN-GRK	Traffic congestion threatens to undermine scope for vehicle efficiency improvements	Yes	Medium-term	MoF, MEMR. Ministry of Transport	Medium
Energy supply	Link remuneration of senior executives in PT-PLN and Pertamina to improvements in supply-side energy	Scope for improving supply-side energy efficiency is not being exploited	No	Short-term	MoF, MEMR, PT-PLN and Pertamina	Medium

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Abreviations

ADB	–	Asian Development Bank
APBN	–	Annual National Revenue and Expenditure
ARRA	–	American Recovery and Reinvestment Act of 2009
B100	–	Biodiesel in its pure form
BAU	–	Business-as-usual
BKF	–	Fiscal Policy Agency
Bn	–	Billion
CAGR	–	Compound Annual Growth Rate
CFL	–	Compact fluorescent lamps
CGE	–	Computable general equilibrium
CIF	–	Climate Investment Funds
CNG	–	Compressed natural gas
CO_2	–	Carbon dioxide
COP	–	Conference of the Parties
CTF	–	Clean Technology Fund
DEN	–	National Energy Council
DNI	–	Negative Investment List
DNPI	–	National Council on Climate Change
DPSP	–	Dedicated Private Sector Program
DSIRE	–	U.S. Database of State Incentives for Renewables and Efficiency
DSM	–	Demand side management
E100	–	Bioethanol in its pure form
EE	–	Energy efficiency
EERF	–	Energy Efficiency Revolving Fund
EIA	–	U.S. Energy Information Administration
EnEV	–	Energy Conservation Act
EPC	–	Energy Performance Certificate
ESCO	–	Energy service company
ETL	–	Environment Technologies List
FAO	–	Food and Agricultural Organization
FiT	–	Feed-in Tariff
FOB	–	Free on Board (buyer pays for transportation of goods)
FTP II	–	Fast Track Programme II
GBI	–	Generation Based Incentive
GDP	–	Gross domestic product
GFF	–	Geothermal Fund Facility
Gj	–	Gigajoule
$GtCO_2$	–	Giga-tonne Carbon Dioxide
GW	–	Gigawatt
GWh	–	Gigawatt hour
HICS	–	High Income Countries
HH	–	Household
ICCTF	–	Indonesia Climate Change Trust Fund
IDR	–	Indonesian Rupiah
IEA	–	International Energy Agency
IFC	–	International Finance Corporation
IIGF	–	Indonesia Infrastructure Guarantee Fund
ILO	–	International Labour Organisation

IMF	–	International Monetary Fund
IPCC	–	Intergovernmental Panel on Climate Change
IPP	–	Independent Power Producer, PPA – Power Purchasing Agreement
Irena	–	International Renewable Energy Agency
ITC	–	Investment Tax Credit
Kcal	–	Kilocalories
KEN	–	National Energy Policy
Kg	–	Kilogramme
km	–	Kilometres
Ktoe	–	Kilo-tonnes of oil equivalent
kWh	–	Kilowatt hour
LED	–	Light emitting diodes
LICS	–	Lower Income Countries
LKPP	–	Government Procurement Agency of Goods/Services
LMDI	–	Logarithmic mean divisia index
LMICS	–	Lower Middle Income Countries
LPG	–	Liquefied petroleum gas
lpg	–	Litres per gasoline equivalent
LULUCF	–	Land Use, Land Use Change and Forestry
m	–	Million
m^2	–	Square metres
m/s	–	Metre per second
MACC	–	Marginal abatement cost curve
Mboe	–	Million barrels of oil equivalent
MEMR	–	Ministry of Energy and Mineral Resources
MEPS	–	Minimum energy performance standard
MIA	–	Environment Investment Rebate
MoF	–	Ministry of Finance
MOPS	–	Mean of Platts Singapore (fuel price index)
MPW	–	Ministry of Public Works
$MtCO_2$	–	Megatonne carbon dioxide
MW	–	Megawatt
NAMA	–	Nationally Appropriate Mitigation Action
NEES	–	National Energy Efficiency Strategy
NERSA	–	National Electricity Regulator of South Africa
NTB	–	West Nusa Tenggara
NTT	–	Nusa Tenggara Timur
OECD	–	Organisation for Economic Cooperation and Development
OTTV	–	Overall thermal transfer value
PIP	–	Indonesia Investment Agency
PKPPIM	–	Center for Climate Change Financing and Multilateral Policy
PLN	–	State Electricity Company
PM10	–	Particulate Matter up to ten micrometers in size
PPP	–	Public Private Partnership
PSO	–	Public Service Obligation
PTC	–	Production Tax Credit
RAN-GRK	–	National Action Plan for Reducing Greenhouse Gas Emissions
REC	–	Renewable Energy Certificate
RES	–	Renewable Energy Source
RIKEN	–	National Energy Conservation Master Plan

RPS	–	Renewable Portfolio Standard
RUEN	–	General Plan of National Energy
SE4ALL	–	Sustainable Energy for All
SLF	–	Certificates worth function
SME	–	Small and medium sized enterprises
SNI	–	Indonesian National Standard
SOE	–	State-owned Enterprise
Solar PV	–	Solar photovoltaics
SSLI	–	Smart Street Lighting Initiative
t	–	Metric tonne
TEERF	–	Thai Energy Efficiency Revolving Fund
TFEC	–	Total Final Energy Consumption
Toe	–	tonnes of oil equivalent
UMICS	–	Upper Middle Income Countries
UNIDO	–	United Nations Industrial Development Organization
US$	–	United States Dollar
VAMIL	–	Arbitrary Depreciation of Environmental Investment Measure
VAT	–	Value Added Tax
WHO	–	World Health Organization
µg/m3	–	micrograms per cubic metre

Part A. Promoting Renewable Energies

1 Introduction to the Promotion of Renewable Energies

This report presents a strategy towards a coherent fiscal – and broader policy - framework for supporting renewable energy in Indonesia. The Ministry of Finance (MoF) is committed to supporting the greater deployment of renewable energy in Indonesia. This can help Indonesia meet its ambitious targets to reduce greenhouse gas emissions, promote energy security and facilitate energy access and local development. However, despite the host of advantages, and the excellent renewable resources that are available in our country, it is clear that the country has not been as successful as it might have been in developing renewables. A number of our peers have, by contrast, been much more successful.

The strategy consists of a set of proposed reforms that collectively form a proposed policy roadmap for greater renewables deployment. These proposed reforms consist of policies that can be introduced both in the shorter term and those that may take longer to develop; they also consist both of explicitly fiscal incentives, as well as a range of further reforms that will increase the effectiveness of fiscal incentives. They form an integrated package for advancing renewables in the country.

The proposed reforms are based on a series of pieces of analysis. Specifically:

– Section 2 provides a brief assessment of the benefits that greater renewables deployment could bring for the country;

– Section 3 considers the ambitious targets that the government has announced and compares these with current deployment levels;

– Section 4 provides an overview of the current policy framework for supporting renewables in Indonesia; and

– Section 5 identifies a package of reforms to enhance renewable energy deployment in the country, explaining how these address some of the key challenges and constraints holding back renewables in the country and drawing both on the specific Indonesian context as well as international best-practice.

2 The Benefits of Renewable Energy to Indonesia

Greater renewable deployment can generate environmental, health and economic development benefits

2.1 Benefits of Renewable Energy

Renewable energy can provide many benefits to our country. The IPCC (2011) identifies four benefits from greater renewables deployment:

– climate and environmental benefits;

– improved energy access, especially in rural areas;

– employment opportunities, boosting macroeconomic performance; and

– improved energy security, also contributing to a more stable macroeconomic outlook.

In addition, the current profile of subsidies in Indonesia means that promotion of renewable energy might support budget consolidation in some cases.

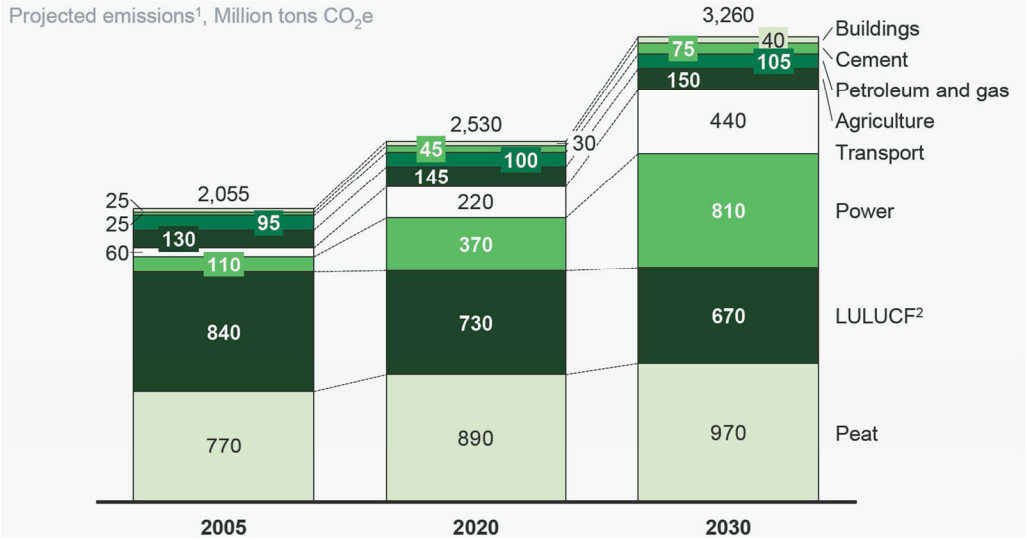
Each of these benefits apply, to differing extents, in Indonesia.

2.1.1 Climate and environmental benefits

Indonesia has demonstrated its international leadership through its ambitious plans to reduce emissions. Our National Action Plan for the Reduction of Green House Gases (RAN-GRK) establishes a target to reduce emissions by 26 per cent below business-as-usual (BAU) emissions by 2020 based on unilateral actions and 41 per cent below BAU if international support is made available. RAN-GRK is a framework for support of mitigation action including in agriculture, forestry and peat land, energy and transportation, industry, and waste management sectors. Its objective was to '*become a reference to the public and businesspeople in the planning of and in the reduction in the GHG emissions'* (Republic of Indonesia, 2011).

Reducing energy sector emissions will be important in realising our goals. While emissions from the power and transport sectors accounted for only 170 Mt of the country's emissions in 2005, less than 10 per cent of the total, they are projected to rise at more than 8 per cent a year to amount to around 1,250 Mt, or almost 40 per cent, by 2030. This is faster growth than expected for any other emissions source.

Figure 1 The power sector is responsible for most business as usual emissions growth from 2.1 to 3.3 $GtCO_2e$ between 2005 and 2030

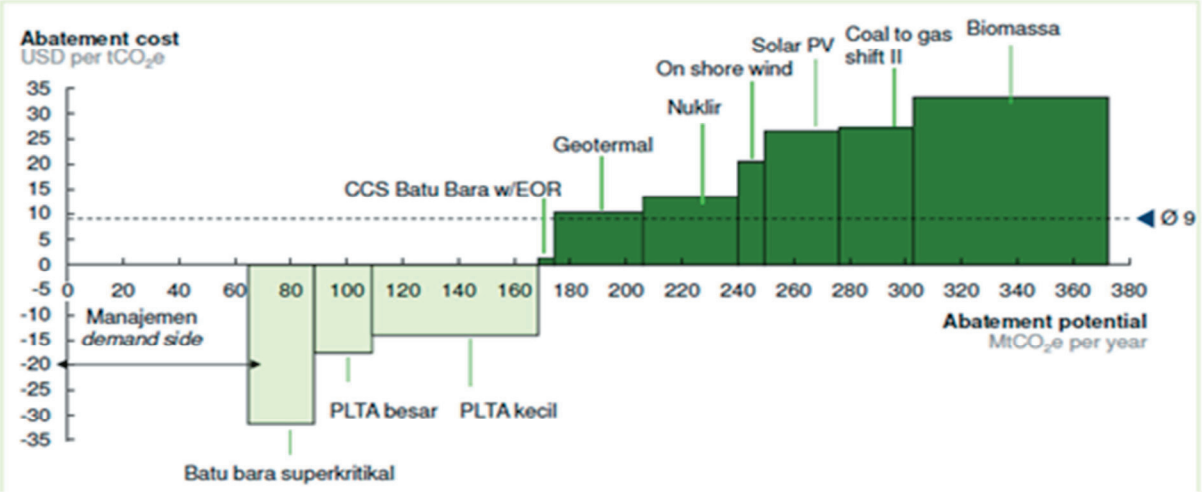


Note: *1. includes only direct emissions from each sector. 2. Emissions from LULUCF are based on a net emission approach i.e. including absorption.*
Source: *McKinsey and Company (2010)*

Many renewable options can deliver emission reductions at relatively low cost. Figure 2 presents DNPI's most recent marginal abatement cost curve[1]. This plots the amount of emission reductions that are available from different emission reduction opportunities from lowest to highest cost. Costs are measured as the difference between the emission reduction opportunity and a higher-carbon alternative, expressed per tonne of CO_2, This means that abatement opportunities with a negative cost can deliver emission reductions at a lower cost than the conventional alternative, with opportunities with a positive cost implying that additional costs have to be incurred in order to deliver the emission reductions. The figure shows that there is potential for both large- and small-scale hydro to deliver significant abatement at a negative abatement cost. Geothermal energy can provide around 35 $MTCO_2$ abatement per year, at a cost of just over US$ 10/tCO_2. There is also significant abatement from other renewables including solar PV, biomass and wind, although these are, on average, more costly, with costs ranging between US$ 20 and US$ 30/tCO_2.

[1] At present, this is only available with labels in Bahasa Indonesia.

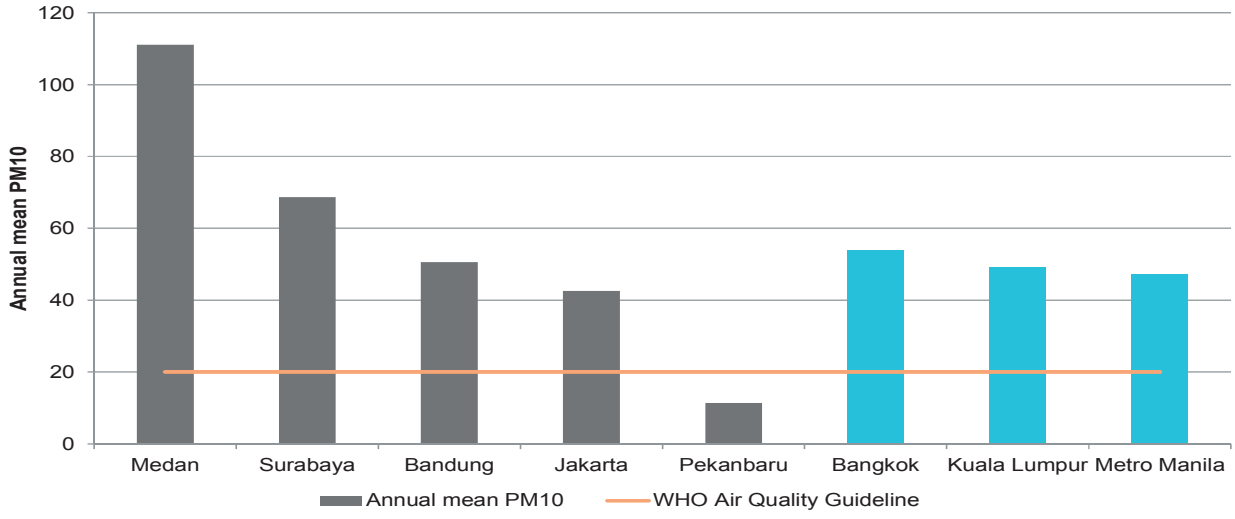
Figure 2 Renewables provide a significant opportunity for greenhouse gas abatement



Note: *Draft version from DNPI*
Source: *DNPI 2014*

Renewables can also contribute to improvements of the environment and human health. Emissions of noxious gases and particulates from the burning of fossil fuels have negative impacts on human health in many of our cities. Like other major cities in Southeast Asia, most of our major cities are exceeding the World Health Organisation's (WHO) air quality guidelines for PM10 levels, as shown in Figure 3. The poor performance of Medan and to a lesser extent Surabaya is particularly noteworthy and, in comparison with Jakarta, is likely to reflect the relative lack of policy focus on air pollution in these cities. In total, outdoor air pollution caused 32,300 deaths per year in 2004 (World Health Organization, 2009).

Figure 3 PM10 levels in Indonesia and other Southeast Asian cities exceed the WHO's PM10 guideline



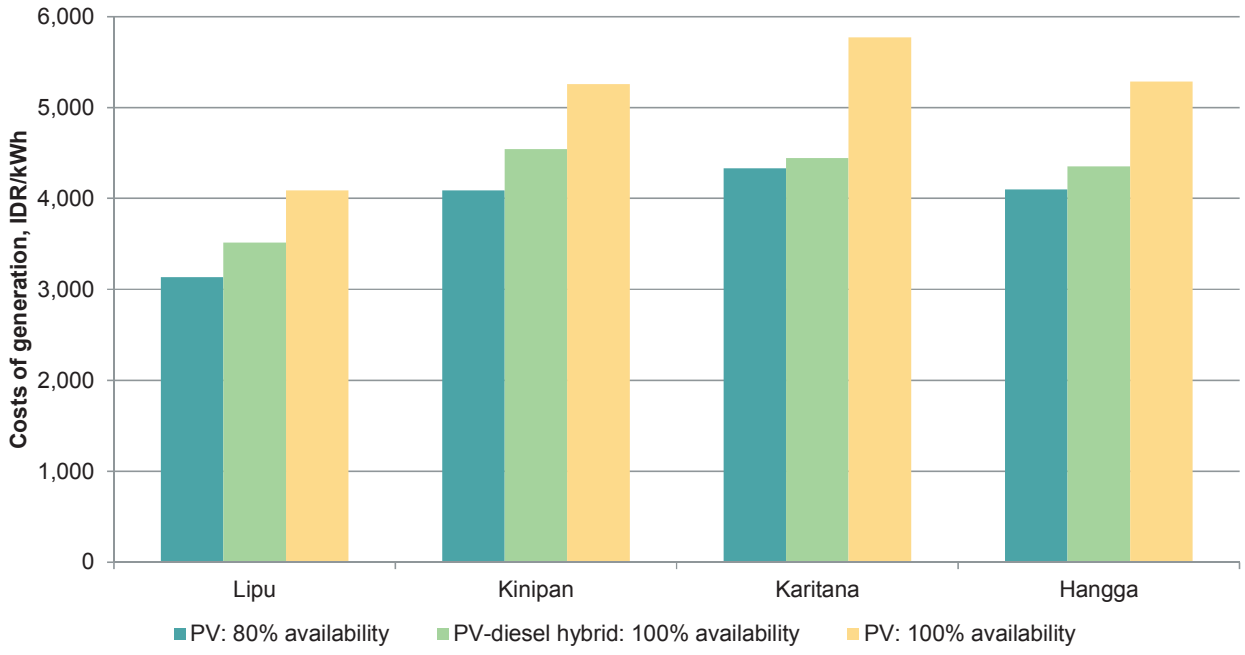
Note: *Indonesian cities in grey, international peers in blue. All data for 2008 except for Metro Manila (2007).The annual mean PM10 is a population-weighted average for urban population in cities above 100,000 inhabitants. The 2005 WHO Air Quality Guideline for annual mean PM10 is 20µg/m^3.*
Source: *World Health Organisation, Vivid Economics*

2.1.2 Energy access in rural areas

Energy access in rural areas presents a major challenge for the country. In 2011, 66 million people (27 per cent of the population) did not have access to electricity, and 102 million people (42 per cent of the population) relied on traditional forms of biomass for cooking (International Energy Agency, 2013c). With its many scattered islands spanning a vast geography, our country faces exceptional challenges in connecting its population to electricity grids.

Renewables are often a cost effective option for improving rural energy access. Zymla (2012) estimates that diesel generation in remote areas[2] costs between IDR 3,000 – 9,000/kWh. By contrast, a 100 kW solar PV plant on one of the islands in Eastern Indonesia would have generation costs of IDR 2,800/kWh. Hybrid systems, which combine solar PV and diesel generation, may be a particularly attractive option in many parts of the country. Figure 4 shows the results of a study that finds that these provide good supply reliability at only a marginally higher cost than (less reliable) solar PV-only systems. This potential is recognised in PLN's '1,000 islands' solar PV development plan, which aims to install 620 MW of solar PV power in remote areas by 2020, forming hybrid mini and micro-grids with diesel, biomass and solar PV generation (Sofyan, 2013).

Figure 4 A comparison of levelised financial costs of different grids on four Indonesian islands shows that solar PV and diesel hybrid systems provide the most reliability at a reasonable cost



Note: *PV = solar photovoltaic power. 100 per cent availability of solar PV implies full reliability of power supply; 80 per cent reliability implies that 20 per cent of the time electricity is unavailable, which leads to high consumer dissatisfaction.*

Source: Sofyan (2013)

[2] This is the typical form of electricity supply in many remote areas where centralised grid supply is not practical. For context, PLN's average generation costs were around IDR 1,340/kWh in 2013.

2.1.3 Employment opportunities and stronger macroeconomic performance

Renewables deployment can create high-quality jobs. National unemployment currently stands at about 6 per cent, a strong improvement compared to a peak of 11.2 per cent in 2005 (Bank of Indonesia, 2014). However, the quality of much of this employment is low: the International Labour Organisation (ILO) estimates that 60 to 63 per cent of those employed can be considered 'vulnerable workers' – own-account, casual and family workers. This employment typically does not provide adequate social protection, meet minimum labour standards or provide opportunities for social dialogue. Therefore, the ILO, with support from the government, has promoted the creation of 'green jobs', which are both environmentally friendly and provide decent work[3]. The geothermal energy, renewable energy and biomass sub-sectors currently already provide 5,000 green jobs. In addition, a share of the 331,000 green jobs in the manufacturing sector relate to manufacturing of renewables equipment while a share of the 187,000 green jobs in construction relate to installation of renewables (International Labour Organisation, 2013). Renewable energy is a promising sector for growth of high-quality green jobs in the country. This partly reflects their high labour intensity. For example, solar photovoltaic (PV) requires seven to ten times as much labour as conventional coal and gas; wind and biomass could be up to three times as labour intensive as conventional sources (Kammen, Kapadia, & Fripp, 2006)[4].

Renewable deployment can spur new industries. Renewables are often supported with a view towards creating new industries that will in time supply international markets, resulting in added national competitive advantage. A number of our Asian counterparts including Nepal, Bangladesh and India have been exploring the potential for renewables to support rural development and our large rural population presents opportunities for promoting rural development through renewable energy support. In Indonesia, other research by PKPPIM identifies the significant potential available to our country to become a global leader in the transition to a bio-based economy due to its abundant natural resources (Soerawidjaja 2013).

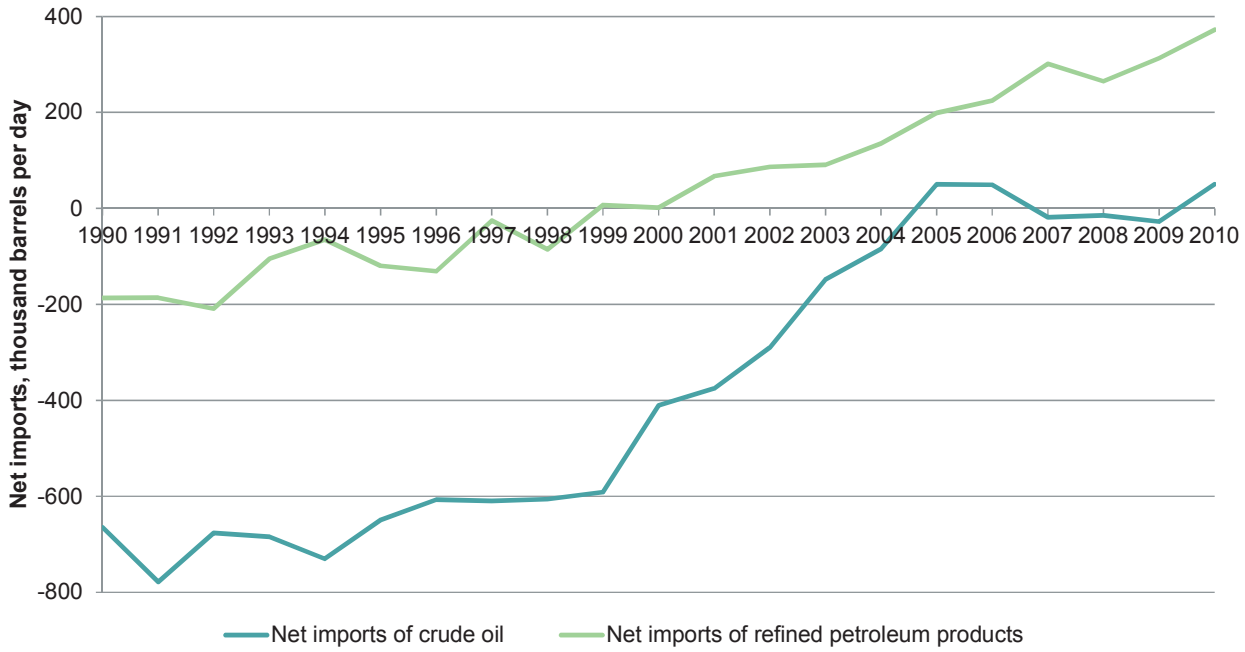
2.1.4 Energy security and macroeconomic stability

Although we are the world's largest exporter of coal, we still face energy security challenges as domestic energy demand – particularly for imported oil – is increasing rapidly. Indonesia overtook Australia as the world's largest exporter of coal by weight in 2011. However, growing domestic oil consumption, the natural maturing of oil fields and limited investment into reserve replacement caused us to become a net importer of both crude oil and refined products in 1999 and 2005 respectively, as shown in Figure 5.

[3] More precisely, green jobs help reduce consumption of energy and raw materials, de-carbonise the economy, protect and restore ecosystem services and biodiversity and minimise the production of waste and pollution. In addition, the ILO only terms a job 'green' if it is decent work, with productive employment, fair income opportunities, social protection and social security for workers and their families as well as rights for social dialogue (International Labour Organisation, 2013).

[4] There are important caveats to the employment generation benefits of renewables: labour market rigidities mean that there are short-term costs of training people to carry out work on RES deployment; high labour-intensity of RES deployment may mean that the productivity of labour is relatively low; and the high costs of some RES technologies can have detrimental effects on competitiveness and prices, although this may be less of a concern if renewables replace more costly diesel generation.

Figure 5 Indonesia became a net importer of refined petroleum products in 1999 and of crude oil in 2005



Note: *Crude oil includes lease condensate*
Source: *EIA*

The heavy reliance on imported fuels places significant strain on the public finances. To date, our policy has been to subsidise the price of these fuels to facilitate widespread energy access. However, this makes us very vulnerable to fluctuations in the international prices of transport fuels. In the 2013 revised budget, fuel subsidies amounted to IDR 200 trillion, with the greatest absolute amount of subsidy payments directed towards gasoline and diesel. These challenges could easily grow as economic development spurs further demand for energy.

Increasing renewables can help boost Indonesia's energy security and reduce our reliance on imported fossil fuels. Increases in renewables, especially of alternatives to transport fuels, can help reduce dependence on imported fuels and hence vulnerability to price fluctuations, help diversify sources of supply and enhance the balance of trade. Previous analysis by PKPPIM suggests that, notwithstanding the expected growth in demand for transport fuels, the correct balance of incentives, pricing reforms and political commitment towards the biofuel industry could ensure that gasoline and diesel fuel imports remain at a constant level out to 2020 (Soerawidjaja, 2013).

3 Targets and Progress

Although Indonesia has set ambitious renewables targets to realise the renewable potential, Indonesia is not yet on track to meet these targets

3.1 Indonesia's renewables potential

There is great renewables potential in our country but most of it remains untapped. Table 3 shows that the most abundant renewable energy resource is hydro power which could provide around 75 GW; although only nine per cent of this is currently being exploited. There is around 50 GW of biomass potential available but only 1.6 GW is currently being used. Geothermal is also abundant (29 GW) with only a small proportion being tapped. Solar and wind energy deployment is currently low at 27 and 1.4 MW respectively, but solar in particular presents good resources for further deployment. Ocean-based power generation from waves and tide also holds great potential in Indonesia with an estimated 49 GW but, as in many countries, remains virtually untapped to date.

Table 3 We have significant renewable power potential which remains largely untapped

Renewable power source	Resource potential	Installed capacity	Ratio capacity to resources (percentage)
Hydro	75 GW	6.8 GW	9.1
Geothermal	29 GW	1.3 GW	4.6
Biomass	50 GW	1.6 GW	3.3
Solar energy	4.8 kWh/m^2/day	27 MW	n/a
Wind energy	3-6 m/s	1.4 MW	n/a
Ocean	49 GW	0.01 MW	0

Note: *Some stakeholders have expressed concern as to whether hydro resources may be deteriorating due to hydrological changes especially in Java and Sumatra*
Source: *Ministry of Energy and Mineral Resources (2013), presentation in Indonesia pavilion at COP 19*

There is also substantial scope for increasing domestic use of biofuels. Soerawidjaja (2013) estimates that the capacity of biodiesel production in Indonesia is more than 5.6 million kilolitres with expansion plans of around 3.1 million kilolitres planned, implying total capacity by 2015 should be around 8.7 million kilolitres. However, in 2012, production only came to 2.2 million kilo litres, of which around 68 per cent was exported (Supriatna, Taylor, & Anatharaman, 2014). The productivity of palm oil plantations, the main source of biodiesel in Indonesia, is around 2.8 t/ha, compared to 3.8 t/ha in Malaysia, calculated as production per hectare of plantation coverage (FAO, 2014; Malaysian Palm Oil Board, 2014). There are also 20 bioethanol refineries that currently run at an average 37 per cent capacity, but all production is of industrial grade ethanol. Fuel grade ethanol production was terminated in

2010 (Slette & Wiyono, 2013), although four producers with a total capacity of 83,000 kilo litres can produce bioethanol of the requisite quality Soerawidjaja (2013).

3.2 Targets

The government has already announced ambitious targets to realise its renewables potential. The National Energy Policy (KEN), passed by parliament early 2014, includes RES targets for 23 per cent of the energy mix by 2025 and 31 per cent by 2050. As Table 4 shows, this will require an increase from the five per cent achieved in 2010. These targets update previous targets as part of the Vision 25/25; while the 2025 target for new and renewable energy in the KEN is two percentage points lower than in the Vision 25/25, the new target no longer includes reference to nuclear power. It also updates the target of 17 per cent new and renewable energy by 2025, which was part of the previous Presidential Regulation No. 5/2006 on National Energy Policy.

Table 4 The new National Energy Policy includes targets up until 2050 when new and renewable energy is envisioned to be the largest source of energy in the energy mix

Energy type, percentage of energy mix	2010	2025	2030	2050
Oil	49	25	22	20
Natural gas	22	22	23	24
Coal	14	23	30	25
New & renewable energy	**5**	**23**	**25**	**31**

Source: National Energy Policy of Indonesia (KEN)

The National Action Plan for the Reduction of Green House Gases (RAN-GRK) also envisages significant renewable capacity addition. Although the roles of renewables in the RAN-GRK are small relative to the emission reductions sought elsewhere, it still implies significant capacity additions:

– 822 MW of mini- and micro hydro;
– 326 MW of solar;
– 59 MW of wind; and
– 17 MW of biomass.

RAN-GRK also envisages greater micro scale biogas utilisation.

The Ministry of Energy and Mineral Resources (MEMR) has stipulated consumption mandates for biodiesel and bioethanol. Fuel distributors are required to mix their products with a share of biofuels under MEMR Regulation No. 32/2008, amended by MEMR Decree No. 25/2013. The targets vary across sectors as presented in Table 5. For transport, industry and commercial sectors mandates are planned to increase to 25 per cent biofuels and 20 per cent bioethanol by 2025. Of the industrial sectors, only mining falls under the mandate, but MEMR plans to extend more sectors in future. A biodiesel consumption mandate of 30 per cent by 2025 applies to power plants[5].

[5] It should be noted that the emissions impact of pursuing greater biofuel production in Indonesia has not been assessed. However, this remains an issue around which there is considerable debate, linked mainly to the direct and indirect land use changes that can result from pursuing biofuel production. Lifecycle assessments tend to show that the emissions impact can vary significantly by crop and geography. See FAO, 2008 for a review of the

Table 5 Biodiesel and bioethanol mixing mandates as a percentage of the fuel mix are set to increase to 2025

	2015		2025	
Biofuel, percentage of fuel mix	*Biodiesel*	*Bioethanol*	*Biodiesel*	*Bioethanol*
Transportation PSO	10	1	25	20
Transportation non-PSO	10	2	25	20
Industry and commercial	10	2	25	20
Power plant	25	-	30	-

Note: *B100 = biodiesel, E100 = bioethanol. PSO = Public Service Obligation. Biodiesel percentages of diesel oil fuel demand, bioethanol percentages of gasoline demand.*
Source: *Appendix to MEMR Decree No. 25/2013*

3.3 Progress

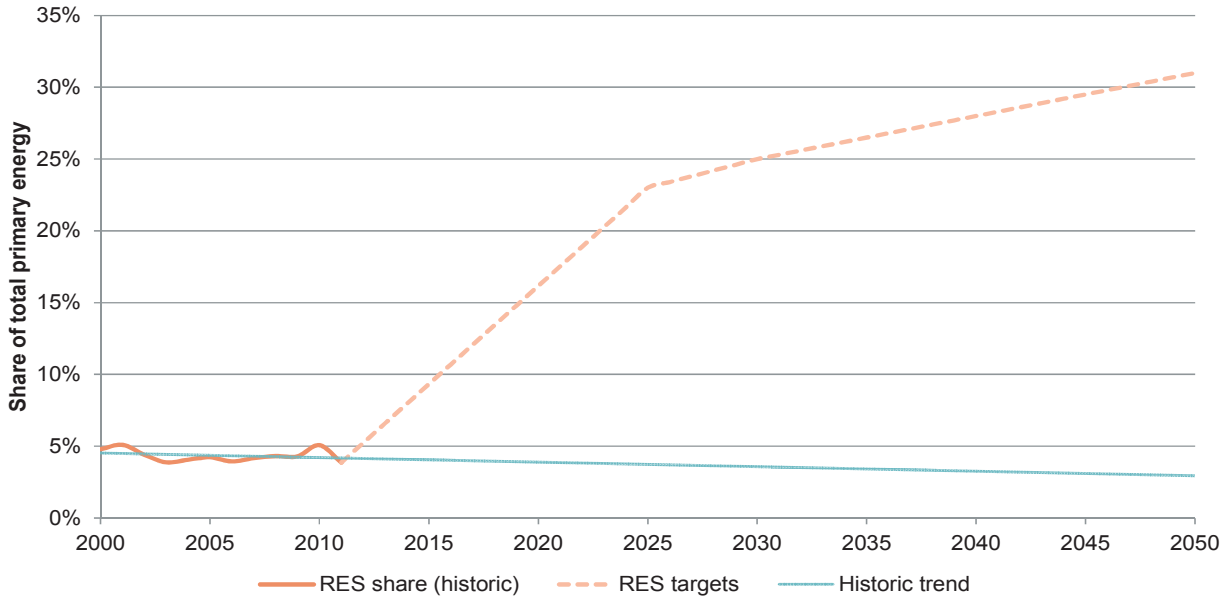
We will need to step up our efforts to meet our targets. The share of renewables excluding biomass in primary energy supply has been stable at just below 5 per cent over the past decade (Ministry of Energy and Mineral Resources, 2013a), 20 percentage points short of where we aim to be by 2030 and 26 percentage points below the 2050 target. Figure 6 shows that if the current trend in RES shares is projected forward, we will fall far short of the KEN targets. We require a significant increase in efforts to develop our renewables potential if the targets in the KEN are to be achieved.

The challenge in growing the share of renewables in the energy mix is particularly prevalent in the power sector. The share of renewable power in total power capacity has remained flat between 2000 and 2011, as shown in Figure 7. The figure also shows that renewable power generation as a share of total power generation has fallen by four percentage points over the same period. Instead, the rapid growth in power generation capacity over the past decade has been delivered by thermal power plants, especially coal-fired generation. Specifically, coal-fired generation, despite already dominating the generation supply mix in 2001, has grown rapidly at a compound annual growth rate (CAGR) of eight per cent. Diesel and gas capacity grew rapidly too. In comparison, large hydro and geothermal capacity have grown more slowly and although other renewables have grown rapidly, this has been from a small base.

PLN's current plans do not foresee significant changes to these trends. Figure 8 shows that PLN forecasts the continued dominance of coal in the power generation mix, with only around 13 per cent of power generation coming from renewable energy by 2021. Although the targets in the draft KEN relate to all energy, not just the power sector, the importance of the power sector, suggests that the 2025 target of 23 per cent renewables could well be missed unless policy changes are made to change PLN's investment patterns.

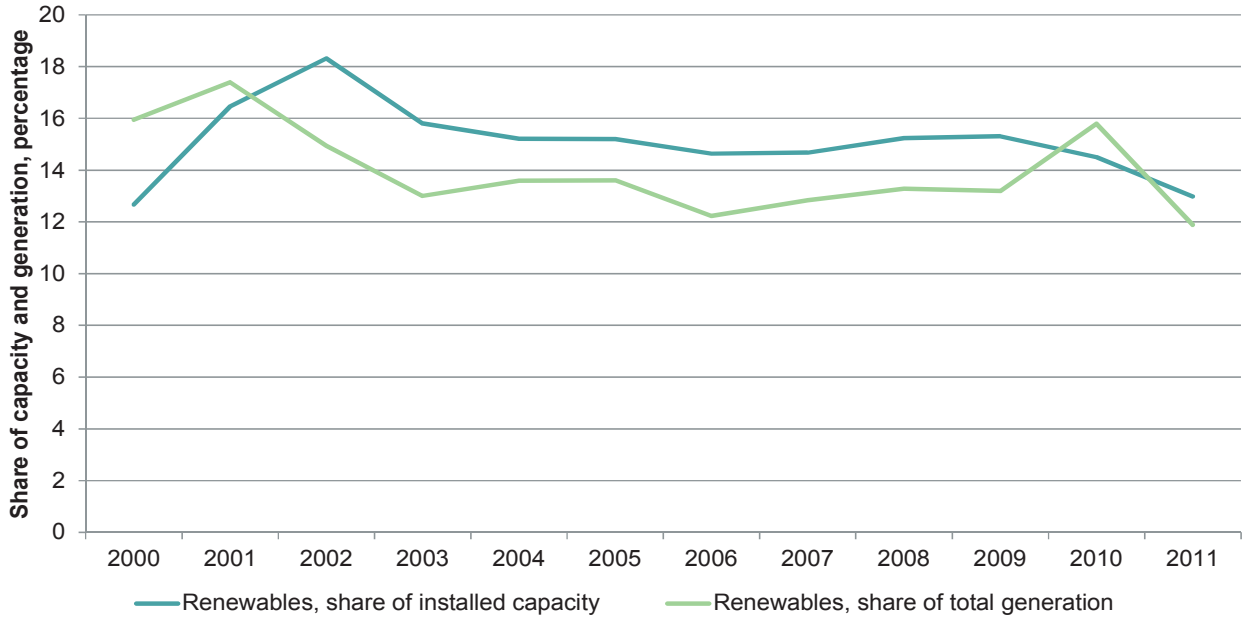
debate on the environmental implications associated with the production of biofuels, including emissions estimates. It notes that the examples of maize produced for ethanol which can generate greenhouse gas savings of about 1.8 tonnes of carbon dioxide per hectare per year, and switch-grass which can generate savings of 8.6 tonnes per hectare per year. However, the conversion of grassland to produce those crops can release 300 tonnes per hectare, and the conversion of forest land can release 600 to 1,000 tonnes per hectare.

Figure 6 **Current trends in RES as a share of primary energy imply that RES support must be increased**



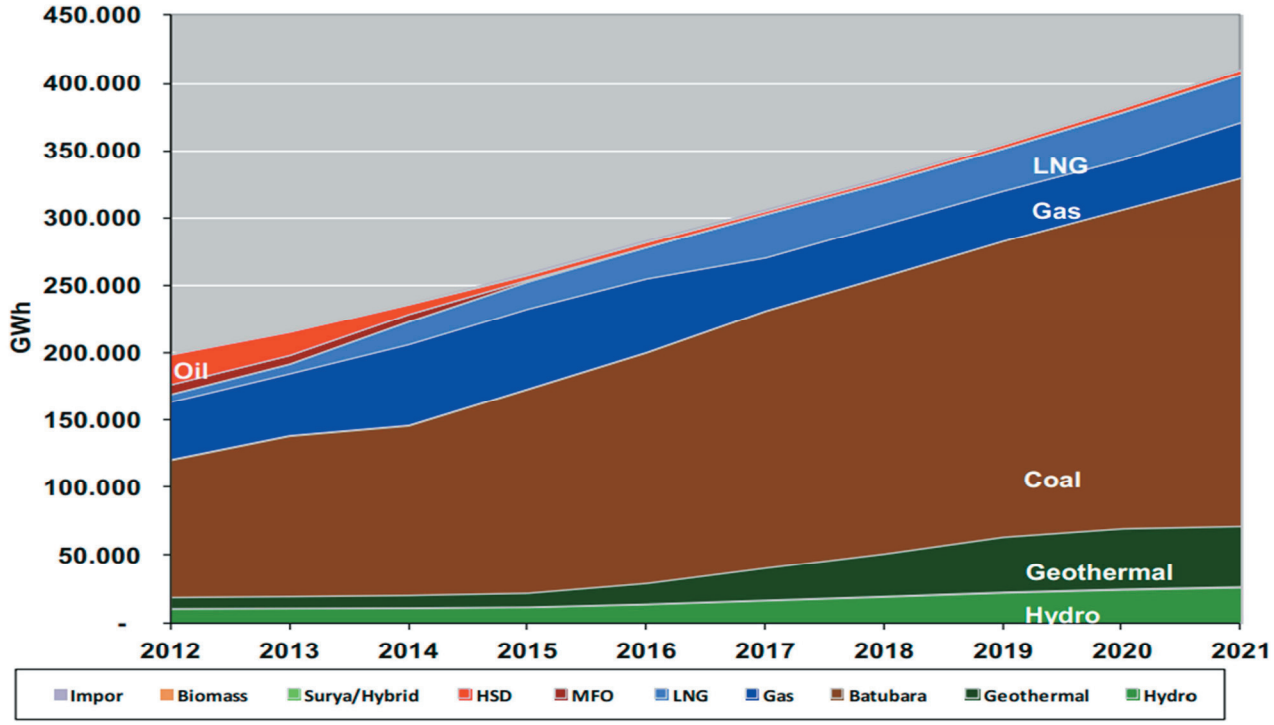
Note: *RES targets from KEN*
Source: *Ministry of Energy and Mineral Resources (2013a)*

Figure 7 **The share of renewable power in installed generation capacity has remained flat between 2000 and 2011; over the same period the share of renewables in total generation has fallen**



Source: *Ministry of Energy and Mineral Resources (2013a)*

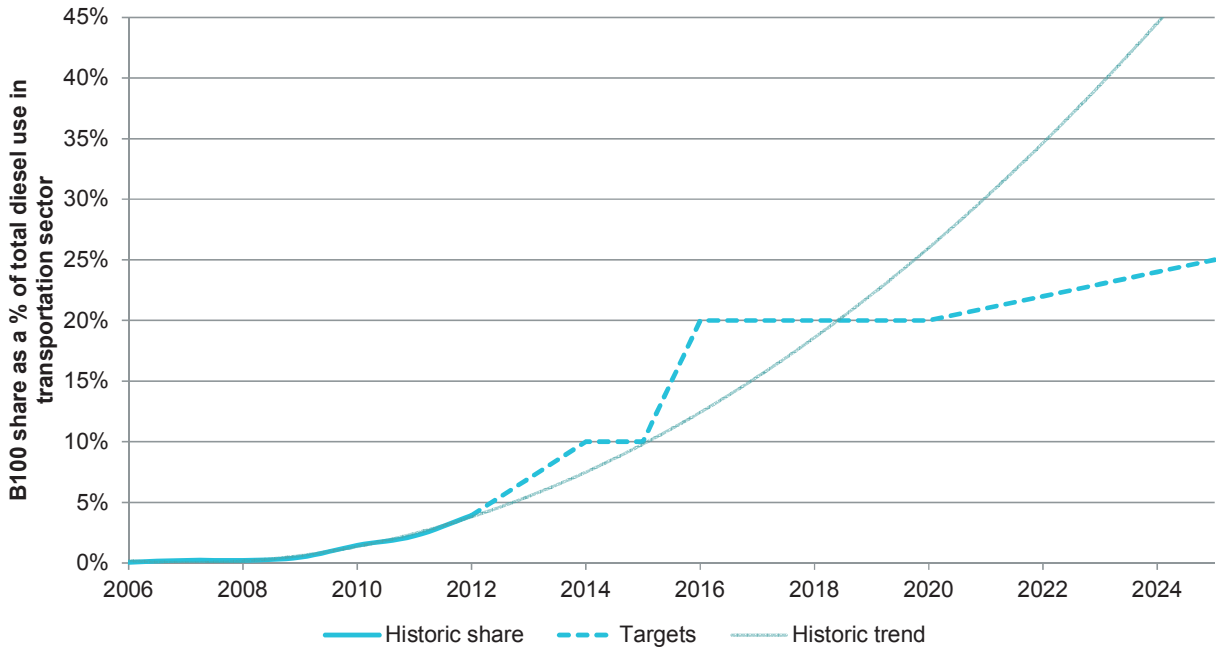
Figure 8 **LN projects that the share of coal in Indonesia's energy mix increases towards the end of decade**



Note: *The projected energy mix is the total for Indonesia including PLN generation and generation by independent power producers*
Source: *PLN RUTPL 2013*

The share of biodiesel used in the transportation sector is growing, but biofuel utilisation remains lower in other sectors; bioethanol use remains very low. Figure 9 shows that the share of biodiesel in the transportation sector increased from negligible amounts in 2006 to almost four per cent in 2012. This is a notable achievement which has not yet been replicated in other sectors, or for bioethanol. If the growth of biodiesel utilisation in the transportation sector keeps accelerating, the biodiesel targets set by MEMR will be achieved. By contrast, bioethanol production terminated in 2010 due to production inefficiencies. Some industrial grade bioethanol is used in consumer goods industries, but blending of bioethanol in transport fuels stopped in 2010 when domestic production ceased. Indonesia's target for bioethanol blending is 20 per cent by 2025 in the transportation and industry and commercial sectors, requiring a significant increase in support efforts and significant new capacity.

Figure 9 **If growth in B100 use in the transportation sector continues to accelerate in line with historic trends, future targets will be achieved**

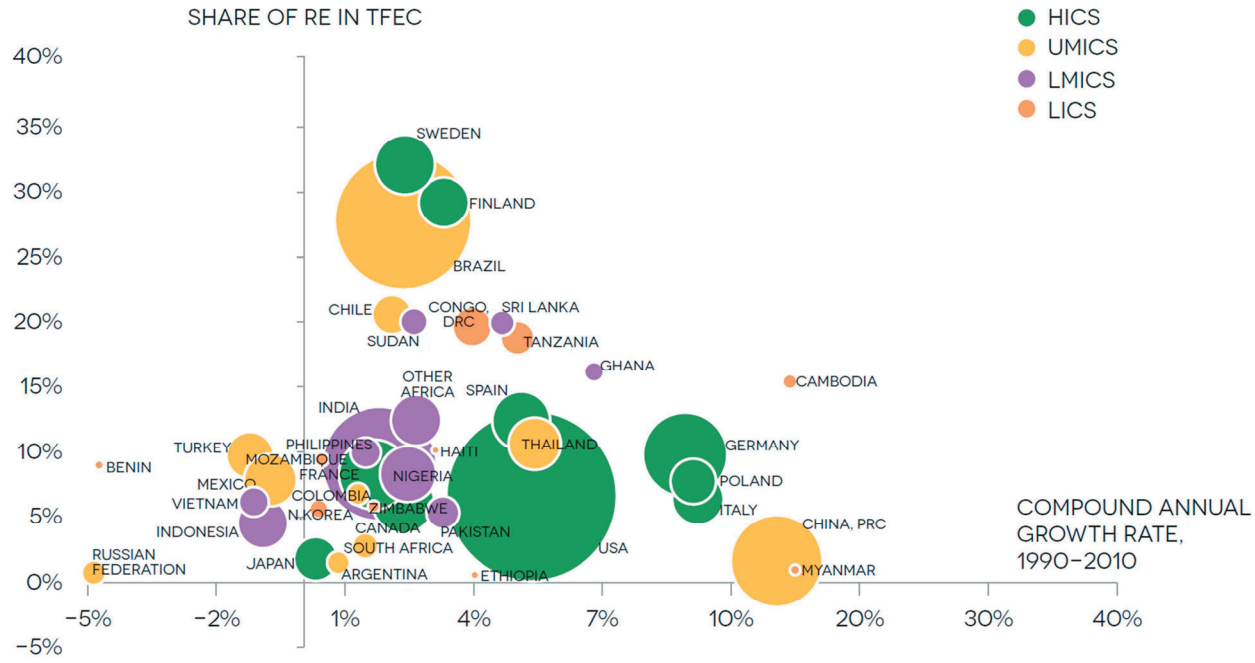


Note: *If future performance is extrapolated from historic trends using a linear rather than exponential function then future targets will not be achieved.*
Source: *Ministry of Energy and Mineral Resources (2013a), Slette & Wiyono (2013)*

3.4 Performance compared to international peers

Indonesia's share and growth of renewables is lagging behind our international peers. According to the Sustainable Energy for All Global Tracking Framework (United Nations & World Bank, 2013), the compound annual growth rate of renewables excluding hydropower and traditional biomass over 1990-2010 was around minus one per cent. The share of renewables in total final energy consumption in 2010 in Indonesia was around four per cent. Figure 10 shows that we typically have both a smaller share of renewables in total final energy consumption than many other countries and we are in the relatively small subset of countries that has seen a decline in renewables in recent years.

Figure 10 Indonesia's RES share and growth are lagging behind other lower-middle income countries



Note: *Includes the use of modern biomass, excludes hydropower. Bubble size indicates volume in terms of PJ of final energy consumption. Negative CAGR in Indonesia and some other countries are primarily due to reduction in use of non-traditional solid biomass. TFEC = total final energy consumption, DRC = Democratic Republic of Congo.*

Source: *SE4ALL (2013)*

4 The Current Renewables Policy Framework

A range of generic and technology specific support policies already exist

This section sets out the current framework for renewable energy support in Indonesia. It is split into four parts:

– Section 4.1 sets out the underlying industry structure and regulatory framework and for the energy sector;

– Section 4.2 describes the generic incentives and support provided to renewable energy projects – in other words support policies that are available (at least in principle) to many or all renewable energy technologies;

– Section 4.3 sets out the technology specific renewable energy support policies; and

– Section 4.4 provides an indicative comparison of some of the renewable energy support policies with the existing pattern of energy subsidies in Indonesia.

The focus of this assessment is on government incentives to support renewable energy. Complementary incentives and support schemes provided by our development partners are not covered.

4.1 Policy foundations and governance

Law No. 30/2007 constitutes the umbrella regulatory framework for our energy sector. It sets out a number of key objectives for energy management in article 3:

– energy independence;

– ensuring the energy supply from domestic and non-domestic sources;

– ensuring the management of energy resources optimally, integrated and sustainably;

– efficient use of energy;

– ensuring access of energy for the people;

– improving the capacity of domestic energy industry and services to be more independent;

– job creation; and

– ensuring environmental sustainability.

It furthermore establishes the National Energy Council (DEN) with the authority to design and formulate long-term energy policy, specified in a National Energy Policy (KEN). The KEN was approved by Parliament in early 2014. It includes targets for renewables deployment, as elaborated in section 3.2. The operational plan for making progress for these targets rests with the General Plan of National Energy (RUEN) which must be completed one year after the KEN is approved. A team has been appointed to work on the development of this plan.

Other laws and regulations complement the umbrella law in specific areas, such as foreign investment. Law No. 25/2007 is the main regulatory framework around investment, setting out principles of establishment and operation of business activities. It also provides for a Negative List of Investment (DNI) identifying which sectors are open or closed to private sector investment. The energy sector is generally open for investment although Presidential Regulation 36/2010 established some conditions, namely:

– power plants smaller than 1 MW are reserved for SMEs and cooperatives;

– power plants of 1-10MW have been open for a partnership between a domestic and foreign company – although restrictions requiring more than 50 per cent Indonesian ownership have been introduced in early 2014, through Presidential Regulation No. 39/2014; and

– power plants larger than 10 MW are open for foreign capital ownership of up to 95 per cent.

A wide variety of institutions is involved in renewables policy making and implementation. The following institutions have some role in RES policy making and implementation (Damuri & Atje, 2012):

– Ministry of Energy and Mineral Resources (MEMR): responsible for energy policy and regulation. Hosts a Directorate General of New and Renewable Energy and Energy Conservation for the administration and promotion of renewables and energy efficiency. Regulates the electricity sector through its Directorate of Electricity and supervises the performance of electricity companies, including the national utility PLN;

– National Energy Council (DEN): chaired by the President, accommodates seven ministries as members and eight non-government members, responsible for formulating the KEN;

– National Planning Agency (Bappenas): economic planning including around energy;

– Ministry of Finance: controls government expenditure and budgets, including renewables investment and incentives;

– Ministry of Agriculture: regulates palm oil and other plantations for biofuel feed-stocks;

– Local and regional governments: important role in policy implementation through developing regulations and issuing permits; and

– Other government agencies: the Ministry of Environment and Ministry of Forestry affect renewables for instance through forest clearance for geothermal development, Ministry of SOEs controls energy SOEs and influences energy policy implementation, Ministry of Industry is responsible for industry affairs.

It is notable, however, and in contrast to practice in many other countries including Thailand and the Philippines, that there is no independent regulator established in Indonesia to adjudicate disputes and to advise/set prices.

Decentralisation reforms have led to re-allocation of some authority over investment policy to regional and local governments, requiring project developers to comply with regulation of both central and decentralised authorities. Decentralisation reforms, implemented from 2001, transferred some authority over investment policy to provincial and local governments. Project developers must comply with rules set at all levels of authority. Within certain boundaries as set out in the Law on Regional Taxes and Charges, provincial and local authorities may apply their own fiscal policies related to renewables, can license local electricity companies and determine local tariffs.

The subjects of renewables policies are public and private enterprises. These include (Damuri & Atje, 2012):

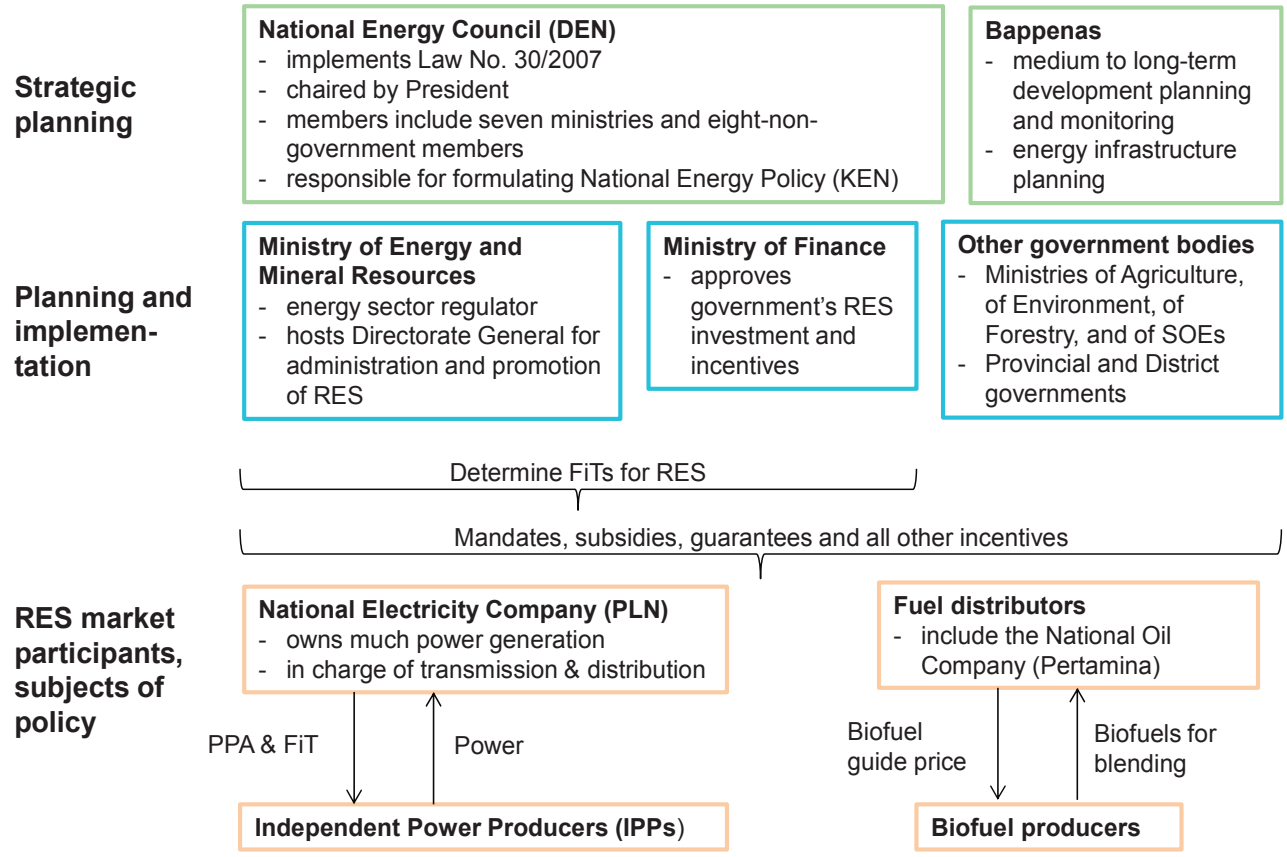
– National Electricity Company (PLN): owns most power plants, in charge of most transmission and distribution;

– Independent Power Producers (IPPs): some RES IPPs exist, selling power to PLN;

– Fuel distributors: including the National Oil Company (Pertamina), PT AKR Corporindo, PT Surya Parna Niaga (SPN), Shell and Petronas; and

– Biofuel producers.

Figure 11 A variety of institutions are involved in and affected by RES policy



Note: *SOE = State Owned Enterprise, PPA = Power Purchasing Agreement, FiT = Feed-in Tariff*
Source: *Damuri & Atje (2012)*

4.2 Generic renewable energy investment incentives

The regulatory framework provides for generic fiscal incentives, guarantee funds and investment funds for RES. These are further elaborated below.

4.2.1 Fiscal incentives

The main fiscal incentives for renewables are set out in Ministry of Finance Decree No. 21/PMK.011/2010. The regulation provides tax incentives for all renewables production, as well as manufacture and import of machinery needed for its production. The incentives are awarded on a case-by-case basis and include provisions relating to income taxes, VAT, import duties, and taxes borne by the government.

Income tax provisions under No. 21/PMK.011/2010 include:

– a reduction of net income by 30 per cent of the amount of the investment (over six years, five per cent per annum);

– accelerated depreciation for fixed assets used in renewable energy production, varying by asset type;

– income tax on dividends received by non-residents on renewable energy production, taxed at 10 per cent (or according to taxation agreement);

– compensation of losses, allowing losses in some years to offset profits and hence reduce tax payments for a period of 5 or 10 years, with possibility of further discretionary extensions; and

– exemption from Article 22 income tax on imports[6] of machines and apparatus needed to make renewable energy.

The Regulation is implemented following Government Regulation No. 1/2007, as updated by No. 52/2011

Further, No. 21/PMK.011/2011 provides for VAT and import duty exemptions, and some taxes can be borne by the government:

– VAT exemptions apply for importing machines and apparatuses, excluding spare parts, needed by companies to make use of renewable energy sources;

– exemptions from import duty for capital goods and machinery used for production of renewable energy can be claimed if specified on a particular list. This applies only when goods are not available in Indonesia or the equivalent Indonesian products have unsuitable specifications. The exemption is valid for two years and can be extended for one more year; and

– the government can elect to pay certain taxes or duties itself if the sector is selected under the Budget Law of Annual National Revenue and Expenditure (APBN).

[6] Note that this is different from import duties.

In 2012, IDR 815 billion of income tax in the geothermal sector was paid by the government.

Government Regulation 52/2011, implemented through 144/PMK.011/2012, provides similar incentives but with clearer procedures but only for certain sectors. The Decree provides companies investing in sectors/regions deemed to have high priority on the national scale, and covers 129 eligible types of investment[7]. Included within these investment types are:

– electric power generation: new energy technologies including hydrogen, coal bed methane, coal gasification and coal liquefaction, renewable energy technologies including hydro, solar, wind and waves and current (tidal) energy;

– geothermal energy: all geothermal exploration, drilling and power generation activities;

– organic waste treatment in palm oil mills to treat palm oil mill effluent to generate biogas into electricity or hydrogen; and

– bio-energy industry (bio-diesel, bio-oil, and bio-ethanol).

To qualify for the provisions, the investment plan must exceed IDR 1 trillion (around US$110 million), including land, but not have entered production up to December 2011 (the point at which GR 52/2011 came into effect). The provisions entitle recipients to:

– a reduction in net taxable income up to 30 per cent of the amount invested, prorated at 5 per cent for six years of commercial production, provided that the assets invested are not transferred out within six years;

– accelerated depreciation;

– extension of tax-loss carry forwards for up to 10 years; and

– a reduction of the withholding tax rate on dividends paid to non-residents to 10 per cent or the applicable reduced tax treaty rate.

The Directorate General Tax issues approval of facilities, based on a recommendation of the Chairman of the Indonesia Investment Coordinating Board (BKPM). DG Tax shall issue its approval decision by the tenth working day after receiving the recommendation of the Chairman of BKPM – no other time limits of the approval process are currently in place. Approved tax provisions can be used in fiscal years in which the investor has realised at least 80 per cent of its investment plan, after DG Tax has paid a field audit and issued a letter confirming that this is the case. After the tax facilities are granted, recipients must submit regular reports (at the point that tax is due) on

– investment realisation;

– production; and

– details on fixed assets ownership, transfer and replacement.

[7] 52 types of investment in particular sectors, 77 types of investment in particular sectors.

Firms can choose between making an application under 144/PMK.011/2012 and 21/PMK.011/2011 where they qualify for both, but procedures around applications and approval under 144/PMK.011/2012 are perceived to be clearer.

Some enterprises associated with the renewables sector – especially manufacturing facilities – may qualify as 'pioneer industries' and claim tax exemptions under PMK 130/2011. 'Pioneer industries' are industries deemed to have extensive linkages, generate high value added and positive externalities, are responsible for introducing new technologies, and have strategic value to the national economy. Five industries are identified in the regulation as being pioneering industries: basic metal industries, oil refining industries/basic organic chemicals originating from oil and natural gas; machinery industries; communication device industries; and industries in the field of renewable resources. In addition, BKPM or the Ministry of Energy can undertake a study to investigate whether a certain industry should be classed as pioneering. In addition, those seeking the tax relief must have an investment plan of 1 trillion rupiah, place 10 per cent of the value of the investment plan within an Indonesian bank, and be registered as a legal entity in Indonesia.

Qualifying as a pioneering sector allows the industry to receive additional tax exemptions. Qualification as a pioneering sector allows requests for income tax holidays of 5-10 years (as decided by DG Tax) followed by a reduction of up to 50 per cent in the income tax rate for the following five years. The company must make the request to the Ministry of Industry or BKPM, who then apply to the Ministry of Finance, showing:

– the availability of infrastructure in the investment location;

– domestic manpower absorption;

– study on the fulfilment of criteria as 'pioneer industry'; and

– a clear and concrete plan on the phase of transfer of technology.

Two companies in the chemical sector, PT Unilever Oleochemical Indonesia and PT Petrokimia Butadiene Indonesia received a tax holiday in 2012, receiving corporate income tax exemption for five years. No companies in the renewable energy sector have qualified for this exemption to date.

4.2.2 Guarantee and investment funds

Various general guarantee and infrastructure investment can support renewables investment. These funds offer products that are available to infrastructure projects, including renewables projects. These include the following funds:

– The Indonesia Infrastructure Guarantee Fund (IIGF or PT PII Persero) is a newly created SOE that provides guarantees for infrastructure projects, covering risks emanating from government contracts under public-private partnerships (PPPs) in eight sectors: transportation, highways, irrigation, water, waste, telecommunications, electricity and oil and gas. It provides guarantees for various infrastructure risks resulting from government (in) action which might result in financial losses including delays in processing of permits and licenses, changes of rules and regulations and a lack of tariff adjustment. The IIGF is

part of a public partnership scheme as described in the Presidential Regulation 78/2010 and MoF Regulation 260/2010. Renewables projects that are not part of FTP II are eligible for these guarantees, but the fund has currently extended guarantees only for the Central Java Coal Fired Power Plant, consisting of two units of 1,000 MW each and a total investment of US$ 4 billion (Indonesia Infrastructure Guarantee Fund, 2012) There are two more coal projects and three hydro projects in early stages of the approval pipeline. Guarantees provided by the IIGF are priced relative to the project value with indicative rates of 1 per cent of the project value as an upfront payment and 0.5-1 per cent of the exposure as a recurring fee.

– Ministry of Finance Regulation 139/2011 establishes government provision of financial guarantees in relation to PLN's business viability for the government's Fast Track Programme II (FTP II) for electricity sector development. This may include renewables projects but also coal and gas plants. As of September 2013, four geothermal power projects and one hydropower project have received guarantees. Total investment in the Rajabasa, Muaralaboh, Rantau Dadap and Sarulla geothermal power projects is US$ 3,544 million of which US$ 3,330 million is guaranteed under FTP II. Investment in the Wampu hydropower project was US$ 174 million, which is fully guaranteed under FTP II.

Stakeholders perceive that the guarantees provided by the IIGF are more valuable than those provided under the FTP II programme.

4.2.3 Government grant funding and lending

The Specific Allocation Fund for the Rural Energy Sector (DAK) provides funds to district/municipal governments to support renewable energy development. The intention is to reach communities that are outside of reach of PLN's power network. In regulation MEMR 3/2013, a specific list of priority activities is identified including the construction of new micro hydro plants (PLTMH); the rehabilitation of damaged PLTMH; expansion or improvement of electric power services from run down PLTMH; the construction of centralized solar power systems (PLTS) and/or the spread of PLTS; and construction of household biogas systems. In 2013, IDR 432 billion of funding was allocated to seventy one districts in Indonesia. The amount of funds allocated to the Fund grew by 188 per cent between 2011 and 2013.

Loans for renewable energy projects are available from the Indonesian Investment Agency (PIP). The Indonesia Investment Agency (PIP) is an agency under the Ministry of Finance which is formed by the Minister of Finance Decree No. 1005/KMK.05/2006. PIP has three focal areas: environmentally friendly development programs; infrastructure (which can also include renewable power projects); and other sectors as identified by the Ministry of Finance. PIP has indicated that it intends to focus increasingly on renewable energy in future years. However, to date, it has yet to supply any capital to renewable energy projects. PIP is also responsible for the Geothermal Fund Facility discussed further below.

4.3 Technology specific incentives

The country offers technology specific incentives alongside generic incentives, including ceiling prices, feed-in tariffs and standardised PPAs.

4.3.1 Geothermal power

MEMR Regulation No. 17/2014 sets ceiling tariffs for electricity generated by geothermal plants to guide the prices that are concluded in PPAs following a tendering process. The ceiling price places a cap on the outcome of the tender and negotiation processes to ensure that geothermal resources are developed cost-effectively. The new regulation bases tariffs on location and when the Commercial Operation Date is planned, in order to provide certainty to mitigate the effects of inflation. The tariff ceiling ranges from US$ 0.118 to US$ 0.254 depending on location in 2015 up to US$ 0.159 to US$ 0.296 in 2025 for projects that have a planned Commercial Operation Date at this date. The ceiling tariffs are shown in Table 6. This regulation revises a 2012 regulation which based ceiling tariffs on project location and whether plants were connected to a medium or high voltage grid. The Regulation also continues to mandate that PLN develops a model PPA for geothermal projects.

A dedicated revolving fund, the Geothermal Fund Facility (GFF), aims to reduce the risk associated with geothermal exploration. The Indonesia Investment Agency (PIP) manages the fund which aims to reduce early-stage development risk by providing support for data collection and high quality information about new potential geothermal sites. This stage of project development typically costs US$ 15-25 million over a period of around three years, representing at least ten per cent of total capital expenditures (Energy Sector Management Assistance Program, 2013). The GFF aims to overcome this hurdle through the services and products it is expected to provide: specifically, as established in Ministry of Finance (MoF) Regulation No. 3/2012, the GFF provides:

– loans for exploration of up to US$ 30 million at the central bank rate, which are repayable only if a site is proven to be productive, for which local governments (who may tender out proven sites) and private investors are eligible; and

– information and data verified by reputable consultants, at cost plus a five per cent margin, to interested parties.

Cumulative funds of more than Rp 3.1 trillion (around US$ 217 million) were made available in 2011-2013, and a number of loan proposals are at an advanced stage of processing, although no resources have been disbursed to date. The Geological Agency of Indonesia is responsible for the subsidised geological data collection but has not undertaken any surveys to date. Some stakeholders perceive that there is uncertainty over precisely what products the fund will offer, and at what rates.

Table 6 Different tariffs for geothermal power apply depending on region and planned of operation

Commercial Operation Date	Ceiling Price (US$ cents/ kWh)		
	Region I	Region II	Region III
2015	11.8	17.0	25.4
2016	12.2	17.6	25.8
2017	12.6	18.2	26.2
2018	13.0	18.8	26.6
2019	13.4	19.4	27.0
2020	13.8	20.0	27.4
2021	14.2	20.6	27.8
2022	14.6	21.3	28.3
2023	15.0	21.9	28.7
2024	15.5	22.6	29.2
2025	15.9	23.3	29.6

Notes: *Region I: Sumatra, Java and Bali; Region II: Sulawesi, Nusa Tenggara Barat, Nusa Tenggara Timur, Halmahera, Maluku, Irian Jaya and Kalimantan; Region III: Remote areas within Region I and Region II where the majority of the electrical power is generated from fuel-oil plants*

Source: *MEMR Decree No. 17/2014*

4.3.2 Solar power

MEMR Regulation 17/2013 establishes the allocation and pricing of solar power. Capacity quota tenders for solar power that PLN will be obliged to buy are in place. In April 2013, 172.5 MW was tendered with a ceiling tariff of US$ 0.25/kWh, increased to US$ 0.30/kWh if project developers use local components for more than 40 per cent of the installation. Successful tenderers must show that they meet various administrative, technical and financial requirements, after which the lowest bid for the capacity will win. PLN offers its standardised 20 year PPA to successful bidders. A number of developers have expressed concern that the current ceiling prices are too low to make projects viable, especially taking into account the possibility that many solar PV projects require foreign financing and that the poor quality of the grid, especially outside of the Java and Bali system, may make it difficult to feed solar-generated electricity on to the grid.

PLN is planning to offer a net metering program for rooftop solar PV up to 1 MW. This program is not yet officially launched and is not yet regulated at the Ministerial level. At present PLN Peraturan Direksi 0733/2013 only establishes the core principles. This allows home owners to produce electricity from solar PV cells and supply this to the grid, with a corresponding reduction in the amount of electricity that the customer is billed for. Net excess generation is not compensated. Reports suggest that net metering may only be attractive for customers that pay the highest tariff. Stakeholders expect that it will take at least another year before the program is officially launched.

4.3.3 Small-scale renewable power

MEMR Regulation No. 4/2012 stipulates that PLN is obliged to purchase power from RES projects under 10 MW. Feed-in tariffs are in place for biomass and biogas regulated in newly launched MEMR Regulation No. 27/2014), municipal solid waste (regulated in MEMR Regulation No. 19/2013) and other renewable energy, ranging between Rp 970 - 1,798/kWh on low voltage networks (weighted average tariff) and Rp 880 - 1,450/kWh on medium voltage networks (weighted average tariff). A correction factor is applied for different regions.

Table 7 Different tariffs for small-scale renewable power apply depending on region and type of grid connection

Technology	Tariff on low voltage network (Rp/kWh)	Tariff on medium voltage network (Rp/kWh)
Biomass	1,500	1,151
Biogas	1,400	1,051
Municipal solid waste – zero waste technology	1,798	1,450
Municipal solid waste – landfill technology	1,598	1,250
Mini and micro hydro	970*	880*
Other renewable energy and excess power	1,004	656

Note: Correction factors are applied for tariffs depending on the region where the power plant is based.
Source: MEMR Regulation No. 4/2012, MEMR Regulation No. 19/2013, MEMR Regulation No. 27/2014
** Weighted Average Tariff*

4.3.4 Biofuels

Biofuel producers benefit from subsidies and tax breaks. Biodiesel producers receive Rp 3,000/l and bioethanol producers receive Rp 3,500/l (Damuri & Atje, 2012). In addition, biofuel producers are eligible for VAT refunds, but these can only be claimed back retrospectively.

The government issues price formulas for biodiesel and fuel grade ethanol. Fuel distributors are required to apply these price formulas in their tenders for biofuels. The Minister of Energy Decree No. 2158K/12/MEM/2014 establishes that biodiesel prices are set at Middle Oil Platts Singapore (MOPS) plus 3.48 per cent. The fuel grade ethanol price formula is the Argus ethanol price FOB Thailand plus 5 per cent.

Farmers, particularly of palm oil plantations for biofuels, benefit from the provision of loans. Two programs are particularly important.

- **MoF Food and Energy Resilience Credit (KKPE)**. This scheme provides credit with subsidised interest rates for the development of food crops, horticulture, plantations, grains, livestock, fisheries, and procurement of equipment to support these activities. Since its inception in 2007, it has disbursed Rp 727.7 billion to 401 businesses. The loans are disbursed through one of 22 Executing Banks, with a maximum tenor of five years and an interest rate equal to the Deposit Insurance Agency plus five percentage points for plantations and six percentage points for non-farm business.

KKP-E is regulated under Ministry of Finance Regulation No. 79/PMK.05/2007, amended by Regulation No. 48/PMK.05/2009 and No. 198/PMK.05/2010; and

- **Bio Energy Development and Plantation Revitalization Credit (KPEN-RP).** Under Ministry of Agriculture Regulation 33/Permentan/OT.140/7/2006, loans are provided, through 17 commercial banks, for development of feedstock crops and development or revitalisation of plantations. The interest rate of KPEN-RP is set at the prevailing market interest rate for similar loans with provisions that it does not exceed the interest rate on commercial bank deposit insurance plus 5 percentage points. The Minister of Finance sets the interest rate KPEN-RP charges to farmer participants upon the recommendation of the Minister of Agriculture, after receiving the results of studies of the Technical Committee, with the difference between these two rates constituting the subsidy under the scheme. As of February 2013, credit agreements amounted to IDR 7.32 trillion; the interest subsidy paid in FY 2012 was IDR 77 billion.

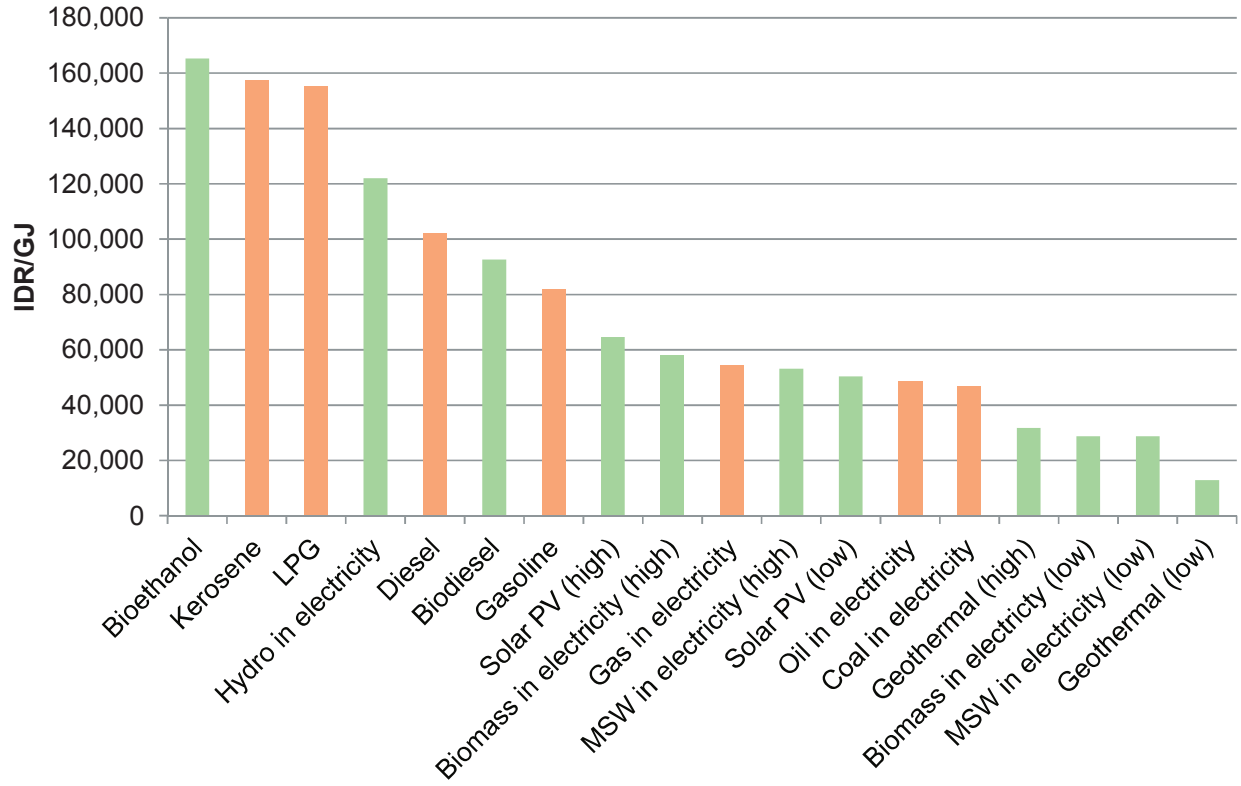
4.4 Comparison of support amounts

While there are a considerable number of support policies for renewable energy, these co-exist with extensive subsidies for fossil fuel energy sources. These fossil fuel subsidies make it more challenging for renewable energy sources to compete, impeding progress towards our renewable energy targets. The pressure on the budget placed by fossil fuel subsidies also make it more difficult to extend appropriate fiscal support for renewable energy.

A comparison of subsidies per unit of energy use provides a useful indication of the consistency and coherence of our current energy policy. Figure 12 provides a comparison in relation to some of the key incentive policies for which sufficient data exists (fuel subsidies, including biofuel subsidies; electricity subsidies and feed-in tariffs for renewables[8]), with all the subsidies expressed on a consistent IDR/GJ basis. Full details on the analysis underpinning these calculations, and a sensitivity analysis, are provided in the Appendix.

[8] Incentive policies excluded from the comparison include the tax exemptions provided to renewable energy production, guarantees and other financial instruments provided to both renewable and fossil-fuel energy, on the basis that the financial impact of these differ according to the specific characteristics of the installation to which they are provided. In addition, the extent of the use of many of these provisions is quite limited.

Figure 12 Many fossil-fuel energy sources receive higher subsidies per GJ of energy than do renewable energy technologies



Note: *Subsidies embedded in feed-in tariffs calculated relative to an estimate of the weighted average cost of different forms of fossil fuel generation. Renewable energy subsidies in green, fossil-fuel energy subsidies in orange*

Source: *Vivid Economics*

The figure illustrates considerable discrepancies in the extent to which different energy sources benefit from subsidies. These estimates suggest that there is almost a 13 fold difference between the most heavily subsidised energy product (bioethanol) and the least heavily subsidised product (geothermal energy). There are also notable examples where fossil-fuel energy sources are benefitting from considerably greater energy subsidies (per GJ of energy) than renewable alternatives. For instance, kerosene and LPG are among the most highly subsidised fuel types; diesel is being subsidised more heavily than biodiesel; and the effect of the electricity subsidy provides a greater benefit for coal, oil and gas-fired electricity production than the subsidies received by some renewable power technologies, even taking into account the impact of the feed in tariffs for these technologies[9].

[9] Further details on how the impact of electricity subsidies are attributed to the underlying fuel sources is provided in the appendix.

5 Proposed Policy Reforms

Improvements to project economics, access to finance and the political economy context can drive our renewable energy sector

This section presents a set of proposed reforms towards realising a coherent renewable energy policy framework. These reforms are based on a review of international best practice coupled with a series of detailed engagements with Indonesian stakeholders.

Three pillars are needed to underpin renewable investment (Figure 13)**:**

– **Project economics:** renewable projects must be able to earn appropriate risk-adjusted returns. At present there are a number of renewable energy technologies in Indonesia where the policy environment prevents this from being achieved;

– **Access to finance:** regardless of how profitable renewables projects appear to be, investments will not proceed if there is little capital available. Not only must the financing be available at a reasonable price, reflecting the underlying risks of the investment; it must also be of the right type and have a risk appetite which is consistent with the underlying risk profile of the investment. This has been noted as a particular challenge in Indonesia where many financial institutions remain reluctant to invest in what are perceived as new and risky technologies (Climate Investment Funds, 2010); and

– **Political economy:** underpinning the other two pillars, there must be a favourable political economy environment. Investors in renewables projects must have confidence that there is a strong commitment, both now and in the future, to policies that facilitate strong project economics and access to finance. The broader enabling framework for private investment must also be supportive. Here, again, there are a number of ways in which the Indonesian context might be improved.

This framework informs the proposed policy reforms and the issues they aim to resolve. At present, there are a number of weaknesses in relation to each of these three pillars. Table 8 presents an overview of the reforms, whether they pertain to fiscal policy, what the relative implementation time span is and what the priority of the reforms is for the MoF. While all of the policy proposals are important and ultimately form a package of reforms that will have maximum effectiveness if implemented collectively, in order to act decisively we must focus our efforts and implement the reforms with the highest priority first. To establish the indicative respective priorities of the reforms, a qualitative assessment of three equally-weighted criteria inform the final prioritisation:

– MoF control. Reforms receive a higher priority if we, the MoF, can exert direct and decisive control over the policy reform;

– Effectiveness. Reforms that are expected to have a large positive impact on renewables deployment are of a higher priority; and

– Budgetary impact. Given our focus on fiscal discipline, policy reforms that place a relatively small burden on public resources are given a higher priority, unless the reform is thought likely to have a strong effectiveness to cost ratio.

The remainder of the section provides more detail on the rationale for the proposed policy reforms.

Figure 13 The fundamental requirements for renewables investment

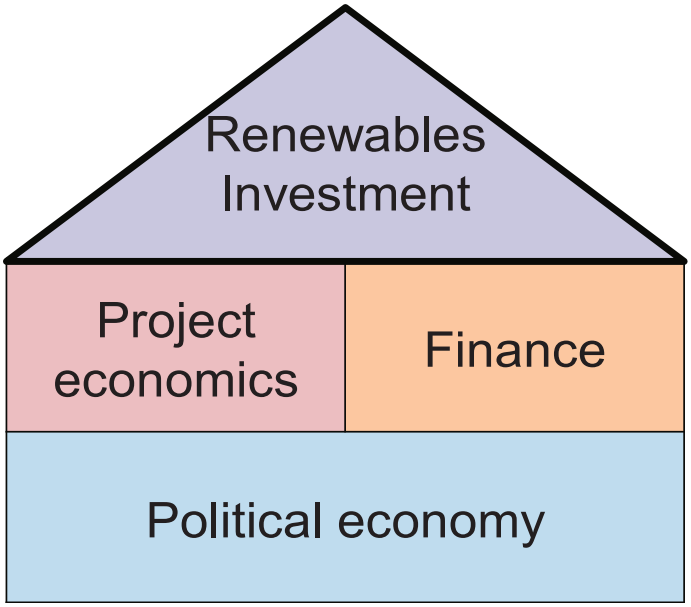


Table 8 Key policy reforms for renewable energy policy in Indonesia

Policy reform	Issue	Term	Key departments	MoF priority
Project economics				
Rationalise and reduce fossil fuel energy subsidies	The subsidies send the wrong price signal and reduce flexibility to support renewables	Short term	MoF	High
Consolidate and automate available fiscal incentives	Current application processes for tax incentives are lengthy and uncertain	Short term	MoF	High
Improve and stabilise renewable power pricing regimes	Unplanned changes to renewable power pricing regimes create uncertainty for investors and for some technologies a pricing regime is lacking	Short term	MoF, MEMR	Medium
Introduce net-metering	Net-metering allows for distributed generation	Short term	MoF, MEMR	Medium
Enforce application of the biofuels price formula stipulated by MEMR	Current pricing policy does not allow cost recovery for producers	Short term	Min SOEs, MEMR	Medium
Access to finance				
Prioritise the provision of guarantees to renewables and remove support for coal-fired power generation	Government guarantees have thus far mainly been awarded to coal-fired projects	Short term	MoF	Medium
Accelerate the implementation of the Geothermal Fund Facility	Geothermal development suffers from considerable resource risk hampering access to capital	Short term	MoF, MEMR, PIP	High
Continue PIP's management focus on supporting renewables	Despite intentions, no funds have been disbursed to renewables projects to date	Short term	PIP	Medium
Increase Ministry of Finance engagement in co-ordinating support from international development partners for renewables through creating a national database	At present, support from development partners lacks tracking and coordination	Short term	MoF	Medium
Political economy				
Introduce renewable energy targets for MEMR and PLN, consistent with the new KEN	It is unclear how the renewable energy targets in the KEN will be met	Short term	MoF, MEMR	Medium
Use government budgets to promote a supportive enabling environment for renewable technologies	A lack of government provision of renewables infrastructure and services forms a barrier to renewables investment	Short term	MoF, MEMR	Medium
Reverse foreign ownership constraints for <10MW projects to allow for transfer of skills and technology	Indonesia risks losing access to foreign investment, skills and technology	Short term	MEMR	Low
Establish an independent energy market regulator	Uncertainty over what happens if there is a dispute raises risk	Medium term	MoF, MEMR	Medium

5.1 Project Economics

5.1.1 Proposal 1: Rationalise and reduce fossil fuel energy subsidies

Our energy subsidies represent a key impediment to meeting our renewable energy targets. Despite the objectives to increase renewable energy production, and scale back the proportion of energy coming from fossil-fuel sources, our current energy pricing policies work counter to these objectives. As the analysis in section 4.4 shows, a number of fossil fuel energy sources are more heavily subsidised than renewable energy alternatives. As well as sending the wrong price signals for the take up of renewable energy, these subsidies reduce our flexibility to provide additional support for renewable energy.

A phased approach to energy subsidy withdrawal can be adopted, with supportive flanking measures. This could begin by committing to a fixed amount of subsidy each year (rather than the amount of subsidy depending on fluctuations in international energy prices), with a focus on reducing those energy sources that appear to benefit disproportionately from the current energy subsidy regime including kerosene, LPG and diesel. This fixed amount of subsidy could then decline over time. At the same time, we might:

- establish an independent commission to investigate the size and costs of energy subsidies and the benefits of their removal, along with the associated distributional impacts, and disseminate the results broadly;

- identify the most appropriate compensatory measures, whether in the form of cash transfers or subsidies to encourage connection to the electricity grid, to protect low-income households from the rise in energy prices; and

- aside from protecting vulnerable consumers, identify the highest priority uses of the saved resources, including in priority spending areas such as infrastructure, education and health.

As energy subsidies are reduced, we can start to think about pricing externalities of energy consumption such as carbon dioxide emissions, especially in power generation, which would further support renewable energy. Through the RAN-GRK, implemented by BAPPENAS, we are committed to reducing our greenhouse gas emissions. The most cost effective way of achieving this is through pricing measures. We are already taking important steps in this regard: through our collaboration with the Partnership for Market Readiness, we are carrying out preparatory work for introducing market instruments to support our mitigation actions (Partnership for Market Readiness, 2013). Accounting for the carbon costs of energy production and use in energy prices, potentially starting in the power sector, would render renewable energy sources more competitive and increase uptake.

The reduction of energy subsidies is a high priority policy reform for the MoF. The MoF has direct control over the budgeting of subsidies, including those that flow to fuels and electricity. As such, while there are strong political challenges, we are in a strong position to phase out energy subsidies in the medium run. Deployment of renewables will be positively impacted as markets will reach a new equilibrium in which conventional energy sources are no longer unjustifiably advantaged. Further, the reduction of energy subsidies will lead to lower public expenses.

5.1.2 Proposal 2: Consolidate and automate available fiscal incentives

A failure to consolidate and automate fiscal incentives is reducing the effectiveness of a potentially powerful instrument. Regulation No. 21/PMK.011/2010 provides for a variety of incentives for renewable energy deployment. In principle, these could be an effective mechanism for improving the project economics of renewable energy and the level of support is broadly consistent with what is seen in a variety of other countries. However, there has been little uptake of these incentives. Stakeholders suggest that this is a result of substantial uncertainty around the application of the Regulation and the lengthy approval processes, which render them insufficiently transparent and accessible. Specifically:

- investors perceive a lack of clarity around the application of fiscal incentives, including whether accelerated depreciation and taxable income reduction can be applied simultaneously;

- the approval processes for incentives are on a case-by-case basis and involve an uncertain review process which is expected to take between 3 and 6 months. One of the common issues delaying approval is the considerable difficulty that the tax office faces when establishing the applicable cost base. Stakeholders furthermore lack a guide that explains the overall approval process; and

- it is uncertain whether incentives are awarded. Therefore, investors cannot count on receiving the incentives in their financial appraisals, reducing their expected value.

We can improve the effectiveness of No. 21/PMK.011/2010 by redrafting it to specify precisely what documents are required to demonstrate eligibility. In contrast to No. 21/PMK.011/2010, No.130/PMK.011/2011 (relating to pioneer sectors) provides very clear guidance on the amount of tax relief that is available and what is required to qualify for the tax relief. For instance, it specifies that photocopies of the Taxpayer Identification Number card, a letter of approval of the new capital investment from the Head of the Capital Investment Coordinating Board, evidence that the requisite funds have been placed in Indonesian banks and so on. This level of clarity can be provided in a redrafted PMK for tax relief in the renewable energy sector. Given the relatively small scale of many of the investments that would be supported by these investments, the evidential requirements placed on respondents should be the minimum needed to satisfy the current criteria. Further, to enhance the simplicity of the mechanism, the current approach of providing the same percentage of tax relief for all investment types will be maintained[10].

We can also commit to making decisions on whether or not an application will be granted in a short space of time. By creating a dedicated unit within the Ministry of Finance, a commitment to process any applications within a limited timescale – for example one month – can be made. To this end, the MoF can create a coordinating unit within the Fiscal Policy Office which oversees the application process throughout DG Tax, other relevant DGs, and the Indonesia Investment Coordinating Board; and makes information about the approval process available to the public.

[10] By providing tax relief as a percentage of the investment amount, the measure automatically takes some account of the different capital intensity of different technologies. As use of the facilities grows, it may be possible to make an adjustment to the pricing approach to different technologies

It will be important that this tax incentive is applied predictably and consistently. As the experience with the U.S. shows, regular lapses of tax credits lead to uncertainty and increased investment risk. This compromises the value derived from subsidies as investors require higher returns to make up for increased risk. A commitment can be made on the length of time for which incentives are maintained at a certain level. Towards the end of this period, a study can be undertaken to examine the experience of the mechanism and whether the level of incentive needs to be adjusted in the future[11].

In addition, there is a need for greater awareness of available fiscal incentives so as to make policies more transparent and accessible to a wider set of interested parties. Market participants are currently not using the available fiscal incentives to any great degree, apart from import duty exemptions. The lack of incentive uptake is in part due to issues around a lack of clarity around incentive applicability and automation of approval processes, but to some extent also due to a lack of awareness. Awareness can be raised by publicity campaigns and offering (free or discounted) tax advisory services, especially for smaller investors. This will increase the transparency and accessibility of these incentives and lead to increased inclusiveness of the policies.

The consolidation and automation of fiscal incentives is a high priority policy reform for the MoF. Although coordination with MEMR is required, the MoF is largely responsible for the regulation of fiscal incentives for renewables. Consolidation and automation of incentives can quickly lead to improved rates of return for investors and trigger a significant increase in renewables deployment. Whereas the additional uptake of incentives may result in foregone tax revenues, the improvement of administrative processes may also lead to a reduced organisational burden and save costs

Box 1 Supporting renewables with fiscal incentives: the case of the U.S federal tax credit

The federal government in the U.S. offers a production tax credit (PTC) or investment tax credit (ITC) to renewables projects. Investors choose between the two incentives. The PTC is a per-kWh tax credit generally for 10 years after the facility is placed in service. PTC rates vary based on kWh produced with wind, closed-loop biomass, and geothermal energy receiving US$ 0.023/kWh; open-loop biomass, landfill gas, municipal solid waste, hydroelectric and marine receive US$ 0.011/kWh (US Department of Energy, 2014). The ITC is a one-time tax credit. For solar, fuel cells and small wind turbines it covers 30 per cent of expenditures; for geothermal systems, micro-turbines and combined heat and power 10 per cent of expenditures. Under the American Recovery and Reinvestment Act (ARRA) of 2009, developers were allowed to receive a grant equal to the ITC in lieu of taking the ITC, due to the limited tax liability that many developers had following the financial crisis.

The PTC has been particularly successful as an incentive for wind power. Between the start of the PTC in 1992 and the end of 2011, wind capacity grew 30-fold to account for 4 per cent of the U.S. total power generation capacity (KPMG, 2013). It is a very attractive incentive: without the tax credit, the average price per MWh to cover wind production costs would be US$ 86, compared to $67 for natural gas (at recent fuel prices). But after the PTC is applied, wind power costs only US$ 63/MWh, making it a competitive energy source (Philips, 2014). The PTC has been extended in one to two-year intervals since its inception and has been allowed to expire in 1999, 2001 and 2003, each time with a notable negative impact on capacity additions. The U.S. Congress now deems the wind industry mature enough to do without the PTC and allowed it to expire in December 2013, although the incentive may re-emerge as part of a revised U.S. energy tax framework (Philips, 2014).

Important lessons can be learned from U.S. experience with tax credits. Tax credits can be very powerful incentives for RES deployment. The PTC has been particularly successful in the wind sector. RES deployment benefits from regulatory certainty. Allowing the PTC to expire led to steep drops in U.S. wind capacity additions.

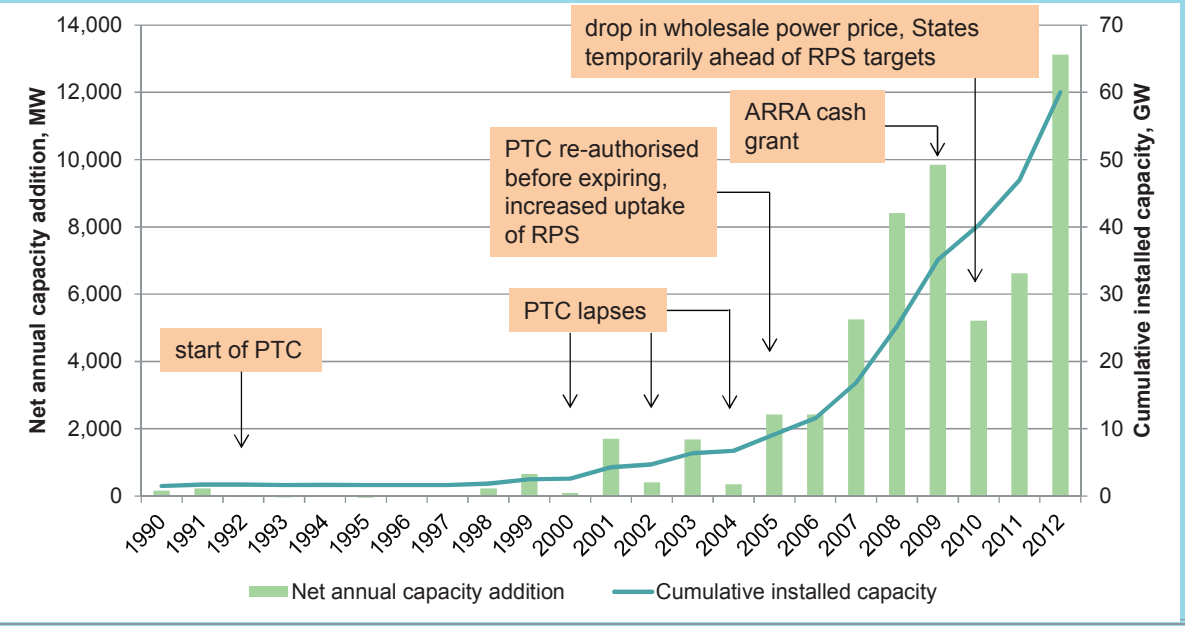
[11] Discussions with stakeholders suggest that the current incentives could well be powerful at current levels and should therefore be tested at these values, before adjusting the subsidy level.

One-year extensions of tax credits did not match the typical lead time of wind power projects of around two years, which led to increased investor risk. Stable and consistent tax credits are preferable.

The complexity and applicability of tax credits determines the size of the potential investor pool. The complexity of the U.S. tax credits and the fact that it is only useful for companies with sufficient tax liabilities implies that it is taken up only by large (financial) investors.

Tax credits appear to have worked well in tandem with other policies. U.S. states have adopted and strengthened renewable portfolio standards since 2005, which improved market certainty as a complement to improving cost effectiveness through federal tax incentives. The Modified Accelerated Cost Recovery System allows accelerated depreciation which has further improved cost-effectiveness of RES.

Figure 14 Lapses of regulation had a significant impact on wind capacity additions, until from 2005 the PTC was re-authorised beforehand each time it was due to expire and more RPS were adopted



Note: *Net annual addition equals new installations minus retirements. RPS = Renewable Portfolio Standard*

Source: *Based on Global Wind Energy Council data and Mitchell et al. (2011).*

5.1.3 Proposal 3: Improve and stabilise renewable power pricing regimes

The changeable nature of pricing regimes for renewable power has created uncertainty in the market. Frequent changes in pricing regimes have made the current pricing policy framework less transparent, sustained and consistent. This results in uncertainty for investors who, as a result, attach greater risk to investing. Prime examples of this are geothermal and mini-hydro pricing policies while there are continuing discussions on whether to return to a system of competitive tenders with a price ceiling. Similarly, an expected increase in the FiT rate for mini-hydro developers has led to postponement of investment by developers. The case of Spain strongly illustrates the risks that can emerge when renewable energy pricing policies are not put on a firm and stable footing.

To overcome this uncertainty we propose different approaches to renewable energy technologies above and below 10 MW. This two-tier approach builds on the current framework for setting renewable energy in the country, in order to minimise further

disruption, while differences in regulatory approach between smaller and larger scale renewable facilities are common in a number of countries including Australia, Austria, Poland, Italy, South Korea and the UK.

– For renewable power generation facilities below 10 MW, the current regime of feed-in tariffs appears to be broadly successful and should be maintained, subject to potential minor modifications (as discussed below); and

– For renewable power generation facilities above 10 MW, a range of guide prices for different technologies should be established. These guide prices would provide a range of prices within which it would typically be expected a PPA would be concluded. In order to promote fiscal sustainability, the range, and the particular price within this range, should be informed by the economic viability of renewable technologies, which can be calculated by comparing their generation costs of the 'typical' conventional technologies in a particular locality (the avoided costs of generation). However, as stressed in earlier Ministry of Finance analysis (Ministry of Finance Republic of Indonesia & Australia Indonesia Partnership, 2009), it is important to note that the 'true' cost of conventional generation includes not only accounting costs such as capital, operating and fuel costs; but also comprise broader economic costs such as fuel price risk, air pollution and carbon costs. For example, the current arrangements whereby coal generators can pass-through coal price rises, amounts to an implicit subsidy for coal generation as they do not pay for what is effectively a hedging instrument. The current lack of any such guide prices, except in relation to geothermal power, means it is difficult for stakeholders to have confidence in the development of PPAs for these projects, as there is uncertainty over what prices would be considered acceptable. This leads to the exclusion of a host of renewable energy opportunities from the supply side of the market. At the same time, a system of formal feed-in tariffs is likely to be difficult to sustain given the wide diversity of different conditions across the country; differentials that will be accentuated for larger facilities that produce more output. This approach strikes a compromise between these different factors, but is likely to require buttressing through the development of an independent regulator to help adjudicate on disputes that may emerge, as discussed in recommendation 12 (section 5.3.4).

A number of important principles should be respected when determining both these feed-in tariffs and guide prices. Prices need to be set so that efficiently operated plant can be expected to meet a reasonable target internal rate of return. The financial models that underpin the calculation of the prices should be published so that stakeholders can scrutinise the assumptions. Beyond this, the following principles can be applied:

– Most importantly, a **clear and transparent process** should be established for when and how feed in tariffs and guide prices might be adjusted and how this periodic review will be undertaken. For instance, a review of all prices might be undertaken every [four] years to take account of cost and technology changes. Crucially, any such adjustments made in this process would only apply to new capital investment;

– Whether, and by how much, at a particular installation, **prices might escalate over time** to take account of cost inflation should be clearly specified, as well as the point at which escalation begins. This latter point is particularly important for geothermal power where PLN's PPAs currently only allow for tariff escalation from the commercial operation date. In the case of geothermal, this has been partly alleviated by the publication of Regulation

MEMR 17/2014, although the regulation still places all of the risks of delay between the signing of the PPA and the commercial operation date on the developer, nor does it specify the indexation to be applied from the point of commercial operation;

– Power producers can be shielded from currency risk by **denominating part of the PPA tariff in, or linking it to an exchange rate of, the currency of the power producer's debt**. Part of the costs of RES projects accrues in foreign currency while foreign investors also expect to expatriate their profits in their own currency. If the revenues from power production are exclusively denominated in local currency terms then this exposes investors to considerable exchange rate risk that they are unable to easily control, increasing their expected return requirements. This may be resolved by allocating some of the exchange rate risk inherent in the PPA to the power purchaser by denominating payments in, or linking them to, a foreign currency. (OPIC, 2014). An equitable sharing of exchange rate risk, recognising that both developers and PLN can only partly control exchange rate risk, would be desirable; and

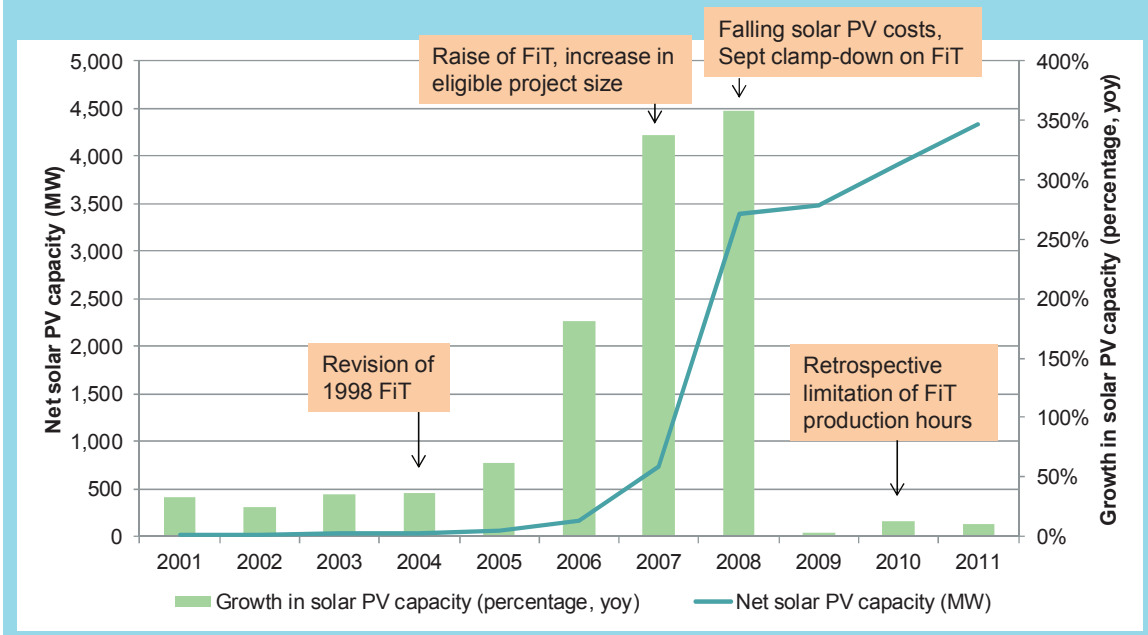
– For relatively immature technologies in the Indonesian context, there is merit in providing a **premium** above the estimate of the price needed to reach the target IRR to encourage early take-up and account for the risks additionally faced by early movers. However, in cases where this approach is adopted, with solar PV being a candidate, this should be accompanied by a digression formula specifying at what level of cumulative capacity the premium would be removed.

The long term proposal for an independent regulator is closely integrated with this proposal: the independent regulator could take charge of this process.

Box 2 Striking a balance between adaptability and stability of FiT policies

Any FiT policy must strike a balance between adaptability and stability. The policy must be adaptable, with the FiT set at a level that reflects the cost profile for a technology at any given time. At the same time it must be stable: investors must be confident that they can develop a project for which support will be consistent and available for a long enough period (International Renewable Energy Agency, 2012). Experience with FiTs around the world shows that this is a difficult balance to strike. Many feed-in tariff policies end up overpaying project owners, as the optimal price is unknown and regulators do not want to risk a scheme that does not deliver. Governments are particularly vulnerable to technology costs falling quickly: the average solar PV price fell 20 per cent in 2009, leaving many countries to commit overly generous tariffs. Generous tariffs often quickly attract development, which may become excessively costly for a government, which may then revise its FiT policy, pushing the market through 'boom-bust' cycles (Wood, 2012).

Figure 15 Spain's generous solar PV FiT resulted in a boom-bust cycle



Sources: IEA Renewables Information, Mitchell et al. (2011), European Photovoltaic Industry Association (2013)

The Spanish solar PV market is a prime example of the effects of inconsistent policy. Spain failed to adapt its policies in time, which led to a 'boom-bust' cycle and instable policies, as depicted in figure 15. In 2007 a solar PV target for 371 MW was set, to be achieved by 2010. In 2007-08 tariffs became very generous as the government was unable to respond to decreasing technology costs. Most of the quota, 315 MW, was installed in the first six months. This led the government to announce that no further installations would receive the generous tariff beyond September 2008, sending the market into a boom: a total of 506 MW was installed by the end of 2007; in 2008 a further 2,661 MW of capacity was added (Wood, 2012). Since then, largely due to government's fiscal constraints, several retrospective measures have been implemented, including limitations on production hours in 2010, resulting in an implied FiT reduction of 30 per cent per annum, and a change in indexing of FiTs, which resulted in a 2.7 per cent reduction per annum (European Photovoltaic Industry Association, 2013). Regulation currently under discussion foresees retrospective change of the fixed FiT into a premium tariff, alongside other retrospective changes. The policy changes since 2008 resulted in bankruptcy of more than half of the Spanish solar PV companies, with PV plants suffering a decrease of 30-40 per cent of their income (European Photovoltaic Industry Association, 2013).

Other studies, including by PKPPIM, identify where the current approach to pricing specific renewable technologies may not be fulfilling these criteria. This strategy study focusses on the fundamental elements needed for a coherent renewable energy (fiscal) regime; as such it has not examined the specific pricing approach taken to each renewable

energy technology and how this compares to the (geographically diverse) costs of these technologies. This requires a systematic analysis once the fundamentals have been established. However, other studies by PKPPIM and other stakeholders have suggested some specific aspects where the current incentive amounts may be deficient:

– **There is no feed-in tariff (FiT) for wind power in place.** Although wind resources are not particularly prevalent in much of our country, there are some locations where it is an attractive option. Currently, there is neither a feed-in tariff for facilities below 10 MW, nor a guide price for those above 10 MW. UNDP's collaboration with the MEMR on a wind energy strategy for the country is helping to identify the appropriate prices but initial discussions with experts indicate that prices in the range of US$ 0.16 to US$ 0.21/kWh may be appropriate; and

– **Solar PV pricing incentives may not be great enough to stimulate investment.** Solar PV remains a relatively immature technology within Indonesia. In order to better exploit its potential, separate PKPPIM studies identify that a higher feed-in tariff should be set, and that, feed in tariffs should also be established for <1 MW systems to connect to isolated small systems, which would be especially important in Eastern Indonesia.

Improvements in and stabilisation of renewable power pricing regimes is a medium priority for MoF. This reform requires close collaboration with MEMR. It is likely to have a large positive impact on renewables deployment although this impact is likely to imply an increase in the total subsidy outlay.

5.1.4 Proposal 4: Introduce net-metering

At present there is no incentive for distributed generation by PLN customers. Net-metering allows utility customers that produce RES power themselves to sell any excess power into the grid. Without such a policy, while customers are able to use renewable energy such as rooftop solar PV for direct consumption, if renewable generation output does not match consumption patterns then it is lost. This is a wasted opportunity. We have ample potential for distributed generation, particularly rooftop solar PV, because of our good solar irradiation of 4.1-5.5 kWh/m^2/day. For instance, this is about 50 per cent more than Germany which at present has by far the most installed solar PV capacity (32 GW out of 100 GW globally) (Renewable Energy Network for the 21st Century, 2013). An ability to feed electricity back into the grid at times that it is not used by the customer could provide an attractive return on investment. Box 3 illustrates the success of net-metering in the US and elsewhere.

A properly designed net-metering policy would create a market for distributed generation technologies and tap additional sources of capital owned by the pool of utility customers. From international experience, the following design principles can be derived which serve as a guide to good net-metering policy design in Indonesia:

— Access to net-metering policies should not be limited to any particular type of customer;

— Net-metering capacity should be unlimited at the programme level to realise its full potential. At the individual system level, size limitation should only be based on the host customer's load or consumption;

— Indefinite rollovers of excess generation credit can provide the best incentive for net-metered customers. The rollover can be effectively or actually credited at the retail rate. If no rollover credit is awarded, excess generation is best compensated for at the past year's average retail rate;

— Better (smart) metering equipment benefits the entire grid and therefore should not come at a high cost to customers;

— Virtual net-metering and meter aggregation on one site should be allowed. If a utility customer has multiple meters installed, it should be allowed to aggregate these meters (either virtually or with a physical aggregation meter) so that it can offset consumption on one meter by generation that is accounted for at another meter; and

— Net-metering customers should pay a reasonable charge for the use of transmission and distribution infrastructure. The retail rate includes a fixed charge for transmission and distribution, so any full credit rollover or compensation at the retail rate would exempt net-metering customers from this charge. This is difficult to justify as net-metering customers are making full use of transmission and distribution infrastructure.

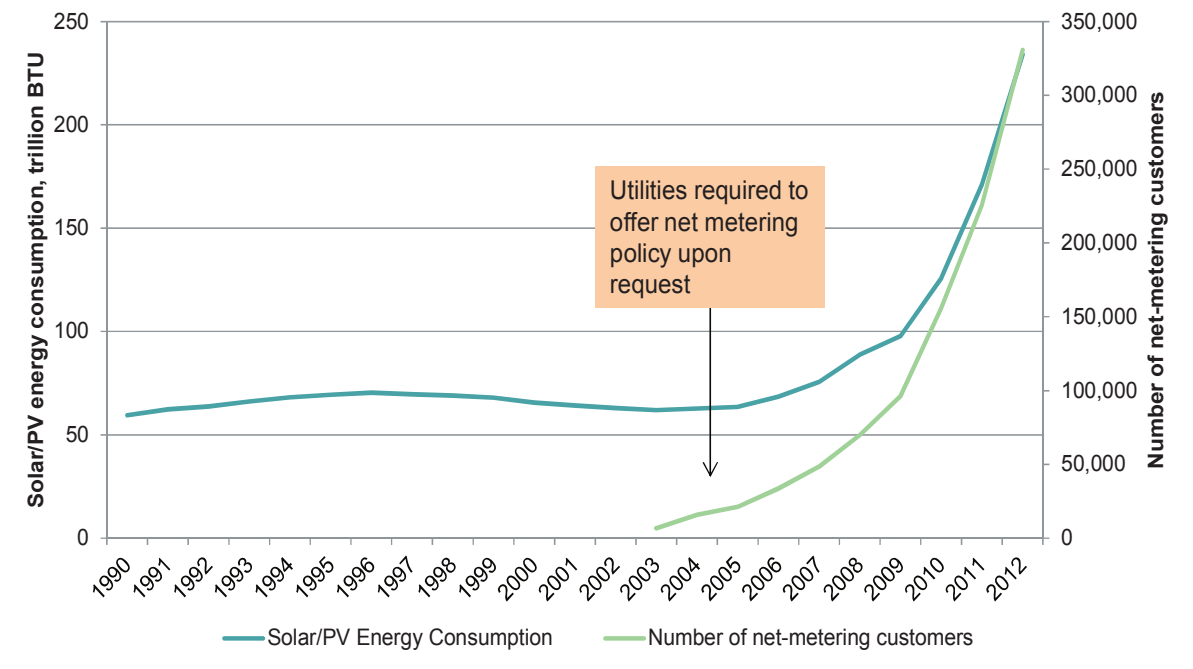
The effectiveness of net-metering is linked to success in raising electricity prices. At present, any net-metering would only be attractive for customers paying the highest electricity tariffs.

The introduction of net-metering is a medium term priority reform for the MoF. The MoF can work with PLN and MEMR to implement net-metering but PLN and MEMR in particular must take a lead on its further development. Net-metering implementation warrants close MoF attention though, as the policy has proven its value around the world by vastly increasing rooftop solar PV deployment. Further, if the use of public infrastructure by net-metering customers is appropriately charged for, the policy is cost-neutral.

Box 3 Net-metering has been a successful incentive for distributed generation around the world

Net metering policies are increasingly prevalent around the world and have been successful in incentivising decentralised generation. Net metering policies exist in at least 37 countries (Renewable Energy Network for the 21st Century, 2013), with high penetration in North America where 43 States in the U.S. and 8 Canadian provinces have them in place. The U.S. has had State-level net-metering policies for around three decades (Freeing the Grid 2014). Utilities Idaho and Arizona pioneered the policy in the early 1980s, but a surge in net metering policies started in the mid-2000s when a federal law was passed requiring utilities to provide for net metering upon request, as can be seen from Figure 16. At present, there are more then 330,000 net metering customers in the U.S. Around 93 per cent of the 4 GW of installed capacity under net metering policies is solar PV.

Figure 16 The U.S State-level net metering policies have been very successful in incentivising decentralised solar PV investment



Source: *EIA International Energy Statistics*

5.1.5 Proposal 5: Enforce application of the biofuels price formula stipulated by MEMR and consider long-term options for liberalisation

The price stipulated by the government for biofuels is not applied in tenders. In the latest tender, a biodiesel price formula was applied by Pertamina that yielded a tender price below the Mean of Platts Singapore (MOPS) price, rather than the 3.48 per cent premium specified in MEMR Decree No. 2185K/12/MEM/2014. Many biodiesel producers did not place a bid as the offer price was not sufficiently attractive. Pertamina was able to secure only 1.1 bn. litres, and has now secured a total of 2.4 bn litres out of the target 5.3 bn litres for the period 2014-2015. Pertamina is particularly struggling to find suppliers in eastern Indonesia, the location of most suppliers for whom the tender price is too low (The Jakarta Post, 2014). Similarly, production costs of fuel grade ethanol range from IDR 7,000 to 8,000 per litre, but the price formula implies that producers have to sell for IDR 6,750 to 7,300 per litre (Slette & Wiyono, 2013).

Enforcement of application of the biodiesel price formula as stipulated by MEMR would improve transparency of policy and allow more biodiesel producers to bid, increasing inclusiveness of the policy. Application of the MEMR formula would lead to inclusion of more biodiesel producers, as the price would cover the costs of a larger number of companies. It would also make biofuel policy more transparent, which leads to improved investor confidence.

In the long run, more fundamental reform can be considered. The current biofuels policy combines both a regulated price (although this is not being followed in the latest biodiesel tender) and a quantity mandate, as specified under MEMR Regulation No. 32/2008, amended by MEMR Decree No. 25/2013. This approach lacks coherence: it is only necessary to have a quantity target (and let the market price reach the level needed to meet the target) or a regulated price (where the quantity that will be supplied under this price is uncertain). At present, it is clear that the regulated prices are not being set high enough to ensure that the quantity targets are met. To address this problem, and ensure that the targets specified in MEMR Regulation No. 32/2008, amended by MEMR Decree No. 25/2013 are met, options for gradual liberalisation of the market can be considered so that a sustainable market price can be reached. As an interim measure, other PKPPIM research has indicated that the regulated biodiesel and bioethanol prices might increase, and be based on the costs of production of biodiesel rather than the oil price, and that there may be merits in combining this with additional subsidies for Indonesian producers (Soerawidjaja 2013); in the case of biodiesel, such an approach would be supported by the analysis above suggesting that biodiesel benefits from lower subsidies per unit of energy output than does diesel.

Enforcing the biofuels pricing formula is a medium priority for the MoF. The MEMR and the Ministry of State-Owned Enterprises are the main bodies responsible for the biofuels price formulae, yet the MoF can play a role in putting its enforcement high on the agenda. Likewise, liberalisation of the market will required concerted efforts across a range of stakeholders. As biofuel contracting targets remain unmet through the recent series of tenders, indicating a too low price point, enforcing higher prices will likely lead to more production and use of biofuels. Government expenditure on biofuel subsidies may increase as a result of the enforcement of the price formula but this would be counteracted by the declining subsidies to conventional refined products.

5.2 Access to finance

5.2.1 Proposal 6: Prioritise the provision of guarantees to renewables and remove support for coal-fired power generation

There are two possible routes by which the state currently provides guarantees in relation to PLN's business viability and other government contracts to renewable energy projects:[12]

- through the Indonesian Infrastructure Guarantee Fund for PPP projects as stipulated in Presidential Regulation No. 56/2011 using the guidelines suggested under Ministerial of National Development Planning Regulation No. 3/2012 ; and

- As part of the Fast Track II programme, under PMK No 139/PMK.011/2011.

[12] See section 4.2.2 for more details on these routes.

The growth of the renewables sector can be stimulated through explicit changes to the way in which we provide guarantees. Three changes can be taken forward.

1. **Following the approach of many International Financial Institutions, including the World Bank, a general presumption against providing guarantees for coal-fired power generation, aside from in exceptional circumstances, can be introduced.** The same approach can be taken for other fossil fuel powered generation facilities, with the exception of gas CCGT plants. Additional public financial support for these technologies makes it more difficult for renewable power technologies to compete and reduces the likelihood that we will be able to reach our ambitious renewable energy targets;

2. **More broadly, a set of general criteria can be established to help transparently assess which projects might benefit from guarantees.** This would lead to more certainty in the market and lower investment risk. These criteria may include:

   — good project economics and management: these are essential for ensuring satisfactory value for money;

   — the impact on carbon intensity of the economy: a positive impact on carbon intensity on the economy is preferable;

   — reliance on foreign investment: higher importance given to foreign investment may make guarantees more important;

   — economic growth: projects with a high positive impact on economic growth are preferable; and

   — inclusive development: projects that alleviate poverty should be able to access guarantees more easily.

   The criteria and selection process described above could apply both to guarantees offered by the Indonesian Infrastructure Guarantee Fund and to guarantees under the Fast Track II programme. In addition, the guarantee products offered under these arrangements should follow recognised best practice, including providing partial, rather than full guarantees, to ensure that investors and banks continue to face the appropriate incentives, and for reasonable guarantee fees to be paid to cover the risks taken on by the guarantor; and

3. **Guarantees can be provided to small-scale RES developers.** Guarantees are a powerful device and can be deployed to tap into Indonesia's large small-scale RES potential. The two existing channels for offering guarantees only cover large-scale RES projects. Yet much of Indonesia's renewables potential is found in technologies that are widely deployed in projects with a total capacity of less than 10 MW, including solar PV. Guarantees for smaller projects may be considered as part of the offering through existing channels for guarantee provision, or through other channels.

The provision of guarantees to renewables and reduction in support for coal is a medium priority for the MoF. The MoF can influence decisions on guarantee provision but it will need to do so through steering the dedicated entities that are set up to do this. This

reform may lead to a strong increase in renewables deployment. The cost of this subsidy will remain low so long as the guarantees do not need to be called upon.

5.2.2 Proposal 7: Accelerate implementation of the Geothermal Fund Facility

Speeding up the development of the Geothermal Fund Facility (GFF) can play an important role in making geothermal projects more attractive. The GFF is a revolving fund for geothermal development. It is managed by PIP and its services are aimed at reducing early-stage development risk by providing support for data collection and high quality information about new potential geothermal sites, which is a major hurdle for further development of the geothermal sector. Cumulative funds of more than Rp 3 trillion (around US$ 217 million) were made available between 2011 and 2013, and several projects are now under active processing although no resources have been disbursed to date. Some stakeholders continue to perceive uncertainty around the exact products that the GFF will provide.

Accelerating the implementation of the GFF will reduce the risk of geothermal development. The GFF is a potentially powerful tool for realising Indonesia's geothermal potential. This makes the case for speeding up its establishment and development of particular importance. The key action that needs to be taken is to select the technical and management consultant firm that can work with PIP to operate the Facility, building on the short term appraisers currently being recruited and in place. The Ministry of Finance will redouble its efforts to work in close collaboration with PIP to ensure that these administrative challenges are overcome as soon as possible.

Once the GFF is operating, a wider range of financial instruments can be offered to support early-stage development risk. Box 4 presents the envisaged activities and financial products that the Clean Technology Fund's Dedicated Private Sector Program for geothermal development might offer. It shows that there is good overlap between the expected practice of both facilities with both expected to provide contingent loans (loans that convert to grants if drilling fails). However, the DPSP facility also envisages a wider array of financial products including first loss guarantees to commercial financial institutions lending to geothermal developers, exploration risk insurance write downs and potentially direct public investment in drilling. If the GFF was to similarly provide a wider array of instruments then it might be able to more flexibly respond to constraints faced by any one developer. However, the work needed to develop these instruments should not impede early implementation of the GFF.

It is crucial that the capital provided to the GFF is able to absorb the risks that it will face. A common challenge with funds such as the GFF is that those providing its resources are not willing to provide those resources on terms that allow the fund to absorb the risks that are needed to promote investment. In the case of the GFF this implies that the resources given to the GFF (at the wholesale level) need to be able to absorb these risks, recognising that that the financial products offered to individual transactions by the GFF (at the retail level) may make a loss, even while strong financial discipline is required at the portfolio level.

Acceleration of GFF implementation is a high priority for the MoF. The MoF has direct control over the implementation process. The GFF may be able to overcome some of the most persistent barriers to geothermal development and thereby greatly stimulate

renewables deployment. Funds are already reserved in current budgets and are capped, so accelerating GFF implementation will not lead to additional public resource outlays.

Box 4 International experience with geothermal support funds

The Clean Technology Fund (CTF) is one of the Climate Investment Funds (CIFs): a multilateral climate finance initiative, implemented by the Multilateral Development Banks. The CTF aims to promote large scale low-carbon investment in a selection of middle income countries, including Indonesia. The CIF is the largest existing climate finance initiative, with a capitalisation in excess of US$ 7 billion, of which the CTF has received more than US$ 5 billion.

The CTF has recently launched a Dedicated Private Sector Program (DPSP); one of these programs aims to encourage private sector renewable energy investment by overcoming early-stage development risk in geothermal projects. The CTF recently approved funding of $115m to overcome early stage drilling risk by providing: '*a significant amount of available concessional financing towards exploratory drillings in a select number of underdeveloped areas'* (Climate Investment Funds, 2013). The countries in which these resources will be deployed in the first phase are Chile, Mexico and Turkey, although Indonesia has also been identified as a potential recipient.

In order to support exploratory drillings, the DPSP proposes to offer a selection of financial instruments targeted at the private sector, depending on the specific country context. These instruments include:

– Direct financial support to private sector concession holders including contingent loans (that is, loans convertible to grants in case of drilling failure); equity or quasi-equity with the upside of potential gains; and risk mitigation schemes such as cost-shared drilling schemes which include the option of the conversion to an equity stake in the project under a pre- agreed pricing formula.

– First loss guarantees to commercial banks or to public sector facilities established to provide risk mitigation to private developers.

– Exploration Risk Insurance. Reducing the cost of insurance premiums charged to insure the thermal output of the reservoir.

– PPP for test drilling. Using public funds to directly invest in drilling activities to confirm the resources, alongside a clear plan in place to transfer further development to private investors. This approach is similar to the approach that has been adopted in Kenya.

5.2.3 Proposal 8: Continue PIP's management focus on supporting renewables

PIP's strategic focus on supporting renewables is targeting delivery of tangible results. In addition to its role to support the GFF, PIP has identified the renewable energy sector as a key priority sector. This is an important and promising development, especially given the challenges that many renewable energy project developers have in accessing finance from commercial financial institutions. While a number of proposals are currently under close consideration, for example in relation to hydro projects, it will be important to convert preparation work into actual disbursements.

To overcome challenges other parts of MOF will work closely with PIP to support its focus on renewable energy. This work could consist of the following activities:

– Assessment of the key sectors that most need support. For instance, recent PKPPIM analysis identifies that PIP could play a particular role in supporting larger waste to energy projects. PIP can also play a role in supporting solar PV;

– Identification of targets for the amount of capacity and number of renewable energy projects that the organisation might support. A set of clear targets can help to focus

management attention. These targets might be linked to the remuneration received by the PIP management team;

– Supporting PIP management's proposals for needed regulatory and structural reforms to increase the flexibility of operations in the market environment in which it operates; and

– Evaluation of any organizational reform and / or additional resource needs that PIP requires to deliver on its targets.

Continuation of PIP's management focus on renewables support is a medium priority for the MoF. The MoF has direct influence over PIP. A dedication of the MoF to ensuring that PIP continues to support renewables may lead to some increases in renewables deployment, which should be cost neutral if PIPs resources are diverted from financing other, non-renewable, energy sources.

5.2.4 Proposal 9: Increase Ministry of Finance engagement in co-ordinating support from international development partners for renewables through creating a national database

Indonesia's significant renewable energy development potential is recognised by a wide array of development partners. The Landscape of Climate Finance in Indonesia (Tuwo, Glenday, Wilkinson, & Falconer, 2014a) reports that more than IDR 1,000 billion was provided in renewables support by international development partners in 2011. The majority of this, IDR 950 billion, was provided to geothermal development with around IDR 150 billion provided to other types of renewables. A review of international databases suggests that a wide array of different bilateral and multilateral development partners is involved in support for renewables development. Key bilateral partners include Japan, UK, Germany and USAID, while multilateral initiatives are financed and implemented by the World Bank and Asian Development Bank (including financing from the Clean Technology Fund), and the Global Environment Facility whose projects are implemented by the United Nations Development Programme.

While this support significantly improves access to finance for renewable energy development, current procedures make it difficult for the Ministry of Finance to track expenditures. Recent CPI analysis (Tuwo et al., 2014a) suggests that 68 per cent of international climate finance[13] received by Indonesia was disbursed through non-government actors and hence often not properly accounted for within the Ministry of Finance systems. This reduces the scope for the Ministry of Finance to oversee where climate finance is flowing and ensure that it is supporting activities consistent with the priorities of the government.

The Ministry of Finance can work towards the creation of a single national database to track international – and domestic – climate finance flows. This would increase the comparability of climate finance information and allow the Ministry of Finance to ensure that an appropriate allocation of climate finance resources is being used to support renewable energy development. For more discussion, see Tuwo et al. (2014).

[13] For all uses, not just renewables

Coordination of international climate finance is a medium priority for MoF. MEMR and other bodies are presently closer to development partners and their funding for renewables in Indonesia than the MoF, whereas international climate finance can play a key role in Indonesia's energy transition and therefore warrants close attention from MoF to ensure appropriate funding allocation. Better funding allocation would lead to increased deployment of renewables with limited administrative costs.

5.3 Political economy

5.3.1 Proposal 10: Introduce renewable energy targets for PLN, consistent with the new KEN

At present there are no explicit renewable energy targets for PLN, which reduces its incentive to pursue renewable power opportunities. PLN currently faces no obligation to increase the level of renewable power which it connects to the grid. This can mean that even in remote areas, where renewable energy is often cheaper than its conventional thermal alternative, thermal generation is preferred because of its short construction time and the relative ease with which it can be integrated with other power sources. In its own projections, PLN indicates that by 2021 only 13 per cent of its output will be from renewable power. Even taking into account the fact that there will be opportunities for switching to renewable energy outside the power sector, PLN's current targets call into question the viability of the KEN target for 2025 (23 per cent) for all energy sources.

Transparent renewable energy targets for PLN consistent with the targets in the new energy policy (KEN) will increase institutional incentives for pursuing more renewable energy and create more sustained and consistent policy signals. Explicit targets for the use of renewables by PLN, consistent with the trajectory for renewable energy set out in the KEN (23 per cent of the energy mix in 2025 and 31 per cent in 2050), would exert additional pressure on PLN to pursue renewable energy PPAs. For example, if the current proportion of renewables that were used for electricity generation was maintained (a little over 50 per cent) then a 23 per cent target for the energy sector as a whole would imply that 46 per cent of the energy *inputs* into the power sector would need to come from renewable sources, up from the current 13 per cent. If only 25 per cent of renewable energy was used for power generation then the proportion of renewables used in power generation would need to increase from 13 per cent to 23 per cent[14]. Targets such as these would help to improve investor confidence that there was a long-term commitment by PLN to utilise renewable power sources. These targets should be backed by remuneration incentives for PLN senior management that reflected the importance of meeting the targets.

Pursuit of these targets will likely require more commercial flexibility for PLN. While there are some renewable power options that can be developed at lower cost than the fossil fuel alternatives, there will also be some cases where renewable power may be more expensive. Therefore, if PLN are to be able to succeed in meeting any such targets then it is likely to require greater pricing and commercial flexibility, ideally under the oversight of an independent regulator as set out below. Efficiency gains will also make it easier for PLN to meet any renewable power targets.

The introduction of renewables targets for PLN is a medium priority for the MoF. This requires close collaboration with other ministries but would lead to significant additional

[14] All these calculations exclude biomass from the definition of renewables.

deployment of renewables, as PLN is unlikely to meet targets in absence of the right incentives. The direct costs associated with this reform are low although depending on the commercial flexibility provided to PLN, subsequently meeting the targets would likely require additional public resources.

5.3.2 Proposal 11: Use government expenditure to promote a supportive enabling environment for renewable technologies

As fossil fuel energy subsidies decline, some of the savings can be allocated to create a more supportive enabling environment for renewable energy. The government can play a key role in creating a more conducive enabling environment for renewable energy investment by providing resources to support activities which have a strong public good element. Notably, within the energy sphere, we need to commit decisively to increased allocation of funding for:

– **Grid modernisation.** Allocate sufficient budget through the APBN to support PLN in modernisation of the grid to improve reliability and its ability to process more power from renewable energy plants. Investors cite grid reliability and capacity as one of the key project risks holding back investment;

– **Local government licensing process improvement.** Decentralisation has put local governments in charge of much of the licensing and permitting procedures for renewable energy project development. However, there is sometimes a lack of capacity at these levels of government required to provide timely and high quality licensing and permitting services. Administrative hiccups represent a major challenge for project developers. We must invest in streamlining the procedural aspects of project development, for example through allocating funds for local government capacity improvement; and

– **Resource mapping.** Funding should be made available for detailed mapping of renewable resources. Resource maps are essential tools for investors to pick appropriate sites for their projects. However, national level mapping requires a vast expense that cannot be justified from the perspective of a single investor. The government can play a key role in overcoming this barrier. This could possibly be done in partnership with international agencies, following the example of India's collaboration with the U.S. National Renewable Energy Laboratory in mapping solar resources (National Renewable Energy Laboratory, 2013). The mapping exercises would particularly be required for solar, wind and biomass resources in particular.

Investing in supportive infrastructure for renewables is a medium priority for the MoF. The MoF can directly influence infrastructure expenditure. It can thereby improve the enabling environment for renewables. This may lead to a significant increase in renewables deployment, but – particularly grid modernisation – will likely require significant resources for PLN which would feed back to additional public resource outlays under the current subsidy arrangements.

5.3.3 Proposal 12: Reverse foreign ownership constraints for projects under 10 MW to allow for transfer of skills and technology

There have been recent changes in the rules determining foreign ownership of renewable energy projects. In December 2013 the Economic Ministers meeting reviewed the Negative Investment List. It decided on new conditions for foreign ownership of businesses in the energy sector, stipulating that for small scale power plants the maximum allowed foreign ownership should be 49 per cent. The Government approved the new list with the issuance of Presidential Regulation No. 39/2014. This is a reversal of Presidential Regulation No. 36/2010 which allowed projects of 1-10 MW to be owned under partnerships between local and foreign firms, without restrictions on division of ownership as long as there were a partnership of domestic and foreign investors.

This change risks impeding faster development of the renewable energy market with some of our renewable energy markets still in the early stages of development, this policy reversal may impede market growth, barring skills and technology from entering the market through foreign investment. Indeed, stakeholders identified a lack of financial and technical capacity on the part of project developers to be a significant impediment to further market development, particularly in biomass and municipal solid waste. In more developed markets such as hydro and solar, access to capital and technology is less of a constraint for investors. At the macro level, Golub, Kauffmann, & Yeres (2011) find that foreign direct investment can have significant 'greening' effects.

The proposed foreign ownership constraints should be annulled to allow continuing benefits from foreign ownership through facilitating technology transfer and capital inflows. Spill-overs from foreign investor activity benefit the renewables market - allowing foreign investment would improve inclusiveness of the policy and spur market development.

Reversing foreign ownership constraints is a low priority for the MoF. Whereas the MoF can influence a decision to reverse the constraints, it does not have direct control over the regulation. Increased inflow of foreign capital would lead to greater renewables deployment – through the provision of capital, technology and knowledge. This would be a cost-effective measure as it does not require any additional direct subsidy outlays.

5.3.4 Proposal 13: Establish an independent energy market regulator

Investors perceive renewable energy investment to be excessively risky due to an absence of independent oversight. The nationally owned utility PLN is the counterparty to any PPA, but there is no independent body that oversees market transactions and PPA compliance that has the authority to settle disputes. PLN's political dependency and the absence of an independent authority increases investor risk, specifically political risk of PPAs. The original Law No. 30/2009 included provisions for an independent electricity market regulator, but this was voted out in Parliament.

An independent energy market regulator with the authority to settle disputes is key to building the regulatory credibility necessary for attracting long-term private investment. This body should have the authority appropriate for its role in governing the energy market and be able to operate independent of government and the national utility, so that entities responsible for formulating policy are kept apart from entities responsible for providing services. Its powers and duties should be provided for in statute, including goals to

promote renewable energy investment in line with the KEN. It can also be responsible for providing technical input into the periodic reviews of feed-in tariffs and guide prices. Its importance could increase further in the medium run if further energy market liberalisation is implemented as an independent regulator could oversee the unbundling of generation, transmission and distribution businesses of PLN, which may improve the quality of service and reduce tariffs as a result of increased and properly supervised competition. Establishment of this body requires a change of the existing electricity law that may only be fully realised in the medium run. Further best practice design details can be found in Box 5.

Establishing an independent regulator is a medium priority for the MoF. The establishment of an independent regulator requires buy-in from various other actors. It would not have a direct impact on renewables deployment, although it would create conditions for a better market environment in the medium run. The budget would benefit from an increase in efficiency and related cost savings.

Box 5 International experience in the design of an independent regulator

A review of international experience provides lessons on the advantages of an independent regulator, the way in which the right legal status of the regulator can be achieved, and best practice on institutional design.

A well-functioning independent regulator is an important element in building an investment climate that enables greater levels of private investment into the power sector. Compared to sector oversight by government bodies, the advantages of an independent regulator include (Besant-Jones, 2006):

- it can attract and develop the highly specialised technical skills needed for a complex sector to relieve overstretched and under-resourced government departments of the regulatory burden;
- it can use its powers of arbitration to relieve the judicial system of a heavy caseload arising from disputes and clarifications of electricity regulations, and thus provide a faster and more flexible service than available under the formal, lengthy, and costly procedures of the typically overburdened law courts; and
- it can avoid the problems associated with industry self-regulation combined with anti-monopoly laws in the case of the power system, even when these laws are well developed and enforced.

Good legal grounding of an independent regulator includes appropriate arrangements around accountability, funding, appointment of commissioners and the extent to which government can overrule its decision. Key measures to achieve the right legal status of the regulator have been found to include (Besant-Jones, 2006):

- making the regulator accountable to the legislators that provided its legal status, instead of to an executive ministry;
- funding the agency independently of government budget allocations, such as through a small surcharge on consumer's bills or a levy on the utility's revenues;
- appointing commissioners on fixed, staggered terms with limitations on government's powers to dismiss them; and
- limiting government's ability to delay or overrule commission decisions, by making these decisions subject only to appeal to the judiciary.

An independent regulator should be designed so as not to become a roadblock in the view of investors, utilities and customers. Best practice institutional design elements include (Besant-Jones, 2006):

- The autonomy of regulatory agencies should be protected by appointing its staff on the basis of technical competence;
- Transparency in a regulator's procedures and processes is critical for public credibility, especially for tariff setting, as well as for attracting investors; and
- The powers of the regulator should depend on how much autonomy it is likely to have, with more power appropriate for countries that intend to attract private investment and whose political and judicial systems have the capacity to limit the risks of regulatory failure.

Part B. Promoting Energy Efficiency

6 Introduction to the Promotion of Energy Efficiency

Part B of this report presents a strategy for a coherent fiscal – and broader policy – framework for supporting energy efficiency in Indonesia. The Center for Climate Change Financing and Multilateral Policy at the Ministry of Finance (PKPPIM) is committed to improving Indonesia's energy efficiency. This can help our country meet its ambitious targets to reduce greenhouse gas emissions, promote energy security and boost competitiveness and prosperity. However, despite the host of advantages, and the significant energy efficiency opportunities in Indonesia, it is clear we have not been as successful as we might have been. A number of our peers have been much more successful. We seek to improve our performance to move towards international best standards.

The strategy consists of a set of suggested policy reforms that collectively form a proposed policy roadmap for greater energy efficiency. These reforms can be introduced both in the shorter term and those that may take longer to develop in the medium term; they also consist both of explicitly fiscal incentives, as well as a range of further reforms that will increase the effectiveness of fiscal incentives. They form an integrated package for advancing energy efficiency in the country.

The suggested policy reforms are based on a series of pieces of analysis. Specifically:

– Section 7 provides a brief assessment of the benefits that greater energy efficiency could bring for the country;

– Section 8 considers Indonesia's current energy use profile and compares it with others in the region;

– Section 9 provides an overview of the energy efficiency targets that the country has set itself in the context of the market potential in the country;

– Section 10 explains the current energy efficiency policy framework; and

– Section 11 identifies a package of reforms to enhance energy efficiency in the country, explaining how these address some of the key challenges and constraints holding back energy efficiency in the country and drawing both on the specific Indonesian context as well as international best-practice.

7 The Benefits of Energy Efficiency

Indonesian citizens and firms stand to gain significantly from greater energy efficiency.

Sustained improvements in energy efficiency can promote budget consolidation and sustainability, improve macroeconomic performance and improve the competitiveness of the economy. It can also help to address poverty concerns while supporting efforts to contribute to solving the global problem of climate change. The benefits from improved energy efficiency are available at different levels:

- The individual level (individuals, households, enterprises);
- The sectoral level (economic sectors such as transport and industry);
- The national level (including macro-economic benefits and benefits to national budgets); and
- The international level (reflecting the international public good nature of the benefits).

7.1 Energy efficiency benefits for the individual

Greater energy efficiency can increase disposable income across all households, and help alleviate poverty. Table 9 shows that, on average, in 2011, Indonesian households spent around 8 per cent of total monthly expenditure on energy – except for the poorest households, which spent 5 per cent of income on energy. Expenditures on electricity are higher than on other fuels across all income quintiles, but those with the lowest incomes spent more on kerosene and firewood, charcoal and other fuels than the highest incomes, who spent more on gasoline. Increasing energy efficiency at the demand-side can lower expenditure on energy and thereby increase disposable income across all income quintiles. For the lowest incomes, this may imply a move away from poverty. Equally, supply-side improvements by the national utility (PLN) and other utilities allow for better quality and quantity of electricity provision to households, supporting increased access to electricity. Currently, 47 million Indonesians (19.5 per cent of the population in 2013) do not have access to electricity (Directorate General of Electricity - Ministry of Energy and Mineral Resources, 2014).

Table 9 In 2011, on average, around 8 per cent of Indonesian monthly household expenditure was on energy, mostly on electricity, kerosene and gasoline; except for the poorest households (5 per cent)

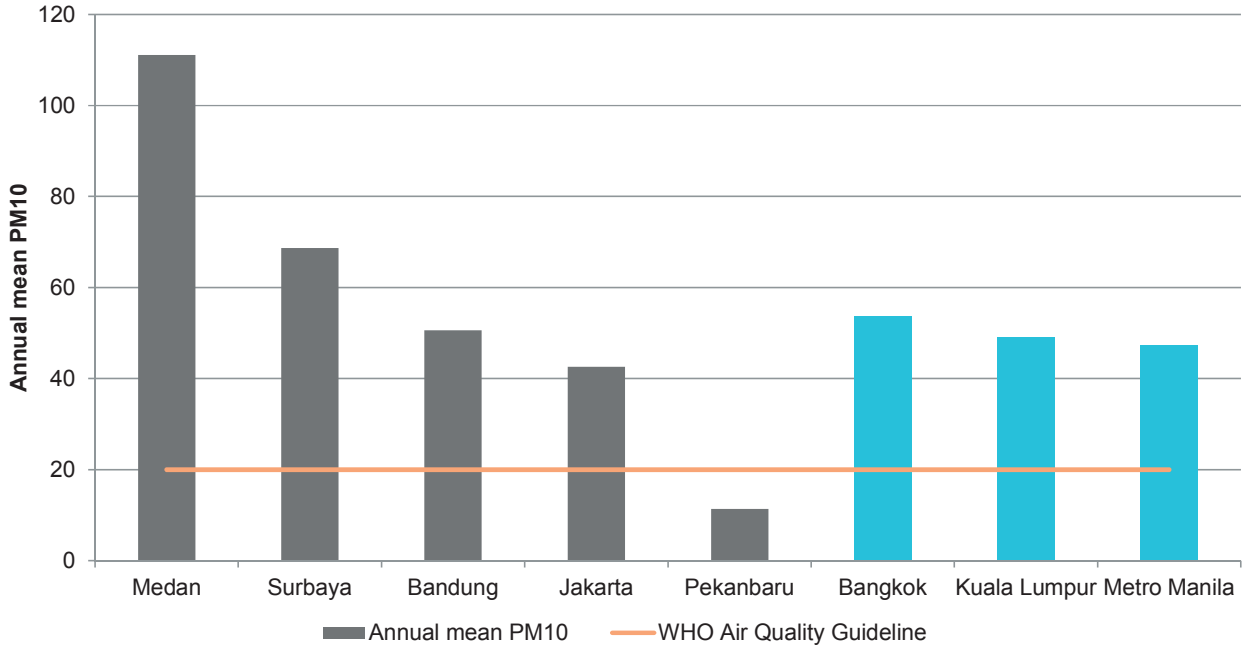
Income quintile	Electri-city*	LPG*	Kero-sene*	Gasoline auto-motive*	Diesel auto-motive*	Firewood, charcoal & other fuels*	All energy*	Average monthly expenditure on energy (IDR)
1	2.2	0.7	0.8	1.4	0	0	5.1	33.229
2	2.4	1.4	0.7	2.8	0.1	1.4	8.7	33.674
3	2.3	1.6	0.6	3.1	0.1	0.6	8.4	50.814
4	2.3	1.6	0.6	3.2	0.2	0.3	8.1	69.058
5	2.4	1.1	0.3	3.6	0.3	0.1	7.8	121.478

Note: ** All figures are percentages of total expenditures. Average total monthly expenditure is calculated as a simple average of rural and urban household expenditures.*

Source: *SUSENAS 2011*

Improving energy efficiency can also provide significant health and well-being impacts. Better energy efficiency allows for improved heating and cooling of buildings, while more efficient transport energy use and power generation can significantly improve air quality. As can be seen from Figure 17, levels of PM_{10}, a particulate matter that is harmful to human health, exceed the World Health Organisation's global air quality guideline in four out of five Indonesian cities for which data is available, in line with results from other large Asian cities. These emissions are to a large extent from motorised vehicles. The results also indicate the potential benefits of energy efficiency (and other transport and air pollution) policies; part of the reason for Jakarta's relatively good performance relative to Medan and Surabaya may be explained by various programmes implemented in Jakarta including gas conversion programmes for public transport and bus rapid transport schemes.

Figure 17 PM_{10} levels in Indonesia and other Southeast Asian cities exceed the WHO's PM_{10} guideline



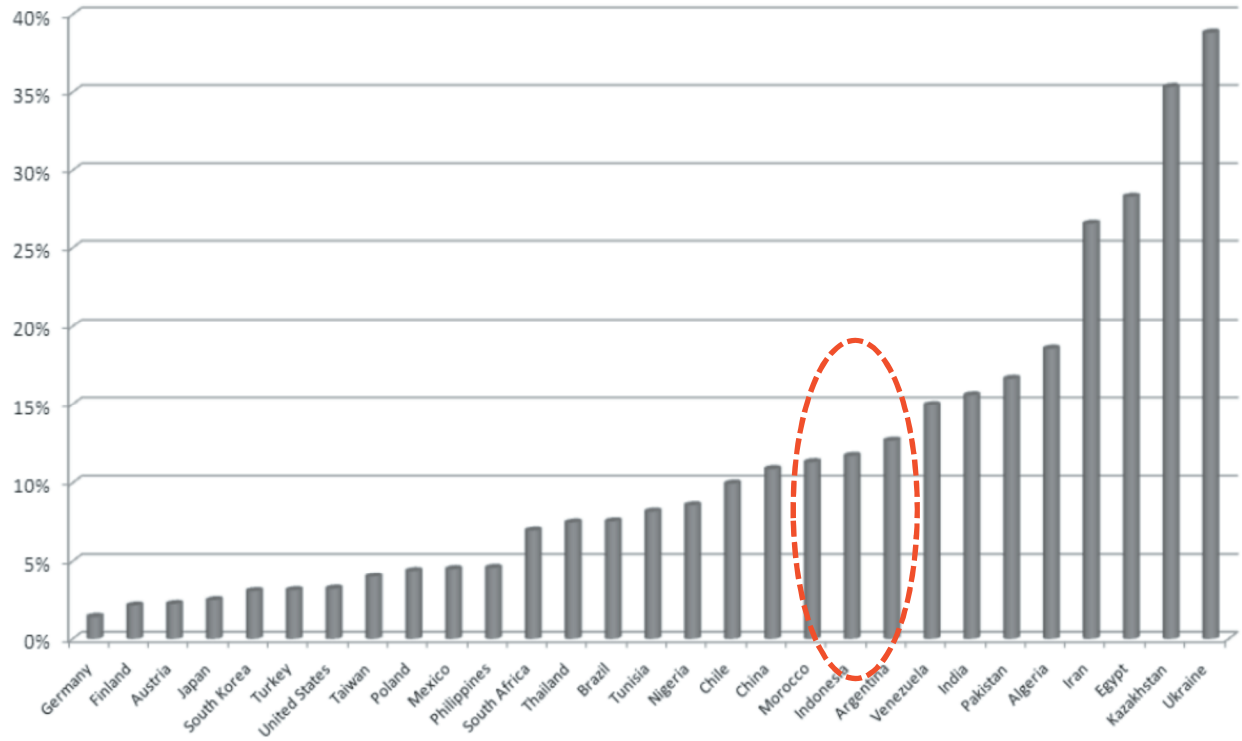
Note: *Indonesian cities in grey, international peers in blue. All data for 2008 except for Metro Manila (2007).The annual mean PM_{10} is a population-weighted average for urban population in cities above 100,000 inhabitants. The 2005 WHO Air Quality Guideline for annual mean PM_{10} is 20μg/m^3.*

Source: *World Health Organisation, Vivid Economics*

7.2 Energy efficiency benefits at the sectoral level

Energy efficiency can allow our industrial firms to improve productivity and competitiveness by reducing costs and pollution. Costs can be reduced through more efficient resource use, improved capacity utilisation, and less operating and maintenance costs. For example, although the costs of energy use are relatively low for Indonesian industrial firms due to subsidised energy prices, they still make up a significant part of the cost base. Figure 18 suggests that the costs of energy use in Indonesia, when valued at international prices, are 12 per cent of value added, which is highest among the South-east Asian peers for which data is presented. Reducing these costs can boost firm and sector productivity competitiveness: UNIDO(2011) showing that a productivity increase can be expected when firms introduce significant energy efficient process technologies. Likewise, Worrell, Laitner, Ruth, & Finman (2001) identify no less than 224 different 'non-energy benefits' from energy efficiency improvements in the 77 case studies it considers. These include improving individual workers' everyday working conditions, safety and job satisfaction.

Figure 18 The costs of energy use in industry value-added are relatively high in Indonesia



Note: *Data for 2008. Energy carriers consumed were evaluated with world market prices, including energy exporting countries which tend to have much lower energy prices for their own industries. This is justified by the lost opportunity to sell more of the energy at market prices. The value added by manufacturing excludes the value added of energy industries which in energy exporting countries biases the picture.*

Source: *UNIDO (2011)*

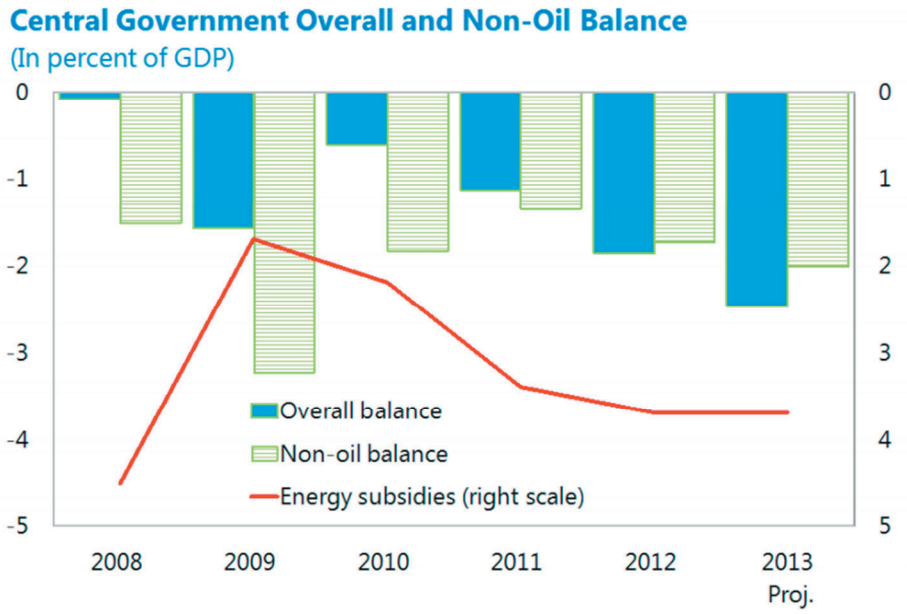
Improvements in energy efficiency can help PLN and other energy providers improve energy services for their customers, reducing operating costs and improving profit margin. Studies show that as much as 10 per cent of energy efficiency benefits accrue to energy providers (Ryan & Campbell, 2012). In many cases, improving energy efficiency among consumers can be a much more cost-effective strategy for dealing with difficulties in providing peak load than adding new capacity. For example, a modelling exercise of the effects of lighting efficiency improvements on the islands of Java, Madura and Bali islands finds that business-as-usual electricity expansion costs would amount to US$ 10.4 billion over the period 2011-2025, compared to US$ 9.8 billion if lighting efficiency improvements (replacing incandescent lamps with CFLs) were implemented. The total avoided costs would be around US$ 600 million (Wijaya & Limmeechokchai, 2010).

7.3 Energy efficiency benefits at the national level

Improving energy efficiency can reduce the burden of energy subsidies on the state budget. In 2012, energy subsidies accounted for 3.7 per cent of GDP and 20.5 per cent of public spending in the country and are projected to remain at that level through to 2014

(International Monetary Fund, 2013). Around 70 per cent of energy subsidies are for fuels; the remainder for electricity[15]. As shown in Figure 19, energy subsidies have been responsible for our widening fiscal deficit. Reducing the burden of energy subsidies will be crucial for providing sufficient fiscal space to meet development spending priorities including investment and poverty alleviation, which, at 2.7 per cent, accounted for one percentage point of GDP less than energy subsidies in 2012. While this will be primarily driven by reducing the size of the subsidy per unit of energy – where there has been important progress recently including a 44 per cent increase in gasoline prices in June 2013 and an average 15 per cent increase[16] in electricity tariffs through 2013 with increases introduced quarterly through the year – reducing the intensity of energy use can also make a significant contribution. Indeed, the two go hand-in-hand.

Figure 19 Indonesia's fiscal deficit has widened since 2010, driven mainly by energy subsidies

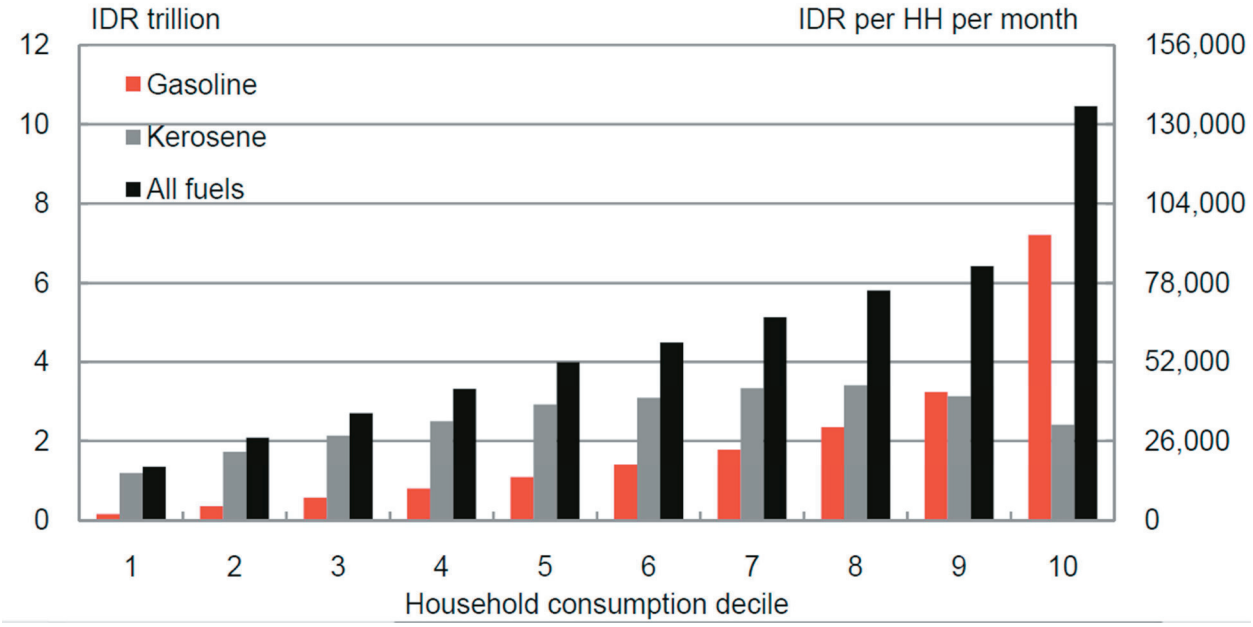


Source: International Monetary Fund (2013)

These changes can also be progressive as energy subsidies currently go primarily to wealthier households. Figure 20 shows how the absolute value of fuel subsidies – the bulk of the subsidy bill – are directed heavily at the most affluent households, with these households benefiting around ten times more from energy subsidies than the poorest households.

[15] Specifically, in the revised budget of 2013, fuel energy subsidies were Rp 184.9 billion and electricity subsidies were 89.8 billion.
[16] The largest percentage increases have been for commercial electricity use (12.6 per cent) and the lowest for residential users (4.7 per cent).

Figure 20 In Indonesia fuel subsidies, especially for gasoline, mostly go to wealthier households



Note: *Fuel subsidy received by households in each per capita consumption decile by fuel type, IDR in annual aggregate and per household per month.*
Source: *World Bank (2011b)*

Energy efficiency investment and increased disposable income can also lead to direct and indirect job creation in energy and other sectors, making energy efficiency an important part of government's green growth strategies. As noted in proposed Green Planning and Budgeting Strategy undertaken by PKPPIM, energy efficiency is essential for sustaining jobs for young people. This states that jobs *"will increasingly be for young people that are skilled in adding value to natural resources in a manner that avoids pollution and maximises efficiency, to conserve the natural resources and ensure international respect and competitiveness"*.

Through these and other mechanisms, energy efficiency can increase GDP. These mechanisms derive mainly from increased consumer spending and investment in energy efficiency, as well as from lower energy expenditure. Ryan & Campbell (2012) summarise estimates of energy efficiency benefits estimated by several Computable General Equilibrium (CGE) models. Where energy demand is reduced by 8 to 15 per cent, significant potential impacts include increases in GDP ranging from 0.8 to 1.26 per cent. Vivid Economics (2013) find that a 1 per cent increase in the level of energy efficiency causes a 0.1 percentage point increase in the growth rate of GDP per capita, for example from a growth rate of 2 per cent per annum to 2.1 per cent per annum.

7.4 Energy efficiency benefits at the international level

Energy efficiency improvements can lead to reduced fossil fuel consumption and lower emissions. Our National Action Plan for the Reduction of Green House Gases (RAN-GRK) identifies various specific energy efficiency measures that can reduce up to 27 $MtCO_2e$ of emissions per year, to be implemented in the period 2010-2020. These include

mandatory application of energy management and enhancement of household appliances efficiency. Other studies suggest that there is around 190 MT CO_2e of emissions reductions available from energy efficiency improvements, of which around 175 MT are available at zero or negative cost, as depicted in Figure 21 (DNPI, 2010). This includes:

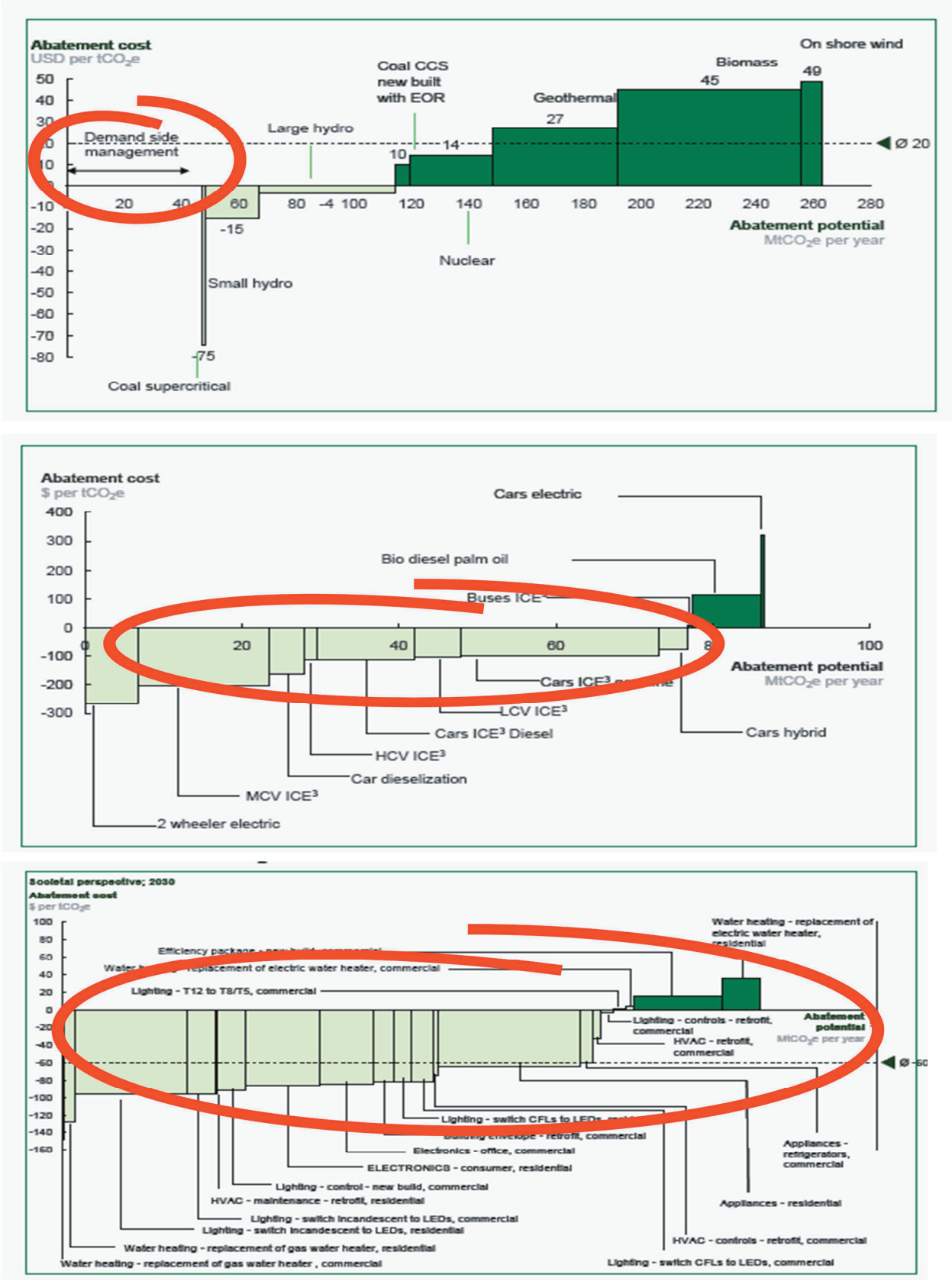
– Demand-side management potential in the power sector of 47MTCO_2e at zero cost;

– 75MTCO_2e from improved internal combustion engines in the transport sector at negative cost;

– 48MTCO_2e of opportunity in the buildings sector (of which >70% at negative cost); and

– 22MTCO_2e of negative cost energy efficiency in the petroleum sector (not shown in figure).

Figure 21 DNPI's MACC curve indicate cost effective energy efficiency abatement potential



Source: DNPI (2010)

8 Indonesia's energy use profile

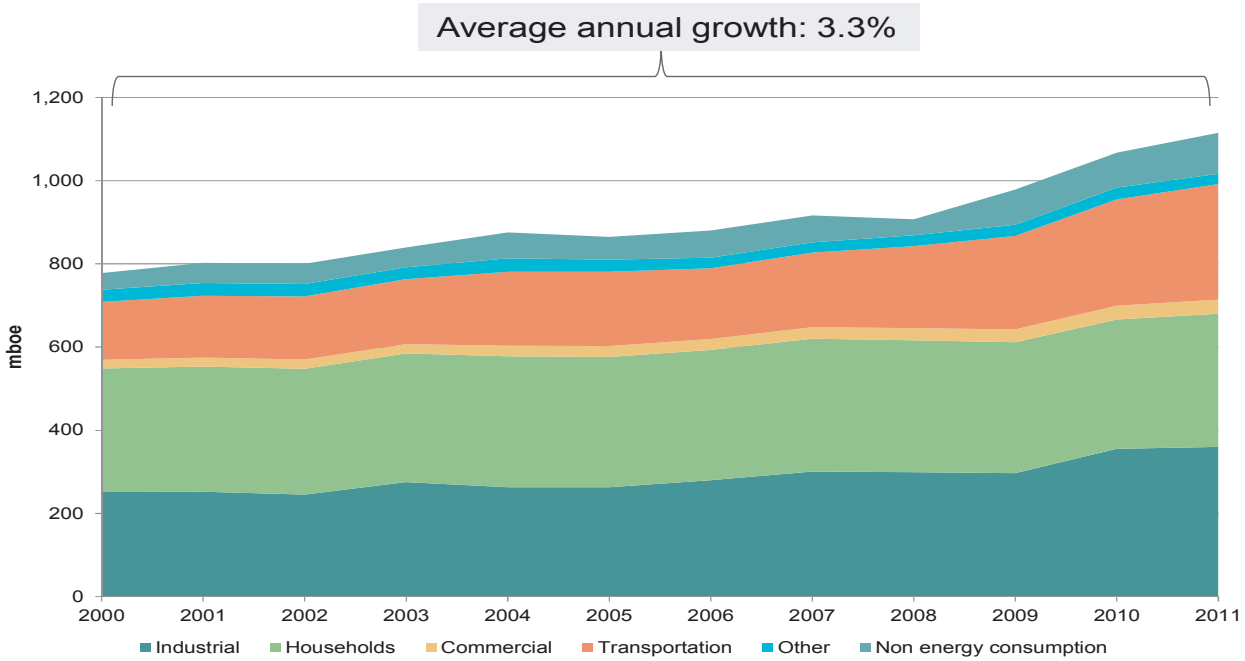
Our energy efficiency is improving but remains below many of our peers

8.1 Trends in energy use across sectors

The country's energy consumption has increased steadily between 2000 and 2011, averaging 3.3 per cent growth per annum in barrels of oil consumed. As can be seen from Figure 22, in 2011 energy use was broadly split between industrial, household and transportation use.

The commercial and transport sectors have increased their consumption the most between 2000 and 2011, as depicted in Figure 23**.** Energy demand in the transport sector roughly doubled over this period. Demand in the commercial sector[17] grew by around 60 per cent. Demand in the industrial sector experienced modest growth until 2009, when it leaped to a level more than 40 per cent higher compared to 2000. At less than 10 per cent, growth in household consumption has been much more limited. There are also notable difficulties in estimating household consumption levels due to the use of traditional biomass, mainly for cooking, which leads to large discrepancies between data sources.

Figure 22 Indonesia's energy consumption has risen steadily between 2000 & 2011

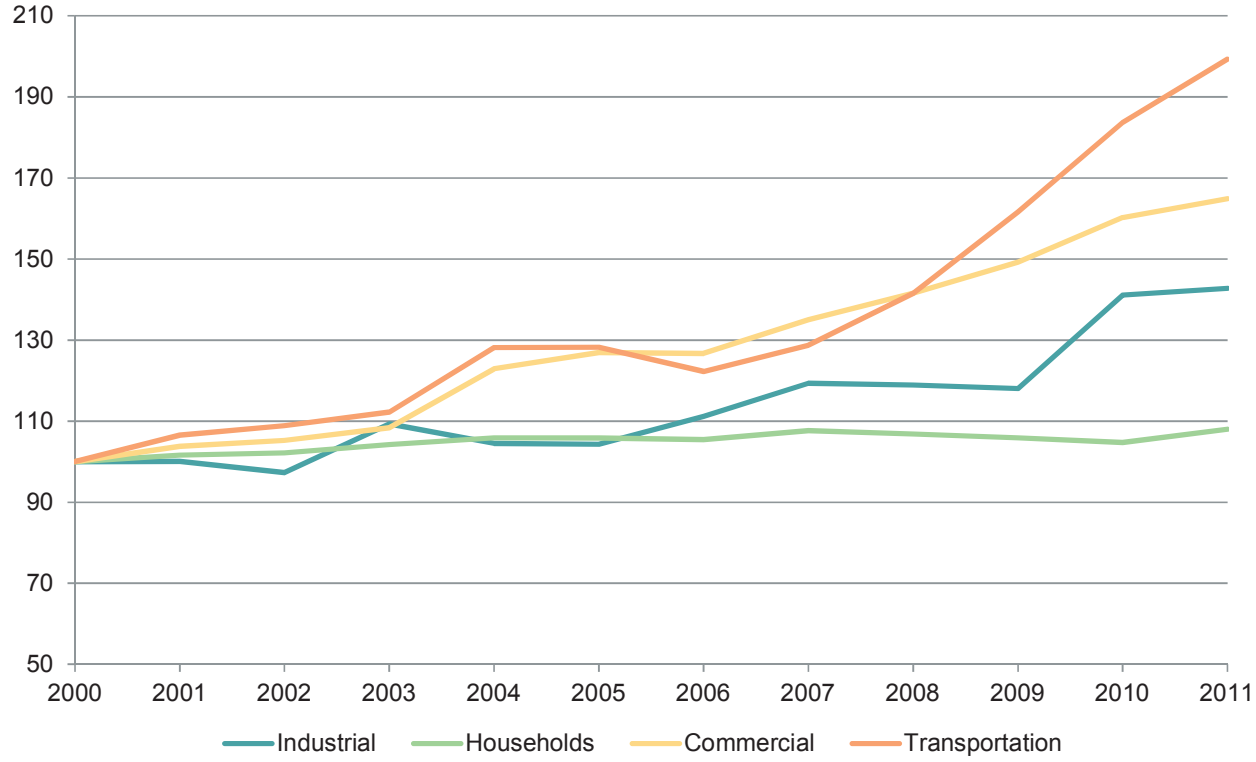


Note: *Mboe = million barrels of oil equivalent. The IEA reports slightly different energy consumption statistics, which is notably higher for household consumption. This reflects uncertainties concerning household biomass consumption.*

Source: *Ministry of Energy and Mineral Resources (2013)*

[17] The commercial sector comprises *'commercial and general business such as: commerce, hotel, restaurant, financial institution, government agency, school, hospital, etc.'*(Ministry of Energy and Mineral Resources, 2013).

Figure 23 Transport energy consumption doubled between 2000 & 2010



Note: *Household energy consumption includes energy use for cooking, lighting, and household appliances but not energy consumption for private transport, which is included in transportation.*
Source: *Ministry of Energy and Mineral Resources (2013)*

8.2 Energy demand decomposition

Four drivers can explain the country's energy consumption patterns:

- **population effect:** an increase in the number of inhabitants increases energy demand as each person requires energy to live;
- **income effect:** energy demand increases with income per person, as people with higher incomes and businesses with higher profits will consume more energy;
- **structural effect:** a move away from energy-intensive to less energy-intensive sectors, for example from manufacturing to services, may lead to a decrease in energy demand and vice versa; and
- **intensity effect:** as the energy use per unit of income, or energy intensity, declines, energy demand will decrease as less energy will be needed to produce the same amount of output.

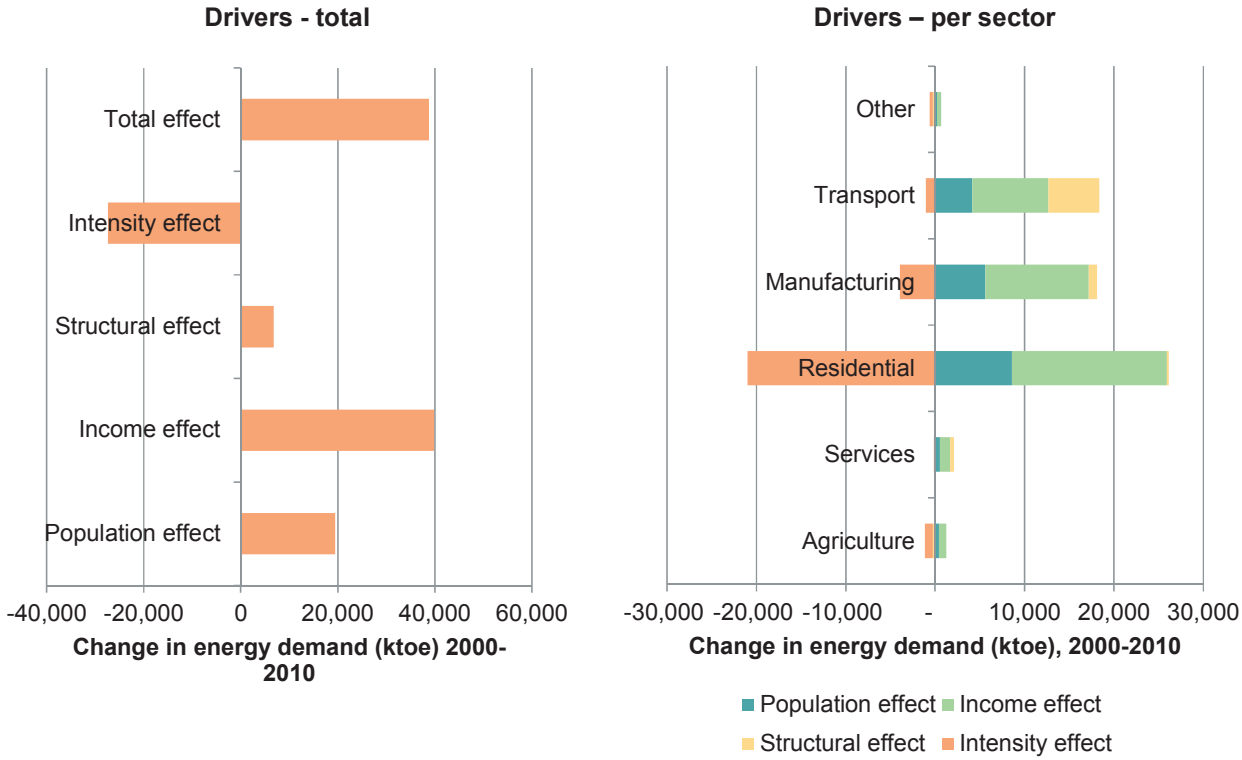
The size and sign of the four effects can be established using demand decomposition analysis which describes the relationship between the drivers and energy demand in a formal equation (see Appendix 1).

Income and population growth explain the bulk of the increase in our energy consumption. The two effects have added 40,000 and 20,000 kilo-tonnes of oil equivalent

(ktoe) respectively to total energy demand. Figure 24 shows that the increase in energy consumption due to rising incomes and population has been somewhat offset by a reduction in the energy intensity of the economy: as energy demand grew, the economy required less energy per unit of income. This is partly the result of efficiency gains.

The second panel in Figure 24 presenting the four effects for each sector, shows that improvements in energy intensity have largely been in the residential sector. By contrast, very little intensity improvements have been achieved in the manufacturing, transport and services sectors. The income and population effects are also the largest in the residential sector, yet, unlike in the transport and manufacturing sectors, these are largely offset by the intensity effect. The improvement in the energy intensity of the residential sector as shown in both Figure 23 and Figure 24 may partly reflect energy efficiency improvements but may also reflect that as household income has grown, households have chosen to spend income on goods and services that do not require much energy.

Figure 24 Energy growth has been driven by population growth and incomes; outside of the residential sector there have been modest improvements in energy intensity



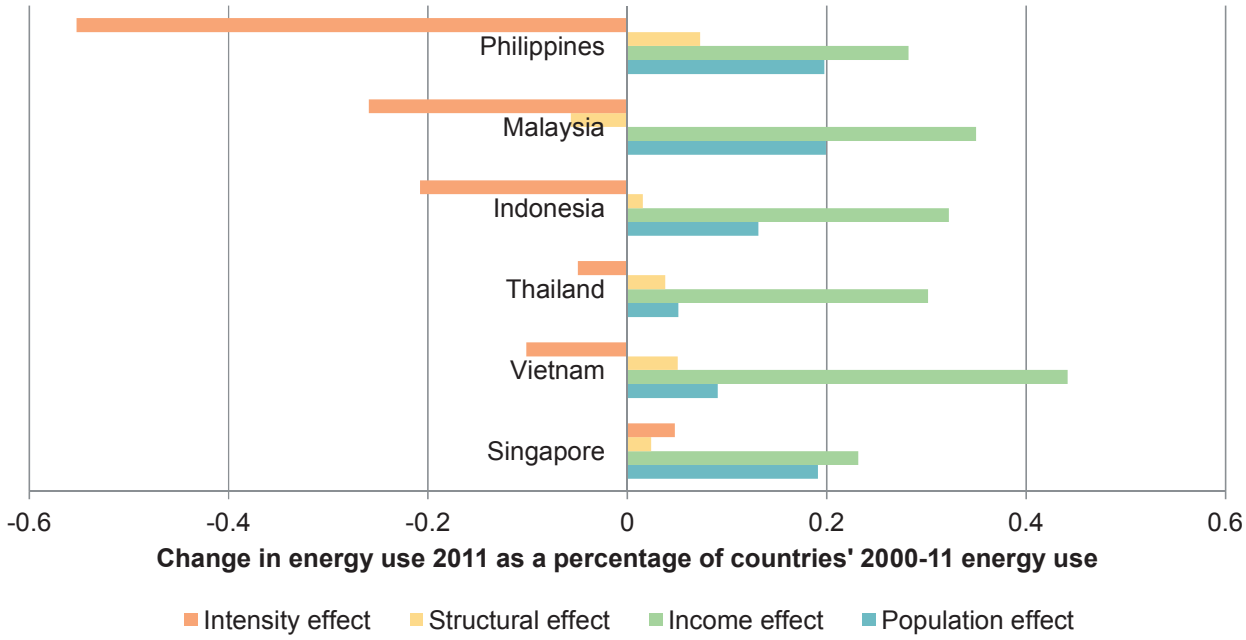
Note: *The same analysis using data from the Handbook of Energy and Economic statistics of Indonesia yields very similar conclusions. We present the analysis using IEA data to facilitate the international comparisons presented subsequently.*

Source: *Vivid Economics based on IEA data*

Indonesia is mid-ranked in terms of success in improving energy intensity to reduce energy demand growth. Figure 26 compares Indonesia's demand drivers to five peers: it shows that the Philippines and Malaysia achieved larger reductions in energy demand from improved energy intensity than Indonesia (around 55 and 25 per cent, compared to around 20 per cent in Indonesia). On the other hand, Indonesia achieved greater reductions in energy intensity over this period than Thailand, Vietnam or Singapore.

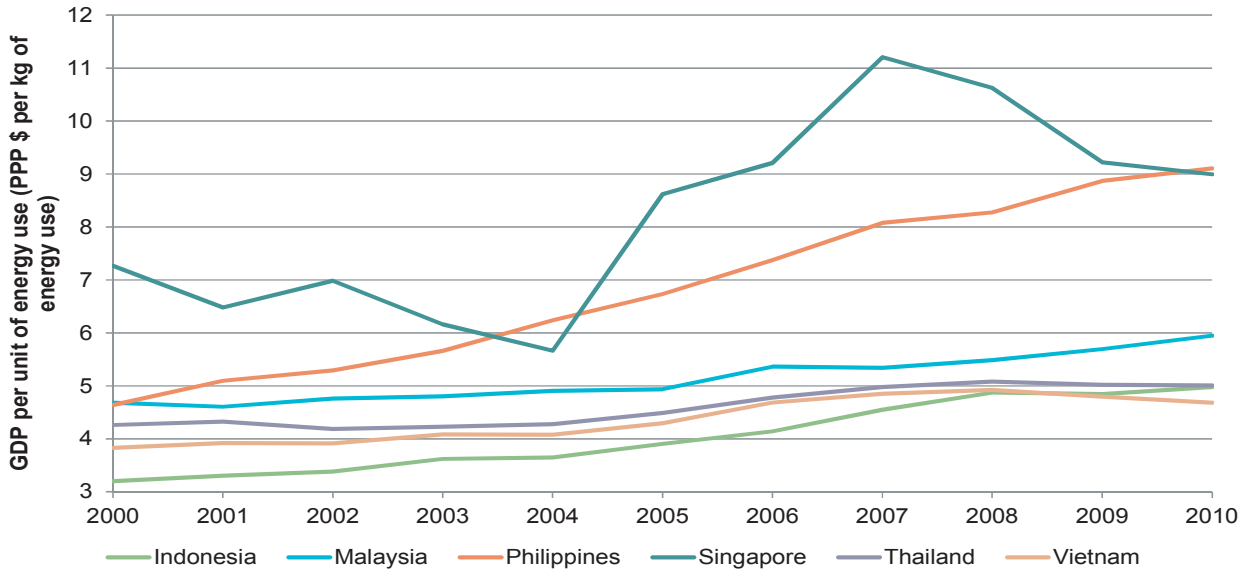
The country's improving energy efficiency performance is reflected by a two thirds increase in its GDP per unit of energy use between 2000 and 2011. However, as shown in Figure 26 at US$5 per kilogram of energy use in 2010 it was lower than in most South-east Asian countries – except Thailand and Vietnam. The strong improvements realised by the Philippines as seen in Figure 25 are also apparent in this data.

Figure 25 The reduction in energy demand from intensity improvements was far greater in the Philippines than in Indonesia



Source: Vivid Economics based on IEA data

Figure 26 Our GDP per unit of energy use has increased but remains lower than most South-east Asian countries



Source: Vivid Economics based on World Bank Development Indicators

The above analysis shows that there are clear opportunities to improve domestic energy intensity. During the period between 2000 and 2011, energy intensity improvements in Indonesia were achieved mostly in the household sector, which means there are opportunities for broader improvement, especially in manufacturing, services and transport. These results are supported by international comparisons, which shows that Indonesia's performance in the improvement of energy intensity is ranked in the middle of South-east Asia: both Malaysia and the Philippines have achieved superior improvements in energy intensity compared to Indonesia.

9 Energy Efficiency Targets and Market Potential

Indonesia has established ambitious targets to realise the substantial untapped energy efficiency potential

9.1 Energy Efficiency Potential

Various market studies demonstrate the ample opportunity for cost-effective energy efficiency investment in the country. The Climate Investment Funds (2010) estimates that the energy efficiency opportunity is worth US$ 5 billion (IDR 45 trillion) to the economy. Asian Development Bank (ADB) market assessments suggest the energy efficiency retrofit requirements to amount to US$4 billion including US$ 1.1 billion in electrical equipment, US$1.0 billion in coal-fired systems, US$ 0.9 billion in diesel-fired plants and $1 billion to finance the building retrofit requirements of shopping malls, office buildings, and hotels. These improvements may realise energy savings of 15 to 30 percent per year. Looking at opportunities in the transport, residential and manufacturing sectors, ReEx Capital Asia (2011) estimates that we have the second largest market in the South-east Asian region after Malaysia, with an investment potential of US$ 1.4 billion of which US$ 0.8 billion is in the industrial and US$ 0.6 billion in the commercial sector. It suggests typical payback periods of between one and three years.

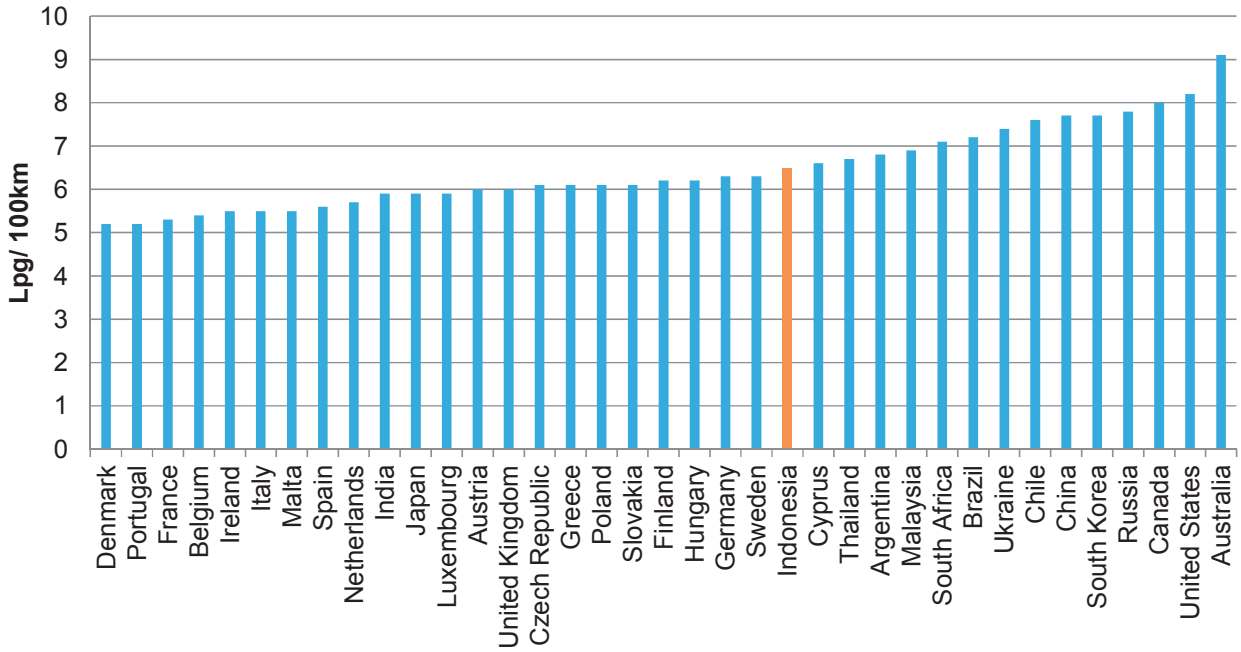
International benchmarking confirms the abundance of energy efficiency potential in the country on both the demand and the supply-side. The energy efficiency of our manufacturing sector is well below that of its peers, as can be seen from Table 10. Energy intensity is in all cases significantly higher than both global best practice and regional peers, except in cement where the country is closer to global best practice. This is further confirmed by the information in Figure 27, which shows both that the average fuel efficiency of our light duty vehicle fleet is far behind global best practice. The same challenges are evident in relation to the supply of energy: Table 10 shows that power distribution losses are higher than for many of our peers, while the energy efficiency of the our thermal power plant has shown little improvement over the last twenty years (ABB, 2013). The IEA reports that a 10 per cent improvement in the efficiency of PLN's power plants should be possible and also identifies that Pertamina's refineries are 'very old and lagging best practice efficiency' (International Energy Agency, 2008).

Table 10 Energy efficiency is well below that of many of Indonesia's peers

Variable	Indonesia's energy intensity	Typical Asian benchmark	Global best practice
Iron and steel (electric arc furnace)	650-700 kWh/t	600 kWh/t (India)	350-500 kWh/t (Japan)
Ceramics	16.6 GJ/t	12.9 GJ/t (Vietnam)	-
Tyres	8100 kcal/kg	7000 kcal/kg (Thailand)	-
Cement	800 Kcal/kg clinker	-	773 Kcal/kg clinker
Glass	12.4 GJ/t	-	10.2 GJ/t (Korea)
Textiles	9.59 GJ/t	3.2 GJ/t (India)	-

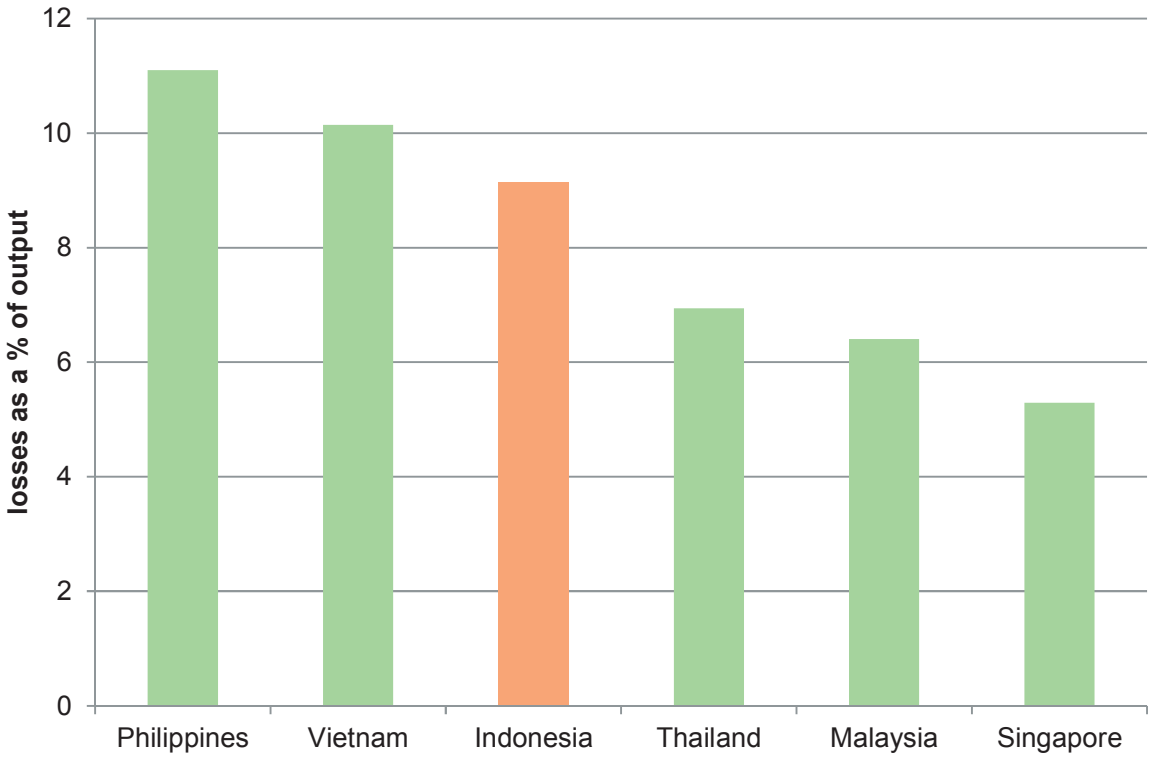
Source: (International Energy Agency, 2008)

Figure 27 At 6.5 lpg/100km, Indonesia's average fuel efficiency is far behind Denmark's 5.2 lpg/100 km



Note: LPG = litres per gasoline equivalent. Tested fuel economy figures are 2010 averages based on country of samples of new registrations of vehicles.
Source: Vivid Economics based on IEA data

Figure 28 In Indonesia, distribution losses as a percentage of power output are higher than in Thailand, Malaysia and Singapore



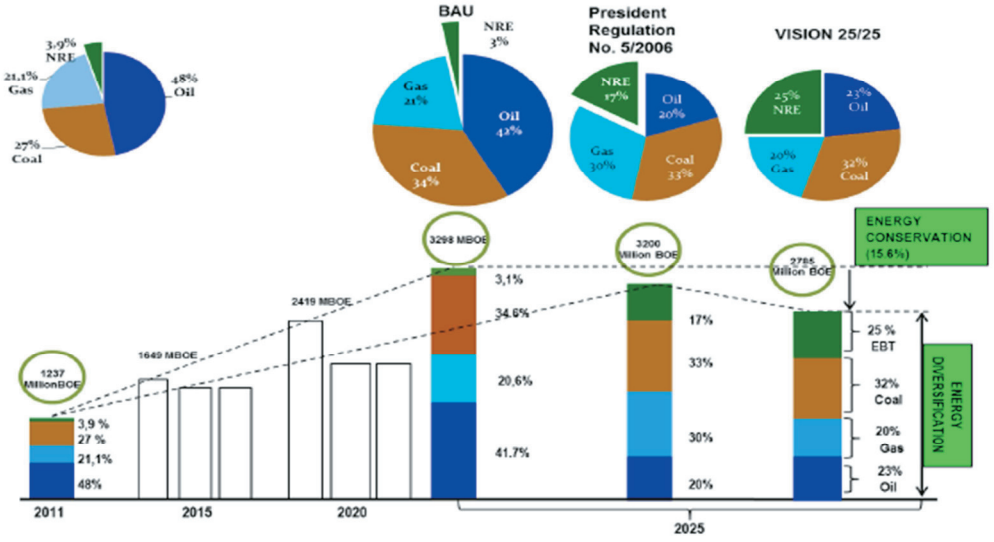
Source: Vivid Economics based on World Bank World Development Indicators

9.2 Energy Efficiency targets

Indonesia has set ambitious energy efficiency targets. These targets are established in both the MEMR's Vision 25:25 documents and the draft National Energy Conservation Master Plan (RIKEN).

Vision 25:25 establishes the ambition to reduce energy consumption by 15.6 per cent against business-as-usual by 2025. As illustrated in Figure 29 the plan envisages that energy conservation accounts for a reduction of 15.6 per cent in energy consumption compared to business-as-usual, although it should be noted that Vision 25:25 is not a legally binding document.

Figure 29 Vision 25/25 includes a target for energy efficiency to reduce energy consumption by 15.6 per cent against business-as-usual by 2025



Source: MEMR (2012)

The draft National Energy Conservation Master Plan (RIKEN) envisages a decline in energy intensity of 1 per cent per annum. The RIKEN aims to provide a reference point for stakeholders across all sectors implementing energy conservation measures nationwide. It sets a target to reduce intensity of energy by 1 per cent per annum, with energy intensity measured as the amount of energy required to produce one unit of GDP. Analysis in the RIKEN suggests that this would require reduction in energy consumption of around 19.6 per cent compared to business-as-usual in 2025. To put this in historical perspective, in the period 2000-2009 energy intensity fell by more than 1 per cent each year, in both primary and final energy consumption. In 2010-2011 however, the reduction in energy intensity was closer to 0.9 per cent on both measures. The plan anticipates that more than half of the energy savings achieved by 2025 will be in the industrial sector. However, the most ambitious reductions relative to business-as-usual have to be made in the household and commercial sectors with both sectors having to reduce consumption to around 24 per cent below business-as-usual, compared to an overall average of just below 20 per cent.

To support the implementation of the draft RIKEN, it is envisaged that eight strategies will be developed. These strategies are to:

- prepare regulations for implementation of Energy Conservation (as discussed further in section 5 below);
- raise awareness of energy users;
- improve personnel capacity and technological mastery;
- improve the efficiency of energy supply;
- improve the efficiency of energy business;

– improve the efficiency of energy uses;

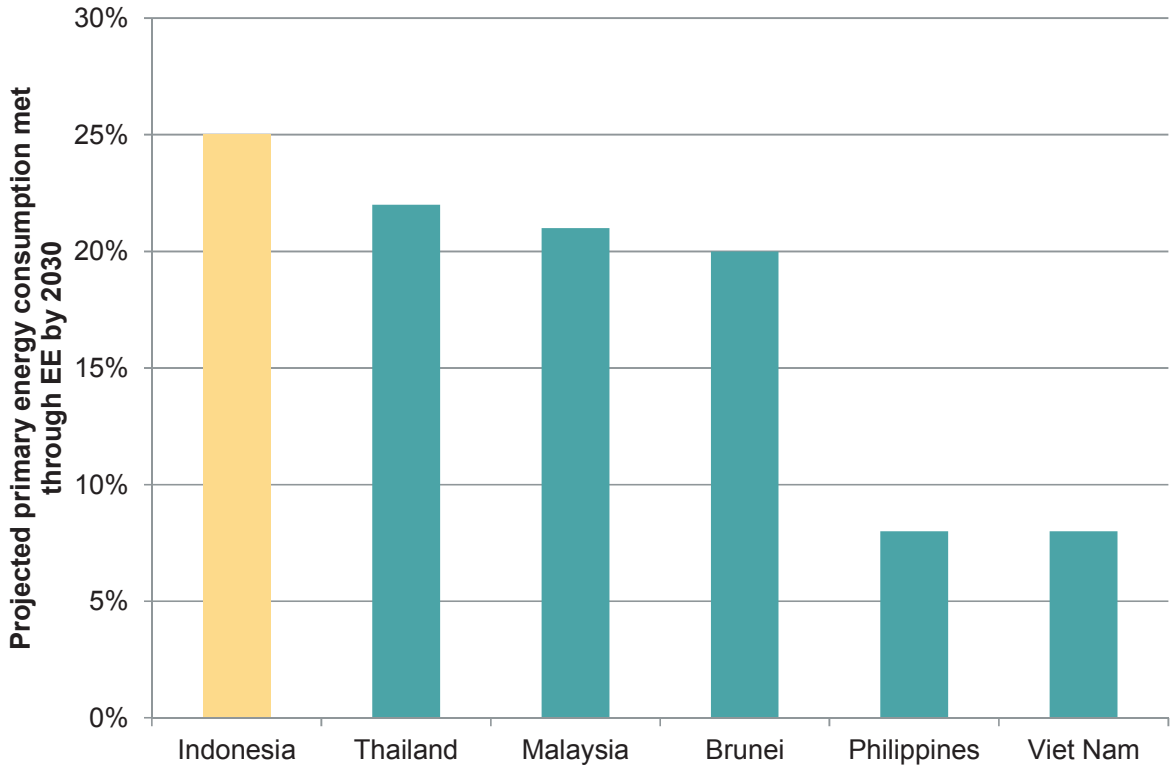
– encourage private investment in Energy Conservation; and

– apply monitoring, evaluation and supervision systems.

Roadmaps in support of these strategies are or will be developed to cover: inter-sectoral activities; energy supply (producers of fossil oil, natural gas and coal); energy businesses (PT PLN and Pertamina); energy users (industry, households, commercial, transport and other uses).

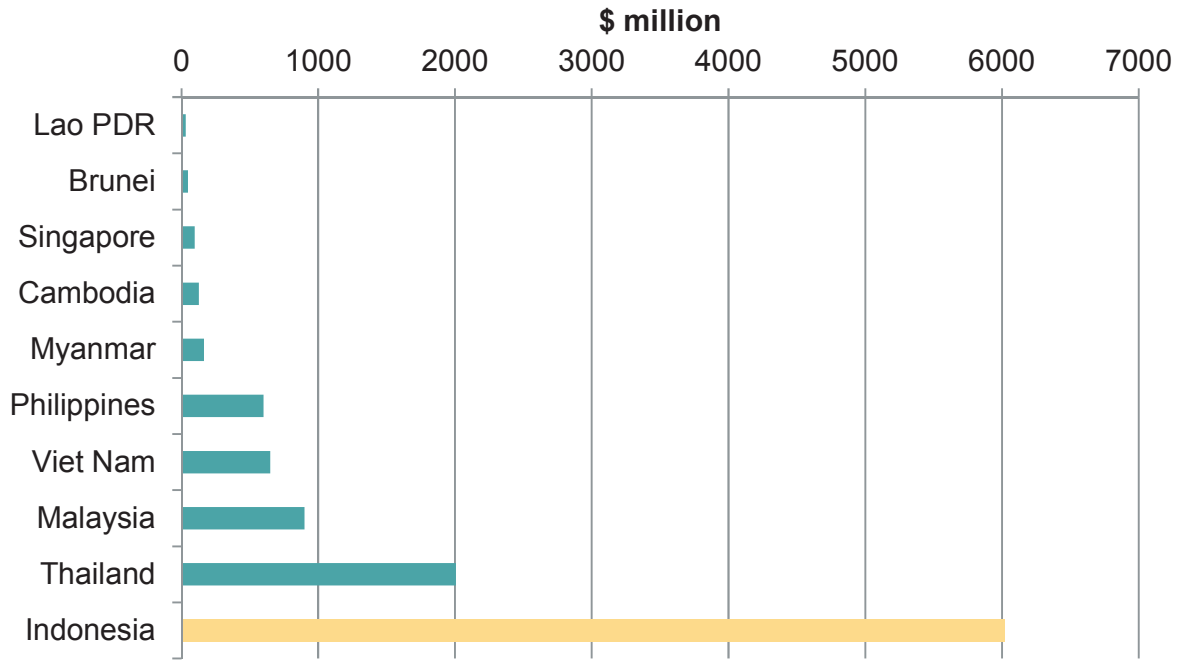
The Asian Development Bank (ADB) estimates that our energy efficiency targets are the most ambitious in the region. Figure 30 shows ADB expects that almost 25 per cent of primary energy consumption needs in 2030 will be met by energy efficiency improvements. According to the study, Indonesia's peers are expected to deliver smaller energy efficiency improvements over the same period. Consistent with this projection, as shown in Figure 31, Indonesia's energy efficiency targets will be the most costly in the region at US$ 6bn, compared to US$ 2bn for Thailand, around US$ 1bn for Malaysia and US$ 600m for the Philippines and Viet Nam (Asian Development Bank, 2013).

Figure 30 The ADB estimates that almost 25 per cent of Indonesia's primary energy consumption needs in 2030 will have been delivered by energy efficiency improvements



Source: Asian Development Bank (2013)

Figure 31 The energy efficiency investment required to meet our targets are more than twice that of our regional peers



Source: Asian Development Bank(2013)

The National Plan for Reducing Greenhouse Gas Emissions (RAN-GRK) also envisages an important role for energy efficiency in reducing emissions. It identifies a number of different actions that can reduce emissions by almost 27 $MtCO_2e$ per annum by 2020 (more than two thirds of total energy and transport sector emission reductions under an overall 26 per cent reduction target compared to business as usual):

- mandatory application of energy management (10.16$MtCO_2e$);
- implementation of energy conservation partnership programme (2.11$MtCO_2e$);
- enhancement of household appliances efficiency (9.75$MtCO_2e$); and
- energy conservation and audit (4.81$MtCO_2e$).

10 Current Energy Efficiency Policy Framework

Existing policy provides some support to promote energy efficiency

This section provides an overview of key policies to support energy efficiency across five sectors. The sectors are industry, buildings, appliances, transport, the public sector and the energy supply sector. An overview of support from development partners is provided in Appendix 3.

10.1 Industry

Most existing energy efficiency policies target the industry and buildings sectors, with Government Regulation No. 70/2009 on Energy Conservation and supporting regulations at the centre. This regulation and the implementation arrangements provided in MEMR Regulation No. 14/2012 require companies with energy consumption above 6,000 tonnes of oil equivalent (ToE) to:

- appoint energy managers and design energy conservation programmes;
- conduct regular, three-yearly audits that must be performed by a certified auditor (either internal or external), to be reported to local government and MEMR with companies that manage to reduce energy consumption by at least 2 per cent per annum for three years getting free energy audits and priority access to energy supply;
- implement the recommendations of the audit process according to cost effectiveness;
- implement recommendations that require no or low cost within one year;
- implement recommendations that require medium to large investment, and that satisfy technical and economical investment viability within 5 years; and
- report on the energy conservation implementation.

The regulations envisage that the requirements of 70/2009 will be supported by a combination of incentives and penalties. These include the following:

- to encourage take up of measures, the regulation envisages that there will be tax breaks available to those who take up measures, as well as low interest rate loans. However, there are currently no tax breaks or measures in place. In addition, the vehicle for providing low interest rate loans will be a dedicated energy efficiency revolving fund – despite progress in its establishment this fund is not yet operational with commencement from 2015 envisaged. The currently envisaged allocation to the fund is IDR 500 billion for 2015, with the National Investment Agency (PIP) providing credit lines to banks at low interest rates (around 2 per cent), which can then be lent to those investing in energy efficiency. Specific guidelines for this programme are currently under preparation; and

– it is intended that companies that do not implement conservation programmes will eventually receive sanctions in the form of warnings, negative publicity, fines and a reduction of energy supply.

The requirements of 70/2009 build on experiences from a range of energy audit schemes. Full details of these are provided in Appendix 2.

There are also regulations that seek to encourage energy efficiency among companies who consume less than 6,000 toe. Under MEMR Regulation 12/2012 companies are expected to implement energy efficiency programmes if it can be shown that this is in their own interest.

10.2 Buildings

Various voluntary standards exist in relation to the energy performance of commercial buildings. These include:

– SNI 6196-2011: Energy Audit Procedures in Buildings including office buildings, hotels, stores/shopping centres, hospitals, apartments, houses, schools, airports and ports. It sets out the procedures that can be used by implementers, supervisors and building managers in implementing energy conservation in buildings;

– SNI 6389-2011: Energy Conservation in Building Envelope, which clarified that overall thermal transfer value (OTTV) should be less than or equal to 35 Watt/m^2 (decreased from 45 Watt/m^2 in previous standard);

– SNI 6197-2011: Energy Conservation of Lighting System in Building, which contains guidelines on how to light buildings to improve energy efficiency without impact on the ambient environment; and

– SNI 6390-2011: Energy Conservation of Air Condition System in Building, which provides guidelines on efficiency of electric unitary air system equipment or package units.

These standards are currently optional, used to identify best practice in building construction and refurbishment.

There is a specific green building programme in Jakarta, launched in April 2013. The Jakarta Green Building Programme was initiated by the Governor of Jakarta through Governor Regulation 38/2012. It requires that new and renovated large commercial buildings meet various green building standards relating to energy consumption, water consumption and land use. If these standards are not met, new buildings will not be issued with a building permit and renovated buildings will not receive a 'certificates worth' function (SLF).

10.3 Appliances

We have introduced energy efficiency labelling for some appliances. The scheme has been introduced to give consumers more information on the energy efficiency levels of electric home appliances. Ministerial Regulation No. 06/2011 regarding Applying Energy Saving Label for Self-Ballasted Lamp is an application of the scheme to CFLs and is now

effective in the market. There are plans to include refrigerators and air conditioners soon, with other products to follow.

MEMR intends to introduce minimum energy performance standards, starting with air conditioning units in 2014. There are voluntary SNI energy performance standards in relation to CFLs, refrigerators and air-conditioning units. Drafts are in place for fans, rice cookers, electronic ballasts and pumps. Work continues on laboratories for research on appliances, specifically air conditioners.

The feasibility of other initiatives is being investigated. For example, a field study on rebates to reduce the prices paid for energy efficient appliances is being carried out at the time of writing.

10.4 Transport

Measures to increase energy efficiency in the transportation sector are more limited. There are very few regulations that directly influence the energy efficiency of vehicles. Government Regulation PP 41/2013 gives a full import duty tax break for 'low-cost green cars', of less than 1500cc with a fuel consumption of at least 20 kilometres per litre of fuel. However, hybrid, CNG and LPG fuelled cars pay a 75 per cent 'luxury goods' tax. Finally, there is an eco-driving initiative, implemented by the Ministries of Transportation and of Environment, aiming to improve fuel consumption.

10.5 Public sector

10.5.1 Presidential Instruction No. 13/2011

Presidential Instruction No. 13/2011 regarding Saving Energy and Water helps promote energy efficiency in the public sector. This is implemented by MEMR Regulation No. 13/2012. These aim to promote energy and water efficiency in government institutions by a goal to achieve 20 per cent electricity savings, 10 per cent water savings and 10 per cent gasoline savings by government buildings, state-owned buildings, official residences as well as street-lighting, decorative lighting and billboards. This is measured relative to consumption six months prior to issuance of the Presidential Instruction. It also provides for the establishment of a taskforce to encourage energy efficiency and a National Team on Energy that reports to the President. These have now been established.

Implementation of the targets began in July 2012. In the first quarter 71 out of 76 agencies managed to reduce their electricity by an average of 8.1 per cent, saving IDR 3.7 billion. In the second quarter the number of agencies making savings fell to 37, on average reducing their electricity consumption by 13 per cent with cost savings of IDR 1.4 billion. In the period July to December, consumption of subsidised fuel fell by 830 kilolitres, although field monitoring shows continued misuse of subsidised fuel by government vehicles. It remains unclear however what incentives or sanctions and timeframes are in place.

10.5.2 Green building concepts

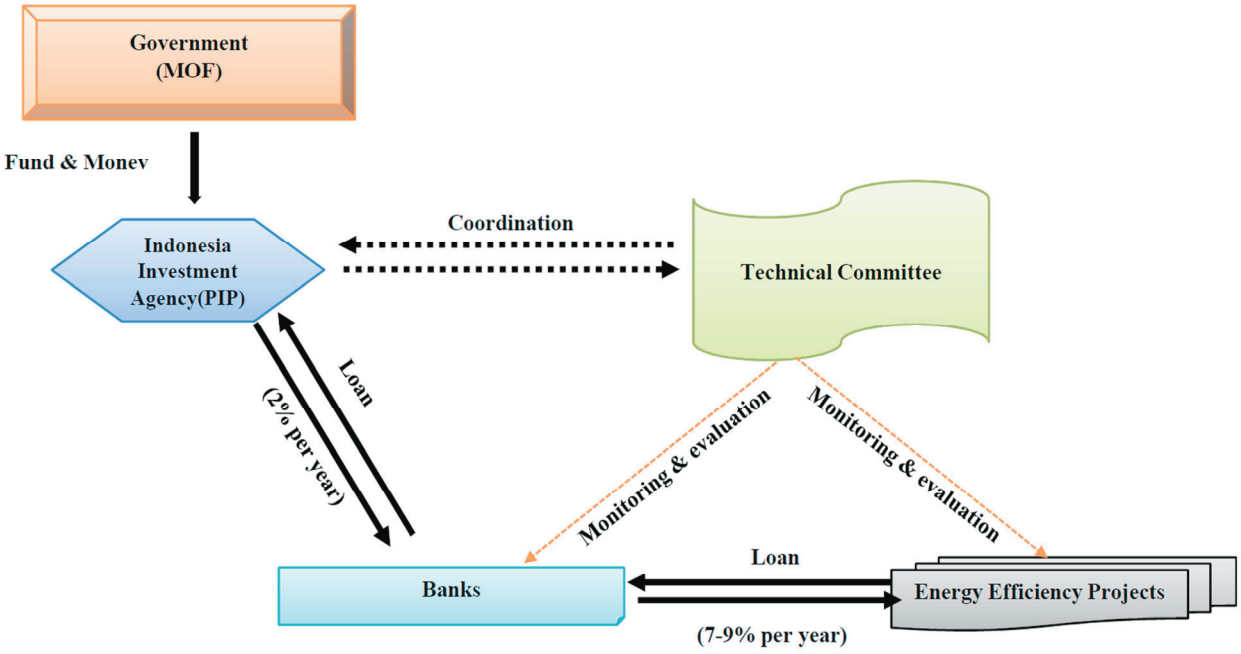
The Ministry of Public Works (MPW) has developed green building concepts which can be applied to public buildings. Law 28/2002 on buildings provides for the government to issue regulations regarding the safety, health, comfort and convenience of buildings. To

support this, the MPW has been creating and implementing green building concepts for new public buildings. Applied to its own building, it achieved reduction of energy consumption by as much as 38 per cent, and to achieve water savings of between 63 and 81 per cent in the dry and wet season respectively. The building was certified by the Green Building Council of Indonesia.

10.5.3 Lending for energy efficiency may be supported by government-owned institutions

We intend to launch the Energy Efficiency Revolving Fund (EERF). The fund would provide capital for financial institutions to on-lend to energy efficiency projects. The likely structure of the facility is depicted in Figure 32. The Ministry of Finance will provide funds to PIP, which will disburse loans to banks at an interest rate of two per cent per annum. Commercial banks will then lend this money on to energy efficiency projects at a rate of seven to nine per cent per annum for five to seven years, with the interest rate spread covering the administrative costs and credit risks of the participating banks. Loan sizes are likely to range from IDR 1 billion to IDR 10 billion and either firms regulated under 70/2009 or energy efficiency appliance manufacturers or ESCOs are expected to be eligible. A separate Technical Committee coordinates with PIP and oversees banks and energy efficiency projects through a monitoring and evaluation framework. At present, the budget estimate for 2015 is IDR 500 billion. Development partners, including the Asian Development Bank, are also supporting energy efficiency financing, as discussed further in the Appendix.

Figure 32 The energy efficiency revolving fund will provide concessional capital to banks to lend this on to energy efficiency projects



Notes: *Ongoing discussions suggest that there may be a Steering Committee that guides the work of the technical committee or a Steering Committee within a technical secretariat*

Source: *Fiscal Policy Agency (BKF) (2013)*

10.6 Energy supply sector

There are no formal policies or regulations to promote supply-side energy efficiency in Indonesia. However, a number of voluntary initiatives have been introduced by both PT-PLN and Pertamina to support greater energy efficiency.

PT PLN has undertaken a number of initiatives to improve the efficiency of its power generation and supply. These include generation technology improvements in its coal plants such as coal switching boiler modification, re-heater modifications, the rehabilitation of dynamic classifiers and greater coal drying. The use of larger units has also aided efficiency while operational improvements such as fuel substitution from oil to gas, facilitated by greater use of gas storage technology, has also been important.

Pertamina has also sought to improve the efficiency of its refineries. The Operational Performance Improvement (OPI) initiative sought to improve operational practices within the organisation including the establishment of corruption-free and customer-focused mind-set and behaviour, leadership in new working environment and stakeholder management. The program is credited with improving refinery productivity and saving billions of rupiahs.

11 Proposed Reforms for a Coherent Energy Efficiency Policy Framework

A range of fiscal and non-fiscal incentives and policies can further support energy efficiency in Indonesia

11.1 International best practice

There are various barriers to the implementation of energy efficiency measures that apply to all sectors (International Energy Agency, 2011)**.**

- *High initial capital costs.* Energy efficiency measures may require a significant investment of capital, which it may be difficult to acquire;
- *Principal-agent problems.* Particularly related to buildings, where a tenant often pays energy bills but the landlord is in charge of changes to the building. In these cases, the landlord does not have an incentive to improve energy efficiency;
- *A lack of awareness of energy efficient products.* Investors often are not aware of the existence of energy efficient products and the savings they can achieve by adopting them;
- *Risk exposure.* In some cases investors may be exposed to the risk of performance of energy efficiency measures, which may increase financing costs;
- *Discount rate issues.* Some energy efficiency measures may require long payback periods which, although desirable from a societal perspective, may not be attractive to individuals; and
- *Difficulty of quantifying external benefits.* Some of the benefits from implementing energy efficiency measures – such as improvements in the ambient environment or reduction in CO_2 emissions – do not flow to those who undertake the measures but to society as a whole.

Best practice demands both ambitious targets and a broad suite of policy measures. First, it is essential to set broadly-accepted, ambitious but achievable national energy efficiency targets. Indonesia already has these in place. With these in place, the combination of financial, behavioural and economics barriers to energy efficiency measures demand concerted efforts using a suite of fiscal, regulatory and financial measures(International Energy Agency, 2011).

11.2 Challenges in Indonesia

There are three groups of challenges holding back implementation of energy efficiency measures which need to be tackled in order to realise our country's potential. These groups of challenges are:

- limited regulatory and incentive policy;

– challenges associated with financing energy efficiency improvements; and

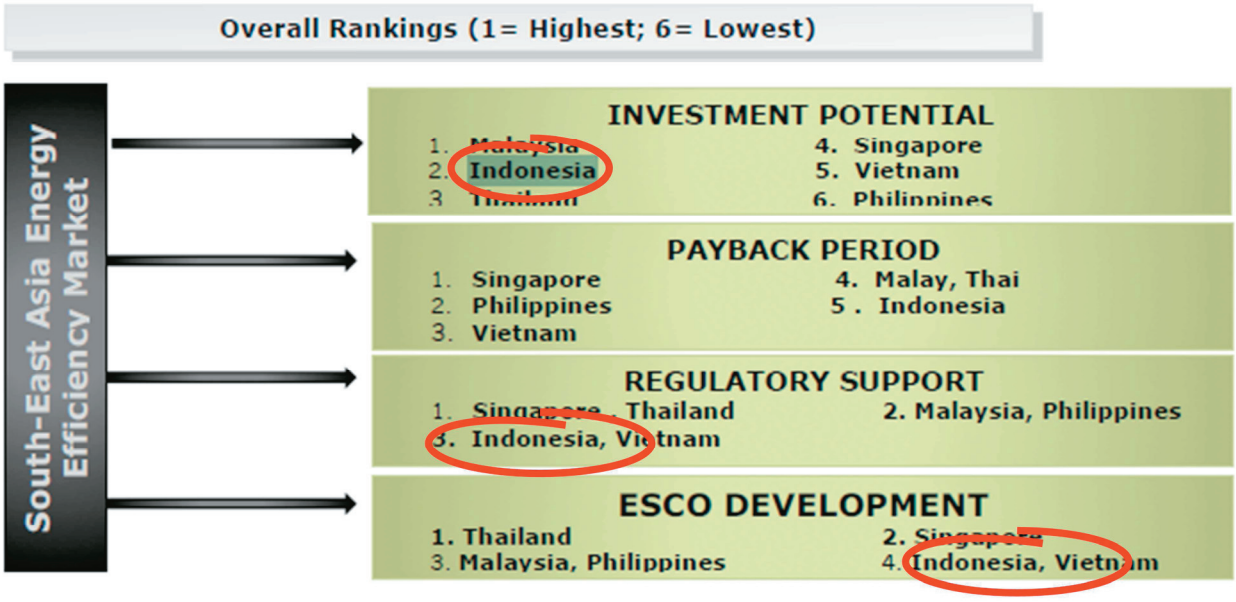
– capacity challenges among key stakeholders.

The groups overlap to some extent. Specifically, the first and third challenges exacerbate the second challenge.

11.2.1 Regulatory and policy barriers

Previous market analysis broadly confirms that regulatory challenges are bigger for Indonesia than most of our regional peers. The analysis is summarised in Figure 33 which suggests that Indonesia has the second greatest energy efficiency market in South-east Asia. However, realisation of this potential is impeded by a regulatory environment which is judged to be the joint worst in the region. This, in turn, contributes to ESCO development being the least mature in the region.

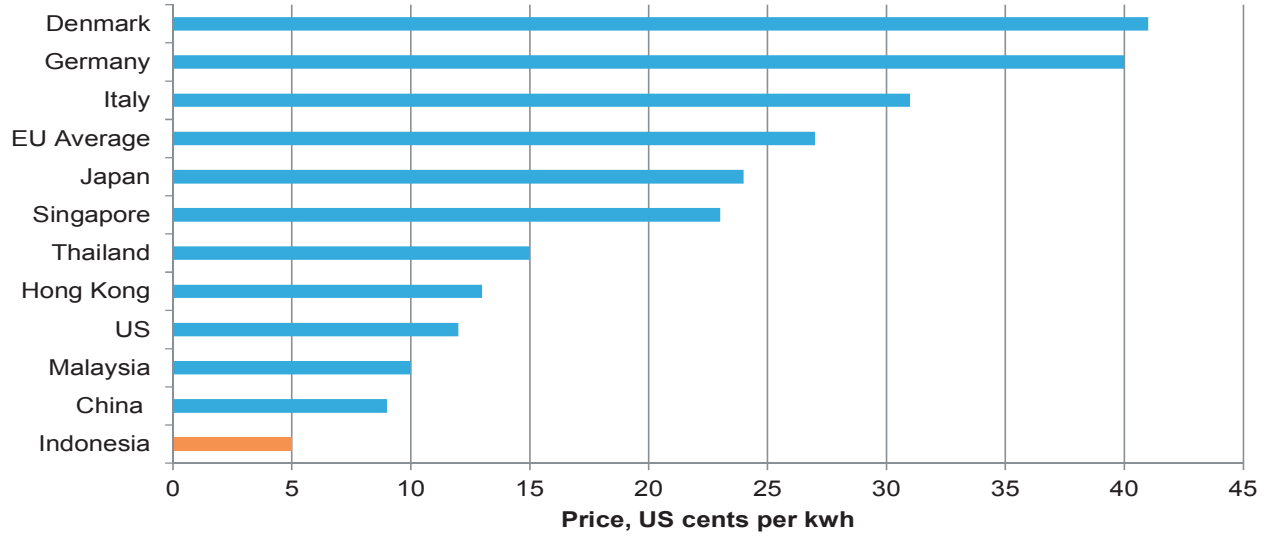
Figure 33 Market analysis suggests Indonesia's regulatory support for energy efficiency is weak



Source: ReEx Capital Asia(2011)

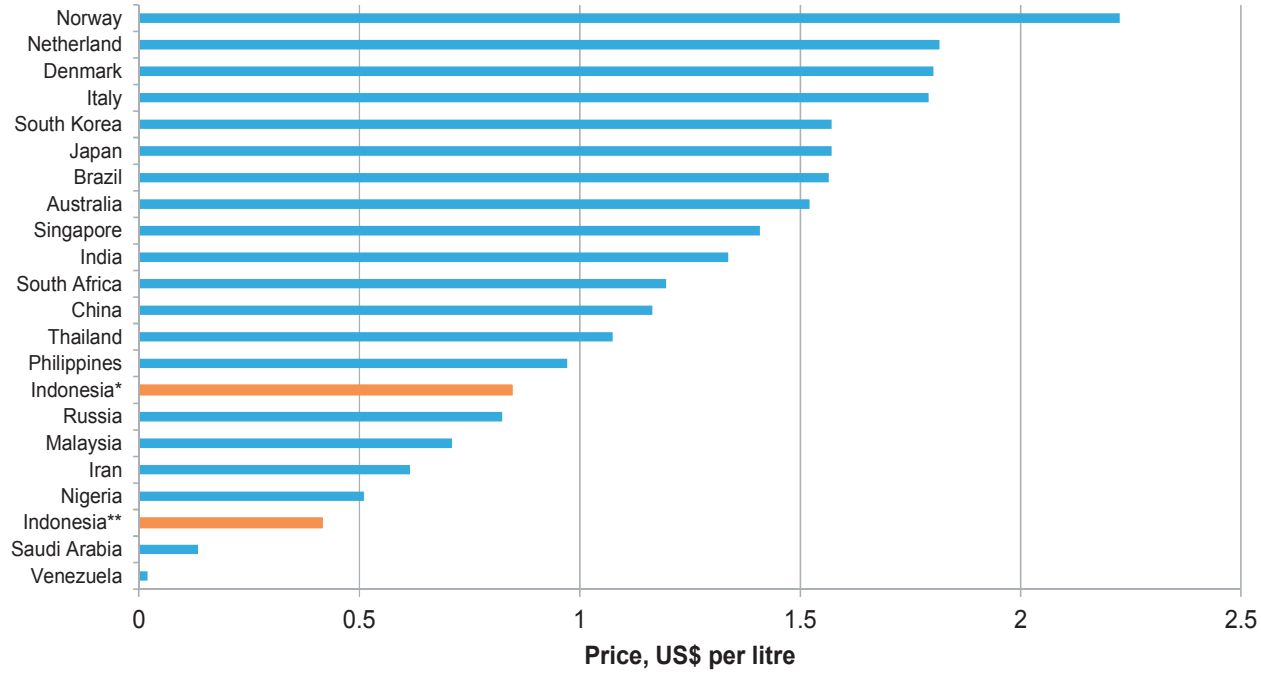
Energy subsidies are a critical policy barrier to increased energy efficiency in the country. We have among the lowest retail electricity tariffs in the region, as shown in Figure 34, and among the lowest retail fuel prices in the world, as shown in Figure 35. Subsidised prices mean that there is less incentive to reduce consumption.

Figure 34 Indonesia's average electricity prices are just half the level of its neighbour Malaysia and less than a quarter of Singapore's



Note: *Prices are average residential tariffs for 2013 converted to US$ at market exchange rates.*
Source: *Vivid Economics based on IEA and Meralco (2013)data*

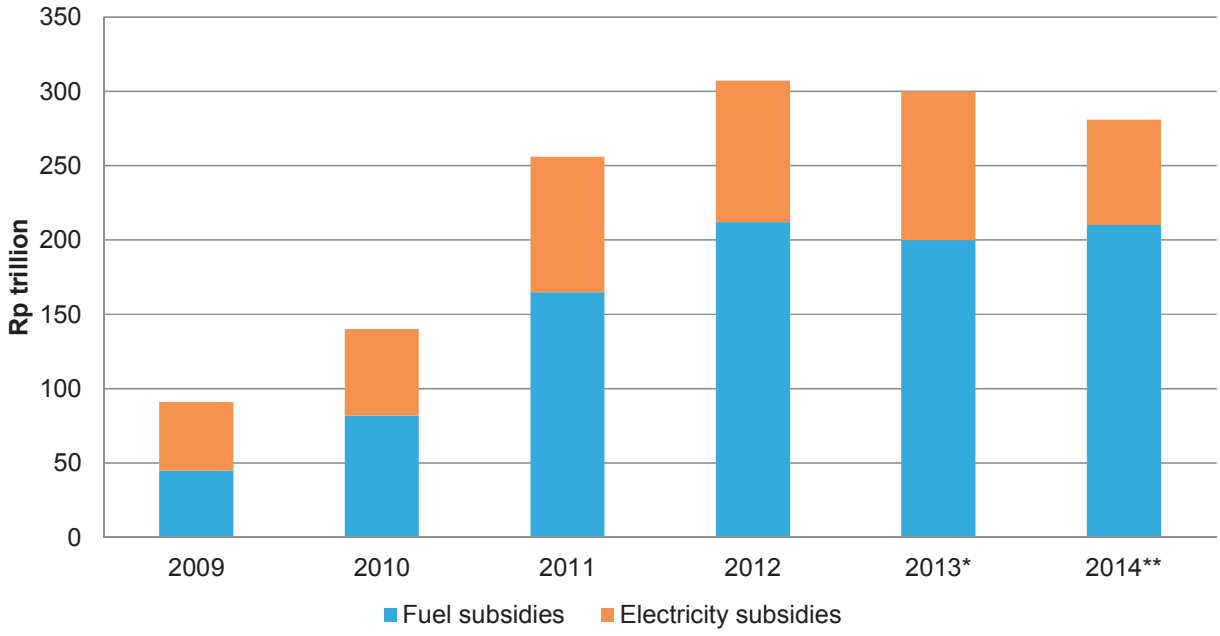
Figure 35 Countries with lower end-user unleaded petrol prices than Indonesia tend to be net oil exporters



Note: *Data for 2012.*High grade Pertamax fuel; **Low grade Premium fuel, consumed by majority of Indonesians. Comparisons based on premium unleaded petrol (95 RON) in each country except where indicated and converted to US$ at market exchange rates. Price comparison relates to 2012 prices so does not account for recent changes in prices and/or subsidy levels. The 2013 rate increase raised low grade petrol prices to IDR 6,500 per litre (US$ 0.66 at the time).*
Source: *Vivid Economics based on Randall (2012) and International Institute for Sustainable Development (2012)*

Some efforts have been made to reduce subsidies but, as a percentage of GDP, and without further major reform, they are expected to remain above 2010 levels. Recent changes have reduced energy subsidies with mid-2013 energy price rises for gasoline and diesel of 44 and 22 per cent respectively. Electricity tariffs have risen by 15 per cent in 2013, based on quarterly increases, for all but consumers with the lowest level of consumption. Nonetheless, although energy subsidies are projected to decrease to around 2.8 per cent of GDP by 2018, they will still remain above their 2010 levels unless major reforms are introduced.

Figure 36 Growing fuel subsidies are driving the sharp rise in energy subsidies, which are expected to remain close to their 2012 peak of IDR 312 trillion (around US$27 billion)



Note: ** Estimate, ** Projection.*
Source: *Vivid Economics based on Indonesia Ministry of Finance (2014) data*

Apart from the perverse effect of energy subsidies, there are various important omissions from the current regulatory support framework. The range of issues indicated by stakeholders includes:

– A lack of tax support for energy saving capital equipment. This includes incentives related to income tax, sales tax, import tax and accelerated depreciation. As APEC (2012) recommends, '*In the short-term plan, the MEMR must consider the endorsement of imported Energy Saving Capital Equipment or pioneering energy efficient technologies and products for use by the Industry through the Ministry of Finance through tax incentives'.* Pioneer tax incentives that are available in other sectors do not apply to manufacturers of energy efficiency equipment at present;

– A lack of incentives and policy to support penetration of domestic energy efficient appliances. Tax breaks, other incentive policy in relation to products defined as energy efficient, and demand-side management policies by PLN are lacking;

– There are few incentives or regulations to support energy efficient transport in place. There is a lack of codification of regulations relating to energy efficiency of buildings – and no application to residential buildings; and

– No formal regulatory incentives for PT-PLN or Pertamina to improve the efficiency with which it supplies power and fuel to final energy users.

11.2.2 Difficulties accessing capital

A lack of access to capital represents a key barrier to undertaking energy efficiency investments in Indonesia. Climate Investment Funds (2010) notes that *'[small and medium sized enterprises] have difficulties accessing finance for EE and RE investments; commercial banks have limited financing tools, knowledge, and understanding of such opportunities, and tend to impose excessive collateral requirements when financing is made available'*. Anecdotal evidence from stakeholder discussions suggests collateral requirements are typically in the region of 100-125 per cent of the loan value. This is a common problem across the world and reflects various market and institutional failures in lending markets. These make it difficult for banks to appraise energy efficiency projects on their merits, leading to a preference to reject the business area in its entirety. A further challenge for energy efficiency financing specifically is caused by our banking regulations. Under the current Bank of Indonesia regulations, banks are required to make provisions for the possibility of non-performing loans according to an assessment of the risk of the loan, using a five point scale, with higher provisions required for more risky loans. These provisions can be reduced by the collateral provided to the Bank for the loan but energy savings are not included in any possible reduction in provision requirement.

11.2.3 Capacity challenges

There are various problems in monitoring energy use and identifying energy efficiency opportunities. These include:

– there are very few organisations which have the required expertise to offer energy efficiency advice across a wide range of different energy efficiency options. This increases transaction costs of getting a comprehensive audit;

– other government departments are still in the process of training assessors who will be certified to assess the quality of energy managers as required under Regulation No. 70/2009. In 2012, a government institute for the certification of energy conservation experts (LSP-HAKE) certified 50 energy managers. In 2013, 20 energy managers, 20 energy auditors and 20 assessors have been certified;

– there is a lack of awareness among companies and households about energy efficiency opportunities using proven technologies. Companies tend to underestimate the savings that are available;

– banks lack the capacity to appraise energy efficiency opportunities;

– there are shortages of capacity in laboratories that can undertake the necessary testing to identify and rank energy efficiency appliances; and

– the Energy Service Company (ESCO) market is immature and suffers from poor quality providers.

11.3 Proposed policy reforms

19 policy reforms can help overcome some of these deficiencies. The reforms aim to provide a comprehensive set of energy efficiency policies, covering all major energy uses, taking into account:

– the existing institutional framework in Indonesia;

– common barriers and challenges associated with improving energy efficiency; and

– emerging and established best practice in energy efficiency policy in overcoming these barriers.

They are also informed by principles of efficient policy design, recognising that a key finding from the energy efficiency literature is that fiscal incentives and price signals often need to be combined with regulatory measures and approaches that increase consumer awareness. Table 11 summarises the proposals including providing information on whether they are fiscal policy, what the relevant time frame is, the key government departments associated with the reform, and what the priority of the reforms is for the MoF. Indicative priorities of the reforms are established by applying three criteria, which are weighted equally in the final prioritisation (low, medium or high):

– MoF control. Reforms receive a higher priority if the MoF can exert direct and decisive control over the policy reform;

– Effectiveness. Reforms that have a large positive impact on implementation of energy efficiency measures are of a higher priority; and

– Public resource requirement. Given our focus on fiscal consolidation, policy reforms that exhibit relatively lower short term requirement on the public purse are of a higher priority.

Assessing the reform options, it appears that we must prioritise energy subsidy removal, acceleration of the implementation of the EE revolving fund, establishing fiscal incentives for industry and buildings, and introducing a demand-side management programme managed by PLN. These priorities reflect that the MoF is a key decision maker in these areas, with a strong capacity for leading these cost-effective reforms that have the potential to significantly improve our energy efficiency. Other reforms, while remaining important, are lower priorities, often as they are mainly the terrain of other government bodies or require relatively substantial public outlays.

Table 11 19 key recommendations for energy efficiency policy in Indonesia

Energy efficiency sector	Recommendation	Issue	Fiscal?	Term	Key departments	MoF priority
Generic	Adopt a phased removal of energy subsidies	Current energy subsidies reduce incentive for energy-users to reduce energy use	Yes	Medium-term	MoF	High
	Accelerate the establishment of the energy efficiency revolving fund	Access to capital is a significant barrier to undertaking energy efficiency improvements	Yes	Short-term	MoF, PIP	High
	Introduce a monitoring framework for MEMR to track progress towards national energy efficiency goals	There is a lack of coordination of energy efficiency measures and it is unclear what progress is being made towards achieving energy efficiency goals	No	Short-term	MEMR	Low
	Launch a publicity campaign to educate users about the benefits of energy efficiency	The population is unaware of the benefits available to them from pursuing energy efficiency	Yes (small fiscal outlay)	Short-term	MEMR, MoF	Low
	Increase MoF engagement in coordinating support from international development partners for EE through creating a national database	International climate finance is not centrally coordinated and tracked, which may result in misallocation of funds	No	Medium-term	MEMR, MoF	Medium
Industrial energy efficiency (and energy sector)	Implement a fiscal incentive framework for industrial and business energy efficiency measures	Currently no fiscal incentives in support of Regulation No. 70/2009	Yes	Short-term	MoF, MEMR	High
Appliances	Accelerate the establishment of energy efficiency labelling and the use of Minimum Energy Performance Standards	Consumers are unaware of the benefits of energy efficient appliances	No	Short and medium-term	MEMR	Low
	Implement an appliances rebate system reducing the cost of energy efficient appliances for consumers	In absence of subsidies, there is insufficient incentive to invest in energy efficiency appliances	Yes	Short-term	MEMR, MoF	Medium
Appliances/ buildings	Reform government procurement systems to promote energy efficient technologies	Government bodies are currently unable to finance energy efficiency measures	Yes	Short-term	MoF, MEMR, Ministry of Public Works, Government Procurement Agencies of Goods/Services (LKPP)	Medium

	Introduce a demand-side management programme managed by the utility	Demand-side management programmes have proven successful in overcoming barriers to energy efficiency investments	No	Medium-term	PLN, MEMR, MoF	High
Buildings	Building on the Jakarta experience, make building codes compulsory for new and renovated buildings	Building owners and tenants do not factor energy consumption performance into decisions	No	Short-term	MEMR	Low
	Introduce tax incentives for the most energy efficient buildings	Energy subsidies reduce the financial incentive to improve energy efficiency	Yes	Short-term	MEMR, MoF	High
	Expand MEMR audit programme to buildings and integrate with energy efficiency Revolving Fund	Building owners are unaware of potential for energy savings	Yes	Short-term	MEMR, PiP, MoF	Low
	Provide information on energy performance at the point of sale	Building owners are unaware of potential for energy savings	No	Short-term	MEMR	Low
Transport	Introduce vehicle efficiency standards and reduce the sulphur content of our fuel	Without standards there is too little incentive to improve vehicle efficiency	No	Medium-term	MEMR, Ministry of Transport	Low
	Set tax rates on vehicles dependent on energy use	Penalising heavy fuel use provides a strong incentive to purchase efficient vehicles	Yes	Short-term	MoF, Ministry of Transport	Medium
	Provide information on energy performance of vehicles	Consumers are unaware of the energy performance of vehicles and so do not factor it into their decision-making	No	Short-term	MEMR, Ministry of Transport	Low
	Accelerate the public transport initiatives identified in the RAN-GRK	Traffic congestion threatens to undermine scope for vehicle efficiency improvements	Yes	Medium-term	MoF, MEMR. Ministry of Transport	Medium
Energy supply	Link remuneration of senior executives in PT-PLN and Pertamina to improvements in supply-side energy	Scope for improving supply-side energy efficiency is not being exploited	No	Short-term	MoF, MEMR, PT-PLN and Pertamina	Medium

11.3.1 Policy reform 1: Energy subsidy removal

Indonesia's subsidised energy prices strongly reduce the incentive to undertake energy efficiency measures. We currently have some of the lowest retail prices for refined products and electricity of any country in the world. This encourages over-consumption and creates a strong disincentive to make energy efficiency improvements that would lead to a more rational use of energy. If prices were to reflect the full costs of energy provision then individuals, firms and investors would find a range of energy efficiency measures attractive to undertake. As noted above, these also impose a very significant burden on the Indonesian taxpayer and are highly regressive. Removing subsides would free resources for tax reductions (although our tax take at 14 per cent of GDP in 2013 is among the lowest in the world), investments in public services and infrastructure or an improvement in the government's fiscal position.

A phased approach to energy subsidy withdrawal, while protecting the most vulnerable consumers, will realise significant macroeconomic and environmental gains for Indonesia. This could begin by committing to a fixed amount of subsidy each year (rather than the amount of subsidy depending on fluctuations in international energy prices), with this fixed amount declining over time. Other aspects of a best policy approach to removing energy subsidies in Indonesia involve:

- mandating an independent commission to investigate the size and costs of energy subsidies and the benefits of their removal, along with the associated distributional impacts, and disseminate the results broadly;

- targeting compensatory measures, whether in the form of cash transfers or subsidies to encourage connection to the electricity grid, to protect low-income households from the rise in energy prices; and

- consulting with stakeholders in formulating subsidy policy reforms and ensures policy coherence by involving all the Ministries dealing with energy subsidies.

The Ministry of Finance remains committed to ensuring the stability of the public finances of the country while protecting our most vulnerable citizens.

Energy subsidy removal is a high priority reform for the MoF. The MoF has direct control over energy subsidies. It is in a strong position to phase out energy subsidies in the medium run. It will result in strongly increased implementation of EE measures, as price incentives will be much improved. In addition the reduction of energy subsidies will lead to lower public expenses.

11.3.2 Policy reform 2: Accelerate the establishment of the energy efficiency revolving fund

A planned energy efficiency revolving fund has the potential to play an important role in tackling some of the key barriers holding back energy efficiency activity in the country. The government is addressing energy efficiency financing challenges through the development of an energy efficiency fund. Under current plans, which are still being developed, this scheme will involve PIP providing low cost capital to financial institutions (at interest rates of around 2 per cent per annum) who would then on-lend the resources to eligible lending opportunities at close to (but below) commercial prime rates. The margin that

banks would earn from these investments should help to encourage financial institutions to lend towards energy efficiency opportunities. A similar model has previously been successfully implemented through the Thailand Energy Efficiency Revolving Fund (TEERF), which counts most of the large commercial banks in Thailand among its partner institutions: the model was so successful that the TEERF's budget line for on-lending was terminated by end 2013, as banks increasingly invest their own capital in EE projects (see Box 6). In Indonesia a wide range of borrowers are expected to be eligible to access capital under the scheme and the potential coverage of sectors and technologies is also broad (including ESCOs, the industrial manufacturing sector, various building technologies and machinery as well as energy efficient transport). It is expected that the scheme will target loans that will allow for a 20 per cent improvement in energy consumption, although it is recognised that it will be very difficult to know precisely how much energy saving is achieved with any investment. The State budget may allocate IDR 500 billion towards the energy efficiency fund in 2015.

The further implementation of the EE revolving fund is a high priority for the MoF. It has direct control over the fund. The fund has a high likelihood of tackling important barriers and thereby strongly boosting the implementation of EE measures, which allows us to realise the significant savings as indicated in the MACC curves in section 7.4. As the Fund would be offering loans rather than grants, although at concessional rates, the long-term impact on the public purse is likely to be broadly neutral.

The Ministry of Finance will proceed rapidly with the development of the energy efficiency revolving fund and, subject to satisfactory performance, provide additional capital over time. Regrettably, some delays have held back the commencement of the fund related to the strategic focus of the fund and administrative arrangements of different bodies. The MoF is committed to working closely with PIP, MEMR and other stakeholders to ensure that these hurdles are overcome as quickly as possible.

Over time, incremental changes to the energy efficiency fund will be considered, in particular, the possibility of providing guarantee products. A loan guarantee scheme could help to tackle the high risk perception that financial institutions have of energy efficiency investments, especially those made by Small and Medium Sized Enterprises (SMEs). By substantially reducing the maximum losses a bank may face when extending a loan, guarantees increase the willingness of lenders to provide finance to green projects. Such schemes are likely to be particular valuable in markets where energy efficiency financing is immature and lenders lack of the knowledge and experience to identify the relative credit risk of different projects and hence have a preference not to provide finance to any projects. This behaviour is particularly likely in relation to loan applications made by SMEs There are a wide range of international examples of successful loan guarantee schemes to promote energy efficiency investment – Box 6 reports on the experience of such a scheme in China. An additional financial package that could also be considered is a re-financing package for ESCOs or technology developers to allow banks to gain greater experience about the characteristics of energy efficiency financing opportunities. The MoF will work closely with development partners active in energy efficiency financing, especially the ADB, to ensure consistency and coherence on these activities.

Box 6 The Thai Energy Efficiency Revolving Fund is a compelling example of a successful EE fund

The Thai Energy Efficiency Revolving Fund (TEERF) started operations in 2003. It was established to address challenges around accessing capital for EE measures, including a lack of interest and experience in EE financing among banks and high perceived risk. By February 2012, 294 energy conservation and saving projects had been financed.

The TEERF is fully government funded and provides low-interest loans to banks, which on-lent these resources to EE projects at favourable interest rates. Its partners include 11 commercial banks, which financed EE projects in buildings and factories, as well as ESCOs and other project developers. Loan periods were for a maximum of 7 years, with loan size up to 100 per cent of project costs but not exceeding USD 1.4 million per project, and a maximum interest rate of 4 per cent on a negotiable basis.

TEERF was terminated in 2013 after it had successfully stimulated banks to use their own capital for EE lending. TEERF funding amounted to USD 206 million between 2003 and 2010. Additional funding of USD 12 million for 2009-2012 and USD 15 million for 2010-2013 was made available, reflecting that the participating banks started to invest their own capital and limited further government assistance was needed. No more funding was made available after 2013.

Six design parameters and conditions were key to the success of TEERF (Frankfurt School - UNEP Collaborating Centre for Climate & Sustainable Energy Finance, 2012):

- the fund was as simple as possible, with minimal government involvement and administrative processes, for example featuring short and easy application and reporting processes;
- the fund structure puts the ownership of the project where it belongs, with the project proponent. This ensures efficiency and commitment so that fund managers do not have to worry too much about project performance;
- conditions and interest rates were attractive for applicants. In addition, banks could restructure overdue loans at their own terms, reducing risk;
- TEERF was actively promoted among Thai banks, which led to high application rates after three to four years;
- communication between key stakeholders was streamlined through the creation of networks of private financiers and ESCOs through meetings, events and training courses; and
- the government was able to jump start the TEERF with almost zero risk, as it financed primarily tested products and the capital was sourced from petroleum import tax revenues.

The consideration of these additional financing modalities should not hold back the development of the revolving fund. International experiences show that a suite of financial products can help support energy efficiency investments and that different products will be more or less effective in different circumstances. As a result, the provision of guarantees by the energy efficiency revolving fund should be considered as a complementary product that the fund could offer once it has become established, rather than an alternative that requires the development of the fund to be resolved while it is deliberated.

Box 7 IFC's utility-based energy efficiency programme

In China, the International Finance Corporation has provided loan guarantees from the China Utility-based Energy Efficiency Program (CHUEE) since 2007. This has provided four risk-sharing facilities with three domestic commercial banks to support energy efficiency lending to utilities, equipment providers and energy service companies (ESCOs) – notably focussing both on supply-side and demand-side energy efficiency. The latest phase of the program is specifically targeted at small-and medium sized enterprises.

The IFC shares (only) part of the loss for all loans within the energy efficiency portfolio of its partner banks. As of end 2013, portions of around 180 loans with a cumulative value of US$ 783 million were guaranteed (International Finance Corporation, 2014). The Program allows partner banks to make loans available to a broader set of customers and at more attractive terms. The typical tenor is three to five years. The Facility applies commercial terms to encourage the development of capital markets towards international standards.

The program has been successful in enabling companies to generate energy savings. For example, Paiwei, a high-tech company specialising in energy saving services and energy management, received a five year loan of US$ 1.6 million to implement electricity savings projects for three power plants that was guaranteed by CHUEE. Paiwei's total investment was US$ 2.4 million, with total energy saving benefits reaped over the lifetime of the project estimated at US$ 4.4 million (International Finance Corporation, 2014).

11.3.3 Policy reform 3: Introduce an energy efficiency monitoring framework for MEMR

There is a lack of information around progress towards achieving energy efficiency goals which may hamper realisation of a desirable policy framework. There is no framework for monitoring progress towards achieving national level energy efficiency targets. A number of policies are in place, but there is no centralised effort to track their implementation and the impact they are having on energy use in target sectors. This makes it difficult to establish whether targets are on course to be met and whether or not greater policy effort may be required.

MEMR should regularly monitor progress towards achieving energy efficiency goals. This would consist of a publicly available biennial update on policy formation and implementation and progress towards energy efficiency targets as established in Vision 25:25 and the RIKEN, carried out by MEMR staff. As well as providing this economy-wide perspective, the report could consolidate the reporting under Presidential Instruction 13/2011 (regulating energy efficiency in the public sector) and MEMR Regulation 14/2012 (regulating energy management in companies with energy consumption of more than 6,000 ToE), as well as any other initiatives including by development partners and private sector companies not covered under MEMR Regulation 14/2012. This would allow lessons from implementation of programmes and initiatives to be incorporated into future actions.

The primary focus for implementation of this proposal is MEMR, rather than MoF. This may lead to a stronger focus on attaining the national energy efficiency goals and thereby increase uptake of energy efficiency measures. This would be a low-cost improvement to make in national energy efficiency policy.

11.3.4 Policy reform 4: Launch an education campaign to increase awareness of the benefits of energy efficiency

A key challenge in encouraging the uptake of energy efficiency measures is a lack of consumer awareness - among both households and businesses – about the opportunities and benefits from pursuing energy efficiency.

Numerous stakeholders discussed as part of this work programme identified that both households and businesses gave relatively little attention to energy efficiency. While this is partly explained by the subsidised energy prices, the various audit schemes implemented by the Ministry of Industry and MEMR demonstrate cost-effective abatement potential exists even at current energy prices. International studies indicate that changes in consumer behaviour, without any other intervention, can lead to energy savings as high as 20 per cent[18] (Dahlbom, Greer, Egmond, & Jonkers, 2009).

To address these challenges, a broad-based information campaign should be launched by MEMR. Previous research into the effectiveness of different campaigns identifies the following key lessons that can be incorporated into any Indonesian campaign (Mikkonen, Gynther, Hämekoski, Mustonen, & Silvonen, 2010):

- undertake market segmentation analysis to tailor both the messages and the communication instruments to best reflect the interests of each user-group;
- combine multiple communication instruments within any campaign, with key instruments including television, mass media and schools (for example, energy theme weeks);
- use energy efficiency ambassadors or other mechanisms in order to present energy efficiency as 'exciting' rather than an exercise in 'self-deprivation'; and
- plan for monitoring and evaluation of the campaign from the outset.

An education campaign is a measure for MEMR to take forward, making it of lower priority for the Ministry of Finance. MEMR must lead on the roll-out of an education campaign. It may have a strong impact on energy efficiency measure uptake at relatively low cost.

11.3.5 Policy reform 5: Increase Ministry of Finance engagement in co-ordinating support from international development partners for energy efficiency through creating a national database

A relatively small amount of international public support for energy efficiency improvements is spread across a wide range of actors. The Landscape of Climate Finance in Indonesia (Tuwo, Glenday, Wilkinson, & Falconer, 2014) identifies that around IDR 94 billion was provided by international development partners to support energy efficiency improvements in Indonesia. This is a relatively small amount of support, compared to the amount of support provided to support renewables (>IDR 1,000 billion) or reduce emissions from forestry and land used change (IDR 371 billion), although this partly reflects that some energy efficiency opportunities are available with relatively little upfront capital. This relatively small amount of funding is distributed across a number of different development partners. Appendix 3, looking at current development partner initiatives, identifies around ten different development partners who have an interest in supporting energy efficiency initiatives in Indonesia.

While this support improves access to finance for energy efficiency development, current procedures make it difficult for the Ministry of Finance to track expenditures.

[18] Although these findings typically refer to countries where prices are cost reflective.

Recent CPI analysis suggests that 68 per cent of international climate finance[19] was disbursed through non-government actors and hence often not properly accounted for within the Ministry of Finance systems. This reduces the scope for the Ministry of Finance to oversee where climate finance is flowing and ensure that it is supporting activities consistent with the priorities of the government.

The Ministry of Finance can work towards the creation of a single national database to track international – and domestic – climate finance flows. This would increase the comparability of climate finance information and allow the Ministry of Finance to ensure that an appropriate allocation of climate finance resources is being used to support renewable energy development. For more discussion, see Tuwo, Glenday, Wilkinson, & Falconer (2014).

Coordinating support from development partners is a medium priority for the Ministry of Finance. This involves, besides the MoF, close involvement and leadership of MEMR and other climate finance related bodies. It may lead to increased implementation of EE measures if funds are better allocated as a result. Improved allocation of these funds may also reduce the cost of the share of subsidies that need to be disbursed by the MoF.

11.3.6 Policy reform 6: Implement a fiscal incentive for industrial energy efficiency measures

MEMR Regulation 70/2009 and accompanying regulations allows for the establishment of a series of fiscal incentives to promote energy efficiency among heavy energy users that has yet to be introduced. On paper, many aspects of MEMR Regulation 70/2009 for industrial energy users are aligned with international best practice, including the mandatory audits and the public reporting on energy efficiency improvements. While there have been some concerns about the implementation of some of these arrangements (see below for more discussion), the experience of the energy audit schemes that have been organised by MEMR and MoI also indicates that it has been difficult to convince industrial energy consumers to adopt energy efficiency measures. In part this is because of problems with accessing finance and the low price of energy, as discussed above, but survey evidence also suggests that it reflects, for example, managerial biases towards capacity enhancing investments. This is a common challenge in energy efficiency investments around the world and helps to explain why, even without subsidies, a wide range of countries, including the Netherlands, UK, Australia, India and China, provide additional fiscal incentive measures for energy efficiency improvements. These typically take the form of accelerated depreciation or other forms of tax relief for qualifying investments. As well as being justified by the difficulties associated with managerial focus on energy efficiency, they are also supported by the difficulties in accessing capital for energy efficiency investments and the local/global environmental benefits from reduced (fossil-fuel) energy use.

International experience suggests that these schemes are successful in stimulating significant energy efficiency investment. Box 7 discusses the experience of the VAMIL and MIA schemes in the Netherlands. For an exchequer outlay of €0.7 billion over the course of 2005-10, the programs succeeded in catalysing capital investments of close to €8.5 billion.

[19] For all uses, not just energy efficiency

The most rational approach would be to extend an improved version of the fiscal incentives for renewable energy production to a wide range of qualifying energy efficiency investments. Under 21/PMK.011/2010, renewable energy production is able to qualify for a range of fiscal incentives including income tax reduction, accelerated depreciation, VAT and import duty exemption. A complementary report on promoting renewable energy highlights how these could be improved to the benefit of renewable energy producers. In addition, the scope of qualifying investments could be extended to include energy efficiency investments. Drawing on international best practice, such as the Dutch experience as discussed in Box 8 a number of further elements of this extension could be developed:

- an annually updated list of qualifying energy efficiency investments would be produced. This could include both a list of specific automatically qualifying technologies as well as allowing for generic technologies that could be shown to improve energy efficiency. There would be benefits of the list of eligible technologies being the same as those that were eligible to apply for loans under the energy efficiency revolving fund (see section 11.3.2) where current thinking is that eligible sector and technologies might include:
    - *industrial manufacturing sector (covering both energy supply and energy demand)*: combined heat and power; retrofit of equipment needed for heat and power generation as well as lighting, ventilation and air conditioning; technologies facilitating process improvements;
    - *building technologies:* energy efficient chillers, energy efficient cooling systems, energy efficient lighting (LEDs, ballast improvements), energy efficient shading, energy efficient ventilation, double-glazing, insulation, solar heating;
    - *machinery:* variable speed drives, automated motors, heat recovery systems, insulation, energy usage monitoring systems, emission capturing systems such as filters or catalytic convertors, energy efficient coolers, energy efficient gas turbines, energy efficient boilers; and
    - *Transport*: electric cars, hybrid cars, public transport systems, smart-grid investments.
- firms, including ESCOs, installing equipment on the list would be able to claim a corporate income tax reduction or accelerated depreciation allowance (with international practice suggesting, for instance, that accelerated depreciation allowances of between 75 and 100 per cent of the equipment's costs could be available in the year of installation);
- the application of the fiscal incentive would be automatic; the firm would make its own assessment as to whether it had purchased qualifying equipment and calculate its tax liability accordingly, with documentary evidence provided to the Ministry of Finance's Director General of Taxation. Reflecting the difficulty of identifying specific energy consumption changes to individual investments or purchases, there would be no need to undertake an *ex post* assessment of the energy savings caused by the purchase; so long as the asset appeared on the list, the firm would be entitled to the tax break. A

random selection of audits would help to limit fraud and ensure that the equipment, once purchased, was being used[20]; and

— a concerted advertising campaign would accompany the fiscal scheme so that both purchasers and suppliers of energy efficient equipment would be aware of the incentives. This would be achieved through use of specialist journals and internet resources.

These incentives are also to be made available to energy suppliers so that, in cases where they have tax liabilities, further efficiency improvements in power generation and fuel supply can be achieved. As discussed in section 9.1, there is ample opportunity of improving the efficiency with which energy is supplied to final users in Indonesia. These improvements can be supported both by the state-owned companies (PT-PLN and Pertamina) as well as privately-owned producers. Subject to these companies having tax liabilities[21], they could also avail themselves of these fiscal incentives to improve energy efficiency.

A fiscal incentive framework for energy efficiency measures is a high priority for the Ministry of Finance. Fiscal incentives are a powerful tool within direct control of the MoF. These incentives can lead to a strong increase in implementation of the energy efficiency measures indicated in the MACC curves in section 7.4. While foregone tax revenues may be relatively sizeable, depending on the detailed design, this should be offset by the energy subsidy savings in the medium term.

Box 8 Fiscal incentives in the Netherlands promote energy efficiency capital investment by reducing the relative costs of green technologies

Two Dutch schemes provide entrepreneurs with incentives to invest in equipment that improves energy efficiency by allowing for deductions against profit tax. The government initiated the Arbitrary Depreciation of Environmental Investment Measure (VAMIL) in 1991. The scheme, which last year had a budget of €24 million, has three key elements:

– it allows for accelerated depreciation of up to 75 per cent of investment costs as early as the first year of the investment;

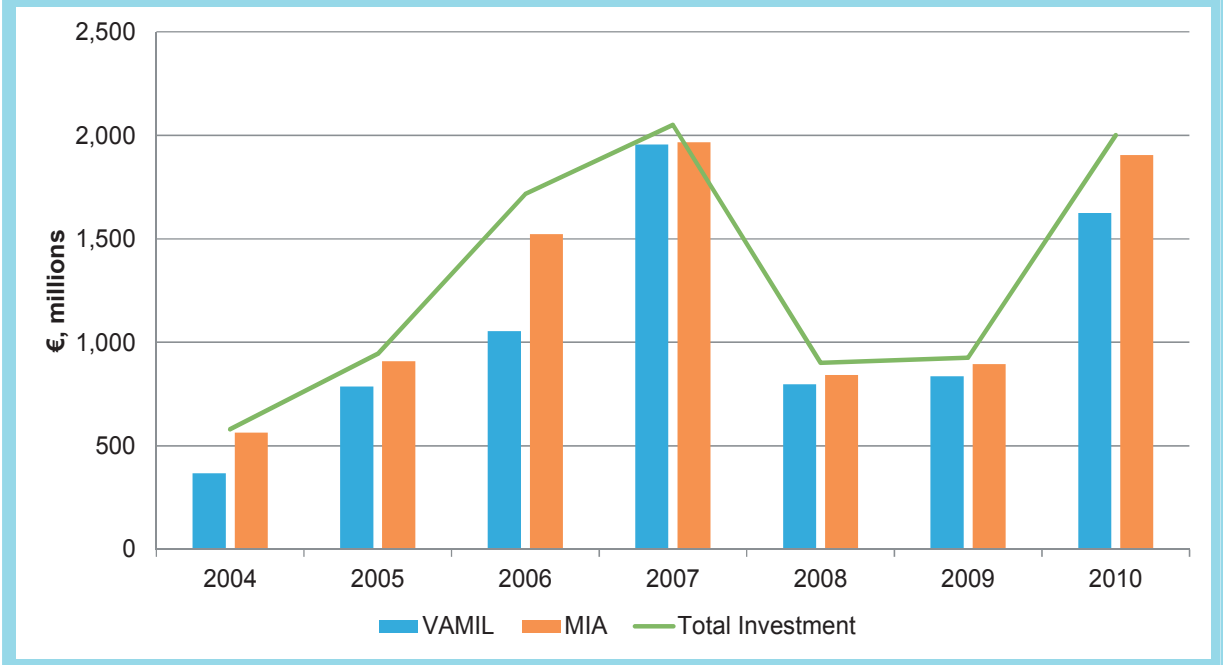
– companies can decide when to write-off investment costs, providing benefits in terms of liquidity and interest costs; and

– the equipment must be fully operational and paid for and maximum investment costs are €25 million per asset.

The Environment Investment Rebate (MIA), established in 2000 and with a €101 million budget last year, allows for a further write-down in investment costs. Up to 36 per cent of costs in qualifying equipment can be deducted against profit tax in the year of purchase. The level of deduction is determined by the environmental performance of the investment, the technological innovation it represents and the additional costs it requires against the conventional alternative.

[20] The calibration of the tax deduction would ensure that the firm would still be worse off if it purchased the equipment, incurring costs, but did not use it.
[21] Pertamina, for instance, paid 68 trillion IDR in tax payments in 2013.

Figure 37 Participation in VAMIL and MIA catalysed over €10 billion in investment in just six years



Note: *Total is less then sum of schemes as the two may be used in conjunction for the same investment.*
Source: *Vivid Economics based on MIA/VAMIL annual report*

A key element to determine a piece of equipment's eligibility for either of the schemes is that it must be included on the Environment Technologies List (ETL). Qualification for inclusion on the ETL includes a demonstrative yield for the environment and that it should be innovative or have a smaller market share relative to the alternative. The list is updated on an annual basis by the Dutch Ministry for Infrastructure and Environment and now includes almost 370 pieces of technology and equipment. Regulations detail the intended use of eligible equipment and its specification may be generic or specific.

The schemes have proven successful in recent years, appearing to catalyse significant investment in energy efficiency technologies. VAMIL and MIA supported investment rose fourfold in the years 2004-7, as Figure 37 indicates. Despite a sharp downturn in 2008 due to the financial crisis, the schemes' popularity recovered quickly such that by 2010, 13,000 projects were supported representing total investment of over €2 billion (Ministry for Infrastructure and Environment, 2012). Between 2005 and 2010, over €8.5 billion in investment was catalysed by the two schemes. The net realised foregone tax revenues over the same period were €0.7 billion (Van Heekeren & Frima, 2012). The scheme continues to operate.

The Dutch experience with investment tax incentives holds lessons for Indonesia. The country shows how fiscal incentives can encourage industrial energy users to make energy efficiency investment. Arguably, investment incentives promoting energy efficiency can be more effective than those encouraging greater use of renewables as there is less need to monitor ongoing use of the equipment. Other lessons from the Dutch experience include:

- **a strong advertising strategy can drive both demand and supply**: the Dutch government gazette, specialist journals and web resources are used to provide information on eligibility and ensure entrepreneurs are aware of benefits. Suppliers are also encouraged to create ETL eligible equipment as a result of the tax incentive-driven demand. Furthermore, an online portal acts as a marketplace where SMEs can find ETL suppliers and determine whether they are eligible for the MIA or VAMIL incentive;
- **simplicity of the application process is crucial**: All information is on a dedicated website and the process for applications is simple involving a two-page online form; and
- **there is need to budget carefully**: the attractiveness of incentives in The Netherlands has led to budget over-runs. The government has recently established a cap on the number of investments supported.

11.3.7 Policy reforms 7-10: Use an array of measures to increase the penetration of energy efficient appliances

Households are the single biggest users of energy in Indonesia; commercial energy use is one of the most rapidly growing elements of end-user energy growth. They are also the two end-use energy sectors that require the largest percentage reductions from Business-As-Usual energy consumption under the draft RIKEN. However, as with industrial energy consumers, energy prices significantly reduce incentives for these consumers to improve their energy efficiency. These problems are compounded by the fact that consumers are typically unaware of the opportunities to reduce their energy efficiency by using more efficient appliances and may often have limited resources and access to capital to undertake energy efficiency improvements. In response to this problem, international best practice identifies that a range of fiscal and non-fiscal incentives need to be deployed (International Energy Agency, 2011). Four recommendations can help to overcome these challenges.

1) **Accelerate the introduction of Minimum Energy Performance Standards[22] and energy efficiency labelling.** International experience suggests that non-fiscal policies such as regulations, standards and labelling have an important role to play, by increasing awareness, in encouraging the uptake of energy efficient appliances. Indonesia has made progress in these aspects: introducing energy efficiency labelling for Compact Fluorescent Lamps, while it has plans in place for air conditioning units as well. MEMR should accelerate this programme to cover a wide range of other appliances under a set timetable. For instance, South Korea instituted a comprehensive labelling and regulatory approach from 1992 which now includes certification across 24 appliances and surcharges on inefficient appliances. To facilitate this transition in Indonesia, a modest expansion of fiscal resources towards publicly funded laboratory facilities, along with greater private facilities, will be required. Furthermore, Minimum Energy Performance Standards – that make it illegal to sell the most energy inefficient appliances should be introduced with air conditioners, refrigerators, electronic ballasts and industrial electric motors being the strongest candidates. These can remove the least efficient appliances from the market with mandatory labelling further supporting consumer choice of more energy efficient appliances. They can also support government procurement programmes, as discussed further below. Academic studies considering the introduction of a MEPS in relation to refrigerators in Malaysia found them to be cost effective intervention and hence to be economically justified (Mahlia, Masjuki, Saidur, & Amalina, 2004).

2) **Introduce a targeted subsidy regime**. A targeted, temporary rebate system could help accelerate utilisation of energy efficiency appliances. Rebates on the purchasing price of high value appliances such as air conditioners and refrigerators could be disbursed and administrated through retailers, with the size of the rebate linked to the energy efficiency of the appliances. The SAVE scheme in Malaysia shows how this might be achieved. Incentives for lower value items such as CFLs and electronic ballast may be better disbursed directly to manufacturers or utilities. Careful monitoring will be required to avoid the abuse of loopholes. In order to ensure the long-term sustainability of the energy efficiency appliance market, any such subsidies should be temporary and limited to a certain number of units, to kick-start the market by growing consumer awareness. The BRESL programme is working on the detailed

[22] Also sometimes referred to as Minimum Efficient Performance Standards

implementation of such a scheme for air conditioners and refrigerators. It has identified three design options, with either consumers, dealers or manufacturers claiming the rebate – each of which has advantages and disadvantages. BRESL estimates that the scheme can save a minimum of 10 per cent of household electricity use, amounting to IDR 2.77 trillion (USD 280 million) per annum of electricity subsidy reductions, with the resources required to finance subsidy potentially less than 20 per cent of this amount (EY, 2014).

3) **Introduce reforms to government procurement systems**. In a number of countries, government supported procurement of energy efficiency appliances has helped to establish energy efficiency technology within that country by helping to address concerns over the viability of new technologies and market inertia, as well as delivering immediate energy savings. MEMR should work with the Ministry of Public Works, other relevant Ministries and the Government Procurement Agency of Goods/Services (LKPP) and to identify one or two energy efficient technologies for the introduction of a phased procurement system that would allow significant improvements in the energy consumption of Indonesia's public buildings. Strong candidate technologies would be CFLs and air conditioning units; especially as the former already benefits from energy efficiency labelling that could be used to determine the standards government departments accept. In addition to these high-profile procurement programmes, reforms to the way in which procurements are organised and evaluated should be introduced including the use of life-cycle costing and the use of energy saving technologies as a selection criterion.

4) **Re-invigorate PLN's demand-side management unit and introduce a broad-based demand-side management (DSM) programme for PLN**. In the medium term, responsibility for reducing electricity consumption should be passed to PLN. The International Energy Agency (IEA) notes that '*An energy utility's resources, customer access and technical know-how means that it is in a unique position'*(International Energy Agency, 2011). This position has been exploited in a number of countries to give the utility a legal obligation (or target) to make energy efficiency savings every year – with the resources realised through a modest surcharge on customers' bills. While PLN has a demand-side management unit, stakeholders suggest that this is under-resourced and lacks senior management attention. Building up the capacity of this unit and then explicitly passing responsibility for energy efficiency improvements to it will allow PLN to assess when reducing the demand of its consumers will be more cost effective than delivering new capacity additions. This will only be possible when PLN has developed a more sophisticated billing system and acquired more information about its customers and their energy-use profile[23]. Any DSM programme should however have regard for international experience, such as the case of South Africa as discussed in Box 9. Despite notable early success, the scheme is currently under review as the regulator there does not believe that the state energy utility is sufficiently incentivised to deliver DSM savings.

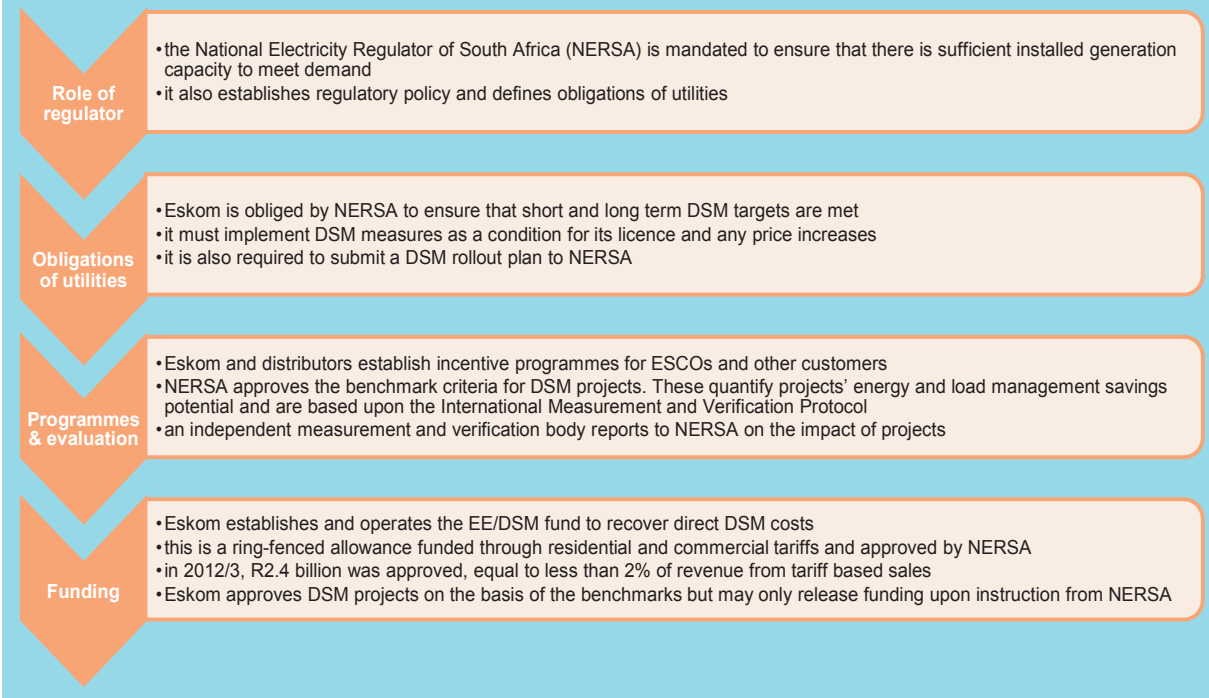
[23]The first step would likely require PLN to make a statistical inventory about the energy specific consumption of urban households with respect to the type of houses, family members and appliances. This could help explain how energy consumption varied according to key factors from which specific recommendations for individual households could be identified.

Box 9 The South Africa DSM Scheme has seen a number of successes and challenges

Most measures to increase uptake of energy efficiency appliances are a low to medium priority for the Ministry of Finance, but should be taken forward by MEMR. Energy efficiency labelling and MEPS are a relatively low-cost option to increase uptake, but mainly the terrain of other government bodies and therefore a low priority. An appliances rebate system is a medium priority as it would likely lead to a strong increase in uptake but would involve several other government bodies and some initial capital outlay. Reform of government procurement systems is a medium priority, as it involves coordination with lots of government bodies, yielding an increase in EE appliances uptake but possibly with substantial costs in initial years before the end of the payback period. However, the introduction of a demand-side management programme managed by PLN is a high priority: although it requires coordination with other government bodies including PLN and the ministries coordinating PLN, the MoF can influence the decision to start such a programme and achieve significant increases in EE measure implementation at relatively low cost: growth in demand for power can be substantially curtailed by a demand-side management programme aimed at realising the savings indicated in Indonesia's MACC curve. The South African DSM scheme has seen a number of successes and challenges

Low prices and few incentives for energy efficiency in South Africa resulted in electricity consumption growing at an average of over 10GWh per year in the early 2000s, with commensurate increases in emissions. The government's National Energy Efficiency Strategy (NEES), published in 2005, aimed to redress this by proposing a range of energy efficiency programmes including DSM schemes. The role of state-owned energy utility, Eskom, was crucial in the implementation of measures as it generates over 95 per cent of the country's electricity. The regulatory arrangements that were devised are shown in Figure 38

Figure 38 The role of the regulator was designed to align Eskom's incentives to yield DSM savings



Source: Vivid Economics based on Eskom 2012, NERSA 2013

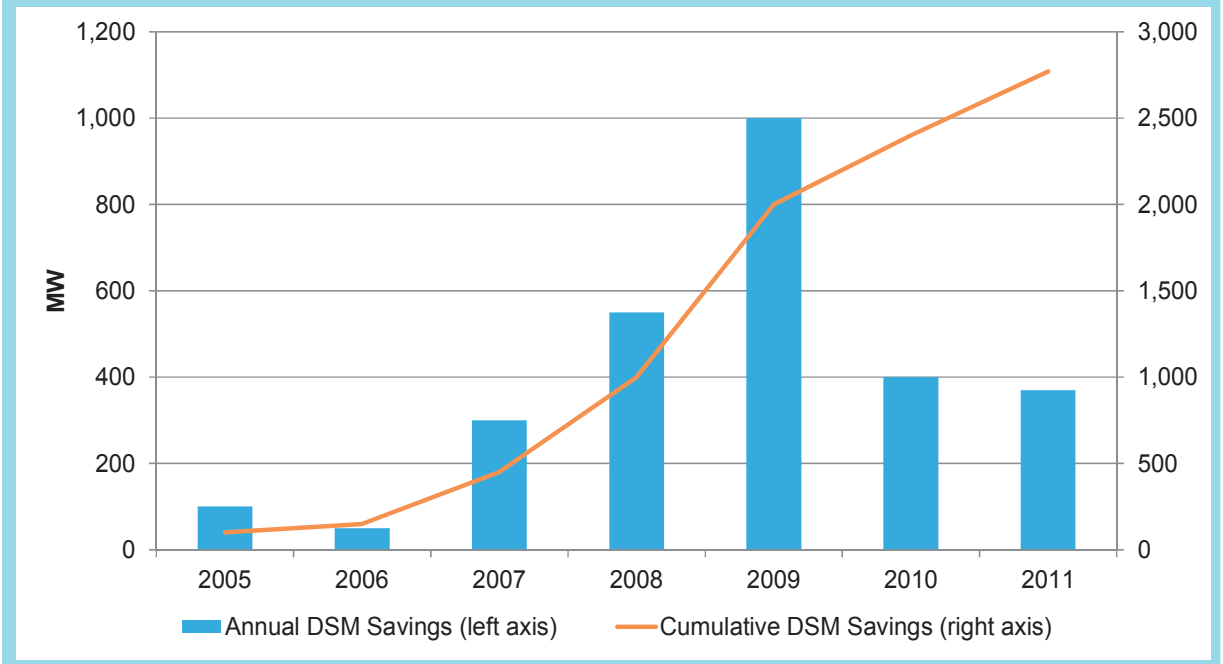
To raise finance for programmes, Eskom established an energy efficiency/DSM fund, a ring-fenced allowance sourced through residential and commercial tariffs. In the initial years of operation, companies could apply to Eskom for resources from this fund under four DSM incentive schemes:

- The Standard Product Programme, which provides rebates on the investment costs for the implementation of specific energy efficiency technologies with a focus on small to medium projects less than 250kW. A total of 572 projects under the scheme generated demand savings (savings in the amount of peak capacity required) of 20MW in 2012;

- The Standard Offer Programme, which pays commercial and agricultural users a fixed amount per kW, saved for verifiable energy savings (from 50kW to 5MW) over a period of three years. The programme saved 31MW in 2012, from just 61 projects;
- The ESCO Programme, which reimburses ESCOs with up to 100 per cent of funding for various categories of significant demand savings, ideally over 1MW. This was the most successful programme in 2012, with 406 projects generating savings of 793MW in 2012; and
- Performance Contracting allows Eskom to purchase bulk verified energy savings across multiple sites and technologies, given a minimum project size of savings greater than 30GWh over a three year sustainability period. Sixteen projects generated 131MW of savings in 2012.

Taken together, these schemes have resulted in significant energy savings over a short period of time. As figure 39 indicates, they generated over 3,000MW in verified demand savings over seven years (Institute for Industrial Productivity, 2013). In 2009, demand savings totalled over 1,000MW, a figure which was over 2 per cent of installed capacity in the year.

Figure 39 Annual verified demand savings rose sharply up to 2009, before falling back significantly recently



Source: Vivid Economics based on IEPD 2013

The opportunities for DSM in South Africa were high due to its inefficient energy usage. However, in the early years of the operation of Eskom's DSM fund, several concerns were raised according to Mathews, (2005):

- the company's DSM group was understaffed and overburdened;
- the process to evaluate proposals was slow and cumbersome criteria to approve projects were inconsistently applied, and;
- uncertainty in the evaluation process made many projects difficult to finance.

Once these capacity and institutional limitations were overcome, the targets established by NERSA ensured Eskom adopted a more proactive approach to DSM. However, NERSA (2013) approved just R5.2 billion for the programme over the period 2013-2018 . NERSA's stated that it: wished to avoid rising electricity prices, had a preference for DSM programmes to be managed by an independent agency, and that it wanted to avoid a conflict of interest as Eskom is effectively discouraging customers to purchase its energy.

11.3.8 Policy reforms 11-14: Introduce a package of fiscal and regulatory measures to improve the energy efficiency of buildings

To improve the energy efficiency of the commercial and residential sectors of the Indonesian economy will require significant improvements to the design and fabric of buildings. While some of the recommendations discussed will reduce the energy consumption of buildings (notably the government procurement and the demand-side management programme), a range of further policies will be needed explicitly targeted at the building fabric. A range of market failures and barriers can hold back these investments including lack of access to capital, landlord/tenant problems (where the person responsible for bearing the cost of the energy efficiency improvement is not the person who benefits from the reduced energy consumption) and a lack of awareness. Energy subsidies compound these problems. Once again, international best practice, such as that of Germany discussed in Box 10 identifies that fiscal policy measures will need to be one element of a co-ordinated package of regulatory and awareness raising measures to lead to a successful change in energy efficiency behaviour. The important elements of this package may consist of the following.

1. **Make building codes on energy consumption for new and renovated buildings compulsory.** Indonesia National Standard (SNI)[24] SNI 6389-2011 'Energy Conservation in Building Envelope' states that the overall thermal transfer value (OTTV) should be less than or equal to 35 Watt/m^2. This standard, however, is voluntary. It should be made compulsory for all new buildings and those that are subject to substantial alteration/renovations. Following the approach taken by the Governor of Jakarta (38/2012), buildings that fail to make this standard should not receive the necessary permits from local governments.

2. **Introduce tax incentives for the most energy efficient buildings.** To encourage the construction of the most energy efficient buildings, the Ministry of Finance should offer a corporate tax credit to firms that construct buildings that exceed the minimum standard of 35 Watt/m^2 by a certain amount. For instance, in the US, a tax credit of US$1.80 per square foot is available to owners of new or existing buildings who make changes that reduce total energy and power costs by 50 per cent or more than specified in minimum standards; deductions of US$0.60 per square foot are available if changes would reasonably contribute to 50 per cent energy savings if additional systems were also installed. The ideal system would offer steadily greater tax incentives for greater energy savings. In the short-term, the value of this tax credit could be calibrated against the reduction in fuel subsidies that the energy efficiency improvements would realise to reduce (or remove) any fiscal impact on the government. The provision of public resources to support building energy efficiency is often a cost effective intervention. In the UK, the Green Deal and Energy Companies Obligation work in conjunction to respectively provide direct support to individuals and businesses to improve building energy efficiency and to require energy companies to help them in this regard. An impact analysis of the schemes found that while costs are estimated at £17.3 billion, benefits[25] will sum to £25.6 billion resulting

[24] SNIs are formulated by the Technical Committee and confirmed by the National Standardization Agency of Indonesia.
[25] Key monetised benefits include energy savings of £13-16bn, additional comfort at £3-4bn, improved air quality at £1-2bn, and carbon savings of £4-7bn.

in a net present value to society of £8.3 billion (Department of Energy and Climate Change (UK), 2012).

3. **Expand MEMR audit programme to focus explicitly on buildings; integrate with Energy Efficiency Revolving Fund.** Since 2003 MEMR has provided a system of free energy efficiency audits to industrial premises and buildings at an annual cost, in recent years, of around IDR 20 billion. Although stakeholders have expressed concerns about the quality of some of the audits, this has led to the identification of energy savings of around 4,000 GWh of which approximately 30 per cent have been taken up. The focus of the scheme has been on industrial premises which have received about two thirds of the audits. This scheme is due to expire in 2014. While this expiry coincides with the likely compulsory requirement to undertake energy efficiency audits for those facilities that consume more than 6,000 toe/year, there is no such obligation for smaller energy consumers. Therefore, MEMR should continue with this scheme to focus particularly on the energy efficiency of buildings. In addition, the programme should be coordinated with the introduction of the energy efficiency revolving fund so that those who receive the free energy audits are also aware of the opportunities that are available to finance the identified opportunities. Opportunities to continue to work with development partners to ensure the quality of the audits and reduce concerns over corruption should be explored.

4. **Introduce regulations to make provision for the energy efficiency of buildings obligatory at the point of purchase/tenancy agreements.** MEMR should mandate that energy performance labels or certificates are provided to owners, buyers and renters. These should communicate information about the energy performance of the building in a simple manner such as a traffic light system.

Tax incentives are the highest priority for the Ministry of Finance. Tax incentives for the most efficient buildings can be controlled by the MoF and may lead to increases in energy efficiency measures at a moderate cost in terms of foregone tax revenues. These incentives, if appropriately targeted, can lead to realisation of many savings indicated in the buildings MACC curve in section 7.4. Other reforms are of lower priority, as these are mainly controlled by MEMR and may have a moderate impact on implementation of EE measures, albeit at low cost of subsidies.

Box 10 Germany aims to improve building energy efficiency through measures designed to overcome financial and information barriers

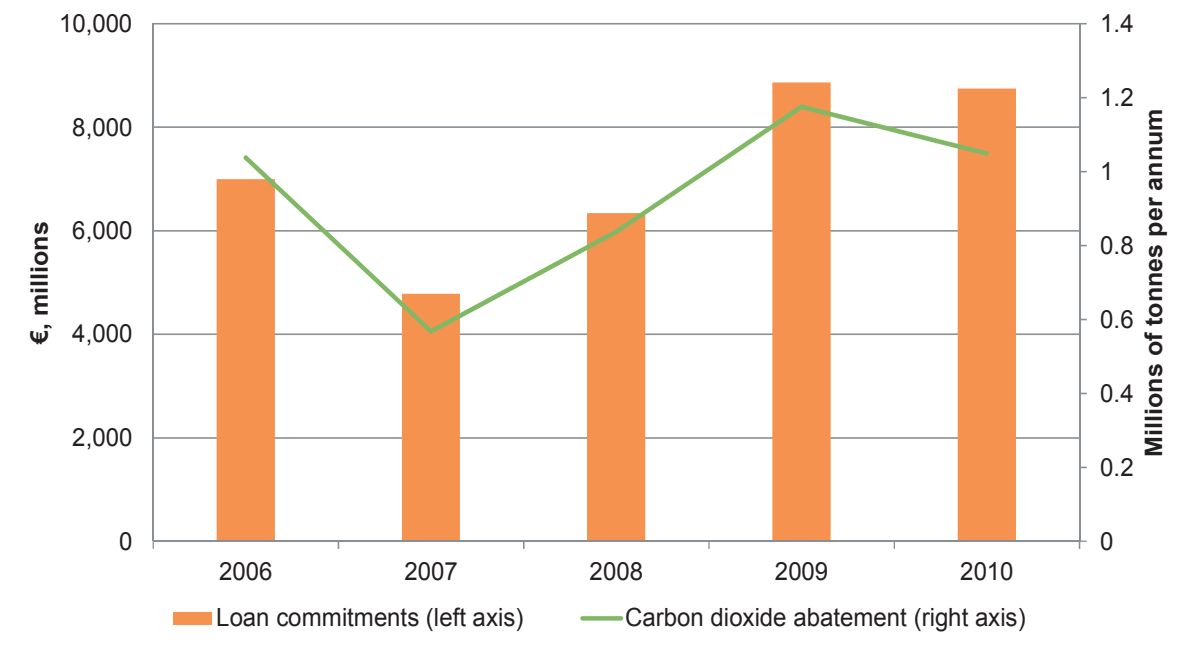
The Energy Conservation Act (EnEV) contains incentives for energy efficiency in residential and commercial buildings in Germany, principally through loans, standards and certificates. The act aims to overcome financial barriers associated with investment in energy efficiency measures in new and existing buildings by providing incentives, through loans and subsidies, to install measures that lower energy consumption. Key features of the provisions include:

- long term, low interest loans of up to €75,000 are available for new builds along with independent, professional advice on possible measures;
- loans have fixed interest rates over 10 years with repayments starting after two years; and
- grants and loans are available for renovations, with those that make higher energy efficiency gains relative to a specified standard eligible for higher amounts.

The scheme has proved to be highly popular with almost two million housing units supported in just five years, with loans worth €37 billion disbursed as indicated in Figure 40. This led to carbon abatement of over 4.6 million

tonnes (KfW, 2011). One of the main channels through which this finance is provided is KfW's 'Energy-Efficient Construction and Refurbishment' programme, which has saved approximately 20GWh of energy each year (KfW, 2014).

Figure 40 Loans worth €37 billion were disbursed in the years 2006-10



Source: Vivid Economics based on KfW(2011)

In addition, an analysis of KfW's support for building energy efficiency in the period 2008-2010 indicate that it had a significant positive impact on the state budget: it stimulated increased economic activity leading to additional government incomes in the form of sales tax, taxes on wages and salaries, social security contributions and taxes on business profits. Analysis suggests that these additional government revenues may have been at least double the programme's costs in each year of the programme. This reflects the high labour intensity of building construction and renovation at a point when there was significant labour market slack in the German economy (STE Research, 2011).

The Act also imposes energy performance regulations on buildings. Building standards take the form of a limit on a building's energy consumption per unit of area it covers:

- the maximum permitted energy demand in new or refurbished buildings has fallen by 50 per cent from 2002 from a binding cap of approximately 150 kWh/m^2 to 75 kWh/m^2at present; and
- builders contracted to construct or renovate buildings are responsible for ensuring they meet the required standard.

However, this element of the scheme has not been as successful as the loans scheme: rates of non-compliance are estimated to reach up to 35 per cent, with rates higher amongst renovations of existing buildings than new ones (Climate Policy Initiative, 2011).While building standards are seen to be practical, the requirement for audits to ensure compliance imposes costs on regulators and state authorities. In addition, a lack of clarity over standards and supply shortages of architects and builders skilled in designing energy efficiency buildings have also been identified as factors that limit the rate of refurbishment.

A further element of EnEV includes a certification system which is intended to provide the buyer with a signal with respect to a buildings' energy efficiency. Energy performance certificates (EPCs) are required to permit buildings' sale or rent. They detail its energy usage according to energy consumption over the previous three years or expected demand after a detailed inspection and must be issued to newly constructed, refurbished or extended buildings. A low uptake of certification, however, is also indicative of the shortcomings of the scheme. Just 38 per cent of homeowners and landlords hold a certificate compared to 78 per cent in Denmark and 76 per cent in The Netherlands, according to Brohmann and Cames (2011). Again, the administrative burden associated with the EPC scheme seems onerous as buildings must be assessed against multiple criteria in order to receive

certification. In its assessment, the Climate Policy Initiative (2011) indicates that EPCs do not seem to trigger transformative investment in energy efficiency in buildings, with the impact of EPCs on purchasing decisions found to be limited.

Taken together, the German experience suggests that improving access to financing is the most significant initiative to improve building energy efficiency. Economic incentives, through low interest loans and grants, result in a greater likelihood of people investing in energy efficiency improvements in their homes. In addition to overcoming financial barriers:

- impartial, expert advice when combined with access to loans can simplify the process and overcome information asymmetries; and
- they can catalyse further energy saving investments that can also help businesses and create jobs.

While building regulations and EPCs could have a role to play as part of any strategy to improve energy efficiency, low enforcement results in a lower likelihood of such measures driving transformative change. To improve compliance, communication campaigns and tougher penalties may be necessary.

11.3.9 Recommendations 15-18: A package of fiscal and regulatory measures to improve transport energy efficiency

Energy use in the transport sector has grown more quickly than in any other end-use sector, doubling over the last ten years. Improvements in energy intensity have been more modest than in either the residential or the manufacturing sectors. To date, efforts to improve the energy efficiency performance of the transport sector have not been a policy priority. Consistent with this, the IEA reports that Indonesia's light-duty vehicles fleet has an average fuel economy of 6.5lpg[26]/100km placing it 23rd out of 36 countries surveyed by the IEA, with lower efficiency than countries such as India and a host of European countries. Building on international experience, there are a range of policies that Indonesia can introduce to realise substantial improvements in the energy efficiency of its transport sector.

1. **Introduce vehicle fuel efficiency standards and reduce the sulphur content of our fuel.** We do not place any obligations on the fuel efficiency or emissions of our light vehicle fleet. This is in contrast with European countries and the US as well as a range of emerging market economies. For instance, China has targets to reduce the fuel efficiency of its light-duty car fleet to 5.0 lpg/100km by 2020. The Ministry of Transport should introduce minimum vehicle efficiency standards for all new vehicles. In order to be effective, these standards would need to be mandatory with international evidence suggesting that voluntary standards have been ineffective (IEA, 2008). It would be most efficient for these standards to apply as an average across the entire fleet rather than to every individual car. Given the prevalence of the light duty fleet in Indonesia – and the relative ease of testing the energy efficiency of light vehicles rather than heavy vehicles – light vehicles should be the policy priority. However, the introduction of these standards will require a reduction in the sulphur content of our fuel which is presently very high by international standards: as per August 2013, unleaded diesel with an average sulphur content of 3,500ppm dominates fuel sales in Indonesia although there is limited availability of diesel with a sulphur content of 500ppm in Jakarta while Indonesian gasoline has a sulphur content of 500ppm (UNEP, 2012, 2013). These high levels of sulphur prevent the adoption of major pollution control technologies such as particulate filters and improved engine designs that can facilitate vehicle efficiency (Kamau, 2010).

[26] lpg is litres per gasoline equivalent.

Analysis of the implementation of fuel economy standards for passenger vehicles suggests it could reduce consumer consumption on fuel by US$19 billion (IDR0.2 trillion), reduce fuel use by 32 billion litres of fuel and cut emissions by 1.4 million tCO_2 in the years 2015 to 2023 (Atabani, 2012). This is consistent with international experience. The case of India, as discussed in Box 11, indicates developing countries which introduce vehicle standards at an early stage can yield considerable benefits in terms of vehicles' average engine efficiency. Similarly, a recent study by the Climate Change Authority of the Australian government on the possibility of introducing vehicle emission standards in Australia concluded that the net private benefits of such standards in Australia (even before valuing CO_2 savings) could be in excess of US$7,000 per vehicle, reflecting the reduced fuel consumption induced by these standards (Climate Change Authority, 2014).

2. **Introduce taxation on vehicles according to energy/CO_2 intensity.** At present Samsat, the agency responsible for cars and roads, administers (in each city and province) the collection of vehicle registration tax and annual vehicle ownership tax which make no distinction according to the CO_2 or energy consumption of vehicles. This is in contrast with a wide range of other countries including South Africa, Chile, UK and the US. There are a number of design options that would need to be addressed in such a scheme:

    a. whether the tax should be levied at the point of purchase or through an annual registration fee or both. It is likely that tax rates that vary at the point of use will be more effective at influencing consumer behaviour although both could be used in conjunction with the other so long as they were carefully calibrated to give an appropriate incentive;

    b. whether the tax should be applied to the CO_2 emissions or its energy use – while both approaches would be similar, there would be differences , for instance, on the price signals given to diesel cars (which are more energy efficient than petrol cars but with diesel having a high carbon content per litre of fuel than petrol);

    c. whether the tax rate should be a fixed amount for all vehicles or an *ad valorem* rate applied to the purchase price (i.e. in proportion to the value); and

    d. whether the system should be structured entirely as (progressively higher) taxes on vehicles with higher levels of CO_2/energy intensity or as a 'feebate' whereby a threshold is set and vehicles with CO_2/energy intensity higher than that threshold face a tax penalty while vehicles lower that the threshold receive a rebate. While a feebate system may be attractive in reducing the extent of the additional tax burden taken by the Indonesian government, current congestion problems in many Indonesian urban areas suggest that it would be appropriate for all vehicles to be taxed but with progressively higher rates of taxation for more carbon/energy intensive cars.

International studies suggest that these schemes can be cost effective. A review by the University of Berkeley of a variety of different options for introducing annual car taxation in California, focussing in particular on a feebate system associated with the

emissions of the vehicle, suggested that the net social cost of all design options would be negative (Bunch, Greene, Lipman, Martin, & Shaheen, 2011).

3. **Introduce mandatory labelling on the energy efficiency of vehicles.** Accompanying the fiscal policy to tax vehicles according to energy/CO_2 use, the Ministry of Transport should make labelling of the energy/CO_2 performance of vehicles obligatory. This will ensure that consumers can effectively respond to the price signals created by the vehicle taxation regime.

4. **Accelerate the delivery of the measures to improve transport congestion identified in the RAN-GRK.** Indonesia suffers from some of the most traffic congested cities in the world. The RAN-GRK identifies a series of measures that would promote greater energy efficiency in the transport sector. These include the development of intelligent transport systems, application of traffic implementation control, application of parking management, application of congestion charging and road charging, reformation of Bus Rapid Transit systems, and rejuvenation of public transport fleets. These initiatives have not represented a focus of this report but an audit of their current status should be undertaken and the appropriate activities undertaken.

Fiscal and regulatory measures for the transport sector are a low to medium priority for the MoF. The introduction of vehicle efficiency standards is a low priority as it is not under direct MoF control; although it may lead to significant EE improvements at low (or zero) costs to the government. Setting taxes on vehicles dependent on energy use are a medium priority – this requires coordination with other bodies, and may require changes to the regulations which currently place responsibility for such taxes with provincial governments, but may also lead to improvements in our vehicle fleet, a fast-growing source of energy use, in a fiscally responsible manner. The provision of information on vehicle efficiency is a low priority for the MoF, as it is mainly the responsibility of other bodies. It may lead to a moderate increase in EE measure uptake at a relatively low cost. Accelerating public transport initiatives is a medium priority: the Ministry of Finance would need to allocate a significant amount of funding for this, but it would lead to higher energy efficiency if it displaces car transportation.

Box 11 India is reducing fuel subsidies and implementing fuel standards to drive energy efficiency in transport

India is one of the two fastest growing car markets in the world. Annual domestic vehicle sales almost doubled in the five years to 2013 to over 3.5 million, as Figure 41 indicates. The country also has a large domestic manufacturing base, with vehicle exports rising by almost 150 per cent in the five years to 2012-13 to 2.9 million. The country is the fourth largest consumer of energy in the world and depends on foreign suppliers for 70 per cent of its oil. To reduce this dependence, India has focussed on energy efficiency measures in the transport sector using a combination of standards, labelling and fiscal incentives.

The government was an early adopter of **fuel economy standards**, first introduced in the 1990s. Standards were tightened rapidly in the 2000s following the introduction of the Euro standard on emissions and fuel regulations. The country currently enforces **Euro IV standards in major cities**, which limits emissions per kilometre of carbon monoxide and particulate matter among other toxic gases of new vehicles sold, and is expected to raise this to the more stringent **Euro V standards in 2015.**These standards effectively reduce the energy consumed per kilometre.

To improve information about vehicle emissions, from 2010 all new cars sold in India were **labelled according to fuel efficiency**, regulations which became mandatory the following year. Cars which do not achieve a minimum

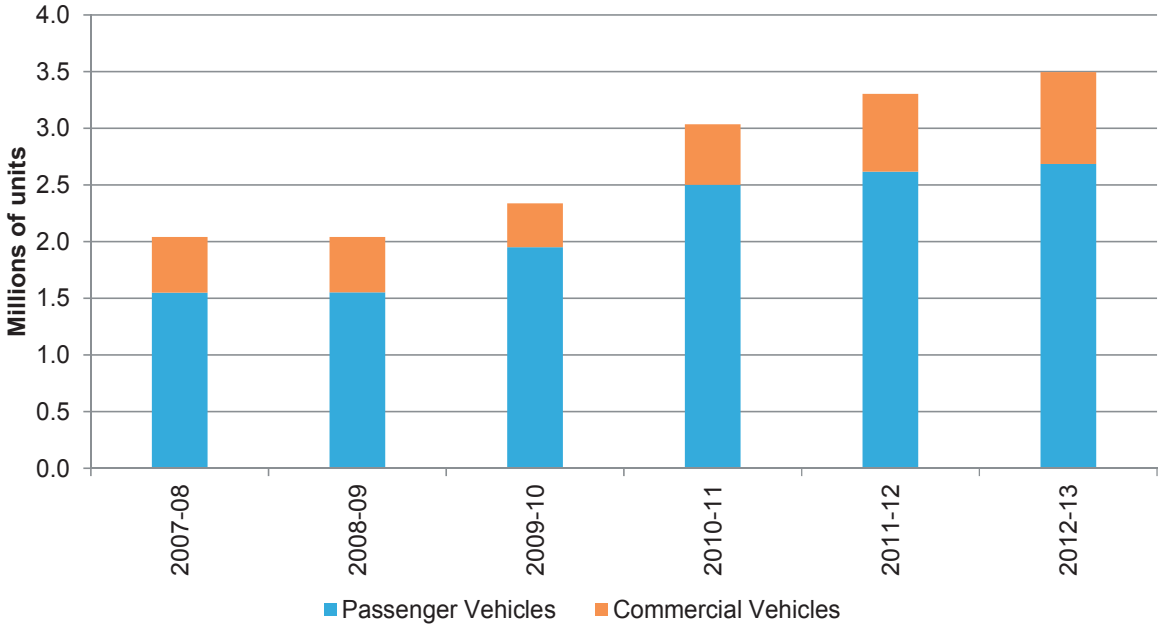
standard may not be sold and labels indicate the car's fuel economy and its relative performance against other models in the same weight category.

Fiscal measures have also been used to promote energy efficiency, by focussing on excise duty and reforming subsidies:

- a **progressive excise duty** regime is designed to incentivise energy efficiency purchases. Cars with engine sizes less than 1200cc face an excise duty of 12 per cent against 24- 27 per cent duty for larger vehicles and up to 30 per cent for the largest vehicles (SUVs). Furthermore, a concessional excise duty of 6 per cent is granted to hybrid and electric vehicles; and

- **domestic petrol prices were liberalised** in 2010. Initially, diesel subsidies remained high resulting in some substitution away from petrol. More recently, rising international prices and a deteriorating exchange rate has resulted in a policy change: diesel subsidies were reduced over the course of 2013 and by mid-2014 the sector is expected to be completely deregulated.

Figure 41 Commercial and passenger domestic sales increased by almost 74 per cent over the past six years



Source: Vivid Economics based on Society of Indian Automobile Manufacturers (SIAM) data

The outcome of these moves has led to India's vehicle fleet being one of the most fuel efficient of all emerging markets. Average fuel efficiency for new registrations in 2010 was less than 6 lpg. This placed the country's vehicle energy efficiency ahead of developed countries such as Japan, the UK and Germany and ahead of Indonesia's 6.5 lpg, as Figure 27 shows. India's experience suggests that consumers can be encouraged to buy energy efficient vehicles through standards, labelling, and fiscal incentives. It also suggests that entrenched fuel subsidies can be tackled in order to further promote efficient usage, something which has strong implications for Indonesia.

11.3.10 Recommendation 19: Link remuneration of key executives at state owned energy supply companies to improvements in energy efficiency

There is considerable supply-side energy efficiency potential in Indonesia. Despite some efforts, there has been minimal overall improvement in the operational efficiency of PT-PLN's thermal plants since 1990 while Pertamina's refineries are generally acknowledged as being inefficient.

In the case of PLN, incentivising energy efficiency improvements in a coherent and robust manner is made more challenging by its reliance on subsidies. For instance, linking the PLN's subsidy payments to improvements in its efficiency level would reduce the financial credibility of the organisation, making it more difficult to attract private-sector renewable IPPs.

The most powerful approach in this instance would be to link part of the remuneration of the Board of PT-PLN to a pre-agreed measure of the energy efficiency performance of the company. This would provide maximum efficiency to PLN to identify the most cost effective measures to improve energy efficiency within the company - and could be cascaded through the organisation as it saw fit. Bonus and incentive payments already account for more than 90 per cent of the salary payments made by PLN so it should be possible to integrate this within the current remuneration framework, although the incentive would need to be sufficiently large, in the context of the other incentive payments made to managers, for it to be powerful.

Linking remuneration of PT PLN executives to supply-side energy improvements is a medium priority reform for the MoF. This falls at least partly outside of MoF control, but is worth pursuing as it would amount to a significant incentive for supply side energy efficiency measure uptake. It would require minimal immediate public resources and greater efficiency on behalf of SOEs would reduce the fuel subsidy bill in the medium term.

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Appendix 1: Calculating Subsidies per Unit of Energy

Section 4.4 provides estimates of the current energy subsidy regime, per GJ of energy. This appendix provides more details of these calculations.

Outside of the electricity sector, the calculations are relatively straightforward. The current subsidy rates are taken from the budget or other sources and combined with information from the IEA (International Energy Agency, 2013a, 2013b) and other sources (BiofuelsB2B, n.d.) on standard conversion factors relating to the density of the fuels and their net calorific values. The key information used in the calculations is provided in the table below.

Table 12 Conversion factors used in calculating subsidy per energy unit outside of the electricity sector

Energy source	Subsidy (IDR)	Litres per metric tonne	Net calorific value (GJ/t)
Gasoline	2,711/litre	1,350	44.75
Diesel	3,731/litre	1,186	43.38
Kerosene	5,583/litre	1,235	43.75
Biodiesel	3,000/litre	1,136	36.8
Bioethanol	3,500/litre	1,266	26.8
LPG	7,175/kg	n/a	46.15

Source: BiofuelsB2B, n.d.; International Energy Agency, 2013b, 2013c

In relation to the subsidies for electricity production – both the general electricity subsidy and feed in tariffs for renewable power production, the approach taken is to 'see through' the electricity production and treat it as a subsidy on the underlying energy sources used to generate the electricity. This is consistent with other analysis of this issue (OECD, 2013). For instance, the general electricity subsidy is treated as (in part) a subsidy for the use of coal in power production. Other energy sources used in power production, including renewable energy sources, are treated in the same way.

In the case of the general electricity subsidy, which is taken to be IDR 570.59/kWh, this approach involves analysing to what extent the fuel source used to generate the power benefits from the subsidy. This requires an assessment of the efficiency with which that energy source is converted into power: an energy source that can be very efficiently converted into power benefits from the bulk of any subsidy, while if an energy source can only be very inefficiently converted into power then the bulk of the benefit of the subsidy to that energy source is lost. For the same reason, transmission and distribution losses need to be taken into account. Feed-in tariffs are treated in broadly the same way, although as the subsidy is provided at the point of electricity generation, not consumption, transmission and distribution losses are excluded. Using data from the IEA (International Energy Agency, 2013a), coupled with discussions with experts, resulted in the following conversion efficiencies being used in the analysis.

Table 13 Assumed conversion efficiencies for power generation in Indonesia

Energy source converted into power	Conversion efficiency before adjusting for T&D losses (percentage)	Conversion efficiency after adjusting for T&D losses (percentage)
Coal	33	29.4
Oil	34	30.8
Gas	38	34.4
Hydro	85	77.0
Solar/geothermal	9	8.2
Other renewables	20	18.1

Source: Vivid Economics

With respect to the renewable feed-in tariffs, Figure 42 calculates the implied subsidy from the feed-in tariff relative to PLN's estimated operating costs of different types of fossil fuel generation, weighted by the percentage of fossil-fuel generation that these sources account for. The figures used are the following.

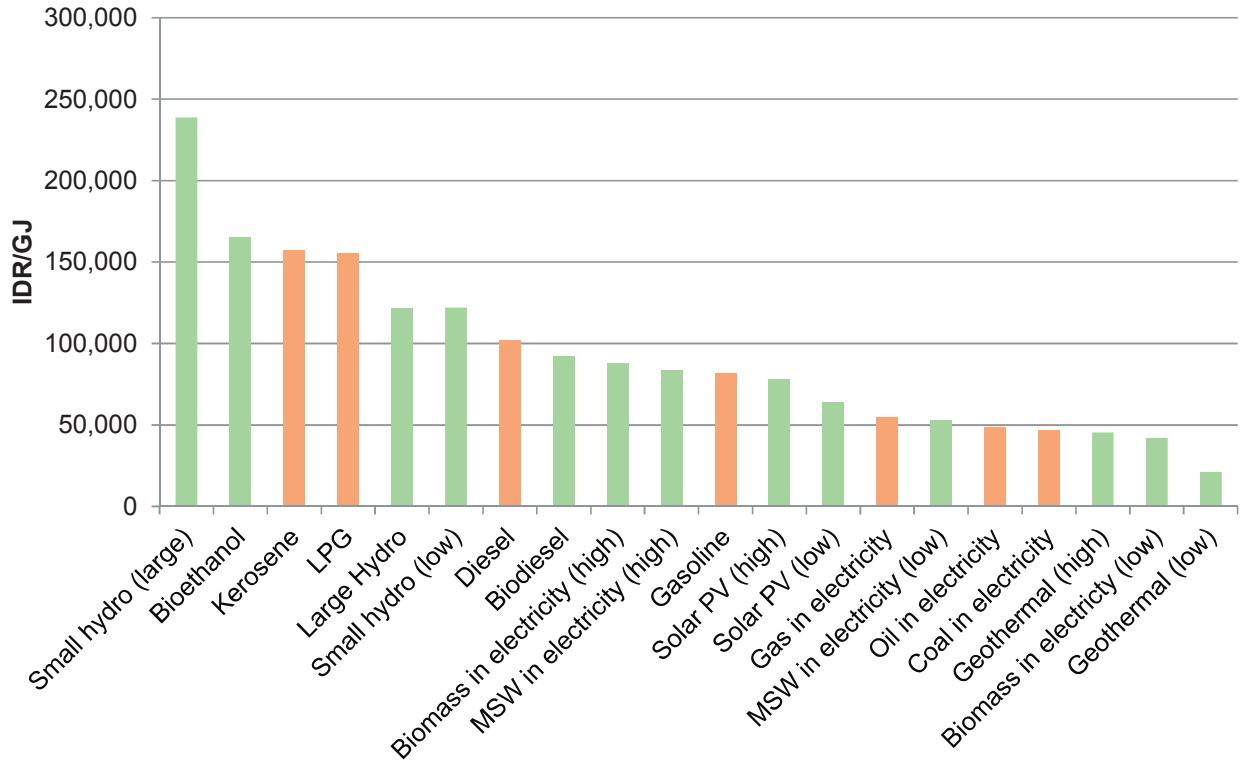
Table 14 Costs and weights of fossil fuel generation

Fossil fuel used in power generation	PLN Operating cost (IDR/kWh)	Weight in fossil fuel generation mix (percentage)
Coal	810.4	50.5
Gas	1,001	28.6
Oil	3,168	20.9

Source: Vivid Economics

An alternative approach to that presented in the main body of the text would be to compute the implied subsidy from renewable feed-in tariffs relative to the cost of the cheapest fossil-fuel source, coal. The impact of this alternative assumption is provided in the figure below. This shows that while some of the results change the overall picture – both in terms of the discrepancy in subsidies in terms of different energy sources and the relatively high subsidies given to some fossil-fuel energy sources – remains the same.

Figure 42 **Energy subsidies per GJ of energy when the subsidy in feed in tariffs is calculated by reference to the costs of coal generation**



Note: *Renewables subsidies highlighted in green; fossil fuel subsidies in orange*
Source: *Vivid Economics*

Appendix 2: Decomposition Analysis

The decomposition analysis first describes the relationship of the four drivers to energy demand more formally, which enables quantitative analysis of the four effects. These effects are (repeated from the body of the text):

- **population effect:** an increase in the number of inhabitants increases energy demand as each person requires energy to live;
- **income effect:** energy demand increases with income per person, as people with higher incomes and businesses with higher profits will consume more energy;
- **structural effect:** a move away from energy-intensive to less energy-intensive sectors, for example from manufacturing to services, may lead to a decrease in energy demand and vice versa; and
- **intensity effect:** as the energy use per unit of income, or energy intensity, declines, energy demand will decrease as less energy will be needed to produce the same amount of output.

Figure 43 **shows the relationship between the drivers and energy demand, described by an equation.** Formalising the relationship enables the construction of a Logarithmic Mean Divisia Index. This index provides for a decomposition of energy demand in Indonesia and the comparator countries into the distinct effects. It describes how energy demand has changed as each driver has changed over the chosen period of time.

Figure 43 Energy demand in a sector *i* can be described as a function of the four drivers in that sector; total energy demand is the sum of energy demand across each sector of the economy

$$Total\ energy = \sum_i \underbrace{population}_{\substack{\text{population}\\ \text{effect}}} \times \underbrace{\frac{\sum_i income_i}{population}}_{\substack{\text{income}\\ \text{effect}}} \times \underbrace{\frac{income_i}{\sum_i income_i}}_{\substack{\text{structural}\\ \text{effect}}} \times \underbrace{\frac{energy_i}{income_i}}_{\substack{\text{intensity}\\ \text{effect}}}$$

Note: *The sectors considered in this analysis are: agriculture, services, residential, manufacturing, transport, and other.*
Source: *Vivid Economics*

The Logarithmic Mean Divisia Index (LMDI) satisfies the important criteria of ease of implementation and interpretability. The LMDI is based on log mean growth rates of the variables of interest. The three main benefits to this approach are:

- it incorporates growth rates of both the variable of interest and explanatory factors;
- the formula structure does not change with the number of explanatory factors and the residual is zero by construction; and

– it allows for additive decomposition, which provides an intuitive understanding of aggregate changes in variables of interest.

The LMDI is applied as follows:

Starting with the identity:

$$E = \sum_i Ei$$

Where total energy consumption$E$is equal to the sum of energy consumption by sectors E_i.Then each sector's consumption can be decomposed as:

$$\mathrm{E_i} = Pop\frac{Q}{Pop}\frac{Q_i}{Q}\frac{E_i}{Q_i}$$

This expression introduces matching terms in the numerator and denominator of the fraction so that the identity remains valid after cancelling out. This manipulation is introduced in order to analyse the factors that are thought to be important, which in this case are:

– Pop, the aggregate population in the economy;
– $\mathrm{Q_i}$, a measure of sectoral activity;
– E_i/Q_i, a measure of energy intensity in sector i; and
– Q_i/Q, the share of a sector in total activity – reflecting the structure of the economy.

The LMDI decomposition, decomposing the change in energy between time periods T and 0, takes the form:

$$E^T - E^0 = \Delta E_{tot} = \Delta E_{pop} + \Delta E_{income} + \Delta E_{str} + \Delta E_{int}$$

Where:

– $\Delta E_{pop} = \sum_i w_i \, log \frac{Pop^T}{Pop^0}$
– $\Delta E_{income} = \sum_i w_i \, log \frac{\frac{Q^T}{Pop^T}}{\frac{Q^0}{Pop^0}}$
– $\Delta E_{str} = \sum_i w_i \, log \frac{\frac{Q_i^T}{Q^T}}{\frac{Q_i^0}{Q^0}}$
– $\Delta E_{int} = \sum_i w_i \, log \frac{\frac{E_i^T}{Q_i^T}}{\frac{E_i^0}{Q_i^0}}$
– $w_i = \frac{E_i^T - E_i^0}{log\, E_i^T - log\, E_i^0}$

Appendix 3: Energy Audit Schemes in Indonesia

The requirements of energy audits under Regulation 70/2009 were introduced by the Ministry of Energy and Mineral Resources (MEMR) in 2003. The 2003 programme expires in 2014, with the expectation that more than 1,000 units will have been audited at a cumulative cost of more than IDR 100 billion. As noted in the RIKEN, it has led to more than 700 GWh of energy savings with a cumulative value of nearly IDR 2 trillion. The scheme provided free energy audits for industrial units and buildings. The audit outcomes are divided into three types:

– opportunities at no cost should be applied in less than one year;

– those at low cost opportunities should be undertaken within two years; and

– medium and high cost opportunities should be undertaken within five years.

A review of the savings identified by audits in the period 2010-2012 shows that in most installations, the identified profitable energy saving opportunities would cost the installation less than IDR 1 billion and that these would save these installations around 1.4 per cent of energy consumption and reduce CO_2 emissions by 1 per cent. The installations would have an average payback period of half a year.

Further, the Indonesia Climate Change Trust Fund (ICCTF) and subsequently MoI funded an energy audit scheme looking at the energy efficiency of steel and pulp and paper mills in the period 2009-2010. In 2011, audits covering 35 steel installations (accounting for around 65 per cent of steel production) and 15 pulp and paper installations were undertaken. This identified energy saving opportunities amounting to between 5 per cent (pulp and paper) and 8 per cent (steel production) of current consumption.

In the textile and footwear sector, 123/M-IND/PER/11/2010 provided discounts of 10 per cent for new imported machinery and 25 per cent for domestic machinery. Around 50 footwear companies improved energy efficiency by 22to 25 per cent, improved production capacity by around 30 per cent, increased productivity by around 5 per cent and generated 21,700 jobs. Ministry of Industry Regulation 91/M-IND/PER/11/2008 provided discounts for 16 sugar factories, increasing production capacity by 1.5 per cent and milling efficiency by 1.2 per cent. Ministry of Industry Regulation 50/M-IND/PER/3/2012 provides up to 12.5 per cent discount for purchase of machinery and equipment of domestic or overseas origin in the sugar industry.

Appendix 4: Development Partner Initiatives to Support Energy Efficiency

Various development partners support energy efficiency in Indonesia. These include the following:

- **UNDP/GEF** programme 'Barrier Removal to the Cost-effective Development and Implementation of Energy Standards and Labelling Efficiency' (BRESL). This is a cooperative project among six Asian countries (Bangladesh, China, Indonesia, Pakistan, Thailand, and Vietnam) to support development of energy standards and labelling with a focus on air conditioners, fans, refrigerators, electric ballasts, electric motors, CFL and rice cookers. There are currently pilot projects to replace existing lamps with LEDs in local government buildings in Makassar;

- **USAID** project 'Indonesia Clean Energy Development' (ICED) provides technical advice and support to project developers that want to pursue small scale renewables and energy efficiency projects;

- **KfW Carbon-Linked Incentive Scheme** (CLS) aims to provide financial incentives linked to monitored and verified emission reductions made by SMEs, probably in textiles and metal industries. The concept development is in 2013; the pilot scheme is planned to start between 2014 and 2018;

- **DANIDA** provides bilateral support through a range of programmes to support energy efficiency. An 'Energy Efficiency and Conservation Clearing House in Indonesia' (EECCHI) provides a repository of information on energy efficiency activities and opportunities. It develops the capacity of energy managers and energy auditors in Indonesia supporting the development of national standards for buildings;

- **ADB** provides financial support through its own resources and Clean Technology Fund (CTF) funding. Financial and technical support to ExIm bank includes a recent 1st performance guarantee for a loan to support energy efficiency improvement;

- **CTF** funding is expected to be used in a programme focussing on retrofit requirements of commercial building owners and operators, government buildings that are in arrears with payment of energy bills, commercial buildings, and industrial parks (heat conversion). It is planning to start a street lighting project in 2014, mainly focused on technical issues, but it may include policy elements;

- **IFC**'s Sustainable Energy Financing Programme concluded in 2012;

- The **International Copper Association** is helping with the development of minimum energy performance standard (MEPS) for air conditioning units. Its work continues through 2014;

- **JICA** has reviewed the potential for a lending facility to support energy efficiency capital investments. It identified possible changes to the electricity tariff system to support energy efficiency, including setting peak-use time zones and expanding ratio of peak to non-peak tariff, introducing incentives for PLN to increase its power factor

in order to reduce loss of energy in transmission, and the introduction of tariff adjustment system in response to fuel price fluctuations; and

– **AFD,** with support from **DFID**, are looking to source and finance low-carbon transactions, including relating to energy efficiency.