Study Report

Fiscal Policy Options For the Energy Sector

in Support of Indonesia's Sustainable Development

Centre of Climate Change Financing and Multilateral Policy
Fiscal Policy Agency
Ministry of Finance
Republic of Indonesia

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List of Acronyms

ADB	Asian Development Bank
AFD	*Agence Française de Développement* (French Development Agency)
APBN	*Anggaran Pendapatan Belanja Negara* (State Budget)
APPI	*Asosiasi Perusahaan Pembiayaan Indonesia* (Indonesia Leasing Association)
BI	Bank Indonesia (Central Bank of Indonesia)
BKF	*Badan Kebijakan Fiskal* (Fiscal Policy Agency)
BKPM	*Badan Koordinasi Penanaman Modal* (Indonesia Investment Coordinating Board)
BOT	build operate transfer
BPPT	*Badan Pengkajian dan Penerapan Teknologi* (Agency for the Assessment and Application of Technology)
CCS	carbon capture and storage
CDM	Clean Development Mechanism
CER	certified emission reduction
CPI	Climate Policy Initiative
CRS	Creditor Reporting System
CTF	Clean Technology Fund
DAK	*Dana Alokasi Khusus* (Special Allocation Fund)
DAU	*Dana Alokasi Umum* (Common Allocation Fund)
DANIDA	Danish Development Assistance Programmes
DBH	*Dana Bagi Hasil* (Shared Revenues)
DKE	*Direktorat Konservasi Energi* (MEMR's Directorate of Energy Conservation)
DME	*Desa Mandiri Energi* (energy-independent villages)
EC	energy conservation
ESCO	energy service company
FDI	foreign direct investment
FiT	feed-in-tariff
GDP	gross domestic product
GEF	Global Environment Facility
GFBOE	gas flaring to barrel oil equivalent ratio
GFF	geothermal fund facility
GFGR	gas flaring to gas production ratio
GFOR	gas flaring to oil production ratio
GGFR	global gas flaring reduction
GHG	greenhouse gas
GIZ	*Gesellschaft für Internationale Zusammenarbeit* (German Federal Enterprise for International Cooperation)
GW	gigawatt
HIP	*Harga Induk Pasar* (market price index)
HVDC	high-voltage direct current
IBRD	International Bank for Reconstruction and Development
ICCTF	Indonesia Climate Change Trust Fund
ICED	Indonesia Clean Energy Development
IPCC	Intergovernmental Panel on Climate Change
IPP	independent power producer
IRR	internal rate of return
ISO	International Organisation for Standardisation

IUP	*Izin Usaha Pertambangan* (mining license)
Jamkrindo	*Jaminan Kredit Indonesia* (Indonesia credit guarantee)
JICA	Japan International Cooperation Agency
KEN	*Kebijakan Energi Nasional* (National Energy Policy)
KKP-E	*Kredit Ketahanan Pangan dan Energi* (Food and Security and Energy Credit)
KWh	kilowatt per hour
LCS	Low Carbon Support
LED	light-emitting diode
LEMIGAS	*Pusat Penelitian dan Pengembangan Teknologi Minyak dan Gas Bumi* (Centre for Research and Technological Development of Oil and Gas)
LIPI	*Lembaga Ilmu Pengetahuan Indonesia* (Indonesian Institute Of Sciences)
LNG	liquefied natural gas
LPG	liquified petroleum gas
MEMR/KESDM	Ministry of Mineral Resources/*Kementerian Energi Sumber Daya Mineral*
MOF	Ministry of Finance
MoU	memorandum of understanding
MW	megawatt
MWh	megawatt per hour
NTB	*Nusa Tenggara Barat* (West Nusa Tenggara)
NTT	*Nusa Tenggara Timur* (East Nusa Tenggara)
ODA	overseas development assistance
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
OJK	Otoritas Jasa Keuangan (Financial Services Authority)
OTTV	overall thermal transfer value
PIP	*Pusat Investasi Pemerintah* (Government Investment Centre)
PKB	*Pajak Kendaraan Bermotor* (vehicle tax)
PKPPIM	Pusat Kebijakan Pembiayaan Perubahan Iklim dan Multilateral (Centre for Climate Change Financing and Multilateral Policy)
PMK	*Peraturan Kementerian Keuangan* (Ministry of Finance Regulation)
PPA	power purchase agreement
PPP	public private partnership
PT	*Perseroan Terbatas* (limited company)
PT IIF	*Perseroan Terbatas* Indonesia Infrastructure Finance
PT PLN	*Perseroan Terbatas Perusahaan Listrik Negara* (Government Electricity Company)
PT SMI	*Perseroan Terbatas Sarana Multi Infrastruktur* (Indonesia Multi Infrastructure Company Limited)
RAD-GRK	*Rencana Aksi Daerah Penurunan Emisi Gas Rumah Kaca* (Local Action Plan for Greenhouse Gas Emission Reduction)
RAN-GRK	*Rencana Aksi Nasional Penurunan Emisi Gas Rumah Kaca* (National Action Plan for Greenhouse Gas Emission Reduction)
RAPBN	*Rancangan Anggaran Pendapatan Belanja Negara* (Draft State Budget)
RAPBN-P	*Rencana Anggaran Pendapatan dan Belanja Negara Perubahan* (Revised State Budget)
RDB	Regional Development Bank
RE	renewable energy
RIKEN	*Rencana Induk Konservasi Energi Nasional* (National Energy Conservation Master Plan)
ROI	return on investment

RON	Research Octane Number
RPJMN	*Rencana Pembangunan Jangka Menengah Nasional* (National Medium Term Development Plan)
RUKN	*Rencana Umum Ketenagalistrikan Nasional* (National Electricity General Plan)
RUPTL	*Rencana Usaha Penyediaan Tenaga Listrik* (Electrical Power Supply Business Plan)
SKEM	*Standar Kinerja Energi Minimum* (Minimum Energy Performance Standards)
SME	small to medium enterprise
SNI	*Standar Nasional Indonesia* (Indonesian National Standard)
SPLN	Standar Perusahaan Listrik Negara (Standard National Electricity Company)
TCF	trillion cubic feet
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VAT	value added tax
VED	vehicle excise duty
VRV	variable refrigerant volume

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Preface

The rapid growth in demand for energy in Indonesia is not being met with an equivalent increase in domestic energy production, leading to high dependency on imported ready-to-use energy. The situation has been exacerbated by high government expenditure on fossil fuel subsidies, which has been the main factor restricting the country's development of new and renewable energy and acceleration of energy conservation to deal with its energy issues.

The government has committed to developing the energy sector to support Indonesia's sustainable development through the formulation of strategies for achieving energy security and national energy sovereignty. Management of energy demand and supply is the main key to formulating these strategies. Effective management of energy can be achieved by formulating and implementing various policies, including fiscal policies, in parallel with energy development goals that also promote sustainable development. The effective formulation of fiscal policy could strategically spur various economic activities that support the development of environmentally-friendly energy, particularly new and renewable energy, in the national energy mix, and the implementation of energy conservation.

The development of new and renewable energy to increase Indonesia's energy supply will progress alongside the country's technological capacity. However, the growing demand for energy cannot wait for the development of new and renewable energy to reach a commercial scale. The government has several options for bridging the growing demand for and insufficient supply of energy, one of which is taking transitional steps such as to develop new infrastructure for gas as an alternative energy and the sustained reduction of the fossil fuel subsidy

In the face of the various challenges to achieving energy sovereignty, the Centre for Climate Change and Multilateral Financing (PKPPIM) at Indonesia's Ministry of Finance is conducting a study of fiscal policy options for the energy sector to support the country's sustainable development. The present report offers guidelines for the PKPPIM and the Fiscal Policy Agency's (BKF) formulation of comprehensive fiscal policy supporting the government's effort to achieve its energy sector targets, taking environmental factors into consideration.

This report on fiscal policy options is prepared based on a discussion of the relevant literature and its relevance and uses the Government of Indonesia's terms and fiscal classification code. I would like to extend my gratitude to all parties that have contributed to and supported its preparation, and hope it will benefit and inform them and other parties operating in the energy sector in Indonesia.

Jakarta, 22nd July 2015

Syurkani Ishak Kasim, PhD.
Head of Centre for Climate Change and Multilateral Financing
Ministry of Finance, Indonesia

Executive Summary

This report presents fiscal policy options for the energy sector to support sustainable development in Indonesia, and is synthesised from thirty-four studies of Indonesia's fiscal policy in the energy sector. It has been prepared by the Fiscal Policy Agency's (BKF) Centre for Climate Change and Multilateral Financing (PKPPIM) at Indonesia's Ministry of Finance, and primarily aims to support the design of fiscal policy aiming for Indonesia's energy security and sovereignity and sustainable development.

The report is in harmony with the Nawa Cita, Indonesia's nine-priority agenda aiming for Indonesia's energy security set out in the Mid-term National Development Plan (RPJMN) 2015-2019. The development of sustainable energy is also aligned with Indonesia's commitment to its National/Local Action Plans for Greenhouse Gas Reduction (RAN/RAD-GRK) as part of the government's effort to deal with the challenges of global climate change.

This report is intended as a reference for the Fiscal Policy Agency especially PKPPIM's preparation of comprehensive fiscal policies supporting Indonesia's achievement of its energy targets. Effective management of energy demand and supply is a key strategy for achieving Indonesia's energy targets and can be achieved through the formulation and implementation of various types of policy, including fiscal policy, in line with the goals of the energy development and sustainable development agendas.

On the energy demand side, four short-term fiscal policy options are suggested: (1) reduced VAT on energy-efficient equipment; (2) reduced import duty on energy-efficient equipment that is not produced domestically; (3) reduced income tax for businesses that support energy conservation such as energy service companies (ESCOs); and (4) financing for energy conservation in the form of soft loans to ease the purchase of energy-efficient equipment and to support the development of green buildings. Fiscal policy options for managing energy demand in the long term include (1) the adjustment of the sales tax on luxury goods, including luxury vehicles, based on their energy efficiency; (2) government subsidisation of energy-efficient equipment; and (3) a loan guarantee to lower the barriers for businesses to enter the renewable energy industry.

On the supply side there are six short-term fiscal policy options: (1) the simplification of renewable energy businesses' applications for fiscal incentives; (2) sanctions for businesses that do not comply with regulations, such as oil and gas producers exceeding the permitted threshold for waste emission leakage; (3) the selection of an institution to manage a fund for geothermal exploration; (4) financing guidelines for PT PLN for the development of energy cogeneration; (5) soft loans for the purchase of solar panels; and (6) government support for the development of gas energy infrastructure. There are two fiscal policies for the long-term management of the energy supply: (1) funding for the purchase of solar panels through a loan guarantee scheme; and (2) a loan guarantee for the development of geothermal energy.

Synergy with various supporting elements of the relevant government institutions and with the private sector, together with regular evaluation to improve the effectiveness of fiscal policy in support of sustainable development, are the keys to Indonesia's energy security and sustainable development. This report presents only fiscal policy options based on the abovementioned 34 studies and does not consider other existing knowledge due to time constraints and the methodology agreed by PKPPIM.

Study Report

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Full report

Chapter 1. Background

This report describes and analyses a set of fiscal policy options in the energy sector. It primarily aims to optimise the role of fiscal policy in increasing Indonesia's energy supply and to improve the efficiency of the country's energy consumption. This effort is in harmony with two of Indonesia's main strategic development agendas: firstly, it is aligned with the Nawa Cita, Indonesia's nine-priority agenda for Indonesia's energy security, as stated in the National Mid-Term Development Plan (RPJMN) 2015-2019. Secondly, this effort supports Indonesia's commitment to implementing its national and regional action plan for reducing greenhouse gas (GHG) emissions (RAN/RAD-GRK) in response to the threats of global climate change. This report serves as a reference for the Centre of Climate Change Financing and Multilateral Policy (PKPPIM) and Fiscal Policy Agency on drafting and formulating fiscal policy supporting the sustainable development of Indonesia's energy sector.

Management of the country's energy demand and supply is the primary key to building Indonesia's energy security strategy. Indonesia is aiming for developed country status by 2033 and is aware of the need to meet its rapidly-increasing demand for domestic energy. As a follow-up measure to support its aim of qualifying as a developed country, Indonesia requires significant investment in its energy infrastructure and facilities, including increased energy efficiency and the development of new forms of renewable energy. The accelerated development of the energy sector is crucial to support the target of achieving economic growth of 7% per year until 2033 (PKPPIM, 2014).

High fossil fuel (BBM) subsidies are seen as one of the factors inhibiting the development of new and renewable energy and accelerated energy conservation (LCS and PKPPIM 2014a; 2014b).[1] BBM subsidies reached an average of 16-19% of the total government budget in 2011-2014 (MOF 2010, 2011, 2012, 2013, 2014). In November 2014, the government removed fossil fuel (BBM) subsidies and adjusted the price of premium BBM from IDR 6,500 (equivalent to USD 0.55 where USD 1=IDR 11,900, as used in the government's 2015 adjusted budget) to IDR 8,500 per litre (USD 0.71 per litre). With the decrease in world oil prices in 2014, the Government of Indonesia (GoI) decided to reduce the price of premium BBM to IDR 7,600 per litre on 1st January 2015. Since then it has ceased to fix domestic oil prices and instead adjusts them quarterly according to the latest global market price.

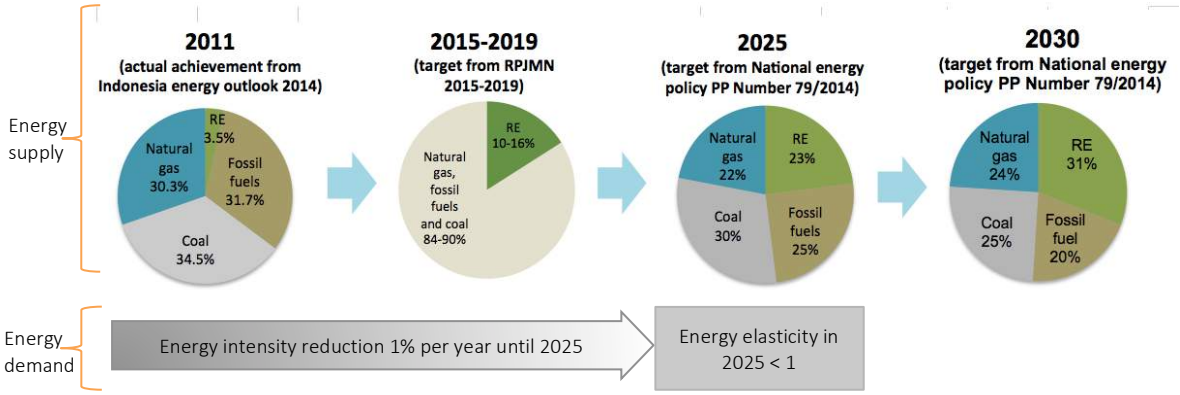
Following the implementation of the new BBM pricing the government's 2015 adjusted budget shows a reduction of 54% in subsidies to the energy sector (fossil fuel, bio energy, and electricity) from IDR 344.7 trillion to IDR 158.4 trillion (see Table 4.16 in MOF 2015b). The decrease in government expenditure on fossil fuel subsidies opens up a fiscal space for the government to undertake various macroeconomic activities including the development of new and renewable energy and the acceleration of energy conservation. However, it needs to anticipate the various social impacts of the increasing price of BBM and its relationship to poverty alleviation (Sugiyarto et al. 2015).

[1] BBM in Indonesia consists of liquified petroleum gas (LPG), gasoline, diesel, and aviation fuel.

The Indonesian government aims to reduce final energy intensity by 1% per year up to 2025 and to achieve an energy elasticity of less than 1% per year by 2025, which means that the rate of growth in energy demand would be smaller than that of economic growth (National Energy Policy (KEN) stipulated in Government Regulation Number 29 Year 2014; and The Master Plan for National Energy Conservation (RIKEN)).[2,3] Regular monitoring is required to assess the achievement of this target.

The Government of Indonesia has set a target to increase the utilisation of primary energy and expand the contribution of renewable energy in the energy mix to 10-16% in 2015-2019 (RPJMN 2015-2019), to 23% in 2025 and to 31% in 2030 (KEN Government Regulation Number 29 Year 2014).[4] Indonesia's energy demand and supply targets are illustrated in Figure 1.

Figure 1. Indonesia's Energy Mix: Achievement and Long-term Plans



Note: RE stands for renewable energy;
source: Indonesia Energy Outlook 2014; RPJMN 2015-19; National Energy Policy (KEN) stipulated in Government Regulation no. 79 Year 2014

Activities that support energy conservation and the development of renewable energy in Indonesia have faced many obstacles such as high operational costs, the large initial investment required and the long period for return on investment (ROI), as well as high political and economic risk (LCS and PKPPIM, 2014b). The risk has restricted the development of renewable energy such as geothermal power. In addition, market participation is low, especially on the part of the financial and banking sectors, which have shown little interest in investing in large new and renewable energy and energy conservation projects. Thus government intervention is considered indispensable to reduce the risk, promote investment in the energy sector as a priority sector and to motivate the community at large to choose products that are more energy efficient.

Fiscal policy can provide strategic financial instruments that can be used to encourage economic activity (Feldstein, 2009), including to accelerate energy conservation and the development of new and renewable energy. We review 34 of the many studies related to fiscal policy and other supporting policies in the energy sector, especially energy conservation and the development of new and renewable energy that have been reviewed in this study. These studies have mostly been conducted in collaboration with PKPPIM. This report presents fiscal policy options based on recommendations prioritised in the 34 studies. Policy recommendations from these studies are

[2] RIKEN aims to provide guidance to all stakeholders in all sectors on how to implement energy conservation activities.
[3] Energy intensity is measured as the amount of energy needed to produce one unit of gross domestic product (GDP). Final energy is a measure of the energy that is delivered to the end users in the economy.
[4] Primary energy is an energy form found in nature that has not been subjected to any conversion or transformation process.

limited to issues related to the energy sector, such as the promotion of saving energy in certain industrial sectors, for example fiscal policies to promote energy cogeneration tailored to specific industries. This report is limited to presenting only fiscal policy options based on policy recommendations in the 34 studies listed in Table 3, due to time constraints and the study methodology agreed by PKPPIM.

The report uses a cluster approach and a meta-synthesis method, a non-statistical technique for integrating, evaluating, and interpreting the findings from several qualitative studies (Cronin et al., 2008). Based on the cluster approach, the PKPPIM has consolidated the policy recommendations from the peer-reviewed studies and categorised them into two main groups: (1) policy options for managing energy demand to improve the efficiency of energy consumption and conservation; and (2) policy options for managing energy supply to promote infrastructure and facility development in order to increase the energy supply and accelerate the development of new and renewable energy.

The policy recommendations are analysed based on three classifications of the government's fiscal policies, namely government revenues and grants, government expenditure and government support to financing scheme. The classification of technical policy recommendations is guided by the policy steps stated in the Ministry of Energy and Mineral Resources (MEMR) Regulation Number 2 Year 2004, Article 40, on the development of green energy.

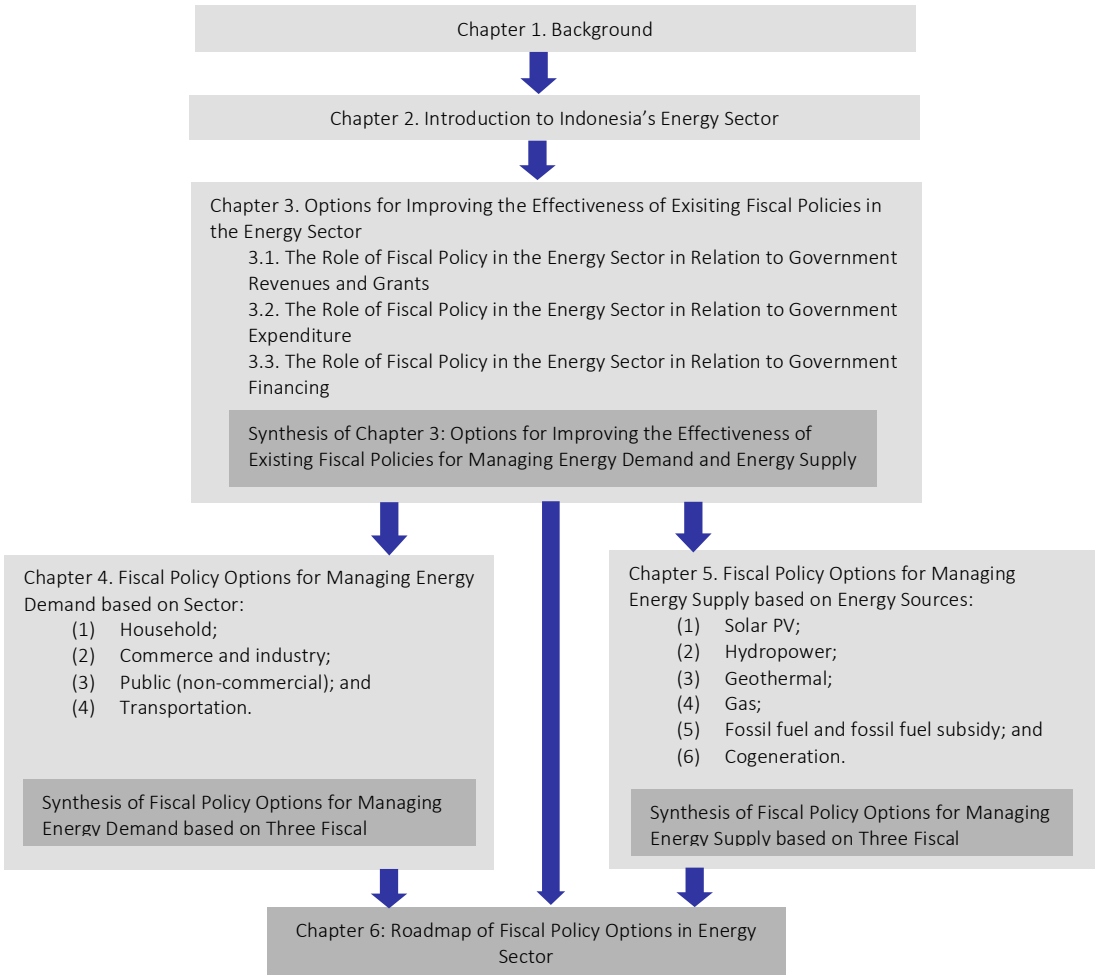
The process of formulating fiscal policy recommendations to meet Indonesia's energy demand and supply has been directed in this report by a guiding question:

What fiscal policy options can influence the demand for and supply of energy and simultaneously support sustainable development in Indonesia?

Fiscal policy recommendations for managing energy demand are organised into four sectors: (1) household, (2) commercial, (3) public (non-commercial), and (4) transportation. Those for managing energy supply are categorised into six groups of energy resources: (1) solar photovoltaic, (2) hydropower, (3) geothermal power, (4) gas, (5) fossil fuels and fossil fuel subsidies, and (6) energy from cogeneration. There is also strong potential for the development and use of other types of renewable energy such as that from wind and wave and tidal sea water; however these are not discussed in this report as there is no specific fiscal policy recommendation for the development of these new and promising energy sources.

This report consists of six chapters. The second chapter briefly explains the energy sector in Indonesia; the third presents the role and potential of fiscal policy in supporting sustainable energy development in Indonesia; the fourth chapter presents and analyses fiscal policy options for managing energy demand; the fifth discusses fiscal policy options for managing energy supply, and the last chapter provides conclusions and policy options, with a proposed fiscal policy roadmap for Indonesia's energy sector. The flow of the discussion in this report is presented in Figure 2.

Figure 2. Discussion Flow of the Report on Fiscal Policy Options in Energy Sector



Chapter 2. Introduction to Indonesia's Energy Sector

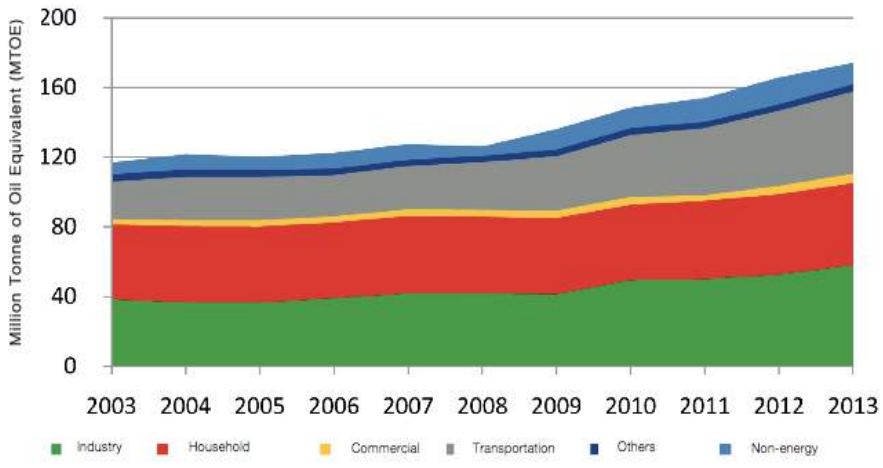
Demand for energy in Indonesia is increasing rapidly and at a much faster pace than supply (LCS and PKPPIM, 2014b). Chapter 2 briefly discusses energy demand and supply, current conditions and energy conservation targets, and sources of financing for activities in the energy sector. The chapter is divided into three sections.

The chapter is divided into three sections. The first section explains energy demand and supply in Indonesia, including progress on the current development of new and renewable energy and energy conservation initiatives. The second section explains the current conditions, targets and potential for energy conservation and the development of new and renewable energy in Indonesia. The third section analyses sources of funding and activities in the field of energy in Indonesia, including energy programmes carried out through bilateral and multilateral partnerships and projects funded by private share capital.

2.1. Energy Demand and Supply in Indonesia

The rising demand for energy in Indonesia, particularly in the household, industrial and commercial sectors (see Figure 3), is triggered by various factors including population growth and income growth (LCS and PKPPIM, 2014a). The data shows that energy consumption increased rapidly at an average of 3.3% per year from 2000 to 2011 (*ibid*).

Figure 3. Indonesia's Energy Consumption by Sector



Source: South East Asia Energy Outlook (2013)

Efforts have already been made to improve the efficiency of energy consumption, especially in the household, industrial and transportation sectors. Such conservation efforts can directly improve the level of people's income, contribute to poverty alleviation, improve health and well-being in the population, and improve productivity and competitiveness by reducing costs, pollution and the burden of energy subsidies on the government budget (*ibid*).

The increasing demand for energy in Indonesia is one of the driving forces behind the government's acceleration of the development of the country's energy infrastructure and facilities in all its provinces as part of its effort to support high, balanced, equitable and sustainable economic growth (MOF, 2015a).

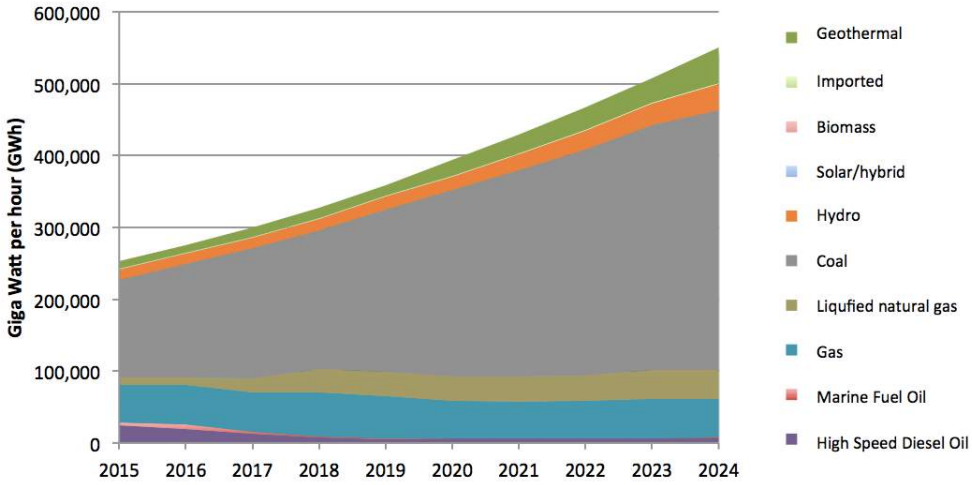
Indonesia is encountering many obstacles in developing the necessary infrastructure to meet its increasing demand for energy and in utilising primary energy, as well as improving the capacity of its electricity generators. In 2012 it achieved only 45% of its target to produce 10,000 megawatts (MW), which it had aimed to reach in 2009. In 2013 Indonesia's own production of fossil fuel fell short of the national 77-million-kilolitre demand by 51% (Pertamina, 2015).[5] This drove it to import ready-to-use-fuels to cover the shortage. The gradual removal of subsidies for fossil fuels, particularly gasoline, in accordance with the National Mid-Term Development Plan 2015-2019 has created fiscal space for the government to invest in the development of productive projects such as energy infrastructure and the development of conventional and unconventional gas and new and renewable energy.

In 2015, the Government of Indonesia committed to prioritising its spending on energy infrastructure to increase the contribution of new and renewable energy to the energy mix. The amendment of the 2015 national budget shows that the government is prioritising the allocation of development funds to energy infrastructure in order to build national energy security and promote economic growth. In 2014, Indonesia's economic growth reached 5.1% with an 8.4% inflation rate (MOF, 2015).

In an effort to increase the utilisation of primary energy, the development of infrastructure in the energy sector such as for conventional gas could become a transitional strategy to meet the escalating demand for domestic energy in the short and the long term until the supply from renewable energy sources reaches a commercial scale and price. In the electricity sector the MEMR has released the 2015-2024 Electricity Supply Business Plan (RUPTL) for the State Electricity Company, PLN (PLN, 2015). The business plan shows that Indonesia is prioritising the improvement of the overall energy mix with increasing contributionz from new and renewable energy; however, Indonesia's energy mix for electricity up to 2024 still relies heavily on coal and conventional gas (Figure 4).

[5] A target of 10,000 MW was set in 2006 in Presidential Decree Number 71 Year 2006 jo. Presidential Decree Number 59 Year 2009 (MEMR, 2012).

Figure 4. Indonesia's Targeted Energy Mix for Electricity Supply by Fuel Type



Source: PLN: RUPTL 2015-2024

2.2. Indonesia's Energy Sector: Development and Potential

There is potential to improve the efficiency of energy consumption via energy conservation in the predominating household, industrial and transportation sectors. Subsidies are a form of financial incentive that can play an important role in increasing energy conservation, particularly in the household sector (JICA (2015) based on PT PLN data 2014). The decrease in the government's subsidy for electricity from IDR 103 trillion in 2014 to IDR 76 trillion in 2015 (MOF, 2015b) is expected to stimulate actors who no longer receive subsidies to carry out energy conservation activities.

The data demonstrate that the long-term potential of renewable energy resources in Indonesia is immense, but they are little-utilised. The available potential of gas and geothermal energy is around 150 trillion cubic feet (TCF) and 29 GW respectively. At the point of writing only 2.1% and 4.8% respectively are being used (see Table 1). The available hydropower potential is about 75 GW, and only 9% of this is operational. There is also the potential for 50 GW from biomass, but currently only about 9.9% is being produced. Solar and wind power are still underdeveloped. There is a potential 49 GW to be derived from waves and tidal sea water, but, as in many other countries, this resource is not well exploited (LCS and PKPPIM, 2014b). Figure 1 shows that renewable energies and natural gas are expected to contribute to 23% and 22% of the energy supply respectively by 2025, providing almost half of Indonesia's total requirement of energy.

Table 1. Potential and Installed Capacity of Energy Sources in Indonesia

No	Energy source	Potential	Installed capacity (May 2013)	%
1	Hydropower	75 GW	6.8 GW	9.1
2	Geothermal	29 GW	1.4 GW*	4.8
3	Biomass	50 GW	1.6 GW	3.3
4	Solar PV	4.8 KWh/m^2/day***	27 GW	n/a
5	Wind power	3-6 m/s***	1.4 MW	n/a
6	Tidal power	49 GW	0.01 MW	0
7	Natural gas	150.7 TCF**	3.17 TCF/year (2012)	2.1**

Source: LCS and PKPPIM (2014b), adapted from the presentation by MEMR (2013) in the Indonesia Pavilion at COP 19 in Warsaw.
Note: *Capacity installed by May 2015; **Capacity installed by 2012 based on Electricity Supply Business Plan 2015-2024 (PLN, 2015); ***The magnitude of the potential for solar PV and wind power depends on the area allocated to solar panels and windmills.

The gap between current conditions and the potential for energy efficiency and renewable energy development in Indonesia can be bridged by an effective transition strategy. The development of new and renewable energy will take considerable time until the technologies reach both maturity and a viable commercial scale and price. The pressing demand for energy cannot wait until new and renewable energy technologies are widely available to replace high-emission fuels. Thus intermediate transitional strategies such as the development of infrastructure for the use of conventional and unconventional gas while gradually reducing fuel subsidies should be employed in building Indonesia's energy security.

2.3. Programmes and Financing for Indonesia's Energy Sector

The government's commitment to building energy security and reducing national GHG emissions includes programmes and activities that support energy efficiency and renewable energy development in Indonesia. Both support the country's development and contribute to the global effort to tackle climate change. To reach these objectives, energy-sector programmes and activities need sufficient funding from both domestic or and international financial sources. The following section describes funding sources that can support the development of Indonesia's energy sector.[6]

2.3.1. Domestic Funding Sources

Public and private loans and grants can provide domestic funding for the development of the energy sector. The source of public domestic funding is primarily the government. Based on the classification of the government's fiscal accounting system in the National Budget (APBN), funding for the energy sector is provided by government expenditure sourced from government revenue, development grants from multi-sources and domestic and foreign finance. In the central government's budget, government expenditure comprises two categories: central government expenditure and transfers to local government.

Prior to the significant reduction in the gasoline subsidy at the beginning of 2015, the central government's biggest expenditure was on subsidies for energy in the form of fossil fuel (gasoline), biofuel and electricity. In 2012, these subsidies reached 3.7% of GDP and 20.5% of central government spending, and it is assumed that these figures will be the same for 2014 (LCS and PKPPIM, 2014a based on IMF, 2013). Approximately 70% of the energy subsidy was for fossil fuel and the rest for electricity. This led to an enlarged fiscal deficit.

Government expenditure in the form of transfer to local government is now being carried out via, among other methods, the Special Allocation Fund (DAK), which continues to give low priority in 2014.[7] The government has allocated IDR 467.9 billion, or 1.4% of the total government budget of

[6] In this report "funding" refers to a financial modality in the form of grant or soft loan whereas "financing" refers to financial modality in the form of loan or debt.

[7] The Special Allocation Fund (DAK) is a key source of capital funding for local development in Indonesia's districts, cities, and provinces, and supplements the principal sources of central government funding to the regions: the General Allocation Fund (DAU) and Shared Revenues (DBH). It is taken from the national budget. It is a mechanism to promote the prioritisation of national policies and to contribute to regional equality. Local governments propose the utilisation of the DAK and report on the status of their infrastructure. The Ministry of Finance then stipulated the disbursement of funds to local governments using the Government Work Plan (RKP). The related line ministries provide technical guidelines for local governments' use of the fund based on their technical capacity. Fund allocation for the projects is carried out by local governments in accordance with the central government's technical guidelines. Local governments submit a progress report every three months and annually to the related ministries with a copy to the Ministry of Finance, the National Planning Agency (BAPPENAS) and the Ministry of Internal Affairs. The provincial government supports the district and city governments' implementation of DAK in their territories (PKPPIM, 2015).

IDR 33 trillion, to clean energy investments in 2014 (MOF Regulation Number 180/PMK.07/2013). In 2015, the budget for the DAK increased to IDR 693.9 billion, 2.1% of the total budget of IDR 33 trillion.

Domestic financing for clean energy development is provided via national banking and non-banking sources. The banks have financed energy through government schemes such as Food and Security and Energy Credit (KKP-E), as stipulated in MOF Regulation Number 79/PMK.05/2007. This payment targets farmers, ranchers, fishermen and fish farmers, individually or as a group, with the purpose of intensifying farming, ranching and fishing. KKP-E is operated by several commercial state, private and local development banks. The KKP-E financing facility has been operationalised in the energy sector; however, the plan is to use it to fund the creation of energy from biomass specifically by only micro and medium-scale projects. There is a need to promote the scheme and enlarge the scale of the projects that it supports.

Finance for energy from the non-banking sector includes state funding for geothermal exploration from the Government Investment Facility (PIP) (since 2011) and financing for energy infrastructure provided by PT Sarana Multi Infrastruktur (SMI).[8] Government finance classified as the non-banking sector also includes a revolving fund to cover the cost of land acquisition and for loan guarantees, such as for power plants developed and owned by PT PLN. This fund aims to accelerate power plant construction and has provided IDR 0.6 - 0.9 trillion a year since 2011 (PKPPIM, 2013).

Despite the government's financial support, the participation of the private sector and particularly commercial banks in financing the development of the energy sector is deemed necessary. Even though private banks have been participating in the development of small-scale hydropower plants through a scheme involving 30% private equity and a 70% loan with commercial interest (BI, 2013), the overall participation of commercial private banks in the development of the energy sector is still very limited. The financing of small-scale power plant projects can be combined with financing from international banks, whose interest rates are lower than those of the national private banks (although there are currency risks involved with foreign financing). However, the difference between international and domestic banks' interest rates needs to be utilised carefully, taking into consideration the potential space and opportunity for domestic financial institutions to support the development of national energy.

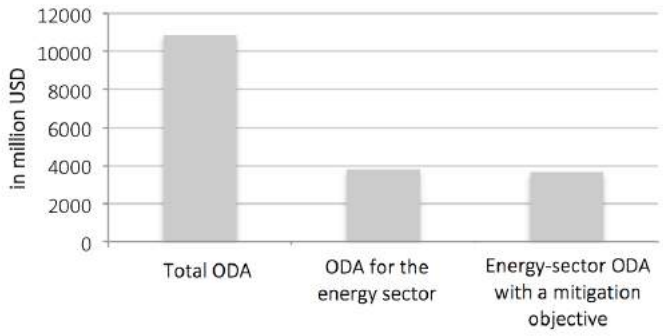
2.3.2. International Funding Sources

International funding for the development of the energy sector includes bilateral and multilateral financing schemes provided by international public and private sources. The amount of international public funding for this sector's development has been significant; however, the amount that is actually provided is usually less than that originally committed (Halimanjaya, 2012). Among other factors, this gap is due to the declining financial performance of donor countries and a low level of funding absorption due to failure of tender committees to outsource development projects and programmes (*ibid*).

Almost a third of overseas development assistance (ODA) to Indonesia is allocated to the energy sector (Figure 4). Japan, the Netherlands and Germany support most of the energy development projects in Indonesia (OECD, 2015). Energy-sector ODA with a mitigation objective is primarily used in Indonesia for the development of gas power plants (47%), development and exploration of geothermal potential (20%), hydroelectric development (17%), gas distribution development (15%) and others (1%) (*ibid*).

[8] The PIP interest rate was similar to that of commercial banks in Indonesia, though longer terms were possible.

Figure 5. Allocation of Total ODA Bilateral Commitment to Indonesia's Energy Sector, 2002-2013



Source: OECD Creditor Reporting System (OECD, 2015)

In addition to bilateral cooperation, international funding is available in the form of grants for climate change projects via multilateral schemes. The funding has come from the Clean Technology Fund (CTF) and the Global Environment Facility (GEF), among others. Climate-change projects are expected to support energy-efficiency programmes and the development of renewable energy in Indonesia. Since 2008 there have been 18 energy project partnerships with climate funds worth a total of USD 54 million (Table 2). The total amount of multilateral ODA for climate change projects is very small compared to that of bilateral ODA, with multilateral funding for the energy sector in Indonesia was only 1.3% of bilateral ODA in 2002-2013.

The Green Climate Fund (GCF) is a multilateral financial institution which was founded in 2009 specifically to finance projects and programmes related to climate change all over the world. Several countries including Indonesia committed a total of USD 11 billion to it by the end of 2014. Many energy projects in Indonesia can potentially be financed by the GCF. Indonesia needs one of the many accredited national, regional, or multilateral institution to help it to access the GCF.[9]

Table 2. List of Partnerships with Climate Funds in the Energy Sector, 2008-2015

Climate fund institutions	Energy conservation	Renewable energy	Energy (general)	Total
		In million USD (number of project)		
Clean Technology Fund (CTF)		4.95 (3)		4.95 (3)
Germany's International Climate Initiative	1.56 (1)	5.94 (3)		7.50 (4)
Global Environment Facility (GEF4)	8.42 (3)	8.16 (3)		16.58 (6)
Global Environment Facility (GEF5)	14.9 (3)		8.03 (1)	22.93 (4)
Indonesia Climate Change Trust Fund (ICCTF)	2.20 (1)			2.20 (1)
Total amount of grants from international climate fund institutions				54.16 (18)

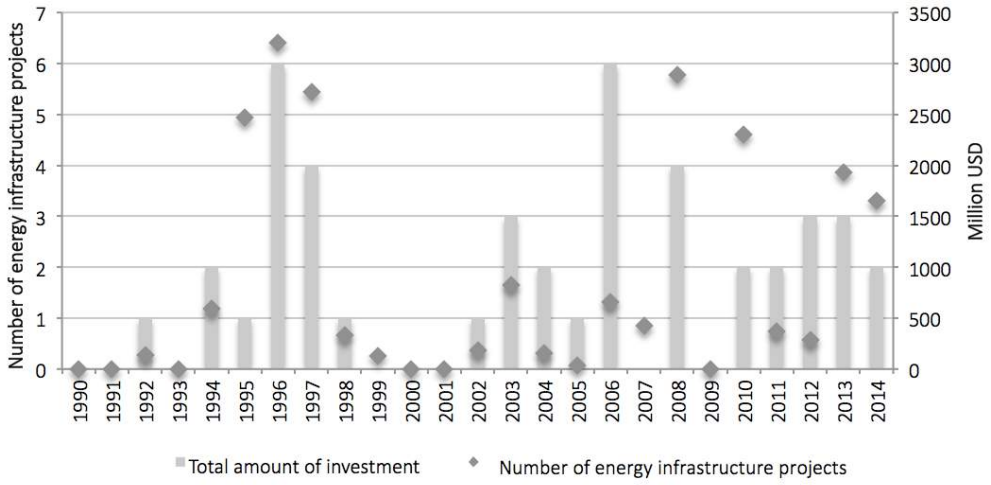
Source: Climate Funds Update (CFU, 2015)

[9] The GCF accreditation system can be accessed at http://www.gcfund.org/operations/accreditation.html

Indonesia needs a large amount of funding to build energy facilities and infrastructure, and the participation of the domestic and international private sectors is necessary. Based on the RUPTL 2015-2024, the level of electrification can be increased by constructing power plants and transmission and distribution systems. For this PT PLN needs a total of USD 69.3 billion; this public investment needs to be co-financed, and USD 62.7 billion are sought from the private sector and independent power producers (IPP) (PLN, 2015).

Private sector funding to support the energy sector in Indonesia is often channelled through foreign direct investment (FDI), venture capital, equity, and stock investments. World Bank data shows that 42 electricity and gas development energy infrastructure projects received private funding from 1990-2014, with the number and sizes of the projects varying each year (see Figure 6).[10]

Figure 6. Energy Projects in Indonesia with Private Finance Participation



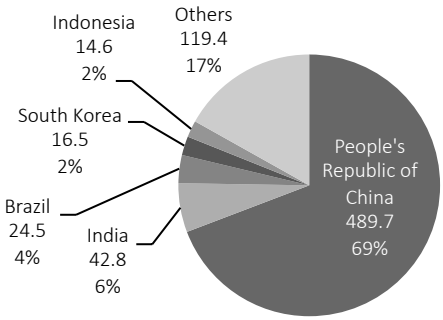
Source: World Bank Private Infrastructure Project database (2015)

Energy projects in Indonesia also have been financed by the international private sector through carbon trading via the Clean Development Mechanism (CDM). Indonesia is the world's fifth largest destination country for CDM projects after China, India, Brazil and South Korea. CDM projects mainly address climate change mitigation, especially in the energy and transport sectors. Indonesia has already generated 14.6 million in Certified Emission Reductions (CER, the currency of the CDM): this is 2.1% of total global emission reductions from 2004-2014 (CDM data from UNFCCC, 2015).[11] Currently the largest producer of CERs is the Republic of China, which has produced as much as 69.2% of the total CERs generated globally from 2004-2014 (see Figure 7).

[10] Currently the data only covers two types of energy infrastructure development, namely electricity and gas energy. The UNDP is exploring the potential for private investment in the energy sector.

[11] The currency unit used in the carbon trade mechanism.

Figure 7. Major Countries Generating Certified Emission Reductions through the Clean Development Mechanism, 2004-2014



Note: numbers refer to the amount of CER produced (in millions) and the percentage is the share of CER produced by the respective countries. Source: UNFCCC CDM data (2015)

It can be concluded that all types of energy projects can be financed by one or more financing sources depending on the risk involved and the scale and value of the investment. These factors need to be taken into consideration when improving the effectiveness of financing and the use of financial resources. Analysis of the income and the profit and risk involved in such projects are essential to support the government in achieving energy development and national energy security.

International funding data used in Chapter 2

OECD Creditor Reporting System (CRS)
The OECD CRS holds project data funded by the Overseas Development Assistance (ODA) as reported by countries on the Development Assistance Committee (DAC), based on each country's reporting capacity. The data was retrieved in December 2014. This report uses the amounts committed because there has been no data on amounts disbursed since 2012. Energy-sector ODA with a mitigation objective in this report refers to energy development projects funded by ODA in developing countries. Energy mitigation ODA refers to all ODA energy projects with the primary or supporting goal of climate change mitigation.

Climate Funds Update
Climate Funds Update is an independent initiative undertaken by the Overseas Development Institute (ODI), supported by Heinrich Böll Stiftung. It records data from projects that is received and channelled by a number of climate finance institutions. Many countries that are the destinations for climate finance institution funding are not identified in the OECD's CRS. The ODI's recording process is carried out two to three times a year through direct correspondence with climate finance institution secretariats and access to their financial reports. This report uses data on projects in the energy sector, renewable energy, and energy conservation.

The World Bank Database on private-sector participation in infrastructure development
Since 1990 the World Bank has recorded the amount invested in development projects in which private sectors are involved. The recording process is carried out by contractual agreement and does not include small or micro-scale projects. This database records infrastructure projects in the telecommunications, energy, transportation and water management sectors, with data in the energy sector limited to electricity and gas development projects.

UNFCCC Clean Development Mechanism (CDM)
Carbon-trading project data on the country of destination, the project document and the investor's country of origin.is recorded by CDM executives and reported to the UNFCCC. The CDM covers industrial-scale energy projects, energy distribution and energy demand. This report uses all available CDM project data to identify the major destination countries of CDM. Available CDM data is mainly dominated by the energy and transportation sectors.

Chapter 3. Options for Improving the Effectiveness of Existing Fiscal Policies in the Energy Sector

Fiscal policy can provide strategic financial instruments that can be used to encourage economic activity (Feldstein, 2009). The government budget divides fiscal policies into three main groups (see Chapter 2): (i) fiscal policy related to government revenues and grants, (ii) fiscal policy related to government expenditure, and (iii) fiscal policy related to government financing. Chapter 3 briefly explains these three types of fiscal policy in relation to the energy sector, mainly discussing policies stipulated by the Ministry of Finance and issues related to the development of the energy sector in Indonesia.

3.1. The Role of Fiscal Policy in the Energy Sector in Relation to Government Revenues and Grants

Fiscal policy on government revenue and grants governs and manages the sources of government income. The government's revenue consists of domestic revenue from taxation and from non-taxation, and government grants. The revenue from taxation in the energy sector comes from domestic taxes and taxes on international trade.[12] The Government of Indonesia has several fiscal policies related to revenue from taxation to support the development of the energy supply. It also has the potential to expand its fiscal policies to help to manage energy demand.

3.1.1. Fiscal Policy on Managing Energy Demand Related to Government Revenues and Grants

Government Regulation Number 31 Year 2007 regulates VAT reduction on imported goods and the delivery of certain strategic taxable goods, but does not include energy conservation products, which are essential to support economic growth and the national GHG emission reduction programme. This regulation could be adapted to support energy conservation activities by adding industries and businesses that have attained high energy efficiency certification such as ISO 5000 and/or national standards stipulated by MEMR and/or Ministry of Industry regulations.[13]

The Government of Indonesia has provided facilities for the reduction of import duties on specific energy products through MOF Regulation Number 177/PMK.011/2007 for products used in

[12] Based on its collection authority and management, taxes in Indonesia are divided into two categories: central tax and local tax. The authority for central tax lies with the Tax Directorate General in the central government. Central tax consists of income tax, VAT, tax on luxury goods, stamp duty, and land and building taxes for plantations, forestry and mining. Local taxes are collected and managed by local government and include, among others, development tax, advertisement tax, motor vehicle tax, entertainment tax, and land and building tax for cities and villages.

[13] ISO 50001 contains an energy management system in industrial facilities and buildings to manage their energy consumption. The implementation of this standard is estimated to contribute to energy savings of 5-12% in an industry or a building (http://www.iso.org/iso/home/store/publication_item.htm?pid=PUB100282).

upstream oil and gas activity and geothermal power. In addition, MOF Regulation Number 154/PMK.011/2012 on the second amendment of MOF Regulation Number 154/PMK.011/2008 provides for import duty exemption on capital goods needed to build and develop power plants in the public interest.

To date there are no facilities for exemption from or reduction of import duties for energy conservation products. This could be rectified by providing a tax exemption or reduction for products that fulfil the rating and labelling criteria stipulated in MEMR Regulation Number 18 year 2014 on standards and labelling for self-ballasted lamps, Government Regulation Number 70 Year 2009 on energy conservation, and Indonesia National Standards (SNI) as stipulated by the National Standardisation Agency.

3.1.2. Fiscal Policy on Managing Energy Supply Related to Government Revenues and Grants

The government has been trying to improve the effectiveness of fiscal policies for managing energy supply. The latest policy on taxation facilities is regulated by Government Regulation Number 18 Year 2015 on Income Tax Facility for Investment on Specific Business Sectors and/or Specific Regions as a tax incentive. The parts of the energy sector that receive income tax concessions are coal and lignite mining for domestic consumption, all phases of oil and gas exploration, production from coal and oil refineries including gas refinement and processing, the electrical equipment industry, waste management, and the procurement of electricity, gas, and geothermal energy.

Government Regulation Number 18 Year 2015 amends the previous policy, which did not restrict fiscal incentive facilities for export-oriented coal developers in which coal is considered a high-emission energy source. The income tax incentive is aimed at business entities operating in the area of renewable energy. Fiscal policy incentives for business entities that operate in some areas of renewable energy are regulated by Ministry of Finance (MOF) regulations such as MOF Regulation Number 21/PMK.011/2010 on the provision of tax and customs concessions for the utilisation of renewable energy sources.[14] MOF Regulation Number 21/PMK.011/2010 details tax concessions as an example of fiscal policy incentives for business entities working on the development of new and renewable energy, including accelerated amortisation. Accelerated amortisation may reduce income tax significantly, as illustrated below.

[14] Chapter III Article 3 provides incentives for businesses in the form of a reduction of taxable net income by 30% from the total investments for 6 years (5% per year); accelerated depreciation and amortisation; the imposition of income tax on dividends paid to the subject of tax from overseas by 10%, or a lower rate according to the application of double tax avoidance; and compensation for losses over more than five but fewer than ten years.

Illustration 1: Tax concession from the accelerated amortisation/depreciation

The following is an example of the calculation of the tax concession laid down by MOF Regulation Number 21/PMK.011/2010 on the provision of tax and customs concessions for the utilisation of renewable energy sources. With accelerated amortisation, a corporation that operates in renewable energy development receives a significant tax reduction. Accelerated depreciation and amortisation is calculated via two methods, namely the straight line method and the declining balance method.

The following table demonstrates two tax incentive scenarios received by a developer of new and renewable energy. Scenario 1 uses assets in group 1 (4-year lifetime) and scenario 2 uses assets in group 2 (8-year lifetime). In the first scenario, based on Act Number 36 Year 2008, the value of depreciation/amortisation is 25% of a business entity's total assets when using the straight line method and 50% when using the declining balance method. Based on MOF Regulation Number 21/PMK.011/2010, the value of depreciation/amortisation increases to 50% of a business entity's total assets when using the straight line method and 100% when using the declining balance method.

Description	Scenario 1		Scenario 2	
	Asset group 1 (lifetime: 4 years)		Asset group 2 (lifetime: 8 years)	
	Straight Line	Declining Balance	Straight Line	Declining Balance
Act Number 36 Year 2008	25%	50%	12.5%	25%
Income tax before accelerated depreciation/amortisation	15,000,000	8,750,000	35,000,000	25,995,483
MOF Regulation Number 21/PMK.011/2010	50%	100%	25%	50%
Income tax after accelerated depreciation/amortisation	5,000,000	-	15,000,000	8,750,000
Government Income	(10,000,000)	(8,750,000)	(20,000,000)	(17,245,483)
Corporate	10,000,000	8,750,000	20,000,000	17,245,483

Note: Figures are IDR

For an asset with a 4-year life the corporation receives an IDR 10 million tax reduction using the straight line method and IDR 8.75 million via the declining balance method. The government experiences a decrease by the same amount. In the second scenario, the value of depreciation/amortisation increases from 12.5% to 50% using the straight line method or from 25% to 50% via the declining balance method. In this case the corporation enjoys an IDR 20 million tax reduction calculated via the straight line method and one of IDR 17,245,483 using the declining balance method, with government income reduced by the same amount.

In illustration 1, under MOF Regulation Number 21/PMK.011/2010 the government provides an incentive in the form of a significant corporate income tax reduction which is expected to motivate business entities to operate in the area of renewable energy.

The effectiveness of MOF Regulation Number 21/PMK.011/2010 would increase if it were accompanied by a guide to applying for the concession, This effort needs to be supported by supervision and implementation of tax payments by business entities that do not receive tax concessions. The steps to take to apply for tax concessions can be developed by referring to MOF Regulation Number 144/PMK.011/2012 on facilities for income tax for capital investment in certain business and/or regions. The lack of guidelines for business entities about how to apply for tax concessions may lead to declining private sector interest in developing facilities for new and renewable energy. Clear and detailed guidelines would improve the efficiency of MOF Regulation Number 21/PMK.011/2010 as a way of increasing private sector financing for the development of new and renewable energy.

The government can simultaneously explore other possibilities by analysing the suitability of MOF Number 21/PMK.011/2010 and MOF Number 70/PMK.011/2013 on the third amendment of the Ministerial Decree of The Minister of Finance Number 231/KMK.03/2011 on the treatment of value added tax (VAT) and sales tax on imported taxable luxury goods. These regulations form the basis of VAT tax relief facilities for goods and products used in geothermal exploration activities.

MOF Number 130/PMK.011/2011 also regulates the granting of corporate income tax exemptions and reductions for business entities operating in the new and renewable energy sector.[15] Corporate taxpayers qualify for a tax holiday if they are classified as industry pioneers or invest a minimum of IDR 1 trillion. These incentives do not apply to business entities that are not classified as industry pioneers.[16] If the Ministry of Finance were to widen the criteria for businesses described as industry pioneers, such as by including specific businesses that have successfully carried out energy conservation and those that have invested less than IDR 1 trillion, MOF Number 130/PMK.011/2011 could support energy conservation in the sectors with the highest energy consumption: the industry and household sectors (Figure 2).

3.2. The Role of Fiscal Policy in the Energy Sector in Relation to Government Expenditure

The government's fiscal policy on expenditure relates to policies on the allocation of central government expenditure and transfer to local government. An example of central government expenditure in the energy sector is its energy subsidy, which applies to fossil fuel (gasoline), biofuel and electricity. Government expenditure through transfer to local government is carried out, among others, by the DAK for rural electrification (see Table 2, Chapter 2). The government's fiscal policy in the energy sector can be analysed from the demand and supply sides of energy, as discussed below.

3.2.1. Fiscal Policy on Managing Energy Demand Related to Government Expenditure

The Government of Indonesia has included government expenditure on energy conservation and new and renewable energy in the MEMR programme's financial note on the amended government budget (RAPBN-P) 2015 (MOF, 2015b). The Ministry of Finance and supporting institutions have analysed the role of a labelling system in budgeting to identify the amount of government finance dedicated to activities supporting the government's green planning, including energy conservation and new and renewable energy. The development of the government budgeting system will include the impact of government activities on the environment. This is supported by the government's target to reduce national GHG emissions and various policies such as Presidential Instruction Number 13 Year 2011 on the saving of energy and water by government agencies and MEMR Regulation Number 13 Year 2012 on the use of electricity in government facilities. These policies could be used as considerations for all line ministries, non-ministerial government institutions, local government, state-owned enterprises and locally-owned companies' budgeting for energy conservation activities.

3.2.2. Fiscal Policy on Managing Energy Supply Related to Government Expenditure

The Ministry of Finance has a number of fiscal policies related to government expenditure to improve the domestic energy supply, such as a loan guarantee for the development of power plants and their infrastructure. The Ministry of Finance Regulation Number 139/PMK.011/2011 provides a procedure for granting a government loan guarantee based on PT PLN's ability to fulfil

[15] In the form of a five to ten-year tax exemption since the production starts commercially, tax reduction of 50% from income tax for 2 years.

[16] Currently the term 'industry pioneer' does not refer to entities that promote energy conservation. Article 3, paragraph 2 of PMK No. 130 considers industries producing the following industry pioneers: (*a) base metal; (b) petroleum-refining industry and/or organic basic chemicals derived from petroleum and natural gas; (c) industrial machinery; (d) renewable energy; (e) communication equipment.*

its financial responsibilities related to the risk of default on loans for the construction of power plants using renewable energy, coal and gas which are developed in cooperation with private power developers. In addition MOF Regulation Number 260/PMK.011/2010 provides guidelines for the implementation of the infrastructure loan guarantee facility for government and business entities' joint projects.

The Government of Indonesia has allocated IDR 1.1 trillion from the 2015 government budget to support the acceleration of 10,000 MW power plant development and for cooperation between government and business entities on projects through the infrastructure guarantee company. It has allocated IDR 3.3 trillion in the form of a loan to a state-owned electricity company (PT PLN) to develop electricity infrastructure, and in addition a loan of IDR 0.7 trillion to the state-owned oil and gas company (Pertamina) to develop power plants that utilise new and renewable energy sources and reduce the environmental impacts of the plants' development.

One example of the government's fiscal policy on expenditure by local government is a budget for rural energy development in the form of a DAK. MEMR Regulation Number 10 Year 2015 provides technical guidelines on the use of this fund in the energy sector for the 2015 fiscal year. The DAK for rural electrification prioritises the development of new and renewable resources such as micro hydro power plants with a capacity of less than 1 MW, off-grid and on-grid (connected to PLN's network) solar power plants, and biogas. Working units at the district level are responsible for the use of the fund and for directly organising the activities they finance.

3.3. The Role of Fiscal Policy in the Energy Sector in Relation to Government Support to Financing Schemes

Government support to financing schemes policy is policy related to a government's investments within and outside the country. Government support to financing schemes in the energy sector is carried out via banking and non-banking financial sources. Domestic financing originates from, among others, investment funds and federally guaranteed obligations, whereas international financing may come from loans for projects and programmes (Chapter 2, section 2.3).

3.3.1. Fiscal Policy on Managing Energy Demand Related to Government Support to Financing Schemes

The Ministry of Finance can use various fiscal policies to support energy conservation activities. One such policy that can be further explored is the revolving fund policy regulated by MOF Regulation Number 218/PMK.05/2009 amending the MOF Regulation Number 99/PMK.05/2008 guidelines for the management of revolving funds in a ministry/government institution, according to which MEMR and/or the Ministry of Finance can set up joint or autonomous financing facilities through a revolving fund mechanism to support energy conservation efforts, as mandated in Government Regulation Number 70 Year 2009 on energy conservation. Among several choices of incentives, the government can offer an incentive in the form of a loan with a low interest rate for investment in energy conservation (Presidential Regulation Number 70 Year 2009 article 20 clause 1d). Other incentives include tax concessions such as VAT reduction (clause 1a), tax relief and local tax reductions for energy-efficient products (clause 1b), and energy audit funded by the government (clause 1d). Illustration 2 in section 4.4 further elaborates on several factors for consideration when setting up a funding facility for energy conservation.

3.3.2. Fiscal Policy on Managing Energy Supply Related to Government Support to Financing Schemes

The Ministry of Finance has developed financing policies to support the development of a broad range of types of energy, including new and renewable energy. These consist of a geothermal energy fund facility, an infrastructure financing facility through PT SMI, and the Facility for Food and Energy Security Credit (KKP-E). There are however design and implementation issues with these incentives: among others, although it has been deposited, funding allocated to geothermal energy exploration has not been disbursed, and financing for the development of renewable energy does not yet cover the development of all types and scales of energy source.

A. Financing Facility for Geothermal Exploration

The Ministry of Finance has provided funding facilities for geothermal exploration through the Geothermal Fund Facility (GFF), with the Government Investment Facility (PIP) the executing agency (MOF Regulation Number 03/PMK.011/2012 on GFF procedures, management and accountability). Due to institutional restructuring (PIP is merged with PT SMI in 2015) there is a need to clarify GFF management in order to channel the fund to local government, mining permit holders (IUP) and geothermal energy permit holders. The GFF will be used to finance projects that have been coordinated together with the MEMR and are listed in the Electricity Supply Business Plan (RUPTL). Indonesia needs an institution similar to PIP to manage the GFF and other renewable energy funding, and this seems likely to be provided by PT SMI. A review and enhancement of MOF Regulation Number 03/PMK.011/2012 could expand it to deal with obstacles to the operationalisation of the GFF by, for instance, simplifying the procedure by which IUPs access GFF funding, and through adequate provision for the sharing of risk between the government and private developers.

B. Corporate Financing for Energy Infrastructure through PT Sarana Multi Infrastructure (PT SMI)

The Ministry of Finance already has a policy regulating the financing of mega-infrastructure projects, including energy infrastructure, through the infrastructure financing company PT SMI (MOF Regulation Number 396/KMK.01/2009 on granting business licenses to PT SMI). The government's capital contribution to the establishment of institutions that provide loan guarantees is regulated in Government Regulation Number 75 Year 2008 in conjunction with Government Regulation Number 66 Year 2007. In 2015 the Government of Indonesia allocated IDR 2 trillion to PT SMI from the government budget to increase its infrastructure capacity. The Ministry of Finance should regularly evaluate the performance of PT SMI investment in the energy sector to assess the effectiveness of this financing policy.

C. Food and Energy Security Credit (KKP-E) Facility

The Ministry of Finance has provided a financing facility for the energy sector, and particularly for small and medium enterprises (SME), in the form of Food and Energy Security Credit (KKP-E) (MOF Regulation Number 79/PMK.05/2007). This credit facility is already operating, implemented by stated-owned banks, national private banks and local development banks. KKP-E can be accessed by farmers, ranchers, fishermen and fish farmers individually or in a group to expand their business. This credit facility is in line with and supports the previous Ministry of Finance regulation on credit for bioenergy development and the revitalisation of plantations (MOF Regulation Number 117/PMK06/2006). While initially designed to support small and medium enterprises, there is considerable potential for expanding it to include medium and large-scale energy projects. There is also potential for simplifying the procedure for accessing this credit scheme.

Three Options for Improving the Effectiveness of Existing Fiscal Policy in the Energy Sector

Chapter 3's analysis of fiscal policies in the energy sector leads to three main options for improving their effectiveness to achieve energy security and sovereignity and sustainable development in Indonesia.

Fiscal policy options for managing energy demand

1. Facilities for the reduction of import duties on energy conservation products with certified high energy rating can be developed by revising MOF Regulation Number 154/PMK.011/2012 based on the second amendment of MOF Regulation Number 154/PMK.011/2008 regarding exemption from import duty for capital goods to support the development of the power plant industry in the public interest.
2. Taxation facilities can be provided that invite investment in and establishment of ESCO service business entities which specifically operate by leasing energy-efficient equipment. This can be done by including ESCO companies in the industry pioneers category regulated by MOF Regulation Number 130/PMK.011/2011 on granting exemptions to or reductions of corporate income tax.

Fiscal policy options for managing energy supply

3. A procedure for and operationalisation of business entities' applications for concessions can be added to MOF Number 21/PMK.011/2010 on the provision of tax and customs concessions for the utilisation of renewable energy sources. The procedure can refer to MOF Regulation Number 144/PMK.011/2012 on facilities for income tax for capital investment by certain business entities and/or certain regions. An alternative is to develop a Ministry of Finance regulation offering technical guidelines for the implementation of MOF Regulation Number 21/PMK.011/2010.

These three main options will need to be supported by improvement of the system for the supervision and implementation of tax payment by business entities that do not receive tax concessions, otherwise tax incentives for certain businesses will not be effective in motivating business entities to develop the government's targeted industries.

Several institutions have conducted studies and reviews in an effort to support energy conservation, increase the energy supply and government income, and support long-term economic growth. Table 3 lists the thirty-four studies and reviews analysed in this report which are related to fiscal policy on managing energy demand and supply as well as non-fiscal policy supporting the development of the energy sector in Indonesia.

Table 3. Studies on Fiscal Policy for Indonesia's Energy Sector Development

No	Title	Year	Institution	Location[17]
Studies related to fiscal policy for managing energy demand				
1	A Coherent Fiscal Policy Framework for Energy Efficiency in Indonesia	2014	LCS	Chapters 1, 2, 4, 5
2	A Study on Cost-effective Development and Implementation of Energy Efficiency Standards and Labeling Programme in Indonesia	2014	UNDP	Chapter 4
3	Technical Cooperation Project for Capacity Development for Green Economy Policy in Indonesia: Research on Green Urban Development	2015	JICA	Section 4.3.2.1 until section 4.3.2.4
4	Rebate Scheme for Energy Efficient Appliances	2014	UNDP	
5	Energy Efficiency Incentives in Southeast Asia: Lessons Learned from Singapore, Malaysia, Thailand and the Philippines	2011	DANIDA	
6	Design of Financing Mechanism for Replacing Street Lightings with LED Technology	2013	GIZ PAKLIM	Section 4.3.3.1
7	Profile Book of Energy Efficiency 2013	2013	UKAID	Chapter 4
8	Options for Fiscal Policy Reforms to Assist Control Motor Vehicles Emissions	2014	LCS	Section 4.4.4.1
9	Inputs to Developing Concepts for the Energy Efficiency Revolving Fund	2013	LCS	Section 4.4
Studies related to fiscal policy for managing energy supply				
10	A Coherent Fiscal Policy Framework for Renewable Energies in Indonesia	2014	LCS	Chapters 1, 2, 5
11	Potential Source of Funding for Clean Energy Development in Indonesia	2013	USAID	Chapter 5
12	Lessons from Solar Off-grid Models in the Sunderbans Insights and Analysis Based on Field Trips to Sunderbans for Indonesia Solar PV	2014	Reemerging World	Chapter 5
13	State Incentives for Residential and Commercial Solar Installations: A Discussion on the Unique State Solar Incentives Landscape across the United States	2014	Palmetto	Section 5.3.1
14	Study on Promotion Policies for Geothermal Power Development by Independent Power Producers	2011	JICA	Section 5.3.2
15	Using Private Finance to Accelerate Geothermal Deployment: Sarulla Geothermal Power Plant Indonesia	2015	CPI	Section 5.3.2
16	Financing Model: Micro Hydro Power Plants	2013	BI	Section 5.3.3
17	Fiscal Policy Strategy Paper to Support Promotion of the Production and Utilisation of Gas in Indonesia	2015	LCS	Section 5.3.4
18	Fiscal Instruments for the Control of Wastes in the Oil and Gas Industries in Indonesia	2015	LCS	
19	Study on the Impact of Fuel Subsidy Reduction in Jakarta	2015	LCS	Section 5.3.5
20	Study on Fiscal Incentive Mechanism of Fuel Subsidy Reduction for Local Government	2014	USAID	
21	Explore the Potential of Cogeneration Systems in the Industrial Sector	2014	UNDP	Section 5.3.6

Continued…

[17] Location of the specific contribution of the study in this current report.

No	Title	Year	Institution	Location
Studies on energy sector related to non-fiscal policy				
22	Feed-in-Tariff as Policy Instruments to Encourage the Commercialisation of Wind Power Plants in Indonesia	2013	UNDP	Annex 1
23	Rapid Assessment of the Indonesian Biofuels Industry and Policies to Support the National Economy and Energy Sustainability	2013	LCS	
24	Bioenergy Investment Guidelines	2014	USAID	
25	Cost and Benefit Analysis Of Financing Waste-to-Energy Investment Through A Credit Support Programme	2014	LCS	
26	Fiscal Policy Options for Promoting Carbon Capture and Storage in the Oil and Gas Industries in Indonesia	2014	LCS	
27	Project Appraisal Document: For A Geothermal Clean Energy Investment Project (Total Project Development in Ulubelu Units 3 & 4 And Lahendong Units 5 & 6)	2011	World Bank	
28	Overview of the Waste-to-Energy Potential for Grid-connected Electricity Generation (Solid Biomass and Biogas) in Indonesia	2014	GIZ	
29	Study on the Integrated Waste-to-Energy Project in Greater Malang, the Republic of Indonesia	2012	Japan	
30	Powering Indonesia's Green Growth: International Experience and lesson learned in stimulating Renewable Energy Investment through Central Bank and Government Incentives – Case study from Six Countries	2013	BI and USAID	
31	Preview of Study: Renewed Perspectives on How to Attract Renewable Energy Investments Feasibility Study: Crop to Energy ("CTE") Case	2013	USAID	
32	Pre-Feasibility Study of Palm-based Biomass Power Generation and Biogas Resource Potential and their Utilisation	2014	USAID	
33	Lessons on Market Development for Photovoltaic Technology in Indonesia: Insights from India, Bangladesh and Germany	2012	PKPPIM, LCS, and IESR	
34	Study on the Financial and Economic Viability of Producing Bio-Methanol Utilising Biomass Waste from Indonesian Forestry	2015	LCS	

Policy recommendations from various studies in the table above have been adopted in the preparation of this report on fiscal policy options for Indonesia's energy sector. Chapters 4 and 5 briefly analyse several fiscal policy options for managing the demand and supply of energy.

Chapter 4. Fiscal Policy Options for Managing Energy Demand

Fiscal policy can be strategically used to accelerate and manage energy demand, improve energy efficiency and promote energy conservation activities. Chapter 4 explains fiscal policy options for energy demand by analysing the policy recommendations from a number of the studies and reviews listed in Table 3. Chapter 4 is divided into three sections. The first section describes underpinning policies in the formulation of new policies for managing energy demand; the second explains several technical recommendations that support the formulation of fiscal policy options in the demand side of energy; and the last prioritises the proposed fiscal policy options based on the classification of government budget fiscal accounts into government revenue and grants, government expenditure, and government support to financing schemes.

4.1. Underpinning Policies in the Formulation of Fiscal Policy Options for Managing Energy Demand

Underpinning policies in the formulation of fiscal policy options for managing energy demand contribute to guiding the formulation of new policies to achieve the national development goals, particularly in the macro-economics and the environment sector. The underpinning policies are: (i) the National Mid-term Development Plan (RPJMN) 2015-2019, (ii) the National Energy Policy (KEN), (iii) the Energy Conservation Policy, (iv) the National and Local Action Plan for Greenhouse Gas Emission Reduction (RAN/RAD-GRK), (v) the Greenhouse Gas Inventory Policy, and (vi) the Green Energy Development Policy.

4.1.1. The National Mid-term Development Plan (RPJMN) 2015-2019

The National Mid-term Development Plan (RPJMN) 2015-2019 is stipulated in Government Regulation Number 2 Year 2015 and explains that one of the government's goals is to achieve energy sovereignty, with an improvement in energy consumption efficiency Explained in Book 1 Section 6.7.2 (BAPPENAS, 2014a). This needs to be done simultaneously with efforts to managing the energy supply such as increasing energy production, particularly from renewable energies. The formulation of fiscal strategies to promote energy conservation is the responsibility of the Ministry of Finance.

4.1.2. National Energy Policy (KEN)

The National Energy Policy (KEN) is stipulated in Government Regulation Number 79 Year 2014. KEN is a guide on energy management in Indonesia with the aim of achieving national energy independence and security in support of sustainable development.[18] There is no international agreement on the relationship between energy conservation policy and GDP growth to date, even though they are closely interrelated on global warming and the reduction of GHG emissions

[18] Government Regulation Number 79 Year 2014 on National Energy Policy (KEN) Article 1 paragraph 11; Chapter 3, section 2 defines energy conservation as '*a systematic, planned and integrated effort to conserve energy resources in the country and improve the efficiency of energy utilisation'.* The range of energy conservation activities includes '*both upstream and downstream, including the management of energy resources and all stages of the exploration, production, transportation, distribution, and utilisation of energy and energy resources* (KEN Article 17 paragraph 1)

(Belke, et al. 2010). To maintain economic growth, energy conservation policies need to be offset by policies regulating the use of new and renewable energy (*ibid*).

4.1.3. The Energy Conservation Policy

The Energy Conservation Policy is stipulated in Government Regulation Number 70 Year 2009 and regulates the framework for incentives and disincentives that central and local governments can offer to energy users and domestic producers of energy-efficient equipment.[19] Articles 19-21 list the criteria that business entities must meet in order to qualify as businesses that conserve energy. These criteria can also be used to define industry pioneers, as regulated in MOF Regulation Number 130/PMK.011/2011 on granting exemptions or reductions of corporate income tax. An audit to identify business entities that are successfully implementing energy conservation would facilitate the Ministry of Finance's use of the Energy Conservation Policy to support such business activity.

4.1.4. The National and Local Action Plan for Reducing Greenhouse Gas Emissions (RAN/RAD-GRK)

The National Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK) is stipulated in Presidential Decree Number 61 Year 2011 and is complemented by the Local Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK). RAN-GRK supports the government's target of reducing national GHG emissions by 26% by 2020 with Indonesia's own effort and 41% with international support. Annex 1 provides a guide to actions for reducing GHG emissions such as reducing the need for travel, especially in urban areas, and reducing carbon output from motor vehicles in various transportation modes. The Ministry of Finance is expected to contribute to energy efficiency action by supporting the Department of Transportation and local governments' implementation of congestion charging and road pricing, combined with the development of rapid mass transit, especially in Jakarta and Surabaya. One of the policy instruments in support of this is motor vehicle tax. The local government has a crucial role in this because it is authorised to collect and manage motor vehicle tax.

4.1.5. National Inventory of Greenhouse Gas Emissions

The establishment of a national inventory of GHG emissions is stipulated in Presidential Decree Number 71 Year 2011. Chapter 3 Article 3, paragraph 3 of this Decree specifically explains the scope of the GHG inventory and the basis for the calculation of the industry, transportation, household, commercial, agricultural, construction and mining sectors' individual contributions to reducing GHGs. The GHG inventory allows the Ministry of Finance to calculate the ratio of spending to contribution in each sector to the total mix of national GHG emission reduction.

4.1.6. Green Energy Development Policy (Renewable Energy and Energy Conservation)

The Green Energy Development Policy is stipulated in MEMR Regulation Number 2 Year 2004 and outlines some of the obstacles to delivering energy conservation: among others, high investment costs, the limited market for renewable energy and the difficulty of nurturing an energy-saving culture. These obstacles can be tackled by fiscal incentives. Improvements to the quality of human resources, the construction and improvement of infrastructure facilities, and better coordination among government institutions on the implementation of various regulations are prerequisites for the formulation and operationalisation of fiscal energy policy. For instance, lack of knowledge and technical capacity regarding energy issues among personnel in the banking

[19] Government Regulation number 70 year 2009 divides the responsibility for energy conservation of central government (Article 4), sub-national government (Article 5 and 6), the private sector (Article 7), and the general public (Article 8). It further divides energy conservation into four types: conservation of energy supply, conservation in energy generation, conservation in energy utilisation, and conservation of energy resources.

sector would affect the reliability of investment risk assessment, leading to banks' low investment in the energy sector (BI, 2013).

4.2. Technical Polices Related to Fiscal Policy on Managing Energy Demand

Fiscal policies could be implemented to support the technical policies stipulated by the Ministries responsible for the technical aspects of meeting the increased demand for energy. The policies that can be further improved and integrated with fiscal policy strategies for managing energy demand are the Green Industry Act, labelling and rating policy, green building policy, energy management policy including energy auditing, and policy on standards of motor vehicle efficiency. Below is a brief explanation of the mutual relationship between fiscal and technical policy in the formulation of fiscal policy strategy for managing energy demand.

4.2.1. The Green Industry Act

Act Number 3 Year 2014 establishes the definition of a green industry as one whose production process prioritises efficiency and effectiveness and the sustainable use of resources, and aims to ally industrial development with preservation of the environment and the provision of benefits to the community. The growth of green industry in Indonesia is still limited and may be encouraged by fiscal incentives such as corporate income tax reductions for producers, distributors and developers of renewable energy. The Ministry of Finance could refer to the definition and standard of green industry in the formulation of fiscal strategies to calculate fiscal incentives on managing energy demand.

4.2.2. Labelling and Rating Policy

Chapter IV of Government Regulation Number 70 Year 2009 covers energy conservation via the use of standards and labelling. MEMR Regulation Number 18 Year 2014 details standards and labelling for self-ballasted lamps whereas MEMR Regulation Number 7 Year 2015 sets out the Minimum Energy Performance Standard (SKEM) for air-conditioning units. At the time of this study, standards and labelling for other equipment such as refrigerators, rice cookers, fans and light-emitting diode (LED) lamps were still under discussion in the MEMR regulation process.

4.2.3. Green Building Policy

Ministry of Public Works and Housing Regulation Number 2 Year 2015 regulates green building covering the requirements and criteria for the programming, technical planning, construction, utilisation and demolition phases. The green building policy had just been stipulated at the time of preparing this report. It aims to promote the growth of green building in Indonesia. The government can use green building policy criteria and requirements in Ministry of Public Works and Housing Regulation Number 2 Year 2015 as prerequisites for applying for fiscal incentives such as reduced land and building taxes.

4.2.4. Energy Management Policy Including Energy Audit

MEMR Regulation Number 14 Year 2012 broadly regulates energy management including energy auditing, which, it suggests, should be carried out at least at least once every three years (Article 8). An MEMR directorate general has been appointed to perform audits for government agencies and the general public, although its capacity for conducting technical audits is limited. Between 2003 and 2014 the MEMR carried out 1,000 building and industry energy audits (JICA, 2015). An audit function is useful in the formulation of fiscal policy, in particular to test the eligibility of a corporation or individual for fiscal incentives based on the energy conservation criteria stipulated in Government Regulation Number 70 Year 2009.

4.2.5. Policies Related to Motor Vehicles

Indonesia's policy on motor vehicles is stipulated in, among others, Ministry of the Environment Regulation Number 10 Year 2012 on the quality standard for motor vehicle exhaust emissions for new types of L3-category vehicles.[20] In addition the government currently levies motor vehicle tax under Government Regulation Number 41 Year 2013 on taxable goods classified in the form of luxury motor vehicles subject to luxury goods sales tax, and its amendment, Government Regulation Number 22 Year 2014. Motor vehicle tax is determined by engine capacity: the greater the engine capacity, the higher the tax imposed.

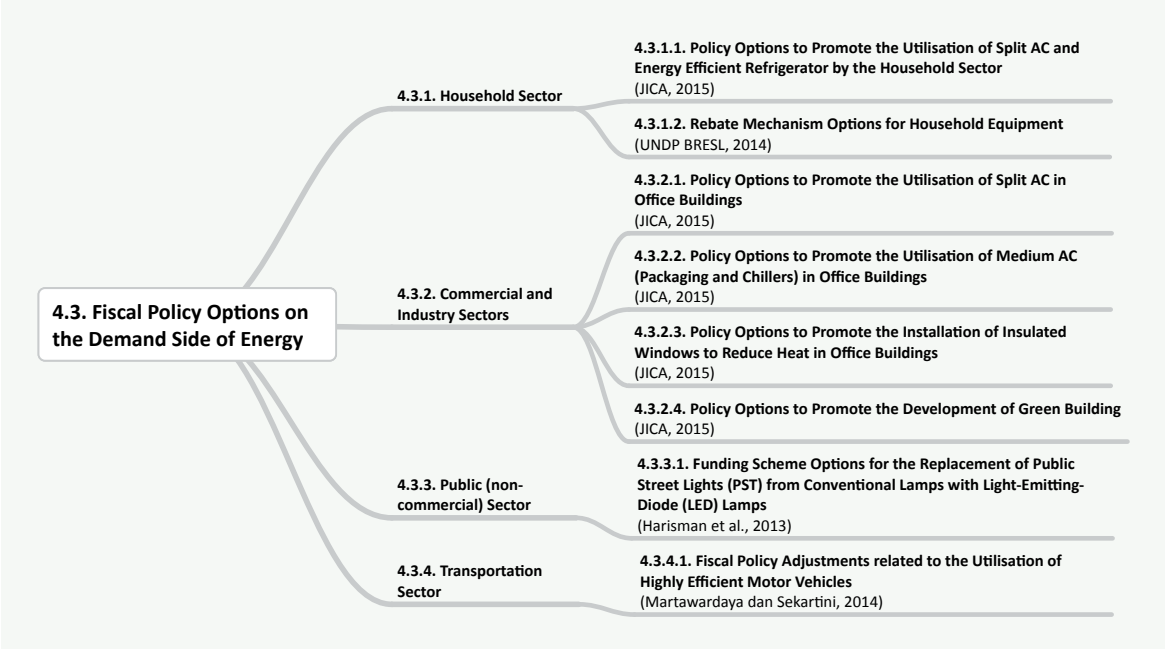
The taxation of luxury goods, which is regulated by central government, and of motor vehicles, which are regulated by local government, could be further developed and used by the Ministry of Finance to implement RAN/RAD-GRK. They could also be developed to motivate motor vehicle users to buy and use energy-efficient motor vehicles. Both central and local government could first undertake a consumer survey to determine an effective tax rate for luxury motor vehicles and motor vehicle tax. Reducing the number of inefficient motor vehicles on the road would also reduce overconsumption of fuel, air pollution and GHG emissions.

4.3. Policy Options for Managing Energy Demand

The fiscal policy options for managing energy demand presented here are prepared based on a number of fiscal recommendations adopted from the studies and reviews listed in Table 3 and supported by the technical policies discussed in section 4.2, and are in accordance with the government's goals and targets. The fiscal policy options for managing energy demand are divided into four sectors: household, commerce and industry, public (non-commercial) and transportation (Figure 8). The following discusses the fiscal policy options in each sector.

[20] A type 3 motor vehicle is a two-wheeled motor vehicle with the engine cylinder capacity greater than 50cc or with a maximum speed of over 50 km/hour regardless motor size

Figure 8. Framework of Fiscal Policy Options for Managing Energy Demand



Note: The studies offering the fiscal recommendations are given in brackets

4.3.1. Household Sector

Fiscal policy recommendations on managing energy demand in the household sector seek to improve households' and individuals' energy consumption efficiency and encourage energy conservation. The policies to be further developed are related to the energy-efficiency of household equipment listed in the energy rating system such as split AC and refrigerators. Two fiscal policy recommendations promote the utilisation of energy-efficient equipment: VAT reduction and direct subsidisation, known as the rebate system. This section also discusses options for mechanisms to operationalise the rebate system if the government chooses to implement it.

4.3.1.1. Policy Options for Promoting the Utilisation of Split AC and Energy-efficient Refrigerators in the Household Sector

JICA's (2015) study finds that Indonesian households' use of energy-efficient equipment, particularly split inverter AC and refrigerators with a four-star energy rating, is still relatively low.[21] By the end of 2014 the market for split inverter AC in Indonesia was only 5%, the smallest in the fast-growing countries in Southeast Asia. The sale of refrigerators is dominated by those with a rating of between 2 and 4. JICA (*ibid*) proposes two policy options for increasing the market for split inverter ACs and energy-efficient refrigerators in Indonesia: (1) a short-term intervention in the form of a VAT reduction combined with an awareness campaign about energy-efficient products and their importance, and (2) a long-term intervention in the form of a direct subsidy (see Figure 4). Both options aim to promote the purchase and installation of new efficient split inverter ACs by 30% and to ensure that all refrigerators used and sold in 2025 are energy-efficient. Transition to the use of four-star energy-rated refrigerators and the growth of the split AC market by 5% per year are expected to reduce energy consumption, on average, by 55,000 and 27,600 MWh per year respectively.[22]

Table 4. Fiscal Policy Options for Energy-Efficient Household Equipment

Policy options		VAT reduction	Direct subsidy (rebate)
Brief explanation of policy options		A scheme to reduce VAT for AC products with inverter technology and 4-star rated refrigerators.	This programme subsidises buyers of energy-saving appliances or products and new and renewable energy in the form of coupons which can be used to secure a discount or exchanged for other products/ services in appointed places.
Priority	Split AC	⊙	○ (900 Volt Ampere (VA) household category)
	Refrigerators	⊙	○ (450VA/900VA household category)
Supporting arguments		Relatively easy to implement with a significant effect on consumer purchasing behaviour.	Has a significant effect on household consumer purchasing behaviour for equipment under or equal to 900VA.
Risk considerations		Direct impact on government income.	High fiscal burden, high administrative costs, risk of fraud such as coupon counterfeiting.
Average net annual benefit to the Indonesian government and households*		VAT reduction of 10%: IDR 262.4 billion (government), IDR 214.5 billion (household).	Rebate of 10% of the market price: IDR 243.7 billion (government), IDR 190.4 billion (household).
Experience in other countries		In Malaysia energy-efficient electronic goods certified by its energy commission are tax-exempt.	This scheme is implemented in Japan through an eco-point programme providing coupons for energy-efficient products purchases.

Legend: ⊙ first priority; ○ second priority; * Total of split AC and refrigerators in the household sector; assumptions and details as stated in JICA 2015. Note: Indonesia has reduced import duty on split inverter AC and energy-efficient refrigerators. However, market demand is still low because the price of split AC is IDR 1 million higher than that of conventional AC, even after the import duty reduction (JICA, 2015). To date there is not sufficient information available on the implementation and the effectiveness of this policy.

Analysis of policy options

The VAT reduction would give a higher net benefit with a smaller fiscal burden, less administrative risk and lower transaction costs. Both policies can be developed further according to available time and resources. VAT reduction can be implemented in the short term if the government wants to reduce the fiscal burden on the government budget. The direct subsidy (rebate) policy can be implemented after first preparing the legal basis and a business plan to reduce the administration risks. Other household equipment listed in the MEMR rating system can also be promoted using these two fiscal policies.

[21] The Minimum Standard of Energy Performance (SKEM) for AC is regulated in MEMR Regulation Number 7 Year 2015 according to which split AC is classified as 4th rated if its energy efficiency ratio ≥ 10.41 (JICA, 2015).
[22] The complete information on the calculation and assumptions are stated in the JICA Study (2015)

4.3.1.2. Rebate Mechanism Options for Household Appliances

UNDP BRSEL (2014) shows that a rebate mechanism for energy-saving household appliances such as ACs and refrigerators from the government directly to the consumer would greatly increase energy efficiency. If the Government of Indonesia decides to develop such a policy the UNDP BRSEL (2014) study provides two options for the operational mechanism: (1) a utility-based mechanism and (2) a project management unit-based mechanism (Table 5).

Table 5. Mechanism Options for Direct Subsidy/Rebate

Mechanism options	Utility-based mechanism	Project management unit-based mechanism
Brief explanation of mechanism options	Corporate utility system funded by the Indonesian government through the MEMR Directorate of Energy Conservation (MEMR's Directorate of Energy Conservation [DKE]). DKE will manage the rebate finances. For a rebate, the consumer registers the items they want to purchase on a website managed by PT PLN or at an appointed kiosk to secure a rebate coupon and use it when purchasing electronic appliances. Sellers are reimbursed by PT PLN on production of coupons taken.	Project management unit system with identical funding sources and item registration to that for rebate vouchers. The difference is PT PLN is not the executor agent. Executor agent is formed and supervised by DKE as project management unit using website facility from PT PLN. After receiving a coupon the consumer can purchase the items. The coupon can also be exchanged directly with the project management unit or the manufacturer. If the manufacturer accepts the coupon he must honour it.
Implementing agency	PT PLN (Persero)	MEMR's Directorate of Energy Conservation (DKE)
Risks	PT PLN (Persero) has not has not agreed to be the implementing agency.	The need fpr good planning along with significant capacity building.

Analysis of mechanism options

There is little significant difference between the two above mechanisms apart from the appointment of the executing agency (PT PLN or MEMR). UNDP BRSEL (2014) supports JICA (2015): there is a trade-off in the direct subsidy mechanism. Both mechanisms have strong potential for motivating consumers but carry a high fiscal burden and costs and intensive administration requirements. The MEMR's Directorate of Energy Conservation (DKE) could set up a pilot project and develop a strategy for minimising administration risks and transaction costs. Lessons learned from the pilot project and estimation of the operational budget could be used as the basis of an MEMR policy proposal to the Ministry of Finance.

4.3.2. Commerce and Industry Sector

Fiscal policy options for the commerce and industry sector aim to increase the efficiency of industrial actors such as contractors and building developers and managers' consumption and conservation of energy. Policies to motivate the use of energy-saving industrial commodities listed in the energy rating system and of standardised commodities including medium AC, insulated window installation, solar power plants and green building, can be further developed.[23] There are several fiscal policy options for this sector such as reductions to VAT, income tax and land and building tax, and soft loans. This section discusses policy options and primarily fiscal policies to promote certain commodities that can be used to support the reduction of energy consumption and improve energy efficiency in the commerce and industry sectors.[24]

[23] Medium AC consists of package AC and high-efficiency chillers. Medium AC is the cooling machine used in the commercial building, consisting of several splits using Variable Refrigerant Volume (VRV) system. In this report, the medium AC follows the classification of goods in the JICA study (2015), that is the medium AC which 10% or more from the Indonesian National Standard (SNI) 6390:2011, the minimum standard for energy efficiency for large-scale AC.

[24] Other energy-saving products that can be considered are inverter (VSD) and economiser installed in boiler.

4.3.2.1. Policy Options for Promoting the Use of Split AC in Office Buildings

Promotion of the use of split AC in office buildings could increase the market for split AC and reduce energy consumption in Indonesia, as mentioned in section 4.3.1.1. The JICA study (2015) proposes three policy options for promoting the use of split AC in office buildings: (1) a VAT reduction, (2) promotion of lease, and (3) a direct subsidy (see Table 6). JICA (*ibid*) also distinguishes between registered and unregistered business entities including SMEs in its policy recommendations.

Table 6. Policy Options for Promoting the Use of Split AC in office buildings

Policy options	VAT reduction	Promotion of lease	Direct subsidy (rebate) for equipment leasing
Brief explanation of policy options	A VAT reduction scheme for business entities for the purchase of energy-saving goods such as split inverter AC.	A promotion scheme to motivate business entities to lease energy-saving goods such as split inverter AC.	Rebate is a subsidy that is directly given to business entities that lease energy-saving equipment such as split AC with inverter.
Priority (taxable business entities)	⊙	⊙	X
Priority (non-taxable business entities)	⊙	X	⊙
Supporting arguments	The difference in market price between efficient and inefficient AC is IDR 1 million per unit. Government intervention could minimise the price difference between the two products to motivate consumers to buy efficient AC.	In Indonesia leasing has been offered as an incentive for lessee but not for lessor because the cost of leasing equipment and good with more than a one-year benefit is a deductible expense in the calculation of corporate income tax.[25]	
Risks	The price of split AC with inverter after VAT reduction is still higher than that of conventional AC. The policy needs to be accompanied by an energy-saving awareness campaign.	The leasing corporation may not be interested in adding energy-saving goods in their range of products.	The impact of the direct subsidy is limited to tenants and excludes renters.
Average net annual benefit to the Indonesian government and commerce and industry sector*	10% VAT reduction: IDR 625 billion (government), and 214.5 billion (industry)	No available information	10% rebate subsidy: IDR 70.3 billion (government), and IDR 190.4 billion (industry)
Experience in other countries	Vietnam does not tax energy-saving products that are not manufactured domestically.	Thailand promotes leasing through ESCO's funding for energy-saving goods (installation fee and fixed interest rate 4-6%) for a maximum of five years.	Japan implements an eco-leasing scheme as much as 3-5% for energy efficient equipment. There is a rebate scheme for buyers using eco-points.

Legend: ⊙ first priority; ○ second priority; X not recommended; *As assumed in JICA 2015

Analysis of policy options

The net benefit from VAT reduction would be greater than that from promoting leasing and direct subsidies (rebates). The Ministry of Finance could use VAT reduction in both the household and the commercial and industrial sector (see Table 4). The MEMR Directorate General of Energy Conservation and the Financial Services Authority have an important role to play in the promotion of leasing by providing guidance and direction for the Indonesian Association of Corporate Financing (APPI) to encourage business entities to add energy-efficient goods and equipment to the range of items they lease out. The cost of promoting leasing is relatively high and will require

[25] Leasing is classified as a deductible expense. For instance, business entity A has an income of IDR 150 million in 2010 with operational cost of IDR 50 million and a leasing cost for split AC of IDR 25 million; its taxable income is IDR 75 million (IDR 150 million - (IDR 50 million + IDR 25 million)).

capacity-building by the financial institutions. International climate funds such as the Clean Technology Fund (CTF) could support the government with capacity development in the commercial and industrial sector. A direct subsidy (rebate) can be implemented if the government already has a rebate mechanism as explained in Table 5.

4.3.2.2. Policy Options for Promoting the Use of Energy-Efficient Medium AC (Package and Chillers) in Office Buildings

The JICA (2015) study estimates that Indonesia's transition from conventional to medium AC at a rate of 5% per year would reduce energy consumption by 15,000 MWh. To promote the use of medium AC in office buildings it proposes five policy options: (1) VAT concessions, (2) promotion of leasing, (3) import duty reduction, (4) soft loans and (5) loan guarantees. The policy options are divided into type of corporation, promotion strategy, replacement of old AC, and installation of new AC (Table 7).

Table 7. Policy Options for Promoting the Use of Medium AC in Office Buildings

Policy options		VAT reduction	Promotion of lease	Import duty reduction	Soft loan	Loan guarantee
Brief explanation of policy options		A scheme to provide a VAT reduction for business entities for the purchase of medium AC.	A scheme to promote leasing companies' leasing and installing of AC and chillers for building managers and developers.	A scheme to reduce import duty on energy-saving products entering the Indonesian market via transportation by air, land and sea.	A low interest loan to be invested in energy-saving products.	Loan guarantee is a scheme to relieve the collateral burden on loans to buy energy-saving products.
Taxable business entities	AC replacement	○	⊙	○	⊙	○
	New installation	⊙	⊙	⊙	⊙	○
Non-taxable business entities	AC replacement	○	X	○	⊙	⊙
	New installation	⊙	X	⊙	⊙	⊙
Supporting arguments		High incentive for new building developers in the design and construction processes.	Indonesia's policy framework supports this scheme (see Table 6).	An interesting incentive for new buildings if the energy-saving appliances are not produced in Indonesia.	Of interest to business entities. Low fiscal burden if financial institutions and banks are willing to participate.	Suitable for business entities with limited financial capacity if the loan guarantee can replace loan collateral.
Risks		May not motivate the managers of old buildings sufficiently to change old appliances that are still functional.	May not provide sufficient incentive to leasing companies to add energy-saving products to their product range.	May not motivate the managers of old buildings sufficiently to exchange old appliances for new.	Energy-efficient goods need to be registered specifically. Bank normally requires a loan guarantee.	Needs to be implemented in conjunction with the soft loan scheme.
Average net annual benefit to the Indonesian government and commerce and industry sector*		No available information.	10% of cost = IDR 37.7 billion (government), IDR 481.2 billion (industry).	No available information.	2% interest rate subsidy = IDR 39.2 billion (government), IDR 394.4 billion (industry).	No available information.
Experience in other countries		Vietnam does not tax energy-saving products that are not produced domestically.	Thailand implements a loan through ESCO's fund for energy-saving products (installation fee and fixed rate 4-6%) for a maximum of 5 years.	Thailand implements import duty reduction for 2014-2017.	Malaysia has a 2% interest rate, loan scheme with a subsidy of up to RM 500 million for a maximum of 15 years.	The Malaysian government has a guarantee fund of up to RM 500 million for a maximum of 15 years.

Legend: ⊙ first priority; ○ second priority; X not recommended; * As assumed in JICA 2015

Analysis of policy options

All of the policy options above can be developed simultaneously to promote installation of split or medium AC. Reducing import duty would not be effective if most medium ACs are produced domestically. The lease promotion strategy, as suggested implemented for split AC (see section 4.3.2.1), can be applied to any type of energy-efficient goods. Intervention by the government via its funding facility for energy conservation is needed for soft loans and loan guarantees. Financing for these designs can be disbursed to commercial banks and financial institutions for loan guarantees such as Jamkrindo (the Indonesian credit guarantee system). Important aspects of the design of a funding facility for energy conservation are explained in Illustration 2, section 4.4.

4.3.2.3. Policy Options for Promoting the Installation of Heat-Resistant Insulated Glass

JICA (2015) shows that the use of heat-resistant insulated glass in buildings in Indonesia is still mimimal, even though Indonesia is one of the main producers of this product. Heat-resistant insulated glass keeps buildings cool and thus the use of electrical power to cool them down is also expected to decrease. JICA (*ibid*) proposes the promotion of insulated glass with an overall thermal transfer value (OTTV) of ≤45W/m^2, which meets Indonesian National Standard (SNI) 6389-2011 (*ibid*).

A growth rate of 5% in the installation of insulated glass in new buildings in a total assumed area of 20 million m^2 is expected to reduce energy consumption by 6,000 MWh per hour. With the implementation of government regulations it is expected that 50% of all glass sold in 2015 will have heat-resistant insulation technology. JICA (*ibid*) states that a VAT reduction policy is the most effective way of promoting the use of heat-resistant insulated glass in the and commercial and industrial sector.

Table 8. Policy Options for Promoting the Installation of Heat-resistant Insulated Glass

Policy options	VAT reduction	Import duty reduction
Brief explanation of policy options	A scheme to reduce VAT on the installation of heat-resistant insulating glass products. .	A scheme to reduce customs duty on imported insulated glass products.
Priority	⊙	X
Supporting arguments	Likely to become a strong incentive for building managers to use heat-resistant insulated glass.	Less effective due to wide availability of products in domestic market. It is hard for customs officers to determine the quality of such glass.
Risks	Less effective if not accompanied by socialisation and building developers' improved awareness of the long-term potential for saving energy due to reduction in energy needed to cool rooms/buildings.	-
Average net benefit of the Indonesian Government per year *	VAT reduction by 10% for 5 years = IDR 278 million.	No available information.
Experience in other countries	Malaysia does not tax energy-saving appliances, including insulated glass, that have been certified by its energy commission. Vietnam does not tax energy-saving equipment including insulated glass, that are not sold on the domestic market and are not produced domestically.	Malaysia has eliminated customs duty on energy-saving goods including insulated glass. Vietnam has reduced duty on energy-saving products including insulated glass that are not sold on the domestic market or produced domestically.

Legend: ⊙ First priority; ○ second priority; X not recommended; * As assumed in JICA 2015

Analysis of policy options

A VAT reduction would offer building developers a strong incentive to use insulated glass in building construction. Reducing import duty is not recommended because insulated glass is widely produced domestically. Reduced VAT to promote the installation of insulated glass is specifically aimed at building developers who purchase and install new glass rather than at the production and distribution chains. This policy needs to be accompanied by an awareness-raising campaign to increase developer awareness of the potential for saving on electricity bills in the long term due to reduced consumption of energy to cool buildings.

4.3.2.4. Fiscal Policy Options for Promoting the Development of Green Building

JICA's (2015) study shows that the number of green buildings in Indonesia is still limited, even though there is a policy in place regulating green building (Ministry of Public Works and Housing Regulation Number 02 Year 2015) (see section 4.2.3). The relatively high cost of installing the facility and infrastructure of green buildings tends to discourage builders even though it can reduce energy consumption in the long run. Government incentives are expected to increase the development of green building to 30% of all new buildings developed in 2015. JICA (*ibid*) proposes several policy alternatives to promote the development of green buildings, including reduced land and building tax. The government and the private sector could participate in promoting the development of green building through soft loans and/or credit guarantee.

Table 9. Policy Options for Promoting Green Building Development

Policy options		Reduced land and building tax	Soft loan	Loan guarantee
Brief explanation of policy options		A scheme for reducing land and building tax for building to certificated green building standards.	A loan with a low interest rate to be invested in the development of green building.	A scheme to reduce the amount of collateral required for loans to buy related green building's products.
Priority	Old buildings	⊙	○	⊙
	New buildings	⊙	⊙	○
Supporting arguments		This is the simplest and most effective scheme for supporting the green buildings regulations. It would increase government revenue and be profitable for building managers.	Attractive for building management companies. Apart from the low fiscal burden on the government, the soft loan can be facilitated by national and international financial institutions.	Attractive to building management companies with limited financial capacity if the loan guarantee can replace loan collateral.
Risks		Requires green building certification as evidence of eligibility for tax reduction and expansion of local government capacity for involvement in implementation.	Requires green building certification as an evidence of eligibility for tax reduction.	-
Average net annual benefit to the Indonesian government *		Land and building tax reduction of 0.16% = IDR 2.5 billion.	No available information.	No available information.
Experience in other countries		Malaysia reduces tax for building management companies with a green building certificate.	In several regional government areas in Japan the local government implements a subsidy for residences that meet the Comprehensive Assessment System for Built Environment Efficiency CASBEE standard.	The Malaysian government has a guarantee fund of up to RM 500 million for a maximum of 15 years.

Legend: ⊙ first priority; ○ second priority; * As assumed in JICA 2015

Analysis of policy options

Reduced land and building tax would motivate new green building and the revitalisation of old buildings. The development of this policy needs an initiative from local government, which collects land and building tax (see footnote at the beginning of Chapter 3), supported by the Ministry of Internal Affairs and the Ministry of Public Works and Housing. DKI Jakarta's local government experience of implementing green building policy could be used as a benchmark for other local governments in Indonesia. Both a soft loan and a credit guarantee are needed and these could be implemented through the funding facility for energy conservation discussed in section 4.4, whose implementation would need to be supported by the Financial Services Authority to encourage financial institutions such as commercial banks and PT Indonesia Infrastructure Finance (PT IIF) and Jamkrindo to actively participate.

4.3.3. Public (Non-commercial) Sector

The following fiscal policy recommendations for managing public-sector energy demand aim to conserve energy for the benefit of the general public. The policy on the replacement of conventional street lighting bulbs with LED bulbs could reduce energy consumption by street lighting by up to 70%. This policy can be further developed by adding a funding scheme (Harisman *et al.,* 2013). To date most local governments have not applied this technology to their public street lighting.

4.3.3.1. Funding Scheme Options for the Replacement of Public Street Lighting with LED Technology

The replacement of public street lighting can be effected using government funding and public private partnership (PPP). The GIZ PAKLIM study (2013) evaluates several funding schemes for this project and proposes the best three: a banking model, a common public-private partnership with a build, operate, transfer (BOT) model, and a BOT model with assistance from a government institution (PT SMI and/or PIP).

Table 10. Funding Scheme Options for Replacement of Public Street Light with LED Technology

Funding scheme options	Banking model	Common build, operate, transfer (BOT) cooperation model	Private build, operate, transfer (BOT) + government institution cooperative model
Brief explanation of funding scheme options	Regional loan through commercial or regional development bank.	Business obtains right to fund PST replacement followed by its' management. Business entity is allowed to charge management fee until the ownership is handed over to the government.	Similar to common private BOT model, but business entity obtains loan from PT SMI and other sources.
Mechanism	Regional government prepares and submits a loan application for planned activities to Regional Development Bank (RDB) after receiving inputs from the Ministry of Home Affairs, which has consulted with the Ministry of Finance . The bank examines and decides on the eligibility of the applicant.	Head of Regional government and/or business entity offers cooperation plan, and develops a draft contract involving regional stakeholders; the regional government issues a formal letter to finalise the cooperation plan.	Similar to common BGS private cooperation model but involves PT SMI as a funding source. For this model, the business entity acts only as a special purpose vehicle (SPV) that simplifies the loan mechanism.
Priority	○	○	⊙
Supporting premises	Interest applied is market interest rate minus risk premia (around 1-3%) or roughly about 9-10% (as at July 2015). Approval from local House of Representatives is required.	Regional government is not required to issue shares but only to issue permits. This scheme is simple to be implemented since it only needs a discussion about the lease budget by the local house of representatives.	Regional government only needs to issue BOT permits and to discuss the lease budget with the local house of representatives. Interest is lower than in common BGS patterns so the value of investment is higher.
Risks	Moral hazard and the risk of non-performing loans. The RDB must comply with central bank regulations such as credit can exceed the size of a maximum loan.	Assets received by the local government from a business entity may have no economic value or are damaged investment value can be lower compared to investment value of other schemes because the private sector needs to generate profit margins and bear the risk hence maybe overcapitalising their assets.	
Cost	Assumption of commercial interest rate: 12% - 3% = 9%	Commercial interest rate + profit margin = 12% + 10% = 22%	Government institution interest rate + profit margin = 7.75% + 10% =17.7%

Legend: ⊙ first priority; ○ second priority

Analysis of funding scheme options

Of the three possible models above, the private BOT model with financing from a government institution (PT SMI) is preferable because it does not require local government to contribute capital but only to issue a permit, and the difference in the interest rate is 4.3% (22%-17.7%) so

the cost of the loan is lower than in the common BOT model and therefore the return on investment is greater. This programme requires the active participation of the Ministry of Home Affairs by way of disseminating the funding mechanism and mapping the needs of local governments, and the participation of PT PLN in the installation of net metering.[26]

4.3.4. Transportation Sector

The following fiscal policy recommendations on managing energy demand in the transport sector aim to improve motor vehicle users' energy consumption efficiency and conservation. Fiscal policy related to motor vehicles can be further developed in the form of tax on the purchase of new vehicles and annual registration tax. The tax rate on motor vehicles is determined by the vehicle's energy efficiency, providing an incentive for the public to switch to low-emission vehicles. Fiscal policy related to motor vehicles is expected to contribute positively to energy efficiency and the reduction of air pollution.

4.3.4.1. Adjustment of Fiscal Policy Related to the Use of Motor Vehicles According to Level of Energy Efficiency

LCS and PKPPIM (2014e) provides a set of fiscal policies aimed at motivating people to change their motor vehicles for those with greater energy efficiency such as hybrid vehicles or vehicles using efficient fuel with Research Octane Number (RON) ≥ 92.

[26] The net metering system measures energy use and the savings obtained by using LEDs in public street lighting.

Table 11. Fiscal Policy Options Related to the Improvement of Motor Vehicles' Energy Efficiency

Policy options	Carbon tax on fuel	Motor Vehicle Tax	
		Tax on the Purchase of New Vehicles	Annual Registration Tax (PKB)[27]
Brief explanation of policy options	Emission tax included in the fuel price.	Emission tax included in the price of new cars, paid once at the time of purchase. The amount of tax depends on the vehicle's emission rating.	Tax reduction on vehicle annual registration for vehicles equipped with a gas conversion kit.
Priority	X	○	⊙
Risk considerations	Positive correlation between emissions produced and tax rate (tax based on emission).	Fairer	A low-emission car that is used frequently produce more emissions than the same car that is rarely used.
Average net benefit per year *	Influenced by political support.	No available fiscal mechanism to date to support this policy.	Depends on local government initiative. No facility or infrastructure available including for monitoring and evaluation.
Experience in other countries		Static simulation result: reduction of total emissions by 37.1%, if total sale of the car decreases by 26.5%. However, government income increases by 10%.	
Supporting argument		The UK applies vehicle excise duty (VED). Germany, Netherland, Sweden, and Norway follow the UK system. France implements a fee-bate system.[28] In Southeast Asia, Thailand follows the UK system and Singapore implements a system similar to France's.	

Legend: ⊙ first priority; ○ second priority; X not recommended; *Assumed in LCS and PKPPIM 2014e.

Analysis of policy options

Central government could work with local government to increase motor vehicles' energy efficiency and levy a tax on new vehicles based on their emissions, with vehicles with higher emissions attracting more tax than those with lower emissions. This initiative could be brought in by implementing Ministry of Finance Regulations supporting Government Regulation Number 22 Year 2014 amending Government Regulation Number 41 Year 2013 on taxable goods classified as luxury motor vehicles subject to the luxury goods sales tax. These regulations link machine cylinder capacity with their carbon emissions, with cylinder capacity determining the amount of tax imposed. LCS and PKPPIM (2014e) mention that the UK's system is suitable for Indonesia because there is already an available policy framework in the form of Government Regulation Number 41 Year 2013 on tax relief for energy-efficient cars, which is similar to the UK's vehicle excise duty (VED), and because Indonesia does not have an existing policy framework for the rebate system implemented in France.

Local government could participate in the form of tax adjustments for annual registration to extend tax on motor vehicles known as PKB such as by imposing a lower tax on vehicles equipped with a gas conversion kit. LCS and PKPPIM's (2014e) simulation provides a number of options for annual registration tax rate based on CO_2 emissions. The Department of Transportation and a few local governments such as the provincial governments of DKI Jakarta and of East Java are successfully implementing an annual progressive registration tax which rises if several vehicles are registered under the same name and address.

[27] Tax to support the development of gas-fuelled vehicle and to increase the conversion rate.

[28] VED system is a motor vehicle tax with tax bands based on CO_2 ratings as an incentive to purchase vehicles with lower emission ratings; fee-bate system is a system where owner of high CO_2 emitter vehicle need to pay fee and low-emitter get rebate that reduce vehicle price

4.4. Synthesis of Fiscal Policy Options for Managing Energy Demand

Synthesis fiscal and non-fiscal policy options for managing energy demand require the participation of the private sector both domestically and internationally. Three prioritised fiscal policy options for managing energy demand are reducing VAT on equipment with a 4-star energy rating, reducing import duty on equipment which has a 4-star energy rating and is not produced domestically, and soft loans and loan guarantees related to the purchase of energy-saving equipment. Rebates for the purchase of energy-saving equipment and the adjustment of sales tax on luxury goods are second-priority fiscal policy options.

There are several criteria for the synthesis of fiscal policy options. The prioritised options do not include policies that are the responsibility of local government, including among others the reduction of land and building tax for urban and rural green building, motor vehicle tax based on volume of emissions, and finance for replacing street lighting with LED technology. Neither do they include non-fiscal policy that is not the responsibility of the Ministry of Financem such as the promotion of leasing for energy-saving appliances.

Table 12.List of Fiscal Policy Options for Managing Energy Demand and Related Stakeholders

Fiscal policy classification	Policy options	Priority	Source of information	Sector	Key stakeholders
Government Revenue and Grants	VAT reduction for energy-saving equipment with a 4-star rating, especially split AC, medium AC, refrigerators and insulated glass.	⊙	Tables 4, 5, 7 and 8	Household, Commerce and Industry	Ministry of Energy and Mineral Resources (MEMR); Directorate General of New and renewable Energy and Energy Conservation; Ministry of Industry; Ministry of Finance (PKPN, PKPPIM, and Directorate General of Budget)
	Import duty reduction on energy-saving equipment, particularly medium AC not produced domestically.	⊙	Table 7		
	Adjustment of sales tax on luxury goods for luxury motor vehicles based on energy efficiency.	○	Table 11	Transportation	Ministry of Finance (PKPN), Gaikindo (Association of Indonesian Automotive Manufacturers)
Government Expenditure	Rebate for energy-saving equipment: AC and refrigerators.	○	Tables 1 and 2	Household, Commerce and Industry	MEMR DG New and renewable Energy and Energy Conservation, Ministry of Finance (PKPPIM and Directorate General of Budget
Government support to financing schemes	Soft loan and loan guarantee to purchase energy-saving equipment such as AC and the development of green building.	⊙	Tables 7 and 9	Household, Commerce and Industry	Fiscal: MEMR; Directorate General of New and renewable Energy and Energy Conservation; Ministry of Finance Non-fiscal: Financial Services Authority for private sector participation in promoting leasing and soft loan; MEMR (DG New and renewable Energy and Energy Conservation).

Legend: ⊙ first priority; ○ second priority

In its role as policy- and decision-maker on related fiscal issues, government needs to consider several factors including the short- and long-term impacts of new policy including fiscal, economic, social and long-term environmental impacts that are irreversible and cannot be avoided (IPCC, 2014). Fiscal policies involve fiscal risk and can be prioritised based on urgency. VAT and import duty reduction are relatively cheap to implement, although they may affect the contribution of VAT to the government's revenue mix. Soft loans and loan guarantees require institution-building and have the potential to increase the government budget for financing, which may affect the government balance sheet; however, they also have the potential to act as catalysts for private-sector investment in low carbon development projects. Fiscal risks, opportunities for economic growth, investment and GHG emission reduction targets should be used as the basis of analysis when following up fiscal policy options for managing energy demand.

This report provides a guide to the main considerations for formulating the policy for a funding facility for energy conservation. This facility aims to stimulate the interest of financial institutions such as commercial banks to provide soft loans and loan guarantee for energy conservation activities such as replacing machinery with the energy efficient ones. The following brief literature review puts forward the main aspects to be considered in establishing a funding facility for energy conservation to facilitate the development of soft loan and loan guarantee policies.

Illustration 2: Funding Facility for Energy Conservation

One of the challenges of the energy conservation effort is the low participation of companies in energy conservation activities. A funding facility could motivate business entities to engage in energy conservation. Based on article 20 of Government Regulation Number 70 Year 2009 on energy conservation, the government could encourage business entities by provision of finance at low interest rates and providing tax concessions and energy audits. Business owners in several focus group discussions seemed reluctant to engage in energy conservation at their own cost because business entities tend to allocate their resources to improving production in the long term (Setyawan, 2014). The following aspects should be considered regarding funding for energy conservation such as types of fiscal incentive, potential recipients, institutional policy, and cost-benefit analysis.

Types of fiscal incentive: soft loan and/or loan guarantee

Based on the analysis summarised in Table 12, business entities will need soft loans and loan guarantees such as for the purchase of energy-efficient AC and the development of green buildings. Energy conservation requires both soft loans and loan guarantees provided by financial institutions such as banks and Jamkrindo to reduce the need for collateral for eligibility for a loan from financial institutions such as banks. Soft loans or loan guarantees are needed to encourage business entities to engage in energy conservation in two phases, as explained below.

The first phase aims to motivate the market and trigger corporate demand for energy conservation on a commercial scale. In this phase the interest rate can be subsidised as an incentive to the banking sector to offer soft loans to the public. The government already offers subsidised interest rates (at lower than the market rate) specifically for the Credit for Food Security and Energy (KKP-E) programme to improve food productivity and support food and energy sovereignty in Indonesia. For the purpose of energy conservation, the proposed interest rate subsidy is the Central Bank's interest rate minus 3%; while the banking sector disburses the fund to business entities at the current Central Bank's interest rate added by 2% to 2.5% (the difference in the interest rate between the subsidised interest rate and the disbursed interest rate is about 5-5.5%, which is used by commercial banks as risk premium, administration costs and the profit margin (Volker, 2015).

The second phase aims to increase demand by lowering the perception of business risk via a loan guarantee, which is expected to reduce the need for collateral for eligibility for a loan. However, several studies by Volker (2015) find that the first phase has to be the main priority before considering the second, market establishment. Furthermore, the transaction costs for an interest rate subsidy tend to be lower than for a credit guarantee because the requirements for skilled technical analysis and a risk premium are relatively lower for soft loans (Volker, 2015).

Potential debtors of energy conservation funding facility

The MEMR has carried out an energy audit through a partnership programme involving 481 business entities which estimates potential average energy savings of 9.300 MWh per business entity (around 10% of the current energy consumption level). The business entities involved in the MEMR audit programme may receive energy conservation funding and to use the funding facility.

Institutional policy

To facilitate funding for energy conservation, MEMR and the Ministry of Finance require an institution to disburse funding to the banks to enable them to offer loans at a subsidised low interest rate, with a guarantee scheme if necessary, and to disburse funding to small, medium and large enterprises. The government needs to review implementing agencies that could fulfil the above criteria. MEMR could also prepare a submission to the Ministry of Finance for a funding allocation and operational and technical guidelines and to set up a steering committee. Policy design covering the formulation of monitoring and evaluation mechanisms to ensure that the banks disburse funding is required (Setyawan, 2014).

Cost and benefit analysis

The Ministry of Finance needs to consider the fiscal risks involved in providing a fund for energy conservation and weigh this cost against government expenditure on energy subsidies for energy wasted by an industry (on the assumption that an industry tends to waste energy if its electricity bills are still subsidised by the government).

Sources: MEMR Partnership Program 2014, Setyawan (2014), Kholis (2014), and Bromund (2015)

Chapter 5. Fiscal Policy Options for Managing the Energy Supply

Fiscal policy for managing Indonesia's energy supply can be used strategically to motivate businesses to increase their production of energy, and especially new and renewable energy to meet domestic demand. Chapter 5 reviews a number of recommendations for fiscal policy put forward in the studies and reviews listed in Table 3. It comprises four sections: the first three detail 1) policies underpinning the formulation of new fiscal policy on managing the energy supply; 2) technical policies supporting the formulation of fiscal policy strategies for managing the energy supply; and 3) options for the formulation of fiscal policy strategies for managing the energy supply. The last section prioritises these policy options based on the Ministry of Finance's fiscal classification into government revenues and grants, government expenditure, and government support to financing schemes.

5.1. Strategic Policies Underpinning the Formulation of Fiscal Policy for Managing the Energy Supply

Some of the policies underpinning fiscal policy on energy supply contribute to guiding the formulation of new policies aiming to achieve national development goals, particularly in the macroeconomics and the environment sector. These policies are: (i) RPJMN 2015-2019, (ii) KEN, (iii) RAN/RAD-GRK, (iv) the Greenhouse Gas Inventory Policy, and (v) the Green Energy Development Policy.

5.1.1. National Mid-term Development Plan (RPJMN) 2015-2019

RPJMN 2015-2019 is stipulated in Government Regulation Number 2 Year 2015 and explains that one of the government's goals is to achieve energy sovereignty. Book 1, section 6.7.2 of RPJMN 2015-2019 specifies support for efforts to increase energy production, particularly from renewable energy, and the acceleration of the energy infrastructure development, bothimportant aspects of meeting the increasing demand for energy.

5.1.2. National Energy Policy (KEN)

KEN is stipulated in Government Regulation Number 79 Year 2014 and provides guidelines for managing energy in Indonesia with the aim of achieving national energy independence and security in support of sustainable development.[29] Both conventional and new and renewable energy contribute to Indonesia's short and long-term energy sovereignty, and particularly to increasing the electrification of remote areas and meeting the increasing demand for energy in

[29] Article 1 Paragraph 4 Government Regulation Number 79 Year 2014 on KEN states that *a new energy source is a source of energy that can be generated by new technologies, derived from both new and renewable energy sources such as nuclear energy, hydrogen, coal bed methane, liquefied coal and gasified coal.* Paragraph 6 remarks that *renewable energy sources are energy sources produced from sustainable energy sources that are managed well, such as geothermal sources, wind, bioenergy, sunlight, streams and waterfalls, sea surface movement and temperature difference.*

various sectors (see Table 13). The development of new and renewable energy makes a double contribution as it supports energy sovereignty while at the same time reducing national GHG emissions, as stipulated by RAN/RAD-GRK.

Table 13. Sources of Energy and their Application

Energy sources	Application
All types of renewable energy	Electricity
Solar energy	Electricity and non-electrical energy for industry, households and transportation
Biofuel	Replacement of fossil fuel, especially for transportation and industry (with a consideration of achieving food security)
Biomass and waste to energy	Electricity and transportation
Fossil fuel	Commercial transportation which cannot use other energy sources
Gas	Industry, electricity, households and transportation (priority is given to one of these purposes with the highest value added).
Coal	Electricity and industry
New energy in liquid form such as liquefied coal and hydrogen	Transportation
New energy in solid and gas form	Electricity

Source: KEN, Government Regulation Number 79 Year 2014 article 12

5.1.3. National and Local Action Plan for Reducing Greenhouse Gas Emissions (RAN/RAD-GRK)

RAN/RAD-GRK supports the government's target of reducing national GHG emissions by 26% by 2020 via its own resources, or by 41% with international support. RAN GRK's Annex 1 explains the action to be taken to increase the energy supply, in particular encouraging small and medium-scale businesses to produce new and renewable energy from micro and mini hydro energy power plants and solar, wind and biomass energy. RAN-GRK's target for energy produced by hydro power plants in 2010-2020 is 692 MW, more than for any of the other sources listed above. The target is to increase the number of energy-independent villages (DME) by 250 in the period of 2010-2014 and by 450 in 2015-2020.

5.1.4. National Inventory of Greenhouse Gas Emissions

The execution of a national inventory of GHG emissions is stipulated in Presidential Decree Number 71 Year 2011, of which Chapter 3 Article 3, paragraph 3b specifically explains the scope of the GHG inventory, including energy procurement and generation. In this way the MEMR provides a guide for the management and execution of the GHG inventory for the energy sector. The Ministry of Finance could use data from this inventory to calculate the ratio of government expenditure on each energy source to total expenditure on energy as well as to GHGs emitted. This would help to monitor the effectiveness of government expenditure on increasing the energy supply and reducing GHG emissions.

5.1.5. Green Energy Development Policy (Renewable Energy and Energy Conservation)

Indonesia's Green Energy Development Policy is stipulated in MEMR Regulation Number 2 Year 2004, which explains the steps to take to encourage an increase in the energy supply, particularly from renewable energy, through obliging businesses to use it. Several steps that can be taken to reach this goal including formulating investment policy and its funding, and on incentives and energy pricing (paragraphs 40a, b, and c). The development of renewable energy requires considerable funding, and thus a funding mechanism is necessary to spur the participation of the private sector, cooperatives and state- and local-goverment-owned companies. The mechanisms that are envisioned are a revolving fund, loan guarantees, soft loans and microcredit. Policy on incentives can be further developed to trigger private sector participation in the development of renewable energy via tax incentives such as tax exemptions for luxury goods used for the development of renewable energy (paragraph 44).

5.2. Technical Policies Related to Fiscal Policies for Managing the Energy Supply

Fiscal policies could be implemented to support the technical policies stipulated by the ministries responsible for the technical aspects of the management of the energy supply. Technical policies regarding the development of energy infrastructure and those related to partnerships with the private sector can continue to be synergised with fiscal policy strategies for managing the energy supply.

5.2.1. Energy Infrastructure Development

The Government of Indonesia already has policies in place to accelerate the development of energy infrastructure such as Presidential Decree Number 4 Year 2010, which assigns PLN to expediting the development of new infrastructure for renewable energy, gas and coal, and MEMR Regulation Number 10 Year 2012, which regulates and manages the technical aspects of new and renewable energy development. The Presidential Decree appoints PT PLN as an executing agency and assigns the Directorate General of New Renewable Energy and Energy Conservation at the MEMR to monitoring and evaluating the progress of physical activity associated with renewable energy development. Indonesia needs a large amount of new energy infrastructure and the participation of the private sector is required if it is to achieve its energy infrastructure targets.

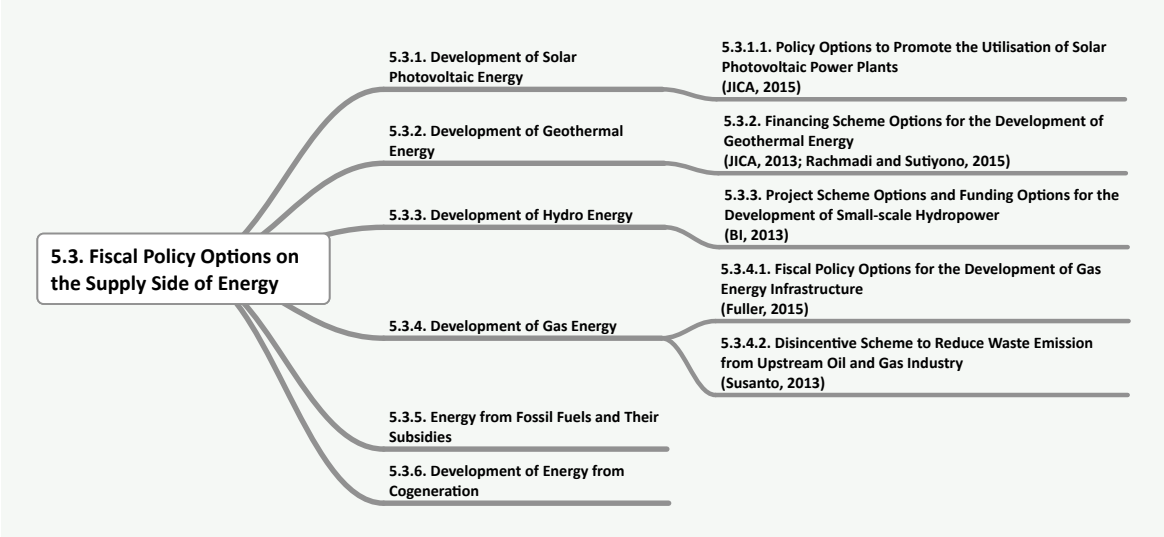
5.2.2. Partnership with the Private Sector

Presidential Decree Number 56 Year 2011 regulates partnerships with the private sector, in this case independent power producers, to broaden private-sector opportunities to participate in the development of energy infrastructure for energy sovereignty. This regulation is amended by Presidential Decree Number 38 Year 2015 on Government Cooperation with Private Businesses on Energy Infrastructure. The support and participation of the private sector is expected to speed up energy infrastructure projects. The Wayang Windu geothermal project, developed by StarEnergy, is an example of private sector participation in the development of energy infrastructure. A more transparent and professional bidding process is expected to encourage the private sector to participate more in energy development projects (JICA, 2013; Singh dan Setiawan, 2013).

5.3. Policy Options for Managing the Energy Supply

This section presents fiscal policy options for managing the energy supply, which can be further developed to increase the supply and spur the development of new and renewable energy via strategies such as policies related to funding and investment and incentives for private companies to invest in renewable energy development projects. This report is guided by article 40 of MEMR Regulation Number 2 Year 2004 on Green Energy Development Policy (section 5.1.5). Other technical policies related to the management of energy supply are listed in Annex 2. This section discusses several fiscal policy options related to the management of various energy sources: solar photovoltaic (PV), geothermal and hydro energy and energy from gas, fossil fuels and cogeneration (Figure 9). Figure 9 includes fiscal policy options derived from the studies listed in Table 3.

Figure 9. Framework of Fiscal Policy Options for Managing Energy Supply



5.3.1. Solar Photovoltaic (PV) Energy Development

Solar PV energy transforms solar energy to electricity via a PV module. Fiscal policy options seek to increase businesses' production and use of energy from solar PV. There are three types of business entity involved in its development: solar panel producers, independent power producers, and off-grid solar power users such as building managers.[30] Solar PV producers receive a tax incentive as they are classed as industry pioneers (see section 3.1). Unlike other renewable energy developers, solar PV developers do not receive an incentive in the form of a feed-in tariff (FiT): they tender for jobs with a pre-determined price ceiling (see Annex 1, energy pricing policy). A study conducted by Ministry of Finance in 2012 identified the absence of an incentive for solar panel use as an area for solar PV policy improvement (PKPPIM, LCS, IESR, 2012).

[30] Based on the electrical distribution system, the development of solar PV energy can be on-grid or off-grid. On-grid solar PV is connected with electricity system belongs to PT PLN. To date electrical connectivity is not evenly distributed across Indonesia, although electricity is widely available in Java and Sumatra (GIZ, 2014). Off-grid solar PV does not require a grid and is mainly used in remote area that cannot be reached by the PT PLN electricity network.

5.3.1.1. Fiscal Policy Options for Promoting Solar PV Power Plants

The 2015 JICA study shows that the utilisation of solar PV power in buildings in Indonesia is still minimal. To address this, JICA proposes two fiscal policy options: (1) the promotion of leasing and (2) a soft loan with a loan guarantee (see Table 14). Both policies aim to increase the use of solar panels and establish solar energy-produced electricity in 500 buildings across Indonesia by 2025. The utilisation of 500 units of solar panelling, each with a capacity of 20 KW, is expected to reduce the use of electricity generated from fossil fuel by 18,000 MWh per year.[31]

Table 14. Fiscal Policy Options for Promoting the Installation of Solar Panels as Buildings' Energy Source

Policy options	Promotion of lease	Soft Loan	Loan guarantee
Brief explanation of policy options	A scheme to encourage businesess to rent energy-saving equipment such as solar panels.	A loan with a low interest rate to be invested in solar power plant.	A scheme to reduce collateral load for loans to buy a solar power plant.
Priority	⊙	⊙	○
Supporting premises	This scheme is already included the Indonesia's policy framework, meaning that it can be implemented quickly (see Table 6).	Of interest to building managers.	Suitable for business entities with limited financial capacity if the credit guarantee can replace loan collateral.
Risks	May not provide sufficient incentive to leasing companies to add equipment for solar panel power plant to their product range.	If implemented, specific types of equipment for solar power plant need to be registered	
Experiences in other countries	Japan and Thailand offer a loan through ESCO's fund for energy-saving products (installation fee and fixed rate 4-6%) for a maximum of five years.	Malaysia provides a funding scheme for investors and manufacturers through its Green Technology Financing Scheme with a 2% interest subsidy and 60% government loan guarantee up to RM 500m, for a maximum of 15 years.	

Legend: ⊙ first priority; ○ second priority

Analysis of policy options

Like the promotion of leasingfor split and medium AC in the industrial sector (see Table 6 and 7), the promotion of leasing of solar power plants requires guidance and direction for the Indonesian Association of Corporate Financing (APPI) from MEMR's Directorate General of Renewable Energy and Energy Conservation and the Financial Services Authority. Another strategy to support the promotion of leasing is to allow energy service companies (ESCOs) or leasing companies that move from non-eco friendly products to eco-friendly products to qualify as pioneer industries, as regulated through MOF Regulation Number 130/PMK.011/2011 on Exemption from or Reduction of Corporate Income Tax.[32] While they do not produce goods, ESCOs deserve an income tax exemption or reduction as service companies that support the implementation of energy efficiency in the industrial sector and green building. Reducing income tax for ESCOs would increase the number of leasing companies offering equipment for energy conservation and the development of renewable energy. The promotion of leasing and soft loans is the top-priority policy options. The Ministry of Finance could implement the soft loan policy via the proposed funding facility for energy conservation (section 4.4).

[31] Complete information on the calculation and assumption used in the study can be found in the JICA study (2015)

[32] An ESCO is a company providing consultancy services for the design and implementation of energy efficiency, energy conservation and energy infrastructure projects. ESCO businesses provide energy efficient equipment, change and service machines, provide power plants, energy cogeneration provision, etc.

5.3.2. Geothermal Energy Development

The Government of Indonesia is developing the use of geothermal energy, which is thermal energy derived from the earth. Under Geothermal Law 2014 the development of geothermal development energy is no longer a mining activity, lifting the restriction on situating it in forest conservation areas. This law has addressed a licensing issue that was a major barrier to scaling up the exploitation of geothermal resources. Its article 20 breaks down the development of geothermal energy into three phases: exploration, exploitation, and utilisation. Exploration is the most difficult of these and government intervention and support are badly needed. Exploration permit holders are obliged to look for potential locations of geothermal energy and to drill geothermal wells (the suggested number is three). This phase normally takes about three years and requires funding of up to USD 25 million (JICA, 2011). To date, business entities' willingness to engage in geothermal exploration has been limited (Rakhmadi and Sutiyono, 2015), partly because exploration involves high risk and success is hard to predict and government support is therefore important.

5.3.2.1. Funding Structure Options for the Development of Geothermal Energy

The Indonesian government previously allocated funding to PIP to expedite geothermal exploration. The arrangement is known as the Geothermal Fund Facility (GFF) and is regulated by MOF Regulation Number 03 Year 2012 on the Management of the Geothermal Fund Facility (section 3.3.2). With institutional restructuring and the transfer of assets from PIP to PT SMI in 2015, this report reviews several funding structure options for the development of geothermal energy as proposed by JICA (2011) and identifies lessons learned and input from the experience of the GFF and the Sarulla Geothermal Power Project. JICA (2011) reviews three funding structures for the development of geothermal energy: the PT SMI scheme, the PT PLN/PT Geodipa scheme, and the MEMR scheme (see Table 15).[33]

[33] This report updates the JICA study's (2011) 'PIP model' to 'PT SMI model' due to institutional development in which there has been a transfer of assets from PIP to SMI in 2015.

Table 15. Funding Scheme Options for the Development of Geothermal Energy

Scheme options	PT SMI scheme	PT PLN/PT Geodipa scheme	MEMR scheme
Brief explanation of scheme options	PT SMI performs all of the exploration processes including site selection and procurement of construction equipment, and provides funding for the exploration. MEMR gives the mandate/authority to PT SMI.	PT PLN or PT Geodipa receive funding from PT SMI and act as the executing agency that finances the exploration. PT PLN or PT Geodipa is responsible for the procurement of construction equipment and provides direction on the ground.	MEMR is responsible for procurement of construction equipment for executing agencies and provides direction on the ground. PT SMI finances the project, obtaining a return on its investment through direct payment from the holder of the geothermal mining permit (IUP).
Supporting premises	Low transaction costs.	PT PLN and PT Geodipa possess the required technical capacity.	Exploration activity can be performed by a business entity which has the assignment letter from the MEMR.
Risks	PT SMI is oriented towards the market and commercial interest rates and less interested in high-risk exploration. It needs to improve its technical capacity considerably.	The responsibility for exploration is mandated to PT PLN and/or PT Geodipa and is interpreted as a commercial activity rather than an assignment by the government. Like PT SMI, PT PLN and PT Geodipa are commercially oriented.	The flow of fund should be regulated in accordance with Government Regulation Number 1 Year 2008. The business entity has to pay the PT SMI interest rate together with the high risks of exploration.

Analysis of scheme options

The three options detailed above are limited because geothermal exploration depends on funding from commercially-orientated business entities rather than being a public service. PT SMI has offered loans at market interest rates and a long-term tenor (the period of loan), which is not offered by national commercial banks. This orientation towards the market interest rate could be an obstacle to businesses investing if there is no risk-sharing mechanism covering exploration failure so they must bear all the risk. PIP's experience of administering the GFF shows that GFF must fulfil several conditions if it is to be effective. The first condition is a policy that facilitates the sharing of the risk between the energy developer and the GFF, such as a scheme that facilitates sharing the risk of exploration failure between the parties involved if a loan is accompanied by collateral. The second condition is institutional policy oriented towards the quantity and quality of geothermal exploration activity rather than merely towards the return on investment and the success of the exploration. The third condition is simple and transparent operational guidelines accompanied by technical guidelines for independent energy producers and local government.

The Sarulla Geothermal Power Project has shown that a large-scale geothermal project in several phases can draw investor interest, particularly in the field construction phase for which revenue from the first and second are used to fund the development of unit 3.[34] Rachmadi and Sutiyono (2015) find that the factors that have spurred private-sector participation in the Sarulla Geothermal Power Project are a long-term FiT with a step-down approach; a business viability guarantee letter (BVGL); a political guarantee for a geothermal project; and a government role in exploration seeking to prove that there are geothermal energy reserves in the area ('proven field') (Table 16).

[34] The Sarulla Geothermal Power Project consists of three units. Units 1 and 2 are to be completed before 2018 and revenue from both units will be used to finance the development of unit 3. This project is expected to start operating in 2018.

Table 16. Funding Components Contributing to the Success of the Sarulla Geothermal Power Project

Funding components	Long-term feed-in tariff (FiT) in USD (30 years)	Business Viability Guarantee Letter (BVGL) (20 years)	Political guarantee	Proven field
Brief explanation of funding components	FiT with step-down approach (declining FiT tariff during span of project, with three declining reference rates) could enable faster loan repayment.	Through BVGL and an ownership statement from PT PLN, the government is committed to guarantee payments to the developer for the sale of electricity in the event that PLN defaults on its financial obligations to the project.	Political risk guarantee backed by Japan Bank for International Cooperation (JBIC) provides additional security for private lenders against adverse political events and non-payment by the government if PLN defaults on its offtake. The guarantee covers war, expropriation, change of law and non-payment by the Government of Indonesia.	Government to take a bigger role in undertaking exploration risk by carrying out its own exploration before putting the development out to tender by private developers and extending soft loans, grants, insurance and guarantees to them.
Goals	Increase revenue, certainty during project cycle; lower the risks associated with currency fluctuation and offtake for private developers; improve project bankability to help speed up financial closure.	Address projects' bankability concerns by ensuring the creditworthiness of state-owned offtaker, maintain positive cash flow for the duration of the loan and help to alleviate risks associated with offtake and financing to speed up financial closure.	Provide additional security for private lenders against adverse political events and non-payment by government if PLN defaults on its offtake.	Private developers would be more ready to bear high costs if significant exploration has already been carried out and the extent of the resource in the fields is proven, meaning that developers and commercial lenders only bear the risks of the field construction phase and project operationalisation phase.

5.3.3. Hydro Power Development

The development of hydro power infrastructure aims to improve the utilisation of the renewable energy contained in flowing water. PLN divides the hydro power tariff into two categories based on power plant capacity, namely those with medium capacity of up to 10 MW and those with low capacity of up to 250 kW (see Annex 2, Energy Pricing Policy, summarised in Table 22). The tariff for power plants with a capacity of above 10 MW is regulated by agreement between the developer and PT PLN (Annex 2).

5.3.3.1. Project Scheme Options and Funding for the Development of Mini Hydro Power

Among all other the types of renewable energy, mini hydro power projects have the potential for full funding from the banking sector (BI, 2013) because investment in a mini hydro power plant is relatively low (USD 1-3 million per MWh). The Central Bank of Indonesia has prepared a financing model for the development of mini hydro power to encourage the participation of the banking sector. This report discusses three types of mini hydro power financing scheme: project-based, corporation and consortium/syndicate (see Table 17).

Table 17. Project Schemes and Finance Options for the Development of Mini Hydro Power

Funding scheme options	Project-based scheme	Corporation scheme	Consortium/Syndication scheme
Brief explanation of funding scheme options	In practice, this funding is given to independent power producers (IPPs), formed as joint ventures with a stock-sharing pattern. The IPP usually manages all processes from project preparation to implementation.	This loan is usually given to development companies which are on the lending bank's customer list.	This involves several banks funding one high-value project to minimise risk. This scheme is possible if developers submit their funding proposal to several banks at once.
Funding Mechanism	Bank loan is given to IPP complemented by a loan guarantee from joint venture.	Energy developers funded by a bank loan and equity.	Energy developers funded by bank loan and/or equity depending on the project phase.
Arguments	Generally difficult if it relies only on funding from banks for a very large-scale project due to the upper limit of the bank loan.	Suitable for large companies with a good reputation.	Suitable for the early phases of development such as feasibility studies and exploration, which are estimated to cost 2-3% of total investment. High interest rate of up to 35%.
Risks	Small-scale projects have a small chance to be funded by this scheme. It is commonly implemented by large joint ventures.	This scheme is only available to debtors which is the bank's customer list.	Developers need strong management capacity to deal with several banks as funding source.
	A high-quality feasibility study is required to avoid the risk of project failure. Operation contractors and management will only add the level of bureaucracy and cost. The operation contractors and management is unneccesary if the development project is well designed. Engineering Procurement Construction contractors are not suitable for the development of hydropower projects because of the value of equipment of hydropower is small and relatively easy to do by developers because of many technical aspects of the purchase have been standardised.		

Analysis of scheme options

The development of mini hydro power can potentially catalyse further private sector participation, particularly on the part of domestic banking, to support the government's efforts to achieve energy sovereignty. The participation of the Central Bank of Indonesia and the Financial Services Authority in disseminating the outcomes of the BI study (2013) of the mini hydro power financing model and banking-sector training are necessary to accelerate the development of mini hydro power funding. The Ministry of Finance's Fiscal Policy Agency could cooperate with the Central Bank of Indonesia and the Financial Services Authority to record the banks' investment in the development of mini hydro power and to assess private-sector participation in sustainable energy development. Technical policies related to the development of mini hydro power can be found in Annex 1.

5.3.4. Gas Development

Although Indonesia is a country with one of the largest reserves of liquified natural gas (LNG) and has the potential to utilise gas as an alternative energy source, a decline in the gas supply can be anticipated from 2015-2017 (LCS and PKPPIM, 2015c) even though the LNG reserve is categorised as a priority in the development of energy sources. An increase in the gas supply would result in both medium- and long-term economic and social benefits. However, environmental factors must be considered in the energy production process. Below are some general recommendations for the development of gas infrastructure and some incentive schemes for handling emission leakages from oil and gas production.

5.3.4.1. Policy Options for the Development of Gas Energy Infrastructure

LCS and PKPPIM (2015c) demonstrates that gas can be used as a alternative source of energy that is both economically and socially beneficial until the development of new and renewable energy reaches a commercial scale and can meet the increasing demand for energy in Indonesia. LCS and PKPPIM (*ibid*) indicates that the use of unconventional gas could increase the national income by between USD 0.68 and 3.4 trillion, reduce CO_2 emissions by as much as 7.3 gigatonnes and create up to 275,000 new jobs by 2050.

LCS and PKPPIM (2015c) explains that the production of oil and gas in Indonesia is mostly undertaken by oil and gas companies such as Total E&P Indonesie, Pertamina, BP Berau (Tangguh), and Conoco Phillips. The Ministry of Finance could play a role in increasing government income in the medium term by supporting gas exploration and the development of gas infrastructure by state-owned companies, motivating oil and gas companies via fiscal instruments to carry out investigative drilling in potential locations. Currently 50 potential sites have been identified, 22 of which have never been developed while 15 others have been explored, although not yet to the maximum. Stated-owned enterprises such as PT Pertamina are expected to explore the potential of gas energy and lead the effort to realise Indonesia's energy security.

Analysis of policy options

LCS and PKPPIM (2015c) makes general recommendations that can be followed by the Ministry of Finance's Fiscal Policy Agency in the form of reviews of suitable and optimum (dis)incentives to motivate oil and gas companies to engage in drilling operations. These reviews could be carried out in collaboration with relevant institutions such as SKK Migas, which was established by the government in 2013 to regulate upstream oil and gas activities. Another factor for consideration in a review of gas energy development is potential alternatives to tax disincentives such as the use of regulation. A comprehensive analysis of these policy options along with their arguments is necessary to ensure that the use of tax incentives and disincentives is the right way to trigger the development of gas energy in Indonesia.

5.3.4.2. Incentive Schemes for Reducing Upstream Oil and Gas Industry Emission Leakages

For sustainable energy development the increase in the energy supply needs to be counterbalanced by right handling of the emissions leaking from oil and gas production, known as gas flares and vents, which occur in all phases of oil and gas production and emit harmful chemical substances (LCS and PKPPIM, 2015d). LCS and PKPPIM (2015d) proposes three incentive schemes to motivate upstream oil and gas producers to reduce emissions leakages in the production process: a regulation promoting the commercialisation of emission leakage such as by developing a profit-sharing contract between the oil and gas producer and the emission leakage manager; a set of government regulations for oil and gas companies; and fines with an upper limit for emissions on a case-by-case basis.

Table 18. Policy Options for Reducing Emission Leakage from Upstream Oil and Gas Industry

Policy options	Commercialisation of emission leakage through regulation	A set of government regulations for oil and gas companies	Fines with upper emission limit in a case-by-case basis
Brief explanation of policy options	Set up maximum price changed to a business entity for its produced emission leakage. Give oil and gas companies incentives to process waste emissions. Develop a profit-sharing contract between the oil and gas producer and the emission leakage manager.	Cooperate with the Global Gas Flaring Reduction Association (GGFR), led by the World Bank, to support initiatives that encourage policymaking which requires oil and gas companies to actively participate in the World Bank programme on this particular concern.	Fine companies with emission leakage exceed government thresholds according to each individual case. The upper threshold can be determined by using average of Gas Flaring to Barrel Oil Equivalent Ratio (GFBOE) plus deviation standard (see Annex 1 and Susanto (2013)). Maximum upper limit is the average of GFBOE category plus 1.
Priority	X	○	⊙
Supporting premises	The existing reguation is normative and there is no economy and fiscal instruments that can be applied; special Task Force for Upstream Oil and Gas Business Activities (SKK Migas) is not interested in selling gas.	Companies, such as Chevron are already involved in this action.	Regulation has been implemented in other countries.
Risks	Oil and gas producers and SKK Migas set high prices, therefore for gas and oil companies, processing gas waste is not economically attractive even though it is technically possible.	-	Difficulty determining upper limits for emission leakage due to the variety of locations between drilling and production.
Experience in another countries		Since 2009, Chevron, in off-shore Agbami, Nigeria, has been operating without producing waste emissions by re-injecting gas waste emissions into their production system.	In Norway, upper limit is determined on a case-by-case basis, and in Alberta the upper limit is uniform.

Legend: ⊙ first priority; ○ second priority; X not recommended

Analysis of policy options

Of the three options above, the third is the least costly and has the potential to increase government revenue. A new policy can be imposed on new companies, and potentially also on existing companies when they extend a Production Sharing Contract with the government or after a reasonable period of notice. However, this option may be politically difficult because it could trigger a strong reaction from the Association of Oil and Gas Producers, although similar policies have now been implemented in many countries and international companies are very familiar with them. The first option requires more time for implementation because it involves developing a new waste-handling system, in which the Ministry of Finance would play a limited role. The second option involves moderate yield and moderate risks and relies on the initiative of the World Bank as well as the oil and gas producers themselves. This option would involve collaboration between the MEMR's Directorate of Oil and Gas and the Ministry of Finance's Fiscal Policy Agency.

5.3.5. Energy from Fossil Fuels and the Fossil Fuel Subsidy

Energy derived from fossil fuels still contributes considerably to Indonesia's energy mix (see Figure 1). Several studies carried out prior to and at the time of the reduction of the fossil fuel subsidy at the end of 2014, particularly for premium gasoline, find that the reduction had a broad impact on society. In relation to the development of Indonesia's sustainable energy, this report includes the results of a study of the role of local government in the reduction of the fossil fuel subsidy (ICED, 2014) and the impact of the withdrawal of the fossil fuel subsidy on poor people in Jakarta (LCS and PKPPIM, 2015a).

5.3.5.1. The Role of Local Government in the Reduction of the Fossil Fuel Subsidy

The authority to determine the reduction of the fossil fuel subsidy lies with central government, although the policy and the system for handling the impact on the population of the reduction are the responsibility of local government. The Indonesia Clean Energy Development (ICED) project (2014) analyses two options for channelling grants from the central government account to local government originating from the savings from the reduced fuel subsidies. Channelling funds in the form of grants may be designed to support emission reduction at the local level. Two of the options in question are a top-down approach and a bottom-up approach (Table 19).

Table 19. Mechanisms for the Distribution System for the Saving from Fossil Fuel Subsidy Reduction

Mechanism options	Top-down approach	Bottom-up approach
Brief explanation of mechanism options	First, the assessment to local governments is conducted to identify their emissions reduction, fossil fuel subsidy and electricity subsidy. The results are submitted to the Ministry of the Home Affairs for review by a verification team consisting of the MEMR, the Ministry of Home Affairs and other related Ministries. If approved, the Ministry of the Home Affairs submits an application for local grants to the MOF. The MOF decide on the grants applied. Following approval, the MOF and the local government sign the MoU and then the local government prepares the plan for the utilisation of the grant.	Local government is assessed based on emissions reduction, fossil fuel subsidy and electricity subsidy. A technical supervision team evaluates performance of local government and the size of the grant needed, and then proposes it to the Ministry of the Home Affairs. The latter submits a proposal to the MOF for a local grant as suggested by the technical team. If the MOF approves, it and the local government sign the MoU and then the local government prepares a plan for the use of the grant.
Priority	○	⊙
Supporting premises	The policy framework to do this approach is available; the Ministry of Home Affairs's supervision system is expected to improve, local participation is expected to increase.	Low potential conflict between the central and local governments; effective as a policy instrument.
Risks	No cross-ministerial team to do the verification of the assessment results.	Difficult to control the utilisation of grants by the ministry responsible for the technical issue concerned.

Legend: ⊙ first priority; ○ second priority
Note: the role of the ministries are further described in ICED (2014)

Analysis of mechanism options

Both approaches seek to motivate local governments to reduce their GHG emissions and fossil fuel consumption. The bottom-up approach gives local government the opportunity to show initiative. Even though both approaches are based on law (see ICED study 2014), the grant's effectiveness depends on local governments' perception of and interest in accessing local grants to fund development in their own region.

5.3.5.2. Impact of the Removal of the Fossil Fuel Subsidy on the Poor of Jakarta

The 2015 Kodrat study shows that the 2014 reduction in the fossil fuel subsidy has had a negative impact on the poor in Jakarta. The poor's purchasing power, especially in non-food categories such as education and health, has significantly declined compared to that of other groups in society, demonstrating that before terminating the fossil fuel subsidy altogether the government needs to consider policies that will have a minimal impact on poor people. This can be done by preparing a fiscal space in local government expenditure that is dedicated to creating welfare programmes to minimise the long-term shock to the poor.

Follow-up action

As a short-term measure, the local government of DKI Jakarta could consider reallocating the fossil fuel subsidy to vulnerable groups in society which need (non-food) support such as in healthcare and education, and to people whose livelihoods rely on the transport sector. Prior to implementing the funding reallocation the local government of DKI Jakarta could undertake a brief study of the role of social security, healthcare and education in helping the poor following the reduction of the fossil fuel subsidy, followed by a study to identify which subgroups in the transport sector have been most affected. As a long-term measure, the funding for the fossil fuel subsidy can instead be invested in the development of various modes of public transport such as mass rapid transportation, railway extensions and shuttle services in major cities for commuters living in surrounding areas. This will support the economic flow and is consistent with RPJMN 2015-2019, which states that the savings made by reducing energy subsidies are to be allocated to productive investment in increasing the allocation of government expenditure on productive capital from 1.8% of GDP in 2014 to 3.9 % in 2019 (see RPJMN pp. 3-75).

5.3.6. The Development of Cogeneration Energy

Cogeneration is the recycling of thermal energy generated from a main industrial production process. There is strong potential for the cement, steel and metal smelting, ceramics and glass, and food and beverages industries, to utilise cogeneration energy. In addition there is an opportunity to implement cogeneration in the PLN's electricity production using diesel engine/gas combined cycle cogeneration (combined cycle) utilising waste heat from the engine. Using the cogeneration system, industrial actors could create electricity from their production process, reducing consumption from other power plants and the PLN (B2TE/BBPT, 2014). Cogeneration has been successfully implemented in several industries and this could be accelerated with government support.[35]

Analysis and follow-up action

There is a significant opportunity to implement cogeneration in the public and commerce sectors. In the public sector, PLN could create a combined cycle system to improve the efficiency of diesel and gas power plants from 30%-40% to about 50%-60% (B2TE/BBPT, 2014), bringing production up to 13,093 GWh per annum (*ibid*). The Ministry of Finance could suggest including the implementation of energy conservation as one of the performance indicators of PLN's senior executive in order to increase energy supply and improve the efficiency of electricity production through cogeneration (LCS and PKPPIM, 2014a).

In the commerce sector there is no specific (dis)incentive instrument to promote energy cogeneration. However, as explained in section 5.3.1.1, ESCOs are one type of company that could provide cogeneration installation services. The classification of ESCO companies as pioneer industries receiving the incentive of an income tax reduction (see section 3.1) could be used as a strategy to promote the supply side of cogeneration. On the demand side, the Ministry of Industry, MEMR and the Ministry of Finance could investigate suitable incentive schemes to encourage large-scale businesses operating in the cement, steel, ceramics, glass, and food and beverage industries to increase energy production via cogeneration.

5.4. Synthesis of Fiscal Policy Options for Managing the Energy Supply

Priority options in the form of fiscal and non-fiscal incentives for managing the energy supply require the active participation of the domestic and international private sector. Based on the policy options discussed in section 5.3, there are seven fiscal policy options for managing the energy supply: (1) a fine for leaked emissions from oil and gas production; (2) a distribution mechanism for the savings made by reducing the fossil fuel subsidy; (3) a soft loan for the installation of solar panels in solar PV power plants; (4) a funding structure for the development of geothermal energy; (5) a loan guarantee for the development of geothermal energy; (6) guidance and direction on PLN finance for cogeneration activity; and (7) support for the development of gas energy infrastructure (see Table 20 on the following page).

There are several criteria for the synthesis of fiscal policy options. These syntheses of policy options do not cover policies that are under the authority or responsibility of local government and the private sector, such as the promotion of leasing. Neither do they encompass top-priority recommendations that are not classified as fiscal policy, over which the MOF has no authority and/or responsibility, such as the feed-in tariff and geothermal exploration, hydro power development schemes and funding, a study of the role of social security and education in helping

[35] Wargadalam (2014) shows that the food and beverage industry and the cement and glass industry have implemented cogeneration technology that provides 33% and 28% respectively of the total energy required for their own production processes.

the poor following the reduction of the fossil fuel subsidy, or a study to identify which sub-groups in the transport sector were most affected by the cutback. Suggestions for studies are discussed in section 6.2. The feed-in-tariff is a related fiscal policy that is regulated by the Ministry of Energy and Mineral Resources.

Table 20. Synthesis of Fiscal Policy Options for Managing Energy Demand

Fiscal policy classification	Policy options	Priority	Information sources	Energy sources	Key stakeholders
Government revenue and grants	Fine for leaking emissions from oil and gas production	⊙	Table 18	Oil and gas	Directorate General of Oil and Gas at the MEMR, MOF, SKK Migas, Association of Oil and Gas Producers
Government support to financing schemes	Soft loan and loan guarantee for the installation of solar panels for solar PV power plants	⊙ for soft loan and ○ for credit guarantee	Table 14	Solar PV	MEMR, MOF, PT SMI, Central Bank of Indonesia, representatives from the banking sector, Financial Services Authority, Association of Corporate Financing Indonesia
	Funding structure for the development of geothermal energy	⊙	Table 15	Geothermal energy	MEMR, MOF, PT SMI, representatives of geothermal development permit holders
	Loan guarantee for the development of geothermal energy	⊙	Table 16		
	Guidance and direction on PLN financing for cogeneration activity	⊙	See section 5.3.6	Cogeneration	Ministry of State-Owned Agency, Directorate General of Electricity at the MEMR
	Support for the development of gas energy infrastructure	⊙	See section 5.3.4.1	Gas	Directorate General of Oil and Gas at the MEMR, MOF, SKK Migas

Legend: ⊙ first priority; ○ second priority

The Ministry of Finance could consider fiscal policy options supporting government targets on increasing government revenue and the energy supply based on limited resources. Firstly, fining oil and gas producers for leaking emissions could increase government revenue. Secondly, several policy options are part of the extension of institutional restructuring, such as the funding structure for the development of geothermal energy. Hence when the Ministry of Finance decides to develop them these options will not require substantial short-term financing. Government funds previously allocated to the development of geothermal energy could function as a funding guarantee to catalyse private-sector participation in exploration for and the development of proven geothermal fields.

Loan and guarantee facilities for the installation of solar panels can be implemented simultaneously with a similar policy on energy-saving equipment aiming to meet the demand for energy, as discussed in Chapter 4. Despite the high cost, the government could support the development of gas energy infrastructure and encourage private-sector participation in the development of gas energy infrastructure, particularly for drilling activities. The Ministry of Home Affairs and the Ministry of Human Resources need to consider a mechanism for the distribution of the savings made by reducing the fossil fuel subsidy; the Ministry of Finance's role is the assessment of submitted proposals.

Chapter 6. Conclusions and Recommendations

Chapter 6 restates a guideline question and presents a summary that answers it and offers a number of recommendations for the government, and more specifically the Ministry of Finance, to work on and then follow up to enhance Indonesia's energy security. The chapter also presents a brief analysis of the potential obstacles and steps for overcoming them and a work plan for use in following up this report.

6.1. Conclusions

Indonesia has strong potential for conserving and increasing its supply of energy to support its sustainable economic growth via a set of fiscal instruments. Domestic and international funding can play an important role in the development of Indonesia's sustainable energy sector. Chapters 3 to 5 present some possible fiscal instruments that could increase the effectiveness of domestic and international funding and which are useful for answering the guideline question:

What fiscal policy options can influence the demand for and supply of energy and simultaneously support sustainable development in Indonesia?

On the demand side, the main objective of fiscal policy is to accelerate energy conservation by motivating businesses and consumers to choose environmentally-friendly consumption and production processes and goods while at the same time contributing to increasing Indonesia's GDP. On the supply side, fiscal policy has the potential to motivate investment in the development of sustainable energy facilities and energy infrastructure, particularly for new and renewable energies, with the greatest potential in energy from gas, hydro power, geothermal and biomass.

This report presents all the fiscal policy options outlined in the end of Chapters 3, 4 and 5 in the form of a roadmap for fiscal policy on energy in answer to the guideline question above (see Table 21). The roadmap describes the policy options and divides them into the short-term (2015-2017, based on the first half of RPJMN 2015-2019) and the medium-term (2018-2019). The short-term policy options address increasing the effectiveness of existing fiscal policy strategy, as discussed in Chapter 3, and the top-priority options, as explained in Chapters 4 and 5. The mid-term options are the second-priority options discussed in Chapters 4 and 5.

Table 21. Road Map of Prioritised Fiscal Policy Options for the Energy Sector

Fiscal policy classification	Short-term goals (2015-2017)	Mid-term goals (2018-2019)
Energy Demand		
Government income and grants	• Import duty on certified energy-efficient equipment with the highest energy rating, and not available domestically reduced (Table 7); • Business entities promoting energy conservation, such as ESCOs classified as pioneer industries with the accompanying income tax reduction (section 3.1, Tables 14, 17); • VAT on energy-efficient equipment with the highest energy rating reduced (Tables 4, 5, 7 and 8).	• Adjustment of tax on luxury goods for luxury motor vehicles, based on energy efficiency (Table 11).
Government expenditure		• Direct subsidy/rebate for energy-efficient equipment with the highest energy rating (Table 5).
Government support for financing schemes	• Funding facility for energy conservation that stimulates financial institutions such as commercial banks to provide soft loan for business entities for the purchase of energy-efficient equipment such as AC and the development of green building allocated (Tables 7 and 9) .	• Funding facility for energy conservation that stimulates financial institutions such as commercial banks and Jamkrindo to provide soft loan and loan guarantee for the purchase of energy-efficient equipment such as AC and the development of green building allocated (Tables 7 and 9).
Energy Supply		
Government income and grants	• Procedure on applying for incentives revised as necessary so businesses operating in the field of renewable energy are well understood and utilised it (section 3.3); • Disincentives for companies with emissions leakage above threshold set (Table 18).	
Government support for financing schemes	• Funds for geothermal energy exploration disbursed (section 3.3, Tables 15 and 16); • Soft loan for the purchase of solar panels allocated (Table 14); • PLN financing directed towards energy cogeneration (Section 5.3.6); • Government support for the development of gas energy infrastructure deployed (section 5.3.4.1).	• Soft loan and loan guarantee for the purchase of solar panels applied (Table 14); • Loan guarantee for the development of geothermal energy applied (section 3.3, Tables 15 and 16).

6.2. Recommendations

This report sets out priorities for the Government of Indonesia priorities, and particularly the Ministry of Finance, with regard to various fiscal policy options for developing the energy sector such as increasing investment in the sector through industrial and household energy conservation and the pursuit of rational policies to promote new and renewable energy. These are the two areas with the greatest potential for managing energy demand and increasing energy supply in both the medium and the long term. This will require huge investment, which may be viewed as a short- to medium-term sacrifice for long-term gain. Consideration of the fiscal risks inherent in all types of strategy is therefore crucial when choosing a suitable policy in order to balance then with the government's budget. A number of further studies are suggested here to support sustainable development in the energy sector.

Government studies and reviews could explore the potential of funding instruments to support the development of sustainable energy. On the demand side, for instance, a study of the feasibility grant to allow partial reimbursements of investment in energy-efficient and/or energy-saving equipment in the industrial and commercial sectors is recommended. The government could then undertake a follow-up study of the role and effectiveness of regulations (such as those proposed

above) that have successfully changed consumer behaviour, and enhance these to make them still more effective.

On the energy supply side, a number of studies are suggested, including follow-up studies of the incentive scheme for energy cogeneration in the industrial sector; the incentive scheme to encourage oil and gas companies to undertake geothermal drilling exploration; the guarantee fund in the funding scheme for geothermal energy; and the joint tracking of the feed-in tariff by the MEMR and MOF and the evaluation of its effectiveness in accelerating the development of energy infrastructure.

Studies are also proposed of the development of an institutional policy and scheme related to green bonds, to be carried out independently and published and sold by bond issuers to investors in the stock exchange/capital markets. Funds raised from these sales could be used to fund various activities promoting the development of green energy, including energy conservation and a PPP scheme for investment in the development of renewable energy infrastructure. The proposed studies could be in the form of detailed assessments of the costs and benefits of particular initiatives, supported by systematic literature reviews, with success stories of private sector participation in the development of renewable energy provided by climate fund institutions such as the Global Environment Facility (GEF) and the Clean Technology Fund (CTF). The government could also review the MEMR's awareness-raising campaigns, develop a government procurement scheme for energy-efficient equipment and extend the energy-efficiency audit for buildings.

6.3. Potential Obstacles and Steps for Overcoming Them

This section anticipates several obstacles that may arise in the development of fiscal policies to manage energy demand and supply, and the steps that can be taken to rectify them.

1. *Priorities at the Ministry of Finance*

The Ministry of Finance's development of sustainable solutions for the energy sector is a high priority. The Ministry of Finance has been assigned to formulate policies to increase government revenue through various tax instruments; hence this paper's recommendations of various tax-based policy options involving VAT, income tax, the tax on luxury goods, import duty on energy-efficient equipment and for companies promoting energy conservation. Some of these may reduce the government's tax income in the short term but will provide broader benefits in the form of a more sustainable economy and environment. However, this report shows that short-term losses could be compensated in the medium and long term via money raised from the disincentives it proposes. Detailed analysis of the broader benefits and costs of such initiatives will also be beneficial to policy makers.

2. *Risk of failure of project financing*

Insufficient preparation and planning could prevent funding for energy conservation being disbursed, affecting Ministry of Finance performance. The risk connected to undisbursed funds is greater if strong strategic planning has not been developed based on data from the field. This risk can be minimised by strategic planning and financial estimations based on further field surveys and research.

3. *Lack of local government interest*

Local government may not be interested in formulating fiscal policy on the management of energy if there are conflicts of interests or priorities. This can be handled by identifying and financially supporting one or two areas with high potential for green development and appointing them as

pilot projects such as Surabaya and Bandung, whose mayors have received many environmental awards but may have insufficient funding to implement green projects on a large scale.

4. Limited local government capacity

Human resource and institutional development require considerable funding and capacity-building effort. Local governments generally find it difficult to access the necessary facilities and infrastructure for the development of their human resources. This can be bridged via cooperation between the Ministry of Finance's Education and Training Agency, the Ministry of Home Affairs and the MEMR to identify and map local government requirements in terms of capacity building for energy development in cooperation with national or international experts.

5. Coordination difficulties between relevant ministries

The development of energy in general and new and renewable energy in particular needs an integrated information system for cross-ministerial coordination. If funding for such coordination is not yet available, technical meetings between cross-sector energy development programmes could be used as an arena for coordination, for example by combining low-carbon support events organised by the Ministry of Finance with the Ministry of Environment and Forestry's multi-stakeholder forestry and land governance programmes to discuss land allocation dedicated to the development of new and renewable energy in protected forest areas.

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Annexes

Annex 1: Technical Policy Options Related to the Development of Renewable Energy

This report presents a number of technical policy options related to the development of renewable energy for which the authority lies with the relevant ministries dealing with technical issues and local government. The policy options in this report are adopted from the studies and reviews listed in Table 3 and classified based on the steps stipulated by Article 40, MEMR Regulation Number 2 Year 2004 on Green Energy Policy Development. The policy options presented here are categorised as energy pricing policy, human resource development policy, information policy, standardisation and certification policy, resource and development policy, and institutional policy, as well as investment and funding policy and incentive policy, which are the main topics of section 5.3 and relate to Article 40 MEMR Regulation Number 2 Year 2004.

A. Policy Options for Pricing Energy

Two options for energy-pricing policy are put forward among the studies listed in Table 3: (1) high tariff policy, recommending that the government pays a producers a high price for new and renewable energy via feed in tariff (FiT)(B2TE/BBPT 2014); and (2) the creation of a market price index for biodiesel and ethanol (LCS and PKPPIM, 2013).

High tariffs for the purchase of electricity from new and renewable energy developers

The MEMR has stipulated a regulation regarding high tariff policies including a feed-in-tariff (FiT). FiT is defined as a premium price paid to renewable energy generators for a guaranteed period (often 10-20 years) which helps to offset the higher capital costs and associated risks concerned with renewable energy projects (Halstead et al., 2015). FiT is designed as an incentive for energy producers in the form of an energy-purchasing subsidy by which the government purchases electricity at a higher price compared to energy purchased from non-renewable energy producers. To date the government has provided FiTs for geothermal, solar, hydro and bioenergy (biogas, biomass, and landfill) producers with different tariffs (see Table 22)

FiT policy regulates the purchase price of electricity, particularly from power plants with a capacity of less than 10MW which are vulnerable to high inflation. There is an exemption on the price ceiling for geothermal and solar PV, for which the tariffs are stipulated in USD which, while perhaps more vulnerable to fluctuation, might attract more foreign investors. In addition a price ceiling for the development of solar PV could create a tariff race to the bottom, meaning that the tariff received by producers cannot be used as ROI, leading to neglected and unfinished solar PV projects in the field. The Indonesian government can purchase electricity through PT PLN from power plants with a capacity of more than 10MW with a FiT agreed between PT PLN and the producer.

Table 22. Price Ceiling and Feed-in Tariff for Renewable Energy

<table>
<tr><th>Source of Energy</th><th>Tariff (per kWh)</th><th>Policies and Note</th></tr>
<tr><td>All types of small and medium renewable energy **</td><td>• IDR 656/kWh x F, if connected to medium electrical voltage
• IDR 1,004/kWh x F, if connected to low electrical voltage
(see note below table for the value of F)</td><td>MEMR Regulation Number 4 Year 2012</td></tr>
<tr><td>City waste with zero waste technology **</td><td>• IDR 1,450/kWh, if connected to medium electrical voltage (previously IDR 1,050/kWh)
• IDR 1,798/kWh, if connected to low electrical voltage (previously IDR 1,398/kWh)</td><td rowspan="2">MEMR Regulation Number 19 Year 2013, previously MEMR Regulation Number 4 Year 2012</td></tr>
<tr><td>City waste with sanitary landfill technology **</td><td>• IDR 1,250/kWh, if connected to medium electrical voltage (previously IDR 850/kWh)
• IDR 1,598/kWh, if connected to low electrical voltage (previously IDR 1,198/kWh)</td></tr>
<tr><td>Biomass**</td><td>• IDR 1,150/kWh x F if connected to medium electrical voltage (previously IDR 975/kWh x F)
• IDR 1,500/kWh x F, if connected to low electrical voltage (previously IDR 1,325/kWh x F)
(See note for the unit of F)</td><td rowspan="2">MEMR Regulation Number 27 Year 2014, previously MEMR Regulation Number 4 Year 2012</td></tr>
<tr><td>Biogas**</td><td>• IDR 1,050/kWh x F, if connected to medium electrical voltage; (previously IDR 975/kWh x F)
• IDR 1,400/kWh x F, if connected to low electrical voltage (previously IDR 1,325/kWh x F)
(see the note below this table for the value of F)</td></tr>
<tr><td>Geothermal</td><td>
<table>
<tr><th rowspan="2">Commercial Operation Date (COD)</th><th colspan="3">Price Ceiling (cent USD/kWh)</th></tr>
<tr><th>Area I</th><th>Area II</th><th>Area III</th></tr>
<tr><td>2015</td><td>11.8</td><td>17.0</td><td>25.4</td></tr>
<tr><td>2016</td><td>12.2</td><td>17.6</td><td>25.8</td></tr>
<tr><td>2017</td><td>12.6</td><td>18.2</td><td>26.2</td></tr>
<tr><td>2018</td><td>13.0</td><td>18.8</td><td>26.6</td></tr>
<tr><td>2019</td><td>13.4</td><td>19.4</td><td>27.0</td></tr>
<tr><td>2020</td><td>13.8</td><td>20.0</td><td>27.4</td></tr>
<tr><td>2021</td><td>14.2</td><td>20.6</td><td>27.8</td></tr>
<tr><td>2022</td><td>14.6</td><td>21.3</td><td>28.3</td></tr>
<tr><td>2023</td><td>15.0</td><td>21.9</td><td>28.7</td></tr>
<tr><td>2024</td><td>15.5</td><td>22.6</td><td>29.2</td></tr>
<tr><td>2025</td><td>15.9</td><td>23.3</td><td>29.6</td></tr>
</table>
Area I: Sumatra, Java, and Bali; Area II: Sulawesi, NTB, NTT, Halmahera, Maluku, Irian Jaya, and Kalimantan; Area III: Isolated areas in Areas I & II most of whose electricity is derived from fossil fuel-based power plants</td><td>MEMR Regulation Number 17 Year 2014, revoking MEMR Regulation Number 22 Year 2012</td></tr>
<tr><td>Solar PV</td><td>Permitted price-ceiling:
• USD 25 cents/kWh
• USD 30 cents/kWh, if a solar power plant uses PV model with at least 40% produced domestically</td><td>MEMR Regulation Number 17 Year 2014</td></tr>
</table>

Continued…

Source of Energy	Tariff (per kWh)							Policies and Note
Hydropower**	Purchasing Price:							MEMR Regulation Number 22 Year 2014, revoking MEMR Regulation Number 12 Year 2014
	Electri-cal Voltage	Location/Area	Multi-function purchasing price*(IDR/kWh)		Purchasing Price from Hydro power plant (IDR/kWh)		F	
			Yr 1 - 8	Yr 9-20	Yr 1-8	Yr 9-20		
	Medium Voltage (up to. 10 MW)	Java, Bali and Madura	967.5 x F	675 x F	1,075 x F	750 x F	1	
		Sumatra	967.5 x F	675 x F	1,075 x F	750 x F	1.1	
		Kalimantan and Sulawesi	967.5 x F	675 x F	1,075 x F	750 x F	1.2	
		NTB dan NTT	967.5 x F	675x F	1,075 x F	750 x F	1.25	
		Maluku, Maluku Utara	967.5 x F	675 x F	1,075 x F	750 x F		
		Papua and Papua Barat	967.5 x F	675 x F	1,075 x F	750 x F	1.6	
	Low Voltage (up to 250 kW)	Java, Bali and Madura	1,143 x F	693 x F	1,075 x F	770 x F	1	
		Sumatra	1,143 x F	693 x F	1,075 x F	770 x F	1.1	
		Kalimantan and Sulawesi	1,143 x F	693 x F	1,075 x F	770 x F	1.2	
		NTB and NTT	1,143 x F	693 x F	1,075 x F	770 x F	1.25	
		Maluku, Maluku Utara	1,143 x F	693 x F	1,075 x F	770 x F	1.3	
		Papua and Papua Barat	1,143 x F	693 x F	1,075 x F	770 x F	1.6	

Note: *utilises reservoir/dam and/or irrigation channel. **for electrical capacity of up to 10 MW or for excess power. F (incentive factor based on geographical location of purchasing) for small- and medium-scale renewable energy: F = 1 for Java and Bali, F = 1.2 for Sumatra and Sulawesi: F = 1.3 for Kalimantan, NTB, and NTT; F = 1.5 for Maluku and Papua. F value applied to energy from city waste with zero waste technology, city waste with sanitary landfill technology, biomass and biogas: F = 1 for Java; F = 1.15 for Sumatra; F = 1.25 for Sulawesi; F = 1.3 for Kalimantan; F = 1.5 for Bali, Bangka Belitung, Lombok; F = 1.6 for Riau archipelago, Papua, and others.

The government is currently formulating FiT policy for wind power, although the production of this type of power is still minimal in Indonesia. A simulation by B2TE/BPPT (2014) presents two options by which the government could stimulate the development of wind power: a fixed tariff applied during the contract (assumption for 20 years), and a tiered FiT system with a gradually decreasing tariff, for example the first ten-year tariff is followed by a second, lower ten-year tariff (see Table 23). A tiered FiT system costs more in the first decade of wind-power development with a higher government burden in this period, and less in the second decade, while a fixed tariff distributes the cost evenly across the entire lifespan of the project.

Table 23. Result of Simulation of FiT for Wind Power

Simulation	Power plant capacity	Capacity factor 30%	Capacity factor 25%	Capacity factor 20%
Simulation 1: fixed FiT	1 MW	IDR 2,232/kWh	IDR 2,658/kWh	IDR 3,297/kWh
	20 MW	IDR 1,429/kWh	IDR 1,694/kWh	IDR 2,093/kWh.
Simulation 2: tiered FiT *	1 MW	IDR 2,596/kWh	IDR 3,139/kWh	IDR 3,953/kWh
	20 MW	IDR 1,574/kWh	IDR 1,912/kWh	IDR 2,419/kWh

Source: B2TE/BPPT (2013)

Note: Assumption in the calculation: *initial tariff applied for the first 10 years, tariff changed to IDR 900/kWh for the second ten years. Reasonable conditions: IRR > 14%; interest rate = 7% per year; residual value of asset is considered zero in the 20th year; price of wind turbine = USD 1,350/kW; USD = IDR 10,000; construction period = 18 months; inflation rate = 2% per year; capital investment 70% bank loan and 30%company's capital (see B2TE/BPPT 2014).

To improve the overall effectiveness of government expenditure on subsidising energy through FiTs, the MEMR, PT PLN and Ministry of Finance's Fiscal Policy Agency could jointly record its FiT energy subsidies for each type of energy and evaluate the effectiveness of its expenditure on FiT and other financial modalitites such as insurance for geothermal exploration. This would provide an empirical basis for recommendations on improving the effectiveness of geothermal operation systems, geothermal funding and FiT policy.

Market price index for biodiesel and ethanol

The use of biofuel such as biodiesel and ethanol as fuel for vehicles is still restricted in Indonesia. The development of biodiesel arrived at a commercial stage with MEMR Regulation Number 32 Year 2008 on the Supply, Utilisation, and Business Administration of Biofuel, which classifies biofuel under 'other fuels'. This regulation was amended by MEMR Regulation Number 25 Year 2013, which promotes the use of biofuel in the transportation and industrial sectors and the development of biofuel power plants. In 2014 the use of biofuel for domestic purposes increased by 1.85 million kilolitres, or 75%, compared to 2013.

The MEMR proposes a 2016 subsidy of IDR 4,000 per litre for biodiesel and IDR 3,000 per litre for bioethanol if the existing mechanism does not work as planned. Accuracy in the determination of biodiesel and bioethanol prices is necessary in order to increase the biofuel supply as a strategy for reducing fossil fuel consumption and its accompanying GHG emissions. To set an effective market price index for biodiesel and bioethanol, Soerawidjadja (2013) proposes a competitive price formulation, with biodiesel market price index = domestic olein price +USD 120; and bioethanol market price index = (Argus price) x 788 kg/m^3 x (1 + 0.35).[36] An additional subsidy of IDR 1,000 per litre is needed on top of the given subsidy.

B. Policy Options for Human Resource Development

There are several policy options for human resource development related to the development of renewable energy: (1) local education and training programmes on solar PV; (2) education and training programmes for solar panel auditors; (3) capacity development for institutions involved in geothermal energy development; (4) the professionalisation of geothermal energy development tender and selection committees; (5) improvement of bioenergy potential analysis and risk analysis; (6) development of capacity for preparing technical guidelines for investment in bioenergy; and (7) development of capacity for reviewing the quality of potential locations for wind power energy and turbine installation.

Local education and training programmes on solar PV

Local government plays an important role in issuing land-use permits and utilising local tax instruments to encourage the installation of solar panels in areas without electricity (Paltmetto, 2014), and therefore local government education and training programmes on solar PV are crucial to accelerate the development of solar PV energy, particularly for areas without electricity.

Education and training programmes for solar panel auditors

The quality of solar panels is not standardised. Lack of skill and knowledge on the part of the personnel responsible for assessing panel quality could lead to project failure, with solar panels producing minimal energy (Re-emerging World, 2014). As a preventive measure, local, district and

[36] In the commodity market palm olein is known as refined, bleached and deodorised (RDB) palm olein. It is a part of the liquid oil produced by the separation of palm oil after it crystallises at a certain temperature and is suitable for frying purposes.

provincial government need to improve their auditors' competency through education and training.

Capacity development for institutions involved in the development of geothermal energy
JICA (2011) emphasises the importance of a technical capacity development programme for institutions involved in the development of geothermal energy such as MEMR and PT SMI. Improved technical capacity is necessary due to the importance of the participation of various institutions in energy infrastructure projects, particularly in exploring potential funding for the development of geothermal energy and other renewable energy projects.

Professionalisation of tender and selection committees for the development of geothermal energy
The government needs a selection committee for the development and utilisation of geothermal energy which can evaluate proposed investments and choose agencies to implement them. Investment must be guided by the principles of fairness and transparency. A fair and transparent selection committee is one of the determining factors for private-sector participation in geothermal projects (JICA, 2011).

Improvement of analysis of potential and risk analysis for bioenergy
Investors and agro-industry owners (palm oil, rice, and sugar cane growers) generally lack a good understanding of investment feasibility assessment, the benefits of investing in the bioenergy sector and procedures for accessing the existing funding facility. To increase investment in bioenergy the government could improve the skills and knowledge of the investors and agro-industry owners involved, particularly on issues related to technical steps for analysing legal, technical and financial factors and investment potential and the risk inherent in bioenergy development proposals (EBTKE/ESDM, 2013).

Development of capacity for preparing technical guidelines on bioenergy investment
The success of projects and the quality of recommendations proposed to government agencies are mainly determined by consultants' qualifications and expertise. The consultant selection process needs to be specified in detail in the proposed government technical guidelines, which are fully covered by the ICED study of bioenergy investment guidelines (USAID, 2014).

Capacity development for reviewing the potential locations for wind power projects and turbines
The success of wind power development is determined by the ability of the relevant personnel to analyse suitable locations for development and the quality of wind turbines based on the characteristics of the proposed location. Annexes 1 and 2 of the WhyPGen study (B2TE/BPPT, 2014) present potential locations for wind power development in Indonesia. According to LAPAN in the WhyPGen study there are potential locations for wind power development in latitudes 9-10°S.[37] These areas have an average annual wind velocity that is suitable for wind-power development. WhyPGen (*ibid*) claims that the potential for wind power in Indonesia is classified as category IV, based on standard IEC 61400-1. Fourth-level wind turbine technology is suitable for this category as it is designed to operate in low wind velocity.

[37] Locations with the potential for medium-scale wind-power development are Bengkulu, East Java, Central Sulawesi, and Gorontalo. Locations with the potential for large-scale wind-power development are Yogjakarta, DKI Jakarta, Central Java, West Java, Banten, South Sulawesi, West Nusa Tenggara, East Nusa Tenggara, and North Sulawesi. North Kayong and Kaimana in Papua are potential locations for the development of off-grid due to the unavailability of network facilities.

C. Information Policy Options

Four options are suggested regarding policy on information related to the development of renewable energy: (1) information integrated with a renewable energy database for investors; (2) outreach and dissemination of programmes on renewable energy through working groups which focus on renewable energy development in Indonesia; (3) a consultation facility to check that FiT proposals are complete; and (4) communication with the local community through the PT PLN's appointment letter for the locations designated for energy developments.

Information integrated with database on renewable energy for investors

There is no integrated information facility serving as a point of reference for developers and investors interested in exploring renewable energy, particularly bioenergy, before making an investment decision. BI (2013) propose the establishment of a database and online library offering information on the various aspects of new and renewable energy to improve access for the banking sector, investors and agro-industry business actors. The Investment Coordination Agency (BKPM), the MEMR, the Agency for the Assessment and Application of Technology (BPPT), the Financial Services Authority and the Central Bank of Indonesia could cooperate to set up the database, online library and integrated information service. The Financial Services Authority and Central Bank of Indonesia could facilitate the consultancy process for the establishment of the new database by bringing the institutions involved in the process together with potential users. Guidelines for the banking sector on reviewing applications for a license to develop hydro power can be included in the integrated information service. These guidelines are necessary to ensure that the assessment of potential investment covers not only the existence of a licence/permit for the development of new and renewable energy such as micro and mini hydro energy but also emphasises the quality of the project (BI, 2013).[38]

Outreach and dissemination of renewable energy programmes via a working group

Currently investors receive minimal information on investment opportunities and the development of policy on renewable energy. USAID (2014) suggests the establishment of a working group with the main function of communicating the information needed to assess an investment. The study by USAID (2014) emphasises the importance of a continuous dissemination and outreach programme by which the working group can expand its network of business actors.

Consultation facility to check that FiT proposals are complete

BI (2013) identifies one of the causes of the slow development of new and renewable energy as the fact that many proposals are not accompanied by the necessary documents. To reduce the number of incomplete proposals due to lack of applicants' knowledge, government institutions such as BKPM, MEMR, and PT PLN could establish a centre providing integrated information services for consultation by investors and project developers in person or online. The centre would help applicants to prepare their proposals and accelerate the project submission process.

Communication with the local community

Communication between central and local government, the implementing agencies and the local community about upcoming projects is necessary, particularly to coordinate land use for the development of renewable energy. This factor affects the success of project implementation in the field (Murni *et al.* 2014). Local people, particularly those living in areas where renewable energy projects are planned, need to be informed of the benefits and risks of the projects and the effects on their livelihoods and on the environment. Based on the PT PLN's plan, projects with a capacity of less than 10 MW are not required to consult the local community. However, Murni et al. (2014) explain that in a case study of a micro hydro project in a remote area on the border of Indonesia

[38] Small scale of hydropower with capacity between 5 kW - 1 MW per unit.

with Malaysia, cultural communication with the indigeneous people was found to be necessary in order to secure its support. Communication with the local community could expedite the implementation process in the field.

D. Standardisation and Certification Policy Options

Four options are suggested for standardisation and certification policy related to the development of renewable energy: (1) the regulation of waste-to-energy management; (2) the use of capacity standard as a criterion for FiT eligibility; (3) the determination of a unit of measurement for waste from the oil and gas industry; and (4) regulation of service procurement after installation and a product performance guarantee for the components of installed solar panels.

Waste-to-energy management regulations

Act Number 18 Year 2008 regulates waste management. In addition to reducing air pollution and GHG emissions released to the air it also supports the management of waste-to-energy. Waste management is further regulated by local governments, some of which stipulate several regulations such as City of Malang Regulation Number 10 Year 2010, which allows the private sector and investors to take part in waste management by investing in the construction of electrical power plants that run on solid landfill such as a PPP waste-to-energy project in TPST Bantar Gebang. Currently the disposal of waste in rivers is prohibited; however, there are many cases in which harmful waste is disposed of in other places and additional regulation of permissible waste disposal sites is needed.

Capacity standard as criteria for FiT eligibility

Improving the effectiveness of FiT requires clear regulations on proposed project requirements and particularly eligibility for FiT (B2TE/BBPT, 2014). B2TE/BPPT (2014) recommends that wind power projects be made eligible for FiT, *inter alia* if their internal rate of return (IRR) exceeds a certain level where the price of the technology is as much as USD 1,350 per kW (or USD 1,759 per kW installed) with a capacity factor of 25% and IRR of 14% if the minimum FiT is 1,741 per kWh (*ibid*). B2TE/BPPT (2014) also recommends that project scale should be considered when determining criteria for eligibility for FiT. New wind power projects with a capacity of more than 10 MW can be considered for FiT, with the upper limit of FiT based on negotiation between the energy producer and PT PLN after PT PLN has signed a PPA for the first 250 MW produced (B2TE/BBPT, 2014). FiT with a fixed tariff can be considered for small-scale projects (≤10MW) and ongoing projects (≤250MW) with a tariff that is adjusted based on a contractual agreement.

Determination of a unit of measurement for waste from oil and gas industry

The MEMR needs to determine a unit of measurement for the waste emission leakage from oil and gas production known as flaring/venting. Susanto (2015) analyses four options, as shown in Table 24.

Table 24. Options for Unit of Measurement for Flaring/Venting Waste in the Oil and Gas Industry

Measurement options	Total waste emission leakage	Ratio of total waste emission leakage from total oil produced or Gas Flaring to Oil Production Ratio (GFOR)	Ratio of total waste emission leakage from total gas produced or Gas Flaring to Gas Production Ratio (GFGR)	Combination of GFOR and GFGR or Gas Flaring to Barrel Oil Equivalent Ratio (GFBOE)
Brief explanation of measurement Options	Oil and gas companies ranked based on total emission leakage without considering the amount of oil and gas produced	Oil and gas companies ranked based on ratio of emission leakage to amount of oil produced	Oil and gas companies ranked based on ratio of emission leakage to amount of gas produced	Oil and gas companies ranked based on ratio of emission leakage to amount of oil and gas produced
Priority	○	○	○	⊙
Supporting premises	This unit only considers emissions without taking into account the efficiency of waste reduction per production unit	Emission leakage increases with increasing production of oil and gas. Therefore measuring by the ratio is more logical and acceptable and GFOR is a better option than GFGR for oil producers.	Emission leakage increases with increasing production of oil and gas. Therefore measuring by the ratio is more logical and acceptable and GFGR is a better option than GFOR for oil producers.	Oil and gas are produced simultaneously, and it is hard to quantify their emissions separately. A combination of GFOR and GFGR is recommended.

Legend: ⊙ first priority; ○ second priority

Of the four options, GFBOE is the most suitable unit of measurement. Waste emissions increase with the increasing production of oil and gas and thus a unit of measurement relative to total production is fairest and will be easiest for oil and gas producers to accept. Oil and gas are normally produced simultaneously and therefore it is hard to quantify their emissions separately. An incentive scheme to reduce flaring/venting by oil and gas producers can be developed via cooperation between the MEMR and Ministry of Finance.

Regulation of service procurement after installation of solar panels and guarantee for fitted solar panel components

After installation solar panels need frequent servicing and component replacement. The same contractor should provide servicing if problems arise due to non-standard panel specification. Different contractors provide different types of solar panel and thus some may not be able to service or replace the components of panels installed by others. If a contractor is not willing to provide services regularly, solar panel users in low economic groups, particularly in the household sector, may seek alternative sources of energy, leading to ineffective solar power development. Sunderbans (Re-emerging World, 2014) recommends after-sales service to replace broken or dysfunctional components after installation as standard. This can be facilitated by adding a product performance guarantee to the contract between solar panel users and developers.

E. Recommendations for Research and Development (R&D) Policy

Three options are suggested for R&D policy on the development of new and renewable energy: (1) a study of pricing and taxes for agro-industry based on the latest empirical data; (2) improvement of the quality of feasibility studies; and (3) a study of the carbon capture and storage (CCS) feasibility test.

Study of pricing and taxes for agro-industry based on the latest empirical data

One of the important problems in the development of bioenergy is the availability of raw material for energy production. As a preliminary solution, the MEMR and Ministry of Agriculture could undertake a study of the availability of raw material and the minimum energy capacity needed for energy developers to achieve a profitable revenue (Soerawidjaja, 2013). Research and development are also needed for identifying potential uses of fat commodity and oils for non-

consumption purposes, particularly from palm oil, rice, sugar cane and other commodities that can be used for biofuel production. Complete information about this could help in estimating the value of investment in the bioenergy development.

Improvement of the quality of feasibility studies
Some mistakes made in renewable energy development processes can be attributed to the poor quality of their feasibility studies. To improve the success of renewable energy development the quality standard for feasibility studies, including the technical, financial, and legal aspects of proposed projects, needs to improve (TetraTech ES, Inc., 2014). This can be done through peer-reviews and quality-based payments to the contractors involved in such studies.

Research on feasibility tests for carbon capture and storage (CCS)
Experts propose the use of CCS technology to accelerate Indonesia's GHG emission reduction. CCS is a new technology for capturing and storing carbon dioxide produced by the combustion of fuel, e.g. in fuel-based power generation units. Its application to power generation requires the installation of a carbon dioxide capture tool, a mode of transport such as carbon dioxide distribution pipes and the selection and development of storage locations, for example underground or under the sea. CCS technology allows carbon residue to be recycled for other uses such as for use in bauxite residue carbonation (GCI, 2011).

LCS and PKPPIM (2014) suggests postponing the use of CCS technology in Indonesiaand shows the three main obstacles that form the basis of the view of Indonesia's unreadiness to implement CCS technology: the high cost of capturing carbon dioxide and of the associated transport facilities, which would increase the cost of producing electricity by 21-91% from the existing cost; the relatively high consumption of energy required, which would increase national energy use by 25-40% more than existing energy consumption; and the difficulty of finding safe places to inject and store carbon dioxide because the available pools are too shallow (LCS and PKPPIM, 2014). To find more potential sites for carbon storage, LEMIGAS could undertake a study of carbon capture and storage in empty oil reservoirs in Sumatera with an audit to identify carbon produced upstream or downstream of the oil and gas industry.

F. Institutional Policy Options

Four options for institutional policy related to new and renewable energy are suggested: (1) the establishment/appointment of an institution to research new and renewable energy; (2) cross-ministerial coordination with local government to determine project sites; (3) simplification of the FiT application procedure for hydro power development through cluster tendering; (4) mortgage extensions for buildings and houses to promote the installation of solar panels.

Establishment/appointment of a research institution to develop technology for new and renewable energy
Currently no national institution formally functions as a research centre dedicated to the development of renewable energy. BI and USAID (2013) argue that such a centre is necessary to support the development of renewable technology. The MEMR and Ministry of Research, Technology and Higher Education could appoint or establish such an institution. Existing institutions that could potentially accept this mandate are the Agency for Assessment and Application of Technology (BPPT), the Indonesian Institute of Sciences (LIPI), and/or a university with a focus on new and renewable energy that has staff, faculty members and researchers already working in the renewable energy sector.

Cross-ministerial coordinationwith local government to determine project sites
Some renewable energy development projects are delayed partly because of the lack of coordination in licensing the use of land for them (Rakhmadi and Sutiyono, 2015); much of the

renewable energy potential is in the protected forest, which falls under the responsibility of the Ministry of Forestry and Environment. The forest must be kept protected without inhibiting the progress of renewable energy developments. Together with the Ministry of Forestry and Environment, the Ministry of Home Affairs and local government the MEMR's Directorate General of New Renewable Energy and Energy Conservation could develop a a cooperative scheme to map out the locations of renewable energy projects that can be carried out without damaging the local ecosystem.

Simplication of the FiT application for hydro power development through cluster tendering

The large number of FiT proposals for the development of small-scale renewable energy adds to the workload of selection committees and slows the selection process. BI and USAID (2013) suggest that the MEMR develops a system for cluster tendering with several renewable energy projects, e.g. for the same type of energy in a certain area, presented as one proposal. They also argue that developing and implementing this policy would increase coordination among various government agencies at different levels.

Tax relief on mortgage extensions for buildings and houses to promote the installation of solar panels

Palmetto (2014) suggests promoting the installation of solar panels via mortgage extensions for buildings and houses, as in the US. This scheme would encourage house and building owners to install solar panels by providing an incentive in the form of tax relief on mortgage extensions for houses and buildings that install solar panels as their source of electricity. This scheme can be developed by the MEMR with the Financial Services Authority and the Public Housing Bank.

Annex 2: Policies Related to Indonesia's Energy Sector

Policy [39]	Explanation
Indonesian Constitution Year 1945	
Indonesian Constitution Year 1945 article 33	Natural resources management and national economic principles
Act	
Act Number 22 Year 2001	Oil and Natural Gas
Act Number 17 Year 2006 Article 26	Facilities on import duties: changes to the Act Number 10 Year 1995 on Customs
Act Number 25 Year 2007	The investment. Article 18(4): by net income reduction to a certain level in accordance with to the investment executed within a certain period of time Article 18(5) special for new venture investments by which pioneering an industry may be given the incentives of income tax holiday
Act Number 30 Year 2007	Energy
Act Number 18 Year 2008	Waste management
Act Number 28 Year 2008	Taxes and local levys including requirements to maintain the environment
Act Number 36 Year 2008	Fourth change to the Act Number 7 Year 1983 about income tax
Act Number 22 Year 2009	Traffic and road transportation
Act Number 32 Year 2009	Protection and the management of environment
Act Number 12 Year 2011 point 267	The establishment of government regulation to govern the discretionary use of a certain authorities embedded with individuals or institutions, uses the word "may". In accordance with the provisions of Energy and Mineral Resources Ministerial Decree Number 2 Year 2004 on which is associated with the Presidential Instruction Number 1 Year 2006 it is clear that the discretion of the authority to establish tax incentives lies with the President, with a Government Regulation (PP) as the law instrument, whilst the operational authority lies in the hands of the finance ministry using a ministerial decree as its law instrument.
Act Number 23 Year 2014	About local government, e.g for cooperation in location for renewable energy development at local level
Government Regulation	
Government Regulation Number 31 Year 2007	VAT Facilities: fourth change to Government Regulation Number 12 Year 2001 on import and or delivery of certain strategic taxable goods, exempt from the imposition of value added tax
Government Regulation Number 75 Year 2008 Jo Government Regulation Number 66 Year 2007	Shares subcription of Republic of Indonesia for establishment of limited liability company (Persero) on infrastructure guarantee (establishment of PT PII).
Government Regulation Number 62 Year 2008	Change to Government Regulation Number 1 Year 2007 on income tax facilities for capital investments on certain business fileds or certain regions
Government Regulation Number 30 Year 2009	Replacing Government Regulation Number 36 Year 2004 on the downstream business activities of oil and gas
Government Regulation Number 55 Year 2009	Replacing Government Regulation Number 35 Year 2004 on the upstream business activities of oil and gas
Government Regulation Number 70 Year 2009	Energy conservation associated with the facilities for tax relief and customs for energy conservation
Government Regulation Number 94 Year 2010	Facilities on income tax: calculation of taxable income and the payment of income tax in the current year
Government Regulation Number 49 Year 2011	Change to Government Regulation Number 1 Year 2008 on government investment Government Regulation Number 1 Year 2008: PIP is direct investing on infrastructure and other fields established by Minister of Finance

[39] Types and hierarchy of legislation is governed by Law Number 12 Year 2011 Articles 7 and 8 which states that the hierarchy consists of a. Constitution of the Republic of Indonesia in 1945, b. the People's Consultative Assembly Decree; Law / Government Regulation in Lieu of Law; c. Government Regulations; d. Presidential Decree; e. Provincial Regulation; and f. Regulation Regency / City. Type of legislation in addition to the above include regulations set by the People's Consultative Assembly, the House of Representatives, Regional Representatives Council, the Supreme Court, Constitutional Court, Supreme Audit Board, the Judicial Commission, Bank Indonesia, the Minister, agency, institution, or level commission established by Law or Government at the behest of the Act, the House of Representatives Provincial Governor, House of Representatives District / City, Regent / Mayor, Village Head or equivalent.

Policy	Explanation
Government Regulation Number 52 Year 2011 Article 2	Facilities on income tax. Second change to Government Regulation Number 1 Year 2007 on facilities of income tax for capital investment on certain business field and/ or certain regions
Government Regulation Number 55 Year 2012	Vehicle
Government Regulation Number 41 Year 2013	Taxable goods that belong to luxury in the form of motor vehicle that is subject to sales tax on luxury goods
Government Regulation Number 22 Year 2014	Change to Government Regulation Number 41 Year 2013 Taxable goods that belong to luxury in the form of motor vehicle that is subject to sales tax on luxury goods
Government Regulation Number 79 Year 2014	National Energy Policy (KEN)
Presidential Instruction and Presidential Regulation	
Presidential Instruction Number 1 Year 2006	The provision and utilisation of biofuel as an alternative fuel
Presidential Instruction Number 13 Year 2011	Energy and water savings
Presidential Regulation Number 5 Year 2006	National Energy Policy (KEN) (old version)
Presidential Regulation Number 4 Year 2010	Assignment to National Electric Company (PT PLN Persero) to accelerate the development of power plants that using renewable energy, coal, and gas
Presidential Regulation Number 78 Year 2010	Infrastructure Guarantee on KPS Project with business entity through Badan Usaha Penjaminan Infrastruktur (BUPI)
Presidential Regulation Number 56 Year 2011	Second change to Presidential Regulation Number 67 Year 2005 on Cooperation between Government and Business Entity on the Provision of Infrastructure
Presidential Regulation Number 71 Year 2011	Implementation of national greenhouse gas inventory
Presidential Regulation Number 61 Year 2011	National Action Plan on Greenhouse Gas Emission Reduction known as RAN - GRK (Rencana Aksi Nasional Penurunan Emisi Gas Rumah Kaca)
Presidential Regulation Number 16 Year 2012	General plans of capital investments, e.g the granting of facilities, ease of access, and/ or incentive for capital investments , and promotion for capital investment on local level
Ministerial Decree and Regulation of The Minister of Finance	
KMK Number 136/KMK.05/1997	Customs 'enforcement governance: exemption of import duties for tools related to environmental pollution control
PMK Number 117/PMK06/2006	Biofuel: loan for development of bio-energy and revitalization of plantation
PMK Number 79/PMK.05/2007	Loan for Food Security and Energy (LFS-E)/Kredit Ketahanan Pangan dan Energi (KKP-E)
PMK Number 154/PMK.011/2008	Exemption of import duties on capital goods in order to build and develop power plant industry for public interest
PMK Number 218/PMK.05/2009	Change to PMK Number 99/PMK 05 year 2008 on guidelines for management of revolving fund in government ministry/ institution
KMK Number 296/KMK.09/2009	Provision of business permit for PT SMI (Persero) as an infrastructure funding company
PMK Number 21/PMK.011/2010	Provision of tax and customs facilities for activities related to utilisation of renewable energy
PMK Number 24/PMK.011/2010	Facilities for tax and custom for activities related to utilisation of renewable energy.
PMK Number 184/PMK.01/2010	The organization and working procedure of Ministry of Finance includes PKPPIM
PMK Number 260/PMK.011/2010	Guidelines for infrastructure guarantee on projects between government and business entity.
PMK Number 130/PMK.011/2011	Exemption or reduction facilities for agency's income tax
PMK Number 139/PMK.011/2011	Guidelines for the establishment of business feasibility assurances for PT PLN (Persero) to build power plants using renewable energy, coal, and gas in corporation with private power developer
PMK Number 03/PMK.011/2012	Guidelines and accountability for geothermal fund facility

Policy	Explanation
PMK Number 76/PMK.011/2012	Change to PMK Number 176/PMK/011/2009 on the exemption of import duty for machinery, goods and materials used for constructing or developing industry for investment
PMK Number 144/PMK.011/2012	Facilities for income tax for capital investment on certain business entities and/ or certain regions
PMK Number 180/PMK.07/2013	General guidelines and fund allocation for fiscal year 2014
Regulation of Minister of Energy and Mineral Resources	
MEMR Regulation Number 2 Year 2004	Development of renewable energy and energy conservation(Development of green energy)
MEMR Regulation Number 1 Year 2006	Procedure for power purchase and/ or network lease in order to provide electricity power for public interest
MEMR Regulation Number 31 Year 2009	Price for power purchase by PT PLN (Persero) from small and medium renewable energy power plan or electricity power excess
MEMR Regulation Number 4 Year 2012	FiT small-scale energy: Price for power purchaser by PT PLN (Persero) from small and medium renewable energy-based power plan or electricity power excess
MEMR Regulation Number 10 Year 2012	Implementation of physical activities of new energy and renewable energy
MEMR Regulation Number 12 Year 2012	Fuel consumption control
MEMR Regulation Number 13 Year 2012	Power saving
MEMR Regulation Number 14 Year 2012	Energy management
MEMR Regulation Number 22 Year 2012	FiT of geothermal/ delegation of power purchase and geothermal energy power plants to PT PLN (Persero) and price benchmarking by PT PLN (Persero) from geothermal energy power plant
MEMR Regulation Number 1 Year 2013	Fuel consumption control in order to control fuel quota
MEMR Regulation Number 17 Year 2013	FiT PV solar/ power purchase by PT PLN (Persero) from photovoltaic solar power plant
MEMR Regulation Number 19 Year 2013	FiT *waste to energy*/ power purchase by PT PLN (Persero) from city waste-based power plant
MEMR Regulation Number 25 Year 2013	Change to MEMR Regulation Number 32 Year 2008 on provision, utilisation, and business administration of biofuel as alternative fuel
MEMR Regulation Number 3 Year 2014	Technical guidelines on utilisation of special fund allocation on rural energy fiscal year 2014
MEMR Regulation Number 20 Year 2014	Second change to MEMR Regulation Number 32 Year 2008 on provision, utilisation, and business administration on biofuel as alternative fuel
MEMR Regulation Number 22 Year 2014	Change to MEMR Regulation Number 12 Year 2014 on power purchase from water energy power plant by PT PLN (Persero)
MEMR Regulation Number 27 Year 2014	Power Purchase from biomass energy power plant by National Power Company (PT PLN Persero)
Perdirjen 211-12/20/600/1/2012	Guidelines on application of approval and document legalization of investment goods import plans for construction and development of power plant industry for public interest
Perdirjen 978.K/10/DJM.S/2013	Quality Standard (Specifications) and Quality (Specifications) of Solar 48 fuel for domestic market
Perdirjen 933.K/10/DJM.S/2013	Standard and quality (specifications) of 88 fuel for domestic market
Regulation of Other Ministries	
Regulation of The Minister for The Environments Number 41 Year 1999	Air pollution control
Regulation of The Minister for The Environment Number 5 Year 2006	Threshold of exhaust gas emissions for old vehicles
Regulation of The Minister for The Environment Number 18 Year 2008	Quality standard for non-moving source for business and/ or carbon black industrial activity
Regulation of The Minister for The Environment Number 4 Year 2009	Threshold of exhaust gas emissions for new vehicles
Regulation of The Minister for The Environment Number 12 Year 2010	Implementation of air pollution control in regions
Regulation of The Minister for The Environment Number 5 Year 2011	Scoring programme for corporate performance level in environmental management. Including examples of non-monetary incentives for *Program for Incentive/disincentive Pollution Control, Evaluation, and Rating* (PROPER)
Circulation Letter of The Minister for The Environment B/38X/MENLH/PDALs/12/2013	Requirements for passing the emission test for prolongation of prolongation of vehicle registration certificate

Policy	Explanation
Regulation of The Minister of Forestry 30/II/2009	Guidelines of emission reduction and deforestation and forest degradation (REDD)
Ministry of Transportation Regulation of Director-General of Land Transportation 78/AJ.006/DRJD/2008	The usage of Liquid Gas for Vehicle (LGV) on vehicle
Ministry of Transportation Regulation of Director-General of Land Transportation SK.1544/AJ.402/DRJD/2006	Implementation of exhaust gas emission test on new type vehicles and current production vehicle
Examples of Subnational Policies	
Regulation of The Governor of DKI Jakarta 2 Year 2005	Air pollution control
Regulation of The Governor of DKI Jakarta 92 Year 2007	Emission test and vehicle treatment test
Regulation of The Governor of DKI Jakarta 31 Year 2008	Threshold for vehicle exhaust gas
Regulation of The Governor of DKI Jakarta 38 Year 2012	Green buildings
Regulation of DKI Jakarta Province Number 2 Year 2005	Air pollution control
Regulation of Special Territory of Yogyakarta Number 5 Year 2007	Air pollution control
Regulation of Malang City Number10 Year 2010	Waste management

Centre for Climate Change Financing and Multilateral Policy
Fiscal Policy Agency, Ministry of Finance
Republic of Indonesia
Jl. Wahidin Raya No. 1, Jakarta (10710) Indonesia
Telp: +62 21 34831678
Fax: +62 21 34831677
Website: www.fiskal.depkeu.go.id