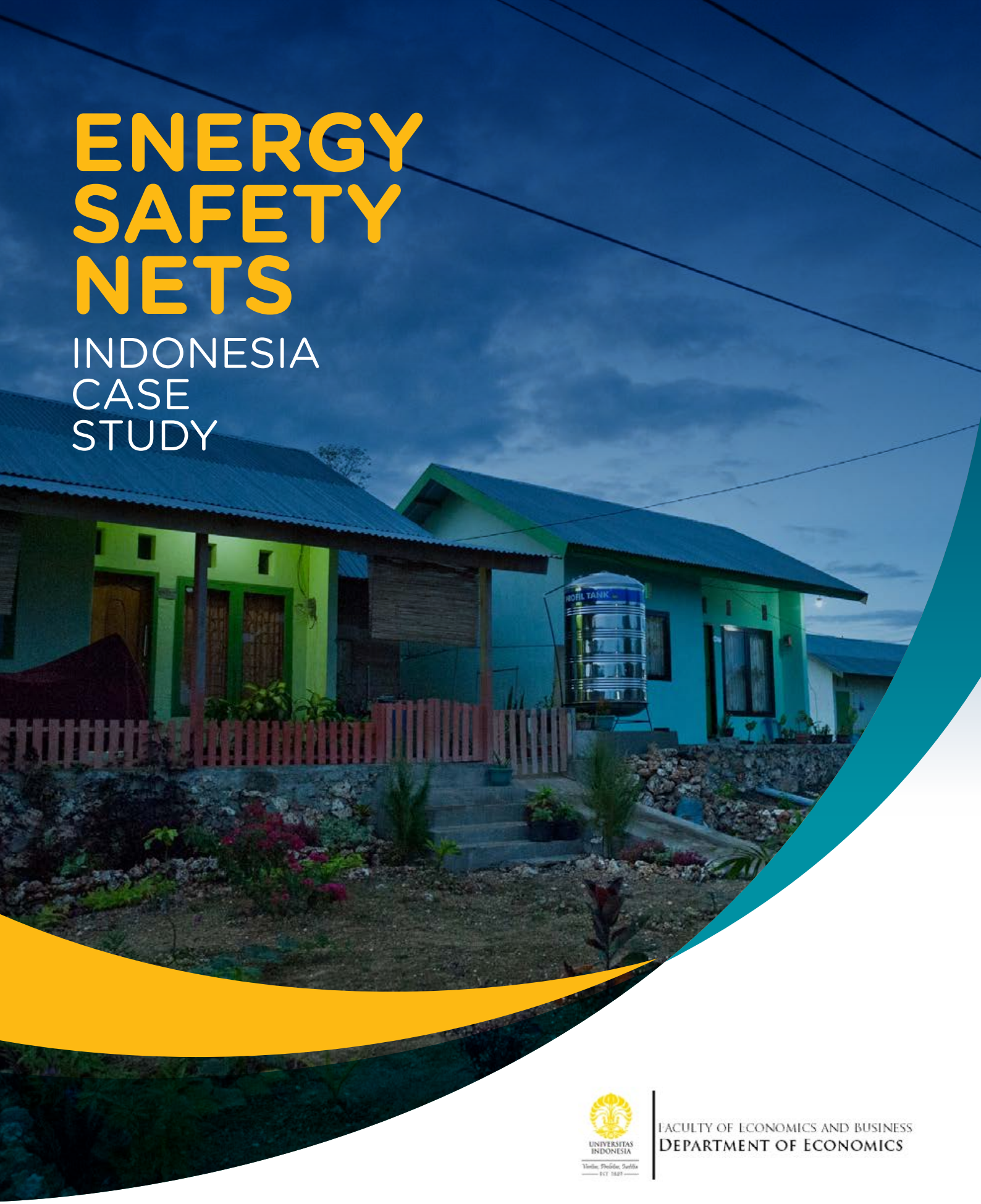
ENERGY SAFETY NETS

INDONESIA CASE STUDY



UNIVERSITAS INDONESIA

FACULTY OF ECONOMICS AND BUSINESS
DEPARTMENT OF ECONOMICS

SUSTAINABLE ENERGY FOR ALL

ODI Evidence. Ideas. Change.

CAFOD Catholic Agency for Overseas Development

ACKNOWLEDGEMENTS

The *Energy Safety Nets: Indonesia Case Study* was researched and written by partners at the Department of Economics, Faculty of Economics and Business Universitas Indonesia (https://www.feb.ui.ac.id/en/department-of-economics/) in Depok. The lead researcher was Teguh Dartanto (teguh.dartanto@ui.ac.id), with support from a team that included Qisha Quarina, Rus'an Nasrudin, Fajar N. Putra and Khaira Abdillah.

We acknowledge with gratitude the financial support provided by the Wallace Global Fund.

The research team acknowledges the contributions to this work of the following workshop attendees and key interviewees: Bappenas - Ministry of National Development Planning (Vivi Yulaswati), BKF - Fiscal Policy Agency, Ministry of Finance (M. Y. Nikho), BPPT - Agency for the Assessment and Application of Technology (Agus Sugiyono), CERAH (Adhityani Putri), Dewan Energi Nasional - National Energy Council (A Sonny Keraf), IBEKA (Adhimas A. P., Petrus L. A., Tri Mumpuni), International Institute for Sustainable Development (Lucky Lontoh), Institute for Essential Services Reform (Erina Mursanti, Marlistya Citraningrum, Melina Gabriella), J-PAL SEA (Poppy Widyasari), Kemenko PMK (Aghniya Halim, Juliyanto), Ministry of Social Affairs (Atin P), Ministry of Social Affairs - Direktorat Jenderal Perlindungan dan Jaminan Sosial (Nurpujiyanto), Coordinating Ministry for Human Development and Cultural Affairs (Nur Budi Handayani), LPEM (C. Hanum Siregar), Indonesian Institute of Sciences - P2E LIPI (Maxensius Tri Sambodo, Felix Wisnu Handoyo),-Pertamina (Gunawan Wibisono, R Choerniadi Tomo, Witdoyo Warsito, Zibali), PGN (Houstina Dewi A, Saphan Sopian), PWYP Indonesia (Andri Prasetyo), The SMERU Research Institute (Asep Suryahadi, Widjajanti Isdijoso), TNP2K - National Team for the Acceleration of Poverty Reduction (Ruddy Gobel), Universitas Indonesia – Department of Economics (Adi Permana, Ambarsari Dwi Cahyani, Aslamia Anwar, Canyon Keanu, Faizal R. Moeis, Fandy Rahardi, Rinayanti, Rini Budiastuti), Universitas Indonesia - Faculty of Economics and Business (Dr. Djoni Hartono, Prof. Dr. Mohamad Ikhsan S.E, M.A), USAID ICED II (Diah Karsiwulan), YLKI (Tulus Abadi), as well as user households interviewed from among the LPG Subsidy Pilot Project Beneficiaries in Rancagong village.

This report is based on research jointly implemented by researchers at the Department of Economics, Faculty of Economics and Business at Universitas Indonesia, the Overseas Development Institute (ODI) and Catholic Agency for Overseas Development (CAFOD). The research in Indonesia is part of a broader program of energy safety nets research also carried out in Brazil, Ghana, India, Kenya and Mexico funded by Sustainable Energy for All (SEforALL) as part of its People-Centered Accelerator work program.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS 2
LIST OF FIGURES 4
LIST OF TABLES 5
ABBREVIATIONS 5
MAP OF INDONESIA 7
EXECUTIVE SUMMARY 8
INTRODUCTION 10
- ENERGY ACCESS AND INCOME POVERTY 11
- RECENT REFORMS TO AMEND A LONG HISTORY OF UNIVERSALLY SUBSIDIZING ENERGY CONSUMPTION 12
- RESEARCH QUESTIONS AND SCOPE OF STUDY 16
- STUDY METHODS 17

ENERGY SAFETY NETS AS PART OF ENERGY REFORMS AND SOCIAL PROTECTION IN INDONESIA 19
- EVOLUTION OF ENERGY SUBSIDY SYSTEM IN INDONESIA 20
  - Unified Database System (Basis Data Terpadu or BDT) 20
- ENERGY REFORM TOWARDS A TARGETED-SUBSIDY SYSTEM FOR ELECTRICITY 22
- ENERGY REFORM TOWARDS A TARGETED-SUBSIDY SYSTEM FOR LPG 28
  - Subsidies for Cleaner Cooking: From Biomass and Kerosene to LPG 28
  - Reform of the LPG Subsidy 30
- ENERGY SAFETY NETS AS PART OF INDONESIA'S SOCIAL WELFARE PROGRAM 32

EVIDENCE OF THE IMPACT OF REFORMS ON ACCESS TO ENERGY: SECONDARY DATA ANALYSIS 34
ELECTRICITY ACCESS AMONG INDONESIAN HOUSEHOLDS 35
- PRIMARY ENERGY FOR COOKING AMONG INDONESIAN HOUSEHOLDS 38
  - Substantial but uneven progress in providing access to LPG 38
  - A lack of enabling infrastructure is hampering universal access to clean cooking fuels 40
  - Behavior remains a key constraint to universal adoption of cleaner cooking technologies 41
- ENERGY CONSUMPTION 44

LESSONS LEARNED AND FUTURE DIRECTION OF ENERGY SAFETY NETS IN INDONESIA: EXPERT INPUTS 45

SUMMARY AND CONCLUSION 49
REFERENCES 51
Endnotes 53
GLOSSARY 56
COPYRIGHT AND DISCLAIMER 58

LIST OF FIGURES

Figure 1: Electrification Rate in Indonesia 11
Figure 2: Electrification Rate by Province in 2017 12
Figure 3: Access to LPG (Bluegas 5.5 kg, LPG 3 kg and LPG 12 kg) by Province in 2017 13
Figure 4: Distribution of Poor People in Indonesia by Province 14
Figure 5: Budget Allocation for Energy Subsidies 16
Figure 6: Timeline History of Energy Reforms in Indonesia 18
Figure 7: Government Expenditure on Energy and Non-Energy Subsidies during Different Administrations 21
Figure 8: BDT Data Collection Method 2015 23
Figure 9: Simplified Economic Analysis of Supply Shortage of Electricity 26
Figure 10: Budget Allocation for Electricity Subsidies 26
Figure 11: Number of Households in BDT Database by Electricity Connection (Millions) 27
Figure 12: The Number of Households with 450 VA and 900 VA Connection in 2016 (in Millions) 28
Figure 13: Social Welfare Programs in Indonesia 31
Figure 14: BDT Database Utilization for Social Assistance Programs 32
Figure 15: Type of Electricity Used among Households in Indonesia, 2007 36
Figure 16: Percentage of Households with Electricity as a Source of Lightning (including PLN and Non-PLN) 37
Figure 17: Correlation between Percentage of Q1 Households with an Electricity Connection in a Province and its Remoteness (Number of Islands) with Electricity and Remoteness 38
Figure 18: Primary Energy Source for Cooking among Households in Indonesia, by Income quintile in 2007 and 2017 39
Figure 19: Percentage of Households with Access to Modern Sources of Cooking Energy (including LPG, piped gas, Electricity and Biogas) by Province and Income Group in 2007 and 2017 40
Figure 20: Relationship Between Households with Access to Electricity and to Modern Sources of Cooking Energy, by Province and by Income Group 42
Figure 21: Intra-Province Share of Electricity Spending, by Quintile in 2007 and 2017 43

LIST OF TABLES

Table 1: Summary of Social Assistance Programs and Energy Reforms	15
Table 2: Comparison of Monthly Electricity Charges for Different Levels of Consumption and Different Modes of Payment	24
Table 3: Electricity Tariffs in Indonesia as of 2017 (after reform)	25

ABBREVIATIONS

ASLUT	*Asistensi Sosial Usia Lanjut* (Social Assistance for Older Persons)
BBPT	*Badan Pengkajian Dan Penerapan Teknologi* (Agency for the Assessment and Application of Technology)
BDT	*Basis Data Terpadu* (Unified Database System)
BLT	*Bantuan Langsung Tunai* (Unconditional Cash Transfer)
BOS	*Bantuan Operasional Sekolah* (School Operational Assistance)
BPNT	*Bantuan Pangan Non-Tunai* (Non-Cash Food Assistance)
BPS	*Badan Pusat Statistik* (Statistics Indonesia)
ESN	Energy Safety Net
FGD	Focus Group Discussion
FKP	*Forum Konsultasi Publik* (Public Consultation Forum)
FPL	Food Poverty Line
GK	*Garis Kemiskinan* (Poverty Line)
JKN	*Jaminan Kesehatan Nasional* (National Health Insurance)
LIPI	*Lembaga Ilmu Pengetahuan* Indonesia (Indonesian Institute of Sciences)
LPG	Liquefied Petroleum Gas
MEMR	Ministry of Energy and Mineral Resources

NFPL	Non-Food Poverty Line
PIP	*Program Indonesia Pintar* (Educational Assistance Program)
PKH	*Program Keluarga Harapan* (Conditional Cash Transfer Program)
PLN	*Perusahaan Listrik Negara* (State Electricity Company)
PMT	Proxy Means Test
Podes	*Potensi Desa* (Village Potential)
PPLS	*Pendataan Program Perlindungan Sosial* (Social Protection Program Database)
PSE	*Pendataan Sosial Ekonomi* (Socio Economic Data Collection)
SDG	Sustainable Development Goal
Susenas	*Survei Sosial Ekonomi National* (National Socioeconomic Surveys)
TNP2K	*Tim Nasional Percepatan Penanggulangan Kemiskinan* (National Team for the Acceleration of Poverty Reduction)

A note on currency

The conversion from the Indonesian rupiah (IDR) to the US dollar (USD) follows the yearly average exchange rate value for each corresponding year that is obtained from Indonesia's Central Bank.

MAP OF INDONESIA

EXECUTIVE SUMMARY

This case study was conducted to investigate how the Government of Indonesia supports access to affordable, reliable, sustainable and modern energy for its poor and vulnerable citizens. Specifically, it identifies Energy Safety Nets (ESNs), the programs available to poor and vulnerable households that support access to electricity and LPG for cooking, analyzes evidence on the impacts of these programs, and discusses the lessons learned from Indonesia's experiences. The results of the case study are informed by a detailed review of the literature, an analysis of the Susenas (National Socioeconomic Survey) and Podes (Village Potential) datasets, and expert interviews and focus group discussions (FGDs) with representatives of policymakers, academics, NGOs and recipient communities. These qualitative analyses have improved understanding of the context surrounding ESNs, including why some policies were introduced, the challenges surrounding implementation, and who or what was responsible for driving the policy agenda. The case study assesses the effectiveness of existing programs and policies and yields valuable inputs for conducting reforms that ensure poor and vulnerable groups have access to modern energy services. Further, it details progress made in the provision of the infrastructure needed to access modern energy services (electricity connections and LPG cookstoves) and focuses on the support necessary for their consumption.

The Government of Indonesia and *Perusahaan Listrik Negara* (PLN), the state-run electricity company, have made substantial gains in providing access to electricity over recent decades, with the goal of near-universal access by 2020. The reliability of electricity has also improved for most households, although some areas remain under- or unserved and many households in geographically isolated areas in eastern regions lack access to electricity. Access to clean cooking technologies is less universal than access to electricity, although the cross-government kerosene-to-LPG program that saw the free distribution of 54 million LPG kits between 2007 and 2012 and the withdrawal of kerosene subsidies significantly boosted the rate of access to clean cooking technologies to 62 percent in 2017. However, many poorer and remote areas of the country continue to lack the enabling infrastructure to adopt cleaner cooking solutions.

Related to support for the consumption of modern energy services, much work has been carried out that documents Indonesia's experience with reforming universal energy subsidies. The energy reform process has been ongoing for many years and delivery of subsidies that support consumption of electricity and LPG for cooking continues to evolve. While improving energy access has featured prominently in the reform process, the key driver has always been reducing the fiscal pressure that subsidies exert and the most significant change brought about by these reforms has been a shift from commodity-based subsidies to those targeted at specific households. Reforms have been particularly instrumental in the case of electricity tariffs and in the kerosene-to-LPG program. This case study discusses the implications of these reforms in terms of their impact on access to energy for poor and vulnerable groups and the linkages between ESNs and other social assistance programs in Indonesia.

Reforms both to electricity tariffs and in the kerosene-to-LPG program involve cross-governmental cooperation and the sharing of resources. Key to their impact on energy access has been the work of the National Team for the Acceleration of Poverty Reduction *(Tim Nasional Percepatan Penanggulangan Kemiskinan,* TNP2K). Led by the Vice President, TNP2K was created in 2010 to promote coordination across government bodies to improve the implementation of poverty reduction programs and the living standards of the poor and vulnerable, and reduce inequality among income groups. One result of this coordination has been to utilize the Unified Database System (*Basis Data Terpadu* (BDT)), launched in 2005. The BDT is administered by the Ministry of Social Welfare but draws on expertise from several different ministries. This micro-level electronic database is built from census data and contains social, economic and demographic information that is linked to the names and addresses of respondents. These data are used to conduct a proxy means test that classifies segments of the population that are eligible for various social protection schemes, including ESNs.

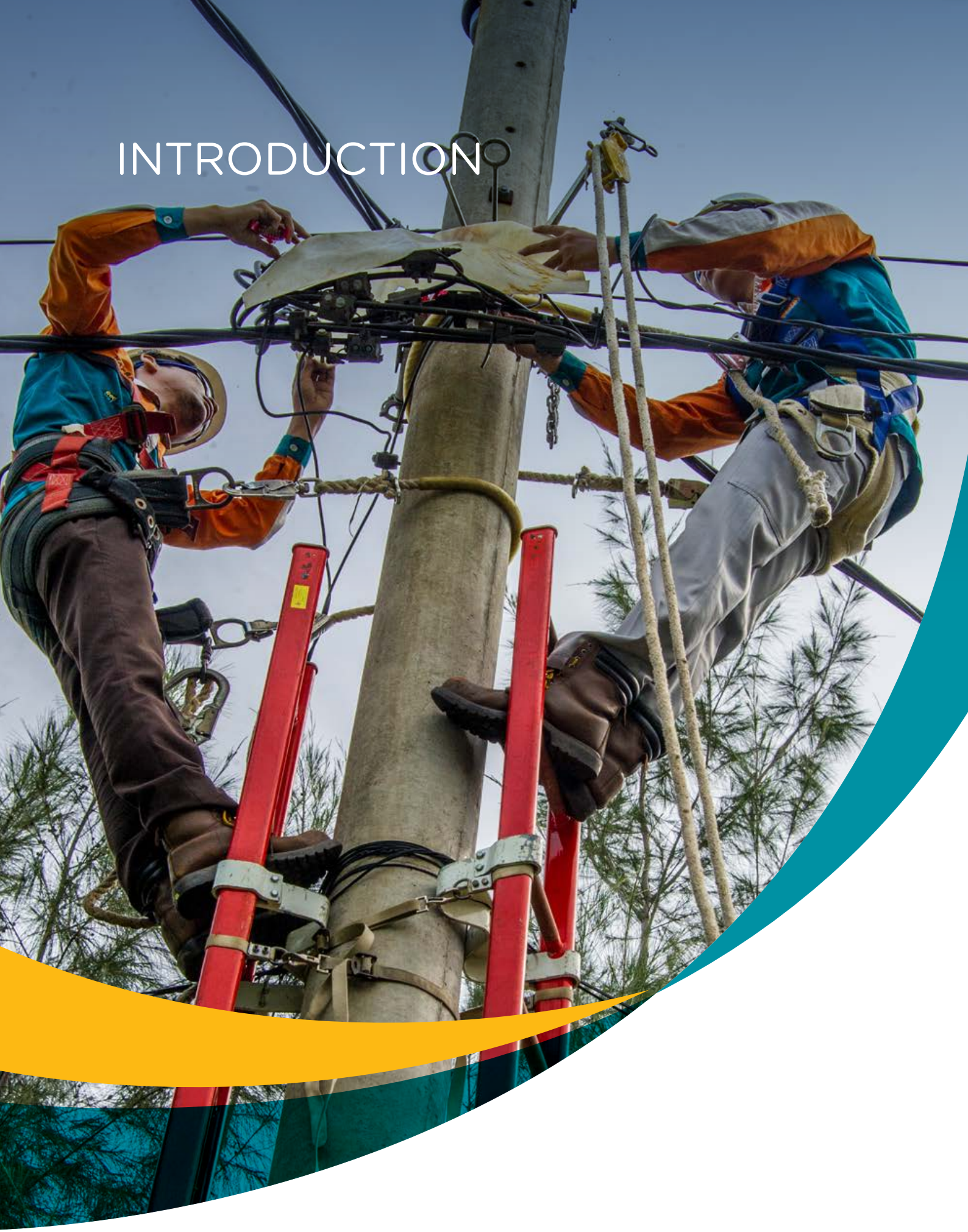
Attempts to more stringently target subsidies began in 2013 and were first carried out in the electricity sector. These involved changes to the tariffs paid by households. Proxy means tests were initially used in an attempt to target only poor and vulnerable households with low-power connections and low usage. In 2017, reforms shifted the target of the subsidy by matching the PLN's customer database with the BDT. This enormous undertaking involved electricity company workers visiting every household that was registered to receive a subsidy to validate whether they were eligible beneficiaries. This process reduced the subsidy's inclusion errors by excluding non-poor households. No direct outcomes contributed to improving energy access for poor and vulnerable households, but households may have indirectly benefited from the reform because it freed up government revenue that was subsequently used to provide other (non-energy) pro-poor social assistance programs. Nonetheless, although rates of access to electricity increased for poorer Indonesian households between 2007 and 2017, and despite the electricity tariff reform being enacted to make the wealthier parts of society pay more for electricity than the poorer segments, consumption by wealthy households in the same period grew much faster than that of poor households.

More recently TNP2K began piloting active targeting of LPG subsidies in a similar way to that carried out previously in the electricity sector (i.e. using the BDT database to determine the eligible beneficiaries). In 2018 a pilot program involving 4,000 households was initiated across four provinces. This entailed providing a fixed benefit level for three 3 kg LPG cylinders per month to households that were invited to the trial and enrolled with support from village officials. This included registering beneficiaries' mobile phone numbers and ensuring they had a bank account to which the subsidy could be transferred. A second pilot program began in 2019 and adopted a more advanced transaction system that involved multiple ways for beneficiaries to prove their eligibility as well as e-vouchers that could be redeemed at approved LPG merchants, rather than cash transfers.

This study aims to shed light on the issue of access to affordable and modern energy for the poor and vulnerable people in Indonesia in the context of ESNs. Key considerations for future ESNs include:

- The extent to which a one-size-fits-all policy can contribute to truly universal access, especially with respect to remote and heterogeneous populations
- The extent to which subsidies should rely on the BDT given the frequency with which it is updated
- The need for the subsidy process to be led by a key political actor
- The need to recognize the willingness of households to change behavior as a key determinant of whether they will shift to cleaner cooking fuels.

INTRODUCTION



Energy is an essential element of people's daily lives and closely related to many development issues, such as productivity, health, gender equality and poverty alleviation. Accessibility to energy represents a major challenge as well as opportunities for many, if not all, countries in the world. The importance of access to energy is addressed in Sustainable Development Goal 7 (SDG7) which has three targets: universal access to affordable, reliable, sustainable and modern energy; increasing the share of renewable energy in the global energy mix; and doubling the global rate of improvement in energy efficiency.[i] The issue of affordable and clean energy remains an important policy agenda around the world. As of 2017, around 3 billion people still lacked access to clean cooking and were exposed to high levels of air pollution, while slightly less than 1 billion people were still without electricity (IEA et.al. 2019). Elsewhere, progress has been made in terms of the use of renewable energy and the declining ratio of energy used per unit of GDP, which demonstrate opportunities in achieving SDG7 by 2030 (Sachs et al. 2018).

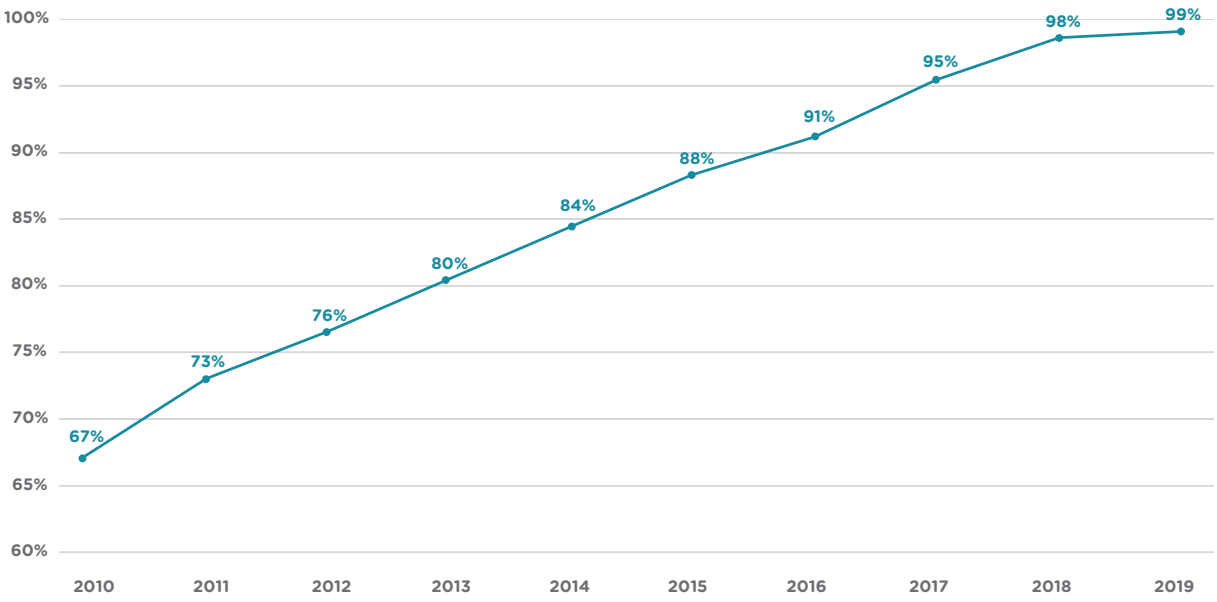
Indonesia, as the fourth most populous country in the world, and the largest economy in Southeast Asia, has been actively engaging with the Sustainable Development Goals (SDGs) to eliminate poverty, promote gender equality, and increase access to modern energy. Under a UN evaluation in 2018, Indonesia's overall achievement for SDG7 is still classified as 'insufficient'; its lowest achievement is in CO_2 emissions, followed by access to clean fuels and technology for cooking. The best achievement for Indonesia by far is in terms of access to electricity.

ENERGY ACCESS AND INCOME POVERTY

2019 data from the Ministry of Energy and Mineral Resources (MEMR) show that the household electrification rate in Indonesia had reached 98.3 percent by 2018 and 98.81 percent by the beginning of 2019 (Figure 1). The government's aim is for the electrification rate to have reached 99.99 percent by the end of 2019 (Ismoyo 2019).[ii] Although Indonesia has achieved a great deal in terms of electrification in most parts of the country, it remains an issue in the

Figure 1

Electrification Rate in Indonesia



Note: 2019 data is a projection

Source: MEMR 2019 (processed by authors)

east, which includes some of the poorest provinces in the country, and thus the challenge for universal access in electrification remains on the national agenda (ADB 2016). The electrification rate for provinces in the eastern part of Indonesia is only about 54 percent, while it has reached more than 95 percent in other parts of the country (Figure 2). In addition, outside of Java, the nation's wealthiest and most populous island, rolling blackouts caused by insufficient supply capacity continue to hamper universal electricity access and usage (Burke and Kurniawati 2018).[iii]

A similar picture is also seen in access to liquefied petroleum gas (LPG), which is considered a modern and clean form of cooking energy. Access to LPG in the eastern provinces of Indonesia is extremely limited compared to that in other provinces (Figure 3). This issue is a key focus of this study and will be discussed further in the following sections.

Despite the country being Southeast Asia's largest economy, many Indonesians still live in poverty or just above the poverty line. Data from Statistics Indonesia (*Badan Pusat Statistik* (BPS)) show that as of September 2018, the number of poor people, those who live below the national poverty line,[iv] accounted for about 25.67 million people (nearly 10 percent of the population), and as of 2016 almost 7 percent of the population were living on less than USD 1.90 per day, the international poverty line.

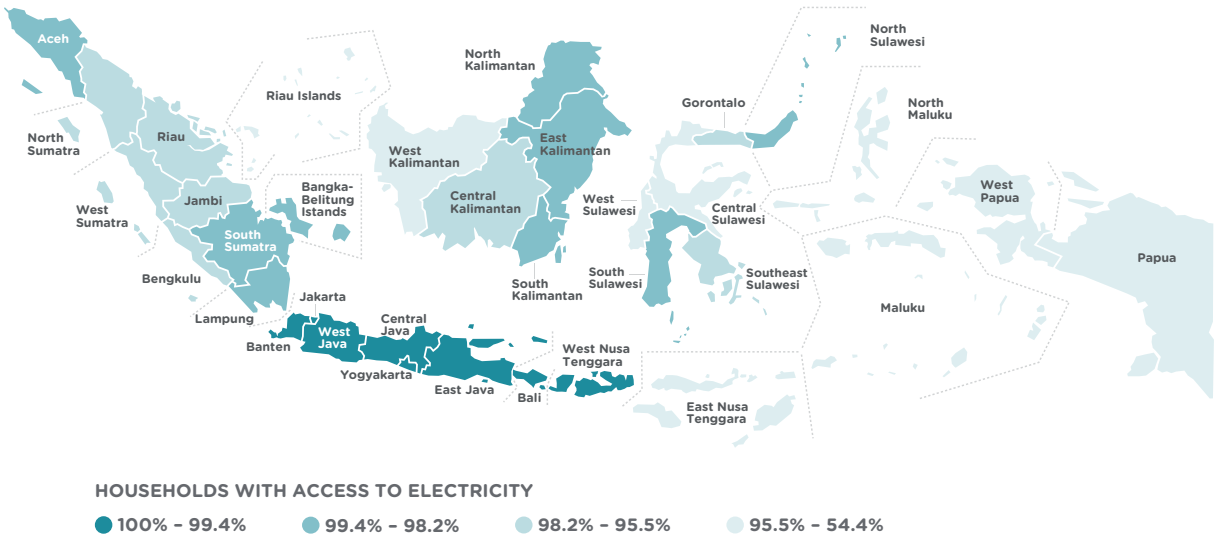
As of September 2018, the absolute number of poor people (based on the national poverty line) in the Java Island provinces (such as Central Java, DKI Jakarta and East Java) was higher than in other provinces in Indonesia (Figure 4). However, the provinces with the highest percentage of poor people are in the eastern part of Indonesia, areas such as East Nusa Tenggara, Maluku and West Papua. Of 25.67 million poor people, 10.13 million (39.5 percent) live in urban areas while 60.5 percent (15.54 million) live in rural areas. To provide universal access to affordable and modern energy across Indonesia, poor and other vulnerable groups within society must have equal opportunities to access modern energy.

RECENT REFORMS TO AMEND A LONG HISTORY OF UNIVERSALLY SUBSIDIZING ENERGY CONSUMPTION

Indonesia has a long history of providing universal commodity-based subsidies for energy products.

Figure 2

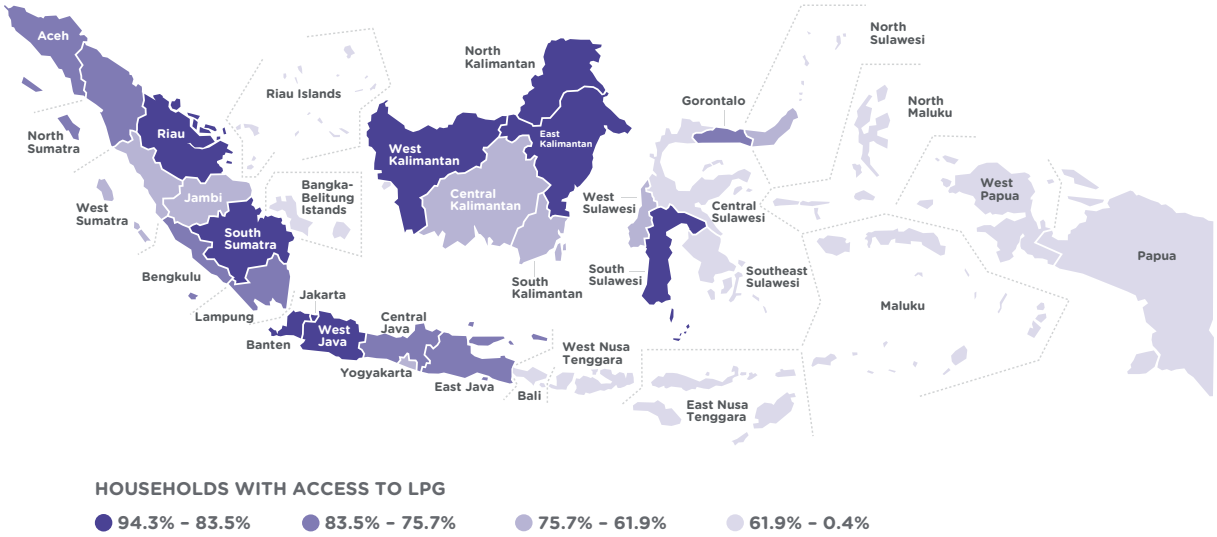
Electrification Rate by Province in 2017



Source: Susenas 2017 (processed by authors)

Figure 3

Access to LPG (Bluegas 5.5 kg, LPG 3 kg and LPG 12 kg) by Province in 2017



Source: Susenas 2017 (processed by authors)

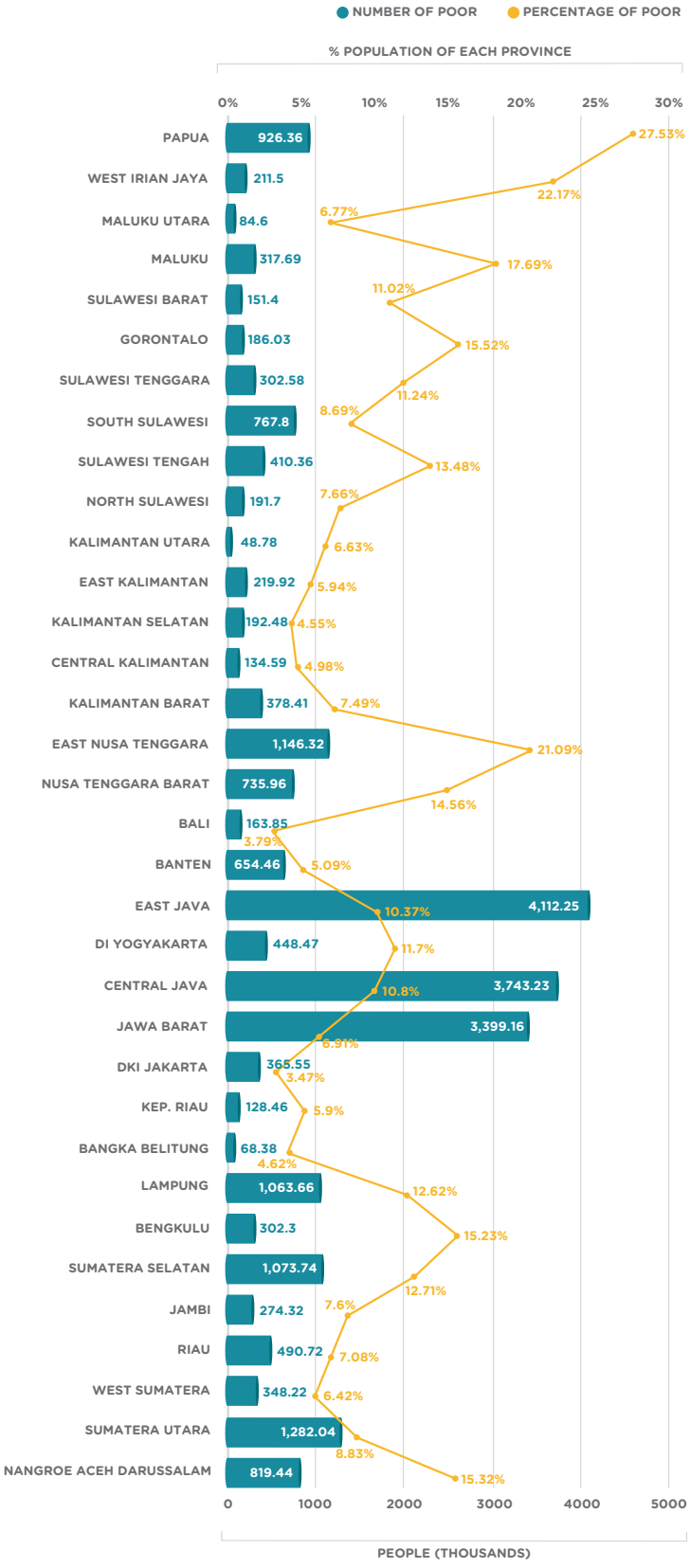
These subsidies, however, have encouraged excessive use of energy, hampered the implementation of energy saving technologies, and limited the government's budget allocation for other pro-poor social assistance programs (Dartanto 2017). Moreover, the benefits from such subsidies are mainly enjoyed by high-income groups who tend to consume more energy (meaning that the subsidies are an inefficient mechanism of supporting poor households). This is the case for some fuels more than others. Dartanto (2013), for instance, shows that in 2008 nearly 72 percent of gasoline subsidies were enjoyed by the richest 30 percent, by income.[v] These issues posed a major constraint for the country both to achieve universal energy access and ensure affordable, modern energy for the poor, since the subsidy regime alone consumed most of the fiscal capacity needed to meet these two goals. Despite subsidies reducing the price of energy, the poor continue to face difficulties in accessing energy due to slow expansion of the supply in remote areas. Enabled by recent developments in the availability of beneficiaries' data, major adverse macroeconomic shocks triggered the government to introduce a series of reforms to energy subsidies for electricity, LPG and other fossil fuels.

Government spending on energy subsidies was reduced from about USD 27.5 billion[vi] (about IDR 342 trillion) in 2014 to about USD 8.6 billion (about IDR 120 trillion) in 2015, a decrease in the fraction of the total government budget used for energy subsidies from 18 percent to 6 percent. On the one hand, these reforms increased energy prices in Indonesia, driving up the price of electricity and gasoline. Alone, these changes would have negatively impacted poor and vulnerable households. However, at the same time, these reforms have freed up some of the public budget to be allocated for social assistance programs, such as the Conditional Cash Transfer Program (*Program Keluarga Harapan* (PKH)) and Educational Assistance Program (*Program Indonesia Pintar* (PIP)), and for subsidized rice (*Beras Sejahtera or Rastra*), all of which better target the poor (see Table 1).

Many studies and reports have conveyed the types and impacts of energy reforms in Indonesia, particularly in relation to health, welfare, and poverty reduction (see for example Ikhsan et al. 2005; Dartanto 2013; Dartanto 2017; World Bank 2012; Perdana 2014; and OECD 2019).

Figure 4

Distribution of Poor People in Indonesia by Province



Source: BPS 2019

Figure 5 demonstrates that expenditure for energy subsidies increased in two years. Subsidies for LPG (cooking) increased from USD 3.0 billion in 2017 to USD 4.5 billion in 2018 and to USD 4.8 billion in 2019. Nevertheless, energy subsidy spending in proportion to the total government budget, in both 2018 and 2019, was still much lower than it was in 2014. Moreover, very recent energy subsidy reforms (2019), particularly in electricity and LPG, have shifted from a commodity-based subsidy system to a targeted (person-based) subsidy (see Figure 6 for a timeline of the history of energy reforms in Indonesia).

Table 1

Summary of Social Assistance Programs and Energy Reforms

YEAR	CAUSE OF REFORM	SOCIAL ASSISTANCE RESPONSE
1997	Increase in fuel price by 70 percent due to Asia Financial Crisis	Scale-up of the IDT program Launch of the social safety net programs (Jaring Pengaman Social/JPS) in 1998, that consist of: 1. A safety net for food security (sale of subsidized rice – RASKIN) 2. A safety net for employment creation (Padat Karya) 3. A safety net for education (Scholarship and Block Grants) 4. A safety net for health (JPS-BK and Block Grants) 5. Regional development (PDM-DKE)
2000 – 2002	Reduced budget allocation for energy subsidy	Compensation for energy subsidy reduction 1. Increased budget allocation for OPK Program – RASKIN 2. Education sholarships such as: a. Bantuan Khusus Murid (BKM) for students b. Bantuan Khusus Sekolah (BKS) for schools c. Bantuan Pendidikan Luar Sekolah for public learning centers. 3. Health-care for poor households 4. Unconditional cash transfers (UCT) 5. Provision of clean water infrastructure 6. Revolving Fund 7. Direct financial assistance for community empowerment 8. Providing transportation subsidies
2005	Increased world oil prices (fuel price hikes)	Compensation for the increase in fuel price: 1. Temporary unconditional cash transfer called Direct Cash Assistance Program (Bantuan Langsung Tunai, or BLT) 2. Health Insurance for the Poor (Asuransi Kesehatan Masyarakat Miskin, abbreviated as Askeskin) 3. School Operational Assistance (Bantuan Operasional Sekolah, or BOS) 4. The Rural Infrastructure Program (Infrastrukture Pedesaan, or IP)
2007	Kerosene-to-LPG reform initiation	Launched two Conditional Cash Transfer (CCTs) 1. Program Keluarga Harapan or PKH (Hopeful Families Program), and 2. PNPM Generasi Sehat dan Cerdas (PNPM Generasi)
2008	Increased world oil prices (fuel price hikes)	Compensation for the increase in fuel price: 1. Re-introduction of temporary unconditional Cash Transfer for one year (BLT) 2. Health Insurance for the Poor 3. School Operational Assistance 4. Assitance for poor students – Bantuan Siswa Miskin (BSM) 5. Micro Credits Program (Kredit Usaha Rakyat, or KUR), and 6. Other social expenditures
2013	Fuel price increased	To compensate for the increase in fuel prices, GoI introduced a fuel subsidy compensation package for the poor consisting of short-term programs and long-term programs. Short-term programs: 1. Unconditional cash transfer (Bantuan Langsung Sementara Manyarakat/BLSM) 2. Rice for the Poor (Beras Miskin) 3. Short-term infrastructure programs: P4-IP, P4-SPAM, P4-ISPA Long-term programs: 1. Education subsidy for students called Bantuan untuk Siswa Miskin (BSM) 2. The Hopeful Family Program (Program Keluarga Harapan, PKH) 3. Social Assitance Program for Neglected Elderly (Asistensi Social Lanjut Usia Terlantar or ASLUT)
2015 – 2017	Gasoline subsidy was entirely removed; adjustment in electricity tariffs; extension of LPG conversion	To compensate for several energy subsidy reforms, the GoI introduced several social assistance programs: 1. Assistance for poor students – Programme Indonesia Pintar (PIP) 2. Scholarship for university students – BIDIK MISI 3. Subsidized rice – the name changed to RASTRA 4. Introduction of electronic food vouchers (Bantuan pangan Non Tunai or BPNT) in 2017 to be integrated with RASTRA program

Source: Authors' compilation

This study was conducted to give detailed insight and shed light on how the Government of Indonesia supports access to affordable and modern energy for the poor and vulnerable people in the context of Energy Safety Nets (ESNs). More specifically, it identifies the programs available for the poor and vulnerable people in Indonesia to access modern technology, provides evidence based on the benefits of energy policies for this group, and discusses the lessons learned for the ESN issue in Indonesia. This study is also complemented with direct information on how policymaking processes have occurred by drawing on expert interviews and focus group discussions (FGDs) with the stakeholders involved, i.e. policymakers and experts who are directly in charge of or involved in the study of energy reforms in Indonesia.

RESEARCH QUESTIONS AND SCOPE OF STUDY

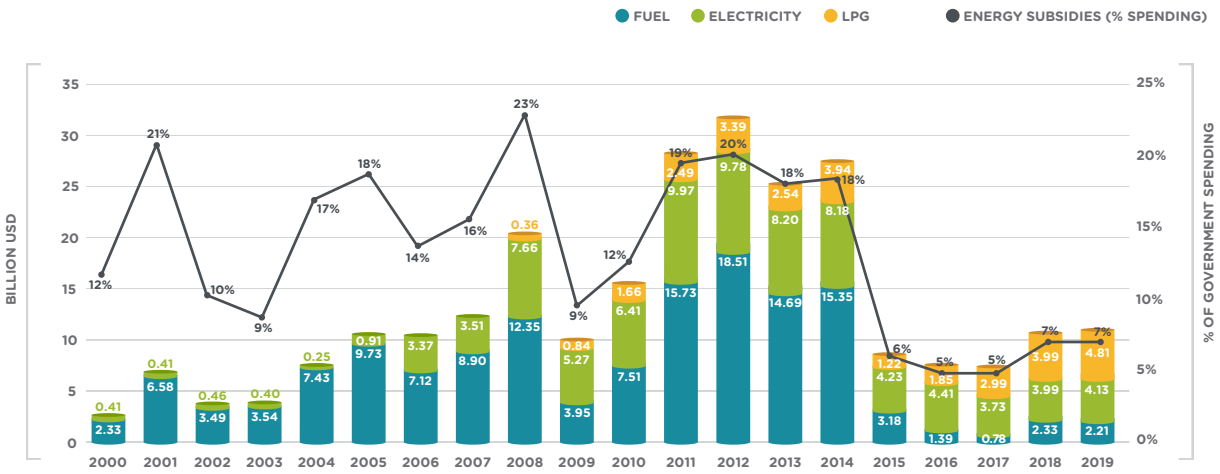
Indonesia has experienced several energy reforms for fuel subsidies, electrification, and LPG conversion. This study discusses the implications of these reforms in terms of ESNs, particularly access to energy for poor and vulnerable groups. In addition, it takes a deeper dive into two aspects: access to electricity and access to LPG as a cleaner cooking fuel. These two energy goals are quite distinct from others since they are characterized by a shift from a commodity-based subsidy toward a targeted subsidy, which is relevant for the aim of this study.

This country case study—like the other five, covering Brazil, Ghana, India, Kenya and Mexico— seeks to answer four research questions:

- What policy measures have been used in Indonesia to enable poor and marginalized people to access and use modern energy services?
- What links have there been/are there between these measures and wider/other social assistance programs?
- How effective have these measures been in enabling the poorest social groups to access and use modern energy services?
- What changes could be made to enhance the effectiveness of existing policy measures in enabling very poor people to access modern energy services?

Figure 5

Budget Allocation for Energy Subsidies



Source: The Ministry of Finance, Indonesia, State Budget Information (APBN), 2000–2019 (processed by authors)

Energy Safety Net (ESN) is an umbrella term for government-led approaches to support very poor and vulnerable people to access essential modern energy services, defined as electricity and clean fuels and technologies for cooking, by closing the affordability gap between market prices and what poor customers can afford to pay.

ESNs can make physical access (i.e. connections) to electricity or clean fuels affordable for poor and vulnerable people, or they can make the unit price of electricity or fuel affordable to consume. ESNs include some form of targeting or eligibility criteria to direct benefits to those who need them.

STUDY METHODS

Several approaches were used in order to address the above research questions: a literature review, quantitative analysis, in-depth interviews and FGDs. These approaches afford a comprehensive analysis of ESNs in Indonesia that can be used for analyzing the effectiveness of existing energy programs or policies, and also for providing valuable input for conducting reforms. The remaining sections of this report will address the above research questions as follows:

Evolution and Targeting of ESNs and Complementarities with Other Social Assistance Programs in Indonesia: A Literature Review

This section evaluates the history and evolution of ESNs in Indonesia based on the existing literature, reports and official documents. The aim is to identify what energy reforms have been implemented in Indonesia, how these reforms have increased energy access among the poor and among marginalized groups, and to determine any other impacts of these reforms. Moreover, as ESNs form part of the country's socail protection program, this section will also explain the linkage between ESNs and other social assistance programs.

Benefit incidence analysis of ESNs: Exploration of Susenas (National Socioeconomic Survey) and Podes (Village Potential) Datasets

The case study also provides evidence-based analysis by exploring secondary data from the Susenas and Podes datasets. This part aims to give a descriptive analysis of whether past and existing ESN programs, particularly for access to electricity and LPG for cooking, are effective. The benefit incidence analysis determines whether poor and marginalized groups have better access to modern energy sources than other groups. The benefit incidence analysis focuses not only on variations in income group but also on regional differences.

Qualitative Study of Past, Present and Future Direction of ESNs in Indonesia: In-Depth Interviews and FGDs with Key Stakeholders

To complement the above analyses, the case study also gathered valuable information regarding ESNs in Indonesia from key stakeholders including various government ministries, energy providers, commentators and academia. In-depth interviews were carried out to better understand the context of ESNs, including why some policies were introduced, the challenges that they face(d) and who was responsible for driving the policy agenda. Two FGDs were also conducted in May and June 2019. The first served to validate research questions and gather information and suggestions as to how the work should be carried out, while the second provided a forum to discuss and refine the preliminary results of the case study. Key stakeholders were invited to present their views to the groups at both events.

Figure 6

Timeline History of Energy Reforms in Indonesia

2005

1. Fuel price increased by an average of 29 percent in March (Presidential Regulation No.22/2005)
2. Fuel price increased by an average of 114 percent in October (Presidential Regulation No.55/2005)

2007

1. Introduction of kerosene-to-LPG conversion program in Indonesia (Presidential Regulation No.104/2007)
2. Start of distribution of subsidized 3 kg LPG in most developed regions (MEMR Ministerial Decree 3175 K/10/MEM/2007)

2008

1. Price increased by 33 percent for gasoline, 28 percent for diesel 25 percent for kerosene in May (MEMR Ministerial Regulation No.16/2008)
2. Gasoline prices were lowered by 9 percent (MEMR Ministerial Regulation No.38/2008)
3. Gasoline and diesel prices were lowered by 9 percent and 13 percent respectively (MEMR Ministerial Regulation No.41/2008)

2009

1. Prices lowered by 11 percent for gasoline and 7 percent for diesel in January (MEMR Ministerial Regulation No.01/2009)
2. Start of distribution of subsidized 3 kg LPG in less-developed regions

2012

1. Electricity base tariff increased by 15 percent overall in 2013 households with a 450 or 900 VA connection (MEMR Ministerial Regulation No.30/2012)

2013

1. One-off fuel price increase, an average of 40 percent (MEMR Ministerial Regulation No.18/2013)

2014

1. Electricity base tariff increased for industrial customers with a connection > 200 kVA (MEMR Ministerial Regulation No.09/2014)
2. Electricity base tariff adjustment for 12 non-subsidized PLN customer groups (MEMR Ministerial Regulation No.31/2014)
3. Price increased by 31 percent for gasoline and 26 percent for diesel (MEMR Ministerial Regulation No.34/2014)
4. Price decreased by 12 percent for gasoline and 3.5 percent for diesel (MEMR Ministerial Regulation No.39/2014)
5. The start of gradual increase of non-subsidized 12 Kg LPG price

2015

1. Subsidies for gasoline entirely removed and diesel subsidies reduced to IDR 1,000/liter
2. Price decreased by 13 percent for gasoline and 12 percent for diesel (MEMR Ministerial Regulation No.04/2015)

2016

1. Electricity base tariff adjustment for 12 non-subsidized PLN customer groups starting from 1 January 2017 and for 900 VA non-subsidized group starting from 1 July 2017 (MEMR Ministerial Regulation No.28/2016)

2017

1. Electricity base tariff adjustment for 900 VA non-subsidized group was delayed until 1 January 2018 (MEMR Ministerial Regulation No.41/2017)
2. Revocation of the electricity subsidy for 900 VA non-poor customers (about 4.1 million customers)

2018

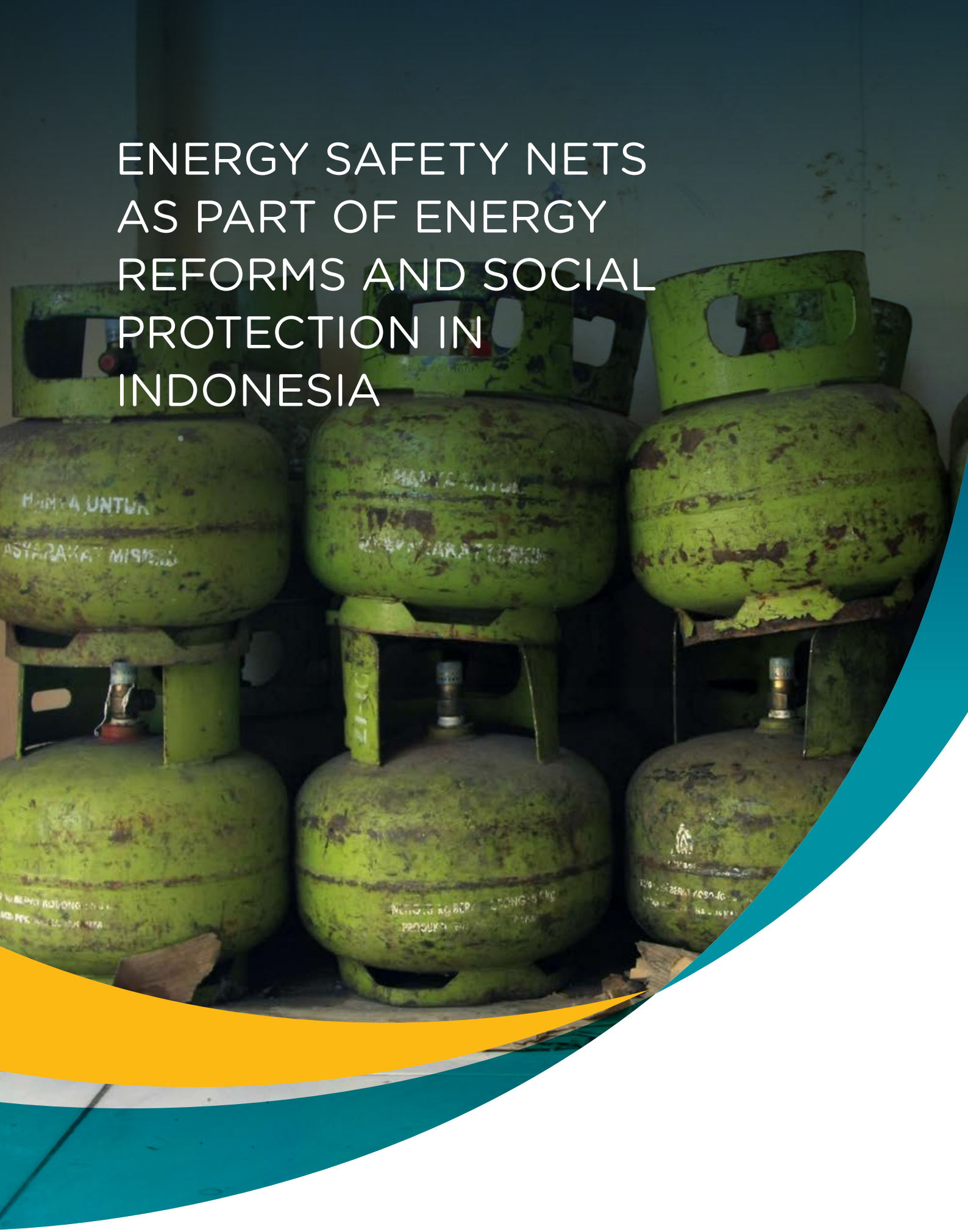
1. Maximum diesel subsidy become IDR 2,000/liter (MEMR Ministerial Regulation No.40/2018)

2019

1. Subsidized 3 Kg LPG distributed in East Nusa Tenggara as part of LPG-to-kerosene-conversion. Subsized LPG has not been distributed in Maluku and Papua
   Pilot testing of targeted subsidy distribution mechanism of 13 Kg LPG for subsidy recipient using biometrics by TNP2K

Source: Authors' compilation

ENERGY SAFETY NETS AS PART OF ENERGY REFORMS AND SOCIAL PROTECTION IN INDONESIA



EVOLUTION OF ENERGY SUBSIDY SYSTEM IN INDONESIA

The Government of Indonesia has a long history of subsidizing energy—including gasoline, diesel, kerosene, LPG and electricity—as an instrument to stabilize prices and as a social welfare policy (Perdana 2014). The provision of energy subsidies and increasing access to energy for the poor are both mandated under the 2007 Energy Law (30/2007).

Historically, Indonesia's subsidy policies focused on universal price support for energy commodities, i.e. per liter of gasoline or per kilowatt hour (kWh) for electricity. The aim was to increase energy accessibility for the poor through lower energy prices. The outcome of this policy was that much of the subsidy was misdirected to richer households who could afford to purchase (and utilize) more of the subsidized fuels. This was compounded by the fact that there was no mechanism to control or filter the consumers who could or could not purchase the subsidized products at the supplier or retailer level. As a result, the energy subsidies benefited the poorer part of society far less than the richer part (Agustina et al. 2012; Dartanto 2013; Savatic 2016; Widodo et al. 2012). Dartanto (2013) and Agustina et al. (2012) revealed that under these policies nearly 30 percent of the government fuel subsidy distribution went to the richest 10 percent of the population and more than half of the subsidy went to the richest 30 percent.

Increasing consumption, price, and price volatility of fossil fuels created an enormous fiscal burden that drove the government to institute several reforms to its energy subsidy program.[vi] While improving energy access has featured prominently in the reform process, the key driver has always been reducing the fiscal pressure that energy subsidies put on government balance sheets.

> "… The main trigger for energy reform is subsidy burden, while aiming to widen the access of energy for people is just secondary impact…" (expert interviewee)

Historically, fuel price adjustments have been implemented under every government administration (see Figure 6 and 7). Moreover, since the Asian Financial Crisis in 1997 (also referred to as the IMF crisis) the government has made several attempts to cut fuel subsidy expenditures (see Dartanto 2013; Dartanto 2017; Perdana 2014; and Tumiwa et al. 2012 for a detailed explanation of the evolution of fuel subsidies in Indonesia). Reducing the amount of expenditure for energy subsidies has enabled the government to allocate the freed-up fiscal space for other social welfare programs. As discussed below, they have also attempted to protect poor households from the adverse impacts of reducing energy subsidies (Pradiptyo et al. 2016). Since 2005, the government has launched several social assistance programs, which better target poor people than the universal commodity-based fuel subsidies.

The revolution in Indonesia's energy subsidy reform has been to shift the type of subsidy system from a commodity-based subsidy to a person-based (targeted) subsidy. These reforms have been particularly instrumental in the case of reforms to electricity tariffs and in the kerosene-to-LPG program. Although driven by a motivation to ease fiscal pressure, this new subsidy policy system has also improved access to modern energy (better electricity and cleaner cooking fuel) for poor people in Indonesia. A key element of this reform implementation was Indonesia's new unified beneficiary database.

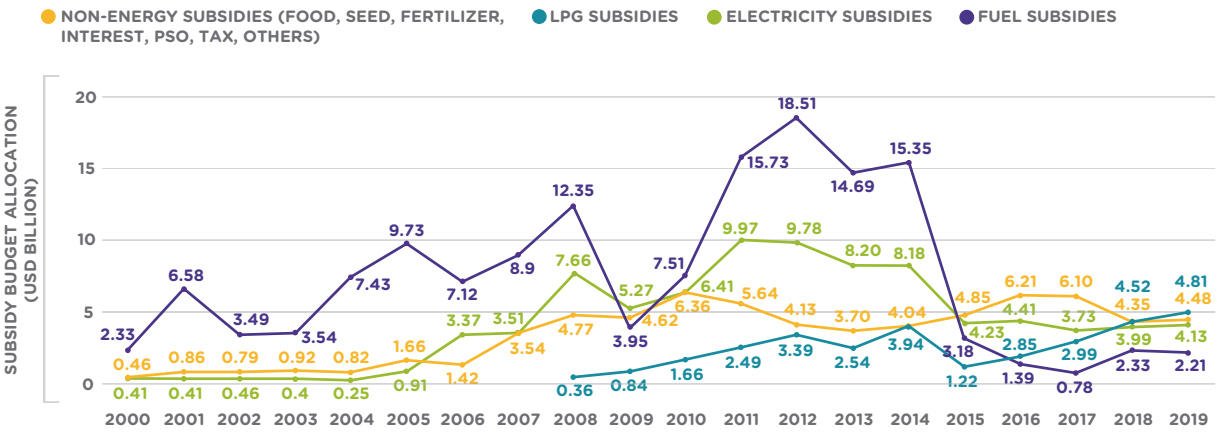
> "… To conduct a reform we need three things; the availability of data, the mechanism, and monitoring system. And right now we already have the first one [the 2015 BDT]…" (expert interviewee).

Unified Database System (Basis Data Terpadu or BDT)

The program of developing the Unified Database System (*Basis Data Terpadu* (BDT)) was initiated in 2005 under President Yudhoyono's administration. It was initially called *Pendataan Sosial Ekonomi* or

Figure 7

Government Expenditure on Energy and Non-Energy Subsidies during Different Administrations



Source: The Ministry of Finance, Indonesia, 2000–2019 (processed by authors)

PSE, which translates to Socio Economic Data Collection. However, the data were initially only used to identify eligible beneficiaries for (non-energy) social assistance programs. The BDT is a micro-level electronic database that is built from census data (from Statistics Indonesia (BPS)) and contains social, economic and demographic information that is linked to the names and addresses of respondents (TNP2K 2018a). These data are used to conduct the proxy means test (PMT) that classifies the poorest 40 percent of the population (25.7 million households as per the latest round). The PMT itself considers household characteristics and demographic indicators including employment, housing, asset ownership, education, health and social assistance membership information.

The BDT is administered by the Ministry of Social Welfare but involves a technical team that draws on expertise from several ministries, including the Ministry of Social Welfare, the Coordinating Ministry for Human Development and Cultural Affairs, the National Team for the Acceleration of Poverty Reduction (TNP2K), Statistics Indonesia (BPS), the Ministry of National Development Planning (*Bappenas*) and the Ministry of Home Affairs. The data have been updated several times since the BDT was launched, including in 2008 (when the name was changed to *Pendataan Program Perlindungan Sosial* or PPLS, which translates to Social Protection Program Database), in 2011, and most recently in 2015. The 2015 round of updates included upgrading the system and methodology and changing the name to BDT.

Figure 8 shows the data collection method for the 2015 BDT. The process started by making use of the initial PPLS 2011 data that combined several other sources of information such as village-level data from 2013–2014, data from other social protection programs, the unconditional cash transfer (UCT) database that had previously not been included in the BDT, validation and verification results from the Ministry of Social Welfare, and suggestions for inclusion from local governments. These data were then presented at a Public Consultation Forum (*Forum Konsultasi Publik* or FKP)[vii] as a temporary household database. This database was then used by Statistics Indonesia to identify which households should be included in a census questionnaire to create the 2015 BDT update. Once these updated data were collected, TNP2K carried out data analysis and developed the PMT model that yielded the 2015 BDT database. The various stages of the process are designed to address the inclusion and exclusion errors

BOX 1: TNP2K – The National Team for the Acceleration of Poverty Reduction

The National Team for the Acceleration of Poverty Reduction (*Tim Nasional Percepatan Penanggulangan Kemiskinan* (TNP2K)) was created to promote coordination across ministries and agencies to improve the implementation of poverty reduction programs, improve the living standards of the poor and vulnerable, and reduce inequality between income groups. It was established with Presidential Regulation Number 15 of 2010 and coordinates across sectors and stakeholders to reduce poverty at the national level, efforts that fall under the responsibility of the President of Indonesia. TNP2K is chaired by Indonesia's Vice President, and reports to the President. Its specific mandates are to: establish a national targeting system that contains a list of the names and addresses of social assistance beneficiaries, hereinafter referred to as BDT, and improve the efficiency and effectiveness of various poverty alleviation programs to reach beneficiaries. Evidence from research as well as data from the field makes coordination more efficient and based on common understanding.

in the BDT data. The next update to the BDT will involve local governments in the registration and verification of new and existing poor households in their respective regions.

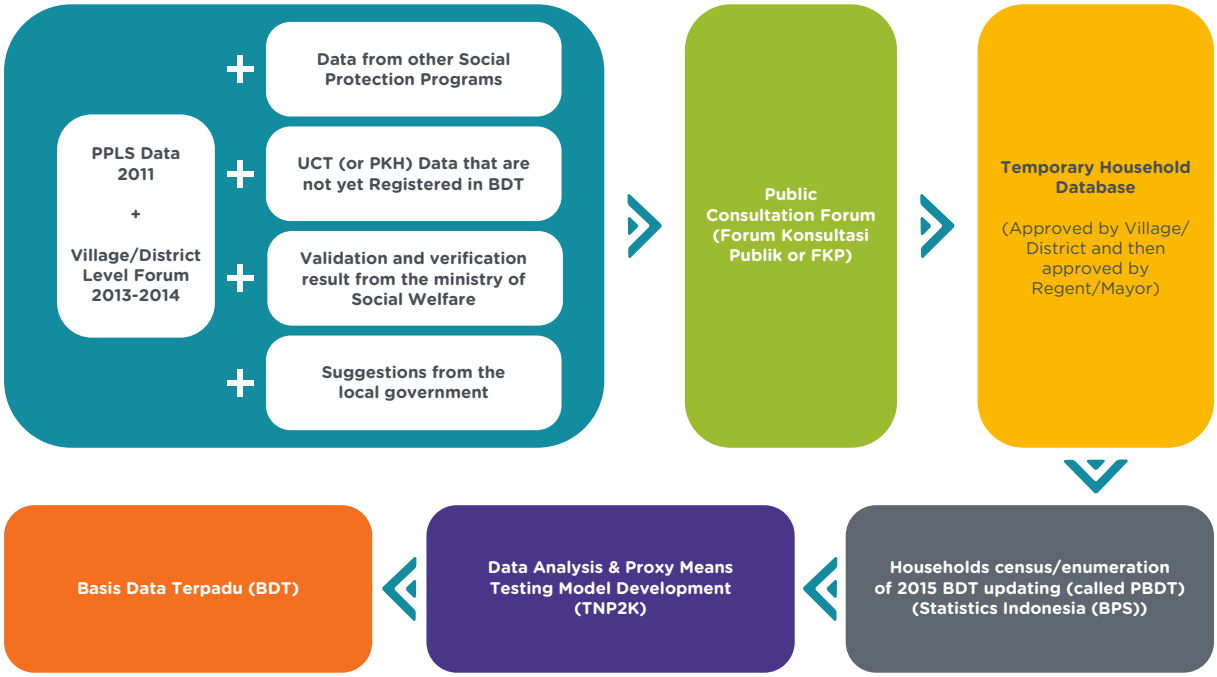
The BDT database has made the targeted subsidy system possible. However, it has not been updated since 2015 and the absence of current data could mean that some eligible poor households might not be included in the BDT dataset (Type I error: exclusion error), while others who are part of the BDT database might actually no longer be classified as poor (Type II error: inclusion error). In an attempt to overcome exclusion errors, one expert interviewee noted that a reporting system has been implemented that allows households to report their situation[viii] if they believe themselves to be eligible. The task force[ix] will then verify the reported cases and determine whether or not the household is eligible to receive the subsidy.

ENERGY REFORM TOWARDS A TARGETED-SUBSIDY SYSTEM FOR ELECTRICITY

Besides subsidizing petroleum fuels, the government also has a long history of providing commodity-based subsidies via below cost electricity tariffs. Generally, the electricity price in Indonesia, which is set by the government, varies by consumer group and sub-group (i.e. industry, business, residential and public services). Consumers are billed every month based on their usage. Regular consumers receive bills for their usage while prepaid users purchase electricity tokens upfront. Indonesia does not charge fixed costs, but regular consumers must pay a minimum tariff (see the following paragraph for an example). There is no minimum tariff for prepaid users. For both groups, the tariffs are typically higher for consumers with higher power connections, measured in volt-ampere (VA) (Burke & Kurniawati 2018). Usage is charged via increasing block tariff structures, in which consumers pay a higher marginal per-kilowatt hour (kWh) tariff at higher usage levels (see Table 3). Low-power consumers pay a lower tariff and the series of increasing block tariffs is set to make the lower levels of consumption more affordable. It is implicitly assumed that lower-power, lower-consumption households are more likely to be poor. However, other consumers may face a minimum monthly electricity bill, and this minimum price (standing monthly charge), in contrast to increasing block tariff, penalizes those who consume the least electricity.

Figure 8

BDT Data Collection Method 2015



Source: TNP2K 2018a

Table 2 shows that regular and prepaid users are charged different tariffs, even if they use the same amount of electricity. If, for example, a household with a 450 VA connection consumes 100 kWh in one month, then the utilization cost charged for that month for a regular user household is [30 kWh × IDR 169) + (30 kWh × IDR 360) + (40 kWh × IDR 495) = IDR 35,670, while a prepaid user household will be charged IDR 41,500 (100 kWh × IDR 415). A regular consumer household that uses only a small amount of electricity, however, say 25 kWh, still needs to pay the minimum utilization cost of IDR 11,000 (instead of 25 kWh × IDR 169 = IDR 4,225), while a prepaid consumer household has to pay IDR 10,375 (25 kWh × IDR 415). Thus, using a prepaid option in such cases of low kWh utilization can give cheaper utilization costs (for the same amount of electricity consumed) compared to the regular option.[x]

General electricity subsidies suffer similar problems to petroleum fuel subsidies. For example, the richer segments of the population are those who benefit from a larger portion of the electricity subsidy, since they can afford and utilize more electrical devices than the poor. Subsidization also leads to inefficient use of electricity that in turn creates unnecessary air pollution from electricity generation. In addition, subsidies reduce the economic incentive for the state-owned electricity company *Perusahaan Listrik Negara* (PT PLN) to expand its access to less-serviced areas where it is less likely to recover higher costs from even lower revenues (Burke et al. 2018). Over the years, national expenditure on electricity subsidies exerted an increasing amount of pressure on the state budget as both the demand and the cost of supplying electricity grew. This culminated in supply shortages and rolling blackouts, as illustrated in Figure 9 using a analysis of supply and demand. The large increase in demand of electricity due to subsidy provision shifted the electricity demand curve to the right, while the increasing marginal cost for PT PLN in providing this additional electricity demand shifted the supply curve to the left, creating the demand excess/ supply shortage. To return to equilibrium (point B in the graph) the price would have to increase (to

Table 2

Comparison of Monthly Electricity Charges for Different Levels of Consumption and Different Modes of Payment

Utilization Costs for 100 kWh charged by IBT Block	IDR 35,670 = (30 kWh × IDR 169) + (30 kWh × IDR 360) + (40 kWh × IDR 495)
Utilization Costs for 100 kWh if prepaid	IDR 41,500 = 100 kWh × IDR 415
Utilization Costs for 25 kWh charged by IBT Block	IDR 11,000 = minimum utilization cost
Utilization Costs for 25 kWh if prepaid	IDR 10,375 = 25 kWh × IDR 415

Source: Authors' analysis

P_{new}). Otherwise, if the price were maintained at the initial value ($P_{initial}$), demand (D_{new}) would still exceed supply (S_{new}). Correcting these market failures and investing in the electricity network resulted in the 81 hours without electricity due to rolling blackouts users suffered in 2008, falling to five hours per year by 2015 (Burke et al. 2018).

Figure 10 depicts the trend in government subsidy expenditure for electricity, and its share of total energy subsidy spending and the total government budget. The data indicate that government expenditure on electricity subsidy increased from USD 0.9 billion (IDR 8.9 trillion) in 2005 to USD 3.4 billion (IDR 30.4 trillion) in 2006 due to increasing oil prices. In part this increase reflects how dependent Indonesia's electricity generation is on fossil fuels and their prices in international markets. The level of electricity subsidy was also high during the period 2011–2014, although the percentage of total expenditure on energy subsidies was lower. From 2014, along with changes in international fuel prices, the reforms to electricity tariffs (discussed in the following paragraph) helped to almost half the electricity subsidy from USD 8.2 billion in 2014 to USD 4.2 billion in 2015.

Reform of electricity subsidies started in 2013, during the final years of the Yudhoyono presidency and the first years of the Widodo presidency, and was initiated by MEMR Regulation No. 30–2012. In 2013, the price of the basic electricity tariff was increased for both industrial customers and households. Other increases in electricity tariffs were implemented in 2014 and 2015. Not all tariff rates were affected by the electricity subsidy reforms; tariffs for consumers with connections of up to 900 VA, i.e. most households and small enterprises, remained unchanged from 2003 until around 2016. In addition, to make the tariffs accommodate changes in global macroeconomic factors, the government implemented a tariff adjustment policy, in which the basic electricity price varies every month depending on three main indicators: exchange rate (Indonesian Central Bank), inflation rate (Indonesian Statistics), and Indonesian crude price (ICP).

Table 3

Electricity Tariffs in Indonesia as of 2017 (after reform)

POWER LIMIT (VA)	REGULAR USERS					PREPAID USERS	
	MINIMUM MONTHLY TARIFF		Usage Cost (/kWh)				
	USD (2017 PPP)	IDR		USD (2017 PPP)	IDR	USD (2017 PPP)	IDR
Up to 450 (subsidized)	2.17	11,000	Block I: 0-3 0kWh	3.34	169	8.19	415
			Block II: 30-60 kWh	7.10	360		
			Block III: >60 kWh	9.77	495		
900 (subsidized)	4.34	22,000	Block I: 0-20 kWh	5.43	275	11.94	605
			Block II: 20-60 kWh	8.78	445		
			Block III: >60 kWh	9.77	495		
900 (unsubsidized)	= 40 × Power Limit (kVA) × Usage Cost (IDR/kWh)		All consumption levels	28.96	1,467.28	28.96	1,467.28
1,300							
2,200							
3,500-5,500							
6,600 and over							

Source: MEMR Regulation 28/2016 and 41/2017

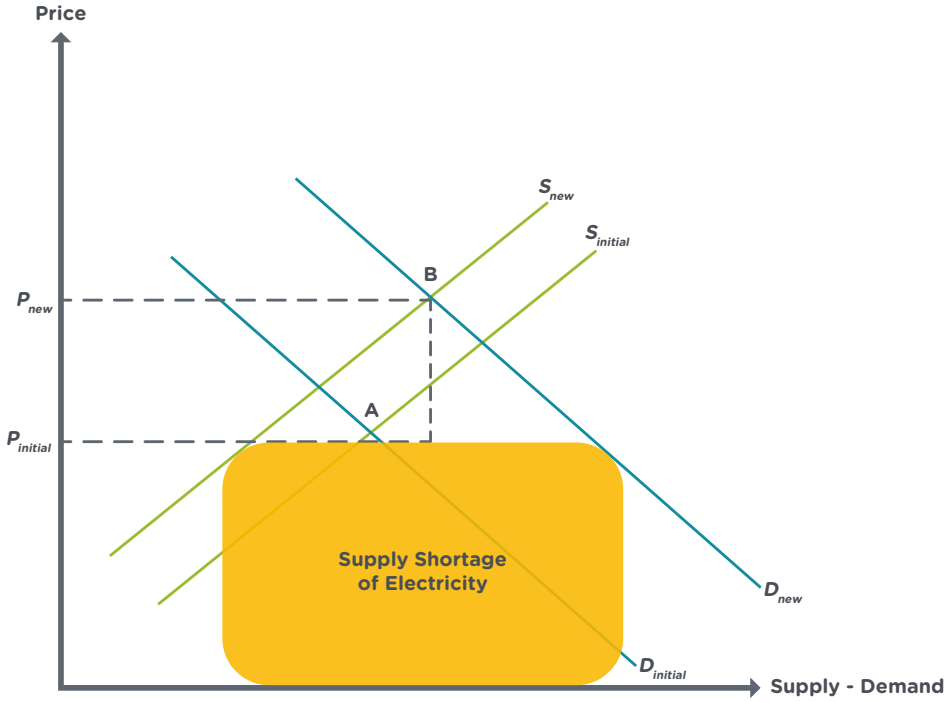
Unlike during some earlier energy reforms, there were no protests or major public opposition against these changes to electricity subsidies. This was because the poor were exempted from electricity price increases[xi] and because the government made reforms part of its election manifesto, conducting a savvy social media campaign that included campus briefings to student groups by officials from the MEMR (Burke et al. 2018).

Although the original electricity sector reforms reduced government spending, the subsidy remained passively targeted (via power connection and usage). Analysis of the 2015 BDT database illustrates why it was necessary to transition to active targeting. In 2015, 25.7 million households were considered poor and thus eligible to receive subsidized electricity. Of this total, 14.7 million households had a 450 VA connection, 4.1 million had a 900 VA connection, 0.4 million had a connection above 900 VA, 4.1 million households did not have an electricity meter, 0.8 million households used electricity that was not provided by PT PLN, and 1.6 million households did not have an electricity connection (TNP2K, 2018a, see Figure 11). This information indicates that not all poor households had a low power electricity connection (450 VA or 900 VA), which was a prerequisite for receiving the subsidy (i.e. a substantial exclusion error).

There was also a substantial inclusion error. Data from TNP2K show that in 2016, there were about 22.35 million households that utilized the PLN electricity with 900 VA connection and 22.8 million households with electricity connection of 450 VA (see Figure 11). Not all of these households are list-

Figure 9

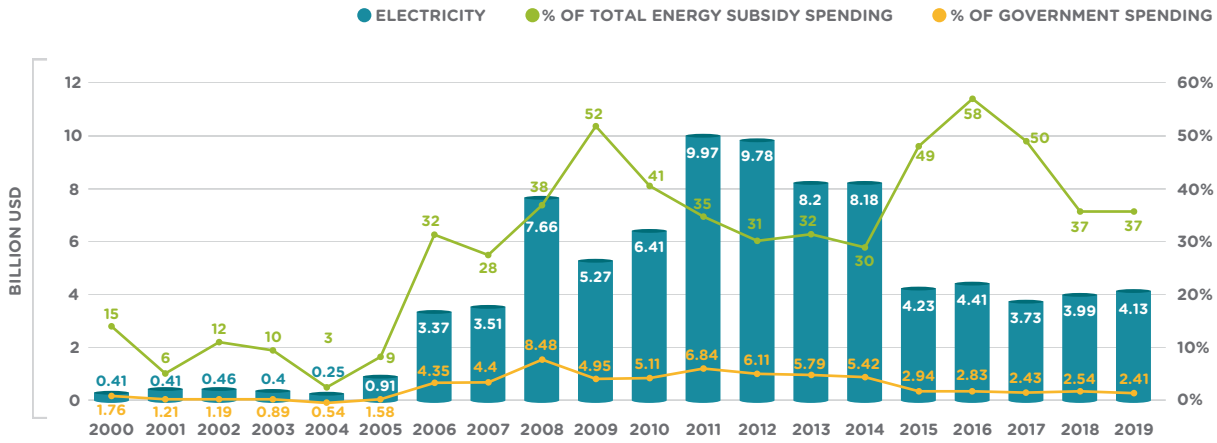
Simplified Economic Analysis of Supply Shortage of Electricity



Source: Authors' construction

Figure 10

Budget Allocation for Electricity Subsidies



Source: Ministry of Finance, Indonesia, State Budget Information (APBN), 2000–2019 (processed by authors)

ed in the BDT database, thus it appears that many would not have been eligible to receive electricity subsidies.

This evidence and the associated fiscal pressures drove the government to take action in reducing and better targeting expenditure for electricity subsidies. In early 2017, to reduce subsidy leakage to non-poor households and increase coverage among the poor, the scheme shifted to actively targeted subsidies that made use of the BDT database. The focus of the reform was firstly on reducing inclusion errors, i.e., revoking subsidies for PLN consumers with 450 VA and 900 VA connections that were non-poor. In

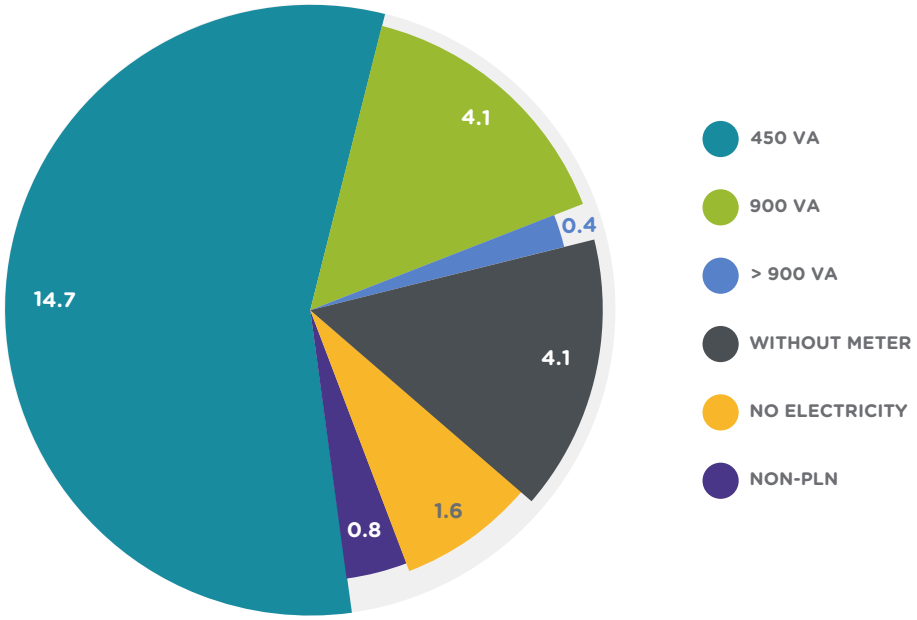
2015, electricity subsidy was mostly consumed by households using 450 VA and 900 VA, which was about IDR 49 trillion (87 percent of the total electricity subsidy)[xii]. The subsidies were first removed from 900 VA households, as they were considered to be better off welfare status than those with 450 VA connections. The rationalization was carried out by matching the PLN consumer database with that of the BDT; this combination of the two datasets was considered revolutionary for the energy sector.

Rationalizing the subsidy required visiting households to verify their current situation and determine their eligibility as subsidy beneficiaries. This was certainly not an easy task considering the geographical challenges in Indonesia. Interviews for this case study revealed that alongside the vital role that Jusuf Kalla, the Vice President, played in driving the reform forward, the state-owned electricity company, PT PLN, was also key to its progress. PT PLN voluntarily appointed itself to manage the validation of subsidy beneficiaries. This involved the company mobilizing its workers to visit the home of every consumer in its database who was registered to receive the subsidy, including those in remote areas. PT PLN employees then validated the data on their database and re-assessed whether the households were eligible to receive the subsidy (i.e. whether they qualified according to the measures used by the BDT).

The reform reduced the number of electricity subsidy beneficiaries with a 900 VA connection from 22.35 million households in 2016 to 4.1 million households by January 2017 (according to one expert interviewee). To soften the impact of losing the subsidies, the electricity tariffs for the 18.25 million excluded households were removed in stages. Thus, 33 percent of the subsidy was removed in December 2016 and January 2017 and the remaining 66 percent was removed in February and March 2017. For households with 450 VA connections, as of 2017, approximately 8 million of the 23.1 million beneficiaries were potentially ineligible (because they are not part of the poorest 40 percent based on the BDT database, see Figure 12). Yet, at the time of writing, no decision had been made at the presidential level to remove these ineligible consumers.

Figure 11

Number of Households in BDT Database by Electricity Connection (Millions)



Source: TNP2K 2018a and TNP2K 2018b

The subsidy reform better targeted electricity subsidies to consumers according to their welfare status, but this was only achieved by excluding the non-poor from the subsidy scheme. No direct changes were made to improve poor households' access to electricity through the reform. Nevertheless, poor households may have indirectly benefited from the reform because it freed up government revenue that was subsequently used to provide other (non-energy) pro-poor social assistance programs (see Table 1). Another indirect impact was that the removal of subsidies may have increased economic incentives for PT PLN to expand its electricity distribution networks.

ENERGY REFORM TOWARDS A TARGETED-SUBSIDY SYSTEM FOR LPG

Subsidies for Cleaner Cooking: From Biomass and Kerosene to LPG

Kerosene subsidies for industrial use were phased out in 2005, but they were retained in the domestic sector. In 2007, around 37 percent of households in Indonesia (nearly 21 million households) used kerosene as their primary cooking fuel (MEMR 2016 and BPS 2017). Faced with fiscal pressure due to high kerosene subsidies, the Government of Indonesia initiated a significant and well-known energy reform, based on Presidential Decree No. 104/2007, the kerosene-to-LPG-conversion program. Although the main driver of this conversion program was to reduce the fiscal burden, it also had several other aims. These were: to reduce dependence on kerosene; to reduce the misuse of subsidized kerosene; to improve the efficiency of the government budget; and to provide practical and clean fuel for households and micro-businesses (MEMR 2007).

The government chose to replace kerosene with LPG for several reasons. First, although the price per kilogram of LPG was 24 percent more expensive than kerosene at the time of the program launch in 2007 (IDR 7,966/USD 0.89/kg for LPG compared to IDR 5,570/USD 0.61/liter for kerosene), the use of LPG was still cheaper to subsidize due to its higher calorific value[xiii] (Thoday et al. 2018).[xiv] Secondly, LPG's supply chain elements (e.g. storage tanks and filling plants) were already in place and it was the 0

Figure 12

The Number of Households with 450 VA and 900 VA Connection in 2016 (in Millions)

Source: TNP2K 2018a and TNP2K 2018b

of the LPG system. These efforts appeared to be effective with the number of reported LPG accidents falling from 354 cases in December 2010 to 59 cases in May 2011 (Pertamina & WLPGA 2012).

The reform program was tremendously successful. By 2010, the initial target of converting 42 million households and microbusinesses nationally by 2012 had been achieved, less than six years since the reform started, Pertamina had distributed LPG kits to almost 54 million households and small-medium enterprises, which accounted for 93 percent of the target (Pertamina & WLPGA 2012).[xv] By 2014, more than 56 million packages had been distributed. One factor that supported the transition was that the government withdrew subsidized kerosene from Java and Bali from 2014, and from West Sumatera, Kalimantan and Sulawesi from 2015.[xvi]

Despite these impressive developments, subsidized kerosene continued to be available in some provinces in the eastern part of Indonesia such as East Nusa Tenggara, Maluku and West Papua (MEMR 2015). Even today, these areas remain without access to subsidized LPG. One source argued that this lack of access is due to a lack of LPG distribution infrastructure to these eastern provinces, in particular ports that can handle large-scale delivery. Other experts have suggested that the LPG conversion program has focused on ensuring cost-effective provision of LPGs, rather than prioritizing universal access. Thus, provinces such as Maluku and Papua do not have LPG available simply because it too costly to distribute it to these two provinces.

The benefits of this program were widely disseminated. The conversions were expected to improve health, lower pollution levels, and increase the availability of agricultural waste for soil enhancement (Smith et al. 2005). Several surveys were conducted by various parties to investigate the consumer's experience in using the 3 kg LPG units. The majority of households that had converted to LPG said that they now cook faster, have a cleaner kitchen, and have reduced their expenditure for cooking fuel by approximately 30 percent (Pertamina & WLPGA 2012). The program also created benefits through the establishment of new industrial facilities and creation of jobs within these facilities. On a broader scale, the conversion program likely led to a decrease in environmental pollution (both CO_2 and other air pollutants). A joint report from Pertamina and Greenworks Asia in 2008 showed that replacing approximately 6 million kiloliters of kerosene/year with LPG would reduce CO_2 emissions by 8.4 million tonnes per year (Pertamina & WLPGA 2012). On a national level, the reform also eliminated Indonesia's dependency on imported kerosene. In fact, since 2012, Pertamina has become a net exporter of kerosene, increasing government revenue (Pertamina & WLPGA 2012).

Reform of the LPG Subsidy

Since 2015, government spending on subsidizing LPG[xvii] has increased. However, a report from TNP2K (2018b) based on Susenas data from 2015 showed that the subsidy was inadequately targeted to the poor. Households using subsidized LPG that were in the poorest 30 percent of the population only accounted for 25 percent of the total number of households using subsidized LPG, and 65 percent of the subsidized households came from the richest 50 percent of the population. This imbalance was further exacerbated by usage of LPG, with the poorest 30 percent of the population spending on average 10 percent less than the richest 50 percent on LPG every month.[xviii]

The regressive nature of the subsidy and the fiscal burden it created pushed the government to begin a reform program to better target the 3 kg LPG subsidy to poor households.[xix] Similar to the electricity subsidy reform, this reform also utilizes the BDT database to determine the eligible beneficiaries. Unlike the reform in the electricity sector, however, energy reform in LPG from

commodity-subsidy to targeted-subsidy is still an on-going project. The paragraphs below describe the aim of the project and the outcomes of recent piloting schemes that aim to incorporate technology to help better target the LPG subsidy.

Based on the BDT database, there are 25.7 million households who are eligible to receive the subsidy for 3 kg LPG cylinders, however about 41 million households currently use 3 kg cylinders (and thus receive the subsidy) (TNP2K 2018b). A Presidential Decree called for the delivery of the LPG subsidy to be integrated with the subsidized food program (*Rastra*) under the Non-Cash Food Assistance Program (*Bantuan Pangan Non-Tunai* or BPNT). As of 2018, about 4.7 million BPNT cards had been distributed (TNP2K 2018b). One issue with integrating these programs is that there is not a complete overlap between their beneficiaries. *Rastra* targets the poorest 25 percent of the population (see Figures 13 and 14 and the accompanying text for further analysis of the interaction between energy subsidies and other social assistance programs in the BDT database), while subsidies for LPG are available to the poorest 40 percent of the population. Thus even if all the *Rasta* beneficiaries are converted to BPNT beneficiaries, accounting for 15.5 million households, a separate program will be required to deliver subsidies to the nearly 10 million non-BPNT households who are still considered to be poor.

TNP2K began piloting the targeted-subsidy program in late 2018 with 4,000 households across DKI Jakarta, North Sulawesi, North Sumatera and West Java. The aim was to distribute the subsidy to the beneficiaries in two cycles (TNP2K 2018b). In each cycle, a fixed benefit level was provided based on average usage (a monthly value of USD 3.14/IDR 45,000, which assumed consumption of three 3 kg LPG cylinders/month). The pilot was conducted in several stages:

1) Identifying beneficiaries from the BDT
2) Sending an invitation letter to potential beneficiaries to attend a village-level socialization meeting facilitated by the TNP2K team
3) Verifying and registering beneficiary households with support from village-level officials. This included registering beneficiaries' mobile phone numbers and opening a bank account for those who did not have one
4) Delivering the subsidy to beneficiaries' bank accounts
5) Beneficiaries' using the subsidy to purchase LPG via approved distributors/merchants.

A second stage of pilots began in 2019. These pilots are similar to those carried out previously, i.e., a monthly subsidy of USD 3.14 (IDR 45,000) is provided to verified[xx] eligible households, but a more advanced banking and electronic transaction system (Fintech) is used to distribute it. The most recent pilots deliver the subsidy via e-vouchers for 3 kg LPG cylinders to beneficiaries' e-wallets through banks or their partners (i.e. a near-cash transfer). Beneficiaries can then use the e-voucher to purchase a 3 kg LPG cylinder at the subsidized price using a dedicated transaction application that is available at TNP2K-appointed LPG merchants who have been provided with the beneficiaries' records in advance.[xxi] The merchants can then verify the beneficiary using a mobile phone text messaging system, national ID verification system, or biometric data. In the case of merchants with biometric equipment, the beneficiaries do not even need to bring their identification card; their photos and fingerprint[xxii] will be taken by the merchant and automatically verified by the system.[xxiii] Thus, the FinTech system not only makes the verification process easier but it also helps the merchants and TNP2K to monitor the purchase histories of the beneficiaries more easily.

Once verified by the merchant, beneficiaries can then purchase their LPG. If beneficiaries purchase more than three cylinders of LPG in the first month, it will reduce the amount of LPG that can be purchased in the next month, i.e. in the second month, they only have a quota of two

cylinders.[xxiv] The actual market price for a 3 kg cylinder is about USD 2.10 (IDR 30,000). Thus, in this case the subsidy covers half of the cost, and beneficiaries pay USD 1.05 (IDR 15,000) per cylinder with the remainder paid directly by TNP2K to the appointed merchants.

During a field visit for this case study to one of the piloted areas in Tangerang, Banten, it was found that the pilot program had been successful and well received by the society there. Moreover, it was found that the role of village officials is vital, especially in helping the TNP2K team to verify whether a potential beneficiary household's current condition merits inclusion on the BDT list. The socialization meeting run by the TNP2K team also plays an important role in delivering information and building understanding within the society about the program.

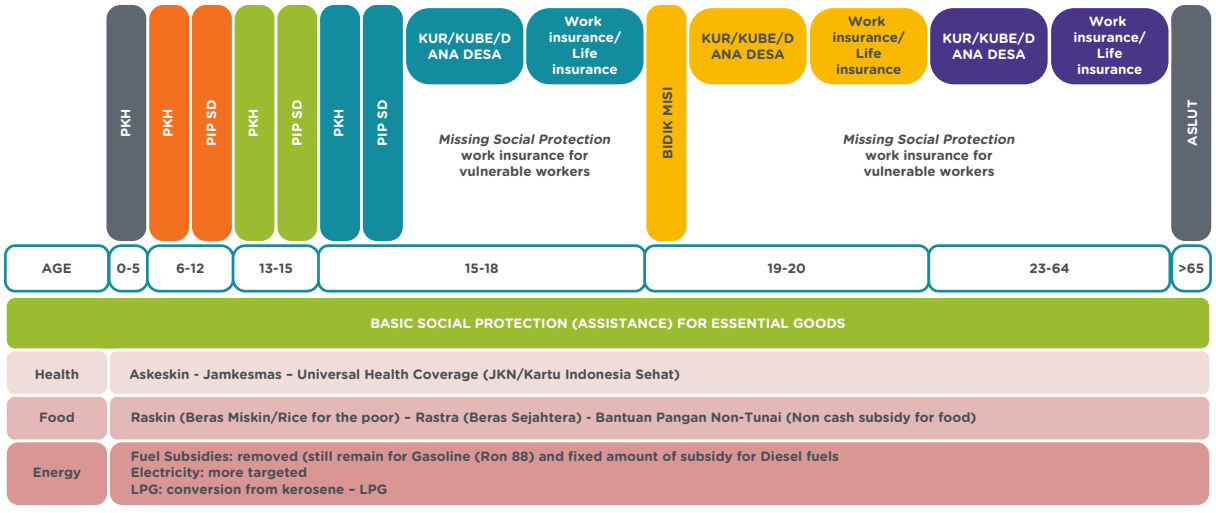
There are, however, some challenges that the team found from the visit. These include:

- Poor households excluded from the BDT database cannot receive the subsidy.
- The scheme does not account for the travelling costs, both in terms of money and time, that beneficiaries have to bear to purchase the LPG. In the area that the team visited, it was fortunate that the appointed merchant was located within the same village and near the beneficiaries' residential area. The story might have been different if the appointed merchant had been located far from the beneficiaries' homes, which would increase travelling costs if the number of appointed merchants were fewer than the number who currently offer LPG sales.
- The purchase of LPG has to be made directly by the registered beneficiary, usually the head of household or the spouse of the head of household. In other words, the purchase cannot be deferred to another member of the household, since the verification at the merchant or supplier level has to be done by showing the beneficiary's identification card or taking the registered beneficiary's fingerprint in the case of a merchant using a biometric system.

Another broader issue is that despite the support provided by the scheme, some households stack

Figure 13

Social Welfare Programs in Indonesia



Source: Author's compilation

their cooking fuels, e.g., they use both LPG and wood, instead of relying entirely on LPG. Respondents maintain that for some, especially the older generations, it is a habit to cook with wood, and they may feel more comfortable cooking with wood rather than LPG. Overcoming fuel stacking will continue to be an issue as the government has neither a way of monitoring it, nor a mechanism to prevent it.

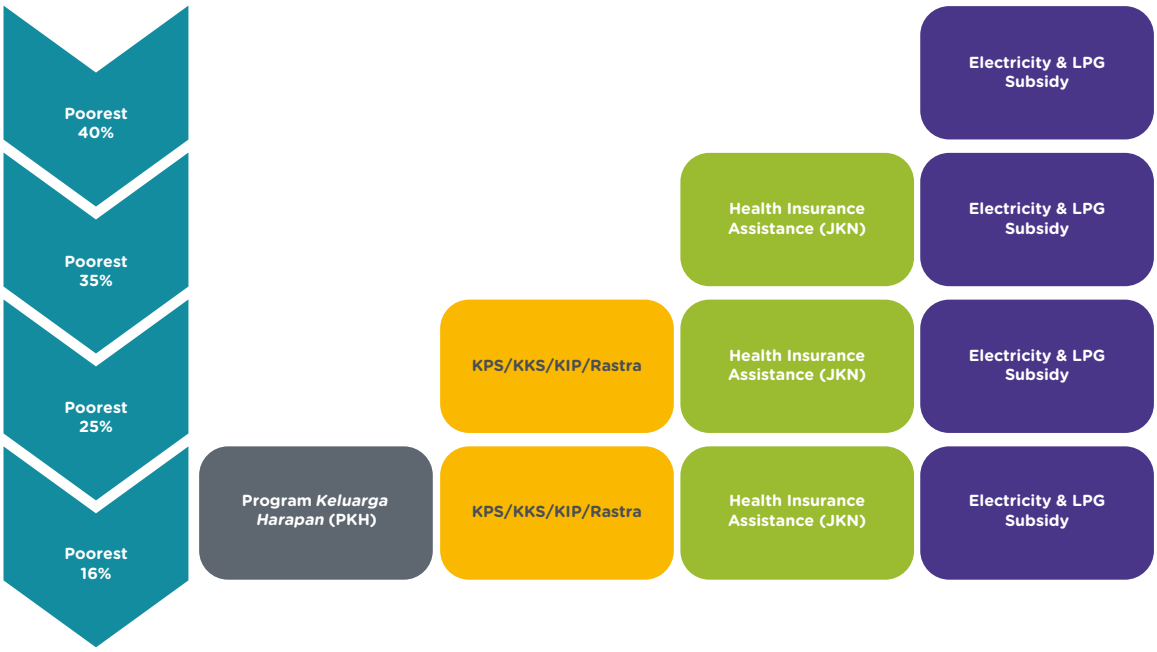
Nevertheless, the pilot for LPG targeted-subsidy reform shows promising results for future implementation of the targeted-subsidy program. At the time of writing, the pilot programs of LPG targeted-subsidy reform had only been carried out in a few specific regions and had not yet reached the national level. It is important to highlight that this program does not alter the unequal access to LPG across Indonesia and the provinces of Maluku and Papua, in the eastern part of the country, still have not converted to LPG from kerosene.

ENERGY SAFETY NETS AS PART OF INDONESIA'S SOCIAL WELFARE PROGRAM

As previously mentioned, in order to offset the adverse impacts of energy subsidy reforms, the Government of Indonesia launched several social assistance programs that better target poor people and households. To compensate for the fuel subsidy cut in 2005, for example, the government introduced four social assistance policies, namely the Unconditional Cash Transfer (*Bantuan Langsung Tunai* (BLT)), School Operational Assistance (*Bantuan Operasional Sekolah* (BOS)), Healthcare for the Poor (*Jaminan Kesehatan Masyarakat* or *Jamkesmas*), and the Rural Infrastructure Support Project (see Table 1). These and pre-existing social assistance measures have some crossover with ESNs. For example, people who are eligible for subsidized rice (*Rastra* BPNT), educational assistance in the form of the Indone-

Figure 14

BDT Database Utilization for Social Assistance Programs



Source: TNP2K 2018a

sia smart card (*Program Indonesia Pintar* or PIP SD/SMP/SMA), a health card (*Jaminan Kesehatan Nasional* (JKN)), bank credit programs (KUR/KUBE/DANA DESA) and social assistance for older persons (*Asistensi Sosial Usia Lanjut* (ASLUT)), are also eligible for subsidized LPG and electricity. Figure 13 shows a general mapping by age group of social welfare programs in Indonesia.

One area of complementarity is that since the ground-breaking program in 2005 to develop the BDT, it has been used to determine the eligibility of beneficiaries for social assistance programs as well as targeted energy subsidies. However, as Figure 14 illustrates, different programs use the BDT to set different eligibility thresholds. For example, only the poorest 35 percent of households are eligible for health insurance assistance, while the poorest 40 percent are eligible for subsidized energy. This higher threshold for the provision of subsidized energy means that all households that are eligible for other social welfare programs, are automatically also eligible to receive subsidies for electricity and LPG.

Tohari et al. (2019) demonstrate empirically that the use of the BDT as a targeting instrument shows a clear positive complementary effect between energy and non-energy safety nets. On average, the expenditure of a household that receives all complementary programs is at least 30 percent higher than an equivalent household that does not receive any support. This finding emphasizes the usefulness of BDT as a unifying targeting mechanism of social protection in Indonesia.

EVIDENCE OF THE IMPACT OF REFORMS ON ACCESS TO ENERGY: SECONDARY DATA ANALYSIS

This section presents the evidence on access to electricity and clean cooking technologies in Indonesia. Cross-sectional data of household connections to these energy sources over time is based on the Susenas. An analysis of electricity utilization then complements the analysis of households with an electricity connection. Qualitative information from in-depth interviews and FGDs is used to assess the quality of household energy access and to explain why the quantitative data fail to capture some cases where households lack access. The case study focuses on the period of reform in the sectors. It takes the reference year as 2007–the year that the LPG conversion program took place–and uses data from the 2017 survey as the most up-to-date information.

ELECTRICITY ACCESS AMONG INDONESIAN HOUSEHOLDS

To assess households' access to electricity, this case study uses the question in the Susenas about a household's source of lighting. Responses are grouped into electricity from PLN, electricity from other sources, and no electricity. Other sources, in the Indonesian context, include private companies, cooperatives, local government, and other community schemes (Sambodo and Novandra 2019). The case study categorizes the households into five quintiles of expenditure per capita to reflect their income level in the analysis. The first quintile is the lowest income group, and the fifth quintile is the highest one.

Figure 15 shows the increase in households with an electricity connection during the decade from 2007. Not only has the number of households without electricity declined, but the number of households connected with (better quality) PLN connections has increased. Encouragingly, the largest increase in connections was in the lowest income quintile. In 2007, around 80 percent of the population in the lowest income group already had access to electricity, either from PLN or from non-PLN sources. Over the decade, there was around a 20 percent increase in the proportion of households within the lowest income group that had a PLN connection. Combined with the increase in use of electricity for lighting (Figure 16), the increase in the number of PLN connections suggests that government efforts have been broadly successful in supporting households' migration toward the use of electricity.

However, Figure 16 also shows the disparity in access to electricity by province and income level. The figure explains two important facts about the progress and its subnational variation. First, at the national level, the Susenas calculation shows that the electrification rate increased from 81 percent in 2007 to 95 percent in 2017 and closed a large portion of Indonesia's electricity access gap. This figure also shows large improvements in provinces located outside of Java. The lowest rates of access to electricity are in Papua, with around 50 percent of households using electricity to light their homes. The region's large, landlocked, mountainous terrain and its low population density contribute to it having the lowest electrification rate in the country (Innah et al. 2017).

The variation in household connectivity by geography and income level reflects both the physical availability of supply, and households' economic ability to access electricity. As an archipelagic nation, one compelling challenge is how to provide universal access to electricity in the small islands and remote areas. This issue is clearly shown by the fact that the provinces that are lagging behind (eastern part) and remote regions (small islands) are where access rates are the slowest to progress (see Figure 16 and Sambodo and Novandra 2019). The government has passed policies to encourage private investment both for electricity generation and rural electrification over the past few years, but interest remains low due to demand being insufficient to yield economic returns in the small islands (Kirari et al. 2018).

Although the gap in the access rate between income levels has narrowed over the past decade, access rates for the first quintile group remain the

lowest. This suggests that this group continues to be marginalized in terms of access to electricity in general on a national scale. Subnationally, Figure 16 also shows that some middle quintile groups in regions such as Papua and West Nusa Tenggara also exhibit low connection rates. Both groups deserve attention in policies designed to refine the coverage of social assistance programs (where connections are physically available) and to promote infrastructure development (where they are not). Providing the economic means for access through social assistance should be accompanied by expanding supply in these regions. To promote sustainable energy development, the government needs to dedicate more substantial resources to both existing and new renewable energy projects and initiatives in these specific regions (Innah et al. 2017).

Qualitative information suggests that the quality of access to electricity also varies across Indonesia. Blackouts and temporary interruptions pose significant challenges for realizing the gains that electricity access can bring, such as supporting night-time activities and boosting productivity and the quality of work during the day. Sambodo (2016) shows that, despite its high rate of household connections, the province of West Java still experiences rolling blackouts. Outside Java, (i.e., affecting 57 percent of the population) the situation is even more dire, and these regions are described as having "power crises".

Figure 15

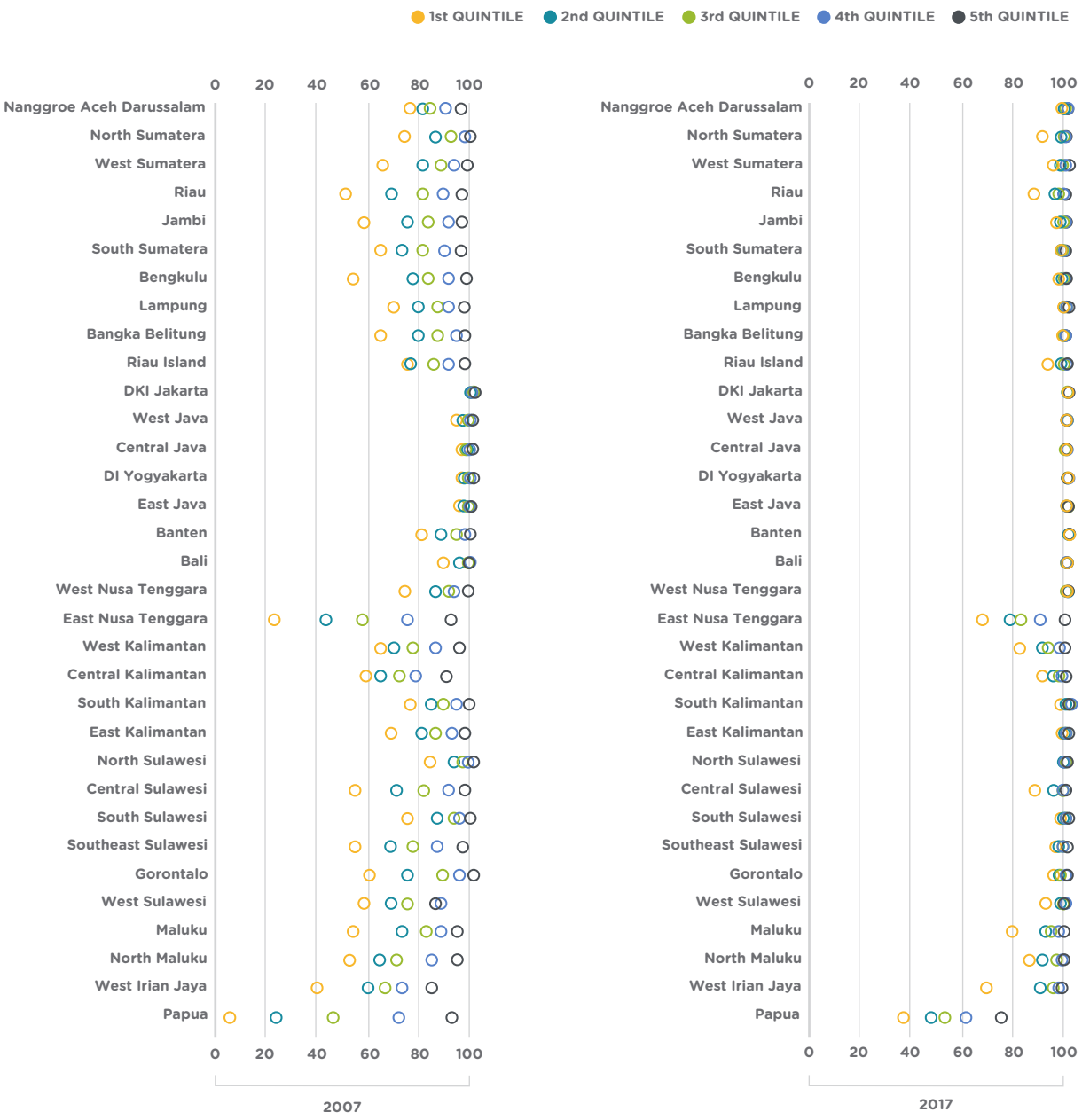
Type of Electricity Used among Households in Indonesia, 2007

Note: The numbers in the table are total sample by quintile and by year.

Source: Susenas 2007 (processed by authors)

Figure 16

Percentage of Households with Electricity as a Source of Lightning (including PLN and Non-PLN[xxv])



Source: Susenas 2007 and 2017 (processed by authors)

Low-quality electricity services are also experienced by some households with non-PLN connections. For these connections, service quality can fluctuate owing to the small scale of generation and its dependence on fuel sourced from other regions. Recent work has suggested that these connections constitute 7 percent of the total share of households with electricity access (Burke et al. 2018), which is close to the 5.5 percent figure derived here from the 2017 Susenas. In absolute terms, this is a considerable number of households that utilize low-quality electricity connections.

An analysis of connections of the first quintile group (Q1 households) by their degree of remoteness might help us to better understand some of the points raised above and suggest ways that policy could be enhanced to more effectively enable very poor people to access modern energy services. Figure 17 provides a scatter plot portraying the relationship between the percentage of Q1 households with electricity connections and the number of islands in each province (a proxy for remoteness). This case study considers that the more islands a province has, the greater the likelihood that each island is small with few inhabitants, and that each household will be geographically remote. Results of this analysis show clearly that geographical access for small islands is key to providing universal energy access in Indonesia. The persistence of the negative correlation between the household connection rate and the number of islands suggests the importance of considering how to best support households on a territorial basis. The top priority sub-population should be the lowest income group in remote places, as represented by people living in the small islands, currently the furthest behind in terms of access to an electricity connection. Central and local governments may need to consider alternative strategies, such as special rural electrification projects, ideally sourced by locally available renewable resources, to provide access to these communities.

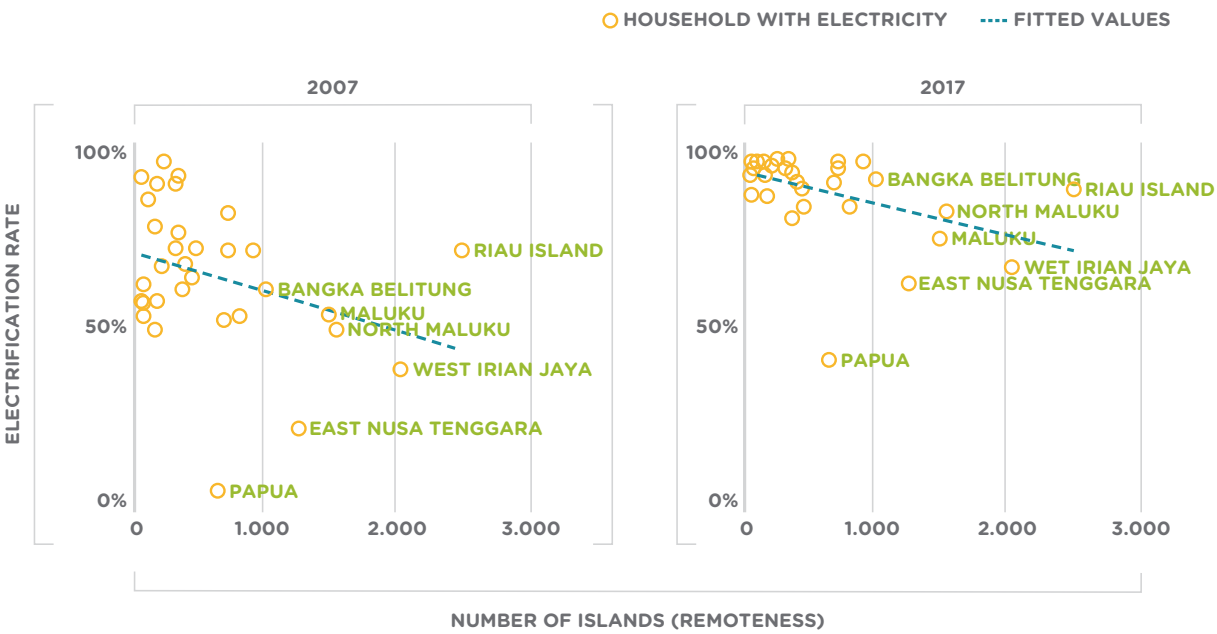
PRIMARY ENERGY FOR COOKING AMONG INDONESIAN HOUSEHOLDS

Substantial but uneven progress in providing access to LPG

As outlined in earlier sections, Indonesia's progress at a national level toward access to modern energy sources for cooking has been notable; the percentage of households with access to LPG increased dramatically from 2007 to 2017. In 2007, kerosene

Figure 17

Correlation between Percentage of Q1 Households with an Electricity Connection in a Province and its Remoteness (Number of Islands)



Note: Each dot represents data for one province.

Source: Susenas 2007 and 2017 and Statistic Indonesia 2014 (processed by authors)

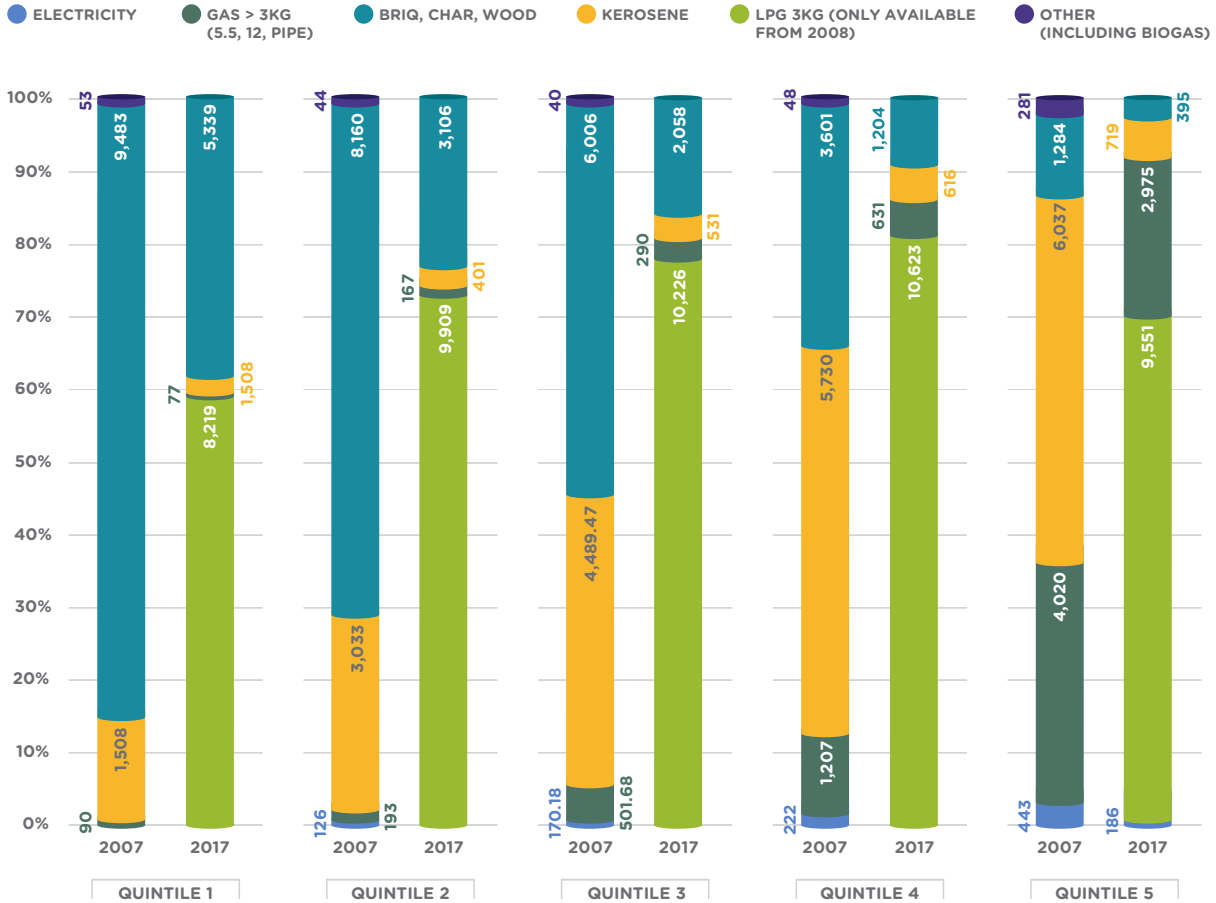
and wood were the two most popular energy sources for cooking among Indonesian households in all income group categories (see Figure 18). This pattern, however, shifted within just a decade to see LPG as the main choice for most households. The 2007 kerosene-to-LPG conversion program and the subsequent increase in the kerosene price in 2008 seem to have successfully shifted the cooking habits of the general population.

Nonetheless, a minority of the population continue to use outmoded energy sources (briquettes, charcoal, wood) as a primary source of cooking, particularly lower-income groups. Inequality in access persists across income groups. As can be seen from the graph below, in 2017 more than 80 percent of households in the top three income quintiles used 3 kg LPG or piped gas, a figure that falls to 60 percent for the lowest income quintile.

As for disparities among regions, unlike the initial level for electricity access, the data show that access rates to modern sources of cooking energy[xxvi] were relatively low for all provinces in 2007. This was especially the case for the lower income groups, but even in the wealthiest quintile, the average rate of access to clean cooking technologies was no more than 25 percent. Significant progress has occurred since then and the national average reached 62 percent in 2017. This impressive improvement, however, varies across regions, with access rates in the provinces of Maluku and Papua. Strikingly, the average rate of the household access to modern energy for cooking in these provinces is only about 1 percent (Figure 19).

Figure 18

Primary Energy Source for Cooking among Households in Indonesia, by Income Quintile in 2007 and 2017



Note: The numbers above represent number of households (in thousands)

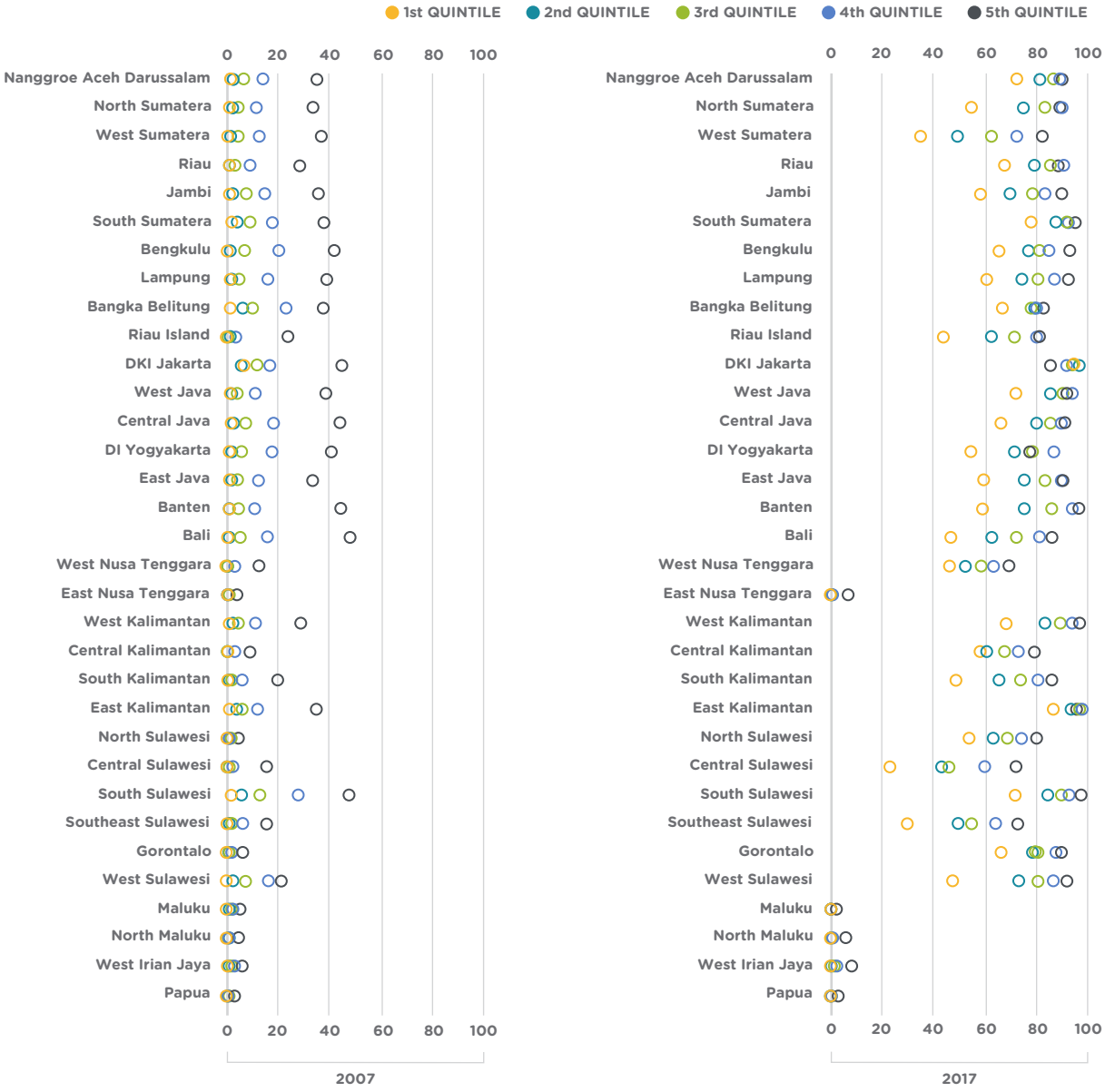
Source: Susenas 2007 (processed by authors)

A lack of enabling infrastructure is hampering universal access to clean cooking fuels

In one of the FGDs, a representative from Pertamina, revealed that the real impediment to providing supply in provinces that lack access to LPG is the lack of seaport infrastructure. Pertamina only has 3,111 distribution terminals that can handle LPG across the 7,058 Indonesian sub-districts (*kecamatan*), i.e., its coverage is only about 44 percent. Although sub-districts without adequate terminals can access LPG through neighbouring sub-districts that have an LPG-appropriate terminal, the con-

Figure 19

Percentage of Households with Access to Modern Sources of Cooking Energy (including LPG, piped gas, Electricity and Biogas) by Province and Income Group in 2007 and 2017



Source: Susenas 2007 and 2017 (processed by authors)

sequence of this is a delay in delivery times and a higher retail price. The weaker aspects of the supply chain (i.e., more uneven distribution) are in the eastern part of Indonesia, including Maluku and Papua provinces. The underlying problems associated with islands' remoteness and difficulties with physical access yield similar challenges to those posed to providing universal access to electricity (see above). Essentially, high upfront costs and low demand from a low-density population make it uneconomic to invest in the infrastructure required to provide energy access to electricity (a grid or seaport distribution and roads for electricity and LPG, respectively).

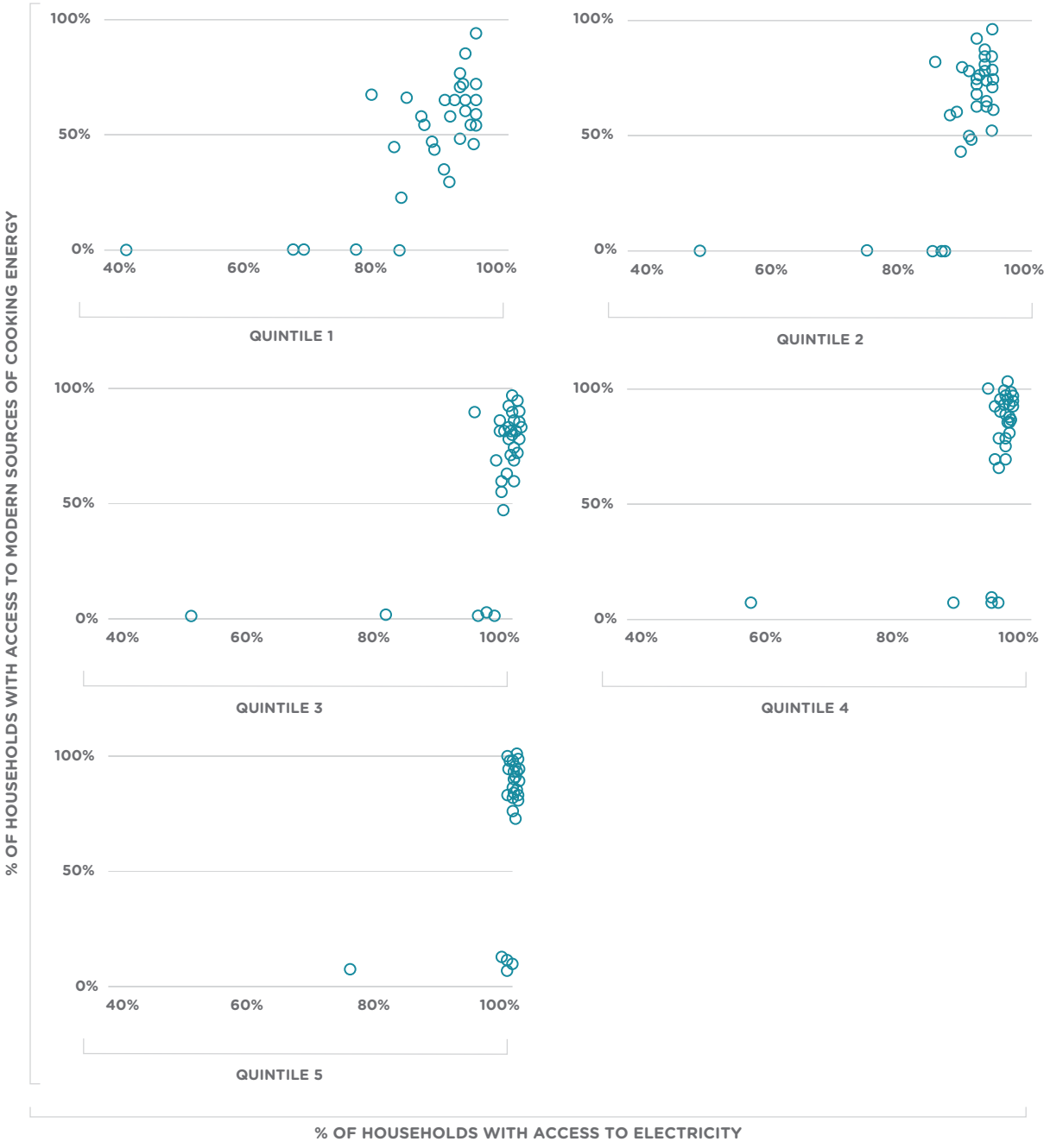
Special non-profit oriented investments will be required to overcome these issues. Collaboration between the private and public sectors for public infrastructure financing is feasible in Indonesia, but this still requires strong economic incentives (it is not enough for local government to issue permits to developers). Alternatively, promoting renewable energy and making use of locally sourced clean cooking alternatives to LPG may be the best way to promote energy access in these regions.

Behavior remains a key constraint to universal adoption of cleaner cooking technologies

In addition to cost and availability of LPG, the willingness of households to change behavior is a key determinant of whether they will shift to cleaner cooking fuels. During one of the FGDs, speakers from the National Planning Agency (*Bappenas*) and the Agency for Assessment and Application of Technology (*Badan Pengkajian Dan Penerapan Teknologi* (BBPT)) emphasized the importance of energy literacy among households and the adaptability of the individual technologies related to modern sources of energy. *Susenas* data suggests that there

Figure 20

Relationship Between Households with Access to Electricity and to Modern Sources of Cooking Energy, by Province and by Income Group



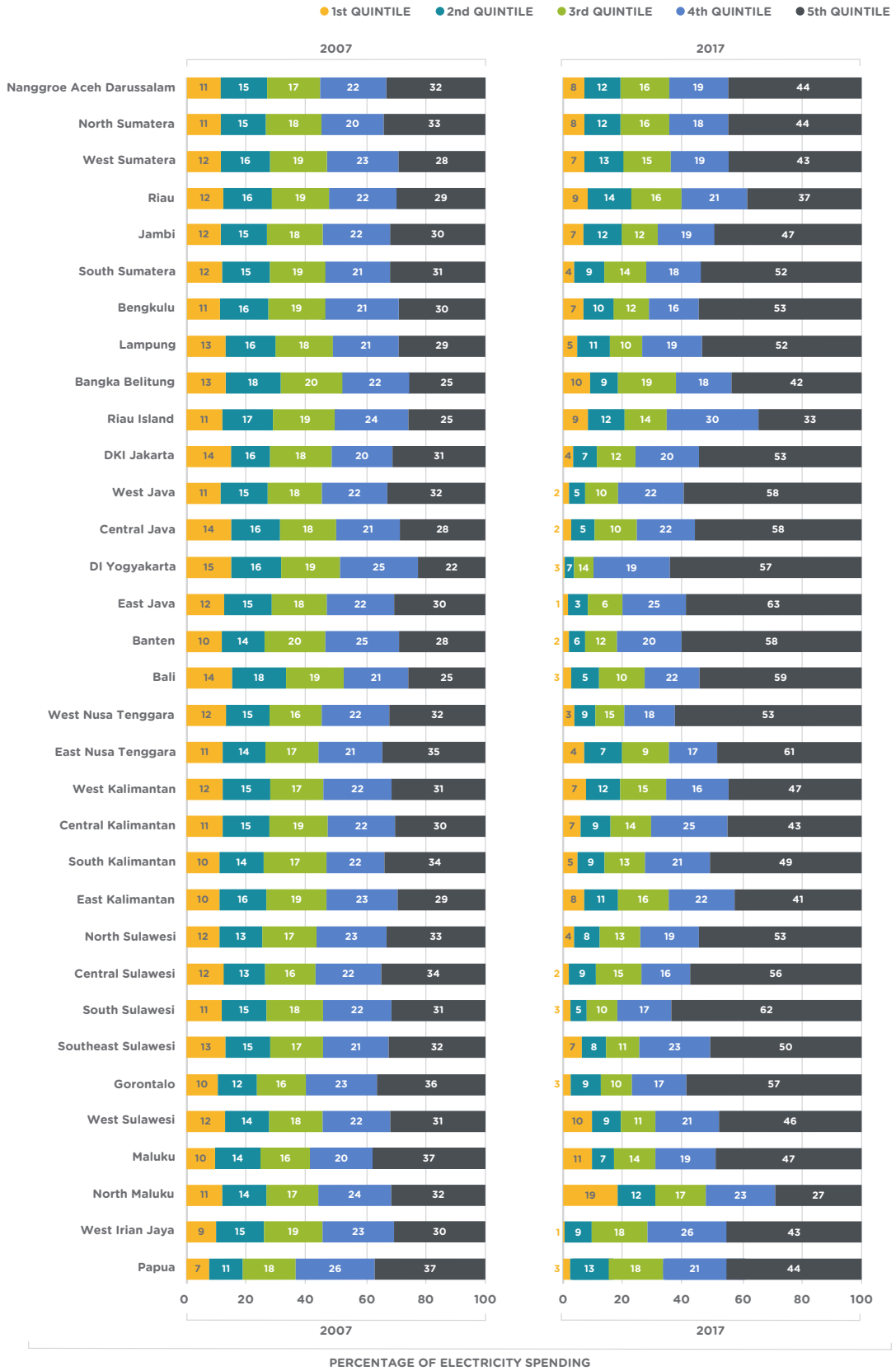
Note: Each dot represents data for one province

Source: Susenas 2017 (processed by authors)

is no universal relationship between the access rates for electricity and LPG (Figure 20). Provinces with a very low percentage of households who have access to LPG are distributed across a wide range of electrification rates. However, in general, the figure also shows a promising correlation between high rates of access to electricity and to LPG. These two trends (a general increase in clean cooking rates with electricity access rates, and the persistently low access to LPG for cooking in some provinces despite access to electricity) could suggest differences in energy-literacy levels.

Figure 21

Intra-Province Share of Electricity Spending, by Quintile in 2007 and 2017



Note: Figures may not sum to 100 due to rounding.

Source: Susenas 2007 and 2017 (processed by authors)

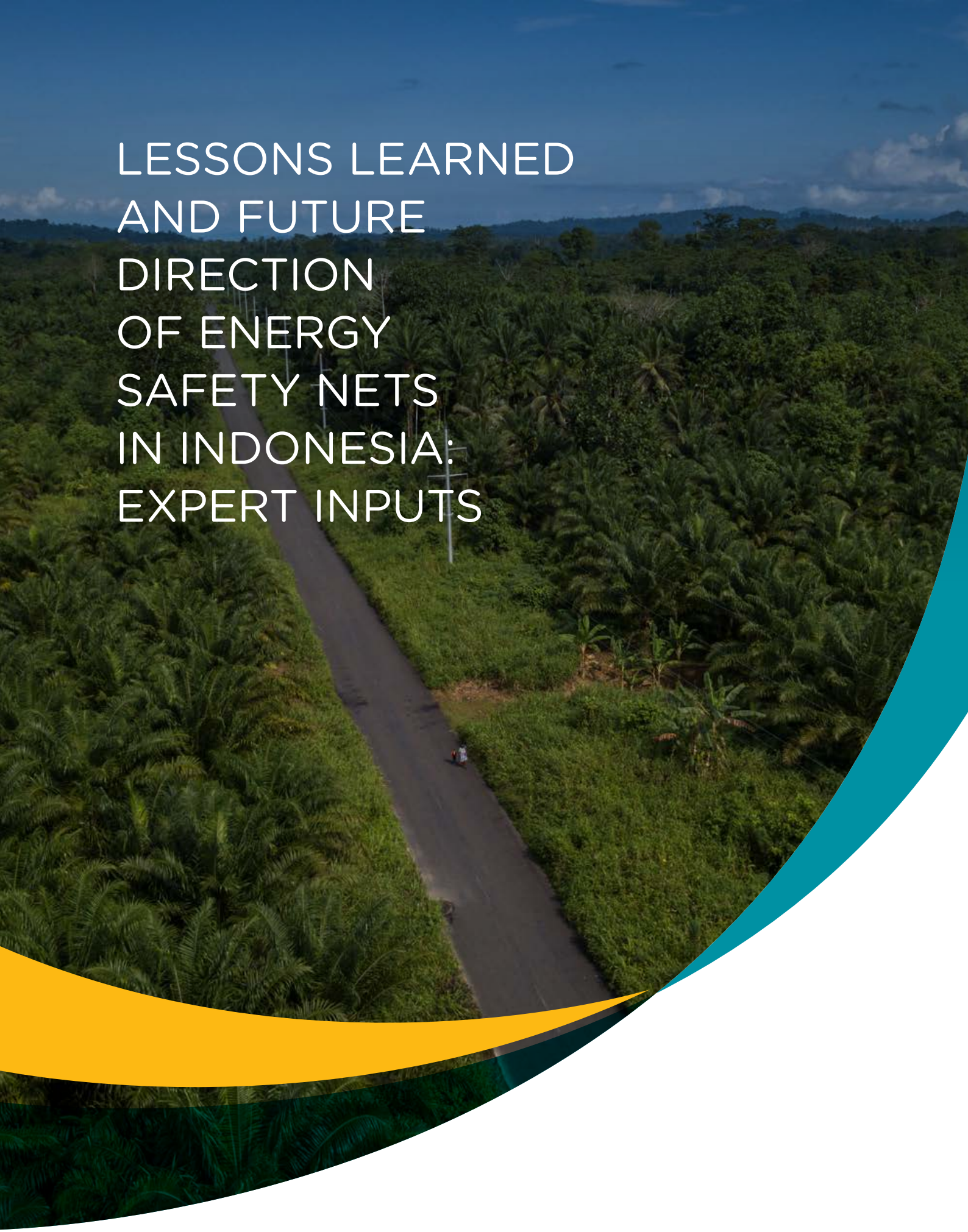
ENERGY CONSUMPTION

This section builds on the analysis of whether households have physical connections to modern energy sources, and concerns the utilization dimension, which depends on a broader set of factors than energy infrastructure.

The experts in the second FGD provided detailed information on how a household's income level shapes consumption of modern energy services and made use of the concept of energy poverty in their analysis. Energy poverty is defined by comparing the consumption level in absolute volumetric terms (e.g. kWh of electricity or kg of LPG) or relative financial terms (e.g. percentage of total household expenditure) with a certain threshold or a benchmark level. One of the experts noted that in terms of volume, energy poverty in Indonesia has decreased, but that the measure using household spending is relatively constant. Sambodo and Novandra (2019) show how these values vary across the population. They define energy poverty as households that consume less than 32.4 kWh per month of electricity (volume standard) and households that spend 10 percent or more of their total expenditure on energy (financial standard). They find that the energy poverty rate measured using the volume standard ranges from 48 percent (first decile) to 2 percent (tenth decile) whereas the rate is relatively constant, at an average of 53 percent, by the spending standard.

The data exposition on consumption in Figure 21 echoes the profile of energy poverty with volume standard reported by Sambodo and Novandra (2019). Figure 21 presents the proportion of total electricity consumption (expenditure) by quintile within each province in 2007 and 2017.[xxvii] In contrast to the narrowing gap between income levels over the 10 years observed for households with electricity connections, the gap between how much the different quintiles consume has widened. The per-quintile share of total electricity consumption was fairly even in 2007, but in 2017 this was dominated by the fifth quintile, constituting more than half of total consumption for most of the provinces. The proportion consumed by the other quintiles, especially the lowest-income group, has shrunk correspondingly. The high share of electricity consumption among the wealthiest occurs not only in highly developed areas like Central Java, but also in less-developed provinces like Nusa Tenggara and Sumatra. This pattern indicates that despite the electricity tariff reform being enacted to make the wealthier parts of society pay more for electricity than the poorer segments, consumption by wealthy households has grown much faster than that of poor households.

Comparing Figures 17 and 21, the case study can conclude that providing connections to poor households and subsidizing electricity use have not been able to close the usage gap between poor and rich segments of society. The tiny share of the lowest-income group's usage of electricity suggests that a more progressive advocacy policy is needed to increase their electricity usage, especially as this may play a significant role in helping them escape from poverty.



LESSONS LEARNED AND FUTURE DIRECTION OF ENERGY SAFETY NETS IN INDONESIA: EXPERT INPUTS

This section summarizes eight key messages and lessons learned regarding the extent to which ESNs have reached the poor and marginalized subpopulation.

Three factors are key to the successful functioning of ESNs: the availability of data to permit targeting, a mechanism to deliver support, and a monitoring system.

To reform its electricity and LPG policies while ensuring access to modern energy sources for all, the Government of Indonesia has attempted to change the subsidy delivery mechanism from one based on subsidizing the commodity to one that is targeted to support the consumer. The in-depth interviews and FGDs identified three factors that have enabled the government to enact the policy changes. The first was the availability of detailed and accessible beneficiary data, sourced from the BDT. For the 2017 electricity reform, one interviewee noted that this was the 'revolutionary' factor that made TNP2K confident that the targeted-subsidy for electricity would be a success. Second, a viable mechanism was needed to distribute the benefits to the beneficiaries, i.e., the technical feasibility of providing a monetary benefit directly to consumers rather than universally. For LPG trials, this involves the use of a novel Fintech payment system that is linked to the systems of the state-owned LPG distribution company. Finally, a monitoring system is essential to provide clarity as to whether the only beneficiaries are individuals listed in the BDT database. Supplementary to this is the opportunity for those not included to lodge an appeal through a formal mechanism.

The main motive for energy reform was fiscal pressure rather than increasing access to energy.

Indonesia's attempt to better target energy subsidies for electricity and LPG is an on-going process. Despite the progressive nature of the reform to date, the government's decision to carry out reform has most often been driven by fiscal considerations. As a consequence of this, ensuring universal access to modern energy services is a secondary aspect of the reforms, and there is no cohesive vision of how they fit into the broader social protection framework.

The current design of Indonesia's ESNs results in a *left-out* sub-population.

Indonesia has not yet managed to ensure all individuals have access to clean and modern energy. A *left-out* subpopulation has not benefited from the targeted-subsidy reform. There are three main reasons for this. First, there are exclusion errors in the BDT database, upon which the targeted-subsidy reform is heavily dependent. Second, the motivation to reduce the cost of the subsidy, rather than widening the access to energy, has resulted in limited and in some cases a complete lack of, investment in energy-supply infrastructure in certain regions, especially those in the eastern part of Indonesia (more detail in the following point). Third, the approach of reform in the electricity sector of ensuring that existing electricity consumers who pay lower tariffs are poor, rather than searching for poor households and ensuring they have the correct electricity connection first, has meant that some poor households may not receive subsidized electricity on account of not having a low-power connection (see Figure 11), or through not being connected to a PLN grid.

Indonesia's many islands and other geographical factors hinder the distribution of modern energy sources and efforts to widen energy access.

The creation of the *left-out* sub-population can also be attributed to the geographical constraints that are posed by some regions in Indonesia. For example, in some areas, the challenging geography has led to a lack of infrastructure to locally supply LPG. In turn, this has meant that people

living in remote areas are unable to purchase LPG despite having the means and willingness to do so. The analysis in the previous section showed disproportionately low energy access rates for Indonesia's eastern regions, such as the Maluku and Papua provinces. One interviewee explained that this disparity was mostly because of the practicalities of distributing energy, i.e., systems and infrastructure are in place making it easier to distribute energy on Java and elsewhere in western Indonesia, while energy access in the eastern regions suffers because of inadequate infrastructure.

If fiscal motivations continue to drive energy reforms, it is unlikely that energy access will improve markedly in these areas as access would require substantial infrastructure investment that may be uneconomic from the supplier's point of view. To overcome these geographical issues and achieve universal energy access, Indonesia cannot use a *one size fits all* paradigm, and instead will need to differentiate policies according to the individual conditions of different regions.

Establishing ESNs requires an influential champion.

One of the interviewees for this case study noted that clear backing for the reform process by far-sighted and important policy figures was instrumental in achieving the preparations for the reform, especially in terms of preparing the database and facilitating intense coordination between line ministries. The success of the kerosene-to-LPG conversion was aided by the participation of Vice President Jusuf Kalla in the policymaking process where he not only initiated the reform, but also monitored and moved it forward as planned.

Beneficiaries must be made aware of the reasons for the ESN and how it functions.

The ability of ESNs to ensure universal energy access is hindered by slow adoption of new technologies by beneficiaries. Improving energy literacy plays an important role in ensuring that changes to existing energy policies are well received and that behavioral changes are adopted where necessary. This may involve awareness-raising programs that explain the health and environmental benefits of using modern energy services alongside monetary incentives. Where changes to traditional practices are required, public support for reforms can be garnered by astute communication and socialization efforts. In this case, local officials at the district or village level can play an important role. A field survey for this case study in one of the areas piloting the LPG reform program revealed the pivotal role that local officials played in facilitating communication between beneficiaries and central government officers, providing information to the beneficiaries regarding the program and its benefits.

New alternative energy options need to be provided for remote areas.

One solution that could be adopted to boost energy access rates in remote areas, suggested by one of the experts interviewed for this case study, is providing alternative forms of energy, such as solar energy, micro-hydro, geothermal, biogas and biofuel. The main barrier to providing these alternative forms of energy is their relatively high initial investment, but this could be softened by earmarking the fiscal space resulting from subsidy reform to cover this and the required maintenance to ensure their sustainability.

One interviewee argued that sustainable provision of electricity in Indonesia will require going beyond the current distribution model used by PLN. In rural and remote areas, community-based generation could enable societies to fulfil their own demand, without being connected to the centralized grid. The respondent also stated that the government needs to do more to develop the many alternative energy sources available in Indonesia and raise awareness among commu-

nities, neither of which have been government priorities to date. The same respondent also suggested that ESNs can play a key role "in the provision of energy [infrastructure] that is built, operated, and organized by the society, so that they can meet their own energy needs."

Explicitly incorporate access to energy within social protection programs.

To further develop ESNs, the government should explicitly integrate different services and commodities—including energy—into a single and effective social protection system. This integrated program should then strive to ensure that all households have access to a modern, affordable and clean energy sources, while engaging in other poverty-alleviation efforts.

From these lessons learned, the case study highlights the following challenges for the future direction of ESNs in Indonesia:

1. Reforms in the energy sector were a starting point for ESNs in Indonesia, but the driving force was to ease the government's fiscal burden rather than providing universal access. The challenge now is to shift the primary aim of the reform, even if this comes at the cost of a *less efficient* subsidization of energy.
2. The recent energy reforms have relied heavily on the use of BDT data. The known exclusion and inclusion errors in the data raise the question of the extent to which we should rely on these data alone. Useful questions that policymakers should be asking include: How often should these data be updated to minimize exclusion and inclusion errors? Are alternative datasets available? Are there other ways to determine which households should be eligible beneficiaries?
3. The necessity of a key political actor driving energy reform raises the challenge of ensuring similar key actors are present and engaged in any similar future reforms.
4. The energy reforms that have been carried out so far might not be sufficient to achieve universal access to energy in Indonesia. As mentioned previously, Indonesia's population is diverse and geographically scattered. Thus, a *one size fits all* policy might not be suitable for ensuring energy access, particularly for the most vulnerable. Part of the challenge is ensuring universal awareness of the benefits of cleaner energy, and empowering citizens to develop alternative energy supplies that best suit their respective regions. Achieving this ideal paradigm requires a huge commitment to change, particularly on the part of the government.

SUMMARY AND CONCLUSION

Indonesia has a long history of providing universal commodity-based energy subsidies. These subsidies, however, have encouraged excessive use of energy and can, because of their impact on government resources, result in reduced spending on new energy infrastructure, and on other public goods and services, like education, health, and national social protection programs. Reducing the fiscal burden has been the main focus for energy reforms in Indonesia, with widening energy access for the poor being a secondary impact. Nonetheless, Indonesia has continued to support energy consumption by poor and vulnerable groups throughout several energy reforms that have shifted commodity-based energy subsidies to more targeted subsidies.

This study aims to shed light on the issue of access to affordable and modern energy for the poor and vulnerable people in Indonesia, especially access to electricity and LPG (modern source of cooking energy) in the context of ESNs. The findings of this case study can be summarized with respect to the original overarching questions as follows:

- There are on-going efforts by the Government of Indonesia to reform the energy commodity-subsidy system into a targeted-subsidy system, particularly in electricity and LPG for cooking. Both can be seen as a way to enable poor and marginalized people to access and use modern energy services.
- Although there is neither a specific social assistance nor a social insurance program for energy in Indonesia, there is a complementary effect between non-energy social assistance programs and subsidies for LPG and electricity.
- An analysis of secondary data showed that there have been improvements in the number of poor people accessing modern energy services (electricity and cleaner cooking), some of which can be attributed to recent energy reforms. However, progress in ensuring access to energy connections has not necessarily been followed by universal utilization of energy. Further work is required to close the considerable gap between consumption by the richest and poorest income groups.
- Enhancing the effectiveness of existing policy policy measures requires: overcoming the lack of energy distribution infrastructure in remote and other low-access regions, strong political support; and could involve adding energy commodities to an integrated social protection scheme to ensure use of modern energy services by poor and vulnerable households.

Five key takeaways from this study for countries considering energy sector reform are:

1. Reforms need a strong and influential key actor.
2. Three factors enabled Indonesia to successfully transition from commodity-based subsidies to targeted ESNs: the availability of high-quality beneficiary data, a mechanism to deliver the subsidy, and a system to monitor it.
3. Beneficiaries need to be well informed about how ESNs will affect them and about the benefits of using modern energy services.
4. Reforms to energy subsidies should be considered alongside (and perhaps incorporated into) other social protection programs.

5. In a diverse and geographically varied country like Indonesia, a uniform policy may not be appropriate for ensuring energy access to all. For example, rather than providing energy access by extending existing distribution plans, developing alternative energy sources such as solar energy, micro-hydro and biogas may be more appropriate for expanding energy access for remote and off-grid households.

REFERENCES

Agustina, C. D. R., Fengler, W., & Schulze, G. G. (2012). The regional effects of Indonesia's oil and gas policy: options for reform. Bulletin of Indonesian Economic Studies, 48(3), 369-397.

Andadari, R. K., Mulder, P., & Rietveld, P. (2014). Energy poverty reduction by fuel switching. Impact evaluation of the LPG conversion program in Indonesia. Energy Policy, 66, 436-449.

Asian Development Bank (2015). Fuel Subsidies in Indonesia: Trends, Impact, and Reforms.

Balya, A. A., Hutabarat, M. A., & Hartono, D. (2019). Cost Burden and Accessibility: Analysis of Indonesian Household Energy Expenditure. Economics Development Analysis Journal, 8(1), 42-53.

BPS (2017). Percentage of households by province and type of cooking fuel, 2001, 2007–2015. Jakarta: Badan Pusat Statistick.

Budya, H., & Arofat, M. (2011). Providing cleaner energy access in Indonesia through the megaproject of kerosene conversion to LPG. Energy Policy, 39(12), 7575–7586.

Burke, P. J., Batsuuri, T., & Halley, M. (2017). Easing the traffic: The effects of Indonesia's fuel subsidy reforms on toll-road travel. *Transportation Research Part A, 105*(July), 167–180. https://doi.org/10.1016/j.tra.2017.08.003.

Burke, P. J., & Savat, S. (2018). Electricity subsidy reform in Indonesia: Demand-side effects on electricity use. *Energy Policy, 116*, 410–421. https://doi.org/10.1016/j.enpol.2018.02.018.

Chelminski, K. (2018). Fossil Fuel Subsidy Reform in Indonesia. In H. Van Asselt (Author) & J. Skovgaard (Ed.). In *The Politics of Fossil Fuel Subsidies and their Reform* (pp. 193–211). Cambridge: Cambridge University Press. https://doi.org/10.1017/9781108241946.013.

Dartanto, T. (2013). Reducing fuel subsidies and the implication on fiscal balance and poverty in Indonesia: A simulation analysis. Energy Policy, 58, 117-134.

Dartanto, T. (2017). Fuel Subsidy Reforms: Lessons Learned from Indonesia's Experiences. Asia-Pacific Social Science Review, 17(1), 141-152.

Del Granado, F. J. A., Coady, D., & Gillingham, R. (2012). The Unequal Benefits of Fuel Subsidies : A Review of Evidence for Developing Countries. *World Development, 40* (11), 2234–2248. https://doi.org/10.1016/j.worlddev.2012.05.005

Grimm, M., Sparrow, R., & Tasciotti, L. (2015). Does electrification spur the fertility transition? Evidence from Indonesia. Demography, 52(5), 1773-1796.

IEA, IRENA, UNSD, WB, WHO (2019). Tracking SDG7: The Energy Progress Report 2019, Washington DC.

Innah, H., Kariongan, J., & Liga, M. (2017). Electrification ratio and renewable energy in Papua Province. *AIP Conference Proceedings.* Vol. 1826. No. 1. AIP Publishing.

Ismoyo, Bambang (2019). 'Semester-I 2019, Rasio Elektrifikasi Sentuh Angka 98.81% (Semester-I 2019, Electrification rate reached 98.81%)', *wartaekonomi,* 02 July. Available at: https://www.wartaekonomi.co.id/read234700/semester-i-2019-rasio-elektrifikasi-sentuh-angka-9881.html (Accessed: July 2019).

Kirari, J. K., Adel, M., Andria, V., & Lakaseru B.O. (2018). Supporting Indonesia's Renewable Energy Development in Remote and Rural Areas through Innovative Funding. Indonesia Development Forum 2018, Jakarta.

Kusumawardhani, N., Hilman, R., Laan, T., Warda, N., & Nurbani, R. (2017). Gender and Fossil fuel Subsidy Reform: an audit of energy subsidies, energy use and gender in Indonesia. GSI/IISD. Manitoba, Canada.

MEMR (2007). *Kerosene-to-LPG Conversion Program Blueprint.* Jakarta: Ministry of Energy and Mineral Resources Republic of Indonesia.

MEMR (2015). Rencana Strategis 2015-2019 (Strategic Planning 2015-2019). Jakarta: Ministry of Energy and Mineral Resources Republic of Indonesia.

MEMR (2016). Handbook of energy and economic statistics of Indonesia 2016. Jakarta: Ministry of Energy and Mineral Resources Republic of Indonesia.

OECD (2019). *Social Protection System Review of Indonesia, OECD Development Pathways.* Paris: OECD Publishing. https://doi.org/10.1787/788e9d71-en

Perdana, A. A. (2014). *The Future of Social Welfare Programs in Indonesia: From Fossil-Fuel Subsidies to Better Social Protection.* GSI/IISD. Manitoba, Canada.

Pertamina & WLPGA (2012). Kerosene to LP gas conversion program in Indonesia: A case study of domestic energy. PT Pertamina (Persero) & World LP Gas Association (WLPGA). Jakarta, Indonesia.

Pradiptyo, P., Susamto, A., Wirotomo, A., Adisasmita, A., & Beaton, C. (2016). Financing Development with fossil fuel subsidies: The reallocation of Indonesia's gasoline and diesel subsidies in 2015. GSI/IISD, Manitoba, Canada.

Renner, S., Lay, J., & Schleicher, M. (2019). The effects of energy price changes: heterogeneous welfare impacts and energy poverty in Indonesia. Environment and Development Economics, 24(2), 180-200.

Sachs, J., Schmidt-Traub, G., Kroll, C., Durand-Delacre, D., & Teksoz, K. (2018). SDG index and dashboards report 2018. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).

Sambodo, M. T. (2016). From Darkness to Light: Energy Security Assessment in Indonesia's Power Sector. ISEAS-Yusof Ishak Institute. Singapore, Singapore.

Sambodo, M. T., & Novandra, R. (2019). The state of energy poverty in Indonesia and its impact on welfare. Energy Policy, 132, 113-121.

Savatic, F. (2016). *Fossil fuel subsidy reform: lessons from the Indonesian case, Studies N°06/16.* IDDRI. Paris, France.

Silwal, A. R., & McKay, A. (2014). The Impact of Cooking with Firewood on Respiratory Health: Evidence from Indonesia. *The Journal of Development Studies,* 51(12), 1619-1633. https://doi.org/10.1080/00220388.2015.1056784

Smith, K. R., Rogers, J., & Cowlin, S. C. (2005). Household Fuels and Ill-Health in Developing Countries.

Thoday, K., Benjamin, P., Glan, M. & Puzzolo, E. (2018). The Mega Conversion Program from Kerosene to LPG in Indonesia: Lessons learned and recommendations for future clean cooking energy, Energy for Sustainable Development. 46, 71-81, https://doi.org/10.1016/j.esd.2018.05.011.

TNP2K (2018a). *Pemanfaatan Basis Data Terpadu Sebagai Layanan Publik Untuk Mengatasi Kemiskinan & Ketimpangan,* November 2018. Unpublished manuscript.

TNP2K (2018b). *Uji Coba Mekanisme Penyaluran Subsidi LPG 3 Kg Tepat Sasaran Melalui Perbankan dan Transaksi Elektronik,* July 2018. Unpublished manuscript.

TNP2K (2019). *Uji Coba Mekanisme Penyaluran Subsidi LPG 3 Kg Tepat Sasaran Melalui Perbankan dan Transaksi Elektronik,* April 2019. Unpublished manuscript.

Tohari, A., Parsons, C., & Rammohan, A. (2019). Targeting poverty under complementarities: Evidence from Indonesia's unified targeting system. Journal of Development Economics. 140, 127-144.

Tumiwa, F., Lontoh, L., Laan, T., Lang, K. and Vis-Dunbar, D. (2012). A Citizen's Guide to Energy Subsidies in Indonesia: 2012 Update. GSI/IISD. Geneva, Switzerland.

Widodo, T., Sahadewo, G. A., Setiastuti, S. U. and Chaerriyah, M. (2012). "Impact of Fuel Subsidy Removal on Government Spending" in Wu, Y., X. Shi and F. Kimura (eds.), Energy Market Integration in East Asia: Theories, Electricity Sector and Subsidies, ERIA Research Project Report 2011-17, Jakarta: ERIA, pp.173-206.

World Bank (2012). History and Evolution of Social Assistance in Indonesia. Social assistance program and public expenditure review;no. 8,Public expenditure review (PER). Washington, DC., USA.

Endnotes

i The corresponding indicators for SDG7 are: 1) access to electricity, 2) access to clean fuels and technology for cooking, 3) CO_2 emissions from fuel combustion / electricity output.

ii Electrification rate is defined as the number of households with electricity divided by the number of total households in that area, e.g. at the district or province level.

iii There was a major blackout event in some provinces on the islands of Java and Bali on the afternoon of 4 August 2019. The blackout occurred in the capital city of Jakarta (in DKI Jakarta Province), the province of Banten, West Java, and some parts of the Central Java and Bali provinces. Unlike the disruptions to supply that are common to the eastern parts of Indonesia, the official statement from PT PLN stated that the blackout happened due to the failure of a 500 KV Transmission line in Ungaran-Pemalang. The blackout created major disruptions for public and private transportation, and telecommunication activities. Commentators were critical of how long it took PT PLN to restore power.

iv The poverty line (*Garis Kemiskinan* (GK)) is the sum of the food poverty line (FPL) and the non-food poverty line (NFPL). Households with an average per capita expenditure per month under the poverty line are categorized as poor. Statistics Indonesia uses a money metric of 2,100 calories/capita/day from 52 commodities for calculating the FPL, which is heterogeneous across regions

due to regional differences in food prices. To calculate the poverty line requires adding in non-food expenditures such as health, education, transportation, etc. (Source: Statistics Indonesia).

v This is in line with a cross-country study carried out by Del Granado et al. (2012) that shows the potential inefficient use of fuel subsidies, where the richest 20 percent of the population secure on average six times higher subsidies than the poorest 20 percent, making universal fuel subsidies an inefficient instrument for policy to protect the poor from increasing fuel prices.

vi The conversion from the Indonesian rupiah (IDR) to the US dollar (USD) follows the yearly average exchange rate value for each corresponding year that is obtained from Bank Indonesia (Indonesia Central Bank).

vii The fiscal became particularly prominent in 2009 when Indonesia became a net oil importer and left OPEC (Renner et al. 2019). Beginning in 2010, government spending on energy subsidies exceeded its spending on defense, education, health and social security combined (Tumiwa et al. 2012).

viii This is a dialogue activity between public service officials and the public to discuss a certain issue or topic with the aim of enhancing the quality of public services. The activity is an implementation of Constitution No. 25, 2009 and Government Regulation No. 96, 2012, which mandate that public service officials must involve the public in providing their public service. The dialogue can be done face-to-face (such as in an FGD or workshop) or using other forms such as radio, social media, online application etc. The invitees usually consist of public service officials, civil organizations, the press and service users.

ix Through the village/district office.

x Collaboration between the MEMR, PLN, TNP2K and the Ministry of Home Affairs.

xi Note that these examples are to calculate the utilization cost only. The total electricity bill is normally higher because it consists of other additional costs such as a subscription and administration fees.

xii Tariffs for consumers with connections of up to 900 VA, i.e. most households, plus small enterprises, remained unchanged from 2003 until around 2016. Consumers with low electricity connections up to 900 VA were considered poor, although that may or may not have been the case. This is because until that period, the subsidy was not yet a targeted subsidy.

xiii The remaining 13 percent is divided across several other customer groups. The tariffs here have also been undergoing reform, but are excluded from the scope of this analysis owing to their much smaller coverage. For more details, see an article from the Ministry of Finance website, URL: https://fiskal.kemenkeu.go.id/dw-konten-view.asp?id=20151230092250435820332.

xiv Calorific value is the energy contained in a fuel, determined by measuring the heat produced by the complete combustion of a specified quantity of it, and usually expressed in joules per kilogram (joule/kg).

xv One liter of kerosene was equivalent in end use to 0.39 kg of LPG (Budya & Arofat 2011).

xvi Unfortunately, the case study is unable to obtain further information about the number of households and small-medium enterprises who received these distributed packages. It was also unable to find information about the welfare situation of the household recipients, i.e. how many

of them were poor or non-poor. In the following section, the case study maps the change in access to clean cooking of poor and non-poor households based on the secondary data analysis.

xvii Some additional information indicated that even if the kerosene is still physically available, it is not sold to regular consumers. Kerosene can only be used for certain purposes, such as for certain industries or for the military (to operate old machines or equipment that can only be operated using kerosene).

xviii Note that the subsidized LPG is the 3 kg LPG volume. Thus, LPG subsidy hereafter will refer to the LPG 3 kg.

xix USD 2.54 (IDR 34,000) per month compared to USD 2.82 (IDR 37,800) per month (TNP2K 2018b, analyzed against Susenas data from 2015).

xx As for SMEs users, the mechanism of the reform is still under discussion.

xxi The verification is needed to ensure that the BDT list provided by TNP2K matches households' true characteristics. This is to avoid inclusion errors. However, we did not get further information as to whether the households who are not chosen as beneficiaries because, for example, they are found to be not poor, will then be removed from the BDT list altogether. Our team, however, thinks that this is not the case, since any change to the BDT database entails a lengthy process.

xxii TNP2K gives the list of beneficiaries to the merchants in advance.

xxiii The beneficiaries' photos and fingerprints are taken during the registration process.

xxiv The biometrics equipment is provided for free by TNP2K to the merchants.

xxv Although not explicitly mentioned in the report, by the same token this implies that if the beneficiaries purchase only two cylinders in the first month, for example, they can then purchase up to four cylinders the following month. In our field visit to one of the piloted areas in Tangerang, Banten, the beneficiaries mentioned that they rarely purchased three cylinders per month, and that their average use of LPG was about two cylinders per month. However, there is no cash payment or refund in cash to the beneficiaries for this unpurchased LPG. The subsidy amount of IDR 45,000 is strictly for the purpose of purchasing LPG, thus any remaining balance for the unused purchase will go back to TNP2K.

xxvi Non-PLN electricity includes cooperatives, local government and the community, and is probably of lower quality compared to that provided by the PLN. The odd pattern of the decreasing rate for Q3 and Q4 in Figure 15 is presumably because of the changing in the sample representativeness of Susenas in the Papua Province in 2017. This information requires further clarification from Statistics Indonesia.

xxvii Including LPG, piped gas, electricity and biogas.

xxviii The case study uses expenditure on electricity to represent overall energy consumption as data for the amount of electricity and LPG in volume terms were not available in Susenas for either year. Expenditure may change over time because of changes in unitary prices and/or changes in the amount consumed. To overcome this the case study examined the correlation between the variation of the expenditure and volume in 2017 (for which data were available) and found that the unitary price component had a negligible impact on total expenditure, i.e., changes in expenditure can be attributed to changes in usage rather than price differences. This relationship echoes the low elasticity of demand for electricity in Indonesia found by empirical work such as Burke and Kurniawati (2018).

GLOSSARY

Access to energy	In addition to being physically available, as per SDG7, *access* denotes modern energy that is affordable, reliable and sustainable.
Conditional cash transfer	Programs that aim to reduce poverty by making benefit conditional upon the receivers' actions. In Indonesia, such programs are now known as *Program Keluarga Harapan* (PKH).
Energy poverty	A measure of the degree to which a household can afford to consume energy for cooking and electricity. Recently defined as a situation in which energy spending is more than 10 percent of income.
Lifeline tariff	A pricing structure for non-discrete energy sources that aims to make a basic quota of energy universally affordable. These can be: • increasing block tariffs (blocks of energy use are charged at progressively higher cost) • volume differentiated tariffs (the cost per unit of energy for all energy consumption is determined by total consumption; households consuming less energy pay less per unit than those consuming more)
LIPI	*Lembaga Ilmu Pengetahuan Indonesia* or Indonesian Institute of Sciences. The governmental authority for science and research in Indonesia which has 47 research centers in fields across social and natural sciences.
Minimum energy consumption threshold	The monthly energy consumption that allows a typical household to enjoy basic energy services.
PLN	*Perusahaan Listrik Negara* or State Electricity Company. An Indonesian government-owned corporation that has a monopoly on electricity distribution in Indonesia and generates the majority of the country's electrical power.
Podes	An abbreviation of *Potensi Desa* or Village Potential. A dataset that provides information about village characteristics for all of Indonesia, with a sample of +/- 65,000. It is surveyed in the context of the periodic censuses (Agriculture, Economy, Population) with data made available every three to four years. The Central Bureau of Statistics has collected village-level data since 1980.

Susenas

An abbreviation of *Survei Sosial Ekonomi National* or the National Socioeconomic Surveys. A series of large-scale multi-purpose socioeconomic surveys initiated in 1963-1964 and carried out every year or two since. This survey covers a nationally representative sample of around 200,000 households and collects socioeconomic information such as age, gender, education, expenditure and types of energy used.

Targeting

Targeting differentiates ESNs from general fuel subsidies. General fuel subsidies universally support fuel consumption while ESNs focus support toward the consumption of fuel by a specified group. Targeting can be both a part of the implementation process (targeting approach) and a measure of performance (targeting outcome).

1. *Targeting approach*

   Enrolling beneficiaries to the ESN. This can be:

   - Active (e.g. via means testing), or
   - Passive (e.g. via threshold consumption rates), and
   - Automatic; beneficiaries don't have to do anything to enrol in the ESN (e.g. universally available lifeline tariffs), or
   - Non-automatic; beneficiaries must sign up to the scheme (e.g. households must register with a government agency).

1. *Targeting outcome*

   An evaluation of the performance of an ESN that complements the coverage outcome (note: evaluation of an ESN's coverage and targeting depend on whether the aim is equity or efficiency).

   The targeting outcome is the proportion of the support provided by an ESN that is transferred to the intended beneficiaries. This can be:

   - in value terms: the proportion of the total support that goes to the intended group (e.g. the poor)
   - in beneficiary terms: the proportion of total beneficiaries that are from the intended group.

TNP2K

The National Team for the Acceleration of Poverty Reduction (*Tim Nasional Percepatan Penanggulangan Kemiskinan* (TNP2K)). Created to promote coordination across ministries/agencies to improve the implementation of poverty reduction programs, improve the living standards of the poor and vulnerable, and reduce inequality among income groups.

Unified database

Basis Data Terpadu (BDT. A social registry that unifies information for poverty targeting across Indonesia's most significant social assistance programs.

COPYRIGHT AND DISCLAIMER

Vienna Headquarters
Andromeda Tower, 15th Floor
Donau City Strasse 6
1220, Vienna, Austria
Telephone: +43 676 846 727 200

Washington, DC Satellite Office
1750 Pennsylvania Ave. NW
Washington, DC 10006 USA
Telephone: +1 202 390 0078

Website: www.SEforALL.org

www.SEforALL.org