

Fossil fuel subsidy reform: lessons from the Indonesian case

Filip Savatic (IDDRI)

FOSSIL FUEL SUBSIDIES ARE HIGHLY PREVALENT WORLDWIDE AND HAVE NUMEROUS ADVERSE EFFECTS

Estimates regarding the amount of public funds utilized to subsidize the production or consumption of fossil fuels are staggering. For 2011, they range from \$83 billion in OECD member states, to nearly \$4.1 trillion worldwide if environmental externalities are considered. Numerous studies have demonstrated that subsidies repress economic growth, undermine energy sector investment, increase public debt, benefit wealthy citizens over the poor, instigate a rise in illicit activities, and engender greater global and local pollution.

MOMENTUM FOR FOSSIL FUEL SUBSIDY REFORM HAS BEEN GROWING AND NON-HOUSEHOLD CONSUMERS HAVE BEEN INTEGRATED INTO REFORM EFFORTS

The negative effects of fossil fuel subsidies have led numerous governments to reform their energy policies. There has also been a growing international consensus in favor of reform. While the components of successful reform programs have been identified through past case studies, the nature of reforms adopted by several governments that target non-households have not been systematically examined.

THE INDONESIAN CASE: NON-HOUSEHOLDS REMAIN SIGNIFICANT BENEFICIARIES OF SUBSIDIES DESPITE TARGETED POLICIES

Since the late 1990s, the Indonesian government has implemented numerous reforms of its fossil fuel subsidies, including measures targeting household as well as non-household energy consumption. In doing so, it has incurred significant fiscal savings. However, an innovative budgetary analysis reveals that households receive a minority, and a declining share, of fossil fuel subsidy funds. This is the case despite the fact that subsidies were implemented to ensure poor households have access to cheap energy. These findings demonstrate the need to consider non-household sectors in the design of fossil fuel subsidy reforms. They also highlight the limitations of conventional policy approaches and past studies of reforms which focus almost exclusively on household consumption.

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LIST OF ACRONYMS

ADB	Asian Development Bank	IMF	International Monetary Fund
AFC	Asian Financial Crisis	KKN	Korupsi, Kolusi dan Nepotisme (Corruption, Collusion and Nepotism)
APEC	Asia Pacific Economic Cooperation	kt	Kiloton
ASCM	Agreement on Subsidies and Countervailing Measures	LPG	Liquified Petroleum Gas
BLT	Bantuan Langsung Tunai (Direct Cash Assistance)	MSME	Micro, Small and Medium sized Enterprise
Btu	British Thermal Units	MtCO₂e	Million metric tons of CO ₂ equivalent
CSE	Consumer Support Estimate	NGO	Non-Governmental Organization
DMO	Domestic Market Obligation	OCI	Oil Change International
ETP	Energy Technology Perspectives	ODI	Overseas Development Institute
G20	Group of 20 Countries	OECD	Organization for Economic Cooperation and Development
GDP	Gross Domestic Product	OPEC	Organization of the Petroleum Exporting Countries
GHG	Greenhouse Gas Emissions	PJ	Petajoule
GIZ	Die Deutsche Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)	PLN	Perusahaan Listrik Negara (State Electric Company)
GOI	Government of Indonesia	PSE	Producer Support Estimate
GSI	Global Subsidies Initiative	SME	Small and Medium sized Enterprise
GSSE	General Services Support Estimate	SOE	State Owned Enterprise
GWh	Gigawatt-hour	TJ	Terajoule
IDR	Indonesian Rupiah	USD	United States Dollar
IEA	International Energy Agency	VAT	Value Added Tax
IEEP	Institute for European Environmental Policy	WRI	World Resources Institute
		WTO	World Trade Organization

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EXECUTIVE SUMMARY

Fossil fuel subsidies are strikingly prevalent worldwide. While debates over definitions and data complicate quantification, regardless of the methodologies used to assess the amount of public resources directed toward fossil fuel subsidies, estimates are staggering. For 2011, they ranged from \$83 billion in OECD member states, to around \$480 billion worldwide without taking externalities into account, and nearly \$4.1 trillion if externalities were considered. The use of such a large amount of limited public funds for subsidies has raised questions over their broader impacts as well as opportunity costs.

Fossil fuel subsidies have considerable, negative economic, social and environmental effects. Numerous studies have demonstrated that subsidies repress economic growth and undermine advancement toward energy independence by engendering inefficiencies, leading to greater public deficits and debts, and reducing incentives for investment in the energy sector. Subsidies are also socially regressive, benefiting wealthy consumers of energy products more than the poor, while simultaneously leading to a rise in smuggling and other illicit activities. Finally, by encouraging over and inefficient consumption of fossil fuels, they engender greater global and local pollution.

Momentum for fossil fuel subsidy reform has been growing. Given the increasingly evident negative effects of fossil fuel subsidies, numerous governments have begun to reform their energy policies. In parallel, there has been a growing international consensus in favor of reform. Various international institutions and think tanks are promoting shifts away from subsidies and assisting national reform programs.

Subsidies are difficult to reform, frequently as a result of broad-based societal opposition. While the negative effects of subsidies have become increasingly clear, reform has nevertheless remained difficult. This is often the result of opposition from those sectors of society which benefit the most from subsidization, coupled with opposition from poor and vulnerable populations that would be disproportionately affected by increases in energy prices. This broad-based societal opposition is difficult for governments to ignore or overcome.

The three primary components of a successful reform program have been identified through past case studies. These components include: (1) mitigation measures to protect those that will be adversely affected, most notably poor households, (2) communication of the benefits of reform to the public and stakeholders, coupled with transparency with regards to reform plans, and (3) the

implementation of market pricing for energy products. By helping smooth the transition to new pricing schemes through mitigation measures, and by explaining to the public and stakeholders the benefits of reform, governments can reduce opposition to policy changes. In turn, depoliticizing energy prices by linking them to the market can ensure that reforms are durable and lasting.

Non-household consumers of subsidized energy products have been understudied despite the fact that they consume the majority of most subsidized energy products. Research on fossil fuel subsidies has frequently focused on their broader economic and environmental impacts, as well as their effects on households, while glossing over non-household consumers of fossil fuels. This is likely the case given that subsidies were initially implemented to bolster economic growth and energy independence and to expand energy access to poor and vulnerable populations. Yet this has created a gap in understanding of how fossil fuel subsidies affect non-household sectors that consume subsidized energy products. The need for further study is demonstrated by IEA data on energy product consumption, which indicates that a majority of most energy products are consumed by non-households in countries with fossil fuel consumption subsidies. As a result, these sectors likely benefit to a certain degree from subsidies and would certainly be affected by reform.

There is evidence that national governments have taken non-household consumers into account when devising subsidy reform programs. France, Poland, Iran and Indonesia, among others, are cases for which there is evidence that non-household consumers were consulted during the development of subsidy reforms, and that mitigation measures aimed at those consumers were adopted by governments. The impacts of such policies have not been systematically studied.

The case of Indonesia reaffirms conclusions reached by studies of fossil fuel subsidies, their impacts, and attempts at their reform. Indonesia has subsidized both the consumption and production of fossil fuels since the late 1960s. The growing fiscal burden imposed by subsidization, particularly since Indonesia became an oil importer in 2004, has been a primary driver of efforts at reform. The Indonesian case offers evidence that subsidies have undermined economic growth and investment in the country's energy sector. In turn, reforms implemented by the government of Indonesia (GOI) have demonstrated that mitigation

measures, widespread communication of the benefits of reform, and advances toward market pricing are all crucial to ensuring the successful implementation of a reform program. The Indonesian BLT unconditional cash transfer program, a mitigation measure adopted for the first time in 2005 to ease the transition to higher energy prices for poor households, and the GOI's general policy innovations have been praised internationally.

Indonesia has implemented several measures that target non-household consumers of subsidized energy products, none of which have been systematically examined. Studies of Indonesia's subsidy reforms have indicated that the GOI implemented certain mitigation measures for businesses and industry in tandem with subsidy reform in addition to those for poor households. Details regarding these measures are sparse. Furthermore, the GOI has implemented several targeted measures restricting the purchase of subsidized energy products by certain sectors. Most notably, since 2005, industry and power generators have been banned from consuming subsidized diesel. Since 2013, certain sectors have also seen their electricity tariffs increase in line with a pre-set timetable reducing subsidies. Other targeted policy initiatives have been implemented with varying degrees of success. The adoption of these measures indicates that the GOI has recognized that non-household sectors are major consumers of energy products and therefore need to be taken into account with respect to reforms. Further study of these measures is necessary to obtain a more comprehensive understanding of the nature of these policies and potential lessons that can be drawn and applied in other contexts.

An innovative budgetary analysis reveals that a majority of Indonesian subsidy funds have been benefiting sectors other than households, despite certain measures restricting non-household consumption of subsidized energy products and the significant budgetary savings tied to those targeted restrictions. IEA data on energy product consumption, GOI data on Indonesia's spending on energy subsidies, and PLN data on electricity consumption and tariffs can be used to assess the effects of targeted subsidy reform measures, and to obtain an indication of the degree to which households or non-households are benefiting from subsidization. On the one hand, budgetary and consumption figures suggest that the GOI has saved trillions of rupiah each year since adopting a ban on the consumption of subsidized diesel by industry and

electricity producers in 2005. On the other hand, an innovative reformulation of budgetary figures so that they indicate spending on subsidies by sector, as opposed to by energy product, reveals that households receive a minority of subsidy funds. In fact, the share of subsidies directly benefiting households declined from 2007 to 2012 (the years for which all requisite data was available), while the transport sector's share of benefits grew. This analysis reveals the importance of non-household sectors and the limitations of the targeted measures that were adopted.

Further research is needed to assess the nature of non-household consumption of subsidized fossil fuels and how subsidy reform may

impact those sectors. The review of existing studies and the analysis of the Indonesian case conducted in this report reveal the existence of a significant gap in understanding of the effects of fossil fuel subsidies and the potential impacts of subsidy reform. Greater examination of non-household consumers would add to the lessons already learned from past attempts at subsidy reform implemented by governments worldwide. In particular, measures restricting the consumption of subsidized products by non-household sectors, coupled with mitigation measures for those sectors, could potentially be deemed important components of future reform programs. Only further, systematic analyses can increase understanding and show the way forward.

1. INTRODUCTION

Fossil fuel subsidies are widespread and problematic. They were initially conceived to promote economic growth and energy independence, as well as to help poor and vulnerable populations have access to energy products. However, it has become increasingly evident that they are at best an extremely inefficient means of achieving those goals. Through their numerous negative effects, from engendering over-consumption of energy, to crowding out important public spending, to scuttling efforts to promote renewable energies, to disproportionately benefiting wealthy citizens over the poor, subsidies ultimately lead to greater energy dependence, illicit activities, and economic inefficiency. Given these deficiencies, difficult reform processes have begun throughout the world. Understanding how subsidies affect economies and societies has become important to ensure that the most effective reform policies are put in place by national governments.

While there has been tremendous progress, many questions regarding fossil fuel subsidies remain unanswered. Lack of information and data is a major challenge for the development and implementation of reforms. Recently, international institutions as well as research institutes and think tanks have sought to increase accessibility to data and findings regarding subsidies. Numerous research programs have begun to shed light on how widespread subsidies are, the various forms they take, the effects that they have, and the strategies that help ensure reforms are implemented successfully. Nevertheless, much remains to be examined.

In particular, non-household consumers of subsidized energy products have been understudied. Analyses of the consumption of subsidized fossil fuels have focused on households as opposed to other sectors such as commercial or industrial consumers. The fact that fossil fuel subsidies tend to “leak” to upper income households, given that richer households consume more energy than poor households, has often been cited as a reason subsidy reform is desirable. Businesses and industry have mainly been discussed in the context of producer subsidies which facilitate the extraction of fossil fuel resources. However, given that commercial and industrial sectors consume subsidized energy products as well, the focus on households has limited understanding of fossil fuel subsidies and their effects. This study sheds light on these types of consumers and determines whether they can be targeted as part of broader efforts at fossil fuel subsidy reform.

Section 2 of this report discusses fossil fuel subsidies generally, how they are defined, their prevalence, their impacts, and how attempts to reform them can be successful. It also demonstrates that non-household consumers of subsidized energy products and the impact of subsidy reform on those consumers have been neglected by past research. The importance of further study is illustrated by the fact that the household sector is not the primary consumer of most energy products, most notably in countries that subsidize consumption. Section 3 discusses the case of Indonesia, a country where efforts at subsidy reform have been underway since the late 1990s. The nature of petroleum product and electricity consumption is examined. Reforms that have targeted industrial and

commercial consumers and the manner in which those measures have saved the Indonesian government significant public resources while simultaneously failing to ensure that the majority of public spending on subsidies is directed at households, are assessed. Finally, section 4 summarizes the most significant findings and points to avenues for further research.

2. FOSSIL FUEL SUBSIDIES: THE GLOBAL CONTEXT

Over the course of the past decade, the negative economic, social and environmental effects incurred by fossil fuel subsidies have been increasingly documented. At the same time, it has become clear that they constitute an ineffective means for countries to promote economic growth and energy independence, or to provide poor and vulnerable populations access to energy products; objectives that justified their initial adoption. In fact, they may even undermine advancement towards those goals. In turn, numerous countries have begun to reform what were otherwise longstanding policies subsidizing the consumption and/or production of fossil fuel resources. The initiation of such efforts has revealed the limited information available regarding fossil fuel subsidies and has subsequently spurred a growing number of studies. Despite the fact that definitional and data problems have remained obstacles to furthering awareness about such subsidies, studies have revealed much about their effects and the need for their reform. This section of the report turns to these findings, as well as to an important avenue for further research.

2.1. How are fossil fuel subsidies defined and information about them collected?

Understanding of fossil fuel subsidies and their effects has been hampered by the fact that there is no single, internationally accepted definition of that term. This is related to a lack of publicly available budgetary information regarding subsidization by national governments. Without a consensus concerning what constitutes a fossil fuel subsidy, opportunities to effectively study their effects or efforts aimed at their reform are undermined. Shelagh Whitley of ODI eloquently describes the challenges posed by the lack of a standard definition and consistent data when she states that “data gaps present a serious challenge to any attempt to phase out fossil fuel subsidies, with governments unclear about what constitutes

a subsidy, how much they are already spending on them, and their socio-economic and climate impacts [...] this absence of harmonized and transparent subsidy data across countries inhibits even the very first proposed step of subsidy phase-out: the analysis of the costs and distortions that subsidies impose on the economy... few governments know the full extent of the subsidies they have granted, as many forms of support have never been quantified.”¹ In general, with different countries and organizations conducting research on the basis of different definitions, it becomes difficult to quantify the degree to which fossil fuels are subsidized and develop a clear understanding of how subsidies affect societies. This can be the case even for governments seeking to reform their policies.

Studies attempting to assess the prevalence of fossil fuel subsidies have demonstrated the challenges associated with data collection. In an extensive review of fossil fuel subsidies in China, Germany, Indonesia, Nigeria and the United States, a team working for GSI found that “the ability to undertake any meaningful subsidy reform, either nationally or multilaterally, is hampered by a basic lack of knowledge about the extent of support to the sector and where information on this support might be held”, and that “providing significant amounts of support to the fossil-fuel sector, but not reporting this in budgets, was the norm across case-study countries.”² The variety of estimates concerning the number of countries which subsidize fossil fuel production and/or consumption, and the amount of public resources they utilize to do so, also stems in part from the use of different definitions and related methodologies for calculating subsidization rates (see section 2.2 below for an overview of estimates). With information frequently unpublished or difficult to access and assess, it has taken a significant amount of time for the negative effects of subsidies to be confirmed through empirical research and for a broad international consensus in favor of reform to coalesce. Nevertheless, efforts at harmonization and collaboration are underway.

Several definitions are commonly cited and form the basis of dialogue concerning fossil fuel subsidies. The definition of subsidy found in Article 1 of the WTO’s Agreement on Subsidies and Countervailing Measures (ASCM) is one such definition

1. Whitley, S. (2013). Time to change the game: Fossil fuel subsidies and climate. November 2013. Overseas Development Institute, p. 7.
2. Koplow, D., et al. (2010). Mapping the Characteristics of Producer Subsidies: A review of pilot country studies. August 2010. Global Subsidies Initiative, p. 11.

used to identify and assess fossil fuel subsidy policies. According to the ASCM, subsidies exist when government:

- (1) provides direct or indirect transfer of funds or liabilities;
- (2) revenue is foregone or not collected;
- (3) provides goods or services below market rates or purchases goods above market rates;
- (4) provides income or price support.³

This is the most widely accepted definition of a subsidy as it has been officially approved by the 153 members of the WTO. Also frequently cited is the IEA's definition of "energy subsidy," or "any government action directed primarily at the energy sector that lowers the cost of energy production, raises the price received by energy producers, or lowers the price paid by energy consumers."⁴

While these definitions offer broad indications as to what types of policies are subsidies, there is nonetheless debate over what specific measures should be considered as falling within them. For example, the IEA, OECD, OPEC and World Bank have acknowledged that "the practical applicability of the WTO definition in generating data of energy subsidies has proven to be limited" as a result of a "lack of commitment and transparency of countries in reporting energy subsidies" and the difficulties associated with quantifying subsidies other than direct financial support.⁵

Through reviewing past interpretations, GSI has identified four broad categories of measures, each more expansive than the previous, as falling within or outside of what is commonly considered a subsidy. These categories are:

- (1) direct budgetary spending or tax relief;
- (2) provision of services below market rates;
- (3) market price support and market transfers such as purchase obligations, tariffs and mandates;
- (4) underpricing of social and environmental externalities.⁶

In general, GSI found that measures that fall into the first category are "widely accepted as being subsidies" while those that fall under the fourth are rarely taken into consideration.⁷

Throughout the literature, there is also a division

of subsidies into the categories of "consumer support" and "producer support," also termed "consumption and production subsidies" or "consumer and producer subsidies."⁸ Specific policies fall into these categories depending on "whether they confer a benefit to producers or consumers" of energy products.⁹ Apart from being implemented to bolster economic growth and prosperity generally, consumer or producer subsidies are adopted for two distinct reasons, namely the expansions of energy access to segments of the population which suffer from energy poverty, or bolstering domestic production of energy resources, respectively. In general, it has become clear that consumer subsidies are most prevalent in developing countries while being rare in OECD countries or advanced economies.¹⁰ On the other hand, production subsidies have been identified without differentiation in both developed and developing countries.¹¹ Studies of subsidies have generally focused on consumption subsidies as they are "more transparent and easier to track."¹² In terms of producer subsidies, a GSI study in 2010 on Indonesia was "one of the first to focus on producer subsidies in the developing world."¹³ The OECD has also begun to collect information on budgetary support provided by the organization's member states through an inventory of policy measures, a survey first published in 2011.¹⁴ Today, both producer and consumer subsidies are studied in detail, and are both targets of a growing global reform agenda.

Ultimately, the establishment of a single definition of what constitutes a fossil fuel subsidy and the application of that definition in national budgetary publications would be a useful step forward in furthering understanding of the impacts of such subsidies and the manner in which they can be reformed. For the purposes of this study, the particular definitions of subsidy utilized by the sources cited are explained and applied when necessary. Despite this issue, it becomes evident that, no matter what definition of fossil fuel subsidy is used, it is possible to discern that they are extremely widespread and that they engender various negative

3. Braithwaite, D. et al. (2010). *Fossil Fuels—At What Cost? Government support for upstream oil and gas activities in Indonesia*. October 2010. Global Subsidies Initiative, p. 11.

4. IEA (2014e). *World Energy Outlook*, p. 315.

5. IEA, OPEC, OECD, World Bank (2010). *Joint Report: Analysis of the Scope of Energy Subsidies and Suggestions for the G20 Initiative*. 16 June 2010, p. 8.

6. Bridle, R. and L. Kitson (2014). *The Impact of Fossil-Fuel Subsidies on Renewable Electricity Generation*. December 2014. Global Subsidies Initiative, p. 2.

7. Ibid.

8. These terms will be used interchangeably in this report.

9. IEA (2010). *World Energy Outlook*, p. 570.

10. Ibid.

11. Ibid.

12. Braithwaite, D. et al. (2010). *Fossil Fuels—At What Cost? Government support for upstream oil and gas activities in Indonesia*. October 2010. Global Subsidies Initiative, p. 9.

13. Ibid.

14. See OECD (2011). *Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels and OECD (2013). Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels 2013*.

effects; factors that have been driving growing national and international efforts toward their reform in the past decade.

2.2. How prevalent are fossil fuel subsidies?

Fossil fuel subsidies have been a longstanding policy measure utilized by governments as a means to achieve specific economic and societal goals. In particular, subsidies have been justified on the basis that they could bolster domestic production of energy resources and thereby secure energy independence while encouraging economic growth as well as expanding access to energy to poor populations.¹⁵ In both cases, subsidization of either production or consumption is intended to have “positive spillover effects” that are both economic and societal in nature.¹⁶ This can include greater levels of employment and higher quality lifestyles tied to access to energy resources.¹⁷ These objectives led governments to adopt a wide range of policies that can be identified as fossil fuel subsidies. Over time, the degree of public support has become staggering, and the negative effects of such widespread subsidization increasingly evident.

As global concerns regarding climate change have grown in tandem with attempts to improve the state of public finances since the global financial crisis of 2007-2008, a growing number of international organizations and research institutes have been conducting studies to assess the prevalence of fossil fuel subsidies worldwide. Table 1 delineates the results of the assessments conducted by the IMF, IEA and OECD, and each organization’s quantification of fossil fuel subsidies globally in 2011. A quick review reveals that fossil fuel subsidies are relatively widespread. No matter what the methodology used in calculations, nor what groups of countries are subject to assessment, the total estimates range from tens to hundreds of billions to trillions of dollars. The use of such large amounts of public resources on subsidies has engendered growing concerns over their effects and associated opportunity costs; both factors having become key motivations for fossil fuel subsidy reform.

The IEA’s price-gap approach

The lack of a single, internationally recognized definition of fossil fuel subsidy has led international

organizations to take different approaches to quantifying them. The IEA, which undertook an early analysis of subsidies in 1999, has adopted what has been called the “price-gap” approach, defined as the comparison of consumer prices (“such as the price of a liter of gasoline at the pump”) with reference or benchmark prices (“full production costs or world-market prices including all costs of transport, refining and distribution”).¹⁸ The difference between the two constitutes the total amount of subsidy. This approach aims to capture the total value of consumer subsidies that reduce the price of fossil fuel products for end-users; policies aimed at expanding access to energy. Production subsidies are not captured by this approach as they raise revenue for producers or promote the extraction of energy resources and can therefore even lead to higher prices for consumers.¹⁹

The IEA has been using the price-gap approach to estimate fossil fuel subsidy levels on an annual basis since 2007. The prevalence of consumption subsidies in developing countries has meant that IEA studies have not focused on assessing subsidies in advanced economies or OECD member states. In its assessments, the IEA has consistently identified around 40 countries where “at least one fossil fuel was found to be subsidized.”²⁰ Table 2 and Figures 1 and 2 delineate the IEA’s estimates from 2007 to 2012. As can be seen, IEA estimates show that the quantity of resources spent on fossil fuel subsidies fluctuates in line with international oil prices. This is unsurprising given that governments will naturally have to spend more to keep national energy prices low for consumers when international energy prices are high. In addition, IEA estimates show that subsidies for the consumption of petroleum products, specifically, account for roughly half of the total amount spent by national governments, with the rest going primarily to support electricity and natural gas consumption. In contrast, subsidies for coal consumption are relatively rare. Recently high energy prices kept subsidies on the order of roughly \$550 billion per year in 2011 and 2012.

The IMF’s pre-tax and post-tax estimates

The price-gap methodology was also adopted in part by researchers (Clements *et al.*) working for the IMF who published an initial, extensive review of the prevalence of fossil fuel subsidies worldwide in 2013. In addition, Clements *et al.* complemented price-gap estimates with an alternate measure of

15. IEA (1999). World Energy Outlook. Looking at Energy Subsidies: Getting the Prices Right, pp. 43-46.

16. Ibid.

17. Ibid.

18. Ibid., p. 21.

19. Ibid.

20. IEA (2014e). World Energy Outlook, p. 320.

subsidies founded upon the most expansive definition of subsidy that includes all four groups of policy measures identified by GSI (see section 2.1), notably the underpricing of social and environmental externalities associated with the use of fossil fuels. In particular, externalities were calculated to take into account “the effects of energy consumption on global warming, [assuming damages of \$25 per ton of CO₂ emissions]; on public health through the adverse effects of local pollution; on traffic congestion and accidents; and on road damage.”²¹ Furthermore, energy products were also assumed to be “subject to the economy’s standard tax rate (an ad valorem tax) on top of [a] corrective tax [for externalities and revenue].”²² Clements *et al.* dubbed subsidies calculated using the price-gap methodology as “pre-tax” and those after taking into account externalities and taxation as “post-tax.” A breakdown of the estimates published by Clements *et al.* can be visualized in Table 3 while Table 4 indicates which countries are identified as having pre-tax subsidies, disaggregated by energy product.

In addition, in May 2015, a second IMF research team (Coady, Parry, Sears and Shang) published an update to the Clements *et al.* study, significantly revising the post-tax estimations initially published and also modifying the pre-tax estimates to a smaller degree. The revisions were primarily the result of “more refined estimates of the environmental costs by energy product for more than 150 countries.”²³ (A detailed description of the differences is available in Box 2 of Coady, Parry, Sears and Shang entitled “Reconciling Previous Estimates of Post-Tax Subsidies.”²⁴) Table 5 reproduces a segment of Appendix 4 of the Coady, Parry, Sears and Shang study, where the initial and revised estimates regarding the quantity of fossil fuel subsidies worldwide can be compared.²⁵

In general, both the initial estimates by Clements *et al.* and the revisions by Coady, Parry, Sears and Shang are staggering. Pre-tax estimates are consistently similar to subsidy estimates made by the IEA, which is unsurprising since both apply the price-gap approach in these cases. Thus, for Coady, Parry, Sears and Shang, estimates are in the order of approximately \$500 billion. Post-tax subsidies, however, are several orders of

magnitude higher. With more refined data regarding externalities, Coady, Parry, Sears and Shang estimate total subsidies to be around \$4.1 trillion in 2011, and project that that number will increase to over \$5.1 trillion in 2014, or 5.8% and 6.5% of global GDP, respectively. When looking at individual fuels, once again, pre-tax estimates are similar to that of the IEA, with petroleum product subsidies being the most significant and coal subsidies minimal. In terms of post-tax subsidies, the significant externalities associated with the use of coal, both in terms of global and local pollution, increase the quantity of subsidies to several trillion dollars according to Coady, Parry, Sears and Shang. In addition, given the use of energy products worldwide, post-tax subsidies are identified in many countries which do not necessarily have pre-tax subsidies. Countries which are not taking into account the negative externalities associated with energy use and are not adopting taxation to reflect those costs, raise revenues, and encourage energy efficiency, are identified as subsidizing “post-tax” regardless of whether they have subsidies to encourage energy consumption “pre-tax.” Specifically, Clements *et al.* identify 94 countries with pre-tax subsidies and 160 with post-tax subsidies, as can be seen in Table 4. Coady, Parry, Sears and Shang identify 153 countries with subsidies in their analysis.²⁶

The OECD inventories

Finally, the OECD has taken an alternative approach, seeking to inventory all policies that provide support to fossil fuels in the organization’s member states. The first such inventory was published in 2011.²⁷ For its inventories, the OECD has adopted the PSE (Producer Support Estimate), CSE (Consumer Support Estimate) and GSSE (General Services Support Estimate) framework previously utilized for analyses of agriculture subsidies.²⁸ Thus, unlike the IEA and IMF, the OECD takes into account producer subsidies and general support to the energy industry in addition to consumer subsidies. In the 2013 inventory, the OECD identified over 550 measures supporting fossil fuels, 59% related to consumption, 29% to production, and 12% as general services support.²⁹ Two-thirds of the measures identified were classified as tax expenditures. These measures “are relative preferences within a country’s tax system that

21. Clements, B. *et al.* (2013b). *Energy Subsidy Reform: Lessons and Implications*. 28 January 2013. IMF, p. 9.

22. *Ibid.*

23. Coady, D., I. Parry, L. Sears and B. Shang (2015). *How Large Are Global Energy Subsidies?* IMF Working Paper. WP/15/105. May 2015. IMF, p. 6.

24. *Ibid.*, p. 19.

25. *Ibid.*, p. 38.

26. *Ibid.*, p. 33.

27. OECD (2011). *Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels*.

28. OECD (2013). *Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels 2013*, p. 16.

29. *Ibid.*, p. 37.

are measured with reference to a benchmark tax treatment set by that country.”³⁰ In other words, they estimate the taxes that individuals or enterprises would have paid in a given country were it not for policies reducing those rates. Importantly, the OECD emphasizes that “since the benchmark or ‘normal’ tax treatment varies considerably from country to country, the value of this type of support is not comparable across countries.”³¹ Keeping in mind this limitation, the OECD estimates support to fossil fuels as fluctuating between \$55-90 billion per year in total from 2005 to 2011.³² Absolute support predominantly relates to crude oil and petroleum products.³³ In comparison with the IEA and IMF, the OECD adopts a more systematic approach to its estimates, although limited comparability across countries and the fact that only support in OECD member states are taken into account means that only a partial picture is provided by these analyses. Nevertheless, the inventories indicate that support remains pervasive even in advanced economies.

Overall, regardless of the definition of fossil fuel subsidy or the methodologies used to calculate their prevalence that are adopted, it is clear that fossil fuel subsidies are widespread, throughout the world. Furthermore, it has been frequently indicated that current estimates are most likely conservative, failing to capture the true extent of subsidies at national and global levels. In terms of the estimates presented here, on the one hand, IEA and IMF estimates, particularly those based on the price-gap methodology, do not take into account producer subsidies or externalities. On the other hand, the OECD limits analyses to the organization’s member states. IMF post-tax estimates are perhaps the most comprehensive, but also fail to take into account policies aimed at facilitating the extraction of fossil fuel resources and general research and development support that would fall under the OECD’s GSSE grouping of subsidies. In short, no methodology fully takes into account both producer and consumer subsidies on a global scale. Furthermore, Koplow indicates that estimates are limited in scope in terms of geography (limited coverage of subsidies at state or provincial levels), policy type (limited analysis of producer subsidies, government-owned energy infrastructure, regulatory oversight and site remediation, and energy security), non-payment for energy use and theft, and non-payment for user fees for

public resources maintaining infrastructure or responding to degradation.³⁴ Koplow concludes that “global estimates of subsidy magnitude are likely well below actual levels of support.”³⁵ This only raises concerns and indicates the importance for continued analysis.

Taking all the existing data into account, the amount of public resources spent on fossil fuel subsidies can comfortably be characterized as very extensive. This, by extension, raises questions regarding the utility of subsidy policies and their efficacy in attaining the goals of greater energy access, energy independence and economic growth for the countries that adopt them. In particular, the issue of opportunity cost comes to the forefront. With such a tremendous quantity of public resources being spent on fossil fuel subsidies as opposed to being directed toward various other possible uses, it appears absolutely critical to assess the economic and social benefits they incur and weigh them against any costs. Such analyses alarmingly reveal that the benefits are limited while negative effects are multifaceted and pervasive.

2.3. What are the impacts of fossil fuel subsidies?

Numerous studies conducted by international organizations and research institutes have demonstrated the many negative economic, societal and environmental effects of fossil fuel subsidies. Table 6, adopted from the IEA’s World Energy Outlook 2010, lists the numerous potential, unintended consequences that arise when such subsidies are adopted. It quickly becomes apparent that the list is rather extensive. Reviewing the research that has been conducted regarding fossil fuel subsidies generally, it can be argued that a preponderance of theoretical and empirical evidence points to the conclusion that their downsides outweigh their benefits and that there are more efficient ways to achieve the objectives which instigated their initial adoption by governments. While this section will review major findings, Table 7 offers a list of the seminal studies discussed for reference.

Subsidies are fiscally burdensome and crowd out important social spending

Firstly, as discussed in section 2.2, fossil fuel subsidies are extremely widespread and consume

30. Ibid., p. 16.

31. Ibid.

32. Ibid., p. 38.

33. Ibid.

34. Koplow, D. (2014). “Global Energy Subsidies: Scale, Opportunity Costs, and Barriers to Reform.” In Half, A., B. K. Sovacool and J. Rowhon (2014). *Energy Poverty: Global Challenges and Local Solutions*. Oxford: Oxford University Press, p. 319.

35. Ibid., p. 318.

an extraordinary amount of public resources. At a national level, subsidies can constitute a significant fiscal burden, and by extension can crowd out other valuable spending or lead to greater budgetary deficits and public debts. As a result, questions regarding opportunity costs come to the fore, especially given that alternative spending decisions could be more efficient at achieving the goals of subsidy policies while fiscal burdens can depress economic growth. In 2011, according to IEA estimates, six countries spent more than 10% of GDP and seven countries more than 25% of their total government revenue on consumption subsidies, demonstrating the magnitude of resources being allocated to policies of uncertain utility by some countries.³⁶ Those numbers alone call into question the wisdom behind continued subsidization. Studies further illustrating how subsidies can reduce spending on important social policies often point to the case of healthcare and use it as a proxy for important social spending more broadly. For example, Koplow compared IEA estimates of the amount of resources subsidizing countries spent on subsidies with the amount they spent on healthcare and found that 18 of 37 spent more on the former. The choice to do so is certainly questionable. With vast amounts of limited national resources being consumed, other social spending is likely to suffer as well. This can be particularly damaging in developing countries where total public resources are severely limited.³⁷ Adding the fact that subsidies are a poorly targeted measure (see below) and the opportunity costs simply become too great to ignore. Ultimately, it is clear that fossil fuel subsidies can crowd out important social spending and engender budgetary challenges for certain subsidizing countries, and that the fiscal health of those countries would improve if market pricing were adopted, thereby also improving prospects for economic growth in the long-run.

Subsidies undermine economic growth, energy efficiency, and energy independence
Secondly, in addition to the fiscal burden that they impose, fossil fuel subsidies can depress economic activity more generally, as opposed to bolster it as intended. In a review of six major studies of fossil fuel subsidies, Ellis of GSI found that they all indicated that reforms “would result in an aggregate

increase in GDP in both OECD and non-OECD countries,” with estimates ranging from a low of 0.1% in total by 2010 to 0.7% per year to 2050.³⁸ The greater economic growth emerges from efficiency and competitiveness gains that would arise if market pricing for energy became the norm. In their study, Clements *et al.* found that “although in the short-run subsidy reform will raise energy prices and increase production costs, over the longer term there will be a reallocation of resources to activities that are less energy and capital intensive and more efficient, helping spur the growth of employment”, and that “subsidy reform will [thus] crowd-in private investment, including in the energy sector, and benefit growth over the longer term [while improving] incentives to adopt energy-saving technologies.”³⁹ On the other hand, to maintain subsidies would “mask the real cost of energy and undermine the financial attractiveness of investment by business and by households on more energy-efficient equipment and appliances.”⁴⁰ Thus, potential negative effects of higher energy prices resulting from subsidy removal are outweighed by the greater economic and energy efficiency that would accrue over time. National experiences have demonstrated that this conclusion is likely true. In its World Energy Outlook 2014, the IEA illustrates how subsidies in the Middle East have undermined investment in energy efficient vehicles, electrical appliances and lighting.⁴¹ In general, the IEA concludes that heavily subsidized prices are “the main barrier to the adoption of more energy-efficient technologies” and that “the potential savings from improved energy efficiency are substantial.”⁴² Overall, a preponderance of evidence certainly calls into question the notion that subsidies can be good for economic growth and thereby benefit society at large. Inefficient energy consumption can engender significant economic costs, making subsidy reform desirable.

Ironically, subsidies also undermine investment in the energy sector itself and by extension advancement toward the goal of greater energy independence. The IEA has argued that “where energy suppliers suffer financial losses because of underpricing, subsidies can create a vicious cycle of under-investment, poor maintenance and

36. Koplow, D. (2014). “Global Energy Subsidies: Scale, Opportunity Costs, and Barriers to Reform.” In Halff, A., B. K. Sovacool and J. Rowhon (2014). *Energy Poverty: Global Challenges and Local Solutions*. Oxford: Oxford University Press, p. 323.

37. Ibid., p. 322.

38. Ellis, J. (2010). *The Effects of Fossil-Fuel Subsidy Reform: A review of modelling and empirical studies*. March 2010. Global Subsidies Initiative, p. 7.

39. Clements, B. et al. (2013b). *Energy Subsidy Reform: Lessons and Implications*. 28 January 2013. IMF, p. 16.

40. IEA (2014e). *World Energy Outlook*, p. 326.

41. Ibid. pp. 327-328.

42. Ibid., p. 328.

under-supply, particularly in the oil-refining and electricity sectors.”⁴³ Clements *et al.* echo this conclusion, pointing out that “low and subsidized prices for energy can result in lower profits or outright losses for producers, making it difficult for SOEs to expand energy production and unattractive for the private sector to invest both in the short and long run. The result is severe energy shortages that hamper economic activity.”⁴⁴ They point to electricity subsidies in Sub-Saharan Africa as having undermined investment in infrastructure, reducing advancement in electrification rates and weakening competitiveness.⁴⁵ Coupled with over-consumption and inefficient consumption, the lack of investment can lead to a depletion of energy resources. Thus, evidence suggests that subsidies are an ineffective means of engendering energy independence and economic growth.

Subsidies are socially regressive policies that are ineffective at extending energy access to the poor

Turning to societal objectives as opposed to economic ones, it has been found that fossil fuel subsidies are a poorly designed mechanism to ensure that low income and vulnerable populations have access to energy resources. On the contrary, empirical analyses have demonstrated that they are primarily a regressive policy measure which disproportionately benefits high income households that consume a greater percentage of subsidized energy products, while simultaneously drawing public resources away from more effective poverty alleviation policies. A study conducted by Arze del Granado, Coady and Gillingham is the most commonly cited work demonstrating this tendency. In their study, the team evaluated how a \$0.25 increase in the prices of gasoline, kerosene and LPG—three commonly subsidized petroleum products—would both directly impact households (through higher prices for fuels) as well as indirectly impact them (through higher prices for other goods and services that reflected increased production costs and consumer prices), in 20 developing countries from around the world.⁴⁶ To do so, the team assessed the distribution of subsidy benefits, concluding that “substantial leakage of subsidy benefits to the top income

group means that universal fuel subsidies are an extremely costly approach to protecting the welfare of poor households.”⁴⁷ Figure 3 illustrates their findings and draws attention to the fact that 42.8% of subsidy benefits go to the top 20% of consumers in the countries studied as opposed to 7.1% for the bottom 20%. The regressive nature of the subsidy policies could not be clearer. Assessments of the distribution of benefits by specific fuels nuance the results slightly with subsidies for kerosene, a fuel more frequently used by poor households for cooking, heating, and/or lighting, being more equitably distributed by income groups. Figure 4 illustrates the differences between the three fuels and the relatively more progressive distribution of benefits tied to kerosene. Nevertheless, whatever the fuel, the inefficacy of subsidies in transferring public resources to the poor is made evident. Arze del Granado, Coady and Gillingham conclude that “if we take the poorest 20% of households to be our target ‘poor’ group, the cost to the budget of transferring one dollar to this group via gasoline subsidies is around \$33 (i.e. \$1/0.03). This reflects the fact that over \$97 out of every \$100 ‘leak’ to the top four quintiles. Even for kerosene, this cost-benefit ratio is around \$5 (i.e. \$1/0.19).”⁴⁸

In terms of impact, Arze del Granado, Coady and Gillingham find that “the total direct and indirect welfare impacts are approximately distributionally neutral, with the percentage decrease in welfare being very similar across income groups [...] whereas the impacts for gasoline and electricity are strongly progressive, the kerosene impact is strongly regressive.”⁴⁹ Thus, although the benefits of subsidies may accrue to the wealthy, their removal may affect the poor to the same extent. In other words, given that the poor spend a disproportionate amount of income on energy products, increases in prices may disproportionately affect their wellbeing. This, in turn, can undermine efforts at fossil fuel subsidy reform (see section 2.4).

The results of Arze del Granado, Coady and Gillingham’s study have been confirmed by several subsequent analyses. For example, Coady *et al.*, studying the “magnitude and distribution of fuel subsidies” in Bolivia, Ghana, Jordan, Mali and Sri Lanka, found that the effects of subsidy removal would be “either distributionally neutral (Bolivia and Mali) or regressive (Ghana, Jordan and Sri Lanka)”, and that “energy subsidies are

43. *Ibid.*, p. 317.

44. Clements, B. *et al.* (2013b). *Energy Subsidy Reform: Lessons and Implications*. 28 January 2013. IMF, p. 15.

45. *Ibid.*

46. Arze del Granado, F. J. and D. Coady (2012). *The Unequal Benefits of Fuel Subsidies: A Review of Evidence for Developing Countries*. World Development. Vol 40, No. 11, pp. 2234-2235.

47. *Ibid.*, pp. 2238-2239.

48. Arze del Granado, F. J. and D. Coady (2012). *The Unequal Benefits of Fuel Subsidies: A Review of Evidence for Developing Countries*. World Development. Vol 40, No. 11, p. 2239.

49. *Ibid.*, pp. 2238.

badly targeted in all the countries analyzed here [even] for kerosene, for which subsidies are often promoted as a way of protecting the poor.”⁵⁰ They add that “the real income burden resulting from the withdrawal of energy subsidies is borne disproportionately by higher-income households, [although] lower income households do suffer sizeable real income decreases from subsidy removal, and any credible policy strategy, therefore, needs to address the mitigation of these adverse effects.”⁵¹ An IMF Technical Assistance Report written to provide guidance on possible fossil fuel subsidy reform in Angola also indicated that “although poor households consume less fuel products in absolute terms, they spend a higher share of their total budget on these products than do better-off households” in that country.⁵² Once again, case studies confirm the broad conclusion: fossil fuel subsidies are a regressive policy measure doing little to ensure that access to energy expands in developing countries that adopt them. At the same time, their removal can create difficulties for poor populations, engendering difficulties and the need for appropriate mitigation measures (see section 2.4).

Altogether, it is clear that Arze del Granado, Coady and Gillingham conducted a landmark study that undermined the argument that fossil fuel subsidies are a means to expanding access to energy to poor and vulnerable populations. Their findings have been confirmed by subsequent studies, further calling into question the utility of such subsidies. While the goal of expanding energy access to poor populations is admirable, evidence suggests that alternative policies are likely better suited to achieve that objective. Funneling limited public resources into the pockets of wealthy consumers—effectively what occurs when subsidies are adopted—is certainly not an optimal strategy.

Subsidies engender greater GHG emissions, global and local pollution

In turn, the significant negative impacts of fossil fuel subsidies on the global environment have been perhaps the most researched and discussed. As global climate change has become a growing international concern, the benefits of removing subsidies in terms of reductions in GHG emissions

has been increasingly emphasized. The list of studies which demonstrate that fossil fuel subsidy reform would lead to such gains is long. By pricing the use of fossil fuels in line with the market, countries would engender a decline in over-consumption, growth in energy efficiency, and thereby a decline in emissions and global pollution. All six studies examined by Ellis predicted significant reductions in GHG emissions if fossil fuel subsidies were systematically removed, with results ranging from a 1.1% decrease in CO₂ emissions by 2010 to an 18% decrease by 2050.⁵³ Findings such as these have consistently been reaffirmed by subsequent research and emphasized by international organizations.⁵⁴ The greater global GHG emissions that arise from subsidies are the result of numerous factors. As discussed above, subsidies are a disincentive for the adoption of more energy efficient technologies. By reducing prices for energy products, they also encourage over-consumption, increasing GHG emissions. Furthermore, subsidies undermine the adoption of renewable energies and thereby the advancement of the energy transitions countries need to undergo in order to combat climate change. In general, the resources spent on subsidies is several orders of magnitude greater than public support for renewable energy, clean energy technologies, and climate finance.⁵⁵ Ultimately, looking at all of the evidence, the fact that fossil fuel subsidy reform would result in significant benefits for the global environment is highly compelling.

Subsidies encourage illicit activities

Finally, subsidies can engender illicit activities, including the adulteration of fuels through the illegal mixing of cheaper fuels into higher quality fuel grades, and smuggling within and between countries. This factor has been brought to light repeatedly by the IEA, which points to growing anecdotal evidence that subsidies engender the growth of an energy black market. In its World Energy Outlook 2013, the IEA indicated that Iran, Indonesia and Saudi Arabia, all countries with significant fossil fuel subsidies, had identified

50. Coady, D. et al. (2006). The Magnitude and Distribution of Fuel Subsidies: Evidence from Bolivia, Ghana, Jordan, Mali and Sri Lanka. IMF Working Paper. WP/06/247. November 2006. IMF, pp. 15, 23.

51. Ibid., pp. 15, 23.

52. Fabrizio, S., K. Dybczak, V. Flamini and J. Kapsoli (2014). Angola Fuel Price Subsidy Reform: The Way Forward. Technical Assistance Report. November 2014. IMF, p. 15.

53. Ellis, J. (2010). The Effects of Fossil-Fuel Subsidy Reform: A review of modelling and empirical studies. March 2010. Global Subsidies Initiative, p. 7.

54. See Whitley (2013), IEA (2010), IEA (2014e), Burniaux, J. and J. Chateau (2011), IEA, OECD, OPEC and World Bank (2011), and IEA, OECD, OPEC, and World Bank (2013), among others.

55. See Whitley, S. (2013). Time to change the game: Fossil fuel subsidies and climate. November 2013. Overseas Development Institute; and Bridle, R. and L. Kitson (2014). The Impact of Fossil-Fuel Subsidies on Renewable Electricity Generation. December 2014. Global Subsidies Initiative.

smuggling as a problem and adopted preventative measures as a result.⁵⁶ While systematic examinations have not been conducted, the existence of international and domestic price distortions can certainly create opportunities for such activities to emerge and growing evidence suggests that they are indeed a problem.

Altogether, it can comfortably be argued that a preponderance of evidence points to the conclusion that fossil fuel subsidies have significant negative economic, social and environmental effects. In general, subsidizing energy products is an ineffective way to achieve the goals of energy independence, economic growth and the provision of energy resources to poor and vulnerable populations. Moreover, evidence suggests doing so is likely detrimental to the attainment of those objectives. With all of the past studies in mind, it is clear that reform of subsidy policies is desirable and should be encouraged on a global scale. Fortunately, given the growing evidence of the manifest ways that subsidies are harmful, momentum for such reform has been building around the world.

2.4. What is being done to respond to the demonstrated negative effects of subsidies?

As the negative effects of fossil fuel subsidies have become increasingly apparent and confirmed by empirical studies, momentum for reform has grown. At a national level, although there has been no complete survey, numerous reform programs have been identified. Clements *et al.* point to “28 major reform episodes” spanning from the 1980s to the late 2000s in 19 different countries.⁵⁷ In its World Energy Outlook 2014, the IEA identifies 27 countries in a table delineating “recent developments in fossil-fuel subsidy reform around the world.”⁵⁸ In general, momentum appears to be building worldwide in favor of reform.

In tandem with independent national actions, an international consensus in favor of fossil fuel subsidy reform has been coalescing since the global financial crisis of 2007-2008, and growing international collaboration on the issue has followed. In June 2009, the OECD member states, as part of their “Declaration on Green Growth,” vowed to “encourage domestic policy reform, with the aim of avoiding or removing environmentally harmful policies that might thwart green growth, such as

subsidies to fossil fuel consumption or production that increase greenhouse gas emissions.”⁵⁹ The G20 has also promoted action at the international level. In the final communiqué of the G20 summit held in Pittsburgh in September 2009, the G20 members committed themselves to “rationalize and phase out over the medium term inefficient fossil fuel subsidies that encourage wasteful consumption” while calling on all countries to “phase out such subsidies worldwide.”⁶⁰ This commitment was reaffirmed in subsequent summits, for which the G20 also commissioned joint reports by the IEA, OECD, IMF and World Bank regarding the scope of fossil fuel subsidies and suggestions for the implementation of reforms.⁶¹ Finally, the APEC countries echoed the language adopted by the G20, in a parallel commitment adopted in November 2009 to “rationalize and phase out over the medium term fossil-fuel subsidies that encourage wasteful consumption, while recognizing the importance of providing those in need with essential energy services.”⁶² While no specific, binding commitments have been made, all of these agreements demonstrate that national governments are recognizing the negative effects of fossil fuel subsidies and are open to support efforts to reform them.

In line with the growing international political consensus that fossil fuel subsidy reform is necessary and beneficial, a growing number of international organizations have become involved with efforts to spread awareness regarding subsidies, gather data, and assist national reform efforts. McFarland and Whitley of ODI published a report in July 2014 reviewing the roles that numerous international organizations have adopted in the realm of fossil fuel subsidy reform. They identified three main types of activities, namely:

- (1) subsidy identification and estimation;
- (2) country level support for subsidy reform, including reform-focused research;
- (3) developing coordination and learning platforms.⁶³

59. OECD (2011). Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels, p. 17.

60. IEA, OPEC, OECD, World Bank (2010). Joint Report: Analysis of the Scope of Energy Subsidies and Suggestions for the G20 Initiative. 16 June 2010, p. 6.

61. Ibid.

62. APEC (2012). Reforming Fossil-Fuel Subsidies to Reduce Waste and Limit CO₂ Emissions while Protecting the Poor. September 2012. APEC Energy Working Group and the Global Subsidies Initiative, p. 1.

63. McFarland, W. and S. Whitley (2014). Fossil fuel subsidies in developing countries: A review of support to reform processes. July 2014. Overseas Development Institute, p. 3.

56. IEA (2013). World Energy Outlook, p. 94.

57. Clements, B. et al. (2013a). Case Studies on Energy Subsidy Reform: Lessons and Implications. 28 January 2013. IMF, p. 6.

58. IEA (2014e). World Energy Outlook, p. 330-331.

Regional and international development banks (ADB, Inter-American Development Bank, GIZ), think tanks (GSI, OCI, IEEP, Chatham House), and international organizations (IEA, OECD, IMF, World Bank) have all become engaged in these efforts.⁶⁴ Certain national governments have also become directly involved with the advancement of reforms. In 2010, a group of non-G20 countries formed the Friends of Fossil Fuel Subsidy Reform with the aim of promoting change to subsidy policies and establishing peer-review mechanisms.⁶⁵ Certain G20 and APEC countries have also partnered to conduct voluntary peer-reviews.⁶⁶ Altogether, multifaceted international collaboration is being developing around the issue of fossil fuel subsidies.

2.5. Why are subsidies difficult to reform?

The growing number of mechanisms for international collaboration and support are all the more welcome given that fossil fuel subsidy reform has proven extremely difficult to implement successfully. Attempts at reforms have often failed after encountering broad-based opposition in many societies. For example, of the 28 reform processes identified by Clements *et al.* “12 were classified as a success, 11 as a partial success—often because of reversals or incomplete implementation—and five as unsuccessful.”⁶⁷ Opposition to reform has been attributed to entrenched interests in addition to poor and vulnerable populations which may be disproportionately affected by price increases despite benefiting less from subsidies than wealthier consumers of fossil fuels. Koplow identifies three predominant sources of public contestation. Firstly, those who benefit most from the subsidies that have been adopted will challenge reforms that will reduce the benefits they receive. As Koplow puts it, “the portion of a country’s capital base that was procured assuming cheap energy grows over time, and this installed base drives up the expected economic dislocations from allowing prices to reach world market levels. Political factions benefiting from the established subsidy policies become increasingly entrenched and more sophisticated as well, compounding the challenge [for reform].”⁶⁸ Secondly, although

fossil fuel subsidies may benefit the wealthy more, “even the small portion that does reach the poor can be important.”⁶⁹ Thus, “poorly planned and executed subsidy removal schemes can disproportionately harm the lowest-income quintiles. Sudden increases in the cost of basic energy or energy-intensive goods and services (often food and public transit) can make them unaffordable, worsening energy poverty.”⁷⁰ Finally, individuals involved in illicit activities such as the smuggling of subsidized fuels to higher priced jurisdictions will also attempt to stymie reform efforts. Taken together, these forces can create powerful opposition to any attempt to change existing and often longstanding subsidy policies.

Through their extensive 28 case studies, Clements *et al.* identify additional obstacles. In particular, they emphasize “lack of information regarding the magnitude and shortcomings of subsidies; lack of government credibility and administrative capacity; concerns regarding the adverse impact on the poor and concerns regarding the adverse impact on inflation, international competitiveness; and volatility of domestic energy prices”, in addition to opposition from entrenched interest groups and the difficulties associated with implementing reforms when macroeconomic conditions are weak.⁷¹ In general, lack of information on the part of the public regarding the extent to which governments spend public resources on subsidies, as well as the various negative effects they incur, reduces support. Similarly, without public trust that reforms will lead to economic, societal and environmental improvements, the multifaceted sources of opposition are difficult to surmount, thereby ensuring subsidies remain in place. Finally, concerns regarding poverty and economic competitiveness, as indicated by Clements *et al.*, can lead to reticence on the part of governments to engage in reforms. In turn, once reforms are adopted, public outrage both from disproportionately affected poor and from economic sectors that benefit the most can scuttle the implementation of new policies.

2.6. How can obstacles to reform be overcome?

Fortunately, a growing number of studies of past reform efforts have identified strategies that have

64. Ibid.

65. Ibid., p. 6.

66. Ibid.

67. Clements, B. et al. (2013b). Energy Subsidy Reform: Lessons and Implications. 28 January 2013. IMF, p. 21.

68. Koplow, D. (2014). “Global Energy Subsidies: Scale, Opportunity Costs, and Barriers to Reform.” In Halff, A., B. K. Sovacool and J. Rowhon (2014). Energy Poverty:

Global Challenges and Local Solutions. Oxford: Oxford University Press, p. 326.

69. Ibid., p. 327.

70. Ibid.

71. Clements, B. et al. (2013b). Energy Subsidy Reform: Lessons and Implications. 28 January 2013. IMF, pp. 23-25.

allowed governments to overcome these many challenges. Koplow summarizes guidelines for successful reform by placing them into four broad categories:

(1) using broader changes within the economy to also fix energy pricing;

(2) acknowledging and addressing from the outset whether dislocations may result from reform;

(3) communicating clearly about the costs of current policies, and both the benefits and challenges of reform;

(4) instituting reforms that are not reliant merely on political goodwill to remain effective.⁷²

These four categories delineate broad strategies that can be applied to particular national contexts. Of course, given that every country has a unique socio-economic and political context, as well as a particular set of subsidies, any attempt at reform will need to be adapted accordingly. Nevertheless, these general strategies have been demonstrated to work through studies of reforms implemented around the world.

Analyzing cases of successful reform, each of the broader categories can be linked to specific contexts or policies adopted by governments that were helpful. Firstly, and most simply, fiscal pressure has been identified as an instigator of reform. When countries have faced ever higher costs to sustain subsidies, the need for reform and the will to execute it becomes acute.⁷³ In such cases, the need for budgetary relief cannot be ignored.

Secondly, it has been recognized that so-called mitigation measures aimed at smoothing the transition to new pricing schemes for those groups that will be most negatively affected by reform are frequently essential. These can take many forms and effectively constitute compensation provided by governments to allow certain populations or industries to adjust to imminent changes in energy prices. The IEA has emphasized that “resistance to subsidy reform is understandable where the beneficiaries of the subsidies stand to suffer real hardship. That is why reforms need to be managed in such a way as to reduce or offset the negative consequences for those groups of consumers that

stand to lose out, especially the poor.”⁷⁴ In particular, direct, unconditional or conditional cash transfer programs which distribute cash to lower income citizens in tandem with changes to pricing policies have been notably successful in several cases.⁷⁵ At the same time, these measures “might only be temporary, to help consumers or producers get over the initial shock of subsidy removal. Where more permanent support is justified, measures are likely to involve welfare payments to the poor and vulnerable—a generally much more efficient and cost-effective way of providing assistance to those groups than fossil fuel subsidies.”⁷⁶ Whatever the specific strategy may be, assessing what the impact of reform will be and devising ways to minimize hardship on those groups that suffer most has been demonstrated to be an important component of successful attempts at subsidy reform.

Thirdly, effective, widespread and consistent communication with respect to the negative effects of subsidies, the benefits of subsidy reform, and the nature of reform plans can ensure that broader societal support for reform is attained. Given that subsidies are extraordinarily costly while incurring few benefits overall, educating the public can be an effective means for overcoming opposition. Several cases demonstrate how effective communication was essential to the smooth implementation of subsidy reforms.⁷⁷ In addition, a recent study of survey data from Indonesia revealed that, when subsidy policies, costs, and the need for reform are explained to citizens, support for reform grows even amongst those initially opposed.⁷⁸ When explained clearly, and in conjunction with mitigation measures, support for reform can be mobilized.

Fourthly and finally, shifting to market pricing, as opposed to consistently changing prices on an ad-hoc basis, can prevent backsliding on reforms when economic, political or social conditions change. As the IEA puts it, “the essential objective of government policies to reform fossil fuel subsidies is to get prices right, i.e. ensure that energy prices reflect their true economic value. This must involve letting the market determine pre-tax prices freely, ensuring that a competitive market, once

72. Koplow, D. (2014). “Global Energy Subsidies: Scale, Opportunity Costs, and Barriers to Reform.” In Halff, A., B. K. Sovacool and J. Rowhon (2014). *Energy Poverty: Global Challenges and Local Solutions*. Oxford: Oxford University Press, p. 328.

73. See Koplow, D. (2014). “Global Energy Subsidies: Scale, Opportunity Costs, and Barriers to Reform.” In Halff, A., B. K. Sovacool and J. Rowhon (2014). *Energy Poverty: Global Challenges and Local Solutions*. Oxford: Oxford University Press, p. 328; and IEA (2011). *World Energy Outlook*, p. 525.

74. IEA (2014e). *World Energy Outlook*, p. 342.

75. Global Subsidies Initiative (2012). *A Citizen’s Guide to Energy Subsidies in Indonesia: 2012 Update*, pp. 31-35.

76. IEA (2014e). *World Energy Outlook*, p. 343.

77. IEA (2014e). *World Energy Outlook*, pp. 343-344.

78. Pradiptyo, R., A. Wirotomo, A. Adisasmita and Y. H. Permana (2015). *The Role of Information in Perception of Fossil-Fuel Subsidy Reform: Evidence from Indonesia*. March 2015. Global Subsidies Initiative, p. 32.

created, works efficiently, and identifying and unravelling all other forms of government intervention that cannot be economically justified.”⁷⁹ Koplow adds that “political support for subsidy reform ebbs and flows depending on local politics, broader economic conditions and global energy prices. To prevent a reversion to subsidies when oil prices rise, for example, a shift from ad-hoc (politically determined) energy prices to market prices is important.”⁸⁰ In general, depoliticizing the pricing of energy should be a goal of fossil fuel subsidy reform. In this way, changes in policy can be durable and the benefits of subsidy removal reaped to the fullest extent.

Bringing together these strategies, the IEA has created a schematic detailing a timeline of goals and advancements that should take place in an ideal fossil fuel subsidy reform program.⁸¹ The schematic includes the implementation of communication and mitigation measures alongside policies that lead to market pricing of energy products, in addition to taxes that reflect externalities.⁸² All of the critical components of successful reform efforts are thereby included. Ultimately, although subsidy reform is difficult, with the right strategies, and through the incorporation of lessons learned from past efforts at reform, it can be accomplished.

Acknowledging the potential for success and the need for reform, it is unsurprising that a growing number of countries have begun to change their energy policies. Recognition of the mechanisms that increase the chances for success offers hope that ever more governments which choose to implement reforms will do so successfully. The growing amount of international collaboration and support will also positively reinforce national efforts. At the same time, despite significant advancement, there still exists a certain degree of uncertainty over the effects of subsidies and the potential socio-economic and environmental consequences of reforming them. Further study and analysis is thus necessary to continue to advance the cause of reform and to ensure that national attempts at reform succeed, while those who will be negatively affected by change are protected appropriately.

2.7. Why have non-household consumers of subsidized energy products been understudied?

Although past studies have developed our understanding of fossil fuel subsidies, they have focused on the effects of those subsidies on macroeconomic conditions, households, and the global environment. This tendency is probably the result of the fact that fossil fuel subsidies were implemented in order to broadly promote economic growth and energy independence, and to ensure that poor households have access to energy resources. Studies have naturally sought to assess the efficacy of subsidies in achieving the policy goals that justified their adoption. In turn, the link between fossil fuel use and global climate change has prompted analyses of how fossil fuel subsidy reform would impact global GHG emissions and efforts to combat climate change as well as transitions to renewable energies and greater energy efficiency. Although past examinations have been extraordinarily valuable in demonstrating the negative effects of subsidies and facilitating the implementation of reforms, they do not provide a complete picture of the ways that fossil fuel subsidies and their reform affect economies and societies.

Among the neglected elements of subsidy study and discourse have been non-household consumers of subsidized energy products. In fact, there have been limited to no systematic analyses of the consumption of subsidized fossil fuels by sectors other than households. This is the case despite the fact that commercial or industrial consumers may consume greater amounts of fossil fuels and may thereby be receiving more public support despite not being the sectors ostensibly targeted by those measures. From this possibility emerge numerous questions. For example, how are sectors which consume significant amounts of subsidies apart from households affected by fossil fuel subsidy reform? What are the ensuing effects of reform on employment and economic growth? Do these sectors engender significant GHG emissions? How should these consumers be taken into account by policymakers seeking to implement subsidy reforms, and are targeted mitigation measures for these sectors possible and desirable? At this stage, there has been insufficient study to answer these questions concretely. As a result, further research is necessary, as those answers would provide a more comprehensive understanding of the effects of subsidies and how best to reform them. A close look at available data and the specific case of Indonesia (see section 3 below) can provide preliminary indications as to the importance of non-household consumption, the way non-household

79. IEA (2014e). World Energy Outlook, p. 341.

80. Koplow, D. (2014). “Global Energy Subsidies: Scale, Opportunity Costs, and Barriers to Reform.” In Halff, A., B. K. Sovacool and J. Rowhon (2014). *Energy Poverty: Global Challenges and Local Solutions*. Oxford: Oxford University Press, p. 329.

81. IEA (2014e). World Energy Outlook, p. 340.

82. IEA (2014e). World Energy Outlook.

sectors can be taken into account by policymakers, and avenues for further study.

2.8. To what extent do non-household sectors consume subsidized energy products?

Examining patterns of energy consumption in countries with fossil fuel subsidies and how they compare with consumption worldwide or in developing (non-OECD) or developed (OECD) countries is a logical first step toward the development of a clearer picture of the effects of subsidy policies. IMF data on fossil fuel subsidies and IEA data on consumption of energy products can provide qualified indications. Crucially, the data suggest that a large percentage of such subsidies do not directly benefit households. At the same time, they may help certain industries and businesses, with indirect benefits with respect to employment and competitiveness that need to be studied in more detail. They also suggest that policies which target non-household consumers of subsidized fossil fuel products should be considered by policymakers as part of broader plans for fossil fuel subsidy reform. Ultimately, the need for greater study of non-household consumers is made evident, as is the fact that policy measures that target them should be considered within the broader context of fossil fuel subsidy reform.

For the purpose of assessing the degree to which countries subsidize the consumption of fossil fuels, this study uses the pre-tax subsidy estimates published in Clements *et al.* This dataset was selected because it was the most detailed on fossil fuel subsidies publically available. Appendix I of Clements *et al.* delineates the pre-tax and post-tax subsidy rates as a percentage of national GDP and of government revenue by country and by energy product (petroleum products, electricity, natural gas and coal).⁸³ Such level of specificity is unique to this publication.

The use of this IMF data comes with numerous caveats. These are discussed directly by Clements *et al.* in their report. Among them is the fact that the subsidy estimates draw on data from different sources that use a variety of methodological approaches and therefore lack full comparability, as well as on a series of assumptions concerning transportation and distribution margins across countries, and how corrective taxes would vary with country income levels.⁸⁴ Recognizing these

limitations, Clements *et al.* conclude that “these weaknesses are outweighed by the merits of constructing a broad picture of the magnitude of energy subsidies across as many countries and products as possible.”⁸⁵ Given the relative lack of data on fossil fuel subsidies, a recognized obstacle to their study (see section 2.1 above), this logic was adopted for this study as well. Interpretation of the following results should take into consideration the fundamental limitations of the data utilized. Conclusions drawn from the results can be considered as preliminary and as pointing above all to avenues for further research.

In addition to these limitations, as discussed in section 2.2 above, the Clements *et al.* estimates were revised by Coady, Parry, Sears and Shang in light of new data. Table 5 delineates the differences in the respective estimates. As can be seen, the revisions for pre-tax subsidies did not exceed \$25 billion for any energy product, with the total pre-tax subsidies revised upward from \$492 billion to \$523 billion, an increase of \$31 billion in total. Although not inconsequential, this revision is significantly smaller than the several trillion dollar increases in estimates for post-tax subsidies. The post-tax changes are greater to such a larger extent as a result of the improved precision of the data used for estimating the cost of externalities tied to energy use; costs that are only taken into account in post-tax estimations.

For this study, the specificity of the data available in the Clements *et al.* publication was the reason it was utilized for further analysis. Unfortunately, the data in the Coady, Parry, Sears and Shang study was not disaggregated into individual country estimates, but only into estimates based on regional groupings. As a result, it is not clear which specific countries were subsidizing which particular energy product or products. Given that the revisions for pre-tax subsidies published by Clements *et al.* were relatively small and not as significant as those for post-tax subsidies, they were used for the present analysis. Table 4 delineates the countries identified as having fossil fuel subsidies by Clements *et al.*, subdivided by energy product and by OECD membership. For reference, Table 3 delineates the overall estimates for subsidies worldwide as determined by Clements *et al.*, with the average amount of resources spent on subsidies by subsidizing countries in terms of percentage of GDP and percentage of government revenue also calculated and indicated.

With the countries that subsidize energy products having been identified and classified by the

83. Clements, B. et al. (2013b). Energy Subsidy Reform: Lessons and Implications. 28 January 2013. IMF, pp. 48-66.

84. Ibid., p. 9.

85. Ibid.

type of energy product subsidized, IEA data concerning the utilization of different energy products illustrates the nature of consumption patterns and allows for a comparison with non-OECD countries, OECD members, and worldwide. Specifically, IEA World Energy Statistics were accessed through the OECD's online statistics database, linked through the OECD ilibrary. These statistics contain detailed information regarding the consumption of all energy products, broken down by sector and use in a majority of the world's countries.

Tables 8-11 and Figures 5-11 illustrate the results drawn from the available data. For each table the total consumption of each product in the countries which subsidize it was calculated by sector. Thus, for those countries with petroleum product subsidies, consumption of gasoline, diesel, kerosene and LPG, the most commonly subsidized products, was calculated. This was repeated for electricity, natural gas, and coal. Consumption was estimated only for those countries which were identified as having subsidies for the specific energy product being considered. The percentage of total use by prominent sectors was subsequently obtained. Table 4 indicates the countries for which data was not available, and which were therefore not included in the analysis.

Sectoral consumption of energy products is similar in subsidizing countries and non-OECD countries in most cases

The data provide numerous insights into the nature of energy consumption in countries with fossil fuel subsidies. Firstly, as was to be expected, a majority of countries identified as having pre-tax consumption subsidies by Clements *et al.* are non-OECD developing countries. Coal is an exception in that a majority of countries subsidizing coal consumption are OECD member states, although there are fewer countries in total in comparison with the other energy products. This can be visualized in Table 4. In turn, given that most subsidizing countries are non-OECD developing countries, the subsidizing country totals for the consumption of energy products are very similar to the general non-OECD country totals. This is the case for motor gasoline, diesel, electricity and natural gas. For each of those products, there is less than a 2.5% difference between the percentages indicated for the subsidizing countries and for non-OECD countries. The difference for kerosene is slightly greater, with households consuming 5.13% more in subsidizing countries than in non-OECD countries generally. LPG is the greatest exception, in that 44.4% of LPG use is attributed to households in subsidizing countries, as opposed to 62.04% in non-OECD countries. However, it is important to emphasize

that Clements *et al.* did not take into account LPG in their analyses of countries with fossil fuel subsidies. That may skew the results and undermines any potential inferences that can be drawn. In addition, coal consumption is used primarily for the production of electricity and heat (the two primary forms of "transformation processes") in subsidizing countries, but in a percentage between that of OECD and non-OECD countries; a result to be expected given the smaller number of countries which subsidize coal in total and the fact that most countries which do so are OECD member states.

Sectoral consumption varies by product

Secondly, the data show that different sectors are the predominant consumers of the various energy products. In terms of petroleum products, the transport sector unsurprisingly consumes nearly the totality of motor gasoline no matter what the country grouping. Diesel is similarly used predominantly by the transport sector; around two-thirds of total consumption in every country grouping. Kerosene is the only product used primarily by households, with the vast majority used by households in subsidizing countries (84.92%) and non-OECD countries (79.79%). LPG is also predominantly used by households in non-OECD countries (62.04%). As discussed above, by not considering LPG in their estimates, Clements *et al.* limit the conclusions that can be drawn from the fact that households consume a substantial amount, but not the majority, of LPG in the identified subsidizing countries (44.40%).

Electricity usage is more differentiated than that of petroleum products in terms of both sectors and country grouping comparisons. Industry consumes the majority of electricity in countries which subsidize electricity consumption and in non-OECD countries generally (54.39% and 52.23%, respectively), followed by residential consumers and commercial or public sector consumers. These countries also experience significant losses of electricity, probably due to poor infrastructure. This is in contrast with OECD countries where households and the commercial and public sector consume a substantially greater percentage of electricity (27.09% and 27.32%, respectively, in OECD countries in comparison with 16.86% and 9.83%, respectively, in countries with electricity subsidies), while industry consumes relatively less (37.72% in OECD countries in comparison with 54.39% in countries with electricity subsidies), and there are fewer losses.

Natural gas is predominantly used for electricity and heat generation in all country groupings, although in a slightly higher percentage in countries which subsidize natural gas consumption and

non-OECD countries in comparison with OECD members. Industry is the second highest consumer, accounting for just above a quarter of consumption in all country groupings. Households account for a relatively smaller portion (12.31% in countries with natural gas subsidies in contrast with 18.96% in OECD countries). Similarly, the vast majority of coal is used for electricity and heat generation. The remainder is predominantly consumed by industry; a pattern that holds for all country groupings.

Households do not directly consume the majority of subsidized energy products

Taking into account this data, several conclusions can be drawn with respect to the nature of fossil fuel subsidies. Most importantly, the data call into question the efficacy of using fossil fuel subsidies as a means to expand access to energy resources to poor and vulnerable households. While households do consume all subsidized energy products to some degree, in countries with consumption subsidies they are not the primary consumers of any except for kerosene. Thus, in countries with subsidies for petroleum products, kerosene is the only energy product for which the majority of public resources being used to subsidize consumption are certainly being directed to households. By extension, the majority of public resources being spent on subsidies for other products are most likely going to other sectors. It is therefore possible to argue that there are perhaps more effective and direct ways to benefit the welfare of citizens with low incomes.

Furthermore, coupled with the existing evidence suggesting that, in the case of household consumers of energy products, the benefits of subsidies accrue to wealthier households as opposed to the poor, it is even clearer that subsidies are an ineffective policy for social protection and the expansion of energy access. The share of consumption indicated for households, already a relatively smaller percentage in comparison with other sectors, primarily indicates consumption by wealthy households. In other words, a truly small portion of public resources are directly benefiting the poor. Broader consumption patterns are therefore further evidence that mitigation measures associated with fossil fuel subsidy reform discussed in section 2.6 above and broader social welfare policies are likely much better for the poor than the subsidization of energy consumption.

Non-household sectors are the main beneficiaries of the subsidization of most energy products

While households benefit most directly from kerosene subsidies, it is at the same time possible to discern which sectors may be benefiting most from

the subsidized consumption of other products. The transport sector in particular benefits from subsidies on motor gasoline and diesel. Further detail is needed to determine whether this mainly benefits households engaged in passenger transport as opposed to commercial transport and freight (see Box 1). The latter is certainly benefiting to a large extent from diesel subsidies given that diesel fuels are mainly utilized by trucks and buses.⁸⁶ In terms of electricity, natural gas and coal subsidies, industry generally may be bolstered substantially by lower energy prices, with the general commercial and public sector to a smaller degree. For natural gas and coal in particular, benefits may be captured by providers of electricity and/or heat, as these products are mainly used in such a manner. In all of these cases, households are certainly not benefiting directly to a large extent.

In general, the data presented is broad in nature, and greater specificity is needed to understand which commercial actors in an economy are the primary beneficiaries of subsidy policies. It is important to note that the context will be different from country to country, given that subsidy policies and energy consumption patterns are fundamentally unique in each case. What is clear is that national governments should understand which economic sectors and actors are consuming subsidized energy products, and therefore predominantly benefiting from subsidy policies that have been adopted. The data also demonstrate the importance of further research into the ways subsidies impact the sectors which consume large amounts of subsidized fossil fuels. Now that it is clear that numerous sectors apart from households benefit from consumption subsidies, a variety of questions and concerns emerge. What are the indirect economic effects of subsidizing the consumption of energy products in terms of employment and investment? How will fossil fuel subsidy reform affect those non-household sectors, and what will be the indirect economic and social consequences of reform?

Ultimately, even if subsidies are not being directly recovered by households, households (and society generally) may nevertheless be benefiting indirectly from the manner in which subsidies might bolster industry and businesses, leading to greater employment, improved business competitiveness, and by extension greater economic growth. Assessing the potential broader economic benefits is important for ensuring that fossil fuel subsidy reform is implemented successfully and that

86. United States Energy Information Administration Energy Explained at <http://www.eia.gov/energyexplained/index.cfm>

Box 1. The transport sector and fossil fuel subsidies

The transport sector is a major beneficiary of subsidies for petroleum products, in particular gasoline and diesel. Assessing the degree to which subsidies assist passenger transport as opposed to commercial transport, thereby linking them to households, their ostensible target, is difficult. In addition, it is currently unclear how subsidies affect the sector beyond encouraging it to over and inefficiently consume fuels. Importantly, subsidy reform may have an effect on commercial transport, including freight and commercial public transport. Understanding these dynamics can be useful for policymakers. Greater study can show them how to plan for reform, and perhaps how to ensure that potential negative impacts are foreseen and addressed. Need for these analyses is only compounded given the links between the transport sector, fossil fuel use, GHG emissions, and efforts to combat climate change.

Data on the transport sector is difficult to attain and usually not publicly available. The IEA is a primary source of information and has published extensive reports, including “Transport, Energy and CO₂: Moving Toward Sustainability” and successive “Energy Technology Perspectives (ETP)” since 2006. It has also developed the “Mobility Model” which contains “historical data and projects and includes all transport modes and most vehicle types... now [covering] 22 countries and regions” (IEA 2009, p. 48). This is the most comprehensive database on the sector, but access is strictly restricted.

What is publically available makes it clear that the contribution of the sector to GHG emissions is substantial. As the IEA states “worldwide, transport sector energy and CO₂ trends are strongly linked to rising population and incomes. Transport continues to rely primarily on oil. Given these strong connections, decoupling transport growth from income growth and shifting away from oil will be a slow and difficult process” (IEA 2009, p. 44). Reducing and eventually removing fossil fuel subsidies would certainly be a significant step towards achieving that decoupling.

Data available through the ETP 2015 publication offers estimates as to the degree to which gasoline and diesel are used for passenger as opposed to commercial freight transport. The relevant data can be visualized in Table 12 and Figure 12. Although the data in fact constitute projections as opposed to historical figures, they nonetheless offer an idea as to the nature of energy consumption in the transport sector. They notably show that, in terms of road transport, light road vehicles, which are more likely to utilize gasoline, are more commonly used for passenger transport, while the inverse is true for heavy road vehicles, which are more likely to utilize diesel. These trends are true for both OECD and non-OECD countries. Thus, this data demonstrate that subsidies for diesel are likely disproportionately benefitting commercial transport and freight businesses. Governments may want to keep that in mind when considering subsidy reforms.

In terms of the Indonesian case, there are indications that almost the totality of diesel and even a majority of gasoline are used for commercial purposes (World Bank 2006, p. 27). The latter possibility does not follow global trends, or even the regional ASEAN trend identified through ETP data (although the percentage of light road vehicles used for freight is higher in the ASEAN region than for non-OECD or OECD countries generally, as can be seen in Figure 12). Commercial transport in the country is heavily liberalized and competitive, although the sector suffers from poor infrastructure and the charging of illegal levies on major roads (ADB 2012 and The Asia Foundation 2008). Removal of subsidies would likely make the sector more fuel efficient while freeing public resources for the tackling of the primary obstacles undermining its advancement. This would by extension result in economic, societal and environmental gains. In short, further research and examination of the transport sector and its link with fossil fuel subsidies could be of use both globally as well as in the case of Indonesia.

negative effects of reform are minimized. Delving deeper, evidence suggests that understanding of the potential effects on non-household consumers of fossil fuels is limited and should be the focus of greater study.

2.9. What have existing studies indicated with regards to non-household consumers?

As discussed in section 2.3 above, past research has offered a significant amount of evidence demonstrating that fossil fuel subsidies are not good for economies. While removal of subsidies can lead to greater energy costs and inflationary pressures in the short-term, efficiency and competitiveness gains will boost economic growth in the long-run. The energy sector in particular would see greater opportunities for investment. At the same time, specific studies of non-household sectors that consume a large amount of subsidized energy products and

that would be affected by reform could be of use, especially given that they are the primary consumers of most energy products in subsidizing countries. Recognizing that reform would bring economic benefits overall, assessments of those sectors which benefit most from subsidies could demonstrate, on the one hand, that subsidy reform would be harmful and that mitigation measures directed at those industries and businesses could improve reform efficacy. It could, on the other hand, demonstrate that they could be specifically targeted by reform policies as part of a systematic shift to market pricing. Such targeting may bring about positive fiscal and economic effects while allowing some subsidies that benefit poor households to be sustained in the interest of a smooth transition to a new policy environment. What is clear is that further study of non-household consumers of subsidized energy would certainly be of use to policymakers and has been underappreciated to date.

Non-household consumers have not been the focus of past studies concerning fossil fuel subsidies

The fact that non-household consumers have generally not been the focus of past studies is clear from a review of publications pertaining to fossil fuel subsidies. While the impacts of fossil fuel subsidy reform on households are extensively discussed in many major reports, non-household consumers are not mentioned, or only mentioned briefly. For example, the IEA, OECD, OPEC and World Bank Joint Report published for the G20 in 2010 mentions the impact of energy subsidy reform on industry in one paragraph, but spends several pages discussing social equity, environmental and broader economic concerns.⁸⁷ Similarly, in the GSI report published for APEC entitled “Reforming Fossil-Fuel Subsidies to Reduce Waste and Limit CO₂ Emissions while Protecting the Poor,” what the authors call “consumer groups” are discussed for a few paragraphs in a 134-page report that focuses extensively on broader socio-economic and environmental challenges that emerge from reform as well as the strategies that can ensure reforms succeed.⁸⁸ Even in specific case studies, the tendency to not extensively discuss non-households holds true. For example, the IMF’s Technical Assistance Report written to assist Angola in its plans for fossil fuel subsidy reform states that conducting an analysis of the potential measures to mitigate the transition for the most energy intensive economic sectors to new pricing mechanisms in the country is “beyond the scope of the report.”⁸⁹ Finally, in an extremely rare report exclusively concerning the effects of fossil fuel subsidy reform on businesses, a GSI Briefing Note by Tambunan sought to evaluate the potential impact of subsidy reforms on SMEs in Indonesia, but could only provide preliminary conclusions (see Box 2). These are simply illustrations of the relatively fewer analyses that have focused on specific economic sectors which consume significant amounts of energy and thereby certainly

benefit to a notable degree from subsidies in many countries. Interestingly, the reports mentioned are among the few in the bibliography presented at the end of this study which acknowledge the possibility of delving into the specificities of energy use by particular economic sectors that consume subsidized energy and the effects that fossil fuel subsidy reform would have on them. Actually delving into such analyses may reveal pathways for reform and other beneficial insights.

Existing studies offer frameworks and avenues for further research

The reports that do discuss non-household consumers of subsidized fossil fuels offer a useful framework for the conduct of further analyses. At the broadest level, subsidies will affect the specific industries and businesses that use the most energy. The IEA data discussed in section 2.8 only provides a general indication on energy consumption by sector, and greater specificity would be the first step in any analysis. In fact, there are generally a limited number of sectors that are particularly energy intensive. As the IEA, OECD, OPEC and World Bank point out in their Joint Report, “energy cost shares in most industries are relatively low, between 0.5% and 3%.”⁹⁰ In turn, they identify three parameters that would determine how fossil fuel subsidy reform would affect the output of industries, namely:

- (1) the importance of energy inputs in production as represented by their cost shares;
- (2) the ease with which energy can be substituted by other inputs, whether to cheaper fuels or through reduced energy use;
- (3) the ability of producers to pass on the increase in energy costs to consumers, as measured by the elasticity of demand for output, which in turn, depends on whether reforms are done unilaterally or multilaterally.⁹¹

Thus, the degree to which energy is important to an industry or business and the degree to which that industry or business can adapt to higher prices by becoming more efficient, shifting the resources it uses, or passing costs on to consumers, will logically be the factors that determine the impact of fossil fuel subsidy reform on that industry or business. As noted in the report, “these parameters vary across production activities and countries.”⁹² While, as with the subsidies themselves, local contexts will differ and national considerations could

87. IEA, OPEC, OECD, World Bank (2010). Joint Report: Analysis of the Scope of Energy Subsidies and Suggestions for the G20 Initiative. 16 June 2010, p. 23-26. Paragraph 58 is the only paragraph regarding the impact of reform on industry, while paragraphs 59-71 discuss impacts on households, the environment and the economy generally.

88. APEC (2012). Reforming Fossil-Fuel Subsidies to Reduce Waste and Limit CO₂ Emissions while Protecting the Poor. September 2012. APEC Energy Working Group and the Global Subsidies Initiative, pp. 44, 53-54.

89. Fabrizio, S., K. Dybczak, V. Flamini and J. Kapsoli (2014). Angola Fuel Price Subsidy Reform: The Way Forward. Technical Assistance Report. November 2014. IMF, p. 22.

90. IEA, OPEC, OECD, World Bank (2010). Joint Report: Analysis of the Scope of Energy Subsidies and Suggestions for the G20 Initiative. 16 June 2010, p. 23.

91. Ibid.

92. Ibid.

lead to various conclusions and the adoption of different policies, conducting analyses of the parameters identified could be useful and improve the efficacy of reform. This is particularly the case given that industrial and commercial consumers broadly defined are the predominant consumers of most subsidized energy products. The results of such assessments could therefore guide policy-makers as they develop reform programs.

More concretely, it is clear that any analyses of non-household consumers of subsidized energy products must identify the most energy intensive sectors with greater specificity than that provided by the IEA data presented in section 2.8 above. Subsequent analyses would then need to assess the degree to which the identified sectors benefit from existing subsidies, how they would be affected by possible reforms, and how policies should be structured to take those considerations into account. The IMF Technical Assistance Report for Angola points to the utility of this approach. For the report, the research team identified the most fuel intensive sectors in the Angolan economy through the use of indicators that capture the fuel intensity of industrial or commercial activities.⁹³ They found that they were “transport and warehousing; fishing; production and distribution of electricity and water; mining of diamonds, metallic minerals, and other resources; metallurgy; manufacture of processed metals; construction,” and so forth.⁹⁴ They thus conducted the natural first step of any analysis. However, the team stopped there stating that “if the authorities wish to consider short-term measures that give these enterprises time to adjust to higher fuel prices, the amount of such subsidies should be subsequently reduced and then eliminated. Designing such programs would require more extensive analysis of the sectors (including an assessment of their competitiveness) and of Angola’s credit markets, which falls beyond the scope of this report.”⁹⁵ Advancing further could have led to important insights into the nature of subsidies, how they can affect certain industries and business, and how subsidy reform could be implemented most effectively. Nevertheless, the report does point the way forward for future studies.

There is some evidence that countries which have conducted assessments on the potential impacts of

reform on specific non-household consumers have chosen to apply mitigation measures aimed at smoothing the transition to new pricing schemes for those sectors. This is an important insight, demonstrating that, with the aim of ensuring reforms succeed, strategies that apply to households can also apply to non-household consumers. Specifically, GSI point to Poland and France, which accompanied subsidy reforms tied to coal production with specific support to the coal mining sector and communities.⁹⁶ In addition, they identify a series of support packages implemented by the Iranian government to support the country’s corporate sector when fossil fuel subsidy reforms were implemented in 2010. These included “interest subsidies on loans for the adoption of new, energy-saving technologies; credit lines to mitigate the impact of higher energy costs on cash flow or to spread the costs of higher energy over a three-year period; revised fees, taxes, import tariffs and export awards for specific industries; and initiatives to improve enterprises’ efficiency, such as credit for the hiring of consultants to improve management.”⁹⁷ In general, GSI acknowledged that “energy-intensive sectors, such as petrochemicals, steel, cement and transport will be affected [by fossil fuel subsidy reform]” and that “governments will need to consider a wide range of policies to support vulnerable sectors and help industries cope with the rise in energy prices. These complementary policies could include measures to improve energy efficiency, improve investment infrastructure, extend credit facilities and other banking services, or implement policies to strengthen market forces and encourage competition.”⁹⁸ These cases offer preliminary evidence that studies of non-household consumers should perhaps become integrated components of broader programs of fossil fuel subsidy reform. Governments may deem that, in addition to extending support to poor households—policies that, have been acknowledged as a critical component of any reform program—mitigation measures for energy intensive sectors should also be provided. It is therefore advisable that further analyses of both the cases mentioned as well as of the situation in countries currently developing plans for reform are conducted.

93. Fabrizio, S., K. Dybczak, V. Flamini and J. Kapsoli (2014). *Angola Fuel Price Subsidy Reform: The Way Forward*. Technical Assistance Report. November 2014. IMF, p. 24. See Appendix I for a detailed discussion of the methodology applied to identify fuel-intensive sectors.

94. *Ibid.*

95. *Ibid.*, p. 22.

96. APEC (2012). *Reforming Fossil-Fuel Subsidies to Reduce Waste and Limit CO₂ Emissions while Protecting the Poor*. September 2012. APEC Energy Working Group and the Global Subsidies Initiative, p. 53.

97. *Ibid.*, p. 54.

98. *Ibid.*

Box 2. MSMEs, employment and fossil fuel subsidies

In attempting to assess the impact of fossil fuel subsidy reform on non-households, it is likely that MSMEs will have to be taken into consideration. The most common types of firms and frequently the ones that employ the greatest number of people in many countries throughout the world, MSMEs are an important component of any country's economy and society. The degree to which these firms benefit, or are harmed, by fossil fuel subsidies or subsidy reform are largely unknown. While studies of the impacts of subsidies on non-household consumers would be beneficial generally, honing analyses on MSMEs specifically is an additional avenue for future research.

Unfortunately, MSMEs are difficult to study as governments have adopted a variety of definitions with respect to which firms are considered micro, small, medium or large. Definitions may involve a single or combination of factors such as number of employees, or annual turnover or investment, among others. Such firms are also frequently part of countries' informal sectors, precluding effective data collection. Recognizing these limitations, research teams working for the World Bank have conducted some of the most comprehensive global analyses to date. Kushnir, Mirmulstein and Ramalho (2010) conducted an unprecedented global survey, identifying 125 million formal MSMEs in 132 economies. Their study notably revealed that the characteristics of MSMEs vary significantly across regions and countries. Ayyagari, Demircuc-Kunt and Maksimovic (2011) also published an extensive analysis of SMEs in 104 economies and assessed their impact on employment and economic activity. Their work offered numerous insights, among them being that smaller firms may be more important to lower income economies than higher income ones.

Keeping in mind the various limitations associated with the dataset compiled by Ayyagari, Demircuc-Kunt and Maksimovic, Figure 13 illustrates the average percentage of total employment by company size in 91 non-OECD countries. The data show that larger firms tend to employ on average a smaller percentage of individuals in developing countries. If one considers the most common definition of SME as a firm with fewer than 250 employees, formal SMEs then employ a majority of individuals on average (66.1%). It is safe to argue that SMEs are important economic actors in developing countries.

In terms of fossil fuel subsidies, these studies show, above all, that local contexts have to be taken into consideration given the varying socio-economic importance of MSMEs for different countries. They also show that MSMEs employ a significant, if not necessarily a majority, of people in developing countries; countries that are more likely

to subsidize the consumption of energy. The effects of subsidies and subsidy removal on MSMEs has not been studied extensively. It would likely be beneficial for governments planning to undergo fossil fuel subsidy reform to assess in greater detail the possible impacts of higher energy prices on those firms which employ significant segments of their respective countries' populations.

MSMEs play an outsized role in Indonesia's economy specifically, in line with their general importance in Asia more generally. Figure 14, which illustrates data from the Indonesian Ministry of Cooperatives and Small and Medium Enterprises, shows that micro enterprises accounted for over 90% of total employment in Indonesia from 2006–2012. It is also the country with the second highest number of MSMEs per 1,000 people in the world according to Kushnir, Mirmulstein and Ramalho (2010, p. 3). Finally, according to the ADB, “in Indonesia there were 56.6 million MSMEs, accounting for 99.9% of total enterprises in 2012 [absorbing] 97% of the total workforce in businesses sectors [and underpinning] the national economy with a stable contribution of around 60% of GDP” (ADB 2013, p. 65). This is in line with trends in Asia generally, where MSMEs account for over 90% of total enterprises in each of 14 different countries for which an assessment was made (ADB 2013, pp. 7–8).

Their significance for the Indonesian economy not in doubt, it is surprising that numerous assessments with respect to how fossil fuel subsidy reform would affect MSMEs have not been conducted. GSI's Briefing Note by Tambunan constitutes an exceptional attempt at using existing survey data to assess the energy intensity of MSMEs and the potential impacts of the subsidy reforms underway in the country. The report concludes that, fundamentally, “SMEs are extraordinarily diverse and the current state of knowledge is too poor to accurately predict in detail how energy pricing will affect different sectors or groups of industry,” while recognizing that there is evidence that “SMEs are less energy-intensive than LEs, but they are also more vulnerable” and that “indirect impacts of energy price increases are likely to have the most serious effects on SMEs, especially through the costs of transportation, raw materials and capital” (Tambunan 2013, p. 11).

Looking forward, national governments may be advised to conduct assessments of subsidy reform impacts on MSMEs. While the Indonesian case is particular given the extreme economic importance of MSMEs in that country, they are nevertheless significant economic actors in many developing countries and should therefore be considered by policymakers devising subsidy reform policies.

Further examination of non-household consumers of subsidized fossil fuels is necessary

Ultimately, while past studies have demonstrated pathways for further research, they have not emphasized the importance of closely examining non-household consumers. Nevertheless, the preliminary evidence that they do provide indicates that such consumers should be studied in greater detail. In particular, the fact that non-household sectors consume the majority of most

fossil fuel products in subsidizing countries, and therefore likely benefit to some extent from subsidization, means that they are ignored at a risk by policymakers planning to implement changes to subsidy policies. The fact that countries appear to have taken these sectors and consumers into account indicates that they have indeed not been ignored. It also makes it all the more strange that they have thus far not been emphasized by researchers or advocates of subsidy reform. This lack of emphasis should shift moving forward.

Delving deeper into a particular case can further demonstrate the significance of non-household consumers for subsidy reform. Specifically, Indonesia, a country that has been implementing numerous reforms to its longstanding subsidy policies for over a decade can potentially reveal much with regards to these consumers. A preliminary analysis of the Indonesian case does in fact show that non-household consumers have been taken into consideration during the development of reforms, and specifically targeted by various policy measures. Assessing the nature and impact of those policies has the potential to reveal a great deal about the understudied domain of non-household consumers of subsidized energy products and subsidy reform. It is to these analyses of the Indonesian case that this study now turns.

3. FOSSIL FUEL SUBSIDY REFORM IN INDONESIA

The Indonesian experience with fossil fuel subsidies and subsidy reforms supports the various conclusions discussed in section 2 above. The country's longstanding subsidy policies have engendered various economic inefficiencies. In turn, since the Asian Financial Crisis (AFC) of 1997-1998, Indonesia has made various efforts at fossil fuel subsidy reform and experimented with the implementation of numerous policy measures, all with varying degrees of success. These developments have notably founded or reaffirmed insights reached by past study of reform efforts. This has particularly been the case with respect to the importance of mitigation and communication measures in ensuring that reforms are successful. In general, the Indonesian case has been a model, illustrating how such measures can ensure that changes to subsidy policies are accepted by publics and stakeholders, while also demonstrating which types of policies are less effective at doing so.

Indonesia also reveals how non-household consumers of subsidized energy products have been relatively neglected in past studies, as well as the corresponding utility of investigating their consumption and their resilience to reform in more depth. The impact of Indonesian subsidies on non-household consumers have simply not been the focus of much research. There are indications, however, that the Government of Indonesia (GOI) has consulted non-household stakeholders in attempts to garner support for reform and has targeted measures to limit the consumption of subsidized energy products by certain non-household sectors, most notably industry. In these ways it has

acknowledged the importance of non-household consumers with respect to subsidy reform.

Analyzing the situation even more closely, it is possible to draw interesting conclusions from the Indonesian case. Specifically, Indonesian policy to limit the consumption of subsidized energy products by industry has saved it a significant amount of resources. At the same time, a budgetary analysis reveals that the majority of government funds earmarked for subsidies are still going to sectors other than households. Therefore, continued analysis of non-household consumers can be of use for the GOI. In turn, the Indonesian case can be an example for other countries interested in advancing their reforms. The need for further research in this domain is in any case confirmed.

3.1. The origins of Indonesian fossil fuel subsidies

Indonesia has a long history of subsidizing the consumption and production of fossil fuels. Historical analyses reveal that subsidy policies were initially adopted during the Sukarno regime, after Indonesia attained independence from the Netherlands in the late 1940s.⁹⁹ Subsidy policies were subsequently expanded during the Suharto regime from 1966 until its collapse in 1998, a period during which large oil reserves were discovered, making the subsidy policies relatively affordable for the GOI.¹⁰⁰ In general, subsidies were implemented by these regimes in order to achieve the goals, as is often the case, of greater energy production and independence, economic growth, and access to energy resources for poor populations. The third justification became particularly relevant during periods of high inflation, with subsidies being used to shield Indonesia's vast number of low-income households from rising prices. For example, the *1960 Eight Year Overall Development Plan* included subsidies on food and fuel in order to protect the poor from high inflation rates; policies that led fuel subsidies to consume around 20% of the government's total revenue by 1965.¹⁰¹ As subsidies became more affordable during the oil-boom years

99. Sukarno was the leader of Indonesia's movement for independence, and was the country's leading political figure from 1945, when Indonesia declared independence, until his ousting from power in 1965-1966.

100. Suharto, an Indonesian army general, was Indonesia's President from 1966, when he seized power, until 1998, when he was forced to step down following massive protests tied to reforms to fossil fuel subsidies and the AFC.

101. Beaton, C. and L. Lontoh (2010). *Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies*. October 2010. International Institute for Sustainable Development (2010), p. 2.

of the 1970s and 1980s, they entrenched themselves into the fabric of Indonesia's society and economy.¹⁰² Yet, by the 1990s, they were among the multitude of problems that plagued the country, and played a part in instigating radical change during the AFC.

Among other factors, fossil fuel subsidies contributed to the collapse of the Suharto regime. In part as a result of the greater national wealth and foreign investment that followed oil discoveries in the 1970s and 1980s, and as its power expanded, the regime became enveloped in corruption, with high-ranking military officers and Suharto's family members placed in key political and economic positions.¹⁰³ The culture of corruption famously became known as KKN, or *korupsi, kolusi dan nepotisme*—corruption, collusion and nepotism.¹⁰⁴ The waste and dysfunction that resulted from this system undermined Indonesia's ability to respond to the AFC. Perhaps the country the worst affected by the crisis, and after experiencing a tremendous decline in the value of its currency, the rupiah (see Figure 15), Indonesia was forced to seek financial assistance from the IMF. Increases in fuel prices were in turn part of the reforms demanded by the IMF in order for Indonesia to receive emergency loans. However, when Suharto raised prices on petroleum products precipitously in May 1998, with kerosene prices increasing by 25%, diesel by 60% and gasoline by 71%—rates higher than those initially planned with IMF support—massive public protests ensued.¹⁰⁵ These forced Suharto to step down after a few weeks, bringing to an end several decades of power and instigating a political transition to democracy.¹⁰⁶ Despite what was ultimately a positive political evolution, the price increases were annulled, foreshadowing difficulties that would bedevil future reform efforts.

By the time the AFC had enveloped Indonesia, the fossil fuel subsidies that it had put in place—and many of which are still in place today, even after more than a decade of reforms—were widespread. Most clearly and transparently, given that these policies are part of the publically available national budget, the country has subsidized gasoline (specifically the grade RON-88, called Premium), diesel (specifically automotive diesel oil), kerosene and electricity. LPG, another petroleum product, has more recently been subsidized as part of the kerosene to LPG transfer program being implemented

since 2007. These subsidies have been classic consumption subsidies in that the GOI has set prices below those of the market and reimbursed Pertamina, an SOE and initially the legal, and now effective, sole distributor of subsidized fuel products, and PLN, the national electricity company and primary generator of electricity in the country, for losses incurred as a result of fuel and electricity subsidies, respectively.¹⁰⁷ It is these subsidies which have garnered the most attention and which have been the focus of repeated and diverse attempts at reform from 1998 through to the present day.

In addition to the official subsidies for fuel products and electricity, a variety of subsidies for the production of fossil fuels (oil, natural gas, and coal) have also been adopted by the GOI. In an extensive review, Braithwaite *et al.* identified production subsidies such as “investment credit allowances, tax incentives and domestic market obligations (DMOs)” totaling approximately \$1.8 billion in support; a number that does not take into account areas the research team identified as “where subsidies may exist but further research is needed.”¹⁰⁸ Pickard and Makhijani, as part of their Indonesia country study for the Bas, Makhijani, Pickard and Whitley report “The Fossil Fuel Bailout,” also found that various tax incentives supporting fossil fuel production, coupled with significant SOE investment in production, confirmed the existence of an array of producer subsidies.¹⁰⁹ Furthermore, the GOI has established DMOs for natural gas and coal, guaranteeing supplies to state-owned electric companies and domestic industries, thereby effectively subsidizing the consumption of those fossil fuels.¹¹⁰ Finally, through the systematic consideration of all energy policies

102. Ibid.

103. Ibid., p. 3.

104. Ibid.

105. Ibid., p. 4.

106. Ibid.

107. For a detailed description of the manner in which subsidies are disbursed by the GOI, see Beaton, C. and L. Lontoh (2010). *Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies*. October 2010. International Institute for Sustainable Development, pp. 12-13; and Braithwaite, D. *et al.* (2010). *Fossil Fuels—At What Cost? Government support for upstream oil and gas activities in Indonesia*. October 2010. Global Subsidies Initiative, pp. 17-18.

108. Braithwaite, D. *et al.* (2010). *Fossil Fuels—At What Cost? Government support for upstream oil and gas activities in Indonesia*. October 2010. Global Subsidies Initiative, p. 10.

109. Pickard, S. and S. Makhijani (2014). *Fossil fuel exploration subsidies: Indonesia. The Fossil Fuel Bailout: Country Study*. Overseas Development Institute and Oil Change International; and Bast, E., S. Makhijani, S. Pickard and S. Whitley (2014). *The fossil fuel bailout: G20 subsidies for oil, gas and coal exploration*. November 2014. Overseas Development Institute and Oil Change International

110. Global Subsidies Initiative (2012). *A Citizen's Guide to Energy Subsidies in Indonesia: 2012 Update*, p. 13.

in Indonesia conducted as part of the Koplow *et al.* study “Mapping the Characteristics of Producer Subsidies: A review of pilot country studies,” the research team concluded that “consumer subsidies are important, but not the only significant part of the problem in Indonesia. Because fossil-fuel subsidies to consumers have been so large, much of the focus on Indonesian fossil-fuel markets has been on those subsidies. However, the data review indicates subsidy problems in many more areas, such as those to producers.”¹¹¹ Altogether, it is clear that Indonesia has numerous producer subsidies in addition to consumer subsidies, with most of the former being hidden from public view because they are not part of official budgetary expenditures. Importantly, many of these subsidies have not been subject to reform, unlike the consumer subsidies on fuel products and electricity.

3.2. Rationales for subsidy reform

With a diverse array of subsidies in place, the costs of subsidy policies came brutally to light during the AFC. While the logic of fossil fuel subsidy reform was clear already at that time, the economic and fiscal pressures for reform have grown ever since. To this day the GOI has sought to reform subsidies as a result of growing fiscal burdens and the increasingly evident negative economic effects of subsidy policies. The growing pressure for reform and the justifications for it have been relatively openly expressed in GOI pronouncements and publications. In a review of government documents which address past reform efforts, including the “Government’s Explanation on its Policy on Fuel Subsidy Cuts and Other Accompanying Policies,” “2004 Policy on Renewable Energy Development and Energy Conservation,” “Blueprint of National Energy Management 2005-2025,” and “2007 National Action Plan for Addressing Climate Change,” among others, Beaton and Lontoh identify four primary rationales that have driven the GOI to reform Indonesia’s consumption subsidies on petroleum products and electricity.¹¹² These are, in declining order of importance:

- (1) relieving budgetary pressure;
- (2) improving the efficiency of social welfare policies;

(3) energy security;

(4) mitigating climate change.¹¹³

The pressures for reform are thus varied, and they are tied to the main failings of subsidy policies discussed in section 2.3 above. The GOI has simultaneously realized the significant gains that could be incurred through subsidy reform and the costs that would be maintained if policies were not changed. It has also attempted to communicate these openly to the Indonesian people.

Budgetary and economic considerations have clearly put the greatest pressure on the GOI. A review of several key economic indicators confirms the problems associated with subsidies and how economic challenges have instigated the adoption of reforms in the Indonesian case. Figures 16 and 17 illustrate the enormous amount of public resources the GOI has spent on subsidies since 2001. Perhaps most stunningly, when international oil prices peaked in 2008, nearly 28% of Indonesia’s public expenditures were consumed by subsidies. Furthermore, the erratic nature of international energy prices has made budgeting difficult for the GOI. Figure 16 shows a comparison between the projected and actual annual spending on subsidies. Subtracting the numbers leads to Figure 17 which demonstrates that in four of the 13 years indicated the GOI spent tens of billions more rupiah on subsidies than planned.

Furthermore, as oil production has declined and since Indonesia became an oil importer in 2004, the country has been steadily importing a growing amount of crude oil and refined petroleum products. This has naturally reduced the revenues that the GOI obtains from the oil and gas industry and damaged Indonesia’s current account balance and external balance on goods and services. These trends can be visualized in Figures 18 and 19. In tandem, there has been a slow decline in the value of the rupiah against the dollar (see Figure 15) which has increased the cost of oil imports priced in dollars on the international market.

Given that subsidies have been identified as among the factors that have stymied investment in the energy industry, both in terms of oil and gas production and in infrastructure in general, while simultaneously fostering over-consumption, they are in part the cause of the unfavorable economic circumstances that Indonesia has had to face. Coupling that with the opportunity to improve social welfare policies to better target poor households, and even benefit the local and global environment, and the overall rationale for reform becomes extremely powerful. Indonesia thus demonstrates

111. Koplow, D., et al. (2010). Mapping the Characteristics of Producer Subsidies: A review of pilot country studies. August 2010. Global Subsidies Initiative, p. 97.

112. Beaton, C. and L. Lontoh (2010). Lessons Learned from Indonesia’s Attempts to Reform Fossil-Fuel Subsidies. October 2010. International Institute for Sustainable Development, pp. 14-16.

113. Ibid.

how socio-economic pressures can be the driver for fossil fuel subsidy reform. For the many reasons indicated, the country has persistently attempted to shift policies and minimize the burdens and negative impacts of subsidies since 1998.

3.3. The Indonesian energy sector

As can be discerned from the historical evolution of Indonesia's subsidy policies and rationales for reforms, shifts in the exploitation of the country's vast natural resources have influence the GOI's energy policies. In general, Indonesia is a country where fossil fuel subsidies have undermined the development of vast reserves of natural resources in a sustainable manner. The Indonesian energy sector in particular has not developed to its potential, most starkly with respect to renewable energy. Indonesia's energy sector has thus reaffirmed the negative effects that subsidies can have in terms of economic development at large and investment both in the energy sector and in renewable energies specifically.

Indonesia's energy resources and trends in exploitation

Table 13 offers an overview of the global rankings of Indonesia in 2012 with respect to its energy sector and natural resources. The table makes it clear that Indonesia has incredible natural wealth. It is currently the world's top exporter of coal and a major exporter of natural gas, with significant reserves of both resources. It has also been a significant producer, and until recently, exporter, of crude oil. Finally, the country has significant potential to develop renewable sources of energy. It is already the third most significant producer of electricity through the use of geothermal energy sources. It has nevertheless not taken advantage of vast opportunities for the development of hydroelectric, solar and wind energy.

Figures 21-23 illustrate the evolution of Indonesia's production, consumption and export of oil, natural gas and coal over time. Figures 24-27 offer a detailed breakdown of the evolution of electricity production in the country and the sources of that production. When tied to fossil fuel subsidies, these data point to three primary conclusions. Firstly, subsidies may have reduced investment in the oil industry, leading to a decline in production while at the same time contributing to the significant rise in consumption that can be seen in Figure 21.¹¹⁴ In particular, subsidies may have increased

the rate at which petroleum product consumption has grown.

Secondly, the share of renewable energy sources that produce electricity in Indonesia, including hydroelectric sources, has declined over time. This can be seen clearly in Figures 24-27. For example, in 2001, hydro and other renewables accounted for approximately 18% of electricity production, while in 2011 their share had declined to 12%. Fossil fuel subsidies may have played a role in reducing incentives for investment in Indonesia's renewable energy resources, and thereby likely account for the significant untapped potential of Indonesia's many renewable energy resources. Furthermore, Indonesia's electricity subsidies have been identified by many studies as having undermined investment in the country's electric grid and related infrastructure.¹¹⁵ This has resulted in blackouts and shortages and an electrification rate that could have increased faster over time, even though total capacity and production has grown.¹¹⁶

Finally, these data show that production of natural gas is growing, and that of coal booming, while consumption of all energy products has been rising at a steady pace. Indonesia has enjoyed strong economic growth since the end of the AFC, with GDP growth rates of around 5-6% annually.¹¹⁷ Expansion of economic activity has certainly been behind the growth in energy consumption and production. However, fossil fuel subsidies may have undermined opportunities for Indonesia to develop in a more sustainable manner, conscious of efforts to reduce global climate change. Subsidy reform, in turn, may change the trends in the country's energy sector for the better.

Reforms of the regulations governing the Indonesian energy sector

Taken together, developments in the exploitation of Indonesia's resources have influenced GOI policy with respect to subsidies. These trends have similarly led to reforms regarding the regulation of the Indonesian energy sector. Since the AFC in particular, the pace of change has grown as the GOI has made efforts to liberalize the country's energy markets. Reforms of energy sector governance

114. See Budiman, A., K. Das, A. Mohammad, K. Tee Tan and O. Tonby (2014). Ten ideas to reshape Indonesia's energy sector. September 2014. McKinsey & Company;

Global Subsidies Initiative (2012). A Citizen's Guide to Energy Subsidies in Indonesia: 2012 Update, p. 21; and IEA (2014e). World Energy Outlook, pp. 334-335.

115. Budiman, A., K. Das, A. Mohammad, K. Tee Tan and O. Tonby (2014). Ten ideas to reshape Indonesia's energy sector, pp. 2-3.

116. Ibid.

117. Rosjo, M. J. (2014). The Adverse Effects of Fossil-Fuel Subsidies in Indonesia. Master of Philosophy in Economics. May 2014. University of Oslo, p. 8.

have been implemented in tandem with those for subsidies of energy products discussed below in section 3.4. The two reform efforts are closely linked given that greater liberalization and a relaxation of government control over energy resources, their distribution, and their prices are all inextricably tied together. As shall be seen with subsidy reform specifically, energy sector reform more broadly has been difficult to implement, and the GOI has seen new policies challenged in court and reversed in several instances. In many ways, greater liberalization of the energy sector at large has the potential to reinforce subsidy reform, and is therefore of relevance to those efforts.

Energy sector policy in Indonesia has always rested on government ownership of all natural resources in Indonesia, enshrined in Indonesia's initial 1945 constitution and reaffirmed to this day.¹¹⁸ The Ministry of Energy and Mineral Resources (MEMR) has in turn been responsible for managing the exploitation and distribution of the country's vast government-owned resources. With respect to oil and gas, the MEMR traditionally delegated regulatory responsibility to Pertamina, the state-owned oil and gas company.¹¹⁹ During the oil boom years of the 1970s and 1980s, Indonesia was notably among the first countries to implement production sharing contracts (PSCs) with foreign investors.¹²⁰ These contracts allowed licensed foreign oil and gas companies to extract resources "under the condition that the government of Indonesia would receive a set percentage of the oil produced after the companies had recovered their costs."¹²¹ As a result of these contracts, upstream oil and gas extraction became a relatively liberal market, with numerous contracts being given to an array of foreign companies. Pertamina itself has sustained a share of around 10% of upstream sector activities, with international companies accounting for the rest.¹²² Downstream refining, distribution and marketing, however, remained the exclusive purview of Pertamina.¹²³ Most importantly, the company was granted a monopoly over the distribution of

subsidized petroleum products to consumers, with the GOI covering losses incurred as a result of subsidization.

The electricity sector mirrored to a certain extent the oil and gas sector in that PLN, the national electricity provider, constituted a vertically integrated monopoly and sole buyer and seller of electricity in Indonesia.¹²⁴ Although several independent power producers exist in the country, their share of electricity production has not constituted more than 15% of the total.¹²⁵ Until recently, PLN would purchase the electricity they provided for subsidized distribution to consumers. As with Pertamina, PLN would receive, and continues to receive, funds from the GOI covering losses incurred from subsidized sales.¹²⁶

Since the AFC, dramatic changes have been implemented to what were longstanding regulatory structures. With respect to oil and gas, the "Oil and Gas Law" of 2001 or Law No. 22 of 2001 completely restructured the regulatory framework for this sector. Firstly, Pertamina's role as regulator of government resources was terminated, and two new agencies, BP Migas and BPH Migas were created to manage the oil and gas market—the former for upstream and the latter for downstream activities.¹²⁷ Pertamina itself became a normal state-owned enterprise, shifting to a limited liability corporation under Government Regulation No. 31 of 2003.¹²⁸ Secondly, Law No. 22 of 2001 ended Pertamina's monopoly over downstream activities, leading Shell to open the first internationally branded petrol station in Indonesia in October 2005.¹²⁹ However, Pertamina effectively remained the sole distributor of subsidized fuels, and therefore sustained its monopoly to a large degree, despite the liberalization.¹³⁰ Finally, the new law ensured that natural gas pipelines run by the state gas pipeline company became open access for all users, and also liberalized gas trading between sellers and buyers.¹³¹ Altogether, the reforms collectively constitute substantial change to the governance of the oil and gas sector.

118. Norton Rose (2010). Indonesian energy report. August 2010, p. 11.

119. Ibid.

120. Beaton, C. and L. Lontoh (2010). Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies. October 2010. International Institute for Sustainable Development, p. 3.

121. Ibid.

122. Braithwaite, D. et al. (2010). Fossil Fuels—At What Cost? Government support for upstream oil and gas activities in Indonesia. October 2010. Global Subsidies Initiative, p. 17.

123. Ibid.

124. Norton Rose (2010). Indonesian energy report. August 2010, p. 34.

125. Ibid.

126. Ibid.

127. Ibid., p. 11.

128. Beaton, C. and L. Lontoh (2010). Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies. October 2010. International Institute for Sustainable Development, p. 5.

129. Norton Rose (2010). Indonesian energy report. August 2010, p. 12.

130. Ibid.

131. Ibid., p. 24.

The regulations governing the electricity market have undergone similar changes. Most notably, Law No. 30 of 2009 (which replaced Law No. 22 of 2002 on account of the fact that this initial reform was deemed unconstitutional by the Indonesian Supreme Court), mirrored Law No. 22 of 2001 for the oil and gas sector. As with the end of Pertamina's downstream monopoly, PLN's monopoly over supply and distribution of electricity was ended, opening the way for an expansion of independent power producers and distributors. Linked to these reforms, the GOI adopted a vast plan to expand electricity generation capacity. Namely, beginning in 2005, the GOI has been implementing a two-phase "fast-track program" to vastly expand electricity production through the use of coal and renewable energy resources.¹³² The boom in discovered and extracted coal reserves as well as the systematic under-exploitation of renewables has been behind these efforts. Laws governing the exploitation of coal and renewables have been, as with other resources, relatively liberal, with various companies engaged in resource extraction. PLN remains the dominant buyer of these supplies for electricity generation as well as distributor to consumers. Although the GOI has taken the lead with investments into additional power generation through PLN, the new regulations envision independent producers as playing an important role, particularly with respect to expanded use of geothermal and other renewables.¹³³

Ultimately, although reforms have successfully brought forth significant changes to Indonesia's energy sector, their implementation has been far from smooth. Many of the changes have faced legal challenges and been deemed unconstitutional by the Indonesian Supreme Court. For example, in 2004, the Supreme Court struck down Law No. 22 of 2002 which liberalized the electricity market, arguing that "electricity is one of the country's public goods and services and as such must, according to Article 33 of the Indonesian Constitution, be managed exclusively by the government."¹³⁴ The new Law No. 30 of 2009 is equally on uncertain legal grounds and pending judicial review.¹³⁵ With respect to oil and gas regulations, in 2012, the Supreme Court "deemed upstream regulator BP Migas to be unconstitutional, based on the regulator's

role that limited the state's full access to maximize the benefits of natural resource management for Indonesia's welfare."¹³⁶ This, in turn, led to the creation of a special task force, SKK Migas, to operate upstream regulations and PSCs.¹³⁷ Following a major corruption scandal in 2013, however, regulating and marketing rights were returned to Pertamina.¹³⁸ All of these upheavals have undermined stability in Indonesia's energy markets and engendered significant uncertainty. Liberalizing reforms have thus been largely incremental, and much work remains to be done. This reality is strikingly similar to reforms specifically dealing with the subsidization of energy products in the country.

3.4. Fossil fuel subsidy reforms

Over the course of the past decade and a half, in tandem with broader attempts at energy sector liberalization, the GOI has implemented numerous policies that aimed to reduce the fiscal, economic and social burdens engendered by fossil fuel subsidies. Reforms have predominantly focused on consumption subsidies for petroleum products and electricity. Most have simply constituted ad-hoc changes to prices, usually when the difference between subsidized domestic prices and international market prices, and therefore the fiscal burden, became too great to bear. Figure 20 shows the somewhat erratic changes implemented over time. Price increases in the early 2000s were met, as during the AFC, with significant public opposition.¹³⁹ Public protests often pressured the GOI to increase prices by less than the intended amount or to not increase prices at all.¹⁴⁰ Attempts by the government to link prices more closely to the market—beginning with a policy of prices at 75% of international market rates—also failed.¹⁴¹ Recognizing the broad opposition to reform, in 2005 the GOI implemented an innovative policy, the *Bantuan Langsung Tunai* (BLT) unconditional cash transfer to poor households. Aiming to reduce the shock of impending price increases and to ensure that the poor would not be adversely affected, the

¹³². Ibid., p. 40-42.

¹³³. Ibid., p. 43.

¹³⁴. Beaton, C. and L. Lontoh (2010). Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies. October 2010. International Institute for Sustainable Development, p. 5.

¹³⁵. Norton Rose (2010). Indonesian energy report. August 2010, p. 35.

¹³⁶. United States Energy Information Administration (2014). Indonesia Report. 5 March 2014.

¹³⁷. Ibid.

¹³⁸. Ibid.

¹³⁹. Beaton, C. and L. Lontoh (2010). Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies. October 2010. International Institute for Sustainable Development, pp. 6-8.

¹⁴⁰. Ibid.

¹⁴¹. World Bank (2006). Fuel Pricing and Subsidies in Indonesia: Reaching an Equitable and Sustainable Policy, pp 15-19.

policy comprised of the distribution of 300,000 rupiah (approximately \$30 at the time) in October 2005 and January 2006 to all households deemed eligible.¹⁴² Distribution occurred following a major census of households throughout the country, with the first disbursement occurring in tandem with increases in prices.¹⁴³ As an extensive analysis by Beaton and Lontoh concluded, the implementation of the program was largely successful, with few complaints and a high percentage of eligible individuals receiving the funds.¹⁴⁴ Furthermore, the government launched a major information campaign to inform the public about the new policy and the reasons for the impending price increases.¹⁴⁵ Together, these policies resulted in the smooth implementation of the planned changes and reduced public contestation.¹⁴⁶ Acknowledging the success of the new measures, the BLT and information campaigns were re-implemented during subsequent price increases in 2009 and 2013.¹⁴⁷

Furthermore, in addition to the BLT, the GOI began implementing a number of new social welfare policies beginning in 2005. These include a program to subsidize rice, health insurance for the poor, assistance for poor students, and a conditional cash transfer program, among others.¹⁴⁸ Although not directly linked to subsidy reforms, these programs demonstrated that the government was shifting social policies to new initiatives to help the poor that are better targeted than energy subsidies which primarily benefit wealthier consumers.

Finally, the GOI has repeatedly attempted, again with varying degrees of success, to implement reforms that target specific sectors. Perhaps most notably, since 2005, industry (including power generators) have been banned from purchasing subsidized energy products.¹⁴⁹ (This reforms in

particular is discussed in more detail in section 3.6 below). Another significant reform has involved electricity tariffs. Since 2013, a set timetable of tariff increases for certain high voltage connections as well as for particular sectors, including industrial, commercial and governmental users, was adopted and implemented over time.¹⁵⁰ Today, PLN, that national electricity provider, has indicated that high voltage residential connections, medium and high voltage business connections, and nearly all government connections pay the company's target "market" rate.¹⁵¹ While subsidies do persist for a majority of electricity consumers, tariff increases are still underway.¹⁵²

Smaller scale reforms have also been implemented—or retracted—by the GOI. For example, since 2012, government vehicles have been restricted from using subsidized gasoline.¹⁵³ However, that same year, the GOI failed to implement a reform that would have also prohibited private, four-wheeled vehicles from purchasing gasoline at subsidized prices.¹⁵⁴ Attempts in January 2015 to restrict diesel subsidies for certain fishing vessels were also retracted, as were attempts to end de-facto subsidies on 12 kg LPG canisters—a product marketed at a loss by Pertamina, the national oil and gas company, even though there is no official subsidy policy for it.¹⁵⁵ Taken together, these policies reveal that the GOI has at times taken sectors other than households into consideration when devising subsidy reforms. No systematic review of such policies has been conducted and it is unclear what the impacts of these policies have been, or if there are lessons to be learned from their adoption. Further analyses pertaining to these questions are discussed in section 3.6 below.

Reforms currently under implementation

Ultimately, fossil fuel subsidy reform is still underway today as it is an important component of the program of the new Indonesian government led by President Joko Widodo, or Jokowi, which assumed power after presidential elections in 2014. In fact, subsidy reform has been one of the primary objectives of the new government and dramatic changes to policy have been implemented in the past two years with respect to subsidies for

142. Beaton, C. and L. Lontoh (2010). *Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies*. October 2010. International Institute for Sustainable Development, p. 17.

143. Ibid.

144. Beaton, C. and L. Lontoh (2010). *Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies*. October 2010. International Institute for Sustainable Development.

145. Ibid.

146. Ibid.

147. Ibid.

148. Perdana, A. A. (2014). *The Future of Social Welfare Programs in Indonesia: From Fossil-Fuel Subsidies to Better Social Protection*. Briefing Note. March 2014. Global Subsidies Initiative.

149. World Bank (2006). *Fuel Pricing and Subsidies in Indonesia: Reaching an Equitable and Sustainable Policy*, p. 17.

150. Global Subsidies Initiative (2015b). *Indonesia Energy Subsidy Review: Issue 1, Volume 2*. March 2015, p. 14.

151. Ibid.

152. Ibid.

153. Global Subsidies Initiative (2012). *A Citizen's Guide to Energy Subsidies in Indonesia: 2012 Update*, p. 24.

154. Ibid.

155. Global Subsidies Initiative (2015b). *Indonesia Energy Subsidy Review: Issue 1, Volume 2*. March 2015, p. 10.

petroleum products. After initial price increases implemented in November 2014, a multifaceted new pricing scheme came into effect in January 2015. The manner in which petroleum products are now subsidized is delineated in Table 14. In brief, subsidies on gasoline have effectively been eliminated entirely, a remarkable change. Those on diesel have been reduced to a fixed subsidy of 1000 rupiah per liter, with the price otherwise fluctuating in line with the market. Finally, a kerosene to LPG conversion program, first launched in 2007, continues to be in effect and under implementation. As part of the program, kerosene and LPG prices continue to be set at below market prices by the government, while LPG “starter packs” consisting of a stove and initial 3 kg cylinder are being distributed for free to encourage households to switch the fuel they primarily use for cooking.¹⁵⁶ While prices have not changed, “LPG receives smaller subsidies and provides the same amount of cooking energy at lower levels of cost, pollution and CO₂ emissions,” which has inspired and justified the policy.¹⁵⁷ What has perhaps been most remarkable is that, due to lower international energy prices, the new policies were accompanied by overall price decreases on the Indonesian market in January 2015. This has allowed for a smooth transition, but also raises questions as to the durability of the reforms when international prices rise again in the future. At the same time, the reforms have freed up significant public resources for alternative investments, which has notably allowed for continued financing of new social welfare programs, and additional funding for SOEs and infrastructure projects, among other goals.¹⁵⁸ This offers hope that the policies will lead to improvements to Indonesia’s economy and society in the coming years.

3.5. Lessons learned from Indonesian reform efforts

Overall, with such a diverse array of efforts at fossil fuel subsidy reform, the case of Indonesia has been recognized as a vanguard in this domain and has been frequently cited as a case demonstrating both

how to ensure reforms succeed and what policies are ineffective. Given the significant policy experimentation of the GOI, it is unsurprising that Indonesia offers numerous lessons regarding how to move away from subsidization. Clements *et al.*, through their numerous case studies, identify seven primary lessons that can be drawn from Indonesian reforms.¹⁵⁹ Most interestingly, Indonesia neatly confirms the three predominant conclusions drawn more generally that have been combined by the IEA into its schematic of a successful reform program.¹⁶⁰ Specifically, Indonesia demonstrates that mitigation measures, which can smooth the transition to higher prices for poor households, are an important and useful tool to ensure that reforms are popularly accepted and succeed. Indonesia’s BLT unconditional cash transfer program has most notably been extensively cited as a key component of reform success, ensuring the acceptance of successive increases in petroleum product prices. Secondly, the importance of communication and transparency regarding reforms has been another crucial lesson. The implementation of vast communication campaigns, which have included “advertisements in print and electronic media, the distribution of pins, stickers, pamphlets and brochures, appearances by public officials on television talk shows, communication via village notice boards, and efforts to seek support from NGOs and students, [as well as] public seminars and cultural performances” have helped the public understand the rationale for reforms and the benefits of changing policies, thereby reducing contestation and smoothing implementation.¹⁶¹ Finally, the Indonesian case demonstrates the need for reform to ultimately lead to the adoption of market prices for energy products, and thereby the de-politicization of pricing. As Clements *et al.* put it, “ad-hoc price adjustments without a clear long-term goal, together with the inability to depoliticize pricing and subsidy policy, led to the reemergence of subsidies and the failure to implement durable reform.”¹⁶² In brief, ad-hoc changes were an ineffective reform that failed to keep up with rising international prices which continuously increased the public resources being spent on consumption subsidies and forced the Indonesian government to face a certain degree of public

156. Beaton, C. and L. Lontoh (2010). Lessons Learned from Indonesia’s Attempts to Reform Fossil-Fuel Subsidies. October 2010. International Institute for Sustainable Development, p. 25.

157. Ibid.

158. For details on new policies, see Global Subsidies Initiative (2014). Indonesia Energy Subsidy Review: Issue 1, Volume 1. March 2014; Global Subsidies Initiative (2015a). Indonesia Energy Subsidy Briefing. February 2015; and Global Subsidies Initiative (2015b). Indonesia Energy Subsidy Review: Issue 1, Volume 2. March 2015.

159. Clements, B. *et al.* (2013a). Case Studies on Energy Subsidy Reform: Lessons and Implications. 28 January 2013. IMF, pp. 25-26.

160. IEA (2014e). World Energy Outlook, p. 340.

161. IEA (2014e). World Energy Outlook, p. 336.

162. Clements, B. *et al.* (2013a). Case Studies on Energy Subsidy Reform: Lessons and Implications. 28 January 2013. IMF, p. 26.

indignation time after time. Thus, the new links to market prices for gasoline and even for diesel with a fixed subsidy policy in place since January 2015 has a greater potential to ensure a lasting shift away from subsidies. These lessons are certainly of great significance and may be applicable in other cases and contexts. At the same time, they may not be the only lessons that can be learned, and must be understood in light of the fact that numerous subsidies remain in place in Indonesia.

While Indonesia has made enormous strides in reducing consumption subsidies on petroleum products and electricity, perhaps most dramatically since the election of President Jokowi in 2014, a significant number of fossil fuel subsidies, broadly defined, remain in place. As discussed above, producer subsidies have not been the subject of many reforms. In addition, changes to consumption subsidies for diesel, kerosene, LPG, and electricity, have reduced the degree to which prices are subsidized, but have not removed those subsidies entirely. If a complete phase-out is the ultimate goal and desirable, then Indonesia still has a way to go. The Indonesian government has also been adopting new support programs to bolster the production of coal and its use in electricity production since the late 2000s.¹⁶³ Thus, despite significant progress, Indonesia remains far from seeing a systematic end to subsidization.

Furthermore, it is unclear that everything that could be learned from the Indonesian case has been identified and studied. In particular, Indonesian policies targeting certain sectors have not received significant examination. It is possible that useful lessons lie behind Indonesia's attempts to both consult sectors which consume a large amount of subsidized energy products and to target these consumers as part of the many broader attempts at subsidy reform that have taken place. The Indonesian case, therefore, can and should continue to be the subject of study, and pressure for continued reform would likely be beneficial for the country.

3.6. Non-household consumers of subsidized energy products and subsidy reforms

The manner in which Indonesia has engaged in fossil fuel subsidy reform might offer more lessons than those frequently reemphasized. In particular, Indonesian measures that have targeted non-household consumers of subsidized energy products have not been the focus of past studies.

This is unfortunate as closer examination may provide important insights that could be transferable to other cases and contexts. This study demonstrates the potential utility of a detailed and systematic review of the Indonesian policies and measures that have targeted those consumers. The preliminary one presented here demonstrates that measures aiming to restrict non-household consumption can at the very least engender large fiscal benefits and may be desirable generally, especially if accompanied by measures that help smooth the transition to higher energy prices for energy intensive sectors. Such policies would focus reform on the primary sources of inefficient consumption while leading to significant savings for national governments. In addition to demonstrating how mitigation measures for poor households can be essential to ensuring the success of reforms, the Indonesian case may also point to ways that non-household consumers should be taken into account as well.

Households as a focus of past research on Indonesian fossil fuel subsidy reform

Studies of fossil fuel subsidy reform in Indonesia have mirrored those concerning subsidy reforms generally in that households have been a consistent subject of interest. A brief review of major publications that have focused on subsidy reform in Indonesia can illustrate this tendency. Several reports by GSI have focused on measures adopted to protect poor households from the effects of higher energy prices.¹⁶⁴ GSI's "Citizen's Guide to Energy Subsidies in Indonesia" mentions non-household consumers in passing while focusing more on broader economic concerns and the impacts subsidies and reforms have on households. Discussion of Indonesia by Clements *et al.* and by the IEA also emphasize the policies directed towards the poor and vulnerable while rarely mentioning businesses or other sectors which consume a significant amount of the country's subsidized energy. As GSI mentions in its report "Fossil Fuel Subsidy Reform and Higher Fuel Prices in Indonesia: Impacts and Expectations," in which recent reforms are discussed and analyzed, "attempts to project the impacts of subsidy reform in Indonesia have tended to pay relatively little attention to businesses."¹⁶⁵

163. Norton Rose (2010). Indonesian energy report. August 2010, pp. 40-41.

164. See Beaton, C. and L. Lontoh (2010). Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies. October 2010. International Institute for Sustainable Development, and Perdana, A. A. (2014). The Future of Social Welfare Programs in Indonesia: From Fossil-Fuel Subsidies to Better Social Protection. Briefing Note. March 2014. Global Subsidies Initiative.

165. Casier, L. and C. Beaton (2015). Fossil-fuel Subsidy Reform and Higher Fuel Prices in Indonesia: Impacts and Expectations. March 2015. Global Subsidies Initiative, p. 7.

This lack of attention is unfortunate, as a review of policy measures adopted by the GOI reveals that Indonesia may offer important lessons with respect to how reforms should be tailored to address the consumption of energy by non-households.

While they may not have been the focus of past research or reports on Indonesian subsidy reform, non-household consumers have certainly been taken into consideration and targeted through reforms adopted by the GOI. Section 3.4 documents the various policies that have targeted sectors other than households that consume subsidized products. While there have been some failures and retractions, at least several important policies have remained in place. A systematic review would be a useful first step toward understanding the extent of these measures and their impacts.

Past findings with respect to non-household consumers of subsidized energy products in Indonesia

Certain past studies that have conducted assessments of non-household consumers offer important preliminary insights and demonstrate the potential utility of further examinations. In particular, GSI's report written for APEC in 2012 reveals that non-household consumers of subsidized energy were extensively consulted by the GOI, and that certain compensation packages were devised to mitigate the impact on businesses of price increases implemented in 2005 and 2008. As the GSI team states:

"In both 2005 and 2008 the government also carried out extensive consultations with influential business associations and intellectual groups. Information regarding these formal consultations is not available publicly. However [...] the government repeatedly highlighted compensation packages. The government developed specific compensation packages for industry, labor and farmer groups. While the industrial sector was awarded with fiscal and non-fiscal incentives, [including exemption on value-added tax on agricultural commodities, extension of credit periods, removal of terminal handling charges, control of interest rate credit and removal of high economic costs on roads], labor groups were promised an increase in the non-taxable income level [...] In 2008, members of the business community gave the government their much-needed support to increase fuel prices."¹⁶⁶

These findings are striking. Apparently, in addition to devising mitigation measures for households, beginning in 2005, the GOI also created parallel measures for commercial, non-household consumers of energy products. This reveals that the GOI had become aware of the fact that a significant portion of subsidized energy is consumed by industrial, commercial and agriculture enterprises and that these consumers had to be taken into account when subsidy reforms were being devised. It is unclear why the BLT program and mitigation measures for households have received so much more attention and publicity in comparison with these measures. Closer study is certainly needed to assess their effects, both in garnering support for reform and for ensuring a smoother transition to higher prices for the sectors and businesses in question.

The Braithwaite *et al.* study, for which the research team conducted an extensive series of consultations with industries and businesses to determine their perspective on subsidy reform in Indonesia, is also insightful. The consultations demonstrated, unsurprisingly, that "views toward the withdrawal of fossil fuel subsidies are distinctly polarized, depending on which industry sector they are operating in."¹⁶⁷ In particular, "oil product consumers" are "not likely to be keen to see these subsidies go" given that their costs would increase substantially.¹⁶⁸ Similarly, support by certain car and motorbike manufacturers also appeared to be limited.¹⁶⁹ The study did not consider what the industries thought of the mitigation measures that were implemented in the past, however, nor did it provide detailed information regarding the specific impacts of price increases. While it acknowledges the importance of taking them into account, the study reveals the limitations of the current understanding of non-household consumers of subsidized products. The need for further research is generally confirmed.

Non-household consumption of energy products in Indonesia

Conducting a closer analysis of the consumption of energy products in Indonesia further demonstrates the fact that non-household consumers should be taken into consideration when fossil fuel subsidy reform is being planned. In line with global trends, discussed in section 2.8 above, IEA data on consumption reveal that households have

¹⁶⁶. APEC (2012). Reforming Fossil-Fuel Subsidies to Reduce Waste and Limit CO₂ Emissions while Protecting the Poor. September 2012. APEC Energy Working Group and the Global Subsidies Initiative, p. 72.

¹⁶⁷. Braithwaite, D. et al. (2012). Indonesia's Fuel Subsidies: Action plan for reform. March 2012. Global Subsidies Initiative, p. 22.

¹⁶⁸. Ibid. pp. 24-25.

¹⁶⁹. Ibid.

been, and continue to be, minority consumers of most subsidized energy products in Indonesia. Table 15 and Figure 28 delineate energy product consumption in 2011 while Figures 29-52 illustrate in detail historic consumption trends. In brief, according to the IEA, in Indonesia the totality of gasoline is consumed by the transport sector (not shown in the figures). Around half of all diesel is consumed by the transport sector, with significant percentages also being used by industry as well as for electricity generation. Kerosene and LPG, on the other hand, are predominantly utilized by households. In the case of these two products, the effects of the kerosene to LPG conversion program are noticeable, with kerosene consumption collapsing from around 8000 kt in 2007 to around 1000 kt in 2012, although the percentage of use by households has remained steady at around 85%. LPG use has simultaneously boomed from around 1000 kt in 2007 to around 5000 kt in 2012 and has seen the percentage of total use by households grow from 74% in 2001 to 95% in 2011. Electricity consumption is divided between households and industry, with each accounting for around one-third of total consumption, and commercial and public services accounting for a steady 15-20% of total consumption over time. Poor infrastructure also engenders substantial losses of production in Indonesia, although that phenomenon has been declining slightly over time, accounting for 13% of total electricity generated in 2001, but for only 9% in 2011. Natural gas is predominantly used by industry, with a steadily growing proportion being used for electricity generation. Finally, the effects of booming coal production and public investments in coal-based electricity generation can be seen, as the percentage of total coal usage for electricity production has grown from 69% in 2001 to 81% in 2011, with the rest being used by industry.

Overall, the data, once again in line with global trends, reveal that households are not the primary consumers of most energy products. The transport sector is the dominant consumer of gasoline and diesel. Importantly, there are indications that the majority of gasoline and nearly all of the diesel are consumed for commercial purposes, which could include commercial transport and freight, as opposed to household passenger transport (see Box 1).¹⁷⁰ The industrial and commercial sectors consume a significant amount of electricity, with the former also being a significant consumer of diesel. Finally, natural gas and coal are also consumed almost exclusively by electricity generators or industry. Households are the dominant consumers only

of kerosene and LPG, and consume about one-third of the electricity produced in the country. Thus, they are not the main consumers of most energy products. Perhaps unsurprisingly, Indonesia's consumption patterns are not strikingly unique in comparison with those assessed for countries with pre-tax subsidies or non-OECD countries generally. This increases the chances that conclusions drawn from the Indonesian case can be applied to other countries with consumer subsidies.

An innovative budgetary analysis and assessment of the impact of reforms targeting non-household consumers of subsidized energy products

Delving deeper, IEA data coupled with national budget data on Indonesian government expenditures allow for a preliminary analysis to be conducted with respect to the effects of adopted policies that target non-household consumers of subsidized energy products. More precisely, it is possible to estimate the fiscal savings that the Indonesian government accumulated for the years of 2008 through 2012 as a result of the 2005 ban on the consumption of subsidized diesel by industry and electricity producers. Presuming that there was no cheating regarding this policy and that those sectors have not utilized subsidized diesel since 2005 (which may not entirely be the case) then it can be estimated that the GOI saved over 150 trillion rupiah in total thanks to this policy, during the period 2008-2012. Table 16 delineates the data used for the calculations and the estimates themselves broken down by year. Ultimately, the figures for the subsidy savings may be overestimates given that illegal consumption may have occurred. Nevertheless, even if reduced slightly, the total savings are certainly not inconsequential. This exercise demonstrates that targeting sectors that consume significant amounts of certain subsidized energy products can result in substantial fiscal savings. These savings could be spent on temporary mitigation measures for the energy intensive sectors being targeted, or be redirected towards other priorities. The benefits of reform generally, as well as targeted measures specifically, are supported by these calculations.

Taking the analysis one step further, it is possible to estimate the amount of public resources being directed to specific sectors through subsidies. These estimates suggest that, despite the targeted ban on the use of subsidized petroleum products by industry and electricity producers, the majority of public funds being used to finance consumption subsidies on those products as well as electricity are not going directly to households. Table 17 delineates all of the data publically accessible

170. World Bank (2011). Indonesia Economic Quarterly: 2008 again? March 2011, p. 27.

regarding actual expenditures on subsidies, disaggregated by fuel type and electricity for the years 2008-2014. This data has never been reassessed to show the benefits being received by sector. Using these data in conjunction with IEA data regarding petroleum product consumption, and PLN data regarding electricity consumption by sector and voltage categories, estimated subsidy expenditures by sector were calculated. The results are delineated in Table 18 for the years 2008 through 2012 (lack of IEA data precluded calculations for 2013 and 2014). The data in both Table 17 and Table 18 can be visualized in Figure 53, in terms of absolute values in trillions of nominal rupiah, and in Figure 54, in terms of percentages.

The budgetary analysis conducted here has not been attempted in the past. There are certainly several caveats that call into question the precision of the estimations. These include, firstly, the fact that the transport sector includes benefits for passenger transport, which is in a way a benefit for households as opposed to commercial enterprises. Secondly, estimations for benefits from electricity subsidies are based on assumptions regarding consumption and tariffs that may not exactly reflect the degrees of subsidization and the distribution of benefits. Finally, exact consumption and application of policies by sector are generally uncertain. Keeping these caveats in mind, the exercise is nevertheless useful. It is unlikely that the estimations are so fundamentally off the mark so as to preclude the drawing of certain overarching conclusions.

Recognizing potential limitations, there are several conclusions that arise from the estimations. Firstly, even after the implementation of restrictions on consumption of subsidized fuels by certain sectors, the household sector has not been directly receiving the majority of subsidy benefits and its overall share has been declining. In contrast, the transport sector is obtaining a significant portion of benefits, and its share has been increasing. In 2012, it received a majority of benefits. In addition, the industrial and commercial sectors, in large part through electricity subsidies applicable during the years assessed, still received a steady proportion of subsidies over time. Finally, the exercise confirms that further study can determine the specific beneficiaries of subsidy policies and the potential for targeting non-household consumers as part of broader reform efforts. A more systematic analysis may lead to insights into the nature of energy consumption and indicate pathways for further reform.

Taken together, it is clear that consumption subsidies in Indonesia are not well targeted given the ostensible goal of benefitting households. Even if not explicitly stated as an objective, past reforms

have not ensured that a majority of resources being spent on subsidies are directly benefiting household consumers. These results indicate that perhaps additional measures targeting the transport, industrial or commercial sectors may be advisable as part of future reforms. Indeed, the new electricity tariffs being implemented since 2013 may have already reduced the share of benefits amassed by industrial and commercial enterprises.

Perhaps most clearly and importantly, the data show potential avenues for further research while demonstrating that there is more that can be learned from Indonesian efforts at fossil fuel subsidy reform. While past studies have focused on household consumers, they have neglected to examine the ways in which the GOI has taken non-household consumers into consideration when devising reforms. Overall, the preliminary analysis conducted here reveals a great deal. The GOI has taken measures to target and reduce non-household consumption of subsidized energy products. In doing so, it has incurred significant fiscal savings. It has also conducted consultations with businesses and industries and developed compensation measures to reduce the burden of higher fuel prices on them. Finally, despite these efforts, a majority of subsidy benefits still go to those consumers. All of these findings are fascinating, yet preliminary. Further study is needed to confirm the estimations presented. Such study could be extremely useful as it could show that taking non-household consumers of subsidized energy products into account could be a component of fossil fuel subsidy reform in other countries. Recommendations can potentially mirror those for households, with the importance of mitigation measures and communication reaffirmed. Given that they are the primary consumers of most energy productions, non-household sectors have been taken into account by the GOI. Assessing the result of reforms and their impact on those sectors should be a subject of future examination and research.

4. CONCLUSION

Past studies of fossil fuel subsidies have revealed a great deal about their impacts and demonstrated the many gains that could be made with their removal. They have shown that subsidies are the cause of significant economic inefficiencies, encouraging overconsumption of resources with detrimental economic and environmental consequences. Perhaps most significantly, they have shown that subsidies do not help countries achieve greater energy independence and economic growth, nor help low-income households gain

access to energy resources—the primary reasons that they were initially adopted by national governments. Perversely, subsidies undermine growth, damage the environment, while benefiting higher income households more than lower income ones. Their removal would lead to greater economic efficiency and growth in the long-run, reductions in GHG emissions, and the liberation of public resources for more effective poverty alleviation measures. With the potential for enormous social, economic and environmental gains now well documented, the need for systematic subsidy reform worldwide has been established.

The challenges policymakers face with respect to fossil fuel subsidy reform have also been the subject of numerous examinations. The difficulties associated with the implementation of reforms stem in large part from widespread opposition from those who benefit the most from subsidies, as well as poor and vulnerable communities that would be disproportionately affected. Studies of both successful and unsuccessful attempts at reform worldwide have revealed three central components to durable changes in subsidy policies: so-called mitigation measures to smooth the transition to those that will be adversely affected by change, most notably the poor; communication measures to make the public and all stakeholders aware of the benefits of reform in addition to which reforms will be implemented; and the de-politicization of energy policies to prevent backsliding, achieved by allowing the market to determine prices. With the multifaceted benefits of successfully executed reform clear, numerous international organizations and institutions have begun to help countries across the globe in the development and implementation of new policies through the application of these strategies.

While many strides have been made in terms of understanding their effects, the need for their reform, and the manner in which reforms can be implemented successfully, various aspects of fossil fuel subsidies have not been the subject of extensive examination. In particular, the impact of subsidies and reforms on non-household consumers of subsidized energy products has been under-assessed. While households have been consistently emphasized, and the need for mitigation measures for the poor has come to be considered an essential component of any reform process, non-household consumers are often given tangential mention. This has left a gap which can and should be filled.

This study demonstrates why non-household consumers should be the focus of further research. Most notably, IMF data on subsidies and IEA data on energy product consumption show that, apart from kerosene and possibly LPG, households are

not the primary consumers of subsidized energy products in those countries identified as having fossil fuel subsidies. The transport, industrial and commercial sectors as well as electricity generators are the dominant consumers of all other energy products. As a result, a certainly non-negligible, and possibly a majority, of subsidy benefits are being accumulated by these economic sectors and actors. Thus, the need to take non-household consumers of energy products into account is made evident.

There are indications that policymakers have in fact already taken non-household consumers into account when devising reforms. Poland, France, Iran and Indonesia have all adopted certain measures to alleviate the transition to new energy policies for certain businesses. Mitigation measures for certain industries and other energy intensive sectors may therefore be equally important for subsidy reform as similar measures are for households. Further study is necessary to assess how targeted measures, both restricting access to subsidized energy products and/or assisting with the transition to new policies, should be integrated into plans for fossil fuel subsidy reform.

The case of Indonesia confirms much of what has already been learned with respect to fossil fuel subsidies while reaffirming that further study of non-household consumers would be beneficial. Since the AFC, Indonesia has implemented a variety of measures in attempts to reduce the fiscal and economic burdens imposed by its longstanding consumption subsidies on certain petroleum products and electricity. These efforts have demonstrated the importance of mitigation measures for the poor, communication measures, and market pricing schemes to ensure that shifts away from subsidized pricing are successful. Although numerous subsidies remain in place, Indonesia has seen significant change in policy and shown the way forward for other countries. Its policy experiments have illustrated what works and what doesn't when it comes to fossil fuel subsidy reform.

Indonesia may also be able to offer lessons for policymakers beyond those already often discussed. In particular, a preliminary analysis of its reform efforts show the potential utility of more detailed assessments of measures targeting non-household consumers. Firstly, Indonesia is a country where sectors other than households consume a majority of subsidized energy products. Apart from kerosene and LPG, the vast majority of which is consumed by them, households account for one-third of electricity consumption and an extremely negligible amount of gasoline, diesel, natural gas and coal consumption. The transport, industrial, and commercial sectors, as well as electricity

generators, consume the majority of these energy products. Thus, Indonesia's economic sectors follow global energy consumption trends. Taking these trends into account with respect to subsidy reform would thus be logical for the same reasons.

Indeed, there is evidence that the GOI has considered non-household consumers when developing its reforms, at least since the mid-2000s. Past studies have indicated that the GOI held significant consultations with business associations and industrial groups with respect to subsidy policy beginning in 2005. It has also adopted measures that have specifically targeted certain sectors, banning them from the consumption of subsidized energy products. This has most notably been the case with respect to the use of subsidized diesel by industry and electricity producers. At the same time, the GOI has apparently devised certain compensation measures to assist energy intensive sectors with their adaptation to new policies. None of these targeted measures have been extensively examined with the goal of assessing impact or potential lessons for subsidy reform. In conducting such examinations, the Indonesian case may offer insights into how various economic sectors which consume subsidized energy products can be considered by governments planning to adopt changes to energy policy.

Preliminary analyses of Indonesian policies reaffirm that there are indeed lessons that can be learned. IEA data on consumption of subsidized petroleum products, PLN data on consumption of electricity and electricity tariffs, and national budgetary data offer the possibility to estimate the savings the Indonesian government has incurred from banning the purchase of subsidized diesel by industry and electricity producers in 2005. The estimates amount to a total of over 150 trillion rupiah saved in the years 2008 through 2012. While this may be an overestimate, it does show that targeted measures aimed at restricting access to subsidized energy products may be a policy option with at least substantial fiscal benefits.

The same data sets can also be used to estimate the amount of benefits different sectors have received from subsidies. In other words, budgetary spending on subsidies can be disaggregated by

sector. Such an analysis reveals that, despite the measures adopted to restrict the consumption of subsidized energy products by certain sectors, a minority of funds went directly to the household sector, and its overall share declined between the years 2008 and 2012. Once again, while there are limitations to the estimations, there is clearly reason to analyze the consumption of energy products by non-households and assess how subsidy reforms should address them. To a larger extent, the Indonesian case demonstrates that not everything that could be learned from the GOI's reform efforts has been learned. Broader policy implications that can be translatable to other cases may be hidden behind the unexamined measures targeting non-household consumers of subsidized energy products in Indonesia.

Overall, this study presents what is known about fossil fuel subsidies, while revealing a major gap in past research with respect to non-household consumers of subsidized energy products and pointing to avenues for further research. While the specific analyses are preliminary and subject to caveats, the primary conclusion that further examination of sectors apart from households is needed is strong. As more and more countries undertake reforms of their energy subsidies, ensuring the most effective measures are adopted will become increasingly useful. With the benefits of subsidy removal clear, and with an international consensus in favor of reform already established, shifts away from fossil fuel subsidies are likely to become increasingly common. Ensuring smooth transitions away from subsidies for sectors which consume the majority of subsidized energy products will be helpful in ensuring that reforms are durable, and that short-term negative economic and social impacts are minimized. Global assessments of consumption and the Indonesian case show the relevance of non-household consumers of subsidized energy products. Understanding in more nuance how reforms affect them has the potential to improve the reforms that will be developed by policymakers worldwide. Further study can reinforce the many benefits of successful reform for the countries and societies slowly turning away from these policies of the past. ■

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APPENDIX

Table 1. Estimations of fossil fuel subsidies in 2011

Organization	Methodology	Countries Assessed	Fossil Fuel	Estimated Subsidy Totals		
				Billions of nominal USD	% of nominal global GDP	% of nominal, global federal revenues
IMF ¹	“Pre-Tax” (price-gap)	Global (94 countries identified as having subsidies) ⁵	Oil:	211.2	0.3	0.91
			Gas:	113.5	0.16	0.48
			Coal:	6.5	0.01	0.03
			Electricity:	148.8	0.22	0.64
			Total:	480	0.69	2.06
IMF ¹	“Post-Tax” (price-gap + externalities + VAT) ⁴	Global (160 countries identified as having subsidies) ⁶	Oil:	879	1.26	3.77
			Gas:	299	0.43	1.28
			Coal:	539	0.77	2.31
			Electricity:	179	0.26	0.77
			Total:	1,896	2.72	8.13
IEA ²	Price-Gap	Global (38 countries identified as having subsidies) ⁷	Oil:	285	0.4	n.a.
			Gas:	104	0.14	n.a.
			Coal:	3.2	0.004	n.a.
			Electricity:	131	0.18	n.a.
			Total:	523.2	0.73	n.a.
OECD ³	Inventory	34 OECD member states ⁸	Oil:	n.a.	n.a.	n.a.
			Gas:	n.a.	n.a.	n.a.
			Coal:	n.a.	n.a.	n.a.
			Electricity:	n.a.	n.a.	n.a.
			Total:	83.137	n.a.	n.a.

Sources and Notes:

1. Clements *et al.*, 2013b.

2. IEA (2012) World Energy Outlook. Author's calculations for % of GDP using World Bank Development Indicator data on global GDP for 2011.

3. Global Subsidies Initiative Interactive Database at <http://www.iisd.org/gsi/interactive-maps>.

4. Externalities include damage from global warming evaluated at \$25 per ton of CO₂ emissions, adverse effects on public health through local pollution, traffic congestion and accidents, and road damage. VAT is a consumption tax rate that should be integrated into the cost of fossil fuel products for revenue raising purposes.

5. Afghanistan, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, Bahrain, Bangladesh, Barbados, Belarus, Benin, Bhutan, Bolivia, Botswana, Brunei Darussalam, Burkina Faso, Cameroon, Cape Verde, China, Congo Dem. Rep., Congo Rep., Côte d'Ivoire, Djibouti, Ecuador, Egypt, Equatorial Guinea, Ethiopia, Fiji, Gabon, Georgia, Germany, Ghana, Honduras, India, Indonesia, Iran, Iraq, Ireland, Jordan, Kazakhstan, Korea, Kuwait, Kyrgyzstan, Lebanon, Lesotho, Libya, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Morocco, Mozambique, Myanmar, Namibia, New Zealand, Nigeria, Oman, Pakistan, Panama, Poland, Qatar, Russia, Sao Tomé and Principe, Saudi Arabia, Senegal, Slovakia, South Africa, Spain, Sri Lanka, St. Kitts and Nevis, St. Lucia, Sudan, Taiwan, Tajikistan, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United States, Uzbekistan, Venezuela, Yemen, Zambia, Zimbabwe.

6. Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Benin, Bhutan, Bolivia, Bosnia, and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cameroon, Canada, Cape Verde, Chad, Chile, China, Colombia, Congo Dem Rep, Congo Rep, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guyana, Honduras, Hong Kong SAR, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Kosovo, Kuwait, Kyrgyzstan, Latvia, Lebanon, Lesotho, Libya, Lithuania, Luxembourg, Macedonia FYR, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mexico, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Rwanda, Sao Tomé and Principe, Saudi Arabia, Senegal, Serbia, Sierra Leone, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sudan, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Venezuela, Yemen, Zambia, Zimbabwe.

7. Algeria, Angola, Argentina, Azerbaijan, Bangladesh, Brunei Darussalam, China, Colombia, Ecuador, Egypt, El Salvador, India, Indonesia, Iraq, Iran, Kazakhstan, Korea, Kuwait, Libya, Malaysia, Mexico, Nigeria, Pakistan, Peru, Philippines, Qatar, Russia, Saudi Arabia, Sri Lanka, Taiwan, Thailand, Turkmenistan, Ukraine, United Arab Emirates, Uzbekistan, Venezuela, Vietnam.

8. Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

Table 2. IEA estimates of fossil fuel subsidies in billions of nominal USD from 2007 to 2012

Fossil Fuels	2007	2008	2009	2010	2011	2012
Oil	186	285	126	193	285	277
Gas	74	135	85	91	104	124
Coal	0	4	6	3	3.2	7
Electricity	81	130	95	122	131	135
Total	341	554	312	409	523.2	543

Sources: IEA World Energy Outlook 2010, 2011, 2012 and 2013.

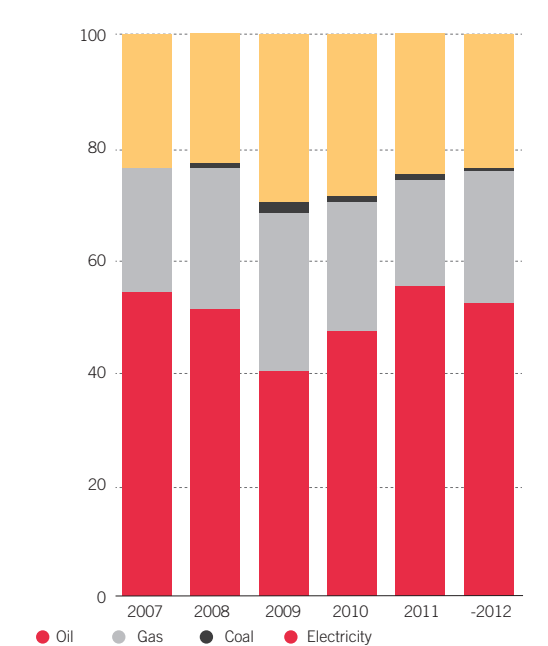
Figure 1. IEA estimates of fossil fuel subsidies in billions of nominal USD by fuel type¹ and annual average brent spot crude oil price in dollars per barrel² from 2007 to 2012



Sources:

1. IEA World Energy Outlook 2010, 2011, 2012 and 2013 (left axis)
2. US Energy Information Administration (right axis).

Figure 2. Percentage of total IEA estimates of fossil fuel subsidies by fuel type from 2007 to 2012



Sources: IEA World Energy Outlook 2010, 2011, 2012 and 2013

Table 3. Pre-tax fossil fuel subsidies in 2011 by fossil fuel product

Category of Fossil Fuel with Pre-Tax Subsidies	Metric	Subsidizing Country Average ¹	World Total
Petroleum Products	% of GDP	6.81%	0.30%
	% of government revenues	24.06%	0.91%
Electricity	% of GDP	1.84%	0.22%
	% of government revenues	6.95%	0.64%
Natural Gas	% of GDP	2.92%	0.16%
	% of government revenues	10.63%	0.48%
Coal	% of GDP	0.08%	0.01%
	% of government revenues	0.29%	0.03%
Total	% of GDP	3.19%	0.69%
	% of government revenues	11.38%	2.06%

Source: Clements *et al.*, 2013b.Notes: 1. Author's calculations. Average of countries which are identified as having fossil fuel subsidies in Clements *et al.* (2013b). For list of countries see Table 4.

Table 4. List of countries by type of fossil fuel product subsidized pre-tax

Petroleum Products		Electricity		Natural Gas	Coal
60 Countries Total		66 Countries Total		22 Countries Total	11 Countries Total
Non-OECD (58 Countries)		Non-OECD (66 Countries)		Non-OECD (22 Countries)	Non-OECD (3 Countries)
Algeria ²	Kuwait	Afghanistan ¹	Lesotho ¹	Algeria	Kazakhstan
Angola	Kyrgyzstan ²	Algeria	Libya	Argentina	Taiwan
Antigua and Barbuda ¹	Lebanon ²	Angola	Madagascar ¹	Azerbaijan	Thailand
Armenia ²	Libya	Argentina	Malawi ¹	Bangladesh	
Azerbaijan	Madagascar ¹	Armenia	Malaysia	Egypt	OECD (8 Countries)
Bahrain	Malaysia	Azerbaijan	Mali ¹	India	Germany
Bangladesh	Maldives ¹	Bahrain	Mauritania ¹	Iran	Ireland
Barbados ¹	Morocco ²	Bangladesh	Mozambique	Iraq	Korea
Bhutan ¹	Myanmar	Belarus	Namibia	Kazakhstan	Poland
Bolivia	Nigeria	Benin	Nigeria	Kuwait	Slovakia
Botswana	Oman	Botswana	Oman	Libya	Slovenia
Brunei Darussalam	Pakistan	Brunei Darussalam	Pakistan	Malaysia	Spain
Cameroon	Panama	Burkina Faso ¹	Qatar	Mauritania ¹	Turkey
Congo, Rep	Qatar ²	Cameroon	Russia	Oman	
Ecuador	Sao Tomé and Príncipe ¹	Cape Verde ¹	Rwanda ¹	Pakistan	
Egypt	Saudi Arabia	China	Saudi Arabia	Qatar	
Equatorial Guinea ¹	South Africa	Congo, DR	Senegal	Russia	
Ethiopia	Sri Lanka	Congo, Rep	South Africa	Thailand	
Fiji ¹	St. Kitts and Nevis ¹	Côte d'Ivoire	Sri Lanka	Turkmenistan	
Gabon	St. Lucia ¹	Djibouti ¹	Taiwan	Ukraine	
Georgia	Sudan	Ecuador	Tajikistan	United Arab Emirates	
Ghana	Thailand	Egypt	Tanzania	Uzbekistan	
Honduras	Trinidad and Tobago	Ethiopia	Thailand	Venezuela	
India	Tunisia	Ghana	Tunisia		
Indonesia	Turkmenistan ²	India	Turkmenistan		
Iran	United Arab Emirates ²	Indonesia	Uganda ¹		
Iraq	Uzbekistan	Iran	Ukraine		
Jordan	Venezuela	Iraq	United Arab Emirates		
Kazakhstan	Yemen	Jordan	Uzbekistan		
		Kazakhstan	Venezuela		
OECD (2 Countries)		Kuwait	Yemen		
New Zealand		Kyrgyzstan	Zambia		
United States		Lebanon	Zimbabwe		

Source and Notes: Clements *et al.*, 2013b.

1. Countries for which IEA data on energy product consumption is unavailable.
2. Countries in which there is no consumption of kerosene according to IEA data.

Table 5. Breakdown of pre-tax and post-tax subsidies globally

Category		\$ Billion				Percent of Global GDP			
		2011 Clements <i>et al.</i>	2011	2013	2015 ¹	2011 Clements <i>et al.</i>	2011	2013	2015 ¹
Petroleum	Pre-Tax	220	241	267	135	0.3	0.3	0.4	0.2
	Post-Tax	726	1,366	1,613	1,497	1.0	1.9	2.2	1.8
Coal	Pre-Tax	6	7	5	5	0.0	0.0	0.0	0.0
	Post-Tax	709	2,124	2,530	3,147	1.0	3.0	3.4	3.9
Natural Gas	Pre-Tax	116	111	112	93	0.2	0.2	0.2	0.1
	Post-Tax	376	436	482	510	0.5	0.6	0.6	0.6
Electricity	Pre-Tax	150	163	156	99	0.2	0.2	0.2	0.1
	Post-Tax	179	231	233	148	0.3	0.3	0.3	0.2
Total	Pre-Tax	492	523	541	333	0.7	0.7	0.7	0.4
	Post-Tax	1,990	4,157	4,858	5,302	2.8	5.8	6.5	6.5

Source and Notes: Coady *et al.* (2015).

1. Projection.

Table 6. Typical rationale for and potential unintended effects of fossil fuel consumption subsidies

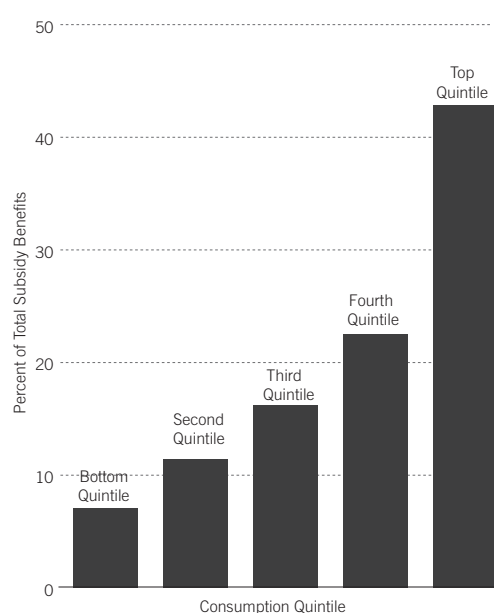
Typical Rationale	Unintended Effects
Alleviate poverty	Encourage wasteful consumption
Promote economic development	Hasten the decline of exports
	Threaten energy security by increasing imports
	Encourage fuel adulteration and smuggling
	Discourage investment in energy infrastructure
	Disproportionally benefit the middle class and rich
	Drain state budgets for importers
	Distort markets and create barriers to clean energy investment
	Dampen global demand responsiveness to high prices
	Increase CO ₂ emissions and exacerbate local pollution

Source: IEA (2010) World Energy Outlook.

Table 7. Key studies regarding fossil fuel subsidies and their effects

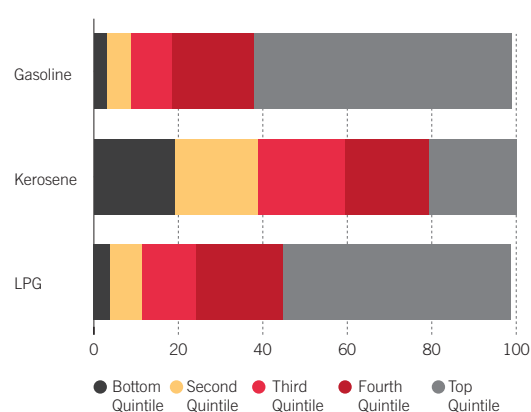
Study	Impacts Addressed or Key Findings
IEA World Energy Outlook (1999, 2007-2014)	General overview of fossil fuel subsidies and their effects.
Clements <i>et al.</i> (2013a and b)	Subsidies are widespread and economically harmful. Case studies illustrate key elements for successful reform.
Coady, Parry, Sears and Shang (2015)	Subsidies are more widespread than commonly thought and harmful for economies and the environment.
IEA, OPEC, OECD, World Bank (2010 and 2011)	General overview of fossil fuel subsidies and their effects.
Koplow (2014)	Subsidies are fiscally burdensome and crowd out important social spending. Review of strategies for successful reform.
Ellis (2010)	Review of empirical studies. Subsidies repress economic growth and engender higher levels of GHG emissions.
Arze del Granado, Coady and Gillingham (2010)	Subsidies are a socially regressive policy.

Figure 3. Distribution of benefits from petroleum product subsidies by consumption quintile

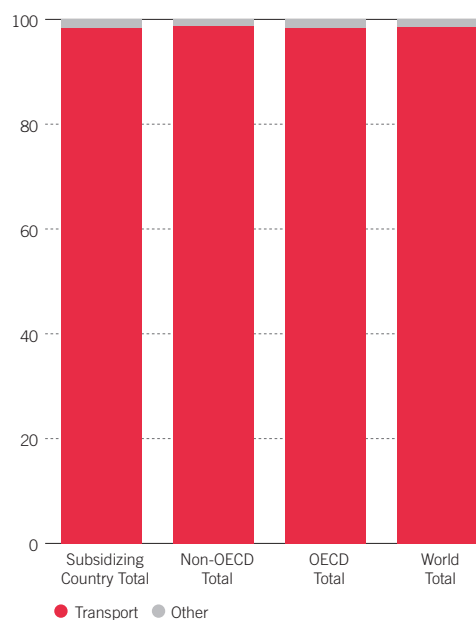
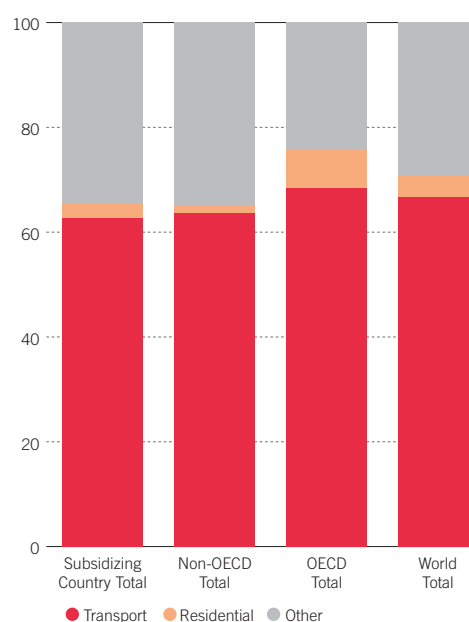
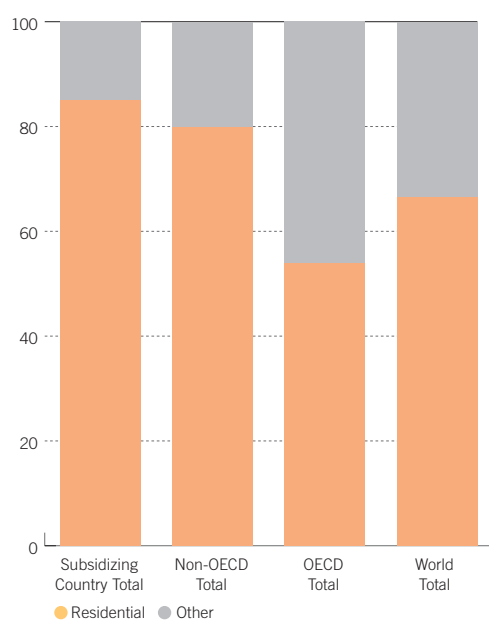
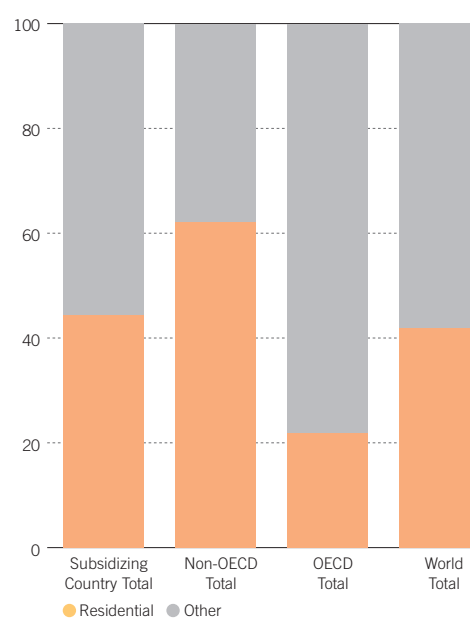


Source: Arze del Granado *et al.*, 2010.

Figure 4. Distribution of Benefits from Petroleum Product Subsidies by Consumption Quintile for LPG, Kerosene and Gasoline



Source: Arze del Granado *et al.*, 2010.

Figure 5. Motor gasoline utilization by sector: comparison by country groupings**Figure 6. Diesel utilization by sector: comparison by country groupings****Figure 7. Kerosene utilization by sector: comparison by country groupings****Figure 8. LPG utilization by sector: comparison by country groupings**

Sources (figures 5-8): Author's calculations and IEA World Energy Statistics Database; all data for 2011.

Figure 9. Electricity utilization by sector: comparison by country groupings

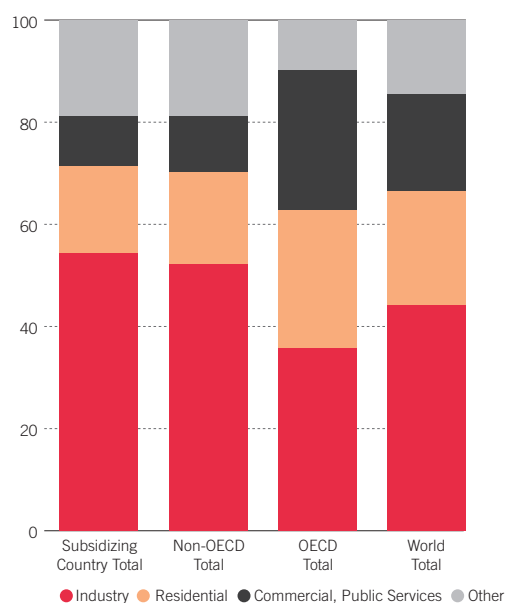


Figure 10. Natural gas utilization by sector: comparison by country groupings

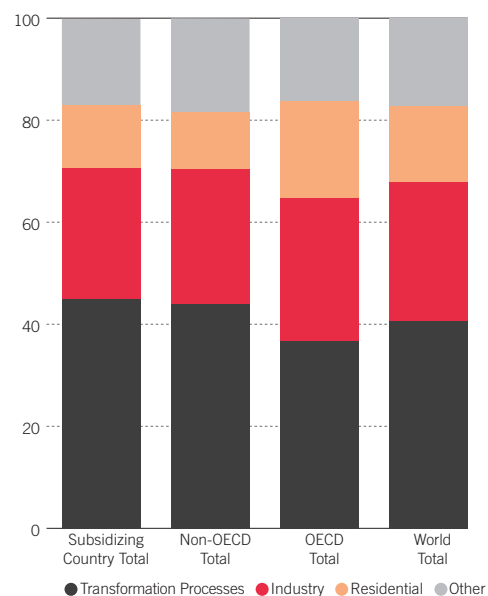
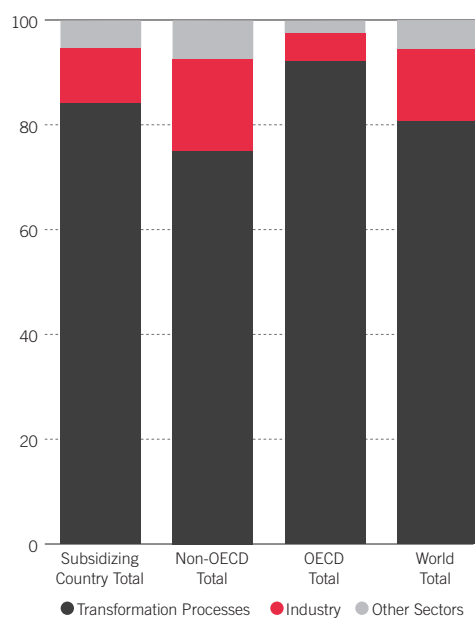


Figure 11. Coal utilization by sector: comparison by country groupings



Sources (figures 9-11): Author's calculations and IEA World Energy Statistics Database; all data for 2011.

Table 8. Percentage of total petroleum product utilization by sector in 2011: comparison by country groupings

Sector	Subsidizing Country Total ¹	Non-OECD Total	OECD Total	World Total
Transport Use of Motor Gasoline	98.40%	98.70%	98.41%	98.52%
Other Sector Use of Motor Gasoline	1.60%	1.30%	1.59%	1.48%
Transport Use of Diesel	62.68%	63.63%	68.50%	66.78%
Residential Use of Diesel	2.76%	1.32%	7.39%	4.14%
Other Sector Use of Diesel	34.56%	35.05%	24.10%	29.07%
Residential Use of Kerosene	84.92%	79.79%	53.96%	66.46%
Other Use of Kerosene	15.08%	20.21%	46.04%	33.54%
Residential Use of LPG	44.40%	62.04%	21.79%	41.91%
Other Sector Use of LPG	55.60%	37.96%	78.21%	58.09%

Source: IEA World Energy Statistics Database.

Notes: 1. Author's calculations. Total of countries identified as having petroleum product subsidies by Clements *et al.* (2013b). For list of countries see Table 4.**Table 9.** Percentage of total electricity utilization by sector in 2011: comparison by country groupings

Sector	Subsidizing Country Total ¹	Non-OECD Total	OECD Total	World Total
Industry ²	54.39%	52.23%	35.72%	44.16%
Residential	16.86%	17.92%	27.09%	22.40%
Commercial and Public Services	9.83%	11.01%	27.32%	18.98%
Losses and Other Sectors	18.92%	18.84%	9.87%	14.45%

Source: IEA World Energy Statistics Database.

Notes:

1. Author's calculations. Total of countries identified as having electricity subsidies by Clements *et al.* (2013b). For list of countries see Table 4.

2. Industry includes energy industry own use.

Table 10. Percentage of total natural gas utilization by sector in 2011: comparison by country groupings

Sector	Subsidizing Country Total ¹	Non-OECD Total	OECD Total	World Total
Transformation Processes	45.90%	44.28%	36.66%	40.65%
Industry ²	25.57%	26.41%	28.02%	27.18%
Residential	12.31%	11.10%	18.96%	14.83%
Other Sectors	16.22%	18.22%	16.36%	17.34%

Source: IEA World Energy Statistics Database.

Notes:

1. Author's calculations. Total of countries identified as having natural gas subsidies by Clements *et al.* (2013b). For list of countries see Table 4.

2. Industry includes energy industry own use.

Table 11. Percentage of total coal utilization by sector in 2011¹: comparison by country groupings

Sector	Subsidizing Country Total ²	Non-OECD Total	OECD Total	World Total
Transformation Processes	84.43%	75.50%	92.61%	80.54%
Industry ³	10.54%	17.37%	5.50%	13.87%
Other Sectors	5.02%	7.13%	1.90%	5.59%

Source: IEA World Energy Statistics Database.

Notes:

1. Sum of all coal types included within IEA World Energy Statistics Database.
2. Author's calculations. Total of countries identified as having coal subsidies by Clements *et al.* (2013b). For list of countries see Table 4.
3. Industry includes energy industry own use.

Table 12. Energy consumed by freight and passenger road transport sub-sectors by region

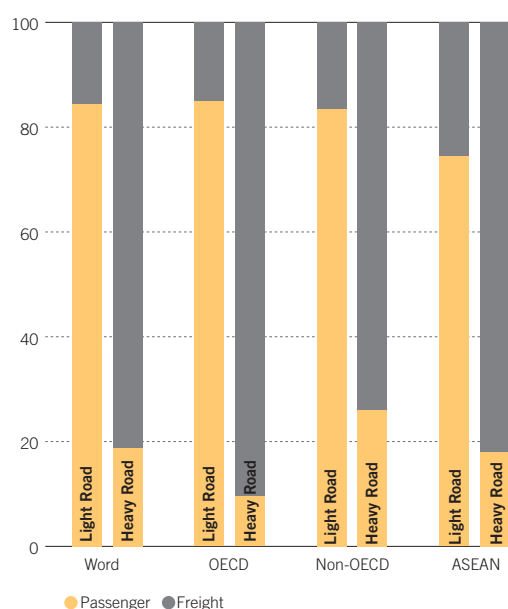
Region	Transport Sub-Sector	Total Energy Consumed in 2012 (PJ) (2°C Scenario)	Percentage of Total Energy Consumed in 2012 (2°C Scenario) ¹
World	Passenger Light Road	44155.4284	84.36%
	Freight Light Road	8188.363357	15.64%
	Passenger Heavy Road	4788.015797	18.83%
	Freight Heavy Road	20636.91969	81.17%
OECD	Passenger Light Road	28146.95782	84.90%
	Freight Light Road	5006.059419	15.10%
	Passenger Heavy Road	1043.373924	9.45%
	Freight Heavy Road	9993.698738	90.55%
Non-OECD	Passenger Light Road	16008.47058	83.42%
	Freight Light Road	3182.303939	16.58%
	Passenger Heavy Road	3744.641873	26.03%
	Freight Heavy Road	10643.22095	73.97%
ASEAN	Passenger Light Road	1736.978796	74.41%
	Freight Light Road	597.3814246	25.59%
	Passenger Heavy Road	253.2219154	17.95%
	Freight Heavy Road	1157.371389	82.05%

Source: IEA Energy Technology Perspectives 2015 at www.iea.org/etp2015.

Notes:

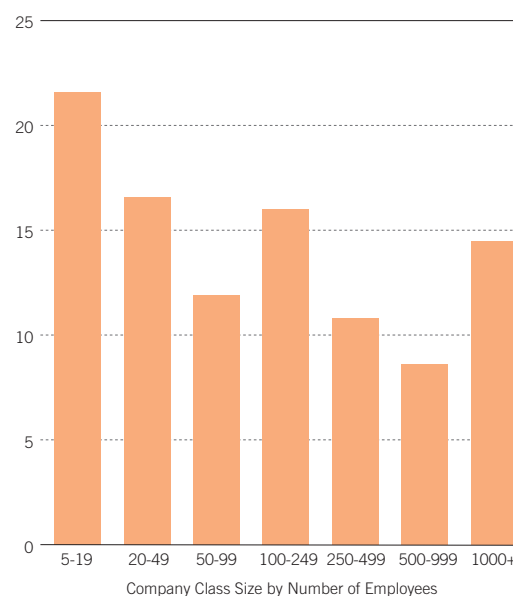
1. Author's calculations.

Figure 12. Percentage of total PJ of energy use in transport sub-sectors by end-use in 2012 (2°C scenario of the IEA's *Energy Technology Perspectives 2015* Publication): Comparison of country groupings



Source: Author's calculations based on IEA Energy Technology Perspectives 2015, accessible at www.iea.org/etp2015.

Figure 13. Average percentage of total employment by company class size in 91 non-OECD countries¹ in the late 2000s²



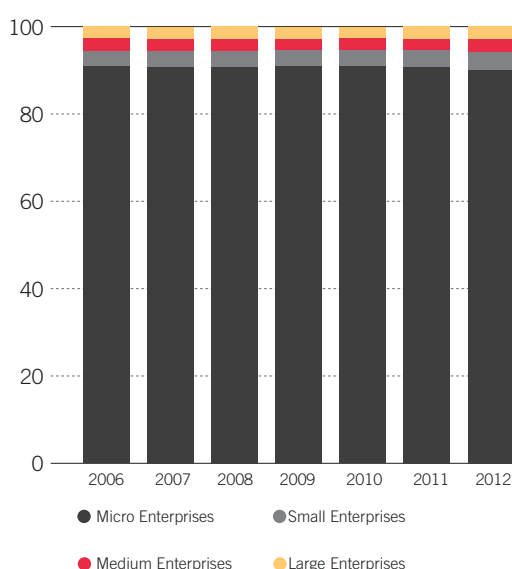
Source: Author's calculations based on data from World Bank Working Paper 5631 Dataset.

Notes:

1. Afghanistan, Albania, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cameroon, Cape Verde, Chad, Chile, Colombia, Congo Dem. Rep., Congo Rep., Cote d'Ivoire, Croatia, Ecuador, El Salvador, Eritrea, Fiji, Gabon, Gambia, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Honduras, Indonesia, Kazakhstan, Kenya, Kosovo, Kyrgyz Republic, Laos, Latvia, Lesotho, Liberia, Lithuania, Macedonia FYR, Madagascar, Malawi, Mali, Mauritania, Mauritius, Micronesia Fed. States., Moldova, Mongolia, Montenegro, Mozambique, Namibia, Nepal, Nicaragua, Niger, Nigeria, Panama, Paraguay, Peru, Philippines, Romania, Russia, Rwanda, Senegal, Serbia, Sierra Leone, South Africa, Swaziland, Tajikistan, Tanzania, Timor-Leste, Togo, Tonga, Uganda, Ukraine, Uruguay, Uzbekistan, Vanuatu, Venezuela, RB, Vietnam, Western Samoa, Yemen, Zambia

2. Year of national data varies. All data from 2005-2009 except for Brunei Darussalam (1997), Cambodia (2001) and Morocco (2002).

Figure 14. Percentage of total employment by enterprise class size in Indonesia from 2006 to 2012



Sources and Notes: Ministry of Cooperatives and Small and Medium Enterprises (Kementerian Koperasi dan Usaha Kecil dan Menengah) at <http://www.depkop.go.id/>. Micro-enterprise share of employment indicated.

Figure 15. USD-IDR average monthly exchange rate from January 1994 to February 2015 (inverted y-axis)

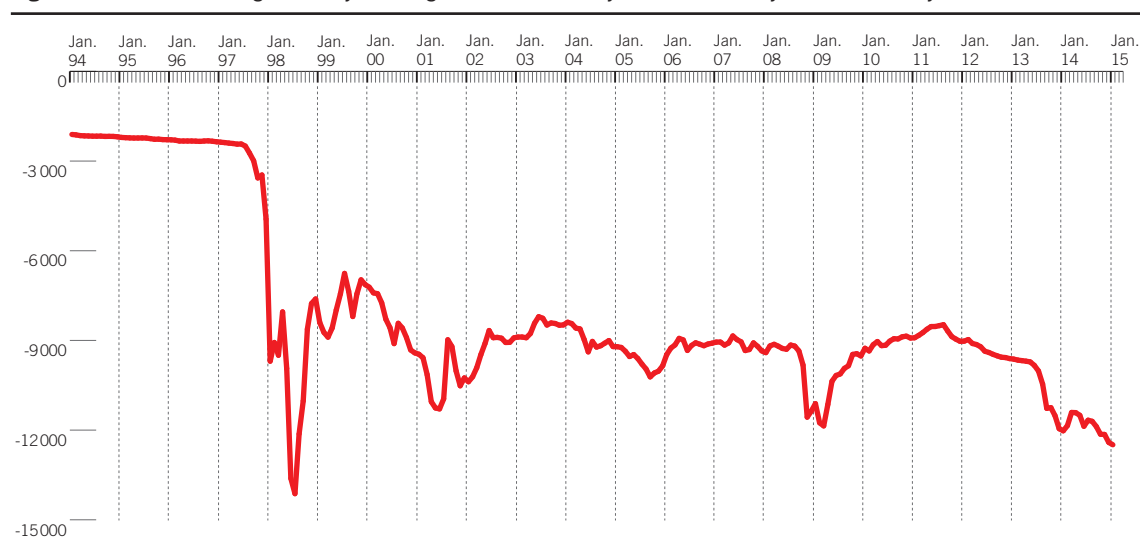


Figure 16. Subsidies as percentage of actual total Indonesian government expenditures (left axis) and projected and actual Indonesian government expenditures on subsidies (millions of rupiah, right axis) from 2001 to 2013

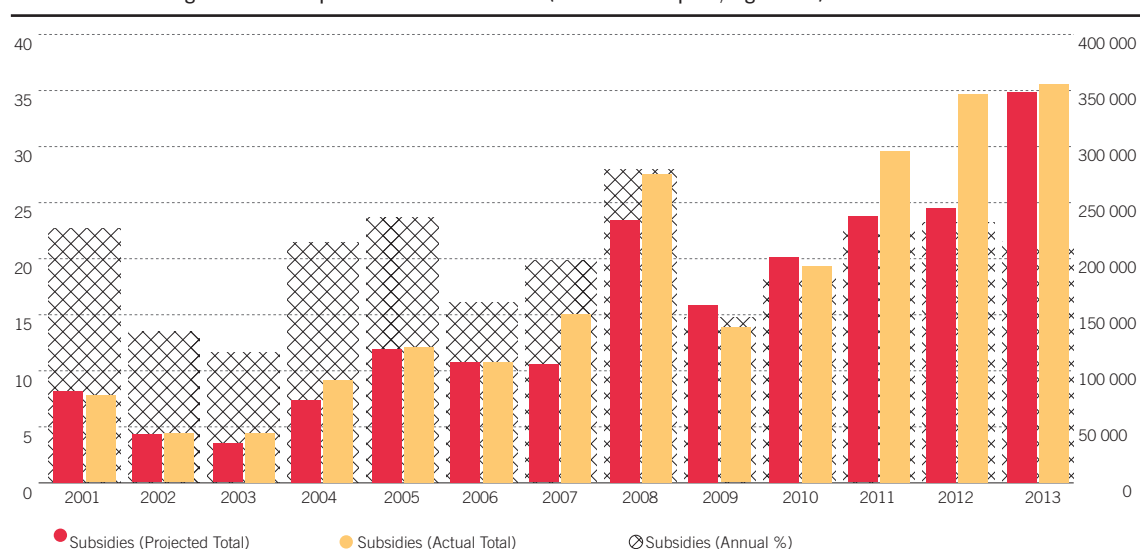
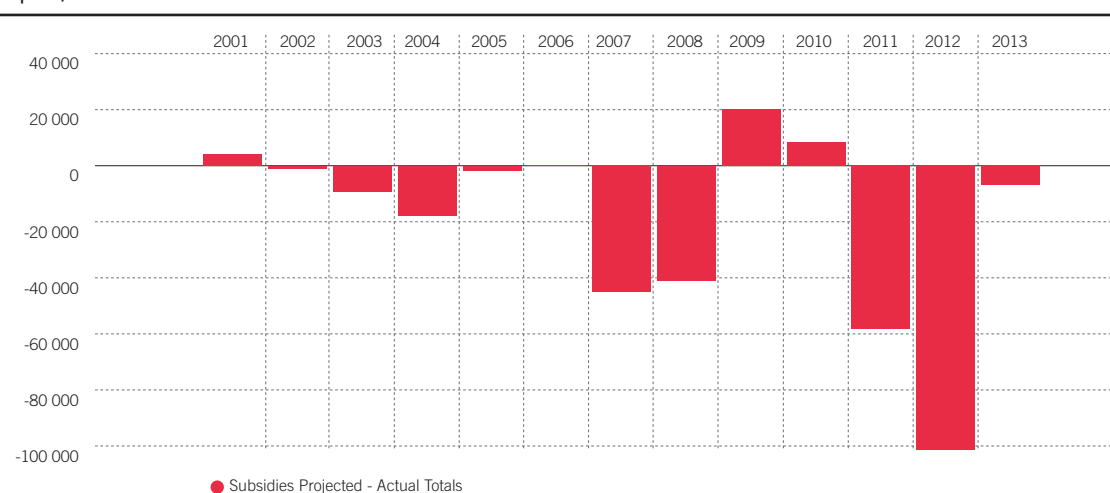
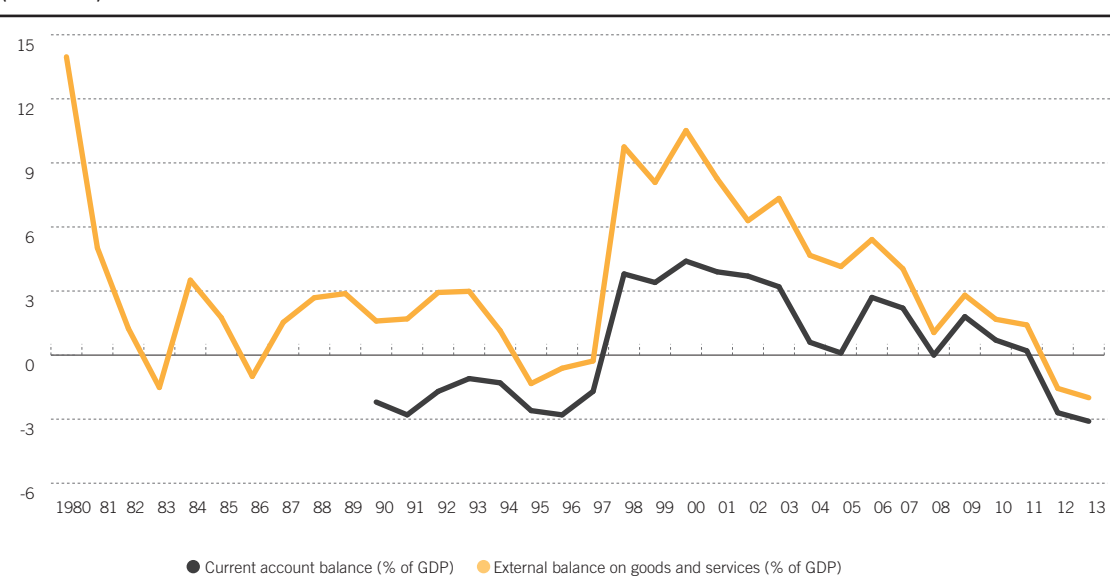


Figure 17. Difference between projected and actual total subsidy Indonesian government expenditures (millions of rupiah) from 2001 to 2013



Source: Bank of Indonesia.

Figure 18. Indonesian annual current account balance (% of GDP)¹ and annual external balance on goods and services² (% of GDP) from 1980 to 2013



Sources:

1. OECD Statistics
2. World Bank Development Indicators.

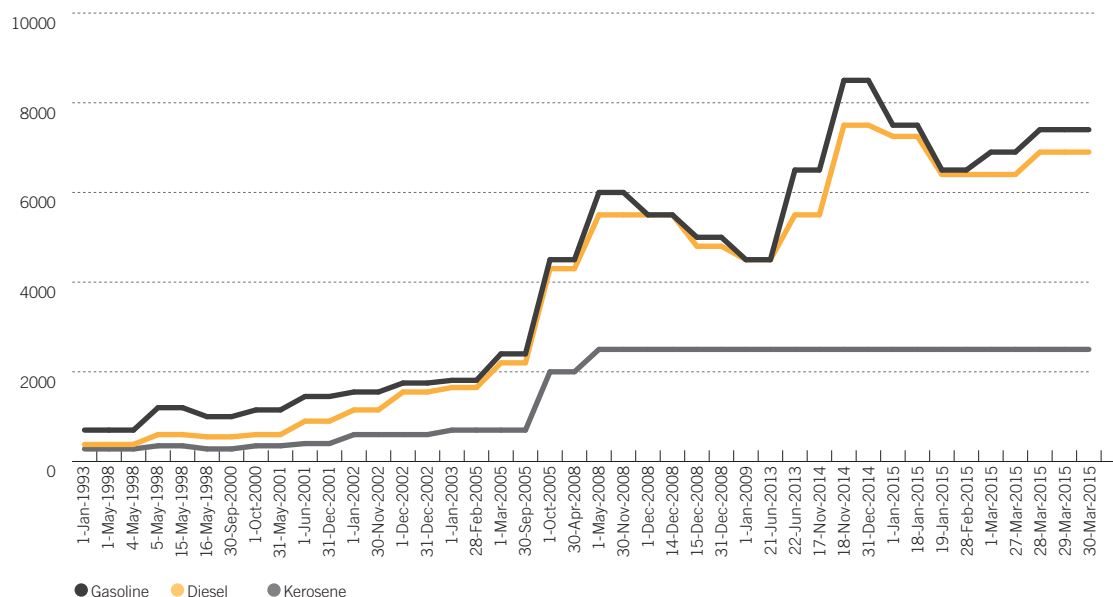
Figure 19. Indonesian annual oil and gas revenues as percentage of total revenues¹ and annual oil rents as percentage of GDP² from 2001 to 2013



Sources:

1. Bank of Indonesia
2. World Bank Development Indicators.

Figure 20. Retail price of gasoline, diesel and kerosene in Indonesia from 1 January 1993 to 30 March 2015



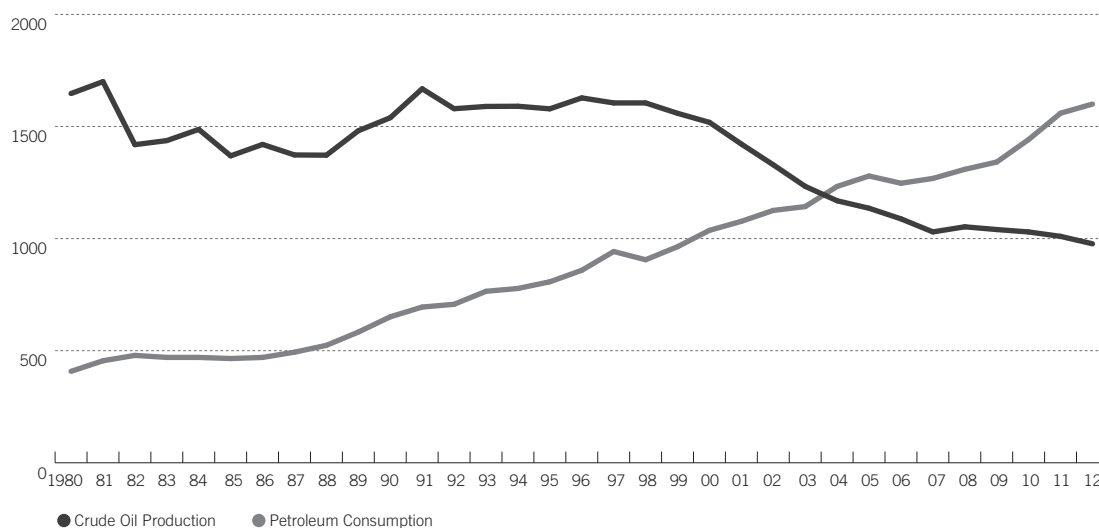
Sources: Beaton, C. and L. Lontoh (2010). Lessons Learned from Indonesia's Attempts to Reform Fossil-Fuel Subsidies. October 2010. International Institute for Sustainable Development; Global Subsidies Initiative (2014). Indonesia Energy Subsidy Review: Issue 1, Volume 1. March 2014, and World Bank (2006); Fuel Pricing and Subsidies in Indonesia: Reaching an Equitable and Sustainable Policy.

Table 13. Global energy sector rankings of Indonesia in 2012

Category	Crude Oil & Petroleum Products	Dry Natural Gas	Coal	Electricity	Geothermal	Other Renewables
Reserves	28 th (3.9 billion barrels)	11 th (3,992 billion cubic meters)	10 th (28.017 billion metric tons)	X	X	-- -- Significant, untapped hydro, solar and wind potential. ¹ -- --
Production	21 st (989 thousand barrels per day)	11 th (72 billion cubic meters)	4 th (442.82 million metric tons)	22 nd (185 billion kilowatt-hours)	3 rd (9.417 billion kilowatt-hours)	
Consumption	14 th (1,698 thousand barrels per day)	24 th (38 billion cubic meters)	17 th (60.24 million metric tons)	21 st (167 billion kilowatt-hours)	X	
Exports	21 st (401 thousand barrels per day)	9 th (35 billion cubic meters)	1 st (382.61 million metric tons)	X	X	
Imports	26 th (374 thousand barrels per day)	X	89 th (4,200 metric tons)	X	X	

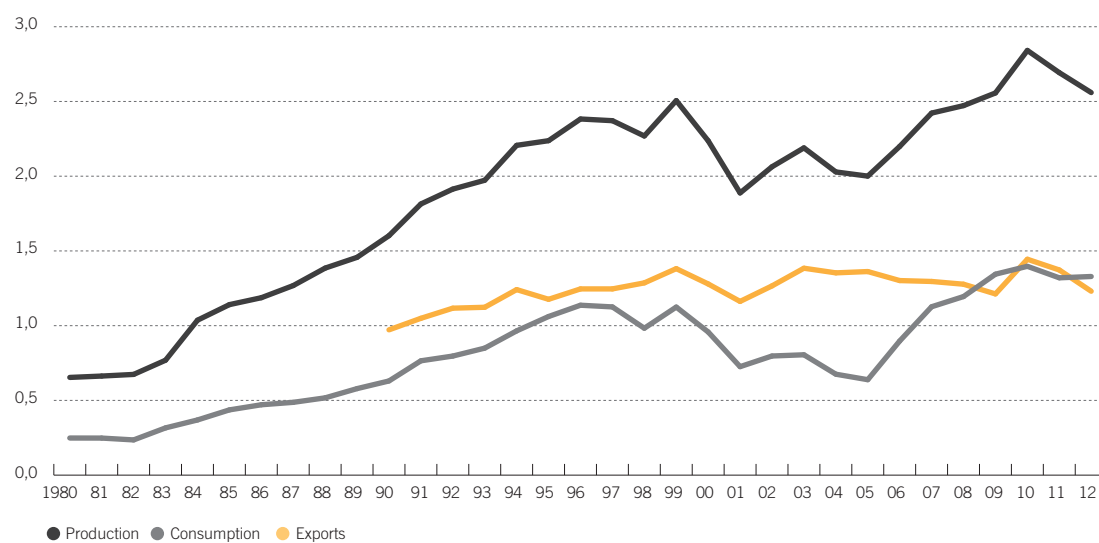
Sources and Notes: US Energy Information Administration.

1. For details on renewables in Indonesia see United States International Trade Administration (2010). Renewable Energy Market Assessment Report: Indonesia. Manufacturing and Services Competitiveness Report. May 2010. United States Department of Commerce.

Figure 21. Indonesian crude oil production and petroleum product consumption (Average annual rate in thousands of barrels per day) from 1980 to 2012

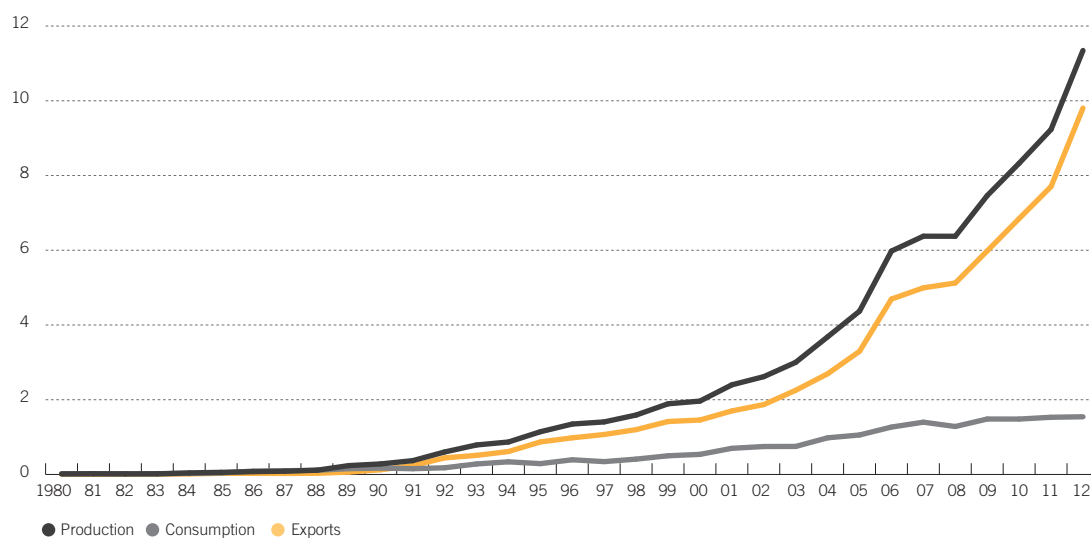
Source: US Energy Information Administration.

Figure 22. Indonesian natural gas production, consumption and exports (Quadrillion Btu) from 1980 to 2012



Source: US Energy Information Administration.

Figure 23. Indonesian coal production, consumption and exports (Quadrillion Btu) from 1980 to 2012



Source: US Energy Information Administration.

Figure 24. Production of electricity (GWh) by source in Indonesia from 1980 to 2011

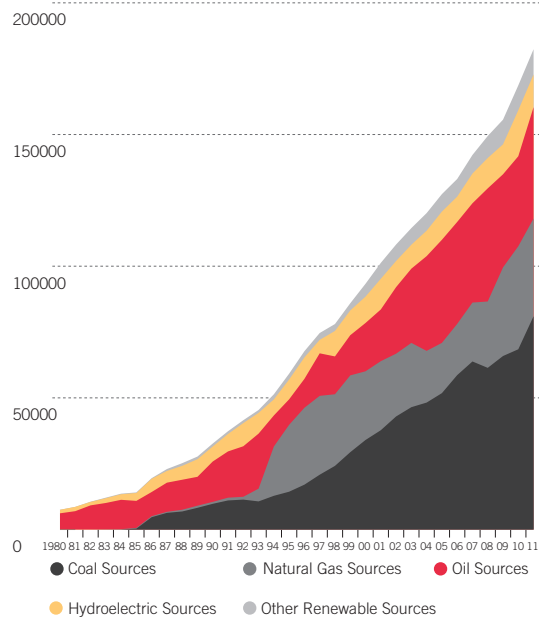


Figure 25. Percentage of total electricity production by source in Indonesia from 1980 to 2011

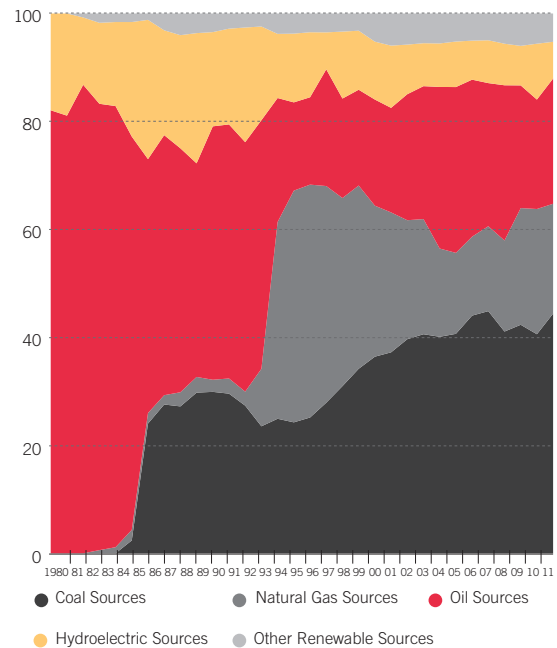


Figure 26. Percentage of total electricity production by source in Indonesia in 2001

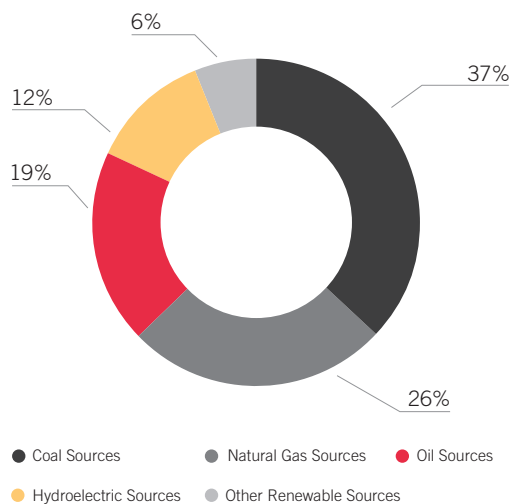
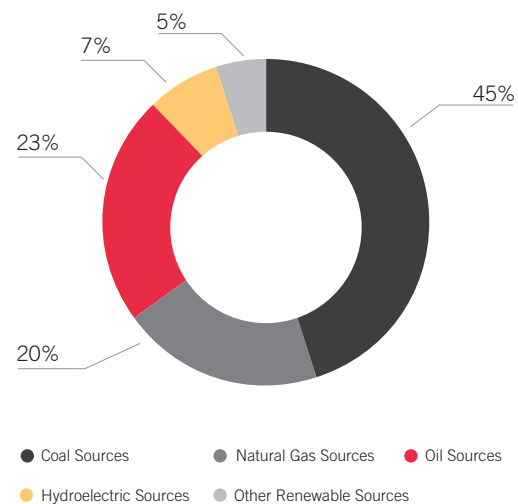


Figure 27. Percentage of total electricity production by source in Indonesia in 2011



Source (figures 24-27): World Bank Development Indicators.

Table 14. Indonesia's fuel subsidy scheme as of January 2015

Fuel	Subsidization Policy
Gasoline	<i>Distribution Compensation</i> Subsidy to cover distribution costs to remote areas to ensure price consistency throughout Indonesia. 2% subsidy paid to fuel distributors. Retail price decided by market with profit margin pegged at between 5-10% of the base market price used by the government.
Diesel	<i>Fixed Subsidy</i> Price fluctuation in line with market with a set subsidy rate of IDR 1,000 per liter that remains unchanged over time.
Kerosene	<i>Fixed Price</i> Price remains fixed at IDR 2,500 per liter with subsidy amount changing over time.
LPG	<i>Fixed Price</i> Price remains fixed at IDR 5,000 per kg for the 3kg cylinders. 12kg cylinders officially unsubsidized although sold at a loss by PT Pertamina, the national oil company.

Sources: Global Subsidies Initiative (2015a). Indonesia Energy Subsidy Briefing. February 2015; Global Subsidies Initiative (2015b). *Indonesia Energy Subsidy Review*: Issue 1, Volume 2. March 2015.

Table 15. Percentage of total utilization of subsidized fossil fuels by sector in Indonesia in 2011

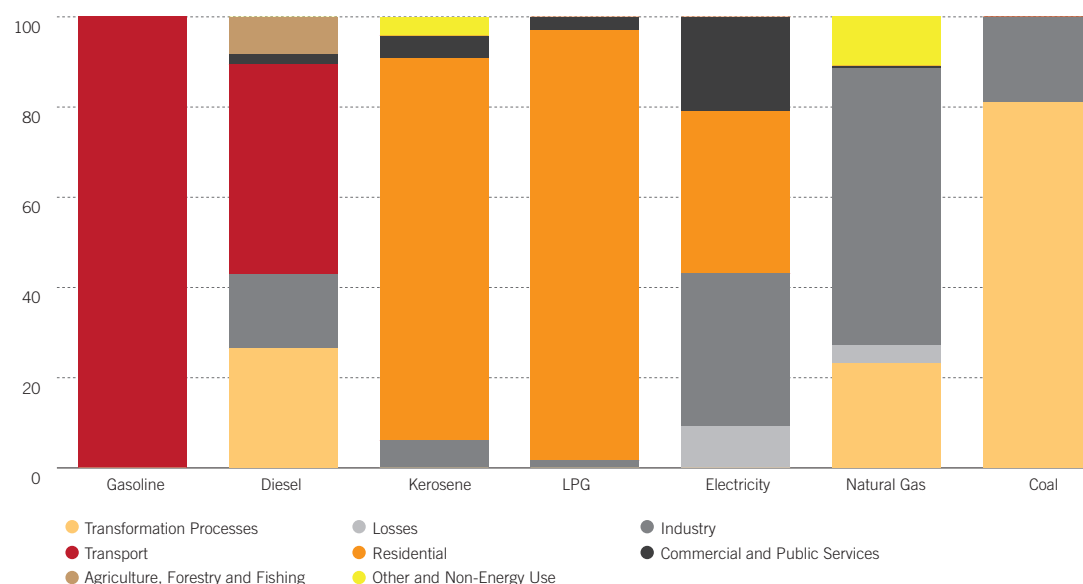
Sector	Gasoline	Diesel	Kerosene	LPG	Electricity	Natural Gas	Coal ¹
Transformation Processes ²	0.00%	26.41%	0.00%	0.00%	0.00%	23.06%	80.96%
Losses	0.00%	0.00%	0.00%	0.00%	9.09%	4.01%	0.00%
Industry ³	0.00%	16.53%	6.10%	1.68%	33.94%	61.44%	19.04%
Transport	100.00%	46.56%	0.00%	0.00%	0.00%	0.07%	0.00%
Residential	0.00%	0.00%	84.68%	95.33%	35.92%	0.04%	0.00%
Commercial and Public Services	0.00%	2.31%	5.04%	2.99%	21.05%	0.50%	0.00%
Agriculture, Forestry and Fishing	0.00%	8.19%	0.00%	0.00%	0.00%	0.00%	0.00%
Other and Non-Energy Use	0.00%	0.00%	4.18%	0.00%	0.00%	10.88%	0.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: IEA World Energy Statistics Database.

Notes:

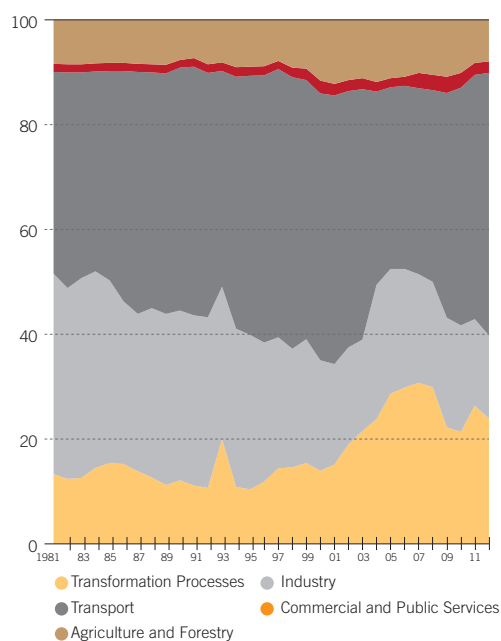
1. Sum of all coal types included within IEA World Energy Statistics Database.
2. Electricity generation.
3. Includes energy industry own use.

Figure 28. Percentage of total utilization of subsidized fossil fuels by sector in Indonesia in 2011



Source: Authors' calculations based on IEA World Energy Statistics Database.

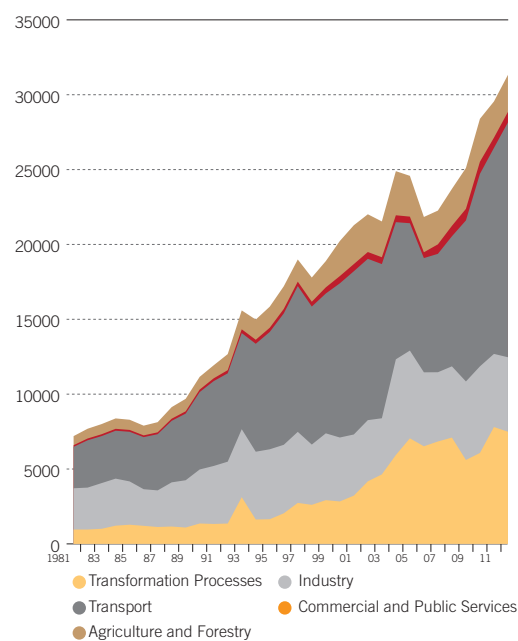
Figure 29. Percentage of total utilization of diesel by sector in Indonesia from 1981-2012



Source: IEA World Energy Statistics Database.

Notes: Transformation processes consists entirely of electricity generation.

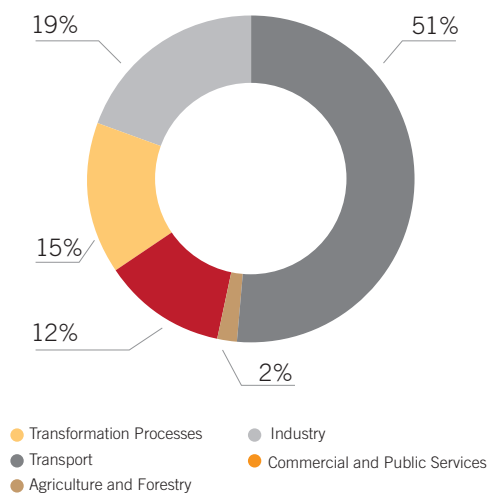
Figure 30. Total kilotons of diesel utilized by sector in Indonesia from 1981-2012



Source: IEA World Energy Statistics Database.

Notes: Transformation processes consists entirely of electricity generation.

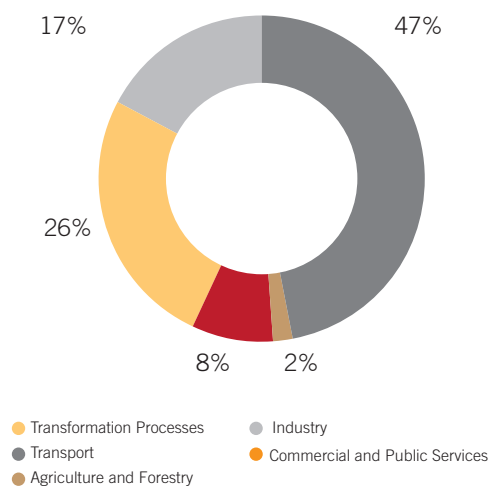
Figure 31 Percentage of total utilization of diesel by sector in Indonesia in 2001



Source: IEA World Energy Statistics Database.

Notes: Transformation Processes accounts for electricity generation.

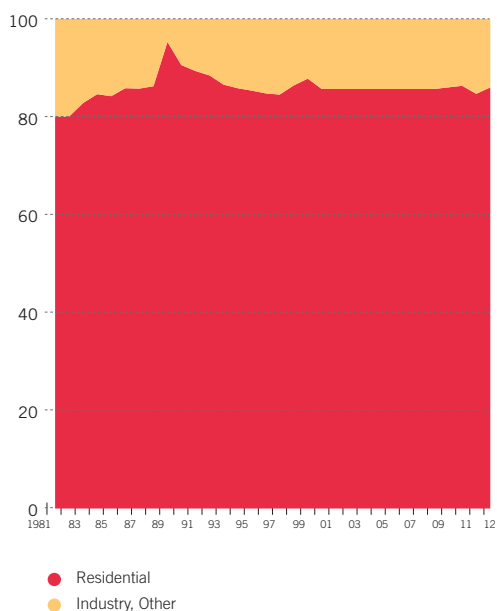
Figure 32 Percentage of total utilization of diesel by sector in Indonesia in 2011



Source: IEA World Energy Statistics Database.

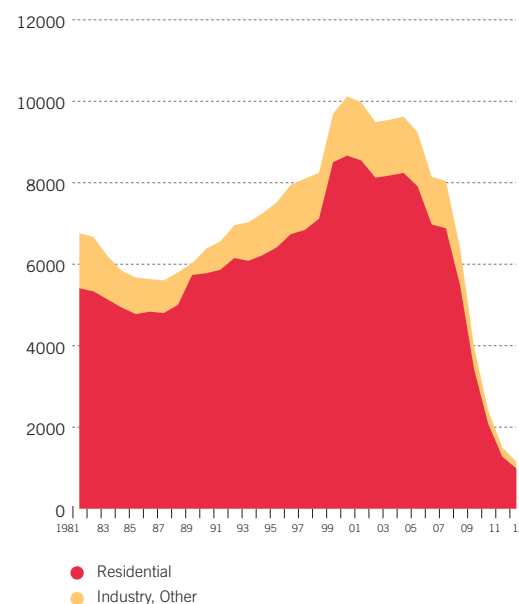
Notes: Transformation Processes accounts for electricity generation.

Figure 33. Percentage of total utilization of kerosene by sector in Indonesia from 1981 to 2012



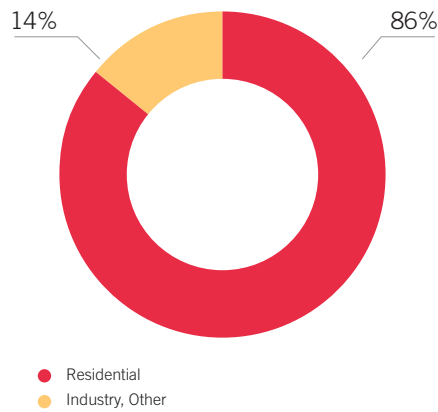
Source: IEA World Energy Statistics Database.

Figure 34. Total kilotons of kerosene utilized by sector in Indonesia from 1981 to 2012



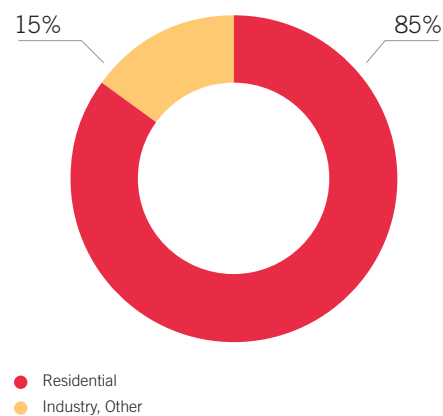
Source: IEA World Energy Statistics Database.

Figure 35. Percentage of total kerosene utilized in Indonesia in 2001



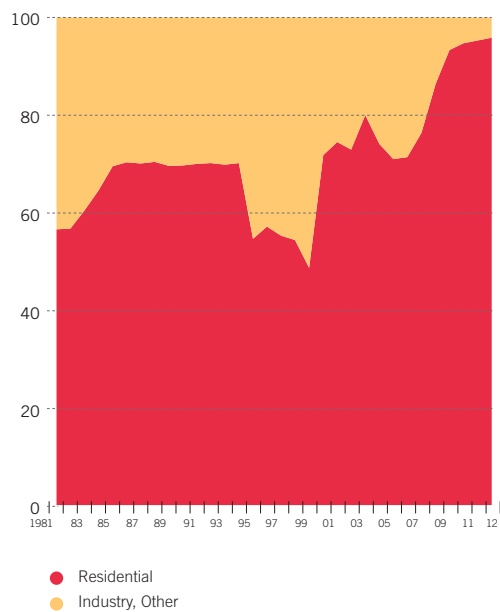
Source: IEA World Energy Statistics Database

Figure 36. Percentage of total kerosene utilized in Indonesia in 2011



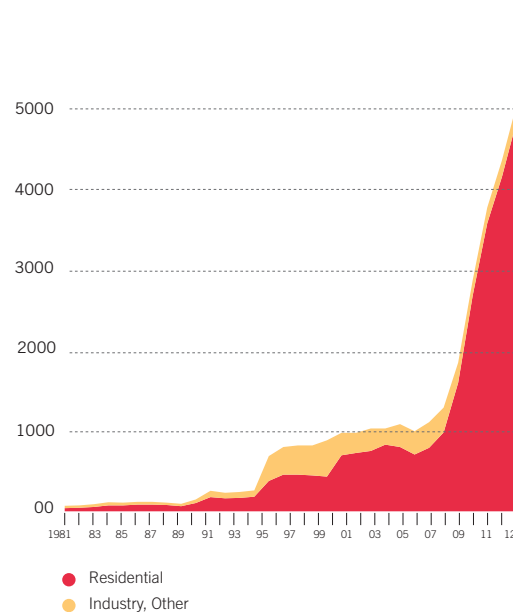
Source: IEA Energy Statistics of Non-OECD Countries 2014

Figure 37. Percentage of total utilization of LPG by sector in Indonesia from 1981 to 2012



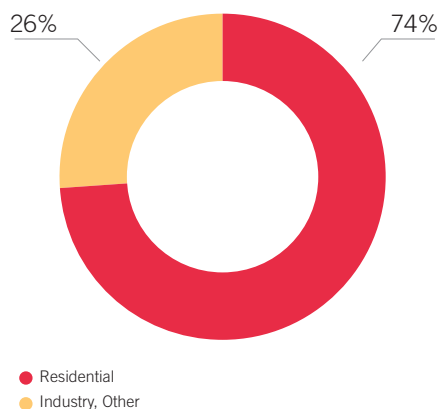
Source: IEA World Energy Statistics Database.

Figure 38. Total kilotons of LPG utilized by sector in Indonesia from 1981 to 2012



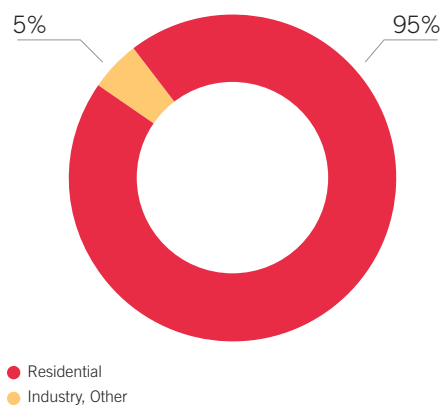
Source: IEA World Energy Statistics Database.

Figure 39. Percentage of total LPG utilized by sector in Indonesia in 2001



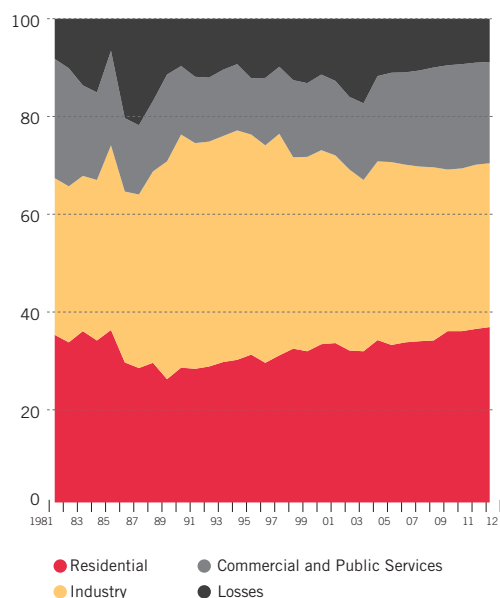
Source: IEA World Energy Statistics Database

Figure 40. Percentage of total LPG utilized by sector in Indonesia in 2011



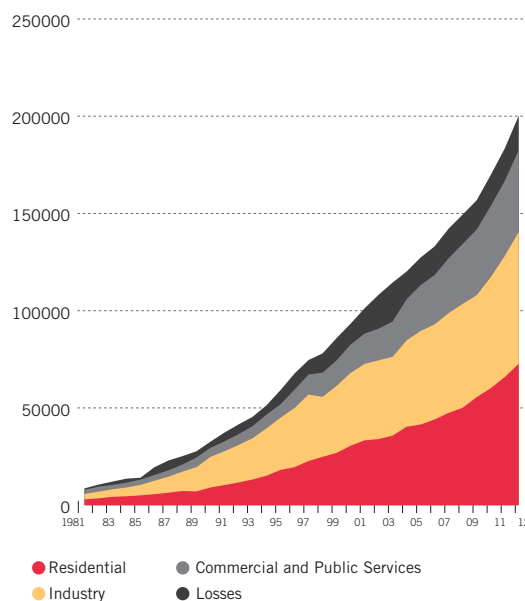
Source: IEA World Energy Statistics Database.

Figure 41. Percentage of total utilization of electricity by sector in Indonesia from 1981 to 2012



Source: IEA World Energy Statistic Database.
Notes: Industry includes energy industry own use.

Figure 42. Total GWh of electricity utilized by sector in Indonesia from 1981 to 2012



Source: IEA World Energy Statistic Database.
Notes: Industry includes energy industry own use.

Figure 43. Percentage of total electricity utilized by sector in Indonesia in 2001

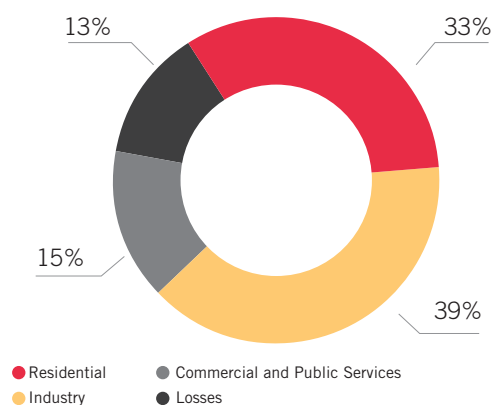
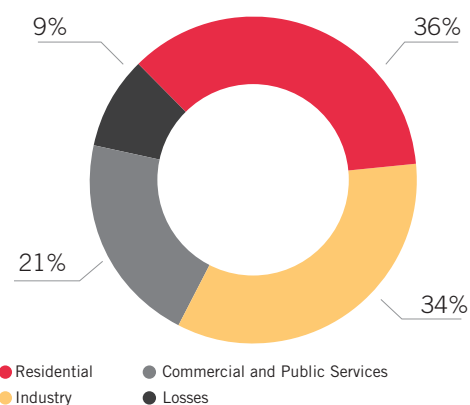
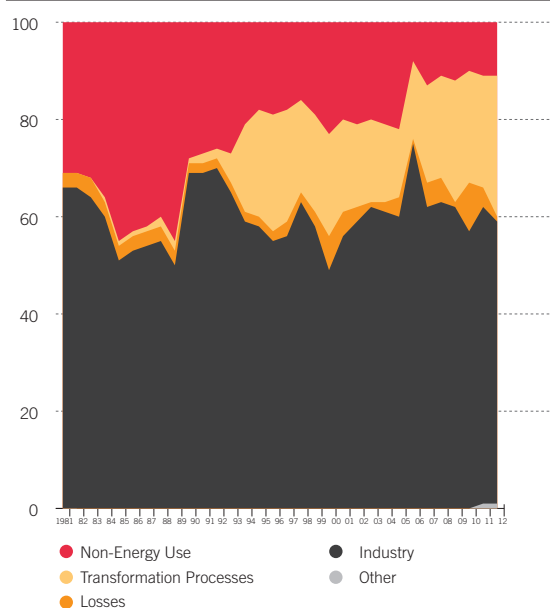


Figure 44. Percentage of total electricity utilized by sector in Indonesia in 2011



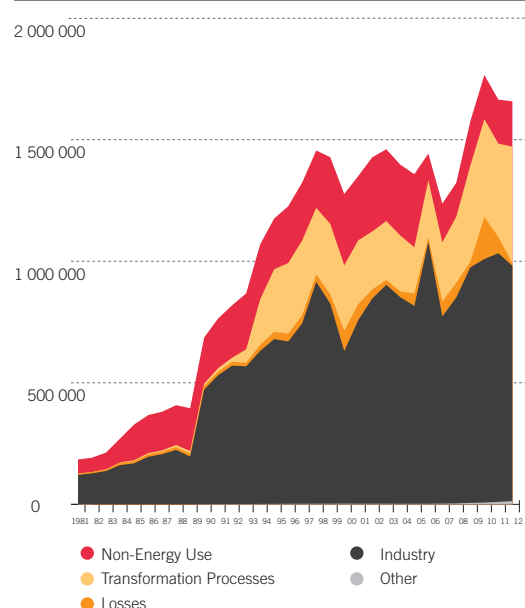
Source (figures 43-44): IEA World Energy Statistics Database. Notes: Industry includes energy industry own use.

Figure 45. Percentage of total utilization of natural gas by sector in Indonesia from 1981 to 2012



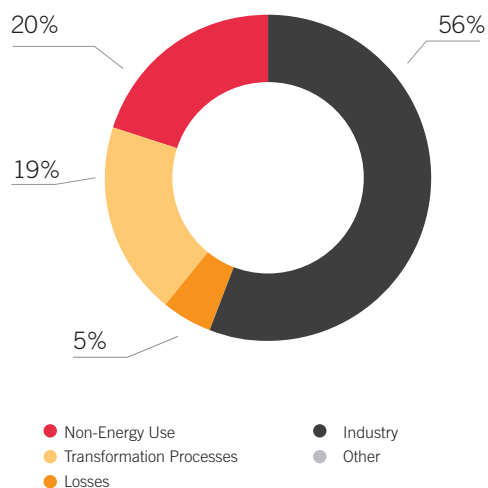
Source: IEA World Energy Statistics Database.

Figure 46. Total TJ of natural gas utilized by sector in Indonesia from 1981 to 2012



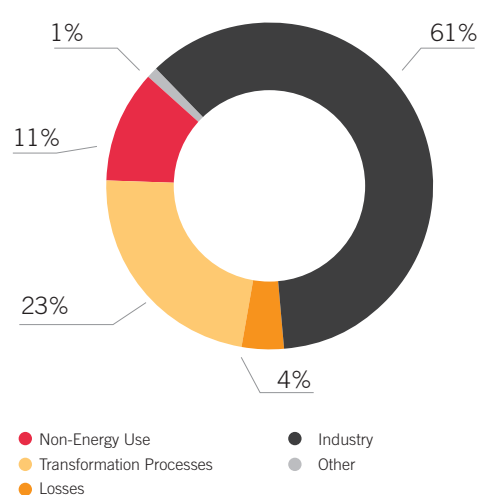
Source: IEA World Energy Statistics Database.

Figure 47. Percentage of total natural gas utilized by sector in Indonesia in 2001



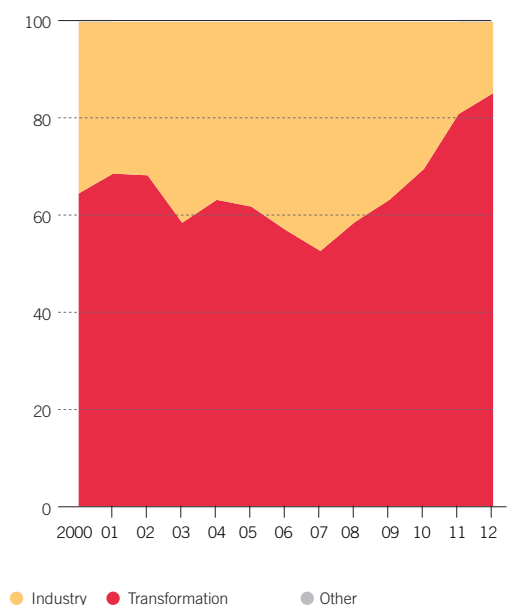
Source: IEA World Energy Statistics Database.

Figure 48. Percentage of total natural gas utilized by sector in Indonesia in 2011



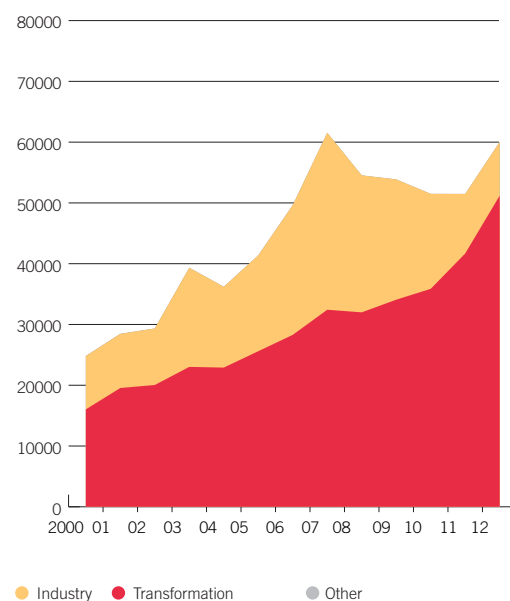
Source: IEA World Energy Statistics Database.

Figure 49. Percentage of total utilization of coal by sector in Indonesia from 2000 to 2012



Sources and Notes: IEA World Energy Statistics Database. Sum of all coal types included in database.

Figure 50. Total kilotons of coal utilized by sector in Indonesia from 2000 to 2012



Sources and Notes: IEA World Energy Statistics Database. Sum of all Coal types indicated in database.

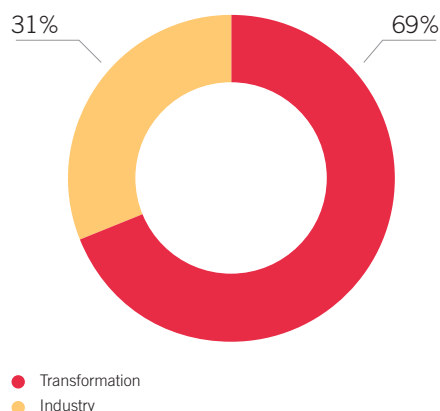
Table 16. Indonesian government savings from the ban of the use of subsidized diesel by industry (including electricity production) from 2008 to 2012

Sector Utilization of Diesel and Budgetary Expenditures and Savings	2008	2009	2010	2011	2012
Transformation Processes ¹	7,100 kt (29.95%)	5,603 kt (22.32%)	6,073 kt (21.39%)	7,805 kt (26.41%)	7,491 kt (23.91%)
Industry ¹	4,758 kt (20.07%)	5,245 kt (20.89%)	5,783 kt (20.37%)	4,884 kt (16.53%)	4,975 kt (15.88%)
Transport ¹	8,686 kt (36.63%)	10,757 kt (42.85%)	12,858 kt (45.29%)	13,757 kt (46.56%)	15,689 kt (50.08%)
Commercial and Public Services ¹	697 kt (2.94%)	771 kt (3.07%)	810 kt (2.85%)	684 kt (2.31%)	700 kt (2.23%)
Agriculture and Forestry ¹	2,469 kt (10.41%)	2,730 kt (10.87%)	2,867 kt (10.10%)	2,419 kt (8.19%)	2,474 kt (7.90%)
Non-Subsidized Sectors Total ²	11,858 kt (50.01%)	10,848 kt (43.21%)	11,856 kt (41.76%)	12,689 kt (42.94%)	12,466 kt (39.79%)
Subsidized Sectors Total ³	11,852 kt (49.99%)	14,258 kt (56.79%)	16,535 kt (58.24%)	16,860 kt (57.06%)	18,863 kt (60.21%)
Total	23,710 kt (100.00%)	25,106 kt (100.00%)	2,8391 kt (100.00%)	29,549 kt (100.00%)	31,329 kt (100.00%)
Diesel Subsidy Expenditure ⁴ (IDR Trillion) (194.37 Trillion IDR Total)	44.05688135	10.43946174	21.85190369	53.34509087	64.67196311
Diesel Subsidy Savings⁵ (IDR Trillion) (150.579 Trillion IDR Total)	44.07918487	7.942718539	15.66835018	40.14803429	42.73979177

Sources and Notes:

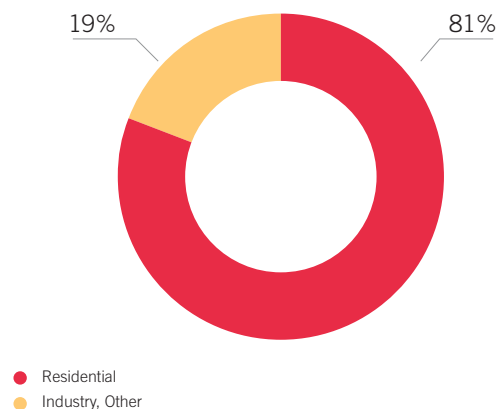
1. IEA World Energy Statistics Database. Author's calculations for percentages. Industry includes energy industry own use.
2. Sum of Transformation Processes and Industry.
3. Sum of Transport, Commercial and Public Services and Agriculture and Forestry.
4. National Audit Board State Budget Audit Reports (Laporan Keuangan Pemerintah Pusat) for the relevant years.
5. Author's calculations based on presented data.

Figure 51. Percentage of total coal utilized by sector in Indonesia in 2001



Sources and Notes: IEA World Energy Statistics Database. Sum of all coal types included in database.

Figure 52. Percentage of total coal utilized by sector in Indonesia in 2011



Sources and Notes: IEA World Energy Statistics Database. Sum of all Coal types indicated in database.

Table 17. Indonesian federal fuel and electricity subsidy expenditures (trillion rupiah, audited) from 2008 to 2014 by fuel type

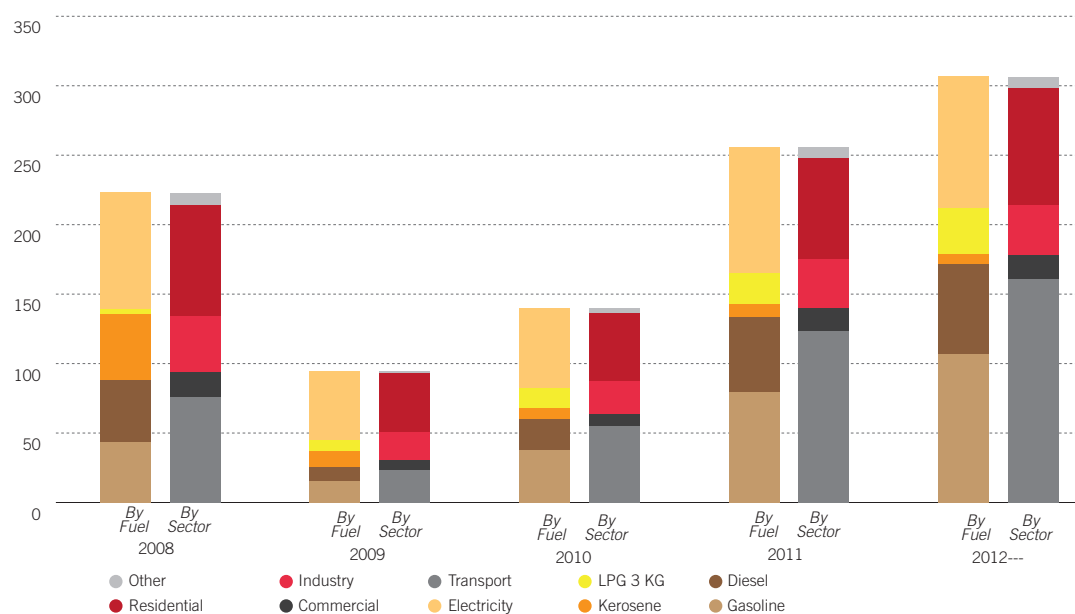
Fuel Type	2008	2009	2010	2011	2012	2013	2014
Gasoline	43.55193314	15.21688727	38.13780614	79.7824091	107.2453944	99.56430123	108.9576883
Diesel	44.05688135	10.43946174	21.85190369	53.34509087	64.67196311	73.20055536	74.86053933
Kerosene	47.6073218	11.48010446	7.509557317	9.441089427	7.129123174	6.253111231	7.200493002
LPG 3 KG	3.890570345	7.902937129	14.85205568	22.59274958	32.84922682	30.98903217	48.97533656
Electricity	83.906513	49.54646792	57.60162007	90.44748546	94.58302778	99.97971409	101.8163177
Total	223.0132196	94.58585851	139.9529429	255.6088244	306.4787353	309.9867141	341.8103749

Source: National Audit Board State Budget Audit Reports (Laporan Keuangan Pemerintah Pusat).

Table 18. Indonesian federal fuel and electricity subsidy expenditures (trillion rupiah, audited) from 2008 to 2012 by sector

Fuel Type	2008	2009	2010	2011	2012
Transport	75.83999181	23.09297717	55.13035393	123.3095986	161.0352703
Commercial	17.91710351	7.252855969	8.421454445	16.70949063	16.97831535
Industry	40.05149214	20.32921964	23.68694889	34.85853064	36.17141994
Residential	80.02673477	41.9119468	48.92528887	73.07748127	83.8115987
Other	9.177897405	1.998858924	3.788896757	7.653723299	8.482130983
Total	223.0132196	94.58585851	139.9529429	255.6088244	306.4787353

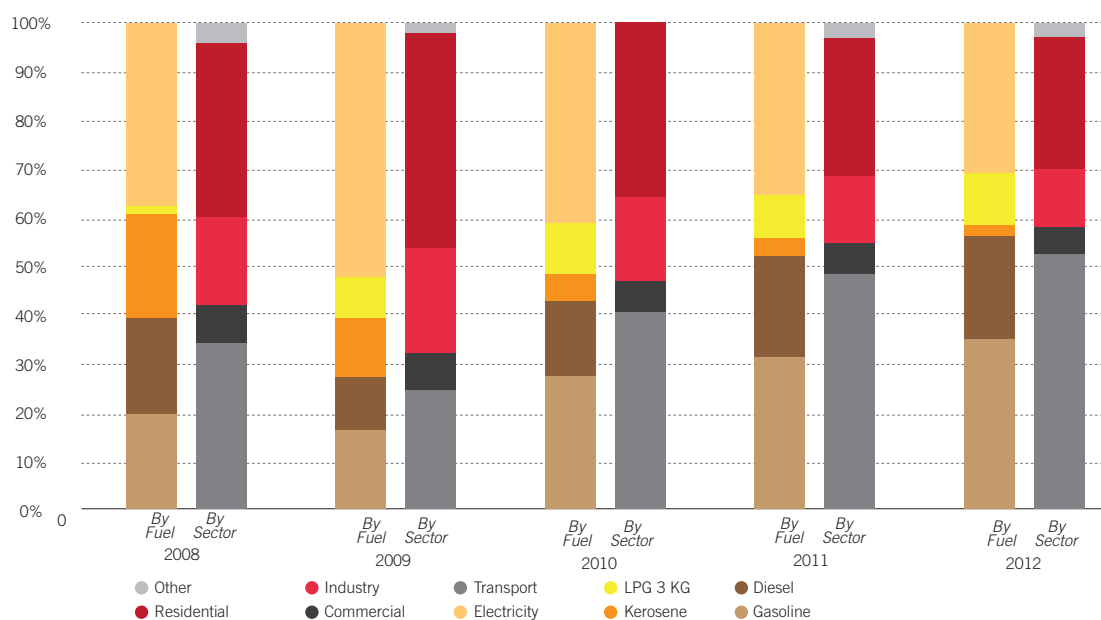
Sources: Author's calculations based on IEA World Energy Statistics Database data on sectorial consumption of petroleum products and electricity in Indonesia, PLN Statistics 2013 data on consumption of electricity by sector in Indonesia and National Audit Board Central Government Financial Reports for the relevant years on fuel and electricity subsidy expenditures.

Figure 53. Indonesian federal fuel and electricity expenditures (trillion rupiah) from 2008 to 2012 by type of fuel¹ and sector²

Sources and Notes:

1. National Audit Board Central Government Financial Reports of 2009, 2010, 2011 and 2012.

2. Author's calculations based on National Audit Board State Budget Audit Reports of 2009, 2010, 2011 and 2012, IEA World Energy Statistics Database data on consumption of gasoline, diesel, kerosene and LPG by sector, and PLN Statistics 2013 on consumption of electricity by sector.

Figure 54. Percentage of total Indonesian federal fuel and electricity expenditures from 2008 to 2012 by type of fuel¹ and sector²

Sources and Notes:

1. National Audit Board Central Government Financial Reports of 2009, 2010, 2011 and 2012.

2. Author's calculations based on National Audit Board State Budget Audit Reports of 2009, 2010, 2011 and 2012, IEA World Energy Statistics Database data on consumption of gasoline, diesel, kerosene and LPG by sector, and PLN Statistics 2013 on consumption of electricity by sector.

Fossil fuel subsidy reform: lessons from the Indonesian case

Filip Savatic (IDDRI)

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- Sartor, O., Spencer, O. (2016). Fossil fuel subsidies and the new EU Climate and Energy Governance Mechanism, IDDRI, *Working Papers* N°09/16.
- Spencer, T. *et al.* (2016). Chinese emissions peak: Not when, but how, IDDRI, *Working Papers* N°07/16.
- Waisman, H. *et al.* (2016). Long-term low emissions development strategies and the Paris Agreement – Why, what and how?, IDDRI, *Policy Briefs* N°06/16.
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