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The political economy of energy transitions and thermal energy poverty

Comparing the residential LPG sectors in Indonesia and South Africa

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Abstract: Indonesia and South Africa are both trying address energy poverty through subsidized energy provision. South Africa has implemented one of the largest electrification programmes in the world, and 80 per cent of the population now have access to the national grid. But this alone is unlikely to achieve universal energy access goals. Indonesia recently implemented one of the largest household energy transition projects to date: the kerosene-to-LPG (liquid petroleum gas) conversion programme. Exploring these projects makes more visible the political economic factors that have affected the adoption of certain energy carriers.

Keywords: Indonesia, institutions, kerosene, liquid petroleum gas, South Africa

JEL classification: H4, O33, O38, N70

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1 Introduction

The central role of energy in human and economic development is widely recognized (Hall et al. 2014). The United Nations has, for example, identified universal access to modern energy as a major policy goal; and sustainable energy has been a widely accepted pillar of the post-2015 development agenda (United Nations Foundation 2015). In the context of developing countries, access to modern energy sources often signifies a shift away from traditional solid fuels (such as wood), which cause significant health and environmental impacts, towards modern energy sources, such as electricity (preferably from renewable sources) and liquid petroleum gas (LPG). In 2014, for example, over 2.6 billion people had no access to clean energy, and used fuel wood and charcoal for thermal energy use (primarily cooking and space heating). The majority of these people live in sub-Saharan Africa (SSA) and Asia (IEA 2014). The resultant household air pollution kills more than 4.3 million people per year (Global Alliance for Clean Cookstoves 2015). Moving away from traditional fuels towards modern cooking and heating fuels is, therefore, a global development priority and a key component of energy transitions in developing countries.

Studies have identified that enabling policies have played an important role in increasing access to and utilization of a key thermal fuel—LPG—in other countries. In Ghana, for example, LPG became a major fuel used by commercial drivers owing to a successful subsidy system (Ahiataku-Togobo 2013). Senegal, aiming to promote the use of LPG over biomass, established a subsidy in 1987, alongside increased wood-cutting licence fees, a land allocation system for charcoal production, and the construction of refilling centres in remote regions to encourage the utilization of LPG in such areas (Brew-Hammond et al. 2014). These successes, however, were not solely the result of enabling policies, subsidies, or economic drivers, but part of an interplay between policies, actors and institutions, their values, and socio-cultural and political factors more broadly, so that it is necessary to understand the prevailing political and economic processes that have affected these outcomes.

Residential LPG usage in South Africa is among the lowest in the developing world (Kojima 2011)—despite the country being one of the leaders in SSA with regard to improving energy access. While South Africa has a relatively limited residential thermal energy policy focus, Indonesia recently implemented one of the largest household energy transition projects to date: the kerosene-to-LPG conversion programme. The majority of Indonesian households switched from using kerosene (the major thermal fuel in most urban poor South African households) to LPG in a relatively short amount of time (Budya and Arofat 2011).¹ It is useful to compare the South African experience with LPG with that of Indonesia, since both countries have a number of significant similarities:

- Indonesia and South Africa are both classified as ‘developing nations’ or ‘middle-income countries’, and characterized by good infrastructure (especially transport, telecommunications) and relatively high levels of industrialization.
- Both countries have significant mineral resources that provide(d) an important economic base for their development. These mineral resources continue to play an important part in shaping the energy and economic development trajectories of both countries.

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- While they might not be ‘hegemonic’ powers as such, both are regional ‘powerhouses’, having the largest economies in their respective areas and the ability to steer regional policy.
- Both Indonesia and South Africa have recently established democratic political systems, coming out of several decades of autocratic regimes that followed the end of colonial rule.
- Both countries have had recent successful energy initiatives. Where South Africa has been remarkably successful in terms of its electrification programme, Indonesia has been particularly successful in terms of LPG provision. Various social grant mechanisms and subsidies are also used in both nations to provide public goods and services to the poor.

By exploring and contrasting the Indonesian experience with that of South Africa, the political economic factors that have affected the widespread adoption of certain energy carriers can become more visible.

1.1 Political economy analysis

The analytical framework employed here is that of political economy analysis, a tool that improves understanding of the drivers of political behaviour, and how this shapes policies and programmes, winners and losers, and the implications for development. This type of analysis, which has a long tradition in the social sciences, has recently gained increased attention in the context of international development, and is promoted by organizations such as the United Kingdom’s Department for International Development and the Governance and Social Development Resource Centre. Although there is no single conceptual framework for the analysis, and the concept is sometimes contested, generally political economy concerns ‘the social relations, particularly the power relations, that mutually constitute the production, distribution and consumption of resources’ (Mosco 2009: 74).

A comprehensive definition of political economy analysis is provided by the OECD-DAC report (Dahl-Østergaard et al. 2005), which describes it as ‘the interaction of political and economic processes in a society; the distribution of power and wealth between different groups and individuals; and the processes that create, sustain and transform these relationships over time’. Its main components are: first, politics, understood in terms of contestation and bargaining between interest groups with competing claims over rights and resources; and, second, economic processes that generate wealth, and which influence how political choices are made. In current world affairs, these processes, which are shaped by incentives, relationships, the distribution and contestation of power between different actors (often closely interrelated), constitute a unified set of dynamics that largely influence development outcomes (DfID 2009; Mcloughlin 2014). Crucial to this study, political economy analysis considers historical legacies, social trends, and prior experience (Mcloughlin 2014), and how all of these factors affect or impede the adoption of a particular technology (in our case, the large-scale use of LPG). Political economy analysis allows for the inclusion of the above, as well as informal institutions and cultural and social practices in the analysis (Williams et al. 2007).

In the context of international development, political economy analysis is often employed as a tool to improve development effectiveness by identifying how and where focus should be directed to promote positive change. Here the tool is used to shed light on South Africa’s and Indonesia’s residential energy transitions and will highlight, through the case studies, that the implementation of energy transitions (in this case LPG) is a highly politicized, locally driven process. The present analysis, using policy documents, reports, websites, and academic and grey literatures, focuses on the period from when the transition was initiated up to the point where it has become mainstream. Examining this period enables focus on the full adoption of the

innovation curve as developed by Rogers (1983). This allows time for economic and political processes to unfold against the backdrop of the country's development path.

The analysis focuses on three broad areas of the political economy:

- (1) the *interests and incentives* facing different *groups* in society, and how these generate particular policy outcomes that may encourage or hinder development;
- (2) the *role of formal and informal institutions*, as well as social, political, and cultural norms in shaping human interaction and political and economic competition;
- (3) the *impact of values and ideas*, including political ideologies, religion, and cultural beliefs on political behaviour and public policy. (DFID 2009).

The remainder of this paper is structured as follows. First, a political economic analysis of Indonesia will be presented, followed by one of South Africa. The case studies will be compared and contrasted and differences and commonalities between the studies highlighted. The paper concludes with a brief summary of findings and concluding analysis.

2 Indonesia

Indonesia is an archipelago in South East Asia with a population of 255 million people, making it the world's fourth most populous nation. Indonesia's economy is the world's 16th largest by nominal gross domestic product (GDP) and 8th largest by GDP at PPP (purchasing power parity)—making it the largest economy in South East Asia. The country emerged from more than three centuries of Dutch colonial rule after the Second World War, and has since gone through various turbulent political, economic, and social transitions. Despite ethnic and linguistic diversity, the history of colonial resistance has played a strong role in providing a national identity, along with a national language and majority Muslim religion (Central Intelligence Agency 2013). The Indonesian economy is based largely on industry (46.4 per cent of GDP), followed by services (38.6 per cent) and agriculture (14.4 per cent). Economic growth levels have been sitting between 4 and 6 per cent for the past 15 years—weathering the global financial crisis in 2008–9 particularly well. However, poverty remains a persistent problem, with 11 per cent of the population living below the poverty line and unemployment sitting at 5.9 per cent (Central Intelligence Agency 2013).

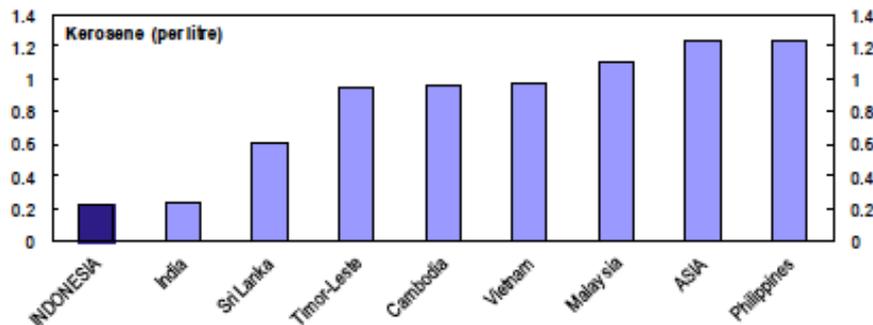
The country remains a net energy exporter, although imports of oil and oil products have been increasing rapidly. In the 1970s, however, Indonesia was a leading oil exporter, producing more than a million barrels a day, and oil revenues contributed over 70 per cent of GDP. The oil price shocks of the mid 1970s, which saw rapidly rising oil prices, enabled the government to introduce significant fuel subsidies to buoy domestic energy affordability—on the back of increasing state revenues. This enabled the country to maintain the price of petrol at less than 0.20 US cents per litre up to 2005. Almost half of all energy subsidies went to kerosene, used largely for domestic cooking and lighting by poor households (Diop 2014; Tumiwa et al. 2012).

Recent years, however, have seen Indonesia importing oil, as domestic production volumes have fallen while, at the same time, domestic consumption has increased. Significant rises in the global oil price placed a great deal of pressure on the Indonesian treasury as it continued its policy of highly subsidized energy provision (Kumoro and Astriana 2015; Tumiwa et al. 2012).

The introduction of fuel subsidies in the early 1970s, especially for kerosene, was driven by social considerations that aimed to ensure affordable fuel supply to the nation's poor. Kerosene is the main fuel consumed by the urban poor, and is second only to wood as a fuel for the rural poor

(Kumoro and Astriana 2015; Mourougane 2010). Figure 1 shows the comparatively low cost of Indonesian kerosene in regional terms for 2008: it is more than five times lower than the Asian average price, largely due to state subsidies.

Figure 1: Kerosene prices in South East Asia, 2008 (US\$)



Source: Mourougane (2010).

The Indonesian kerosene subsidy is substantial in both absolute and relative terms. By 2006 overall fuel subsidies grew to such a level that they made up more than 10 per cent of state expenditure—despite kerosene consumption actually dropping in this period. Continuing with the subsidy scheme was consequently deemed unsustainable by the Indonesian government (Arofat 2014; ASTAE 2013; Budya and Arofat 2011; Kasih 2012).

The Indonesian government’s response was to introduce the kerosene-to-LPG conversion programme in 2007. The programme had distributed more than 55.3 million LPG conversion packages (3 kg filled LPG canister, stove, regulator, pipes) by late 2013, covering most of Indonesia’s previously subsidized low-income kerosene users. The programme ensured that once more than 80 per cent of an area’s subsidized kerosene-using households had been converted to LPG, subsidized kerosene was gradually withdrawn from the area. As a result, LPG use has climbed steadily, while kerosene use has dropped, saving the Indonesian government more than US\$1 billion in its first year of implementation (Arofat 2014; ASTAE 2013; Budya and Arofat 2011; Kasih 2012).

The programme required significant investments in distribution and retail infrastructure, and was largely carried out by the state oil company, Pertamina, and coordinated by the Ministry for Minerals and Energy. Pertamina incurred all programme implementation costs, and was consequently reimbursed by the Indonesian government (Arofat 2014; ASTAE 2013; Budya and Arofat 2011; Kasih 2012).

While this case study is an analysis of the political economy of the LPG conversion programme, to properly appreciate the LPG programme’s context it is necessary to understand the nature and need for Indonesia’s kerosene subsidies and their impacts on the society and economy. The following three sections will examine the political economy factors of the LPG conversion programme, in the context of the overall Indonesian fuel subsidy regime.

2.1 Groups, interests, and incentives

The dynamics of the Indonesian government’s policy choices in respect of residential energy policy has been, in large part, bound up with wider politics. When Sukarno, the country’s first post-colonial president, decided to nationalize energy interests, it was reasoned that this was to primarily benefit Indonesian households—the major energy consumers in Indonesia at that time.

General Suharto, the successor to Sukarno, continued with this policy. Providing subsidized energy was a way of relieving some of the economic pressures on households, as well as stimulating the Indonesian economy towards rapid industrialization built on the back of cheap energy and energy-based foreign earnings (Ascher 1998; Liddle 1991; Mourougane 2010). Given Indonesia's relative oil resource abundance in the twentieth century, it made sense to use these resources to secure political support and stimulate economic development. At that stage, the most easily provided household fuel was kerosene.

Domestic energy subsidies therefore formed part of a broader strategy to secure and maintain political power. General Suharto learned just how much of a stabilizing role these subsidies played in 1998, when he tried to reduce energy (primarily kerosene) subsidies, and was consequently removed from power by popular protests. While the protests were in part stimulated by the Asian financial crisis of the 1990s, the massive hikes in fuel tariffs played an important role (Mourougane 2010; Seah 2014).

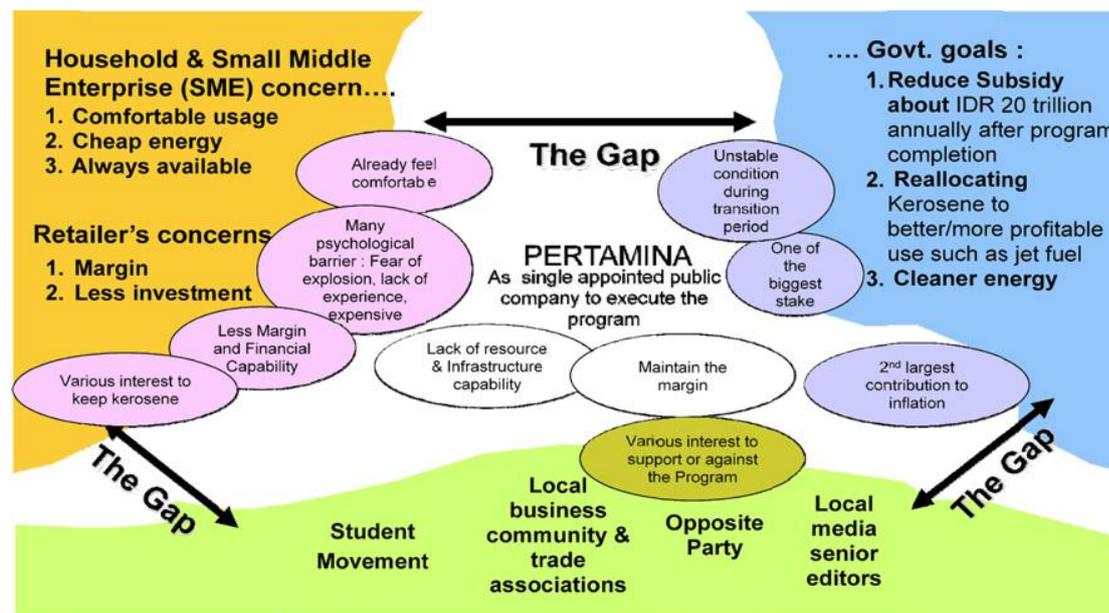
The economic burden of kerosene subsidy costs continued to grow in the early 2000s. Protests related to kerosene pricing occurred again in 2003 and 2005, although in these cases the opposition was less severe—in part because the country was not facing the same level of economic instability as in 1998. Household energy subsidies have remained politically sensitive in Indonesia, often triggering instability (Braithwaite et al. 2012; Mourougane 2010)

The Indonesian government's response to the financial pressure of kerosene subsidies in the first part of this century was therefore the provision of a cheaper and more efficient household fuel alternative—LPG. The programme was carried out by the national oil company, Pertamina, and had the explicit support of the country's vice-president.

Pertamina had to manage various interests and incentives from numerous groups (see Figure 2). It had to ensure not only that it had the capacity to guarantee the continuous supply of LPG to a geographically challenging populace, but also the overall acceptance of the conversion programme by different interest groups, which had varying objectives:

- The government was ultimately interested in saving money through the reduction of the kerosene subsidy.
- Households and small and medium-sized enterprises wanted a cheap, reliable, and convenient energy source.
- Retailers—up to that point responsible for selling subsidized kerosene to households—needed to retain their profit margin while switching to a fuel source that required significant new infrastructural investment.
- Various interests groups—non-governmental organizations, political parties, trade associations, etc.—had political and other locally driven agendas that could quite easily be served by undermining the conversion programme or using its failure as political leverage.

Figure 2: Stakeholder gap analysis for LPG conversion programme by Pertamina



Source: Budya and Arofat (2011).

The interests and agendas of most of the stakeholder groups were aligned with the success of transitioning from kerosene to LPG. For the government, their support stemmed from the fact that the kerosene subsidy, at that stage, was undermining its fiscal sustainability and endangering the country's economic and political stability. Pertamina was to execute a programme that ultimately served the national oil company's goals too: increasing its production, storage, and distribution infrastructure, while enlarging the consumer base. For households, the switch from kerosene to LPG did not encounter acceptability barriers that often emerge when implementing fuel-switching programmes. LPG is cleaner burning, more convenient, and is seen as a more modern fuel. The provision of free conversion kits (including the LPG cylinder and stove) helped a great deal with regard to acceptability. The most problematic group proved to be the kerosene retailers. Pertamina had to assist retailers in changing business models and practices. Retailers had for years enjoyed the convenience of the kerosene business, but now had to engage in a more complex business with lower profit margins. However, despite their reluctance, of all the groups represented, private sector retailers were also the least powerful, with little collective bargaining power and highly dependent on the state for the provision of subsidized fuel. (ASTAE 2013; Budya and Arofat 2010; Kasih 2012).

2.2 Institutions

Indonesia's post-colonial political institutions have gone through a number of variations over the years, but have principally conformed to the principles of a unitary presidential system where almost all governing power resides in the centralized government (Macasaquit 2006). The country has, however, moved from authoritarianism and centralized dictatorship to a more decentralized version in the democratic era post-1998 (Ascher 1998; Liddle 1991).

The post-1998 democratic reforms have seen significant changes. While a unitary, presidential system is still in place, there has been noteworthy decentralization. The role of the legislature has been restored and strengthened, and it now plays an important role in checking the executive's authority, as well as developing, amending, and approving legislation. The kerosene-to-LPG conversion programme is illustrative of this changing dynamic. It was initiated by presidential decree in 2007, but implementation was delayed by several months due to the Indonesian

parliament having several concerns that it wanted to be addressed before the decree would be approved. According to Brathwaite et al. (2012), political alignment on energy issues has become politically loaded. No single party holds an overall majority in parliament, and parliamentary voting history shows that energy reform is being used for political gain. However, stability appears to be even more important for politicians, and the overriding factor that pushed the LPG conversion programme through parliament was the fiscal threat posed by kerosene subsidies. This process contrasts with the introduction of the kerosene subsidy under General Suharto, where there was virtually no chance of parliament delaying or blocking legislation coming from the executive.

Indonesia's political culture has also shaped the form and design of the energy transition programme. As opposed to, for example, using market-based incentives and involving the private sector, it was largely driven, planned, and implemented by central government actors. Private sector involvement was limited to 'last-mile' distribution—serving as the link with customers. According to Karim (2014), there is wide acceptance in most Southeast Asian nations (as well as China) of a (benign) dictatorship as a road to economic development. This seemingly authoritarian political culture, forged in Indonesia's case through more than 30 years of authoritarian rule, appears to be one of the reasons that state-led development planning is not only accepted but also in fact expected by Indonesia's policy makers. It should be noted, however, that the existence of a well-resourced national oil company, the level of investment required, the timeframes required (government consistently pushed for earlier deadlines), and the real political threat of instability were all factors that also influenced the choice of programme design. Nonetheless, the shaping and enabling role of the prevailing political culture needs to be acknowledged as well.

2.3 Values and ideas

Given how deeply rooted energy subsidies are in the Indonesian value system, the pressures on the treasury from kerosene subsidies could not be addressed through merely removing these subsidies. The Indonesian government had to find an alternative means of providing subsidized household fuel that was more affordable for the national budget. LPG was seen as this fuel, largely because it is a more effective fuel that requires a lower level of subsidy for an equivalent amount of energy. As mentioned earlier, the initial years of the programme seemed to indicate that there were significant savings for the Indonesian state. However, it appears that they are now starting to face the same budgetary pressures with the LPG subsidies as they had with kerosene (Cahyafitri 2015). The longer-term issue of how to decrease energy subsidies therefore remains unsolved—in large part because it is such an integral part of Indonesian society.

3 South Africa

South Africa, since emerging from apartheid rule to democracy in 1994, has put service delivery high on the political and economic agenda. The goal of providing universal access to services, including housing, water, electricity, and sanitation, has been a defining feature of the democratic government's rule. It has successfully implemented one of the largest electrification programmes in the world, and almost 6 million households (or 80 per cent of the population) now have access to the national grid—compared to 30 per cent in 1994 (Department of Energy 2012a). This programme has for many years dominated the household energy agenda. Viewed as the solution to all household energy issues, it has crowded out other supply options. But grid electrification is unlikely, on its own, to achieve universal energy access goals. First, the grid is unlikely to reach all households. In remote rural areas, low settlement densities make extension of the grid technically or economically infeasible. In urban areas, informal settlements are not

eligible for their own connections due to land-use and planning restrictions related to the illegality of these settlements. Second, poor households are multiple fuel users, employing a range of energy carriers for different end-uses. Pursuing electricity as the only supply solution does not, therefore, match the basic demand profiles of households.

Residential LPG usage in South Africa is among the lowest in the developing world (Kojima 2011). A supply-constrained market and a high retail price have limited LPG's expansion into the low-income market. While household energy policy has focused on electrification, the liquid fuels policy sub-sector has also not incentivized expansion in LPG supply chains. LPG, as a result, plays a minor role in the overall energy mix. Most of what is produced domestically supplies industrial and commercial users.

South Africa has no significant oil or gas reserves. The supply of LPG comes predominantly from local refineries using imported crude oil, but also from coal, through a coal-to-liquids process, and natural gas, in a gas-to-liquids process. South Africa's refineries are old, inefficient and experience many unplanned shutdowns, causing regular LPG supply shortages in the winter months.

Many of the energy sector's resource allocation decisions are rooted in the country's socio-political history. This section aims to explore the key ways in which the legacy of apartheid continues to shape contemporary economic and political decisions in energy policy, first by looking at the legacy of close relationships that exist between the state and the petrochemical sector, and, second, by investigating the politicization of service delivery and how technology supply choices are framed.

3.1 Group, interests, and incentives

Understanding the framework of existing power relations in the private sector and dominant interests is essential to understanding LPG markets in South Africa. Although a range of supply and demand barriers exist in the low-income market, a key reason for LPG not expanding into the domestic market is that there is insufficient supply to do so, and retail prices are too high.

The limited supply appears to be related to maintaining the market power of the dominant oil companies. The refineries, owned by international oil companies, control virtually all of LPG production in South Africa. There is evidence of significant anti-competitive behaviour that has limited market growth and entry by new players, which has spurred the Competition Commission to launch an industry-wide investigation (Ensor 2015). This investigation is not the first of its kind in this broader sector.² There is therefore a long-standing and entrenched pattern of market dominance and collusive behaviour in South African oil product markets.

Some of the ways in which barriers to entry are enforced are: preferential supply arrangements with refineries, costs of entry, control over infrastructure, and collusive pricing strategies. There is a high degree of vertical integration in LPG supply chains, from the refineries through to wholesaling, distribution and retail (Paelo et al. 2014). Refineries tend to sell their product to their own wholesalers. In the absence of adequate importing infrastructure, smaller independent wholesalers find it difficult to source product. Over 80 per cent of the wholesaling market is in the hands of the four major resellers who get their product directly from refineries (Lloyd 2014).

² The commission has also investigated and found cases of collusive conduct by the oil companies in the bitumen, piped natural gas, and diesel markets. Oil companies have been found guilty of sharing information, price fixing, and other coordinated behaviour (Das Nair et al. 2015).

Another barrier to entry in the wholesale market is the cost structure. Wholesaling of LPG is highly capital-intensive, requiring investment in bulk transporter tankers, bulk storage facilities, cylinder-filling plants, cylinders, cylinder delivery vehicles, and installation on customers' premises. There are also anti-competitive long-term selling agreements between wholesalers, distributors, and customers around access to infrastructure—such as pipe networks and storage in a shopping mall—that prevent smaller players from entering certain customer markets (Lloyd 2014). The major wholesalers also allegedly under-price cylinders to keep new entrants out of the retail market. Even in the absence of explicit anti-competitive practices, informal institutional norms typical in tight oligopolies—such as relationships, having tacit industry knowledge and inside information that benefit those who have already worked with or for major oil companies—serve to keep out newcomers (Das Nair 2015; Paelo et al. 2014). The industry is in general characterized by secrecy and lack of information in the public domain (Lloyd 2014).

The regulatory framework appears to be tied in to a supply limiting market—suggesting regulatory capture. Very specific conditions of market control, price regulation, and limited supply appear to benefit certain market players. Wholesalers appear to enjoy a low-risk market and are potentially drawing significant economic rents from the mark-up between the regulated wholesale and retail prices. Retail prices approximately double the wholesale refinery gate price (Lloyd 2014). For refineries, enabling further growth in the LPG market has no direct benefits. The vertically integrated supply chains suggest they are extracting economic rents through transfer pricing. Since their refineries are old and cannot expand, any increase in supply would have to come from imports, which would be beyond their control. Furthermore, expanding residential LPG usage would only steal market share from their paraffin (kerosene) sales.

Most of the big wholesalers have shown little interest in expanding into the low-income domestic market, and these more peripheral markets have been left to the small players. These retail markets are expensive and difficult to operate in, compared to industrial and commercial markets. Challenges relate to restrictive municipal by-laws around fire safety standards as well as a retail price for LPG, which makes the cost of cooking or heating with it much higher than with electricity or paraffin, both of which are subsidized. Consumers are also not familiar with LPG, and fear explosions. Creating market demand would require running awareness campaigns and advertising, thus raising operating costs. Furthermore, when there are winter supply shortages caused by a refinery shutdown, the residential market is usually the first to experience shortages as distributors try to cushion other sectors. This supply insecurity decreases attractiveness of the energy carrier to low-income households (Mohlakoana and Annecke 2008).

There are, however, current developments which threaten to undermine the status quo and affect the current market power the majors enjoy. The first is the Competition Commission enquiry (Ensor 2015). The second is the construction of new importing and storage infrastructure on South Africa's west coast, with massive investment going into developing a gas terminal at Saldanha Bay. The facility, designed to be open access, will enable smaller players to access infrastructure and help to break the current monopoly hold on product supply. While this import infrastructure is a major step forward for market expansion, it is only part of the infrastructure picture. The need remains for associated investments into LPG cylinders and distributed filling facilities.

3.2 Institutions

Existing industry players clearly benefit from current market conditions, but of particular interest is the way the regulatory framework appears to entrench their market power and limit competition. This gives rise to questions around the private sector's influence among decision makers. In many ways this pattern can be traced back to state–business relations under

apartheid—which left a legacy of concentration and control in this and many other sectors (Das Nair et al. 2015). There is a long history of close relationships between the state and the petrochemical sector in South Africa. During apartheid, petrochemical companies enjoyed guaranteed market returns, tariff protection, and removal of competition in various ways, as the threat of sanctions pushed security of supply in liquid fuels high up the political agenda (Baker et al. 2015; Das Nair et al. 2015). An innovative coal-to-liquids process was pioneered by Sasol and, in order to develop this source and protect the profitability of Sasol, competition was removed from the market. Oil companies were forced to cut expansion and buy product from Sasol, but in return they received guaranteed returns in the marketing and retailing sectors. In the post-apartheid dispensation, the state has formally tried to promote liberalization of the sector and a reduction in regulation, for example as laid out in the Energy White Paper (Department of Minerals and Energy 1998) and the Competition Act (1998). Interestingly, however, the petrochemical sector managed to obtain an exemption from this deregulation.

Regulated markets can lend themselves to regulatory capture. It has potentially been in the interests of oil companies to maintain regulation if they are behaving in cartel-like ways. Competitive markets can be damaging to cartels if they cannot ensure there are barriers to entry. Under more highly regulated regimes, and where dominant actors have sufficient influence, barriers to entry can be enforced through regulation. The South African regulatory framework appears to support the market power of the oil majors in a number of ways, such as through pricing and safety standards. Both wholesale and retail prices are regulated. The regulated wholesale price, known as the maximum refinery gate price (MRGP), has been widely acknowledged to make imports uncompetitive with refinery production. Importing and storage infrastructure is limited in South Africa; as wholesalers can import only small parcels at a time, they incur higher unit costs (Lloyd 2014). A discussion document on reviewing the MRGP released by the Department of Energy in 2012 (Department of Energy 2012b) notes that the MRGP has limited the expansion of import facilities and does not compensate for infrastructural investments. No further mechanism adjustments have been forthcoming since this discussion document, however. Similarly, cylinder safety standards in the industry are set such that only one manufacturer's product complies—thereby keeping others out.

The ways in which various aspects of regulation interact with market power suggest that oil companies may be influencing decision makers. The Department of Energy, the government institution responsible for regulating pricing, is characterized by inaction, which appears to implicitly benefit and maintain the power of certain actors. This is not unique to the liquid fuels energy sub-sector in South Africa. In an analysis of the electricity sector, Baker (2011) finds that many government departments and private players exert their influence over the energy policy-making process. Industrial stakeholders and heavy industry enjoy privileged levels of access (Baker et al. 2015). Broader structural drivers during the apartheid administration established a certain culture of state–business relations in the energy sector, and close relationships and beneficial arrangements for the petrochemical sector continue to shape their interactions and policy-making today.

Weak institutional capacity also exerts its influence over the policy-making environment (Baker 2011; Newbery and Eberhard 2008). Confusion about roles and responsibilities, and a lack of coordination, often compounds the already weak capacity within the Department of Energy. Different government departments often undertake seemingly contradictory actions that may not be in alignment with other policy objectives. Entities act according to their own goals and, in the absence of a strong guiding policy framework or governing department, different departments may pursue their own strategies. The construction of the new LPG import terminal at Saldanha Bay illustrates this. The tendering, licensing, and construction process has been long drawn out and characterized by multiple disputes. Different government departments with overlapping

jurisdictions are pursuing their own agendas according to how they see LPG market expansion developing. The National Energy Regulator of South Africa wants to enable competition in the sector by establishing multiple import terminals and deregulating the market, while the Transnet National Ports Authority wishes to create one large facility to bring down costs. This would be an open access facility but well regulated to reduce players extracting economic rents. Both models have strengths and weaknesses, but currently both players are undermining the actions of the other, and in so doing making for a lack of clarity retarding longer-term market development. Their respective preferred models are likely also related to the particular institutional interests around market influence (e.g. through regulation) or control over infrastructure.

3.3 Values and ideas

For various political reasons, the electrification programme has crowded out other energy access considerations and has dominated the household energy agenda (Matinga et al. 2014; SEA 2014; Tait et al. 2013). Alternative energy carriers for the household market, such as biomass, paraffin, LPG, and off-grid solar, have all received limited policy attention. South Africa has adopted a traditional approach to energy access as a supply-oriented service based on big infrastructure rollouts. Much of the policy focus has centred on the provision of infrastructure rather than on the energy services delivered. As such, issues such as the various institutional and technical barriers to achieving high annual connection rates have dominated. But there has been far less focus on a demand-side appreciation of the services that households derive from electricity and whether these meet households' basic needs. A supply-side orientation tends to embrace standardization and uniformity, to plan technology rollouts that largely aim to be independent of contextual variations (Furlong 2014). The supply-side orientation has arguably blinded decision makers to the ways in which the delivery of an electricity meter may not actually result in users being able to access sufficient safe and affordable energy services to meet all of the household's basic needs. In a technocratic approach to electrical infrastructure planning there is no space to consider an integrated approach to delivering energy services that can consider multiple fuels and technologies, based on the demand context. Thus the fact that many poor households may not cook with electricity and continue to use paraffin gets overlooked in energy policy.

Various political and historic factors have come to shape South Africa's approach to household energy and the favouring of electricity. First, the framing of energy poverty as a policy problem in the early 1990s, and the role key actors played in shaping that agenda; and, second, the values attached to certain technology choices in the post-apartheid socio-political realm. The national electricity utility, Eskom, played a key role in the electrification programme from a very early stage. In the early 1990s, Eskom developed, managed, and financed the 'Electricity for All' programme, aimed at electrifying citizens who had been excluded from service delivery under apartheid. This has largely been seen as a way of demonstrating its commitment to, and alignment with, the values of the new democratic dispensation (Matinga 2010). Eskom at that time also had excess generation capacity and the financial reserves to enable quick rollouts at scale. Their central role at this early stage of the programme meant they became a key actor influencing how energy poverty, as a policy problem, was framed. An engineering focus to infrastructure planning dominated. Even though the programme no longer sits under Eskom's ambit, this legacy remains. The Department of Energy now has an electrification programme, rather than a household energy strategy. Most other household energy initiatives that have been undertaken in South Africa can be traced to the interests of the electricity sector. For example, the only significant programme promoting LPG among poor households, instituted in 2008, came at a time when the country was experiencing blackouts and needed to reduce peak demand. It was discontinued shortly after electricity supply returned to something like normal. From a

household welfare perspective, any switching programme should be looking to switch users from paraffin to LPG, rather than electricity to LPG, which has neutral impact on household welfare.

The second consideration of the dominance of electricity has been around how the service delivery agenda of the democratic government has been set. Services such as energy, water and sanitation have become key features of the government's policy to redress past imbalances. During apartheid, the state systematically denied basic services to non-white citizens, and equality has therefore become a key symbol in current service delivery programmes. Electricity, as the technology enjoyed by the privileged under apartheid, was thus ensured primacy in the government's service delivery agendas, its dominance being as much for its political attributes as its technical ones. Technologies such as electricity represent much more than the direct services they provide, having become symbolic of inclusivity in government policy and of the development aspirations of post-apartheid South Africa (Matinga et al. 2014; Tait et al. 2013). Energy options other than an electric grid connection are often perceived to be inferior or not 'modern' (Matinga 2010). When the poor protest about service delivery, their demands relate to electricity and not energy. With the political currency attached to electricity, there is little incentive for politicians to promote alternative energy sources, such as LPG.

The government's electrification programme has also become deeply distorting in household energy markets. The programme consists of a fully subsidized connection as well as a subsidized monthly allocation of free kilowatt hours. Furthermore, electricity tariffs in South Africa were underpriced for many years, leading South Africa to have had one of the lowest electricity prices in the world (Newbery and Eberhard 2008). Even with recent electricity price hikes, the country's electricity tariffs remain among the lowest on the African continent (Fripp 2015). In comparison, LPG's retail price is one of the highest in the world (Kojima 2011) and the upfront costs of purchasing cylinders and appliances are not subsidized. A combination of a bias towards electricity in household energy policy and imperfections in LPG regulations thus make it an uneconomic option for the poor and limit its market penetration. But electricity tariffs are rising substantially as the electricity sector moves towards cost-reflective pricing (Deloitte 2012). The previously stark cost differential between the two energy carriers is therefore fast changing—potentially ushering in a new era of residential energy use patterns in the country.

4 Concluding analysis

This paper set out to discover the political economy elements and mechanisms influencing residential thermal energy transitions in Indonesia and South Africa, through the lens of the LPG sector. The following key elements emerged from the analysis:

4.1 State power and control

The relative power of the state, its implementing institutions and the private sector, especially with regard to the energy sector, plays a significant role in residential energy policy. This is, for example, one of the reasons why countries with relatively strong and capable national oil companies—like Pertamina in Indonesia—are able and willing to provide LPG to households at significant scale, and why South Africa, through its national electricity utility company, exhibits a clear, and almost exclusive, preference for household electrification. The more control government is able to exercise over a particular sector or fuel, the more likely it seems that this sector or fuel will be supported for wide-scale adoption. The converse of this argument is, of course, not only that government might not be willing to support sectors where its power is more limited, but also that it might in fact not be able to. The South African LPG sector seems to offer a picture of an industry with enough collective power to not only resist government

efforts to entice it into serving low-income, potentially less profitable customers—but to use government regulation to maintain competition-limiting market dominance.

4.2 Stability and the politics of discontent

Energy provision and, in particular, household thermal energy provision, is distinctly political in both countries, with the potential to cause great instability. Energy cost is recognized as a significant political factor in Indonesia, prompting proactive measures such as the LPG conversion programme. Energy subsidies are also of great financial and political consequence in Indonesia, largely due to the high level of subsidies provided. South Africa's residential energy policy is influenced by the country's socio-political history to such an extent that subsidized electricity provision remains the only acceptable form of energy provision. In both countries extensive political currency is derived from energy subsidies—regardless of the fuel or technology used.

4.3 Aligning interests and objectives

A key factor influencing the implementation of residential energy policy in both countries is the alignment of policy objectives with the interests and strengths of key actors. This is why, for example, both the Indonesian LPG conversion programme as well as the South African electrification programme were able to achieve such massive rollout in a short time frame. Through actively involving the implementing agency—whether Pertamina or Eskom—in the design of the programme, it was guaranteed that the eventual product would speak to these agencies' strengths and interests. Where this alignment of objectives and interests is not in place—as is the case in South Africa's LPG sector—there is very little chance of successful policy implementation.

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