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Sporadic Fuel Crisis in South Sudan: Causes, Impacts, and Solutions[1]

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Summary

South Sudan has encountered waves of periodic fuel crisis since 2011. The government has attempted quick-fix measures, but the crisis has continued unabated. Despite a number of speculations surrounding this matter, however, the actual causes and impacts are not necessarily well understood. In this analysis, we attempt to fill this knowledge gap. Thus, drawing from various data sources, this work examines the causes and impacts of fuel crisis on the country's economy, and offers a number of potential solutions.

Despite being locally produced, coupled with drastically plummeting global crude oil prices, fuel costs more in South Sudan than elsewhere in the region—invoking a paradox. Secondly, the prevailing shortage and high cost are a consequence of a myriad of explanatory factors, namely hard currency shortage, high taxes and duties, absence of refineries and depots, growing demand for oil from electricity producing and consuming sectors, and inefficiency in energy use. These factors are exacerbated by gaps in institutional, regulatory and policy frameworks, lack of fair market restraints, and corruption. Consequently, this has led to fuel hoarding, hikes in transport cost, reduced productivity, amplified social stratification, and the soaring prices of basic commodities. After the floating of the South Sudanese Pound against the US Dollar mid December last year, a new phenomenon occurred. Instead of fuel shortage, there is a drop in demand after the price of a liter was increased from 6 SSP to 22 SSP. In other words, the high costs of fuel have prompted low demand, as a good number of motorists, households, and businesses that are dependent on diesel powered generators for electricity now face affordability problems.

To achieve energy security or sustainable, reliable, and affordable energy supply, South Sudan needs sustainable peace, diversified sources of energy and exports, depots and refineries to meet domestic

[1] This research project was carried out with financial support from Cordaid.

consumption. Meanwhile, the country ought to: reduce costly import duties and taxes to lower prices, strengthen its economic relations with Sudan and Kenya to ensure adequate access to fuel, as well as pursuing public awareness on conservation and efficient use of limited fuel supply to lower demand and protect the environment. The recent re-opening of the South Sudanese-Sudanese borders and the admission of South Sudan to the East African Community are opportunities in the right direction.

1 Introduction

South Sudan is an oil producing country, yet it has experienced sporadic fuel crises since a fuel blockage by Sudan due to political dispute in May 2011. The Sudan fuel blockade has been blamed for the origin of the sporadic fuel crisis, which sent waves of shock across many sectors, causing significant fuel shortage and high prices. Several fuel crises have sporadically surfaced since, many of which are explained by the fact that the country depends on oil as the main energy source that drives most economic production activities and service delivery efforts in a number of towns and cities across the country. Some of other underlying causes include inadequate downstream infrastructure, management gaps, reduced hard currency earnings, and high taxes and import duties, among others (see Table 1). These conditions have exposed South Sudan's domestic fuel consumption to both external and domestic shocks, revealing the nation's lack of resilience to cope with fuel supply disruptions. The sporadic fuel crises, which have persisted until the end of December 2015, will remain a recurring problem for a considerable period, unless sufficient interventions are instituted in the oil downstream sector in particular and the energy sector in general. Fuel crisis has had dramatic impacts on social and economic outcomes of the country through high prices and transport costs, which have consequently affected prices of other basic goods and services, hitting low-income households the hardest.

Using data from the Nile Petroleum Corporation (NilePet), Customs Directorate, and fuel stations and interviews with the oil industry, Petroleum Ministry, and National Security representatives, this analysis looks at the proximate causes and impacts of fuel crisis in South Sudan and provides policy options to overcome a number of challenges in the oil downstream sector in particular and energy sector in general. The rest of the analysis is presented as follows. Sections 2 and 3 outline some of the causes and impacts of fuel crisis and section 4 concludes with a menu of policy-oriented options or interventions.

Table 1. Fuel crises by year, causes, and impacts

Year	Cause	Impact
May and June 2011	▪ Sudan Fuel blockade ▪ Price control per liter	▪ Office's hours reduced, or fully closed, ▪ Increased pump prices, ▪ Increased transportation costs ▪ Crisis on other fuel dependent sectors
Feb and July 2012	▪ Scarcity of foreign exchange ▪ Petrol shortages in East Africa ▪ High taxes and import duties	▪ Parlayed transport sector ▪ Crisis on other fuel dependent sectors
Oct 2014	▪ Delays in clearance at Nimule customs border, ▪ Cash held up at Qatar National Bank ▪ Lack of information in downstream sector ▪ Insufficient and inefficient fuel infrastructure system in Kenya	▪ Increased fuel prices ▪ Increased transportation fee ▪ Crisis in other fuel dependent sectors ▪ Reduced working hours
May, Oct, Nov, Dec, 2015	▪ Scarcity in Foreign exchange ▪ High taxes and import duties ▪ Fixing of the fuel prices at 6 SSP	▪ Increased fuel prices ▪ Increased in transportation fee ▪ Crisis on other fuel dependent sectors.

2 Causes of fuel crises

2.1 Lack of infrastructure

Despite being an oil producing country, South Sudan's lack of downstream infrastructures to refine crude oil and stockpile sufficient fuel for local consumption has left the country with sporadic shortage of fuel supply and high prices. Being an oil rich state, the world's newest country inherited 75% of oil when it seceded from Sudan. As of

2015, South Sudan had an estimated oil reserves of 1,083.71 billion barrels[2]. However, all the downstream facilities (refineries, pipelines and depots) are located in the North. This maintains Sudan's strong grip on oil resources extracted in South Sudan (Figure 1). Since independence, South Sudan has faced several severe episodes of fuel shortages, initially because of closure of borders with the Sudan, and more recently due to lack of local depots and refineries.

First, one of the major challenges in the downstream sector in South Sudan is lack of adequate depot infrastructure. South Sudan's demands for fuel transcend the storage capacity available. The demand is higher because the total storage capacity in Juba, the central distributer to the rest of the states, is estimated at only 19 million liters,[3] while the country wide monthly consumption is estimated at 20 million liters[4]. The monthly consumption covers 70% diesel and 30% petrol. Equating demand to storage capacity, there is a deficit of 1 million liters each month. A million deficit means that a monthly reserve runs out before the next supply could be delivered. Also, limited storage capacity implies that any delays in delivery send drastic shocks of fuel scarcity in the country. Looking back, a two-day fuel shortage in October 2014 due to delays at the Nimule port serves as a good example of the consequence of insufficient storage facilities in the country. With the current limited storage capacity, the government needs to set conditions that will encourage the construction of more depots across sectors to guard against sporadic fuel crises.

Second, the absence of local refineries makes it difficult to secure a sustainable source of fuel. Following South Sudan secession, an agreement was made on how to deal with assets previously owned by the Sudan. Under this agreement all the assets such as pipelines, depots and refineries went to Sudan, leaving South Sudan with no mid and downstream sector. As a result, the new state has heavily been relying on imports of petroleum-refined products. Since the country procures fuel externally, South Sudan's local fuel consumption has been exposed to several internal and external shocks. These shocks have hindered reliable and consistent fuel supply. Therefore, the underlying lack of the downstream sector results in persistent fuel crisis in South Sudan.

The government has taken some steps to mitigate the lack of downstream and midstream infrastructure. However, it has faced political and economic constraints. For instance, a number of refinery construction projects have been put on hold due to the recent conflict.

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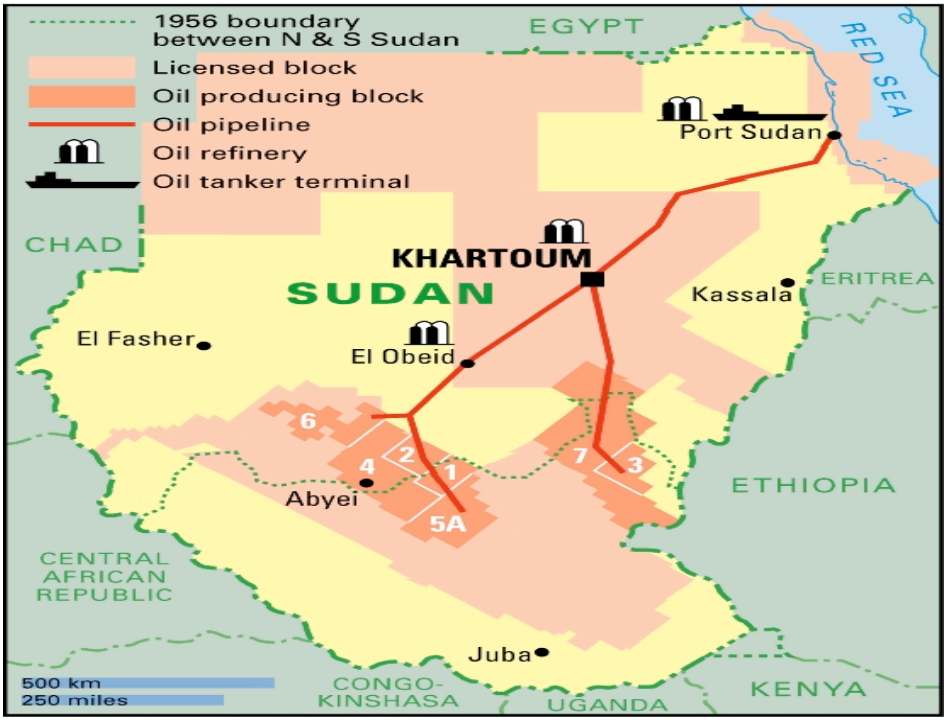
[2] "MPM Marketing Report."

[3] The total storage capacity includes all the petrol stations' underground storages in Juba, plus, NilePet, Abiem and Imatong gas's depot.

[4] The total demand for fuel is estimated based on the amount of fuel consumed during Independence 2015. In preparation for the celebration, about 78 million liters of fuel was imported for June, July and August, 2015. According to a NilePet official, around June to July 2015, South Sudan fuel consumption was stable. As a result, the amount consumed that time has been taken as the baseline for total demand. It is important to note that South Sudan fuel consumption is relatively small compared to the region.

Other refinery projects such as Akon and Pagak lack funds to construct. Other important complementary infrastructures that may ensure the success of the refineries are not in place. Of importance is the prevailing limited political will to see these projects succeed. That is, the government lacks clear plans on the distribution of fuel after the refineries are put to use. Are there plans to construct pipelines to connect them? It is comforting that NilePet is funding the depot projects, but the government needs to consider the pipelines or transportation systems that facilitate the distribution of refined fuel items.



Sourced: http://priceofoil.org/content/uploads/2010/03/sudan_oil.jpg

2.2 Institutional, regulatory, and policy gaps

An efficient and sustainable fuel supply depends on institutions, policy, and regulatory frameworks that are used to manage and regulate the sector to safeguard against potential crises. In other words, South Sudan's petroleum sector suffers misalignment of policies, regulations, and other resources that facilitate its performance in the downstream sector. For instance, according to South Sudan Transitional Constitution 2011, Chap III, and Petroleum Act, 2012, the National Petroleum and Gas Commission (the Commission) is the body [5] that formulates policies and guidelines, monitors and assesses the

[5] In contrary, in most countries, the Ministry is the policy-making body while the commission could be an oversight body that monitors the implementation of the policies.

implementation of the policies, and approves operational strategies. The Ministry of Petroleum and Mining (MPM), on the other hand, is the policy-implementing institution that initiates policy enabling legislations, rules and regulations. The National Petroleum and Gas Corporation, now the NilePet, is the commercial wing that participates in upstream, midstream, and downstream activities of the petroleum and gas enterprise.

In practice, the institutions lack clear coordination in dividing and executing roles and responsibilities as stipulated in the petroleum laws. For instance, the Ministry drafted the petroleum policy and produced guidelines for fuel companies, fuel stations, and depot registrations. Legally, these tasks are the role of the Commission, though policy-making process, for the petroleum sector, might have begun before the Commission was established. The Commission focuses primarily on assessing and monitoring the upstream sector but seems to be isolated from the task of downstream sector. It is supposed to approve operational strategies of the downstream sector, among other tasks. That is, its primary tasks include monitoring, assessing, and adjusting prices of fuel in the market, but instead, NilePet now carries out these tasks instead of the Commission. This does not conform to the regional experience. For example, the Kenya Energy Regulatory Commission's mandates are setting prices, regulating the energy sector, reviewing policies, and taking lead in formulating, reviewing and enforcing the rules and laws of the petroleum sector. The reason that a role of an energy Commission, either in South Sudan or Kenya, is required rests with the need to regulate the sector fairly and transparently. Thus, what is coming out clear of the petroleum sector in South Sudan is lack of appropriately coordinated activities. This lack of clear division of labor leads to duplication of responsibilities and misaligned priorities.

The petroleum policy gap is partially responsible for this lack of clear separation of roles and responsibilities in the sector. South Sudan Draft Petroleum Policy, 2013 outlines the principles and objectives that address some of the current and future problems in the petroleum sector. Its objective is to clarify various roles, but it is not in use since it has not been finalized and passed. The policy is good on its own merits. However, it falls short of comprehensively addressing the mid and downstream sectors. For example, it fails to address data management and ownership on downstream sector, depot policy, strategic reserves and local transport networks. The issues the draft policy does not address are partially responsible for fuel shortages. To achieve timely, reliable, and sustainable supply of fuel requires policies on petroleum products importation, strategic reserves, depots and local transportation routes as a tool to meet local consumption and to prevent future fuel shortages. But until the petroleum policy is out with details addressing all the sectors comprehensively and pragmatically, fuel crisis may continue to be a recurrent nightmare in the country.

Furthermore, South Sudan's energy sector is plagued by lack of quality data. NilePet, the institution responsible for this role, has limited capacity to generate sufficient data from all markets. For instance, data from private importers, such as Dalbit International, Tristar Energy and Imatong gas, to mention a few, are unaccounted for in the national fuel

consumption account. This thwarts institutional planning, invoking a demand for specialized, technical, and analytical committees at NilePet. Instead, the current practice is that to come up with information on issues such as storage capacity or to understand the causes of fuel shortages, an ad hoc committee would be established to produce a corresponding report. To this effect, several ad hoc committees have been established and dissolved, subject to emerging needs.

Likewise, lack of clear regulations in the energy sector led to price control battle between the government and fuel importers in 2011. Shortly following the Sudan fuel blockade in 2011, South Sudan experienced fuel price increase from $1 to about $2 per liter. As a result, the government responded by fixing the price of a liter at $1.90/L. Some fuel importers discontinued importing fuel, as a reaction to government's fixed prices. Their reason was that they were paying exaggerated prices in East Africa and high taxes at the South Sudanese port, thus fixed prices made them trade at a loss.

2.2.1 Taxes

Fuel crisis in South Sudan is partly a product of relatively higher taxes. For example, South Sudan's fuel suppliers pay 38% in taxes and import duties per truck (see Tables 2). High taxes in a very difficult environment discourage many fuel importers from doing business in the country. Even worse, a combination of fixed prices and other factors mentioned earlier make the cost of supplying fuel expensive and consequently force the fuel suppliers to hoard fuel and divert it to the black market to recover these costs.

Table 2. Cost of buying a truck of fuel in East Africa (Source: Customs Directorate)

Taxes and Import Duties on a Fuel Tank					
Fuel tank	Volume	Cost/liter (USD)	Custom value in USD	Custom value in SSP	Taxes in SSP
Petrol	34,000	0.79	26,860	497,312.9	187,841.00
Diesel	30,000	0.79	23,700	438,805.5	165,757.00

2.3 Price control

Owing partly to the fixed exchange rate and prices per liter of fuel and NilePet's limitation to supply enough fuel in the market, many oil marketing companies (OMCs) prefer to deal in the black market to avoid government's prices and make profits. This has led to hoarding of the commodity and fuel shortage in the official market. Before the recent unification of the black market and the official bank exchange rates, South Sudan had a fixed exchange rate of SSP 2.95 per dollar. The price of fuel was fixed at SSP 6 ($2) per liter and maintained via state sponsored subsidies. As the difference in official rate

and black market widened, the black market became more lucrative and several small and medium size OMCs started to sell fuel through illegal channels. For example, the national security agency that controls and monitors economic crimes discovered that several companies have been hoarding fuel—all to end up in the black market. Furthermore, some big businesses, such as hotels, have been encouraging the importers to hoard the fuel for a much higher price. Due to the hoarding of fuel, NilePet has recently taken charge of fuel supply, buying from importers and reselling it to petrol stations, government institutions, and other local consumers. Meanwhile, it seems most big businesses continue to buy fuel in the black market. Unfortunately, NilePet alone cannot meet the high demand of 80% of fuel. Together, the fixed foreign exchange rate and fixed retail price encouraged fuel hoarding for a high profit in the black market and at the expense of the general public.

However, the demand[6] for fuel has currently skydived following the floating of the South Sudanese Pound against the US dollar. The demand for fuel has lessened not due to increased availability, but as a result of distressed purchasing power of the population. In other words, the floating of Pound has made most citizens unable to afford fuel at SSP 22 per liter, a 366% increase from SSP 6 per liter. While the fuel prices have increased, the salaries have remained the same, which the government now tries to solve by increasing the salaries of junior staff by 300%. In addition, the government has subsidized a liter of fuel by over 40%. Following the floating of the currency, a retail price of fuel is supposed to stand at SSP 37 per liter. Even at the reduced cost per liter, majority of the population cannot afford the scarce commodity, nevertheless. This has caused a false decline in demand.

2.4 Corruption and administrative loopholes

Until recently, the government of South Sudan (GoSS) has been using the letter of credit (LC) to resolve the hard currency shortage. It issued LCs to importers, but the measure had many loopholes for corruption, making fuel shortage a continuing problem. The government started the LC system during the 2012 oil production shutdown as a credit line from the Qatar National Bank (QNB) to import basic commodities such as fuel [7]. Importers were paid once the fuel products were delivered. The Ministry of Petroleum and Mining (MPM) and NilePet were each budgeted $40 million per month [8]to supply fuel for three months by issuing the LCs. However, there were cases where

[6] A number of fuel station operators interviewed said there has been a sharp decrease in the amount of fuel they sell per a day. Before the floating of currency, they used to sell up to 5000 liters per a day. Now they report they sell about 1500 liters per a day as consumers cannot afford the fuel at the current prices. Some of those interviewed prefer a significant reduction in the price of a liter.
[7] PETERO, "Parliament Return Letters of Credit to Central Bank."
[8] Ibid.

companies/individuals with no capacity to import were issued credit. Corruption was exacerbated by bureaucratic procedures at the Qatar National Bank, consequently causing fuel shortage. For instance, in October 2014, there were about 52 companies given LCs, but no fuel was ever supplied. Also, fuel was not delivered because of bureaucratic procedures at the QNB that "suspended the procurement and importation"[9] of fuel, triggering fuel shortage at the end of 2014.

In addition, those companies that accessed the dollars at official rate failed to supply the volume of fuel commensurate with the amount of credit allocated. Even worst, some fuel importers doctored documents to falsely indicate delivery of the commodity in order to access more dollars. The LC system, in short, failed to meet its fundamental objectives. Instead of addressing the scarcity of essential goods like fuel, the intervention suffered administrative loopholes, subsequently incentivizing and encouraging fraudulent practices at the expense of the country's economy.

2.5 Reduced hard currency earnings

Since 2013, South Sudan has lost a great deal of revenue due to tremendous fall in the global oil prices and the reduction of production due to the recent conflict. Before the oil prices dropped, oil production in Unity State, for example, declined by 40% because of insecurity. In January 2014, the SPLM-IO captured the oilfields around Bentiu and shut down production. These fields have not operated since then, even after the government recaptured them. The fall in global oil prices compounded the war-induced low production.

Moreover, after a few years of price stability at $105 per barrel, the oil prices began to sharply decline in June 2014 and continued throughout 2015.[10] The prices are expected to even reach $20 per barrel in 2016, according to IMF's recent forecast[11]. The fall in oil prices is partly blamed on the oversupply of oil in the market due to increased production in the US and the decision of the OPEC to maintain the existing levels of output. These factors are aggravated by the return of Iranian oil into the market after sanctions were recently lifted. As a result, the price of Brent crude reached less than $28 per barrel in January 2016. This means that South Sudan's Dar Blend, with a discount of about $10, is being sold at $18 per barrel.

The decline in oil prices has drastically decreased oil revenues by 48% from SSP 2,088 million in Nov 2014 to SSP 1,085 million in March 2015, and has continued to shrink as

[9] Paul Adong, the former Managing Director of NilePet, in the Corporate South Sudan Business Weekly magazine.
[10] Baffes, Franziska Ohnsorge, and Stocker, "The Great Plunge in Oil Prices: Causes, Consequences, and Policy Responses."
[11] Nwaka, "IMF Forecasts Oil Price Slump In 2016."

oil prices continue to plummet[12]. The fall in the oil revenues translates into an overwhelming plunge in South Sudan's foreign exchange earnings. The drop in the global oil prices has meant substantial reductions in the total revenues and hard currency coming to the government, partly leading to the current economic crises being faced in the country.

Furthermore, under the 2012 Cooperation Agreement between Sudan and South Sudan, the financial arrangement requires South Sudan to pay Sudan $24 per barrel of Dar Blend sold. As well, South Sudan was supposed to pay $26 per barrel of Nile Blend produced in Unity State. This concession in Unity State was shutdown following the devastating effects of war. This only leaves the Dar Blend produced in Upper Nile State to trade in the international market. The $ 24/b covers $15 per barrel for transitional Financial Assistance (TFA)–which South Sudan offered Sudan for a period of three years following its independence. By the end of May 2015, the remaining balance in TFA was USD 2.02 billion out of a total of USD 3.028 billion. The remaining $9.10 is for processing, transportation, and transit fees. To sum it up, between April 2013 and May 2015, South Sudan should have paid Sudan an amount of USD 1.64 billion. With substantial reductions in oil production and global prices, South Sudan's hard currency earnings are further squeezed by payments to Sudan.

Petroleum imports are critical goods in South Sudan; these imports rank second and represent 8% of the total import value[13] in the country. A significant decline in these often leads to fuel crisis. For instance, the impact of the lack of hard currency to secure petroleum imports resulted in fuel shortage between August and December 2015. There was a substantial decrease of fuel supply from 76% in August to 39% in October (Table 3). In summary, war in oil producing areas, declines in global oil prices, and obligations to Sudan have significantly reduced hard currency earnings, invoking fuel crisis in South Sudan.

[12] Ministry of Finance and Economic Planning (MFEP), "2014/15 Third Quarter Macro-Fiscal Report May 2015."
[13] Basnett and Garang, "Diversifying Trade for Sustained and Inclusive Prosperity."

Figure1. Decrease in oil revenue due to drop in oil prices from Q1, Q2 and Q3 actuals (source: MPM)

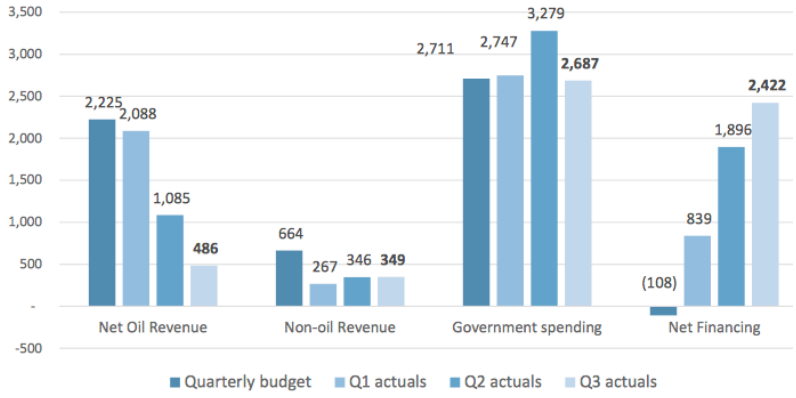


Table 3. Monthly supply quantity in million liters

Months	Aug-15		Sep-15		Oct-15		Nov-15		Dec-15	
Type	**AGO**	**PMS**	**AGO**	**PMS**	**AGO**	**PMS**	**AGO**	**PMS**	**AGO**	**PMS**
Supply	10.7	5.9	7.0	4.8	5.4	2.0	7.2	2.8	2.3	1.7
Demand	14.0	6.0	14.0	6.0	14.0	6.0	14.0	6.0	14.0	6.0
Supply in %	76%	99%	50%	81%	39%	33%	52%	46%	8%	9%
Deficit	-24%	-1%	-50%	-19%	-61%	-67%	-48%	-54%	-92%	-91%

Source: NilePet

2.6 Regional spillover effects

Importing fuel from East Africa meets several challenges that have contributed to fuel shortage in South Sudan. We call these the regional spillover effects. For instance, insufficient and inefficient infrastructure system in Kenya bears on South Sudan's access to processed fuel. Kenya imports crude and refines fuel for local and regional consumption. However, the regional supplier has limited storage capacity of 326 millions liters, with 269 millions liters as the only operational capacity and from which it consumes 87,000 bpd (13,833,000 liters) per day (Kenya Ministry of Energy & Petroleum 2015).

Kenya is also dealing with a regional demand estimated at 450 million liters per month (Achieng' & Rotich 2013). South Sudan is one of the main regional consumers/traders that imports fuel from Kenya[14]. So, due to high demand for fuel from Kenya, any reduction in supply at the Kenyan port sends shocks to other regional countries. For example, in November 2015, part of the petrol shortage in South Sudan, related to the lack of petrol in Kenya. The fuel importers in South Sudan express concern of sometimes operating under pressure due to limited supply of fuel in Kenya.

[14] David Owiro et al., "Situational Analysis of Energy Industry, Policy and Strategy for Kenya."

To make matters worse, South Sudan is not the only country dealing with fuel shortage; Uganda is also experiencing its fair share. "We bring petrol from Kenya and the quantity Kenya exported last month was not enough for six countries across East Africa," said a Ugandan energy official in July 2012[15]. This situation demonstrates that Kenya's oil imports capacity is insufficient to meet an incredibly high regional demand. Alternatively stated, the lack of adequate fuel storage in Kenya to fully cater to its own demand and that of other regional countries surely disrupts fuel supply in South Sudan.

Secondly, the management of fuel supply in Kenya is inefficient, which affects the end consumers like South Sudan. Kenya's oil industry has experienced a number of distribution issues that affect the reliability of its fuel supply to consumers. For example, clearance delays at the ports have greatly undermined timely delivery of fuel to South Sudan, subsequently causing shortages. Research shows that the "Kenyan pipeline management system was found to be inefficient, making product handling for domestic consumption and regional distribution unreliable"[16]. The then Undersecretary of the Ministry of Petroleum and Mining, Machar Aciek Ader, explained in an interview on Radio Miraya that, "the flow of petroleum products from Mombasa to Eldoret through the Kenyan pipeline has its own problems and it was not possible for our importers to load in Eldoret, causing some delays". Likewise, Rwanda is searching for alternative routes to import its fuel from Tanzania because of clearing time it takes in Kenya to export fuels[17]. The East African region as a whole, therefore, suffers from constant fuel shortage owing to logistical and infrastructure problems in the supply route.

2.7. Demand from electricity and water sector

Returning to internal causes of fuel crises, consumption from electricity sector aggravates demand for fuel in South Sudan. Many years of civil war in the Sudan have left South Sudan with no or little electricity and water infrastructure in place. Nearly 10 years after the signing of Comprehensive Peace Agreement (CPA), and 4 years after independence, South Sudan's electricity and water sectors are still in infancy. Thus, delivering these services to the citizenry is quite a long-term dream of the Government of South Sudan.

Lack of water infrastructures and provisions from sources other than oil, has implications on fuel consumption. In juba alone, there were about 20 water bottle manufactures, and 500-registered water trucks in 2014[18]. All these suppliers depend for their services on

[15] Ladu and Okello, "Anxiety as Fuel Crisis Bites."
[16] Eric and Rotich, "Factors affecting effective distribution of petroleum products in Kenya: a case of Kenya pipeline company (KPC).."
[17] Karuhanga , "KPC Inefficiency in Eldoret Pushes Rwandan Fuel Transporters to Dar."
[18] Ibid.

diesel. To illustrate this, a water manufacturing company in Juba, Aqua'na, estimated that the cost of electricity represents 20% of its operation bill. The huge operational cost suggests large consumption of diesel fuel using generators. Further, there are about 7-11 water filling stations along the River Nile where water tankers source water for sale. Each filling station consumes 20 to 40 liters of diesel a day. Supposedly each consumes 40 liters per day, 11 water filling stations would consume roughly 440-litres/day or 92,000 liters per month. There are additional 8 water points and 2 filling stations set up to deliver treated water for bicycle vendors, which means the water filling stations could be consuming more than the current estimate. Besides, each filling station receives about 20-60 trucks of water that refill about 5-10 times a day. Considering the fact that these trucks also rely on diesel, the trucks increase the fuel consumption on production and delivery of water to end-users.

Moreover, electricity demand has also increased the demand for fuel. A study on the energy sector in South Sudan in 2009 found that 93% of power consumption was from diesel powered generators. Indeed, the electricity sector still provides little to no electricity to the public. South Sudan Electricity Corporation, the commercial wing of the Ministry of Electricity, Dam and Water Resources, supplies only about 1% of the population, mostly in Juba, with unreliable and expensive electricity. Consequently, the elites, construction, manufacturing, hospitality, government institutions, NGOs and retail shops all get their electricity from diesel-powered generators. It is therefore not a coincidence that South Sudan imports 70% of diesel compared to 30% of petrol. The higher import of diesel suggests the demand from generators that predominately consume diesel rather than petrol.

In addition to a high demand from the electricity sector is the inefficiency of energy use. For example, a lot of energy is wasted through the use of inefficient generators. In addition, people and businesses waste fuel by having own generators instead of sharing one. In other words, lack of grid systems that can supply homes and businesses with electricity from one source is forcing people and businesses to each own a diesel powered generator, instead of having one efficient generator connected to the grid and supplying as many people with the same power from the same source. Dependency on oil for electricity does not only increase the cost and demand for fuel, it also pollutes the environment as diesel powered generators cause air and noise pollution.

3 Impacts

The sporadic fuel crisis has had deleterious impacts on many sectors. Some of these sectors are transport, water, electricity and health. As the cost of fuel rises, fuel supply dwindles and the demand for fuel rises steeply. Given the fact that the prices of fuel were fixed at 6 SSP (now fixed at 22SSP), the traders rationally responded not by increasing the prices in the conventional market place but also by hoarding the fuel commodity and selling it in the black market at exorbitant profits. Consequently, this increased transport

costs, which in turn increased the prices of basic goods and services. The high prices further decrease the purchasing power of the citizens, which has implications for social well-being and economic productivity.

For instance, as of September 2015, the cost of a liter soared 500 percent of the regular price, leading to ripple effects on the other sectors and adding to the high cost of living. In the transport sector, the price of a motorbike transport, for example, went from a minimum of 5 SSP to 20 SSP. This averages 100 SSP a week and totaling 400 SSP per month for an individual who lives very close to their employment. Assuming that such a worker makes 700 SSP per month, nearly 60 percent of their earning now accrues toward transport, unless they resort to walking. The public buses followed suit and substantially raised the transport fares to meet the resultant high expenditure of acquiring fuel in the black market. The fare went from SSP 1 to SSP 5, a 400 percent increase.

According to the World Food Program (WFP), high fuel cost affects trade flow, especially when the supply is disrupted. The crisis also affects the movement of passenger vehicles and depresses economic activities [19].

Fuel crisis has affected supply of other goods in South Sudan. Considering that water production and delivery to businesses and residential areas in Juba rely on fuel, increase in fuel prices ultimately leads to an increase in water prices. This has negatively influenced the demand for water, especially among poor households and small-scale businesses. First, for untreated water, the filling stations in juba averaged 180 trip-trucks per day between January and February 2015. This number stood between 118 and 160 trip-trucks a day in response to April-May's fuel shortage, suggesting a reduction of between 11 and 34% in water production and delivery[20].

High fuel prices also lead to high operational cost for water trucks that affects the end users. A water truck vendor's operational cost before fuel shortage was around SSP 250; this recently increased to SSP 350 per day[21]. Consequently, the prices of water to residential areas increased. For instance, a 250-liter truck that cost SSP 6 a liter then now costs SSP 10 for areas farther from the Nile. The price is even higher for Gudele, amounting to SSP 15 per liter[22]. Secondly, the water factories have suffered an operational cost increase of 35% due to increase in fuel prices. The retail price of drinking water subsequently went from SSP 1 to SSP 5 a bottle.

In the electricity sector, fuel shortage has had serious implications on productivity of the economy. The fact that fuel is the main source of electricity in South Sudan makes the implication of shortage a broader problem. In the public sector, lack of fuel has resulted

[19] WFP
[20] King, "Deteriorating Economic Situation."
[21] Ibid.
[22] Ibid.

in some institutions working fewer hours. The University of Juba, for instance, lost many days of work due to lack of electricity. The same also applies to the Parliament. Electricity is only available till afternoon, and after lunch most of the staff leave premises following the shutdown of generators. In other words, the hours of operation have been reduced, sometimes by nearly 40 percent and forcing employees to abandon workstations early, hence seriously reducing productivity.

In addition, the high cost of fuel has affected production in other businesses. An average bottled water manufacturer, for example, has reduced their total production capacity to a low 10 percent. Some companies have closed down, causing shortages in bottled water[23]. This situation is well explained by Nelson Achiek's comments, a manager of Cool Water Factory, who told Radio Miraya that, "the company he runs is the only one still in business as his competitors have halted production, warning that even his company may be forced to shut down".

These changes have resulted in an increase in the price of clean drinking water. Some households are now not able to buy clean water, opting to drink dirty water from pools, prompting serious health concerns. For instance, cholera outbreaks recently reported in Juba could be related to these new economic conditions. For example, according to Zlatko Gegic, Country Director for Oxfam in South Sudan, in a report, stated "The high cost and scarcity of clean water puts people at much greater risk of deadly yet preventable diseases like cholera."[24] Oxfam further reported 33 deaths in Juba alone, and 800 more infection cases[25]. Several anecdotes present cases of people dying of starvation, as they can't afford to buy basic food items. Partly due to an increase in fuel prices, food prices and the cost of living have soared, with most families' purchasing power drastically plummeting.

Lastly, due to electricity demand, big hotels and business that were willing to pay fuel at high prices to keep their businesses running contributed to the development of fuel related black market. Officials at NilePet, for example, admit that some big businesses have been encouraging importers to hoard fuel and sell it at higher prices[26].

Although the impacts have been negative, the positive aspect, though insignificant, is that the high cost of fuel and shortage prompted low use, which, in principle, lessens pollution.

4 Policy options

To end the sporadic fuel crisis and achieve wider access to an efficient and sustainable energy in South Sudan, we propose a number of policy strategies, which include*:*

[23] Oxfam, "Humanitarian Bulletin South Sudan."
[24] Oxfam, "A City Exposed: Oxfam Media Brief July 2015."
[25] Oxfam, "Humanitarian Bulletin South Sudan."
[26] Interview with Paul Adong, the former MD of NilePet

- Reduction in taxes or exemption of basic imports, including fuel, in addition to preferential treatment at the Bank of South Sudan, for a select number of trusted imports companies to access dollars at a favorable rate,
- Improving data collection, monitoring, analysis, and reporting,
- Developing fuel depots of enough capacity to store fuel for local consumption,
- Establishing strategic fuel reserves for use during disruptions or delays of supply,
- Using the crude oil produced in the country to develop oil refineries, which can produce cheap and abundant fuel for both local and international markets,
- Developing energy infrastructure and diversifying energy sources by developing hydro, solar and wind power, among others, to reduce reliance on oil as the only source of power and reduce environmental impacts of fossil fuels,
- Developing water supply system to reduce the use of diesel fueled water trucks,
- Finalizing the draft petroleum policy

Refineries, energy infrastructure, energy sources diversification and water supply systems are medium to long term strategies, while the construction of depots, reduction in or removal of taxes and custom duties on fuel imports, and enforcement and monitoring measures, serve short- and medium-term purposes.

4.1 Short-term solutions

We propose a number of policy scenarios for the short-term.

4.1.1 Tax reduction, exemption, and preferential treatment

The current fuel tax regime requires reforms to make downstream sector attractive for fuel importers, protect consumers and benefit the government fairly. Putting in place right tax reforms will also serve as a tool to discourage illegal trading, such as the black market. One of the reasons for fuel crisis is the government's fixed price, which makes importers trade at a loss as a result of high taxation rates. A high tax rate encourages dealing in the black market to avoid price control and make profits. Trading in the black market reduces the quantity of fuel sold at petrol stations where the government tries to control pump prices to protect the consumers. Reduced fuel supply is normally evident through long queues of cars at stations across several towns in South Sudan. Those who have limited time to get fuel are forced to buy in the black market. This shows that, by the end of the day, the government cannot gain two benefits at the expense of the fuel traders, where it taxes them high and at the same time tries to protect consumers against high pump prices.

Recently, a new phenomenon has developed since the floating of the South Sudanese pounds against the US Dollar where fuel has become available, but the purchasing power of the people has plummeted. In other words, citizens are unable to afford fuel at SSP 22 per liter.

As a solution, an analysis of downstream sector tax regime is necessary to find the optimal tax rate that is fair to importers, government and consumers, as well as a review of foreign exchange regime to find a suitable way to reduce costs of importing strategic items like fuels. To explore this possibility, this study has proposed eight scenarios. These assume that reducing taxes will reduce fuel pump prices and make them affordable to the citizens and allow fuel importers and government to profit.

Our unit of analysis is a fuel tank. We focus on both diesel and petrol fuel tank. Jet "A" fuel is excluded, as this is mostly consumed by the elites. Factors we consider include the fuel custom value, which we consider the purchasing value, how much taxes, excise and import duties are levied, the transport cost, the gross and profits. We suggest a number of scenarios as discussed below (for purchasing value, refer to table 2 in section 2.2.1)

4.1.2 Scenarios

Scenario I is the status quo in which the fuel retailers sell at 22 SSP per liter and the government charges 38% in taxes and import duties.

Scenario I (22 SSP retail price - status quo)

Fuel tank type	Sale in SSP	Profit without taxes	Profit in USD without taxes	Profit less 38% in taxes in SSP	Profit less taxes in USD
Petrol	748,000	250,687.10	11,394.87	62,846.10	2,856.64
Diesel	660,000	221,194.50	10,054.30	55,437.50	2,519.89

As shown in the table above, the supplier makes a profit of $11,394.87 without taxes. However, with taxes, he/she gets a profit of $2,856.64. There are two significant points to note here. First, while the supplier is able to make profit, this is lost through opportunity cost because fuel has recently gotten more expensive, with fewer consumers remaining in the market. Secondly, most of the taxes and custom duties being currently charged by the government are illegal. The current tax rate should be 5% in excise duty, according to the Taxation Act, 2009.

Scenario II (22 SSP retail price with 40% tax reduction recently proposed by the government)

Fuel tank type	Sale	Profit less 23% taxes in SSP	Profit in USD
Petrol	748,000	175,550.70	7,979.58
Diesel	660,000	154,891.70	7,040.53

This is the scenario the government recently announced; it reduced fuel tax to 23%. Under a new tax regime, the fuel suppliers get a profit higher than the profit under the status quo of 38% in taxes and import duties. This may increase the volume of fuel in the

market. However, like the status quo scenario, there is a problem of affordability and opportunity costs. Likewise, the new tax rate is illegal.

Scenario III (22 SSP retail price, 5% tax rate as in the Taxation Act 2009)

Fuel tank type	Sale in SSP	Profit less 5% taxes in SSP	Profit in USD
Petrol	748,000	225821.455	10,264.61
Diesel	660,000	199254.225	9,057.01

Scenario III is legal and gives higher profits to the fuel retailers. However, this scenario suffers the same problem as in preceding scenarios—high opportunity costs. If adopted because of its legal standing, the government would have to reconsider how to apply its recent tax reduction announcement as we suggest in Scenario VIII.

Scenario IV (reduction in retail price to 20 SSP and no taxes)

Fuel tank type	Sale in SSP	Profit in SSP	Profit in USD
Petrol	68,0000	182,687.10	8,303.96
Diesel	600,000	161,194.50	7,327.02

This scenario modestly benefits the ordinary citizens and largely profits fuel suppliers. The government may not buy it; however, as it gets deprived of tax revenues.

Scenario V (reduction of the retail price to18 SSP with 0 taxes)

Fuel tank type	Sale	Profit in SSP	Profit in USD
Petrol	612,000	114,687.10	6,294.57
Diesel	540,000	101,194.50	5,554.03

This option is reasonable for both the fuel suppliers/retailers and the consumers. However, the best option is the one in which the government, the suppliers, and the public could all benefit. Like Scenario IV, being unable to charge taxes during the current economic hardship does not make this scenario the best for the government.

Scenario VI (reduction of the retail price to 16 SSPs with 0 taxes)

Fuel tank type	Sale	Profit in SSP	Profit in USD
Petrol	544,000	46,687.10	2,562.41
Diesel	480,000	41,194.50	2,260.95

The biggest winner under this option is the public and the loser is the government. If we take the utilitarian principle of the greatest good for the greatest number as our guide, this scenario becomes the best possible option as this benefits the consumers (the greatest number) and gives reasonable profits to the providers to continue to engage in fuel trade.

Scenario VII (18 SSP retail price, 5% taxes)

Fuel tank type	Sale	Profit in SSP	Profit in USD
Petrol	612,000	89,821.46	4,929.83
Diesel	540,000	79,254.22	4,349.85

This option charges 18 SSP retail price and considers 5% in taxes per liter as stipulated in the Taxation Act, 2009. It reduces the price by 4 SSP, gives the retailer a profit of 18% on a tank and an excise duty tax of 5% to the government. This option is the best for all the parties.

Scenario VIII (17 SSP retail price, 3% taxes)

Fuel tank type	Sale in SSP	Profit in SSP	Profit in USD
Petrol	578,000	65,767.71	3,609.64
Diesel	510,000	58,030.33	3,184.98

This scenario follows the announcement from the government to reduce taxes by 40% on fuel and basic commodities. Since the only legal tax rate for fuel we know is 5% per liter, we reduce 5% by 40%, resulting in a new tax rate of 3% per liter. This option also benefits all the parties. It is particularly attractive because of a 22% reduction in the retail price. Indeed, this enables fuel suppliers to make higher profits by selling more fuel.

4.1.3 Preferential treatment

The scenarios we outline above may solve the problem of high fuel cost in some ways. However, one crucial factor that remains unresolved and which contributed to fuel shortage in the final quarter of 2015 is hard currency shortage. Following the floating of currency in mid December, the gap between the official foreign exchange rate and that of the parallel market has continued to widen. For example, the official rate in the last dollar auction was 19.75 SSP. While the black market rate was 18.5 SSP at the time of the announcement of the SSP floating policy, it is now above 30 SSP per dollar. This has considerable influence on fuel supply. We propose how to resolve this in the short-term.

In addition to considering some of the above policy options, the government should create a separate dollar access window for strategic items like fuel. This preferential treatment, as has been shown to work in other contexts, could benefit South Sudan for the short-term. Trusted fuel suppliers[27] would then access dollars at the lowest possible

[27]Trusted fuel suppliers to be given Dollars at favorable rates are that ones with proven history of ethical conduct (e.g. having been able to consistently deliver fuel as required), proven financial

foreign exchange rate through the central bank. This also prioritizes basic commodities delivery into the market. Enough fuel supplies in the market allows the retailers to reduce the prices and still profit via the economies of scale. The challenge with this policy option is that there is potential for continued dollar scarcity, unless the recent peace agreement is implemented to enable increased external investment and to amplify oil production. Secondly, the policy would work well if strict transparency and accountability measures are enforced, that way it does not suffer the LC's abuse.

4.2 Improve data collection, monitoring, analysis, and reporting

The Ministry of Petroleum and Mining should take the responsibility of data collection, monitoring, analysis and reporting on the downstream sector. This enables the ministry to make adequately informed regulatory and planning decisions. Doing this requires establishing data management system.

The idea is to empower the directorate of the downstream sector in the Ministry of Petroleum and Mining to collect and store all data from all the suppliers and fuel traders. This effort requires:

- Establishing petroleum products import regulation that requires all the fuel importers and traders within South Sudan to submit imports documents to the government at the port. The same regulation would require all fuel retailers and stations to submit operational data on monthly basis.
- Once the data are collected, a team of experts permanently stationed at the MPM could analyze and publish the results in the ministry's monthly report/gazette.

The first option is to let the MPM carry out this task given that it is already responsible for the upstream sector data management, analyses, and publication, indicating reasonable experience in the area. Also, the MPM has a downstream sector that is less busy than that of the NilePet.

The last option is to give this role to the Ministry of Energy and Dams, where it should create a directorate or a unit to monitor, collect data, analyze, report and publish for policy, planning and regulatory purposes geared towards achieving energy security.

4.3 Developing fuel depot of enough capacity to eliminate supply gaps

Lack of fuel storage is one of the causes of fuel crisis. To solve this problem, there are a number of options namely: incentivizing fuel retailers to expand their storage capacity, establishing portable fuel depots, and building depots across the nation.

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capacity (having ability to pay Pounds in exchange for Dollars) and proven logistical and technical capacity (e.g. availability of fuel tanks or proven ability to rent or hire fuel tank), among others.

4.3.1 Incentivizing fuel retailers

This will require that the private fuel stations be given incentives to encourage building extra storages. This could be taxes or registration fees exemption, or preferential treatment for imports support.

4.3.2 Depots

Portable depots are relatively cheap and quick to construct; they take 30-40 days worth of construction. The storage capacity of a portable depot is often 1 million liters. If 100 of these storages are built and filled, then this could reduce South Sudan‘s fuel shortage problems. We offer this as a short-term solution to meet the immediate demand of fuel, while the long-term plan of constructing permanent depots in all the states of South Sudan continues.

4.4 Long-term solutions

4.4.1 Refineries

To ensure a stable fuel market, South Sudan needs to start developing refineries to produce cheap and abundant petroleum products and reduce reliance on imported fuel down to 50% by year 3 and 90% -100% by year 6. Currently, the country does not have a single oil refinery. It depends for its petroleum product needs on neighboring countries, particularly Sudan and Kenya. After Sudan banned trade with South Sudan in 2011, Kenya became the only destination for fuel imports. Any disruptions in Kenya lead to fuel crises in South Sudan. Therefore, building refineries to produce enough fuel for local consumption can solve the sporadic fuel crisis, as producing it locally will eliminate or minimize the high costs of transport and taxes. Secondly, having local refineries increases the country’s energy independence.

4.4.2 Energy infrastructure

South Sudan needs to develop energy infrastructure and diversify its sources to have at least 50% of energy coming from hydro, solar, and wind power by 2021, and 90% by 2026 to reduce reliance on oil as the only source of power. Similarly, this minimizes environmental impacts of fossil fuels.

Currently, the urban areas like Juba, heavily rely on diesel to power everything, including cars, residential areas, and businesses. This results in a high demand for diesel, hence affecting other prices. Building sound infrastructure facilitates diversification of energy sources. The infrastructure should be a priority because it can provide an enabling environment to produce and supply electricity from hydro-power and other sources to save the country from having to rely on oil as the source of power.

Alternatively, the country should pursue Micro-Generation Feed-in Tariff Strategy to generate energy in the short- to medium- terms. The Micro-generation Feed-in Tariff produces and distributes power to the citizens, businesses and organizations by installing individually owned power source that is fed to the public grid. These individuals sell power surplus to the government.

There are a number of justifications for this strategy. First, it can, in part, solve the problem of inefficiency of energy consumption, particularly with regards to each family or business having its own diesel powered generator or solar systems without sharing the surplus with neighbors in need. Second, through the micro-generation program, producers are motivated to supply more power by getting guaranteed payments for every extra kilowatt of electricity they feed into the grid. Third, it is cheaper because individual households and businesses largely finance the program. The government then offers reliable grid and customer protection. Fourth, micro-generation incentives can restrict the sources of power to clean and renewable energy, such as solar and wind or hydro-power.

To adopt this energy supply option, a Feed-in Tariff policy, legislation, special tax considerations, and financial incentives would be required. The policy and law can set the standards and requirements while the tax and financial incentives can ease the upfront costs of installation and operationalization. The incentives should include exempting renewable energy equipment from taxes and import duties.

4.4.3 Developing water supply system

This can reduce by 50% in five years the use of diesel fueled water trucks. Currently, water is supplied using diesel-powered trucks, which puts stress on the volume of available fuel and influences prices of other essential goods. The new strategy includes constructing water treatment plants and supply networks to various points. This will possibly lower the demand for fuel.

5. Conclusions

Obviously, South Sudan faces hard choices as shown in the rescue options we presented above. Factors such as drastic decline in global oil prices, the protracted conflict that has now lasted for two years, and the financial commitments made to Sudan in 2012 have exacerbated the situation. While the conflict persists, using the oil revenues as the tool to build energy infrastructure and to diversify energy sources, as well as introducing preferential treatment for fuel suppliers as a temporary measure, becomes a difficult choice to make.

To overcome these economic constraints, the country needs to focus on implementing the Agreement on the Resolution of the Conflict in South Sudan (ARCISS). This creates a number of favourable conditions that can lead to achieving energy independence. These include changing the donor attitude with the view to funding energy infrastructure.

Stability helps resume oil production, with the resultant revenues used to support energy infrastructure and economic diversification.

In addition to implementing ARCISS, South Sudan needs to maintain good relationship with Sudan and other neighboring countries. This increases South Sudan's leverage towards accessing refined fuel products in the short- and medium terms.

Regardless of the difficulties and challenges, the country should take a bold step in ensuring that fuel is affordable and available as this is a strategic item for state and people's security. We revisit these options as outlined earlier, below:

- Reduce the retail price to 17 SSP per liter and apply the 5% tax rate per liter as stipulated in the Taxation Act, 2009. This needs to reflect recently introduced tax reduction, with the new tax rate now amounting to 3% per liter. We propose this option because it has potential to benefit the government, fuel providers, and consumers.
- Or reduce the fuel retail price to 16 SSPs and remove all the taxes and custom duties. If we use the utilitarian principle of the greatest good for the greatest number as our guide, this will be the best possible option, as this benefits both the consumers (the greatest number) and the fuel providers.
- Or reduce fuel retail price to 18 SSP and continue to charge 5% tax rate as stipulated in the Taxation Act, 2009. This option is the best for all parties. However, it still keeps the fuel relatively expensive.
- Remove all taxes and cap the retail price of fuel at 17 SSP or at any lower rate but give freedom to retailers to lower the price as much as they want based on demand, as this encourages retailers to profit using the economies of scale.
- Build portable depots as a short-term measure and invest in refineries and fuel reserve storages as a long-term measure.
- Invest in renewable energy, particularly hydro, wind and solar power by providing incentives for micro-generation feed-in tariff program.
- Taxes and duty reduction or exemption on fuel imports should be implemented for the next one to two years as a temporary measure until there is enough fuel storage capacity to cushion against any fuel disruptions. When this objective is achieved, taxes and import duties should be reapplied to discourage consumption of fossil fuels and to encourage use of more efficient energy sources.

- Quality data, especially in the downstream sector, should be regularly acquired, analyzed, and debated for the concerned institutions to plan accordingly and to adequately address energy issues in the country. This is because the ability to manage this complex industry partly depends on applying appropriate decision tools.

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The Sudd Institute is an independent research organization that conducts and facilitates policy relevant research and training to inform public policy and practice, to create opportunities for discussion and debate, and to improve analytical capacity in South Sudan. The Sudd Institute's intention is to significantly improve the quality, impact, and accountability of local, national, and international policy- and decision-making in South Sudan in order to promote a more peaceful, just and prosperous society.

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