Economic Impact Assessment on Removal of Tax Exemptions on Stand-Alone Solar Products in Kenya

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Prosperity House, Westlands Road,
P.O. Box 4320, 00100, Nairobi, Kenya.
Tel: +254 (0)20 271 0485

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ABBREVIATIONS AND ACRONYMS

Acronym	Definition
ACE	Africa Clean Energy
ACE TAF	Africa Clean Energy Technical Assistance Facility
EAC	East African Community
EAC CMA	East African Community Customs Management Act
ECA	Economic Consulting Associates
GDP	Gross Domestic Product
GoK	Government of Kenya
IMF	International Monetary Fund
KEREA	Kenya Renewable Energy Association
KES	Kenyan Shillings
KNES	Kenya National Electrification Strategy
KOSAP	Kenya Off-Grid Solar Access Project
KRA	Kenya Revenue Authority
OGS	Off-Grid Solar
PAYE	Pay As You Earn
PAYG	Pay As You Go
PPP	Policy Position Paper
PPT	PowerPoint
PV	Photovoltaic
SAS	Stand-Alone Solar
SEforALL	Sustainable Energy for All
SHS	Solar Home System
VAT	Value Added Tax

EXECUTIVE SUMMARY

Context and objectives

Stand-alone solar products (SAS) play a critical role in delivering electricity access for all, especially for hard-to-reach, low-income Kenyan households. In rural Kenya, only 26% of households have access to the main grid, while 30% rely on SAS technologies as their primary source of lighting. There is still a significant gap to reach the universal access targets in rural areas, where over 40% of the population relies on paraffin, gas lamps, torches, batteries, wood and candles.

The recent introduction of Value Added Tax (VAT) at the standard rate of 16% in the Finance Act 2020 and import duties of up to 25% through the East African Community Customs Management Act, pose a significant risk to the benefits of access to SAS products. These additional costs will be entirely (or almost entirely) passed on to consumers, which will make high-quality SAS products unaffordable for many households.

This report presents an assessment of the impact of VAT and import duties on household access to SAS products in the next five years.

Findings

In total, reintroducing VAT exemptions for SAS products could result in Treasury incurring a net cost of around USD 13 million per year by 2025, while import duties could represent up to USD 16 million further. This is a small (albeit not unimportant) contribution compared to total national revenue of USD 16 billion.

Considering the impact on prices and affordability, the 16% VAT charge could result in as many as 470,000 fewer households accessing SAS products by 2025 (with import duties the number rises to 650,000). This limited reach would also come at a cost of 2,500 jobs in the SAS supply chain, a reduction of up to USD 2 million in income taxes and corporation tax contributions, and a slowdown in economic activity worth at least USD 40 million per year for households. Furthermore, VAT and import duties will significantly limit the ability to reach national universal energy targets and put SAS products further out of reach to the most vulnerable communities. It will also reduce available lighting for study hours, increase the use of environmentally damaging energy alternatives such as wood-fuels and kerosene, and limit the development of businesses and service providers utilizing solar technologies for productive purposes such as healthcare provision, medical cold-storage, and micro, small and medium enterprises.

Considering the impact on prices and affordability, the 16% VAT charge could result in as many as 470,000 fewer households with access to SAS products by 2025.

Recommendations

1. VAT exemptions should be reinstated. Without VAT exemptions, high-quality SAS products will not be affordable for many Kenyan households, particularly in underserved rural counties.
2. Regional coordination should clarify and reinstate exemptions across the East African Community. This may need to be phased after the more immediate priority of reinstating the VAT exemptions, which is fully within the control of Kenyan authorities.
3. Targeted subsidies and incentives should support the hardest-to-reach and promote productive use of solar technologies. Programs such as Kenya Off-Grid Solar Access Project (KOSAP) are essential in providing additional incentives to ensure SAS products are affordable for the most remote and lowest-income communities. Targeted incentives should also support access to technologies and services that support economic livelihoods and have the most potential to power productive jobs.

1. INTRODUCTION

ACE TAF has been working with the Ministry of Energy, the Kenya Renewable Association (KEREA), and GOGLA to provide a robust evidence base for the case of tax exemptions on stand-alone solar (SAS) products in Kenya. This initiative is part of a larger consortium which brings together several institutions including Power Africa Off-grid Project (PAOP), SNV Netherlands Development Organization, BFZ and Clean Cooking Association of Kenya (CCAK), Africa Mini Grid Association (AMDA) and Green Mini Grid Facility (GMG), the consortium provides a platform for various supporters of KEREA to co-ordinate and deliver efficient support to the Association while avoiding duplication of efforts. ACE TAF is presenting evidence on the impact of the taxes on the uptake of SAS, while AMDA and PAOP provide evidence on mini grids. Lastly, CCAK is working to supply data on the impact of these taxes on uptake of clean cooking products.

The objective of this report is to provide a socioeconomic impact assessment of the recent introduction of VAT, and import duties on SAS products. The Finance Act 2020 saw the introduction of VAT on all SAS products sold in Kenya, while recent amendments to the East African Community Customs Management Act (EAC CMA) have resulted in import duties levied on various SAS products. This study investigates the trade-off between collection of taxes and duty from the sector, versus the impact of these taxes on the SAS sector. It then estimates the benefits delivered by the SAS sector, towards universal access to electricity by 2022 as stated in the Kenya National Electrification Strategy (KNES), 2018, and a range of other socioeconomic outcomes.

Specifically, this study provides an evidence base to understand the impact of the recent amendments to both VAT and import duties on SAS providers:

- The removal of VAT exemptions for SAS products through amendments to the Value Added Tax Act, No. 35 of 2013 that were enacted through the Finance Act, 2020
- The removal of import duty exemptions for some SAS products that were enacted through amendments to the East African Community Customs Management Act, 2004 adopted under the Legal Notice No. EACC/89/2020.

The remainder of this report is structured as follows:

- **Section 2** summarises the energy access context, including the need to reach the remaining underserved counties targeted by the Kenya Off-Grid Solar Access Project (KOSAP).
- **Section 3** describes the context behind taxation of SAS products in Kenya, and highlights the importance of strengthening national revenue collection.
- **Section 4** summarises the stakeholder engagement that informed the analysis presented in this study.
- **Section 5** describes the quantitative tool used for this study, and sets out the key assumptions and sources used in the assessment.
- **Section 6** describes the results of the assessment and underlines the benefits delivered by tax exemptions for SAS products across a range of monetised and non-monetised impacts.
- **Section 7** concludes with recommendations including continued tax exemptions in the short-term, but with a clear understanding of a route map to sector maturity and an understanding of when it may become appropriate to revisit the conditions for such exemptions in future.

2. KENYA ENERGY ACCESS CONTEXT

2.1 Summary of energy access priorities

Just over half of households now have access to grid-electricity – although this falls to just 26% in rural areas.[1] As shown in Figure 1, in rural areas more households now rely on off-grid solar technologies as their primary source of lighting than are connected to the grid (30% compared to 26% respectively). There is still a significant gap to reach the universal access targets, particularly in rural areas where 46% of the population still relies primarily on paraffin, and gas lamps, torches, batteries, wood and candles.

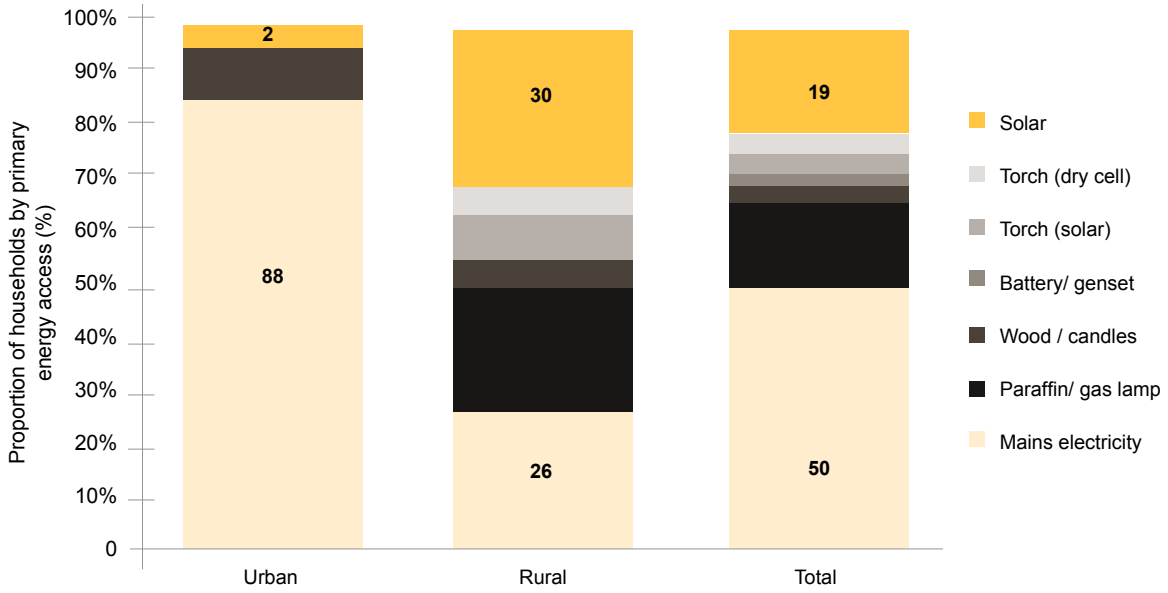

Figure 1: Primary source of lighting by energy source

Source: ACE TAF analysis of Kenya National Bureau of Statistics (2019). Kenya Population and Household Survey

The 2018 Kenya National Electrification Strategy (KNES) provides the overarching strategy to achieve universal access to electricity. The strategy identifies key barriers that must be overcome to achieve this, including:

- Lack of proper incentives to attract private investors
- High costs and low affordability of off-grid services
- Low quality off-grid products
- Lack of enabling legal frameworks for off-grid services

The impact of recent amendments to both VAT and import duties needs to be considered against the broader context of these barriers. The imposition of such taxes will raise the cost and further decrease the affordability of off-grid energy services, will reduce the attractiveness of the market to investors, and is likely to increase the penetration of cheaper, lower quality "grey" goods which are often channeled through informal marketplaces and therefore avoid some of these new taxes.

The KNES aims to increase the uptake of SHS with a target of over a million households by 2023. The strategy details that by 2018, there were 700,000 connections through SHS, while its potential stood at nearly two million households. It commits to increase the uptake of SAS systems to just over one million households. It also estimates that this goal would require an annual subsidy of USD 16 million.

There has been notable and rapid evolution of the off-grid solar (OGS) market in the last decade. Approximately

1. *Kenya National Bureau of Statistics (2019). Kenya Population and Household Survey*

8.7 million households now meet their basic energy needs through quality verified (QV) solar products, and these products have reached around 30% of households not connected to the grid – up from just 2% in 2009.[2]

Nonetheless, the remaining two thirds of the unconnected population will be harder to reach. Indeed, a recent Shell Foundation study found that 49% of the households they interviewed that already have access to a SHS are living below the poverty line of USD 3.20 per day.[3] The penetration of OGS products is significantly lower in the north and north-east of the country, where poverty levels are higher than the national average and the ability to bear the cost of even an entry-level SHS is extremely limited.

In this context, KOSAP aims to offer targeted subsidies to this underserved population. KOSAP is a national government project running from 2017 to 2023, implemented by the Ministry of Energy with finance and technical support provided by the World Bank through a USD 150 million (KES 16 billion) Funding Facility. One of KOSAP's core objectives is to deliver 1.3 million people with SHS in 14 counties, mostly in the North East as shown in Figure 2.

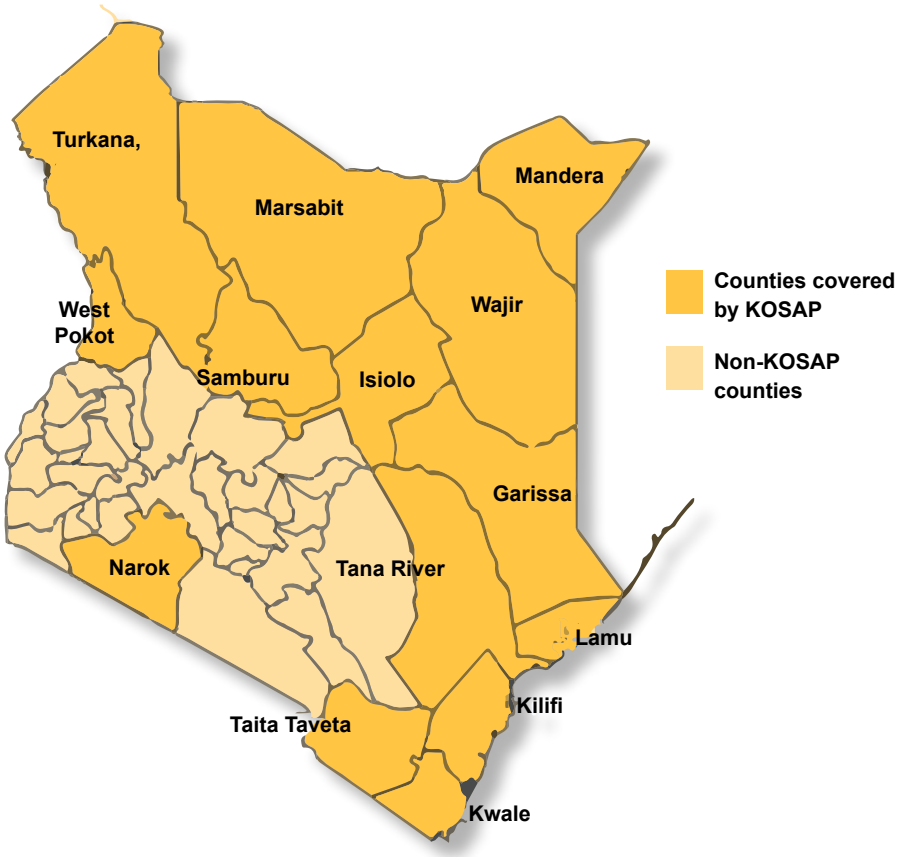

Figure 2: KOSAP covers 14 counties comprising the majority of the land area of Kenya – and aims to reach 250,000 households with SHS

Source: ACE TAF analysis of KOSAP description

In the counties covered by KOSAP, just 23% of households have access to electricity compared to a national average of 70%.[4] Of that 70% national average, it is worth noting that only 50% is provided by the main grid, while a further 20% is provided by SAS products. Among the KOSAP counties, the level of access to either the grid or a SAS product is just 23%, and even this masks significant variation among the counties. For example, just 8.7% of households in Turkana have access to grid or electricity, with just 11.8% in West Pokot, and 14.1% in 14.5% in Samburu.[5]

2. *KOSAP information flyer*
3. *Shell Foundation (2020) "Improving the Quality of Life of Kenyan Households with Off-Grid Solar Home Systems"*
4. *Power Africa (2020) "OFF-GRID SOLAR MARKET ASSESSMENT BRIEF FOR 14 UNDERSERVED COUNTIES OF KENYA"*
5. *Kenya National Bureau of Statistics (2019). Kenya Population and Household Survey*

2.2 Overview of the standalone solar sector

The SAS industry in Kenya is now well established with several international companies. Kenya is one of the top 10 global markets for SAS products, and has seen a rapidly growing sector over the past decade.

Annual sales peaked at almost 2 million products in 2019, but dropped in the first half of 2020. As shown in Figure 3, sales in the first half of 2020 totaled over 870,000 units, down by 11% compared to the same period in 2019. Over the last few years there has been an increasing shift to "PAYG" products – bought on consumer credit with monthly repayment instalments – and a reduction in the share of products paid for in-full with cash.

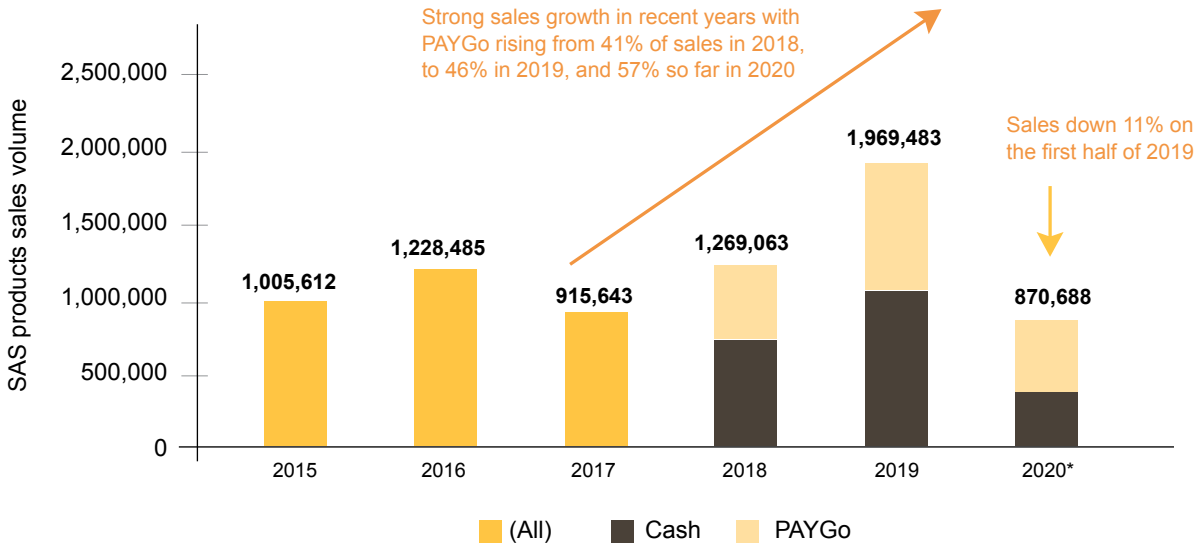

Figure 3: Sales of SAS products by GOGLA-affiliate members since 2015
Source: ACE TAF analysis of GOGLA half-yearly sales data

Notes: * note data for 2020 is only for the first half of the year, up to end of June 2020

3. NATIONAL REVENUE AND TAX CONTEXT FOR THE SAS INDUSTRY

3.1 National revenue context

Kenya's annual national revenue of KES 1.7 trillion – or 20% of GDP – is a crucial resource for the government to deliver on infrastructure investments and socioeconomic development programs that benefit citizens. As shown in Figure 4, Kenya is in line with regional comparators, and indeed significantly below South Africa, Botswana, Lesotho and Namibia, in the amount it raises in national revenue each year as a share of GDP. In much of Europe for example, national revenue as a share of GDP is typically above 30% and in some cases about 40%.

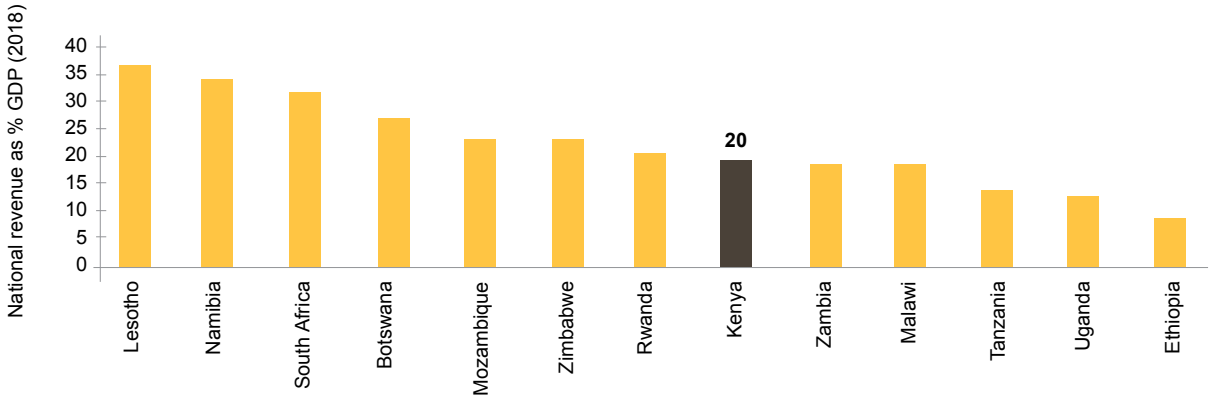

Figure 4: Kenya raises around 20% of GDP in national revenue – in line with regional comparators

Source: ACE TAF analysis of World Bank data on revenue in local currency units and as share of GDP, accessed 02 November 2020

The COVID-19 pandemic is placing a greater strain on government resources worldwide, including in Kenya. The economy has proved relatively resilient so far, realising a growth of 4.9% in the first quarter of 2020 as compared to 5.5% in the first quarter of 2019. Nonetheless, the impacts of COVID-19 have not yet been fully felt, and are likely to (1) decrease national revenue sources, while also (2) increasing the need for government expenditure in the form of support packages to safeguard jobs and livelihoods, and protect vulnerable populations.

In order to cushion businesses and citizens from the economic impacts of COVID-19, in 2020 the government adopted fiscal measures through various reductions in the overall tax burden. These measures included reducing the standard VAT rate from 16% to 14% (although the rate reverted to 16% from 1st January 2021), reducing corporation tax and personal income (PAYE) taxes from 30% to 25%, provision of a 100% tax relief for persons earning a gross monthly income of up to KES 24,000 and reduction of turnover tax rate from 3.0% to 1.0%. These fiscal measures have come at a foregone estimated cost of KES 172 billion to the Exchequer.[6]

6. *Republic of Kenya (2020). 2020 Budget Review and Outlook Paper*

3.2 VAT and import duty context

In this constrained fiscal context, VAT and import duties represent an important source of fiscal revenue for Kenya. In the most recent 2019-20 fiscal year, the government collected KES 1.7 trillion worth of revenue, of which 41% came from direct income taxes (shown in yellow in Figure 5), with local and import VAT[7] contributing a further 22% and import duties another 6% (shown in orange in Figure 5).[8]

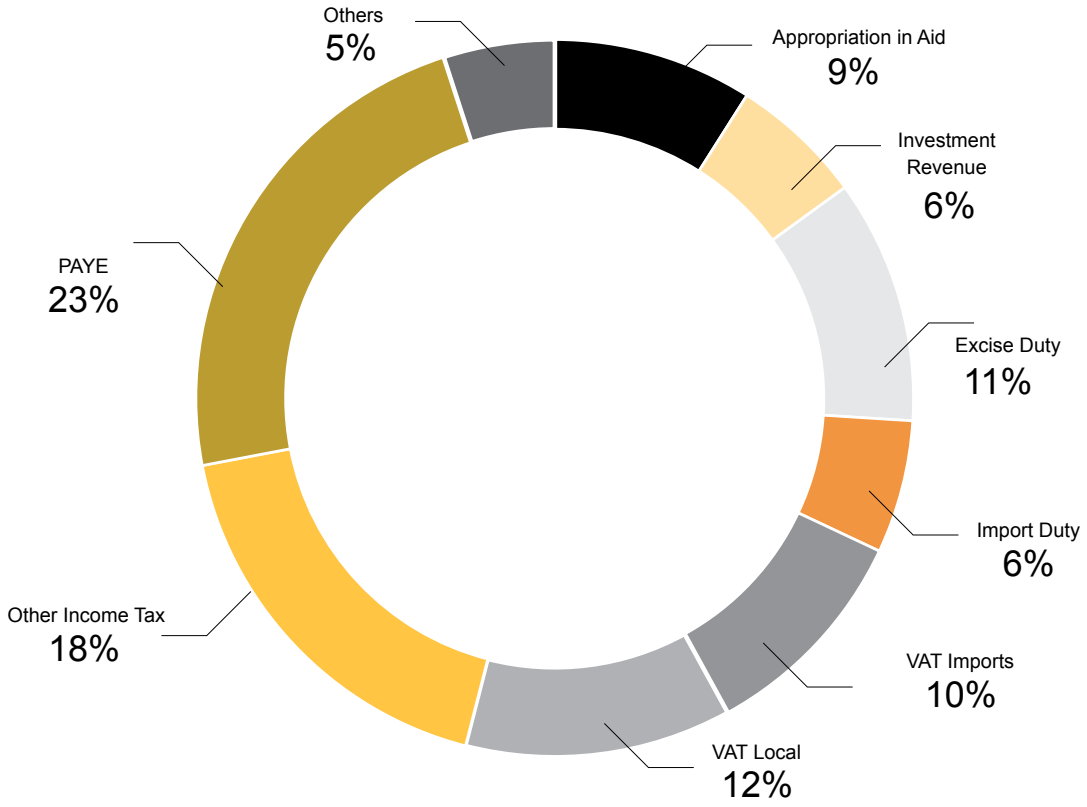

Figure 5: Breakdown of Kenya provisional national revenue by source, 2019-20, representing a total of KES 1.7 trillion

Source: ACE TAF analysis of Republic of Kenya (2020). 2020 Budget Review and Outlook Paper

Over the years, the VAT regime has been rationalized. This has been done so as to 'eliminate misclassification, simplify tax administration, improve compliance, control smuggling and minimize exemption requests', and also as a 'choice instrument for dealing with exceptional circumstances and financing unexpected expenditures, pursuing industrial strategy' especially revamping or promotion of local industries or specific sectors.[9] A recent IMF report estimated that the foregone revenue from maintaining a large list of tax waivers and exemptions amounted to KES 478 billion in 2017, as a result of 135 VAT-exempt goods and services, and 17 zero-rated goods and services.[10] This provides important context for the recent VAT amendments, which in this sense are part of a broader trend to both reduce the complexity of VAT, and reduce the number of VAT exemptions over time.

7. *Local VAT is the VAT levied and collected from local sales while import VAT is the VAT levied and collected from imported goods at customs port of entry.*
8. *(GoK: 2020a)*
9. *Karingi, Stephen Njuguna, Wanjala and Bernadette (2005). The Tax Reform Experience for Kenya. WIDER Research Paper, No. 2005/67. United National University World Institute for Development Economics Research (UNU-WIDER)*
10. *IMF (2020). Kenya: Fiscal Transparency Evaluation Update. IMF Country Report No. 20/2.*

Currently, there are three applicable VAT rates in Kenya (GoK: 2020c), as shown in Table 1.

Table 1: Active VAT rates in Kenya and how they apply to different goods and services

Type	Rate	Goods and services covered (illustrative)
Standard	16%	This rate applies to most vatable goods and services including SAS products. However, the rate had been reduced to 14% in 2020 as a temporary measure to cushion the industry and consumers from the negative impact of the COVID-19 pandemic
Reduced	8%	This is mainly applicable to fuel and other specific petroleum products. Notably, this *'reduced'* rate applies to conventional "dirty" lighting and home energy fuels such as petroleum and kerosene
Zero	0%	Supply of liquefied petroleum gas including propane; and all inputs and raw materials whether produced locally or imported, supplied to manufacturers of pest control products
Exemptions	n/a	Locally manufactured motherboards, inputs for the manufacture of motherboards; and plant machinery and equipment used in the construction of a plastics recycling plant

Source: ACE TAF analysis

3.3 VAT and import duties applied to SAS products

This study focuses on the impact of the recent application of the standard 16% VAT on SAS products.[11] As shown in Figure 6, SAS products have largely been exempt from VAT since the emergence of these technologies at scale in the early 2000s, and as such the recent revision of the tax codes to the full standard rate of VAT represents a significant and unprecedented burden of tax on the sector.

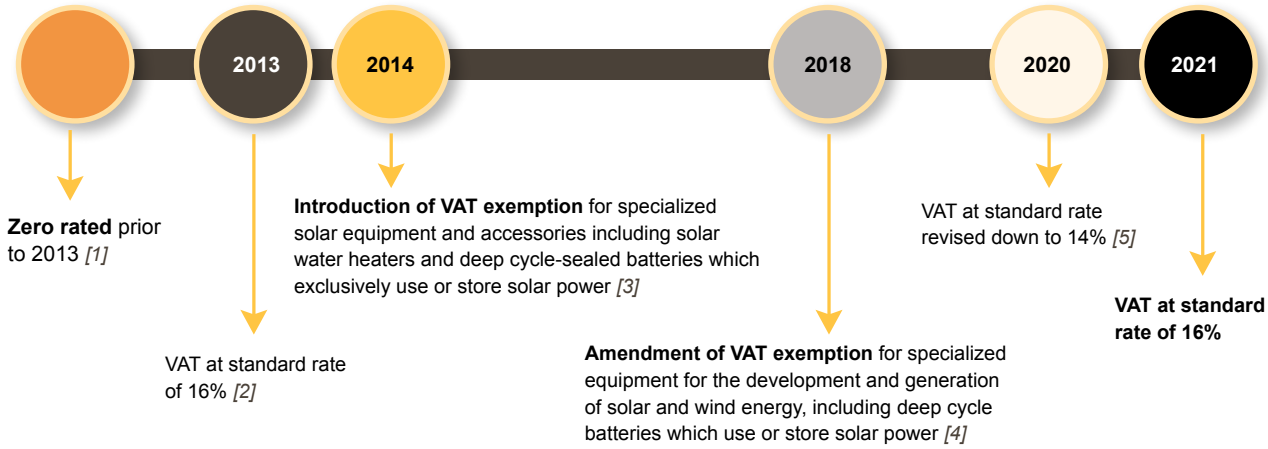

Figure 6: Evolution of VAT as applied to SAS products in Kenya

Source: ACE TAF analysis of Kenya tax codes and periodic revisions

Notes:

[1] Value Added Tax Act, Cap 476 (Repealed)

[2] Value Added Tax Act, No. 35 of 2013

[3] Section 2 (a) (5) of the Value Added Tax (Amendment) Act, 2014 (No. 7 of 2014) to provide for inclusion of new Paragraph 45 of Part I, Section A of First Schedule of the Value Added Tax Act, No. 35 of 2013

[4] Paragraph 45 of the VAT Act, No. 35 of 2013 was deleted and substituted by providing the new paragraph 45 in the VAT Act

[5] Deletion of paragraph 45 of the VAT Act, No. 35 of 2013

11. *Pico solar products are the off-grid solar systems rated up 10Wp, while SHS are off-grid solar kits rated 11 watts-peak (11 Wp) and above that provide lighting and powering appliances*

Additionally, the study looked at the impact of alterations to the East Africa Community Customs Management Act, introduced in June 2020. In particular the EAC CMA has been changed such that some SAS products are now eligible for import duties, as a result of the following revisions:[12]

- deleting the words "development and" coming immediately after the words "equipment for" and "generation".
- inserting the words "Photovoltaic (PV) Module, Direct Current Charge Controllers, Direct Current Inverters and Solar" immediately after the word "Energy" and immediately before the words "Deep Cycle Battery which use and/or store solar power".

Currently, Pico solar systems as well as some of the SHS components, are subject to import duty in Kenya. Some of the SHS components that are subject to import duty include solar 'charge control units' with or without USB charging capability, solar PV 'cables', 'batteries/valve regulated lead acid batteries', 'batteries lithium-ion' and 'metaling unit boxes'. Uganda, Tanzania and Rwanda apply import duty to the same products.[13] SHS such as PV solar module and DC to AC inverters are however exempt from import duty while 'solar metering units', 'solar power display meters' are qualified as zero-rated (i.e. 0% rate) of import duty.[14] However, pico solar systems are not subject to VAT in Rwanda, Tanzania and Uganda.[15]

3.4 Industry position and summary of current surveys on the impact of the topical amendments to VAT and import duties

In light of the recent introduction of VAT and import duties, a recent survey carried out by KEREA and SNV found that the new taxes have already caused significant disruption to SAS providers.[16] The survey of SAS companies in late 2020 revealed that 67% of respondents expected severe disruptions to supply as a result of the newly imposed VAT and import duties. In addition, 70% had not received significant guidance from KRA on the operationalization of the new taxes, which increases uncertainty on rollout of operations and delays investment decisions on expansion of activities.

The vast majority of companies would have to pass on the additional tax costs directly to end users, which would significantly reduce the ability to pay for these products. Over 60% of the respondents indicated that they would have to pass on the cost of VAT and import duty to their customers, while the others were not yet certain of the controls. Of these respondents, 85% reportedly increased product prices by up to 20% as a result of VAT imposition, while the remaining 15% of respondents increased product prices by up to 40%. Similarly, over 80% of the respondents increased prices by up to 20%, while the remaining 18% increased product prices by up to 40% as a result of the imposed import duty.

Finally, companies are facing a decline in already tight profit margins and seeing an immediate reduction in sales volumes. Over 80% reported a decrease in profitability, while more than 50% anticipate a decline in the number of customers they can reach each month and an increase in customer complaints. In addition, 83% reported significant influence on their companies' strategic decisions while over 50% of the respondents reported that they would delay investment and expansion activities. Finally, 12% of the respondents indicated that they would make redundancies while 11% of the respondents would stop hiring new staff. These findings are summarised in Figure 7.

12. *Legal Notice No. EACC/89/2020 amended item 26th of the Fifth Schedule of EAC CMA 2004 PART B*
13. *Boards, panels, consoles, desks, cabinets and other bases, equipped with two or more apparatus for electric control or the distribution of electricity, including those incorporating instruments and numerical control apparatus (For a voltage exceeding 1000 V) are subject to 0% import duty in Uganda, Tanzania and Rwanda while in Kenya they are subject to 10% import duty.*
14. *UNREEA (2020). The East African Regional Handbook on Solar Taxation.*
15. *with the exception of 1.5-3 Wp products which are single light and mobile charging that are subject to 18% VAT in Uganda*
16. *SNV (2020). Determining the impact of Value Added Tax (VAT) and import duty on access to renewable energy products (Conducted in August 2020)*

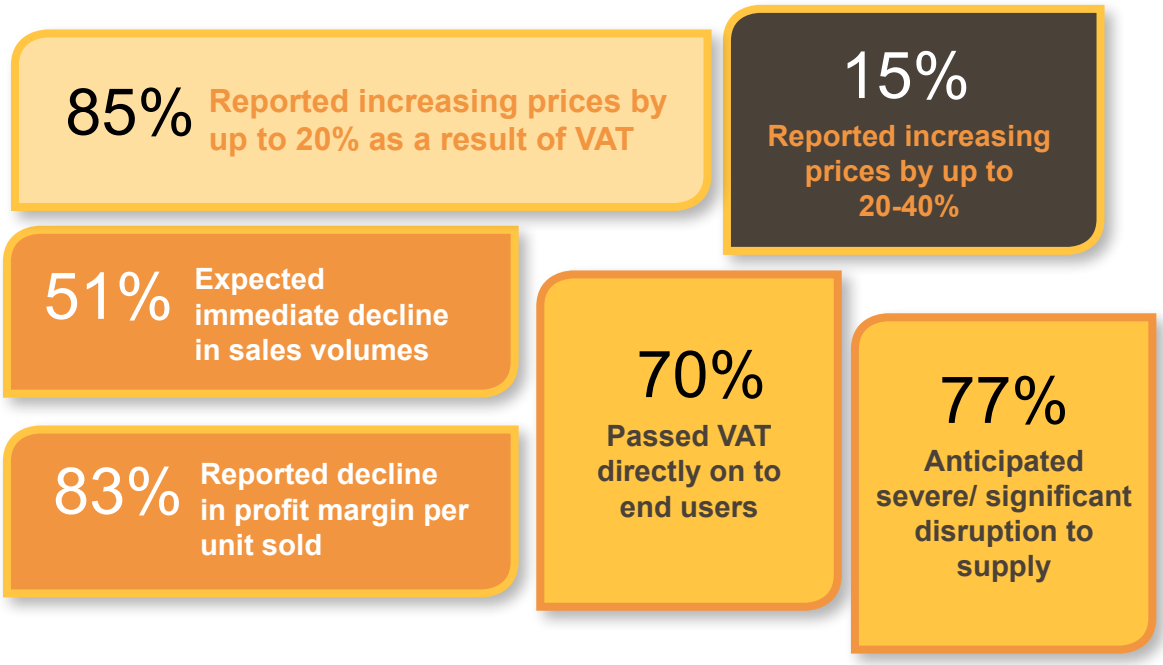

Figure 7: Off-grid solar providers reported significant disruption to supply as a result of the introduction of VAT and import duties

Source: ACE TAF analysis of SNV and KEREA industry survey

Through KEREA, industry players highlighted their concerns and engaged with Parliament in April-June 2020.[17] The key messages from the sector are that the removal of VAT exemptions on SAS products which implies the introduction of 16% VAT costs to the products –

- Would result in 17% fall in demand for SAS
- Result in loss of 20,000 jobs in renewable energy value chains
- Reduce corporate taxes and personal income tax due to job loss
- Hinder realization of national electrification goals
- Affect marginalized rural areas which depend primarily on solar systems for their energy needs (solar energy accounts for 40% of lighting needs).

17. KEREA (2020). Finance Bill, 2020: Presentation to the Committee on Finance and National Planning

4. SUMMARY OF STAKEHOLDER ENGAGEMENT

As part of this study targeted engagements were carried out with a dozen public and private sector stakeholders. The full list of stakeholders consulted is provided in Annex 1, where a sample interview template is also provided. The interviews were used to confirm and update the findings from the stakeholder engagement described above, and to test modelling assumptions for the quantitative analysis described in Section 5 and 6.

While SAS products have attained a stable customer base by reaching currently unconnected households there is a major affordability challenge, which is exacerbated by the recent imposition of taxes. Companies cite the previous VAT exemptions as playing a key role in enabling the successful growth of the sector so far. Nonetheless, margins in the industry remain very low, and companies are not in a position to "absorb" the burden of taxes. The market conditions to connect currently unserved households are very challenging, with low ability to pay in rural areas. These customers are very sensitive to price changes and cannot bear the cost of an additional 20% price increase (as described above). In particular, companies operating under KOSAP are already reporting difficulties in meeting targets with the new tax regimes in place, and in general these are very low affordability markets which will be badly affected by anything that further raises prices.

As well as reducing sales volumes, companies are also having to extend payment terms for customers to afford SAS systems. PAYG is increasingly used – over 50% of sales are now made using PAYG – and spreading payments creates the possibility to spread price increases over a longer period of time. A typical repayment plan can require customers to pay between KES 50-65 per day over a period of 2 years or more. Companies report now extending the repayment terms for PAYG products, with payment plans extending up to 36 months. However, this is not a "costless" adjustment, in that it both increases the burden on households to commit to a repayment plan that lasts for several years, effectively further indebting rural households with limited prior experience with consumer finance. It also increases the cost of products, as companies must include a cost for providing this consumer finance which reflects both the cost of working capital (companies incur costs up-front and only recover the cost over time), and default risk. Customers are also reluctant to purchase products that entail a longer commitment to repayment, and longer payment plans increase the default risk.

While there has not been much direct lay-off of full-time contracted staff yet, agent networks have seen some attrition. As companies are waiting to see the full impact of the tax changes, full-time employees have been retained to serve the existing customer base. However, agents working on sales, often on a commission, have seen reduced activity.

Another key consideration beyond the impact on sales volumes, is on the type and quality of energy access product. Accessing larger SHS offers productive economic opportunities that a smaller lighting system does not provide enough power for. So not only will the introduction of VAT and import duties reduce sales volumes, it will also likely mean households that buy a system opt for smaller, less productive products. It may also result in households purchasing lower-quality, cheaper, "grey" market solar products, which may avoid some of the taxes by being imported and sold through less formal channels. This poses a risk to consumer safety and confidence in SAS products.

Finally, consultations raised the need for both greater coordination and faster implementation. While some public agencies are fully supportive of VAT and import duty exemptions, there is a need for a structured case for these exemptions to enable coordination with other key stakeholders. For example, to support the National Treasury in assessing the case for VAT exemptions, understanding the relative magnitude of foregone tax revenues compared to the benefits delivered, is important (and is the main purpose of this assessment). Furthermore, even once the case has been made, timely implementation of policies is very important. Kenya Revenue Authority (KRA) has been working to reduce a backlog in processing qualifying VAT refunds. While not the focus of the study, it is worth noting that the industry players still face challenges even when qualifying for VAT refunds, especially lengthy delays that lead to holding working capital, which businesses dealing with SAS products may not have experienced because the products were VAT exempt.

5. THEORY OF CHANGE AND APPROACH TO ASSESS THE IMPACTS OF VAT AND IMPORT DUTIES

5.1 The impact of tax exemptions through SAS sector development

The SAS sector is a crucial part of reaching universal access to energy as enshrined in SDG 7, and in the KNES. SAS technologies offer the most cost-effective electrification option for a significant proportion of Kenyan households, and predominantly those in remote rural areas, who are typically not only the hardest to reach with varied forms of clean and modern energy, but also often the poorest and most vulnerable communities.

While achieving universal access to energy is a worthy goal in itself, the benefits of access to SAS technologies are wide-ranging. As shown from the study findings, providing fiscal incentives in support of the SAS sector supports:

- Creating a level-playing field with other technologies which have historically benefited from significant public sector support and subsidies.
- Generating crucial high and low skilled jobs in rural areas.
- Mitigating greenhouse gas emissions from traditional, fossil-fuel-based energy access products.
- Reducing household expenditure on recurring purchases of other forms of energy, if the relatively higher cost of SAS products can be overcome
- Supporting the growth of what is still a relatively young sector, to make sure businesses secure a path to maturity, reach all of their target customer base, and achieve stable profitability.
- Ensure widespread access to SAS products which offer households and small businesses access to power for productive use in and outside the household.
- Providing high-quality lighting and extending time for children to spend on education at home, and reducing damaging health impacts of burning fossil fuels indoors.

For example, with the main electricity grid concentrated in Kenya's central corridor, SAS solutions represent the most cost-effective way of reaching most of the remaining unconnected population. While the last-mile connectivity program significantly lowers the grid-connection fee for households, this fee estimated at around USD 1,000 per connection does not reflect the true cost that would be borne by the Kenya Power and Lighting Company (KPLC).[18] The least-costly solution for most rural customers in the coming decade will be SAS.[19]

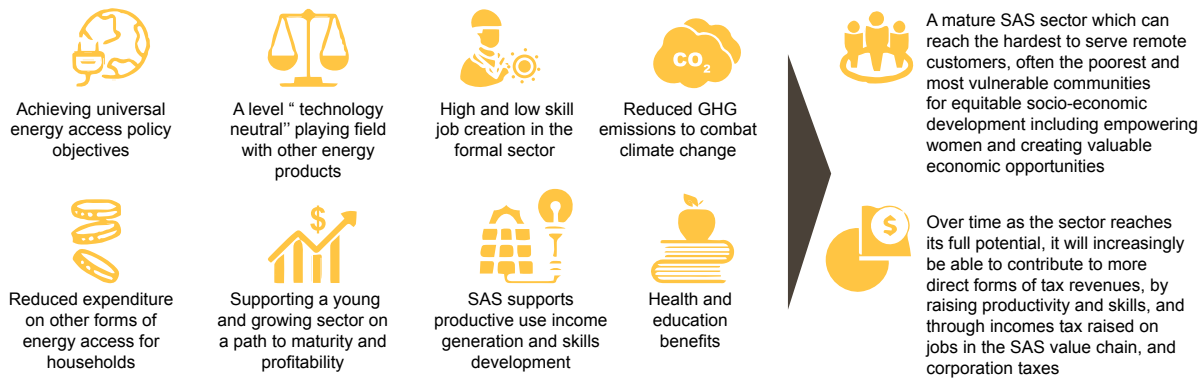

Figure 8: The SAS sector delivers a range of important policy, fiscal, and socioeconomic benefits that must be weighed against national revenue foregone from tax exemptions

Source: ACE TAF analysis

18. *World Bank (2017) "Project Appraisal Document - Off-Grid Solar Access Project for Underserved Counties"*
19. *See for example the Global Electrification Platform projections for Kenya*

There are further benefits beyond these factors, including increasing security and safety and reducing accidents. SAS technologies are also increasingly used to power specific productive use appliances, to power cold storage for food storage, and storage of critical health care products (e.g. vaccines), and for use in health and education facilities. Figure 8 provides a summary of the socio-economic benefits of SAS.

The SAS sector is a key component of fair and equitable socioeconomic development, ensuring no one is left behind. This is crucial as Kenya continues its growth trajectory – and to ensure COVID-19 resilience in communities – expanding beyond the major cities and focusing on the poorest and most remote Kenyan communities.

Furthermore, while much of the data and analysis presented in this report concentrates on 'access', ensuring affordability of SAS products also guarantees that households can afford more powerful quality systems that can support greater energy services, including productive use. One of the major risks in increasing the costs of SAS products is that it will restrict households to purchasing smaller Pico products with limited lighting and device charging, denying many households access to larger products that have the potential to transform livelihoods by powering economic activities and innovation.

This assessment builds on and contributes to a growing body of evidence on the impact of fiscal incentives on the SAS industry's progress and delivery of socioeconomic benefits. In particular, it builds on a series of national studies supported by UK DFID's Energy Africa campaign, for Mozambique,[20] Malawi,[21] Uganda,[22] Zambia,[23] and other recent studies including a Uganda Off-Grid Energy Market Accelerator analysis of fiscal policy,[25] and a Duke University study on the impact of tax on uptake of SAS in East Africa.[25] Duke 2019 – The True Cost of Solar Tariffs in East Africa, and HB 2019 – Policy Research on the 10% duties on solar (Nigeria). Some of the key findings from these previous studies are summarized in Table 2. The approach taken and some significant conclusions from these studies is described in Annex 2, and briefly summarized in the box below.

Box 1: Impact of tax changes to SAS sector as shown by other studies.

Studies conducted on East Africa have found that the introduction of import tariffs negatively impacts the uptake of SAS units, thus impacting the ability of governments to achieve their access targets. A Duke study of Kenya and Uganda found that a 20% import tariff would result in a decrease of 18% in the sale of kits without televisions. This reduced to a further 32% decrease in sales for kits with televisions.

Conversely, an ECA study on Mozambique found that setting import duties and VAT at 0% would increase projected sales of SAS to 500,000 over a 10-year period. This means that 3.1 million people would have access to power through solar PV by 2026 against a national access target of 4.1 million by 2030. Whereas maintaining the current taxation regime would leave that number at 231,000 by 2030 (5% of the national access target).

5.2 Model structure and key assumptions

The quantitative approach used for this assignment is built around the same architecture developed for the ACE TAF multi-country responsible taxation tool. The flow of calculations is shown in Figure 8. The tool models a range of VAT and import duty scenarios, taking as its starting point a scenario with exemptions and then looking sequentially at the impact of adding VAT and/or import duties separately, and then both combined. Alongside these scenarios, the tool incorporates data from a range of sources on the affordability of SAS products, the price sensitivity of demand to changes in end user prices (as a result of tax changes), and a wide range of estimates of the impact of access to SAS products. These are described in-depth in the paragraphs below.

20. *Economic Consulting Associates (2016) "Energy Africa – Mozambique. Technical assistance to model and analyse the economic effects of VAT and tariffs on pico PV products, solar home systems, and improved cookstoves"*
21. *Economic Consulting Associates (2017) "Energy Africa – Malawi. Technical assistance to model and analyse the economic effects of VAT and tariffs on pico PV products, solar home systems, and improved cookstoves"*
22. *Economic Consulting Associates (2018) "Energy Africa – Uganda. Fiscal policy options for Solar Home Systems (SHS)"*
23. *Kuungana Advisory (2018) "Energy Africa – Zambia. Technical assistance to model and analyse the economic effects of fiscal policy options for off-grid technologies in Zambia"*
24. *UOMA (2018) "Fiscal Policy Analysis: An assessment of the tax and subsidy options to accelerate solar home systems in Uganda"*
25. *Fetter, Rob, and Jonathan Phillips (2019) "The True Cost of Solar Tariffs in East Africa"*

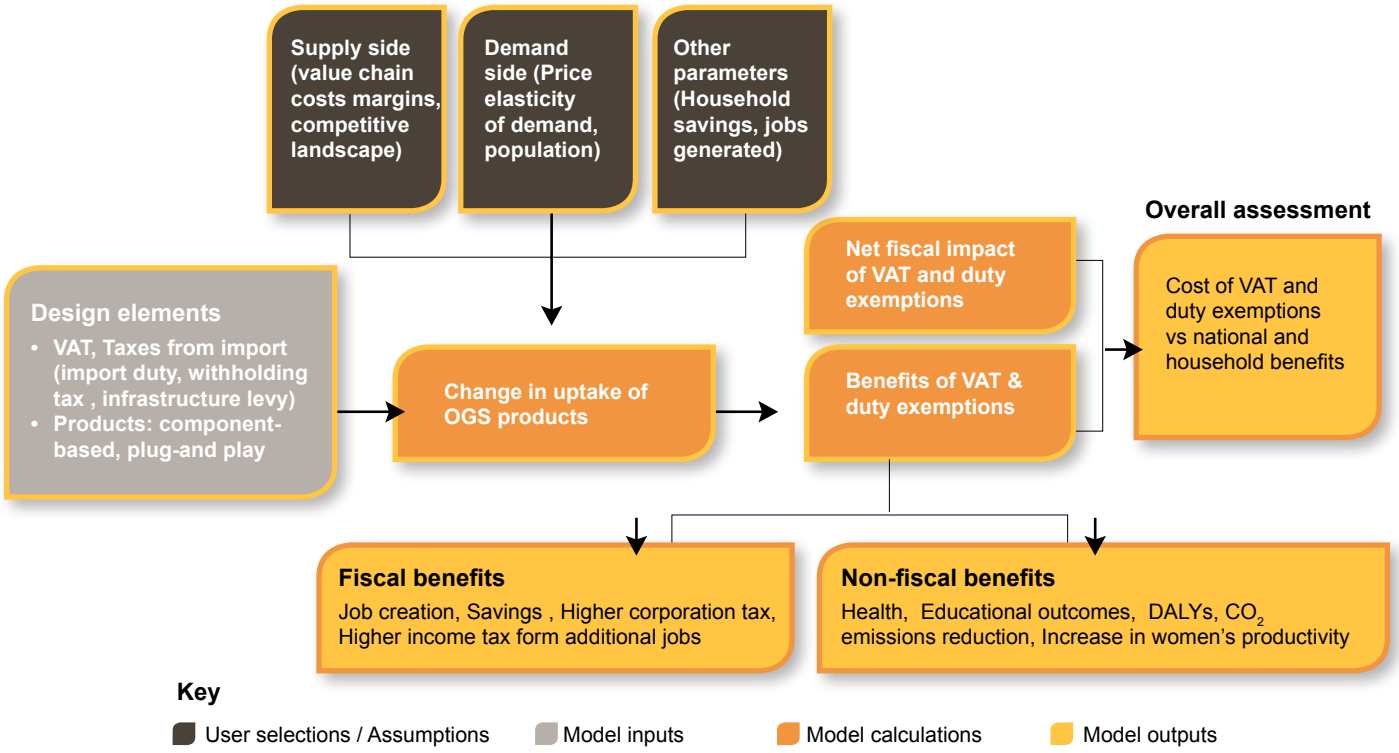

Figure 9: Tool structure to assess the impact of VAT and import duties on the SAS sector
Source: ACE TAF analysis

The key sources and assumptions used to generate the quantitative results are:

- **Baseline sales trajectory**. In the baseline – founded on historic sales volumes under a regime of tax exemptions – we assume that there would continue to be just over 1 million unit sales per year, which has been the case for the last five years, albeit with some significant fluctuations from one year to the next. This sales trajectory is broadly in line with reaching the energy access targets set out in the KNES, although it also requires that sales penetrate the most remote and low affordability market segments, which will be a challenge even with the previous set of tax exemptions.
- **Change in uptake of SAS solutions.** The main model result presents the consequential change in sales volumes from a simple 'price elasticity of demand' (PED) approach based on estimates from previous studies.[26] The model uses a single elasticity of -0.9, which means that for a 10% increase in price, sales would fall by 9%. Alongside this simple price response function, the model also has a module to calculate demand response based on affordability across the income distribution, which could also be customised to specific regional settings. The results presented here are based on the PED approach, although it is notable that using the affordability approach would in most cases result in a steeper drop in sales from a price increase, and this would be accentuated in the 14 priority KOSAP counties, where affordability is far lower than the national average.
- **Corporation tax:** it is assumed that SAS companies on average make very limited pre-tax net margins of only 16%.[27] Note, this is based on our experience working in the sector, and does not represent the margins of any particular company, nor a detailed assessment of profit margins in the sector.

  Currently low margins suggest that any taxes levied are likely to be fully passed on to end users – the supply curve has very limited ability to absorb these costs, with products typically provided close to an 'at-cost' basis. On the other hand, low margins also mean that the modelled gains in corporation tax are very modest. As the sector grows and we hope to see stable margins develop, it may also begin to make higher corporation taxes contributions, so the analysis of corporation tax presented in Section 6 – Key Findings is likely a conservative

26. *For example, Duke (2019) "The True Cost of Solar Tariffs in East Africa"*
27. *ACE TAF (2020) "Understanding the Impact of Distribution Costs on Uptake of OGS Products in Select SSA Countries"*

estimate. We assume a corporation tax rate of 37.5%, although this would be markedly lower at 30% for resident Kenyan companies.[28]

- **Employment in the SAS value chain.** The tool estimates the number of jobs created in the SAS value chain to deliver the annual sales in each tax scenario. This is (intentionally) not a reflection of specific employment levels, and is based primarily on the GOGLA 'Growth Engine for Jobs' study, which itself is based on a comprehensive review of the literature on job creation associated with SAS technologies worldwide.

  To estimate income tax contributions from workers in the SAS value chain it is assumed that the average managerial position earns around USD 15,000 in taxable income, and faces an average tax rate of 20%. Other workers in the SAS value chain are presumed to earn USD 5,000 in taxable earnings,[29] with an average tax rate on these earnings of 10% to reflect the much lower share of earnings that will fall within income tax bands.

- **Benefits to users of SAS products.** Users of SAS products are expected to both (1) take up new jobs and start new businesses, and (2) become more productive and spend longer in their current jobs. The share of SAS users that utilise their system to generate additional income is based on the GOGLA 'Powering Opportunity East Africa' report, which in summary estimates that 28% of SHS users generate an average additional income of USD 46 per month.[30] As we expect that much of this extra income will be generated from low-wage jobs, often in the informal sector, we do not include any increase in tax revenues associated with this increase in economic activity. However, this is a conservative assumption as some of these micro-business activities may begin to generate formal, tax-paying jobs, and the additional income earned may also be spent in the marketplace on goods which generate VAT.

  We also estimate a reduction in expenditure, based on a 70% reduction in spending on other energy access technologies such as battery powered torches, candles, and kerosene.

- **Educational outcomes.** The model assumes that the average end user household of SAS products has two children of school age, and gains an extra two hours of light for education each evening.

- **Climate mitigation benefits.** We estimate a reduction in CO2 equivalent emissions from a reduction in kerosene use only. On the basis of an average monthly usage of 2 litres of kerosene per household, and 2.5 kilogrammes of CO2 emissions per litre of kerosene consumed. These emissions are valued at a global social cost of carbon of USD 50 per tonne.

Finally, we assume that the product mix bought by Kenyan households remains largely unchanged, and is represented as shown in Table 2. For simplicity, we assume that 80% of systems are "plug-n-play" (i.e. full packaged kits), while the remaining 20% are put together as component-based systems.

Table 2: Prices and shares of systems of different sizes in Kenya

	Plug-n-play		Component based	
Product type	**Average price (USD)**	**Share of sales**	**Average price**	**Share of sales**
0 – 3 Watt single lighting systems	25	60%		
3 – 11 Watt multi-light systems	60	15%		
11 – 20 Watt small SHS	150	15%	200	35%
20 – 50 Watt medium SHS	350	10%	475	50%
50+ Watt large SHS			500	15%

28. *We have used the higher rate of 37.5% here as more representative of the structure of SAS providers, which are typically overseas firms with a local Kenyan office*
29. *This is based on an average annual wage in Kenya of KES 380,000 per year, KNBS Economic Survey 2020*
30. *GOGLA (2019) "Powering Opportunity East Africa"*

6. KEY FINDINGS

6.1 Scenarios considered

The analysis presented in this section shows the outcomes delivered under four modelled tax scenarios (summarized in Table 3):

- **Scenario 1 – exemptions:** presents the outcomes under full VAT and income duty exemptions, which was the "baseline" context in Kenya until recently.
- **Scenario 2 – import duties on:** shows the impact of only the imposition of import duties on (some) SAS products, as introduced by the amendments to the EAC CMA.
- **Scenario 3 – VAT on:** shows the impact of only VAT at 16% as introduced by the Finance Act 2020.
- **Scenario 4 – VAT and import duties on:** shows the combined impact of both the VAT and import duties.

Table 3: VAT and Duty rates modelled by scenario

Taxes	VAT		Import Duty	
System type	Component -based	Plug-and-play	Component -based	Plug-and-play
Scenario 1 (No VAT/ No duty)	0.0%	0.0%	0.0%	0.0%
Scenario 2 (Import Duty on/ No VAT)	0.0%	0.0%	25%	25%
Scenario 3 (VAT on/ No import duty)	16%	16%	0.0%	0.0%
Scenario 4 (Both VAT and Import duty on)	16%	16%	25%	25%

6.2 Scenario outputs

In total, VAT exemptions for SAS products would result in a net cost to Treasury of around USD 13 million per year and would generate over USD 40 million in annual benefits. Including VAT on all SAS sales would generate additional tax receipts of USD 13 million per year. However, this potential revenue should be seen in the context of the broader set of benefits that would be foregone as the increased price of SAS products would reduce the number of households reached. The total number of households reached would fall by 470,000 by 2025. This limited customer base reach would also come at a cost of 2,500 jobs in the supply chain, USD 2 million in income taxes and corporation tax contributions, and economic activity worth at least USD 40 million per year for households. The following sections provide deeper discussion on these impacts, and a broader set of non-monetized benefits delivered by the SAS sector that would further support the case for exemptions.

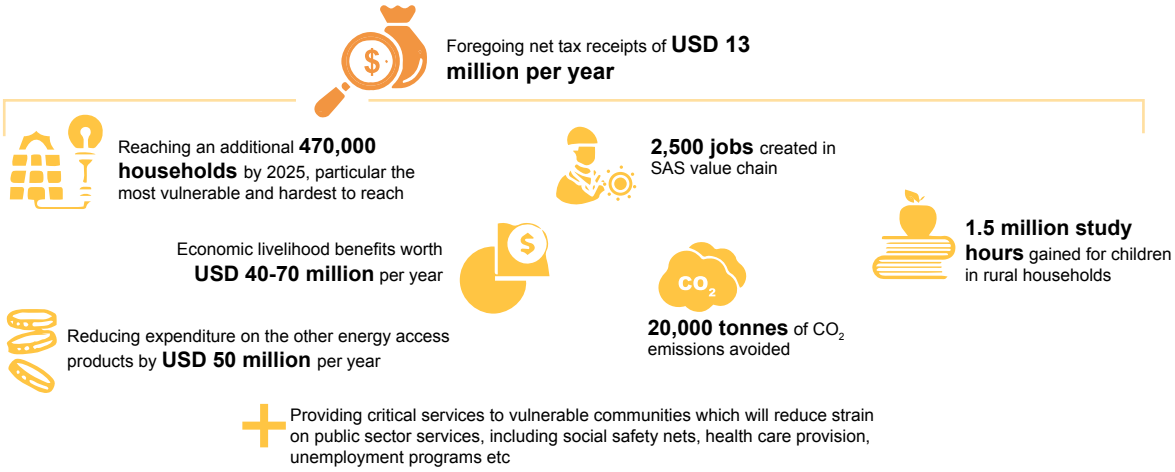

Figure 10: Summary of the case for VAT and import duty exemptions
Source: ACE TAF analysis

The imposition of VAT and import duties will push Kenya off-course towards meeting its energy access targets. With the remaining unconnected households predominantly in the poorest and hardest to reach districts, and in the broader context of the challenges posed by COVID-19, even under the optimistic assumption of sales volumes continuing in line with past trends this would only just about reach the energy access targets. The KOSAP program described in Section 2 provides targeted incentives to reach these remaining unconnected households, which would be undermined by a countervailing impact of VAT and import duties that will increase end user prices and reduce companies' ability to serve the 14 underserved districts.

As shown by the green bottom line, the imposition of VAT and import duties could result in 600,000 fewer households having access to SAS energy products by 2025. This would be a significant blow to the continuation of a strong growth path, and making sure that growth provides good opportunities for the most vulnerable regions and communities.

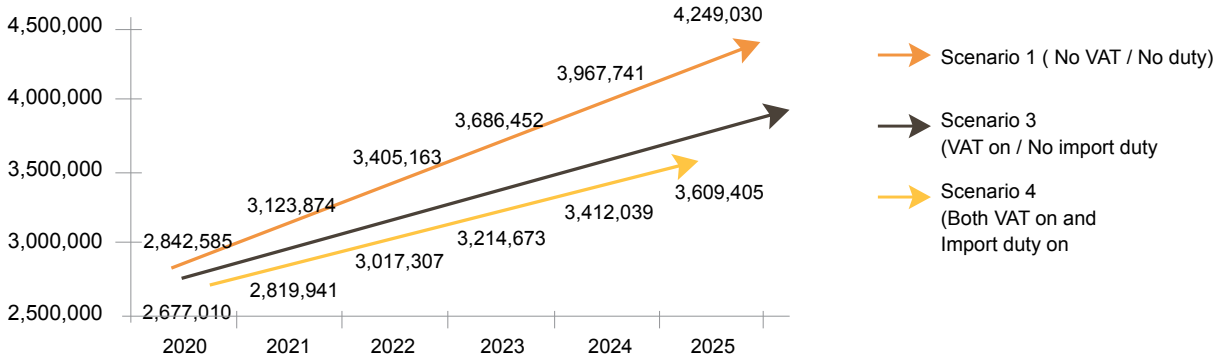

Figure 10: Energy access progression by scenario (total households)
Source: ACE TAF analysis

Nonetheless, it is important to recognize that maintaining the VAT and import duty exemptions comes at a cost to national revenues. As shown in Figure 10, the new VAT rate of 16% could raise an additional USD 13 million per year, while import duties may add a further USD 16 million per year. This is not a significant amount in the context of total national revenue raised each year which is around USD 16 billion.

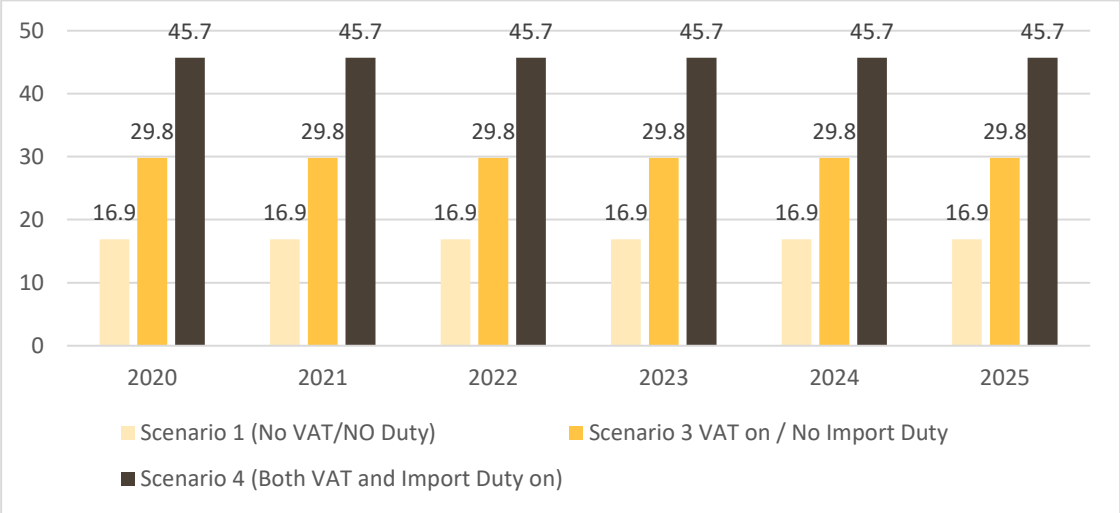

Figure 11: National revenue gained from VAT and import duties (USD millions)
Source: ACE TAF analysis

Corporation tax receipts may increase as the sector matures, although they will not significantly offset the foregone VAT if the exemptions are reinstated. The margins for SAS operators are low – in this analysis modelled as a net margin of 15% - so the ability to raise corporation tax revenues from this margin is limited. The estimated corporation tax boost from maintaining the VAT exemption would only be around USD 400,000 per year, although this would increase if the sector achieves higher and more stable margins.

On the other hand, jobs created in the solar value chain will both provide important economic opportunities and generate direct income tax revenues. With the VAT exemption maintained, an additional 2,500 full time jobs in the SAS value chain would be generated each year. Apart from providing valuable livelihoods and skilled job opportunities, these opportunities could also contribute in the region of USD 1.7 million per year in income taxes.

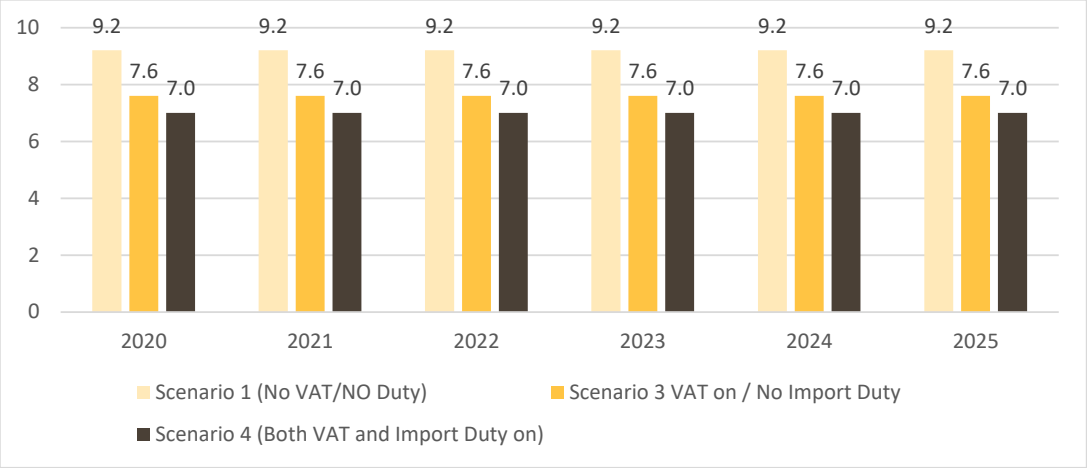

Figure 12: Income taxes from jobs in the SAS value chain (USD millions)
Source: ACE TAF analysis

Similarly, the SAS subsector generates employment opportunities and productive economic potential for households. Maintaining the VAT exemption and reaching more households with SAS products could result in around 200,000 more households using their SAS products to support a new business or start a new job. In total, including households who use their SAS products to boost productivity in their current economic activities, the increased income generated for households could be between USD 40 million and USD 75 million more per year,[31] which is far greater than the foregone VAT tax receipts of just USD 13 million per year (and noting this is also offset by up to USD 1.7 million of extra tax generated elsewhere in the SAS sector).

These benefits of improved productivity and economic empowerment often affect women and people in more vulnerable communities the most. Women's productivity is another indirect benefit that is derived from the increased uptake of SAS and growth of the sector. Of the jobs created by the sector, 27% of the positions were filled by women. Similarly, the main beneficiaries of access to electricity for "downstream" users in households are often women, who get improved access to information and communication technologies and can start businesses from the house; which would otherwise not be possible.

31. *While if all households gained access to a solar home system over time the expected uplift to livelihoods would be expected to amount to USD 75 million per year, in the short term it is expected that many households will access only smaller Tier 1 (or below) systems. While for these systems there may be an income uplift, it is likely to be smaller than for those accessing larger systems, in which case the impact may be lower and closer to the bottom of the range described here at USD 40 million per year*

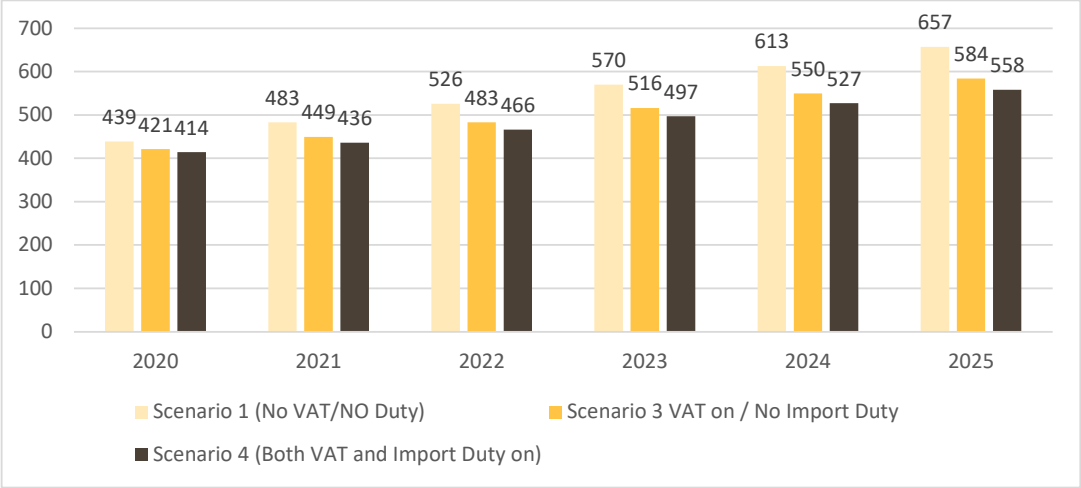

Figure 13: Economic uplift for households with access to SAS products (USD millions)

Source: ACE TAF analysis

In addition to fiscal impacts, taxation policy changes have significant power on the non-fiscal aspects of the economy. Households will save expenditure on other energy sources; in particular kerosene, battery-powered torches, candles and in a small minority of cases diesel gensets. Switching to SAS products would not completely eliminate spending on these energy sources but should reduce spending on other sources by at least 70%. These reserves would amount to gross savings of almost USD 50 million per year by the end of 2025 with VAT exemptions in place.[32]

Further benefits included through accelerated access to SAS products are in education, health, and climate change. The VAT exemptions could result in up to 1.5 million more study hours for children with access to reliable lighting, while up to 20,000 tonnes of CO2 emissions would be reduced from replacing fossil fuels for lighting in homes. Similarly, to the extent to which solar products replace burning fossil fuels indoors, increased access to SAS will reduce the harmful impacts of indoor air pollutions resulting in healthier, more active communities that are less reliant on healthcare.

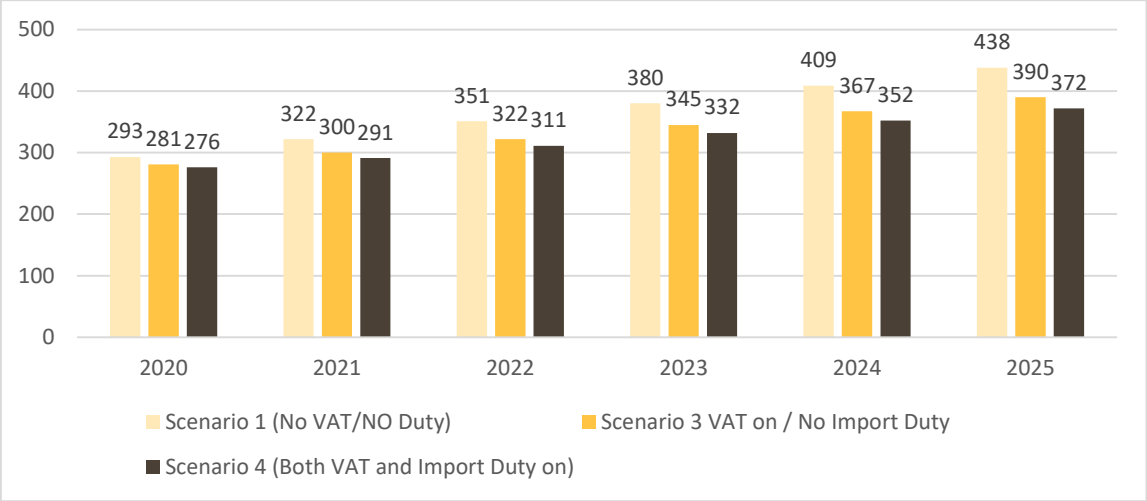

Figure 14: Reduction in household expenditure on other forms of energy access (USD millions)

Source: ACE TAF analysis

32. *These savings are estimated based on an average kerosene consumption of around 2 litres per month for rural households, of whom around 70% are assumed to used kerosene. Note that these are "gross" savings in expenditure on other fuels, i.e. they are not net of household spending on solar products which could be lower or higher than previous spending on current energy access products.*

7. RECOMMENDATIONS

While increasing tax revenues is critical to supporting effective government, the gains from the development of SAS greatly outweigh the revenue that could be generated from VAT and import duties. Tax revenues are a crucial resource to support government expenditure on infrastructure, social security, and delivery of crucial public services, while reducing reliance on external development finance. Nonetheless, tax exemptions are an invaluable tool for essential products and services to reach vulnerable populations, and provide a productive economic uplift that outweighs the cost of the exemption. SAS products match both of these descriptions, increasingly extending to hard-to-reach and low-income rural areas, while also offering important employment both in the SAS value chain and for households who use their SAS systems for productive economic purposes.

The three key recommendations should be implemented to maximize the benefits delivered by the SAS industry, and ensure value for money for tax exemptions. First and foremost, the VAT exemptions should be reinstated, as without them high-quality SAS products will not be affordable for all Kenyan households, particularly in the underserved counties targeted through KOSAP. Second, regional coordination is needed to clarify and reinstate exemptions across the East African Community, although this may require phasing after the more immediate priority of reinstating the VAT exemptions, which is fully within the control of Kenyan authorities. Finally, additional, and highly targeted subsidies should serve the dual objectives of (1) ensuring no-one is left behind in the quest to achieve universal access to electricity, and (2) supporting access to technologies and services that sustain economic livelihoods.

Recommendation 1: **The VAT exemptions should be reinstated as the benefits outweigh the generated revenue**

The VAT exemptions on SAS products should be reinstated, at least until a clear set of pre-conditions have been met. In particular, as long as there is an energy access gap, with energy access solutions needed in underserved counties which are both hard to reach and where ability to pay is limited, tax exemptions should be maintained.

Visibility and confidence in the security of these exemptions is also important to providers and investors. Exemptions should be maintained for at least a 5-10 year period, and a set of clear preconditions should be agreed before the removal of exemptions to give all stakeholders reassurance and an ability to form rational expectations on which to base investment and expansion decisions.

Recommendation 2: **Import Duty exemptions should be implemented, ideally through structured long-term engagement at a regional EAC level**

As all SAS products are imported, with some minimal assembly of products carried out locally, the ability to bring in fully packaged products and component parts in a timely manner and at low cost is essential to reaching the largely rural and poor target customer base. Through amendments to the East Africa Community Customs Unions Management Act, 2004, import duty exemptions should be reinstated if the energy access targets are to be met.

Recommendation 3: **Continue to support SAS expansion to achieve universal access through additional fiscal strategies – in particular ensuring the success of KOSAP**

While VAT and import duty exemptions are crucial to support the SAS industry's ability to grow and serve its customer base of largely rural households, they will not be enough to close the energy access gap by 2030. The remaining unconnected households are typically the poorest households, living in the most remote districts. Targeted subsidies and incentives such as those provided through KOSAP must continue for the connection of these remaining households. Furthermore, to maximize the economic benefits of SAS products, fiscal incentives should carry on supporting households to move beyond small pico solar products (0-3-Watt single lighting systems) to larger systems (3-11-Watt multi-light systems initially, and then on to 20+ and 50+ Watt SHS).

Annex 1 – Stakeholder Engagement – Respondents and Interview Templates

1.1 Summary of stakeholders engaged

The stakeholders engaged over the course of this assignment are summarized in Table 2.

Table 2: Stakeholder engagement in this inception phase

Organisation	Date	Discussion topics
ACE TAF internal	7th-Oct	Kick-off call for core project team: Mary Githinji, Kiragu Wachira, Ed Day.
KEREA SHS Industry COVID-19 response Follow up meeting	12th-Oct	The meeting brought together the KEREA SHS sector working group. The consulting team attended the meeting to share the study process and deliverables. The consulting team was introduced to KEREA SHS team members by Patrick Tonui (GOGLA Representative for East Africa). The consulting team provided an overview of the study process and deliverables. The meeting was informed that the first deliverables were a detailed inception report and an interim policy brief generated from the inception report. The interim policy brief would be ready for submission to Parliament before 15th November, 2020.
Ministry of Energy	12th-Oct	Introduction of core study team to JJ Gitonga (Ministry of Energy), and to Patrick Tonui (GOGLA representative East Africa) and Shaleen Wangui (KEREA). Discussion of MoE position in regards to the SAS sector and the recent tax revisions.
KOSAP	15th-Oct	Call with Rodney Sultani, KOSAP manager within the Ministry of Energy and contact point for World Bank projects in partnership with the MoE. Discussion of KOSAP objectives, affordability challenges, and data availability on sales achieved through KOSAP.
GOGLA	19th-Oct	Call with GOGLA impact metrics and socioeconomic analysis team to discuss data availability on disaggregating sales volumes to Kenya by product type, how to apply evidence from GOGLA's Powering Opportunity and Engine for Jobs research, and broader discussion of approach to this study.
KRA 6th Tax Roundtable	22nd-Oct	Attended KRA's 6th Tax Roundtable organized by the principal body and Kenya Private Sector Alliance (KEPSA). The meeting discussed tax administration procedures that generally affect the private sector not specifically the renewable energy sector. Issues discussed included processing of VAT, refund claims, management of tax disputes, dealing with fraud in lodging of VAT refund claims, VAT processing challenges and management of excise tax.
KPMG	23rd-Oct	Call with Robert Waruiru to discuss previous analysis and advocacy work, and KPMG's broader tax and OGS experience.
Duke University	27th-Oct	Call with Dr Robert Fetter to share experience from the Duke (2019) *"True cost of solar"* study and how to break down the price elasticity of demand by income segment, and estimate this for those who have not purchased an SAS product (and are therefore a "missing" market).
3 Industry players who are members of KEREA	24th & 26th Feb 2021 and 3rd Mar 2021	Key informant interviews were conducted with questions that focused on change in prices for leading products as a result of introduction of VAT and Import duty, assessment of industry margins and industry level of maturity, impact of VAT on consumer purchases and behaviour and assessment of industry preference for application of VAT

Source: ACE TAF analysis

1.2 Example interview topic guides

Kenya Standalone Solar Systems Taxation Study: Consultation with private sector providers
[DATE] | [Time] | [LOCATION]
Consultant team: [Kiragu / Ed]
Respondent: [NAME / COMPANY]

Context of the assignment

This consultation is part of a study that is being conducted by ACE-TAF, GOGLA and KEREA on the social and economic impact of -

- The removal of VAT exemptions for SAS products through amendments to the Value Added Tax Act, No. 35 of 2013 that were enacted through the Finance Act, 2020
- The removal of import duty exemptions for some stand-alone solar products that were enacted through amendments to the East Africa Community Customs Unions Management Act, 2004 adopted under the Legal Notice No. EACC/89/2020.

The study is intended to collate and analyse information from the SAS industry and the SAS products market in order to engage in policy advocacy targeting the National Treasury and the National Assembly's Departmental Committee on Finance and National Planning.

CONFIDENTIALITY: Note we will not cite information from this discussion directly, but it will help us inform both the assumptions going into the quantitative tool and the narrative for a policy brief on the impact of the recent amendments to VAT and to the EAC CMA.

Agenda

1. What are the most common product types sold (e.g. top 3) and their typical retail price points? Kindly indicate the products that were under VAT and import duty exemptions prior to July 2020.

	Product Type	Retail Price
1.		
2.		
3.		

2. How important have the previous VAT (and import duty) exemptions been to you in establishing operations and achieving scale in Kenya?
3. To what extent are providers able to bear some of the cost of the VAT and import duty imposition?
    a. What type of gross margin has been made historically by the industry in Kenya; is this progressing to a stable and high enough margin, so systems are not provided "at cost" and is there some ability to bear taxes?
    b. If not now, how about in the future?
    c. Will this change over time if/when companies reach maturity and a stable operating profit?
    d. Would all the VAT and import duty be added to the end user price?
4. How do you assess opportunities to expand your sales network into new regions in the country?
    a. What is your target customer base in terms of household characteristics / regions?
    b. Are there customers you are not able to reach and not planning to reach as they cannot afford your products?
    c. Do you operate / intend to operate for example in the Kenya Off-Grid Solar Access Project (KOSAP) counties?
    d. How much can a typical household customer spend on energy access products per month?
    e. How sensitive is this customer base to a change in the price of product – if adding 16% VAT to the end user price? how much do you expect this will affect the volume of sales you make?
5. What would you see as the necessary conditions under which VAT could be appropriate – either for all products or for some products on the market?
    a. Do VAT and import duty exemptions need to be permanent? Or is there a transition for the market to reach a point where it is more comparable to other taxed goods and services?
    b. Should exemptions be focused on some specific products that either (1) are destined for very low ability to pay customers as a basic access product, or (2) generate significant economic benefits that need to be catalysed in the short term?
6. Is local manufacturing / assembly an objective, and if so how may that affect design of import duties / VAT?

Annex 2 – Summary of Findings from Previous Studies

2.1 Inventory of existing tax and SAS sector studies

A number of studies have investigated the (two-way) link between tax policy and SAS market development in the last five years. The key aspects of methodology and findings of each of these are summarised below, for each of the following studies (listed by order of publication):

- Energy Africa 2016 – Mozambique OGS Fiscal Study
- Energy Africa 2017 – Malawi OGS Fiscal Study
- Energy Africa 2018 – Uganda OGS Fiscal Study
- Energy Africa 2018 – Zambia OGS Fiscal Study
- Shell Foundation 2018 – Uganda-Fiscal-Policy-Analysis for OGS
- Duke 2019 – The True Cost of Solar Tariffs in East Africa
- HB 2019 – Policy Research on the 10% duties on solar (Nigeria)

This assessment also builds on a broad portfolio of studies supported by ACE TAF Including the three described in the bullets below, and several other country studies expected to commence in the coming months.

- A *'Multi-country study of responsible taxation for the SAS sector',* which is developing a modelling framework to estimate the impact of a range of VAT and import duty regimes on SAS sector development, including country pilots in Malawi, Rwanda, and Sierra Leone
- A *'Sierra Leone Impact Assessment of VAT and Duty Exemptions'*, which will examine the impact of VAT and import duty exemptions in place over the last five years, and examine the case for maintaining these exemptions.
- A *'Nigeria Impact Assessment of VAT and Duty Exemptions'*. Which will explore the impact of recent revisions to Nigerian tax policies resulting in the removal of exemptions and imposition of a 5% VAT and 5% import duty on SAS products
- A review of Statutory Instruments 32 and 33 relating to duties on SAS products in Zambia.
- **This Kenya assessment can build on the findings and methodologies of a growing body of international evidence.** The paragraphs below provide a brief summary of the main findings from some of these previous studies.

2.2 Key findings from the international literature on tax – SAS sector

A 2016 Economic Commission for Africa (ECA) study in Mozambique developed the first cost-benefit approach to estimate the impact of VAT and import duties on SAS sector development. There were no import duty or VAT exemptions on SAS products in Mozambique at the time. One of the key trade-offs discussed is the potential for import tariffs to encourage local production of solar components, which would be more competitive if imported products faced import duties. However, the report concludes that this is not a realistic prospect, as local production could only meet a fraction of demand. The assessment falls back on some high-level assumptions from the international literature, including extra job creation (+30 per 10,000 units sold) for SAS compared to traditional fuels, extra lighting hours both for small businesses (10-12 business hours) and (+2 hours) education, (USD 20-USD 40 per year) financial savings for households.

Next, an ECA (2017) study in Malawi revised the cost benefit model, and considered the impact of the import duty exemptions in place, and the prevailing 16.5% VAT. A key source for the study is a BIF (2016) survey that benchmarks typical energy access expenditure in Malawi.[33] The study adopts similar assumptions to the earlier

33. *BIF (2016) "Off-grid lighting and mobile charging study: A snapshot of household technologies, habits and expenditure in Malawi"*

Mozambique assessment, such as the same +2 hours of light assumption, household savings of USD 20-USD 40 per year, and job creation of 30 jobs per 10,000 units sold. It also specifies an assumption that 90% of tax costs will be passed through to consumers, and cites the Off-Grid Solar Market Trends Report 2016 estimate of PED at -0.567.

The next study, again carried out by ECA in early 2018, highlighted Uganda, but discusses fiscal policy options rather than conducting a socioeconomic impact assessment. Uganda had VAT and import duty exemptions in place for solar products, but had reintroduced both import duties (25%) and VAT (18%) on solar powered appliances. It cites a widely used although now dated study of the adoption of SAS at different prices, from just 37% at USD 7, rising to 69% at USD 4 (Solar Aid, 2014). A subsequent analysis from the Uganda Off-Grid Energy Market Accelerator (UOMA) then developed a model to estimate the impact of various tax incentives and subsidy incentives, with a clear differentiation of the main products on the market and their prices, compared to average monthly expenditure on kerosene and phone charging. The study goes on to estimate willingness to pay for SAS products in different regions of Uganda and to make the case for a phased implementation of (maintaining) tax exemptions and subsidies to support market development.

The fourth and final study in this series, focused on Zambia (2018), where SAS were already exempt from both import duties and VAT. Although this policy was not consistently applied particularly when it came to bundles / kits that included both solar panels and appliances. The analysis used a range of price elasticities for sensitivity analysis, assumed a net margin of between 0% - 10% for SAS companies (to understand pass-through of taxes to end users), and included an assumed reduction in current energy access expenditure of between 50% and 100% of the average USD 11 spent by households. It also assumes that for income increases among SAS users, 15% of that income will fall into personal income tax bands.

The Duke (2019) study covers both Uganda and Kenya and offers a detailed description and model of how taxes and SAS market development interact.[34] The core findings of the study are that introduction of 20% tax (be it VAT or import duties), which would be fully passed through to customers, would reduce sales of small SHS's by 20%, and larger SHS's (with TV) by 32%. This would have a significant impact on energy access, leaving 58,000 fewer households in Kenya and Uganda with energy access, with total foregone benefits of USD 2.2 million (USD 39 per household). The Duke study collated seven years of sales data for over 700,000 SHS's sold in Kenya and Uganda in order to observe a large range of price points for indicative product types. The authors estimate a price elasticity of demand of -0.9 for small SHS, and a range from -0.03 to -4.1 for larger SHS.

Finally, a previous study found demand for solar lighting products is highly price sensitive, with 29% uptake at prevailing market prices in rural Kenya, but 69% uptake when offered at a discounted price. This is likely to remain the case in rural markets in Kenya which still have low rates of energy access (as described in Section 3 above), where ability to pay is limited and as such even small changes in price may significantly suppress demand.

34. Philips and Fetter (2019) "The True Cost of Solar Tariffs in East Africa". Duke University

Contact info:
Eng. Kamal Gupta
Chairman - Kenya Renewable Energy Association
Email: chairman@kerea.org
Tel: 0734 447 957

Contact info:
Patrick. K Tonui
Head of Policy and Regional Strategy
Email: p.tonui@gogla.org
Tel.: +254 705 258701

Additional Partners

ACE TAF PARTNERS INCLUDE:

STRATEGIC PARTNER:

Tetra Tech International Development

Fourth Floor, Prosperity House, Westlands Road |
PO Box 19084 – 00100 | Nairobi, Kenya.