Dirty fuel: an analysis of official and unofficial petroleum products in the Niger Delta

Summary

Official fuel quality regulation must be enforced to stem widespread toxic air quality in Nigeria.

Research in the Niger Delta suggests that low quality, highly toxic fuels are imported into the country by international commodity traders, who are exploiting weak regulations. Unofficial fuels (from artisanal refineries using stolen crude) also fall well below international standards, but were often better quality than officially imported fuels.

The availability of low quality fuels appears to be widespread. It is likely that consumption is leading to high levels of pollution in an already heavily polluted environment, serious health impacts, and increased costs to consumers (due to the damaging effects on engines). Consumption of these fuels, and production of unofficial fuels, are likely to be contributing to localised environmental problems, such as the soot phenomenon in Port Harcourt, but data modelling suggests these sources are not the only cause.

Further research is urgently needed on fuel quality and air pollution across Nigeria, and governments, commodity institutions, and the oil industry must act together to regulate fuel content and emissions across the petroleum sector.

Recommendations

- At a minimum, urgently ensure the Standards Organization of Nigeria (SON) and relevant partners enforce the proposed Nigerian fuel sulphur standards across official supply channels, and plan for further reductions to align with European Union (EU), or similar, standards.
- Commission a joint investigation by the Nigeria National Petroleum Corporation (NNPC) and the SON to identify sulphur levels within official fuel supplies across Nigeria. Should unacceptable levels be found, hold the relevant international and/or national companies, importers, and institutions to account.
- Commission a study into the sources of the remaining particulate emissions in Port Harcourt city, Rivers State, working with experts from Universities, the Commissioner for Environment, and international oil and gas companies, to gather and share data on air quality levels in different locations, and model factors that can help mitigate the soot.
- Support the Rural Electrification Agency (REA) to work with private partners to develop renewable energy infrastructure across the Niger Delta to reduce demand for fossil fuels (either imported or produced at local artisanal refineries).
- The Ministry of Petroleum Resources and Petroleum Technology Development Fund (PTDF) should consider engaging artisanal oil refiners in plans for domestic refining, given they are often producing fuels with better characteristics than official fuels supplied to Nigeria.

Introduction

This briefing paper summarises the potential impacts of both the consumption and production of unofficial fuel, and the consumption official fuels on health and the environment; and the potential contribution of these to the soot problem in Port Harcourt. The findings are based on research originally undertaken to understand the potential impact of the production and consumption of artisanal, or 'unofficial' fuel[1] (diesel, gasoline, and kerosene) on those living in the Niger Delta. During the research, analysis of control samples of official fuel revealed worrying indications about the quality of official fuel available. This discovery led to the expanded scope of research.

The full research report of the same title is available on SDN's website, as part of a growing body of knowledge about the artisanal oil industry in the Niger Delta, along with SDN's *More Money, More Problems report (2018),* which researched the economic dynamics of the industry.

Methodology

The analysis is based on a total of 91 unofficial (artisanally refined) and official (filling station) samples (diesel, gasoline, and kerosene) collected in three batches in December 2018, July 2019, and December 2019 across Rivers and Bayelsa states (plus samples from Lagos State—these were taken as control samples to compare with official sources in the Niger Delta, that may be different or blended with unofficial fuels). A range of fuel parameters were tested by a qualified laboratory in Port Harcourt city, and results were further analysed by Noctis and SDN. Results were also input to two emissions models, one for estimating total emissions and another specifically for sulphur.

Findings

Overall fuel quality

Fuel samples all tended to fall well below international standards with respect to viscosity and sulphur content. Of concern, samples of fuel from official sources were often of worse quality than unofficial fuel samples.

All fuel samples had higher viscosities compared to benchmarks, which affects combustion, damages engines, and is highly polluting. Official fuel samples in Lagos were less viscous, but contained higher sulphur content, than Niger Delta official samples.

All samples also had worryingly high levels of sulphur—a major contributing factor to soot and particulate emissions. The average official diesel sample contained 204 times more than EU fuel sulphur standards and 43 times the level for gasoline. While the average unofficial diesel sample contained 152 times more than EU sulphur standards and 40 times the level for gasoline.

Comparison of gasoline, diesel, and kerosene

Gasoline: Unofficial gasoline tended to be of better quality than official gasoline samples collected in the Niger Delta, supporting reports of consumer preferences and the competence of

producers. Gasoline is in high demand across Nigeria as it fuels the majority of cars and motorbikes on the roads, and small-to-medium sized electricity generators that are used by households and small businesses. With a good quality unofficial fuel that can be seamlessly blended with official products, there is a large black market for unofficial gasoline, as well as a high permeation into the official market.

Diesel: Both unofficial and official diesel samples were of poor quality and high viscosity, which is bad for engines and highly polluting. Despite this, higher viscosity, or 'thicker', diesel is often

preferred locally as it is perceived to last longer, so can help save costs and reduce frequency of refuelling. Consumers of diesel are mostly commercial or service providers that need to operate for long periods, such as businesses and social services with large generators, trucks travelling long distances across Nigeria, speedboats and ships traversing riverine areas and voyaging into the ocean, and construction sites that require heavy machinery.

Kerosene: Official kerosene was found to be much better quality than unofficial samples, but is generally in short supply. The low quality of unofficial samples indicate artisanal camps face challenges achieving a pure kerosene product. Because kerosene is a major household source of energy in the Niger Delta, especially in rural areas, the inadequate supply of official sources force consumers to use lower quality, unofficial sources.

Exploitation of weak regulations

The official fuels sampled, most of which will have been imported to Nigeria, did not comply with approved Nigerian standards for sulphur in fuel[2] (50ppm for diesel, and 150ppm for gasoline and kerosene). The fuels also do not comply with similar standards in place across other West African countries, and fall well below established standards in other jurisdictions such as the EU (10ppm for diesel and gasoline). The approved standards for Nigeria are well publicised, but authorities are not doing a sufficient job of testing petroleum products imported to the country, enforcing standards, or regulating the quality of fuel available in Nigeria. Marketers of petroleum products are evidently exploiting the absence of effective regulation, and dumping low quality fuels on the Nigerian market.

Modelling and impacts

One aspect of the research specifically looked at whether the production and consumption of unofficial fuels is leading to the soot problem in Port Harcourt city, Rivers State. Using two different emissions modelling techniques, the research estimates that unofficial fuel production and consumption produce 40% of total particulate matter (PM2.5 and PM10) in the Port Harcourt city area; when official fuel consumption is added, this comes to 50%. Therefore, an estimated 50% of air pollution in Port Harcourt city comes from other sources—possibly official refineries, petrochemicals and bitumen plants, and burning of organic and inorganic waste.

More broadly, high levels of sulphur, and associated particulate matter, are a cause for serious environmental and health concerns. These high levels of pollution are likely to be contributing to increased instances of respiratory diseases, including lung cancer, and multiple other health impacts. For instance, particulate pollution is a leading cause of death across the world, and is associated with higher cases of dementia, Parkinson's disease, Alzheimer's disease, delinquent behaviour, stunted brain development, and even increased crime in cities.[3]

Conclusion

This research reinforces findings from the Dutch Government and Public Eye that fuels are 'blended based on the sulphur standard of the country of destination'.[4] International commodity traders and marketers are therefore knowingly exploiting the lack of regulation enforcement in Nigeria, to the detriment of the health of all Nigerians.

Our previous research indicates the artisanal oil industry grew six times in size between 2012 and 2017.[5] This research suggests that the evolving technology can produce diesel and gasoline of comparable quality to imported fuels, and have much lower levels of pollutants, especially sulphur.

Government, the media, and international oil companies have blamed the high levels of air pollution in Port Harcourt city, Rivers State, on the growth of the artisanal oil industry—particularly the production process for unofficial fuel. This research suggests that unofficial production and all fuel consumption (unofficial and official) are contributing to around half of all particulate matter pollution in Port Harcourt city. It is therefore unlikely that artisanal refineries are the sole, or even majority, cause of low air quality. Rather, consumption of fuels (especially official) has a higher impact, and the pervasiveness of low quality official fuels may be incentivising demand for higher quality, unofficial fuels.

While this research focused on samples from the Niger Delta, and emissions in Port Harcourt city, Rivers State, the samples in Lagos imply that poor quality, highly polluting, fuel is consumed across Nigeria. Already, the World Bank reports that 94% of the population of Nigeria is exposed to air pollution that exceeds WHO guidelines, with Aba, Umuahia, Onitsha, and Kaduna designated as four of the worst air-polluted cities in the world.[6] This will continue to worsen without action on regulation.

Improved standards for fuel quality were approved in Nigeria by SON in 2017, but to date, enforcement is evidently weak to non-existent by responsible agencies. As the issue has reached a severe point, there must be no further delay in enforcing the standards across the supply chain, and for all responsible stakeholders to be held to account. However, this will be a difficult political move because it will almost certainly disrupt the unstable supply of refined petroleum products to Nigeria. To reduce disruption, there would need to be simultaneous improvements in public transport and electricity supply to reduce consumption in vehicles and generators.

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1 Fuel that has been refined in local, makeshift refineries, from stolen crude.

2 Although these standards are not being enforced.

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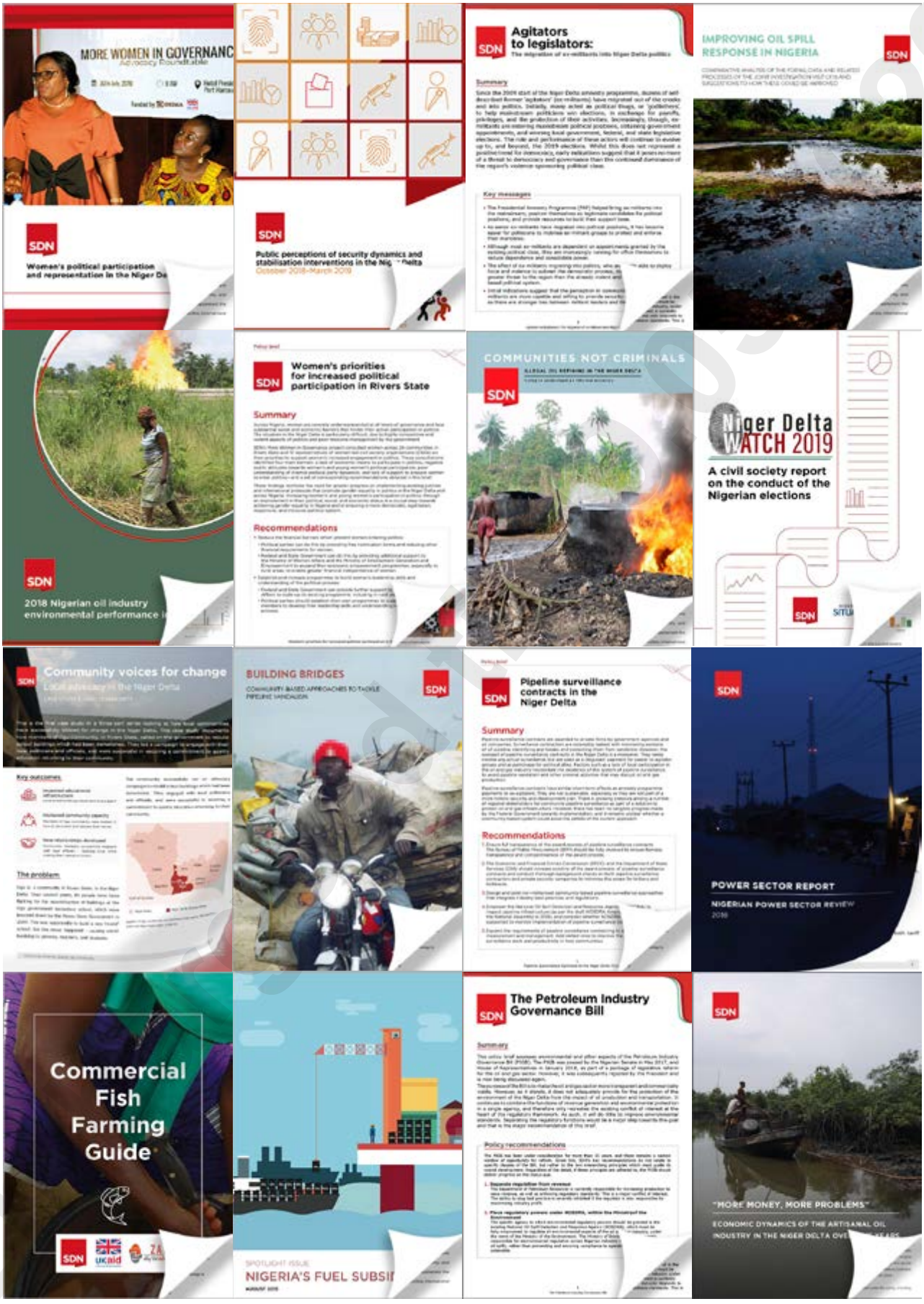

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