Co-Processing in the South African Cement Industry: Refuse-Derived Fuels and Other Alternative Fuels

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Abstract

South Africa is a top contributor to Africa's waste problem. Waste is proliferating at an alarming rate, placing mounting pressure on the waste management system, which already suffers the consequences of an inadequate legislative system, lacking resources, and low enforcement and compliance rates.

A primary concern and area of improvement in the South African waste sector is the generation and management of plastic, and the proliferation of waste tyres. In recent times, South Africa has sought to develop and implement alternative methods of waste management in order to tackle these issues, compounding South Africa's waste problem. A method that has grown in popularity around the world, and in South Africa, is the production of waste-derived fuels, such as refuse-derived fuels (RDF), for use in industrial processes instead of traditional fuels. In South Africa, RDF is not classified as a waste, however, its definition is not clear.

RDF is used in the cement industry, and is procured either through local RDF manufacturers, or through imports. Several cement manufacturing facilities report using alternative fuels, however there remain significant transparency issues when it comes to reporting RDF use. This lack of transparency and clarity is mirrored when it comes to RDF trade. South Africa is a net importer of waste under which RDF is classified, however, no aggregated data is available on RDF trade specifically.

Five cement facilities are authorised to co-process alternative fuels, including RDF. These facilities are generally located in remote areas, but are nonetheless located in proximity to small towns and communities that bear the brunt of environmental and health impacts of waste co-processing.

In the absence of publicly available information, it remains difficult tracking the production, trade, and use of RDF in South Africa. It is imperative that the South African government, RDF manufacturing companies, and companies using RDF increase transparency by reporting on RDF production, use, and trade, and making this information publicly available.

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Introduction

In recent times, with the latest Climate Change Conference in 2023, leaders and representatives from around the world have come to recognise the mounting impact of the waste sector on the environment (COP28 UAE, 2023). While African countries collectively generate far less waste than countries in the global north, Africa is particularly vulnerable to the impacts of waste proliferation and mismanagement. The environmental and climate vulnerability of the continent have a direct, and measurable impact on local populations, disproportionately affecting communities of colour living in low-income, and rural areas.

As a result of a growing population and economy, South Africa is a top contributor to Africa's waste problem. Waste is proliferating at an alarming rate, with the country generating over 100 million tonnes of waste in 2022 (Department of Forestry, Fisheries and the Environment, 2022; UNEP, 2020). This places a mounting pressure on the South African waste management system, which already suffers the consequences of an inadequate legislative system, lacking resources, and low enforcement and compliance rates.

A primary concern and area of improvement in the South African waste sector is the generation and management of plastic, and the unmanageable proliferation of waste tyres. South Africa produces about 2317 thousand tonnes of plastic waste per annum, 58% of which is mismanaged (IUCN-EA-QUANTIS, 2020). Waste tyres stockpiles around the country are becoming unmanageable, with disposal to landfills being a key concern (REDISA, 2023). In the past few decades, South Africa has sought to develop and implement alternative methods of waste management in order to tackle these issues. A method that has grown in popularity around the world, and in South Africa, is the production of waste-derived fuels, such as refuse-derived fuels (RDF), for use in industrial processes instead of traditional fuels.

In 2009, the South African government published *The National Policy on Thermal Waste Treatment of General and Hazardous Waste* to present its position on thermal waste treatment as an acceptable waste management option, and to provide a framework for its implementation. In this policy document, the government asserts its intention to "move away from single waste management solutions, towards the integration of thermal waste treatment technologies" - for instance in cement production plants for the treatment of selected general and hazardous wastes (Department of Environmental Affairs, 2009). This industrial application has since been championed as a

demonstration of the country's commitment to reduce greenhouse gas emissions from landfills and coal combustion in cement kilns.

By the time this policy was published, cement kilns in South Africa had been using alternative fuels for years, starting around 2001 with the burning of spent pot liners from the aluminium industry (Department of Environmental Affairs and Tourism, 2007). Permissible waste streams have now significantly widened with the Department of Environmental Affairs (2007) providing five classes of alternative fuels to be used for co-processing: gaseous alternative fuels (coke oven gases, refinery waste gas, landfill gas); liquid alternative fuels (low chlorine solvents, vegetable and lubricating oils and fats, distillation residues); pulverised, granulated or fine crushed solid alternative fuels (ground wood, sawdust, planer shavings, dried sewage sludge, granulated plastic, animal flours, fine crushed tyres); coarse crushed solid alternative fuels (crushed tyres, rubber, plastic waste, waste wood); and lump alternative fuels (whole tyres, plastic bales).

In South Africa, cement companies procure waste for co-processing from third party waste management companies - namely, Interwaste, Averda, RECOR Waste to Energy, EnviroServ, and Oricol Environmental Services (Engineering News, 2020; Wayman, 2017). Between 2013 and 2017, a number of cement companies, including NPC, AfriSam and Afrimat (known as LaFarge at the time) were supplied with waste tyres for co-processing in cement kilns by the Recycling and Economic Development Initiative of South Africa (REDISA), which among other goals, seeks to implement alternatives to tyre stockpiling, and landfilling (REDISA, 2023; Green Economy Media, n.d.).

While alternative fuels have been used in the cement industry for over twenty years in South Africa, its definition, and the scale of its use and trade remain severely misunderstood. This is the case specifically for RDF - an alternative to traditional fossil fuels, produced from a selected fraction of municipal solid wastes, including plastics waste (30-35%), textiles (which are 60% plastic), timber waste, paper and other combustible materials. These materials are then shredded, and sometimes compressed into bales or pellets (IPEN, 2023). RDF is also referred to as Process Engineered Fuel (PEF), Waste-Derived Fuel (WDF), Alternative Fuels or Solid Recovered Fuel (SRF), or Tyre-Derived Fuel (TDF). When RDF is used, it is often classified under broader industry terms, such as mixed wastes, municipal wastes, and mixed plastic wastes. This is also the case for RDF trade as it is not recognised as a distinct waste type by the Basel Convention, responsible for controlling the

transboundary movement of waste. As such, RDF production, use, and trade often goes undetected, making it increasingly hard to monitor, and track its distinct impacts.

The current report aims to map, as much as is currently possible, the production, trade, and use of RDF in South Africa. This research serves as a building block for further, more specialised research on the composition of RDF in South Africa, its trade, and its environmental and health impacts. This report will contribute to wider international research and advocacy efforts aiming to ban the trade and use of RDF worldwide.

Legislative Framework

The South African Constitution (1996) provides that "everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development". This clause demonstrates South Africa's commitment to maintaining an environment that does not interfere with its citizens' health and wellbeing, extending to the waste sector.

The National Environmental Management: Waste Act (2008) provides waste management principles in line with these constitutional aspirations. The Waste Act broadly governs waste management in the country, providing measures for the prevention of pollution and ecological degradation, by setting standards for the production and handling of waste. This includes provisions for the storage, transportation and processing (treatment, re-use, or recycling) of waste.

Further legislation centres on waste management methods that divert waste from landfills. *The National Policy on Thermal Waste Treatment of General and Hazardous Waste (*2009*),* for instance, provides that thermal waste treatment is an acceptable means of waste management, and may be used for application in cement kilns for the production of cement - thus integrating waste within a circular economy. In this legal documents, Alternative Fuels and Raw Materials (AFR) are defined as "general and hazardous wastes which are used to substitute conventional or primary fossil fuels and/or virgin raw materials in cement kilns and other industrial processes (also referred to as 'Alternative fuels and resources', 'Secondary materials', 'Refuse derived fuel', or 'Solid recovered

fuel')". Alternative fuels are thus regarded both as general and hazardous waste, rather than as a product.

It must be noted, however, that through direct engagement with the Chemicals and Waste Management unit of the Department of Forestry, Fisheries & the Environment, it was revealed that RDF is not considered a waste in South Africa, and therefore classification is not applicable to it. It therefore remains uncertain what RDF is defined as, given that the *National Policy on Thermal Waste Treatment of General and Hazardous Waste (*2009) stipulates that AFRs - defined as general and hazardous wastes - are also referred to as RDF.

More recently, the Department of Environmental Affairs (2015) published the *Best Practice Guideline for the Establishment and Operation of a Waste-Derived Fuels Preparation Facility*. These guidelines outline the responsibility of companies in managing the storage, transport, and use of waste intended for waste-derived fuel production, as well as ensuring that each facility is operating according to best environmental practice standards. Here, waste-derived fuel is defined as "a fuel produced by the recycling, recovery and/or treatment of a waste material to create a material which can be used as a fuel to generate heat and energy", referring to waste-derived fuel as a material, or afuel, rather than waste or product.
No information is publicly available on the incentivisation of RDF manufacture or use through carbon credits, subsidies, or renewable energy the reception of carbon credits by companies that manufacture RDF, or use RDF instead of traditional fuels.

RDF Trade

The Basel Convention (1989), to which South Africa is signatory since 1994, provides guidelines for the protection of human health and the environment against the adverse consequences of waste generation, trade, and management. RDF is not recognised as a category of waste by the Convention, nor is it recognised internationally through Harmonised System (HS) codes. HS codes are essential in tracking trade to and from South Africa, specifically in the absence of publicly available national customs data. While it is not distinctly categorised, RDF is traded internationally under selected HS codes dedicated to waste:

- HS 3915 - Waste, parings and scrap of plastic.

- HS 3825 - Residual products of the chemical or allied industries, not elsewhere specified or included; municipal waste; sewage sludge; other residual products. The OECD suggests that RDF is broadly categorised under the HS 3825 code (OECD, 2024). This HS code comprises a number of subcategories, of which 382510 corresponds to municipal waste, thus including RDF.
- HS 3606 - Ferro-cerium and other pyrophoric alloys in all forms; articles of combustible materials n.e.c. in chapter 36. In 2015, the Singapore Customs issued a ruling, classifying PEF under this code as an article of combustible materials.

All base codes are followed by two additional digits to identify subcategories of waste (e.g. 391510 designates ethylene polymers, which fall under the broader plastic parings and scrap waste type) (See appendix A for a list of all relevant subcategories included under the above base codes). Where applicable, these will be detailed.

Below are tables detailing the net weight, trade value, and partner countries for the above HS codes. These figures do not account for RDF only as they comprise other similar waste types, however, they may provide an initial insight into the trade of RDF and similar products. It must be noted that data reported to COMTRADE by South Africa - from which the current data is derived - is often incomplete. In some instances, the net weight of waste is not reported, while trade value is; or figures are missing altogether. In these instances, figures from 2022 are included instead to indicatea general trend.

HS 3915

South Africa is a net importer of plastic parings and scraps. In 2023, the export value of HS 3915 nearly doubled, however, no net weight was reported. It may be assumed that it increased without outweighing imports for the same year. The greatest importers of HS 3915 to South Africa were China, Namibia, Zambia, Mauritius and Botswana. South Africa exported most of this waste to Israel, Zimbabwe, Vietnam, India and Latvia.

Table 1: Imports and Exports of HS 3915 between South Africa and the World (FY 2019-2023) (UN Comtrade, 2024).

	Imports		Exports	
Year	**Net Weight (kg)**	**Value (USD)**	**Net Weight (kg)**	**Value (USD)**
2023	12 104 180	4 698 281	-	4,009,454
2022	15,402,368	4,545,769	2 918 936	2 151 355
2021	13,226,582	4,590,235	1,547,431	1,382,311
2020	10,009,856	3,149,341	2,079,123	1,248,416
2019	17,155,746	5,244,162	2,130,855	1,166,722

Subcategories of HS 3915 are presented in a separate table as a means to provide aggregated data.

Table 2: Trade of HS 3915 subcategories FY 2023 (UN Comtrade, 2024)

Note that arrows indicate trend (i.e. ↑ indicates an increase in net weight, and ↓, a decrease from previous years).

	Imports			Exports		
HS Code	**Net Weight (kg)**	**Value (US$)**	**Top 5 Partners in descending order**	**Net Weight (kg)**	**Value (USD)**	**Top 5 Partners in descending order**
391510	3 025 601 ↑	559 114	Namibia, Botswana, Lesotho, Eswatini, Zambia	1 034 929 ↑	472 131	Vietnam, Zimbabwe, India, Malaysia, Thailand

391520	1 ↓	391	Spain, USA	4 ↑	22	Namibia
391530	2 ↓	19	Brazil	445 014 ↑	308 215	Zimbabwe
391590	9 078 575 ↓	4 138 756	China, Zambia, Mauritius, Germany, Spain	(1 855 344) ↑	(1 399 282)	Israel, Zimbabwe, UK, Latvia, 'Other Asia'

HS 3825 and HS 382510

The trade of the broader HS 3825 code, and the HS 382510 subcategory are presented below. South Africa is a net exporter to HS 3825. Imports increased sharply between 2019 and 2022, and decreased in the last year, matching imports in 2021. Exports have increased, reaching nearly three times the quantity of imports for the same year. South Africa imported most HS 3825 from Eswatini, Namibia, Malawi, Italy and Norway, while exports centred around Eswatini, the Netherlands, the Democratic Republic of Congo, Switzerland and Zimbabwe.

Table 3: Trade of HS 3825 between South Africa and the World (FY 2019-2023) (UN Comtrade, 2024)

	Imports		**Exports**	
Year	**Net Weight (kg)**	**Value (USD)**	**Net Weight (kg)**	**Value (USD)**
2023	696,478	41,011	1,686,268	677,876
2022	2,029,632	65,491	-	510,855
2021	680,755	132,285	732,257	193,791
2020	223,006	44,417	1,067,435	253,402
2019	2,373	9,534	64,330	254,222

South Africa has not imported HS 382510 since 2019, when it imported 2 kilograms from Eswatini. Previously, South Africa imported HS 382510 in larger quantities, for example from Germany in

2017 (1,920 kilograms), and Eswatini in 2016 (19 kilograms). No information is available regarding imports during other periods. South Africa exports HS 382510 - exporting nearly 8 times as much waste in 2023 as in 2022. The main countries receiving HS 382510 from South Africa are Eswatini, Namibia, the Democratic Republic of Congo, and Zimbabwe.

Table 4: Trade of HS 382410 between South Africa and the World (FY 2019-2023) (UN Comtrade, 2024)

	Imports		Exports	
Year	**Net Weight (kg)**	**Value (USD)**	**Net Weight (kg)**	**Value (USD)**
2023	-	-	16,800	1,675
2022	-	-	2,337	1,348
2021	-	-	5,010	2,679
2020	-	-	5,266	13,636
2019	2	0	3,200	3,747

HS 3606

South Africa is a net exporter of HS 3606 waste types. Exports have increased throughout the years, while imports have decreased. South Africa imported most HS 3606 waste from China, the United Kingdom, Denmark, the Republic of Korea, and Turkey. South Africa exported these waste materials mainly to Namibia, Mozambique, the Democratic Republic of Congo, Eswatini, and Lesotho.

Table 5: Trade of HS 3606 between South Africa and the World (FY 2019-2023) (UN Comtrade, 2024)

	Imports		Exports	
Year	**Net Weight (kg)**	**Value (USD)**	**Net Weight (kg)**	**Value (USD)**
2023	202,322	608,865	417,046	1,043,702
2022	294,579	954,245	-	957,839
2021	365,264	928,432	345,617	2,132,003
2020	258,450	741,009	379,422	933,727
2019	258,937	1,027,324	278,136	728,356

Local RDF Production

Limited information is available online regarding the production of RDF in South Africa. Cement companies procure RDF from waste management companies, or through initiatives such as the Recycling and Economic Development Initiative of South Africa (REDISA).

Only three companies report producing RDF in South Africa - Interwaste, Averda, and RECOR Waste to Energy. Other companies such as EnviroServ and Oricol Environmental Services provide cement companies with specific types of alternative fuels, dissimilar to RDF, such as liquid hydrocarbon waste, and liquid and sludge waste respectively (Engineering News, 2024; Oricol Environmental Services, 2023). The South African Waste Information Centre, responsible for publishing waste management licences (WML) and atmospheric emission licences (AEL) does not currently have a working licence portal. All company-related information is thus limited to information publicly available online, or willingly shared by companies themselves.

In 2016, Interwaste launched its RDF production plant in Germiston (1 Brammer Street, Industries East, Germiston, 1401) as a means to expand its waste management branches, and divert waste headed for landfill. Interwaste is the only net exporter of RDF in South Africa, into the international waste industry. The plant takes on an average of 100 tonnes of general, industrial and municipal

waste per month to convert into RDF for use in the cement industry. The plant has the capacity to process up to 300 tonnes of waste per month, and Interwaste plans on expanding operations to reach this potential (Stubbs, 2024). In an interview with local news, Interwaste CEO, Jason McNeil, explained that Interwaste produces RDF that has a high heating value, similar to that of A-grade coal. Among other undisclosed waste products, Interwaste uses rubber products such as tyres and conveyor belts to produce RDF. In 2020, it considered the use of hard hats, oily rags and overalls in trials. No information regarding the outcome of these trials is available (Slater, 2020). In recent times, Interwaste has started to explore the use of wood chips and offcuts in its RDF plant, emulating similar practices in the United States, to produce electricity and steam (Stubbs, 2023).

Averda produces RDF from waste left over after sorting recoverable organic and recyclable items from municipal and general waste. Averda does not disclose the location of its RDF production facility, nor does it specify the waste streams it uses, and in what quantity. It does explain that the RDF it produces is suitable for a number of industrial and manufacturing processes, however, that it has been used particularly by the cement industry in South Africa (Averda, n.d.). It is unclear when this facility started to produce RDF, however, Averda received a loan in 2022 by the International Finance Corporation to fund early stage developments of projects around Africa, including the South African RDF production facility (Averda, n.d.b.).

RECOR Waste to Energy, based in Stellenbosch (2 Plein Street, Oude Poskantoor Building) produces RDF from municipal solid waste for cement kilns in South Africa (RECOR Waste to Energy, 2024). RECOR Waste to Energy also produces tyre derived fuel to produce electricity, especially for use in remote mines and industry (RECOR Waste to Energy, 2024b). No further information is publicly available on the volume of RDF it produces, or the types of waste used to produce it, nor does it provide more information on its tyre derived fuel operations.

Between 2013 and 2017, the REDISA programme, which had its own waste tyre stockpiles, provided a number of companies, including NPC, Afrisam, and Afrimat with waste tyres for controlled burning in kilns. The REDISA programme was shut down in 2017, and the South African Waste Management Bureau was made in charge of the Industry Waste Tyre Management Plan instead. Since, no similar procurement of waste tyres have been made to cement kilns (REDISA, 2023; Green Economy Media, n.d.).

Local RDF Use

Information available to date suggests that RDF is used specifically for the production of cement in South Africa, however, local RDF manufacturing companies recognise its utility in production plants for power generation, steam generation and heat generation (Stubbs, 2023). It remains unclear which cement companies receive the RDF waste management companies produce, and in what capacity. No information is publicly available on cement companies' use of imported RDF.

It must be noted that following persistent civil society efforts in the 2000s, cement kilns located near communities were not granted authorisations to burn waste as an alternative fuel source. These include the following:

- Pretoria Portland Cement Hercules Plant: Es'kia, Mphahlele Drive, Pretoria West, Pretoria, 0084, South Africa
- Pretoria Portland Cement New Brighton Plant: Ibayi, Nelson Mandela Municipality, Eastern Cape
- Pretoria Portland Cement Jupiter Plant: 62 Lower Germiston Rd, Heriotdale, Johannesburg South, 2094, South Africa

Other cement kilns around the country have received licences to burn alternative fuels. Despite being located in areas considered rural, they are often located within, or in close proximity to communities, and farmlands, surrounded by areas that are frequently visited, such as hotels, leisurecentres, and nature reserves. The environmental and human health impacts of co-processing in cement kilns must be considered, regardless of rural designation.

Unlike other methods of waste combustion, such as modern waste incinerators, cement kilns are not designed to burn waste, and thus are not equipped to limit emissions of exit gases (Oakley, 2007). Emissions vary according to the characteristics of each waste material incinerated, meaning there is no standard emission pattern. That being said, cement kilns that co-process waste report emissions of persistent organic pollutants, nitrous oxide, sulphur oxide, ozone, particulate matter, carbon monoxide, and cement kiln dust among others, each entrenching a range of environmental and health impacts (Harley, 2007).

Persistent organic pollutants such as dioxins and furans are of special concern because they are highly persistent pollutants, meaning they take a long time to break down once they have entered the environment. Dioxins and furans are toxic, and can cause a range of symptoms such as cancer, endocrine disruption, and a range of reproductive and developmental problems (EPA, 2023; Clean Air Action Network, 2020; Ministry for the Environment, 2021). Research into these emissions, have uncovered that kilns that burn hazardous waste emit 80 times more dioxin as compared to kilns that use fossil fuels. Dioxins are found in cement kiln dust, which is another primary health concern. Cement kiln dust emissions contain particulate matter, which when inhaled, cause a range of respiratory issues, such as lung cancer and emphysema (Harley, 2007).

The environmental and health impacts of burning RDF and other alternative fuels in cement kilns remain understudied and misunderstood. It is imperative that cement companies monitor and publish emissions data in order for protective policy to be developed in line with constitutional aspirations of attaining the rights to an environment that is not harmful to one's health.

Through engagement with cement companies based in South Africa, some WML were acquired, as well as additional information as to each company's use of alternative fuels. In most cases, no information is available regarding RDF use specifically, however, cement companies report using alternative fuels. This will be detailed below.

Natal Portland Cement (NPC)

NPC, also known as Intercement or Huaxin, is a cement company that operates in South Africa, Mozambique and Egypt. Across its international cement manufacturing operations, NPC has replaced 50-70% of traditional fossil fuel sources to waste (Engineering News, 2020). In 2021, NPC used about 750 000 Gj of refuse-derived fuels, 615 000Gj of mixed industrial waste, and 1.3 million Gj of other fossil-based waste (InterCement, 2021). No aggregated data is available regarding South African operations' use of alternative fuels and RDF.

In South Africa, NPC operates cement plants in Durban, Newcastle and Port Shepstone. Since 2015, the Simuma Plant in Port Shepstone is licensed to burn alternative fuels and resources in cement kilns 1 and 2. The plant is authorised to burn 1 tonne of hazardous waste, and 100 tonnes of general waste per day (see copy of authorization for the use of alternative fuels and resources in Appendix B). Through engagement with NPC, it was confirmed that on an annual basis, the Simuma plant

burns 5443 tonnes of whole tyres, 58 tonnes of shredded tyres, 160 tonnes of waste oils, and 7683 tonnes of heavy ends.

Picture 1: NPC Simuma Plant, located in Izinqolweni, Oshabeni Watersheds (Global Flow Control, 2024).

Within a 10 kilometres radius of the Simuma factory, are located farmlands, the Mzimkhulwana river, three primary schools (Kwaluhlaza, Murchison, and Maris Stella), and the Murchison District Hospital. The communities living within this radius are uniquely exposed to, and impacted by the environmental impacts of hazardous and general waste co-processing.

Pretoria Portland Cement (PPC)

PPC is a South African manufacturer and supplier of cement operating in South Africa, Botswana, Democratic Republic of the Congo, Ethiopia, Rwanda and Zimbabwe (PPC, 2020). De Hoek and Dwaalboom are two of PPC's cement-manufacturing plants in South Africa. Both factories are licensed to use alternative fuels for the production of cement, including RDF. Through engagement with PPC, it was confirmed that while PPC is authorised to burn RDF, it does not currently.

At the De Hoek plant, 2428 tonnes of tyres were co-processed, compared to 1321 tonnes in 2022 (PPC, 2023). This is a significant decrease from the year 2020, during which the facility co-processed 15 000 tonnes of waste tyres (PPC, 2020b). No further information is available on the co-processing of other waste materials.

Picture 2: PPC De Hoek facility, Piketberg, Western Cape.

Picture retrieved from google maps

The De Hoek plant is located in close proximity to a number of small towns like Wittewater, Piketberg, and Korinberg. It is also located beside the De Hoek Golf and Recreation Club, near the Banghoek private nature reserve, and a few hotels and guesthouses.

The Dwaalboom facility is authorised to co-process waste products in kilns 1 and 2 - specifically, scrap tyres, rubber waste, de-watered treated pellets, hydrocarbon waste, oil contaminated general waste, coal fines, plastic waste, biomass (paper waste, sawdust, wood chips and waste from biofuel production) (see a copy of Dwaalboom's Record of Decision in Appendix C). The 2023 PPC annual report provides that Dwaalboom burns refractory spent pot liners, but does not specify quantities used.

Picture 3: PPC Dwaalboom facility, Schoongesicht Farm, Dwaalboom, South Africa (Arnoldi, 2021). The Dwaalboom plant is located in a rural region in the North West of the Limpopo province, however it is situated less than two kilometres away from the Matlametlong community, and about a kilometre further from the Mokgalaneng and Disake communities, which comprise eight schools in total.

AfriSam

AfriSam is a South African cement, aggregate and readymix manufacturer. Its cement manufacturing facility in Dudfield is authorised to co-process alternative fuels and raw materials in cement kilns 2 and 3 to replace coal (see appendix D for record of decision). It is licensed to burn scrap tyres, hydro-carbon and carbon waste, plastic waste (excluding PVC), grease and oil contaminated textiles. It also is authorised to receive waste from the AfriSam/EnviroServ Waste Blending Platform in Roodepoort. Alternative raw materials authorised for use in cement kilns include iron (scale, oxide), synthetic gypsum, aluminium (dross, oxide), foundry sands and lime containing sludge. No information is currently available on the waste materials used for co-processing, and in which quantities.

Picture 4: AfriSam Dudfield Plant, Lichtenburg, Ditsobotla Municipality, North West Province (South African Builder, 2019).

The Dudfield plant is located about 6 kilometres from the centre of Lichtenburg, a farming town known for growing maize, and producing meat and cement. The town comprises schools, sports grounds, a golf club, and several hotels. Local and visiting communities are impacted through the air, and through the food that they consume.

Afrimat

Afrimat is a South African mining and materials company, which in April 2024, took operational control of South African Lafarge operations, including the Lichtenburg cement plant, which uses alternative fuels and raw materials on site. Kilns number 3 and 4 are authorised to co-process waste in place of fossil fuels (Lafarge Industries South Africa, 2022). No information is provided as to the waste materials used, nor the quantities of waste co-processed in this facility.

Picture 5: Afrimat Lichtenburg Facility, Lichtenburg, Ditsobotla Municipality, North West Province. *Picture retrieved from google maps*

The Afrimat Lichtenburg facility is located within the farming town of Lichtenburg, a few kilometres away from the Afrisam Dudfield facility. It is located closer to the town centre, which comprises schools, sports grounds, a golf club, and hotels.

Conclusion

The use of waste-derived fuels in South Africa's cement industry reflects the country's aspiration to reduce reliance on fossil fuels, and divert waste from landfills, however in doing so, citizens' rights to a healthy environment, as stipulated in the Constitution are jeopardised. Cement kilns around the country have used alternative fuels for over 20 years, however significant challenges remain in the regulation, monitoring, and transparency of RDF production, trade, and use.

In the absence of a distinct classification for RDF under the internationally-recognised Basel Convention, and Harmonised System (HS) codes, efforts to track RDF movement are rendered impractical and complicated. Within South Africa, limited information on RDF use is publicly available, both as a result of the national reporting system, SAWIC, malfunctioning, and due to insufficient company-specific reporting and auditing.

RDF is produced in South Africa by three companies - Interwaste, Averda, and RECOR Waste to Energy - and consists mainly of municipal and general waste, tyre waste and other rubber waste. Little to no information is available on production quantities, or recipients. Cement companies do not report producing their own RDF.

Five cement manufacturing facilities around South Africa, report using alternative fuels - NPC Simuma, PPC De Hoek, PPC Dwaalboom, Afrisam Dudfield, and Afrimat Lichtenburg. Only NPC reports using RDF, however, no facility-specific information on quantities or composition is available. PPC is authorised to co-process RDF but does not report doing so. All facilities co-process alternative fuels, with waste materials ranging from tyres, to waste oils, spent pot liners, biomass, rubber waste, and plastic scraps. While these facilities were granted authorisations to burn alternative fuels due to their relative remote locations, each facility is located near small communities which bear the brunt of the environmental impacts of waste combustion in cement kilns.

While the integration of RDF, and other alternative fuels in cement kilns aligns with South Africa's goals of reducing landfill waste and reliance on fossil fuels, it does not address the root cause of waste proliferation, and discounts the pronounced environmental and health impacts that waste co-processing has. It is crucial that transparency on RDF trade, production, and use be attained, in order for further research to take place, and for protective policies and measures to be put in place to mitigate the impacts of its use in cement kilns.

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Appendix A

HS Code Descriptions

HS 3915 - Waste, parings and scrap of plastic

HS 391510 - Ethylene polymers; waste, parings and scrap

HS 391520 - Styrene polymers; waste parings and scrap

HS 391530 - Vinyl chloride polymers; waste, parings and scrap

HS 391590 - Plastics n.e.c in heading no. 3915; waste, parings and scrap

HS 3825 - Residual products of the chemical or allied industries, not elsewhere specified or included; municipal waste; sewage sludge; other residual products

HS 382510 - Residual products of the chemical or allied industries, not elsewhere specified or included; municipal waste

HS 3606 - Ferro-cerium and other pyrophoric alloys in all forms; articles of combustible materials n.e.c. in chapter 36

Appendix B

NPC Simuma Plant Authorisation for the Use of AFRs

edtea

Department :
Economic Development, Tourism and Environmental Affairs
PROVINCE OF KWAZULU-NATAL

Enquiries : Mr.S.S. Ngcobo	Telephone: 039 682 2049	Private Bag : X9152
Imibuzo :	Ucingo :	Isikhwama Seposi : Pietermaritzburg
Navrae :	Telefoon :	Privaat Sak : 3200
Reference: DC21/0024/2013	Fax :	Date : 18 November 2015
Inkomba :	iFeksi :	Usuku :
Verwysing:	Faks :	Datum :

Fax Transmission

NPC-Cimpor RF (Pty) Ltd
PO Box 201
Port Shepstone
4240

Attention: Mr. Cliffy Naidoo

Fax no: 086 638 3554

Dear Sir

DC/21/0024/2015: ENVIRONMENTAL AUTHORIZATION FOR THE USE OF ALTERNATIVE FUELS AND RESOURCES (AFR) AT NPC SIMUMA

The KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs has **authorized** the abovementioned project. This environmental authorization and reasons for the decision are attached herewith.

Appendix C

PPC Dwaalboom Record of Decision

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
ECONOMIC DEVELOPMENT, ENVIRONMENT & TOURISM

RECORD OF DECISION

Herewith the Record of Decision in terms of section 22 of the Environment Conservation Act, 1989 (ECA) with regard to the undertaking of the activities described below as required in GNR 1182 of 5 September 1997 as amended, **listed activity** 1(c) listed as the construction or upgrading of transportation routes and structures, and manufacturing, storage, handling or processing facilities for any substance which is considered as dangerous or hazardous and is controlled by national legislation, **Activity 8** listed as the disposal of waste as required in terms of section 20 of the Environment Conservation Act,1989, and **Activity 9** listed as Scheduled processes listed in the Second Schedule to the Atmospheric Pollution Prevention Act,1965 (Act No.45 of 1965).

1. **REFERENCE NUMBER:** **16/1/12-30**

2. **BRIEF DESCRIPTION OF THE PROJECT**

PPC Dwaalboom proposes to minimize their use of coal by investigating the use of secondary materials in the cement manufacturing process. PPC proposes to use waste stream from the following categories as secondary fuels in the cement kilns:

- Scrap tyres and rubber waste;
- De-watered, treated sewage pellets;
- Hydrocarbon waste (such as used oil, oil contaminated general waste, oil contaminated soil and coal fines);
- Plastic waste; and
- Biomass (such as paper waste, sawdust, wood chips and waste from bio-fuel production).

However, PPC has determined the following waste streams that will not be considered at all parts of the Secondary Materials Co-Processing Programme:

- Anatomical Hospital waste;
- Asbestos-containing waste;
- Unsorted Electronic Scrap;
- Bio-hazardous Waste;
- Entire batteries;
- Explosives;
- Mineral Acids,
- Radioactive waste; and
- Unsorted municipal waste.

Appendix D

AfriSam Dudfield Plant Record of Decision

Department of Agriculture, Conservation & Environment

Reference:	EIA126/2006NW
Enquiries:	Ellis Thebe
Tel No.:	(018) 389 5099
Fax No.:	(018) 389 5006
E-mail:	gethebe@nwpg.gov.za

Attention: **Mr. Paul Botha**
AfriSam (South Africa)(Pty) Ltd
P. O. Box 6367
WELTEVREDENPARK
1715

Tel No.: (011) 767 7230
Cell No.: 082 904 5560
Fax No.: (011) 767 7030

PER FASCIMILE AND POST

Dear Sir

RECORD OF DECISION FOR USE OF ALTERNATIVE FUELS AND RESOURCES IN KILN 2 AND 3 OF THE AFRISAM DUDFILED CEMENT PLANT, LICHTENBURG, DITSOBOTLA LOCAL MUNICIPALITY, NORTH WEST PROVINCE (EIA126/2006NW)

Your application for Authorisation, in terms of Section 22 of Environment Conservation Act, 1989 (Act No. 73 of 1989) in respect of Scheduled processes listed in the Second Schedule to the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965) (listed activity 9 in Schedule 1 of GN. No. R. 1182 of 5 September 1997, as amended), in terms of Section 21 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) refers.

This Department has evaluated the **Environmental Impact Report** dated December 2009, received on 11 January 2010 and have considered your application.

By virtue of power delegated to me in terms of Section 33(1) of the Environment Conservation Act, 1989 (Act No. 73 of 1989), I hereby in terms of Section 22(3) of the Environment Conservation Act, 1989 (Act No. 73 of 1989) authorises:

Scheduled processes listed in the Second Schedule to the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965) (listed activity 9 in Schedule 1 of GN. No. R. 1182 of 5 September 1997, as amended), in terms of Section 21 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) which *refers to use of alternative fuels and resources in kiln 2 and 3 at Afrisam Dudfield cement plant on remaining extent of the farm Dudfield 57 IP in Lichtenburg, Ditsobotla Local Municipality, North West Province.*

Enclosed please find the Record of Decision and the conditions under which your application is authorised.

Agricentre, cnr. Dr. James Moroka Drive & Stadium Road
(opposite Convention Centre) Mafikeng

Private Bag X2039, Mmabatho, 2735, South Africa
Tel: +27 (18) 389 5111