Project: "Promotion of BAT/BEP to reduce uPOPs releases from waste open burning in the participating African countries of SADC sub-region"

Module 5

BAT/BEP Guidance for the SADC Region on the reduction and/or elimination of open air burning of wastes and agricultural residues

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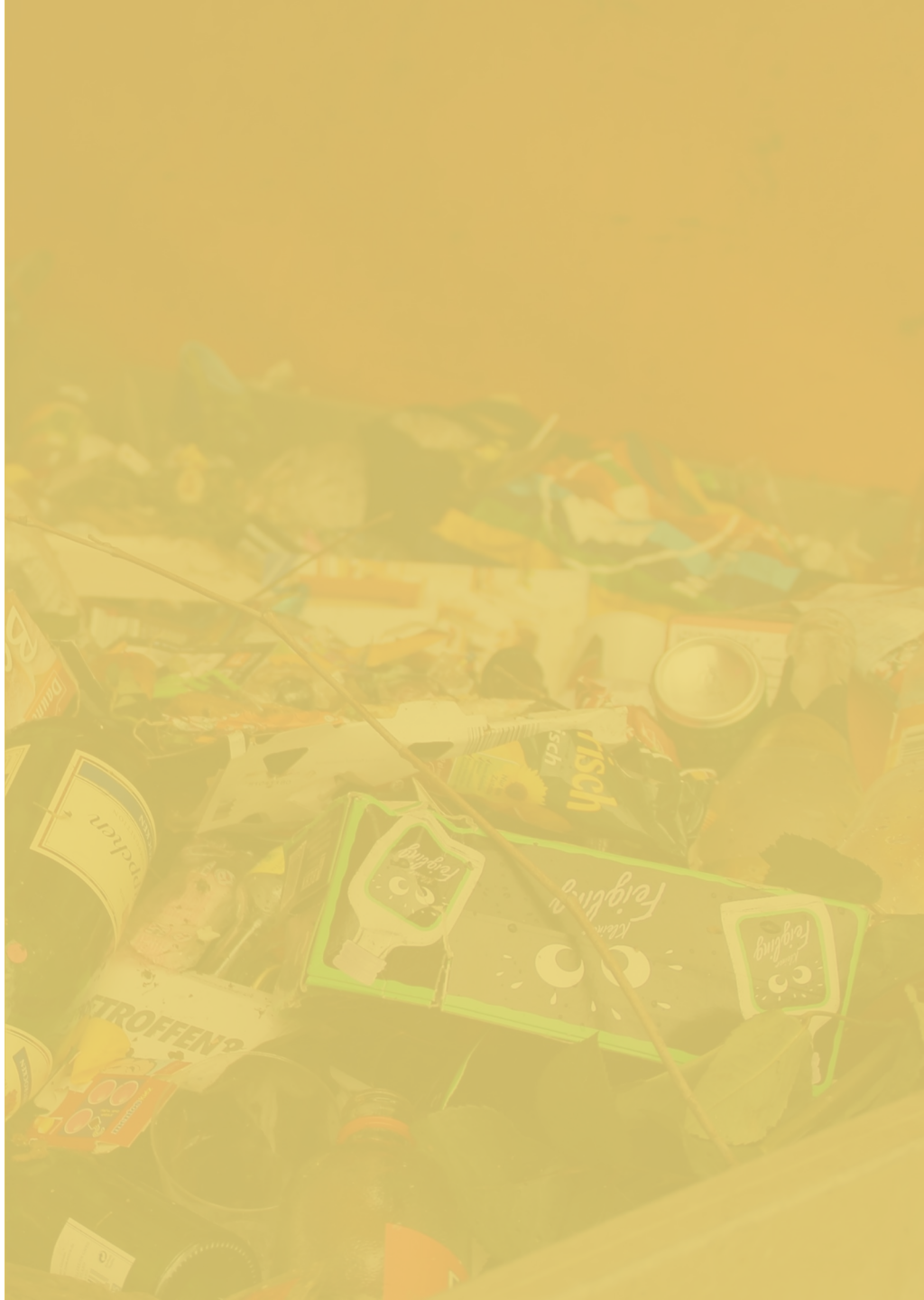


I. Introduction

General guidance

Open air burning covers a wide range of different uncontrolled waste combustion practices, including dump fires, pit burning, fires on open land and barrel burning.

For people in many parts of the world - when waste is not effectively managed - open burning is the cheapest and easiest means to reduce its volume and disposal.

This is especially true for people with no access to organized waste collection or that work in agricultural areas.

The Stockholm Convention refers aspirationally to "…the aim of cessation of open and other uncontrolled burning of wastes, including the burning of landfill sites".

I. Introduction

Public health threats of open air burning of waste

Open air burning is a very serious threat to public health and the environment.

The low temperature burning and smouldering conditions typical of open burning result in the formation of many toxic substances.

Toxic compounds form are released during open burning regardless of the composition of the material being burned.

Policy-makers and practitioners must be aware that the released substances:

- can travel long distances
- deposit on soil, plants, and in water
- accumulate in the food chain and
- always reach humans, by air inhalation, dermal contact with contaminated soils or dust, or food consumption

The main goal: to establish an effective solid waste management system to eliminate open air burning of waste

II. Establishing a solid SWM system

Best practice: establish SWM alternatives

This presentation provides guidance for open air burning practices BUT it underlines the environmental harm resulting from open burning, and should not be taken as a licence to continue the practice.

Open air burning of waste should be minimized and eliminated as soon as possible.

It may still be a last resort where collection is not ensured by the service provider and there are no alternative disposal or recovery methods due to inadequate SWM infrastructure.

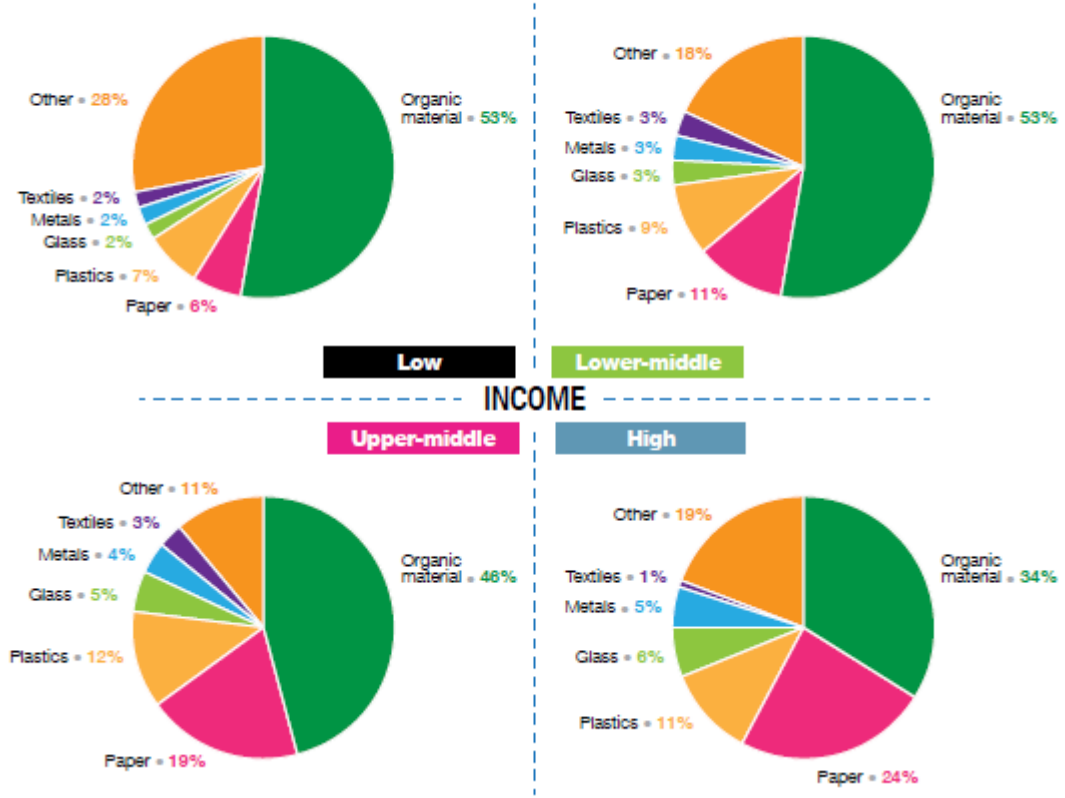
It might also become the last resort in the case of disaster or other emergencies.

The focus of implementing the Stockholm Convention must be on establishing alternatives to open burning rather than simply trying to improve a bad practice.

II. Establishing a solid SWM system

Best practice: define waste composition

Figure 3. 3 Variation in MSW composition grouped by country income levels



The overall municipal waste composition varies with national income

Case studies in the SADC region show:

In Madagascar and Mozambique the content of kitchen (organic) waste and other organic material from household is high, from 60% to 70%.

In Eswatini the content of organic material in the waste is around 40%.

II. Establishing a solid SWM system

Best practice: establish and implement sound SWM practices

Design and build an effective SWM system

Each country should define its own path to establish and implement sound SWM practices. The realization of an effective solid waste management system includes:

- Reduction of waste
- Reuse of products
- Recycling of materials from waste
- Home and large-scale composting
- Modern sanitary landfilling, and
- in situations where the technical and financial situations make it feasible, incineration adopting best available techniques (BATs).

The Convention's implementation efforts and its financial mechanism could be used to support the establishment of effective SWM systems as alternatives to open burning.

II. Establishing a solid SWM system

Best practice: reduce the volume of waste disposed in non-sanitary landfills

To reduce the amount landfilled, administrators and service providers must organize:

- the separated collection of WEEE, even by activating Extended producer Responsibility (EPR) schemes
- segregation at source of recyclables, such as paper, plastics, metals, glass, textiles
- the setting in place of the chain of recycling activities
- Collection centers for recyclables can increase collection rate for recyclables
- House composters can assist to reduce the burning of kitchen waste.
- Composting of organic material deriving from segregated collection. Segregation at source of organic material is viable for vegetable markets and restaurants and can provide un-contaminated material to be converted into fertilizers of good quality.

II. Establishing a solid SWM system

Composting of food waste

Using kitchen waste as animal feed, traditionally implemented in some countries, is a good alternative to reduce/eliminate the organic material from the waste cycle.

In situations where the content of organic material is high, deviating it from dumpsites can really benefit the waste management and improve hygienic and health condition at dumpsite.

Segregation of organic material from MSW is much more effective if done at source.

Composting in the SADC region

Composting activities are traditionally implemented at small scale in the households, that use compost as fertilizer for vegetable gardens.

Activities at large scale are at a very early stage in the region as their economic sustainability can be challenging.

Composting to produce fertilizers needs segregation of the organic material from other waste, which can only be achieved in a safe manner by doing it at source.

II. Establishing a solid SWM system

Best practice: focus on the involvement of the government, private sector and civil society

Efforts to reduce open burning of waste should be promoted and such efforts should focus on increasing the capability of government, local authorities and the private sector to build an effective SWM system both at the national and local tiers.

Government agencies in charge of public health policy and education should be as deeply involved as those responsible for waste policy.

II. Establishing a solid SWM system

Household waste management in the SADC region

SWM is a system. Where the system is effective, and it makes the complete management cycle a collective responsibility rather than an individual responsibility, direct economic costs may rise, but environmental costs and impacts will fall.

Barriers to a sound management of household waste in the region include:

- Lack of funds for Local Authorities to organize effective collection services, resulting in incomplete coverage.
- Inefficiencies of collection service: the formulation and approval of a SWM Strategy at the national level and a City Plan are important elements for achieving effective collection service.
- Local Authorities checking if contracts with private companies are carried out effectively is also important.
- Challenges in urban planning: the region has many informal settlements with little urban planning. Big cities, towns and villages have narrow streets and areas not accessible to waste collection trucks, requiring more manual labor.

II. Establishing a solid SWM system

Household waste management in the SADC region

Barriers to a sound management of household waste in the region include:

- Waste fee: setting up a waste fee policy that suits the local situation is important to ensure the revenues for the payment of collection and disposal of waste. Fee policies in the SADC region are different.

- Capacity and management of landfills/dumpsite: different types of landfills and dumpsites exist in the SADC region. Informal and inadequately controlled dump sites are common, and sanitary landfills are few.

- Long distance between dumpsite and town (above15-20 km): If a dumpsite is far from town, transportation costs are high and may affect the economic sustainability of the waste service (also resulting in less trips/day, low collection frequency). It has been observed that private collection companies sometimes illegally dump waste to reduce transportation costs.

- Non-availability of landfills/dumpsites: the availability of land for new landfills/dumpsites has turned out to be a real problem in some SADC countries. Municipalities plan new modern landfills but are not able to get the land.

II. Establishing a solid SWM system

Household waste management in the SADC region

- Inefficiencies in waste collection can be addressed by regular checks of the activities of collection companies to ensure that quality of service is matching what has been contracted.

- The waste fee policy should be carefully analyzed as it is imperative to get an efficient collection and disposal service at prices accepted by the population.

- Collection of waste fees through the electricity (or water) bill is very efficient as can reach most households and guarantee the payments, although commissions to utility companies must be carefully negotiated.

- Source reduction in the SADC region: Efforts have been done to reduce/ban the use of thin plastic bags (shoppers), which have been banned in some countries.

II. Establishing a solid SWM system

The following recycling activities have been observed in the SADC region

- Segregation of plastics, paper, glass, metals: Activities are located by dumpsites/landfills; the material is segregated and delivered to buyers in South Africa.
- Recycling of plastics: sometimes performed by foreign companies (mainly from China); recycled plastic is either converted into granules to be sold or used to produce goods to be exported.
- Secondary aluminum recycling: aluminum discards are melted to produce pots to be sold locally
- Plastic bricks production: plastic discards are melted with sand to produce bricks for the local market.
- Beer bottles reuse schemes: bottles are collected and returned to breweries which buy them back (Extended Producer Responsibility scheme).
- Production of bricks from recycled glass: glass is ground and mixed with cement to produce bricks sold locally.
- Production of handicrafts from reused materials.
- Composting: organic material is separated from waste and composted to produce fertilizers.

II. Establishing a solid SWM system

Best practice: technical training and educational programmes

Establishing high intensity training programs and documentation designed to prepare administrators, practitioners, service providers to building a new SWM system.

Establish information campaigns for target audiences – e.g. dumps workers, informal waste pickers and citizens - about the risk to human health and the environment caused by open burning.

Policy-makers must be aware that awareness raising campaigns could reduce the burning activities at backyards, but alternatives must be offered to households that are not served by the collection service.

Best practices for all the cases in which open air burning of waste cannot be eliminated

III. What to do in case of open air burning

Best practice: protect indoor-air quality

Household wastes should **never** be burned in indoor residential combustion devices such as stoves, fireplaces or furnaces.

Guidelines for indoor air quality: household fuel combustion

To ensure healthy air in and around the home, WHO's Guidelines for indoor air quality: household fuel combustion provide health-based recommendations on the types of fuels and technologies to protect health as well as strategies for the effective dissemination and adoption of such home energy technologies.

https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health

https://www.who.int/heli/risks/indoorair/indoorair/en/

III. What to do in case of open air burning

Best practice: with respect to the materials burned

BEP include:

- avoid including non-combustible materials, such as glass and bulk metals, wet waste and materials of low combustibility
- avoid waste containing high chlorine and/or bromine content, such as halogenated plastics such as PVC
- avoid materials containing catalytic metals such as copper, iron, chromium and aluminium, even in small amounts
- materials to be burned should be dry, homogeneous or well blended and of low density (e.g. non-compacted waste).
- avoid potentially explosive items (e.g. aerosol cans, partially full containers of flammable liquids) and hazardous materials should be removed.

III. What to do in case of open air burning

Best practice: with respect to the burning process

BEP include:

- Supply sufficient air
- Maintain steady burning or rate of mass loss
- Minimize smouldering, possibly with direct extinguishment, because this is the phase of burning associated with the largest production of persistent organic pollutants
- Limit burning to small, actively turned, well-ventilated fires, rather than fires in large poorly ventilated dumps or containers.

III. What to do in case of open air burning

Handling after burning

Before burned waste can be handled or covered, it must be completely extinguished, because it can potentially ignite uncontrolled burning over large areas or allow ongoing smouldering (which produces high contamination).

Ash from mixed waste burning should not be spread on land, either bare of cultivated.

The following after-burning situations should be prevented but have been observed in the SADC region:

- Use of ash from waste or vegetable gardens as fertilizers: it occurs when people are using it as cheap fertilizers → toxic substances in the ash are transferred to soil and then to the food chain.
- Ash dispersed and ingested by animals: dogs, cows, goats and chicken in not surveilled, not fenced dumpsites get in contact with contaminated dust and crops.
- Inadequate disposal of ash: ash from incinerators of medical waste is sometimes disposed of at MSW dumpsites with no safety measures.

III. What to do in case of open air burning

Best practice: ban of burning activities at dumpsites

Banning of open burning of waste is already implemented in the regulations of countries the SADC region, but can be enforced more rigorously.

This policy can be implemented at moderate costs and – if enforced effectively- can bring substantial reductions of uPOPs formation with benefits to health and environment.

Municipalities have an important role in enforcement of the ban of any open burning activity, including supporting the activities and training of waste pickers.

III. What to do in case of open air burning

Best practice: improved non-sanitary landfills management

- Waste pickers' activities need to be regulated by municipalities, and they need to be trained carefully.
- The practice of open air burning of waste by waste pickers can be eliminated or reduced by concentrating the activities of waste pickers in a dedicated restricted area of the dumpsite, where sorting can be made easier and more profitable and there is therefore no need to burn.
- Waste pickers can be organized, registered, trained and given an identification card and Personal Protective Equipment for a safer sorting of recyclables.
- Access to the landfill should be restricted by fencing and regular enforcement
- Trucks should be instructed to offload the waste in that area only, where waste pickers can be able to easily sort the recyclables.

Once waste pickers have recovered the recyclables, what remains can be moved to its final place.

- Daily coverage of waste with soil is recommended to reduce odors, vermin and spontaneous ignition.

III. What to do in case of open air burning

Best practice: spontaneous fires fighting

Types of fires at non-sanitary landfills: surface fires and deep-seated fires (smoldering).

Surface fires typically occur in dumpsites where waste is not properly covered with inert matter.

When the bulk of waste is not covered, air intrusion provides the oxygen required for increased biological decomposition of organic material. This creates substantial heat and can cause waste to spontaneously ignite.

In deeper layers, where conditions for the anaerobic process of organic material take place, methane gas is generated, that moves to the surface, where it can generate spontaneous fires.

Methane can also generate deep seated fires, up to 5-6 meters deep. Compacting of the waste can reduce such fires. The use of water as extinguisher needs large quantities and results in production of leachate. Other extinguishers like CO2 and flame retardants, are more effective but more expensive and generally not available in the SADC region.

III. What to do in case of open air burning

Best practice: spontaneous fires fighting

- Aeration of the mass of the bulk waste in a landfill has also been successfully used as a landfill management technique.

- Measures to extinguish spontaneous fires should be taken by municipalities as soon as smoke is detected, to avoid the extension of the fire to wider areas of dumpsite and the establishment of deep-seated fires difficult to extinguish.

III. What to do in case of open air burning

Best practice: measures to reduce exposure to uPOPs in after-burning situations in the SADC region

- Surveillance /enforcement: the ban of burning activities at non-sanitary landfills, and its associated enforcement, remains the major measure to be implemented to reduce after burning situations
- Extinguish smoldering and deep-seated fires as soon as detected
- Ban the use of ash as fertilizer and raise awareness of farmers and garden owners on risks and alternatives;
- Safely dispose of ash from medical waste incinerators.
- Ensure 100% collection coverage to the districts where backyard/ barrel/street burning is detected.
- If lack of finance does not allow it, improve the efficiency of the ongoing collection services and organize Collection Centers for recyclables.

III. What to do in case of open air burning

Best practice: health and safety considerations

Steps should be taken to reduce exposure to toxic substances.

Most human exposure comes through the food chain. Thus, burning sites should be located away from crops and animals production.

It is also good practice to locate combustion sites remote from the population or at the very least downwind of residential areas.

Personnel tending the fires should position themselves upwind from any burning waste and be clear of the burning waste.

Protective clothing such as gloves, boots and overalls, together with smoke .

Electric and electronic waste (WEEE) burning best practices: stop burning of cables

III. What to do in case of open air burning

Best practice for WEEE: end cable burning

The burning of cables and other WEEE is a common practice to recover precious metals.
This practice is one of the most dangerous due to the amounts of emitted POPs: it is estimated that burning cables emits 12,000 µg TEQ/t of dioxins and furans. As a comparison, burning circuit boards emits 100 µg TEQ/t of dioxins and furans.

Thus the impact on the workers' health is high.

Burning cable and other electric or electronic waste is the most critical habits that needs stopping and it should be given priority in the implementation of policies to reduce open burning.

Best practices for specific waste streams (agricultural waste and biomass)

IV. Agricultural waste and biomass

Intentional biomass burning

Farmers in many parts of the world set fire to cultivated fields to clear stubble, weeds and waste before sowing a new crop.

Its tenacity, despite its harmful consequences for air quality, soil health, and the climate is a testament to its convenience and acceptance among farmers across a wide range of farming systems and agroclimatic zones.

When agricultural fires burn out of control, even with "controlled burning" policies in place, they cause larger forest, peatland, grassland, and pasture wildfires, which then release additional black carbon, methane, CO, and CO_2 and damage or destroy nearby sensitive ecosystems, habitats and carbon sinks.

The environmental and human costs of agricultural open burning far outweigh the near-term economic benefits for farmers.

https://www.ccacoalition.org/en/activity/open-agricultural-burning

IV. Agricultural waste and biomass

Intentional biomass burning

Over time, the repeated practice of open burning becomes costly to farmers. Successive fires destroy the organic matter that makes soil fertile, causing crop yields to decrease over time and increasing the need for costly fertilizers.

Recent studies show that 5-10% of global air pollution deaths (approximately 250,000 deaths annually) are due to open biomass burning.

PM2.5 from agricultural sources is the main contributor to premature death from air pollution for the eastern U.S., Europe, Russia, and East Asia.

https://www.ccacoalition.org/en/activity/open-agricultural-burning

IV. Agricultural waste and biomass

Intentional biomass burning

Selected biomass burning may be permitted by government for perceived economic benefit, agricultural benefits (ash as soil adjuvant), risk prevention in forestry, termite, reptile or other pest control.

In each of these cases the government has the power to remove permission for such burning and to educate the public regarding the health risks of open burning, especially if it is conducted on a large scale.

IV. Agricultural waste and biomass

Best practice: understand the reasons for burning agricultural residues

While the cost-benefit reality of burning varies significantly, burning is widespread because so many farmers perceive it offers multiple benefits, above all costs.

Farmers' favorable perception of burning is partly owed to the fact that they do not factor in the environmental and health costs of burning that are felt off-farm.

Burning could also be held in place by the notion that crop residues are a form of waste, rather than a resource, and the belief that burning is the least costly way of removing a cumbersome waste stream.

The idea that crop residues are a waste stream can also minimize the feeling of loss associated with burning.

Meanwhile, in contexts where bans or regulations on burning are in place, weak enforcement means that there is little disincentive for farmers to stop the practice.

The World Bank Group - Agricultural Pollution Field Burning

Policy-makers need to understand these reasons to be able to set up strategies to inform and support change.

IV. Agricultural waste and biomass

Agricultural plastic rejects

The use of plastic film in agriculture (greenhouses, low tunnels, etc.) in the SADC region is quite limited compared to other countries like China (about 20,000 ha for Africa against 1,300,000 ha in China).

Depending on the need and topography, various types of films are applied: low-density polyethylene, linear low-density polyethylene, high-density polyethylene, ethyl vinyl acetate (EVA)/ethylene butyl acrylate (EBA) and reclaims etc. Linear low-density and low-density polyethylenes together have the majority of market share.

By application, the market is segmented into greenhouse, silage, and mulch; out of these, mulching is leading with 40% of the regional market share.

Some specialty suppliers offer material specified to be degradable, though this requirement is not universal.

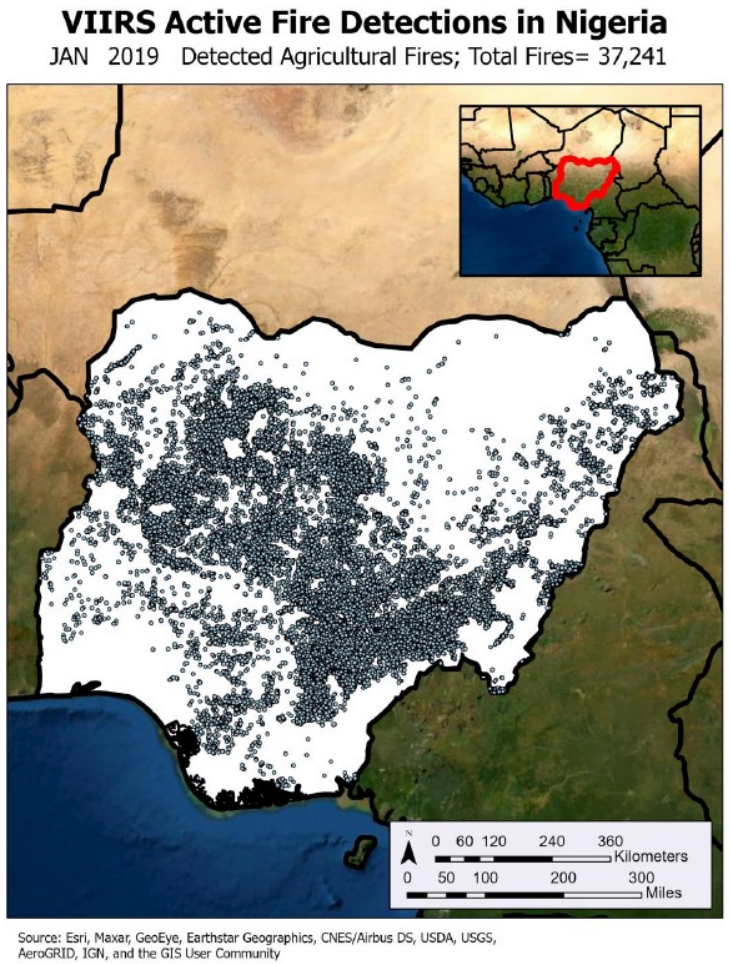
Rigid plastic containers of pesticides or other agricultural chemicals may be found as well.

Bags are usually low-density polyethylene; bottles, drums and tubs are usually high-density polyethylene, a multilayer polyethylene.

Plastic containers of pesticides should be separately collected by different collectors as they are classified as hazardous waste and need proper disposal (incineration).

IV. Agricultural waste and biomass

Best practice: satellite monitoring of burning activities - Nigeria



The goal of this type of analysis was to transfer technology and knowledge of open source geospatial data and technology methods to monitor open burning within Nigeria, including improving black carbon emission estimates and identify communities for interventions.

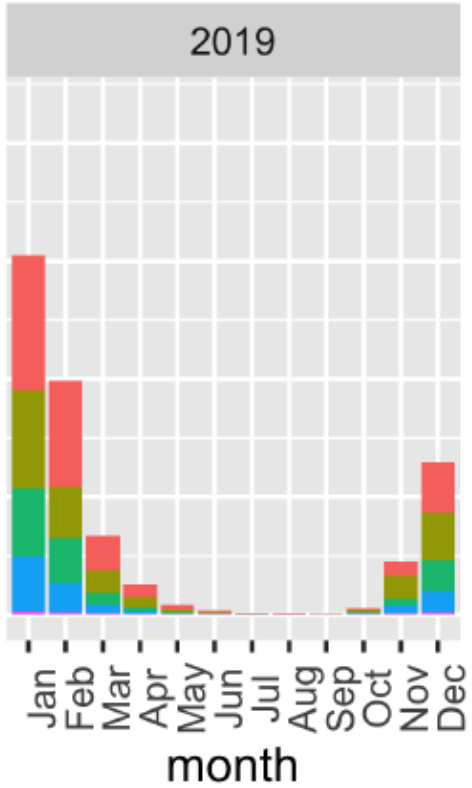
https://www.ccacoalition.org/en/activity/open-burning-mapping-nigeria-and-west-africa

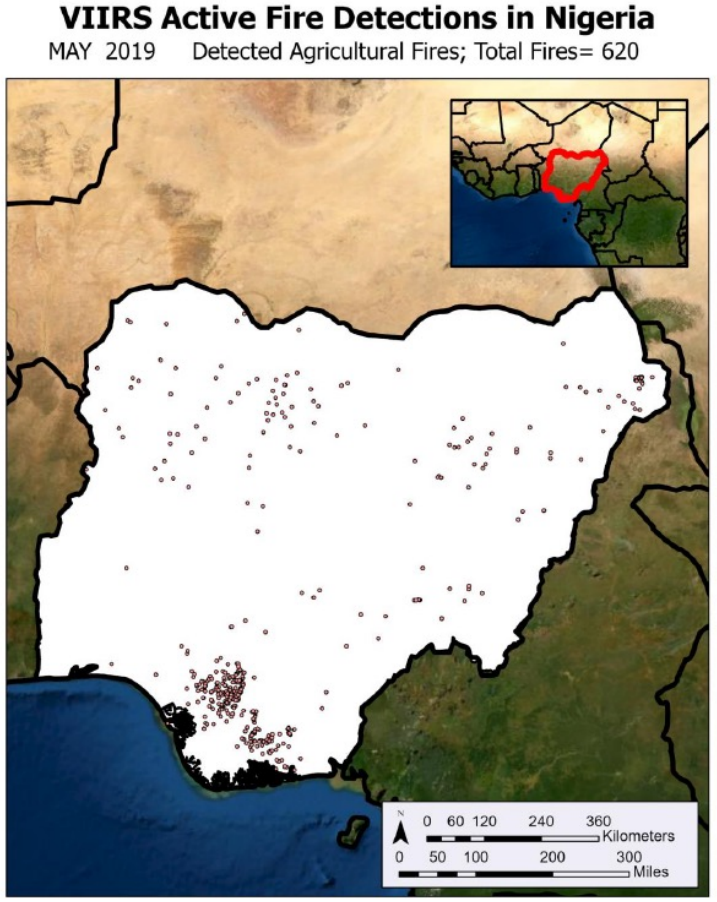
CLIMATE & CLEAN AIR COALITION
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

IV. Agricultural waste and biomass

Best practice: satellite monitoring of burning activities - Nigeria

Burning activities are seasonal





https://www.ccacoalition.org/en/activity/open-burning-mapping-nigeria-and-west-africa

IV. Agricultural waste and biomass

Best practice: reduce intentional biomass burning

Major alternatives involve repurposing residues as:

- Ground cover
- Soil amendments: mulch or compost
- Animal feed
- Feedstock for energy: the use of crop residues to generate energy (biogas, or fuel in cement production) can mitigate burning-related pollution to the extent that burning can occur in more controlled conditions, thus resulting in lower particulate and methane emissions. Beyond this, its main benefit is to displace other forms of energy production and any pollutants associated with these.
- Construction materials

IV. Agricultural waste and biomass

Best practice: reduce intentional biomass burning

Open burning accelerates climate change.

Changing agricultural practices towards conservation agriculture:

Conservation agriculture (CA) provides an exit from burning as two of its central tenets are to minimize soil disturbance (no-till) and to maintain soil cover; the third is to diversify crop species. New crops are then directly sown into the protective vegetation cover.

CA is well-suited to small- and medium-sized fields with a complex cropping calendar and multi-crop systems.

These measures all reduce the need to burn agricultural residues as these are saved for the next crop seeding.

Conservation (reduced/minimal) tillage leaves at least 30% of crop residue on the soil, facilitating planting and increasing nitrogen in the soil, while also reducing the need for fertilizer.

Fire in the Fields: Moving Beyond the Damage of Open Agricultural Burning on Communities, Soil, and the Cryosphere". A CCAC Project Summary Report – 2016

IV. Agricultural waste and biomass

Best practice: reduce intentional biomass burning

Where economically feasible, adopt:

- low stubble techniques
- tilling agricultural residues into soil
- composting of straw and other crop residues

Direct seeding ("no-till") is defined as planting directly into the standing and undisturbed stubble of the previous crop, and farmers on millions of hectares around the world have transitioned to this technology.

Use of cover crops: in no-till farming the use of cover crops is predominant as it helps the farmer to control of weeds and ensure that the land will be weed free when the farmer is ready to plant. Also cover crops helps in the increasing and fixing of nutrients into the soil.

These practices improve the soil structure and restitute biomass to soil where it acts as fertilizer.

IV. Agricultural waste and biomass

Best practice: reduce intentional biomass burning

Rotational logging of non-virgin forests can be implemented in some areas to preserve virgin forests and keep open burning activities under control.

For example, residues from logging which are normally burned can be shredded to be then converted into fuels (pellets).

Livestock feed and/or bedding: straw is gathered for use and, where appropriate, used as cattle feed and bedding for swine, poultry, and cattle.

This alternative assumes the farmer also has livestock as part of the holdings or that

there are nearby livestock facilities.

Saw dust can be used in the furniture sector (fiberboards).

IV. Agricultural waste and biomass

Best practice: reduce intentional biomass burning

Use in bioenergy: often through conversion of stubble to pellets.

Stubble is gathered for biomass burning for heating and biofuel. This method is widely practiced in some regions of the world but it requires cost-benefit analysis and it is dependent upon the development of local/national markets.

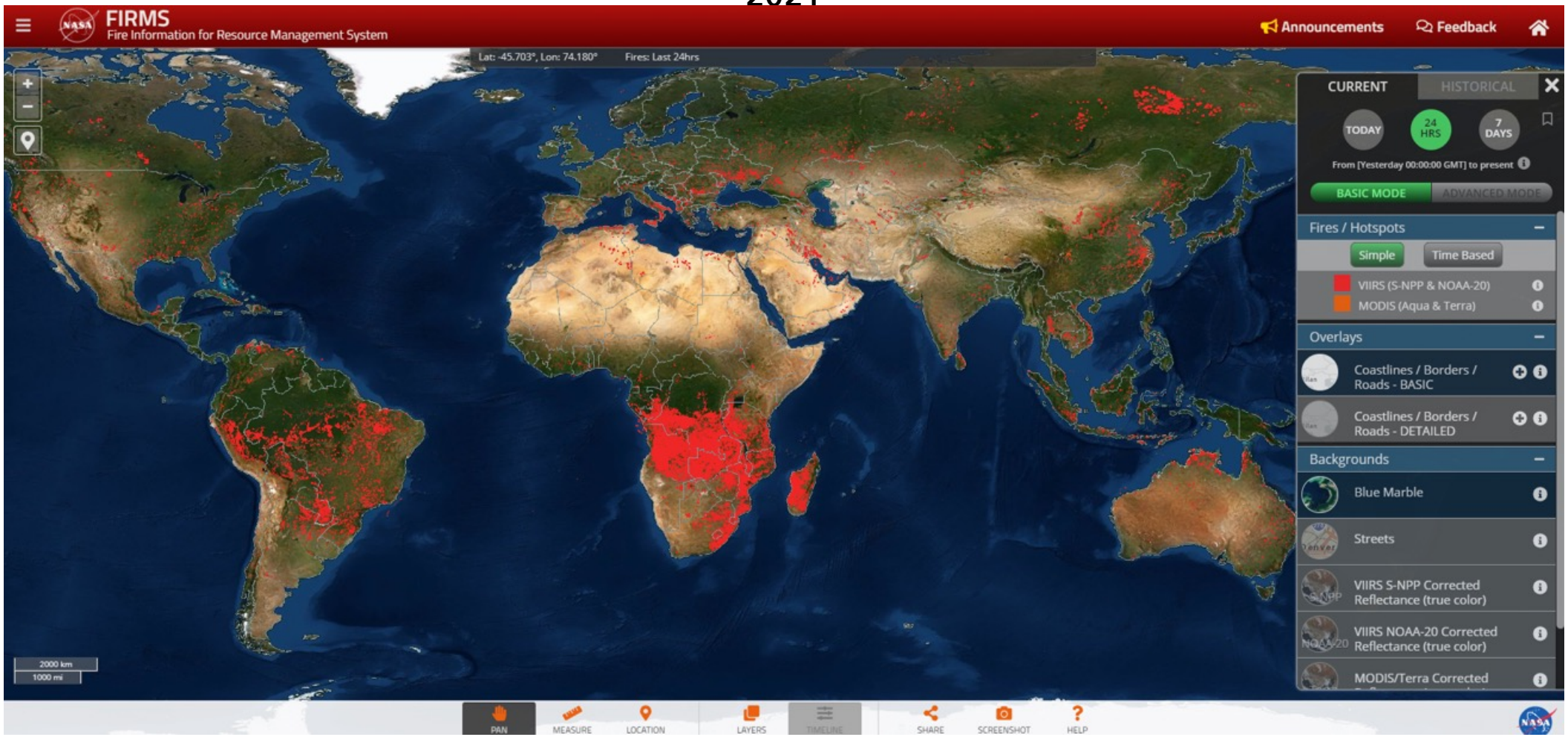
Relevant transport distances: users plants should be located within 30-40 km.

Biomass can be burned in several ways. The best techniques are those that use the biomass as fuel for boilers/ furnaces; the heat released is used for production processes such as sugar, palm oil, and thereby substitute for fossil fuels and reduce climate impact.

Rotational logging can provide the material to produce charcoal without affecting biodiversity of virgin forests.

IV. Agricultural waste and biomass

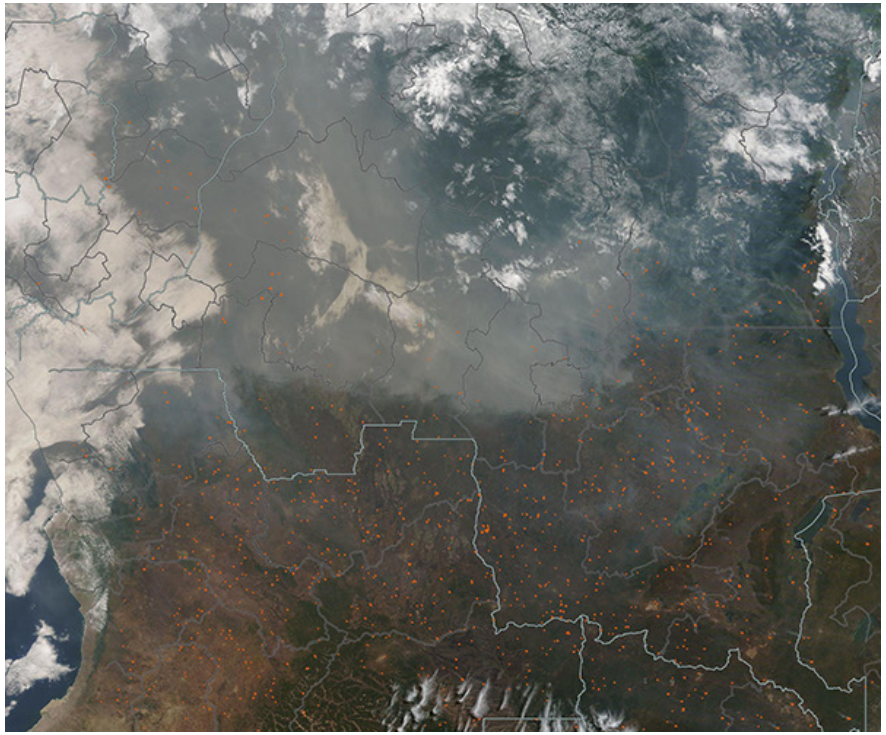
NASA Fire Information Resources accessed 9 August 2021



IV. Agricultural waste and biomass

"The widespread nature of these fires, their location and the time of year suggests that these are fires that people have intentionally set for agricultural purposes.

Farmers in this region have used fire for thousands of years to clear fields of old crops, prepare fields for new plantings, clear underbrush, and renew pasture or savannah grasslands. While fire is a cheap and efficient way to manage land… fire also creates hazards, such as pollution from the smoke, release of greenhouse gasses, and degradation of ecosystems. In Central Africa, the fire season typically begins by May and peaks in August."



https://modis.gsfc.nasa.gov/gallery/individual.php?db_date=2021-08-02

IV. Agricultural waste and biomass

Best practice: reduce intentional biomass burning

Alternatives to agricultural burning: rice husk briquette machine in Tanzania.

The machine can be transported.

Briquettes can be turned into charcoal at par with the price of charcoal from the forest.

Specifications (Tanzania Model)	· Production capacity: 120kg/h of rice husk briquettes · Weight: approx. 850 kg · Size: 2.3m(L) x 1.05m(W) x 1.4m(H) · Electricity supply: AC400V/3φ 50Hz AC200V/1φ 50Hz · Electricity consumption: approx. 16kW (maximum 19kW) · Rice husk supply: manual

http://www.briquette-machine.com/cases/rice-husk-charcoal-briquette-press-Tanzania.html

IV. Agricultural waste and biomass

Best practice: reduce intentional biomass burning

Multi-pronged approach consisting of:

- Education and information, including exchange of best practice and dissemination of information across all stakeholders—farmers, the public, entrepreneurs, policy-makers and others
- Introduction of financially sustainable and culturally appropriate agricultural alternative practices
- Support farmer organizations in shifting agricultural practices and innovative projects: need to assess economic feasibility of change and establish financial mechanisms.
- Introducing stricter legislative sanctions and official commitment

"Fire in the Fields: Moving Beyond the Damage of Open Agricultural Burning on Communities, Soil, and the Cryosphere". A CCAC Project Summary Report – 2016.

IV. Agricultural waste and biomass

Obstacles and challenges: reduce intentional biomass burning

Farmers sometimes lack the ability to pay for (or lack access to) the labor, equipment, or chemicals that would allow them to compost, switch to no-till farming, generate energy, move wastes off-field for alternative uses, or manage pests and diseases without burning.

Equipment for the production or biogas or biochar can require higher upfront investments and only make sense for operations above a certain scale, both in terms of feedstock availability and energy needs.

Farmers also often lack the technical knowledge and know-how to adopt alternatives, and in certain contexts, collective action or markets are insufficiently developed to help farmers overcome some of these obstacles.

- The complexity, persistence, and context specificity of the burning challenge needs to be mirrored by patient forms of public sector support that enable technological as well as social innovation—involving, serving, and motivating stakeholders at every level.

Industrial waste issues

V. Industrial waste

Industrial waste

Composition of industrial waste is a result of the production process; different production processes generate different discards.

As few landfill for industrial waste exist in the SADC region, Municipal SW and industrial waste are mixed and disposed at the same places, which can result in increased emissions of POPs from open burning.

As textile industry is widespread in the SADC region, thanks to special international agreements, textile discards is a common kind of industrial waste.

V. Industrial waste

Textile discards should be properly managed to avoid burning and reduce the footprint on environment

Suggested BAT/BEP practices are:

- Locally recycle the discards to produce industrial products such as insulation material for construction, furniture and automotive sectors.

- Involve companies who import or produce the garments to support recycling of textile discards (Extended Producer Responsibility).

Best practices for specific waste streams (construction and demolition waste)

VI. Construction and demolition waste

Construction waste

Construction waste mainly consist of soil and inert matter and can commonly be seen abandoned along the roads and in informal dumps.

It includes rubble, earth, rock and wood displaced during construction.

Common combustible materials of construction include wood, paper and other cellulosic, asphalt, paint and various plastics.

Intentional combustion of waste derived from C&D is a matter of low cost and convenience.

While it is a poor practice and should be avoided under any but the worst circumstances regarding public health, the intentional combustion of post-disaster debris is known due to unavailability of alternatives, desire to avoid massive use of landfill space or for convenience in clearing areas after earthquake.

Cost of transport and of disposal are the main barriers for a sound management of C&D waste and often result in informal abandoning along roads and in informal dumpsites.

VI. Construction and demolition waste

Typical construction and demolition materials and potentials for reuse are:

- Bricks and concrete used for clean-filling
- Timber salvaged for new structural or material use
- Timber waste ground into mulch or compost
- Crushed concrete used for road-base
- Plasterboard crushed for soil conditioner or manufacture of new plasterboard
- Steel, aluminum and other metals for reuse in the manufacture of new metal products
- Pallets
- Clean plastic recycling
- Crushed tiles for paving or landscape decoration

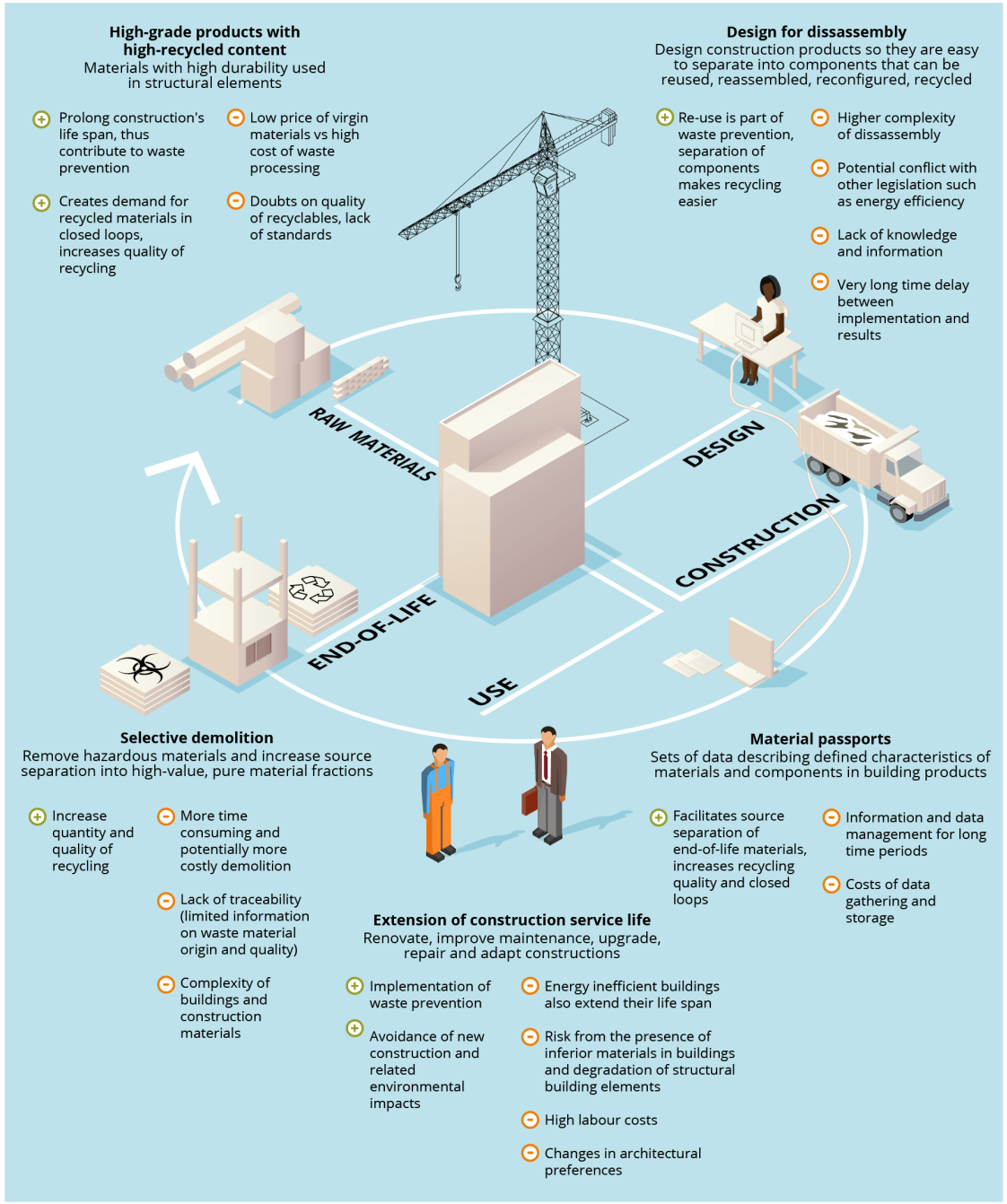
VI. Construction and demolition waste

Strategies and policy instruments to avoid, reduce or divert C&D waste in the SADC region

Reuse of construction and demolition materials is practiced in the region.

What is reusable is recovered from the waste, but abandoning is frequently observed.

Abandoning of C&D waste can be avoided by reusing the inert matter for buildings foundation or as bottom bed for road construction and similar, but needs a proper logistic to match offer and demand (for example special dumpsite for construction waste where waste is crushed and then sold as road bed, embankment material, etc.).



Examples of circular actions that improve the management of C&D waste

Alternatives to reduce C&D waste and its disposal are:

- Improved design to facilitate disassembly
- Control over raw materials of construction
- Selective demolition and separation on-site

These processes can be economically viable or can be made so by changes in laws or regulations governing disposal of these materials.

https://www.eea.europa.eu/publications/construction-and-demolition-waste-challenges

VI. Construction and demolition waste

Additionally, contracts for construction can be written to specify removal of debris as a responsibility of the contractor.

Acceptable means of disposal can also be specified by contract.

Construction companies can be committed to produce the evidence of disposal of waste (i.e. receipt from landfill).

VI. Construction and demolition waste

Post-disaster waste

Its burning should be allowed only for materials which have no or low POPs emission factors (wood, not painted wooden materials), while e-waste and materials with chlorine content, such as PVC, painted wood, should be recovered and reused.

What is left can be delivered to landfills (or buried if landfills are not available).

Best practices for specific waste streams (end-of-life tyres)

VII. End-of-life tyres

Problems with disposal of/recycle of tyres have been reported in the region.

The tyre market in Africa has seen growth in demand and consumption, especially in the passenger car tyre segment.

Replacement accounts for the majority share in tyre market and this trend is anticipated to continue.

Un-recycled tyres are burned to recover the steel, causing a massive air pollution and emission of POPs.

Tyre recycling industry is present in South Africa only.

Lack of organized collection of worn tyres is a cause of their abandonment in the environment.

VII. End-of-life tyres

Best practice: down-cycling and energy recovery of tyres

End-of-life tyres may be reused whole or recycled after shredding.

Reuse of whole tyres above ground must mitigate their tendency to collect water and harbour insect infestation.

Shredding and separation of materials (rubber, steel, fabric) and recycling for asphalt, rugs and mats, furniture, etc.

Processed tyres may be used in rubber-modified asphalt for road surfacing materials.

Shredded and ground tyres have also been compressed and used in building materials.

Shredded tyres are used as a cushioning material for playgrounds.

If shredded and whole tyres are to be combusted in cement kilns, it must be done under proper combustion conditions and operation corresponding to best available techniques.

VII. End-of-life tyres

Best practice: establish an EPR scheme for tyres

Establishment of a mandatory consortium among dealers and producers for the collection and recycle of scrap tyres can improve the recovery and massively reduce the impact to environment.

The consortium should be given the task of collecting for free worn tyres from the source (tyre repairers, gas stations, etc.).

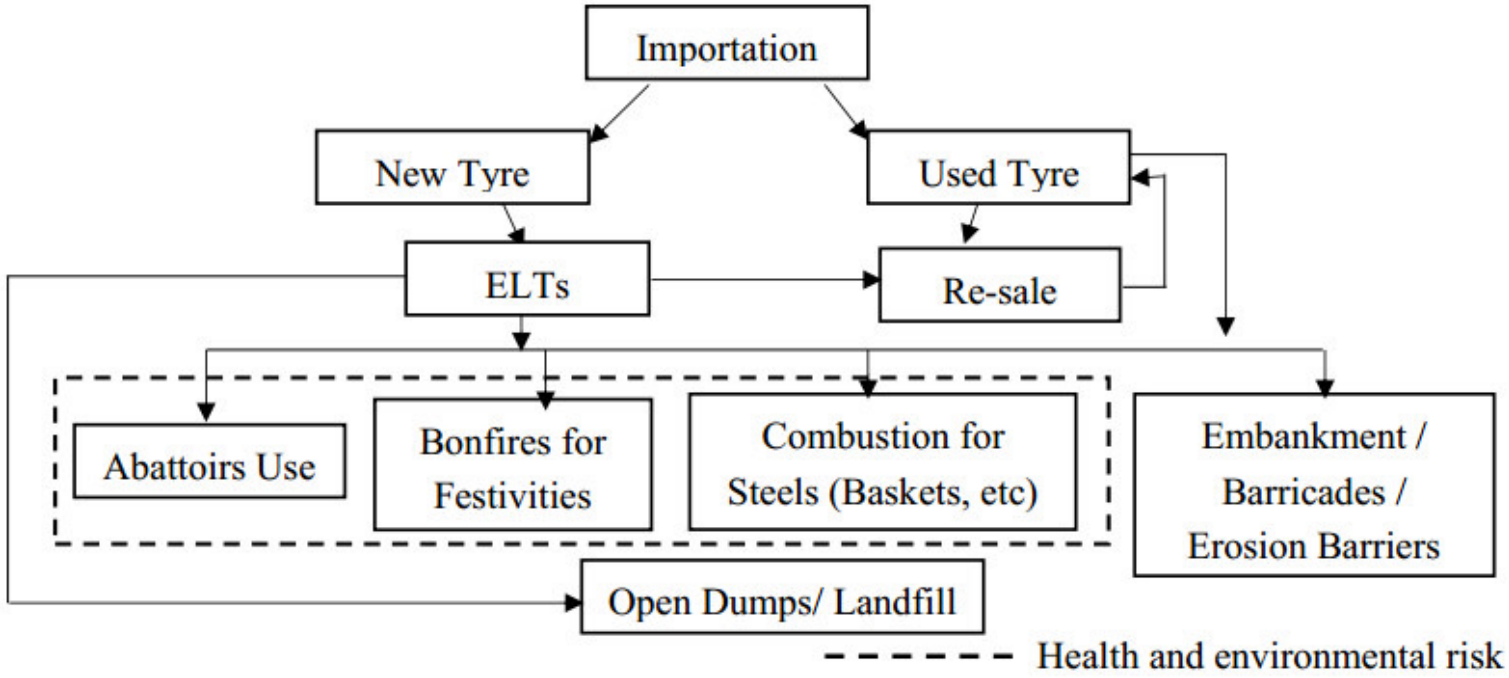
EPR is an important instrument of Circular Economy aimed at holding producers accountable for the environmental effect of their products, from design to post-consumer stage (products lifecycle).

Since 2001, various EPR schemes have evolved.

On February 21, 2020, South Africa's Department of Environment, Forestry and Fisheries held consultation meetings dedicated to implementation of Extended Producer Responsibility (EPR) systems for tire industry in South Africa. End-of-life tire accumulation have become quite an issue in the country, especially given that operations of the waste tire management authority, REDISA, were temporarily halted in 2018.

VII. End-of-life tyres

Best practice: Nigeria examples of understanding the occurrence of the burning of tyres



"Implementation of circular economy principles in management of end of-life tyres in a developing country (Nigeria)" Okafor C. et al.. October 2020. AIMS Envir. Sc.

VII. End-of-life tyres

Best practice: retreading

A retreaded tyre enables saving...

- **70%** **Ressource extraction** (ore, oil...), mainly because of the avoided consumption of steel casings
- **29%** **Land use** or growing hevea
- **24%** **CO_2 emissions**
- **21%** **Air pollution** as measured by particulate matter emissions
- **19%** **Water consumption**

...compared to a low-end non-retreadable tyre

Source: *Ernst & Young report: The socio-economic impact of truck tyre retreading in Europe*

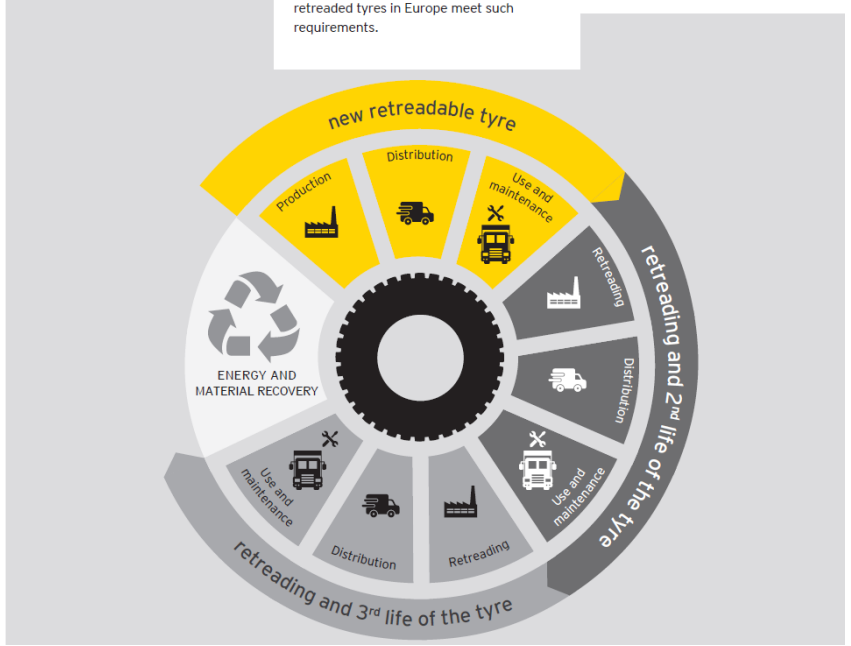
Key environmental characteristics of the retreading circular economy

Eco-design
A tyre cannot be reused if it was not initially designed for retreading.

Sustainable supply
The tyre industry represents 70% of global demand for rubber trees whose cultivation poses increasing issues of land use and biodiversity (impacts which will be quantified further in this study).

The tyre industry is therefore in a position to take action by encouraging its suppliers towards responsible production of this raw material. Retreadable new tyres and retreaded tyres in Europe meet such requirements.

Reuse
The new tyre - retreaded tyre combination reduces the use of raw materials by 70% compared to a non-retreadable low-end tyre *(Source: Life Cycle Assessment of tires - Comparison of environmental impacts of different truck tires scenarios, Life Cycle Analysis conducted by Groupe Michelin in February 2016, certified ISO 14040: 2006 and ISO 14044: 2006 by Quantis).*



Best practices for specific waste streams (medical waste)

VIII. Medical waste

Risks from intermediate burning techniques and practices used for medical waste

Combustion devices, sometimes called “incinerators” by vendors, are sold for the purpose of burning refuse.

In some cases these devices may be as simple as steel drums or barrels that contain the waste but do not constitute a BAT nor a BEP (e.g. treatment of fumes is not performed).

For the purposes of this training, open burning includes any form of combustion for waste disposal, whether in unconfined piles or confined in metal barrels or burners, that does not meet the standards for incineration adopting BATs.

VIII. Medical waste

Risks from intermediate burning techniques and practices

In the SADC region, such "intermediate burning practices" are used for medical waste: inadequate burning operations often lead to low combustion temperatures and generation of POPs.

So called "incinerators" are normally located by the main hospitals or municipal dumpsites. The capacity is small (500-1.000 kg/day) and the operation is by batch (daily).

On the contrary, the safe combustion of medical waste requires high temperatures both in the combustion chamber (>900 °C) and for the exhaust fumes treatment (>850-900 °C for more than 2 seconds) to avoid dioxin formation.

As a best practice the potential generation of POPs from a medical waste "incinerator device" can be visually controlled by:

- Visually checking the smoke at stack: if color is black it indicates bad combustion.
- Checking the appearance of the ash: the presence of syringes and other solid materials is an indication of not good combustion (low temperatures).

Thank you for your attention!

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