STOCKPILES TO SYSTEMS

Designing Functional ELT Frameworks in Africa

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1.1 Background

Waste tyre generation—and the complex environmental and health impacts associated with it—is a looming crisis in the African continent. This mounting generation is driven primarily by a sharp increase in vehicle demand over the last decade, with more than 60 per cent of this demand met through used-vehicle imports. Critically, the forecasted increase of 10 million vehicles by 2050 on the continent is also expected to be dominated (80–90 per cent) by second-hand imports.[1]

The foremost issue with the import of second-hand vehicles is that they typically arrive with tyres that are old and nearing the end of their usable life (two to three years), and thus wear out much faster than new ones. Consequently, as Africa's vehicle fleet expands, its waste tyre volumes will also rise sharply. Compounding this burden, some African countries also import standalone used tyres, which too have a brief lifespan and are discarded fast. In the absence of regulated waste management systems in the continent, the discarded tyres are haphazardly dumped or burned openly. This creates a stark predicament that cannot be deferred to the future—it is already visible and escalating, with impacts evident across the continent.

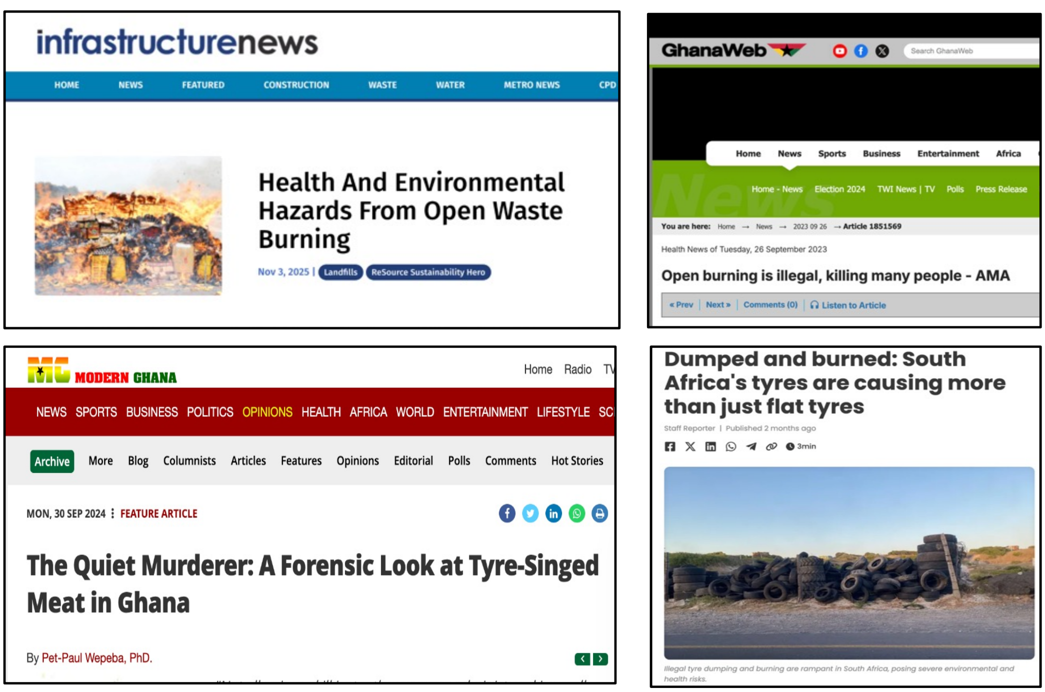
Already, 19 of the world's 50 largest dumpsites are located in Africa, and with the waste volume projected to reach 516 million tonnes by 2050, the pressure on these landfills is only set to intensify.[2] A major portion of this strain is attributed to waste tyres, due to their bulky, non-biodegradable and spatially demanding nature. Apart from the valuable land space they occupy, unregulated end-of-life tyres (ELTs) also pose significant environmental and public health risks, particularly from fires that occur when dumped tyres ignite in landfills. These fires, which can burn for weeks and are extremely difficult to extinguish, release thick, toxic smoke containing pollutants such as benzene, carbon monoxide (CO), sulphur dioxide (SO_2), and other harmful compounds. Prolonged exposure to such emissions has been linked to serious respiratory ailments such as asthma and bronchitis, and elevated cancer risks.

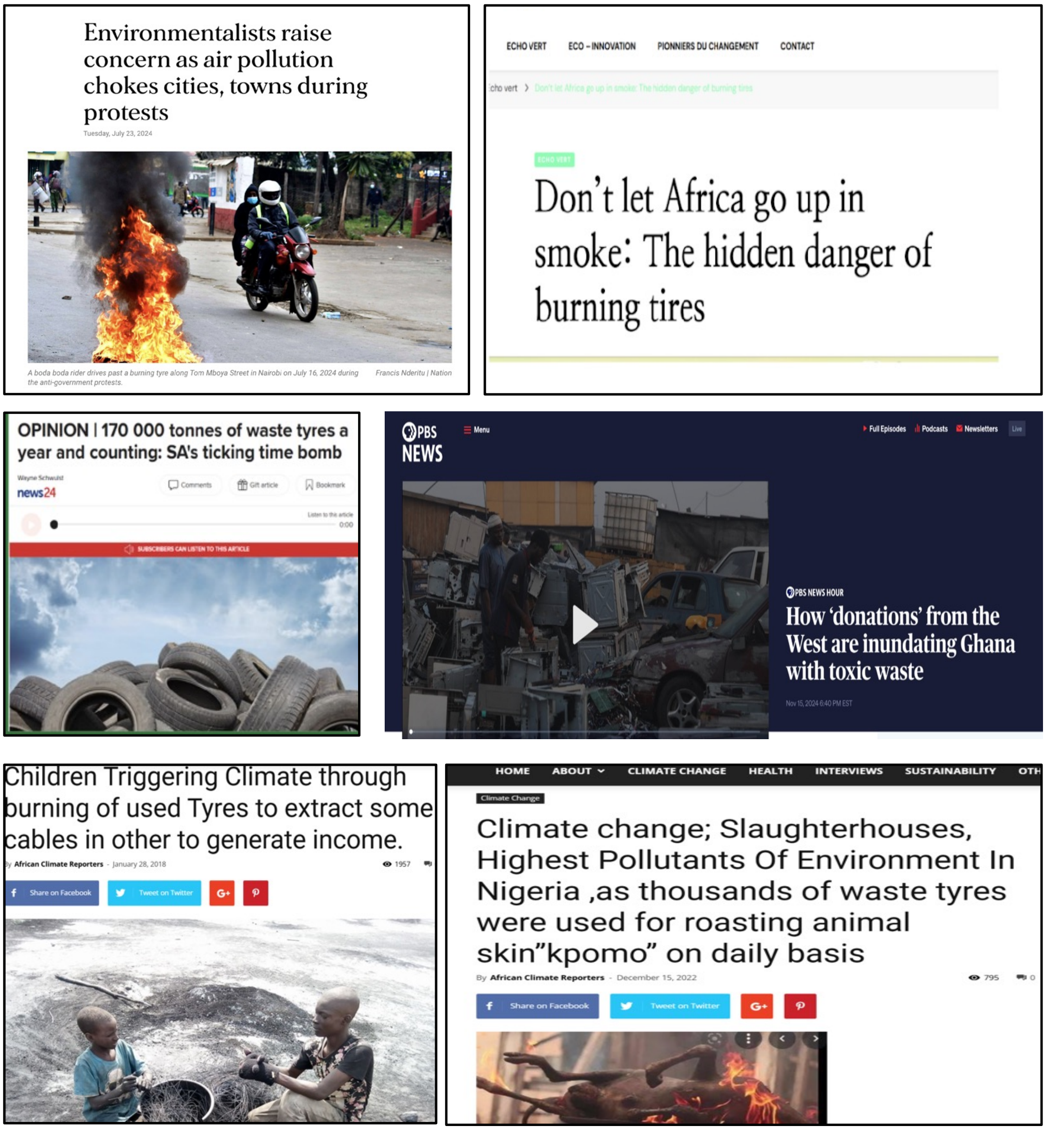
The effects of such fires extend beyond air pollution and can also contaminate groundwater sources. According to the US Environmental Protection Agency (EPA), burning one million tyres can generate over **55,000 gallons**[3] of toxic, oil-like residue, capable of seeping into underground waterways and poisoning vital community water supplies. Further, waste tyres abandoned in landfills also act as breeding grounds for mosquitoes during the monsoon. A single ELT can produce approximately 10,000 disease-carrying mosquitoes in a single breeding cycle, spreading diseases such as malaria, dengue and chikungunya.[4]

Importantly, these grave threats posed by the mismanagement of waste tyres aren't isolated to one country. Across the entire continent, headlines echo one another—from the open illegal burning of tyres in Ghana to black smoke rising over highways in Kenya, and tyres burnt daily to roast animal hides in Nigeria—tyre waste has become a pan-African crisis (*see Figure 1: Media discourse on Africa's waste-tyre crisis*).

This crisis does not stem from the absence of solutions. Proven recycling and recovery practices already in operation across multiple countries demonstrate that ELTs, when processed using established industrial methods, can serve as valuable raw materials.

Figure 1: Media discourse on Africa's waste-tyre crisis





Source: Compiled by CSE

1.2 Global recycling practices

Multiple recovery pathways are available globally, including material reuse, energy recovery, and the development of value-added products. Approximately 20 per cent of a tyre's composition is steel, which can be sent to smelters. Fibre and nylon components comprise another 15 per cent of a tyre and can be repurposed for the production of clean-up materials such as oil-absorbent pads and mats, or can be used as alternative fuel resources in cement plants. The remaining bulk—rubber—can be recovered and recycled to produce tyre-pyrolysis oil (TPO), crumb rubber and devulcanized rubber that can be used in surfacing works or even to make new rubber products.

These products are produced largely through three major recycling pathways (see *Figure 2*: *ELT recycling pathways*). These include:

- Mechanical shredding to produce crumb rubber,
- Chemical devulcanization to generate reclaim rubber, and
- Pyrolysis to extract tyre pyrolysis oil (TPO) and carbon black.

Figure 2: ELT recycling pathways

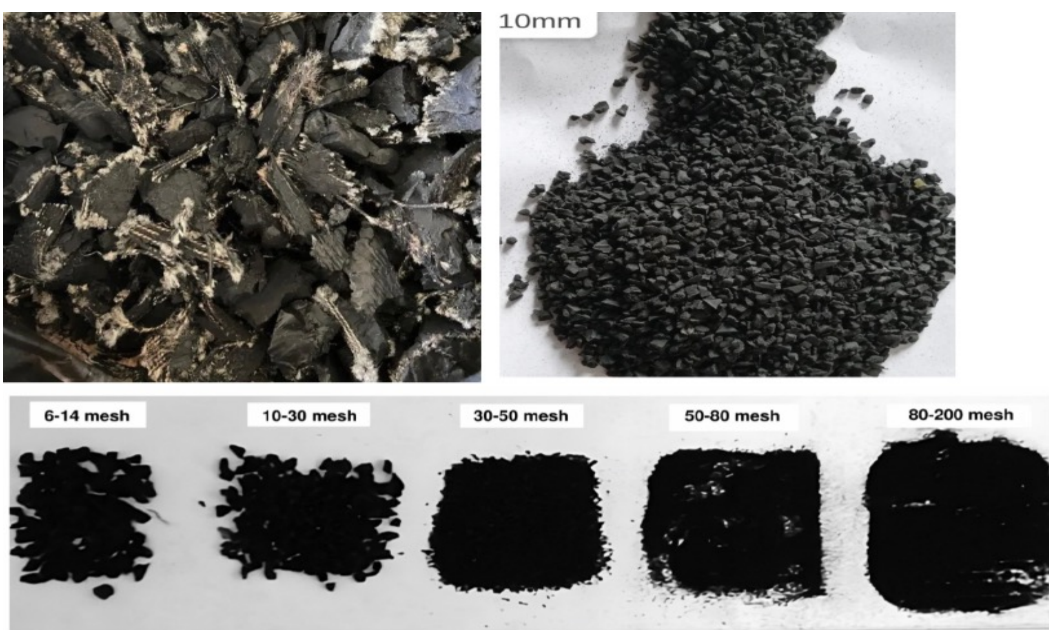
Source: Compiled by CSE

Among these pathways, mechanical recycling into **crumb rubber** (**CR**) is one of the most widely adopted and versatile options globally, owing to its relatively low technological complexity and wide range of end-product uses. The manufacturing process involves mechanical shredding and grinding of waste tyres into chips or granules of varying sizes in the range of 25 millimetres (mm)–180 mesh (the higher the mesh number, the smaller the particle). CR of 4–25 mm is generally used in products such as artificial turf, playground surfacing and rubber goods such as pavers, while CR of smaller size (30–40 mesh) is used in reclaim rubber, gym and athletic tracks (40–120 mesh) as well as the manufacture of new tyres (80–170 mesh) (see *Figure 3: Various sizes of crumb rubber*).

In new tyre manufacturing, CR can be utilized in a few distinct ways. First, it can be used directly as a filler material in new tyres, replacing China clay, which is a natural resource, to enhance tyre strength. Second, when processed into micronized rubber powder (MRP)—170 mesh—crumb rubber can be used to replace up to 7 per cent of natural rubber in new tyres.

Apart from these, CR is a key input in the production of **crumb rubber modified bitumen** (**CRMB**). Under conventional practice, bitumen alone is used as a binder, but it can be modified with the addition of different modifiers to enhance its performance. One such modification can be done with CRMB, which is created by mixing 20 per cent CR with 80 per cent bitumen and extender oils. When

Figure 3: Various sizes of crumb rubber



CRMB is used instead of bitumen alone, roads constructed with it can withstand high temperatures, heavy loads and water exposure, thereby significantly reducing cracking, rutting and weather-related degradation. This makes CRMB particularly relevant for African countries, where roads are continually subjected to severe thermal and mechanical stresses.

CR also serves as the major raw material for the production of **reclaimed rubber.** When new tyres are made, the rubber is 'vulcanized'—treated with sulphur and heat to form strong bonds between the rubber polymer chains—which makes the rubber durable, but difficult to reuse. Simply grinding up this rubber into crumbs cannot undo these bonds. A process called devulcanization, in which these sulphur bonds are broken using a combination of heat, chemicals and mechanical force, is required for the rubber to regain its plasticity and become soft and mouldable again. This treated rubber, known as reclaimed rubber, can be used to produce new rubber products such as tyres, mats, conveyor belts, footwear and other moulded goods. This ability to return rubber to a form that can directly re-enter tyre manufacturing cycles in some percentage (around 7 per cent) makes reclaimed rubber one of the most circular ELT recycling pathways, with the potential to reduce the dependency on virgin rubber.

Another widely used pathway globally, **pyrolysis,** is a thermochemical process that anaerobically breaks down tyres using heat, so that the rubber doesn't burn, but instead thermally decomposes. The result is a mix of various products:

- Tyre pyrolysis oil (35–50 per cent): A low-grade fuel oil with a gross calorific value (GCV) of around 6,500 kcal/kg; used as an industrial oil.
- Solid carbon char (25–40 per cent): A carbon-rich residue with a GCV of approximately 6,500 kcal/kg, often sold as a substitute for coal in industrial processes.
- Pyrolysis gas (20–35 per cent): A combustible gas with a high GCV of 12,000+ kcal/kg, commonly used on-site as a fuel for running the pyrolysis reactor.
- Scrap steel: Recovered steel wires from the tyre, sold to steel scrap markets or used in secondary steel production.

Beyond industrial-scale recycling, tyre retreading remains an economically important practice globally, though it does not constitute a recycling process.

Retreading involves refurbishing worn tyres for reuse by replacing the damaged or worn tread (outer layer) by new rubber tread while retaining the original tyre casing. Retreading extends the service life of tyres, reduces the demand for new tyres, and thus is commonly practised for commercial tyres such as trucks and buses, as these casings are designed for multiple life cycles. In addition to retreading, a small but growing number of upcycling initiatives also repurpose ELTs into products such as footwear, flooring and furniture. While these applications remain niche and limited in scale, they highlight the creative reuse potential of tyre materials beyond conventional recycling. A new application of ELTs is their use as tyre-derived fuel (TDF) in cement kilns, replacing a portion of coal due to their higher calorific value.

Although various such recycling pathways exist, their adoption remains uneven and limited across Africa. Country-specific regulations, market structures, economic criteria and incentives, as well as technical and enforcement capacity, constitute a host of factors which determine which recycling pathways take hold and at what scale.

1.3 Pan-African scenario

This section examines the tyre market patterns, policy landscape and ELT management scenario in Kenya, Ghana, Nigeria, Uganda, Tanzania, Ethiopia, South Africa and Egypt. These countries are selected as they combine relatively high levels of industrialization and vehicle ownership with large import volumes, both of new and used vehicles, making them among the largest generators of ELTs on the African continent. These countries, however, have limited official data on ELT generation and recycling, and thus this generation has been estimated through indicative calculations conducted by CSE, taking into account new and used standalone tyres as well as tyres that come in with vehicles (see *Table 1: Snapshot of the tyre flow dynamics in the studied countries*).

A key observation across the continent is the extremely limited domestic tyre manufacturing, with most countries currently having little to no meaningful local production capacity, with only a few exceptions standing out. South Africa, being the continent's most established local manufacturing hub, produces 8 million tyres annually,[5] followed by Uganda maintaining a modest manufacturing base of 4.8 million tyres annually,[6, 7] largely concentrated in the motorcycle segment. Egypt, meanwhile, has a current annual production capacity of 1.5 million tyres, but is actively seeking to expand this capacity through new investments.[8] Beyond these few isolated cases, however, domestic tyre manufacturing capacity is sparse.

Table 1: Snapshot of the tyre flow dynamics in the studied countries

Countries	Annual domestic production (million)	New tyre import (million)	Used tyre import (million)	Ban on import of used tyres?	Used vehicle import (million)	Total vehicles imported (million)	Annual ELT generation (million)	Tyre regulation/ EPR available?
Kenya	0	2.7	0	Yes	0.4	0.4	2.6	Yes
Ghana	0	1.6	1.5	No (restriction of not older than four years)	0.2	0.2	3.1	Yes
Nigeria	0	1.6	0	Yes	0.4	0.4	10	Yes
South Africa	8	8.5	0.09	No, only has ban on import of commercial used tyres	0	0.4	11.8	Yes
Uganda	4.8	1.6	0	No (restriction of not older than nine years)	0.5	0.5	1.5	No
Ethiopia	0	1	0.2	No	0.2	0.2	1.0	No
Tanzania	0	7.4	0.2	Yes, for PV and LCV, for others restricted (not older than eight years)	0.7	0.7	7.4	No
Egypt	1.5	5.1	0	Yes, under the Hazardous Waste Rules	0	0.1	4.6	No

* The import data is from the year 2023 and the ELT generation data is assumed to be two to three years post-import.

Source: Compiled by CSE

As a result, tyre supply across the continent is **largely import-driven**, with several African countries almost entirely dependent on external sources to meet their domestic demand. Annual new tyre imports in the African countries typically fall within 1–3 million units, with a few countries operating at a much larger scale. Tanzania recorded substantially higher imports of 7.4 million new tyres in 2023, while Egypt imported 5 million new tyres annually in the same year. South Africa, even as the continent's primary manufacturing hub, still imported around 8.5 million new tyres to meet its local demand.[9] Together, these numbers underscore the continued dependence on imports for tyre availability across the continent.

Building on this dependence, tyre supply is influenced not only by new tyre imports but also by the inflow of used tyres. While most countries restrict or ban the import of used tyres, a few exceptions, such as Ghana and Tanzania, permit such imports under age and category restrictions, with Ghana importing the largest volume of 1.5 million used tyres among the studied countries. These used tyres are nearing the end of their service life and are discarded soon after entry, likely inflating ELT generation. This problem isn't limited to the standalone import of used tyres but is also compounded by the importation of used vehicles by most countries, which effectively brings in old tyres. Approximately 0.2–0.5 million total vehicles are imported annually by each country, out of which a staggering 85–95 per cent are used vehicles, further contributing to faster and higher transition to the waste stream. Egypt and South Africa stand out as exceptions in this context, maintaining stricter controls on used-vehicle imports.

While used imports contribute to a portion of overall ELT generation, the major driver is new-tyre imports, leading to annual ELTs volumes falling within the range of 1–3 million units in most countries. A few countries, however, stand out for substantially higher totals, with South Africa generating 11–13 million ELTs annually, followed by Tanzania, which generates around 7 million ELTs annually, reflecting their significantly higher tyre consumption as compared to regional peers. Nigeria, on the other hand, officially reports ELT generation of around 10 million units annually—far exceeding what would be expected from its recorded imports of just 1.6 million units of new tyres and 0.4 million units of used vehicles per year. This discrepancy, as indicated by multiple reports, could arise from the continued import of massive volumes of used tyres entering through illegal channels, ***despite an official ban on used-tyre imports since 2016.*** The huge scale and consistency of these illegal flows over the years points to the governmental inertia leading to an overall systemic failure.

This governmental inaction is not unique to Nigeria, as across the African continent, in spite of ELT generation running into millions and the fact that tyres are globally recognized as a valuable recyclable stream, they remain strikingly low on the policy priority list. While the countries do have laws for other waste streams such as plastic, e-waste and Municipal Solid Waste (MSW), they lack any significant frameworks that could provide a meaningful regime for dealing with the vast volumes of such an overwhelmingly visible waste.

The absence of policies is mirrored in the recycling landscape as well, which remains limited and largely informal. In most countries, **upcycling activities are the dominant and most widespread pathway that uses ELTs,** but these largely remain unorganized and unrecognized, and are often undertaken by individual artists and small enterprises outside formal regulatory systems. However, in Ghana, the scale of the upcycling activities has prompted governmental efforts toward formalization, leading to the establishment of the Used Tyres Upcycling Association (UTUA) to consolidate tyre-upcycling enterprises under a single umbrella and improve their coordination. Another major route to which these waste tyres are diverted is retreading which, like upcycling, also remains predominantly informal, handled by thousands of roadside vulcanizers. While they remain unorganized in most countries, South Africa has developed this route into one of the most formalized and industrialized sectors globally, where an estimated 100–120 dedicated plants collectively re-tread over 1 million truck tyres annually.[10] Notably, the organization Auto & Truck Tyres operates the world's largest tyre retreading facility, capable of retreading up to 0.36 million tyres per year.[11] Similarly, Ethiopia has also initiated moves in formalizing this sector through government-backed partnerships, leading to 12 such facilities operational in this country, which signals an emerging formal presence. However, despite their wide presence, both upcycling and retreading are not quantified, operating at relatively small scales and even at their most active can absorb only a negligible amount of the total share of ELT generation. The sheer volume generated in most countries—ranging from 1 million to 12 million—is impossible to handle through upcycling and retreading alone, and requires industrial-scale recycling.

However, currently, there is a stark absence of these organized and formal industrial ELT recycling ecosystems on the continent. These solutions are still limited to sporadic and isolated initiatives, rather than operating as part of a coordinated, system-wide activity.

Pyrolysis is one such recycling activity that has been expanding across several parts of the continent, but this expansion has been very gradual, with an average of five to six facilities per country. This practice is increasingly favored largely due to its ease of setup, low capital cost as well as its capacity to utilize large waste tyre volumes. However, its environmental performance depends heavily on emission controls and residue management, and thus requires stringent regulatory measures to ensure safety and cleaner production. Crumbing is another emerging recycling pathway in Africa but it currently remains limited to one or two operators, perhaps indicating the absence of market demand for crumb-derived products or the lack of technical and financial capacity.

While most countries are struggling to incorporate these conventional recycling pathways in their system, South Africa and Egypt have demonstrated more advanced applications, albeit in a limited fashion. In South Africa, the Mathe Group processes 0.25 million tyres annually into rubber crumbs, out of which 50 per cent is used to make crumb rubber and the rest is utilized for the production of rubber-modified bitumen (RMB), which is then used for national highway projects by the South African National Roads Agency (SANRAL). One such project where this RMB is used is the Gauteng Freeway Improvement Project where, **over 1.8 million waste tyres** were used to construct approximately 200 kilometres of roadway.[12]

Similarly, another facility in the same country, Mandini Energy, instead of ending the process at TPO and char, further upgrades the char into recovered carbon black that can be reused in the manufacture of new rubber and tyres, partially saving a portion of virgin rubber. Additionally, the TPO is further processed to remove its pungent odour and increase its flash point, thereby enabling its use in more sensitive applications, including hospital boilers. Egypt, meanwhile, appears to be the only country with a dedicated reclaim facility, Marso Rubber, which processes roughly 0.1 million tyres annually into de-vulcanized rubber. This product is then used to make products such as car mats, anti-slip pool mats and athletic tracks. Apart from these pathways, a few countries have also experimented with co-processing of tyre pieces as fuel to cement kilns, but this remains a supplementary outlet rather than a fully mature recovery system.

Collectively, these approaches highlight the absence of clear, targeted regulatory measures to systematically manage ELTs in major African countries. While most of the countries have largely overlooked this waste crisis, a few countries—**Kenya, Ghana, Nigeria and South Africa**—stand out as early adopters, having introduced specific or relatively structured ELT management policies.

Nigeria is among the early adopters of waste-tyre regulations, with a formal Extended Producer Responsibility (EPR) model established under the **National Environmental (Domestic and Industrial Plastic, Rubber and Foam Sector) Regulations, 2011.** The regulations apply to all manufacturers and importers of plastic, rubber and tyre products. Under the EPR framework outlined in Schedule 13 of these regulations, tyre manufacturers and importers are mandated to submit an extended product responsibility programme to NESREA for approval; detailing strategies for collection, handling, transportation and final treatment of post-consumer tyres. Producers are also required to submit annual compliance reports indicating quantities placed on the market, collected, processed or stored, along with the locations of collection depots and marketing measures undertaken to reduce post-consumer waste. The regulation has put financial responsibility for managing the waste solely on producers.

While the country has taken an early initiative to develop ELT-related regulations, the directives are not clearly defined or detailed, leaving the regulations vague, unimplementable and ineffective. This laxity is reflected on the ground with the first Producer Responsibility Organization (PRO)-Used Tyres Producers Responsibility Organization of Nigeria (UTPRON), created in 2023, despite the decade-long existence of the regulation. This group is intended to act as a PRO for tyres, working with manufacturers, importers, distributors and recyclers to improve collection and recycling. However, this initiative remains in its infancy and is currently focused on awareness, partnerships and small-scale collection efforts rather than on a fully established, enforceable EPR framework.

Kenya entered this league by introducing the **Sustainable Waste Management (Extended Producer Responsibility) Regulations** in 2024, which classified waste categories subject to EPR and explicitly listed tyres among them. The regulations mandated producers to either individually, or collectively via PROs take financial, organizational and physical responsibility for the management, treatment and disposal of their tyres. The regulations require individual and collective schemes to submit a four-year EPR plan that explains the handling, processing and disposal of 100 per cent of the tyres placed in the market by the producer.

In terms of monetary obligations, the regulation includes multiple fee layers, such as a one-time registration fee (US $39) payable by each PRO or individual, an EPR scheme registration fee (US $77) and an annual operating license fee (US $776 for a PRO). Moreover, to finance the regulatory monitoring, a PRO is responsible for paying 5 per cent of the total membership fees collected annually to NEMA. In parallel, tyre importers are subject to an additional import fee of US $1.16 per tyre. To facilitate recycling, PROs are required to provide raw materials to recyclers at no cost and to cover processing fees.

The 2024 regulations are notably detailed in their design, and include a comprehensive EPR framework setting out clear producer obligations, multi-year planning requirements, and multiple financing instruments. These elements appear robust and enforceable on paper. However, given the recent nature of these regulations, the extent to which these requirements translate into functional collection networks, sustained recycler participation, and measurable recovery outcomes remains to be demonstrated in practice.

South Africa was the first to develop regulatory principles for waste tyre management, with the **National Environmental Management Waste Act (NEMWA, 2008)** gazetted in 2008, and introduced the concept of Industry Waste Management Plans (IndWMPs) for handling various industrial waste categories. The plan is required to be developed by the industry or group of industries that generate the particular waste and requires an approval from the minister. The plan should include details on waste generation and reduction mechanisms, the implementation strategy and timeframe, and monitoring measures. Further, a parallel regulation for waste tyre management—**the Waste Tyre Regulations (WTR)-2008/2009**—was promulgated in the same year. These regulations establish a framework for dealing specifically with tyres and **mandated the management of waste to be directly funded and managed by tyre manufacturers and importers.** It prohibited disposal of whole tyres at landfills and mandated submission of IndWMP under the NEMWA, 2008.

The most successful of the plans under the WTR 2008/2009 was IndWMP submitted by the **Recycling and Economic Development Initiative of South Africa (REDISA)**, which was launched in 2013. REDISA operated as an independent, non-profit implementing agency rather than a producer-led PRO, overseeing the collection and recycling of ELTs. The funding for the ELT management—collection, redistribution and recycling—was achieved through a levy of US $0.14 per kg of tyres produced or imported in the country. This levy was collected directly by REDISA. This raised tyre recovery rates from **4–42 per cent in 2013–17** collecting around 1 million waste tyres in that time,[13] **by establishing 3,000 collection points and 22 depots**; a scale unprecedented elsewhere on the continent. For the first time, South Africa had a functioning, nationally coordinated tyre management system.

However, in 2017, REDISA came under the scrutiny of the Department of Environmental Affairs due to a lack of transparency and inadequate reporting; and was discontinued. In the same year, the new **Waste Tyre Regulations of 2017 were gazetted replacing the WTR 2008/2009.** Through these regulations, in the absence of an approved industry-led IndWMP, the responsibility of ELT management was transferred to the government; handled by the **Waste Management Bureau (WMB)** under the Department of Forestry, Fisheries and the Environment (DFFE). The new regulations imposed registration requirements for tyre producers, collectors and processors with the WMB. Further, the levy of US $0.14/kg collected from the producers and importers was collected by the revenue department and added to the national treasury from where budgets were allocated to WMB for the management of ELTs. Under this fund, waste tyres are delivered to processors at no cost and they are additionally paid a processing fee as determined by the WMB for every tonne of waste tyres processed.

However, this new model has faced numerous on-ground challenges. Since 2017, recycling businesses in the sector have been operating without the promised processing fee or any subsidy support. Thus, many recyclers have exited the sector, stalling recycling operations and resulting in the tyre stockpiles growing to nearly 6 million units as of 2023. Currently, out of the 29 registered depots, 20 are currently nearly full, clearly indicating that the majority of the waste tyres generated are being stockpiled rather than actively recycled or processed.[14]

The major issue in this failure is the disconnection between the tyre levy collected from tyre importers/manufacturers and its actual disbursement to the ground-level recycling activities. This gap lies in the fact that these levies are not ring-fenced, i.e. that they are not specifically dedicated to waste-tyre interventions alone and are added to the common national fund. Consequently, in all likelihood, the levies collected might not be proportionally available to be used specifically for ELT management. Further, although WMB has been given the complete responsibility for the management of ELT, it has not been given any financial control over the funds required to operate the process and completely relies on the revenue department for the release of funds. This practice might have led to frequent deprioritization of funds for ELT handling, resulting in the collapse of the recycling system.

Overall, the transition from the 2008 industry-led waste-tyre management to the current government-led model (primarily due to the absence of any approved industry-led IndWMP) seems to have fractured a previously working system. The country's systematic failure to develop a robust, implementable and approved IndWMP for almost a decade now, considering its enormous annual ELT generation of 12 million units, is alarming.

South Africa's experience can serve as a vital lesson for other countries that are currently moving toward government-led ELT management systems. **Ghana,** for instance, has moved from producer responsibility to a government-led model through its recently published **Environmental Protection Act, 2025 (Act 1124), 2025.** This act gave full responsibility to the Environmental Protection Authority (EPA) for the regulation of the entire lifecycle of various waste streams, **including new and used pneumatic tyres**.

Under this act, producers/importers of tyres are mandated to register with the Authority, obtain a permit and **pay an 'advanced eco-levy' for each tyre imported/produced,** with exemptions for manufacturers that exclusively export their products and importers who recycle their products. Notably, the levy amount per item is not specified in the act and is to be prescribed by the Minister. The revenue generated from this levy will be channeled into the Electrical and

Electronic Waste Management Fund—a common fund—that will be managed by the EPA to support the management of a wide variety of waste, including ELTs.

Although Ghana, similar to South Africa, has a government-led ELT management framework, it has, in contrast, designed its framework so that the entity responsible for the management also has direct financial control over the levy funds, thus avoiding economic dependence on separate entities and the consequent delays in fund disbursement. However, Ghana's framework mirrors South Africa's in one critical aspect—levy revenues are not ring-fenced and are pooled into a broader national waste-management fund. To avoid the challenges that come with this arrangement—disproportionate allocation of funds for particular waste streams—Ghana could consider establishing a dedicated ELT management fund, especially considering the major volumes (3.1 million units per year) generated in this region.

In essence, whichever model a country decides to adopt, it should encompass actionable elements—both financial and technical—that translate into clear recovery outcomes on the ground.

Chapter 2: Foundational pillars for effective ELT systems

As detailed in Chapter 1, only a handful of countries—Kenya, South Africa, Ghana and Nigeria—have taken steps to address their growing ELT volumes by introducing specific regulations incorporating basic aspects such as producer obligations, levy-based or EPR scheme-based financing mechanisms, and regulatory mandates for organized waste tyre collection. However, the presence of these elements in these countries has not automatically translated into acceptable recycling outcomes, indicating a fundamental missing link, i.e. the absence of target-oriented elements. These elements have formed the backbone of the robust ELT management systems and the consistently high recovery rates (averaging 95 per cent) in developed economies. Given the dire need for most African countries to develop or amend specific ELT management frameworks, there is a critical opportunity to draw on regulatory experience from such developed economies.

Rather than directly replicating these models in African contexts, greater value lies in understanding the core complementary pillars that support such high-performing ELT management frameworks, and considering how these can be adapted for various African countries. In practice, robust waste management ecosystems rely on dual pillars: regulatory measures that create the necessary push by mandating target-based obligations, along with an equally vital market-side pull for sustained recycling outcomes. By incorporating these proven elements into new or evolving systems, African countries could improve the likelihood that their regulatory intent translates into functional collection networks, viable recycling markets, and measurable recovery outcomes on the ground (see *Table 2: Comparison of key ELT regulatory elements in selected African countries*).

2.1 Quantifiable regulatory elements

Regulations must move beyond mere broad declarations of intent and function as enforceable instruments by clearly delineating not only the responsibilities of the obligated entities but also prescribing the mechanisms by which these obligations are to be fulfilled to meet targeted outcomes. In the absence of such defined elements, the actors are given excessive discretion, which often leads to compliance being driven haphazardly by convenience and cost considerations. To ensure that countries systematically move towards the envisioned environmental outcomes, embedding specific directives within the regulatory framework is essential.

a) Strengthen producer responsibility in ELT systems

Producer responsibility as standalone or through PROs forms the backbone of ELT regulations in the African countries with regulatory frameworks for ELT management. Notably, 'Producers' include both manufacturers and importers that place tyres on the market—a critical distinction in Africa, where limited domestic manufacturing means imports dominate supply and importers become the primary obligated producers. Thus, strengthening producer responsibility could be one of the most immediate and practical entry points for improving the operability and enforceability of this management framework.

Incorporate proportional responsibility

Building in **proportional responsibility** into the regulatory systems can be an advance step towards an equitable and workable EPR framework. This is a mechanism wherein obligations of tyre producers are decided in proportion to the volume of the tyres that they place in the market. Under such a system, large producers—usually defined on the basis of annual sales volume but can vary from country to country—who place the greatest number of tyres on the market also carry a correspondingly higher responsibility for their end-of-life management.

This proportional principle can be applied through various mechanisms. For instance, regulatory mandates may require 'large producers' to **establish a specified number of collection points** with adequate geographic coverage. Such an approach could ensure that collection capacity grows in proportion to tyre sales, helping to close persistent collection gaps in most African regions, and reducing the risk of tyres flowing into unregulated pathways. Further, the financial responsibilities for managing waste tyres could also be allocated **proportionally** and be explicitly linked to the number of tyres placed in the market by a producer. Some countries already apply this logic through per-tyre levies collected at the point of sale. A similar proportional approach can also be built into EPR fee systems, in which contributions are structured according to market volumes instead of a flat fee.

Moreover, these proportional obligations can extend beyond fees and collection to include **mandatory waste-prevention planning**. Producers placing tyres in the market above a defined threshold, as decided by countries, could be required to prepare and implement waste-prevention plans aimed at reducing ELT generation at the cradle itself, instead of managing the waste later. Such plans are required

ELT FRAMEWORKS IN LEADING ECONOMIES

EPR-driven countries

France

- The country has a high ELT recycling performance, with recycling rates around 94 per cent.
- Producers can either join a collective system via an accredited eco-organization (PRO) or operate as an individual; most opt to join PROs.
- Producers pay an eco-contribution fee per tyre to the PRO.
- The fee is eco-modulated, with discounts or penalties applied based on product design and environmental performance, including recycled content, durability, repairability, reuse potential, recyclability, use of renewable materials, and the presence of hazardous substances.
- The PRO is also mandated with researching the feasibility of introducing bio-based materials into new tyres, and submitting proposals for corresponding bonus–penalty mechanisms to the government.
- The framework has tight collection targets, rising from 96 per cent to 98 per cent in five years.
- Recycling targets for producers are set at 40 per cent of the tyres placed on the market, with the percentage increasing over time. This 40 per cent is to be achieved without using pathways such as reuse, retreading, energy recovery, and use as infill in synthetic sports fields.
- Additionally, at least 5 per cent of the materials recovered from recycling are required to be reintegrated into the manufacturing of new tyres.

Canada (Ontario)

- Ontario has ELT recovery performance of around 85 per cent.
- Producers are required to submit a detailed compliance plan outlining how they will meet their collection and management obligations, either individually or through a PRO.
- Recovery targets are allowed to be met only through reuse, retreading, and recycling. While landfilling and incineration of tyres are prohibited, the framework also excludes the use of tyres as fuel in cement kilns (TDF) from counting towards recovery targets.
- Producers and PROs are required to establish and operate free, publicly accessible tyre collection systems.
- Large producers—defined by an average annual supply of around 11.7 tonnes of tyres—are subjected to minimum collection site establishment mandates, to be met in line with the population size or the scale of their market presence.
- Collection obligations extend beyond points of sale, as producers must also establish collection sites in high-population areas even where they do not directly sell tyres there.
- Producers are also required to arrange collection within 10 business days once notified that more than 200 waste tyres have accumulated at a recognized site.

Spain

- Spain has high ELT recovery rates close to 99 per cent.
- All tyre producers are required to register in the national Register of Product Producers and have membership in either an individual or collective EPR scheme.
- Producers must pay an EPR fee to their PRO, with eco-modulation applied to these fees, with lower fees charged for tyres that are more durable, reusable or retreadable, contain recycled material, and generate fewer microplastics during use.
- Large producers placing more than 250 tonnes of replacement tyres annually are additionally mandated to prepare waste-prevention plans at the design stage, outlining how tyre durability, environmental performance, and end-of-life recoverability will be improved.
- The regulations structure recycling obligations around the waste hierarchy. To meet its recovery obligation, the producer must channel ELTs through defined recycling pathways in predefined proportions.
- These proportions, as of 2025, require at least 15 per cent to be directed towards reuse, a minimum of 50 per cent towards material recycling, and no more than 35 per cent may be met through energy recovery. 100 per cent of recovered steel should

also be recycled. These thresholds are progressively tightened over time with material recycling requirements increasing to 59 per cent by 2030 and 65 per cent by 2035, while the share permitted for energy recovery falls to 26 per cent by 2030 and 20 per cent by 2035. The 15 per cent minimum requirement for reuse remains unchanged across all periods.

Sweden

- Has consistently achieved near-complete ELT recovery in the range of 96–100 per cent.
- Tyre producers and importers are required to meet their EPR obligations through an approved PRO, which centrally manages collection and recycling on their behalf.
- Tyre producers have to pay EPR fees to this PRO, linked directly to the volume of tyres placed on the market.
- Tyre retailers are mandated to accept an equivalent number of end-of-life tyres from customers at the point of sale, free of charge.

Market-driven countries

Germany

- Germany has achieved ELT recycling rates close to 96 per cent, despite not having a tyre-specific EPR law. Instead, responsibility for waste tyres is embedded within the broader circular economy framework and implemented through market-based arrangements, with the burden shared across the supply chain.
- Consumers pay a disposal fee at the point of tyre replacement, typically around US $2.38–4.76 per passenger car tyre.
- Garages and tyre retailers are legally required to hand waste tyres only to certified waste collectors, and similarly, only licensed recyclers are permitted to handle ELTs.
- Operation of non-certified recyclers constitutes a violation and can result in penalties, reaching up to US $60,000.
- There is a very strong downstream market. Federal public authorities have a legal duty to prioritize products made from tyre-derived materials and those that are durable, repairable, and recyclable in public procurement.
- Under Germany's circular public procurement approach, road construction tenders often award additional evaluation points to contractors using tyre-derived materials such as rubber-modified bitumen.
- Companies developing new applications for recycled rubber also get R&D incentives, including subsidies covering up to 25 per cent of personnel costs, capped at €1 million per year.

USA

- According to the U.S. Tire Manufacturers Association (USTMA), 79 per cent of ELTs are recovered yearly.
- TDF accounts for the largest share, driven by the country's extensive cement kiln and paper mill network.
- Many U.S. states finance tyre recycling through mandatory per-tyre fees charged at the point of sale, typically ranging from US $0.50–2 per tyre. California provides a clear example: a US $1.75 fee is levied on every new tyre sold, paid by consumers, collected by retailers, and remitted to the state.
- These revenues are ring-fenced exclusively for waste-tyre management, including recycling programmes and enforcement activities, and are not permitted to flow into general state budgets.
- A number of federal and state programmes stimulate demand for ELT-derived materials through public procurement and targeted financial incentives.
- For instance, public funding is used to offset the higher cost of rubber-modified asphalt and encourage its adoption. At the federal level, the Rubberized Pavement Grant Program provides US $250,000–750,000 directly to cities to support the use of rubberized asphalt in road construction projects. At the state level, programmes such as Kentucky's Waste Tire Program function as central funding mechanisms, reimbursing counties for the additional cost of using rubber-modified asphalt compared to conventional asphalt through dedicated waste-tyre grants.
- Beyond roads, downstream markets are supported through direct production incentives, such as the Tire Incentive Program (TIP), which pays manufacturers US $0.10–0.50 per pound for products made from recycled rubber, and the Tire-Derived Aggregate (TDA) Grant, which offers up to US $350,000 to promote civil engineering uses of shredded tyres.
- Equipment-focused measures are also used like in Arkansas, where recyclers get a 30 per cent state income tax credit on equipment used exclusively for recycling.

to include improving tyre design for greater durability and consequently longer service life, as well as adopting manufacturing practices that support better re-use, re-tread and recycling potential, as well as exploring the feasibility of incorporating alternative or bio-based materials in new tyres. Such a practice is already followed in Spain, where tyre producers that place more than 250 tonnes of tyres on the market annually are mandated to prepare and implement a waste-prevention plan.

Since most African nations lack local tyre manufacturing, the design and material characteristics of tyres entering these markets are largely determined by importers based on the pricing. As a result, considerations such as durability and recyclability are not incorporated into the point of purchase of these imported tyres. Mandating waste-prevention plans can therefore shift responsibility upstream by compelling importers to account for the products' lifespan and recovery potential when introducing them into the market. This will reduce waste generation at the source rather than relying solely on downstream recycling, which is critical since formal recycling and recovery capacity is still developing in most African regions and cannot absorb the large volumes of ELTs generated there.

Institute mandatory take-back frameworks

Another way to bolster producer responsibility is to embed **mandatory take-back obligation** into the ELT management law, requiring any seller that supplies tyres to an end user to accept a similar quantity of waste tyres free of charge at the time. Such take-back obligations could create a predictable consistent return channel for waste tyres by anchoring the responsibility of collection at the point of sale and thus reducing reliance on both voluntary disposal and sporadic municipal collection. While few African governments have listed take-back systems as an optional component of EPR plans, mandating such a system could bring tyres back into formal channels and reduce the chances of ELTs being disposed of informally.

b) Adopt eco-modulation in fee design

Another regulatory lever is the structure of fees paid to the PROs which can be **eco-modulated** to influence producer behaviour. In existing African EPR systems, PROs collect fees from producers to finance the management of ELTs; however, these fees are applied at a flat rate to all tyres, regardless of their quality or environmental performance. While this approach helps recover operational costs and simplifies administration, it offers no incentive for producers to improve design or material choices.

Introducing government-approved eco-modulation can address this gap. According to the principle of eco-modulation, the government can structure the fees to be paid to the PRO linked to measurable performance criteria of ELTs, such as durability, retreadability, recycled content, presence of hazardous material or features that improve recovery at end-of-life. Tyres with longer service life and higher recovery value will attract lower fees, while those with shorter lifespans or poor recyclability face higher charges. France offers an example of how eco-modulation works in practice. The country's PRO applies a base eco-contribution fee per tyre, which is then adjusted through clearly defined penalties or discounts linked to product design. Tyres with higher recycled material content receive a fee reduction, starting at a 10 per cent discount (for recycled content in the range of 1.5–10 per cent), and increasing as recycled content rises. Similar fee adjustments apply based on the presence of hazardous substances in the tyres, with an additional 10 per cent penalty on the base fare imposed when hazardous materials in the tyres are above 0.1 per cent. Through these eco-modulated fees, France directly rewards better-designed tyres while disincentivizing products that undermine end-of-life recovery.

Thus, much like mandatory waste-prevention planning, eco-modulated fees can create a direct financial incentive and aid in gradually steering tyre importers in Africa to place better performing tyres on the market, thereby slowing the rate at which tyres enter the waste stream.

c) Set performance targets based on waste hierarchy

Countries should define what outcomes the recycling system is expected to deliver once ELTs are collected. It is vital for governments to set differentiated ELT recovery targets for the producers across reuse, recycling and energy recovery, since these routes deliver different environmental impacts and resource outcomes. While very few countries in Africa mandate annual targets for waste tyre management—though mandates exist in Kenya and South Africa—the recovery pathway is left unspecified and open to producers' discretion.

In this scenario, producers tend to favour the cheapest or easiest option, even if it causes environmental or health hazards. Thus, mandating **structured recovery obligations in line with the waste hierarchy** can act as a policy tool to steer the market towards higher-value options and guide recycler investment in environmentally friendly pathways.

Spain demonstrates how recovery targets can be explicitly structured around the waste hierarchy by fixing minimum and maximum shares of a producer's overall recovery obligation. Out of a producer's total recovery target, a minimum 15 per cent must be met through reuse and a minimum of 50 per cent must be met through material recycling. At the same time, energy recovery through pyrolysis and TDF are explicitly capped, and permitted to meet a maximum of 35 per cent of a total recovery target as of 2025, with this cap tightening to around 20–25 per cent every five years. Spain effectively uses such differentiated targets as a signaling tool to make national priorities explicit—clearly indicating which recovery pathways are to be scaled, which are to be transitional, and where the market is expected to invest over time.

Interestingly, this concept is not novel to the African ELT regulations, as a few of them already acknowledge the importance of prioritizing the waste hierarchy for ELT management but stop short of providing enforceable elements required to implement this theory in practice. Thus, African nations could design similar achievable targets grounded and calibrated to their existing infrastructure, to account for variation in recycling infrastructure capacities across different countries. These targets can also be progressively tightened as the recycling ecosystem develops.

2.2 Market demand creation for ELT-derived products

While the robust regulatory measures form the backbone for effective waste tyre management, they need to be complemented by robust end-use markets to reinforce the cycle. Several developed economies with high ELT recycling rates have demonstrated that **downstream market development is a critical complement to upstream regulations**, and have implemented various strategies to develop such markets.

a) Integrate ELT-derived products into public procurement criteria

One such important measure is **public procurement,** in which governments **mandate or incentivize** the use of ELT-derived products in public works (roads, pavements, or urban infrastructure). For instance, governments can promote the use of tyre-derived materials by mandating minimum ELT recycled-product requirements in public projects. Such measures thus provide recyclers a reliable outlet for their products and reduce the risk of investing in processing capacity without assured buyers. By demonstrating their performance in public projects, wider acceptance will be encouraged, creating predictable, long-term demand for such products.

Another way to encourage the use of such products is demonstrated by Germany, where public procurement strategies are used to reward the incorporation of recycled tyre materials. In road construction tenders, contractors using tyre-derived materials such as rubber-modified bitumen receive additional evaluation points, allowing such environmentally friendly bids to score higher even when they are not the cheapest. The country has further reinforced the incorporation of ELT-derived materials within mainstream infrastructure projects, through technical specifications in national standards for the use of various categories of recycled rubber in road constructions.

b) Provide fiscal incentives for ELT-derived innovations

Procurement measures could also be complemented with **direct financial incentives** that support both the production and use of recycled tyre materials. These may include tax incentives for recyclers producing retreaded tyres, recycled rubber or crumb rubber, in the form of subsidies for recycling equipment and infrastructure. Currently, industrial-scale recycling businesses are nascent and capital-constrained in Africa; thus, providing early financial support becomes critical to help offset the higher initial costs associated with setting up a recycling

Table 2: Comparison of key ELT regulatory elements in selected African countries

Regulation elements	Kenya	Ghana	Nigeria	South Africa
Ban on landfilling of ELTs	Yes, in a separate regulation	Yes	No, disposal is allowed as per government's recommendations	Yes
Mandatory registration of producers and recyclers	Only for producers	Yes	No	Yes
Take-back scheme mandated	Yes	Yes	Yes	No
Mandatory minimum number of collection points linked to geographical sales volume	No	No	No	No
Time-bound recycling obligations once stockpiles exceed a threshold	No	No	No	Yes, for waste tyre stockpile owners
Government-approved eco-modulated EPR fees linked to performance criteria of waste tyres	Yes	No	No	No
Specific recycling targets set by govt for reuse, recycling and energy recovery	No	No	No	No
Mandated obligations of waste-prevention design strategies for producers	Yes	No	No	No

This table draws its comparison exclusively from four regulatory frameworks: Nigeria's National Environmental (Domestic and Industrial Plastic, Rubber and Foam Sector) Regulations, 2011; Kenya's Sustainable Waste Management (Extended Producer Responsibility) Regulations, 2024; South Africa's Waste Tyre Regulations, 2017; and Ghana's Environmental Protection Act, 2025 (Act 1124)

Source: Compiled by CSE

facility and can make the difference between pilot projects and commercialized industrial-scale recycling operations.

Additionally, **innovation-based incentives** can also be directed for entities that **develop new methods to recycle ELTs** and incorporate ELT-derived products in markets. Such approaches can help de-risk experimentation, accelerate product development, and expand products, which ultimately can reduce the over-reliance on a narrow set of outlets while strengthening long-term market stability for recycled materials.

Chapter 3: Priority actions enabling integrated ELT ecosystems

Africa's waste tyre challenge is not merely a question of handling rising volumes, but also of systemic regulatory gaps that prevent even existing solutions from functioning effectively. Addressing these gaps requires moving beyond scattered interventions towards integrated, aligned frameworks with clear foundational elements as described in Chapter 2. Incorporating these elements fully into operational systems in the African context requires clear entry points and early implementation milestones that countries can realistically pursue within their existing institutional and market contexts. This chapter, therefore, focuses on identifying such actionable priority steps that can serve as practical starting points for African countries.

Given the wide variation in regulatory capacity, markets, and recycling infrastructure across African countries, these recommendations are designed to be adaptable. Implementing these measures can begin to shift tyres from unmanaged waste streams into organised recovery pathways across the continent.

1. Institute governance framework dedicated to waste tyres

The most critical failure in Africa's waste-tyre management landscape is the near-total absence of a regulatory ecosystem governing ELTs. Despite annual generation running into millions of units across the continent, and the fact that tyres are globally recognized as a recoverable resource, waste tyres remain strikingly low on the policy priority list in most countries. Their sheer volume, resistance to degradation, and the specialized recovery pathways required for ELTs make them fundamentally unjustified for being lumped into generic waste policies, and thus necessitates dedicated regulation to ensure proper management.

In this context, **countries should establish targeted ELT regulations that clearly define responsibilities across the entire management chain, from producers and/or importers to collectors, recyclers and authorities**. These regulations must also move beyond broad intent and incorporate enforceable, operational elements (as discussed in Chapter 2) that translate obligations into measurable recovery outcomes on the ground.

2. Formulate targets specific to recovery pathways

To further strengthen these regulations, clear, time-bound **national ELT recovery targets must be an integral part of these policies**, as they create measurable goals and enforce accountability. The targets should specify the proportion of tyres, from the total generation, to be collected and recovered within a pre-defined timeframe. Alongside this, the targets must clearly specify the share of recovery allocated to the various recycling pathways operating within a country in accordance with the waste hierarchy. Once such national targets are determined, these can be proportionally allocated to producers to meet individual targets.

Moreover, while defining such pathway-specific targets, countries should recognize within them practices such as retreading and upcycling. Although these practices already operate at scale in most countries and contribute significantly to extending tyre life and reducing ELT generation, they are most often unorganized and thus their share remains unaccounted for. Incorporating them when developing recovery targets will not only provide a more accurate picture of total on-ground recovery, but will vitally aid in bringing these sectors into a formal system.

Once recovery targets are established, countries can determine the number of tyres required to meet them, and accordingly **determine the minimum number of collection centres required**. Crucially, in order to ensure that collection infrastructure is distributed in line with waste generation, these centres should be allocated based on the size and geographical distribution of the tyre market in a country.

3. Build robust data systems for improved decision-making

Baseline data on the existing tyre ecosystem is a fundamental critical prerequisite for developing an implementable ELT regulatory framework with achievable recovery targets. Without a clear understanding of how many tyres enter and exit the system, it is not feasible to set realistic targets and assess whether progress is being made.

Yet alarmingly, most African nations lack consolidated, credible statistics on ELT generation, recycling and disposal, with these largely being estimates rather than measured figures. This absence of data does more than create technical uncertainty; it also masks the true magnitude of the ELT burden across the continent, making the issue appear less urgent in regulatory priorities. This regulatory perception, in turn, reduces the incentive to establish dedicated policies or monitoring systems, leading to a self-perpetuating cycle.

To break this cycle, **countries must develop systematic data collection of tyre flows across the entire chain from cradle to grave,** including production, imports, sales, reuse, recycling and disposal. Since this collection is not a one-time exercise, but a continuous process, it should be supported by dedicated systems to periodically update the database.

In order to allow regulators, stakeholders and the civil society to monitor progress effectively in real-time rather than having to wait for an annual or multi-year report, **the data collected should be transparently disclosed through publicly accessible platforms** such as digital portals that display key information (registered producers, quantities of tyres placed on the market, recovery volumes, and progress against national targets). This will also aid in realizing the additional benefits of public oversight, such as independent scrutiny, early detection of non-compliance, and stronger pressure on both producers and recyclers to meet their obligations.

4. Catalyse downstream market with strategic fiscal support

While the push created from regulatory measures is necessary to drive recovery, sustaining long-term recovery also requires strong market demand for ELT-derived products. As detailed in Chapter 2, market pull is crucial in creating reliable end-use outlets for the ELT-derived products, promoting investment and expansion in recycling infrastructure, and driving product innovation. This can be achieved either through targeted incentives for ELT-based products and new innovations, or via public procurement policies that prioritize the use of recycled tyre materials.

To bolster such market-support measures, establishing a funding base through EPR fees or levies is essential. Moreover, to ensure effective use of these funds, a crucial approach is to **ring-fencing these funds exclusively for waste-tyre management,** instead of the current practice where funds are pooled in general waste management treasuries and ultimately distributed across multiple waste streams. Ring-fencing ensures that revenues generated from tyres are allocated exclusively to ELT-specific activities, including strengthening collection infrastructure, supporting recyclers, and stimulating end-use markets.

5. Standardize operating protocols for pyrolysis and CRMB pathways

While targeted market incentives aim to proliferate recycling activity, it is equally important to ensure their environmentally sound operation and minimize risks. This makes it critical for countries to **develop standardized technical operating protocols for key recycling pathways,** particularly those that are technically complex or expanding**, such as pyrolysis and CRMB.**

Tyre pyrolysis is rapidly expanding across several African countries, driven by its high processing capacity and lower upfront investment compared to other recycling options, such as devulcanization. However, in the absence of clear environmental safeguards, this expansion poses significant pollution risks, including uncontrolled emissions and improper disposal of by-products, effectively negating the environmental benefits of recycling. To avoid such adverse impacts, governments should mandate standardized operating protocols that clearly define environmental compliance requirements for pyrolysis plants. These protocols should be detailed, covering emission limits, mandatory air pollution control systems, safe storage and handling of tyre pyrolysis oil and char, wastewater management, and periodic environmental monitoring. Critically, pyrolysis facility licensing should be conditional upon adherence to these requirements, supported by regular inspections and enforceable penalties.

Beyond regulating risk-prone pathways such as pyrolysis, technical standards and operating protocols can also enable the scale-up of large-volume applications such as CRMB in road construction. CRMB has significant potential to absorb substantial volumes of ELTs given the scale of road infrastructure development across Africa. Despite its demonstrated performance advantages, its adoption remains limited and inconsistent due to a lack of clarity among contractors and road agencies over concerns around material variability and road performance risks. To unlock the potential of CRMB, countries should formally notify SOPs and standards for the product, clearly defining the production criteria, quality parameters and technical requirements.

6. Incentivize market-entry of higher-quality tyres

Along with developing methodologies for ELT recovery activities, it is also vital to systematically influence the quality of tyres entering a market, as these characteristics directly determine recovery feasibility at the end of life. To enable this, countries should develop **a tyre recyclability performance index** based on parameters such as material composition, ease of dismantling, proportion of recoverable rubber content, presence of hazardous additives, percentage of recovered rubber used, and compatibility with existing recovery pathways. This performance index could then be operationalized through eco-modulated EPR fee structures, where tyres with a higher performance index attract lower costs while poorly designed or difficult-to-recycle tyres face higher charges. Such financial differentiation would create a clear economic signal for producers and importers to prioritize more recyclable tyre designs for the African markets, shifting the management upstream rather than attempting to handle constraints only at the waste stage.

References

1. Mittal, G., and F.G. Boateng. 2025 May 2. Africa's used vehicle dependency: A complicated double-edged phenomenon. *Australian Outlook*, Australian Institute of International Affairs. Accessed February 18, 2026.

2. Ishita Garg and Ahana Ghosh 2025, *Africa's Wasted Potential: Unlocking Industrial Waste in Circularity*, Centre for Science and Environment, New Delhi

3. United States Environmental Protection Agency (EPA). n.d. Tire Fires. EPA Scrap Tires Resource Conservation Program. Accessed February 18, 2026.

4. WKMS. 2016 July 19. Illinois EPA to collect used tires to combat virus-carrying mosquitoes. WKMS News. Accessed February 18, 2026.

5. Research and Markets. 2025 Jun 26. South Africa tyre market report 2025: Local tyre production hits 8.1 million as imports compete for market share in South Africa. GlobeNewswire. Accessed February 18, 2026.

6. MMP Group. n.d. Automobile. MMP Group Africa. Accessed February 18, 2026.

7. Daily Monitor. 2014 Feb 12. Tyre company to create 700 jobs. Monitor (Uganda). Accessed February 18, 2026.

8. Enterprise. 2023. Where we stand on Egypt's plans to localize tire manufacturing. Enterprise News Egypt. Accessed February 18, 2026.

9. World Integrated Trade Solution (WITS)

10. Bandag South Africa. n.d. Environmental sustainability. Bandag. Accessed February 18, 2026.

11. Auto and Truck Tyres. n.d. Services. Auto and Truck Tyres South Africa. Accessed February 18, 2026.

12. Jacobs, J., and L. Marais. 2022. Latest developments in crumb rubber modified

bitumen for use in asphalt and seals: The South African experience. Academia. edu. Accessed February 18, 2026.

13. Infrastructure News. 2025 July 1. South Africa's tyre recycling limbo: How did we get here? Infrastructure News. Accessed February 18, 2026.

14. Department of Forestry, Fisheries and the Environment (DFFE), South Africa. 2022. Industry waste tyre management plan. Government Gazette No. 50322, Notice 4542. Pretoria: DFFE.

Africa's waste tyre crisis is no longer a distant threat—it is unfolding in plain sight. As vehicle ownership rises and substantial imports of used vehicles continue, millions of tyres reach the end of their service life each year. Bulky, non-biodegradable and highly flammable, these tyres occupy scarce landfill space, ignite long-burning fires that release toxic and potentially carcinogenic emissions, contaminate soil and groundwater, and serve as breeding grounds for disease-carrying mosquitoes—all despite the existence of proven large-scale recycling pathways globally.

Yet, across Africa, waste tyres remain one of the least regulated and least prioritized waste streams, with only a mere handful of nations introducing any policies to deal with this issue. This report examines tyre flow dynamics across major African economies, revealing the gaps and challenges in both regulatory intervention and ELT recovery infrastructure. It also distils core structural elements that can prove to be operational and implementable in designing concrete, workable ELT systems.

Africa cannot afford to treat waste tyres as a peripheral issue any longer. Without a deliberate system design, today's unmanaged flows will harden into tomorrow's entrenched crisis, causing widespread public-health hazards. The shift from stockpiles to systems must begin now.

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