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FOSTERING RESOURCE EFFICIENT & ZERO WASTE SYSTEMS IN NIGERIA: THE INDISPENSABLE ROLE OF THE PRIVATE SECTOR – LAFARGE GLOBAL EXPERIENCE

By

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Topics for Discussion

- **Resource and Resources Efficiency**
- **Turning Waste into Resource**
- **Sustainability Development: The Cement Industry Opportunity**
- **An example of a possible proposed good public private Partnership: Lafarge in Nigeria Partnering with LAWMA on waste to landfill minimization**

Resource and Resource Efficiency

From EU[1] Policy brief

Resources: is define to encompass all natural resources that are inputs to our economy, which includes both physical resources and eco-system services. The categories of resources are: metals, minerals, fuels, fish, timber, water, soil, clean air, biomass, biodiversity and land and sea.[2]

Resource efficiency:

- Ways to deliver more with less (natural resources).
- increases in aggregate economic value through more productive use of resources, taking their whole life cycle into account.
- Extracting and using natural resources in a sustainable way; within the planet's long-term boundaries[3] which includes minimizing impacts of the use of one resource on other natural resources.

Circular Economy:

- Using less material and eliminating waste; maximizing value at each step in a process, managing resources in flows, and deepening cooperation throughout supply chain

Shanghai Declaration[4] on Better Cities, Better Life

"Cities should respect nature, consider the urban ecological environment as an asset, integrate environmental issues into urban planning and administration, and accelerate the transition to sustainable development.

- *They should promote the use of renewable energy sources*
- *build low-carbon eco-cities.*
- *strongly advocate for conservation of resources and*
- *promote environment-friendly manufacturing.*

Cities and their citizens should join together to create sustainable lifestyles and an ecological civilization in which people and environment co-exist in harmony".

Sustainable development[5] : The most quoted definition sustainable development, is the one made by the Brundtland Commission:

"Development which meets the needs of current generations without compromising the ability of future generations to meet their own needs."

- The advocating of resource conservation promotes resource efficiency where there is a strong legal framework and incentives for organization that implement resource recovery.

- Moving towards a near-zero waste society not only has an environmental rationale, it increasingly becomes a factor of competitiveness for the private sector.

- Establishing and improving facilities for collection, recycling, treatment and disposal for MSW management can be very costly. For example, building and operating sanitary landfills and incineration plants require huge investments and incur substantial operation and maintenance costs.

- Unless as a nation, we understand this concept, it will be increasingly difficult for the private sector to invest their energy and fund into projects that does not add value to the shareholders

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Turning Waste into Resource

Turning Waste into Resource

- Waste management has become a growing global concern as urban populations continue to increase and consumption patterns change.

- The health and environmental implications associated with garbage disposal are mounting in urgency[6], particularly in developing countries where proliferation and spread air- and waterborne diseases such as plague, dengue fever and diarrhoea among local populations.

- The world is facing increasing scarcity, raw materials from natural resources are limited, financial resources are often insufficient, and securing land for final disposal of garbage is getting more difficult.

- Clearly, policy directions aiming for resource efficient, recycle-based society should be set by government if they are to provide a clean, healthy and pleasant living environment to its citizens for current and future generations.

Turning Waste into Resource

What are the link between "waste" and "resource":

- Resources can be recovered from waste if they are separated at the source, and are treated properly e.g. **EU countries expect house to separate waste into different bin**

Significance of "upstream resource management":

- Equal or higher emphasis should be given to "upstream" resource management and waste reduction efforts, as compared to downstream" waste management options such as treatment and disposal e.g. **proper waste segregation can be built into LAWMA transfer station**

Resource efficiency and circular economy[7]:

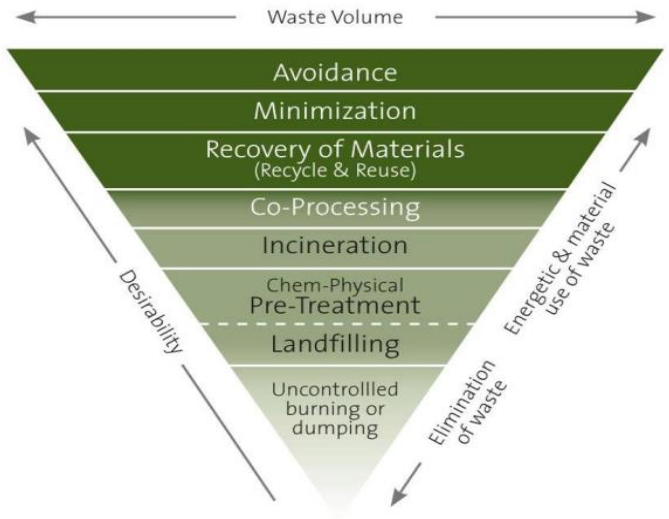
- By reducing production of wastes, and by maximizing the use of reusable and recyclable materials, a city can achieve greater resource efficiency. In other words, smaller amounts of physical resources could produce the same amount of products or services while generating less waste, as in the case of a closed loop economy processes – **one industries using potentially waste of other industries as input.**

Turning Waste into Resource

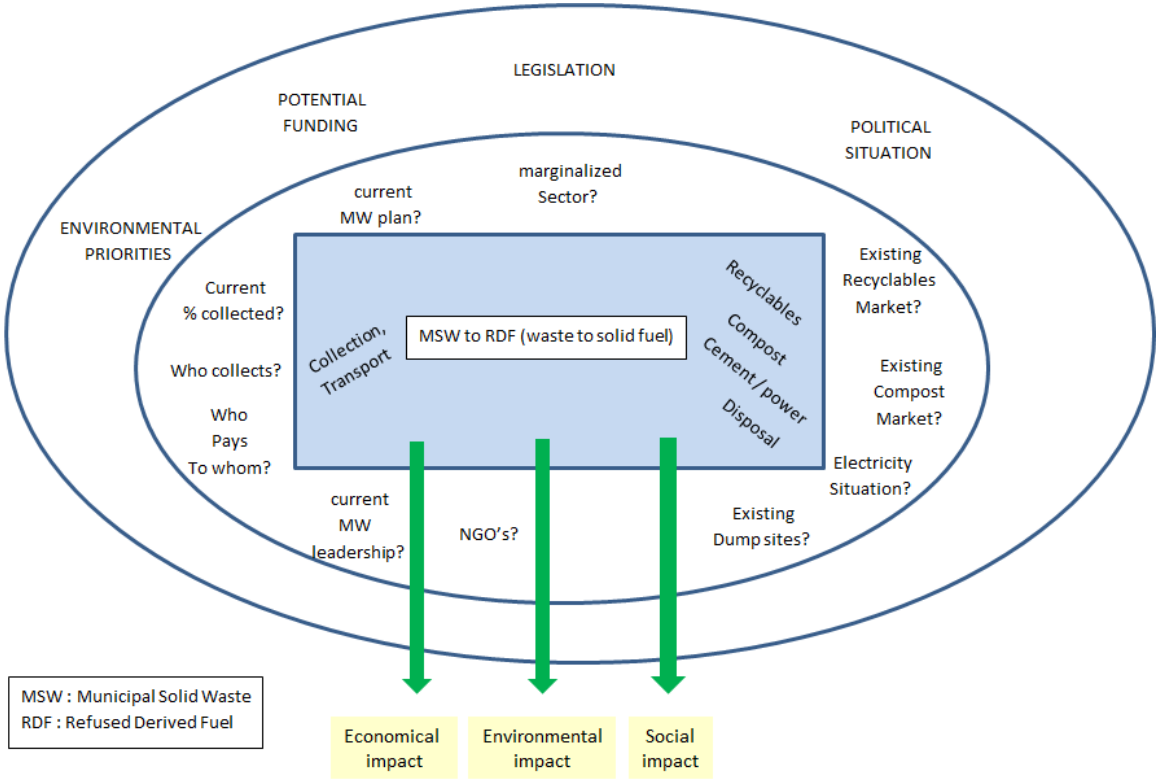
- The processes of resource recovery from MSW depend upon relatively expensive sophisticated equipment such as hydrolysis, pyrolysis, anaerobic injection reactor etc.; as such operations of such processes must be integrated to allow the whole value chain of the process to impact upon each unit of the operations processes.

Resource recovery[6] from waste entails

- An accurate knowledge of the quantity and composition of the waste input,
- Assurance of the consistency of delivery
- At a reasonable cost
- Adequate economic and qualified human resources



Turning Waste into Resource



- **Environmental priorities of the cities must be clear**
- **Legislation and enforcement must be strong**
- **Potential funding must be agreed**
- **There must be Political willingness to implement**

Turning Waste into Resource

	Phase 1	Phase 2	Phase 3	Phase 4
Collect MSW	50% informal	Collect rate 80%	Collect rate ↗	Collect rate 100% Consistent coll. and processes with local recovery possibilities
landfill	Dumping sites	Sanitary landfill ↗	Sanitary landfill minimised ↘	Sanitary landfill minimised ↘
recyclables	Between 0% and 20%	By Informal sector, structure recycle prices	professionalised	optimised
compost	no	Who pays ?	Who pays ?	Optimised ?
RDF for ciment	no	no	yes	
WTE (elect.)	no	no	?	
Industrial waste	Mixed wastes	Beginning of Selective collect	Separated collect	Separated collect

Turning waste to resources allows emerging cities to progress in their municipal waste roadmap, more spending's will have to be faced to address:

1. Current "illegal dumpsite" situation
2. First "sanitary landfill" approach
3. Landfill first minimization with RDF
4. Total recovery optimization

Turning Waste into Resource

Urban waste managers should pursue the paths of Integrated Solid Waste Management (ISWM) and Reduce, Reuse and Recycle (3Rs) that place highest priority on waste

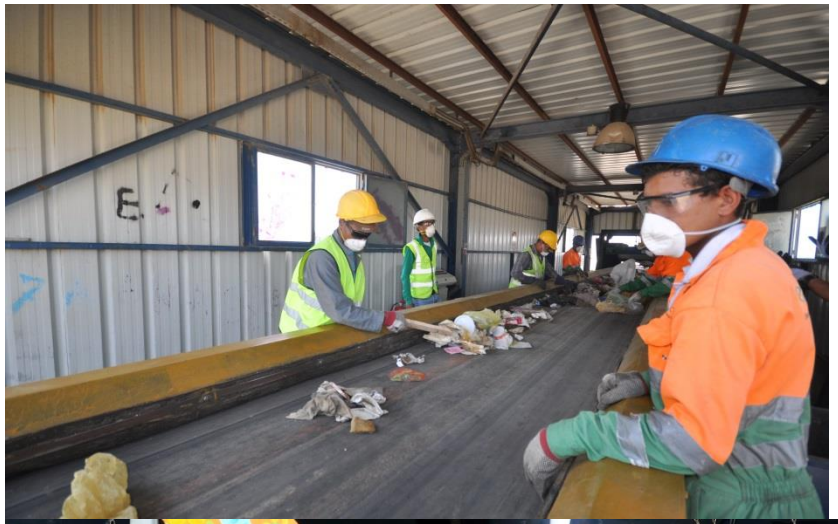
- prevention,
- reduction, and
- recycling

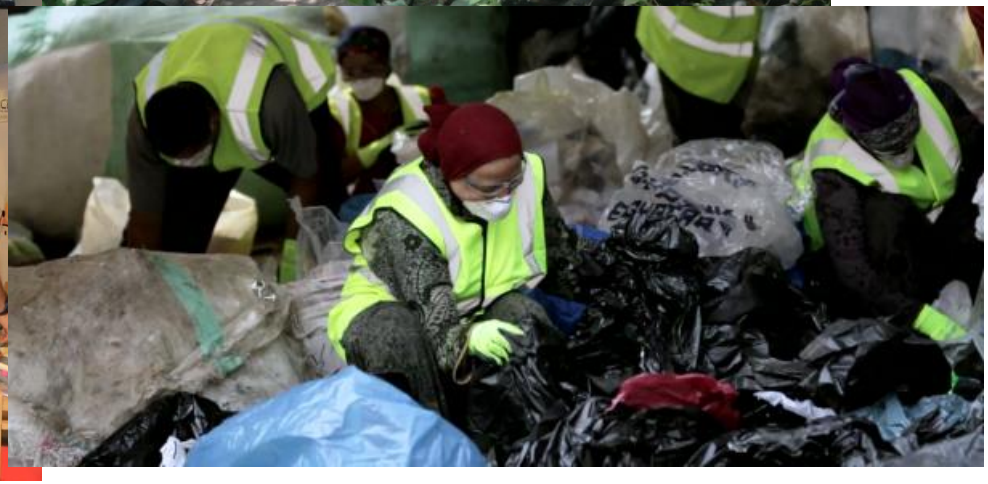
instead of just trying to cope with ever-increasing amounts of waste to dumpsite.

The city waste management company need to define roadmap that will

- move them from phase 1 which is just waste collection and dumping to phase 2 which is the investment phase to start the process of a sanitary landfill
- With phase 2 process in place, then phase 3 will require further investment and partnership from private sector that will lead to waste minimization and moving to zero waste
- Phase 4 involves integrating the whole process to optimize

Sustainable development : The Cement industry opportunity





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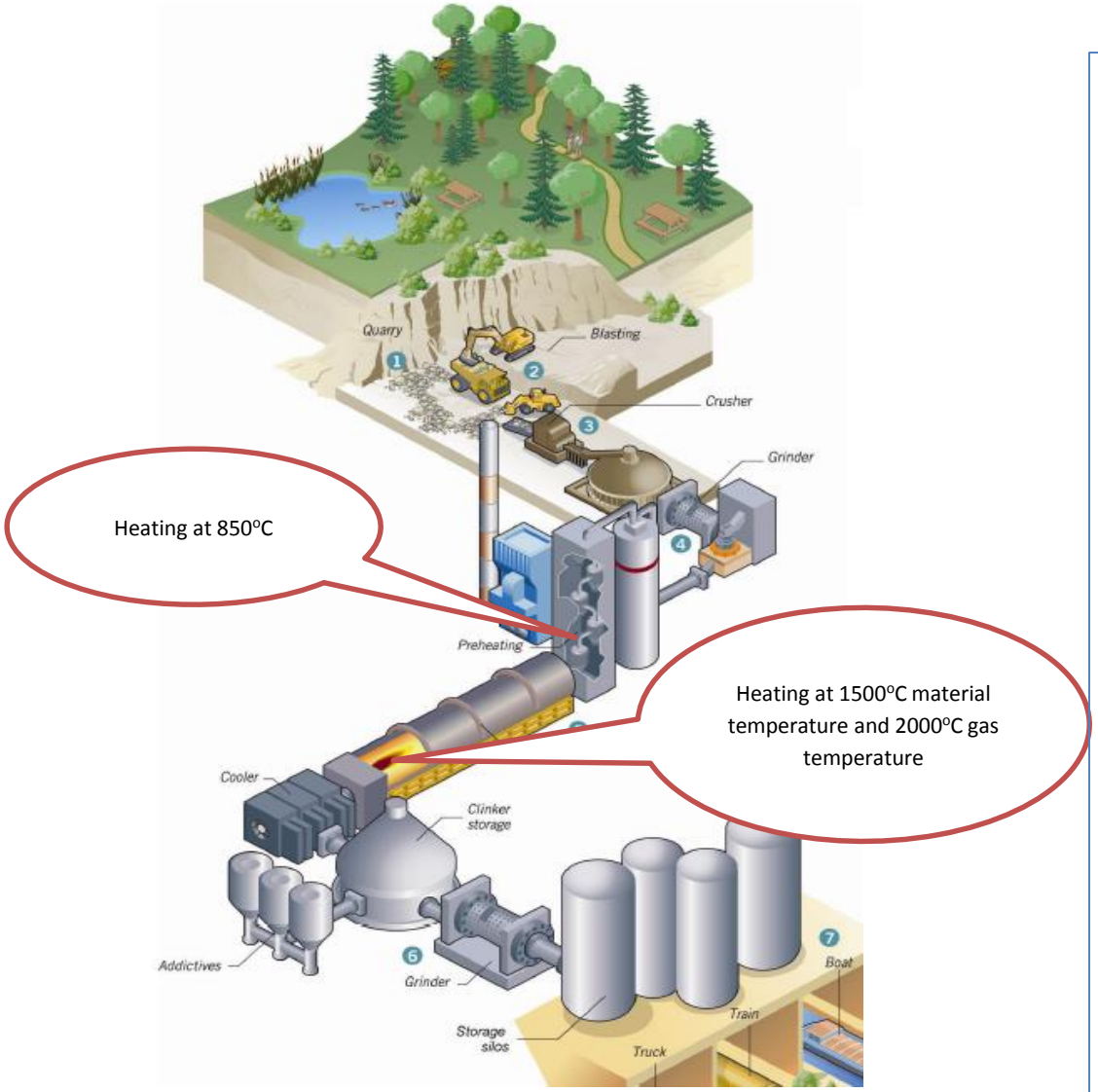
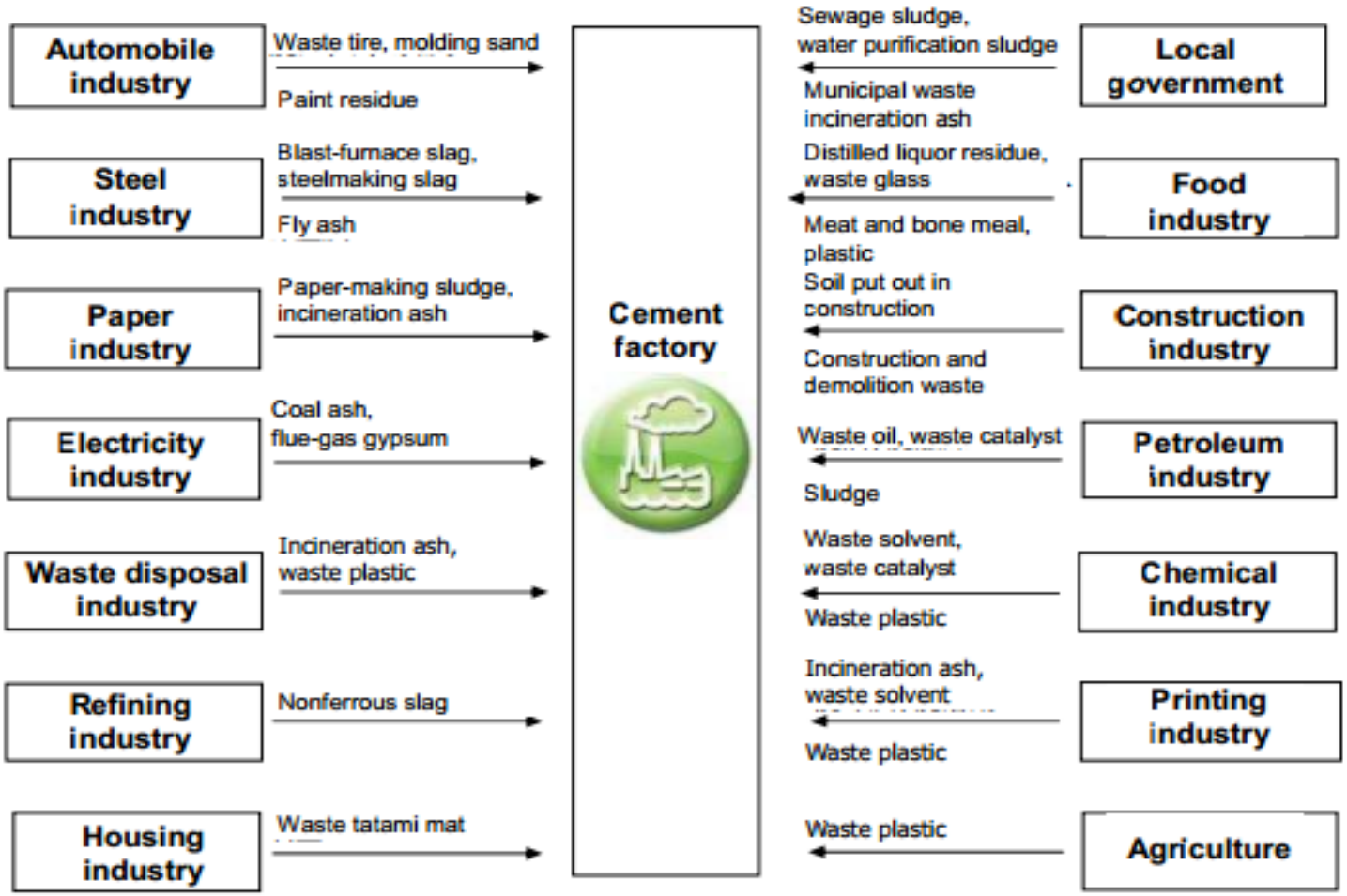
Sustainable development : The Cement industry opportunity



- Producing cement naturally consumes non-renewable raw materials: limestone and clay which are the basic constituents of cement, as well as the fuel which is required in the heating process - generally fossil fuel (coal, pet coke, gas etc.),

- CO_2 is generated during the heating process in the kiln: by the chemical reaction of the materials and by burning the fossil fuels necessary to heat the kiln.

Effective Utilization of Waste and By-product Leveraging In Cement Factory



Reducing CO_2 emissions in Cement Industries – Global priority for Lafarge

- Lafarge signed a partnership agreement with World Wide Fund for nature (WWF) in 1990 to reduced its CO_2 emission by 20% between 1990 and 2010, and 33% by 2020 based on the initial figures of 1990
- The CO_2 reduction was achieved by:
  - ❑ Improving the efficiency of the kiln resulting in 20% reduction
  - ❑ Development of alternative fuel using biomass, MSW and other waste products to replaced fossil fuel
  - ❑ Using of other industrial waste as part of raw materials and cement additives thereby limiting the use of the basic raw materials (limestone, clay)

Reduce CO2 and global warming by using agricultural residue as fuel

How does cement Industries provide effective utilisation of waste as resource and its advantage over other processes?

- Cement process is a "natural" incinerator with temperature up to 2000^{o}C

- The investment for cement making is already done. Many other waste to energy requires fresh and significantly investment

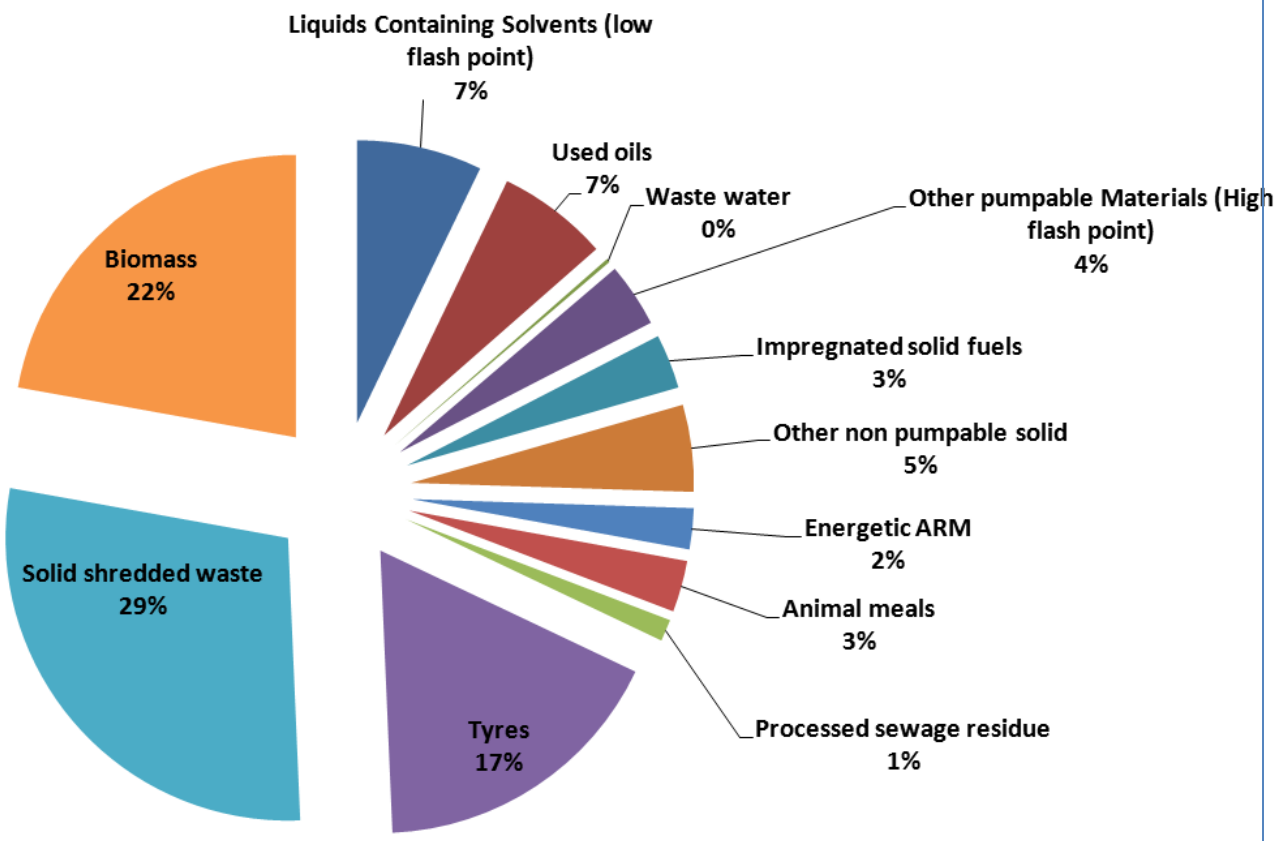
- Cement plant is a part of local community and most of the time the plant will be there for 50years. Lafarge Cement in Nigeria started in 1959.

- Cement options for incineration or co-processing of waste will significantly
  - ❑ Reduce waste landfilling as the combustible part of waste are removed
  - ❑ Prevent some industrial waste from getting into landfill
  - ❑ Prevent the normal burning of agricultural waste which potentially create an economy for people who gather these wastes and supplied to the cement industries.
  - ❑ Prevent open burning of used tyres with all the environmental pollution.

2013 LAFARGE GLOBAL WASTE REPARTITION (GJ)

Tyres + Biomass + SSW = 68%

This represent over 3.5million metric tons of various waste materials



- Lafarge is currently burning biomass in its plant in Sagamu.
- Lafarge in Nigeria has planned to substitute 30% of its fossil fuel with alternative fuel by 2017 and 50% by 2020.
- To achieve this there is an aggressive drive for investment in its plant that will allow the AF to be burnt.

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Outlook of partnership

- Good industrial layout using waste
- Safe working environment
- Dignity in Labour

DEVELOPING MEANINGFUL PARTNERSHIPS WITH PRIVATE SECTOR

A Public Private Partnerships requires

- Simple, consistent technology-neutral policy framework, which allows market investment to drive the cost effective delivery of the waste management infrastructure required.

- Private sector must be able to secure a long term contract with a local authority partner to enable capital intensive process based infrastructure to be developed.

- The local authority should actively engage the industry to better understand the range of possible innovations on offer and seek to resolve potential constraints to investment

- A sustainable partnership with Private sector on resource recovery from waste requires the understanding that a sustainable resource recovery needs heavy financial burden as CAPEX and OPEX – the investment must return profits for it to remain sustainable.

An example of a proposed Public Private Partnership: LAFARGE IN NIGERIA PARTNERING WITH LAWMA ON WASTE REDUCTION TO LANDFILL

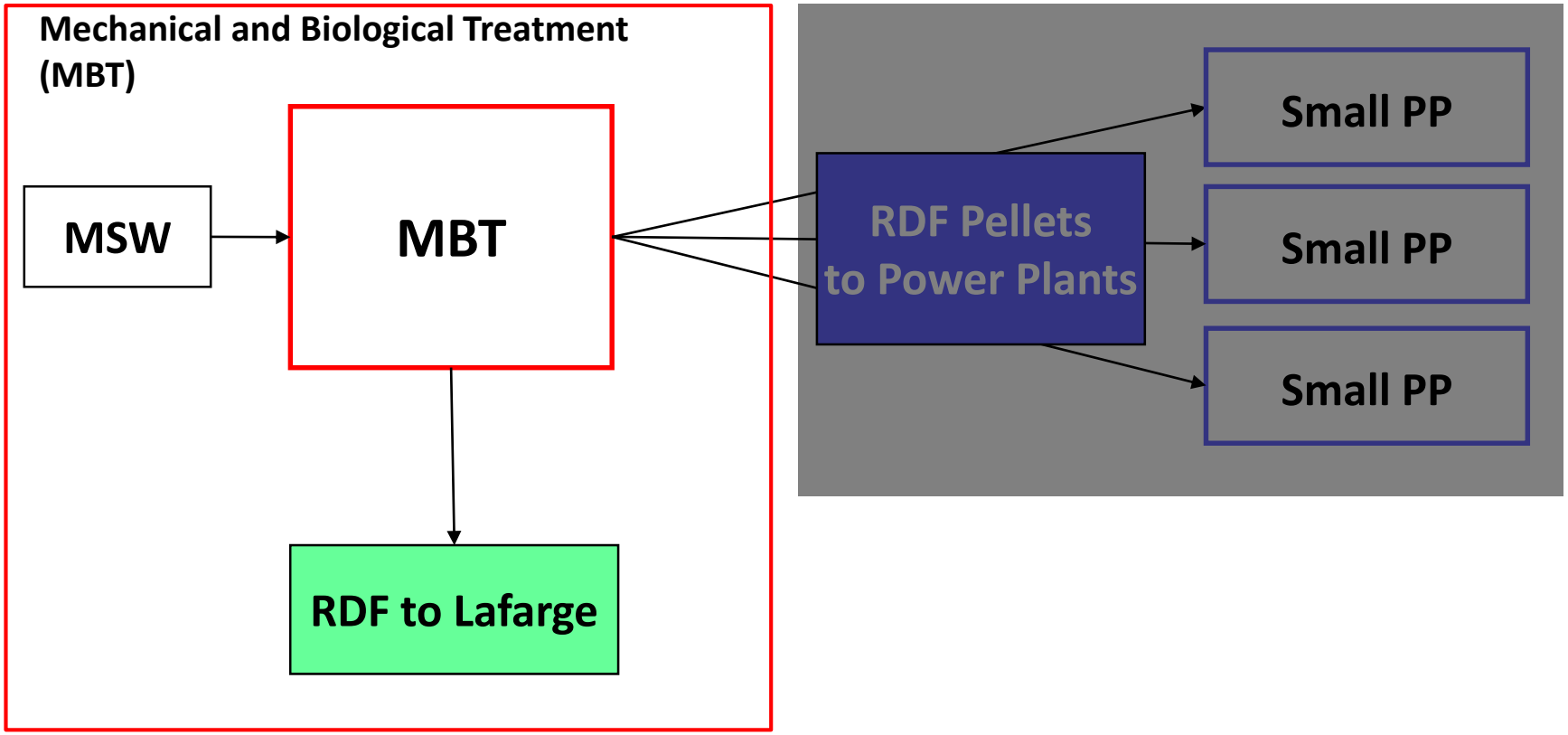
Lafarge is developing system in Nigeria to work with LAWMA to address two needs.

- Produce refused derived fuel (RDF) from MSW by:
  - ❑ Investing in co-processing platform in its cement plant to be able to accept such waste as alternative to gas fuel in its cement kiln
  - ❑ Invest in Mechanical and Biological Treatment (MBT) plant to sort and treat waste to be useful as fuel
  - ❑ Partnership between LAWMA and Lafarge with power producer to produce power with RDF
- Investment on whole tyre feeding system to burn used tyre.

Others opportunity we are looking at with Sugarcane farmers cooperatives in Ogun state

- Recovery of sugarcane peels from Lagos by the farmers from Ogun state to Lafarge plant in Ogun state as biomass – Planning to using same trucks for delivery of the cane to brink back the waste
- Requires cooperation from the two states and Law enforcement agent

RDF from MSW – WTE
Technical Concept - MBT



Mass Balance of our proposed MBT project

1500T/d

877 T/d

623 T/d

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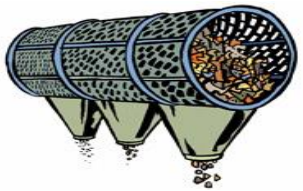


Trommel

Manual Sorting

Mechanical and Biological Treatment

IWM LAWMA

Sanitary Landfill

90 T/d

Bio-drying

Mechanical Treatment

98 T/d

RDF to Cement

318 T/d

RDF Pellets to Power plants

LAFARGE

Lawma
Lawma
Lawma

GENERAL FLOW CHART

MBT

GASIFICATION

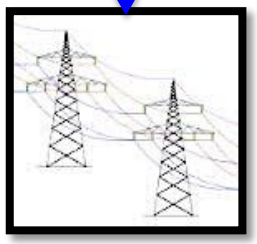
BIOGREEN

GAS CLEANING

GAS ENGINE

HEAT

ELECTRICITY



Char to Cement plant

- Reducing the amount of waste going into landfills
  - ❑ Subsequently reduce operating cost in the landfills
  - ❑ Logistic of moving untreated waste, e.g. if a waste sorting facility can be installed in waste transfer station to remove combustibles and recyclables.
- Increase the number of years the landfill will get filled
- Create decent jobs for people who will operate the MBT plant
- Stop open burning of tyre and release of harmful gases into the atmosphere.
- Generate "Green power" for the state
  - ❑ E.g. on tyre gathering process, the extended producer responsibility policy framework by NESREA can be implemented in conjunction between the industry, NESREA and LAWMA to share the cost of tyre gathering and can potentially of reduced logistics cost
- Reducing global CO_2 production and reduce the impact on climate
- Saving gas for other development in Nigeria (e.g. gas to power, Lafarge investing in 200MW power due to accessibility to gas)

Links to further information

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7. Pathway to circular economy. https://www.rabobank.com/en/images/Rabobank-Industry-note-Pathways-to-a-Circular-Economy-New-model-for-FoodAgri.pdf Rabo bank Industrial Note #343 2012

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