Waste Tyre Management Kenya

Presentation of the Proposed Model

October 23, 2012 - Nairobi

Content of the Presentation

- History of the Waste Tyre Initiative
- Strategic Alliance on Waste Tyre Management
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- Information about Waste Tyres in Kenya
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History of the Waste Tyre Initiative

- Waste Tyre Management Association (WATMA) formed in 2007
- Championed by NEMA to set up a tyre disposal fund using tyres as efficient and environmentally sustainable disposal whilst creating requisite policy and regulatory framework
- Members comprise wide range of actors including tyre manufacturers, dealers transport companies and relevant government departments
- In 2009 GTZ was approached to support the initiative.
- PPP identified as viable instrument
- In May 2011 the Strategic Alliance for Waste Tyre Management Kenya has been established
The main objective of this initiative is to develop a waste tyre management system in Kenya, where the regulatory framework is provided by the Kenyan government and the private sector is designing and implementing the system in cooperation with NEMA.

Phase 1: A concept for collection and utilization of waste tyres will be prepared and the regulatory frame will be developed.

Phase 2: after successful implementation of phase 1, the waste tyre management system will be implemented.

New members are welcomed to join the alliance.
Milestones of the Strategic Alliance on WMTK

- Partnership established in May 2011
- Concept and Feasibility Studies for collection and recycling of waste tyres prepared and agreed upon (April 2012)
- Core group consisting of NEMA, GIZ, Sameer Africa, TreadSetters & KRA established to follow up on concept implementation
- Consultations with Ministries of Environment and Finance ongoing through NEMA to seek their support

The Problem

In 2012, about 2 million waste tyres are generated in Kenya. This amount is increasing every year.

Tyres are not biodegradable and there are no facilities to process the resulting waste. If not handled properly, waste tyre can pose a major ecological threat.

Presently, the majority of tyres are collected and burnt in an open space, for example in dumps or other selected areas, to recover steel strap which is then sold off to metal dealers and industrial manufacturers for a fee.
Open burning of waste tyres

Burning of tyres to recover the steel wires

Average revenue for selling the wires to scrap dealers:
15 – 40 KES per kg
Burning of tyres is done discreetly as it is outlawed and perpetrators are sometimes arrested and arraigned in court.

Open air burning of these tyres results in emission of hazardous gases like dioxins, mercury, hydrogen chloride, sulphuric acid, fluorides and particulates that can damage human health.

These gases not only affect those within close proximity to the burning activity but spreads far and wide to cover a significant range and linger for a while thereafter.

Information about Waste Tyres in Kenya

- Amount and Sources of Tyres
- Estimation of Waste Tyres
- Forecast
- Final Destination of Waste Tyres
Estimated amounts of waste tyres in Kenya in 2009

<table>
<thead>
<tr>
<th></th>
<th>Total number of vehicles in Kenya</th>
<th>Average number of tires per vehicle</th>
<th>Average mass of tyre kg / tyre</th>
<th>Time period of use including retreading years / tyre</th>
<th>Total mass of waste tyres tons</th>
<th>Total number of waste tyres no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Cars</td>
<td>499,679</td>
<td>4</td>
<td>9</td>
<td>3.5</td>
<td>5,140</td>
<td>571,062</td>
</tr>
<tr>
<td>Utilities, Panel Vans, Pick-ups, etc.</td>
<td>219,901</td>
<td>4</td>
<td>25</td>
<td>2.5</td>
<td>8,796</td>
<td>351,842</td>
</tr>
<tr>
<td>Lorries, Trucks and Heavy Vans</td>
<td>91,431</td>
<td>10</td>
<td>50</td>
<td>2.5</td>
<td>18,286</td>
<td>365,724</td>
</tr>
<tr>
<td>Buses</td>
<td>26,558</td>
<td>8</td>
<td>50</td>
<td>2.5</td>
<td>4,249</td>
<td>84,986</td>
</tr>
<tr>
<td>Mini Buses/Matatu</td>
<td>58,286</td>
<td>6</td>
<td>25</td>
<td>2.5</td>
<td>3,497</td>
<td>139,886</td>
</tr>
<tr>
<td>Trailers</td>
<td>27,039</td>
<td>6</td>
<td>50</td>
<td>2.5</td>
<td>3,245</td>
<td>64,894</td>
</tr>
<tr>
<td>Wheeled Tractors</td>
<td>25,091</td>
<td>4</td>
<td>60</td>
<td>5</td>
<td>1,204</td>
<td>20,073</td>
</tr>
<tr>
<td>Motor Cycles</td>
<td>239,104</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>598</td>
<td>119,552</td>
</tr>
<tr>
<td>Three Wheelers</td>
<td>13,856</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>83</td>
<td>13,856</td>
</tr>
<tr>
<td>Other motor vehicles</td>
<td>20,138</td>
<td>4</td>
<td>15</td>
<td>3.5</td>
<td>345</td>
<td>23,015</td>
</tr>
<tr>
<td>Total</td>
<td>1,221,083</td>
<td>45,443</td>
<td>1,754,889</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tyre imports into Kenya in 2011 (source: Kenya Revenue Authority)

<table>
<thead>
<tr>
<th>Imported tyres per company [tons in 2011]</th>
<th>No. of companies</th>
<th>Amount of tyres [tons in 2011]</th>
<th>Percentage of total weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>more than 1000</td>
<td>5</td>
<td>13,759</td>
<td>42%</td>
</tr>
<tr>
<td>250-1000</td>
<td>21</td>
<td>8,647</td>
<td>27%</td>
</tr>
<tr>
<td>100-250</td>
<td>36</td>
<td>5,176</td>
<td>16%</td>
</tr>
<tr>
<td>25-100</td>
<td>66</td>
<td>3,571</td>
<td>11%</td>
</tr>
<tr>
<td>0.001-25</td>
<td>462</td>
<td>1,390</td>
<td>4%</td>
</tr>
<tr>
<td>Total</td>
<td>590</td>
<td>32,544</td>
<td>100%</td>
</tr>
</tbody>
</table>
Source of tyres in Kenya

- Others (tyres produced in Kenya, grey market imports, etc.) - 18%
- Tyres imported with cars - 20%
- Tyre imports - 62%

Forecasted quantities of waste tyres in Kenya

- Tons/a
- Year
Final destinations of waste tyres in Kenya in 2011

Options for Utilization of Waste Tyres

- Waste Tyre Recovery in Europe
- Opportunities in Kenya
- Waste Tyres as Alternative Fuel in Cement Kilns
According to the European Tyre and Rubber Manufacturers’ Association, the annual cost for the management of waste tyres is estimated at € 600 million.

Considering an amount 3.3 Mio tons of waste tyres in 2010, average specific costs amount to 180 Euro per ton (app. 1.80 Euro for a small tyre and 9 Euro for a truck tyre)

Advanced material recycling solutions are fairly expensive and don’t offer a realistic solution for Kenya at the moment
# Cost of shredding of tyres

<table>
<thead>
<tr>
<th>Size</th>
<th>Description</th>
<th>Application</th>
<th>Cost per ton* (US-Dollar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; (5.08 cm)</td>
<td>Clean cut. Ply &amp; bead steel remains</td>
<td>Cement Kilns, Civil Engineering</td>
<td>$10</td>
</tr>
<tr>
<td>2&quot; (5.08 cm) minus</td>
<td>Minimal wire, cut beads removed by magnets</td>
<td>Industrial utility, pulp paper mill boilers</td>
<td>$25</td>
</tr>
<tr>
<td>1&quot; (2.54 cm) normal</td>
<td>Same as 2&quot; minus with extra shredded pass</td>
<td>Power utility boilers (cyclone tspe)</td>
<td>$10-$30</td>
</tr>
<tr>
<td>1/2 &quot; (1.27 cm) minus</td>
<td>Truly wire free, requires additional shredding equipment</td>
<td>Feed stock for crumb rubber, playground and sport field surfaces</td>
<td>$25-$55</td>
</tr>
</tbody>
</table>

According to the results of the feasibility study for WMTK the coprocessing of Waste Tyres in cement kilns in Kenya at the moment offers the most recommendable solution.
Co-processing of tyres in a cement kilns

Utilization of energy and material resources

Baling and shredding of tyres

Baled tyres

Shredded tyres
Cost Analysis of the Proposed Solution

- Costs / revenues have been analyzed in 2 scenarios for
  a) collection and transportation of waste tyres
  b) co-processing in the cement kiln

Scenarios for Feasibility Study: Scenario 1

- Nairobi: 6,000 tons per year
- Central collection point
- 4,000 tons per year (40 m³ truck)
- Mombasa: 2,000 tons per year (20 m³ truck)
- Bamburi Cement Kilns
Scenarios for Feasibility Study: Scenario 2

Scenario 2: 20,000 tons per year

Central collection point

Collection point

10,000 tons per year (20 m³ truck)

Scenario 2 with baling

16,000 tons per year (40 m³ truck)

Scenario 2 with shredder

Bamburi Cement Kilns

Mombasa

Proposed Implementation Steps for WTMK

First implementation step: Nairobi and Mombasa 2012 - 2014

Second implementation step: 2015 - 2017

Third implementation step: 2018 - 2020

Fourth implementation step: All urban areas, from 2021
Cost Balance (overall system costs of the scenarios)

<table>
<thead>
<tr>
<th>Unit</th>
<th>Scenario 1</th>
<th></th>
<th>Scenario 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost collection</td>
<td>Cost co-processing</td>
<td>Cost balance</td>
<td>Cost collection</td>
</tr>
<tr>
<td>Cost per ton</td>
<td>KES per ton</td>
<td>10,962</td>
<td>-7,158</td>
<td>3,804</td>
</tr>
<tr>
<td>Cost per small tyre (10kg)</td>
<td>KES per tyre</td>
<td>110</td>
<td>-72</td>
<td>38</td>
</tr>
<tr>
<td>Cost per large tyre (50 kg)</td>
<td>KES per tyre</td>
<td>548</td>
<td>-358</td>
<td>190</td>
</tr>
</tbody>
</table>

Implementation of WMTK will start with scenario 1, whereas scenario 2 requires a well-developed collection system, which might take several years to be implemented.

Therefore, at the beginning costs according to scenario 1 have to be taken into account.
WMTK costs are influenced by several factors, such as

- future development of coal prices
- prices achieved during tenders
- system efficiency and additional administration costs (i.e. charges of KRA for collection of import levy)

In order to include some financial buffer the following levies are proposed:

- 5 KES per kg tyre or tyre material, resulting in
  - KES 50 for a small tyre
  - KES 250 for a truck tyre

Assuming a selling price between KES 10,000 for a small tyre and KES 50,000 for a truck tyre the proposed levy would make up 0.5% of the selling price.
Proposed Organisational Model for WMTK

- Different models have been analyzed and discussed
- A system, which is exclusively management by the private industry has not been considered as feasible, mainly due to the very large no. of tyre importers
- In the proposed model private industry and state agencies share responsibilities
Thank you for your attention

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