For a sustainable Future

TAREA

Tanzania Renewable Energy Association

MARKET RESEARCH AND ANALYSIS

QUANTIFICATION OF IMPORTED SOLAR BATTERRIES 2014-2016

URBIS FOUNDATION

Stiftung für Umwelt und internationale Solidarität

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Abstract

The study was done to determine the quantity of imported solar batteries that contain pollutants, solar batteries disposal and management. The study found that most importers started importing batteries in 2005 until 2012 the number increased and remained for two more years until 2014. The survey also revealed that the number of new importers almost doubled in 2015. Most of the importations in the past three years (2014, 2015 and 2016) of lead acid batteries were 12V batteries followed by 6V batteries with different capacities. The results suggest that for 12 V batteries capacity ranges between 7 - 250 Amp Hours. On the other hand, 6V batteries have capacity in the range of 15-897 Amp Hours. It was observed that 12 V batteries with 120 Amp Hour have been mostly imported in 2016 with significant difference compared with other capacities. Based on these findings disposal mechanism is highly needed in order to reduce the effect to our environment. It was recommended to promote good occupational health practices, a transparent policy together with a sound regulatory framework and specific guidelines for used batteries management should be developed in a scientific manner that mitigates and eliminates the serious potential risks and hazards to the environment and public health. To achieve this task, there is an urgent need to establish a National Policy for used/expired batteries management and recycling

1.0 Introduction

In Tanzania, used batteries are not normally managed in an environmentally sound manner. Detailed legislation specifically targeting the management of batteries does not exist, except for some related statutory instruments such as the Law on Environmental Protection and Natural Resources Management; the Sub-Decree on Water Pollution Control; and the Sub - Decree on Solid Waste Management. Unsound batteries management has caused concern for the environment and population health in Tanzania and there is an urgent need to improve the management mechanisms based on sound environmental practices, otherwise, harmful and irreparable consequences will occur in the near future.

The adverse health effects are a particular concern because they become another obstacle in the application of the Poverty Alleviation Program, which is the main policy of the present Government of Tanzania. The main environmental and health threats arising from current practices are the release of hazardous materials from batteries. Batteries currently contain one or more of the following eight metals: cadmium, lead, zinc, manganese, nickel, silver, mercury and lithium. These metals are released during various stages in the life cycle, including recharging, ineffective and inefficient batteries recycling and residue disposal. These "unfriendly" activities are all contributors to the pollution of the soil, aquatic ecosystems, and sometimes, domestic air quality as well, resulted in large amounts of hazardous metal substances accumulating in places readily accessible to young children and worker's families. These small stockpiles might be a risk to them and the local communities.

Tanzania Renewable Energy Association (TAREA) has taken this initiative to intervene the situation. With the support from URBIS Foundation of Germany, TAREA through its stake holders conducted the research to quantify the volume of solar batteries

imported in Tanzania from 2014 to 2016. Three big cities including Dar es Salaam, Arusha and Mwanza were parts of the work plan of the project. They are the main points of entries of batteries in Tanzania.

Photo 1: Wet lead acid batteries 2V/700Ah

Photo 2: Aged free maintenance batteries 2V/210Ah at the health centre

2.0 Main objectives

The main objective of this study is to determine quantity of imported solar batteries that contain pollutants in the period of 2014-2016.

3.0 Specific objectives of the study

The specific objectives of the study are finding the facts below.

(1) The amount of solar batteries imported since 2014 to 2016

(2) The evaluation of local management practices, recycling and the disposal of any expired batteries

(3) Environmental, occupational and population health risks, and hazards resulting from the disposal

(4) The shortcomings in batteries management and recycling, and especially, requirements for legal instruments, capacity building, and future action plans, based on the recommendations from stakeholders.

4.0 Significance of the research

This study could make a very important contribution because is consistent with the policies of the current Government of Tanzania towards environment management and alleviation of the widespread poverty in certain sections of the population. Essentially, the outcomes of the project can or will directly or indirectly:

(1) Prevent environmental pollution while maintaining socio - economic development based on environmentally sound procedures.

(2) Increase the incomes to batteries collectors and formalize income to recyclers.

(3) Provide the workers and the general public with an understanding of the necessary measures to prevent or

avoid any adverse effects resulted from expired batteries disposal

5.0 Study Methodology

The study looks at major solar batteries importers and distributers in Tanzania. Questionnaires were distributed to all stakeholders in big cities including Dar es Salaam, Arusha and Mwanza. This method was a challenge to some stakeholders as they are contractors and they were working on sites. The alternative method used was phone interview to complete some information. Some directors worried that the numbers would be shared to the revenue authority. To resolve this challenge, we agreed not to mention any company, but present cumulative figures.

6.0 Amount of solar batteries imported since 2014 to 2016

The survey showed that mainly two types of batteries were imported, lead acid batteries and lithium ion batteries. The survey quantified the key sources of heavy metal pollutants, solar batteries.

6.1 Lead acid batteries

Results indicate that most of the importations in the past three years (2014, 2015 and 2016) of lead acid batteries were 12V batteries followed by 6V batteries with different capacities. The results suggest that for 12 V batteries capacity ranges between 7 – 250 Amp Hours, table 1. On the other hand, 6V batteries have capacity in the range of 15-897 Amp Hours, see Table 2. It was observed that 12 V batteries with 120 Amp Hour have been mostly imported in 2016 with significant difference compared with other capacities. Other imported batteries of 2V, 4V and 24V are presented in the table 3.

It is obvious that amount of heavy metals present in the batteries is equivalent to the capacity and based on these

findings disposal mechanism is highly needed in order to reduce the effect to our environment.

Capacity (Amp Hour)	2014	2015	2016
250	**0**	0	**350**
220	0	1080	760
210	40	136	95
200	730	439	931
150	1,035	1280	1,622
120	260	240	3,117
108	10	0	0
100	17,755,926	34,463,614	9,794
90	0	0	180
80	370	420	410
75	3,770	6,400	7,800
70	60	70	60
65	5,617,154	13,937,284	30
55	800	1,200	900
50	520	85	5,075
40	88	120	185
26	5,000	75,000	11,000
24	500	17,056,440	500
20	50	20	20
18	2,600	3,300	3,200
17	8,144,480	15,915,540	0
12	3,800	4,000	4,500
10	45	40	25
7	2,455,200	13,318,900	32,000
Sub total	**33,992,438**	**94,785,608**	**82,554**
	Total	**128,860,600**	

Table 1: 12 Volts Lead Acid Batteries (Amount/year)

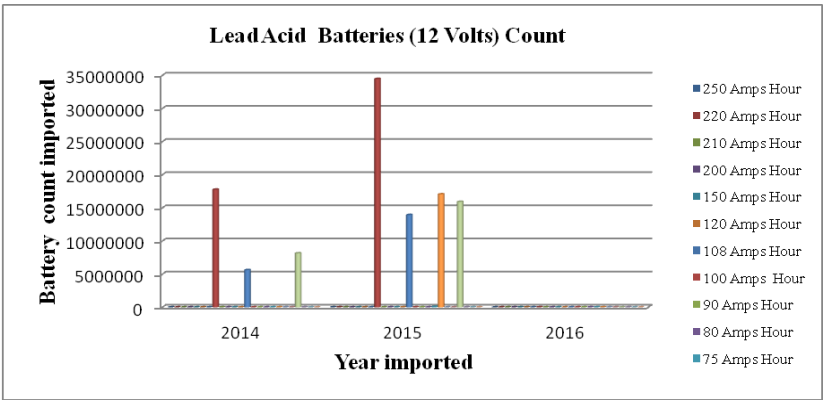

Figure 1: Imported 12V lead acid batteries with different capacities from 2014 to 2016

Capacity (Ampere Hour)	**2014**	**2015**	**2016**
897	20	50	10
800	60	120	12
600	50	120	60
550	0	48	96
425	0	24	18
50	0	0	7500
26	0	500	0
24	0	40	0
15	2304	2278	9217
Sub Total	**2434**	**3180**	**16913**
	Total	**22527**	

Table 2: 6 Volts Lead Acid Batteries (Amount/year)

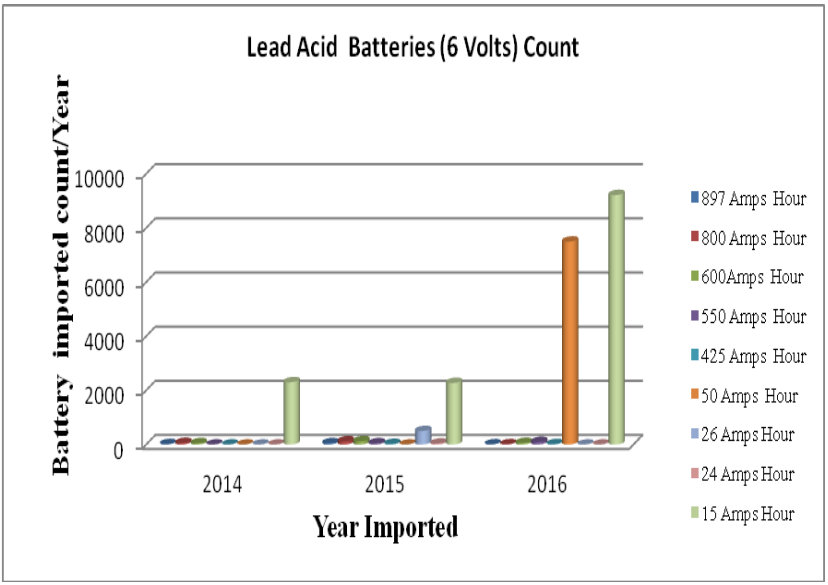

Figure 2: Imported 6V lead acid batteries with different capacities from 2014-2016

Capacity (Ampere Hour)	2014	2015	2016
5	50	108	30
10	215	245	90
15	35	15	20
20	160	145	70
30	50	45	10
40	80	50	60
70	10	25	10
80	20	35	75
90	0	0	30
100	0	0	60
150	0	0	97
250	0	0	50
Sub Total	**620**	**668**	**602**
	Total	**1890**	

Table 3: Imports of other (2V, 4V & 24V) Lead Acid solar batteries Amount/Year)

6.2 Lithium batteries

The survey found that lithium batteries were imported in 2014 and none in 2015 and 2016. Table 4 and figure 4 show 12 V batteries with different capacities. Declining of lithium batteries importation or usage has been its cost. Lead acid battery is cheaper to lithium battery.

Capacity(Amp Hour)	2014	2015	2016
9		10	100
7.8	6910	0	0
7.2	6925	0	0
3	100	200	1000
	13935	**200**	**1000**
	Total	15135	

Table 4: Imported 12V Lithium batteries

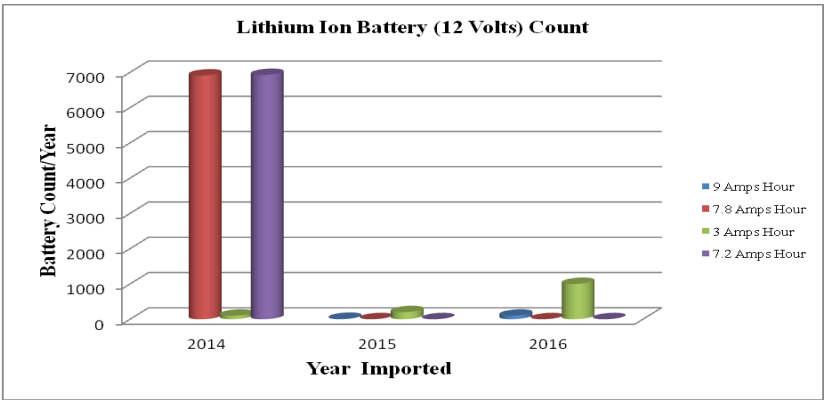

Figure 4: Imported of 12V Lithium batteries with different capacities from 2014 – 2016

7.0 Local battery management

In figure 5, the research findings show that respondents don't know if there is anyone who manages expired batteries. However, 75% of the respondents are aware of the effect of pollutants present in lead acid and have strongly agreed that the management of the expired batteries is very important. On the other hand 25% of the respondents seem to know the importance of recycling.

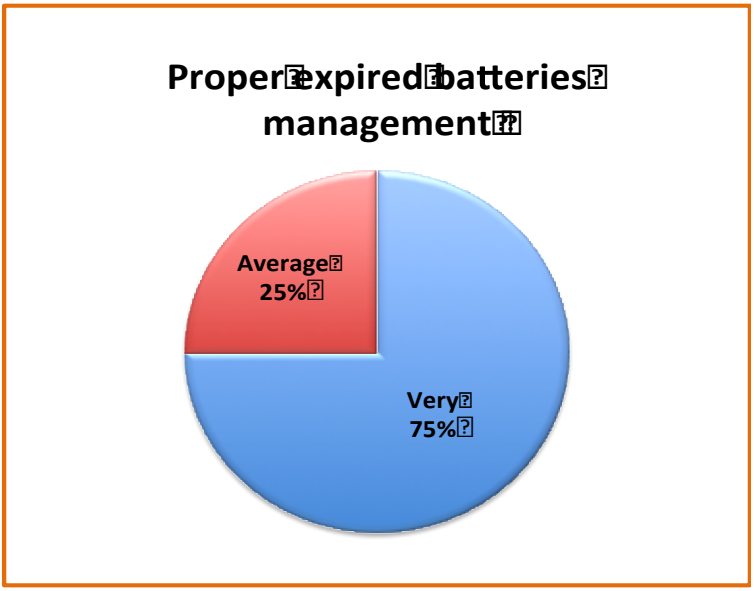

Figure 5: Reaction on importance of managing expired batteries

Also the study revealed that used solar batteries in Tanzania are disposed off through the public waste collection systems or waste dumping sites, because used batteries still has low value for waste pickers or scavengers. Few vendors are breaking the battery and sell metal and plastic. The acid is just poured on the ground, see photo 3. No formal recycling technology/facilities are being used and this situation threatens the environment, economy and public health.

This research found that generally, the people working in these sources of pollutions are generally limited in their awareness and knowledge of environmental protection and health care. Also the study found that most Tanzanian people have never considered or being concerned with the adverse health impacts resulted from the way they manage used batteries.

8.0 Results and Discussion

Male and Female respondents were involved in this research project. Among them 18% were individual stakeholders while 82% were private companies/institutions. The industry seemed to be dominated by male. The results show that only 17% of stakeholders involved in the survey were female while the rest were male. In this research most importers started importing batteries in 2005 until 2012 the number increased and remained for two more years until 2014. The survey also revealed that the number of new importers almost doubled in 2015. Figure 6 shows that 75% of the respondent deals with solar energy equipments only while 13% of the respondent said they are in mixed business of solar and wind equipment importation. These results suggest strong need and market potentials for solar energy in Tanzania.

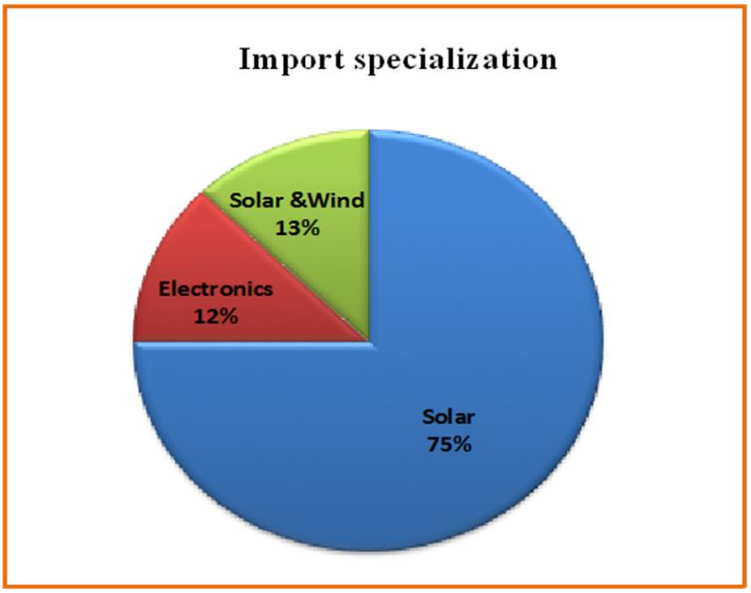

Figure 6: Import specialization

The results shows that major importations of solar batteries are from China 63% and India 16% contributing to more than two third of all importations. Only 11% of the batteries are imported from USA while 10% are from Canada, USA, Kenya and Germany. The study revealed that the imported batteries have different lifespan that range between 2 to 15 years. This is an important indicator of the amount of pollutants from the expired batteries. The study shows that 59% of the imported batteries have between 3-5 years lifespan see figure 7. The results also revealed that 33% have a lifespan of between 3-4 years while 8% have a lifespan of 2 years.

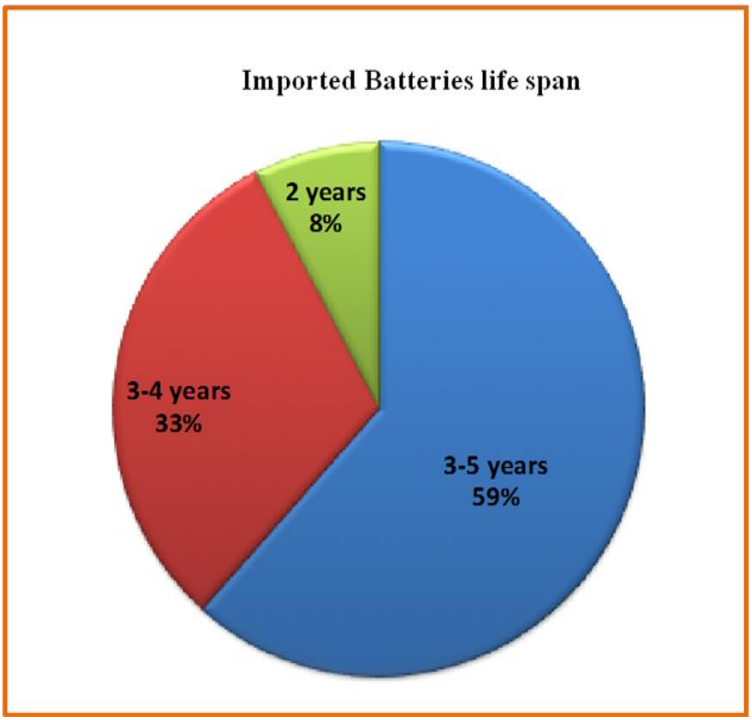

Figure 7: Batteries lifespan

9.0 Recommendations

(1) To promote good occupational health practices; a transparent policy together with a sound regulatory framework and specific guidelines for used batteries management should be developed in a scientific manner that mitigates and eliminates the serious potential risks and hazards to the environment and public health. To achieve this task, there is an urgent need to establish a National Policy for used/expired batteries management and recycling.

(2) Identify the environmental and human health impacts based on the analysis of collected data and information

(3) Protect the environment and promote sustainability through legislation that secures sound used batteries recovery operations, defines responsibilities and accountability, surveillance and enforcement.

(4) Institutional arrangements and social participation including the formation of administrative systems, public participation and information, stakeholder involvement, a role for the private sector and nongovernment organizations and voluntary initiatives

(5) Building and strengthening the capacity of staff in the various Tanzania Government institutions that are involved with used/expired batteries management

(6) To achieve these aims it is essential that a National Action Plan is developed and agreed by all interested parties, and implemented.

10.0 Conclusion

The most surprising fact to emerge from this survey was that a total of 128,860 million batteries imported were 12 volts Lead acid batteries. It was followed by 6Volts Lead acid batteries that were 22,527. Most encouraging, the survey also reported that most of stakeholders confirmed that they would sell their old batteries for recycling rather than dumping them. As a conclusion, the preparation of Guidelines for the environmentally sound management of used batteries should be developed and implemented at the national level and the capacity building should be promoted, especially, technological transfer through exchange visits between some countries where similar projects or problems were resolved successfully with beneficial outcomes. The public should be sensitized on the negative impacts of used batteries.