UMEME'S ADDITIONAL RETROSPECTIVE INVESTMENT VERIFICATION REPORT

2014

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1 INTRODUCTION

Umeme Limited, as part of its 2014 completed investments submitted to the Authority for verification, consideration and approval to earn a return on investment. In its submission, Umeme Limited included investments implemented without prior plan approval by the Authority. The investment plan approved by the Authority for 2014 totaled to US$78,708,763.

Umeme Limited made a submission of completed investments for 2014, totaling to US$92,589,343, out of which, a total of US$45.934 Million [after verification] was approved to earn a return in respect to the company's approved Investment Plan.

During the 2014 verification exercise, the investments that had been executed by Umeme Limited without the Authority's approval were not considered at the time of verification. The company was requested to re-submit the investments separately for the Authority's review, consideration and possible approval for a ROI with detailed explanations why the company did not seek prior Authority's approval.

Umeme Limited submitted the additional 2014 investments in its letter dated 30th December 2014, received by the Authority on 2nd January 2015. The submitted documentations for the investments were reviewed, field verification were conducted and this report presents the review and verification findings for possible retrospective consideration and approval by the Authority. The investments were categorized as follows:

(i) Carry over Investments;
(ii) MV Loss Reduction;
(iii) LV Loss Reduction;
(iv) Restoration Projects;
(v) Commercial Loss Reduction;

(vi) Other LV Technical Loss Reduction Projects;
(vii) Restoration with safety.

2 BACKGROUND

Umeme Limited applied to the Authority for approval of its 2014 Investment Plan amounting to US$ 142,474,000. The Investment Plan for the year 2014, was reviewed taking into consideration the respective justifications for each project, the implementation status and the impact on the network of the 2013 approved investments, cost estimates, previous loading and network outage data analysis, the recommendations by the Emmerton Technical Loss Reduction Strategy and respective field inspection recommendation to address the network constraints.

The Authority approved a total investment budget of US$ 78,708,763 in three meetings. The first set of approval was made at the 226th meeting, amounting to US$ 40,945,000 and the second approval was made at the 230th meeting, amounting to US$ 33,167,000. In the latter meeting, the Authority revised the first approval of US$ 40,945,000 to US$ 36,345,000 to reflect the detailed cost breakdown as presented by the company in its submission of the additional information which informed the second Authority approval.

The third approval was made at the 237th meeting, amounting to US$ 9,474,000 and communicated in the ERA letter dated 28th October 2014.

While communicating the third approval, the Authority noted that the investments that had been approved in the area of loss reduction were sufficient to enable the company achieve the annualized loss trajectory target for the year 2014. The Authority deferred any other investments in loss reduction in the company's application to 2015.

Umeme Limited, in its response dated 30th December 2014, submitted additional information in support of the various projects implemented without the Authority's approval. The total submission for consideration for retrospective approval of the Authority amounted to **US$ 37,613,966,** as detailed in Table 1.

Table 1: 2014 UMEME INVESTMENTS SUBMITTED FOR RETROSPECTIVE APPROVAL

S/N	Description	Approved Budget by ERA (USD)	Additional Requested amount for approval (USD)	Total Project Cost (USD)	Project completed in 2014 (USD)	Forecast Carryover to 2015 (USD)
Change of scope						
1	Kireka - Namugongo: zones 1-6	876,515	5,787,634	6,664,149	6,664,149	
2	Mutundwe - Kabowa feeder ABC zone 1	259,943	396,229	656,172	656,172	
3	Restoration Projects - Overhead lines	2,441,508	3,335,184	5,776,692	5,776,692	
Without Authority Approval						
4	Green Valley Transformer Relief	0	125,655	125,655	125,655	
5	MV and LV Technical Loss Reduction	0	20,737,309	20,737,309	15,623,738	5,113,571
6	LV Technical Loss Reduction	0	3,204,102	3,204,102	3,204,102	
7	Commercial Loss Reduction Schemes	0	2,000,000	2,000,000	2,000,000	
8	Quality of Supply - Public Safety	0	2,027,853	2,027,853	2,027,853	
	Total	**3,577,966**	**37,613,966**	**41,191,932**	**36,078,361**	**5,113,571**

3 METHODOLOGY AND MAJOR GUIDING PRINCIPLES

The Methodology and the Guiding Principles have been as highlighted in the 2014 Investment Verification Report. For avoidance of doubt, these guidelines emanate from the Electricity (Tariff Code) Regulations, 2003, section 6 (1) which requires the Licensee to justify any costs or investments included in the formulation of Tariffs. The Authority may challenge such costs and where necessary reject them, if it considers them not to be prudently incurred and/or are unreasonable in nature.

Furthermore, the Umeme Limited License No. 46 (Amendment No.4), provides for investments whose approval is granted by the Authority to earn a return on Investment in addition to those implemented under emergency. The Authority reserves the right to determine the nature and magnitude of the emergency, in order to allow or reject such investments implemented without prior approval of the Authority.

The retrospective investments were verified in accordance with the provisions of the Electricity Act, Electricity Tariff Code Regulations and the Investment Approval and Verification Guidelines, 2013.

3.1 MAJOR PRINCIPLES

The submitted retrospective investments have been verified, based on the following major principles as stipulated in the various Authority Legislations and/or Guidelines. The principles are as below:

(i) Transformers which did not last their useful lives and were replaced with a higher rated transformer (upgrade), the value of the new transformer has been offset with the cost of the old transformer for ROI purposes;

(ii) Replacement of low voltage (LV) poles, conductor together with their associated labor and transport costs have not been considered as these are catered for under the company's DOMC;

(iii) Borrowing costs, overhead absorption, labor and transport costs relating to supervision by Umeme staff have not been considered as part of Capital Expenditure (CAPEX) for ROI purposes as these are provided for in company's DOMC;

(iv) Capital Work in Progress (CWIP) submitted has not been considered as part of investments for ROI purposes;

(v) Unsupported journal vouchers have not been recommended for ROI;

(vi) Impairment of decommissioned assets such as conductor and transformers has been provided with an assumption that the conductor had remained with Five (5) years and transformers Five (5) of their useful lives. Furthermore, the L&T and accessories associated with the decommissioned assets have been assumed at 30% of this cost;

(vii) Prepayment and retrofit costs have not been considered in this review.

Other Principles

(i) Investments rejected by the Authority have not been considered;

(ii) Investments deferred by the Authority to the following investment cycle (year) have been considered in the recommended year;

(iii) Investments that were done without prior Authority decision have been treated as emergency investments and have been subjected to the criterion of an emergency investment.

3.2 METHODOLOGY

The investment verification process was undertaken in two phases:

3.2.1 PHASE I- DESK REVIEW

In this phase, all documentation of submitted completed investments were reviewed to check:

(i) Whether the project was approved by the Authority;

(ii) Justification given for the investments is accurate and adequate;

(iii) Check whether the company's procurement procedures were followed to ensure value for money;

(iv) Ascertain how the respective contractual obligations where undertaken;

(v) Review and confirm content of the various project implementation documentations and close-out reports; and,

(vi) Evidence of payments made against completed works.

All documentation regarding each investment submitted was fully verified for consistence with the Authority's Investment Approval and Verification Guideline, 2013, the License Terms and Conditions and the Electricity Tariff Code Regulation with regards to Investments.

3.2.2 PHASE II – FIELD VERIFICATION

After the desk review, the submitted investments were sampled out based on the materiality of the investments to validate the works done

in the field to confirm implementation to contractual standard, physical existence and quality of works done.

4 DETAILED INVESTMENT VERIFICATION AS PER THE SUBMITTED CATEGORIES

Umeme Limited submitted a total amount of **US$ 34,015,894** for verification. We note that this amount was different from that submitted in their application of 30th December, 2014 of **US$ 37,613,966**. This review and approvals thereof are based on the amounts submitted for verification.

4.1 CARRYOVERS

Three projects were submitted under this category and these are:

a) Kireka – Namugongo 11kV feeder;
b) Mutundwe – Kabowa 11kV feeder; and,
c) Green valley transformer.

In 2013, the Authority had approved the two feeders namely Kireka – Namugongo and Mutundwe – Kabowa 11kV Feeders for Technical Loss Reduction with the scope limited to transformer injections. No submission and approval for Green Valley Transformer was done.

For these approved Feeders, the strategy for implementation in 2013 was to address the low hanging fruits as Umeme Limited awaited the completion and recommendations of the Emmerton Loss Reduction Study. Table 2 shows the approved transformer injections per feeder, the cost and resultant annualized loss gains.

The sections below describe the approval processes, reviews and recommendations carried out for each project.

TABLE 2: 2013 APPROVED TECHNICAL LOSS REDUCTION

Feeder	Targeted transformer Zones	Cost US$m	Annual loss Reduction GWh
Gayaza	45	1.819	3.03
Mulago	6	0.244	0.4
Kampala South - Entebbe 1	30	0.802	1.34
Kigo	22	0.75	1.25
Namugongo	60	2.203	3.673
Mbale Ring 1	38	0.782	1.3
Kabowa	10	0.488	0.81
Buddo	42	1.328	2.21
Mutundwe- Mityana	5	0.144	0.24
Namungona	11	0.74	1.234
Nsambya	17	0.69	1.151
Total	**286**	**9.99**	**16.638**

4.1.1 KIREKA – NAMUGONGO FEEDER (US$6,774,301)

The sequence of approvals for the Kireka – Namugongo 11kV Feeder were as follows:-

i) The Authority at its **217th meeting held on 30th April 2013,** approved a cost for 60 transformer injections for Namugongo at a budget cost of **US$2.203million**;

ii) Umeme Limited in its 2014 Investment Plan Letter **Ref: ERA/2013.11/165,** dated **28th November 2013** and another Letter **Ref: ERA/2014.3/55,** dated **31st March 2014,** respectively applied for Namugongo transformer injections under the carryover category at an increased cost of **US$ 3,249,974**. The increase in project scope was due to the inclusion of ABC conductor in the project scope which had not been approved by the Authority;

iii) The Authority at its **226th** meeting held on **February 12th 2014** and at its **230th** meeting held on **30th April 2014** respectively deferred the

approval of the ABC component under 2014 carryover and requested Umeme to submit additional details separating the transformer zones from the ABC re-conductoring works;

iv) Umeme Limited responded to the Authority's decision in its Letter dated **30th May 2014** and provided the cost breakdown as; MV costs **(US$ 1,211,869)**, Transformer costs **(US$ 876,514)** and LV costs **(US$ 4,685,918)** for Kireka – Namugongo zones 1 – 6 **totaling to US$ 6,774,301**;

v) The Authority at its **237th** meeting held on **Tuesday 7th October 2014,** took note of the revised cost for the transformer injection and the further increase in the scope of the overall project cost from US$ 2.2million to US$6.774million. The Authority therefore approved the revised cost for the transformer injections (US$876,514) and deferred the MV and LV costs and requested Umeme to seek approval of additional investments totaling to US$ 5,897,787, having extracted the revised transformer costs of US$876,514;

vi) Umeme in **its letter dated 30th December 2014** responded to the Authority's approval by providing additional information and justifications. The justification for the increase in scope was to address the technical losses as well as commercial losses on the LV network by converting the bare conductor to ABC. Umeme indicated that the project change in scope was extended by the Emmerton Loss Study.

Umeme sought for retrospective approval of **US$ 5,787,635,** being the actual cost of works whose approval was deferred. Detail cost break downs are shown in Table 3.

Table 3: SUMMARY OF COSTS SUBMITTED PER ZONE FOR KIREKA – NAMUGONGO FEEDER FOR APPROVAL

S/N	Scheme	Costs (US$)
1	Zone 1	830,966
2	Zone 2	1,387,333
3	Zone 3	1,480,905
4	Zone 4	1,647,982
5	Zone 5	56,963
6	Zone 6	1,260,000
	Less: Approved Transformer Costs	**876,514**
	TOTAL	**5,787,635**

ERA's Analysis

The Emmerton Loss Reduction Report was reviewed and recommendations for Kireka – Namugongo LV were analyzed. Table 4 shows the 52 transformer zones whose details were captured and analyzed for losses. Table 4 further shows the aggregated losses (technical and commercial) after metering, the recommended LV Aerial Bundled Conductor investment, and the resultant gains.

Table 4: ANALYSIS OF THE EMMERTON REPORT FOR KIREKA – NAMUGONGO 11KV FEEDER

No	DT Name	kVA	LV total circuit length	1ph Customers	3ph Customers	Estimated LV Network TL's kWh	%	LVABC required km	Cost LVABC	TL b4 kWh	TL after kWh	TL saved kWh	Cost $ per GWh
1	Bulindo	100	5.727	145	0	116,823	31	1.718	25,770	116,823	19,269	97,555	264,164
2	Shimon Pri Teachers College	200	1.191	11	1	155,449	21	0.357	5,358	155,449	25,640	129,810	41,274
3	Tobacco Tx 2	1000	0.46	30	0	439,338	12	0.138	2,070	439,338	72,464	366,874	5,643
4	Jyomayi Kitafumba Bulindo	200	8.783	138	0	85,045	11	2.635	39,525	85,045	14,027.1	71,017	556,555
5	Kitukutwe No.2	25	5.459	55	0	8,652	9	1.638	24,566	8,652	1,427.10	7,225	3,400,127
6	Kiwologoma 2	25	3.338	19	0	6,441	7	1.001	15,022	6,441	1,062.4	5,379	2,792,901
7	Kira Kito Village No.2	200	3.733	51	2	50,896	7	1.12	16,799	50,896	8,394.7	42,501	395,246
8	Armajaro U Ltd	315	1.9	50	0	66,150	6	0.57	8,550	66,150	10,911	55,239	154,782
9	Regina Estate	50	0.746	4	0	9,439	5	0.224	3,359	9,439	1,556.9	7,882	426,116

No	DT Name	kVA	LV total circuit length	1ph Customers	3ph Customers	Estimated LV Network TL's kWh	%	LVABC required km	Cost LVABC	TL b4 kWh	TL after kWh	TL saved kWh	Cost $ per GWh
10	Kimwanyi Tx	25	1.814	13	1	4,467	5	0.544	8,164	4,467	736.9	3,731	2,188,347
11	Mbalwa No.1	500	6.661	270	3	85,170	5	1.998	29,972	85,170	14,048	71,122	421,424
12	Kireka Village	500	6.084	101	5	80,666	4	1.825	27,378	80,666	13,305	67,361	406,433
13	Kira Kito Village	100	4.063	168	2	15,683	4	1.219	18,284	15,683	2,586.7	13,096	1,396,140
14	Nakwero T/C	25	1.418	23	0	3,853	4	0.425	6,379	3,853	635.5	3,217	1,982,750
15	Ndiwulira Tx	50	0.5	9	1	7,424	4	0.15	2,251	7,424	1,224.6	6,200	363,090
16	Najjera 2 Booster	200	1.45	160	5	28,862	4	0.435	6,527	28,862	4,760.5	24,102	270,790
17	Namugongo C.O.U	315	5.743	416	4	44,764	4	1.723	25,844	44,764	7,383.3	37,381	691,381
18	Kamuli Market No1	500	4.877	409	2	70,639	4	1.463	21,944	70,639	11,651.1	58,988	372,015
19	Kira Gombolola	315	5.051	120	8	41,442	4	1.515	22,728	41,442	6,835.5	34,607	656,740
20	Butenga	200	6.279	103	2	24,230	3	1.884	28,256	24,23	3,996.5	20,234	1,396,

No	DT Name	kVA	LV total circuit length	1ph Customers	3ph Customers	Estimated LV Network TL's kWh	%	LVABC required km	Cost LVABC	TL b4 kWh	TL after kWh	TL saved kWh	Cost $ per GWh
	Zone									0			502
21	Nsaawo Namugongo No1	200	6.086	212	4	23,780	3	1.826	27,387	23,780	3,922.2	19,858	1,379,157
22	Mulawa	50	6.715	72	0	5,817	3	2.014	30,216	5,817	959.4	4,857	6,220,564
23	Mbalwa No.2	200	5.129	171	3	21,461	3	1.539	23,082	21,461	3,539.7	17,921	1,287,971
24	Mtn Mulawa Village	50	0.277	3	0	5,210	3	0.083	1,247	5,210	859.3	4,350	286,713
25	Mbalwa Estates	200	4.835	201	1	20,714	3	1.451	21,759	20,714	3,416.6	17,298	1,257,923
26	Kimbejja Village No 2	200	4.665	158	0	20,273	3	1.399	20,992	20,273	3,343.8	16,929	1,239,986
27	New Jerusalem School	200	4.348	296	0	19,435	3	1.304	19,566	19,435	3,205.6	16,230	1,205,584
28	Kulva	25	0.657	14	0	2,428	3	0.197	2,956	2,428	400.5	2,028	1,457,537
29	Kajubi Road	200	3.987	94	0	18,450	2	1.196	17,941	18,450	3,043.1	15,407	1,164,482

No	DT Name	kVA	LV total circuit length	1ph Customers	3ph Customers	Estimated LV Network TL's kWh	%	LVABC required km	Cost LVABC	TL b4 kWh	TL after kWh	TL saved kWh	Cost $ per GWh
30	Kirude	100	1.628	55	0	9,060	2	0.488	7,326	9,060	1,494.3	7,565	968,410
31	Smiles Kireka	200	3.8	351	2	17,926	2	1.14	17,100	17,926	2,956.7	14,969	1,142,338
32	Kamuli Hill Infants Sch	315	2.589	164	1	27,754	2	0.777	11,651	27,754	4,577.7	23,176	502,706
33	Kiwologoma Tc	50	4.193	62	0	4,385	2	1.258	18,868	4,385	723.3	3,662	5,152,625
34	Walusimbi	200	3.543	141	1	17,190	2	1.063	15,945	17,190	2,835.2	14,354	1,110,837
35	Nsasa Tc	50	3.529	29	0	3,954	2	1.059	15,878	3,954	652.2	3,302	4,809,036
36	Viena College	200	3.004	141	7	15,569	2	0.901	13,520	15,569	2,568.0	13,001	1,039,882
37	Namugongo Rd No.2	200	2.872	135	2	15,155	2	0.862	12,926	15,155	2,499.6	12,655	1,021,355
38	Kyaliwajala T/C	315	1.919	504	10	23,192	2	0.576	8,638	23,192	3,825.3	19,367	445,991
39	Kimbejja Village No 1	200	2.562	140	0	14,149	2	0.769	11,528	14,149	2,333.8	11,815	975,652

No	DT Name	kVA	LV total circuit length	1ph Customers	3ph Customers	Estimated LV Network TL's kWh	%	LVABC required km	Cost LVABC	TL b4 kWh	TL after kWh	TL saved kWh	Cost $ per GWh
40	Kironde Village	200	2.543	65	1	14,086	2	0.763	11,442	14,086	2,323.3	11,763	972,744
41	Mulawa Kawuku	50	2.663	51	0	3,340	2	0.799	11,985	3,340	550.9	2,789	4,297,265
42	Tobacco Tx 1	315	1.532	111	5	20,257	2	0.46	6,894	20,257	3,341.2	16,916	407,519
43	Mulawa Coffee Factory	200	2.155	60	0	12,755	2	0.647	9,698	12,755	2,103.8	10,651	910,471
44	Kito Village 2	200	2.014	70	1	12,246	2	0.604	9,061	12,246	2,019.8	10,226	886,063
45	Total Kireka	200	1.903	206	4	11,837	2	0.571	8,563	11,837	1,952.4	9,885	866,239
46	Kira Ntinda Rd2	100	4.604	151	2	5,890	2	1.381	20,716	5,890	971.5	4,919	4,211,791
47	Nsasa Namugongo	50	1.84	21	0	2,675	1	0.552	8,280	2,675	441.2	2,234	3,706,279
48	Sisters Of Mercy	200	1.335	44	0	9,568	1	0.4	6,006	9,568	1,578.2	7,990	751,679
49	Shell Kireka Tx	315	3.154	224	6	14,789	1	0.946	14,195	14,789	2,439.3	12,350	1,149,372

No	DT Name	kVA	LV total circuit length	1ph Customers	3ph Customers	Estimated LV Network TL's kWh	%	LVABC required km	Cost LVABC	TL b4 kWh	TL after kWh	TL saved kWh	Cost $ per GWh
50	Sasa	50	1.464	19	0	2,332	1	0.439	6,587	2,332	384.7	1,948	3,382,310
51	Kamuli Zone B	200	2.908	193	1	7,226	1	0.872	13,085	7,226	1,191.90	6,034	2,168,410
52	Holy Ghost Father's	25	0.04	1	0	455	0	0.012	181	455	75	380	477,244
	Total		**170**					**51**	**763,965**	**1,748,794**	**288,443**	**1,460,351**	**75,038,557**

From the Emmerton Loss Reduction Report, the following recommendations were made:

i) Re-conductoring a third of the circuit lengths for each of the 52 transformer zones with ABC. The total LV circuit length was 170km and the recommendation was that only 51km were to be converted to ABC;

ii) The cost of ABC was estimated at US$ 763,965;

iii) Total technical loss before re-conductoring was 1,748,794kWh and would result into a reduction in total technical losses up to 288,443 kWh, after reconductoring; and,

iv) Total savings to be made was estimated to be 1,460,351kWh with an estimated cost saving of US$ 75,038,557 per GWh.

The desk review and field verification of the submission further revealed the following:

(i) Umeme submitted the following costs per zone for verification as shown in Table 5 below.

Table 5: SUBMITTED COSTS FOR VERIFICATION FOR KIREKA – NAMUGONGO FEEDER

Project Zone	**Submitted Cost (US$)**
Zone 1	811,155
Zone 2	1,209,606
Zone 3	1,596,825
Zone 4	1,596,399
Zone 5	68,212
Zone 6	831,993
Totals	6,114,190

The costs relating to zone 5 MV re-conductoring amounting to US$ 68,212, were already considered in 2013 investment verified and allowed. The costs for zone 5 should therefore not be considered in this computation, since they were already verified and approved by the Authority.

Further to this, the cost submitted for verification included transformer injections which had already been approved at a cost of US$ 876,514 under 2014 completed investments. These costs were also not considered as part of the additional amounts recommended for approval.

(i) The MV costs for the respective zones 1,2,3,4 and 6 were done to extend the MV network to provide supply to the new transformers. This cost component is prudent and is recommended for approval.

(ii) We note that although the Emmerton Report recommended re-conductoring with ABC of a third of the LV circuits per transformer zone, the company went ahead and re-conductored the entire LV circuits with ABC. The conversion of bare conductor to ABC was done to reduce commercial losses and improve safety in the environs. A review of the justification provided by the company and the field verification confirmed that this area is highly densely populated with high potential of power theft and vulnerable to accidents. Management therefore finds the decision by the company to convert the entire LV to ABC reasonable and prudent. That notwithstanding, Management impaired the cost of conversion to ABC to remove the depreciated value of the replaced bare wire conductor.

(iii) The desk review revealed the following about the works done on the feeder:

a) Of the 3,669, ten (10) meter poles were installed, 2,714 poles were replaced by LV poles;
b) Umeme injected a total of 102 transformers against the recommended 52 transformers by the Emmerton Report; and
c) Umeme replaced a total of 452,780m bare wire conductor with Ariel Bundled Conductor.

(iv) The project involved a large component of LV pole replacement i.e. 2,714 LV poles. The recommendation was that, these costs should be considered under the company DOMC budget;

(v) The field verification confirmed the existence of MV poles, ABC conductor and transformers. The common observation was that most of the transformers had their circuit breakers ***by-passed thereby compromising the protection grading of the network and rendering the circuit breaker to be a stranded asset***. Some of the transformers had already been replaced;

(vi) Table 6 shows the details of the amounts verified per zone and the recommended amounts for approval after verification, impairment and treatment of O&M costs.

Table 6: SUMMARY OF AMOUNTS SUBMITTED, VERIFIED AND APPROVED FOR KIREKA – NAMUGONGO FEEDER

Project zones	Submitted Cost (US$)	Poles		Conductor		Transformers			Rejected costs (US$)			Approved costs (US$)
		MV	LV	MV (m)	ABC (m)	50	100	200	O&M[1]	Impairment	LV[2]	
1	811,155	100	555		42,182	9	3	5	85,464	68,459	66,262	590,558
2	1,209,606	46	932	5,669	42,182	7	5	3	127,961	83,623	135,767	861,843
3	1,596,825	98	1005	10,458	56,597	3	13	3	178,619	92,911	146,837	1,015,752
4	1,596,399	93	656	12,000	97,880	6	18	6	171,853	133,821	89,519	1,201,206
5	68,212	0	0	0	0	0	0	0	68,212	0	0	0
6	831,993	132	793	10,000	56,597	2	10	2	90,734	11,759	108,547	620,953
Totals	**6,114,190**	**469**	**3,941**	**38,127**	**295,438**	**27**	**49**	**19**	**722,843**	**390,573**	**546,932**	**4,290,312**
Less: Amounts approved in 2014												876,514
Amount Recommended for ROI												**3,413,798**

[1] : O&M costs represent the cost of labor, transport and other Umeme staff costs which are already provided for the Company's DOMC

[2] LV costs represent the cost of LV pole replacements

AUTHORITY DECISION

The Authority approved a total amount of **US$ 3,413,798,** towards the Kireka – Namugongo as 2014 completed investments to earn a return on investments.

4.1.2 MUTUNDWE – KABOWA FEEDER

The feeder was approved by the Authority at the initial budget cost of **US$ 0.488m** as part of the 2013 Investment Plan under Technical Loss Reduction.

In the 2014 Investment Plan, Umeme submitted a revised cost for Mutundwe - Kabowa feeder under the carryover category as **US$ 259,943** and this was approved by the Authority.

In its Letter, dated **30th December 2014,** Umeme submitted the revised scope for Mutundwe - Kabowa Feeder with cost increasing from US$ 259,943 to US$ 656,172 and hence requesting tor additional approval of US$396,229. The revised scope included re-conductoring the LV circuits with ABC and injecting 10 distribution transformers.

ERA'S ANALYSIS

This investment was treated as a carryover project from 2013. In the communication regarding Umeme 2013 investments dated 18th December, 2014 (ref: ERA/2014.12/023), Umeme reported that the total project costs for Mutundwe – Kabowa amounted to **Ugx 1,606,052,825 (US$578,133).** However, the supporting documentation availed showed **Ugx 824,505,923 (US$ 296,798)** for verification. The submitted cost was nearly in line with what the Authority had approved for this project.

The desk review of the project documentation revealed the following:

i) The Company submitted total project costs for verification amounting to **US$ 296,798,** contrary to the application amount of US$578,133;

ii) Five (5) existing transformers were recovered from the Feeder. Umeme did not avail the asset movement schedule to confirm whether these transformers were transferred to other locations on the network or were kept in store. The value of these transformers with an estimated remaining life time of five (5) years has been netted off from the recommended amount for ROI;

iii) 10 transformers were injected onto the feeder network;

iv) 11 MV poles and 248 LV poles were decommissioned; and 48 MV poles and 315 LV poles were installed on the network. However, the submitted material extract showed 5 - LV (10m) poles and 16-14m MV poles. The LV poles have not been considered for ROI;

v) 20,538m of ACSR100 conductor; 19,245m of ACSR25 conductor and 20,820m of ACSR50 conductor were replaced with 30,343m of ABC. The remaining useful life of the bare wire conductors was netted off the recommended amount to be included in the asset base;

vi) The commissioning reports of the transformers installed showed that all transformers were installed and commissioned in 2014;

vii) Completion certificate shows that the works were completed on 27th December, 2014. Further evidence that the works were completed in 2014 is that transformers were taken out of stores in January 2014, installed and commissioned in February 2014.

viii) Table 7 shows the amounts verified and those recommended for approval.

Table 7: FIELD FINDINGS FOR MUTUNDWE - KABOWA

submitted Cost (US$)	poles		conductor		Transformers		proposed rejected costs			Approved costs
	MV	LV	MV (m)	ABC (m)	100	200	O&M	Impairment	LV	
296,798	39	378	3,696	29,48	7	4	37,179	34,220		**225,400**

CONCLUSION

From the above review findings, the following conclusions were drawn:

i) Based on the principle that an asset is regarded as useful only when it has been duly commissioned, the transformers were commissioned in 2014, which imply that the works do qualify for ROI in 2014;

ii) The value that qualifies for ROI had been offset with the impairment charge for conductor and the recovered transformers where the company had neither provided redeployed evidence nor indicated that they had lived their useful life time;

iii) The 248 LV poles that were replaced fall under the DOMC and should be treated as such;

iv) The Impairment cost of the replaced conductor and decommissioned transformers amounted to US$34,220; and,

v) The Costs considered to be DOMC amounted to US$ 37,179.

AUTHORITY DECISION

The Authority approved a total amount of **US$ 225,400** for ROI in Kabowa – Mutundwe project as 2014 investment for Umeme.

4.1.3 GREEN VALLEY TRANSFORMER RELIEF (US$0.3 MILLION)

Umeme indicated that this project was submitted in the 2013 Investment Plan, but was implemented in February 2014. Umeme sought retrospective approval of the project.

This project was handled under the technical loss category. The project scope included re-conductoring of LV circuits from bare wire to ABC and installation of distribution transformers.

OBSERVATION

This project had never been submitted for Authority's consideration therefore it could not be treated as a carryover.

This project could only be considered under the category of distribution transformers that were approved to address load growth as well as technical losses. The Authority at its 237th meeting approved a list of 74 distribution transformers for injection in the network to relieve stressed transformers.

AUTHORITY DECISION

The Authority rejected the investment relating to Green Valley transformer as a carryover and advised Umeme to consider submitting the project under transformer injections with adequate justifications.

4.2 MV LOSS REDUCTION PROJECTS

The Authority at its 230th meeting held on April 30th, 2014 considered Umeme investments for loss reduction and rejected approval of the following eight medium voltage feeders due to insufficient information and justifications.

The eight projects included the following:

i) Kawanda - Kawempe;

ii) Entebbe 2 – Kampala South (Roofings);

iii) Queensway – Katwe;

iv) Queensway – Lukuli;

v) Jinja Industrial – Walukuba;

vi) Tororo Rock – Tororo Ring 1;Kampala North – Gayaza road; and,

vii) Masaka Central – Upper ring.

Umeme in its application dated 30th May 2014, submitted to the Authority additional justifications for the above feeders except for Kampala – North Gayaza, where no information was provided. Details of the submitted additional information is shown in the Table 8.

Table 8: MV Feeders for Technical Loss Reduction

S/N	Feeder	Current loss Factor	Targeted % loss factor after the upgrade	Budget cost (USD)	Existing conductor	Upgrade conductor	Route km	Cost per KM
1	Kawanda - Kawempe	16	9	37,800	ACSR25	ACSR100	2.52	15,000
2	Entebbe 2 – Kampala South (T-offs)	15	6	40,000	ACSR25	ACSR100	17.87	2,238.4
3	Queensway – Katwe 1	28	3	100,000	ACSR100	ACSR150	6.44	15,528
4	Queensway – Lukuli	36	7	60,000	ACSR25	ACSR150	5.16	11,627.9
5	Jinja Industrial – Walukuba	16	12	87,931	ACSR100	ACSR150	22.4	3,925.5
6	Tororo Rock – Tororo Ring 1	33	25	591,900	ACSR25	ACSR150	39.46	15,000
7	Masaka Central – Upper Ring	25	15	2,706,750	ACSR100	ACSR150	180.45	15,000
Total Projects Cost				**3,624,381**				

From the review of additional information submitted, it was noted that the company had provided adequate information and Justification to enable the Authority make a decision.

The Authority at its 237th meeting held on Tuesday 7th October 2014 noted that it had already allowed the company sufficient investments to enable it achieve the loss reduction targets as set by the Authority. The Authority therefore deferred additional investments in the loss reduction category to 2015.

Umeme responded in its letter dated 30th December 2014 and explained that it believed the Authority had used annualized expected gains from the loss reduction projects already approved and did not take into consideration the timing of implementation of the projects to achieve the gains.

Umeme further submitted a revised list of investments totaling to US$20.737million and indicated that these were part of the project portfolio for loss reduction to achieve the company's 3% loss reduction, having taken into account the investments that had already been approved and implemented for loss reduction. Umeme further indicated that these projects had been prioritized in the Emmerton loss reduction report to aid the company meet the ERA set loss reduction targets.

These investments were reviewed and the sections below give a detail of the verification findings.

4.2.1 KAWANDA – KAWEMPE FEEDER

Umeme submitted that the feeder had become a high loss feeder on its network due to the poor state of conductors on the feeder. The scope of work involved feeder up grade through re-conductoring part of the feeder from ACSR25 to ACSR50 (0.5km) and to ACSR100 (2.02km) to improve performance of the feeder.

OBSERVATIONS AND ANALYSIS

A total value of US$ 19,365 was submitted as an investment cost for re-conductoring the above feeder. The cost included US$ 3,127 in borrowing costs, provisions, overhead absorption costs, transport and Emmerton consultancy capitalized cost.

According to the Emmerton Loss Study Report, the Kawempe – Kawanda Feeder ranked No.17 in terms of high technical losses standing at 16.3% contributing 0.19% to the overall Umeme technical loss figure.

The desk review of the project documentation revealed the following:

(i) 8 Medium Voltage (MV) poles were decommissioned and 12 MV poles were installed on the feeder network;

(ii) 6,850m of ACSR25 conductor were replaced with 1,870m of ACSR50 conductor and 6,050m of ACSR100 conductor;

(iii) Completion certificate shows that the works were completed on 29th October, 2014;

(iv) The works done were in line with the findings of the Emmerton Loss Study and the company executed the works to reduce the technical losses on the feeder.

The field verification revealed the following findings:

(i) The works on the Kawanda - Kawempe feeder was technically done according to the standard;

(ii) The conductor verified tallied with that in the submission;

(iii) The number of poles verified totaled 11 poles (9 replaced LV poles and 2 new LV poles). This finding did not match the material submission of thirteen poles (13 poles);

(iv) Five (5) Circuit breakers had been by-passed, while three were burnt on transformer no. 11/20980/200 structure No. 419237;

(v) Five circuit breakers had been by passed on the old transformer, while the RHJT fuses had all been by passed at Katooke TC old transformer.

CONCLUSION

From the above findings, the project was approved to earn a return on Investment on the cost of new conductor upgrade, less the impaired value of the old conductor.

The cost of replacing and decommissioning LV poles together with the accessories associated with the project was considered to be DOMC cost.

AUTHORITY DECISION

The Authority approved **US$ 13,771** as the cost of the investment done on Kawanda – Kawempe feeder as a **2015** investment.

4.2.2 JINJA INDUSTRIAL – WALUKUBA

Umeme submitted that the feeder had high losses on its network due to the poor state of conductor and the Medium Voltage poles on the feeder. According to the Emmerton Loss Study Report, the Jinja Industrial – Walukuba feeder ranked No.25 among the high loss feeders in the country with its technical losses standing at 16.4% contributing 0.14% to the overall Umeme technical loss figure.

The scope of work involved re-conductoring and upgrading feeder conductor from ACSR25, ACSR50 and ACSR100 to largely AAAC150 to reduce the loss factor on the feeder.

Umeme submitted that a total value of US$ 173,509 was used to undertake this project. A verification of the support documents was undertaken to confirm the authenticity, accuracy as well as the value for money of this project.

OBSERVATIONS AND ANALYSIS

The desk review of the project documentation revealed the following:

(i) 46 MV poles were decommissioned and 57 MV poles were installed on the feeder network;

(ii) 4,800m of ACSR100 conductor; 3,510m of ACSR25 conductor and 5,130m of ACSR50 were recovered and upgraded with 30,922m of ACSR150, 4,079m of ACSR100 and 1,122m of ACSR50 conductor respectively;

(iii) The handover certificate shows that the works were completed on 15th December, 2014;

(iv) The field verification confirmed that the works were completed according to the standard and the poles (51) matched the ones provided in the support document. However, the material extract submitted reveals ***6 poles*** more than the verified 51 poles in the field. Umeme in total recovered 13,440m of conductor and upgraded it with 36,123m of conductor leaving un-accounted for conductor of 22,683m. These meters had been offset from the submission.

CONCLUSION

The above review findings led to the following conclusions:

i) The works were done in line with the findings of the Emmerton Loss Study and the company executed the works to reduce the technical losses on the feeder. The works were executed and completed within the year 2014;

ii) The project is a CAPEX as it involved upgrading of the conductor and did qualify for ROI in 2015 as approved by the Authority. Table 9 shows the details of the amounts recommended for approval.

Table 9: ANALYSIS OF COSTS FOR JINJA WALUKUBA FEEDER

	Ugx	US$
Materials	321,944,408.00	115,891
L&T	113,817,467	40,971
Way leaves	1,281,250	461
Consultancy-Emerton	3,137,951	1,130
Transport cost	525,913	189
Overhead Absorption	12,799,606	4,607
Borrowing costs	28,501,090	10,260
	0.00	173,509
O&M		(16,647)
Un accounted for materials		(1,921)
Impairment		
Conductor 0.025 Al Sca	3,422,250	(1,232)
Conductor 0.05 Al Sca	6,522,282	(2,348)
Conductor 0.1 Al Sca	68,222,425	(24,558)
Recommended amt		**126,803**

AUTHORITY DECISION

The Authority approved a total amount of **US$ 126,803**, towards re-conductoring of Jinja Industrial – Walukuba Feeder as a **2015** investment.

4.2.3 MASAKA CENTRAL – UPPER RING FEEDER

Umeme submitted that the feeder had high technical losses on its network due to the poor state of conductor and the MV poles on the feeder. According to the Emmerton Loss Study Report, the Masaka Central – Upper Ring feeder ranked No.15 in terms of high technical losses standing at 23.4% contributing 0.19% to the overall Umeme technical loss figure.

The scope of work involved re-conductoring and upgrading of the feeder back bone conductor from ACSR50 conductor to ACSR100 conductor, and the Tee-offs from ACSR25 and steel conductor to ACSR50 conductor to ACSR 50 so as to reduce the technical loss factor and improve the overall performance of the feeder.

The company submitted a total amount of US$ 604,749 used to undertake this project. A verification of support documents was undertaken to confirm the authenticity, accuracy as well as the value for money of this project.

OBSERVATIONS AND ANALYSIS

The desk review of the project documentation revealed the following:

(i) 43 Medium Voltage poles were decommissioned and 63 MV poles were installed on the feeder network;

(ii) 192,740m of ACSR50 conductor was upgraded to ACSR100 conductor and 90,063m of ACSR50 and steel conductor were upgraded to ACSR50 conductor;

(iii) The handover certificate shows that the works were completed on 25th September, 2014;

(iv) The detailed information availed to support the implementation of the project totaled to US$ 587,639, which is different from the applied for amount of US$604,749;

(v) Analysis of the submission revealed that US$ 62,808 relates to operational and maintenance costs and this figure had not been recommended for ROI purposes;

(vi) An impairment charge has been done on the upgraded conductor netting off the residual value of the decommission conduct;

(vii) The field verification confirmed that the works were completed and done according to the contractual standards.

CONCLUSION

The above review findings led to the following conclusions:

i) The works done were in line with the findings of the Emmerton Loss Study and the company executed the works to reduce the technical loss factor on the feeder. The works were executed and completed within the year 2014;

ii) Following the Authority's earlier decision based on the observation that Umeme had already been allowed enough Capex to achieve its loss target for 2014, this investment qualified for a 2015 investment.

AUTHORITY DECISION

The Authority approved **US$ 440,276** towards the re-conductoring of the Masaka Central – Upper Ring feeder as a **2015** investment.

4.2.4 QUEENSWAY – LUKULI FEEDER

Umeme submitted that the feeder had registered high technical losses on its network due to the poor state of conductor and the medium voltage poles on the feeder. According to the Emmerton Loss Study Report, the Queensway – Lukuli feeder ranked No.8 in terms of high technical losses standing at 36.4% contributing 0.26% to the overall Umeme technical loss figure.

The scope of work done involved re-conductoring and upgrading conductor on the back bone of the feeder from ACSR100 conductor to ACSR150 conductor, and from ACSR25 conductor to ACSR100 conductor so to as improve loss performance of the feeder.

Umeme submitted US$ 77,539 for verification to earn a return on investment towards the re-conductoring of Queensway - Lukuli feeder.

OBSERVATIONS AND ANALYSIS

The desk review of the submitted project documentation revealed the following:

(i) 11 MV poles were decommissioned and 11 MV poles were installed on the feeder network;

(ii) 8,400m of ACSR100 conductor were upgraded to ACSR150 conductor and 8,100m of ACSR25 conductor were upgraded to ACSR150 conductor;

(iii) The handover certificate showed that the works were completed on 28th January, 2014;

(iv) The analysis found out that US$ 16,999 related to costs outlawed in principle, US$ 9,812 accounted for materials that were not supported with CRIVs, while US$5,815 was an impairment charge.

CONCLUSION

The above review findings led to the following conclusions:

i) The works done were in line with the findings of the Emmerton loss study and the company executed the works to reduce the technical losses on the feeder. The works were executed and completed within the year 2014.

ii) Following the Authority's earlier approval and observation that Umeme had already been allowed enough Capex to achieve its loss target for 2014, this investment qualified as a 2015 investment.

AUTHORITY DECISION

The Authority approved **US$ 44,913** towards the investment done on Queensway - Lukuli feeder as a **2015** investment.

4.2.5 TORORO ROCK – TOWN RING 1

The outage performance for the feeder for the year 2013 were analyzed and the results showed that the feeder experienced total outages of 231hours in the year, giving an average monthly outage of 19.2hour. The feeder at the time was serving 2,500 customers.

The age profile of the MV feeder of Tororo Rock – Town Ring 1 11kV feeder showed that the feeder was of advanced age (i.e. last refurbished 1965) and no major refurbishment had been done on it to replace the old aged infrastructure.

OBSERVATIONS AND ANALYSIS

The desk review of the project documentation revealed the following:

i) The loss factor before works could commence were estimated to be 33% and the company expected to reduce the losses to 25% with the intervention;

ii) 1,000 MV poles were decommissioned, 20 x 14m poles, 279 x 12m poles, 20 x10m poles were installed;

iii) 126,894m of 100mm^2 conductor was re-strung;

iv) US$ 512,013 was submitted for verification, of which US$ 46,333 related to borrowing costs, overhead absorption and supervision costs of the project.

CONCLUSION

The above review findings lead to the following conclusions:

i) The project had a loss reduction component as well as a restoration aspect since the feeder had not been refurbished in a long time; and,

ii) The project qualified as an investment to earn ROI but borrowing costs, overhead absorption and supervision costs of the project did not qualify;

iii) The Authority had earlier approved and observed that Umeme had already been allowed enough Capex to achieve its loss target for 2014, this investment qualifies as a 2015 investment.

AUTHORITY DECISION

The Authority approved **US$ 465,680** for Tororo Rock – Town Ring 1 11kV feeder as a **2015** investment.

4.2.6 NANSANA MV FEEDER

Umeme submitted that the feeder had registered high losses on its network due to the poor state of conductor. The scope of works involved re-conductoring part of the feeder from ACSR25 to ACSR50 and to ACSR100 to improve the feeder performance.

OBSERVATIONS AND ANALYSIS

The re-conductoring of this feeder had been approved earlier on in 2013, but Umeme did not submit any details regarding its execution during the verification exercise of 2013. The company submitted a fresh request to have this investment approved as part of 2014 investment plans and yet it should have been treated as a 2013 carryover investment.

The Emmerton Loss Study Report had ranked the Namungoona – Nansana feeder No.11 in terms of high technical losses standing at 25.7% contributing 0.21% to the overall Umeme technical loss figure.

Umeme submitted US$ 119,069, for inclusion in the asset base as the cost of re-conductoring the feeder. The costs were analyzed together with the contract documents and the desk review observed the following:

(i) 37 medium voltage (MV) poles were decommissioned and 60 MV poles were installed on the feeder network;

(ii) 10,330m of ACSR25 conductor and 8,200m of ACSR50 were recovered and replaced with 660m of ACSR50 conductor and 20,771m of ACSR100 conductor respectively;

(iii) Completion certificate shows that the works were completed on 11th December, 2014;

(iv) Included in the submission was a cost of US$11,105 an amount that was already outlawed in principle (borrowing and overhead absorption and Umeme staff L&T) not to attract a return on investment.

(v) The submission further included unsupported material additions of US$ 16,453 that could not be traced against the CRIVs.

(vi) An impairment provision had been made on ACSR25 and ACSR50, which was decommissioned. As had been the case, the conductor was assumed to have remained with a useful life of five more years.

CONCLUSION

The above review findings lead to the following conclusions:

i) The works were done in line with the findings of the Emmerton Loss Study and the company executed the works to reduce the technical losses on the feeder. The works were executed and completed within the year 2014;

ii) The project involved upgrading of the conductor and did qualify for ROI in 2014.

Table 10 shows the details of the amounts recommended for ROI.

Table 10: NANSANA FEEDER COST ANALYSIS

Nansana Feeder	US$
Materials	86,438
L&T	21,526
Consultancy-Emerton	642
Transport cost	261
Overhead Absorption	3,162
Borrowing costs	7,041
	119,069
O&M	(11,105)
Un accounted for Materia	(16,453)
Impairment of conductor	
Conductor 0.1 Al Sca	(9,920)
Conductor 0.05 Al Sca	(4,728)
Recommended Amt	**76,863**

AUTHORITY DECISION

The Authority approved **US$ 76,863** to earn ROI as a **2014** investment.

The company applied for two MV feeders namely Katwe 1, Kampala South - Entebbe 2 (T-off). However the two feeders had no information submitted and these were rejected.

4.3 LV LOSS REDUCTION

Umeme submitted the projects in table 11 requesting for Authority's approval retrospectively under LV Loss Reduction in their letter dated 30th December 2014. The justification was that the projects were prioritized in the Emmerton Loss Reduction Study.

The Authority had noted that there was an increase in the project scope on Kawempe and Gayaza and that a proposal was advanced to use ABC without clear justification.

The Authority had deferred these investments to 2015 upon provision of sufficient justifications.

The rest of the projects under this category had never been considered and/or given prior approval by the Authority.

Table 11: LV LOSS REDUCTION

S/N	LV Loss Reduction	Umeme's Application Original Budget (US$)	Request for Approval (US$)
1	Transformer zones: Gayaza feeder (ABC)	4,200,000	6,594,117
2	Transformer zones: Kawempe feeder MV and LV	4,600,000	3,138,870
3	Kireka - Seeta (ABC)		3,099,000
4	Mukono - Seeta (ABC)		6,312,000
	Totals	**8,800,000**	**19,143,987**

The Authority at its 237th meeting held on 7th October 2014 deferred the investments for Gayaza and Kawempe Feeders to 2015 and requested Umeme to provide justifications for ABC.

These investments were reviewed and the sections below give the details of the verification findings.

4.3.1 KAMPALA NORTH – GAYAZA ROAD (US$5,749,632)

Umeme submitted that the investment aimed at reducing the technical losses from 55% to below 19%. In addition the feeder had a high demand growth rate of above 20% per annum, which is almost twice the national average. The scope of the project included the following:

(i) Refurbishment the MV (11kV) line and provide extensions to the newly injected transformer zones;

(ii) Installation of the 125KVA, 11kV/LV new distribution transformers;

(iii) Upgrade of the 260 km of LV network to Aerial Bundles Conductors (ABC); and,

(iv) Replace 3,164 rotten poles of which 2,839 are LV poles.

Before implementation of the project, Umeme submitted the performance of the feeder as follows:

i) MV losses stood at 5,538,475kWh (16.7%) and LV losses stood at 3,188,664kWh (4.53%). The loss contribution of the feeder to the overall Umeme technical losses was 0.303%;

ii) The MV network had 214 conductor joints on a 7.3 km stretch of MV conductor implying 29 joints per km on average;

iii) The LV network had 7,886 conductor joints on a network length of 119 km; this translates to about 66 joints per km;

iv) The network had 97.3 km of poor and thin conductor dominated by ACSR 25 and steel;

v) Out of 6,200 poles on the network, 960 poles were rotten;

vi) The average per km length of a transformer zone stood at 3.56 km/zone. Out of 88 transformer zones, 77 transformer zones did not comply with the 1.5 km/zone;

vii) Umeme provided the actual cost breakdown of the materials used as shown in table 12.

Table 12 COST DISTRIBUTION FOR KAMPALA NORTH GAYAZA FEEDER

MV Conductor & hardware Cost (US$)	MV Pole Cost (US$)	Transformer Cost (US$)	LV ABC & hardware Cost (US$)	LV Pole Cost (US$)	Total Cost (US$)
384,868	134,886	1,154,544	3,518,160	557,174	**5,749,632**

OBSERVATIONS AND ANALYSIS

The loss study done by Umeme in 2013 identified feeder technical loss values and proposed the optimal loss reduction strategies that could be adopted to achieve the loss targets set by ERA. According to the MV loss study, the Kampala North Gayaza road feeder ranked No.14 in terms of high technical losses i.e. technical loss of 16.9% and a contribution to the overall losses of 0.2%.

A further review of the loss study report showed that for Gayaza road feeder; of the fifteen transformer zones that were metered, four transformer zones had pilferage (power theft) between 61 to 66%, six (6) had pilferage between 25 to 48%, and the rest of the transformers had pilferage below 2%. Based on the sample, these findings showed that there is a high pilferage (power theft) on the feeder. This could necessitate the use of ABC to curb power theft on the network.

The following documents were seen i.e. proposed drawing, Bill of Material (B.O.M), scope of works, loss reduction strategy, contract document, notice to proceed, LPO, work schedules, transformer commissioning reports, as built drawing.

The desk review of the project documentation revealed the following:

i) The feeder had fifty six (56) transformers, of which twenty six (26) transformers were recovered from the feeder. The documentation

showed that ***only nineteen (19) transformers were returned to stores; leaving seven (7) recovered transformers unaccounted for);***

ii) Over 61 legal attempts/way leaves issues arose during project execution. However, Umeme did not provide support information on the successful handling of these way leaves and whether or not they resulted into assets for capitalized to earn a return;

iii) The material reconciliation had some items used for prepayment conversions, which was outside the scope of this particular project (e.g. 10000x buckle strap 122mm s/st C254, 94000xCable tie PVC for ABC, 3800mx Cable single 16mm G/Y/B). These were excluded from the values considered for ROI;

iv) Umeme decommissioned 13 Air break Switches which had developed faults. However, there were no handover reports, and only 6 air break switches had goods return note forms verified. Furthermore, much as 13 air break switches were decommissioned, they were not replaced leaving the transformers unprotected;

v) 125 transformers were injected onto the feeder network;

vi) 350 MV poles and 3,550 LV poles were decommissioned and 3,575 LV poles were installed on the network;

vii) 572,269m of ACSR100 conductor; 232,200m of ACSR25 conductor and 75,680m of ACSR50 conductor were replaced with 391,272m of ABC. The depreciated value of the recovered value was netted off from the asset base;

viii) The commissioning reports of the transformers installed showed that all transformers were commissioned on 22nd March 2015 which

meant that this investment could not be considered for 2014 but rather 2015;

ix) Umeme's submission classified the works done as Kampala North – Gayaza feeder. The documentation showed that the works were done not only on Kampala North – Gayaza road feeder but also on feeders originating from Waliggo substation i.e. Nangabo and Kyanja. The explanation to this is that at the time of scoping of the project, the Waliggo substation had not yet been constructed. The feeders originating from Waliggo substation used to be part of Kampala North – Gayaza feeder;

x) In its submission, Umeme estimated an annual loss reduction of 2,662,714 kWh translating into a 0.092% reduction in the loss factor. In terms of cost of losses, a 1% loss reduction is equivalent to about US$3.4m saving. Extrapolating the same for the 0.092% would lead to a US$ 0.31m equivalent saving which is far less than the project capex of US$ **5,749,632**;

xi) According to the Emmerton recommendation for Gayaza, Umeme was supposed to invest US$ 1,194,353 by installing 80km to achieve a loss saving of 2,662,714 kWh as shown in table 14. This was based on the Company re-conductoring with ABC of a third of the LV circuits per transformer zone. In terms of practicality of re-conductoring only a third of the LV circuits with ABC and the rest with bare conductor, we find this impractical especially for a feeder facing high power theft and as such it would be prudent to re-conductor the entire LV circuits with ABC. Table 13 below shows the recommended scope for Kampala North – Gayaza from the Emmerton Loss Reduction Report.

Table 13: EMMERTON INVESTMENT RECOMMENDATION FOR KAMPALA NORTH - GAYAZA FEEDER

LVABC required km	Cost LVABC (US$)	TL b4 kWh	TL after kWh	TL saved kWh	Cost $ per GWh
80	1,194,353	3,188,644	525,930	2,662,714	73,058,511

The field verification revealed the following:

(i) Fourteen (14) of the transformers submitted for verification were found to have ***been replaced and four (4) were found missing from their structures***. The four missing transformers were 11/19380/50, 11/19679/200, 11/20426/50 and another 200kVA whose number was not picked.

In response, Umeme provided that the 11/19676/200kVA was transferred to another area that needed urgent connectivity and was to be returned, 11/20426/50kVA and the Bahai 50kVA had been booked from store but these ratings were out of stock, and lastly, the Kyanja stone Quarry 50kVA had been booked in store but these ratings were out of stock by the time of the verification. The cost of these transformers EXCLUDING associated materials and labor amount to US$ 23,471;

(ii) Most transformers verified had their circuit breakers by-passed, burnt or missing. Unprotected transformers were prone to a risk of blowing up which increases the DOMC of the company. Lack of protection impaired the rest of assets on the network. A total of 128 circuit breakers were found missing/burnt. The company was requested to make good and they have since repaired / replaced the circuit breaker to provide proper protection of the transformers in particular and the entire network in general;

(iii) The verification further revealed that some transformers never had protection from lightening thus increasing their risk of blowing up. A total of 25 surge arrestors and 38 fuse carriers were found missing on different transformers. Much as this (quantity) is immaterial in terms of the total transformers on the feeder and network, securing transformers is a sign of a prudent utility practice and is a sign of an efficient risk management strategy required by insurance providers;

(iv) A total of 120 transformers were verified of which 14 transformers had been replaced. Umeme is yet to provide the details on the cause of the fault, source of replacements (workshop, store or previously decommissioned);

(v) Much as 125 transformers were commissioned, twenty six (26) transformers were decommissioned. Umeme is yet to provide the useful life of the decommissioned transformers and supporting documentation for the seven decommissioned transformers not verified. The unverified 7 transformers equate to US$ 53,858;

(vi) The HV and MV poles were found to match those of the material submissions;

(vii) The company submitted that the feeder losses were as follows:

Technical losses reduced from 17% to 13 %. There was no submission of current loss factor to confirm that the technical loss reduction plan which formed part of the justification for the investment was achieved.

CONCLUSION

The above verification findings led to the following conclusions:

i) Although the Company carried out the investments without the Authority's approval, there were gains made in terms of loss reduction both technical and commercial arising out of the investment;

ii) The value that qualifies for ROI is net of the impairment charge for the recovered transformers and the recovered conductor which was replaced with ABC;

iii) Umeme should explain why air break switches were recovered from the field and not returned to the network;

iv) The 3,550 LV poles that were replaced fall under the DOMC and should be treated as such;

v) Since the Management had earlier observed that Umeme had already been allowed enough Capex to achieve its loss target for 2014, this investment qualified as a 2015 investment; and,

vi) The field verification identified a number of anomalies which the Company needed to address in order for the investment to be rendered worthwhile. The Company had to address the hitches identified before it could be approved.

Table 14 shows the financial amounts verified during the desk review and field verification exercise that qualify for ROI.

Table 14: SUMMARY OF KAMPALA NORTH - GAYAZA FEEDER

Summary	Supported Cost (Ugx'M)	Supported(US$ '000)
Materials	10,839	3,901.76
L&T	3,710	1,335.55
Retrofit Costs	2,287	823.08
Transport	9	3.38
Borrowing Costs	1,005	361.74
Overhead Absorption Costs	553	199.01
Provisions	1,200	431.85
Emerton Consultancy	128	46.20
Other costs	102	36.54
	19,832	7,139
Less		
Retrofit Costs	(2,287)	(823)
Transport	(9)	(3)
Borrowing Costs	(1,005)	(362)
Overhead Absorption Costs	(553)	(199)
Provisions	(1,200)	(432)
Emerton Consultancy	(128)	(46)
Other costs	(102)	(37)
Missing Trannformers (4)	(65)	(23)
Unsecured Transformers (8)	(144)	(52)
Decommissioned Transformers not Seen (7)	(150)	(54)
Impaired/Replaced Transformers (19)	(426)	(153)
Cost of impared Air break switches	(39)	(14)
Cost of LV Poles (10m+9m)	(1,252)	(451)
Impaired conductor- ACSR100	(617)	(222)
-ACSR50	(201)	(72)
-ACSR25	(49)	(18)
Recommended amount	**11,607**	**4,178**

AUTHORITY DECISION

The Authority rejected this investment until the company remedies the identified anomalies. Umeme was advised not to submit the completion report for ERA's review and verification to inform further decisions.

4.3.2 KAMPALA NORTH – KAWEMPE LV AND MV (US$2,784,106)

Umeme submitted that the investment aimed at reducing the technical losses from 57% to below 20%. The scope of the project was:

(i) Refurbishment and upgrade of the medium voltage (11kV) line of route length 2km, from ACSR50 and ACSR25 to 100ACSR and provide extensions to supply the newly injected transformer zones;

(ii) Inject 61 new 11kV/LV distribution transformers;

(iii) Upgrade 163km of low voltage network from Bare wire conductor to Aerial Bundled Conductor (ABC); and,

(iv) Replacement of 1,240 rotten poles of which 1,099 were LV poles.

Before implementation of the project, Umeme submitted the performance of the feeder as follows:

i) MV losses stood at 2,535,368 kWh (7.6%) and LV losses stood at 1,992,664 kWh (3.59%). The loss contribution of the feeder to the overall Umeme technical losses was 0.156%;

ii) The MV network had 63 conductor joints on a 2.1 km stretch of MV conductor implying 30 joints per km on average;

iii) The LV network had 3,789 conductor joints on a network length of 49.9 km; this translates to about 79 joints per km;

iv) The network had 59.4 km of poor and thin conductor dominated by ACSR 25 and steel;

v) Out of 2,468 poles on the network, 650 poles were noted as rotten;

vi) The average per km length of a transformer zone stood at 2.94 km/zone. Out of 58 transformer zones, 45 transformer zones did not comply with the 1.5 km/zone.

OBSERVATIONS AND ANALYSIS

According to the MV loss study (Emmerton Study) the Kampala North – Kawempe Feeder ranked No. 36 in terms of high technical losses i.e. technical loss of 7.6% and a contribution to the overall losses of 0.09%.

Umeme submitted a list of high loss feeders as at January, 2014 and the submission showed that the Kampala North – Kawempe Feeder ranked No.1 in overall loss estimates i.e. both technical and commercial losses. Losses were averaging at 64% per month.

Review of the technical loss study carried out in 2013 by Emmerton Report showed that the MV technical loss factor of 16% giving a contribution to the overall (Technical and commercial) losses of 0.19%. The average LV technical loss factor was estimated at 4%. This implies that commercial losses contribute to the larger extent the loss factor i.e. 44%. This could necessitate the use of ABC to curb the illegal hooking and power theft on the network.

In terms of technical loss reduction at the MV level, the consultant recommended re-conductoring 2.52km of MV line to reduce the losses to 9%. Looking at the overall loss factor of the feeder being largely due to commercial losses, Umeme went beyond the recommended scope of re-conductoring the MV segment of 2.5km, injected 61 new transformers and re-conductored the LV network to ABC.

Umeme provided the actual cost breakdown of the materials used as shown in table 15.

Table 15: MATERIAL COST BREAKDOWN OF KAMPALA- NORTH KAWEMPE FEEDER

MV Conductor & hardware Cost (USD)	MV Pole Cost (USD)	Transformer Cost (USD)	LV ABC & hardware Cost (USD)	LV Pole Cost (USD)	Total Cost (USD)
117,903	52,251	506,632	1,885,376	221,944	**2,784,106**

The desk review of the project documentation revealed the following:

(i) According to the project write up, Kampala North – Kawempe feeder ranked No. 1 in terms of average monthly losses as at January 2014;

(ii) The feeder had fifty eight (58) transformers, of which twenty one (21) transformers were recovered from the feeder. The depreciated value of the recovered transformers had been netted off the asset base;

(iii) 61 transformers were injected onto the feeder network;

(iv) 56 MV poles and 1,065 LV poles were decommissioned while 251 MV poles and 1387 LV poles were installed on the network;

(v) 238,631m of ACSR100 conductor; 95,850m of ACSR25 conductor and 31,240m of ACSR50 conductor were replaced with 189,334m of ABC. The depreciated value of the recovered conductor should be netted off from the asset base;

(vi) The commissioning reports of the transformers installed showed that all transformers were installed before the end of December 2014, but were commissioned in late March 2015 thus this investment could only be considered as a 2015 project.

(vii) Completion certificate shows that the works were completed on 2nd November 2014;

(viii) In its appeal submission, Umeme estimated an annual loss reduction of 1,663,997 kWh, translating into a 0.057% reduction in the technical loss factor. In terms of cost saving at an estimate of US$ 3.4m, the saving derived from the 0.057% loss reduction totaled to US$ 0.194m. The company conducted a study to determine the benefit after the works and it was found that the loss factor on the feeder has reduced by 10% technical and 30% non-technical. The investment had thus addressed the intended justification in form of reduction in technical and non-technical losses through conversion to ABC.

(ix) The Emmerton Report had made the following recommendations in table 16 concerning Kawempe Feeder. This was based on the Company re-conductoring with ABC of a third of the LV circuits per transformer zone. In terms of practicality of re-conductoring only a third of the LV circuits with ABC and the rest with bare conductor, ERA fount this impractical and as such it would be prudent to re-conductor the entire LV circuits with ABC to minimize technical and non –technical losses. In addition the feeder has registered a high load growth rate necessitating the conductor upgrade.

Table 16: EMMERTON RECOMMENDATION FOR KAWEMPE FEEDER

LVABC required km	Cost LVABC	TL b4 kWh	TL after kWh	TL saved kWh	Cost $ per GWh
44	662,413	1,992,664	328,667	1,663,997	33,745,555

(x) The field findings revealed that the works had been done. It further revealed that the Company needed to improve on its maintenance practices as most of the LV circuit breakers at the respective

distribution transformers were found to have already malfunctioned. As a result, the field staff had opted to bypass the circuit breakers for continuity of service which affects the lifetime of the distribution transformer in service.

CONCLUSION

The above review findings led to the following conclusions:

i) Based on the principle that an asset is regarded as useful only when it has been duly commissioned, the transformers were commissioned on 22nd March 2015; this would imply that the works do not qualify for ROI in 2014 but would apply for 2015;

ii) The value that qualified is net of recovered transformers that had not been redeployed and impairment of the bare wire conductor that was replaced with ABC;

iii) The 1,065 LV poles that were replaced were under the DOMC and were to be treated as such;

iv) Since the Authority had earlier observed that Umeme had already been allowed enough Capex to achieve its loss target for 2014, this investment qualified as a 2015 investment;

Table 17 shows the financial amounts verified during the desk review and field verification exercise that qualify for ROI.

Table 17 TABULATION OF COSTS FOR KAMPALA NORTH - KAWEMPE FEEDER

Summary	Supported Cost (Ugx'M)	Supported(US$' 000)
Materials	5,212	1,876
L&T	1,919	691
Retrofit Costs	289	104
Transport	-	-
Borrowing Costs	513	185
Overhead Absorption Costs	230	83
Provisions	299	107
Emerton Consultancy	71	25
Other costs	50	18
Total	8,583	3,090
Less		
Retrofit Costs	(289)	(104)
Transport	-	-
Borrowing Costs	(513)	(185)
Overhead Absorption Costs	(230)	(83)
Provisions	(299)	(107)
Emerton Consultancy	(71)	(25)
Other costs	(50)	(18)
Impaired Transformers (21)	(197)	(71)
Cost of LV Poles (10m+9m)	(468)	(169)
Impaired conductor- ACSR100	(397)	(143)
-ACSR50	(81)	(29)
-ACSR25	(20)	(7)
Recommended Amount	**5,968**	**2,148**

AUTHORITY DECISION

The Authority approved investments amounting to **US$ 2,148,149** towards loss reduction works for Kampala – North – Kawempe Feeder to earn a return as a **2015** investment.

4.3.3 KIREKA – SEETA

Umeme in its application dated 30th December 2014 submitted that this feeder had consistently registered an average loss percentage of 40% and that the Emmerton Loss Reduction Study had identified 11% being attributed to technical losses (i.e. at MV and LV). The project was

divided into two zones for easy control and monitoring. Table 18 shows the breakdown of the project scope.

Table 18: COSTS FOR KIREKA – SEETA FEEDER AS SUBMITTED BY UMEME

Zone	Cost US$	Scope
Zone 1	1,146,665	4.2km of MV extension, installed 70km of ABC, injected 875 poles and 14 distribution transformers
Zone 2	1,284,811	3.2km of MV extension, installed 80km of ABC, injected 980 new poles and 17 distribution transformers
Total	**2,431,475**	

OBSERVATIONS AND ANALYSIS

Umeme's submission is consistent with the consultant's findings. Review of the Emmerton Report showed that technical loss levels at both MV and LV were low. The report showed a low technical loss figure compared with the actual losses on the feeder. This implies that the contribution to the losses on the feeder was largely due to commercial. This justification for the commercial losses was further clarified in Umeme's letter dated 26th April 2016 in which the company submitted the actual performance of the feeder in terms of losses after works were implemented. This is shown in Table 19.

Table 19: PERFORMANCE OF KIREKA – SEETA 11KV FEEDER IN TERMS OF LOSSES

Loss type	Before	After
MV Technical Losses	6%	8%
LV Technical Losses	2%	3%
Commercial Losses	31%	0%

The submission by Umeme showed that the feeder was experiencing more commercial losses than technical losses and as such, the

company implemented the ABC to reduce power theft. Umeme provided the actual cost breakdown for Kireka -Seeta used as shown in Table 20.

Table 20: ACTUAL COST BREAKDOWN FOR KIREKA –SEETA WORKS

Feeder Zone Description	**Zone 1**	**Zone 2**
MV Conductor & hardware Cost (US$)	293,513	677,555
MV Pole Cost (US$)	22,086	4,275
Transformer Cost (US$)	95,416	123,050
LV ABC & hardware Cost (US$)	357,641	
LV Pole Cost (US$)	88,746	79,851
Contractors Labor & Transport (US$)	187,564	238,218
OH Absorption(US$)	30,812	34,118
Borrowing costs(US$)	68,610	75,971
Transport Costs(US$)	2,275	2,953
Provisions(US$)	13,663	0
Total Cost (US$)	**1,160,326**	**1,235,991**

The desk review of the project documentation and field verification revealed the following:

(i) The detailed submission availed revealed a total amount of US$ 2,396,317 which is less than the submitted summary of US$2,431,475 by US$35,158;

(ii) According to the project write up, Kireka – Seeta Feeder ranked No. 12 in terms of average monthly losses as at January 2014;

(iii) Much as the material submission revealed 31 transformers, only 29 transformers were injected onto the feeder network. The two transformers (US$10,358) were replacements and were thus netted off from the amounts to be considered to a return on investment.

(iv) 69 MV poles and 999 LV poles (US$ 14,141) were decommissioned; and 226 MV poles and 1660 LV poles were installed on the network;

(v) 148,933m of ACSR100 conductor with an impaired value of US$ 51,990 (remaining useful life of five years); 97,460m of ACSR25 conductor with a remaining life of five years valued at **US$ 9,143** and **163,743m** of ACSR50 conductor with a remaining life of five years valued at **US$ 30,724** were replaced with 151,107m of ABC. The depreciated value of the recovered conductor was netted off from the asset base;

(vi) The commissioning reports of the transformers installed showed that all transformers were installed and commissioned before the end of December 2014;

(vii) Completion certificate showed that the works were completed on 30th December, 2014;

(viii) The field findings revealed that the works had been done. It further revealed that the Company needed to improve on its maintenance practices as most of the LV circuit breakers at the respective distribution transformers were found to have already malfunctioned. As a result, the field staff had opted to bypass the circuit breakers for continuity of service which affected the lifetime of the distribution transformer in service.

CONCLUSION

The above findings led to the following conclusions:

i) Based on the principle that an asset is regarded as useful only when it has been duly commissioned, the transformers were installed and commissioned before the end of 2014 and the partial completion

certificates for both the zones 1 and 2 were issued on 30th December, 2014. This project does qualify for ROI in 2014. Since the Authority had earlier observed that Umeme had already been allowed enough Capex to achieve its loss target for 2014, this investment qualified as a 2015 investment;

i) The value that qualifies for ROI shall be subject to impairment of the depreciated value of the recovered conductor that was replaced with ABC;

ii) The 999 LV poles **(US$123,277)** that were replaced were under the DOMC and should be treated as such;

iii) Although the project did not qualify as a technical loss project, in terms of commercial losses, there was enough justification for the company to implement the project;

Table 21 shows the details of the financial review and the amounts recommended for approval.

Table 21: KIREKA- SEETA ZONES 1 & 2 FINANCIAL REVIEW

Feeder Zone Description	**Kireka - Seeta**	**Kireka - Seeta**
	Zone 1	**Zone 2**
Submitted value (Table 11)	$ 1,160,326	$ 1,235,991
Less		
Impaired Conductor		
Conductor 0.1 Al Sca (148,933m)	**For all**	51,990
Conductor 0.05 Al Sca (97,460m)		30,724
Conductor 0.025 Al Sca (163,743m)		9,143
Replaced Tx Cost		10,358
LV Pole Cost	$ 88,746	$ 79,851
OH Absorption	$ 30,812	$ 34,118
Borrowing costs	$ 68,610	$ 75,971
Transport Costs	$ 2,275	$ 2,953

Feeder Zone Description	Kireka - Seeta	Kireka - Seeta
	Zone 1	**Zone 2**
Provisions	$ 13,663	$ -
Disallowed total	***$ 204,106***	***$ 295,108***
Approved Amount	**$ 956,220**	**$ 940,883**

AUTHORITY DECISION

The Authority approved a total amount of **US$ 1,897,103** towards Kireka - Seeta 11kV feeder to earn ROI as a **2015** investment.

4.3.4 MUKONO – SEETA

Umeme in its letter dated 30th December 2014 submitted that the feeder had consistently registered an average loss percentage of 40% as identified in the Emmerton Loss Reduction Study. The project was divided into four zones for easy control and monitoring. By the end of 2014, this project was still work in progress. This project was submitted under the 2015 completed investments for verification. Table 22 shows the breakdown of the project scope.

Table 22: Costs for Mukono – Seeta Feeder as submitted by Umeme

Zone	Cost US$	Scope
Zone 1	1,714,285	• Reconductor 125km of LV bare wire with ABC • Inject 22 new transformers along the feeder • Install LV and MV poles along the feeder • Transformer KVA metering
Zone 2	2,062,435	• Reconductor 131km of LV bare wire with ABC • Inject 41 new transformers along the feeder • Inject and replace LV and MV poles along the feeder • Transformer KVA metering • Extension of 7.3km of MV network

Zone	Cost US$	Scope
Zone 3	1,391,880	• Reconductor 94km of LV bare wire with ABC • Inject 40 new transformers along the feeder • Inject and replace LV and MV poles along the feeder • Transformer KVA metering • Extension of 5.3km of MV network
Zone 4	890,444	• Reconductor 61km of LV bare wire with ABC. • Inject 20 new transformers along the feeder. • Inject and replace LV and MV poles along the feeder. • Transformer KVA metering. • Extension of 6km of MV network.
Total	**6,059,044**	

OBSERVATIONS AND ANALYSIS

Umeme's submission was consistent with the consultant's findings. Review of the Emmerton Report showed that technical loss levels at both MV and LV were low. The report showed a low technical loss figure compared with the actual losses on the feeder. This implied that the contribution to the losses on the feeder was largely due to commercial. This justification for the commercial losses was further clarified in Umeme's letter dated 26th April 2016, in which the company submitted the actual performance of the feeder in terms of losses after works were implemented. This is shown in table 23.

Table 23: PERFORMANCE OF MUKONO – SEETA 11KV FEEDER IN TERMS OF LOSSES

Loss type	Before	After
MV Technical Losses	7%	8%
LV Technical Losses	3%	3%
Commercial Losses	27%	1%

The submission by Umeme showed that the feeder was experiencing more commercial losses than technical losses and as such, the company implemented the ABC to reduce power theft. However, there was need to take into consideration the introduction of prepaid meters and as such the computed sales would account for energy that had not yet been consumed by the Umeme customers. The actual commercial loss figure could be higher than what is reported.

The desk review of the project documentation and field verification revealed the following:

(i) For Zone 1: 8.2km of MV line was extended to allow for transformer injections along the feeder. 19 transformers were injected and three transformers were upgraded. Material returns show two 100kVA transformers and one 50kVA transformer were recovered and returned to stores. Bare conductor of route length 125 km was replaced with ABC 70mmsq (125641m). 17MV poles and 660 LV poles were decommissioned. 1213 (9m) poles, 76 (10m) poles, 22 (14m) poles and 94 (12m) poles were installed.

(ii) For Zone 2: 7.3km of MV line was extended to allow for transformer injections along the feeder. 39 transformers were removed from stores. Four (4) transformers were upgraded and two (2) transformers were downgraded, the rest were injections. Material returns showed that one 500kVA transformer, two 315kVA transformers, seven 100kVA transformers, two 50kVA transformers and one 25kVA transformer were recovered and returned to stores. 34 (10m) poles were returned to stores. Bare conductor of route length 131 km was replaced with ABC 70mmsq (131314m). 43 MV poles and 801 LV poles were decommissioned. 902 (9m) poles, 274 (10m) poles, 62 (14m) poles and 140 (12m) poles were installed, and 42 transformers were installed;

(iii) For Zone 3: 31 transformers were installed of which one was vandalized from stores. Material returns showed that one 315kVA transformer, two 200kVA transformers, three 100kVA transformers, four 50kVA transformers and two 25kVA transformers were recovered and returned to stores. 34 (10m) poles were returned to the stores. Bare conductor of route length 93 km was replaced with ABC 70mmsq (93573m). 13 MV poles and 319 LV poles were decommissioned. Final material reconciliation showed that 200 (9m) poles, 467 (10m) poles, 15 (14m) poles and 46 (12m) poles were installed;

(iv) For Zone 4: 6km of MV line was extended to allow for transformer injections along the feeder. 21 transformers were drawn from stores and installed. Material returns showed that four 50kVA transformers, one 16kVA transformer, two 25kVA transformers and one 100kVA transformer were recovered and returned to the stores. 34 (10m) poles were returned to stores. Bare conductor of route length 60 km was replaced with ABC 70mmsq (60130m). 20 MV poles and 181 LV poles were decommissioned. Final material reconciliation showed that 330 (9m) poles, 302 (10m) poles, 1 (14m) poles and 64 (12m) poles were installed. One 50kVA transformer was vandalized and replaced.

(v) The commissioning reports of the transformers installed show that all transformers were installed and commissioned before the end of December 2015;

(vi) Completion certificate showed that the works were completed on 30th December, 2014;

(vii) The field findings revealed the works had been done. It further revealed that the Company needed to improve on its maintenance

practices as a number of LV circuit breakers at the respective distribution transformers were found to have already malfunctioned. As a result, the field staff had opted to bypass the circuit breakers for continuity of service which affected the lifetime of the distribution transformer in service.

CONCLUSION

The above findings led to the following conclusions:

i) Based on the principle that an asset is regarded as useful only when it has been duly commissioned, the transformers were installed and commissioned before the end of 2015 and the project did qualify for ROI in 2015;

ii) The value that qualified for ROI was to be subject to impairment of the depreciated value of the recovered conductor that was replaced with ABC;

iii) The LV poles that were replaced were under the DOMC and had to be treated as such;

iv) Although the project did not qualify as a technical loss project, in terms of commercial losses, there was enough justification for the company to implement the project.

Table 24 shows the details of the financial review and the amounts recommended for approval.

Table 24: MUKONO – SEETA 11KV FEEDER FINANCIAL REVIEW

Zone	Materials	L&T	Transport	Borrowing Costs	Overhead Absorption Costs	Emerton Consultancy	Total
TLR Mukono Seeta ABC Zone 1	1,146,290	337,282	4,083	83,092	91,135	52,403	1,714,285
TLR Mukono Seeta ABC Zone 2	1,363,653	463,962	1,902	98,978	69,422	64,519	2,062,435
TLR Mukono Seeta ABC Zone 3	986,185	246,306	5,590	61,019	51,967	40,813	1,391,880
TLR Mukono Seeta ABC Zone 4	601,539	219,819	794	38,427	14,146	15,719	890,444
	4,097,667	**1,267,368**	**12,369**	**281,516**	**226,670**	**173,454**	6,059,044
Less							
LV Poles (9m +10m)							(407,993)
Impairement of conductor							(22,612)
O&M related costs							(694,008)
Recommended Amount							**4,934,432**

AUTHORITY DECISION

The Authority approved a total amount of **US$ 4,934,432** for Mukono – Seeta 11kV Feeder to earn ROI as a **2015** investment.

4.4 RESTORATION PROJECTS - ADDITIONAL OVERHEAD LINES

The following feeders were submitted under this category for which the company sought retrospective approval:

(i) Kisubi – Sissa;
(ii) Busunju – Hoima T-offs; and,
(iii) Kiriri – Kabulasoke.

The following costs were submitted as actuals spent as shown in table 25.

Table 25: RESTORATION PROJECTS FOR RETROSPECTIVE APPROVAL

S/N	Restoration Feeder	Submission (UShs)	Submission equivalent (US$)
1	Busunju – Hoima T – Offs	505,180,657	181,850.49
2	Kiriri – Kabulasoke 11kV feeder	3,994,325,532	1,437,842.16
3	Kisubi – Ssisa Feeder	2,468,772,374	888,686.96
	TOTAL	**8,390,518,954**	**3,020,345.19**

OBSERVATIONS AND ANALYSIS

The scope of works under restoration was largely replacement of MV poles and associated assembly, and included a component of conductor upgrade from 25mm^2 conductor sizes to larger conductor sizes i.e. 50mm^2 and 100mm^2.

i) Busunju – Hoima T – Offs: 115 MV poles were decommissioned, 29 x 14m poles, 102 x 12m poles and 13 x 10m poles were installed. 3910m of 100mm^2 ACSR and 20,100m of 50mm^2 ACSR were upgraded from the original conductor size of 25mm^2;

ii) Kiriri – Kabulasoke 11kV Feeder: 1016 MV poles were decommissioned, 86 x 14m poles, 943 x 12m poles and 54 x 10m poles were installed. 128,377m of conductor 100mm^2 and 234,488m of 50mm^2 was upgraded from the original conductor of 25mm^2. The Company's submission totaled US$ 1,437,842 for the work done. Analysis of submitted costs revealed that they included borrowing, overhead absorption costs and staff operational costs totaling to US$ 128,686. These have not been included in the recommended amount to earn a return on investment;

iii) Kisubi – Ssisa 11kV Feeder: 472 MV poles were decommissioned, 62 x 14m poles, 420 x 12m poles and 40 x 10m poles were installed. 130,194m of conductor 100mm^2 and 110,420m of 50mm^2 were

upgraded from the original conductor of 25mm^2. There were large amounts of material returns for 100mm^2 amounting to 83,746m;

iv) Field inspections for two (2) feeders were done. These were Busunju – Hoima T – Offs and Kiriri – Kabulasoke 11kV Feeder. The field findings showed that the works were done to standards as per the scope submitted in the documentation and key materials used in the projects reconciled with the materials extraction from the stores.

CONCLUSION

These mentioned investments were not approved by the Authority. Below is a case by case conclusion on the restoration feeders:-

i) The age profile of the MV feeder of Kiriri – Kabulasoke 11Kv feeder showed that the feeder was of advanced age (i.e. last refurbished in 1975) and no major refurbishment had been done on it to replace the old infrastructure. This investment was justified and should be approved as part of the Company's a 2015 investment;

ii) The age profile of the MV feeder of Kisubi – Ssisa 11kV feeder showed that the feeder is of advanced age (i.e. last refurbished in 1960) and no major refurbishment had been done on it to replace the old infrastructure. It was further noted that this project was submitted under the 2015 investment plan in the category of technical loss reduction. The Authority deferred approval of the investment due to inconsistencies in the information submitted. Since this project was submitted under the 2015 investment plan, it should be treated as such;

iii) For the case of Busunju – Hoima T-offs, it was noted that in the third approval of 2014 investments, the Authority approved additional investments on the Busunju – Hoima line to allow Umeme replace more poles on the Busunju Hoima line. The works done qualify for ROI.

AUTHORITY DECISION

(i) The Authority approved the investment of Kiriri – Kabulasoke 11kV feeder amounting to **US$ 1,305,916** to earn ROI as a 2015 investment;

(ii) The Authority approved the investment of Kisubi – Ssisa 11kV feeder amounting to **US$ 809,837** in to earn ROI as a **2015** investment;

(iii) The Authority approved the investment of Busunju – Hoima T-offs amounting to **US$ 165,649** to earn ROI as **2015** investment.

4.5 COMMERCIAL LOSS REDUCTION PROJECTS

Umeme submitted investments under this category of investments worth US$ 654,570. The work done under this investment category included relocating and securing of meters for TOU customers, community based initiatives, installation of ABC and meter clustering. This category of investments was submitted to the Authority for approval in the 2014 investment plan; however, although the investments were considered relevant, the Authority guided that these works were of operation and maintenance nature and should thus be treated as such. It is on this basis that the Authority disallowed the investments.

Umeme submitted that the rationale for implementing commercial loss reduction projects was to achieve the loss reduction target of 3% set by ERA. The scope of work involved re-designing of the network to secure meter installations, reconfiguration to customer clustering and network upgrades involving the installation of ABC.

AUTHORITY DECISION

The Authority stayed its original decision and **disallowed** the submission on Commercial Loss Reduction investments since these were

considered as O&M in nature at the time of approval of 2014 investments.

4.6 OTHER LV TECHNICAL LOSS REDUCTION

Under this category Umeme submitted US$3,204,102 as additional expenditure required to be approved for ROI. To support this investment, Umeme submitted a detailed list of 103 transformers schemes that were implemented totaling US$ to 3,617,883.04. Out of the 103 schemes submitted, information for 93 schemes amounting to US$ 3,265,232, was availed and a desk review conducted on them.

The works done under this category were:

(i) Re-designing of transformer zones by injecting new transformers;

(ii) Re-conductoring LV lines with ABC; and,

(iii) Replacement of LV rotten poles.

The justification for undertaking these investments was due to the existing transformer zones being characterized by long circuits and poor voltage profiles leading to high technical losses.

No field work was done to ascertain whether the works done were not O&M in nature.

OBSERVATION

The Authority noted that it had already approved investments in technical loss reduction that were sufficient for Umeme to achieve the loss trajectory target for 2014. Furthermore, the Authority had already approved an amount of US$ 3 million towards a similar initiative under load growth.

The nature of the investments done under this category required Umeme to submit historical information prior to undertaking these investments and field verification to ascertain whether the works done qualify for ROI or are of O&M in nature. Once the investments are qualified, they shall be considered as 2015 investments.

AUTHORITY DECISION

The Authority **rejected** this category of investment until the historical information is provided that informed the decision to invest in those respective areas.

4.7 RESTORATIONS WITH SAFETY PRIORITY

Umeme submitted a category of investments called Restorations with Safety priority. Umeme submitted a list of thirty eight (38) schemes under this category.

DESK REVIEW

The desk review findings showed that of the thirty eight (38) schemes submitted worth US$ 2,223,020, only information for twenty five (25) schemes worth US$ 2,102,584 was provided.

A review of the schemes provided showed that these were investments in the category of safety that had been applied for by Umeme in 2014 and had been rejected by the Authority as being O&M in nature. The company re-classified them and re-submitted them as restoration projects with a safety component. A further review of the projects showed that the motivation for carrying out these projects was based on the following aspects:

(i) Safety concerns particularly in schools; Umeme replaced bare conductor with ABC;

(ii) Load growth in some areas; Umeme upgraded and/or injected transformers to address load growth and improve the quality of supply in the concerned areas; and
(iii) LV restoration; Umeme replaced rotten poles and replaced bare conductor with ABC.

There was no field verification done on the above projects.

OBSERVATIONS

The desk review findings showed that these investments had a mix of O&M activities and CAPEX investments. O&M activities included replacement of rotten poles and bare conductor. CAPEX activities included injection of new poles (MV), transformer upgrades, transformer injections in the form of system improvements and conversion of bare wire conductor to ABC.

The general view of the submission under this category is that these investments were system improvements that combined a safety aspect, load growth, LV restoration and to some extent a loss reduction component.

Only the investments where injection of new poles (MV) which have lived their life time, transformer upgrades and injections do qualify for ROI but should be considered under the transformer injection load growth category. The LV restoration works in the form of pole replacement, transformer replacement, and transformer relocations are O&M activities and was treated as such. For the case where bare conductor was replaced with ABC, the book value of the replaced conductor was impaired from the value of ABC installed.

Table 26 shows the amounts submitted by the company.

Table 26: RESTORATION WITH SAFETY PRIORITY PROJECTS

	Restoration with Safety Project	Submission (UGX)	Submission in (US$)
1	Ireda Primary School	241,369,943	86,886
2	Adyel Primary School	467,948,484	168,448
3	Lango College ABC Project	335,217,970	120,669
4	Aduku Road Tx Lira	350,493,320	126,168
5	Bright Light Primary and Sec School	293,757,939	105,744
6	New Generation School Lira and P	407,046,959	146,525
7	Busoga University	354,249,491	127,520
8	Kaliro Teachers College	105,573,131	38,003
9	Kaliro High School	108,940,676	39,216
10	Busoga High School	191,577,894	68,963
11	Kidera Prison	73,728,498	26,540
12	Kyabugimbi Secondary school	159,336,647	57,357
13	St. Kagwa High School	244,819,107	88,128
14	Ishaka Town School	231,559,011	83,355
15	Butsibo Secondary School	50,967,847	18,347
16	Kizungu	595,795,151	214,469
17	Kisenyi	399,189,396	143,697
18	Rwebikoona	183,116,086	65,917
19	Nagongera Girls Primary School	140,724,221	50,657
20	Rock View Primary School	167,447,939	60,276
21	Namuwongo Market	108,725,014	39,138
22	Soweto (Proposal to Relief Namuwongo).	117,747,739	42,386

	Restoration with Safety Project	Submission (UGX)	Submission in (US$)
23	Kibuli Muwaire (Wabigalo Primary)	121,396,539	43,699
24	Namuwongo Bukasa Road Transformer.	128,425,063	46,229
25	Kikubamutwe Village Transformer	261,823,392	94,249
		5,840,977,457	**2,102,584**

Having made the above observations, separation of costs with intent to isolate CAPEX from O&M was not possible since the costs were all mixed up, the age of the replaced MV poles was not provided and the injected transformers where already catered for under the load growth category.

AUTHORITY DECISION

The Authority upheld its position and **disallowed** safety submissions as part of 2014 investments until the Company provides the segregated costs for the respective works done to allow for the consideration of works that qualify for ROI.

5 AUTHORITY DECISION

a) The Authority approved the following investments under retrospective investments:

i) Kireka - Namugongo: zones 1-6: **US$ 3,413,798** as a 2014 completed investment;

ii) Mutundwe - Kabowa Feeder ABC: **US$ 225,400** as a 2014 completed investment;

iii) Kawanda – Kawempe Feeder: **US$ 13,771,** as a 2015 completed investment;

iv) Queensway – Lukuli: **US$ 44,913,** as a 2015 completed investment;

v) Jinja Industrial – Walukuba: **US$ 126,803,** as a 2015 completed investment;

vi) Masaka Central - Upper ring: **US$ 440,276,** as a 2015 completed investment;

vii) Tororo Rock - Town ring 1: **US$ 465,680,** as a 2015 completed investment;

viii) Nansana MV feeder: **US$ 76,863,** as a 2014 completed investment;

ix) Kampala North – Kawempe Feeder: **US$ 2,148,149,** as a 2015 completed investment;

x) Kireka – Seeta Feeder: **US$ 1,897,103,** as a 2015 completed investment;

xi) Mukono – Seeta Feeder: **US$ 4,934,432,** as a 2015 completed investment;

xii) Hoima - Busunju T-offs: **US$ 165,649,** as a 2015 completed investment;

xiii) Kiriri – Kabulasoke Feeder: **US$ 1,305,916,** as a 2015 completed investment;

xiv) Kisubi – Sissa Feeder: **US$ 809,837,** as a 2015 completed investment.

b) The Authority rejected the following investments:

i) Green Valley Transformer Relief: Umeme should consider submitting this investment under transformer injections;

ii) Queensway – Katwe Feeder: No information was submitted;

iii) Kampala South - Entebbe 2 Feeder (Roofings T-off): No information was provided;

iv) Kampala North – Gayaza feeder: The Company must rectify the numerous identified technical hitches and submit a report before the investment can be considered for approval;

v) Commercial Loss reduction Schemes: The Authority had already pronounced itself on this type of investments and regarded them as DOMC in nature;

vi) LV Technical Loss Reduction: Umeme has to first account for already approved transformer injections and also submit historical data of the transformer loadings;

vii) Quality of supply - Public Safety: Umeme to segregate costs of the works done to allow ERA consider investments that do qualify for ROI.

c) The Authority approved an additional **US$ 3,716,061, as 2014 completed investments;**

d) The Authority approved an additional **US$ 12,352,529, as 2015 completed investments;**

e) The Authority rejected a total amount of **US$ 16,427,886 that** was submitted for additional approval.

Details are summarized in table 27.

Table 27: SUMMARY OF UMEME 2014 INVESTMENTS APPROVED UNDER RETROSPECTIVE CONSIDERATION

S/N	Description	Submission (US$)	Verified (US$)	Approved (US$)	Remarks
Carryovers					
1	Kireka - Namugongo: zones 1-6	6,114,190	5,950,660	3,413,798	**Approved as completed investment in 2014** • Emmerton report recommended reconductoring 1/3 of LV circuits with ABC. Company reconductored the entire LV circuits with ABC. • Reason was to curb both technical and commercial losses. It was also not practical to use ABC for only 1/3 of the circuits. • Recommended for 2014, less impairment, DOMC and LV costs and costs earlier approved in 2014

S/N	Description	Submission (US$)	Verified (US$)	Approved (US$)	Remarks
2	Mutundwe - Kabowa feeder ABC	656,172	296,798	225,400	**Approved as completed investment in 2014** • Emmerton Report recommended reconductoring 1/3 of LV circuits with ABC. Company reconductored the entire LV circuits with ABC. • Reason was to curb both technical and commercial losses. It was also not practical to use ABC for only 1/3 of the circuits. • Recommended for 2014, less impairment, DOMC and LV costs
3	Green Valley Transformer Relief	125,655	125,655	0	**Rejected:** To be accounted for under approved transformer injection amounts in 2014
	Sub Total	**6,896,017**	**6,373,113**	**3,639,198**	
MV Technical loss reduction					
1	Kawanda - Kawempe	19,365	19,365	13,771	**Approved as completed investment in 2015;** Less Impairment and DOMC costs. Investments allowed for loss reduction in 2014 were sufficient to achieve intended loss target
2	Queensway - Lukuli	77,536	77,536	44,913	**Approved as completed investment in 2015**; Less Impairment and DOMC costs. Investments allowed for loss

S/N	Description	Submission (US$)	Verified (US$)	Approved (US$)	Remarks
					reduction in 2014 were sufficient to achieve intended loss target
3	Jinja Industrial - Walukuba	173,509	173,509	126,803	**Approved as completed investment in 2015;** Less Impairment and DOMC costs. Investments allowed for loss reduction in 2014 were sufficient to achieve intended loss target
4	Masaka Central - Upper ring	604,749	604,749	440,276	**Approved as completed investment in 2015;** Less Impairment and DOMC costs. Investments allowed for loss reduction in 2014 were sufficient to achieve intended loss target
5	Tororo Rock - Town ring 1	512,013	512,013	465,680	**Approved as completed investment in 2015;** Less Impairment and DOMC costs. Investments allowed for loss reduction in 2014 were sufficient to achieve intended loss target
6	Nansana MV feeder	119,069	119,069	**76,863**	**Approved as completed investments in 2014;** less DOMC and impairment costs. Project was a carryover from 2013
7	Queensway - Katwe			0	**Rejected:** No submission
8	Kampala South - Entebbe 2 (Roofings T-			0	**Rejected:** No submission

S/N	Description	Submission (US$)	Verified (US$)	Approved (US$)	Remarks
	off)				
	Sub Total	**1,506,241**	**1,506,241**	**1,168,306**	
LV Technical Loss Reduction					
1	Kampala North - Gayaza	5,749,632	5,749,632	-	**Rejected:** Company had to rectify technical hitches identified in the field inspection and submit a report. Otherwise the project did qualify for 2015 as allowed loss reduction investments for 2014 were sufficient to achieve loss target for 2014
2	Kampala North - Kawempe	2,784,106	2,784,106	2,148,149	**Approved as completed investment in 2015,** Less Impairment and DOMC costs. Allowed loss reduction investments for 2014 were sufficient to achieve loss target for 2014
3	Kireka - Seeta	2,431,475	2,431,475	1,897,103	**Approved as completed investment in 2015,** Less Impairment and DOMC costs. Allowed loss reduction investments for 2014 were sufficient to achieve loss target for 2014
4	Mukono - Seeta	6,059,044	6,059,044	4,934,432	**Approved as completed investment in 2015,** Less Impairment and DOMC costs. Allowed loss reduction investments for 2014 were sufficient to

S/N	Description	Submission (US$)	Verified (US$)	Approved (US$)	Remarks
					achieve loss target for 2014
	Sub Total	**17,024,257**	**17,024,257**	**8,979,684**	
Restoration Projects					
1	Hoima - Busunju T-offs	181,850	181,850	165,649	**Approved for 2015**, Less Impairment and DOMC costs
2	Kiriri - Kabulasoke	1,437,842	1,437,842	1,305,916	**Approved for 2015**, Less Impairment and DOMC costs
3	Kisubi - Sissa	888,687	888,687	809,837	**Approved for 2015**, Less Impairment and DOMC costs
	Sub Total	**2,508,379**	**2,508,379**	**2,281,402**	
Other Investments					
1	Commercial Loss reduction Schemes	654,000	654,000	-	**Rejected:** The Authority had already pronounced itself on these projects. That they were DOMC in nature and that the Company should use its DOMC allocation.

S/N	Description	Submission (US$)	Verified (US$)	Approved (US$)	Remarks
2	LV Technical Loss Reduction	3,204,000	3,204,000		**Rejected:** Umeme to account for the approved transformer injections for 2014 and to submit historical data of these upgraded and overloaded transformers. These were mainly transformer injections, replacements, upgrades and replacement of rotten poles and conversion of bare conductor to ABC.
3	Quality of supply - public safety	2,223,000	2,103,000	-	**Rejected:** Umeme to submit segregated costs for ABC, transformer injections, transformer replacements, LV pole replacements for consideration to be made on those items that qualify for ROI.
	Sub Total	**6,081,000**	**5,961,000**	**-**	
	Total	**34,015,894**	**33,372,990**	**16,068,590**	