



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

## FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)

26 p.  
t. all in

21695



XD9700016

Restricted

Original: English



**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION**

**US/ZIM/92/028**

**Opportunity Studies  
for the Local Manufacture of Spare Parts and Components  
for Electricity Distribution in Zimbabwe  
(Final Report)**

**Phase II**

**EXECUTIVE SUMMARY**

**Prepared for the Zimbabwe Electricity Supply Authority**

by  
AUSTROPLAN, Austrian Engineering Company Limited  
and  
DANUBE HYDRO AUSTRIA, Donaukraft Engineering

**August 1996**

---

## EXECUTIVE SUMMARY

### CONCLUSIONS

#### Objectives and selection of opportunities:

In Zimbabwe only 20 % of the population has access to electricity. The government is committed to full electrification and the potential for manufacturing is therefore very significant.

As for ZESA, the utility has received financial means from the World Bank for generation but also support facilities such as the central workshop. Recently the company suffered from the loss of experienced staff leaving to join the private sector.

It was one of the main objectives of this study to identify opportunities to source locally products procured for the Zimbabwean electricity utility. To ZESA this also means an activity in its strategy to reduce exposure to foreign exchange risk. This study represents Phase II of the project in a bid to investigate suitable companies in a staged fashion. After a screening process in Phase I, Phase II focused on the closer involvement of specific companies in the process. Also a more detailed definition of products, i.e. spare parts for electricity distribution, which are suitable for a local production was carried out. In the course of the execution of Phase II the range of projects had to be adapted to the new findings, resulting in the structure now found in this report.

Methodology: The implementation of the project's Phase II encompassed four field missions,

- a mission focusing on the local market as well as technical aspects (June 25th 1995 through July 19th 1995),
- a mission dealing with individual sites and environmental issues (July 25th 1995 through August 10th 1995) and
- a mission investigating other markets in the region (October 15th 1995 through October 29th 1995);
- a Presentation of Draft Report and additional investigations 12.07.- 24.07.1996:  
The UNIDO team presented to a general meeting the findings and recommendations given in the draft final report and discussed the follow-up actions required to assist the business opportunities identified to implementation and production. It is expected that at the end of this project a programme of assistance would be outlined providing ZESA with two of more options to pursue in promoting more local manufacturing and assisting in the indigenization of the economy.

An analysis of the power sector as well as discussions with experts of various levels within ZESA provided a background for the specification of products required at present and in the future.

In discussions with members of Zimbabwe's financing community parameters for the financial evaluation of the projects were determined, also defining minimum requirements and incentives. e.g. in the ZIC the incentives, the corporate tax, the tariff regime were investigated.

The electricity utilities of neighbouring countries were investigated for their requirements in terms of the specified products, in order to determine the potential of these markets to be used as a back-up for the demand-base required for investment projects.

Note on profitability indicators:

Discount rates for the calculation of the **NPV** have been determined **at 13%**, resulting as the cut-off rate or opportunity cost of capital, which is defined as the actual rate of interest on long-term loans (international) plus a risk premium as defined in the UNIDO Manual for the Preparation of Industrial Feasibility Studies, published by the United Nations in Vienna in 1991 (ref. ID/372). Local lending was not assumed, as local interest rates are too expensive and volatile. Financing arrangements including some form of loan financing will need to be established by the project owners and have not been considered in the opportunity studies except the calculation for Ceramic Insulators of Zimbabwe, where input data was copied from the study carried out by the Canadian consultant DGL.,

The following opportunities were investigated:

	<b>name of project</b>
III.1	EXTENSION OF LOCAL MANUFACTURE OF TRANSFORMERS (SOUTH WALES ELECTRIC)
III.2	EXTENSION OF ZESA'S WORKSHOP FOR THE PRODUCTION OF TRANSFORMERS
III.3	EXTENSION OF LOCAL PRODUCTION OF ELECTRIC METERS (COMMUNICATION SYSTEMS OF ZIMBABWE - CSZ)
III.4	EXTENSION OF LOCAL PRODUCTION OF CABLES AND CONDUCTORS (CENTRAL AFRICAN CABLES CAFCA/BICC)
III.5	EXTENSION OF LOCAL PRODUCTION OF INSULATORS (WILLSGROVE WARE POTTERY)
III.6	EXTENSION OF LOCAL PRODUCTION OF INSULATORS (CERAMIC INSULATORS ZIMBABWE)
III.7	EXTENSION OF LOCAL PRODUCTION OF SWITCHES (SWITCHCRAFT)
III.8	EXTENSION OF LOCAL PRODUCTION OF FITTINGS FOR TRANSMISSION AND DISTRIBUTION (HUBERT DAVIES)
III.9	OPTIMIZATION OF THE MANUFACTURING CAPABILITIES OF ZESA'S WORKSHOP (MECHANICAL SECTION)
III.10	OPTIMIZATION OF THE MANUFACTURING CAPABILITIES OF ZESA'S WORKSHOP (ELECTRICAL SECTION)

## Opportunity Reports:

### III.1 Extension of local manufacture of transformers (SOUTH WALES ELECTRIC)

- Market:

Item	Annual demand 1995	UNIT	Annual demand 2000	Export Opport. 1995	Export Opport. 2000
11/0.4kV 50 KVA	315	Pcs.	402	538	683
11/0.4kV 100 KVA	413	Pcs.	527	564	690
11/0.4kV 200 kVA	237	Pcs.	302	79	101
11/0.4kV 300 kVA	86	Pcs.	110	139	173
11/0.4kV 500 KVA	114	Pcs.	145	56	69
33/0.4kV 50 KVA	37	Pcs.	47	47	60
33/0.4kV 100 KVA	27	Pcs.	34	112	143
33/0.4kV 200 KVA	14	Pcs.	18	55	70
33/0.4kV 500 KVA	20	Pcs.	26	13	16

The projections of transformer demand, especially with smaller transformers, reflect ZESA's policy of rural electrification.

- Investment: 3.25 Mio. Z\$
  - Winding machines - semi automatic
  - Winding machines - simple
  - Special welding machine
  - Computer operated metal sheet cutter
- Net Present Value: 4.9 Mio. Z\$
- Internal Rate of Return: 33.1%

This well established manufacturer of transformers is familiar with the product, however has deficits in research and advanced technology in terms of product and process. Hindrances for SWE are also the high tariffs on raw materials and the dumping prices offered by foreign competitors. The investigation carried out is based on typical transformer types for distribution purposes which are already used in the Zimbabwean distribution grid. Entering the proposed product-categories would be even more advantageous as the market risk is reduced by demand from neighboring countries. The favorable profitability expressed by an **IRR of 33 %** by far exceeds the set minimum rendering the **project as very feasible**.

In spite of that SWE is part of the Hawker-Sidley-Group they are free to join with other companies. SWE has already had negotiations with BESO (British Executive Services Overseas) and preliminary discussions with EFACEC. Following our investigation ABB (Eastern Africa Region) has shown interest for cooperation with ABB Tanzania. In case of following this proposal, the technical know how of this factory should be surveyed.

A cooperation between SWE and the Electrical workshop of ZESA could make sense in terms of synergy but would additionally need a technical know how transfer from outside.

- SWE currently exports to Malawi and are looking at Mozambique and Tanzania. However these countries have payment problems. Payment is required in US dollars.
- Operations severely affected by dumping. The UNIDO team could check through ITC, Geneva on the export subsidies given to transformer producing/exporting countries such as South Africa (now down from 17 % to 9 %) and India.
- Still await government's new tariff structure on imported raw materials. It is expected that tariffs will be reduced on raw materials and increased on finished goods.
- Copper bought from CAFCA has no sufficient quality for transformers and may source instead from South Africa.
- SWE would like to cooperate with ZESA on the purchase of raw material and purchase orders for say 2 years. This would facilitate long term planning. Willing to negotiate with ZESA to help with the backlog of transformers to be repaired. The fear of creating a monopoly could be allayed through negotiations.

### III.2 Extension of ZESA's Workshop for the production of transformers

- Market:

Item	Annual demand 1995	UNIT	Annual demand 2000	Export Opport. 1995	Export Opport. 2000
11/0.4kV 50 KVA	315	Pcs.	402	538	683
11/0.4kV 100 KVA	413	Pcs.	527	564	690
11/0.4kV 200 kVA	237	Pcs.	302	79	101
11/0.4kV 300 kVA	86	Pcs.	110	139	173
11/0.4kV 500 KVA	114	Pcs.	145	56	69
33/0.4kV 50 KVA	37	Pcs.	47	47	60
33/0.4kV 100 KVA	27	Pcs.	34	112	143
33/0.4kV 200 KVA	14	Pcs.	18	55	70
33/0.4kV 500 KVA	20	Pcs.	26	13	16

The projections of transformer demand, especially with smaller transformers, reflect ZESA's policy of rural electrification.

- Investment: 27.16 Mio. Z\$

Vacuum pump  
Filter machines  
Oil pump  
Winding machines  
Test bay

- Net Present Value: 1.8 Mio. Z\$
- Internal Rate of Return: 14.49%

---

ZESA plans to transform the workshops into separate profit centers, whereby joint ventures with the private sector are considered a reasonable future solution.

The new facilities offer a good opportunity to take over not only repair services for ZESA's equipment but, in order to increase its efficient utilization, also to enter into the manufacturing of the types of transformers most used at ZESA. IRR calculated for the production of transformers in ZESA's workshop resulted in a reasonable rate of close to 17 %. The increase of the degree of utilization of the workshop by this project is to be considered as an additional strength of this project.

If the workshop is decided to produce also new transformers for ZESA and for the regional market, **there is a need of training in commercial terms in acquisition and a technical know how transfer** . A follow up with assistance by UNIDO seems to be recommended

- The two workshops are seen to be under the same management team. The mechanical workshop does 75 % fabrication and 25 % repairs, while the electrical workshop does 25 % fabrication and 75 % repairs.
- The capacity utilization in the workshops is extremely low, this would have to be significantly improved to achieve viability. Through the World Bank loan US\$ 3.5 million has been invested in these facilities. For the equipment not yet delivered tender documents have already been prepared.
- The decision to commercialize has been taken, privatization being considered. Staff agreed that ZESA would need additional expertise to assist in the commercialization, and to achieve profitability and competitiveness, especially in the areas of Marketing, Quality Control, Design engineering and Public Relations.

### III.3 Extension of local production of electric meters (COMMUNICATION SYSTEMS OF ZIMBABWE)

- Market

Item	Annual demand 1995	UNIT	Annual demand 2000	Export Opport. 1995	Export Opport. 2000
Single phase	16,200	Pcs.	20,670	51,452	77,839
Three phase	5,900	Pcs.	7,528	13,956	20,765

- Investment: 258,000 Z\$

#### Testing equipment

- Net Present Value: -53,929 Z\$ (at assumed discounting rate of 14%)
- Internal Rate of Return: 11.7%

CSZ has been producing high quality electronic military equipment mainly for the SA market. So far the operation of CSZ consisted of the assembly and testing of electronic instruments, making it an experienced manufacturer in this field. However the company is currently underutilized and will be even more so when supply contract for military equipment ceases.

The company is prepared to begin production of household single phase meters of the prepayment and the regular electronic type. The investment required for this project can be considered very minor, while its production cost range at above Z\$ 10 mn, though at a foreign content of around 60 %, for 20.000 units per year. At the assumed scenario of prices and sales quantities an IRR of 11.7 % is below the set minimum requirement of 13 %. However export opportunities to neighboring countries would allow for larger numbers of meters to be produced.

CSZ also revises the budgeted cost structure for a higher local content. The tariff structure should also become more favourable. The company has already indicated know-how partners from South Africa (Schlumberger) and the UK (GEC), which would be willing to co-operate. **Production could start in short time after the investment decision.**



### III.4 Extension of local production of cables and conductors (CENTRAL AFRICAN CABLES - CAFCA/BICC)

- Market

#### CABLES

Item	Specification	Annual demand 1995	UNIT	Annual demand 2000	Export Opport. 1995	Export Opport. 2000
11 kV cables	35	50.8	km	60	30.5	40
	50	6.1	km	10	2.1	3
	70	36.4	km	50	15.5	20
	120	6.6	km	10	10.7	12
	150	0.0	km	0	7.3	10
	185	10.7	km	14	13.9	17
	95	8.1	km	10	10.3	12
	240	0.0	km	0	0.0	0
33 kV cables	300	0.0	km	0	1.3	1,6

#### CONDUCTORS

Item	Specification	Annual demand 1995	UNIT	Annual demand 2000	Export Opport. 1995	Export Opport. 2000
Aluminum Conductor Steel Reinforced (ACSR)	25	670,0	km	854,0	634	895
	50	755,0	km	965,0	958	1.119
	100	1.354,0	km	1.727,0	1.874	2.233
	175	68,0	km	87,0	0	0
	200	0,0	km	0,0	0	0
	350	0,0	km	0,0	140	170
Hard Drawn Aluminum (HDA)	25	100,0	km	127,0	983	1.251
	50	310,0	km	397,0	771	958
	100	434,0	km	554,0	1	1
Hard Drawn Copper (HDC)	35	71,0	km	91,0	5	6
	70	3,0	km	4,0	5	6

- Investment: 50 Mio. Z\$

XLPE extruder  
Additional high voltage test equipment  
Copper taping line  
Ancillary equipment

- Net Present Value: - 7,7 Mio. Z\$ (at assumed discounting rate of 14%)
- Internal Rate of Return: 10.33 %

(Cost and sales estimates by CAFCA were applied, which, as CAFCA explained, would provide a satisfactory profitability)

The company is an experienced producer of cables and conductors with well developed distribution ties to the private sector as well as neighboring countries. To CAFCA the introduction of 11 kV and 33 kV line material represents an extension of its product range. Within 18 months as of July 1996, CAFCA will install a new XLPE extruder for the production of 11 KV cables. CAFCA complains about ZESA's sacrificing quality for lower prices, thereby discouraging high quality standards in local productions.

Still the required investment was quoted by the company to be Z\$ 50 mn for an entirely new production line. At the production figures and prices given by CAFCA the IRR of 8.7 % was found to be below the minimum rate.

### III.5 Extension of local production to insulators (WILLSGROVE WARE POTTERY)

- Market

Item	Specification	Annual demand 1995	UNIT	Annual demand 2000	Export Opport. 1995	Export Opport. 2000
Insulators LV		39.4	1,000 pcs.	50	179.9	221
Insulators Pin HT	11 kV	15.3	1,000 pcs.	20	21.1	26
Insulators Stay	11 kV	4.9	1,000 pcs.	6	12.5	15
Insulators Disc	11 kV	9.6	1,000 pcs.	10	8.2	11
Insulators Pin HT	33 kV	7.5	1,000 pcs.	10	12.8	16
Insulators Stay	33 kV	0 <sub>1</sub>	1,000 pcs.	0 <sub>1</sub>	3.4	4
Insulators Disk	33 kV	0 <sub>1</sub>	1,000 pcs.	0 <sub>1</sub>	7.3	9
Insulators Long Rod	33 kV	0 <sub>1</sub>	1,000 pcs.	0 <sub>1</sub>	1.5	2

1 „small varying numbers for maintenance only“

- Investment: 900,000 Z\$

Lathes  
Slurry pumps  
Ball mills  
Clay mixing tanks  
Vibro screen  
De-ionizing electro magnet  
Glazing equipment

- Net Present Value: -43,626 Z\$ (at assumed discounting rate of 14%)
- Internal Rate of Return: 11.33 %

The industrial tableware manufacturer would require know-how for the production of insulators, which its management is sure to find. The key concern indicated is the proof of sufficient demand. This demand was estimated not only for Zimbabwe, but also for its neighboring countries (except RSA). The resulting sales quantities forming the basis of the calculation of the IRR have been assumed at conservative levels thereby rendering the IRR of 11.94 % to be at the lower end of possible commercial profitability.

**The Board of Directors has decided to stay at it's core business**

### III.6 CIZ - Ceramic Insulators of Zimbabwe (CIZ):

Two different scenarios are considered, because at the second mission no contacts were allowed.

- 1) On basis of a Canadian study
- 2) A combination of this study and the experience of the consultant.

- Market

Item	Specification	Annual demand 1995	UNIT	Annual demand 2000	Export Opport. 1995	Export Opport. 2000
Insulators LV		39,4	1,000 pcs.	50	179.9	221
Insulators Pin HT	11 kV	15,3	1,000 pcs.	20	21.1	26
Insulators Stay	11 kV	4,9	1,000 pcs.	6	12.5	15
Insulators Disc	11 kV	9,6	1,000 pcs.	10	8.2	11
Insulators Pin HT	33 kV	7,5	1,000 pcs.	10	12.8	16
Insulators Stay	33 kV	0 <sub>1</sub>	1,000 pcs.	0 <sub>1</sub>	3.4	4
Insulators Disk	33 kV	0 <sub>1</sub>	1,000 pcs.	0 <sub>1</sub>	7.3	9
Insulators Long Rod	33 kV	0 <sub>1</sub>	1,000 pcs.	0 <sub>1</sub>	1.5	2

1 „small variating numbers for maintenance only“

#### Varinat 1

- Investment: Z\$ 7,292,681

- Site and factory buildings
- Pug mill
- Ball mills
- Pumps, high pressure
- Filter presses
- Wet magnetic screen
- Turning equipment
- Moulds, profile cutters and dies
- Kilns
- Blunger

- Net Present Value: Z\$ 6,034,047 (at assumed discounting rate of 14%)

- 
- Internal Rate of Return: 22.77 %

## Variant 2

- Investment: Z\$ 2,100,000

Factory Building and Services  
Pug Mill  
Killns  
Turning Equipment  
Racks and Ancillary Equipment  
Tools  
High Pressure Pump

- Net Present Value: Z\$ - 1,771,877 (at assumed discounting rate of 14%)
- Internal Rate of Return: - 9.55 % %

CIZ is the sole manufacturer of LV insulators in Zimbabwe. The company only in the course of the final discussions for this report (8/95) declared its willingness for to cooperate after it intermittently declined to do so. The basis of the financial analysis was a study elaborated by the Canadian consultant DGL under the funding of CIDA analyzing the establishment of a new manufacturing facility for insulators and ceramic line material. Agreements with joint venture partners are also considered.

The analysis of Variant 1 resulted in an IRR of 22.7%, which would represent a good profitability. However the increase of turnover as forecast in the DGL study appears doubtful.

Variant 2 results in a definite commercial failure as its projected investment can not be covered by its operational performance, i.e. sales compared to operating costs and investment are too low.

**Comment on the study of DGL:** A big amount of the mentioned IRR derives from the group of production „transformer and capacitor bushings, cutouts and isolators, station and line posts“, including fittings on the insulators.

In the consultant's Opportunity Report III/5 (Willsgrove) the production of bushings and insulators for transformers and capacitors was not considered, as Willsgrove expressed these products would be too complicated to start a new production with. Also in the consultant's opinion especially bushings represent a technically sophisticated product with reliable performance over long periods of time and its production demands for good experience in the field of insulator production. **In this case a strong partner with a high experience has to be introduced.**

### III.7 Extension of local production of switches (SWITCHCRAFT)

- Market

Item	Specification	Annual demand 1996	UNIT	Annual demand 2000	Export Opport. 1995	Export Opport. 2000
Load Break Switches	11kV 16 A	149	pcs.	177	1,177	1,436
	11kV 70 A	87	pcs.	103	243	302
	33kV 16 A	80	pcs.	95	181	229

- Investment: 983,240 Z\$

Compression moulding machines  
Testing equipment (electrical and mechanical)  
Hoists  
Forklift

- Net Present Value: 1.04 Mio. Z\$ (at assumed discounting rate of 14%)
- Internal Rate of Return: 23.09 %

Switchcraft at present faces high competition with switchboards and therefore is very interested to venture into new market segments in order to improve its profitability. The manufacturer and distributor of various kinds of mechanical and electrical instruments would require specific know-how for the production of Load break switches. The project would form a low level investment at below Z\$ 1 million yet operate at production costs of around Z\$ 10 mn. The sound profitability of an IRR of 23 % has to be viewed considering the assumption of a pricing level comparable to low European prices plus transport cost. The consultant found two European companies willing to start cooperation with Switchcraft in the field of the said switches respectively to transfer know-how.

### III.8 Extension of local production of fittings for transmission and distribution (HUBERT DAVIES)

- Market

Item	Annual demand 1995	UNIT	Annual demand 2000	Export Opport. 1995	Export Opport. 2000
PG Clamps	1.1	1,000 pcs.	1.4	n.a.	n.a.
PG Clamps 2 bolts 100/12cu	12.4	1,000 pcs.	15.8	n.a.	n.a.
50mm sq.PG Clamps	15.4	1,000 pcs.	19.6	n.a.	n.a.
25/25mm sq.PG Clamps	10.3	1,000 pcs.	13.1	n.a.	n.a.
50/50mm sq.PG Clamps	12.9	1,000 pcs.	16.5	n.a.	n.a.
100/100mm sq.PG Clamps	12.3	1,000 pcs.	15.7	n.a.	n.a.
25/50mm sq.PG Clamps	2.1	1,000 pcs.	2.6	n.a.	n.a.
50/100mm sq.PG Clamps	2.0	1,000 pcs.	2.5	n.a.	n.a.
25/100mm sq.PG Clamps	1.9	1,000 pcs.	2.4	n.a.	n.a.
25mm sq. Gun Clamp	3.0	1,000 pcs.	3.8	n.a.	n.a.
50mm sq. Gun Clamp	3.7	1,000 pcs.	4.8	n.a.	n.a.
75mm sq. Gun Clamp	2.5	1,000 pcs.	3.2	n.a.	n.a.
100mm sq. Gun Clamp	2.7	1,000 pcs.	3.5	n.a.	n.a.
Earth clamp cond. 16mm sq	3.4	1,000 pcs.	4.4	n.a.	n.a.
Snail Clamp .025 u	3.5	1,000 pcs.	4.4	n.a.	n.a.
Snail Clamp .012/0.38	4.5	1,000 pcs.	5.7	n.a.	n.a.
Preformed Joints 25 mm sq.	14.3	1,000 pcs.	18.3	n.a.	n.a.
Preformed Joints 50 mm sq.	4.9	1,000 pcs.	6.2	n.a.	n.a.
Preformed Joints 75 mm sq.	3.7	1,000 pcs.	4.7	n.a.	n.a.
Preformed Joints 100 mm sq.	2.1	1,000 pcs.	2.7	n.a.	n.a.
HDC Preformed Joints	1.5	1,000 pcs.	1.9	n.a.	n.a.

- Investment: 94.9 Mio. Z\$

Civil works

High temperature furnace (preparation of ingots)

Medium temperature furnace (quality heat treatment)

Computer assisted final machining

- Net Present Value: 37.7 Mio. Z\$ (at assumed discounting rate of 14%)
- Internal Rate of Return: 16.28 %

---

This project, though linked to an already existing, strong company, would represent a greenfield plant. Consequently it forms a large investment requirement (Z\$ 95 mn). An additional concern about this project would most likely require a capital rich partner in addition to Hubert Davies. The investors would also need to carefully establish distribution ties to ensure a sufficient demand base. A private enterprise, like Hubert Davies, which is one of the best-known hardware manufacturers and suppliers within Zimbabwe will only take an initiative, if ZESA offers some kind of medium-term purchase contracts and provides consolidated figures on the future demand. From the scarce data that could be collected on this project, the production of fittings and similar components appears to be feasible in Zimbabwe and the economic viability has been demonstrated. Hubert Davies would be a choice for Project implementation as the company seems very dynamic. Pre-condition is that the company guaranties to produce within Zimbabwe and that ZESA would accept market prices.



### **III.9 Optimization of the manufacturing capabilities of ZESA's workshop (MECHANICAL SECTION)**

- **Market**

The key to success for the mechanical workshop to increase the utilization rate of the plant.

Key customers to be targeted in the future should be:

- ⇒ ZESA' power plants
- ⇒ Line maintenance
- ⇒ Construction of new lines (unpackaging of contracts)
- ⇒ Contract work for the private sector

- Investment: 48.6 Mio. Z\$
- Net Present Value: 128,085 Z\$ (at assumed discounting rate of 14%)
- Internal Rate of Return: 13.07 %

(These results were arrived at after the application of a 41% mark-up on production cost.)

The multitude of services carried out by the mechanical workshop will need to be offered in and at prices of the open market, if it is to be established as an independent business entity. The results of the analysis of the mechanical workshop are based on the assumption of a mark-up of 41 % on the production costs in order to achieve the set minimum IRR of 13 %. With the hundreds of services and products performed respectively produced by the workshop, market prices will have to be investigated to determine the actual profitability. In the likely event that a number of prices have to be set short of the stated mark-up, ZESA's management should still consider the prerequisite function of a workshop for a utility, and allow for some deductions on the side of e.g. the large investment assumed in the above mentioned financial analysis.

---

### III.10 Optimization of the manufacturing capabilities of ZESA's workshop (ELECTRICAL SECTION)

- Market

Key customers to be targeted in the future should be:

- ⇒ ZESA's power plants
- ⇒ New substations
- ⇒ Line construction (unpackaging of contracts)

- Investment: 46.9 Mio. Z\$
- Net Present Value: 1,206,284 Z\$ (at assumed discounting rate of 14%)
- Internal Rate of Return: 13.61 %

The statements given on the mechanical workshop are also valid for the electrical workshop. However the mark-up on job order costs of the services and products of the electrical workshop would even need to be 52 %. It is again emphasized that the analysis presented has several parameters, which should be modified in order to improve the risk position of the business, one of which is the utilization rate, i.e. the number of services and products performed respectively produced in the workshops.

---

### **General comments on ZESA's Workshops:**

The Central Workshops of ZESA were established in order to carry out specific work, like the repair, testing and maintenance of faulty equipment, the assembly of panels and cubicles and the production of various items for the use by the technical departments within ZESA. Primarily, the focus was on import substitution, but when the import restrictions were removed the focus of activities turned to those of a workshop for repair and servicing of electrical and mechanical equipment.

Production in the new mechanical workshop was started in the first quarter of 1995. When the present assessment mission took place, a regular production was going on, but work methods and procedures were not yet incorporated to an extent to allow for a conclusive evaluation. Nevertheless, the basic issues of the Central Workshop Catalogue and statements by the workshop management may be confirmed and commented as follows:

- the mechanical workshop shall operate as autonomous business unit, with an own small administration, an own accounting and an independent cost controlling unit
- it is deemed appropriate to set specific marketing activities, in order to make the workshop business known within ZESA and externally
- working methods and procedures within the production process have to be reviewed in order to raise the efficiency and to avoid idle time
- the modality for the acquisition and procurement of materials and auxiliary equipment has to be improved and the possibility of flexible and fast actions has to be ascertained
- an over-all management accounting and cost control system has to be introduced, in order to assure prompt action when the cost effectiveness is in doubt.

Last but not least, it has to be emphasized that it is the nature of a utility's workshop that manpower and capacities can be made available whenever prompt action is needed. Therefore, the economic evaluation has to take into account the practical value of an enterprise owned by and dependent on ZESA as a utility. It is also ZESA's responsibility to make sure that the workshops' services are used by the big thermal and hydro power plants to the maximum possible extent.

## LOCATIONAL AND ENVIRONMENTAL CHARACTERISTICS

The chosen companies have been investigated for their locational and environmental conditions. In general the following characteristics could be found.

All visited plants are situated in industrial areas. However, residential areas are in some cases not very far away.

The exogenous sources of pollution are mainly the environmental releases of the traffic, i.e. release of harmful gases and particulate matters to the atmosphere as well as noise.

Energy is mainly used as electric energy which is supplied by ZESA. The operating voltage is usually 380 V three phase.

The plants have two separate drainage systems for effluents and for storm water. Waste water is drained after primary treatment (oil/water separator, sedimentation of solid particles). Sludges originating from primary treatment are collected by the competent department of the municipality. Storm water is drained elsewhere (e.g. in a nearby river).

Solid wastes which are collected separately at each company visited are:

- iron and steel scrap,
- copper and brass scrap.

Some companies also collect waste paper and cartons, as well as plastics separately .

These materials are usually sold to contractors for material recycling.

Solid wastes which are to be considered as non-recyclable are usually mixed together in available containers (e.g. empty 200 l drums). These waste mixtures contain very often hazardous materials (e.g. oily paper and oily textiles). If a suitable number of drums is filled, these drums are collected and transported to a nearby dumping site either by the company's own transport vehicles or by a contractor.

In some workshops fans are installed for extraction of air which might be polluted by solvents or dust. Dedusting equipment (e.g. cyclones) is usually not used.

Noise control is sometimes carried out by administrative control measures (supervision of the use of ear protectors, medical surveillance) and by engineering control. Engineering control is carried out by the installation of sound proof hoods at the relevant machines.

### Mitigation measures

Mitigation measures, i.e. elimination and/or reduction of wastes and emissions, are proposed to be planned and implemented in the frame of the establishment of Environmental Management and Auditing Schemes (EMAS).

The procedures to be followed should be based on the ISO 14 000 set of standards which provides businesses with a structure for managing the potential environmental impact of their operations. This set of standards is designed to help companies improve environmental performance and keep environmental issues from becoming market barriers.

## RECOMMENDATIONS

**In the following topics the next steps for a follow up are listed to each study.  
If ZESA wants to have assistance or cooperation with UNIDO, there has to be an  
official request for further cooperation.**

### Standards

Zimbabwe has a well organized Standardization Institute "Standards Association of Zimbabwe", located in Harare, providing free access to standards for everybody who is interested. This institute is also certifying according to ISO 9000 series. Standards mainly used in Zimbabwe are BS, SASZ, IEC, ISO and DIN, and the most needed editions are available in the institute. If the desired standard is not available in the institute, it can be provided within few weeks. In respect of standardization the situation in Zimbabwe may be expressed as appropriate and well developed.

ZESA's tender documents define clearly which standards are demanded resp. shall be applied on the product asked for. On the other hand in the offers or during negotiations ZESA sometimes allows deviations from these demands if this leads to cheaper products. This practice does not support the creation of new production lines in the country as it is not encouraging for competitors to calculate following the demanded standards and being confronted with competitors offering lower quality with lower prices. To stop the acceptance of deviations from tendering demands will help for implementation of activities investigated in the present report.

### III.1 SWE - Production of transformers:

Necessary follow up :

Company	Action	Scenario
South-Wales Electric	Mediate and draft an annual supply contract between SWE and ZESA;	A contractual arrangement between the parties helps to create a well utilized factory supplying at ZESA's specifications;
	Assign a process an experienced process engineer to determine necessary modernization;	The engineers technical report forms the basis of an investment of either SWE itself or in a joint venture;
	Mediate between an interested know-how supplier (e.g. ABB Tanzania and SWE the conditions of a joint venture;	Establishment of a joint venture to supply ZESA;

### III.2 ZESA Workshop - Production of transformers:

Necessary follow up :

Company	Action	Scenario
Central Workshops - Transformer production	Mediate an agreement with South Wales Electric to cooperate in the production of transformers;	Specified components of transformers are manufactured in ZESA's electrical workshop, for final assembly at SWE;
	If negotiations with SWE fail, mediate an agreement with an international supplier (e.g. EFACEC) for know-how support and cooperation;	Production lines for specified types of transformers are erected within the facilities of the workshop, manufacturing under the guidance of personnel trained by the know-how supplier;

In any case it has to be considered that the repair of transformers should be done in the same workshop where the new transformers are produced, otherwise an almost double investment is necessary.

### III.3 CSZ - Production of meters:

The introduction of meters in CSZ's product range would only require a minor investment.

Necessary follow up :

Company	Action	Scenario
Communications Systems of Zimbabwe	Mediate negotiations between CSZ and ZESA for an annual supply contract;	The permanent demand of ZESA over the medium term would insure CSZ against the market risk and thereby improve its standing lending agencies;
	Draft and mediate a downpayment scheme between ZESA and CSZ for orders for meters;	ZESA pays for part of the production cost up-front in order to help CSZ finance the heavy working capital burden;
	Identify and negotiate for know-how support to CSZ by an international supplier (e.g. Schlumberger, GEC);	A know how supplier helps to gradually move larger portions of value added into the local production of CSZ;

### III.4 CAFCA - Cables and conductors:

In final discussions CAFCA expressed that they consider additional investment for the production of cables as too high for the small market which is accessible. An additional XLPE-extruder will be installed on their own funds. No cooperation in foreseen.

### III.5 Willsgrove - Production of insulators:

In final discussions Willsgrove Tableware Ltd. expressed that its Board of Directors has decided that the production of insulators would mean to weaken efforts for the core business of tableware. The decision is to stay at the core business. **The project was therefore abandoned.**

### III.6 CIZ - Production of insulators:

Under the assumptions of Variant 2 CIZ would need to identify a very experienced know how partner, who would provide technical expertise not only in a consulting position but also with immediate technical assistance on the manufacturing level. By this approach the manufacturing of the more complex product range of transformer and capacitor bushings, cutouts and isolators, station and line posts, including fittings becomes possible.

**CIZ is very interested to continue the project** and had already contacts to the South African manufacturer Cullinan, which was also proposed by the Austrian insulator-factory.

Necessary follow up :

Company	Action	Scenario
Ceramic Insulators of Zimbabwe	Identify and mediate an agreement between and international know-how supplier (e.g. Cullinan) and CIZ;	Through the support of an experienced manufacturer CIZ can also target more complex product specification, thereby utilizing new facilities in an optimal fashion (moving from financial analysis Variant 2 to Variant 1);
	Mediate project financing by the Industrial Development Corporation of Zimbabwe;	Financing for building and equipment;

### III.7 Switchcraft - Production of load break switches:

Necessary follow up :

Company	Action	Scenario
Switchcraft	Mediate cooperation agreements between experienced manufacturers (e.g. Moosdorfer) and Switchcraft;	Through the know-how support Switchcraft enters into the production of load breakers;
	Mediate an annual supply	Switchcraft can reduce its

	contract between ZESA and Switchcraft;	market risk through the secured demand from ZESA;
	Identify means of finance interested in the extension project of Switchcraft;	Favorable international loan conditions improve the financing base of the project;



### III.8 Hubert Davies - Production of fitting for line construction:

Though the project's analysis found a favorable IRR, the large scale investment would require Hubert Davies to find a financially powerful partner. In addition, through its business ties to many African countries, Hubert Davies would need to strive and considerably widen the demand base, as the project was calculated based on an almost 100 % market share in Zimbabwe, which might not be possible to secure at all times.

Hubert Davis also considers it risky to be supplier for a monopoly buyer. In final discussions the company expressed that it **would not proceed with this project**.

### III.9 and III.10 ZESA's Workshop:

The key issue to both sections of the workshop is its utilization rates, which need to make up for every reduction of the mark-ups calculated in this analysis, if prices are not obtained on the market due to competitive pressure.

Necessary follow up : proposed ZESA - UNIDO Cooperation

Company	Action	Scenario
Electrical and Mechanical Workshops	Identify sources of demand in all divisions of ZESA, which represent work suitable to be carried out by the Central Workshops;	Through the additional work derived from orders previously sourced outside of ZESA, the utilization of the Central Workshops is improved;
	Arrange for and/or implement training for workshop staff in terms of commercial administration and marketing;	The management and staff of the Central Workshops becomes capable of running the facility as a profit center;

### IMF/BAW

This company is not included in this report as it was only introduced to the study team at the stage of final discussions. The company is a manufacturer and repair shop of electrical equipment. It could probably replace SWE in project considerations.

## General Economic Aspects

In a comprehensive evaluation of the projects presented the following comparison is to allow for an overview of the project's cost and benefits in terms of foreign share respectively local contents of investment and production cost placing the percentages of foreign shares in relation to the magnitude of the respective amounts.

Project	Initial Investment in mn Z\$	Foreign share in %	Production costs in 5th yr in mn Z\$	Foreign share in %
III.1 SWE-Transformers	3.25	64	16.28	39
III.2 ZESA Workshop- Transformers	27.16	87	13.10	49
III.3 CSZ-Meters	0.26	50	11.89	58
III.4 CAFCA-Cables and Conductors	50.00	88	32.37	21
III.5 Willsgrove Potteries-Insulators	0.90	100	1.28	7
III.6 CIZ-Insulators	n.a.	n.a.	n.a.	n.a.
III.7 Switchcraft-Load Break Switches	0.98	87	11.00	86
III.8 Hubert Davies-Fittings	94.92	52	20.88	42
III.9 ZESA's Mechanical Workshop	48.58	60	15.83	21
III.10 ZESA's Electrical Workshop	46.92	40	15.71	20

It is a matter of the optimization of an economic structure to integrate the various sectors of an economy, not only to gain autonomy but also to improve efficiency in economic processes.

### Inter sectional integration:

The report analyzes a number of projects providing new opportunities to link up additional manufacturing companies to the power sector, which have, so far, not at all or only at minor quantities, manufactured for the power sector. Examples for this economic benefit are given with Communications Systems of Zimbabwe (III.3), Willsgrove Potteries (III.5), and Everglow/Switchcraft (III.7).

In other cases a restrengthening of ties to present suppliers would also benefit this integration effect, as is the case with South Wales Electric (III.1) and Central African Cables).

In order to pull more and more of the value added chain into the country, it is vital for Zimbabwe to foster projects where products, which at present are merely assembled locally, are brought to full scale production in the country. The case of Switchcraft (III.7) offers such an opportunity, also since know-how suppliers showed interest to start negotiations on a cooperation.

---

**RECOMMENDATIONS:**

- ⇒ The taxation and charging of duties on certain main inputs of the industry manufacturing spare parts and components for electricity distribution should be modified in order to improve the competitive position of Zimbabwean companies. The tariff structure is under a revision, which should be finalized by year-end 1996.
- ⇒ Technology unpacking: The Ministry of Energy and ZESA should consider the disassembly of turn key line construction projects in order to allow for the highest possible degree of participation of local manufacturers of line materials such as cables, conductors, transformers, fittings, switches etc.
- ⇒ The financial institutions (Banks, Ministry of Finance) should help create payment structures (convertibility problem) between Southern African Countries (COMESA) in order to facilitate exports.