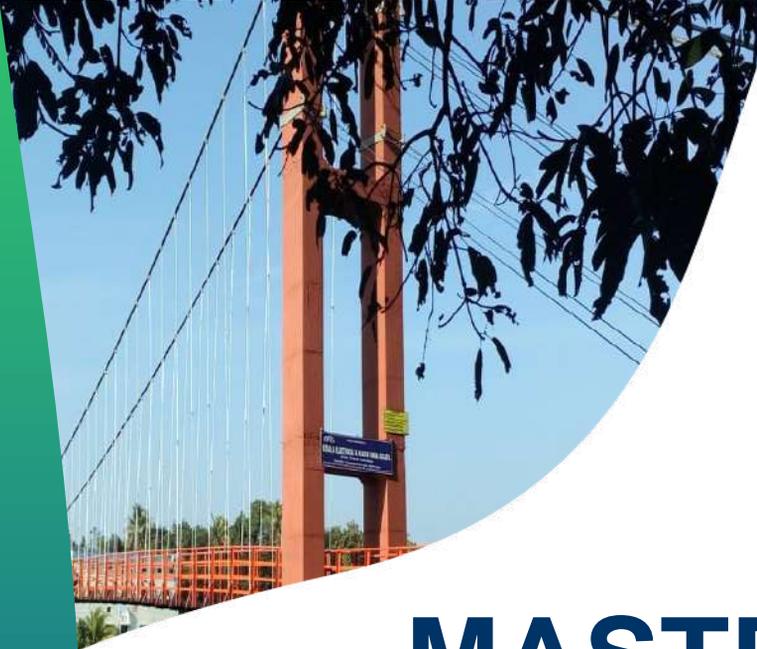


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MASTER PLAN 2030

KEL

Kerala Electrical & Allied Engineering Co. Ltd.

Government of Kerala Undertaking

Master Plan
Kerala Electrical and Allied Engineering Co LTD

INDEX		
Sl.No	Title	Page No
	Executive Summary	i-ii
1	Introduction	1
2	Analysis of Product Cost and Cost Trends for the past five years	4
3	Demand Out Look	5
4	Opportunities for Increasing Marketability	5
5	Trends in Investments of the Competitors	6
6	Technology Assessments	6
7	Lean Manufacturing	6
8	Impact of Duties and Tariffs	7
9	Generic factors	7
10	Key Strength	8
11	Inherent Weakness	8
12	Opportunities	9
13	Perceived Threats	10
14	Energy Audit	11
15	IT based Solution	11
16	Manpower Rationalisation Prospects	11
17	Feasible Projects	11
17.1	Short Term plans	12
	a. Kundara Unit	12
	i) Traction Alternators	12
	ii) Electric Vehicle Motors	13
	b. Mamala Unit	14
	i) Wound Core Transformers	14
	ii) NABL Accredited Lab	15

MASTER PLAN

KERALA ELECTRICAL AND ALLIED ENGINEERING COMPANY LTD.

Executive Summary

The Master Plan proposal put forward by Kerala Electrical and Allied Engineering Co. Ltd (KEL), before the Government is intended to bring the company to the lime light and to have the inevitable presence of its products in the domestic and international market so as to enhance the turnover to the desirable level. Even though, KEL is having technical and professional expertise in the area of manufacturing electrical equipment and heavy steel structural, the major challenge faced by KEL is to sustain in the market wherein competitors from private sectors are equipped with high grade automated machineries with latest technology to maximise their productivity and also the inability to conquer the market with premium products as a part of diversification. The master plan proposes to overcome all these hurdles to enable us to emerge market leader in domestic market.

The short term and medium term plans are proposed to provide a new dynamism to the existing scenario which enables us to overcome the competency of the competitors compelling us to canvass orders in lesser price resulting in eroding of the margin. These proposals are also in line with our present way of functioning which will be an added advantage.

Manufacturing Wound Core transformers is an inevitable requirement to sustain in the transformer industry by reducing the loss levels and size as the stacked core transformers cannot withstand the competition in price by the competitors. The Traction Alternator/Motors/Transformer are proposed for Railways for which there is an ensured huge demand. If we succeed in capturing at least 10% of the requirement, it will turn around the future of the Company as they are premium products having high margin and less competition. NABL lab facilitates the validation of our products supporting to build high reputation in the industry.

The long term plans proposed are based on a new uprising vision of changing the conventional concepts followed by PSUs. The PSUs when enter into a new project, by the time it launch the product, the market will be saturated by the proposed products with very attractive price which a PSU cannot match with, resulting further crash in its growth. The proposed plans are now in a very premature stage and who succeed in establish it at the outset can be the market leaders.

The investment and turn over projected is as follows:-

MASTER PLAN

KERALA ELECTRICAL AND ALLIED ENGINEERING COMPANY LTD.

1.0 INTRODUCTION

KERALA ELECTRICAL AND ALLIED ENGINEERING COMPANY LTD. (KEL), a Public Sector Undertaking fully owned by Government of Kerala, is a multifaceted Engineering Company of high reputation having more than 5 decades of experience and expertise with an enviable customer base which includes Defence, Irrigation and Power Projects, Space Research Organizations, State Electricity Boards, Indian Railways and General Public both in India and abroad. The Company has four state-of-the-art manufacturing units spread across Kerala and has a pan India presence with its Sales and Service unit in all major Metros and selected Cities.

THE PRODUCTION UNITS AT A GLANCE:-

Kundara Unit:-

Year of inception	1964
Major Products	➤ Brushless Alternators for Train Lighting and Air Conditioning ➤ General Purpose DG sets
Installed Capacity	15900 kW
Capacity utilisation 2020-21	61.07%
Maximum utilised	80%
Present Manpower(Officers/Staff/Workers)	19 / 25/ 88 (Total 132)
Major Customers	Indian Railway, Defence
Turn Over/ Profit 2020-2021	4785 lakhs/ +9.73 lakhs
Turn Over for Breakeven / month	395 lakhs
Quality Certifications	ISO 9001-2015

	iii)Modernisation of Fabrication Shop	16
	c. Edarikode Unit	17
	i)Mordenisation of CRT plant and LT Distribution boards	17
17.2	Medium Term plan	18
	a. Kundara Unit	18
	i)Traction Motors	18
	b. Mamala Unit	20
	i)Traction Transformers	20
17.3	Long Term Plans	21
	a. Mamala Unit	21
	i)Hydrogen Fual Cell	21
	ii) Solid State Transformers	23
18	Human Resource Plan	24
19	Financial Restructuring Plan	25
20	Conclusion	25

Sl. No.	Project Proposal	Unit	Investment required (Rs. in Crores)	Expected Employment (Nos)	Expected Turnover (Rs. in Crores)
A.	<u>Short Term Projects</u>	-			
1	Traction Alternator	Kundara	5.08	40	25.00
2	Electric Vehicle Motors	Kundara	7.00	50	47.00
3	Wound Core Transformer	Mamala	9.00	7	40.00
4	NABL Accredited Lab - Phase - 1	Mamala	4.60	8	3.00
5	Modernisation of Fabrication Shop	Mamala	15.00	25	45.00
6	LTDB Panel & Productivity Enhancement of CRT Plant	Edarikode	2.00	10	5.00
	Total (Short Term Plans)		42.68	140.00	165.00
B	<u>Medium Term Plans</u>	-			
1	Traction Transformer	Mamala	10.00	10	24.00
2	NABL Accredited Lab - Phase - 2	Mamala	10.00	15	5.00
3	Traction Motor	Kundara	25.00	50	128.00
	Total (Medium term Plans)		45.00	75.00	157.00
C	<u>Long Term Plans</u>				
1	Solid State Transformer	Mamala	10.00	20	15.00
2	Hydrogen Fuel Cell	Mamala	20.00	60	75.00
	Total (Long Term Plans)		30.00	80	90.00
	Grand Total		117.68	295	412.00

An investment of Rs. 42.68 Cr. and Rs.45 Cr. respectively required to implement the short term / medium term projects including projects under progress which will result in an enhancement of turnover by Rs.322 Cr. The profit generated initiates the reduction in accumulated loss and make the company positive in net worth. This will help the company to get financial assistance from Banks and other financial institutions for implementation of further diversification envisaged in the long term plan. After implementation of all the above proposals, a total turnover of around Rs. 550 Cr. with a net profit margin of Rs. 38 Cr. is estimated and in 2030-31 and Company will be able to wipe off all its accumulated loss.

MAMALA UNIT:-

Year of inception		: 1968	
Divisions	Distribution Transformer Division	Power Transformer Division	Structural Division
Major Products	Transformers up to 3000 kVA, 33 kV	➤ Medium Power Transformers up to 10MVA, 110 kV	➤ Civil and Electro-Mechanical works ➤ Suspension Bridge ➤ Lattice Bridge ➤ Solar Power Plants ➤ Radial Gates for Dams ➤ Pre-Engineered Factory Building ➤ Hydro-Electric project Components
Installed Capacity	3,00,000 kVA	1500 MVA	1200 MT
Capacity Utilisation 2020-21	38.38%	Commercial Production not started	30%
Maximum Utilised	110%		90%
Major Customers	State Electricity Boards	State Electricity Boards	LSGD, Corporations, Departments of SC-ST, Tourism, NHM, Revenue, Education, Irrigation etc., Indian Railway
Breakeven Turn over/ month	497 lakhs	125 lakhs	500 lakhs
Present Manpower (Officers/Staff/ Workers)	39 /16 /76 (Total 131)		
Quality Certifications	ISO, BIS, BEE		
Turn Over/ Profit 2020-2021	5832 lakhs, -1002lakhs		

Edarikode Unit

Year of inception	1995
Major Products	<ul style="list-style-type: none">➤ Oil Cooled Transformers up to 500 kVA➤ Cast Resin Transformers up to 1600 kVA
Installed Capacity	3,00,000 kVA
Capacity Utilisation 2020-21	17%
Maximum Utilised	75%
Present Manpower(Officers/Staff/Workers)	6 / 9/18 (Total 33)
Breakeven Turn over/ month	305 lakhs
Major Customers	State Electricity Boards
Turn Over/ Profit 2020-2021	676.58 lakhs /-251.26 lakhs

KEL, made its footprint in producing premium range electrical equipments and Structural components of buildings, bridges, Hydro- Electric projects etc. KEL has also marked its signature in executing Electro-Mechanical / Civil projects. The company's promise in maintaining the quality lead to build an extremely satisfied group of eminent Customers. Over these years KEL has managed to make a brand name of its own in the transformer/ rotating machine industry with its Highly Durable, Reliable and Energy Efficient products.

KEL also has successfully ventured into the manufacturing of Resin Cast Dry Type Transformers, Special Application Transformers such as EMU, LOCO, Dynamic Reactive Power Compensation and Furnace Transformers. The transformer manufacturing unit is one of the first transformer industries in Kerala to avail BIS Certification for Distribution Transformers.

As on 31/03/2021, the company has a share capital of Rs.190.43 Crores against an authorized capital of Rs.193 Crores. The long term liability stands at Rs.14 Crores. Continuous losses has resulted in the mounting of accumulated losses eroding the capital completely and the net worth has become negative at Rs.11.62 Crores The working capital facility with bank is 31.35 Crores including cash credit facility of Rs.17.35 Crores.

The present employee strength of the company is 324 including 81 officers and 243 workers/ staff. The sanctioned strength is 799 with 139 officers and 660 workers. It was the strength arrived after implementing VRS in 2003 and fixed as the revised sanctioned strength with the approval of the Government. The present strength is only 32% of the sanctioned strength. The work norms were originally fixed on the basis of work study conducted by Productivity Council, Kalamassery and subsequently revised through negotiations with trade Unions during implementation of LTA. Present staff pattern and manpower requirements were assessed by Centre for Management Development (CMD), Trivandrum during March 2020 and the vacancies now projected are based on their report.

Even though KEL has good market reputation and has orders in hand to run the units in a viable manner, deterioration of plant equipments, unviable operational conditions and poor working capital liquidity made the entire operations resulting inefficient in maintaining a sustained profitable market. Quality Control and Final Testing facilities employed in KEL's shop are just enough to maintain our quality standards having no comparison with International Standards. Continuous losses have also resulted in the erosion of working capital. Banks are not favourable for enhancing working capital credit limit against an unhealthy balance sheet. Also, the area where KEL has been operating is highly competitive in nature and has been driven with stringent payment conditions imposed by the customers. In most of the times this will end up with blockage of funds. Banks are also not ready to enhance the working capital limits, which was fixed long back when the turnover of the company at three times lesser compared to the present turnover.

The major point to be highlighted about KEL is that, it has succeeded in achieving an operating profit of **4.32 Crores** during 2019-20 overcoming all the constraints explained above. It emphasizes the strength of the Company to excel to a glorious future by minimising the weakness by adopting corrective measures. For that we are presenting here the proposals to build a prosperous future looking forward to the year 2030.

2.0 Analysis of Product Cost and Cost Trends for the past five years

The following table shows the details of product cost in percentage of sales for the last five years:-

Particulars	2016-17	2017-18	2018-19	2019-20	2020-21
Sales & Works Contract Revenue	11595.00	9592.51	16777.00	12744.88	11294.41
Cost Components					
Raw Materials Consumed	7796.55	6054.91	11469.08	7561.67	6163.43
Percentage to Sales	67.24%	63.12%	68.36%	59.33%	54.57%
Labour	2692.05	2796.08	2876.26	2706.32	2489.36
Percentage to Sales	23.22%	29.15%	17.14%	21.23%	22.04%
Finance Cost	706.08	633.09	573.22	802.42	362.68
Percentage to Sales	6.09%	6.60%	3.42%	6.30%	3.21%
Depreciation	148.98	129.75	114.38	122.32	94.25
Percentage to Sales	1.28%	1.35%	0.68%	0.96%	0.83%
Net Profit/Loss	-1702.77	-2144.42	-413.59	68.52	-1286.80
Percentage to Sales	-14.69%	-22.36%	-2.47%	0.54%	-11.39%

3.0 Demand Outlook for each Major Product

As per IEEMA datasheet, the percentage Market share of KEL is less than 2% in distribution transformers and less than 1 % for power transformers except in the range of 0-100 kVA where the market share is around 6%. If the figure of unorganised sector is also considered, our market share will be lower than indicated. That is more than 98% of the market is shared by our competitors. From this it can be confirmed that good demand exists for the product. By securing another 2% of the market, we can double the sales. But for securing order from other states, our marketing strategy to be revised and services of marketing agents having good rapport with decision makers of respective State Power Utilities to be utilized.

Regarding Alternator sector, the market requirement of Railway itself is more than enough for the sustainable operation of Kundara unit as we are now able to capture only less than 10% of the Railway demand. Also, as the need of General purpose DG sets increase along with the development of infrastructure, its requirement will be very high in future. Now we are focussing on executing the orders of Government institutions only, which itself contributes a very crucial positive impact on the profitability of the Unit.

4.0 Opportunities for Increasing Marketability of each Major Product

Marketability of the products can be increased only by improving Price Competitiveness by implementing cost reduction measures as suggested below.

a. Reduction in Material Cost.

Importing / processing of critical raw materials: If all Electrical Sector Companies jointly import materials like CRGO Steel laminations, Aluminium / Copper conductors, etc and process it in-house / locally, good saving in material cost can be achieved. Additional benefit of the suggestion is to overcome the material shortage which we were facing for the last several months for CRGO.

b. Regaining Suppliers trust by providing prompt payment:

Presently, considering inordinate delay in getting payment from PSUs, Vendors are loading the interest for delay also into the price. If we are able to ensure prompt payment through mechanisms like LC, negotiation power of the company will get improved and vendors will offer competitive prices.

c. Design optimization through software tools / opting modern methods of production:

Our designs are not optimised compared to that of world renowned manufacturers / MNCs. By optimising the design of our products utilizing design software tools, material content of our products and thereby material cost can be minimized.

d. Reduction in Production Cost:

Improving productivity / work norms - Incentive scheme: Currently, our productivity is much less compared to industry standards and our employee cost is about 25-30% of sales, compared to industry norm of 10%. Through negotiations with employees, incentive scheme should be introduced to enhance productivity.

Increasing contract manufacturing of components: When production volume is increased, additional requirements of various components to be arranged through outsourcing / contract manufacturing so as to minimise the cost of production.

e. Economy of Scale :

By increasing the production volumes through automation, cost of production will come down as per economy of scale principle. MNCs are doing windings, core building and fabrication etc., through fully automatic set up and hence able to sell the products with a much lesser price in the market.

5.0 Trends in Investments of the Competitor for each Major Product (State/ National / International)

Major threat now KEL facing is the investment made by Competitors in India and abroad in expanding / automating their production facilities. Our competitors for transformers in Telangana and Gujarat are making thousands of transformers per day in their automated facilities. Even an MSME in the State engaged in Transformer manufacturing has invested heavily in atomizing their plant.

Also, our competitors are importing major raw materials in bulk at much lower price analyzing market trends.

6.0 Technology assessment pertaining to the Manufacturing Process for each major product.

Optimized designs are being introduced by MNCs to compete in the market. Step Lap technique, Split Cores, Wound Cores, Foil winding, etc are some of the techniques adopted by our competitors. Out of these, we have also started adopting step-lap techniques. For split core / built core techniques, high level of automation and huge investments are required.

We are one of the approved vendors of Railways for Rail Bogie Frame. However, the product was found unviable due to high labour cost, as we follow manual production methods. By automating the fabrication section, the scale of production can be enhanced and bogie frame manufacturing can be made a viable product line.

7.0 Lean Manufacturing:

Our competitors including MNCs and other Companies are following lean manufacturing techniques and value engineering to minimise product cost. However, PSUs including KEL do not have any exposure to lean manufacturing

techniques and the Government may take initiatives to impart practical sessions to PSUs in lean manufacturing, through world class consultants in the field.

8.0 Duties & Tariffs having impact on pricing

For participating in Government tenders, we are giving Bank Guarantee. Through a G.O, if the Government permits Departments / PSUs to accept Government Guarantee, instead of BG, we can save BG commission of Banks.

9.0 Generic Factors influencing Growth of the PSU and the Sector.

1. Low productivity – Employee Cost is around 25-30% against industry average of 10%. Trade Unions to be made agreeable for incentive scheme. One who produce more than the agreed minimum quantity to be encouraged by paying extra. Performance evaluation techniques unbiased by reporting officer to be implemented to motivate employees.
2. To cater surge in orders above normal production capacity, to be executed within short delivery schedules, extra skilled manpower will be required. Also, to develop a new product on demand, engineers having expertise in that area will be required for short period, till commercialising the product. To meet such requirements of PSUs, Government can provide a pool of skilled human resources, from which PSUs can hire employees of required skills for the job, on short term basis. After fulfilling the demand, the employees can be sent back to the pool for utilisation of other companies.
3. Instead of buying all materials in raw form and manufacturing components in-house, outsourcing of components from fully automated manufacturers to be increased to minimize cost of production. No car manufacturers will manufacture wiper motor in-house.
4. PSUs can't compete with MNCs, as cost of production of MNCs is much less than that of PSUs, on account of high level of automation / economy of scale advantage of MNCs.
5. Due to erratic payment of PSUs, vendors always quote higher price for raw materials, loading interest cost for delayed payment. Assured payments to vendors within stipulated time through mechanisms like LC can bring down material cost.
6. Decision making is very slow due to procedural delays like tendering many times. Instead of being business oriented, officers of PSUs are trying to be procedure oriented to avoid audit queries and vigilance cases. Government shall review the Purchase Manual so as to make it more industry friendly.
7. Professional Director Board: Present Boards of PSUs are more concerned about day-to-day operations of the company than focusing on Corporate Governance. Though Government representatives are present in the Board, all major proposals placed before the Board for approval are being put up to Government for approval. This is causing inordinate delay in taking decisions. Government representatives in the Board may verify and ensure that the

proposals are not against the policies of the Government and decisions to be taken in the Board itself, without forwarding to Government for a decision.

8. Private participation in PSUs to be encouraged in a phased manner and appointment of independent directors as stipulated by Companies Act can bring in more accountability and efficiency in PSUs. Private participation shall be in such a way that by the year 2030 or 2040, PSUs shall operate with minimum Government shares and at optimum efficiency, in a CIAL business model.
9. Quality of HR is deteriorating year on year in PSUs. For innovative ideas and for speedy implementation of new projects, good quality HR is required. To ensure recruitment of good quality HR, transparent recruitment process free from external influence to be adopted.

10.0 KEY STRENGTHS OF THE PSU

1. Good Brand Equity

KEL had developed a reputed brand name in its respective fields which opens the door for business association with experts for developing innovative products having high feasibility in the market.

2. Railway approved Vendor

Since its inception KEL is a well approved vendor of Indian Railway where quality is the deciding factor, which provides a huge opportunity as the railway requirements are always in the process of continuous augmentation and modernisation.

3. Capability to undertake Electrical and Infra Projects

The most important strength of KEL is that it is well experienced and capable of undertaking major Electrical and Infra projects which is an indispensable necessity for the economical growth of the country.

4. Adequate Land for Expansion

KEL is having 33.17 acres of land in prime areas of the state and hence the land cost can be avoided for future projects resulting reduced investment.

11.0 Weaknesses inherent to the PSUs.

1. Depletion of Skilled HR

For the sustained growth of the company, research and development wing to be strengthened and new futuristic products to be identified and developed in a time bound manner. For this, young and skilled technicians and engineers conversant with latest technology are to be infused.

Also, to effectively control scarce financial resources, qualified Chartered Accountant and Finance Executives are to be appointed. But as the retirements are not replaced for last years, KEL is deficient in this area blocking its pace to success.

2. Lack of Technical Up-gradation

Continuous improvement in design and manufacturing of the products is a crucial element to sustain in the market which is very competitive. The only solution is the up gradation of technology to optimise and provide special superior features to our product for better comparison.

3. Manual Operations

Most of our manufacturing process is depend on manual operations which in turn increase the labour cost and making our products not feasible in the market.

4. High Production Cost

The major decelerating factor of the PSUs is the loss incurred on execution of orders due to the high cost of products affected by the high raw material/ labour as well as operational costs as already explained earlier.

5. Lack of R&D and Marketing

Continuous improvement in product design, cost reduction through process improvement, etc are the main objectives of R & D, which is lacking in KEL. In good old times, the Marketing network of KEL was very strong and it was having regional offices in all major cities across INDIA. But now due to lack of manpower the marketing network became very feeble resulting in loss of orders.

6. Geographical Location

As the factories of KEL are situated in the southernmost tip of the country, the freight cost to get raw materials from northern part of India and also to deliver the finished goods across the country, we have to spend considerable amount as transportation cost. Adding this amount over and above the already high production costs, the products become unviable in the highly competitive market.

7. Poor Liquidity

As the major customers of KEL are Government Institutions like State EBs the sales realisation is delayed, blocking the smooth rolling of working capital resulting hindrance to the prompt execution of further orders and ends with LD again draining the working capital.

12.0 Opportunities for KEL in line with Sectoral Outlook

1. Evolving EV Space & Infra Projects

Since the future of Automobile Industry is on Electric Vehicle, KEL is having a magnificent opportunity in manufacturing EV Motors as KEL is very much specialised in the rotating machine sectors.

Similarly many infra projects are going to be implemented by the State/ Central Government, KEL's expertise in this field also provides a golden opportunity.

2. Proactive Government Policies

Government Policies of supporting PSUs are opening up great opportunities like sharing of products, undertaking huge turn key projects in various engineering areas like modernisation of sub stations, old building, installation of solar projects etc.

3. Indigenisation (Defence)

KEL has successfully executed many prestigious Defence projects like Falcon Missile Project, Thrisul Missile Project, Prithvi Missile Project, Pinaka Project, Akash Missile System, Military Power Car Battery Chargers - Battle Tanks, Radar Application. The expertise in this field is an immense opportunity for KEL to have a re-entry to specialised Defence projects.

4. Export Market

KEL has already exported Transformers to many developing countries like Africa and Train lighting alternators to Tanzania, Sri Lanka and South Korea etc. The Resin Impregnated / Resin Cast Transformers also have a huge export market in developed countries like UK and US which is not yet explored by KEL.

13.0 Perceived Threats for the PSU on a National & Global Canvas

1. Competition from MNCs

The horrifying threat that KEL is facing is the non-competence of price of our products in the local / global Market. The MNCs facilitated with huge investment are installing automated machines resulting very attractive price, supporting them to capture the market more easily. Also they can purchase and store major and critical raw materials analysing the market trends, where KEL has to spend more money on purchase resulting in failure to compete with MNCs.

2. Change in Government Policies

The major Customer of KEL are the Electricity Boards of other States. If those Governments change their policy opposing KEL's interest is a major threat.

3. Unhealthy Balance Sheet

The Balance Sheet of KEL showing negative net worth building a barricade to KEL to participate in major tenders. For example we are now submitted our tender for

Water Metro Project by KMRL, where we are facing a threat of getting disqualified due to this though we are confident enough to execute the work.

If Government was kind enough to settle the old statutory and other dues pending in our company, we will get opportunities to avail working capital loans from banks and can manage our operations in a better way

14. 0 Energy Audit and reduction in Energy Costs.

Energy audits are being conducted periodically through the Auditing firms from the Government approved Panels. Many of the recommendations of the audits were implemented. However audit suggestions require substantial investments could not be implemented due to paucity of funds. Energy efficient equipment are adopted for new installation made as the part of modernization.

Electrical Sector PSUs in the State are not very energy intensive and hence saving by changing all motors and lights to energy efficient will not have much impact on overall profitability of the Company. However, by shifting from ON-OFF type ovens to Thyristor Controlled Heating Ovens, considerable reduction in energy bill could be achieved.

15.0 IT based Solution for Cost Reduction

Implementation of a good ERP system can optimize Procurement and inventory management costs. We have already implemented an ERP system at our Mamala Unit and propose to implement the same in other Units as well.

Installing software for design optimization: As mentioned above, our designs are bulkier than that of our competitors. By optimising the design of our products utilizing design software tools, material content of our products and thereby material cost can be minimized. Through tie-up with Academic Institutes (IU Chair), we are trying to utilise their resources for optimising the design.

16.0 Manpower Rationalisation Prospects including Recommendations for Reskilling, Multi-Skilling, and Re-Training.

Average age of present manpower is above 53 years and hence not worth imparting any more training. New recruitment in essential areas and outsourcing of components from fully automated manufacturers to be increased to minimize cost of production.

17.0 Feasible Project implementation Time frame

Short term/ Medium term /Long term plans of the company including up gradation, expansion and diversification are furnished below. The proposals are identified envisaging strengthening of the core area and also to minimize the dependence on a single party for orders. The market demand, product price etc. are estimated based on published data of IEEMA, Railway etc. Before proceeding with the projects approved by the Government detailed market study will be conducted for preparation of DPR.

17.1 Short Term Plans

a. Kundara Unit

i. Traction Alternators: -



ICF and RCF has already stopped manufacturing of conventional coaches and switched over to LHB coaches. Due to this, requirement of 4.5 kW and 25 kW alternators which are the main items manufactured in Kundara, has decreased drastically and the requirement is limited to zonal Railways only, as replacement spares in old conventional coaches. As such, to sustain in the market, it is inevitable to diversify the Unit's product portfolio. In consultation with Senior Officials of various Railway manufacturing units, we have identified certain items like 500 KVA, 750 V power car alternator, 230 kW Traction alternator for DETC etc., for development with moderate up-gradation of plant machinery. Separate infrastructure is required for bulk production as present facility at our plant is not sufficient for manufacturing bigger alternators. During April 2019 we have received an enquiry from Cummins India Limited to supply 230 KW Traction alternators for DETC being manufactured by them for Railway application. As there are only 2 parties (M/S BHEL and CGL) supplying Traction alternators for DETC, an entry in to this segment will be very much helpful for the sustainability of Kundara unit. Based on our offer, CIL placed development order for 20 numbers of Traction Alternators and the same developed is under testing. KEL have expertise in designing and manufacturing traction alternators which have better margin and stable demand in railways. Total time required to start commercial production at the new plant will be 12 months.

The Railway requirement at present is about 300 nos /year of Traction alternators and 250 nos of DG set for power car of LHB coaches incorporating the alternators per annum. KEL can produce 100 nos of Traction Alternators per annum and manufacture and supply 62 nos of DG set for power car.

ITEM	RATE	QUANTITY	TURNOVER
Traction Alternators	Rs.9,50,000	100 Nos	Rs. 9.5 Crores
Power car DG sets	Rs.26,00,000 (average rate)	60 Nos	Rs. 15.5 Crores

ii. Electric Vehicle Motors



The new and evolving environmental protocols accepted internationally for the protection of the environment dictates the fact that the Indian automobile industry has to inevitably adopt the transition from Internal Combustion Engine (ICE) based vehicles to Electric Vehicles (EV) by 2030. As per the National Electric Mobility Mission Plan 2020 (NEMM), released by the Ministry of Heavy Industry and Public Enterprises, Government of India on a view to enhance the national energy security, reduce the dependence on oil imports for transportation and mitigate the adverse environmental impacts from road transport vehicles emphasis the necessity to boost domestic manufacturing capabilities for electric vehicles.

TATA Motors who are the pioneers in Automobile industry approached KEL to develop and manufacture the prototype motor in compliance with their specification. In this context, KEL officials have visited the works of TATA Motors at Pune and had detailed discussion with their senior officials. We have presented our credentials and established our capability to manufacture the motor. On successful development of the prototype as per their specification, TATA motors may consider KEL as one of their suppliers for EV Motors and we have to set up a production line exclusively for the production of the same, preferably at our Kundara Unit.

The plant is envisaged for the manufacture of electric motors ranging from 50 kW to 250 kW with an ultimate plant capacity of 3000 motors per year of mixed ratings. In the first phase of implementation 1000 numbers production capacity is planned at an investment of Rs.10.00 Crores.

Product	Average Rate	Quantity	Turn Over
EV Motors	Rs.470000	1000 nos	Rs. 47 Crores

b. Mamala Unit

i. Wound Core Transformer



The benefits of the wound core over the conventional type stack core is as follows:-

- Wound Cores are easy to build and high labour requirement of conventional manual core building can be saved.
- Magnetising current can be reduced and thereby transformer efficiency can be increased by using wound cores.
- Use of continuous strips in complete path of rolling direction reduces the magnetic flux saturation of core and improves the distribution of magnetic flux density which minimises the weight of the core, core losses and no load current. The savings in core weight results in reduction of overall size of transformer and hence leads to lower production cost as well as reduction in losses helps to minimise the operating cost also.
- Manufacture of large quantities of identical design will benefit from automated processing of the wound cores and assembly time is highly reduced.
- In improving the competency of price in the market support to increase the market share of distribution transformers especially in lower range.

The above factors support use of wound core in manufacturing transformer with low production cost for securing higher market share at a much better price. Also, as there are limited numbers of manufacturers for wound core transformers in India, we will be better placed in the market, if we reduce product cost by using wound cores.

The below table is presented based on the market analysis on 2020 and the expected market value is anticipated to grow at a CAGR of 6.89 %. During the year 2020-21 the total MVA produced all over India is reduced by 40% due to the wide spread of Covid pandemic and hence market potential is still higher than that presented here.

kVA	Present Demand 2019-2020(IEEMA)			Expected in 2021-22-23			Expected in 2023-2024		
	Nos	MVA	% Share of KEL	MVA	% Share of KEL	Turn Over Lakhs	MVA	% Share of KEL	Turn Over Lakhs
0-25	349524	5795	0.9	5900	2	3068	6300	3.2	5242
25-63	37843	2246	2.2	2300	3.5	1572	2450	7.7	3683
63-100	35748	3549	6.4	3600	9	4633	3800	13	7064
100-200	12075	2095	0.7	2200	0.85	245	2350	2	617
Total	435190	13685	2.2	14000	3.87	9518	14900	6.25	16606

The kVA production envisaged in 0-200 kVA range as per the table is 541000 kVA in 2021-23 and 931000 kVA in 2023-24 by increasing the market share as shown. Now the installed capacity of the distribution transformer plant is 500000 kVA and the turnover is around 55 crores. Hence by implementing facility for manufacturing wound core transformer of installed capacity of 500000 kVA, it is possible to enhance the productivity as shown above and achieve an additional turnover of around 40 crores on 2023. A competent Technology partner is required for design of wound core transformer and implementation of manufacturing facility.

ii. NABL Accredited Lab for Transformer Testing

The proposal for National Accreditation Board for Testing and Calibration Laboratories (NABL-ISO 17025) is put forward foreseeing many benefits in improving internal production strategies and establishing market prominence in the industry as well. Self – validation of our product results in streamlined management, lessened failures and improved quality assurance. Some of the key benefits of NABL-ISO 17025 accreditation are as follows

- Stamping of quality by improving testing competency due to increased accuracy, validation, and right documentation.
- Acquired measurable growth in business as a result of the improvement in processes and results as well as improved efficiency.
- Recognition in the national and international markets as a result of enhanced product reputation, customer trust and confidence because of accurate test results.
- Once the facility is established the running cost for testing is only power and labour and hence the profitability will be more than 50%.
- Cost and time saving as a result of increased efficiency.

Type testing of transformers by an NABL accredited lab is mandatory for participating in tenders and the validity of the test is only three years. Also in bulk orders many EBs insist for type testing of one no. out of a portion of ordered quantity. Now the manufacturers of South India depends CPRI, Chennai for type

testing where it is overloaded. Then the next choice is ERDA, Ahmedabad which in turn increase the cost for testing.

In phase 1, it is proposed to develop the facility for

- Type testing of distribution transformers up to 2500 kVA, 33 kV class, excluding short circuit test.
- Routine testing of Medium power transformers up to 12.5 MVA, 110 kV class
- Type testing of Dry –type transformer up to 2500 kVA, 33 kV class where short circuit test is not necessary.

For that an investment of 4.6 cr. is envisaged including NABL accreditation fees. The type test charges are around 5 lakhs, excluding Short Circuit. If 60 transformers are tested in a year we can acquire a turnover of Rs. 3 Crores and the savings of type test charges of our transformers will be an additional saving.

Phase II

On successful completion of Phase I and finding it feasible the testing capacity can be enhanced by providing facility for undertaking Short Circuit Tests also up to 500 kVA, 33 kV class which in turn increase the turnover again by 2 Crores.

iii. Modernization of Fabrication Shop

KEL Mamala Unit is having a Structural Division set up during 1964 with installed capacity of 1200 MT per annum. At that time KEL was very prominent in Structural Engineering Industry and involved in manufacturing of Heavy structural mentioned as follows:-

- Penstock pipes for Hydro Electric Projects
- Vertical Gates for irrigation and power transmission
- Radial gate
- Transmission Tower for distribution of Power

But now, all the machineries are eroded resulting in inefficient productivity and the capacity utilisation is reduced to 40%. Still we are manufacturing the following items utilising the available facilities to its maximum.

- Transformer Tanks for in-house requirements
- Components of Steel lattice and Suspension Bridges
- Industrial storage tanks

Also we have manufactured and successfully supplied Bogie frames and Bolsters for Indian Railways. But we were forced to drop the project because the product became unviable due to high production cost and cycle time needed for manufacturing. .

In order to regain the earlier market leadership in this segment, we need to replace the old machineries with new modernised, sophisticated and automated machineries like CNC profile cutter, Robotic TIG and MIG welding machines, Guilletine Shear, Plate bending machine etc. for improving the quality and precision of the products as well increase the production capacity.

On modernisation of the fabrication unit as mentioned above, we can manufacture heavy structural fabrication like pressure vessels, Industrial storage tanks, components of bridges etc which have high demand in market. Also we can re-capture the market of manufacturing the Bogie frames for Railways.

The following is the expected output from this proposal:-

Products	Rate per MT	Production	Turn Over Rs. In Crores
Bogie frame	Rs.275000	900 MT	24.75
Industrial tanks	Rs.100000	1500 MT	15.00
Bridge components	Rs.100000	500 MT	5.00
Total			44.75

c. Edarikode Unit

i. Modernisation of CRT plant & LT Distribution Boards

KEL, Edarikode unit is equipped with a full- fledged plant for manufacturing Cast Resin Dry type Transformers up to 1600 kVA with an installed capacity of 3 lakhs kVA per annum. The main challenge faced by the unit to get orders is to arrive competitive pricing at par with the prices of our competitors and as a result our market share continued to be very low, even if the Kerala market as annual requirement of nearly 600-700 nos. of Dry type Transformers.

One way to reduce the material cost is to optimise the design. The major constrain in the optimisation of design is the non availability of moulds required for casting. The mould cost per one set of HV/LV comes around 1,00,000/- . Another option for reducing the production cost is to use foil wound coils especially in Aluminium. The price of Aluminium is very less compared to Copper and foil wound transformers are very compact with more stability to withstand short circuit. Hence the quality as well as price feasibility can be enhanced by installing foil winding machine which costs around one crore.

The most important and major area where keen attention is to be given is the Export Market. There is a huge demand for resin impregnated low tension distribution transformers of lower range ie 100-200 kVA in US and Canada. The rough estimate on annual requirement is about 150 crores. For that the present plant has to be modified and capacity to be enhanced incorporating facility for resin impregnation of coils.



An another opportunity explored is to manufacture LT Distribution boxes as KSEB is proposing a replacement for the present re-wirable fuses in LT side of the distribution transformers by Compact LT boxes with circuit breakers resulting more safety, less maintenance and lessening the power interruptions. The investment required for manufacturing the product is very minimal, need equipments for bus-bar cutting, bending etc. The market potential is 50 around Crores per annum and KEL can achieve a turnover of 5 crores with 15% profit.

17.2 Medium Term Plan

a. Kundara Unit

i. Traction Motors for Railways:



The demand for Brushless Alternators being produced at KEL Kundara is exponentially going down due to change in coach design of Indian Railways. Considering our long association with Indian Railways and considering the acceptance of KEL products in Railways, Kundara Unit consulted with coach manufacturers and Railway Officials about other products they are in need, which

can be manufactured at Kundara Unit with their present expertise and experience. Traction Motor was one of the item appeared on top of list suggested by all the coach builders and Locomotive manufacturers.

Presently, Chittaranjan Locomotives Works (CLW), Kolkata, Diesel Loco Works (DLW), Varanasi and Diesel Loco Modernisation Works (DMW), Patiala are manufacturing Locomotives for Indian Railways. As per production plan of Railway Board, all the Loco builders together manufacture about 800 main line locomotives and about 250 numbers of EMU Motor Cars per annum. In the main line Locomotives Six or Eight, 850 kW Traction Motors per locomotive are used depending on the capacity of the Locomotive and total Traction Motor requirement is about 5000 number per year. From the P.O copies of Railways it is seen that the prevailing per unit Motor price is about Rs.20 lakhs and the Traction Motor business volume is estimated to be about Rs. 1000 Crores p.a. In EMU Motor Coaches, Four 250 kW Traction Motors per Motor Coach are used. Prevailing price of the 250 kW Traction Motor is about 14 Lakhs and the total business volume estimated for EMU Traction Motor is about Rs 140 Crores. The quantity requirement of both type of Motors are rising year on year as Railways are increasing locomotive production every year to meet the growing demand of the country. Total Motor requirement is presently met by Chittaranjan Loco Works of Indian Railways, Siemens, ABB, Crompton Greaves, BHEL and Saini Electricals. Out of these, Crompton is not in full operation and BHEL is not meeting delivery schedules due to financial crunch. In this situation, if we can develop the motor immediately, being a Government Company, KEL can easily secure 10-15% of the total requirement. KEL Managing Director along with technical team visited Chittaranjan Loco Works, West Bengal and had detailed discussions with their top officials. They have promised their full support in developing the Traction Motors and shared general drawings and other details of the Motors required for the DPR preparation. They have also taken the team to their Motor production shop and explained all the production process involved. They have also given the list of essential facilities required for the production of Motors for estimating the project cost.

Initially we may focus on these two types of AC Traction Motors and considering a very conservative market share of 10%, we can expect the volume of business as Rs.128 Crores per annum with a minimum profit margin of 10%.

ITEM	RATE	QUANTITY	TURNOVER
850kW Traction Motors	Rs.20,00,000	500 Nos	Rs. 100 Crores
250kW Traction Motors	Rs.18,00,000	160 Nos	Rs. 28.8 Crores

A DPR prepared in this regard is pending with the Government for approval. An early approval of the Government will be beneficial in getting the early bird advantage.

b. Mamala unit

i. Traction Transformers for Railway Application:-



Railways are gradually shifting to fully electrified rakes and manufacturing a large number of EMU coaches every year. As per current year's production plan of Indian Railways 500 nos of EMU Motor Cars are scheduled. For each EMU Motor Car, one Transformer is required. Current price of this product is about 30 Lakhs per Transformer. Only a few vendors like BHEL, Crompton, Hind Rectifiers, etc are in the field, providing a chance to enter into this new venture and if we succeed to get at least 10% of the market share, an immense hike in turnover as well as profit can be achieved. EMU coach production and hence demand for traction transformers are increasing year on year and its price / margin is also attractive. KEL already have the expertise and experience in developing the product so that the project can be implemented within a time frame of 6 to 12 months.

The highlights of the proposal is follows:-

- **Already developed and type tested 1550 kVA, 25 kV / 780 V traction transformer and approved by RDSO**
- Limited no. of suppliers for traction transformers in India
- Design and development of 1250 kVA traction transformer under process
- Modification of existing plant by addition of limited machineries is enough to manufacture traction transformers
- As we are already approved vendors for RDSO chances of getting order is higher

	Annual Demand 2021-22 Nos	2022-23	Expected Quantity 2023-24 Nos	Turnover in Crores	Expected Order 2024-25	Expected Turnover in Crores
Traction Transformer 1250 kVA, Three Phase	500	Prototype testing & development order	90	Rs.24.00	150	Rs.50.00
	Total MVA		112.5		187.5	

17.3 Long Term Plans

The long term plans proposed are based on emerging technologies and market trend. Also the changing standards with regard to save the environment and fast depletion of fossil fuels are taken in to consideration. The proposed plans are now in a very premature stage and who succeed in establish it at the outset can be the market leaders. For achieving this KEL require eminent and experienced technology partner in the respective fields. The market volumes, product price etc. are based on predictions by various agencies in the field and +/- 30% variations may occur when the projects come in to reality.

a. Mamala Unit

i. Hydrogen Fuel Cells:

As the energy demand for automotive and industrial sectors continues to increase rapidly, conventional fossil fuels will no longer fulfil growing needs for clean and reliable energy. Hydrogen has been emerging internationally as a multi-sector solution. From aviation and shipping to long-distance road transportation, hydrogen is a green alternative to power heavy-duty vehicles and energy-intensive industries. With the rapidly growing population and economic development in India, the country is facing large environmental concerns that are affecting its population. Fuel cell and hydrogen technology is emerging as an effective solution for the current energy crisis, environmental degradation, and climate change impacts from fossil fuels.

Hydrogen is the fuel of the future - Hydrogen is an energy carrier that can be used in fuel cells producing virtually no greenhouse gas emissions. Fuel cells are one of the cleanest and most efficient technologies for generating electricity. Since there is no combustion, there are none of the pollutants commonly produced by boilers and furnaces. For systems designed to consume hydrogen directly, the only products are electricity, water and heat. Fuel cells are an important technology for a potentially wide variety of applications including on-site electric power for households and commercial buildings; supplemental or auxiliary power to support car, truck and aircraft systems; power for personal, mass and commercial transportation; and the modular addition by utilities of new power generation closely tailored to meet growth in power consumption. These applications will be in a large number of industries worldwide.

Diesel generators are widely used for decentralized power generation throughout India, and although inexpensive, are inefficient and come with significant environmental and health risks. Fuel cell generators can replace diesel generators, emit drastically lower emissions and are completely zero-emission when paired

with hydrogen fuel. Fuel cells are capable of standing in for diesel generators, especially in the space of telecommunications. Currently, the majority of rural Indian telecom sites use diesel generators, which not only create air pollutants and noise, but are difficult to maintain. The country contains more than 500,000 cellular towers, which contribute more than 2% to India's total greenhouse gas emissions. If India were to replace the generators with fuel cells, they would be able to cut down on emissions, similarly to what is done in the United States. Across the U.S., fuel cells from companies like Plug Power and Alteryx are used to power telecom sites, proving the viability for this.

The Electric Vehicle ecosystem was also in search of power storage devices other than Lithium Ion Battery and Fuel Cell is one of the identified alternatives. Fuel cell electric vehicles (FCEVs) powered by hydrogen is more efficient than conventional internal combustion engine vehicles. FCEVs use a propulsion system similar to that of electric vehicles, where energy stored as hydrogen is converted to electricity by the fuel cell. Unlike conventional internal combustion engine vehicles, these vehicles produce no harmful tailpipe emissions. FCEVs are fuelled with pure hydrogen gas stored in a tank on the vehicle. Similar to conventional internal combustion engine vehicles, they can fuel in less than 4 minutes and have a driving range over 300 miles. FCEVs are equipped with other advanced technologies to increase efficiency, such as regenerative braking systems, which capture the energy lost during braking and store it in a battery. Major automobile manufacturers are offering a limited but growing number of production FCEVs to the public in certain markets, in sync with what the developing infrastructure can support.

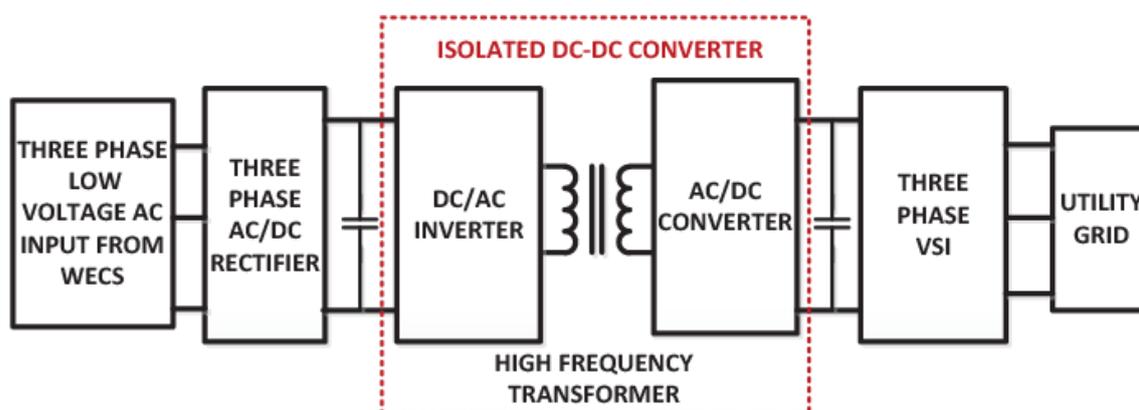
Upcoming Fuel Cell Developments:

A hydrogen fuel cell bus was launched in 2019 in India by Tata Motors in collaboration with the Indian Space Research Organization (ISRO) and Indian Oil (IOCL). In addition, Hyundai also seeks to place its first fuel cell NEXO SUV in India by 2021, and plans on building the required hydrogen infrastructure to support the vehicles near Delhi.

In February of 2020, India's National Thermal Power Corporation Limited (NTPC), invited global expressions of interest to provide 10 hydrogen fuel cell buses and cars in Leh and Delhi. These projects foresee hydrogen production through renewable energy sources and utilizing it for use in fuel cell vehicles for public transportation.

Hence hydrogen fuel cells have a very good potential in the coming years and if succeed in producing it will turnaround the fortune of the organization.

ii. Solid State Transformer



Solid state Transformers (SST) are very compact in size and preferred in areas where space and weight constraints exist. Global SST market is segmented on the basis of product type, application, and region. Based on product type, the market is divided into distribution solid-state transformer, power solid-state transformer, and traction solid-state transformer. Applications include renewable power generation, electric vehicle charging stations, power distribution, traction locomotives, and others. Though cost wise, SST is expensive than conventional distribution transformer, power utilities will prefer SST in urban areas, where conventional transformers occupying large space on road sides hindering traffic.

Market Outlook – 2028

SST market globally, was valued at \$141.5 million in 2020, and is projected to reach \$468.0 million by 2028, growing at a CAGR of 16.9% from 2021 to 2028. Solid-state transformer (SST), is an advanced transformer that incorporates semiconductor components, control circuits, and a high-frequency transformer. Compared to traditional transformers, it enhances the quality of the power by controlling voltage fluctuations. It reduces grid losses, supply reliability, protects the load from power supply disruptions and allows voltage conversion from AC to DC, DC to AC, and DC to DC on different voltage levels. The global SST market is presently driven by growing renewable electricity production, electric mobility, and heavy investments in smart grids and energy systems. In the electric mobility segment, electric vehicles are being produced at a phenomenal rate and will require more charging infrastructure in the future. EV charging is based on direct current (DC) sources and has increased the demand for active power control; thus, driving the demand for smart transformers. Moreover, SSTs are used to effectively manage smart grids. Hence, growing investment and participation in the smart grids market will benefit the global solid state transformer market in the long run.

In Traction Electrics of Locomotives, presently conventional 50 Hz transformer are used to step down 25 kV overhead line voltage to 750 V suitable for Traction Motors. The weight of the transformer is now a limiting factor to increase the train speed and to increase the hauling capacity. By replacing the conventional low frequency transformer with solid state high frequency transformer, the weight of the transformer can be reduced to one tenth.

Developments in the design of SSTs that include various configurations and components is anticipated to help operating players in launching new products. One of the recent developments in the solid-state technology was the technological partnership between major transformer maker Hitachi ABB and Nanyang Technological University in Singapore in February 2021. Other major players in the SST industry include Alstom SA, Eaton Corporation, General Electric Company, Hitachi ABB, Power Systems & Controls Inc., Red Box Aviation, Schneider Electric, Siemens AG, Varnette Inc., and Vollspark.

18.0 Human Resource Plan

Employee Productivity of PSUs in general is very less comparable to that of similar private companies. For example, Employee Cost of KEL is around 25-30% against 7% of one of our competitors in Telengana.

In this scenario, new project proposals are envisaged with minimum additional manpower. New recruitment of 295 employees proposed are mainly intended for strengthening R&D and Marketing, the two areas where KEL is lacking very much.

To enhance production volumes at minimum employee cost and to sustain in this competitive market, our competitors are investing heavily in automating their production facilities. Our competitors for transformers in Telangana and Gujarat are making thousands of transformers per day in their automated facilities. Even an MSME in the State engaged in Transformer manufacturing has invested heavily in atomizing their plant.

In the above context, we too envisaged the project proposals considering certain level of automation, to minimise the employee cost. To meet enhanced production volumes estimated in the master plan for the ensuing years, it is proposed to adopt contract manufacturing strategy. Also, instead of buying materials in raw form and manufacturing all the components in-house, it is proposed to support Micro/Mini ancillary units near to our manufacturing units, so that all non-critical components required for our production can be out-sourced from such units, economically.

It is also proposed to introduce production incentive scheme during implementation of next long-term agreement, to improve employee productivity and thereby to reduce employee cost.

19.0 Financial Restructuring Plan

The Sales turnover figures in the past are not on a rising trend and also the accumulated loss stands at Rs.202 crores. In this connection it may be noted that the existing products of the Company are highly competitive in the market and hence the margins are getting reduced each year which has affected the profitability adversely. To overcome the situation, Company has to introduce new products in the market having less competition which will help to get higher margin for covering the fixed cost. Company has identified the required products and the same has been included in the Master Plan. By the implementation of the Master Plan the turnover will increase and consequently the profitability also will be increased. The following table demonstrates how Company will be able to wipe out the entire accumulated loss by the end of the Project Plan and to show a positive net worth.

<u>Profitability and accumulated loss</u>				
<u>Year</u>	<u>Sales Turnover (Rs.crores)</u>	<u>Profit/loss for the year (Rs.crores)</u>	<u>Profit after tax (Rs.crores)</u>	<u>Accumulated loss(-)/ profit (Rs.crores)</u>
2020-21	112.94	-12.87		-202.21
2021-22	156.35	-5.85		-208.06
2022-23	216.47	1.14	0.97	-207.09
2023-24	277.95	19.45	16.53	-190.56
2024-25	377.05	26.35	22.40	-168.16
2025-26	436.12	33.53	25.95	-142.21
2026-27	460.02	32.24	27.40	-114.81
2027-28	483.92	33.95	28.86	-85.95
2028-29	507.82	35.66	30.31	-55.64
2029-30	531.72	37.37	28.03	-27.61
2030-31	552.20	38.65	28.99	1.38

20.0 Conclusion

An investment of Rs. 42.68 Cr. and Rs.45 Cr. respectively required to implement the short term / medium term projects including projects under progress which will result in an enhancement of turnover by Rs.322 Cr. The profit generated initiates the reduction in accumulated loss and make the company positive in net worth. This will help the company to get financial assistance from Banks and other financial institutions for implementation of further diversification envisaged in the long term plan. After implementation of all the above proposals, a total turnover of around Rs. 550 Cr. with a net profit margin of Rs. 38 Cr. is estimated and in 2030-31 Company will be able to wipe off all its accumulated loss.