



FIFTEENTH KERALA LEGISLATIVE ASSEMBLY

**COMMITTEE
ON
PUBLIC UNDERTAKINGS
(2023-2026)**

THIRTY FIFTH REPORT
(Presented on 11th February, 2025)

**SECRETARIAT OF THE KERALA LEGISLATURE
THIRUVANANTHAPURAM**

2025

FIFTEENTH KERALA LEGISLATIVE ASSEMBLY

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On

TTPL , TCCL , KEL, FOMIL

**(Based on the Reports of the Comptroller
and Auditor General of India for the
year ended 31st March, 2019)**

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COMMITTEE ON PUBLIC UNDERTAKINGS
(2023-2026)

COMPOSITION

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Shri Venugopal R., Joint Secretary

Shri Anil Kumar B., Deputy Secretary

Shri Mohanan O., Under Secretary.

INTRODUCTION

I, the Chairperson, Committee on Public Undertakings (2023-2026) having been authorized by the Committee to present the Report on its behalf, present this 35th Report on TTPL, TCCL, KEL, FOMIL based on the reports of the Comptroller and Auditor General of India for the year ended 31st March, 2019 relating to the Public Sector Undertakings of the State of Kerala.

The aforesaid Report of the Comptroller and Auditor General of India was laid on the Table of the House on 10-6-2021. The Report, besides other things in their findings, brought to light some functional irregularities relating to Travancore Titanium Products Limited (TTPL), Travancore Cochin Chemicals Limited (TCCL), Kerala Electrical and Allied Engineering Limited (KEL) and Foam Mattings (India) Limited (FOMIL). The Committee, in connection with the perusal of the report, took notice of the comparability of the audit paragraphs pertaining to such irregularities and decided to examine them altogether. The consideration of the audit paragraphs included in this report and the examination of the departmental witness in connection thereto were made by the Committee on Public Undertakings (2021-2023) at its meeting held on 13-7-2023.

This Report was considered and approved by the Committee (2023-2026) at its meeting held on 30-10-2024.

The Committee place on record its appreciation for the assistance rendered to them by the Accountant General (Audit), Kerala in the examination of the Audit paragraphs included in this Report.

The Committee wishes to express thanks to the officials of the Industries department of the Secretariat, Travancore Titanium Products Limited (TTPL), Travancore Cochin Chemicals Limited (TCCL), Kerala Electrical and Allied Engineering Limited (KEL) and Foam Mattings (India) Limited (FOMIL), for placing the materials and information solicited in connection with the examination of the subject. The Committee also wishes to thank in particular the Secretaries to

Government, Industries and Finance Department and the officials of Travancore Titanium Products Limited (TTPL), Travancore Cochin Chemicals Limited (TCCL), Kerala Electrical and Allied Engineering Limited (KEL) and Foam Mattings (India) Limited (FOMIL) who appeared for evidence and assisted the Committee by placing their views before the Committee.

Thiruvananthapuram,
11th February 2025.

E. CHANDRASEKHARAN,
*Chairperson,
Committee on Public Undertakings.*

**REPORT
ON
TTPL, TCCL, KEL, FOMIL**

Compliance Audit Observations relating to Public Sector Undertakings (other than Power Sector) (2018-19)

5.1 Compliance to the Government of Kerala guidelines for implementation of Enterprise Resource Planning initiatives by Public Sector Undertakings

Non-adherence to GoK guidelines for implementing e-governance initiatives affected timely implementation of ERP systems in seven PSUs. Five PSUs could not derive any benefit even after incurring ₹1.15 crore due to non-completion of their ERP systems.

The Government of Kerala (GoK) issued (September 2009) guidelines for implementation of e-governance initiatives in the State, detailing therein the procedures to be followed in the development of software systems. In this backdrop, Enterprise Resource Planning (ERP) systems¹ implemented after September 2009 by 8 randomly selected Public Sector Undertakings (PSUs) out of 17 were examined in order to assess the level of compliance to the guidelines by these PSUs. Of the selected PSUs, ERP systems were commissioned in Kerala State Coir Corporation Limited (COIR CORP), Travancore Titanium Products Limited (TTPL) and Travancore Cochin Chemicals Limited (TCCL) with varying degrees of success. Implementation was in different stages of completion in Kerala State Horticultural Products Development Corporation Limited (HORTICORP), The Kerala State Cashew Development Corporation Limited (CASHEW CORP), Kerala State Warehousing Corporation (WAREHOUSING CORP) and Kerala Electrical and Allied Engineering Limited (KEL). The implementation of ERP system was a failure in Foam Mattings (India) Limited (FOMIL). The status of ERP implementation in the selected PSUs is given in the Appendix 7. The Audit findings in this regard are discussed below:

1 A packaged business software system that allows an enterprise to automate and integrate the majority of its business processes, share common data and practices across the entire enterprise and produce and access information in a real time environment.

5.1.1 Leadership and Coordination of the implementation process

The e-governance guidelines (the Guidelines) stipulated that organisations implementing e-governance projects shall appoint a nodal officer who, even if not from the IT wing, should at least be not more

TCCL constituted a committee comprising of head of individual departments in which Nodal Officer and implementing agency (IA) were also members. Power users were identified from each department and the Nodal Officer acted as the coordinator between them and the IA throughout the implementation process

than one level below the Head of the Organisation. As per the guidelines, the Nodal Officer plays a proactive role in implementation of ERP systems and is responsible for change management in the event of any adverse situation.

Audit, however, observed that except TCCL, none of the PSUs instituted a formal mechanism for ensuring involvement of top management in the implementation of ERP. Three PSUs (CASHEW CORP, WAREHOUSING CORP and KEL) appointed nodal officers from the lower managerial level as coordinators and the ERP projects in these PSUs were yet to be completed long after their projected target dates due to absence of active role of the top management. For instance, in two PSUs, development process was stalled for long periods of time² merely due to failure of the PSUs to test the beta versions³ of software modules. In the case of TTPL and COIR CORP, the role of Nodal Officer was entrusted to Manager (IT) and System Analyst respectively. Such an arrangement was, however, absent in FOMIL and HORTICORP and the ERP systems in these PSUs were not yet completed (November 2019).

The GoK replied (September/October 2020) that WAREHOUSING CORP appointed a nodal officer from the lower level due to lack of technically qualified personnel. HORTICORP appointed an Accounts Officer as nodal officer, and KEL and TTPL appointed Senior Managers.

² WAREHOUSING CORP-January 2014 to March 2017; CASHEW CORP-December 2011 to October 2016.

³ An early version of software made available for testing and feedback.

FOMIL replied (June 2020) that a nodal officer was not appointed due to lack of any competent IT personnel. CASHEW CORP replied (June 2020) that based on the audit observation the head of IT from the top management team was appointed for supervision of ERP implementation.

The reply only validates the audit observation that non-appointment of properly qualified and suitably senior nodal officers as required in the Guidelines affected the timely implementation of ERP systems in the PSUs.

5.1.2 Development of Detailed Project Proposal

The Guidelines stipulated that all IT enabled projects should invariably have a detailed project proposal (DPP) prepared either in-house or by taking external help from a Total Solution Provider⁴(TSP)/professional consultancy agency. The proposal shall consist of User Requirements Specification (URS), Functional Requirements Specification (FRS⁵), Technical Analysis and an Implementation Plan. None of the PSUs, however, prepared DPPs/its components resulting in the following issues:

5.1.2.1 Non-preparation of URS and FRS

As per the Guidelines, URS and FRS should be prepared by functional experts within the organisation by defining the user requirements exhaustively, and practically feasible process reforms should be included in the FRS. Tenders for software development should be invited based on FRS which, in turn, shall form the basis for development of System Requirements Specification (SRS) to be delivered by the Implementing Agency (IA).

Audit observed that since the user requirements were not exhaustively identified through URS by the PSUs themselves, no process reforms could be identified and brought out through FRS. The PSUs assigned the work of developing SRS to the IAs without identifying the user requirements and FRS. The SRS developed by the IAs, hence, suffered from the following shortcomings which affected the development process.

⁴ So approved by GoK.

⁵ Defines how URS is to be achieved

- As no URS was prepared in FOMIL, demands for changes cropped up immediately after the installation of the software. Reports and invoices generated through the system did not meet the statutory and business requirements and the software remained non-functional despite incurring ₹8.19 lakh (80 per cent of the contract amount).

FOMIL replied (June 2020) that due to lack of competent officials it was not aware of the procedures to be followed.

5.1.2.2 Absence of Technical Analysis

As per the Guidelines, technical analysis shall be carried out based on the URS and different alternatives for connectivity, operational platform (Operating System, RDBMS⁶ etc.) and risks associated therewith. Audit, however, observed that none of the PSUs carried out any detailed technical analysis of the proposed ERP systems which led to the following issues:

As per the Guidelines, free and open source based software⁷ should be used, wherever possible. Audit, however, observed that only CASHEW CORP used open source platform⁸ in its ERP system while other PSUs used proprietary⁹ platforms¹⁰. Three PSUs (KEL, HORTICORP and WAREHOUSING CORP) spent ₹2.95 lakh towards license fee for proprietary software.

FOMIL stated (June 2020) that technical analysis was not done due to non-awareness of procedure and absence of competent IT personnel. The fact remained that the selection of proprietary software was not followed by any technical analysis.

6 *Relational Database Management System.*

7 It is a type of computer software in which source code is released under a license in which the copyright holder grants users the rights to study, change, and distribute the software to anyone and for any purpose.

8 PGSQL/Apache/Linux

9 It is a closed-source, non-free computer software for which the software's publisher or another person retains intellectual property rights, usually copyright of the source code and patent rights.

10 RDBMS like MS SQL and Oracle

TTPL invited tenders and awarded the work order to the IA for developing the ERP systems on 'web based platform'. The system was, however, developed on 'client-server' model at the time of implementation. This was due to the fact that the PSU did not conduct an analysis regarding the feasibility of having a suitable platform of the system to be developed before inviting the tender.

The GoK replied (October 2020) that TTPL proceeded for developing clientserver model software, as there was not enough internet facility to support functioning of the ERP software on a web based platform. The reply confirmed that the technical analysis did not consider all aspects that had a bearing on the selection of type of software platform.

5.1.2.3 Absence of Implementation Plan

As per the Guidelines, an implementation plan containing an estimate prepared on the basis of 'total cost of ownership', the expected benefits quantified based on higher revenue generation or cost reduction and the time schedule for the pilot phase and final rollout for the project shall be prepared.

Audit, however, observed that the PSUs did not envisage any definite objective for implementation of ERP systems. In the absence of the implementation plan, Audit could not assess the outcome or impact of ERP projects that were completed and the opportunity cost of those that were delayed beyond the target date.

5.1.3 Application Development and Project Rollout

5.1.3.1 Invitation of tender

As per the Guidelines, application development involving a third party agency shall be through a transparent tendering process based on FRS, detailed technical architecture, implementation plan and information security policy of Kerala State IT Mission (KSITM)/ Computer Emergency Response Team-IN (CERT-IN). The PSUs, however, did not comply with this stipulation and entered into tendering with bare minimum specifications of the functional processes to be covered by the software.

5.1.3.2 Prequalification criteria

TCCL prequalified bidders based on essential characteristics like Modularity, Flexibility, Open Architecture, Transaction Audit Trails, Integrated Workflow, Simplicity, Manageability and Scalability. Points were allotted for experience, solution status, functionality compliance, readiness to handover source code and detailed project implementation plan.

The Guidelines stipulated that there shall be a prequalification process to shortlist the bidders. As per the Central Vigilance Commission (CVC) guidelines, the average annual financial turnover

of the bidders is to be included as one of the prequalification criteria in the tender document to ensure the financial soundness of the firm. CVC guidelines also stipulated that all important tender evaluation criteria need to be specified in unambiguous terms in the bid documents so that the evaluation of bids can be made without any subjectivity.

Audit, however, observed that two PSUs (CASHEW CORP and WAREHOUSING CORP) did not include any prequalification criteria in the tender. Of the five¹¹ PSUs which included prequalification criteria in the tender, the criteria stipulated by FOMIL, TCCL and COIR CORP did not include parameters for ensuring financial soundness of the bidders while that of FOMIL were too vague to ensure participation of only ERP vendors. Similarly, WAREHOUSING CORP, COIR CORP and TTPL did not include the evaluation criteria, subsequently used for prequalifying the bids, in their tender documents.

Both COIR CORP and TCCL stipulated successful implementation of the software in their respective sectors as a prequalification criterion which led to selection of experienced IAs and successful implementation of the ERP.

The absence of or ambiguous prequalification criteria led to selection of inexperienced Implementation Agencies resulting in non-implementation/ delayed implementation of the ERP systems by the Implementing Agencies.

¹¹ HORTICORP awarded the work on nomination basis

The GoK replied (September/ October 2020) that WAREHOUSING CORP and TTPL carried out technical evaluation of the bids received and selected the lowest firm from the technically qualified bidders. The main focus of TCCL was on robustness of software, proximity of its transaction flows to the business practices and technical expertise of the bidder.

The fact, however, remains that the CVC guidelines were not complied with by the PSUs, with adverse impact on implementation of the ERP systems.

5.1.3.3 Evaluation of bids and award of work

The following deficiencies were noticed in bid evaluation and award of work in the case of six out of eight PSUs:

- FOMIL selected the IA though the firm did not meet the criteria of having 'supported ERP systems of at least two PSUs in Kerala' and 'twenty-five-year experience in IT sector' prescribed for the technical qualification of the bidders. As per the Stores Purchase Manual¹² (SPM), price bids of technically qualified bidders alone shall be opened. FOMIL, however, opened the price bids of all the four bidders including that of two technically disqualified bidders and evaluated them.
- FOMIL replied (June 2020) that 25 years' experience criterion was overlooked. The bid of the firms that had implemented ERP projects in government aided agencies were considered as equivalent to PSUs.

The reply was not tenable as the evaluation was not in line with the criteria stipulated in the tender document.

- The Guidelines stipulated that the estimated cost of an IT project should be assessed based on 'total cost of ownership' and that cost comparison among various software should include cost of all necessary licenses and recurring expenses for first three years. Costs related to licensing and annual maintenance (varying from 10 to 12 per cent) were, however, considered by TCCL, TTPL and KEL only.

FOMIL replied (June 2020) that the failure to incorporate maintenance cost in the tender was due to lack of expertise/ absence of an IT official.

¹² Read with Office order No. 72/12/04 dated 10 December 2004 issued by CVC.

5.1.3.4 Service Level Agreements

As per the Guidelines, System Requirements Specification (SRS), detailed acceptance test plan based on the SRS, application software with fully documented source code and all necessary licenses are the deliverables expected from the IA. Accordingly, a detailed Service Level Agreement¹³ (SLA) needs to be entered into with the IA covering all the aspects of development, implementation and maintenance of the software.

Audit observed that four PSUs (FOMIL, COIR CORP, KEL and HORTICORP) did not enter into any SLA with the respective IAs and therefore these PSUs did not have clear-cut guidelines regarding the service obligations of the IAs and the associated service deliverables during the implementation process. The remaining four PSUs (CASHEW CORP, WAREHOUSING CORP, TTPL and TCCL), through the SLAs, ensured that the SRS was prepared and source code of the developed system was handed over to it by the IA. Further, none of these SLAs provided for comprehensive acceptance testing including the final acceptance testing by an independent third party as stipulated by the Guidelines.

COIR CORP accepted (June 2020) that they did not enter into SLA with the IA, while FOMIL replied (June 2020) that they were unaware of the guidelines regarding SLA.

The fact remained that the PSUs did not comply with the Guidelines. The replies of the PSUs were also silent on the absence of provision for comprehensive acceptance testing. Absence of or incomplete SLA would result in inadequate mapping of deliverables expected from the implementation of ERP systems.

5.1.3.5 Acceptance Testing

The Guidelines stipulated that Acceptance Test Plan (ATP) along with sample data should be ready by the time the application software is developed and that testing is conducted by functional experts within the organisation. The Final

¹³ A Service Level Agreement is a contract between a service provider and its customers that documents what services the provider will furnish and defines the service standards the provider is obligated to meet.

Acceptance Testing (FAT) should be conducted by a professional agency appointed through a transparent process.

Audit observed that documentation regarding in-house acceptance testing was not available in any of the PSUs nor did the PSUs involve any external agency for FAT since there were no agreement clauses regarding the same. Absence of ATP or FAT led to the following issues in four out of eight PSUs:

- FOMIL released about 80 per cent of the contract price without conducting any testing. Even though the IA claimed successful completion of ERP, various departments in FOMIL raised complaints/ demanded changes in the software which the IA did not carry out. As a result, FOMIL went for litigation.

The GoK replied (September/ October 2020) that WAREHOUSING CORP conducted the testing after revamping the project and all the modules were running. HORTICORP released 88 per cent of the contract price based on technical committee evaluation that ERP implementation attained 80 per cent progress. Further, acceptance testing in TCCL was conducted by functional experts within the company which helped in timely completion of the project. In the case of TTPL, the software was accepted with the help of technical experts from The Kerala Minerals and Metals Limited, a State PSU.

CASHEW CORP replied (June 2020) that all the issues with IA were over and the project was revived. Though SLA did not provide for acceptance test by a third party, the process of independent audit and testing by a government approved external agency was initiated. FOMIL replied (June 2020) that the requirement of testing by a third party agency was not known to the management.

The replies of GoK and FOMIL were not acceptable as the Guidelines mandated final acceptance test by an external agency selected through a transparent process. The reply regarding HORTICORP was not acceptable as the payment made was not in line with the conditions specified in the work order. The failure to conduct ATP or FAT resulted in the delayed development and fine-tuning of the ERP software based on actual requirements.

5.1.3.6 Other Contract Management Issues

Audit also noticed contract management issues in various PSUs as stated below:

FOMIL

- As per the tender conditions, no advance payment could be made to any suppliers. The PSU, however, agreed to pay 50 per cent advance along with work order while issuing work order to the IA. The conditions under which the PSU agreed to pay the advance, were not forthcoming from the records made available in audit.

FOMIL replied (June 2020) that in the absence of subject expert with the company, management believed the IA and released the payments.

5.1.4 Procurement of Hardware

The Guidelines also stipulated that no e-governance initiative should plan for common IT infrastructure like server since the facility in the State Data Centre could be made use of and duplicate expenditure avoided.

Audit, however, observed that out of eight PSUs covered in audit, only CASHEW CORP explored the possibility of using State Data Centre (who offered free hosting) for their data storage needs. While TCCL used the existing server, COIR CORP was hosting database through Amazon Web Services and incurred ₹2.68 lakh (from March 2017 onwards) as hosting charges. In the case of remaining five PSUs, four PSUs (TTPL, FOMIL, WAREHOUSING CORP and HORTICORP) spent ₹9.49 lakh for procuring the server machines. The amount spent by KEL for procuring the server, however, could not be ascertained from the documents produced in audit.

CASHEW CORP has entered into an agreement with KELTRON for hosting its database in the Cloud VMs of State Data Centre, thus avoiding extra expenditure for own server.

The GoK replied (September 2020) that WAREHOUSING CORP procured the server machine as per the advice of IA and the server was running without any

issues. The services provided by State Data Centre were not available when TTPL procured their server. HORTICORP procured the hardware through KELTRON as there were no technical experts in the PSU.

FOMIL replied (June 2020) that the procurement of server was made without the knowledge that common state level facilities existed. COIR CORP replied (June 2020) that server space was not available in IT Mission when it approached them in 2013-14. In-house server was used for two to three years until it became nonfunctional. Amazon Web Services were availed by the company as their cost was cheaper compared to new server machine.

The replies were not acceptable as the procurement of hardware by PSUs was not in line with the Guidelines issued by GoK. Further, COIR CORP did not ascertain the availability of server space with the State Data Centre/ IT Mission before it opted for Amazon Web Services in 2017 or thereafter. The reply regarding TTPL was to be seen against the fact that the Guidelines issued by GoK in September 2009 provided for use of common facilities like servers. Hence, procurement of server by TTPL in April 2011, i.e., after 18 months of issue of the Guidelines was not justified.

5.1.5 Security of Hardware and Data

Of the eight PSUs, ERP systems of six PSUs (TCCL, TTPL, WAREHOUSING CORP, COIR CORP, HORTICORP and KEL) were either fully or partially operationalised (i.e., some of the modules) and the PSUs used live production servers to host their data. The security of hardware and data assumed importance as any loss of data could cripple their operations from short to medium duration.

5.1.5.1 Information security policy

As per the Guidelines, an organisation should either use Information Security Policy published by KSITM (based on CERT-IN) or use a modified version to suit their requirement. Audit, however, noticed that none of the six PSUs adopted Information Security Policy of KSITM or prepared a modified version.

The GoK replied (October 2020) that TTPL now formulated documented information security policy and necessary steps were being initiated by TCCL and WAREHOUSING CORP for the same.

5.1.5.2 Server security

As per the System Security Guidelines issued by CERT-IN, physical access to a server should be limited to only the administrator and other server operators. Audit, however, noticed that this was not ensured in five PSUs and only HORTICORP complied with this requirement. In fact, in TCCL and TTPL, main server and hot back-up server machines were kept in a room which was accessible to other staff for use of common printer kept therein. In WAREHOUSING CORP, the server machine was kept in a photocopy room adjacent to the visitor's room.

The GoK replied (October 2020) that TTPL and WAREHOUSING CORP have now ensured server room security and entry was restricted to authorised persons only.

5.1.5.3 Database security

As per the Database Server Security Guidelines issued by CERT-IN, database server supplying information to a website should never be on the same machine as the web server. In the case of WAREHOUSING CORP and KEL, Audit, however, observed that the web server and database server were located in the same server machine. In WAREHOUSING CORP and HORTICORP, though the server was connected to the internet, the database was not protected by any firewall.

The GoK replied (September/ October 2020) that implementation of firewall and related security systems which were part of the computerisation plan of WAREHOUSING CORP was progressing. KEL has installed an end point security business software for data security. In the case of HORTICORP, an antivirus software was installed for database security.

However, the ERP system implemented by WAREHOSUING CORP was functioning without any firewall protection. The other PSUs initiated action after the same were pointed out by Audit.

5.1.5.4 Data backup policy

It was observed that all the PSUs had either manual or automatic back-up systems. In the case of COIR CORP and CASHEW CORP, the responsibility for data backup was entrusted to their respective data storage service providers. The other PSUs, however, did not have a documented data backup policy as stipulated by the System Security Guidelines.

The GoK replied (September/ October 2020) that TTPL formulated new IT policy which includes data backup policy and data of HORTICORP was backed up in backup server in KELTRON. The data of WAREHOUSING CORP would be backed up in the State Data Centre.

COIR CORP replied (June 2020) that data backup was done by the IA on weekly basis.

However, the PSUs except TTPL were yet to formulate a documented data backup policy as required under the Guidelines which may weaken the regular data backup procedures and audit trail.

5.1.6 Other Related Issues

5.1.6.1 Training, documentation and change management

The Guidelines stipulated that all users and stakeholders of the new system shall be imparted knowledge about the new systems to ensure proper use and operation of applications and infrastructure. The Guidelines read with Regulation No. 161 of Regulation on Audit and Accounts issued by the CAG of India also required that all documentations such as the URS, FRS, SRS, design documents, change control documents, training materials, source code etc. shall be kept under safe custody of the IT Division so that maintenance and change management are carried out smoothly.

It was observed that COIR CORP did not maintain change control documents, source code etc. while none of the prescribed documents were available in KEL. Though all the PSUs entered into agreements/ issued work orders with specific clauses for imparting training in the new software, computer illiteracy was a major impediment in ERP implementation in the case of WAREHOUSING CORP and KEL.

The GoK replied (September/ October 2020) that the IA of KEL imparted training, but there was high reluctance from employees due to poor computer literacy which delayed the implementation. WAREHOUSING CORP was providing training to their employees.

Recommendation 5.1: *The GoK/PSUs may ensure that the Guidelines for implementation of e-governance initiatives are complied with while implementing ERP systems so that such projects are completed in a time bound manner and intended benefits achieved.*

5.2 Electrical energy management by Public Sector Undertakings in the manufacturing sector

Delay in conducting energy audit, failure to achieve specific energy consumption norms, non-availing of open access facility etc. led to extra expenditure and non-achievement of energy savings.

Energy¹⁴ management activities in India are governed by the Energy Conservation Act, 2001 (Act). Government of Kerala (GoK) accords high priority to energy conservation and energy efficiency and issued guidelines (May/ November 1992) for conducting energy audit and directions (June 2015) to regulate energy consumption standards for equipment and appliances. Bureau of Energy Efficiency (BEE) is established under the Act to coordinate with designated consumers, designated agencies and others. Energy Management Centre (EMC) is the State Designated Agency to co-ordinate, regulate and enforce the provisions of the Act/ guidelines/ directions.

A sample of nine¹⁵ out of thirty Public Sector Undertakings (PSUs) functioning in the manufacturing sector was selected as per Stratified Random

¹⁴ As per Section 2(h) of Energy Conservation Act, 2001, energy means any form of energy derived from fossil fuels, nuclear substances or materials, hydro-electricity and includes electrical energy or electricity generated from renewable sources of energy or bio-mass connected to the grid.

¹⁵ Travancore Cochin Chemicals Limited (TCCL), Malabar Cements Limited (MCL), The Kerala Minerals and Metals Limited (KMML), Kerala State Coir Machinery Manufacturing Company Limited (KSCMMCL), Travancore Titanium Products Limited (TTPL), Keltron Component Complex Limited (KCCL), Steel Industrials Kerala Limited (SILK), Sitaram Textiles Limited (STL) and Transformers and Electricals Kerala Limited (TELK).

Sampling Method¹⁶ for assessing the level of compliance to the Act/ guidelines/ directions and evaluating the implementation of energy conservation measures during the period 2016-17 to 2018-19. Audit findings in this regard are discussed below:

5.2.1 Delay in conducting energy audit

As per the GoK directions (1992/2015) read with Government Order (January 2011), all HT/EHT installations should conduct energy audit once in three years.

Audit observed that out of nine PSUs selected for audit, energy audit was not conducted in STL so far (October 2019). Though SILK conducted first energy audit in 2008, subsequent energy audits were not conducted till October 2019. In the case of remaining six¹⁷ PSUs, delay ranging from 7 to 59 months was noticed in conducting the latest energy audit which was due between May 2012 and March 2019. The energy audit conducted by MCL, KMML and KSCMMCL did not include all their HT/EHT connections¹⁸.

Regarding delay in conducting energy audit, the GoK replied (October/ November/December 2020) that SILK planned to conduct energy audit during July 2020, which did not materialise due to Covid-Pandemic situation. TCCL conducted the energy audit only in February 2019 due to selecting energy auditor from the BEE's empanelled list. Further, KMML and TTPL had initiated steps for conducting the energy audit for its units. KCCL missed one energy audit due to retirement of key personnel and STL would take immediate steps to conduct energy audit.

The fact, however, remains that non-conducting of energy audit or delay in conducting it would lead to delayed identification of areas for energy efficiency and conservation with probable energy savings. The reply of GoK regarding TCCL.

16 Based on energy consumption bill data.

17 TCCL, KMML, KSCMMCL, TTPL, KCCL and TELK. Since the last energy audit of MCL was conducted in April 2016, next audit was due in April 2019.

18 Mines at Walayar of MCL, Mineral Separation Unit and Titanium Sponge Plant of KMML and the administrative building of KSCMMCL

was not correct as the delay was due to failure of the PSU to ensure technical qualification of the L1 firm before opening the price bid which led to cancellation of the tender. Further, as STL and SILK did not conduct any energy audit and KMML did not claim the subsidy though it conducted energy audits, these PSUs did not receive the subsidy¹⁹ from EMC.

Audit also noticed that EMC was appointed (January 2011) as the State Designated Agency to coordinate, regulate and enforce the provisions of the rules²⁰ in force. EMC, however, did not regularly monitor the conduct of energy audit and followup measures implemented by the PSUs.

EMC stated (July 2020) that empanelled energy auditors would be directed to incorporate details including status of implementation of previous energy audit and recommendations in energy audit report.

5.2.3 Excess power consumption by non-designated PSUs

In the case of non-designated PSUs, Audit reviewed the existence of power consumption norms and power consumption pattern against such norms, if any.

Audit observed that four²¹ out of seven PSUs did not fix any norms for power consumption. In the case of remaining three²² PSUs, the consumption of power was higher than the norm fixed by them. The excess power consumption over the norms ranged between 0.47 per cent (TTPL) and 13.90 per cent (KMML) during 2016-17 to 2018-19. This resulted in extra expenditure of ₹11.36²³ crore.

The GoK replied (November/December 2020) that the specific energy consumption of TTPL was fixed for a daily production of 45 tons and the excess compared to the norm was due to non-achievement of this production level.

19 EMC provides subsidy of ₹50,000 or 50 per cent of the cost incurred, whichever is less, to PSUs for conducting energy audit.

20 The Energy Conservation Act 2001, guidelines issued by the GoK in May 1992 and November 1992 and directions issued by the GoK in June 2015.

21 KSCMMCL, TELK, SILK and KCCL.

22 KMML, TTPL and STL.

23 KMML (₹10.87 crore), TTPL (₹33.96 lakh) and STL (₹14.55 lakh).

Further, steps were being taken to fix the range of specific energy consumption under different production levels. The GoK replied that STL achieved the norms in 2016-18, but the power consumption increased in 2018-19 due to the increase in capacity utilisation.

The GoK reply was silent on the reasons for the excess consumption of power in KMML. The reply regarding TTPL was also not acceptable as no production level was stipulated for achieving the specific energy consumption at the time of fixing the norm. Further, the norm was revised from 1,200 kWh to 1,150 kWh in May 2016 based on the performance in 2015-16 and no revision was made thereafter which indicated that the norm was achievable. The reply regarding STL was not tenable as increase in capacity utilisation would ideally help to achieve the norm.

5.2.4 Non-utilisation of open access facility for purchase of power

As per Section 42 of the Electricity Act 2003, Kerala State Electricity Regulatory Commission introduced (2013) open access scheme enabling the electricity users having more than 1 MW connected load to avail the benefits of cheap power by purchasing it from the open market.

Audit noticed that out of seven PSUs²⁴ which were eligible to avail the open access facility, only two PSUs, KMML and TCCL, utilised the facility from 2015-16 and 2017-18 onwards respectively. There were savings of ₹13.37 crore to KMML and ₹8.72 crore to TCCL on account of purchasing power using the open access facility up to 2018-19.

Out of the remaining five PSUs, three PSUs, MCL, TTPL and TELK, had EHT connections and there was scope for availing power through open access facility to minimise the cost of power.

5.2.4.2 Despite initiating steps (March 2017) for availing open access, TTPL could not avail open access facility due to revision of specifications and non-supply of Availability Based Tariff (ABT) meter by KSEBL.

²⁴ MCL, TCCL, KMML, TELK, TTPL, KCCL and STL.

The GoK replied (November 2020) that steps were initiated by TTPL for installation of ABT meter and to avail power from open access.

5.2.6 Lapses in energy requirement planning and efficiency improvement measures

As per the tariff orders of KSEBL approved by the Kerala State Electricity Regulatory Commission, 75 per cent of the Contract Demand (CD) or the actual Recorded Maximum Demand (RMD) whichever is higher is considered as the billing maximum demand. If the RMD exceeds the CD, RMD is billed at 1.5 times. The tariff orders from time to time also provide for incentives²⁵ to HT and EHT consumers for power factor²⁶ (PF) improvement. An increase in PF above 0.90 would thus reduce energy charges. If the PF falls below 0.90, one per cent of energy charges for reduction of every 0.01 unit is charged in addition to the applicable charges.

5.2.6.1 Analysis of the contract demand and the actual consumption pattern from the monthly electricity bills of nine PSUs (total 13 connections) from April 2016 to March 2019 was made in audit. In four connections of three PSUs²⁷, the actual RMD was in the range of 15.25 per cent to 67.83 per cent of the CD. The PSUs did not analyse the need for reducing the CD and act accordingly which resulted in avoidable expenditure of ₹54.14 lakh²⁸.

TTPL replied (January 2020) that on implementation of the ongoing projects, the total power requirement would be 3,850 KVA.

25 0.50 per cent vide Kerala Gazette Order No. 782 dated 21/04/2017, 0.25 per cent vide Kerala Gazette Order No. 1305 dated 28/11/2012, No. 2652 dated 9/9/2013 and No. 2379 dated 27/09/2014.

26 Power Factor (PF) expresses the ratio of true power used in a circuit to the apparent power delivered to the circuit.

27 Two connections in KSCMMCL, one connection each in TTPL and TELK.

28 Excess contract demand is worked out by taking difference between the actual connected load and the connected load recommended in energy audit reports. This excess contract demand is multiplied with applicable fixed charges.

Audit, however, noticed that the energy audit reports of these PSUs also recommended for reduction in contract demand which was not yet complied with.

Recommendation 5.2: The GoK/PSUs may accord priority for undertaking timely energy audit, to identify energy efficiency and conservation areas including availing open access facility in order to achieve efficient use of energy. A senior management level oversight mechanism may be contemplated to monitor the achievement in this regard.

[The Audit paragraph 5.1 & 5.2 contained in the report of the C & AG for the year ended 31 March 2019.]

The notes furnished by the Government on the audit paragraph are given in Appendix II

Discussion and findings of the Committee

5.1. Compliance to the Government of Kerala guidelines for implementation of Enterprise Resource Planning initiatives by Public Sector Undertakings.

5.1.1. Leadership and Coordination of the implementation process

5.1.3.5 Acceptance Testing

The Committee enquired the reason for not appointing a Nodal Officer for implementing ERP (Enterprise Resource Planning) systems in FOMIL [Foam Mattings (India) Limited] as per the e-governance guidelines. The concerned officer replied that the post of Junior Officer (Computer) in the company's IT department, which is the only post in the Company's IT wing, was vacant at the time of receiving the instruction to implement the ERP system in 2011 and currently the post is being filled through PSC. Lack of qualified IT personnel in FOMIL affected the appointment of nodal officer and the Company had not sought any help from other agencies such as Kerala State IT Mission.

To a query of the Committee regarding the audit reference that 80% of the contract amount was spent without implementing the ERP system, the concerned officer replied that as per the work order for the implementation of the ERP

system, the Board had decided to give 50% of the contract amount as advance and 30% after the software installation. The official further informed that although the software installation has been completed, various departments of FOMIL have requested that the software shall be customized to make it useful due to the deficiencies experienced during the operational phase, but as the implementing agency was unable to do so, the company has legally moved to recover the total amount along with interest and the case is now at the execution stage.

The Committee inquired why it was decided to implement ERP system even though the post of the skilled personnel (Junior Officer, Computer) was vacant. The concerned official informed that although the nodal officer was not appointed, further steps had been taken with a good intention of implementing the ERP project and that tenders were invited and the said agency was qualified in terms of technical bid and financial bid. He further informed that during the presentation shown by the implementing agency to the company officials, it was thought that the project could be implemented successfully. But when it was implemented, all the requirements of the company were not met.

The Committee enquired whether the experience of the implementing agency had been evaluated at the time of bid. The concerned official informed that the implementing agency had produced the documents of implementing similar type of ERP systems in different organizations. In the communication with the said institutions over telephone it was understood that the projects had been implemented successfully. He added that compared to other institutions, the working method of FOMIL is different and therefore the implementing agency failed to customize the software as required by the Company.

The Committee observed that the ERP system has not been implemented in the company despite proceeding with legal actions against the implementing agency and sought an explanation in this regard. The concerned official informed that the process of merging of FOMIL with Coir Corporation Limited is nearing completion and since ERP system has been implemented in Coir Corporation, there is no need to implement ERP separately in FOMIL and the process of merger is in final stage. The Committee observed that it was understood that the implementing agency was not competent to undertake the contract.

The Committee observed that as per the e-governance guidelines, organisations implementing e-governance projects shall appoint a nodal officer, who even if not from the IT wing, should at least be not more than one level below the Head of the organisation. Moreover, he plays a pro-active role in implementation of ERP systems and shall be responsible for change management in the event of any adverse situation. The Committee noted that no nodal officer had been appointed in FOMIL due to lack of qualified personnel in the Company. Moreover in the absence of qualified officers in the Company they did not seek the help of other agencies. Therefore, the Committee suggested that CVC guidelines should be strictly followed while implementing this type of project in future.

To a query of the Committee about the appointment of Nodal Officer, the Managing Director, Travancore Titanium Products Limited informed that in the absence of senior officers with IT expertise, a person at managerial level was appointed as the nodal officer and requested the government to appoint a qualified person in this post as qualification and efficiency are required to meet the basic criteria for the said post. He added that based on the study of the centre for Management Development, steps are being taken to upgrade the TTPL and if approval is available, a senior officer can be appointed as the nodal officer and that ERP system has already been upgraded.

From the Government reply the Committee observed that KEL had constituted a high level Committee comprising of a senior executive with Senior Manager as Nodal Officer after a delay of more than 5 years and the ERP modules has been implemented successfully only in one unit ie. Mamala unit of KEL.

In the case of TCCL, reply furnished by Government was accepted by the Committee.

Conclusions/Recommendations of the Committee

1. The Committee observes that FOMIL neither appointed a nodal officer nor seek the help of other agencies like Kerala State IT Mission for the implementation of e-governance project and thereby violating the e-governance guidelines. Hence the Committee recommends that CVC guidelines must be followed while implementing this type of projects in future.

2. The Committee noted that FOMIL released about 80% of contract amount for the project violating the CVC guidelines even though they do not conducted Acceptance Test Plan (ATP) or Final Acceptance Testing (FAT). The Committee suggests to furnish a detailed report regarding the decision to implement the project in the absence of the nodal officer and the decision to release the contract amount before successfully implementing the project.

3. The Committee observes that ERP implementation has been done only in Mamala unit of KEL. Therefore, the Committee recommends to implement ERP in all the units of KEL and submit a report to the Committee.

5.1.2. Development of Detailed Project Proposal

5.1.2.1 Non preparation of URS and FRS

Guidelines stipulated that all IT enabled projects should invariably have a detailed project proposal (DPP) prepared either in-house or by taking external help from a Total Solution Provide (TSP)/professional consultancy agency and DPP shall consist of User Requirement Specification (URS), Functional Requirement Specification (FRS), Technical analysis and an implementation plan. URS and FRS should be prepared by functional experts within the organisation and tenders for software development should be invited based on FRS, which shall form the basis for System Requirement Specification (SRS) to be delivered to the Implementing Agency(IA). The Committee inquired whether the development of the system requirement specification prepared by the implementing agency was hindered by the non-preparation of URS and FRS. The concerned official replied that due to the absence of the nodal officer in FOMIL, the procedure protocol could not be followed.

Principal Secretary, Industries Department informed the Committee that FOMIL has not prepared URS and FRS and the observation of audit is correct.

The Committee observed that the software was not operational because the implementing agency was given the task of developing the SRS without preparing the URS and FRS, which were the basis of the system requirement specification, and awarded 80% of the contract amount. Hence the Committee suggested to collect the amount spent on software from the concerned officers who were responsible for the loss.

Conclusions/Recommendations of the Committee

4. The Committee noted that in FOMIL, SRS was developed by the implementing agency without preparing URS and FRS. Hence the Committee recommends to review the total project and to insist the same Implementing Agency to rectify the project without making any additional payment.

5.1.2.2 Absence of Technical Analysis

To a query about absence of technical analysis in TTPL, the Managing Director of TTPL informed that the company used office automation package in a client server platform from 1995-96 onwards but the guidelines for implementation of e-governance were issued by the Government in 2009. Although internet connection and availability of aux cable was limited during 2013-14, the Company switched over to the present ERP system only in 2017-18 which was the upgradation of IT based Knowledge Development Integration to meet the requirements of that time. He added that during 2017-18 the requirements of the Company were changed and hence ERP system was upgraded to web based platform accordingly. He added that at present, the integration is being done by forming an IT Committee comprising the officers of the IT Mission and the web based system is being used by carrying out the integration on the web based platform as and when the technology switches to new mode.

The Committee remarked that TTPL has not conducted technical analysis regarding the feasibility of a suitable platform to be developed before inviting the tender and it has not considered all aspects that had a bearing on the selection of type of software platform.

The Committee enquired about the current status of ERP implementation in Kerala Electrical and Allied Engineering Limited (KEL). The General Manager, KEL informed that earlier there was no IT wing capable of doing technical analysis and now, under the leadership of a high level committee consisting of Senior Managers, the software was upgraded by conducting requirement analysis and all the modules are working successfully. He added that the software is currently being used in the Marmala Unit and steps are being taken to implement it in the next regional unit, Kundara.

The Committee noted that as per guidelines, free and open source based software should be used wherever possible, but KEL spent ₹2.95 lakh towards licence fee for proprietary software.

The Committee observed that in FOMIL technical analysis was not done due to non-awareness of procedure and absence of competent IT personnel. Moreover the selection of proprietary software was not followed by any technical analysis. In the Government reply, FOMIL stated that since the installation of ERP was not completed within the stipulated time, the Company has initiated legal action against the firm.

The Committee remarked that the guidelines were not followed by KEL, FOMIL and TTPL for the technical analysis in the selection of software for the implementation of ERP. Hence the Committee recommended that these types of negligence should be avoided in future and insisted that the companies had to strictly adhere to the Government guidelines issued from time-to-time.

Conclusions/Recommendations of the Committee

5. The Committee observes that the guidelines were not followed by KEL, FOMIL and TTPL for technical analysis in the selection of software for the implementation of ERP. Hence the Committee recommends that this type of negligence should be avoided in future and insists that the companies should strictly adhere to the Government guidelines issued from time-to-time.

5.1.2.3. Absence of implementation plan

To a query of the Committee about the reason for the absence of implementation plan in TCCL, the Managing Director replied that TCCL had a definite implementation plan and considering the criticality, Company decided to go in for phased implementation.

In the Government reply about absence of implementation plan in FOMIL, it was stated that as per the work order it was strictly mentioned to complete the software installation to ensure successful running within 90 days from the date of work order and a thorough study of the process and operation should be undertaken before finalising the module.

The Committee observed that FOMIL did not envisage any definite objective for implementation of ERP systems.

5.1.3. Application Development and Project Rollout

5.1.3.2. Prequalification criteria

5.1.3.3. Evaluation of bids and award of work

To a query of the Committee about the failure to incorporate maintenance cost in FOMIL's tender, the concerned officer informed that due to lack of higher level managers and technically qualified officers, the tender did not include the required parameters.

The Committee inquired whether any technical expertise has been sought from IT Mission and whether non implementation of ERP was intimated to Government. The concerned official informed that they were not aware of the Government guidelines of 2009 and there was no formal IT department or technical committee at the time of ERP implementation and it was not known that technical expertise should be sought from the IT Mission if there was no IT expert in the firm. He further added that when the implementing agency did not complete the work and proceeded with the case to recover the expenditure, the technical aspects and possibilities of ERP were realised and then FOMIL sought technical expertise from the IT Mission. He admitted that the Government was not informed about the non-completion of the ERP.

The Committee observed that the head of the organization should have a clear understanding of the ERP system to be implemented there. The Committee also criticised the statement of the official that they were unaware of the government guidelines. The Committee expressed dismay at the statement and criticised the lackadaisical attitude of officials. The concerned official informed that the coir industry is different in terms of wage structure and other aspects compared to other public sector institutions and the presentation of the implementing agency was successful. Also, the official added that the bidder has been selected as he has worked in companies like Coir Cluster, Mats & Mattings Company and has produced a good certificate from Coir Board.

The Committee opined that since the IT Department's order states that the Director, KSITM shall provide technical support to any Government/Organization for any purpose mentioned in those guidelines relating to an e-governance project, FOMIL should have utilized the assistance of the IT Mission.

The Principal Secretary informed that normally there is CVC guidelines for implementing requirements and from time to time the Government also issues orders for smooth implementation of projects. He added that PSUs can implement the ERP system with their own initiatives according to the framework but if it violates the guidelines then they have to refer it to Government for sending it to IT Department or IT Mission.

The Committee observed that the implementing agency was selected in FOMIL without following the guidelines of 2009 and violating the SPM rules and suggested that necessary precautions should be taken to prevent such lapses in future.

Conclusions/Recommendations of the Committee

6. The Committee criticised the statement of the officials of FOMIL that they were unaware of the Government guidelines. The Committee expressed dismay at the statement and criticised the lackadaisical attitude of officials. The Committee noted that the implementing agency was selected without following the guidelines of 2009 and recommends that necessary precautions should be taken to prevent such lapses in future.

5.1.3.4. Service Level Agreement

The Committee inquired the reason for not entering into Service Level Agreement with the implementing agency of ERP system by FOMIL and KEL, the Managing Director, FOMIL informed that the contract to implement ERP was made as per the detailed work order with terms and conditions given by the implementing agency including the guarantee period and the period for completing the implementation of ERP and other conditions.

The General Manager, KEL informed that initially KEL did not have a Service Level Agreement and later entered into a Service Level Agreement with the implementing agency and entered into a five year Annual Maintenance Contract.

The Committee opined that the Service Level Agreement should have been implemented in 2017.

5.1.3.6 Other Contract Management Issues.

As per the tender conditions, no advance payment could be made to any suppliers but FOMIL agreed to pay 50% advance along the work order while issuing work order to the Implementing Agency. The Committee sought clarification regarding the responsible officer for the execution of the contract. The concerned official informed that the responsibility was not fixed and the amount was paid by the MD at the time of implementation of the contract. The MD who implemented the contract has been changed and legal action was taken against the supplier after discussing the matter with the new MD. The Additional Director, COIR added that the problem arose due to lack of IT expert in the company. The Principal Secretary added that 80% of the amount has been paid to the contractor.

The Committee opined that the award of the contract was not fair and action has to be taken against the then MD who acted against the Government guidelines. The Committee recommended to fix the responsibility and to recover the amount from the concerned official.

The Principal Secretary assured the Committee that he would take action and inform the Committee about the action against the erring official.

Conclusions/Recommendations of the Committee

7. The Committee observes that FOMIL paid 50% of the contract amount along with the work order to the contractor, even though no advance payment have to be made to the contractor as per tender provision. The Committee opined that the payment of advance amount was not fair and action has to be taken against the then MD who acted against the Government guidelines. The Committee recommends to fix the responsibility and to recover the amount from the concerned official.

5.1.4 Procurement of Hardware

The Committee enquired whether TTPL approached the Government to sort out the issues with State Data Centre before deciding to procure its own server. The MD, TTPL elucidated that there was an urgent need for a server as the existing server was damaged and the services provided by the state data centre were

not available at that time. He added that four letters have been sent to the State Data Centre in the last one year regarding e-office implementation. As there was no reply from SDC, it was decided to resolve the problem through the IT Department and a letter has been sent to the Government four months ago regarding this matter.

The Committee inquired whether there were clear guidelines at the time of signing the contract for ERP implementation and how long it had been since the server damage occurred. The MD informed that the company had a server at the time of ERP implementation and it was upgraded and used from 1995 to 2012 and the server got damaged in 2012. He added that the new server was bought because the previously implemented system had an emergency spare server system and at the time of server damage, the financial and marketing functions were in that system, so the server would have been active or the entire data would have been lost. He further stated that when the server was damaged, they approached the State Data Centre for the server and it was informed that the SDC server will be made available when the e-office become active even if there will be some delay.

The Principal Secretary informed that when the server got damaged, the State Data Centre should have to provide a new server but first priority was given to Government Departments and only second priority was given to Public Sector institutions.

5.1.5 Security of Hardware and Data

5.1.5.1 Information security Policy

5.1.5.2 Server Security

The Committee enquired whether KEL, TTPL and TCCL have implemented security of hardware and data. The Managing Director, TCCL informed that the server room has been moved to another floor and isolated to ensure security of hardware and data.

The Managing Director, TTPL responded that they were not aware before the audit observation that main server and backup server machines should be kept separately as a matter of security and they have been relocated after audit observation.

The General Manager, KEL replied that endpoint security business software system has been implemented to ensure security of hardware and data.

The Principal Secretary, Industries Department replied that the data has been stored in the computer working from the production server and that data should be kept separately in back up to prevent potential loss caused by continuous use.

5.1.5.3 Database security

The Committee sought clarification regarding the current status of database security in TTPL and KEL. The concerned officer in TTPL replied that database server has now been kept as a separate entity. The General Manager, KEL informed that on the basis of audit observation, a special system has been implemented in KEL's Mamala unit and will be implemented in Kundara unit as well.

Conclusions/Recommendations of the Committee

8. The Committee observes that a special system for security of data has been implemented only in Mamala Unit of KEL. Therefore, the Committee recommends to give a detailed report regarding the steps taken to implement database security in the Kundara unit.

5.1.5.4 Data backup policy

To a query of the Committee about the Data backup policy of TTPL, KEL and FOMIL, the concerned officer in KEL replied that now the company has automatic and parrallel backup and ground space has been taken for backup.

The Managing Director, TTPL informed the Committee that a separate store room has been provided and a web based system was introduced.

The Personal Manager, FOMIL stated that a separate server room system has been implemented to ensure database security.

5.1.6 Other Related Issues

5.1.6.1 Training, documentation and change management

To a query of the Committee about training and refresher courses imparted to the staff of PSUs who were using ERP, the concerned officer in KEL replied that the implementation was a little difficult in the first stage, but after training were given to the employees, there has been a change and now an electrical engineer is working as the nodal officer.

General Recommendations

9. *The Committee is at a loss to understand why the Government initiated establishing e-governance program in PSUs for the development of software system and the procedure to be followed under the banner ERP in a hasty manner banking only on the guidelines issued by IT mission. The Government should have evolved a protocol under the aegis of IT Mission for implementing ERP in PSUs and a monitory mechanism to oversee the procedure in each phase should also have established especially in the dearth of competent officials in PSUs.*

10. *For selecting the Implementing Agency for each PSU, the concurrence of the IT Mission should also have made mandatory.*

11. *The Committee observes that when new programmes or projects are being implemented utilising State/Central funds through PSUs, no controlling or monitoring mechanism is seen established by administrative departments. Hence the Committee strongly recommends that strict procedural guidelines for monitoring the implementation of the new projects /programmes in PSUs should be evolved by the Chief Technical Expert under the Technical Wing of Finance PUC.*

5.2 Electrical Energy Management by Public Sector Undertakings in the Manufacturing Sector.

5.2.1 Delay in conducting Energy Audit

To a query of the Committee, the Managing Director, TCCL informed that according to the Bureau of Energy Efficiency mandate, energy audit is being conducted every three years and when the tender file related to the energy audit of 2019 was checked, it was found that the eligibility criteria was not met with and hence the order was not given. The tender was cancelled and fine was imposed on the company because of the delay in retendering and placing the order.

The Audit Officer enquired whether the officials were not aware of the eligibility criteria at the time of opening the technical bid. The concerned official replied that in the caustic soda plant there was a condition that only those who have experience and technical qualification can participate in the bid and as there was no

proof of experience in the file at the time of final file inspection, the bid was cancelled and retendered in 2020 and energy audit was completed.

The Principal Secretary also informed that it was a wrong claim by the bidder.

5.2.3 Excess power consumption by non-designated PSUs

The Committee sought clarification about the current purchase of power and its percentage of consumption. The Managing Director, TCCL informed that there is a demand of 6 lakh units of electricity per day and that 50% of the material cost is the power cost and 50% of the power cost is the production cost and the cost increases when the power tariff increases. He added that when electricity is purchased from open market, KSEB will increase the reading charge accordingly and that the electricity consumption rate has increased significantly in the last one year and the power cost of the company in the last three months has increased to ₹4.5 crore.

To a query of the Committee, the Managing Director, TCCL replied that the electricity consumption has not reached 40% and due to membrane cell technology, electricity consumption is low but the cost is high and currently the power tariff is ₹6.70.

The Manager, TCCL added that though the power cost at the central grid is ₹3.50, it becomes around ₹6 in the State which includes the reading charge which ranges from ₹1.18 to ₹1.20, cross subsidy surcharge of ₹1.19, wheeling charge 30 paise and a reduction of 7% less from the point of connectivity to the organization. The Managing Director further added that all these are available only when there is open access facility.

The Managing Director, TTPL replied that open access facility was not available all the time and there was a difference of 50 paise between open market and KSEB, the reading charge has been increased drastically and KSEB now discourages the open market.

The Committee sought clarification about the power cost of TTPL. The Managing Director informed that power cost of TTPL is only about 12% and there

is a problem of low production and that efforts are being made to reduce the consumption of electricity, turbine generator has been installed with the support of EMC and solar power has also been implemented as a part of smart city project. He added that the main problem is variation in production quantity and difficulty in reaching standard capacity.

The Committee opined that the power cost of TTPL is more than the standard and the company should take measures to reduce the power cost by conducting energy audit properly. Therefore, the Committee suggested that timely energy audit should be properly undertaken to identify energy efficiency and to reduce the cost of electricity. To that the Principal Secretary, Industries Department informed that most of the plant and machinery has not been upgraded and even now they are using old technology which is energy intensive. He added that generally all PSUs are upgrading technology.

The Director TCCL informed that they are upgrading technology continuously in TCCL to meet the energy standards.

Conclusions/Recommendations of the Committee

12. The Committee opined that the power cost of TTPL is more than the standard and the Company should take measures to reduce the power cost by conducting energy audit properly. Therefore, the Committee suggests that timely energy audit should be properly undertaken to identify areas of energy efficiency and to reduce the cost of electricity.

5.2.4 Non-utilisation of Open Access facility for purchase of power

The Committee enquired about the non purchase of power using open access facility in TTPL. The Managing Director replied that though all the procedures were completed for getting open access, due to the changes in the specification of Availability Based Tariff Meters and non-distribution of meters by KSEB in time resulted in the delay. He added that they are purchasing power through open access since November 2021.

5.2.6 Lapses in energy requirement planning and efficiency improvement measures

To a query of the Committee about the Contract Demand of TTPL, the Managing Director informed that the Contract Demand has been reduced from 4000KVA to 3500 KVA from January 2017 and capacitor bank has been commissioned to improve the system power factor.

The Committee enquired whether a senior management level oversight mechanism was there to monitor electrical energy management. The MD, TTPL replied that at the time of audit, the Energy Manager's certificate had not been renewed from EMC. The person who has obtained this certificate is currently supervising and at present two persons have passed the examination conducted by the EMC.

Thiruvananthapuram,
11th February 2025.

E. CHANDRASEKHARAN,

*Chairperson,
Committee on Public Undertakings.*

APPENDIX-I

SUMMARY OF MAIN CONCLUSIONS/RECOMMENDATIONS

Sl. No.	Para No.	Department Concerned	Conclusions/Recommendations
(1)	(2)	(3)	(4)
1	1	Industries Department	The Committee observes that FOMIL neither appointed a nodal officer nor seek the help of other agencies like Kerala State IT Mission for the implementation of e-governance project and thereby violating the e-governance guidelines. Hence the Committee recommends that CVC guidelines must be followed while implementing this type of projects in future.
2	2	Industries Department	The Committee noted that FOMIL released about 80% of contract amount for the project violating the CVC guidelines eventhough they do not conducted Acceptance Test Plan (ATP) or Final Acceptance Testing (FAT). The Committee suggests to furnish a detailed report regarding the decision to implement the project in the absence of the nodal officer and the decision to release the contract amount before successfully implementing the project.
3	3	Industries Department	The Committee observes that ERP implementation has been done only in Mamala unit of KEL. Therefore, the Committee recommends to implement ERP in all the units of KEL and submit a report to the Committee.

(1)	(2)	(3)	(4)
4	4	Industries Department	The Committee noted that in FOMIL, SRS was developed by the implementing agency without preparing URS and FRS. Hence the Committee recommends to review the total project and to insist the same Implementing Agency to rectify the project without making any additional payment.
5	5	Industries Department	The Committee observes that the guidelines were not followed by KEL, FOMIL and TTPL for technical analysis in the selection of software for the implementation of ERP. Hence the Committee recommends that this type of negligence should be avoided in future and insists that the companies should strictly adhere to the Government guidelines issued from time-to-time.
6	6	Industries Department	The Committee criticised the statement of the officials of FOMIL that they were unaware of the government guidelines. The Committee expressed dismay at the statement and criticised the lackadaisical attitude of officials. The Committee noted that the implementing agency was selected without following the guidelines of 2009 and recommends that necessary precautions should be taken to prevent such lapses in future.
7	7	Industries Department	The Committee observes that FOMIL paid 50% of the contract amount along with the work order to

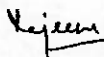
(1)	(2)	(3)	(4)
			<p>the contractor, even though no advance payment have to be made to the contractor as per tender provision. The Committee opined that the payment of advance amount was not fair and action has to be taken against the then MD who acted against the Government guidelines. The Committee recommends to fix the responsibility and to recover the amount from the concerned official.</p>
8	8	Industries Department	<p>The Committee observes that a special system for security of data has been implemented only in Mamala Unit of KEL. Therefore, the Committee recommends to give a detailed report regarding the steps taken to implement database security in the Kundara unit.</p>
9	9	Industries Department	<p>The Committee is at a loss to understand why the government initiated establishing e-governance program in PSUs for the development of software system and the procedure to be followed under the banner ERP in a hasty manner banking only on the guidelines issued by IT mission. The Government should have evolved a protocol under the aegis of IT Mission for implementing ERP in PSUs and a monitory mechanism to oversee the procedure in each phase should also have established especially in the dearth of competent officials in PSUs.</p>

(1)	(2)	(3)	(4)
10	10	Industries Department	For selecting the Implementing Agency for each PSU, the concurrence of the IT Mission should also have made mandatory.
11	11	Industries Department	The Committee observes that when new programmes or projects are being implemented utilising State/Central funds through PSUs, no controlling or monitoring mechanism is seen established by administrative departments. Hence the Committee strongly recommends that strict procedural guidelines for monitoring the implementation of the new projects /programmes in PSUs should be evolved by the Chief Technical Expert under the technical wing of Finance PUC.
12	12	Industries Department	The Committee opined that the power cost of TTPL is more than the standard and the Company should take measures to reduce the power cost by conducting energy audit properly. Therefore, the Committee suggests that timely energy audit should be properly undertaken to identify areas of energy efficiency and to reduce the cost of electricity.

APPENDIX II
NOTES FURNISHED BY THE GOVERNMENT ON
THE AUDIT PARAGRAPH
GOVERNMENT OF KERALA
INDUSTRIES DEPARTMENT
REMEDIAL MEASURES TAKEN REPORT ON PARA 5.1 IN THE REPORT OF
C&AG ON PUBLIC SECTOR UNDERTAKINGS FOR THE YEAR ENDED ON 31.3.2019
TRAVANCORE COCHIN CHEMICALS LIMITED

Para No.	Audit Para	Remedial Measures Taken
5.1	<p>Compliance to the Government of Kerala guidelines for implementation of Enterprise Resource Planning initiatives by Public Sector Undertakings:</p> <p>The Government of Kerala (GoK) issued (September 2009) guidelines for implementation of e-governance initiatives in the State, detailing there in the procedures to be followed in the development of software systems. In this backdrop, Enterprise Resource Planning (ERP) systems implemented after September 2009 by 8 randomly selected Public Sector Undertakings (PSUs) out of 17 were examined in order to assess the level of compliance to the guidelines by these PSUs. Of the selected PSUs, ERP systems were commissioned in Kerala State Coir Corporation Limited (COIR CORP), Travancore Titanium Products Limited (TTPL) and Travancore Cochin Chemicals Limited (TCCL) with varying degrees of success. Implementation was in different stages of completion in Kerala State Horticultural Products Development Corporation Limited (HORTICORP), The Kerala State Cashew Development Corporation Limited (CASHEW CORP), Kerala State Warehousing Corporation (WAREHOUSING CORP) and Kerala Electrical and Allied Engineering Limited (KEL). The implementation of ERP system was a failure in Foam Mattings (India) Limited</p>	<p>Travancore Cochin Chemicals Limited recognizes the vital role that information technology plays, in effecting the Company business as well as the importance of protecting information in all forms. Even though a documented IT policy encompassing all the major activities related to the management of the IT resources was not in place, we have been following acceptable procedures and practices in management of IT resources.</p> <p>Based on the recommendation of CAG Audit, a detailed IT policy was prepared defining rules, regulations and guidelines for proper usage and maintenance of these technological assets to ensure their ethical and acceptable use and assure health, safety and security of data, products, facilities as well as the people using them.</p> <p>Key components of IT policy include the following:-</p> <ol style="list-style-type: none"> 1. General standards for acceptable use of TCCL IT resources General 2. Procurement and disposal of resources 3. Allocation / de-allocation of resources 4. Passwords 5. Access control 6. Managing system privileges

<p>(FOMIL). The status of ERP implementation in the selected PSUs is given in the Appendix 7. The Audit findings in this regard are discussed below:</p>	<ol style="list-style-type: none"> 7. Changes to systems 8. Security (access control) 9. Website content management 10. Software usage and licensing policy 11. Internet and intranet usage policy 12. Email usage policy 13. Data backup 14. Disaster recovery procedures 15. Critical work locations
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 Additional Secretary
 Industries Department
 Govt. Secretariat

**GOVERNMENT OF KERALA
INDUSTRIES DEPARTMENT**

**ACTION TAKEN REPORT ON PARA 5.1.5.2 IN THE REPORT OF C&AG ON
PUBLIC SECTOR UNDERTAKINGS FOR THE YEAR ENDED ON 31.3.2019**

Para No.	AUDIT PARA	REPLY
5.1.2.3	<p>Absence of Implementation Plan.</p> <p>As per the Guidelines, an implementation plan containing an estimate prepared on the basis of 'total cost of ownership', the expected benefits quantified based on higher revenue generation or cost reduction and the time schedule for the pilot phase and final rollout for the project shall, be prepared.</p> <p>Audit, however, observed that the PSUs did not envisage any definite objective for implementation of ERP systems. In the absence of the implementation plan, Audit could not assess the Outcome or impact of ERP projects that were completed and the opportunity cost of those that were delayed beyond the target date.</p> <p>Regarding phase-wise rollout, Audit noticed that CASHEW CORP's decision to roll out the software in all factories and Head Office in one go faced hurdles like non-completion of data entry in all factories, difficulties in inter-factory transactions, non-availability of adequate number of trained personnel etc.</p> <p>CASHEW CORP replied, (September 2020) that it was now fully equipped to implement the project. The other PSUs did not offer any specific reply in this regard.</p>	<p>TCCL had a definite implementation plan and considering the criticality, company decided to go in for phased implementation. The Phase I implementation contained business specific modules such as Finance, Marketing, Purchase and Stores and the scheduled deadline was 01/04/2013 which was met successfully.</p> <p>The implementation agency had submitted detailed implementation plan outlining the testing, Parallel run, user training and Live Run. TCCL already had hardware infrastructure in place and selection of the software was done based on the available infrastructure. The supporting documents were submitted to Audit team at the time of audit.</p>
5.1.3.2	<p>Pre-qualification criteria</p> <p><i>[TCCL prequalified bidders based on essential characteristics like Modularity, flexibility, Open Architecture, Transaction Audit Trails, Integrated Workflow, Simplicity, Manageability and Scalability. Points were allotted for experience, solution status, functionality compliance, readiness to handover source code and detailed project implementation plan]</i></p> <p>The Guidelines stipulated that there shall</p>	<p>Considering the criticality, the emphasis was on implementing a proven product that can be seamlessly customized to TCCL's business practices. Hence, the primary focus was on the robustness of the software and the proximity of its transaction flows to the business practices of TCCL.</p> <p>The secondary focus was on the technical expertise of the bidder. TCCL</p>

be a prequalification process to shortlist the bidders. As per the Central Vigilance Commission (CVC) guidelines, the average annual financial turnover of the bidders is to be included as one of the pre-qualification criteria in the tender document to ensure the financial soundness of the firm. CVC guidelines also stipulated that all important tender evaluation criteria need to be specified in unambiguous terms in the bid documents.

TCCL had also insisted in the bidder compliance conditions that the bidder should have successful installations of the software in similar industrial verticals. The selected software was successfully running in KMML and TTPL. The audit has also observed these bidder compliance conditions helped in the successful implementation of ERP in TCCL.

Subsequent to the observation of audit, TCCL has made the CVC guidelines pertaining to financial soundness of the bidder mandatory in all future tenders wherever applicable.

(CASHEW CORP and WAREHOUSING CORP) did not include any pre-qualification criteria in the tender. Of the five PSUs which included pre-qualification criteria in the tender, the criteria stipulated by FOMIL, TCCL and COIR CORP did not include parameters for ensuring financial soundness of the bidders while that of FOMIL were too vague to ensure participation of only ERP vendors. Similarly, WAREHOUSING CORP in their respective sectors as a COIR CORP and TTPL did not include the evaluation criteria, subsequently used for pre-qualifying the bids, in their tender documents.

[Both COIR CORP and TCCL stipulated successful implementation of the software in their respective sectors as a prequalification criterion which led to selection of experienced IAs and successful implementation of the ERP]

The absence of or ambiguous prequalification criteria led to selection of inexperienced Implementation Agencies resulting in non-implementation/ delayed implementation of the ERP systems by the Implementing Agencies.

The GoK replied (September/ October 2020) that WAREHOUSING CORP and TTPL carried out technical evaluation of the bids received and selected the lowest

	<p>firm from the technically qualified bidders. The main focus of TCCL was on robustness of software, proximity of its transaction flows to the business practices and technical expertise of the bidder.</p> <p>CASHEW CORP replied (June 2020) that the tendering was carried out before the Guidelines came into force and the work was awarded to KELTRON COIR CORP replied (June 2020) that the experience of the firm was stipulated as criteria instead of fixing turnover. Also, the financial statements of the last five years were scrutinized.</p> <p>The fact, however, remains that the CVC guidelines were not complied with by the PSUs, with adverse impact on implementation of the ERP systems.</p>	
5.1.5.1	<p>Information Security Policy</p> <p>As per the Guidelines, an organisation should either use Information Security Policy published by KSITM (based on CERT-IN) or use a modified version to suit their requirement. Audit, however, noticed that none of the six PSUs adopted Information Security Policy of KSITM or prepared a modified version.</p> <p>The GoK replied that TTPL now formulated documented information security policy and necessary steps were being initiated by TCCL and WAREHOUSING CORP for the same</p>	<p>A detailed IT Policy has been prepared defining rules, regulations and guidelines for proper usage and maintenance of technological assets to ensure their ethical and acceptable use and assure health, safety and security of data, products, facilities as well as the people using them.</p> <p>Detailed backup policy is a part of the IT Policy of TCCL. The IT Policy has been successfully implemented in the company.</p>
5.1.5.2	<p>As per the System Security Guidelines issued by CERT-IN, physical access to a server should be limited to only the administrator and other server operators. Audit, however, noticed that this was not ensured in five PSUs and only HORTICORP complied with this requirement. In fact, in TCCL and TTPL, main server and hot back up server machines were kept in a room which was accessible to other staff for use of common printer kept therein. In WAREHOUSE CORP, the server machine was kept in a photocopy room</p>	<p>Subsequent to the C&AG observation on the access control of the Server Room, TCCL has already shifted the Server Room to a newly constructed cabin on the 2nd floor of the Administrative Building, adjacent to the Systems Department. The access to the new Server Room is restricted and controlled by the Systems Department.</p>

	adjacent to the visitor's room. The GoK replied (October 2020) that TTPL and WAREHOUSE CORP have now ensured server room security and entry was restricted to authorised persons only.	
5.1.5.4	<p>It was observed that all the PSUs had either manual or automatic back-up systems. In this case of COIR CORP and CASHEW CORP, the responsibility for data backup was entrusted to their respective data storage service providers. The other PSUs, however, did not have a documented data back up policy as stipulated by the System Security Guidelines.</p> <p>The Gok replied (Sep/Oct 2020) that TTPL formulated new IT policy which includes data backup policy and data of HORTICORP was backed up on backup server in KELTRON. The data of WAREHOUSING CORP would be backed up in the State Data Centre.</p> <p>COIR CORP replied (June 2020) that data backup was done by the IA on weekly basis.</p> <p>However, the PSUs except TTPL were yet to formulate a documented data backup policy as required under the Guidelines which may weaken the regular data backup procedures and audit trail.</p>	<p>A detailed IT Policy has been prepared defining rules, regulations and guidelines for proper usage and maintenance of technological assets to ensure their ethical and acceptable use and assure health, safety and security of data, products, facilities as well as the people using them.</p> <p>Detailed backup policy is a part of the IT Policy of TCCL. The IT Policy has been successfully implemented in the company.</p>

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5.2.1 Delay in conducting energy audit

As per the GoK directions (1992/2015) read with Government Order (January 2011), all HT/EHT installations should conduct energy audit once in three years.

Audit observed that out of nine PSUs selected for audit, energy audit was not conducted in STL so far (October 2019). Though SILK conducted first energy audit in 2008, subsequent energy audits were not conducted till October 2019 in the case of remaining six PSUs, delay ranging from 7 to 59 months was noticed in conducting the latest energy audit which was due between May 2012 and March 2019. The energy audit conducted by MCL, KMML and KSCMMCL did not include all their HT/EHT connections.

Regarding delay in conducting energy audit, the GoK replied (October/ November/December 2020) that SILK planned to conduct energy audit during July 2020, which did not materialise due to Covid-Pandemic situation. TCCL conducted the energy audit only in February 2019 due to selecting energy auditor from the BEE's empanelled list. Further, KMML and TTPL had initiated steps for conducting the energy audit for its units. KCCL missed one energy audit due to retirement of key personnel and STL would take immediate steps to conduct energy audit. TELK replied (September 2020) that the energy audit was conducted and report submitted to EMC in September 2020. Regarding not conducting energy audit of all the units, the PSUs replied that steps were initiated to conduct the energy audit of these units.

The fact, however, remains that non-conducting of energy audit or delay in conducting it would lead to delayed identification of areas for energy efficiency and conservation with probable energy savings. The reply of GoK regarding TCCL was not correct as the delay was due to failure of the PSU to ensure technical qualification of the LI firm before opening the price bid which led to cancellation of the tender.

TCCL had conducted Energy Audit in the year 2014 by M/s TERI Bangalore. As per the new regulation, as it was made mandatory to conduct Energy audits once in 3 years for designated consumers, TCCL initiated the process of inviting Energy Audit proposals from BEE accredited auditors through competitive quotation in June 2017 itself. As per this, TCCL received four offers and the technical committee recommended opening all the price bids as all bidders were initially found to have met eligibility criteria.

Experience in Chlor Alkali was a condition for getting technically qualified bidders and based on this, the department recommended the Energy audit work order to M/s SGS India Limited. But while processing, it was found that the party even though had claimed sufficient experience in almost all sub sectors under PAT Scheme had not submitted proof of experience in Chlor Alkali Industry and failed to submit the proof for experience in conducting energy audit in a Chlor alkali industry which TCCL had asked and which they had claimed during the stage of submission of offer. As the party did not produce proof, even after repeated reminders, the tender had to be cancelled and fresh offers were called. In December 2018 TCCL issued work order for conducting energy Audit with M/s NITCON Limited and they conducted the same in February 2019 and submitted report in April 2019. Detailed Timeline of tendering/ re-tendering process mentioned in the below table clarifying the delay in conducting Energy Audit.

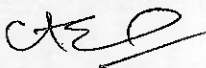
Sl. No.	Particulars	Date
1	Work order initiation for Energy Audit	28.06.2017

Further, as STL and SILK did not conduct any energy audit and KMML did not claim the subsidy though it conducted energy audits, these PSUs did not receive the subsidy from EMC.

Audit also noticed that EMC was appointed (January 2011) as the State Designated Agency to coordinate, regulate and enforce the provisions of the rules in force. EMC, however, did not regularly monitor the conduct of energy audit and follow up measures implemented by the PSUs.

EMC stated (July 2020) that empanelled energy auditors would be directed to incorporate details including status of implementation of previous energy audit and recommendations in energy audit report.

2	Technical Evaluation of Four offers received	04.10.2017
3	Recommendation of W.O with M/s SGS India Ltd	24.11.2017
4	Request for submission of proof for Chlor alkali Experience with M/s SGS India Limited	12.02.2018
5	Cancellation of existing tender and re-tender initiation	13.03.2018
6	Technical Evaluation of three offers received	11.10.2018
7	Recommendation of W.O with M/s NITCON Limited	26.10.2018
8	Work Order issued to M/s NITCON Limited	04.12.2018
9	Energy Audit conducted in TCCL by M/s NITCON Ltd	06.02.2019
10	Report submitted by NITCON Limited	10.04.2019


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**GOVERNMENT OF KERALA
INDUSTRIES (H) DEPARTMENT**

**REMEDIAL MEASURES TAKEN ON THE REPORT OF THE COMPTROLLER
& AUDITOR GENERAL OF INDIA ON PUBLIC SECTOR UNDERTAKINGS FOR
THE YEAR ENDED ON 31st MARCH 2019-**

(TRAVANCORE TITANIUM PRODUCTS LIMITED)

Para No.	RECOMMENDATION	ACTION TAKEN
5.1	<p><u>5.1 Compliance to the Government of Kerala guidelines for implementation of Enterprise Resource Planning initiatives by Public Sector Undertakings</u></p> <p><u>Non-adherence to GoK guidelines for implementing e-governance initiatives affected timely implementation of ERP systems in seven PSUs. Five PSUs could not derive any benefit even after incurring Rs. 1.15 crore due to non-completion of their ERP systems</u></p> <p>The Government of Kerala (GoK) issued (September 2009) guidelines for implementation of governance initiatives in the State, detailing therein the procedures to be followed in the development of software systems. In this backdrop, Enterprise Resource Planning (ERP) systems implemented after September 2009 by 8 randomly selected Public Sector Undertakings (PSUs) out of 17 were examined in order to assess the level of compliance to the guidelines by these PSUs. Of the selected PSUs, ERP systems were commissioned in Kerala State Coir Corporation Limited (COIR CORP), Travancore Titanium Products Limited (TIPL) and Travancore Cochin Chemicals Limited (TCCL) with varying degrees of success. Implementation was in different stages of completion in Kerala State</p>	

Horticultural Products Development Corporation Limited (HORTICORP), The Kerala State Cashew Development Corporation Limited (CASHEW CORP), Kerala State Warehousing Corporation (WAREHOUSING CORP) and Kerala Electrical and Allied Engineering Limited (KEL). The implementation of ERP system was a failure in Foam Mattings (India) Limited (FOMIL).

5.1.2.2 Absence of Technical Analysis

As per the Guidelines, technical analysis shall be carried out based on the URS and different alternatives for connectivity, operational platform (Operating System, RDBMS etc.) and risks associated therewith. Audit,

however, observed that none of the PSUs carried out any detailed technical analysis of the proposed ERP systems which led to the following issues:

HORTICORP, during the implementation of ERP proposed to link weighing machines located in outlets with the ERP system so as to facilitate real time data on stock position of vegetables and fruits. An amount of Rs.5.20 lakh was expended for upgrading existing weighing balances at outlets with GPRS etc. IT-Division identified the best modern to make them compatible with the ERP system. However, the power backup capability of the weighing machines was not assessed. As a result, the ERP system could not be implemented in retail/ mobile outlets as the upgraded machines could be used only for two to three hours continuously. Though the manufacturer of the weighing machine suggested additional battery backup to solve this, HORTICORP did not entertain the same as it needed additional investment.

The GoK replied (September 2020) that initially the entire system worked efficiently but the efficiency of the system dropped due to power back up issues which could not be addressed due to huge investments.

The reply confirmed that there was absence of technical analysis which hindered online monitoring of sales in retail outlets.

The IT-Division of TTPL had conducted a detailed feasibility study, System study, viewed several demonstrations and evaluated various major ERP software implemented in similar type of organizations and other Office Automation software projects that were available at that point of time which are SAP, Microsoft Navision etc. IT-Division identified the best software practices that were available in different software solutions and shortlisted the basic transaction flow requirements that were necessary for TTPL. Accordingly, the IT-Division of TTPL has submitted a proposal to the Management for switching over to a client-server based network platform and suggested for inviting tender for the above after fulfilling all necessary formalities. Company used Office automation package in a client-server platform from 1995-96 which is switched over to the present ERP system in 2012-13. Since the users were trained and conversant in running the software in the client server platform, company have

WAREHOUSING CORP decided (July 2017) switched over to the same platform to use the existing Tally financial accounting in new ERP system and then package even after implementation of the ERP switched over to the present web system. Hence generation and export of based platform without affecting XML93 files from the Accounts Module of normal operations of the company. ERP system to the Tally package was ERP system of the company is attempted while developing the ERP system. It capable to handle both client-server was, however, not found feasible and the as well as web based applications. Accounts Module had to be modified Presently on line transactions and e- accordingly. The time and effort expended on invoicing are being done through the integration of Tally with the ERP did not have upgraded ERP system.

5.1.2.2

the proposal for using Tally financial accounting package along with ERP system lacked justification as ERP system was implemented as an integrated software solution for materials, marketing and finance functions.

The GoK replied (September 2020) that the computerisation project was completed in March 2020.

The fact remains that the shortcomings in development process due to non-adherence to the Guidelines delayed the completion of the project by eight years.

As per the Guidelines, free and open source based software should be used, wherever possible. Audit, however, observed that only CASHEW CORP used open source platform in its ERP system while other PSUs used proprietary platforms. Three PSUs (KEL, HORTICORP and WAREHOUSING CORP) spent Rs 2.95 lakh towards license fee for proprietary software

COIR CORP. stated (June 2020) that MS SQL was selected due to its better data management and security features. FOMIL stated (June 2020) that technical analysis was not done due to non-awareness of procedure and absence of competent IT Personnel.

The fact remained that the selection of proprietary software was not followed by any technical analysis.

TIPL invited tenders and awarded the work order to the IA for developing the ERP systems on 'web based platform. The system was, however, developed on 'client-server' model at the time of implementation. This was

due to the fact that the PSU did not conduct an analysis regarding the feasibility of having a suitable platform of the system to be developed before inviting the tender.

The GoK replied (October 2020) that TTPL proceeded for developing client- server model software, as there was not enough internet facility to support functioning of the ERP software on a web based platform.

The reply confirmed that the technical analysis did not consider all aspects that had a bearing on the selection of type of software platform.

5.1.3.2 Pre-qualification criteria

The Guidelines stipulated that there shall be a prequalification process to shortlist the bidders. As per the Central Vigilance Commission (CVC) guidelines, the average annual financial turnover of the bidders is to be included as one of the pre-qualification criteria in the tender document to ensure the financial soundness of the firm. CVC guidelines also stipulated that all important tender evaluation criteria need to be specified in unambiguous terms in the bid documents so that the evaluation of bids can be made without any subjectivity.

Audit, however, observed that two PSUs (CASHEW CORP and WAREHOUSING CORP) did not include any pre-qualification criteria in the tender. Of the five PSUs which included pre-qualification criteria in the tender, the criteria stipulated by FOMIL, TCCL and COIR CORP did not include parameters for ensuring financial soundness of the bidders while that of FOMIL were too vague to ensure participation of only ERP vendors. Similarly, WAREHOUSING CORP and COIR CORP and TTPL did not include the evaluation criteria, subsequently used for pre-qualifying the bids, in their tender documents.

5.1.3.2

The absence of or ambiguous pre-qualification criteria led to selection of inexperienced Implementation Agencies resulting in non-implementation/ delayed implementation of the ERP systems by the Implementing Agencies

As per Tender notice No.CD/CN/MA-5/MIS.Soft/ITD/10-11 dated:07/06/2010 of the company pre qualification criteria was fixed at the time of issuing Tender for the ERP project. TTPL had carried out the technical evaluation of bids of the pre qualification criteria and selected the lowest bidder based on technical qualification.

The GoK replied (September/ October 2020) that WAREHOUSING CORP and TTPL carried out technical evaluation of the bids received and selected the lowest firm from the technically qualified bidders. The main focus of TCCL was on robustness of software, proximity of its transaction flows to the business practices and technical expertise of the bidder.

CASHEW CORP replied (June 2020) that the tendering was carried out before the Guidelines came into force and the work was awarded to KELTRON.

COIR CORP replied (June 2020) that the experience of the firm was stipulated as criteria instead of fixing turnover. Also, the financial statements of the last five years were scrutinized.

The fact, however, remains that the CVC guidelines were not complied with by the PSUs, with diverse impact on implementation of the ERP systems,

5.1.3.4 Service Level Agreements

As per the Guidelines, System Requirements Specification (SRS), detailed acceptance test plan based on the SRS, application software with fully documented source code and all necessary licenses are the deliverables expected from the IA. Accordingly, a detailed Service Level Agreement (SLA) needs to be entered into with the IA covering all the aspects of development, implementation and maintenance of the software.

Audit observed that four PSUs (FOMIL, COIR CORP, KEL and HORTICORP) did not enter into any SLA with the respective IAs and therefore these PSUs did not have clear-cut guidelines regarding the service obligations of the IAs and the associated service deliverables during the implementation process. The remaining four PSUs (CASHEW CORP, WAREHOUSING CORP, TTPL and TCCL) through the SLAs, ensured that the SRS was prepared and source code of the developed system was handed over to it by the

Systems Requirements Specification (SRS) was ensured by TTPL through Service Level Agreement and the source code was secured from the IA which acknowledged by the Audit. Acceptance Testing was conducted with the technical experts from KMML.

5.1.3.4

IA. Further, none of these SLAs provided for comprehensive acceptance testing including the final acceptance testing by an independent third party as stipulated by the Guidelines. COIR CORP accepted (June 2020) that they did not enter into SLA with the IA, while FOMIL replied (June 2020) that they were unaware of the guidelines regarding SLA. The fact remained that the PSUs did not comply with the Guidelines. The replies of the PSUs were also silent on the absence of provision for comprehensive acceptance testing. Absence of or incomplete SLA would result in inadequate mapping of deliverables expected from the implementation of ERP systems.

5.1.3.5 Acceptance Testing

The Guidelines stipulated that Acceptance Test Plan (ATP) along with sample data should be ready by the time the application software is developed and that testing is conducted by functional experts within the organisation. The Final Acceptance Testing (FAT) should be conducted by a professional agency appointed through a transparent process.

Audit observed that documentation regarding in-house acceptance testing was not available in any of the PSUs nor did the PSUs involve any external agency for FAT since there were no agreement clauses regarding the same. Absence of ATP or FAT led to the following issues in four out of eight PSUs:

Disagreement between CASHEW CORP and the IA on the completion/ commissioning status of various modules of the ERP led to suspension of development work for over two years.

FOMIL released about 80 per cent of the contract price, without conducting any testing. Even though the IA claimed successful completion of ERP, various departments in FOMIL raised complaints/ demanded changes in the software which the IA did not carry out. As a result, FOMIL went for litigation.

WAREHOUSING CORP did not conduct acceptance testing of the modules completed by the IA in October 2012. In the absence of

any testing reports, the IA could not further proceed with the development work for over four years (up to July 2017).

5.1.3.5 HORTICORP released about 88 per cent of the contract price without any testing and acceptance procedure though the IA was eligible for only 50 per cent as per the work order. HORTICORP, thus paid an excess amount of Rs.28.73 lakh without considering the stages of implementation. Further, the software was presently utilised only for generating invoices. The other functionalities such as real time monitoring of outlets, procurement, storage, accounting etc. envisaged in the project have not been achieved to date (January 2020).

The GoK replied (September/ October 2020) that WAREHOUSING CORP conducted the testing after revamping the project and all the modules were running. HORTICORP released 88 per cent of the contract price based on technical committee evaluation that ERP implementation attained 80 per cent progress. Further, acceptance testing in TCCL was conducted by functional experts within the company which helped in timely completion of the project. In the case of TTPL, the software was accepted with the help of technical experts from The Kerala Minerals and Metals Limited, a State PSU.

CASHEW CORP replied (June 2020) that all the issues with IA were over and the project was revived. Though SLA did not provide for acceptance test by a third party, the process of independent audit and testing by a government approved external agency was initiated. FOMIL replied (June 2020) that the requirement, of testing by a third party agency was not known to the management.

The replies of GoK and FOMIL were not acceptable as the Guidelines mandated final acceptance test by an external agency selected through a transparent process. The reply regarding HORTICORP was not acceptable as the payment made was not in line with the conditions specified in the work order. The failure to conduct ATP or FAT resulted in the delayed development and fine-tuning of the

Acceptance Testing was conducted with the help of technical experts from M/s KMMML where the same ERP software was running successfully from 1999-2000. ERP software underwent further modifications with additional SRS on mutual agreement and the revised ERP package will be accepted only through Comprehensive acceptance testing and final acceptance testing by a third party as per the guidelines.

ERP software based on actual requirements.

5.1.4 Procurement of Hardware

The Guidelines also stipulated that no e-governance initiative should plan for common IT infrastructure like server since the facility in the State Data Centre could be made use of and duplicate expenditure avoided.

Audit, however, observed that out of eight PSUs covered in audit, only CASHEW CORP explored the possibility of using State Data Centre (who offered free hosting) for their data storage needs. While TCCI used the existing server, COIR CORP was hosting database through Amazon Web Services and incurred 2.68 lakh (from March 2017 onwards) as hosting charges. In the case of remaining five PSUs, four PSUs (TTPL, FOMIL, WAREHOUSING CORP and HORTICORP) spent Rs. 9.49 lakh for procuring the server machines. The amount spent by KEL for procuring the server, however, could not be ascertained from the documents produced in audit.

The GoK replied (September 2020) that WAREHOUSING CORP procured the server machine as per the advice of IA and the server was running without any issues. The services provided by State Data Centre were not available when TTPL procured their server. HORTICORP procured the hardware through KELTRON as there were no technical experts in the PSU.

FOMIL replied (June 2020) that the procurement of server was made without the knowledge that common state level facilities existed. COIR CORP replied (June 2020) that server space was not available in IT Mission when it approached them in 2013-14. In-house server was used for two to three years until it became non-functional. Amazon Web Services were availed by the company as their cost was cheaper compared to new server machine.

The replies were not acceptable as the procurement of hardware by PSUs was not in line with the Guidelines issued by GoK. Further, COIR CORP did not ascertain the availability of server space with the State Data Centre IT Mission before it opted for Amazon

TTPL procured the server when the facility was not available from State data Centre as per the guidelines.

5.1.4

	<p>Web Services in 2017 or thereafter. The reply regarding TTPL was to be seen against the fact that the Guidelines issued by GoK in September 2009 provided for use of common facilities like servers. Hence, procurement of server by TTPL in April 2011, i.e., after 18 months of issue of the Guidelines was not justified.</p>	
5.1.5	<p>5.1.5 Security of Hardware and Data Of the eight PSUs, ERP systems of six PSUs (TCCL, TTPL, WAREHOUSING CORP, COIR CORP, HORTICORP and KEL) were either fully or partially operationalised (i.e., some of the modules) and the PSUs used live production servers to host their data. The security of hardware and data assumed importance as any loss of data could cripple their operations from short to medium duration.</p>	
5.1.5.1	<p>5.1.5.1 Information security policy As per the Guidelines, an organisation should either use Information Security Policy published by KSITM (based on CERT-IN) or use a modified version to suit their requirement. Audit, however, noticed that none of the six PSUs adopted Information Security Policy of KSITM or prepared a modified version. The GoK replied (October 2020) that TTPL now formulated documented information security policy and necessary steps were being initiated by TCCL and WAREHOUSING CORP for the same.</p>	
5.1.5.2	<p>5.1.5.2 Server security As per the System Security Guidelines issued by CERT-IN, physical access to a server should be limited to only the administrator and other server operators. Audit, however, noticed that this was not ensured in five PSUs and only HORTICORP complied with this requirement. In fact, in TCCL and TTPL, main server and hot back-up server machines were kept in a room which was accessible to other staff for use of common printer kept therein. In WAREHOUSING CORP, the server machine was kept in a photocopy room adjacent to the visitor's room. The GoK replied (October 2020) that TTPL and WAREHOUSING CORP have now</p>	<p>TTPL has formulated Information Security Policy which is acknowledged by the Audit. TTPL implement modified ERP and e-office systems for which company have approached State Data Centre for Server Space as per Government Guidelines. TTPL have already ensured server room security and restricted entry to authorized persons only.</p>

ensured server room security and entry was restricted to authorised persons only.

5.1.5.4 Data backup policy

It was observed that all the PSUs had either manual or automatic back-up systems. In the case of COIR CORP and CASHEW CORP, the responsibility for data backup was entrusted to their respective data storage service providers. The other PSUs, however, did not have a documented data backup policy as stipulated by the System Security Guidelines.

5.1.5.4 The GoK replied (September/October 2020) that TTPL formulated new IT policy which includes data backup policy and data of HORTICORP was backed up in backup server in KELTRON. The data of WAREHOUSING CORP would be backed up in the State Data Centre.

COIR CORP replied (June 2020) that data backup was done by the IA on weekly basis.

However, the PSUs except TTPL were yet to formulate a documented data backup policy as required under the Guidelines which may weaken the regular data backup procedures and audit trail.

5.2 Electrical Energy management by Public Sector Undertakings in the manufacturing sector

Delay in conducting energy audit failure to achieve specific energy consumption norms, non availing of open access facility etc led to extra expenditure and non- achievement of energy savings.

5.2 Energy management activities in India are governed by the Energy Conservation Act, 2001 (Act). Government of Kerala (GoK,) accords high priority to energy conservation and energy efficiency and issued guidelines (May/November 1992) for conducting energy audit and directions (June 2015) to regulate energy consumption standards for equipment and appliances. Bureau of Energy Efficiency (BEE) is established under the Act to coordinate with designated consumers, designated agencies and others. Energy

Management Centre (EMC) is the State Designated Agency to coordinate, regulate and enforce the provisions of the Act/guidelines/directions.

A sample of nine out of thirty Public Sector Undertakings (PSUs) functioning in the manufacturing sector was selected as per Stratified Random Sampling Method for assessing the level of compliance to the Act/guidelines/ directions and evaluating the implementation of energy conservation measures during the period 2016-17 to 2018-19.

5.2.1 Delay in conducting energy audit

As per the GoK directions (1992/2015) read with Government Order (January 2011), all HT/EHT installations should conduct energy audit once in three years.

Audit observed that out of nine PSUs selected for audit, energy audit was not conducted in STL so far (October 2019). Though SILK conducted first energy audit in 2008, subsequent energy audits were not conducted till October 2019 in the case of remaining six PSUs, delay ranging from 7 to 59 months was noticed in conducting the latest energy audit which was due between May 2012 and March 2019. The energy audit conducted by MCL, KMMML and KSCMMCL did not include all their HT/EHT connections.

TTPL complied energy audit for the financial year 2021-22.

Regarding delay in conducting energy audit, the GoK replied (October/November/December 2020) that SILK planned to conduct energy audit during July 2020, which did not materialise due to Covid-Pandemic situation. TCCL conducted the energy audit only in February 2019 due to selecting energy auditor from the BEE's empanelled list. Further, KMMML and TTPL had initiated steps for conducting the energy audit for its units. KCCL missed one energy audit due to retirement of key personnel and STL would take immediate steps to conduct energy audit.

5.2.1

TELK replied (September 2020) that the energy audit was conducted and report submitted to EMC in September 2020. Regarding not conducting energy audit of all the units, the PSUs replied that steps were

initiated to conduct the energy audit of these units.

The fact, however, remains that non-conducting of energy audit or delay in conducting it would lead to delayed identification of areas for energy efficiency and conservation with probable energy savings. The reply of GoK regarding TCCL was not correct as the delay was due to failure of the PSU to ensure technical qualification of the L1 firm before opening the price bid which led to cancellation of the tender. Further, as STL and SILK did not conduct any energy audit and KMML did not claim the subsidy though it conducted energy audits, these PSUs did not receive the subsidy from EMC.

Audit also noticed that EMC was appointed (January 2011) as the State Designated Agency to coordinate, regulate and enforce the provisions of the rules in force. EMC, however, did not regularly monitor the conduct of energy audit and follow up measures implemented by the PSUs.

EMC stated (July 2020) that empaneled energy auditors would be directed to incorporate details including status of implementation of previous energy audit and recommendations in energy audit report.

5.2.3 Excess power consumption, by non-designated PSUs

In the case of non-designated PSUs, Audit reviewed the existence of power consumption norms and power consumption pattern against such norms, if any.

Audit observed that four out of seven PSUs did not fix any norms for power consumption. In the case of remaining three PSUs, the consumption of power was higher, than the norm fixed by them. The excess power consumption over the norms ranged between 0.47 per cent (TTPL) and 13.90 per cent

Company fixed specific electricity consumption for different range of production. The specific consumption of electricity varies with production. Hence the specific electricity consumption can be fixed against a band of production range only. There are three major plant units inside factory.

TDP - Titanium Dioxide plant
(Monthly Production capacity varies from 200-1600 Tonnes of TiO₂)

SAP - Sulfuric Acid plant (Monthly Production varies from 3000-9000 Tonnes of Acid)

NP - Neutralization Plant (Effluent treatment plant)

(KMML) during 2016- 17 to 2018- 19. This resulted in extra expenditure of Rs. 11.36 crore; Considering the TDP plant, the power consumption/Tonnes of TiO_2 at higher production level since the requirement of equipments will be almost same. Since being a continuous plant, power requirement for acid plant is almost constant. While calculating the specific electricity consumption, company range of specific energy consumption under different production levels. The GoK replied SAP and TDP consumption together that STL achieved the norms in 2016-18, but against production of Titanium Dioxide only (Never consider Acid production for SEC calculation, as main product of company is TiO_2 and acid plant is a supporting unit for the same). Hence for the lower TiO_2 production period, the percentage of acid plant electricity consumption will be more when comparing with higher TiO_2 production period as the acid plant electricity consumption is almost same for both the cases. This will result in higher specific electricity consumption with acid plant during lower TiO_2 production period. The sulphate route of manufacturing Titanium Dioxide is a batch wise operation and hence specific power consumption can vary even with same level of production in Titanium Dioxide Plant and also depending on ancilliary units like Sulphuric Acid Plant. Company has fixed range of specific consumption depending on production levels in TiO_2 Plant and Sulphuric Acid Plant which is appended as Annexure A.

5.2.3

5.2.4 Non-utilisation of open access facility for purchase of power

As per Section 42 of the Electricity Act 2003, Kerala State Electricity Regulatory Commission introduced (2013) open access scheme enabling the electricity users having more than 1 MW connected load to avail the benefits of cheap power by purchasing it from the open market.

5.2.4	<p>Audit noticed that out of seven PSUs which were eligible to avail the open access facility, only two PSUs, KMML and TCCL, utilised the facility from 2015-16 and 2017-18 onwards respectively. There were savings of Rs.13.37 crore to KMML and Rs.8.72 crore to TCCL on account of purchasing power using the open access facility upto 2018-19.</p> <p>The GoK confirmed (December 2020) that STL did not initiate steps for availing open access facility for purchase of power. KCCL would explore the possibilities of utilisation of open access facility.</p> <p>Out of the remaining five PSUs, three PSUs, MCL, TTPL and TELK, had EHT connections and there was scope for availing power through open access facility to minimise the cost of power.</p>	<p>Company had taken steps for procuring & installation of ABT meter from KSEB itself and started procuring power through open access from November 2021 onwards.</p>
5.2.4.2	<p>5.2.4.2 Despite initiating steps (March 2017) for availing open access, TTPL could not avail open access facility due to revision of specifications and non-supply of Availability Based Tariff (ABT) meter by KSEBL. The GoK replied (November 2020) that steps were initiated by TTPL for installation of ABT meter and to avail power from open access.</p>	
5.2.6	<p><u>5.2.6 Lapses in energy requirement planning and efficiency improvement measures</u></p> <p>As per the tariff orders of KSEBL approved by the Kerala State Electricity Regulatory Commission, 75 per cent of the Contract Demand (CD) or the actual Recorded Maximum Demand (RMD) whichever is higher is considered as the billing maximum demand. If the RMD exceeds the CD, RMD is billed at 1.5 times. The tariff orders from time to time also provide for incentives to HT and EHT consumers for power factor (PF) improvement. An increase in PF above 0.90 would thus reduce energy charges. If the PF falls below 0.90, one per cent of energy charges for reduction of every 0.01 unit is charged in addition to the applicable charges.</p>	
	<p>5.2.6.1 Analysis of the contract demand and the actual consumption pattern from the monthly electricity bills of nine PSUs (total 13 connections) from April 2016 to March 2019 was made in audit. In four connections of three</p>	<p>TTPL had reduced the contract demand to 3500KVA from 4000</p>

PSUs the actual RMD was in the range of KVA during January 2017. Hence 15.25 per cent to 67.83 per cent of the CD. from January 2017 onwards contract demand of TTPL is 3500KVA. The PSUs did not analyse the need for reducing the CD and act accordingly which resulted in avoidable expenditure of ' 54.14 lakh.

5.2.6.1 TTPL replied (January 2020) that on implementation of time ongoing projects, the total power requirement would be 3,850 KVA. TELK replied (September 2020) that KSEBL insisted (2016) for upgradation of equipment in the TELK substation for reduction of CD. TELK added that as the planned upgradation of the equipment would take time, it would again request KSEBL to reduce the CD. KSCMMCL replied (December 2020) that full level of production was not yet started and more machinery were being installed and assured that steps would be taken to reduce the CD to a safer level.

Audit, however, noticed that the energy audit reports of these PSUs also recommended for reduction in contract demand which was not yet complied with.

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POWER CONSUMPTION AT VARIOUS DAILY PRODUCTION LEVEL

CALCINER-II	CALCINER-III	CALCINER-IV	SAP	NP	CONSUMPTION (APPROX AVG)	TiO2	ACID
	NO	NO	NO	NO	3,500	0	0
NO	NO	NO	NO	YES	25,000	15	0
YES	NO	NO	YES	YES	32,000	15	300
YES	NO	NO	NO	YES	32,000	30	0
NO	YES	NO	YES	YES	37,000	30	300
NO	YES	NO	NO	YES	46,000	45	0
YES	YES	NO	YES	YES	52,000	45	300
YES	YES	NO	YES	YES	51,000	55	0
NO	YES	YES	NO	YES	55,000	55	300
NO	YES	YES	YES	YES	60,000	65	300
YES	YES	YES	NO	YES	60,000	65	300
YES	YES	YES	YES	YES	64,000	65	300

RANGE OF SPECIFIC ELECTRICITY CONSUMPTION AT DIFFERENT RANGE OF MONTHLY PRODUCTION LEVEL

TiO2 PRODUCTION RANGE	SPECIFIC ELECTRICITY CONSUMPTION		REMARKS	NOTE: The power requirement for acid plant is almost constant since being a continuous plant. While calculating the specific electricity consumption, we use electricity consumption of both SAP and TDP consumption together against production of Titanium Dioxide only (not taking Acid production). Hence for the lower TiO2 production period, the percentage of acid plant electricity consumption will be more when comparing with higher TiO2 production period as the acid plant electricity consumption is almost same for both the cases. This will result in higher specific electricity consumption with acid plant during lower TiO2 production period.
	WITH SAP	W/O SAP		
100-449	2000-2500	1400-1700	Negative production level	
450-800	1300-1700	1100-1600		
801-1000	1050-1250	850-1150		
1001-1100	1150-1200	1100-1150	Effective production level	
1101-1200	1150-1200	1150-1150		
1201-1300	1150-1200	1100-1150		
1301-1400	1150-1200	1150-1200		
1401-1500	1050-1150	1050-1150	Max plant utilization	
1501-1600	950-1000	950-1000		

ABBREVIATION

1. SAP - Sulfuric Acid Plant
 2. TDP - Titanium dioxide Plant
 3. NP - Neutralisation Plant
 4. TiO2 - Titanium Dioxide Pigment
 6. CALCINER - Production equipment using in TiO2 Plant
- Note: Prepared based on analysing the data from 2010-11 to 2020-2021 (last 10 year data)

Amir
 Amir
 FIROZ N
 MANAGER (Electrical)
 09-08-21

I-449				
Pro		Sp.C	Month	Avg per day unit
TiO2	Acid			
426	0	1673	Dec-12	22990
417	0	1474	Dec-14	19828
416	0	1376	Jan-15	18625
363	3317	1926	Feb-15	24969
446	1192	1498	Sep-15	22270
217	5005	2102	Jun-17	15204
307	4554	1980	Aug-17	19608
314	5853	2805	May-19	28412
182	0	1754	Apr-20	10641
343	6502	1547	Feb-21	18951
164	3165	3937	Mar-21	20828
226	6790	3176	Apr-21	23926
400	6694	2271	May-21	29303
407	6694	2180	Jun-21	29575
326	7179	2569	Jul-21	27016

MAX WITH SAP	446	7179	3937		29575
MIN WITH SAP	164	1192	1498		15204
AVERAGE WITH SAP	319	5159	2363		23642
MAX w/o SAP	426	0	1754		22990
MIN w/o SAP	182	0	1376		10641
AVERAGE w/o SAP	360	0	1569		17981

450-800				
Pro		Sp.C	Month	Avg per day unit
TiO2	Acid			
765	5130	1428	Oct-11	35239
725	5593	1723	Nov-11	41639
725	5593	1723	May-12	30086
544	2061	1270	May-13	23604
563	6149	2242	Aug-13	40718
548	5232	1697	Sep-13	30999
528	5574	1658	Oct-13	24072
541	4887	1572	May-14	20049
544	2061	1270	Jun-14	27780
544	2061	1270	Nov-14	21627
689	5174	1412	Aug-15	31383
732	5198	1270	Nov-15	30988
632	5014	1408	Jan-16	22607
715	5387	1409	Apr-16	33581
739	7617	1373	Oct-16	32731
564	5381	1360	Jul-17	24743
550	7721	1675	Apr-19	25208
578	7160	1807	Jun-19	34815
800	7160	1531	Oct-19	39510

MAX with SAP	800	7617	2242		41639
MIN with SAP	544	2061	1270		24743
AVG with SAP	664	5604	1565		33677
MAX w/o SAP	774	557	1580		30086
MIN w/o SAP	460	0	1138		23604
AVG w/o SAP	577	174	1353		25193

801-999				
Pro		Sp.C	Month	Avg per day unit
TiO2	Acid			
818	5094	1306	Sep-11	35610
857	5055	1214	Feb-12	35876
800	5473	1321	Mar-12	34090
863	3271	1462	Jun-12	42057
951	5933	1284	Nov-12	48703
936	4337	1304	Apr-13	40685
972	4199	1366	Jun-13	44258
899	6177	1344	Oct-13	38976
969	5991	1197	Nov-13	38663
971	5697	1248	Dec-13	39091
918	5168	1302	Jan-14	38556
856	4929	1336	Feb-14	40843
928	5263	1191	Sep-14	36842
959	4835	1209	Oct-14	37401
801	3796	1155	Dec-15	29844
931	3777	1097	Feb-16	35217
984	5520	1148	May-16	36440
855	5045	1194	Sep-16	34029
907	5317	1226	Nov-16	37066
911	4728	1124	Dec-16	33031
881	4377	1249	Feb-17	39299
938	3088	1126	May-17	34071
900	5698	1180	Sep-17	35400
901	6223	1182	Nov-17	35499
932	6297	1096	Dec-17	32951
922	6303	1282	Mar-18	38129
858	6977	1192	Apr-18	34091
972	7725	1075	Jun-18	34830
878	6997	1258	Aug-18	36734
851	3367	1167	Sep-18	33104
936	6250	1185	Oct-18	35779
887	7170	1150	Nov-18	37835
887	6381	1215	Feb-19	38489
947	3893	1221	Mar-19	37300
942	7212	1250	Jul-19	37984
900	7160	1240	Aug-19	36000
826	5729	1290	Sep-19	35518
951	3512	1186	Nov-19	37596
958	7160	1200	Mar-20	37084
918	7160	1322	Jun-20	40453
910	7160	1386	Jul-20	40099
976	6502	1283	Sep-20	42066
991	6502	1223	Nov-20	40400
900	6502	1210	Jan-21	35129

MAX with SAP	991	7725	1462		44258
MIN with SAP	800	3088	1075		29844
AVG with SAP	912	5572	1232		37162
MAX w/o SAP	918	871	1342		39741
MIN w/o SAP	888	737	951		30180
AVG w/o SAP	903	804	1147		34950

1000-1039					
Pro		Sp.C	Month		Avg per day unit
Pro	Acid				
1022	6765	1214	Oct-12		40023
1080	6057	1222	Jan-13		44315
1078	760	1087	Aug-13		37800
1058	5551	1165	Mar-15		37881
1004	5551	1159	Apr-15		38788
1019	352	1067	Jan-16		35223
1038	5548	1068	Jul-15		35761
1012	4333	1072	Oct-15		34996
1023	6025	1245	Mar-16		41085
1012	5502	1065	Jun-16		35926
1064	6027	1168	Jul-16		40089
1010	5017	1117	Jan-17		36393
1063	4395	1089	Oct-17		37342
1017	5551	1117	Jan-18		36645
1000	6730	1097	Jul-18		35387
1040	7052	1204	Jan-19		40392
1002	352	1201	Dec-19		38819
1003	7265	1260	Jan-20		40767
1003	6502	1240	Aug-20		40120
1038	6502	1268	Oct-20		42458
MAX with SAP	1080	7265	1272		44315
MIN with SAP	1000	4333	1065		34996
AVG with SAP	1027	5951	1163		38923
MAX w/o SAP	1078	760	1201		38819
MIN w/o SAP	1002	352	1037		35223
AVG w/o SAP	1025	556	1121		37274

1100-1199				
Pro		Sp.C	Month	Avg per day unit
TIO2	Acid			
1165	6027	1096	Apr-10	42561
1191	6672	1033	May-10	39687
1173	5589	1069	Feb-11	44783
1192	5589	1099	May-11	38852
1141	6165	1314	Dec-11	41585
1150	7749	1279	Jul-12	48364
1148	5601	1297	Aug-12	47447
1184	7834	1189	Sep-12	49632
1117	6426	1227	Jul-14	46926
1103	5962	1140	May-15	44212
1126	6170	1099	Aug-16	40562
1132	6209	1120	Mar-17	39919
1150	3339	1004	Apr-17	40898
1105	7071	1056	May-18	38487
1107	5854	1173	Feb-20	37641
				44776

MAX with SAP	1191	7834	1314		49632
MIN with SAP	1103	3339	1004		37641
AVG with SAP	1142	6191	1150		43278
MAX w/o SAP	1193	510	1099		41585
MIN w/o SAP	1173	0	977		38852
AVG w/o SAP	1183	255	1038		40218

1200-1299				
Pro		Sp.C	Month	Avg per day unit
TiO2	Acid			
1248	6735	1180	Jun-10	49088
1229	6705	1206	Nov-10	49406
1206	6997	1210	Jan-11	47073
1299	6922	1150	Jun-11	48189
1204	6873	1181	Aug-11	43869
1202	6259	1146	Feb-13	49196
1251	7032	1180	Mar-13	47619
1237	7163	1023	Jul-13	40821
1226	7616	1113	Dec-18	44017

MAX with SAP	1299	7616	1210		49406
MIN with SAP	1202	6259	1023		40821
AVG with SAP	1234	6922	1154		46809
MAX w/o SAP					
MIN w/o SAP					
AVG w/o SAP					

1300-1399				
Pro		Sp.C	Month	Avg per day unit
TiO2	Acid			
1349		1152	Dec-10	50131
1328	7313	1182	Jul-11	50635
1398	6496	1137	Jan-12	51275

MAX with SAP	1398	7313	1182		51275
MIN with SAP	1328	6496	1137		50635
AVG with SAP	1363	6905	1160		50955
MAX w/o SAP					
MIN w/o SAP					
AVG w/o SAP	1349	0	1152		50131

1400-1499				
Pro		Sp.C	Month	Avg per day unit
TiO2	Acid			
1401	7344	1095	Jul-10	49487
1463	7518	1061	Aug-10	50072
1406	6148	1061	Sep-10	48121
1416	6410	1100	Oct-10	50245
1408	6143	1087	Mar-14	49371

MAX with SAP	1463	7518	1100		50245
MIN with SAP	1401	6143	1061		48121
AVG with SAP	1419	6713	1081		49459

1500-1599				
Pro		Sp.C	Month	Avg per day unit
TiO2	Acid			
1501	3246	980	Mar-11	47450.97

MAX with SAP	1501	3246	980		47451
MIN with SAP	1501	3246	980		47451
AVG with SAP	1501	3246	980		47451

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Action Taken Report on para number 5.1 of the Comptroller and Auditor General's Report on Public Sector Undertakings for the year ended on 31st March, 2019.

Sl No.	Para number 5.1	Action Taken Report
1.	Compliance to the Government of Kerala guidelines for implementation of Enterprises Resources Planning initiatives by Public Sector Undertakings.	The ERP is implemented at KEL - Mamala Unit and the activities of Purchase, Production, Marketing and Finance departments are done through ERP. Proper Stock Management, Efficient Inventory Control, Costing of products, E - invoicing, GST compliance, Efficient procurement and purchase management, Integration across departments of marketing, Purchase, Stores, Design and production, Project costing and maintenance and more reports for data analysis are the advantages achieved by the Mamala unit of KEL by the implementation of ERP.

Majeena

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Appendix 7

Statement showing the status of implementation of ERP systems by selected PSUs

(Referred to in Paragraph 5.1)

Sl. No.	Name of the PSU	Scope of ERP	Name of Implementing Agency	Work order Date	Initial Budget	Actual Expenditure	Completion Date	Final Date of Completion
1	CASHEW CORP	Automation of Head Office and factories	Keltron	05/01/2011	35.00	17.50	31/08/2018	30/04/2011
2	FOMIL	Integration of functional departments.	Novasoft Consultancy Services Pvt. Ltd.	05/01/2012	10.24	8.20	28/02/2012	04/04/2012
3	WAREHOUSING CORP	Interconnecting warehouses, regional offices and zonal offices with head office.	C-DAC	09/02/2011	17.00	19.68	31/10/2019	09/02/2012
4	KEL	Automation of various functional departments.	Zeta Software Solutions Pvt. Ltd.	04/03/2017	4.90	2.94	16/06/2017	02/06/2017
5	HORTICORP	Automation of procurement, storage and sales/ distribution.	Fi-es Systems	15/10/2015	76.36	66.91	30/11/2019	16/02/2016
6	TCCL	Integrated software solution for materials marketing and finance functions.	Syon Solutions	28/07/2012	20.90	14.63	31/01/2015	23/02/2013
7	GOIR CORP	Development of integrated software solution.	Carol Solutions	10/12/2013	20.60	16.36	30/11/2019	08/06/2014
8	TTPL	Integrated office automation with MIS.	Syon Solutions	30/01/2010	21.00	18.47	31/10/2019	28/06/2011
Total					205.10	162.23		

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2025

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