

CHAPTER IV: DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

4.1 Infertuous expenditure of Rs.2.08 crore

Central Electro Chemical Research Institute failed to ensure availability of requisite infrastructure which resulted in non achievement of the objectives of a project for development of batteries with a cycle life of 350 charge-discharge cycles. This led to infertuous expenditure of Rs.2.08 crore.

Central Electro Chemical Research Institute (CECRI), Karaikudi, a constituent unit of Council of Scientific and Industrial Research (CSIR), submitted a project proposal of two years duration titled "Development of high energy lithium polymer batteries of 1 Ah¹ capacity with a cycle life of 350 for vehicular traction" to the Ministry of Non-Conventional Energy Sources, now Ministry of New and Renewable Energy (MNRE) in June 2000. The project aimed at development of 3.5 volt/1.0 ampere-hour lithium/ polymer electrolyte/lithium cobalt oxide batteries for traction application, with a cycle life of 350 charge-discharge cycles. The battery so developed was to be the stepping stone towards scaling up and assembly of a prototype battery unit for powering electric vehicles. Accordingly, CECRI sought Rs.1.25 crore from MNRE for this purpose. A notional contribution of Rs.1.23 crore was to be made by CECRI itself.

In June 2000, MNRE cautioned CECRI that there were major limitations of life cycle and self discharge of anode in the lithium battery system. MNRE requested CECRI to give due importance to this aspect by including it in the plan of work, and this was agreed to by CECRI. In September 2000, MNRE communicated Advisory Committee's approval for the project at a reduced outlay of Rs.90.80 lakh, by not providing for intellectual fee (Rs.7.00 lakh), overheads (Rs.13.00 lakh) and reducing funding under heads: consumable stores, travel and contingencies (Rs.14.00 lakh), and also imposed a condition that CECRI should deliver at least six lithium polymer cells at the end of the project. CECRI communicated its acceptance in October 2000 to pursue the project with the downsized budget of Rs.90.80 lakh.

The project commenced in November 2000. The initial sanctioned duration of two years was extended by one more year by MNRE and the project was completed in November 2003. Against the sanctioned amount of Rs.90.80 lakh by MNRE, CECRI incurred an expenditure of Rs.92.13 lakh towards the project, apart from its own notional expenditure of Rs.1.16 crore. Although

¹ Ampere hour

the project was completed in November 2003, CECRI could submit the final technical report only in July 2004. At the end of the project, CECRI could develop 3.5 v/1.0Ah lithium/polymer electrolyte/lithium cell with a cycle life of only 50 against the targeted cycle life of 350. It was indicated in the final report that the targeted cycle life of 350 could not be realised due to lack of facilities such as dry room and advanced welding facilities such as laser welding. CECRI also did not deliver six cells to MNRE as agreed to.

Further, an expert, who was appointed by MNRE, after examining the final report, commented that CECRI made no attempt to test the battery for vehicular traction application. He further commented that the quality of data of characterisation studies was poor and concluded that studies described in the project report were not up to the standards of international literature in the area of batteries and from the view point of application, no attempt was made to demonstrate any small device, at least glowing of a bulb, if not working of a cell phone or movement of a vehicle. He further added that the results were neither useful for publication in a reputed scientific journal nor for any application and the work described in the report was not commensurate with the magnitude of funds sanctioned for the project.

The expert comments indicated that CECRI failed to develop high energy lithium batteries of required capacity which could be further scaled up to the level of powering an electric vehicle, as envisaged in the project proposal. Thus, the entire expenditure of Rs.92.13 lakh from MNRE and Rs.1.16 crore from CECRI resources on the project became infructuous.

While conceding that the ultimate leak proof design for the cells and envisaged cycle life were not achieved, CECRI stated that it did not approach MNRE subsequently for additional funding, though it claimed in its reply that absence of required funding to procure the additional facilities like advanced welding and dry room had resulted in not bringing out leak proof design. CECRI further stated that cells were not delivered to MNRE considering safety reasons, since the cells fabricated were not leak proof. CECRI further claimed that the monitoring committee and the experts were satisfied with the final report and there was no adverse remark.

The reply is not acceptable since the expert offered adverse comments on the final report submitted by CECRI and retained his original comments on the nature and quality of work performed in the project, even after submission of clarification by CECRI. As regards absence of required funding, CECRI had agreed to pursue the project with the downsized budget. In fact, CECRI had slashed the budget for salaries and equipment head at the instance of MNRE for easier processing of proposal at MNRE and Director CECRI had agreed to bear expenses from CECRI funds. Moreover, the facilities like advanced welding and dry rooms were not included in the initial project proposal. The project would have cost Rs.2.41 crore by including additional facilities costing Rs.1.50 crore in the project proposal. Further, when the importance of

fabricating lithium cells inside the dry rooms was felt during the course of the project, no mid-term correction was made to overcome this impediment.

CSIR stated in November 2007 that the mid-term corrections with MNRE for setting up dry room facility and advanced welding facility could not be made as it was first phase of the project only and with the downsized funding amount, the project was completed successfully achieving almost all the objectives except that relating to achievement of 350 cycle life.

However, the fact remains that the failure of CECRI to provide for facilities like advanced welding and dry room initially coupled with failure to make mid-term correction as well, resulted in non-achievement of the objective of development of batteries with a cycle life of 350 charge-discharge cycles and infructuous expenditure of Rs.2.08 crore.

4.2 Blockage of funds

The Indian Institute of Chemical Biology, Kolkata failed to ask the supplier to replace the equipment despite its unsatisfactory performance within the warranty period. As a result, it was saddled with a defective equipment for which expenditure of Rs.98.88 lakh has already been incurred.

Indian Institute of Chemical Biology (IICB), Kolkata, a constituent unit of the Council of Scientific and Industrial Research (CSIR), placed an order on a foreign firm, M/s SEPIA tec GmbH, in December 2002 for procurement of an Automatic Chromatography² System costing Rs.1.15 crore for separation and purification of crude extract. As per the agreement entered with the supplier, 80 *per cent* payment was to be made against proof of dispatch of the equipment and the balance 20 *per cent* upon receipt of 10 *per cent* performance guarantee for a period of one year from the date of installation and commissioning of the equipment. The agreement also stipulated that the equipment would be warranted for one year from the date of acceptance by the purchaser and the supplier would give free service after the warranty period for one year.

IICB opened a Letter of Credit (LC) in February 2003 and received the equipment in August 2003 on payment of Rs.5.85 lakh towards customs duty. Bank also debited Rs.93.03 lakh in the same month towards 80 *per cent* cost of the equipment and other ancillary charges. The instrument was received in August 2003 but could not be installed immediately due to non-preparation of a room for installation, air conditioners and air compressor and was kept lying

² Chromatography is the collective term for a family of laboratory techniques for the separation of mixtures.

outside the main building. The necessary infrastructure could be arranged only in October 2003 and the equipment was installed in February 2004.

After installation, the equipment was operational upto 17 March 2004 and thereafter error was noticed in the functioning of the equipment. IICB informed the matter to the supplier in May 2004. The service engineer of the firm could not make the equipment fully functional despite repeated attempts to rectify the defects. As the equipment had not been made fully functional despite repeated attempts, IICB should have asked for its replacement. The representative of the supplier visited IICB in October 2005. It was agreed that a thorough diagnostic run/check up on the equipment be conducted and a comprehensive report be generated and sent to the supplier to rectify the equipment's malfunction. It was also agreed that after satisfactory installation and commissioning of the equipment, a performance bank guarantee equivalent to 10 *per cent* of the cost of equipment valid for six months would be furnished by the firm and IICB would release balance 20 *per cent* payment immediately. However, in October 2005, the firm insisted on receipt of balance payment as a pre condition to commissioning of the equipment.

Due to prolonged non-rectification of the defects of the equipment by the foreign supplier, CSIR, New Delhi instructed IICB in March 2006 to issue legal notice to the supplier but IICB did not do so. Rather, IICB instead of heading the advice of CSIR for issuing legal notices, proposed in November 2006 to take the help of sister laboratories of CSIR having similar equipment from the same firm to put pressure on the supplier to rectify the defects. The status of rectification of the defects was not intimated by IICB.

CSIR stated in December 2007 that the laboratory has initiated a legal action against the firm.

Thus, failure of IICB to ask the supplier to replace the equipment despite its unsatisfactory performance within the warranty period resulted in blockage of Rs.98.88 lakh besides non-utilisation of the equipment costing Rs.1.15 crore for more than three years.

4.3 Non-commercialisation of technology developed for monitoring of toxic gases

Failure of Central Institute of Mining and Fuel Research to conduct further studies on the shortcomings noticed in the system developed at a cost of Rs.33.24 lakh resulted in non-commercialisation of the system.

Central Institute of Mining and Fuel Research (CIMFR) Dhanbad (previously Central Mining Research Institute) proposed in September 1997 to undertake a project titled "Integrated monitoring and communication system for toxic and

combustible gases in mines, using ceramic based sensors” at an estimated cost of Rs.42.83 lakh in collaboration with the Central Glass Ceramics Research Institute (CGCRI), Kolkata for a period of three years. While Ministry of Coal (MoC) was to give Rs.13.25 lakh and Rs.13.55 lakh to CIMFR and CGCRI respectively, CIMFR and CGCRI were to contribute Rs.7.27 lakh and Rs.8.76 lakh respectively for the project. The main objective of the project was the development of reliable sensors for toxic gases³ and monitoring system in underground coal mines, thereby providing a greater degree of safety in mines. The project proposal envisaged that the sensors and monitoring systems would be required by small, medium and large scale mines and these were expected to fetch a turnover of Rs.60.23 crore in the next five years from sale/installation in about 415 mines.

While CIMFR was to develop the software and hardware for monitoring and communication system, CGCRI was responsible for fabricating the ceramic sensors along with their characterisation, testing, calibration and for conducting long term stability and reproducibility of the sensors. Finally, the system was to be installed by CIMFR for conducting field trial jointly with CGCRI.

Ministry of Coal designated Central Mine Planning and Design Institute Limited (CMPDIL), Ranchi as the nodal agency for implementation of the project. CIMFR and CGCRI started the work on the project in April 1998 and completed it after an extension in September 2002 and a delay of one year.

In the final report of the project submitted in September 2002, it was indicated that the complete system as well as the sensors performed successfully during the trial runs. However, the report proposed that for the system to be foolproof and functional in even the worst conditions, there was a need to develop a wireless data acquisition system as breakage of wires were inevitable in case of an accident in an underground mine. The report indicated that further studies to deal with the problem of sending data in underground mines due to large attenuation⁴ of RF waves in the coal strata was required and there was need for further studies to make the system versatile for detection of other gases such as oxygen, sulphur dioxide, nitrous oxide etc, in the underground mines. Despite identifying the above shortcomings, neither did CIMFR approach the funding agency with a proposal to address these shortcomings and to undertake further work in order to make the system ready and foolproof for commercialisation, nor was any effort made to do the work on their own. While CIMFR, in April 2007, did not comment on the fate of commercialisation of the system, CGCRI stated in May 2007 that negotiations were on with three private firms for transferring the technology, but no details were furnished. As such, the system could not be commercialised even after

³ Carbon Monoxide and Methane

⁴ Attenuation is the reduction in amplitude and intensity of a signal.

four years of the completion of the project despite an expenditure of Rs.10.63 lakh and Rs.22.61 lakh incurred by CIMFR and CGCRI respectively.

With regard to development of a system having the facility for wireless transmission of sensor data, CSIR stated in October 2007 that CIMFR was presently implementing two year project with funding from Ministry of Communications and Information Technology, which was scheduled to be completed in March 2009. The reply of CSIR suggests that the problem of wireless transmission of sensor data, which was expressed in September 2002, still remains to be resolved.

Thus, failure of CIMFR to address the shortcomings noticed in the system developed at a cost of Rs.33.24 lakh resulted in non-commercialisation of the system which was estimated to have a revenue earning potential of Rs.60.23 crore in five years.