

ANNEXURE TO THE DIRECTORS' REPORT

Particulars of Conservation of energy, Technology absorption and Foreign exchange earnings and outgo in terms of Section 217(1)(e) of the Companies Act, 1956 read with the Companies (Disclosure of particulars in the Report of Directors) Rules, 1988 forming part of the Directors' Report for the year ended March 31, 2014:

A. CONSERVATION OF ENERGY

The Company has always been conscious of the need for conservation of energy and has been sensitive in making progress towards this initiative. Various energy conservation measures have been taken at all the plants and offices of the Company to implement energy conservation projects like:

- ▶ Conversion of electrical heating into Natural Gas (NG) heating system of washing machines and tempering furnace, conversion of LPG heating into NG heating of Endogas generators, conversion of indirect heating into direct heating system for ovens in Paint Shop, reduction in surface heat loss, improvement in burning efficiency of burners by controlling the air - fuel ratio with the help of flue gas analysis, optimization of Paint shops oven as per production schedule.
- ▶ Installation of LED Tube lights, LED street lights, LED low bays fittings, LED bus bar indicators. Installation of energy savers in lighting circuits, switching OFF unwanted lights, installation of Star rated Air Conditioning systems, etc.
- ▶ Installation of Variable Frequency Drives for various applications like Blowers, Pumps and Air supply plants as a flow control strategy for energy conservation.
- ▶ Fresh Air blowers replaced by Man cooler fans, automation for Blower operation, use of motion sensors and timers for ON-Off control of lighting system, blowers and fans.
- ▶ Optimization of compressed air supply pressure, use of DC powered nut runners in place of Pneumatic nut runners, use of pressure control valves and Isolation valves in compressed air network, localized small compressors for low pressure requirement, migration of localized dryer system to centralized dryer system for dry compressed air supply.
- ▶ Modification in electrical logic for automatic switching On-Off operation of hydraulic motors, coolant pumps, blowers etc, optimization of AC plant operations, removal of unwanted AC systems.

- ▶ Wind Ventilators, downsizing of motors, trimming of impellers of oversized water recirculation pumps, Delta to Star connection of motors etc.

All these efforts have resulted in saving of electrical energy of ₹2.67 crores units, Fuel saving: Diesel - 39.7KL, LPG/Propane - 209MT and Natural Gas - 1.66 Lakh SCM. The whole effort resulted in cost savings of around ₹20.28 crores and annual Co₂e reduction 22,938 tCo₂e.

Company has taken new initiative for implementation of ISO: 50001 Energy Management System (EnMS) across all the Company's Plants in India. The Company's Pune, Jamshedpur, Lucknow, Pantnagar, Sanand and Dharwad Plants are certified for ISO: 50001 Energy Management System (EnMS) by M/s BVC.

Company's endeavor for maximizing use of wind energy (Green Power) has also made significant contributions.

- ▶ In addition to the Company's own 'captive wind power' projects of 21.95 MW capacity, further initiatives have been taken to purchase wind power from 'Third Party wind developers' through open access. For this, PPAs signed for purchase of additional wind power of ₹8.80 crores Wind units with five parties. With this, Company's CVBU Pimpri Plant's total Wind Power utilization for FY 2013-14 reached to ₹9.07 crores wind units (equivalent Co₂e Reduction of 84,931 tCo₂e), this resulted in net savings in electricity charges of ₹27.14 crores.
- ▶ Renewable Energy Certificate (REC): Company's 21.95MW Wind Power project is registered under REC scheme. Cumulative 32,544 RECs generated; out of which 18,931 RECs sold through auction, cumulative benefit of ₹2.72 crores.

Award / Recognition received during the year is as below,

- ▶ CVBU Pune Plant is honored with "Excellent Energy Efficient Unit Award" by CII-National award for Excellence in Energy Management - 2013, under Automobile Manufacturing category.

B. RESEARCH AND DEVELOPMENT

Specific areas in which R & D carried out by the Company

The Company's R&D is aligned towards developing and acquiring the technology, core competence and skill sets required for robust and timely delivery of the envisaged future product portfolio with leading product attributes across the range of commercial and passenger vehicles. For the passenger vehicle product range, the focus is on stunning

design, driving pleasure and connected car technologies and for the commercial vehicle product range the focus is to be the market leaders by enhancing fuel efficiency and minimizing total cost of ownership.

All the R&D activities that the Company is currently undertaking takes into account the current and likely future regulatory norms along with meeting and exceeding the prescribed and prevalent vehicle safety regulations. The company also continues its R&D efforts in developing vehicles which are powered by alternate fuels like CNG, LPG, Bio-diesel, electric traction and Hydrogen some of which was showcased at the Delhi Auto Expo in February 2014 as well.

Benefits derived as a result of the above R&D

The Company maintains requisite R&D facilities, core competence and skill sets enabling it for compliance of regulations and reducing product development time to meet market requirements. Increasing use of 'digital validation' techniques has enabled a reduction in the number of physical

prototypes required. All existing Company products and engines are compliant with the prevalent regulatory norms.

During the FY 2013-14, the Company filed 73 Patent Applications and 157 Design applications. In respect of applications filed in earlier years, 18 Patents were granted and 20 Designs were registered.

Future Plan of Action

The Company continues its effort on developing new products and technologies to meet growing customer expectations. The existing products will be refreshed at regular intervals to suit upcoming trends. In the long term, the Company is focusing on improving driving comfort, fuel efficiency, performance and design aesthetics. Company's R&D is also committed to minimize the environmental impact and carbon footprint of its products and manufacturing operations, with Greenhouse Gas (GHG) emissions in particular. The Company is uniquely placed to meet this commitment, with its comprehensive product line-up and indigenous manufacturing base.

Expenditure on R & D

(₹ in crores)

Expenditure incurred on research and development :	2013-14	2012-13
(a) Revenue Expenditure - charged to Statment of Profit and Loss	413.55	500.15
(b) Revenue Expenditure - capitalised	1,618.76	1,142.38
(c) Capital Expenditure	112.04	116.78
	2,144.35	1,759.31
Revenue from Operations	34,288.11	44,765.72
R&D cost as a % to Revenue from Operations	6.3%	3.9%

C. TECHNOLOGY ABSORPTION, ADAPTATION AND INNOVATION

Efforts made towards technology absorption, adaptation and innovation

The Company is putting continuous efforts in acquisition, development, assimilation and utilization of technological knowledge through its wide advance engineering project portfolio. The projects in the advance engineering portfolio are focused around the technologies and innovations which the Company might need in the years to come and the current thrust areas being automotive applications like light weighting, fuel efficiency improvement and Hybridization

with alternate fuel like CNG, LPG, Ethanol, bio-diesel, electric traction, Hydrogen etc. The Company is actively working on various hybrid and electric power trains for hybrid, electric and fuel cell electric vehicles for both commercial and passenger car applications and making good progress.

The Company took initiatives by various interventions at Powertrain and vehicle level to improve upon the performance, refinement, meeting and exceeding the current prevalent norms of emission, fuel economy and reduction in carbon footprint of the products launched recently as well as the future products and platforms. The Company continues to work on the already initiated new generation powertrain programmes which would meet the

stringent future domestic and international emission norms. As a longer term action, the Company has also started taking into cognizance the current CAFÉ (Corporate Average Fuel Economy) and what would the likely future regulations entail on the envisaged future product portfolio.

The Company is also currently focusing on bringing safer vehicles to the end customers and the vehicle occupants (both active and passive safety) than the norms currently prescribed for which extensive safety attribute target setting, Computer-Aided Engineering, Simulation and testing capabilities has been baked into plan for delivering the future products on the anvil.

The Company is progressing well in its innovative and constant endeavour to front load the future product development process with concurrent engineering, digital validations and upfront failure mode identification. All relevant development and testing facilities and infrastructure required to support the endeavour like state-of-the-art advanced design

studio, rapid proto-type development system, testing cycle simulators, advanced emission test laboratories are being put in place to support this migration of heavier digital product development model.

Benefits derived as a result of the above efforts

By careful selection of the advanced engineering and technology portfolio, the Company intends to capitalise and bookshelf the developed technology for incorporation into the future products for making them more exciting and more attractive to the end customers. Similarly the Company wishes to mitigate all future risks related to technology by timely having appropriate emerging technology on Powertrain, Safety, etc to meet and exceed all future emissions and vehicular safety norms. The Company is also in a stronger position today with front loading the digital product development and validation which has resulted in operational efficiency, better quality and shorter lead time to market.

Major technology absorption projects undertaken during the last year include:

Sr. No.	Technology For	Status
1	Development of Infotainment system	Development in Progress
2	Brushless DC Motor for Engine Cooling Module	Development in Progress
3	Development of Low Carbon Vehicle Technology Program	Development in Progress
4	Development of Electric Traction Motor technology	Implemented
5	Hydrogen recirculation blower system on Fuel cell-Battery-Hybrid Bus(4x2) family	Development in Progress
6	Battery Management System on Bus and Car Hybrids	Development in Progress
7	Development of a Hydra-mount for vibration reduction of vehicles at a particular frequency of resonance of an engine or a cab	Under Implementation
8	Development of CNG turbo technology for M& HCV	Implemented
9	Touch Screen Infotainment System with text messaging and navigation capabilities	Under Implementation
10	A 2-way Intake silencer and a surge tank for reduction of vehicle In-cab noise	Implemented
11	Dual fuel (Diesel + CNG) technology development on 4 cylinder medium duty engine	Development in Progress
12	Gasoline Turbo technology development for passenger car 1.2 L gasoline engine	Under implementation
13	Development of SCR + DPF system on passenger car diesel engine for compliance to advanced emission norms for export	Development in Progress
14	In-house development of a novel and bespoke armoured vehicle	Development in Progress
15	Development of Range Extender Electric Vehicle concept demonstrators based on Nano and Manza.	Development in Progress
16	Advanced Infotainment using wireless connectivity	Development in Progress

Major Technology imports include:

Sr. No.	Technology for	Year of Import	Status
1	Development of Fuel Cell Bus	2011-12	Development and testing in progress
2	Gas Injection technology for LCV, MCV & HCV engines	2009-10	Completed for NA Engines and Productionised
3	Stop - Start feature for various vehicle Platforms	2009-10	Completed
4	ESP (Electronic Stability Program) for Xenon Euro V Vehicle	2012-13	Completed
5	Average Fuel Economy Display for HCV and LCV platforms	2012-13	Implemented

D. FOREIGN EXCHANGE EARNINGS & OUTGO**Activities relating to exports**

The Company exported 49,922 vehicles during the year.

Export initiatives such as goods, products and services exported include:

- ▶ The Company executed large and prestigious order in Myanmar for the MoD and other large bus orders in the Middle East and procured a large defence vehicle order in Africa with MINUSMA.
- ▶ The Company debuted in markets Philippines and expanded its presence in Myanmar including new 3S facility.
- ▶ The Company participated in key motor shows and conclaves around the world such as the Johannesburg International Motor Show (JIMS), Indonesia International Motor Show (IIMS), Geneva International Motor Show, Algiers Motor Show, Manila Motor Show and the Africa Conclave.
- ▶ New products customized for key international customer segments were launched – including the Xenon RX, a lower cost variant in South Asia and the Xenon XT, a premium variant for South Africa.
- ▶ Ace Ex2 was launched in Sri Lanka, Bangladesh and Nepal. Prima was launched in Sri Lanka and South Africa. The Xenon was launched in Australia.
- ▶ Whilst Tata Sumo was the best-selling vehicle nameplate, Safari Storme witnessed a strong debut in Nepal. The Company is the 3rd largest Passenger Vehicle brand in Nepal in terms of market share.

Development of export markets

The Company continues to focus on introducing various products in existing markets as well entering new markets in ASEAN, Africa, Russia and Latin America.

Export Plans

The Company plans to focus on growing the export business aggressively in identified geographies by offering customer centric products and strong after sales support.

Foreign Exchange Earnings and Outgoings (₹ in crores)

Earning in foreign currency	6,941.73
Expenditure in foreign currency (including dividend remittance)	2,853.21

On behalf of the Board of Directors

CYRUS P MISTRY

Chairman

Mumbai, May 29, 2014