

 **EICHER** TRUCKS AND BUSES

5/2/2019

EICHER TRUCKS & BUSES, PITHAMPUR

**VE COMMERCIAL VEHICLES**  
A VOLVO GROUP AND EICHER MOTORS JOINT VENTURE

**VECV (A Volvo group & EICHER Motors joint venture) - VISION**

**THE NEXT GENERATION TRUCKS AND BUSES**

**GO PRO**



To be recognized as the industry leader driving modernization in commercial transportation in India and the developing world

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**VECV Business Areas**

**TRUCKS, BUSES AND ENGINES**



**Eicher Trucks and Buses**      **Bus Body and Application Manufacturing**

**Volvo Trucks**      **Engines**

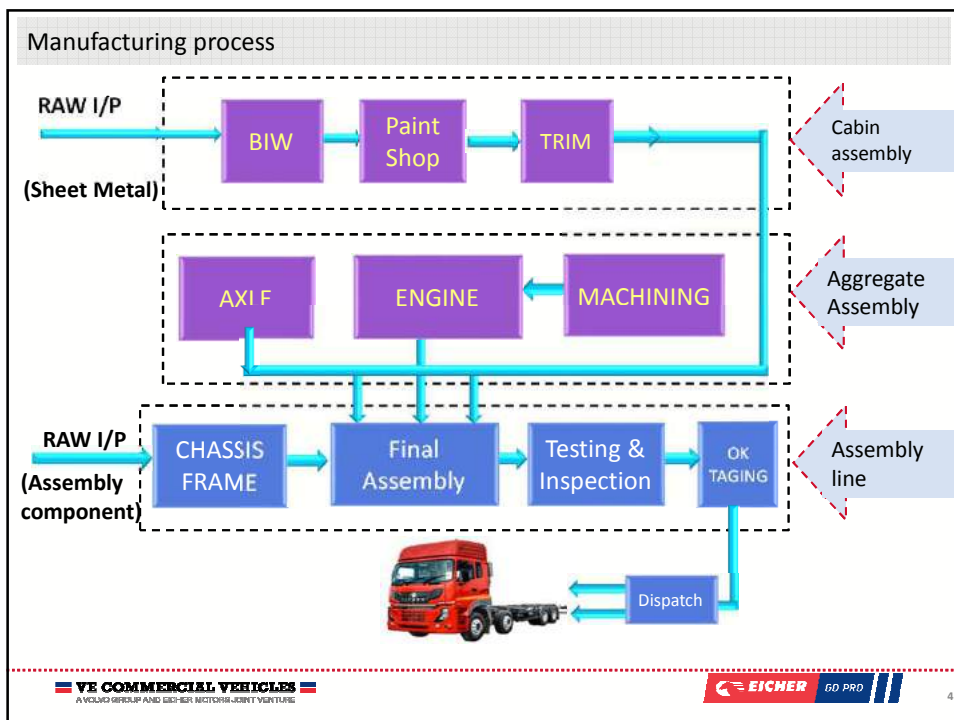
**EICHER ENGINEERING COMPONENTS**

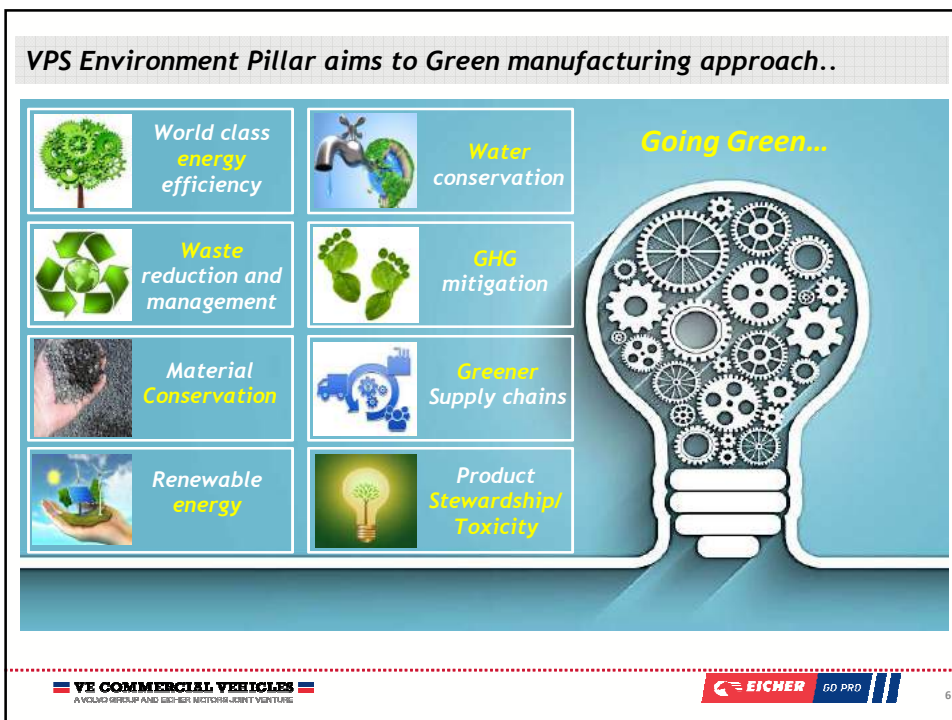
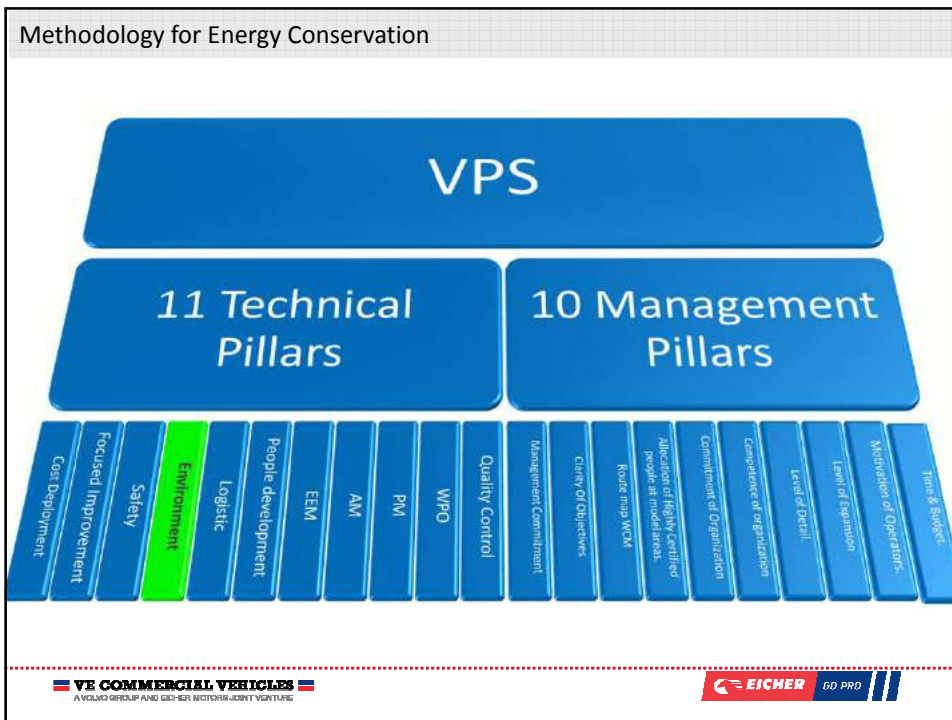


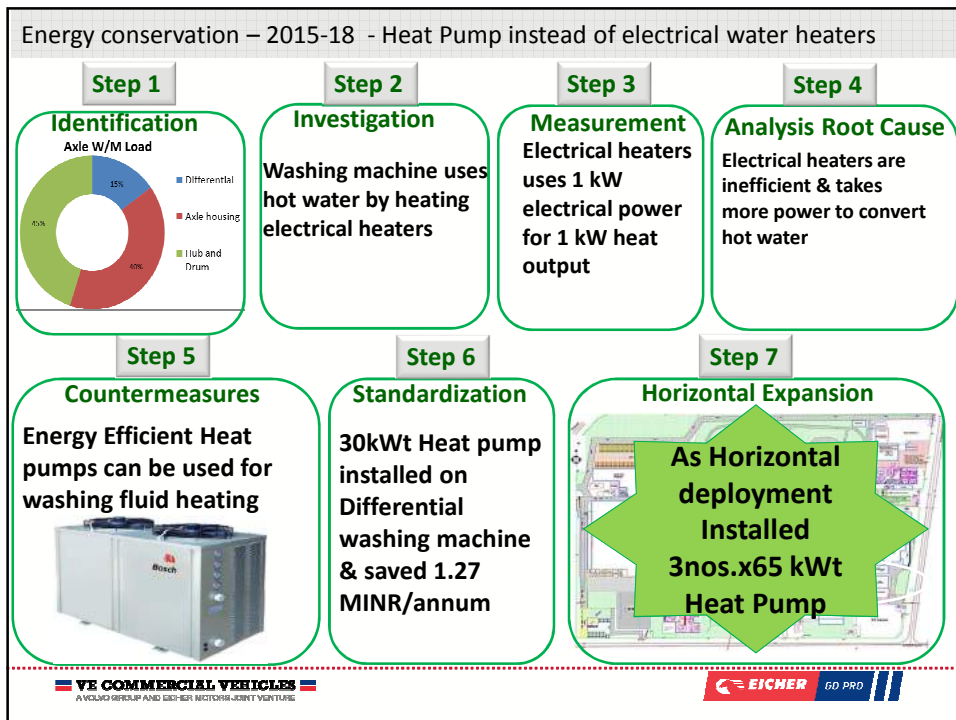
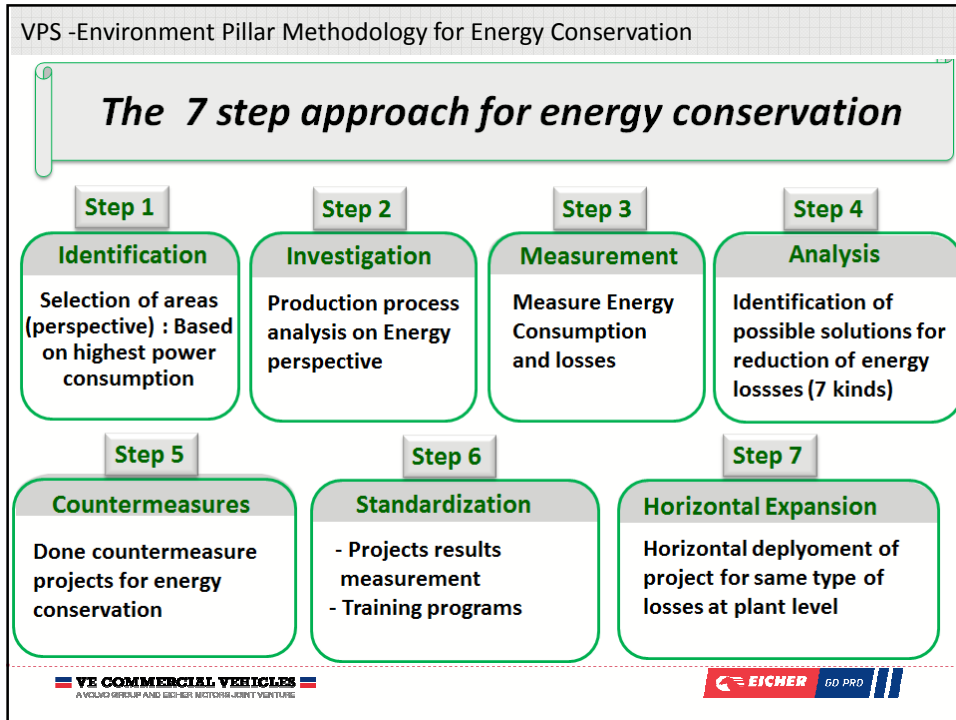
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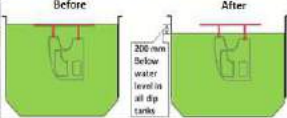
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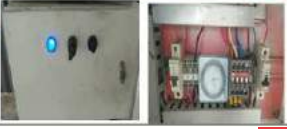








Energy Conservation Projects - Zero investment projects Highlights				
SN	Other Energy conservation projects	Annual Savings		
		MWh	MINR	
4	Operation of process pumps & fans linked with position of cabin into their zone.		159	1.11
5	Spot repair machine frequency optimized from 50Hz to 40Hz during non working time		17	1.21
6	ASU on/off controlled by a real time timer & shut off during non-working hours		206	1.44
7	All process dip tanks level reduce by 200 mm in depth & saved LNG as heat load reduced		88 mMBTU/annum	0.79 MINR/annum

Energy Conservation Projects - Zero investment projects Highlights				
SN	Other Energy conservation projects	Annual Savings		
		MWh	MINR	
5	Sealer oven circ. Fan frequency optimized from 50Hz to 25Hz during Post Purge Time.		1.08	0.008
2	Working area ASU fan frequency optimized at low frequency according temperature.		121	0.85
3	Top coat ASU & Exhaust Fan Frequency optimized from 50 HZ to 25 Hz at break time .		59	0.41
4	ASRS Lighting on/off controlled by a real time timer & shut off during Day Time.		42	0.3



### Innovation project 1: Hot water generation by Compressor waste heat

**Before – Compressor heat exhausted to Ambient**

**Compressor Energy Consumption**

Energy in compressed air 4%  
Other losses 4%  
Heat Rejected in air 20%  
Heat Rejected in oil 72%

Oil heat rejected to Ambient

Compressor screw uses oil to cool the screw & then ambient air used to cool the hot compressor oil, then heat exhausted to atm.

**After – Hot water by Compressor HRS**

**Schematic for HT heat recovery**

Hot oil from screw cooler  
Hot oil water at 70°C (pre-heat washing machine)  
30°C water  
Washing m/c side HE (Heat Transfer)  
Washing Machine  
30°C water  
Cooler oil water with C back to in compressor  
Hot water tank  
Hot water pump

The heat exhausted to ambient recovered by compressor heat recovery system & used to generate hot water

**Results**

Savings		Investment	Other savings
312840 Kwh/annum	2.19 MINR/annum	2.3 MINR	<ul style="list-style-type: none"> <li>➤ Reduction in hot air exhaust</li> <li>➤ Compressor cooling improves</li> </ul>

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### Innovation project 2 : High COP Heat Pump system instead of Electrical heaters

**Before – Electrical heaters**

Heating by Electrical heaters

Washing fluid heating by electrical heaters @ rear axle line

**After – Heat Pump**

Standby  
55-60°C Clean Tank  
Axle  
Housing Washing m/c  
55-60°C Dirty Tank  
Heat pump

Heating of washing fluid by high COP Heat Pump system


**Results**

Savings		Investment
757142 kWh/annum	5.3 MINR/annum	8.42 MINR

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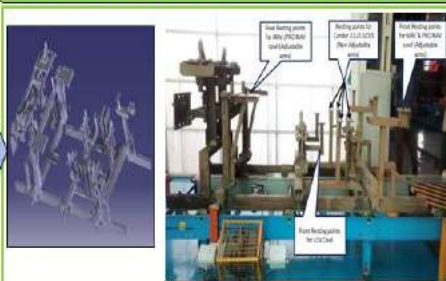
Innovation project 3 : Dip Skid Commonisation for PT-CED & Ro-Dip process

**Before – Different skid for diff. model**




**Old skid with adaptor plates, need to use adaptors for diff. cab model & takes fitment time**

**After – Common skid for diff. models**




**Common skid for 12 different models, eliminate the adaptor plates fitment times, & Saving of 3.5 min in each cycle**




Results		
Savings		Investment
89280 MWh/annum	10 MINR/annum	0.128 MINR
6048 mmBTU/annum		




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Energy Conservation Projects (2015-18)



EnCon. Project Description	Saving Potential/annum		Investment
	kWh	MINR	MINR
<p><b>Energy efficient heating</b> High COP Heat Pump on Axle washing machine eliminated electrical heating (225 kWt)</p>  <p style="font-size: small;">(Heat Pump Total : 4 nos.)</p>	<b>757142</b>	<b>5.3</b>	<b>8.42</b>
<p><b>Energy efficient helical pump for bore well</b> 11.2 kWh centrifugal pump replaced by Helical pump 3.7 kWh</p>  <p style="font-size: small;">Helical rotor</p>	<b>14285</b>	<b>0.1</b>	<b>0.1</b>
<p><b>Compressor operation automation to eliminate unloading hours</b></p>  <p style="font-size: small;">Automation to control unloading process</p>	<b>23077</b>	<b>1.8</b>	<b>0.35</b>

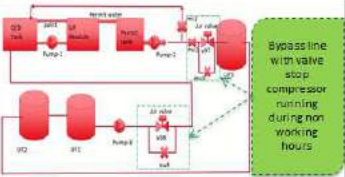
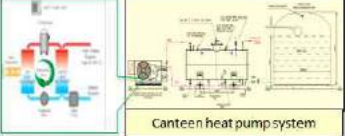
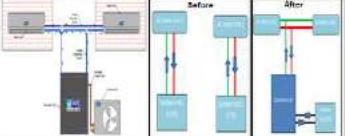




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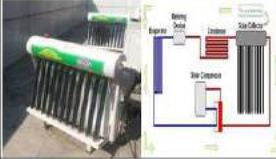

Energy Conservation Projects (2015-18)				
EnCon. Project Description		Saving Potential/annum		Investment
		kWh	MINR	MINR
<b>Variable Frequency Drives</b> : <i>All the motors above 5.5 KW are now operated through VFD</i>		660000	4.62	2.37
<b>LED lights</b> <i>3876 conventional lights replaced by energy efficient LED lights Phase 1 to 4 (2015-16 to 2017-18)</i>	 <p>Power reduction Per fixture :</p> <ul style="list-style-type: none"> <li>- 250W to 80W</li> <li>- 36W to 18W etc</li> </ul>	1197313	10.1	10.6

Energy Conservation Projects (2015-18)				
EnCon. Project Description		Saving Potential/annum		Investment
		kWh	MINR	MINR
<b>Modification in pneumatic valve actuation system</b> <i>At CED paint shop, compressor is now switched -off during non working hours</i>	 <p>Bypass line with valve stop compressor running during non working hours</p>	36285	0.254	0.036
<b>High COP heat pump eliminated electrical heating for dish washer at canteen</b>	 <p>Canteen heat pump system</p>	20000	0.14	0.3
<b>AC converter operates two air conditioners with one out door unit</b>	 <p>Before After</p>	1857	0.013	0.024









Energy Conservation Projects (2015-18)				
EnCon. Project Description		Saving Potential/annum		Investment
		kWh	MINR	MINR
<b>Day light harvesting</b> <i>210 nos. roof sheets are replaced by transparent poly carbonate sheets</i>		171429	1.2	1.17
<b>Solar hybrid AC</b> <i>Hybrid AC made of Solar collectors which superheats the refrigerant &amp; thereby reduce energy use</i>		9072	0.063	0.165
<b>Air cooler at CMS2 building</b> <i>Evaporative air cooler has high efficiency then Centralized cooling system (ASU)</i>	 Evaporative Air Cooler 10K CMH @1.1 kWh	485714+	3.4+	5+

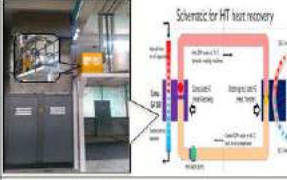

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Energy Conservation Projects (2015-18)				
EnCon. Project Description		Saving Potential/annum		Investment
		kWh	MINR	MINR
<b>Nano-fluid for compressor</b> <i>Use of POLYTRON MTC – Oil Additive into compressor to improve compressor efficiency</i>		27648	0.19	0.045
<b>Nano-fluid for chiller</b> <i>Improvement in heat transfer by use of Nano fluid (Hydromx) at Cab weld cooling system</i>		35714	0.25	0.51
<b>Variable Refrigerant flow A/C</b> <i>installed energy efficient VRF AC instead of DX AC unit at new ME office</i>		37706	0.26	1.5



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Energy Conservation Projects (2015-18)				
EnCon. Project Description	Saving Potential/annum		Investment	
	kWh	MINR	MINR	
<p><b>Compressor Heat Recovery system</b> <i>Successfully installed heat recovery system on compressor to generate hot water from exhaust hot air &amp; reuse at washing m/c</i></p> 	312840	2.19	2.3	
<p><b>Indoor nature switch for highbay lights</b> <i>Successfully trail taken of in-door lux sensor for gangway lights(24 nos.), Automatic switch on at low lux level &amp; Automatic switch off at required lux level</i></p>  <p style="text-align: center;">Light Control by Nature Switch</p>	2304	0.016	0.0165	



Energy Conservation Projects (2015-18)				
Other Process improvement projects	Saving Potential/annam		Investment	
<p><b>LT Room energy meter Installation</b> <i>Installed efficient &amp; common energy meter at main LT room for effective power monitoring</i></p> 	<p><i>It improves right data collection with same type of energy meter which is also compatible to automatically send data remotely</i></p>			
<p><b>LED lights installations in 2018-19 YTD total 275 nos.</b> <i>In all new projects installed LED overhead &amp; process Tube lights</i></p>  <p style="text-align: center;">LED light installed in plant also improves lux level</p>	248271	1.74	1.95	



Energy Conservation Projects (2015-18)				
EnCon. Project Description	Saving Potential/annam		Investment	
	LNG conservation by <i>Reuse of waste heat by heat pipe on ED &amp; Top coat Oven at CED Paint shop</i>		5799 mMBTU	5.04 MINR
Burner efficiency improvement by <i>streamlining LNG flow at CED Paint shop</i>	 LNG molecules gap increases after passes through flux maxiox device	929 mMBTU	0.7 MINR	0.45 MINR
Hot exhaust air for HWG <i>Compressor exhaust use on Hot water generator to preheat the suction air before combustion</i>		639.36 mMBTU	0.53 MINR	0.023 MINR



Energy Conservation Projects - Zero investment projects (2015-18)				
No	Title of Project	Year	Annual Electrical Saving (kWh)	Total Annual Savings (Rs million)
1	Robotic Paint booth- re-program VFD for blower & install VFD on pump.	2015- 16	66154	0.43
2	Manuel switching off( air cooler, lights, fans etc)	2015- 16	147692	0.96
3	Hydel Power purchase	2016- 17	1647226	3.85
4	Manual switching off( air cooler, lights, fans etc)	2016- 17	155714	1.09
5	Operation of process pumps & fans linked with position of cabin into their zone.	2017- 18	158571	1.11
6	Spot repair machine frequency optimized from 50Hz to 40Hz during non working time	2017- 18	172857	1.21

Energy Conservation Projects - Zero investment projects (2015-18)				
No	Title of Project	Year	Annual Electrical Saving (kWh)	Total Annual Savings (Rs million)
7	ASU on/off controlled by a real time timer & shut off during non-working hours	2017-18	205714	1.44
8	Work deck ASU speed control with temperature & humidity in Day/night. (Consider 4 hr. motors run in 50% frequency so 232+200 units will be saved)	2017-18	121429	0.85
9	Optimization of Top coat Booth ASU supply & Exhaust blowers running interlock with cabin sensing. ( 132 Kw -02 blowers will be saved at least 03 hr at low frequency)	2017-18	58571	0.41
10	Zero investment EnCon project - Thermal	2017-18	88 mMBTU	0.07
<b>Total Zero Investment Savings (MINR)</b>				<b>11.42</b>






List – Energy Conservation projects (2015 -18)				
SN	Title of Project	Annual Savings		Investment
		Kwh	MINR	MINR
1	Plant cooling tower (10 nos.) fan operation - control by temp. controller	143590	0.93	0.056
2	Replacement of conventional lights by energy efficient LED lights	147692	0.96	1.26
3	Automation in street lights	43446	0.28	0.035
4	EDC Utilities- Cooling tower pipe line modification & pumps interlocking	446154	2.90	0.14
5	Arrest compressed air leakages in plant	258462	1.68	0.12
6	VFD installed in 1000 cfm compressor	125538	0.82	0.025
7	Engine test Beds-Integration of exhaust blower with engine test cycle	25846	0.17	0.05
8	Automation in ADU ( air dryer units ) at shop floor	153231	1.00	0.14
9	VFD installed in 200 cfm compressor at Paint shop	27692	0.18	0.3






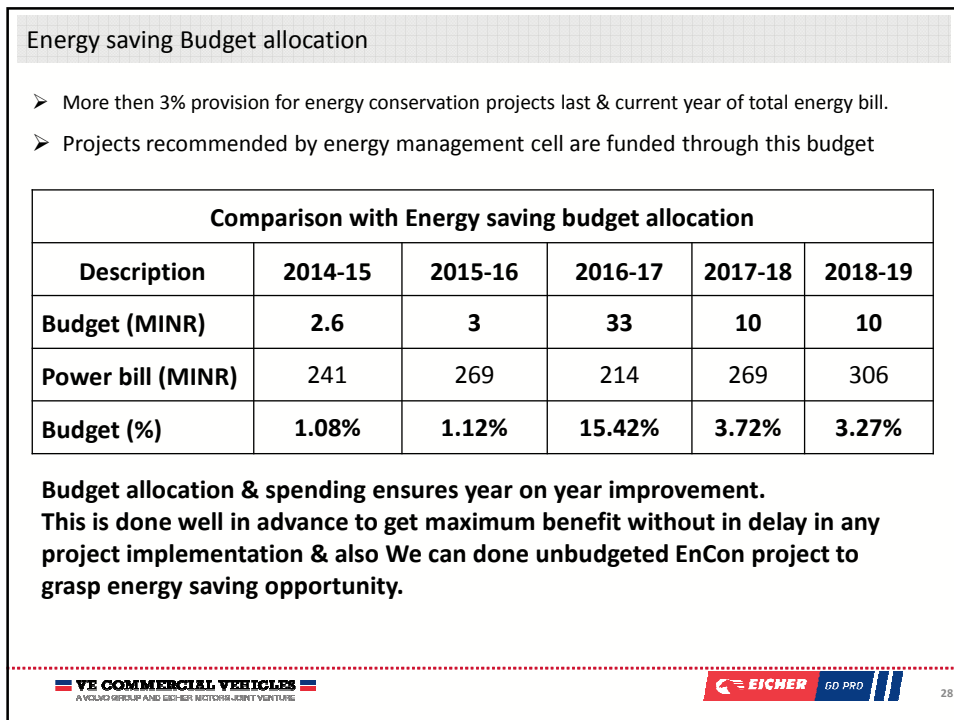
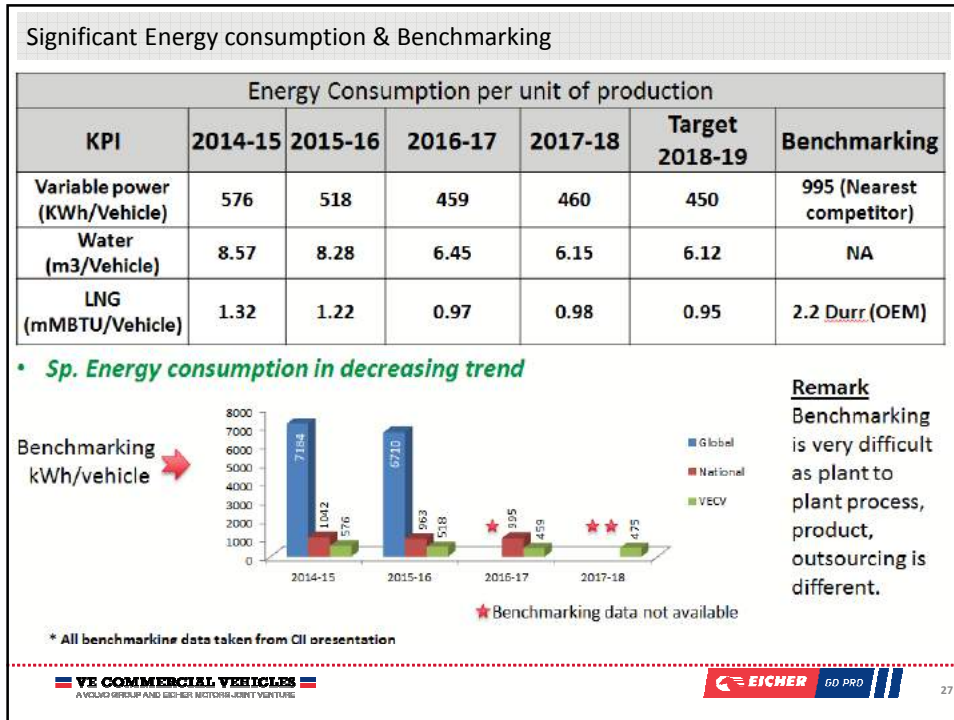


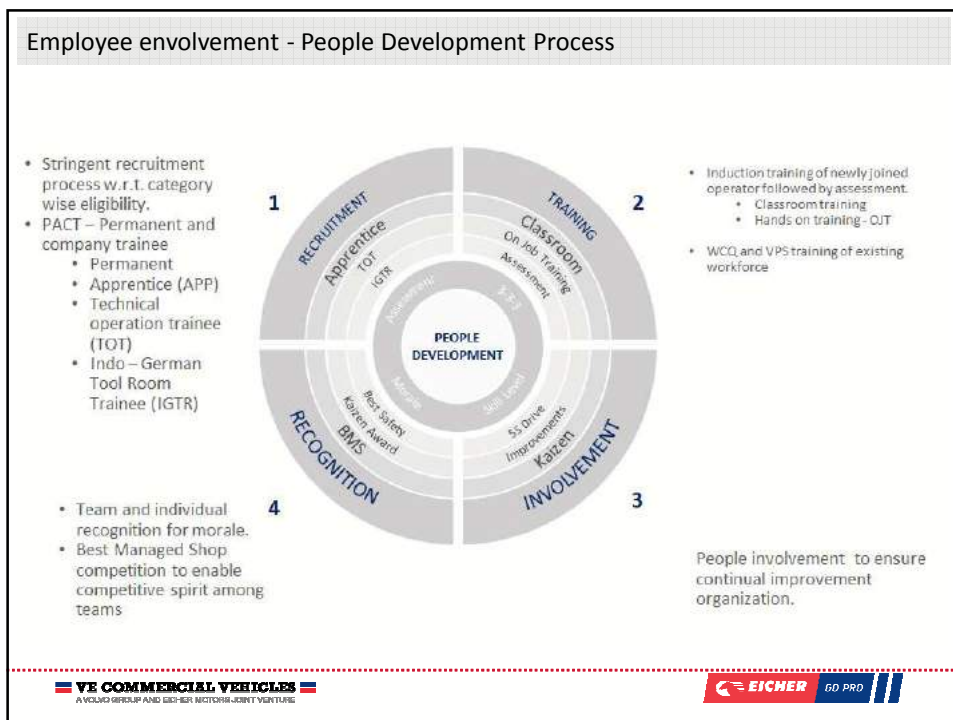
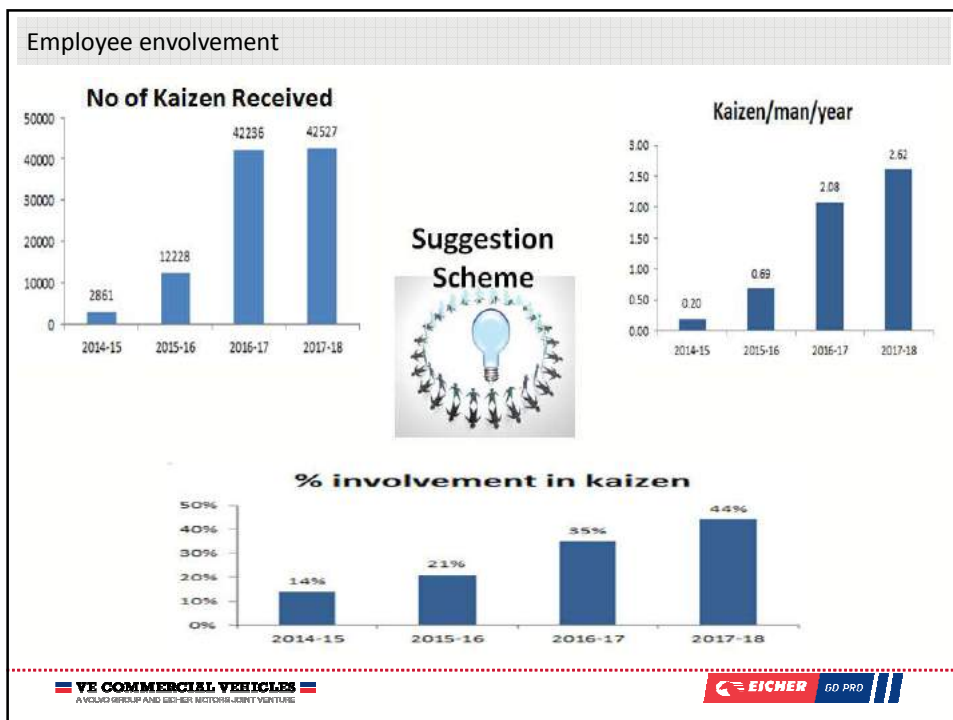
List – Energy Conservation projects (2015 -18)				
SN	Title of Project	Annual Savings		Investment
		Kwh	MINR	MINR
10	Machine shop Air Line <u>Seperation</u>	332308	2.16	0.25
11	Heat recovery system for ED oven in paint shop- LNG saving	0	2.16	2.4
12	Energy conservation by VFD installation on paint shop pumps & compressor	20769	1.62	0.48
13	HVAC booth pump replaced ( 0.75 kw to 0.37 KW,6 nos)	1538	0.12	0.03
14	Plant LED Light conversion Total 3184 nos. LED lights installed	582335	5.89	6.47
15	Energy conservation by VFD installation on plant pumps, compressor & blowers as horizontal implementation of energy savings	22106	1.72	1.12
16	Heat Pump in Axle line washing machine	15385	1.20	1.18
17	Compressor Automation	23077	1.80	0.35
18	AC convertor at Rlab Air conditioner	209	0.02	0.02

List – Energy Conservation projects (2015 -18)				
SN	Title of Project	Annual Savings		Investment
		Kwh	MINR	MINR
19	Helical Pump on <u>borewell</u> no. 06	1282	0.10	0.1
20	Heat recovery system for Top coat oven in paint shop- LNG saving	0	3.00	2.4
21	Energy conservation by VFD installation on paint shop pumps & compressor	231429	1.62	0.48
22	Energy efficient Air cooler at CMS2 building– 78 nos.	485714	3.40	5
23	Modification in pneumatic valve actuation system	36285	0.25	0.036
24	Heat Pump in Axle line washing machine phase-2	575714	1.69	3.35
25	Plant LED light conversion	467286	3.27	2.934
26	Flux <u>maxiox</u> system on Oven LNG pipeline	0	0.72	0.45
27	30 kVA Solar plant at CMS2	44902	0.31	1.5





### Awards & ISO Certifications



"National Energy management award 2017"



"GreenCo Bronze Rating"



CERTIFICATE  
ISO 50001



LEED Certification for VECV Headquarters @  
One of the top 50  
Manufacturing green buildings  
in India.



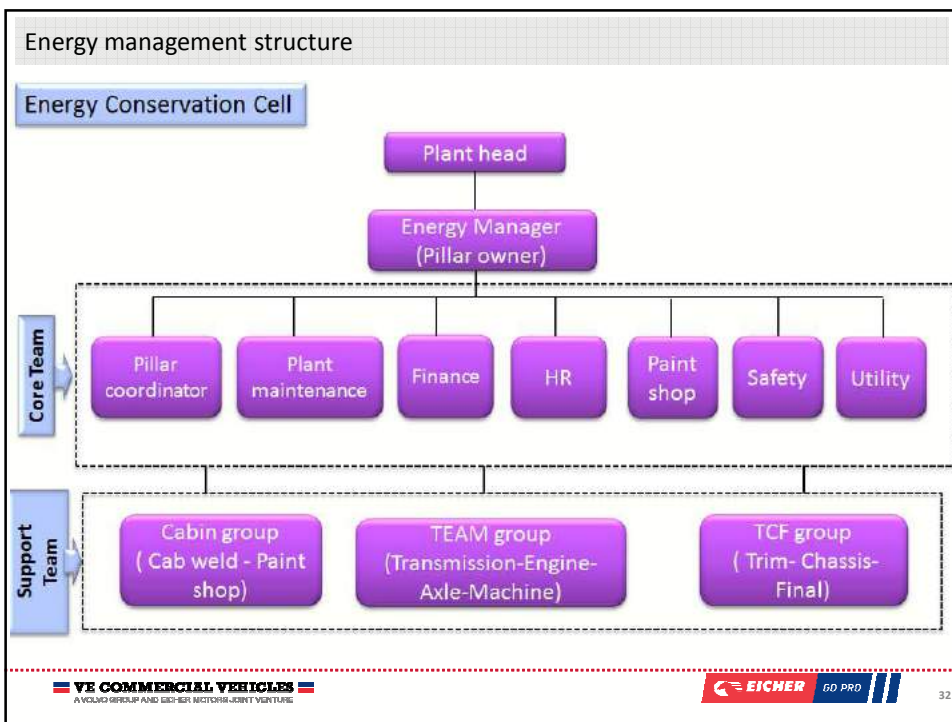
GREEN BUILDING AWARD



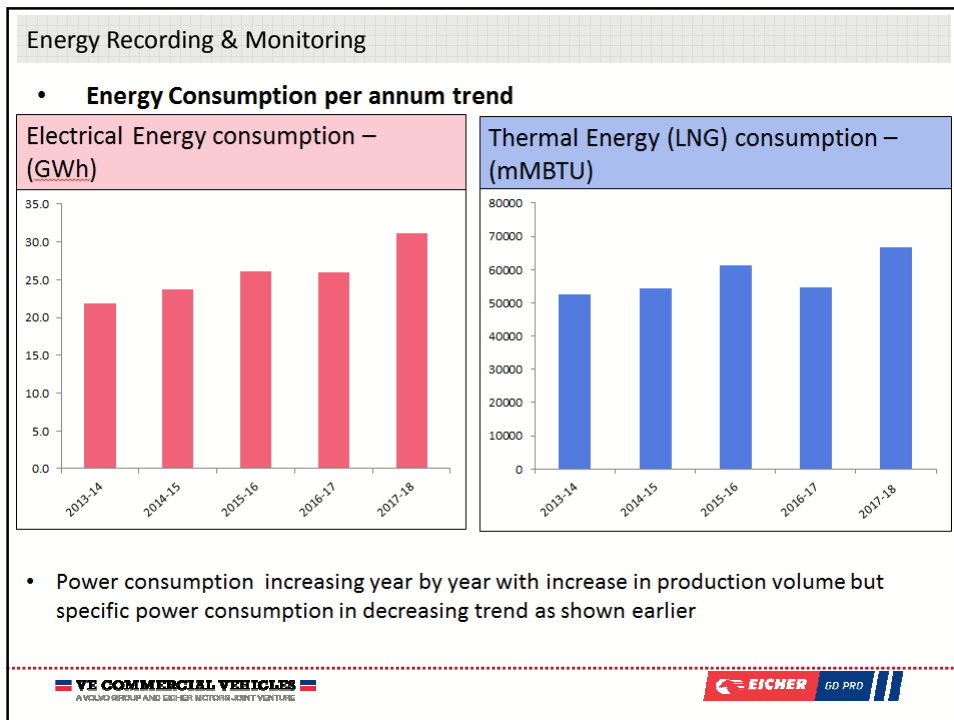
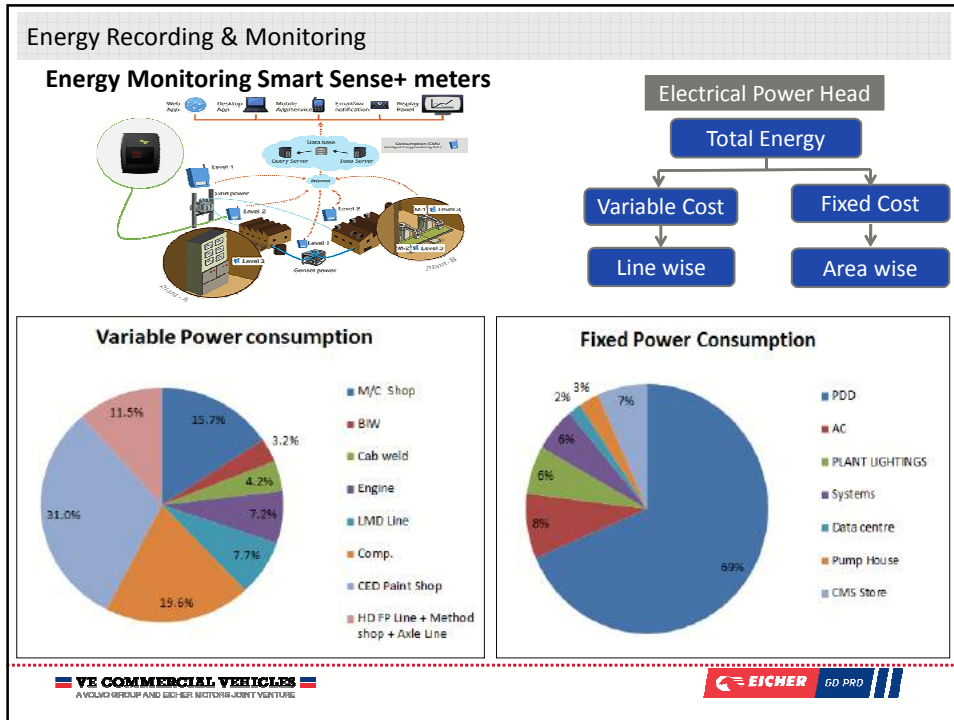
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### Renewable Power & percent share



**2014-15** | **2015-16**

29.58% | 38.48%


**2016-17** | **2017-18**

45% | 45%

**Option Evaluation**

- Bio Mass
- Mini Hydel
- Solar



**2013-14**


**2014-15 & 2015-16**

- Solar Power Purchase 17 GWh
- Rooftop solar 10 kWp
- Solar Pump 5 kWp
- Solar hybrid air conditioners

**2016-17 & 2017-18**

- Total Solar Power Purchase 27GWh
- Roof top solar 50 kWp new installation

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### Utilization of Waste as Energy source

Projects implemented to reduce hazardous waste generation

❖ Use of waste as Alternate Fuel/Raw Material

S N	Details of Project	Year	% of waste disposed as alternate fuel / raw material
1	Exhaust fumes of ED oven reused as fuel & preheat the oven fresh air	2015	Total 2485 mMBTU LNG as fuel saved & total 2.16 MINR cost savings achieved
2	Exhaust fumes of Top coat oven reused as fuel & preheat the oven fresh air	2016	Total 3314 mMBTU LNG as fuel saved & total 2.88 MINR cost savings achieved
3	Solvent recycling	2016	100% used solvent recycling
4	Food waste conversion in compost	2016	20% Food waste conversion into manure
5	M/C shop washing m/c filter paper Reuse Of Filter Press cloths	2017	100% filter clothes are reused for chips segregation.
6	Use of compressor waste heat as fuel to generate hot water for axle line	2017	Total 312840 Kwh electricity & Total 2.19 MINR cost savings per annum generated

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**Green supply chain**

As green supply chain energy conservation initiatives done at supplier end

**EEC- Dewas**

1. LED lights into expansion shed of plant
2. Air cooler to replace air conditioner in Gear grinding m/c
3. VFD at compressor
4. Energy on ventilation system
5. Installation of energy efficient VRF air conditioning system

**VEPDC - Pithampur**

1. Plant LED Lights conversion
2. Installation of energy efficient VRF air conditioning system
3. Air cooling of training room & rest area at place of air conditioning.

**Vehicle dispatch :**

1. Centralized Vehicle distribution center created from Pithampur to save transportation fuel & energy

**EEC - Thane**

1. Improvement in lighting system by LED lights conversion

**Other suppliers - Pithampur**

1. Improvement in lighting system by LED lights conversion of process & street lights

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**Water conservation**

**Water Consumption (kl)**

Year	Water Consumption (kl)
2013-14	288186
2014-15	353407
2015-16	417000
2016-17	365206
2017-18	403134

**SWC - Kl/vehicle**

Year	SWC - Kl/vehicle
2013-14	7.06
2014-15	8.57
2015-16	8.28
2016-17	6.45
2017-18	6.15






- Water consumption increasing year by year with increase in production volume but specific water consumption in decreasing trend



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**Way ahead : Electrical power savings 2935 MWh**

Way ahead	1 MW roof top solar power plant on Opex model		Saving Potential per annum : <b>1500 MWh (10 MINR )</b> Investment : 50 MINR
	Day lighting system for buildings		Day lighting system trial in progress, Light pipe installed & performance under observation
	Phase 5 Plant LED light conversion		Saving Potential per annum : <b>470576 kWh (3.294 MINR)</b> Investment : 3.29 MINR
	Heat pump at Guest house		Saving Potential per annum : <b>11428 kWh (0.083 MINR)</b> Investment : 0.5 MINR
	Airtron AC power saver		Saving Potential per annum : <b>86985 kWh (0.61 MINR)</b> Investment : 0.59 MINR



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**Way ahead : Electrical power savings 2935 MWh**

Way ahead	Control air system to control plant compressed air pressure		Saving Potential per annum : <b>240000 kWh (1.68 MINR )</b> Investment : 1.69 MINR
	RTPFC for real time power factor controlling		Saving Potential per annum : <b>316667 kWh (1.9 MINR )</b> Investment : 3.8 MINR
	Plant VFD conversion		Saving Potential per annum : <b>195429 kWh (1.4 MINR)</b> Investment : 2.05 MINR
	Use of POLYTRON MTC– Oil Additive into all compressor to improve compressor efficiency		Saving Potential per annum : <b>113288 kWh (0.793 MINR)</b> Investment : 0.645 MINR



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# Thank you



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