

## **SOUTH EAST CENTRAL RAILWAYS**

### **Bilaspur (Chhattisgarh)**

#### *Unit Profile*

South East Central Railway (SECR), one of the youngest zones of Indian Railways which came into existence on 1st April, 2003 with three divisions namely Bilaspur, Raipur and Nagpur with a vast network of 2488.629 Route Kilometers (RKM) and 4960.926 Track Kilometers (TKM) through the states of Chhattisgarh, Madhya Pradesh, Maharashtra and Odisha.

Indian Railway (IR) is one of the pioneering organization, focusing on energy conservation initiatives since yesteryears. The landmark decision in adoption of three phase energy efficient technology in electric locomotives and electrical multiple units, policy intervention in implementation of the energy efficiency measures in Traction and Non-Traction areas have scripted new dimensions in energy conservation efforts.



The main operational area of SEC Railway is in Central India which has abundance of mineral resources. This natural geographical position provides scopes & challenges for industrial growth not only in this region but also helps in far flung areas creating lot of direct & indirect job opportunities & employment generation. SECR has been a front-runner on the freight loading of coal, cement, steel, iron and other minerals to the power houses, cement, steel plants & incredibly plays an important role in the economic & industrial activities of nation.

Electrical energy requirement of SECR for the year 2014-15 was 1122.98 million units for Traction purpose, amounting to Rs. 705.11 Cr. & 98.66 million units for Non-Traction energy amounting to Rs. 69.75 Cr.

South East Central Railway has laid major thrust and gives utmost emphasis on energy conservation front, both in Traction as well as Non-Traction areas.

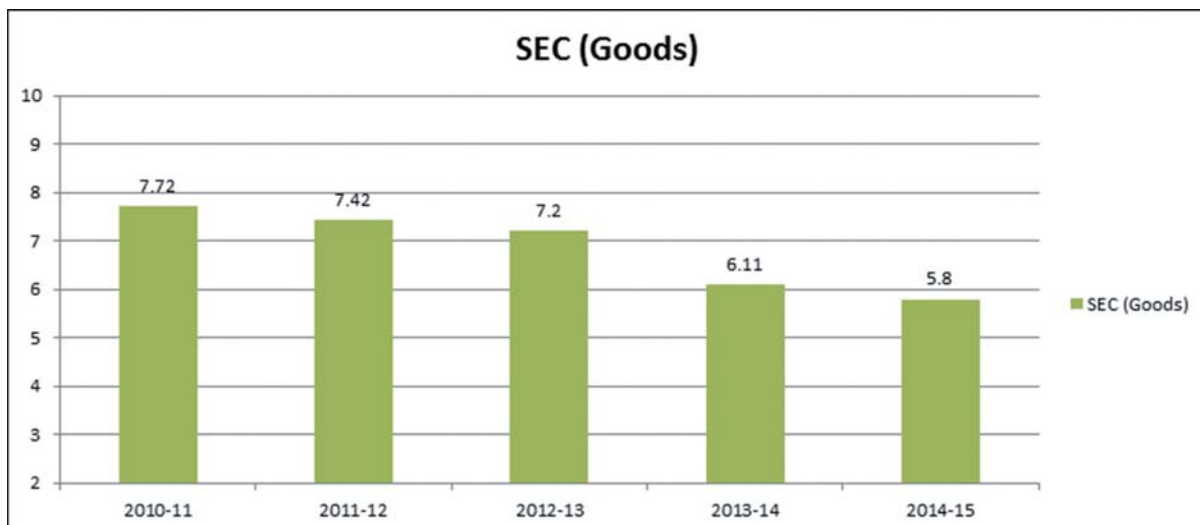
### Energy Conservation

Following major energy conservation initiatives have reduced the energy consumption.

#### (A) TRACTION

- On traction side, deployment of new generation energy efficient electric locomotives and electrical multiple units (EMUs) with 3 phase regenerated braking feature etc. have resulted into reduction in Specific Energy Consumption (SEC).

2010-11	2011-12	2012-13	2013-14	2014-15	% Imp w.r.t. 10-11	% Imp w.r.t. last year
7.72	7.42	7.20	6.11	5.80	24.87%	(+) 5.07



**Savings due to regenerative braking:**

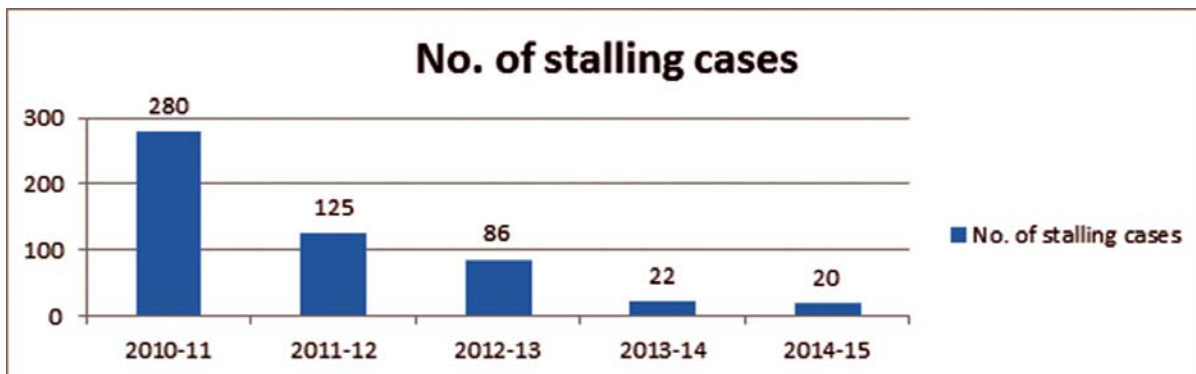
Year	Average Energy in kWh regenerated by loco per day		% of energy regenerated in term of total energy consumed for each loco	
	WAP-7	WAG-9H	WAP-7	WAG-9H
2010-11	NA	1020.00 kWh	-	11.65
2011-12	NA	1063.00 kWh	-	11.78
2012-13	855.63 kWh	1365.54 kWh	6.43	13.63
2013-14	936.79 kWh	1385.00 kWh	9.41	13.83
2014-15	931.75 kWh	1054.41 kWh	11.33	12.19

- South East Central Railway conducts vigorous training of loco pilots for the purpose of safe and smooth working of trains.
- In this effort the drivers are also trained on the loco simulator, to work in a controlled environment giving real life situation experience to them.
- Their skill of working of trains is evaluated using the loco simulator.
- One important aspect of this evaluation is the energy consumption by drivers during working of train.
- Drivers are counselled to work train in such a manner that they do maximum possible coasting, taking advantage of the down gradients while working a train on a down gradient.
- Ensuring good road learning so as to make best use of different gradients to effect maximum possible saving in Energy consumption.
- For resorting to maximum COASTING by guidance through Coasting Boards provided on line at specific locations.
- Microprocessor based Energy Meters are now provided in all Electric Locomotives to monitor the energy consumption.
- Benchmarking of energy consumption for various sections based on trials & monitoring Loco Pilot-wise energy consumption by downloading data from ESMONS are being done to improve the driver's skills and energy efficiency of locos.
- Switching OFF trailing loco in case of Multiple Units while working light load trains.
- Electric loco idling in sheds and yards are kept shutdown.

- Regular counselling of Loco Pilots is done for Switching 'OFF' blower in case yard detention is more than 15 minute.
- In SEC Railway reduction of stalling cases has been achieved up to 93% in last 5 tears. By improving loco pilot driving techniques, cases of stalling in heavily graded sections are reduced.

#### Reduction in stalling cases:

Loco	2010-11	2011-12	2012-13	2013-14	2014-15	% reduction over 2010-11	% reduction over last year
No. of stalling cases	280	125	86	22	20	93%	9.1%



- Provision of Additional Capacitor Bank in Traction Sub-stations, thereby earning incentives owing to improved power factor.
- Standby transformer at Traction Sub-stations are kept switched off to eliminate no load losses during summer season.
- Wheel-slip consumes wasteful energy. Therefore, sanders working in the locomotives are ensured.
- Earlier Arno converters - a mechanical device was used for conversion from single phase to three phase supply for Auxilliary motors, which had poor efficiency. This has now been replaced by energy efficient Static Converters - an electronic device.

#### (B) NON-TRACTION:

- Segregating of 70/30 lighting circuits at platforms.
- Use of CFL/LED fittings at corridors, staircase, toilets & bathrooms.
- Adoption of T-5 fluorescent tube lights in place of T-12 FTL fittings.
- Use of automatic power factor correction panels in HT/LT substations.
- Replacement of old 90 watt ceiling fans by 60 watt ceiling fans.
- Use of electronic fan regulator in place of conventional fan regulators.
- Provision of LED based station name board in place of neon sign board.
- Timer switch on high mast towers, yard lighting/street lighting.

- Use of electronic ballast in place of conventional ballast in FTL circuits and metal halide circuits.
- Automation of pumps.
- Use of energy efficient pumps in place of old inefficient pumps.
- Efficiency measurement of pumping installation and implementation of action plan.
- Use of energy saver for: (a) Pumps (b) Lighting circuits (c) Air conditioning circuits (d) machines in workshops.
- Use of occupancy sensors for light control in (a) Officer's chambers (b) Conference rooms (c) Waiting halls.
- Use of VVF control for cranes, lifts and escalators.
- Use of 3 star and above labeled electrical products and equipments.

### USE OF RENEWABLE SOLAR ENERGY:

Solar panels & solar water heaters have been installed at various locations like service buildings, LC gates, running rooms etc. as a measure for energy conservation through use of renewable energy resources.



- a. 3x10 KWp Grid connected Solar Panels have been commissioned at DRM Office Building rooftop (BSP-02; R-1).
- b. 1x10 KWp Solar Panel commissioned at Raipur Station for PRS building.
- c. Solar Panels commissioned at 08 Stations (R: 7; NGP: 1). Total Capacity: 6.444 KWp.
- d. Solar Panels commissioned at 91 LC Gates (BSP: 34; R: 9; NGP: 48). Total Capacity: 6.734 KWp.
- e. Solar Water Geysers commissioned - 50 Nos. (BSP: 11; R:13; NGP:26). Total Capacity: 54,200 LPD.



## HARNESSING OF SOLAR ENERGY BY UTILISING ROOF TOP SPACES OF RAILWAY STATIONS, OTHER RAILWAY BUILDINGS AND LAND:

Hon'ble MR in the budget speech for 2014-15 has proposed *"To harness solar energy by utilizing roof top spaces of Railway Stations & other Railway Buildings & land including through the PPP mode"*

Hon'ble Prime Minister has also desired that *"Railway use Solar Energy more aggressively and install them on roof of station buildings & other areas...."*

Installation of Solar Photovoltaic Power Plant at Bilaspur under RESCO model is planned in collaboration with CREDA (Chhattisgarh Renewable Energy Development Authority).

S No.	Div.	Name of Work
1	BSP	Installation of 25 KWp Solar Plant at Bhanwartonk Station in Bilaspur Division.
2	BSP	Provision of solar water heaters in 3 Running Rooms (BSP-2, BJRI-1) 2500 LPD capacity each.
3	BSP	Provision of 100 KWp Solar Plant at old GM Building rooftop at Bilaspur.
4	R	Installation of 40 KWp Grid connected Solar Plant at Raipur station.
5	BSP	Installation of 400 KWps Solar plant at new GM Building under PPP model.
6	BSP	Installation of Solar plants totaling 1 MWp, set as target for SECR.

### Identified Locations (1 MWp Capacity) in SECR for Harnessing of Solar Energy on roof top

SN.	Div	Name of building/location identified	Connected load (in KW)	Available rooftop space (in Sq.m.)	Proposed solar plant capacity in KWp
1	BSP	New GM building, Bilaspur	1015.94	4100	410
2		DRM complex, Bilaspur	250	2000	200
3		Central Hospital, Bilaspur	454.2	4500	450
4		Station building, Bilaspur	330	1615	160
5		MDTC, Bilaspur	42	620	60
6		Electric Loco Training School & Hostel, Uslapur	40	1298	130
7		Running room, Bilaspur	40	540	50
		<b>Total</b>	<b>2132</b>	<b>14133</b>	<b>1460</b>

## USE OF BIO GAS

Bio-gas plant of 35 cu.m. capacity commissioned in Electric Loco Training Centre /Uslapur resulting in saving of 15 commercial LPG cylinders per month amounting to Rs 3.89 Lacs per annum (approx.).



## USE OF BIO-DIESEL IN DIESEL TRACTION AS ALTERNATE FUEL OF HSD OIL

Construction for 30 TPD Bio Diesel plant based on latest state of the art technology is in progress at Raipur for supply of Bio Diesel to SECR.

Bio-Diesel manufacturing plant is based on algae, which is fast growing, high yielding and has no requirement of arable land. This second generation Bio Diesel plants can also use forest residue and farm residue as raw materials.



### Advantages of Bio-Diesel:

1. It is a renewable source of energy.
2. Environmental friendly with no sulphur content and low soot emission.
3. Ready replacement to Petrol/Diesel.
4. No modifications required in Diesel Engine.
5. It is easily mixable with diesel and hence can be used in mixture with petrol/diesel in certain proportion.
6. Best suited ones are non-edible tree based oils (Jatropha Curcus, Pungam, Neem, Mahua etc).
7. Used cooking oils can also be used for making Bio-Diesel, by re-using them is carcinogenic.
8. Animal fats wherever available can also be used for making Bio-Diesel.

### *Energy Policy*

- Creating awareness among all loco pilots and rolling stock staff on their specific roles in Conservation of Energy.
- To check wastage of energy by creating awareness among loco pilots, Railway staff & Rail users and strengthening Energy Conservation measures and distribution systems.
- To adopt energy efficient equipments and luminaries as per BEE standards.
- Maximizes use of renewable energy sources & natural lights wherever possible.
- To monitor energy consumption, fixing energy consumption targets to control demands.
- Form teams, under the management of energy group to give impetus to energy efficiencies and conservation.
- To carry out periodic energy audit to identify the areas for further improvement.