EVALUATION OF SUSTAINABLE DEVELOPMENT

AND

PERFORMANCE REPORT

AT

M/s. BHARAT DYNAMICS LIMITED
Hyderabad

SERVICE ORDER REF: SCO No 81400593 dt. 29-03-2013.

By

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ACKNOWLEDGEMENT

M/s BDL Management deserves to be congratulated and appreciate their efforts in implementing some of the *SUSTAINABLE DEVELOPMENT* plans in their units. These initiatives definitely help to improve the environment and reduces the emission of Green House Gases in to atmosphere.

COPES Acknowledges with thanks the following executives of M/s. BDL for their co-operation and effective co-ordination in completing the report:

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4) Mr. K Hari Singh, DGM (MOU)

5) Mr. Sekh Hakikullah, DGM (Civil - KBC)

6) Mr. D K Viswanath Reddy, Sr. Mgr. (Civil – BU)

7) Mr. E. Ramesh, Sr. Mgr.(IMM – TS)

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(1) ENERGY AUDIT AND ENERGY CONSERVATION

INTRODUCTION

Energy conservation is the need of the hour to save fossil fuels and also to protect the environment. Govt. of India under BEE (Bureau of energy efficiency) has formulated rules, regulation and guide lines for creating awareness, and also offers incentives to encourage industries, large consumers etc. for implementation.

Conserving energy is nothing but reducing energy wastage. Reducing energy consumption is one of the planets best and most important environmental sustainability. This provides renewable fossil fuels last longer, decreases dependence on oil imports, reduces local and global environmental damage.

There are number of ways to save energy and money in industry, such as co-generation, waste heat recovery from coal fired and other industrial boilers etc. Replacing or discarding energy in- efficient motors and other appliances. And incorporating many energy conserving equipment such as adjustable speed drives, automatic temp. Controllers, light intensity sensing devices, efficient light fixtures, and computer controlled energy management systems such as SCADA (Supervisory Control and Data Acquisition) and many more.

METHODOLOGY

M/s. BDL engaged an external expert agency to study their entire plant w.r.t. energy usage and submit an audit report where they can save / conserve energy to reduce their energy bills so that their specific energy cost to production value shall come down apart from other tangible benefits.

The audit agency had studied all their major electrical consuming shops / equipments viz., Illumination, heavy electrical motors, heat treatment furnaces, electroplating shop, water pumping system, air condition loads. Further, they studied their electricity bills, maximum demand utilization and power factor etc. which will influence the energy bill. They suggested energy conservation measures by

i) Operation/ maintenance improvements

ii) Short term low investment with immediate returns,

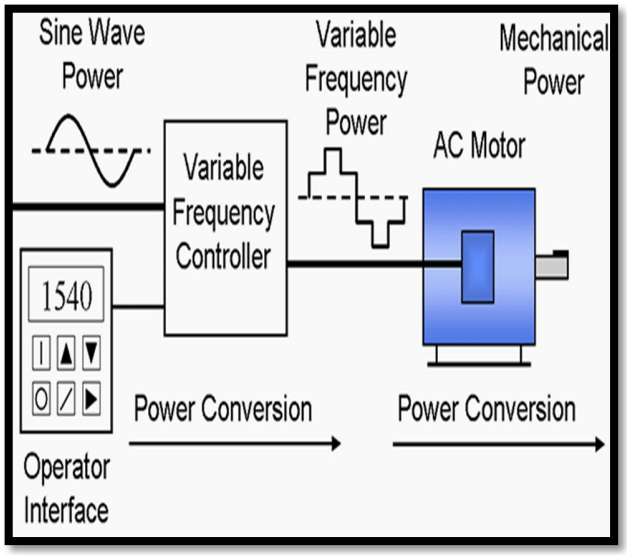
iii) Medium and High investment replacement with pay back periods.

They also indicated the energy conservation achievable in KWH and quantified in terms of Rupees.

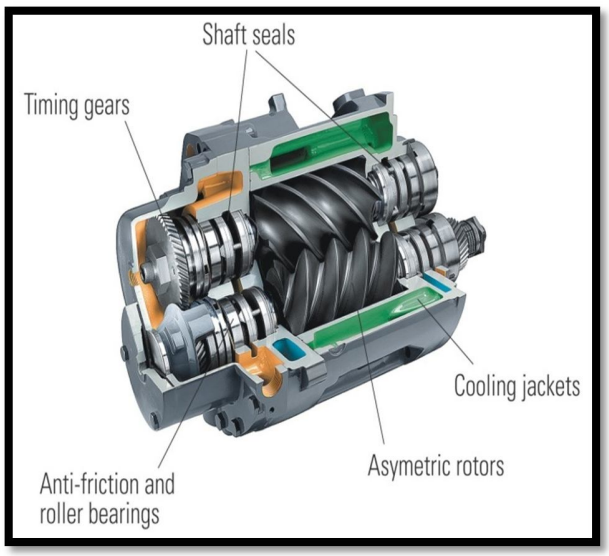
Out of the total recommendations by audit team, M/s BDL – Kanchanbagh had implemented 9 (NINE) recommendations (MoU targets 2012 – 13). These implementations have resulted in reduction in carbon emissions by 510.58 tones of CO2 emissions in to atmosphere, by sustainable development of various energy conservation methods.

Automatic Power factor Control panel (Typical)

Typical 70W MH Light



Typical VFD



Typical Screw Compressor

FINDINGS

Savings Recommendation	Brief Description	Annual KWh Savings Achieved	Equivalent CO_2 Emission Save in Kg
EA-1	Replace exiting 125W MVHP lamp with energy efficient 70W MH lamp unit	15,943	15,943
EA-2	Replace inefficient resistance fan regulators with energy efficient electronic stepped fan regulators	5,162	5,162
EA-3	Optimizing inlet air temperature for ELGI air compressor	3,300	3,300
EA-4	Arresting air leakages and removal of redundant compressor air pipes circuits	1,00,200	1,00,200
EA-5	Replace inefficient cooling tower with new energy efficient cooling tower at SS-II/CDO	14,880	14,880
EA-6	Replacement of existing inefficient compressor with energy efficient screw compressors SSV	36,000	36,000
EA-7	Installation of Ball cocks to avoid over flow of water from cooling towers	5,911	5,911
EA-8	Optimize and monitoring of PF substation wise to get maximum benefit to reduce KVAH billing	1,89,581	1,89,581
EA-9	Purging of condenser/Evaporator circuit with acid for improving performance by better heat transfer		0
	Kgs of *CO_2* gas emission save		**3,70,977**

[As per BEE, 1Kwh= 1Kg of CO_2 emission. The CO_2 emission factor for the sub bituminous coal is 1.816T- CO_2 / T of fuel.]

By implementing these Energy Conservation recommendations, M/s. BDL Kanchanbagh was able to save about up to 3.71 Lakhs of Electrical units annually an equivalent of CO_2 emissions savings up to 371 Tones per annum

(2) NON CONVENTIONAL ENERGY-SOLAR STREET LIGHTING

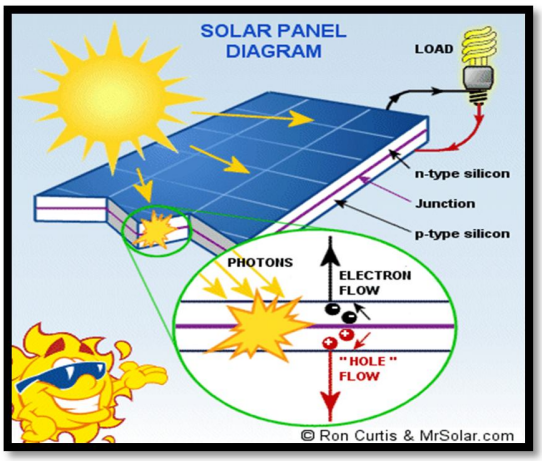
***INTRODUCTION*:**

Non – conventional or renewable energy is used to conserve the conventional fossil fuel. They are wind energy, solar energy, Tidal, Bio energy and Geo thermal energy etc. Solar and wind energy are most commonly used and brought to a stage of commercial viability. India is a tropical country, where sunshine is available for longer hours per day and in great intensity. Solar energy, therefore, has great potential as future energy source .Heavy subsidies are given by Govt. of India for adopting non-conventional / Renewable energy Schemes.

SOLAR TECHNOLOGY:

"There are two ways to generate electricity from light(solar radiation) energy. First converting it into electricity through direct conversion using photovoltaic devices and second by concentrating the incident light rays onto a small surface to produce heat and use that heat to drive a turbine which in turn drives a generator producing electricity .Solar PV technologies are limited up to decentralized energy generation and large scale grid connected power plants. However there is wide range of applications of thermal energy generated through solar namely cooking, water/space heating, desalination, process heating etc. up to high grade applications like steam generation for industrial processes to power generation using steam turbines. As solar energy is a dilute energy source hence large scale concentrating collectors are required for high temperature applications like power generation"

Typical Solar Light System:



METHODOLOGY:

In the direction to use renewable energy, M/s. BDL has procured and installed 25 no. of Solar based street lighting at their Vishakhapatnam facility. The specified and installed solar lighting has given below.

Sl. No	Item
1	Solar Photo Voltaic Panel 180Wp-12V
2	Maximum peak power tracker with 20A charge controller
3	36 W LED lights
4	Solar PV panel size 1200x600 mm

Solar street lights near Pylon and on 12mtrs Road at M/s. BDL, Vizag unit

Installation of the above is a welcoming and forward step by BDL towards establishing sustainability and reducing the emission of green house gases CO_2 by avoiding installation of conventional street lighting.

FINDINGS:

By installing solar based LED Street lighting the BDL has reduced annual CO_2 emissions by 10.074Tonnes equivalent

(3) SEWAGE AND WASTE WATER TREATMENT FOR NON - POTABLE USAGE

INTRODUCTION:

History reveals, civilization flourished on and along river beds. Water is an essential element to sustain the life. As centuries passed, mankind has constructed dams, barrages, anicuts etc. to utilize the water for irrigation, power generation, industries, and the various needs of bursting population. With this, the perennial rivers became thin canals with no sufficient water flow to meet ever growing demand in all the spheres. Further to exploiting and indiscriminate usage of water, the rivers, lakes, and water bodies are heavily polluted as the sewerage and untreated industrial waste waters are let in to streams. Not only water bodies, underground water is also being polluted.

To save this life saving scarce resource, it became highly essential, especially for industry to treat and re-cycle the sewerage and other waste water and use for non-potable uses such as gardening etc.,

"Wastewater", also known as 'Sewage," originates from household wastes, human and animal wastes, industrial wastewaters, strom runoff, and ground water infiltration .Wastewater, basically, is the flow of used water from a community .The nature of wastewater includes physical, chemical and biological characteristics which depend on the water usage in the community, the industrial and commercial contributions, weather, and infiltration/inflow .It is 99.94 percent water by weight (Water Pollution Control Federation 1980).The remaining 0.06 percent is material dissolved or suspended in the water. The dissolved and suspended solids in waste water contain organic & inorganic Materials. Organic matter may include carbohydrates, fats, oils, grease, surfactants, proteins, pesticides and agricultural chemicals, volatile organic compounds, and other toxic chemicals. Inorganic matter may cover heavy metals, nutrients (nitrogen and phosphorus), pH, alkalinity, chlorides, sulfur and other inorganic pollutants. Gases such as carbon dioxide, nitrogen, oxygen, hydrogen sulfide, and methane may be present in wastewater (Lee and Lin, 2000).Wastewaters are normally threated by a combination of physical-chemical and biological operations. However, it is possible to treat waste waters solely with physical-chemical methods (Droste,2004)"

METHODOLOGY

In this direction M/s. BDL – Kanchanbagh Unit has taken up setting up sewage and waste water treatment facility, and distribution system of re- cycled waste water for non potable uses.

M/s. BDL had set up 2.5 Lakhs liters capacity STP using MBR technology. The treated water is tested for normalcy with standard and then allowed for non-potable usage, especially for gardening & watering of vast area lawns spread over in BDL Campus. An extensive distribution

pipe network of about 1200 meters was laid around Admin & D & E buildings. This recycled water is being used for horticulture and plants covering an approximate area of 2.5 acres.

Typical STP & Recycling the Waste water

FINDINGS

They are able to utilize about 2.0 Lakhs liters of treated water per day and thus 67981 KWh of energy to pump this quantity and the resulted in saving 67.98 tonnesCO2 equivalent emission.

(4) PLANTATION OF TREES AT BDL UNITS.

INTRODUCTION

Destruction of forests creates numerous environmental catastrophes, including altering local rainfall patterns, accelerating soil erosion, causing the flooding of rivers, and threatening millions of species of plants, animals and insects with extinction.

The main causes of deforestation are: expansion of agricultural and industrial needs, population growth, poverty, consumer demand and landlessness.

Approximately 45% of India's land is degraded primarily due to deforestation, unsustainable agricultural practices, mining and excessive groundwater extraction. More than 2/3rds of this can be regenerated.

India has the 10th largest forest cover in the world at 68 million hectares. The government's National Action Plan on climate change involves expanding forest cover from the current 23% to 33% of India's territory, and to afforest 6 million hectares of degraded forest land.

India has rich biodiversity - more than 45,000 plant and 91,000 animal species. However there are rapid loss trends – 10% flora and fauna are on the threatened list and many are on the verge of extinction.

***METHODOLOGY*:**

In order to reverse the de-forestation trend and its ill effects, M/s. BDL has taken up steps for trees and avenue plantation in open areas of their Kanchanbagh and Bhanur Units under social forestry.

M/s. BDL has placed work order on contractor for preparation of tree pits with supply of good quality manure mix with Red earth and river sand *(all as per horticulture norms).* Planting of saplings and regular watering to ensure their growth.

1. At Kanchanbagh they have planted about 4000 teak tress at Bomb dump area

Typical Social Forestry (Teak Tree Plantation)

2. At Bhanur they have planted around 7000 avenue plants such as

   a) Peltopharm, b) Gulmohar, c) Mahongany, d) Alistoniacalaris,
   e) Cssica Javanica, f) Spathodia, g) Cassia Fistola
   .

Avenue Plantation at M/s BDL, Bhanur Unit

***FINDINGS*:**

By planting these trees M/s. BDL has increased the green cover in and around the Campus and helped in reduced green house gases like carbon dioxide

Also added benefits once these plants grow

a) Control of Dust in the environment

b) Reduction in ambient temperature

c) Improving soil quality

d) Controlling soil erosion due to rain water run off

e) Providing shade.

f) Recycling of more Carbon dioxide through plants.

(5) RAINWATER HARVESTING AT BDL BHANUR.

***INTRODUCTION*:**

Water is one of the most important elements on earth. Every living being needs water for its survival, without water plants, animals, microbes-everything will perish. Population growth – couples with industrialization and urbanization has resulted in an increasing demand for water thus leading to water crisis and serious consequences on the environment. The requirement of fresh water for industrial use will increase from 30 BCM (Billion Cubic Meters) to 120 BCM by 2025 AD. A rapid industrialization has lead to the industrial effluents and sewage, resulting in water pollution which leads to water crisis in India and all over the world. The effluent stream coming out of the industries is mainly comprised of hazardous chemicals and heavy metal ions such as chromium-nickel, copper, lead, arsenic etc.. Heavy metals are very toxic in nature and harmful to the environment.

RAIN WATER HARVESTING TO AUGMENT GROUND WATER RESOURCES

1 Rain water harvesting is the technique of collection and storage of rainwater at surface or in sub-surface aquifers, before it is lost as surface run-off.The augmented resource can be harvested in the time of need. Artificial recharge to ground water is a process by which the ground water reservoir is agumented at rate exceeding that under natural conditions of replenishment

2 NEED

a. To overcome the inadequacy of waters to meet our demands
b. To arrest decline in ground water levels
c. To enhance availability of ground water at specific place and time and utilize rain water for sustainable development
d. To increase infiltration of rainwater in the subsoil which has decreased drastically in urban areas due to paving of open area
e. To improve ground water quality by dilution.
f. To improve ecology of the area by increase in vegetation cover, etc..
g. To increase agricultural production

POTENTIAL BENEFITS OF RAINWATER HARVESTING

a. Cost of recharge to sub-surface reservoir is lower than surface reservoirs
b. The aquifer serves as distribution system also
c. No land is wasted for storage purpose and no population displacement is involved
d. Ground water is not directly exposed to evaporation and pollution
e. Storing water underground is environment friendly
f. It increases the productivity of aquifer
g. It reduces flood hazards
h. Effects rise in ground water levels
i. Mitigates the effects of drought
j. Reduces soil erosion

Methodology:

Under this initiative M/s. BDL ,Bhanur have created the following rain watering harvesting pits.

1. Near FMS building 12,00,000 ltrs capacity water harvesting pit

2. Opposite Fire station 1,00,000 ltrs capacity water harvesting pitr

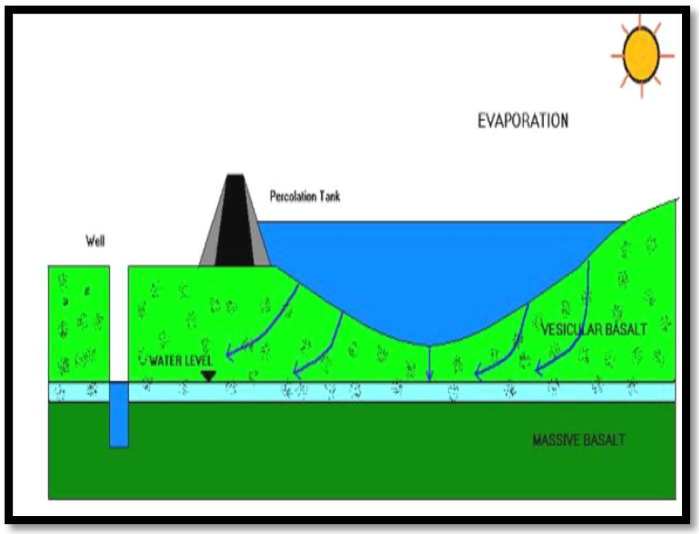
3. Above ground level water storage facility by construction of harvesting bund with spill way at the backside of officers hostel for 60 Lakhs ltrs.

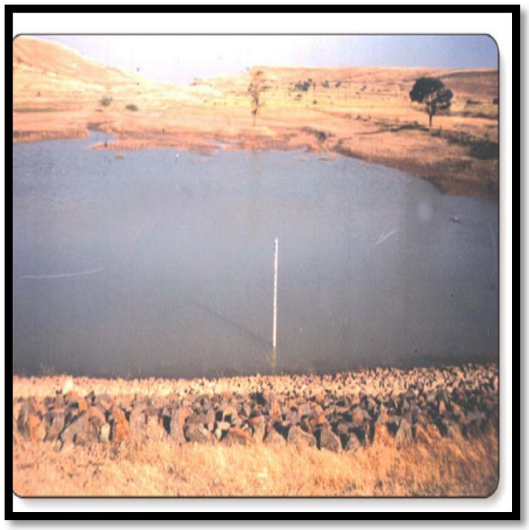
W

g

Pond & Bund at M/s. BDL Bhanur.

The harvesting pits are made by the side of natural nalas flowing through BDL. These nalas are fed by a catchment area of around 1000 acres which lies beyond BDL boundaries. These harvesting pits are located at higher elevation than BDL bore wells which are located in lower level.





Typical water harvesting bund ***Typical lagoon formation***

The terrain is deep black cotton soil. These harvesting pits look like natural ponds.

The excess water overflows this structure storing some water to serve as source of recharge. The silt content of stream water in due course is deposited in the interstices of the boulders in due course and with growth of vegetation, the bund becomes quite impermeable and helps in retaining surface water run off for sufficient time after rains to recharge the ground water body.

***FINDINGS*:**

The ground water table which used to be at 90 feet level during 1990's has dropped down to around 300 feet. Immediate impact of these harvesting structures, there is marked improvement at ground water table which rose to, at around 60 feet presently.

The rain water harvesting structures have directly influenced the water table levels and improved BDL daily water consumption from bore wells.