

**Shahajirao Bajirao Patil Vikas Pratisthan`s**

**S.B.PATIL POLYTECHNIC,VANGALI**

**SUBJECT: ENVIRONMENTAL STUDIES**

**Report On**

**Energy Conservation**

**SUBMITTED BY**

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**UNDER THE GUIDANCE OF**

Mrs.Patil R.B.

2019-20

**Part A-Plan**

**Micro-Project On**

**Energy Conservation**

**Brief Introduction:**

Energy conservation is the effort made to reduce the [consumption of energy](https://en.wikipedia.org/wiki/Energy_consumption) by using less of an energy service. This can be achieved either by [using energy more efficiently](https://en.wikipedia.org/wiki/Efficient_energy_use) (using less energy for a constant service) or by reducing the amount of service used (for example, by driving less). Energy conservation is a part of the concept of [eco-sufficiency](https://en.wikipedia.org/wiki/Eco-sufficiency). Energy conservation reduces the need for energy services and can result in increased [environmental](https://en.wikipedia.org/wiki/Natural_environment) quality, [national security](https://en.wikipedia.org/wiki/National_security), [personal financial security](https://en.wikipedia.org/wiki/Personal_security) and higher savings. It is at the top of the sustainable [energy hierarchy](https://en.wikipedia.org/wiki/Energy_hierarchy). It also lowers energy costs by preventing future [resource depletion](https://en.wikipedia.org/wiki/Resource_depletion).

Energy can be conserved by reducing wastage and losses, improving efficiency through technological upgrades and improved operation and maintenance. On a global level energy use can also be reduced by the stabilisation of [population growth](https://en.wikipedia.org/wiki/Population_growth) .Energy can only be [transformed](https://en.wikipedia.org/wiki/Energy_transformation) from one form to other, such as heat energy to motive power in cars, or [kinetic energy](https://en.wikipedia.org/wiki/Kinetic_energy) of water flow to electricity in [hydroelectric power](https://en.wikipedia.org/wiki/Hydroelectric_power) plants. However machines are required to transform energy from one form to other.

The wear and friction of the components of these machine while running cause loss of quadrillions of BTU and $500 billions in industries only in USA. It is possible to minimize these losses by adopting [green engineering](https://en.wikipedia.org/wiki/Green_engineering) practices to improve life cycle of the components.

Aim of the Micro-Project:

* To study the concept of Enviroment.
* To study the different types of pollutions.
* To study the concept of resolve of different types of pollution.

Action Plan:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sr. No. | Details of Activity | Planned Start Date | Planned End Date | Name of Responsible Team Members |
| 1 | Collect data from Different Sources (books/internet/etc.) | 16-2-19 | 20-2-19 | Gaurav Anarase |
| 2 | Analysis of the collected data & to generate useful information from it. | 20-2-19 | 23-2-19 | Rushikesh Chinchkar |
| 7 | Testing | 5-3-19 | 10-3-19 | Poonam Kolte |
| 8 | Prepare Report | 10-3-19 | 13-3-19 | Pooja Chavan |
| 9 | Presentation | 13-3-19 | 18-3-19 | All members |

Resources Required:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sr. No. | Name of Resource | Specifications | Quantity | Remarks |
| 1 | Hardware: Computer System | 320 GB HDD, 2 GB RAM | 1 |  |
| 2 | Operating System | Windows-Xp | 1 |  |
| 3 | Software | MS-Word | 1 |  |

**Part B (Outcomes after Execution)**

**Micro-Project on**

**Energy Conservation**

**Brief Description:**

Major Losses :-

1. Compressed air leakage(10% to 50%)
2. Water and steam leakage
3. Heat ingress in refrigeration and air-conditioned spaces. These have to be minimized

|  |  |  |  |
| --- | --- | --- | --- |
| Holdia. | Air Leakage | Kw Loss | Cost Of Loos/yr  8000 hrs.&@ Rs.5/kWh |
| 1/32 | 1.62CFM | 0.275 | 11,000 |
| 1/8 | 26CFM | 4.42 | 1,76,800 |
| ¼ | 104CFM | 17.68 | 7,07,200 |

Steam Leaks :Steam and condensate leaks cost industrial plants millions of dollars in lost energy, while increasing emissions, creating safety hazards, and lowering the reliability of plant operations. Steamleaks result in the loss of both latent and sensible energy.

|  |  |  |
| --- | --- | --- |
| HOLE DIA | 7 KG/CM2 | 20 KG/CM2 |
| 3MM | 22.5 KG/HR. | 59 KG/HR |
| 6 MM | 100 KG/HR | 225 KG/HR |

Steam Leakage prevention is most important.

Insulation of pipelines :



|  |  |  |
| --- | --- | --- |
| 150 MM PIPE AT 300 0C – AMBIENT 30 0C | HEAT LOSS KCAL/M/HR | REMARK |
| Bare | 3415 | With increasing thickness cost goes up but savings increase marginaly economic thickness of insulation can be studied. |
| 25 mm Insulation | 505 |
| 50 mm Insulation | 307 |
| 75 mm | 232 |
| 100 mm | 191 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Cost | Heat Value | Cost for 1000KCAL |
| Coal | Rs.2000/TON | 4000KCAL/KG. | 0.50 Rs. |
| Oil | Rs.40/KG | 10000KCAL/KG. | 4.00 Rs. |
| Gas | Rs.30/M3 | 9000KCAL/M3 | 3.33 RS. |
| Electricity | Rs.6/KWH | 860KCAL/KWH | 6.97Rs. |

Inter fuel subtitution :

Electricity is most expensive for heating.

Importance Of Running Cost Of Motors :

|  |  |  |
| --- | --- | --- |
| Motor Rating (kW) | 7.5 | 7.5 |
| Efficiency | 0.86 | 0.88 |
| Power Input (kW) | 8.72 | 8.52 |
| Running Hours/Year | 6000 | 6000 |
| kWh/Year | 52320 | 51120 |
| Rs/year (Rs.5/kWh) | 261600 | 255600 |
| Running Cost (10yr.) | 2616000 | 2556000 |
| First Cost | 20000 | 23000 |
| First Cost As % Of Running Cost | 0.8 | 0.8 |

Observations :

* Even a 7.5kw (10hp) motor consumes electricity worth Rs.26 lakhs in 10 yr.
* A small difference in efficiency (88%-86%) leads to saving of rs.5000/yr.
* Extra cost (Rs.3000) is recovered in 7 months.
* Running cost accounts for 99% of total life cycle cost.
* Give importance to running cost.

Oversized Motors :

* Oversize motors and pumps lead to following problems.
* High initial investment.
* High running cost due to low efficiency.
* High maximum demand due to poor power factor.
* High installation cost.
* High rewinding cost.
* Replace with proper size and high efficiency.

Light Levels :

|  |  |  |
| --- | --- | --- |
| General lighting | 20 TO 50 LUX | Outdoor stores yard,boiler house |
| Interior lighting | 50 TO 200 | Werrehouse,dining hills,lobby |
| Office lighting | 150 TO 250 | Office work, Reading work |
| Workshop assembly drawing | 300 TO 500 | Inspection Drawing facility |
| Task lighting | 500 and above | Visually difficult task |

Introduction :

* Compressed air is very insufficient and expensive utility.
* Only 10% to 15% input energy is available to do work. Rest is vested as heat.
* After distribution losses leakage actual work done by compressed air is 5% or so.
* 100 cfm at 7 bar(100LBS/INCH2) require 16 to 17 KW.

Energy Saving Apportunities :

* Alternative to compressed air
  + - Minimize compressed air leakage.
    - Regular compressor maintenance.
    - Proper type of air drier.
    - Minimize air pressure.

New Technologies :

* Air amplifier takes outside air uses small amount of compressed air
* VFDs are used for capacity control of reciprocating and screw compressors.
* 20% to 30% saving.

Refregeration Compressors :

* Reciprocating – up to 200tr
* Screw - 100 to 750tr
* Centrifugal - 200tr Or more
* 1TON of Refrigeration is removal of heat at a rate of 3023 kcal/hr or 12000 BTU/hr

Waste Heat Recovery :



* Recover heat from flue gas, engine cooling water, engine exhaust, low pressure waste steam, drying oven exhaust, boiler blowdown, etc.
* Recover heat from incinerator off-gas.
* Use waste heat for fuel oil heating, boiler feed-water heating, outside air heating, etc.
* Use chiller waste heat to preheat hot water.
* Use heat pumps.
* Use absorption refrigeration.
* Use thermal wheels, run-around systems, heat pipe systems, and air-to-air exchangers.

**Aim of Micro-Project:**

1. We were studied the concept of Enviroment.
2. We were studied the different types of Pollution.
3. To study the concept of resolve of different types of pollution.

**Course Outcomes Integrated:**

1. The ability to collect, record and analyse data.
2. knowledge of the human and scientific causes and consequences of environmental change

**Actual Procedure Followed:**

First Gaurav Anarase collects data from different resources books, internet and other reference books etc. Analysis of the collected data and to generate useful information from it, this work was done by Rushikesh Chinchkar. At the end prepared the report of micro-project Pooja Chavan .Testing the report Poonam Kolte. and prepared presentation by all the group members.

**Actual Resources Used:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sr. No. | Name of Resource | Specifications | Quantity | Remarks |
| 1 | Hardware: Computer system | 320 GB HDD, 2 GB RAM | 1 |  |
| 2 | Operating System | Linux | 1 |  |
| 3 | Software | VMWare | 1 |  |

**Skills Developed/Learning out of this Micro-project:**

1. knowledge of the human and scientific causes and consequences of environmental change.
2. the ability to collect, record and analyse data.
3. knowledge of international and development issues relating to global poverty, conflict, health economic and political transition, cultures, values, and technological change.
4. ability to work towards sustainable solutions.
5. the ability to carry out investigations in a responsible and safe manner.
6. working well within groups, either face to face or online, recognising and respecting the views of others.
7. analysing and planning tasks by using time effectively.