

## RECENT TRENDS IN ENERGY

Prof. L.B.Diwakar

### ABSTRACT:

In a situation where India tries to quicken its improvement process and adapt to expanding vitality requests, preservation and vitality productivity measures are to assume a focal part in our fundamentally diminish the requirement for crisp interest in vitality supply frameworks in coming years. It is basic that hard and fast endeavors are made to understand this potential. Vitality preservation is a target to which all the national in the nation can contribute. Whether a family or a production line, a little shop or a vast business assembling, an agriculturist or an office laborer, each client and maker of vitality can and should attempt for his own advantage, too vitality arrangement. A national development for vitality preservation can as that of the country.

India has made fast walks towards monetary independence in the course of the most recent couple of years. Noteworthy advancement has been made in the fields of industry, farming, correspondence, transport and different areas requiring developing utilization of vitality for formative and monetary exercises. In the event that India is to accomplish the focused on development in GDP, it would require proportionate data of vitality, basically business vitality as coal, oil, gas and power. Be that as it may, India's fossil fuel stores are constrained. The known stores of oil and common gas might last scarcely for 18 and 26 years

individually at the present stores to creation proportion. India has gigantic demonstrated coal holds (84 billion tons), which might keep going for around 200 years yet the expanding fiery debris content in Indian Coal and in addition related nursery gas outflows are the significant concern.



### KEYWORDS:

Energy conservation, Waste Management, Integrated energy, combined cycle.

### INTRODUCTION:

In a circumstance where India tries to enliven its change process and adjust to growing essentialness solicitations, safeguarding and imperativeness efficiency measures are to accept a central part in our on a very basic level lessen the prerequisite for fresh enthusiasm for essentialness supply systems in coming years. It is essential that firm attempts are made to comprehend this potential. Imperativeness conservation is an objective to which all the national in the country can contribute. Whether a family or a creation line, a little shop or a tremendous business collecting, an agriculturist or an office worker, every customer and producer of essentialness can and ought to endeavor for his own particular leeway, too imperativeness game plan. A national advancement for imperativeness safeguarding can as that of the nation.

India has made quick strolls towards money related autonomy over the span of the latest couple

of years. Imperative progression has been made in the fields of industry, cultivating, correspondence, transport and distinctive regions requiring creating use of imperativeness for developmental and financial activities. If India is to perform the concentrated on advancement in GDP, it would require proportionate information of imperativeness, fundamentally business essentialness as coal, oil, gas and power. In any case, India's fossil fuel stores are compelled. The known stores of oil and basic gas may last hardly for 18 and 26 years separately at the present stores to creation extent. India has colossal exhibited coal holds (84 billion tons), which may continue going for around 200 years yet the growing red hot flotsam and jetsam content in Indian Coal and moreover related nursery gas surges are the critical concern.

**Table 1.4** Sector-wise energy consumption

Sector	Percentage power consumption
Industry	41%
Transport	9.5%
Domestic	47.3%
Others	3.2%

### ENERGY DEMAND AND SUPPLY

On the vitality request and supply side, India is confronting extreme deficiencies. 70% of the aggregate petroleum item request is being met by imports, forcing a substantial weight on outside trade. Nation is additionally confronting Peak power and normal vitality deficiencies of 12% and 7% individually. To give energy to all , extra limit of 100,000 MW would be required by 2012, requiring around Rs. 8000 billion speculation. Further, the per capita vitality utilization in India is too low when contrasted with created nations, which is only 4% of USA and 20% of the world normal. The per capita utilization is focused to develop to around 1000 kWh every year by 2012 , along these lines forcing additional interest on force framework.

### IMPORTANCE OF ENERGY CONSERVATION

On the essentialness demand and supply side, India is going up against great inadequacies. 70% of the total petroleum thing solicitation is being

met by imports, constraining a significant weight on outside exchange. Country is moreover going up against Peak force and typical imperativeness insufficiencies of 12% and 7% independently. To offer vitality to all , additional farthest point of 100,000 MW would be required by 2012, requiring around Rs.8000 billion hypothesis. Further, the per capita imperativeness use in India is too low when stood out from made countries, which is just 4% of USA and 20% of the world ordinary. The per capita use is engaged to create to around 1000 kWh consistently by 2012 , thusly driving extra enthusiasm on power structure.

**Need for energy conservation in India**

The expanding interest for force has prompted impressive fossil powers smoldering which has thus adversely affected environment. In this setting, effective utilization of vitality and its protection is of principal significance. It has been assessed that about 25,000 MW can be spared by actualizing end-use vitality effectiveness and interest side administration apportions through India. Effective utilization of vitality and its protection expect considerably more noteworthy significance in perspective of the way that one unit of vitality spared at the utilization level diminishes the requirement for new limit creation by 2.5 times to 3 times. Further, such sparing through productive utilization of vitality can be accomplished at under one-fifth the expense of new limit creation. Vitality productivity would, in this way, fundamentally supplement our endeavors to meet force necessity, aside from lessening fossil fuel utilization.

The financial improvement of a nation is regularly firmly connected to its utilization of vitality. Despite the fact that India positions 6th on the planet to the extent all out vitality utilization is concerned, regardless it needs a great deal more vitality to keep pace with its advancement destinations. India's anticipated financial development rate is slated at 7.4per penny amid the period 1997-2012. This would require similar development in the prerequisite of business vitality, the vast majority of which is relied upon to be from fossil fills and power.

India's demonstrated coal stores might keep going for over 200 years, yet the constrained known



oil and common gas stores might last just 18 years to 26 years, which is a reason for concern. The proceeded with pattern of expanding offer of petroleum fills in the utilization of business vitality will undoubtedly prompt more reliance on imports and vitality unreliability. India's vitality power per unit of GDP is higher when contrasted with Japan, U.S.A. furthermore, Asia by 3.7 times, 1.55 times and 1.47 times individually. This shows wasteful utilization of vitality additionally considerable degree for vitality investment funds. The expanding worldwide exchange liberalization and developing worldwide rivalry have made efficiency change, including vitality cost lessening, an imperative benchmark for monetary achievement. Consequently, an outlook change in our way to deal with vitality arrangement issues is required – a movement from a supply ruled one to a coordinated methodology. This coordinated methodology would need to consolidate a legal blend of interest in the supply side limit, operational proficiency upgrades of existing force creating stations, decrease of misfortunes in transmission and circulation, end-use effectiveness and renewable advances. The arrangement objectives and ideas would need to be moved from "vitality preservation" to "vitality productivity", and from "vitality inputs" to the "adequacy of vitality use" and "vitality administrations". Making of new power era limit is immoderate and requires long incubation period though vitality productivity exercises can make accessible extra power at similarly low ventures inside of a brief time fram.

### **Need of Energy Conservation in Maharashtra:**

Vitality protection maintains a strategic distance from inefficient utilization of vitality without much venture. It can be termed as another wellspring of vitality, which when accessible, can be promptly utilized with no further misfortune or incubation period. It is the least expensive wellspring of vitality. Truth be told, it is the most effortless answer for cross over any barrier in the middle of interest and supply. Some different reasons are:

1. Increasing vitality request in India is a channel of

the national economy. Also, it is a central point ruining the intensity of essential Indian businesses in the worldwide business sector. Along these lines, vitality protection is similarly essential for the country and modern firms.

2. Electrical force is one of the rare assets in our nation. Era of power is exceptionally capital serious. 1 MW of force era costs around Rs. 4 crore in light of the low plant load component and high transmission misfortunes predominant in the nation. The introduced limit of force station must be along these lines, 2.2 times the electrical burden.

3. Energy sparing accomplished through vitality productivity and preservation additionally maintains a strategic distance from capital interest in fuel, mining, transport, water and land required for force plant, accordingly alleviating ecological contamination.

At present, there is a hole of 2,500 MW in the middle of interest and supply of the power in the State of Maharashtra. To introduce 2,500 MW limit, the prerequisite of capital is of the request of around Rs. 10,000 crore. Gestation period for setting up new power activities is of the request of roughly 4 years to 5 years. Consequently, the vitality protection measures give least expensive approach to connect the interest and supply crevice with least capital venture. It additionally enhances the plant load component of producing stations which decreases the expense of power.

Maharashtra is one of India's driving modern states. It has around 29,562 businesses of which around 10,000 HT commercial ventures are set up inside of it. Likewise, Maharashtra is the biggest maker of power in the nation. Consequently, there is an immense potential for vitality sparing in all areas which is close around 3,000 MW.

It implies lessening in vitality utilization yet without making any penance of value or amount of generation. As such expanding the creation from a given measure of vitality data by lessening misfortunes/wastages and augmenting the productivity. Some venture is to be made so as to execute vitality preservation measures, however this speculation is little contrasted with that in producing

the identical measure of vitality that is spared through protection. As a famous slogan, Energy spared is Energy Generated. Truth be told the vitality is spared at the client end which incorporates sparing of transmission/transportation misfortunes likewise separated from usable vitality.

### Various aspects of energy conservation

Sparing of usable vitality which is generally squandered directly affects the economy, environment and long haul accessibility of non renewable vitality sources. Energy protection infers diminishment in vitality utilization by employing so as to lessen misfortunes and wastage vitality productive method for era and usage of vitality. There are three imperative parts of vitality preservation.

#### 1. Economic angles –

a. Reduction in expense of item :- Energy preservation at last prompts financial advantages as the expense of creation is diminished. Vitality cost as a percent of aggregate expense of the item in the whole mechanical area in India shifts from a low of 0.36% to as high as 65%.

b. New openings for work: - Energy preservation generally requires new interests in more proficient types of gear to supplant old wasteful ones, checking of vitality utilization, preparing of labor and so on. In this way vitality protection can bring about new openings for work.

#### 2. Environmental viewpoint –

Each kind of vitality era/usage influences nature to some degree either specifically or in a roundabout way. The degree of debasement of environment depends for the most part on the sort of essential vitality source. Additionally amid each vitality change arrange a piece of vitality breaks to surroundings and shows up as warmth. Subsequently vitality is created and used to the detriment of antagonistic ecological effects. Selection of vitality protection means can minimize this harm.

#### 3. Depletion of non renewable vitality resources –

The unfathomable greater part of vitality utilized as a part of the world today is gotten from fossil energizes which are non renewable. These assets were set down a large number of year's back. Consequently its costs will undoubtedly go up with respect to everything else. We should surrender inefficient practices in vitality usage and moderate this assets by all methods for future.

### PRINCIPLES OF ENERGY CONSERVATION

Some broad standards of vitality preservation are;

#### 1. Recycling of waste –

Each completed item has a characteristic quality relying on unique vitality data amid its creation process. Reused aluminum jars require just 6% of vitality expected to make the can in any case. Reusing of one aluminum can would sufficiently spare vitality to run a TV for 3 hours. Japan serves as a case of a head reusing nation. Half of its waste material is reused. This incorporates 95% of all daily papers and half of every other paper.

#### 2. Modernization of Technology –

Created nations have possessed the capacity to diminish the vitality utilization essentially contrasted with adopting so as to create nation vitality proficient cutting edge innovation. For example vitality utilized by Indian industry is 9.50 million Kcal/ton which is more than twofold the sum utilized by Italy or Japan which is around 4million Kcal/ton. In this way present day vitality effective innovation ought to be embraced by supplanting/retrofitting the current old wasteful types of gear.

#### 3. Waste warmth usage -

Different modern procedures require warmth of various evaluations. Waste warmth from one procedure can serve the need of other which requires warmth of poor quality.

#### 4. Judicial utilization of legitimate sort of fuel –

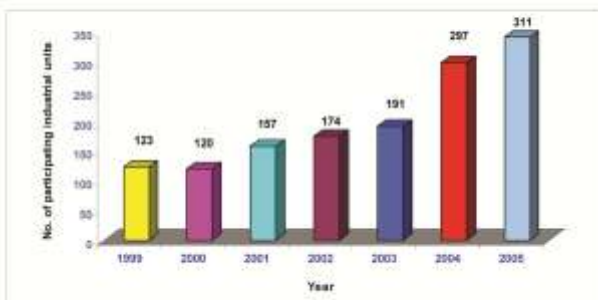
A less expensive essential source ought to be

avored wherever conceivable set up of unreasonable one for instance coal and bio fuel and so on might be considered set up of oil or gas which are costlier.

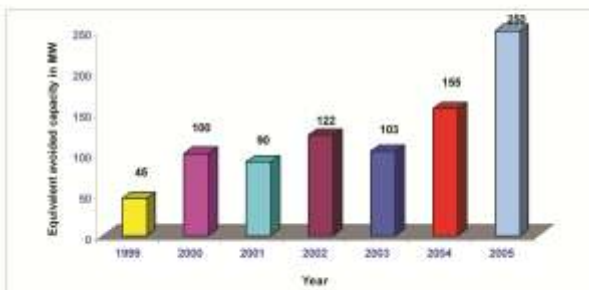
### 5. Training of labor –

Labor ought to be prepared to receive propensities in productive utilization of vitality.

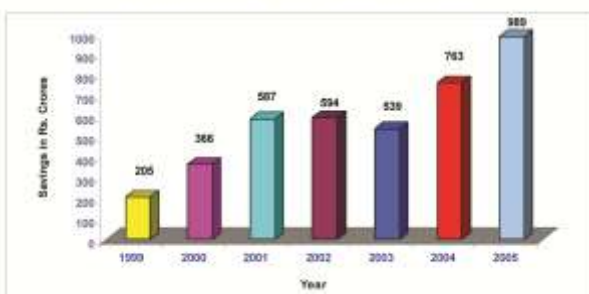
Encouraging response from Indian Industry in the EC Award Scheme (1999-2005)



Electrical Energy Savings, equivalent avoided capacity in MW



Money savings achieved by participating units in EC Award Scheme (1999-2005)



### ENERGY AUDIT

Vitality review is an official, specialized overview of vitality utilization of an association

/process/plant equipment, aimed at lessening of vitality utilization without influencing profitability and propose techniques for vitality protections and diminishment in vitality cost. The proposals /suggestions are known as ECOs (Energy Conservation Opportunities). The proposals are displayed in three classes,

#### 1. Minor ECOs -

These are straightforward, simple to implement, requiring less speculations and usage time. These are connected with ceasing of spillage focuses maintaining a strategic distance from imprudent squanders, house keepinf slips and lack of regard of O and M staff.

#### 2. Medium ECOs -

Medium ECOs are marginally mind bogging requiring extra speculation and moderate implemenetation time.

#### 3. Major ECOs -

These give huge vitality protection opportunity. These are high tech, complex and require overwhelming ventures and long usage period.

TABLE 7: Energy Audit Result

Building particulars	Annual Energy Consumption (Lakh kWh)	Annual Energy Savings (Lakh kWh)	% Savings (kWh)	Annual Energy Savings (Rs. Lakhs)	Investment (RS. Lakhs)	Payback period (Years)
PMO	8.3	2.7	32	16.9	50.5	3
Rashtrapathi Bhawan	34.1	7.8	23	49.9	51.2	1
Sanchar Bhawan	25.6	11.9	46	76	147.1	1.9
Shrem Shekti & Transport Bhawan	20.4	8	39	42.9	157.5	3.7
RR Hospital	100	28.8	28	88.3	44.9	0.5
Air Port	713	145	20	586	810	1.5
Rail Bhawan	23.5	6	25	40	163	4.2
AIIMS	369	93.1	28	712	1070	1.5

### GENERAL ELECTRICAL ECOs

#### a. Simple electrical ECOs :

1. Switching off the heaps ( lights, heaters, ACs, TVs and so forth.) when not being used.
  2. Changing from electrical warming to sun based warming wherever conceivable.
  3. proper house keeping.
- Staggering so as to



4. reducing crest demend the utilization of vast burdens.
5. Providing programmed thermostatic control to water heaters, refrigerators, Air conditioners and so forth.
6. Replacing wasteful lights by vitality proficient lights.

### b. Transitional electrical ECOs :

1. Installation of static VAR sources at substations.
2. Employing programmed controlled burden swithes.
3. Heat recuperation from cooling oil/water related transformer.
4. Installation of shunt capacitors close inductive burden for force element change and decreasing KVA request.
5. Improvement in operation and upkeep, lessening down time.

### c. Extensive electrical ECOs :

1. The straightforward manual/semimanual controlled supplies in an electrical plants are retrofitted with vitality proficient PC controlled types of gear.
2. Modern more effective and simple to keep up plant supplies might supplant old less proficient ones.

**SUMMARY OF ENERGY SAVINGS ACHIEVED BY INDUSTRIAL UNITS PARTICIPATING IN MINISTRY OF POWER'S ENERGY CONSERVATION AWARD SCHEME (1999, 2000, 2001, 2002, 2003, 2004 & 2005)**

Year	No. of participating units	Savings in Rs. Crores	Investment in Rs. Crores	Electrical Energy Saving		Furnace Oil Savings in Lakhs KL	Coal Savings in Lakh Metric tonnes	Gas savings in Lakh Cubic Metres
				Million kWh	Equivalent Avoided Capacity in MW			
2005	311	989	1316	1316	250	2.40	7.58	13122
2004	297	763	1364	814	155	2.49	5.37	18585
2003	191	539	1071	542	103	2.21	12.65	73181
2002	174	594	691	641	122	1.7	7.4	35588
2001	157	587	659	485	90	2.21	4.79	3929
2000	120	366	630	524	100	1.327	0.64	707
1999	123	205	940	205	45	1.62	2.15	2444
Total 7 years		4,043	6,671	4,527	865	13.957	40. 58	1475,56

## COGENERATION

A strategy for producing electrical force and helpful warmth in a solitary establishment is known as cogeneration. Warmth might be supplied as steam, hot water or hot air. The net result is over all

expansion in the proficiency of fuel usage. Cogeneration is prudent for commercial ventures which can create power less expensive and more helpfully than that purchased from utility. It is temperate just if the productivity of cogeneration plant surpasses that of general effectiveness of discrete creating plants of power and warmth. There are three general sorts of cogeneration frameworks.

### 1. Waste warmth usage :

The real motivation behind this framework is to create power with warmed water as a side effect. The warmth therefore accessible can be utilized at an area close electric force plant. This sort of cogeneration is reffered to as waste warmth utilization. The heat released in steam turbine condenser cooling water from an electric force era plant is used for some gainful reason. Around half to 65% of the warmth supplied either by fossil fuel or by atomic fuel in cooling so as to exist steam plant is evacuated water. This warmth is disseminated to the envoinment by direct release of water to sea or stream.

### a. Space warming and cooling :

Warm water can be circulated to homes, offices, stores and commercial ventures for space warming and household use.

### b. Warm water in agribusiness :

Warm water at a temp 24-46 can be utilized to warmth green house, soil warming to broaden developing season of trees and vegetables in winter.

### a. Warm water aquaculture :

Different little plants and creature living beings whereupon angle regularly nourish can be delivered in warm water lakes supplied with different creature and sustenance handling squanders.

### 2. Coordinated vitality frameworks :

This framework is outlined to meet both the electrical interest and warmth interest of an extensive building complex or a group. This framework uses a warmth motor to change over a

piece of warmth to helpful mechanical energy, which in turn is changed over into electrical vitality by a generator. The staying rejected warmth is utilized for warm necessities.

**3. All out vitality framework (TES) for industry :**

Here the goal is to deliver both power and mechanical procedure heat for an industry. Numerous commercial enterprises ( eg. Petroleum refineries, compound plants and paper businesses) utilize a lot of procedure warmth and also electrical vitality to work pumps etc. In these cases cogeneration can bring about 30% sparing of fuel contrasted with isolated era of power and process heat.

**Consolidated Cycle (Binary Cycle) Plants :**

In consolidated cycle power plant electric force is created by utilizing two warmth motors as a part of coupled as a prime movers. The warmth released from one heat engine is not squandered into the air but rather serves as the hotspot for the following warmth engines. The net result is a more prominent general working temp range than is conceivable with a solitary warmth engine. The warm productivity of consolidated cycle framework is therefore more prominent than that for the two warmth motors working freely.

As th innovation is very much produced for the gas turbine it is most usually utilized as fixing cycle motor. The turbine deplete gasses at a temp of 600 or more go through a waste warmth kettle where steam is created from water under pressure. Gas turbine deals with Brayton cycle & has a proficiency of around 20% The steam turbine chips away at Rankine cycle and has effectiveness of around 35% .The productivity of consolidated cycle power plant is around 45-50 %.

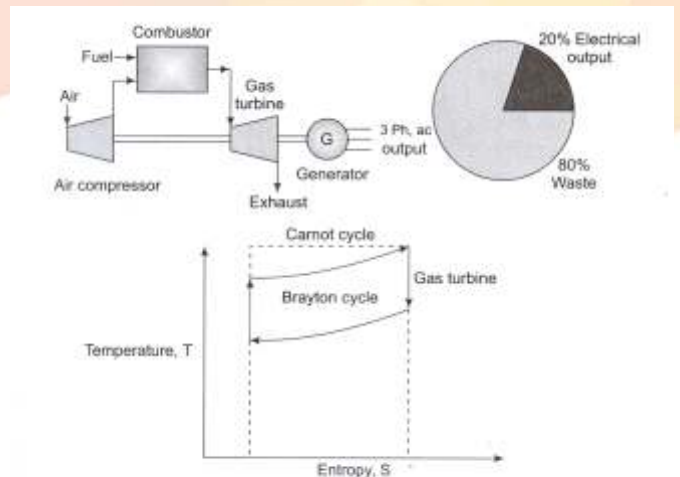


FIG. 2.1 (a) Open cycle (simple cycle) gas turbine power plant  
(b) T-S diagram of open cycle (simple cycle) gas turbine power plant

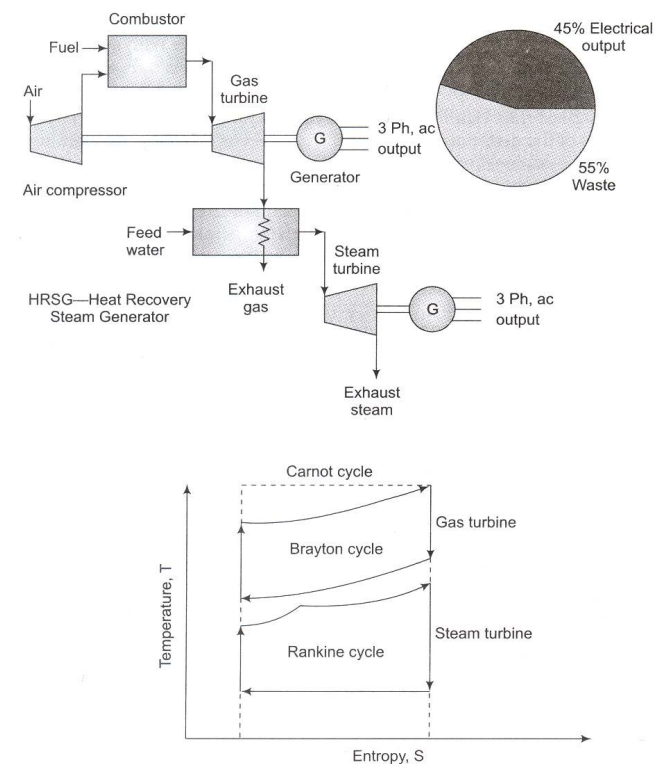


FIG. 2.2 (a) Combined cycle power plant  
(b) T-S diagram of combined cycle power plant

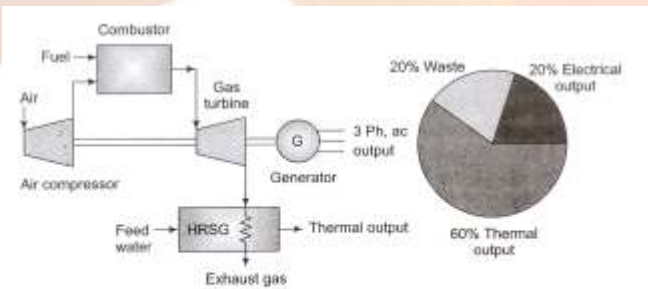


FIG. 2.3 Open cycle (simple cycle) gas turbine power plant with cogeneration

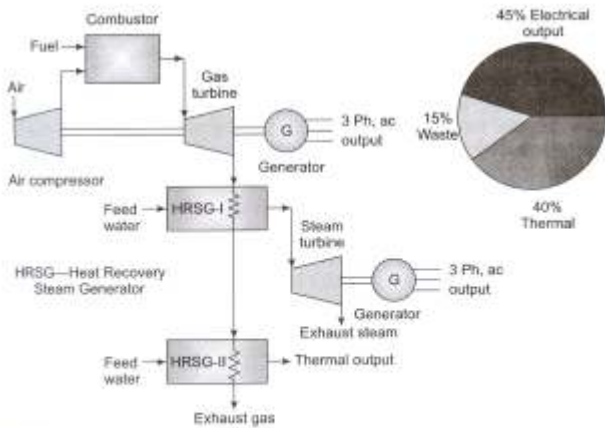


FIG. 2.4 Combined cycle power plant with cogeneration

2. <http://mnes.nic.in/>
3. <http://www.em-er.org/>
4. <http://www.iaei.org/>

**CONCLUSIONS**

The expanding inclination for business vitality has prompted a sharp increment in the interest for power and fossil energizes. Utilization of Fossil Fuels has brought about discharge of immense amount of carbon dioxide creating genuine natural harms. There is still a significant potential for adopting so as to diminish vitality utilization vitality effectiveness measures at different areas of our nation. Vitality productivity won't just lessen the need to make new limit requiring high venture, additionally bring about generous natural advantages. With the institution of the Energy Conservation Act, 2001, a lawful structure is currently accessible for advancing vitality proficiency in all parts of the economy .Efficient utilization of vitality and its protection will succeed as a project if conclusion pioneers and chiefs of industry lead the pack in supporting the preservation program.

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