

# Electric Power : Conservation and Generation

<sup>[1]</sup>Garima Goswami, <sup>[2]</sup>Jaivardhan Singh Shekhawat, <sup>[3]</sup>Himanshu Tiwari-<sup>[4]</sup>Hitesh Tak <sup>[5]</sup>Himanshu Sharma  
<sup>[1][2][3][4][5]</sup>Department of Applied Sciences (Chemistry), JIET Universe, NH-62, MograPali Road  
Jodhpur (Rajasthan), India

**Abstract-** World over one basic predicamentis power generation and power conservation is next important concern. Alternate renewable energy sources are continuously explored by scientists. In the recent past, thousands of builders and professionals have been incorporating an increasing number of technologies on building and within the interiors of new and existing structures. In this paper a system or technique is proposed to work on the air cooling system in huge buildings, which is not only helping to drop down its temperature but also bestowed upon electricity generation. This is not all; this system also helps in controlling the release of greenhouse gases in environment, thus doing a significant job for mankind survival on this globe.

**Keywords:---** air cooling, chiller, condenser, conservation, electricity generation, turbines.

## I. INTRODUCTION

Economic growth of a country is depended on energy availability in that country. The entire fabric of developmental goals is webbed around a successful energy strategy. Energy has a pivotal role in developing economy and social structures. One of the major problems concerning its supply is the depleting nature of the fossil resources, combined with the need for transition to renewable energy resources. The renewable energy resources depend on a number of scientific and technological quantum leaps. Meanwhile, the gap between supply and demand is fulfilled or bridged by energy conservation.

The conservation of energy, therefore, is using less or more wisely than before. Saving a 'watt' is nearly always cheaper than increasing the supply by a watt. The energy industry is one of the most capital intensive industries. Efficient utilization of energy resource is not only conservational, it also saves capital investment. Thus conservation is really the cheapest of energy 'resources' better than its genesis or incipience. In this paper importance of energy management and its benefits are discussed. Use of energy efficient equipment to save energy is also proposed. Hunt for better renewable and sustainable energy sources are desired by scientific community.

## II. USE OF AIR COOLING SYSTEMS

Most of the buildings whether residential or commercial are equipped with Air conditioning or air cooling systems, either to increase the work efficiency or as a symbol of status and luxury. Use of AC's requires

large amount of electric energy utilization and also release large amount of greenhouse gases in the atmosphere.

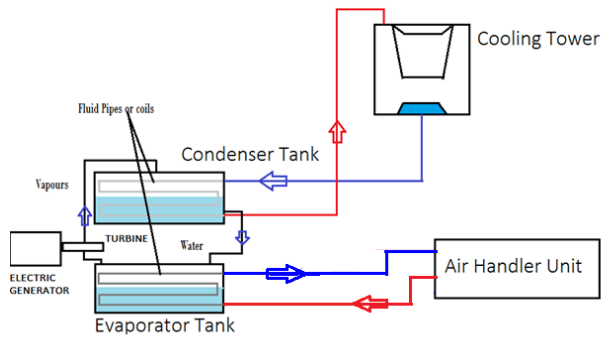
## III. CHILLER TECHNOLOGY

Chiller technology includes basically an air cooling system in giant commodious buildings like luxurious hotels, multistoried business centers, malls, etc. which can not only help to conserve electric energy but also be used to generate electricity. It helps in increasing the efficiency of the air cooling systems in the buildings in an environmental friendly manner. The system consists of three major parts:-

1. Air Handler Unit
2. Cooling Tower
3. Chiller

## IV. SETUP OF CHILLER SYSTEM

Air handling unit is setup inside the building and it is connected with chiller which is kept in basement or in mechanical room and is connected with cooling tower which is placed on roof. All three parts are connected with fluid pipes (made up of metal with low boiling point). These pipes help maintain water flow between chiller and air handling unit and chiller and cooling tower water pumps.



**Figure : Set Up Of Chiller System**

**Working :-**

Chiller consists of 2 barrels (lower is called evaporator and upper is called condenser) and a turbine (connected with electricity generator) connected between these 2 barrels.

Lower barrel is provided with fluid pipes which are connected to air handler unit & fluid pipes of upper barrel is connected to cooling tower. Both the fluid pipes are separate and their fluid never intermixes.

The function of air handler unit is to lower down the temperature inside the building by absorbing its heat and transferring it to water. Resultant hot water moves back to chiller in the lower barrel known as evaporator. Lower barrel have two openings both are connected with air handler unit through pipes. One opening is to bring hot water from air handler unit and other opening to take cooled water to air handler unit.

Boiling point of this fluid pipe inside evaporator is very low. So when hot water come inside barrel through pipes water in evaporator converts into vapors. This vapor moves up passing through the turbine. Pressure of the vapors moves the turbine which rotates the electric generator to generate the electricity (up to 280 Kw per unit).

After leaving the turbine, vapors move upwards in condenser tank (upper barrel).

In condenser or upper barrel, cool water flows in fluid pipes from cooling tower and circulate in the condenser tank and cool the vapours allowing them to condense back in the liquid form.

The heat from water in condenser passes onto the liquid present in the fluid coil or pipe resulting in increase in the temperature of liquid, which is sent back to cooling tower for cooling.

The cooled water from condenser goes down from tank outlet and goes to the pump which is re-pressurised and injected back in evaporator tank ( bottom barrel ) and this process is repeated again and again.

The heat energy absorbed by the chiller needs to be rejected out of the system and into the atmosphere. Evaporative heat rejection devices called cooling towers are used to remove heat from buildings but this heat is not allowed to escape to the atmosphere, instead is taken up by water to increase its temperature. Hot water from condenser tank is cooled down in cooling tower by sprinkling water from top and absorbing the heat from it with the help of cool air from outside atmosphere and sent back to condenser tank (upper barrel).

**V. CONCLUSION**

Energy requirement of commercial sector is now not considered a commodity but a service. In this view, the quality of energy supply and reliability become much more a proffer for the user's satisfaction rather than a simple one time commodity sale. Although Indian Government has taken the power generating projects as its highest priority, but still are struggling in meeting the ever growing demands of electric power. The cause is not only limited to developmental activities but has a significant contribution from higher amount of power losses and energy thefts. The only possibility of better performance from available resources is Energy conservation. An appropriate strategy for energy conservation is required to achieve economic and environmental growth . The above chiller system technology may be very effective if taken into practice. The best possible method not only to conserve energy but also an environmental friendly technique which should be adopted wherever possible

**REFERENCES**

[1] Abdullah M. Al-Shaalan , "EER Improvement for Room Air-Conditioners in Saudi Arabia", Energy and Power Engineering, 2012, 4, 439-446, doi.org/10.4236/epe.2012.46058.

[2] Theo Covary, Katrien Du Preez, Thomas Götz, "Energy efficient Air Conditioners (AC)", Wuppertal Institute for Climate, Environment and Energy, pg. 1 -30.

[3] J. Li, "Bilateral Collaboration on Energy Efficiency in Buildings," Institute du Development Durable et des Relations Internationales (IDDRI), Paris, February 2008.

**International Journal of Science, Engineering and Management (IJSEM)**  
**Vol 2, Issue 2, February 2017**

---

[4] “20 Tips to Help You Conserve Energy and Save You Money”<http://www.ccacac.com/maintenance-tips/tips/20-energy-saving-tips>.

[5] “Air Conditioning Energy Conservation Tips”,  
[http://www.viwapa.vi/News/EnergyConservationTips/AirConditioning\\_EnergyConservationTips.aspx](http://www.viwapa.vi/News/EnergyConservationTips/AirConditioning_EnergyConservationTips.aspx).

[6]Kevin Furey, Bob Decker, and Jason Brown, “Electric Energy Efficiency and Conservation: Policy Options, A Summary of State Activities, and Energy-Saving Ideas for Montana Utilities”,(December 2010), Montana Public Service Commission 1701 Prospect Avenue Helena, MT 59620,pg 110,

[7]Peter Fox-Penner, Smart Power: Climate Change, the Smart Grid, and the Future of Electric Utilities, Island Press, Washington, D.C., 2010, p. 44.

[8] How does a chiller system work?<http://www.industry.usa.siemens.com/automation/us/en/process-instrumentation-and-analytics/solutions-for-industry/hvacr/pages/how-does-a-chiller-system-work.aspx>.

[9]How a Chiller, Cooling Tower and Air Handling Unit work together,  
<https://www.youtube.com/watch?v=1cvFIBLo4u0>

[10] Chiller Basics - How they work,  
<https://www.youtube.com/watch?v=0rzQhSXVq60>

[11]<https://m.youtube.com/watch?v=1cvFIBLo4u0>

[12] <https://m.youtube.com/watch?v=3LSxhSrbzPE>