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   RESULTS & DISCUSSION

   FINDINGS

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CONTRIBUTIONS TO BOOKS

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- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

GREEN IT: ENERGY SAVING USING PELTIER

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ABSTRACT
Green Computing can adopt in our daily life to improve the deteriorating environmental conditions. Green computing or green IT, refers to environmentally sustainable computing or IT whose goals are to reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote the recyclability or biodegradability of defunct products and factory waste. Green Computing concentrates on energy efficiency, reducing resource consumption and disposing of electronic waste in a responsible manner. Such practices include the implementation of energy-efficient central processing units (CPUs), servers and peripherals as well as reduced resource consumption and proper disposal of electronic waste (e-waste). As the number of computers is increasing day by day, so is the amount of electricity consumed by them which in turn is increasing the carbon content in atmosphere. This problem has been realized by people and measures are being taken which help in minimizing the power usage of computers. Superficially, this can be called as Green Computing. So to save Energy consumption this paper introduced concept of using Peltier.

KEYWORDS
green IT, energy saving.

1. INTRODUCTION
When we heard the term green computing the first thought that came into our mind was “going green with computers” but the questions that strike our thoughts the very same moment were HOW and WHY to “go green”, and in the quest for finding the answers to our questions we landed up with the conclusion “GREEN COMPUTING –GREAT COMPUTING” . This research work of ours has given us a new perspective to think in the direction that technology does not only mean to accomplish our tasks but also make sure that our technology is not harming the environment around us.

FIG. 1: GREEN COMPUTING

This environmentally sustainable computing can be defined as "the study and practice of designing, manufacturing, using, and disposing of computers and associated subsystems such as monitors, printers, storage devices, networking, and communication systems efficiently and effectively with no impact on the environment.

1.1 WHAT IS MEAN BY GREEN COMPUTING?

Green computing, green IT or ICT Sustainability, refers to environmentally sustainable computing or IT. In the article *Harnessing Green IT: Principles and Practices*, San Murugesan defines the field of green computing as "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems — efficiently and effectively with minimal or no impact on the environment."The goals of green computing are similar to green chemistry; reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote the recyclability or biodegradability of defunct products and factory waste. Many corporate IT departments have Green Computing initiatives to reduce the environmental impacts of their IT operations. Research continues into key areas such as making the use of computers as energy-efficient as possible, and designing algorithms and systems for efficiency-related computer technologies.

1.2 WHY GREEN COMPUTING

Our so called technically successful world almost sounds fake .We have great machines and equipments to accomplish our tasks, great gadgets with royal looks and features make our lives more impressive and smooth. Today almost all streams weather its IT, medicine, transportation, agriculture uses machines which indirectly requires large amount of power and money for its effective functioning. It’s OK we are happy with ourselves, we are completing all our work on time everything is working smoothly and Effectively, we are earning large amount of money and living a luxurious life but have we ever given a thought that what sort of a achievement it is? We have achieved what we desired but have we ever realize that in this journey of ours what have we return to natural surroundings, The air which we breathe, the water that we drink, the food that we eat and the soil on which we live is contaminated with hell lot of pollutants which are acting back upon us and harming us. Newton’s Third Law of Motion states that “For every action, there is an equal and opposite reaction.”, therefore consumption of energy sources has a negative reaction on the environment. Datacenters use a large amount of power and consequently cooling energy is needed to counteract the power usage. It can be an endless circle of energy waste Hence the three main reasons that made us realize the need for growing green are
1. Release of harmful gases from electronics.
2. More utilization of power and money.

3. Increase of E-waste and improper disposal.

2. TOWARDS "GREEN" DATA CENTERS

A data center hosts computational power, storage and applications required to support an enterprise business. A data center is central to modern IT infrastructure, as all enterprise content is sourced from or passes through it. Datacenters can be broadly classier, on the basis of power and cooling layout, into one of the 4tiers:

Tier 1: Single path for power and cooling; no redundant components;

Tier 2: Redundancy added to Tier 1, thereby improving availability;

Tier 3: Multiple power and cooling distribution paths, of which one is active;

Tier 4: Two active power and cooling paths, and redundant components on each path. This classification however, is not precise and commercial data centers typically fall between Tiers 3 and 4. A higher tier implies an improvement in resource availability and reliability, but it comes at the expense of an increase in power consumption. Data centers host services that require high availability, close to 99.99%. Fault tolerance, therefore, becomes imperative. The loss of one or more components must not cause the data center to terminate its services to clients. Consequently, data centers feature hardware redundancy.

The migration to cloud and virtualized network and converged storage infrastructures is driving the centralization of both IT operations and network equipment. As with any technology, the industry has developed specific terminology to describe energy efficiency and utilization for data centers. When engineering a data center, two key metrics include Power Usage Effectiveness (PUE) and Data Center Infrastructure Efficiency (DCIE).

Overall data center efficiency includes networking, servers, the ability to use 'free cooling', and other determinants of Total Cost of Ownership (TCO). Enterprises are increasingly called to task to demonstrate their Corporate Social Responsibility (CSR), one aspect of which is reducing their carbon footprint. Each country has its own standards. The efficiency of the networking equipment deployed therefore directly impacts a data center's 'green' credentials.

3. MEASURING POWER CONSUMPTION

There are a variety of computer power consumption benchmarking techniques in practice today. Even though many techniques are available, there is no universal one size fits all technique that is appropriate for every benchmarking situation. Different methods of benchmarking must be completed for different usage patterns. Additionally, measuring computer power consumption is different than general computer benchmarking because a tool is usually required to measure how much electricity is being consumed by a running machine. General computer benchmarks such as CPU or video benchmarks do not require any special tools. Since power consumption benchmarks require electricity measuring devices, it makes it harder for people to participate in the power consumption benchmarking area. The requirement and cost of a tool adds a burden to those who wish to run their own computer power consumption benchmarks. Here two electricity consumption meters are described, the affordable KILL A WATT meter and the more expensive Watts up? meter. There are two fundamental ways of measuring power consumption: measuring power consumption at one moment in time and measuring power consumption over time. Each method has its pros and cons. Measuring power consumption over one moment in time is useful when measuring a device that is using a constant amount of power.

4. ENERGY SAVING USING PELTIER

4.1 PELTIER HISTORY

Early 19th century scientists, Thomas Seebeck and Jean Peltier, first discovered the phenomena that are the basis for today's thermoelectric industry. Seebeck found that if you placed a temperature gradient across the junctions of two dissimilar conductors, electrical current would flow. Peltier, on the other hand, learned that passing current through two dissimilar electrical conductors,caused heat to be either emitted or absorbed at the junction of the materials. It was only after mid-20th Century advancements insemiconductor technology, however, that practical applications for thermoelectric devices became feasible. With modern techniques, we can now produce thermoelectric "modules" that deliver efficient solid state heat-pumping for both cooling and heating; many of these units can also be used to generate DC power at reduced efficiency. New and often elegant uses for thermoelectrics continue to be developed each day.

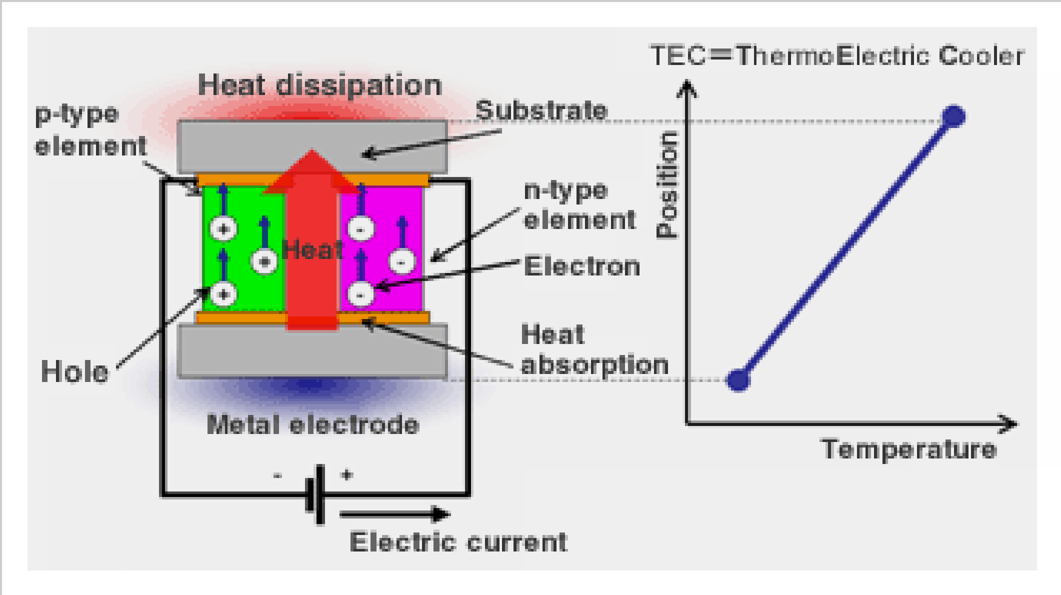
4.2 PELTIER

The Peltier effect occurs whenever electrical current flows through two dissimilar conductors; depending on the direction of current flow, the junction of the two conductors will either absorb or release heat. Explaining the Peltier effect and its operation in thermoelectric devices, is a very challenging proposition because it ultimately keys on some very complex physics at the sub-atomic level. Here we will attempt to approach it from a conceptual perspective with the goal of giving readers an intuitive grasp of thistechnology. In the world of thermoelectric technology, semiconductors are the material of choice for producing the Peltier effect—in part because they can be more easily optimized for pumping heat, but also because designers can control the type of charge carrier employed within the conductor (the importance of this will be explained later). Using this type of material, a Peltier device (can be constructed—in its simplest form—around a single semiconductor "pellet" which is soldered to electrically-conductive material on each end (usually plated copper). In this "stripped-down" configuration (see right), the second dissimilar material required for the Peltier effect, is actually the copper connection paths to the power supply.

A Peltier element consists of two types of semiconductors of p-type and n-type in series-connection, and when a DC current is applied, Peltier effect (a thermoelectric effect where heat transfers due to voltage application) takes place causing heat transfer from the heat-absorbing side to the heat-dissipation side. When the heat from the heat-dissipation side is removed, the temperature on the heat-absorbing side decreases. Whereas, in general heat conduction, heat flows from high-temperature side to low-temperature side, Peltier element functions as a heat-pumping apparatus to transfer heat from low-temperature side to high-temperature side.

Thus, a Peltier element is used as a heat-dissipating device with its heat-absorbing side attached on a heat-generating element, it becomes possible to lower the heat-generating element's temperature than ambient temperature. Since Peltier elements have no moving parts, it is advantageous that system construction can be made simple and compact.

FIG. 2: INTERNAL STRUCTURE OF PELTIER



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Moreover, the heat-absorbing and heat-dissipating sides can be switched by simply reversing the direction of electric currents, application to temperature-controlled equipment is feasible. In addition to conventional Peltier elements mounted on a ceramic substrate, Furukawa Electric has added to its product lineup substrate-less Peltier elements (sometimes called skeleton type because of the visibility of the electrode), in which the elements are arrayed on a multi-hole epoxy substrate, and an electrode is attached on their either side. The skeleton-type Peltier element has advantages in that it allows ease of large-sized structure, flexible configuration, and high reliability.

5. CONCLUSION

By using PELTIER in GREEN COMPUTING : it takes only 5 watt for cooling. Compare to other device for cooling the computer machine it is low cost device. It is not only bounded for the computers but it can also be used in other devices which generate heat and need cooling. It can also be used in those devices also. It can easily portable with the processor fan and SMPS.

6. FUTURE WORK

We can use Peltier for generating more electricity -For the small devices like mobile charging. And in Industries also-Making Air condition using Peltier for the big factories where air condition run 24*7.

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