

# Efficiency in energy conversion research paper example

[Environment](#), [Disaster](#)



## **Introduction**

Most advancement in sciences and technology would not be possible without the use and conversion of energy from one form to another. Thus, thermodynamic principles are considered fundamental laws of energy and relevant to the development of the society at large. This study considers thermodynamics as it concerns different forms of energy, their conversion, and usage.

## **Laws of Thermodynamics**

The laws of thermodynamics emphasize on particular phenomena that describe the relation of energy with matter (Kanoglu, Cengel, & Dincer, 2012). Thermodynamics laws define the amount of physical parameters such as temperature, entropy and energy that characterize a thermodynamic system. These laws also refer the principles about the energy transformation, entropy change as well as variation in temperature. In defining thermodynamic systems, the system, its surrounding, and the boundary must be defined.

## **Thermodynamics and Energy Conversion**

The first law of thermodynamics is concerned with energy transformation. The law states that energy develop by process rather than a generation or destruction, and it holds the tendency to change its forms. The mathematical equation can prove the first law of thermodynamics that is  $E_{in} - E_{out} = \Delta E_{system} = dE_{dt}$ . The first law of thermodynamics is a comprehensive law that cannot be overlooked by any process and hence for a process to occur,

it must satisfy this law. However, a process may satisfy the first law without occurrence. This is the stage at which the phenomena of entropy comes that is expressed by the second law of thermodynamics. In fact, no process related to energy can be developed without fulfillment the requirements of both the first and second laws of thermodynamics. These laws also explain the ways to produce energy such as work done the conversion to heat and other forms of energy and it makes compulsory to account all fragments of energy input into a system. (Kanoglu, et al., 2012).

## **Energy Types and Processes**

Energy exists in various forms, below are some energy types and processes:

**Fossil Fuel:** Fossil fuel includes oil, peat, natural gas and coal. In simple words, fossil fuel is developed by decomposed residues of prehistoric animals and plants. Fossil fuel when burnt release carbon dioxide that refer a greenhouse gas and contributes to global warming. However, the world depends largely on fossil fuel for powering industries, machinery, plants and so forth (Biofuel, 2009).

**Nuclear energy:** Nuclear energy is the energy released during a process of fusion or splitting of atomic nuclei. Nuclear energy is increasingly used in various processes including generation of light and heavy water reactors, research reactors, propulsion reactors and breeder reactors. Nuclear energy usually relies on the half-life of the radioactive element that is used to describe the time taken for half the total number of atoms in the nuclei of the elements to decay.

**Solar Energy:** Solar energy is described as the energy that is generated using

rays of sunlight produced deep down in the core of Sun. Nuclear fusion involves the fusing of nuclei of atoms at high temperature that produces a tremendous amount of energy and heat (Solar Energy, 2009). This explains why the sun provides almost all the energy and heat the earth receives and sustains every living organism on the earth surface.

**Wind Power:** As its name implies, wind energy is the energy that is generated using wind force. The principles of energy conversion can be applied to this form of energy, and hence wind energy can be converted to other forms of energy such as mechanical energy. This can be useful for grinding, milling and water pumping purposes.

**Hydro Power:** The prefix “ hydro” stands for water. Hydropower is generated by the fall of water from high elevations to lower levels. This principle is usually employed in the provision of energy for electricity generation also known as " hydroelectric power". The energy is obtained by coupling turbines with runners or waterwheels. Hydropower is immensely employed in bypass canals, dams, and storage lakes.

**Bioconversion (biofuel):** Biofuel simply stands for fuel produced from organic matter but in this case not from long dead organic matters. It can be defined as any gaseous, liquid or solid fuel produced directly or indirectly using agricultural or industrial, commercial, domestic wastes and so forth. EPA (2015) defined biofuels as fuels prepared using renewable biomaterials such as ethanol from corn kernels, biomass, corn stovers and so forth. They are extensively used as sources of energy today.

## **Provisions of the Energy Policy Act-2005**

The Energy Policy Act was formulated and signed in 2005, and it provides defining principles for energy efficiency. This concerns various energies including fossil fuel, nuclear energy and so forth. The two major provisions of the Energy Policy Act include:

### **Based on benefits provided by taxes that were outlined for advanced and innovative energy-saving strategies and technologies.**

Energy efficient standards are taking into account 16 products.

However, besides these major two, lots of other smaller energy efficiency provisions are also provided by the implementation of the law (Nadel, Prindle, & Brooks, 2006).

## **US Energy Goals and its Provisions**

These provisions have facilitated the United States in order to achieve its energy goals. For instance, the Energy Policy has gone a long way in helping the U. S to reduce its energy use. It is estimated that with the law, U. S will cut down on its energy use by 1. 5% by 2020. These are significant savings. However, much more remarkable savings could be achieved by law addressing issues like fuel consumption in vehicles, articulating energy-saving targets for different utilities and so forth.

## **Conclusion**

Energy use and conversion is vitally important today, and this makes the principles of thermodynamics a vital principle not only for engineering and

physics but also for everyday life. This is necessary in driving the economy, industries, machines, and plants.

## Reference

Biofuel. (2009). In Microsoft Encarta 2009 Encyclopedia

Boundless (n. d). “ The Three Laws-- of Thermodynamics.” Boundless

Chemistry. Retrieved 20 June 2015, from: [https://www.boundless.com/](https://www.boundless.com/chemistry/textbooks/boundless-chemistry-textbook/thermodynamics-17/-the-laws-of-thermodynamics-123/the-three-laws-of-thermodynamics-496-3601/)

[chemistry/textbooks/boundless-chemistry-textbook/thermodynamics-17/-the-laws-of-thermodynamics-123/the-three-laws-of-thermodynamics-496-3601/](https://www.boundless.com/chemistry/textbooks/boundless-chemistry-textbook/thermodynamics-17/-the-laws-of-thermodynamics-123/the-three-laws-of-thermodynamics-496-3601/).

EPA, (2015). Basic Information | Biofuels | Retrieved 20 June 2015, from

<http://www.epa.gov/ncea/biofuels/basicinfo.htm>

Kanoglu, M, Cengel, Y. A & Dincer, I.. (2012). Efficiency Evaluation of Energy Systems. Retrieved 20 June 2015, from [http://springer.com/cda/content/document/cda\\_downloaddocument/9781461422419-c1.pdf?SGWID=0-0-45-1327838-p174267792](http://springer.com/cda/content/document/cda_downloaddocument/9781461422419-c1.pdf?SGWID=0-0-45-1327838-p174267792) .

[com/cda/content/document/cda\\_downloaddocument/9781461422419-c1.pdf?SGWID=0-0-45-1327838-p174267792](http://springer.com/cda/content/document/cda_downloaddocument/9781461422419-c1.pdf?SGWID=0-0-45-1327838-p174267792) .

Solar Energy (2009). In Microsoft Encarta 2009 Encyclopedia.