What is energy transformation definition

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Energy transformation, also known as energy conversion, is the process of changing energy from one form to another.[1] In physics, energy is a quantity that provides the capacity to perform work or moving (e.g. lifting an object) or provides heat. In addition to being converted, according to the law of conservation of energy, energy is transferable to a different location or object, but it cannot be created or destroyed.

The energy in many of its forms may be used in natural processes, or to provide some service to society such as heating, refrigeration, lighting or performing mechanical work to operate machines. For example, to heat a home, the furnace burns fuel, whose chemical potential energy is converted into thermal energy, which is then transferred to the home"s air to raise its temperature.

In order to make energy transformation more efficient, it is desirable to avoid thermal conversion. For example, the efficiency of nuclear reactors, where the kinetic energy of the nuclei is first converted to thermal energy and then to electrical energy, lies at around 35%.[5][6] By direct conversion of kinetic energy to electric energy, effected by eliminating the intermediate thermal energy transformation, the efficiency of the energy transformation process can be dramatically improved.[7]

Energy transformations in the universe over time are usually characterized by various kinds of energy, which have been available since the Big Bang, later being "released" (that is, transformed to more active types of energy such as kinetic or radiant energy) by a triggering mechanism.

A direct transformation of energy occurs when hydrogen produced in the Big Bang collects into structures such as planets, in a process during which part of the gravitational potential is to be converted directly into heat. In Jupiter, Saturn, and Neptune, for example, such heat from the continued collapse of the planets" large gas atmospheres continue to drive most of the planets" weather systems. These systems, consisting of atmospheric bands, winds, and powerful storms, are only partly powered by sunlight. However, on Uranus, little of this process occurs.[why?][citation needed]

On Earth, a significant portion of the heat output from the interior of the planet, estimated at a third to half of the total, is caused by the slow collapse of planetary materials to a smaller size, generating heat.[citation needed]

Familiar examples of other such processes transforming energy from the Big Bang include nuclear decay, which releases energy that was originally "stored" in heavy isotopes, such as uranium and thorium. This energy was stored at the time of the nucleosynthesis of these elements. This process uses the gravitational potential energy released from the collapse of Type II supernovae to create these heavy elements before they are incorporated into star systems such as the Solar System and the Earth. The energy locked into uranium is released spontaneously during most types of radioactive decay, and can be suddenly released in nuclear fission bombs. In both cases, a portion of the energy binding the atomic nuclei together is released as heat.

Sunlight also drives many weather phenomena on Earth. One example is a hurricane, which occurs when large unstable areas of warm ocean, heated over months, give up some of their thermal energy suddenly to power a few days of violent air movement. Sunlight is also captured by plants as a chemical potential energy via photosynthesis, when carbon dioxide and water are converted into a combustible combination of carbohydrates, lipids, and oxygen. The release of this energy as heat and light may be triggered suddenly by a spark, in a forest fire; or it may be available more slowly for animal or human metabolism when these molecules are ingested, and catabolism is triggered by enzyme action.

Through all of these transformation chains, the potential energy stored at the time of the Big Bang is later released by intermediate events, sometimes being stored in several different ways for long periods between releases, as more active energy. All of these events involve the conversion of one kind of energy into others, including heat.

A coal-fired power plant involves these energy transformations:

In such a system, the first and fourth steps are highly efficient, but the second and third steps are less efficient. The most efficient gas-fired electrical power stations can achieve 50% conversion efficiency.[citation needed] Oil- and coal-fired stations are less efficient.

In a conventional automobile, the following energy transformations occur:

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Web: https://kary.com.pl/contact-us/
Email: energystorage2000@gmail.com
WhatsApp: 8613816583346