

Remanufacturing: An Answer to Global Warming

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Description of Global Warming

The process of remanufacturing automotive products conserves energy in the amount of trillions of Btu's each year. In addition, remanufacturing can greatly mitigate the amount of carbon dioxide expelled into the air known as "greenhouse gas" emissions. The remanufacturing of durable goods including automotive parts is equivalent to about 3% of the sales of original equipment manufacturers. Yet, the effect of this conservation is noteworthy and extremely important to the environment by reducing the rate of global warming.

To describe global warming or the greenhouse effect in very easy terms, understand that carbon dioxide, nitrous oxide, methane, ozone and various fluorocarbons are considered greenhouse gases. They are present everywhere in the atmosphere and like glass, they are somewhat transparent to the high intensity radiation of the rays of the sun. That is, the gases allow transmission of the short wavelength of the sun's energy to the earth's surface. These gases, however, are opaque to low intensity energy re-radiated from the Earth and they absorb the longer wavelength room temperature radiation. That's the greenhouse effect.

Different gases have different selectivity depending on the kind of radiation they will accept and will pass. Controlling the amount of carbon dioxide is one aspect of controlling global warming. Saving energy by not burning more wood, or not burning more oil or coal means less carbon dioxide is released to the atmosphere.

Comparison of Greenhouse Gases with Earth's Neighbors

The human kind of the Earth wants and needs to have some level of greenhouse effect. Without greenhouse gases in our atmosphere, the earth would be a lot colder, since the gases would not be there to trap the energy. The Earth's temperature could be as much as 60 F degrees colder without the greenhouse effect.

Compare the atmosphere of the Earth to other planets, like Mars and Venus. Mars is very cold because it is farther away from the Sun, but it also has little atmosphere with few greenhouse gases and, therefore, minimal global warming. There is only a 3 degree greenhouse effect; only 5% of the greenhouse effect observed at the earth's surface.



As for Venus, its surface temperature is 1232 F degrees, which is hot enough to melt lead. The Venusian atmosphere is composed of 97% carbon dioxide compared to Earth's 0.036%. If the atmosphere of Venus contained no carbon dioxide, its surface temperature would only be 390 F degrees. This temperature difference of 842 F degrees represents the Greenhouse effect on Venus. This shows how sensitive global temperatures are to the amount of carbon dioxide in the atmosphere.

The Potential Effects of Greenhouse Gases

As the carbon dioxide level begins to increase, the Earth can expect to get warmer. It is estimated that the present air temperature on the surface of the Earth is 0.5 +0.9/-0.4 degrees F warmer than pre-industrial times. In 1958, the atmospheric concentration of carbon dioxide was about 315 parts per million (ppm). In 1975, it was 330 ppm. In 1985, it was 354 ppm; now in 1998, it is 360 ppm. Doubling of atmospheric carbon dioxide from its current level is predicted to lead to further warming of 6.3 to 7.7 degrees F. By the year 2040 as the climate warms, areas of equal temperature will migrate from the equator toward the poles. Vegetation will not be able to adapt quickly enough to the warmer temperatures. Mass extinction of both plants and animals and severe restrictions of necessary food supplies are possible. Biospheric integrity may decline and human kind's ability to bear these climatic changes will be harshly tested.

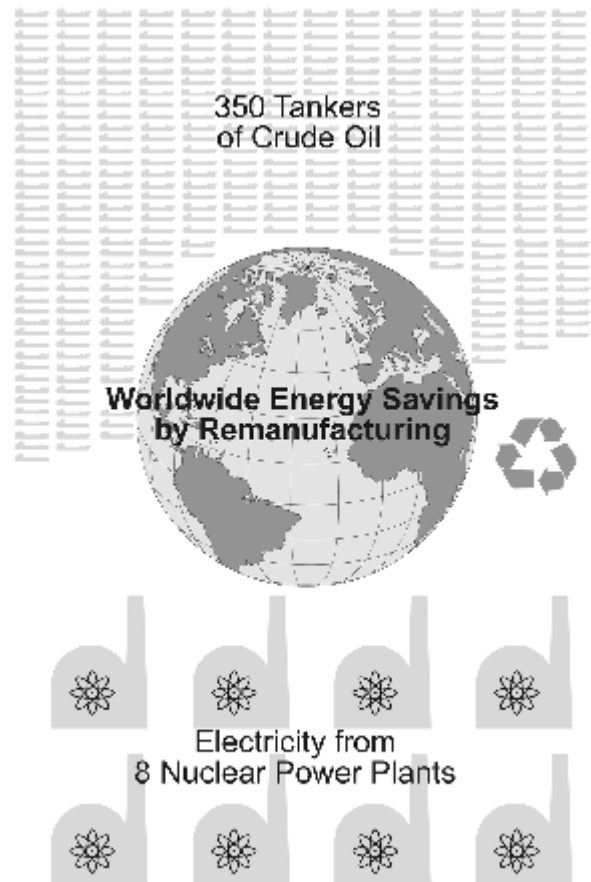
Remanufacturing and Greenhouse Gases

According to Ed Daniels, of the Energy Systems Division of Argonne National Laboratory, remanufactured products conserve the equivalent of 400 trillion Btu's of energy per year. In other words, this amount of energy would have been used to manufacture these parts as brand new parts.

Remanufacturing a product saves about 85% of the energy that would otherwise have been used in producing that part. Since the energy is not consumed, less carbon dioxide is put out into the atmosphere compared to fossil fuel having to be used as the energy source. Remanufacturing can, therefore, offer possible mitigation of global warming by reducing excessive emissions of the greenhouse gases. The savings are made by reusing the parts and not producing new ones.

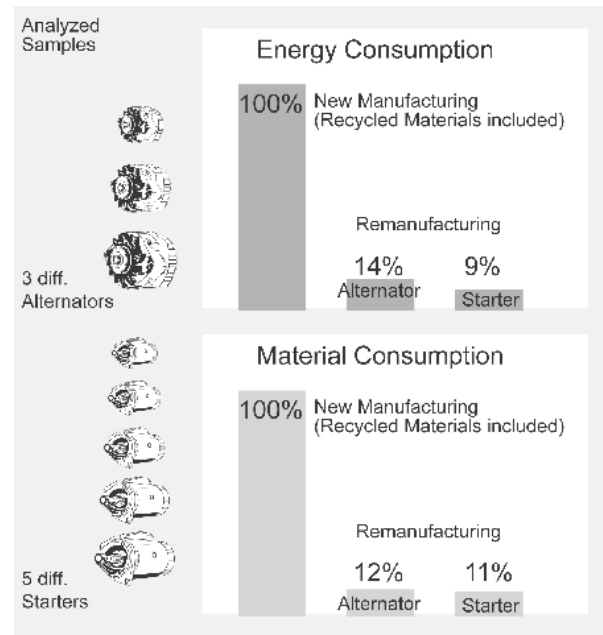
Remanufacturing is one of the three R's of product retirement: reuse, remanufacturing and recycling. Remanufacturing is an activity that conserves resources of both energy and materials. Both of these would otherwise be consumed producing new products.

Remanufacturing of automotive small parts, such as starters, alternators, clutches, brake calipers and wiper motors, in addition to larger parts, such as engines and transmissions begins with an inoperative, failed or worn out part called a "core". This core is disassembled so that the subsystems and components can be cleaned, tested, repaired/reworked or replaced. The components are then reassembled and tested such that the expected performance of the reassembled equipment can be defined and warranted.



Components, which are made of materials such as cast iron, steel, and plastic, are often inspected, found satisfactory and reused. Rubber, small plastic and electronic components are often replaced with new components. The tremendous energy savings is generated from the reuse of the predominate remainder of these products that would otherwise be replaced by brand new parts.

Daniels presented several examples to compare what this energy savings of 400 trillion Btu's/year could mean. The energy saved, because parts are reused in the remanufacturing process, is equivalent to the energy content of enough gasoline to operate about 6 million passenger vehicles each year. With a vehicle fleet size in America predicted at 204 million passenger cars and light trucks in 2001, these energy savings can be translated into the energy of gasoline that provides enough fuel to operate 3% of the fleet in a year.



The comparison of the energy savings to an equivalent reduction in the carbon dioxide generated as Greenhouse Gas Emissions is also astounding. In general, each million Btu's (MBtu) of energy consumed results in the generation and emission of 140 pounds of carbon dioxide from a blended average of sources. Coal sources could generate as much as 260 pounds of carbon dioxide, but other energy sources (such as hydroelectric power and nuclear plants) generate insignificant amounts of carbon dioxide. Therefore, a more representative blended value of 140 pounds of carbon dioxide per MBtu is used. Thus, the 400 trillion Btu's per year of energy saved in remanufacturing avoids the generation of 28 million tons per year of carbon dioxide.

This 28 million tons of carbon dioxide would be released by about ten fairly significant 500 Megawatt coal-fired electricity generating plants each year. This electrical load can relate to the amount of electrical energy required to operate more than 1,000 medium-sized university complexes across the nation.

It is very possible that government encouragement and legislative support of the remanufacturing industry could add greatly to the savings of energy and reduction in undesirable excess emissions of greenhouse gases. If the industry were able to double or triple in size in five years, the energy savings could have an even greater effect on the environment. Also, if the list of remanufactured products were to be expanded, the desired effect could be realized even faster.

In conclusion, these comparisons can aid in the realization of the effect of reusing automotive parts in the remanufacturing process. These parts would be used in place of the production of new parts that require much more energy and material. It is even clearer now that remanufacturing is a vital industry in future governmental considerations of the environment and global warming.

Charts produced by the Fraunhofer Institute, Stuttgart, Germany were used with their permission.