

## EnerTech's SlurryCarb™ Process Aims to Reduce Global Warming



*Global temperatures have increased by 0.55 °C (1°F) in the last 100 years*



*Emissions produced from burning fossil fuels*



*Even minute temperature increases create noticeable changes in our environment*

### **What is global warming?**

The term global warming is used to describe the recent increase in the Earth's average surface and ocean temperatures. Global warming occurs naturally as a result of environmental phenomena such as solar flares, volcanic activity, and variations in the Earth's orbit. Scientists believe, however, that the observed warming of the Earth's temperatures in recent decades is very likely due to the increase in manmade greenhouse gases being introduced into the atmosphere.

### **What are greenhouse gases and how do they impact global warming?**

Greenhouse gases such as carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) create an insulating layer around the Earth that prevents heat from escaping. This phenomenon is known as the "greenhouse effect." When left in balance, the greenhouse effect is beneficial to the Earth because it retains heat within our atmosphere, keeping temperatures warm enough to sustain life. In recent years, however, greenhouse gases have begun to build up in the atmosphere, throwing off nature's delicate balance and increasing the Earth's temperature.

Historically, scientists have found that increased levels of CO<sub>2</sub> invariably correspond with increased global surface temperatures. CO<sub>2</sub> enters our atmosphere naturally as a byproduct of the respiration of mammals and is then recycled by plants through photosynthesis. The process through which CO<sub>2</sub> moves throughout our atmosphere is called the carbon cycle.

Human-related activities such as the combustion of fossil fuels also release greenhouse gases such as CO<sub>2</sub>. When fossil fuels are combusted to produce energy, the carbon they contain combines with oxygen in the atmosphere to form large quantities of CO<sub>2</sub>. This excess CO<sub>2</sub> causes an imbalance in the natural carbon cycle and cannot be readily reabsorbed through photosynthesis, resulting in a buildup of the gas in the atmosphere. As atmospheric CO<sub>2</sub> increases, more heat is prevented from escaping the Earth's surface.

While the earth naturally progresses through cycles of warming and cooling, fossil fuel use is believed to be a significant factor in the recent buildup of greenhouse gases, and thus a major contributor to the increasing global temperatures that scientists have observed in the past 100 years.

### **What evidence is there that global warming is occurring?**

Global temperatures have increased by about 0.55 °C (1°F) over the past 100 years, compared with an increase of only 1 °C (1.8 °F) over the previous 10,000 years. This warming trend is expected to accelerate; many scientists predict



*Melting glaciers in the Arctic are responsible for decreasing our fresh water reserves*

global temperatures will increase over 5 °C (9 °F) in the next 100 years.

The greatest recorded warming trends are occurring in the Arctic, the region around the Earth's North Pole, where temperatures have been increasing an average 1.22 °C (2.2 °F) per decade, double the rate of anywhere else on the planet. This tremendous warming trend is causing the glaciers to retreat. As Arctic glaciers thaw, sea levels rise, resulting in the merging of salt and fresh water. This decreases our fresh water reserves and compromises our coastal cities as water claims more developed land yearly.



*Thawing Siberian peat bogs release sequestered CO<sub>2</sub> into the atmosphere*

These warming effects are not just confined to the Arctic. Western Siberia's peat bog, frozen since the onset of the last ice age, has begun melting in the last few years as average temperatures in the region have increased. Methane and carbon dioxide that were, until recently, sequestered in the frozen bog, are being released into the atmosphere as the bog thaws, further adding to the buildup of greenhouse gases. Glacier National Park, in the continental United States, is experiencing the dramatic melting of its signature glaciers, so much so that scientists predict that all the glaciers in the park will melt by 2030.

### ***How is global warming a problem?***

As greenhouse gases build up and warm the earth, we face accelerating climate changes on a global scale. Some of the changes we currently face due to incremental greenhouse gases and global warming include:

- Melting of Arctic Glaciers
- Rising sea levels
- Diminishing fresh water reserves
- Interruption of growing seasons
- Increasing numbers of mosquitoes resulting in the spread of disease
- Increased likelihood of flood or drought
- Loss of suitable habitat for many species of plants and animals



*CO<sub>2</sub> emissions from transportation are a major source of greenhouse gases*

Even small temperature increases create noticeable changes in our environment that can alter entire ecosystems.

### ***How can we help reduce the effects of global warming?***

The majority of the energy that we use to power our cars, homes, and offices is produced by the combustion of fossil fuels and other non-renewable sources that continually add to the net volume of carbon dioxide in the atmosphere. In our day to day lives, we can help diminish the impact of global warming by reducing the amount of energy we consume. This can be achieved by doing simple things such as driving less, shutting off lights when we leave a room, and dressing in layers when it is cold rather than turning up the heat.

On a larger scale, our contribution to global warming can be diminished by reducing our reliance on fossil fuels and other non-renewable fuels to produce energy. Any solution to global warming needs to include a strategy for replacing fossil fuels with renewable energy sources.



*Renewable energy can help lessen the impact of global warming*

### **What is Renewable Energy?**

Renewable energy is a term used to describe energy sources that can be easily replaced (are inexhaustible) and have a limited negative impact on the environment. Solar power, wind power, and waste are a few examples of renewable energy sources.



*Biosolids are a common waste product that can produce high energy, renewable fuel*



*Burning E-Fuel does not release any new CO<sub>2</sub> emissions into the atmosphere*



*A SlurryCarb™ facility can help reduce fossil fuel use and lower greenhouse gas emissions*



*Renewable energy can make significant strides towards reducing greenhouse gases*

## **Why is renewable energy important?**

By utilizing renewable sources rather than fossil fuel sources to generate energy, we can reduce greenhouse gas emissions and help diminish the impact of global warming. In addition, renewable energy can alleviate other types of pollution that have an adverse impact on our environment such as contamination of air and water.

Utilizing renewable fuel has economic benefits as well as environmental. It decreases our reliance on foreign fuel, generates job growth for our economy, and helps reduce the depletion of natural resources.

## **What are biosolids?**

Biosolids are the organic waste material left over after the treatment of domestic sewage sludge. Each year the United States produces millions of tons of biosolids that must be treated, recycled or disposed of. (In 2005 the U.S. generated an estimated 7.6 million tons of biosolids.)

The most common practice for recycling biosolids has been as fertilizer. Recently, however, this practice has become increasingly controversial and many counties across the country are banning the practice due to public concern that it may lead to health problems.

As an alternative to utilizing treated biosolids as fertilizer, they can also be used to generate a clean, renewable fuel and act as an alternative to fossil fuels.

## **How can biosolids be treated to produce renewable energy?**

EnerTech Environmental's patented SlurryCarb™ process converts biosolids into a renewable fuel, called E-Fuel. By converting biosolids from a waste material into a clean-burning fuel, not only does the SlurryCarb™ process avoid the environmental challenges of biosolids disposal, the process also creates the opportunity to reduce fossil fuel use and lower greenhouse gas emissions from energy production.

## **How does E-Fuel use reduce atmospheric carbon dioxide?**

Burning E-Fuel does not release any new CO<sub>2</sub> into the atmosphere. The carbon in E-Fuel was already circulating through our environment, unlike the carbon in fossil fuels which was contained or sequestered within the earth. Because it is recycling CO<sub>2</sub>, producing energy from E-Fuel adds no net CO<sub>2</sub> into the atmosphere. This means that for every ton of coal we replace with E-Fuel, we prevent, over a ton of additional CO<sub>2</sub> from being released into the atmosphere.

## **A step in the right direction...**

On its own, replacing fossil fuels with renewable fuels will not completely prevent global warming. However, replacing fossil fuels with renewable energy is a step in the right direction. By implementing renewable energy technologies like EnerTech's SlurryCarb™ process on a large scale we can make significant strides towards reducing our use of fossil fuels and the greenhouse gases they release.

With renewable energy technologies like the SlurryCarb™ process, we have a chance to protect our planet and make it a healthier place to live for generations to come.

## **See Also**

For further energy statistics and information on what you can do to lower your energy consumption, please visit the Energy Information Administration, [www.eia.doe.gov](http://www.eia.doe.gov).