Myths, Misconceptions, and Little Known Facts!

Our *"Did You Know?"* Series

As part of our "Did You Know" series, we are offering some facts and statistics to help dispel some of the information that is often confusing about incineration and waste management as a whole. To learn more about incineration, you can read our White Paper on Vortex Combustion, or other documents in this series, available online at www.AmericanEnergyGroup.org.

Purpose

The reason we put this document together is to help individuals better understand the issues and information that surrounds waste management, especially for combustion systems. Surveys and reports have shown over the years that although incineration is much safer, and less harmful to our environment, people still have problems with their operation. We will offer facts and information that come from trustworthy sources, in order to help you make a more informed decision.

In addition, please keep in mind that our Firebird V-III™ not only meets, but exceeds all standards for air quality emissions. Because this technology has been successfully proven with the most extreme disposal programs, such as hazardous waste (contaminated waste from a nuclear fuel rod facility) and infectious waste (animal remains from medical testing), it is more than capable of handling normal municipal and industrial waste management.

Following are several topics in which our extensive research has shown to be the issues that are most discussed, and are for the most part, the ones that can be proven with solid, well-accepted facts and data.

Air Quality Standards

One of the most important things to understand right up front is the requirement of any system that emits exhaust into the atmosphere, and the potential impact on our environment. The chart on the right shows some of the air quality specifications in terms of what can be emitted into the air, which everyone must be in full compliance.

National Ambient Air Quality Standards

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon Monoxide	9 ppm (10 mg/m³)	8-hour	None	
	35 ppm (40 mg/m³)	1-hour		
Lead	0.15 µg/m³	Rolling 3-Month Average	Same as Primary	
	1.5 µg/m³	Quarterly Average	Same as Primary	
Nitrogen Dioxide	0.053 ppm (100 µg/m³)	Annual (Arithmetic Mean)	Same as Primary	
Particulate Matter (PM_{10})	150 µg/m³	24-hour	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m³	Annual (Arithmetic Mean)	Same as Primary	
	35 µg/m³	24-hour	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hour	Same as Primary	
	0.08 ppm (1997 std)	8-hour	Same as Primary	
	0.12 ppm	1-hour	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Mean)	0.5 ppm (1300 µg/m³)	3-hour
	0.14 ppm	24-hour		

When people voice their concerns about the potential pollution from something such as an incinerator, they typically rely on statements from others, and opinions rather than facts. We often hear comments about incinerators polluting the air, and posing health hazards for those that live close to them. The truth is that the US EPA (as well as every state's EPA), restricts the operation of systems that require any kind of emission or exhaust into the air. With that being said, no device or system can legally operate if it exceeds the air quality standards as shown in the chart shown. We are protected as residents and citizens (and as voters!) from potential harmful pollution from any system, long before it can begin its operations.

Did You Know…?
… that there are over 3,000 active landfills, and nearly 10,000 old municipal sites here in the United States?

Landfills vs. Incinerators

One of the most interesting facts that we have come across, deals with the comparison between landfills and incinerators. The use of incinerators is controversial, and most Americans passionately oppose it. The controversy stems from the conflict between the short-term issues, and long-term ones. We have always known that incinerators are actually better for the environment than landfills, but according to the EPA, as well as the AQMD (Air Quality Management District, in Southern California), "the overall harm produced by incineration is generally millions times lower than the long-term harm caused by the original materials buried in the landfills."

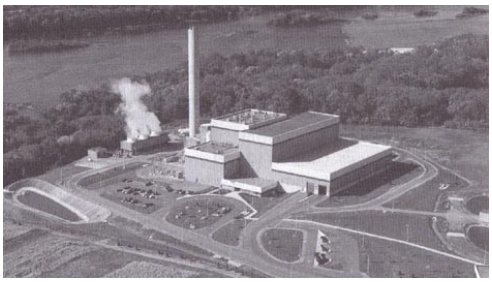
When it comes to landfills and harmful environmental issues, the one that generally comes to mind is the methane gas emissions. Even on those landfills that have been shut down, you can see some of the "caps" that are spotted around the piles of decomposing or rotting waste materials. Simply putting a cap on these methane pockets doesn't eliminate the problem, just controls it. The real long-term problems with landfills come from the leachate, or the product of precipitation percolating through waste materials deposited in the landfill. When the water mixes with the decomposing waste, it becomes contaminated and seeps or flows into the ground water, which in turns contaminates water sources. That's probably more than you really wanted to know about landfills, right?

Did You Know…?
… that incineration has been used as a means of waste management since the 1800's?

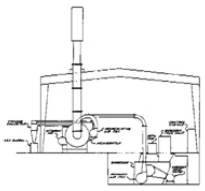
Our Firebird V-III™ can be used in a process known as landfill reclamation, where we can literally reverse the harmful effects that come from landfills that are either active, or have been shut down for years. Because of the small footprint of our design, along with the fact that we do not produce harmful emissions, and have successfully disposed of the most hazardous waste materials, we are a perfect solution to this decades-long dilemma. So, not only are we eco-friendly in our normal operation, but we can turn the clock back on the damage that we have and might otherwise continue to do to our delicate environment.

"They're just plain ugly"

OK, that one we have to agree with! Typical municipal incinerators are massive behemoths that can look similar to a nuclear power plant. Even the smaller ones like the photo to the right, are huge complexes that need to be put far away from populated areas.



However, a little known fact is that our Firebird V-III™ boasts a small footprint, and can be installed closer to those populated areas. Another reason that it can be placed in these locations is that it doesn't emit odors, harmful emissions and gases, or even smoke which can carry extremely tiny particulate matter, also known as fly ash.



Our stand-alone system (without energy recapture) can be set up in a building that is approximately 40 feet by 40 feet, 30 feet tall, and with an exhaust stack reaching less than 50 feet in the air. With the energy recapture configuration, the entire facility can be less than 150 feet by around 65 feet. With communities that exceed 40-50,000 residents, multiple units can be deployed strategically around the area to optimize the overall waste management issues, as well as reducing the hauling of collected materials to landfills.

Did You Know…?
… as published in *Medical News Today*, that air pollution experts say modern incinerators are no significant threat to public health?

CO_2 emissions

This is actually one of those topics that has reached a level of confusion, making it almost impossible to fully understand the impact that carbon dioxide has on our environment. It has been used and actually misused in conversations and debates for many years. One of the problems is that we have become a society that gets our information from sound bites rather than professionals that offer scientific facts.

Atmospheric concentrations of CO_2 fluctuate with the change of seasons, mostly due to the seasonal plant growth in the Northern Hemisphere. Concentrations fall during the northern spring and summer, as plants consume the gas. Concentrations rise again during the northern autumn and winter, as the plants become dormant, die, and even decay. In our atmosphere, it is considered a trace gas. Five hundred million years ago, CO_2 was 20 times more prevalent than it is today. For our discussions, municipal waste incineration produces only .0035 the amount of CO_2 that is produced by fossil fuel combustion for our energy and transportation needs.

People often throw around terms that become accepted in discussions, but are actually incorrect. For instance, you hear people talking about carbon emissions in the same way they refer to CO_2 emissions. Carbon emissions are exactly that. Carbon is given off in the incomplete combustion process (see our "Did You Know" series: ***Everything You Always Wanted to Know About Incineration***) as soot and ash, and is considered to be harmful to the environment, and to humans and animals. Carbon dioxide is an important part of our breathing, and used in the photosynthesis process of plants that in turn supply our oxygen. It's a circle-of-life thing.

Did You Know…?
… that in addition to being part of our breathing process, CO_2 is used for adding carbonation to sodas, and in the making of wine?

CO_2 is also used in many other aspects of our everyday lives. We use it to artificially carbonate soft drinks, soda water, beer, and sparkling wine. Beer is also carbonated through natural fermentation, but many distillers take short cuts, using CO_2. It is also used in foods through the production of carbon dioxide from leavening agents. It is one of the most commonly used compressed gases for pneumatic systems, and is also used in fire extinguishers. Other uses include: welding, caffeine removal, pharmaceuticals, agricultural and biological applications, lasers, polymers and plastics, oil recovery, as refrigerants, and in wine making.

Although we use CO_2 in many parts of our lives, the issue that surrounds the emissions is the concentration of CO_2 gas in our atmosphere. As can be expected, human activities add a great deal of the gas into the air, especially in high density populations and larger cities. The mixture, or parts per million (ppm) can reach levels that alter the temperature of our planet through a process known as the greenhouse effect. This is where the temperature on the surface of the earth rises due to the presence of an atmosphere containing gases that absorb and emit infrared radiation. These gases trap the heat in, rather than allowing normal dissipation of heat.

Dioxins

Formally known as polychlorinated dibenzodioxins, dioxins occur as by-product in the manufacture of organochlorides (chlorinated solvents), as a by-product of incinerating plastics that are made with chlorine, such as PVC, and from natural sources such as volcanoes and forest fires. The emissions of dioxins from incineration have been reduced by over 90% due to stringent emission standards, and are now considered to be a very minor contributor to dioxins in the atmosphere. In fact, there are higher amounts of emissions that come from cigarette smoke, paper bleaching processes, and even backyard fire pits.

The incineration of medical wastes has been thought to give off a higher volume of emissions of dioxins than municipal incineration, due to the disproportionate amount of plastics that contain chlorine from their manufacturing process. Over the past few years, many medical waste incinerators have been shut down, although research has proven that this has come about more from emotional and political reasons than from concerns about the environment.

The technology behind the Firebird V-III™ does not produce dioxins or other harmful emissions because of the combination of the high speed vortex and high temperature, as well as the continuous re-circulation of the particulate matter back into the vortex. With the waste material never allowed to rest on a grate and smolder (the process that creates emissions and fly ash), the V-III™ doesn't require typical exhaust scrubbers to clean the emissions prior to being pushed into the atmosphere.

Methane

Methane is being separated because it is unusual in many ways. It's believed that 18 percent of the greenhouse effect is caused by methane, putting it second on the list of offending gases behind carbon dioxide. Methane breaks down in the atmosphere to form carbon dioxide, ozone, and water, all of which absorb heat, and raise the earth's temperature. However, there are sources of methane that have a significant impact on our environment, namely cows.

Cows emit a massive amount of methane through belching, with a lesser amount from flatulence. Research shows that cows can expel as much as 50 gallons of methane every day, which is comparable to the pollution that is produced by one car. We aren't saying that we should get rid of cows because they produce these emissions, but we should all understand all aspects of these issues. There are still debates ongoing that pit expert against expert as to the real causes and reasons for our environmental problems.

Other types of emissions

Because of an incomplete combustion process, current technology incinerators emit other substances, along with smoke and fly ash, even while meeting all EPA air quality standards. When discussing emissions other than CO_2 and dioxins from incinerators, the focus generally falls to what is known as heavy metals. These are: lead, mercury, and cadmium.

Did You Know…?
… that definitions of the term "heavy metals" are sometimes based on density, sometimes on atomic number or atomic weight, and sometimes on chemical properties or toxicity?

Current incineration technology is capable of handling the destruction and disposal of waste that contains high concentrations of lead, mercury, cadmium, and other substances thought to be health hazards. While they are considered to be non-combustibles, there are simple methods of collecting these metals in ways that are completely safe to humans and the environment. The V-III™ uses a unique cyclone separator that pulls these materials out of the vortex flow, and safely deposits them in a collection tray, ready for proper disposal.

These other emissions have become, just as CO2 and dioxins, concerns based more on emotions than actual pollution problems. We are not saying that pollution isn't a problem; quite the opposite. Pollution is a major problem that is being addressed by some of the greatest minds, and even some of our politicians! What we are saying is that incineration (even current technology) is not a significant source of our emissions issues.

Just like the previously discussed elements, there are everyday uses for lead, mercury, and cadmium. For instance, cadmium has been used as a pigment source for steel, while mercury is used for thermometers (less now due to digital technology) and is found in dental fillings. The toxicity of the silver (mercury) amalgam in fillings has been linked to very serious health issues, such as: brain damage in children, neurological problems, gastrointestinal issues, and even a connection to Alzheimer's Disease.

Did You Know…?
… that incinerator regulations in the 21st century are considered to be the most stringent of all types of combustion and energy recovery systems?

Summary

As the box to the left points out, the air quality standards set by our federal and local EPAs are the toughest regulations of any of the emission standards for all types of combustion, as well as energy recovery systems. In addition, they are also the most protective for the health and environment of local residents and communities.

The issues that we face in our world today are unlike many of the problems that our parents and grandparents encountered. While it's true that our parents think we have it easier than they did, and we wonder sometimes how our children could possibly survive in a world without microwaves, iPods, and cell phones (but just try to take my BlackBerry away from me!), we have to understand that we are in the midst of something very unique.

Never before have we had a convergence that was so inter-related as we are currently experiencing with energy, the economy, and the environment. That is why we formed our 3e Certification℠ - to acknowledge those that have done all the right things to ensure our: Energy Independence, our Economic Strength, and our Environmental Health. For more information about us, and our programs, please visit: www.AmericanEnergyGroup.org