



**T**hat's the big question that most people should be asking, but don't, for fear that they may appear to not know enough about this very important issue. This document, known in the business world as a "white paper" actually has a green cover, to reference the tag that has been given any effort dealing with solving our energy issues. This paper will give you a little background while offering some information that will help you understand more about this often confusing topic. It's not easy being green, but we'll try to make it easier to go green!

It shouldn't be confusing, because most of us have experience in dealing with natural gas, electricity, gasoline, and other sources of power that we use every day. We have all heard about the need for energy conservation, or greenhouse emissions and carbon footprints. OK, I'll admit, this is where the confusing part comes in. While they are all very closely connected, they are indeed separate topics. We also get confused as celebrities tell us that we should be going green, while they fail to practice what they preach. We have heard them tell us to use two squares of toilet paper, or to use public transportation, or even that we should ride our bikes or walk everywhere. Meanwhile, they are receiving special hybrid cars from Lexus, and then shipping it from Japan to London via private air cargo, eliminating all of the positive effects the car would have had in normal use.

The topic that was brought to the forefront eighteen months ago is energy independence. We are a nation that has become addicted to foreign sources of oil, predominately from the Middle East and other countries that don't like us very much. T. Boone Pickens, the billionaire Texas oil giant, has been trying to encourage us to get away from these foreign sources for over 20 years. We just weren't ready to listen. During the summer of 2008, we saw oil prices reach new highs, topping off at over \$147 a barrel. That forced prices at the pump to reach well over \$4 a gallon. With those numbers in mind, Mr. Pickens calculated that we send more than \$700 billion out of this country for oil, based on the fact that we now import nearly 70% of our oil. Thirty years ago, we imported 24% of our oil, while the price per barrel was not a major issue.

That's where alternative energy comes into the discussion. Many people feel that we need to drill more here in this country, but others are fighting that concept. Unfortunately, it has become a political bouncing ball, and people are starting to equate drilling or no-drilling to various parties or candidates.

When we hear chants to drill, we need to understand that drilling for oil in ANWR (Arctic National Wildlife Refuge in Alaska), or the OCS (Outer Continental Shelf – offshore drilling), will only offer us a bridge to the next phase of any energy program. We need to look deep into **any** form of energy, as long as it's American. That's where alternative energy sources play such a vital role.

**al·ter·na·tive** [awl-tur-nuh-tiv] adj. - a choice of two or more things, propositions, or courses of action

Alternative energy typically refers to any source of usable energy that is meant to replace or augment existing sources of energy, such as fossil fuels. It is also substituted for "renewable energy," but should not be limited to that one description. Some dictionaries define it as energy derived from nontraditional sources. That's the direction we will be taking here. We will also be covering the background of fossil fuels, and also explaining the importance of transitioning to alternative sources, including of course, renewable energy sources.

The best way to understand this issue of energy independence is to understand the background of the current usage of fossil fuels, namely oil and natural gas, and the addition of renewable forms of energy. One twist in our overall discussion is the use of natural gas, a non-renewable fossil fuel, in our transportation needs. While the rest of the world has accepted this particular method, the U.S. only accounts for slightly more than 1 percent of vehicles powered by compressed natural gas, or better known as CNG.

Before we get to the fossil fuels, we should offer a list of alternative energy sources. We will briefly discuss some of these later in this paper, and will dedicate future white papers separately to the most common ones.

- ✓ Biofuels
- ✓ Biomass
- ✓ Geothermal
- ✓ Solar energy
- ✓ Tidal power
- ✓ Wind energy
- ✓ Wave power
- ✓ Hydroelectric
- ✓ Nuclear

As previously stated, the newly found enthusiasm for alternative energy came about because of the high oil costs. Currently, those prices are going down, but experts agree that this is temporary, and that gasoline prices will return to a level hovering around \$3 a gallon. One concern is that with this short-term reduction, and prices not reaching \$4 in the foreseeable future, the interest and the urgency to transition to alternative forms of energy may diminish.

The current level of interest, however, is pointed more in the direction of transportation, with solar, wind, nuclear, and other sources taking a back seat. The large auto makers have seriously lagged behind in development of vehicles using these alternative forms, but only for the U.S. market. General Motors is the largest manufacturer of CNG-powered vehicles, and yet they don't offer a single model for sale in this country. Hybrid vehicles have become better known, such as Toyota's Prius, followed by the electric vehicle offered with the Tesla Roadster. Honda currently makes a CNG-powered Civic GX that is made here in America. There is promising potential with newer technologies, such as hydrogen fuel cells and state of the art battery power; however, battery use is still limited to light weight vehicles, whereas CNG is capable of being used on heavy duty vehicles such as trucks and buses.

## Fossil fuels

Fossil fuels, also referred to as mineral fuels, are hydrocarbons found within the top layer of the Earth's crust, coming from the fossilized remains of dead plants and animals, and formed by exposure to heat and pressure over hundreds of millions of years. They range from highly volatile materials such as methane, to liquid petroleum, to non-volatile materials such as coal. The Energy Information Administration has estimated that in 2005, 86% of the primary energy production in the world came from the burning of fossil fuels, with non-fossil sources comprised as: hydroelectric – 6.3%, nuclear – 6.0%, and other forms such as geothermal, wind, solar, and wood and waste with only .9%.

From before our recorded history, we have used coal as a form of fuel. Liquid petroleum, and the subsequent commercial expansion, was in a strange way an alternative energy source, replacing oils from animals that were used in lamps. Although we used to burn it (flare-off as a byproduct of petroleum production), natural gas is now seen as a valuable resource, and is considered to be very abundant.

That's enough of the history of our usage of fossil fuels. We need to concentrate on the financial and political ramifications of what this addiction to foreign oil is doing to our country. When we discuss political concerns, we aren't referring to red and blue states or campaigns, but the issues that arise from foreign governments, and for that matter, rogue nations that don't have our best interest in mind.

To truly comprehend how we can be affected politically or financially, it's important for us to understand how oil is controlled, and who has their fingers on the buttons. As stated previously, we import nearly 70% of our oil. Natural gas is an abundant resource right here in the U.S, as is coal. To measure these resources, we use levels and flows. Levels are the reserves in the ground, and flows are production. The interesting piece of data deals with the years of production left based on the reserves in the ground and the daily usage.

	Levels (proven reserves)	Barrel oil equivalent
Oil	1,119 to 1,317 billion barrels	---
Gas	6,183 to 6,381 trillion cubic feet	1,161 billion barrel oil equivalent
Coal	997,748 million short tons	4,416 billion barrel oil equivalent

	Flows (daily production) in 2006	Barrel oil equivalent
Oil	84 million barrels per day	---
Gas	104,435 billion cubic feet per day	19 million barrel oil equivalent per day
Coal	10,230 million short tons per day	29 million barrel oil equivalent per day

	Years of production left in the ground using the most optimistic reserve estimates
Oil	1,317,000 million barrel reserve/84 million barrels per day/365 days per year= 43 years
Gas	1,161,000 million barrel equivalent reserve/19 million barrel equivalent used per day/365 days per year= 167 years
Coal	4,416,000 million barrel equivalent reserve/29 million barrel equivalent used per day/365 days per year= 417 years

Data from: Oil & Gas Journal, World Oil

Looking at the data above should give a clear picture of two aspects of this issue. One is that oil is depleting very quickly, based on the existing oil reserves that we are aware of to date. Gas and Coal represent a longer availability, again based on current known reserves. Even if we didn't import such a high percentage, we are looking at just over 4 decades of oil availability, which is a frightening scenario. This is why a transition to alternative forms of energy is critical for us to be able to cope with our future demand. With our high addiction to foreign oil, it's clear that having someone else in control of our oil volumes and pricing, is dangerous to us in terms of financial and national security. During the spike in oil prices, OPEC met to manipulate the market by reducing their production by 1.5 million barrels per day in response to the steady drop in oil prices, and the reduction in overall demand. Fortunately, this didn't have the desired effect they were hoping to achieve, but we can't rely on luck in the future.

## Environmental impact

Although it tends to be lower in priority than the financial or political issues, the environmental impact of the use of fossil fuels has become the most emotional portion of the debate. Scientists often differ about the exact causes and the effect that greenhouse gas emissions from the combustion of fossil fuels has on our planet. While the origins are often in dispute, there is no doubt that there is a concern with global climate conditions. The problem arises with public acceptance. As with many emotional issues, there people at each extreme, and the truth that lies somewhere in the middle.

In order to understand the science behind this aspect of the energy issue, we need to look towards the skies. Greenhouse gases (GHC) are gaseous components of the atmosphere that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation that is emitted by the Earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. Greenhouse gases are essential to maintaining the temperature of the Earth. Without them, the planet would be so cold as to be uninhabitable, and an excess can raise the temperature of a planet to lethal levels. It's not the presence of the gases, but the balance and proportions.

For decades, we have heard a variety of information about the greenhouse effect, or how we are damaging the ozone layer. Most of us have never really gotten a grasp on that subject, we simply accepted that our use of carbon-based fuels, and spray cans can damage our atmosphere. Over the past few years, we have a new term to be associated with the energy issue – carbon footprint, the measure of the impact that human activities have on the environment.

The most controversial aspect dealing with energy is carbon offsets. A carbon offset is a financial instrument that is supposed to represent a reduction in greenhouse gas emissions. One carbon offset should represent the reduction of one metric ton of carbon dioxide, or its equivalent in other greenhouse gases. For full disclosure, I need to state that I am not only very confused by this practice, but I am somewhat convinced that it is a financial scam, because the purchase of these credits only satisfies the guilt of one party, without any actual reduction in emissions.

There are two markets for carbon offsets – larger compliance market consisting of companies and governments, and the smaller voluntary market, made up of individuals, smaller companies, and other government agencies. Although these offsets are continuing to be sold, I have yet to find any proof that the mere act of paying someone that is using a lower volume of emissions has any reduction in the actual usage. For instance, if my neighbor and I should have identical carbon footprints, and I use 125% and he uses 75%, my purchase of his unused credits has only put money in his pocket without any actual reduction to the carbon emissions.

Carbon offsets, conservation efforts, recycling, and other activities are often called being “green.” This term has been blended into our culture and is now become part of our energy lexicon. While conservation, recycling, and similar programs are very important, the issue we are dealing with is energy independence through the use of alternative energy sources. We must reduce and eventually eliminate our dependence on foreign sources of oil that we import from regions and nations that don’t like us very much. We can also do this while protecting our environment.

A realistic energy plan not only addresses the need to transition to American resources, but also promotes the use of renewable energy from wind and solar, biomass, as well as other technologies. This is very important because of the fact that these alternative energy sources also have much less impact on the environment, some with no harmful effects at all. This plan should recognize that there will be some time needed to get our wind turbine farms and solar panel arrays available for producing the needed volume, and that we bridge that gap with clean coal technology, the use of CNG powered vehicles, and the use of hydrogen and battery power.

While some methods are several years from being perfected for our use, CNG, wind, solar, waste-to-energy (WtE), and biomass energy generation, are technologies that have been in use for 40 or 50 years, and continue to be improved. Other forms of alternative energy are not only promising, but practical uses are close by. According to the World Energy Council, the U.S. sits on the largest reserves of oil shale (technically a fossil fuel, but definitely an alternative source), or about 62% of the world’s deposits. The total world’s volume of oil shale can produce as much as 3.3 trillion barrels of oil shale, significantly greater than the known global oil reserves of 1.7 trillion barrels.

Battery powered vehicles are currently being used in California, but the low number of recharging locations is still being addressed. New advanced battery technology is also very close, allowing us to use these state of the art power sources in mid and heavy duty vehicles.

This is where American Alternative Energy Group’s V-III™ vortex combustion technology can play an important and immediate role in addressing our current energy needs and environmental concerns. Whether used for waste programs such as municipal, industrial, medical, or even landfills, or for non-waste applications such as woody biomass, our technology offers a unique opportunity to generate truly 100% American green energy technology today. When you hear elected officials and other groups talking about how much we are doing towards American renewable energy programs, keep this in mind: The majority of the technology and manufacturing jobs for currently available renewable energy is overseas – 60% of wind turbine technology; 80% of solar panel technology, and a whopping 100% of CNG technology.

Although there is much to be done to achieve an effective energy policy, this is an exciting time in America, if we just look at the issue with an open mind. Our most powerful natural resource is our people. We have the creativity and the ingenuity to solve any problem that comes before us. We **can** solve this crisis, and we **will** solve it.