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Green Gas Stations: A Guide for Tribally Owned Gas Stations

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The DOE's Tribal Energy Program provides financial and technical assistance to tribes for the evaluation and development of renewable energy resources on tribal lands.

As building knowledge and skills is essential to developing, implementing, and sustaining energy efficiency and renewable energy projects, the program also offers education and training opportunities provided to Native American college students as they work toward potential careers in renewable energy and energy efficiency positions.

Guide to "Going Green" for Tribally-owned/operated Gas Stations in New Mexico

"Going green" is making its way across the country. In fact, many individuals, commercial businesses, and just about everything and everyone are "going green."

But, what does it mean to be "green" and what can gas station owners and operators do to be "green gas stations"? And most importantly, what does being a green gas station actually entail?

This report will serve as a quick guide for tribally-owned gas station businesses located in New Mexico. This report is also an overview for those who want to learn more about making their gas station a green gas station, but don't know where to start.

The information was compiled from various sources including information acquired from the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA). There are many websites full of information and several website addresses and links are included throughout the document for your convenience and further research.

What is a "Green Gas Station"?

Essentially a "Green Gas Station" is a gas station that operates above and beyond environmental regulatory requirements. It is about changing the way your business operates to help protect the natural environment and ensuring it is there for future generations. It requires commitment from the top down (owners, facility managers, and employees). Going green involves a change in thinking, a change in doing business, and a change in lifestyle.

Going green isn't about requirements. Rather, going green is about what you are willing or able to commit to. Fortunately, the parameters for greening a gas station is wide open, including installing renewable energy technologies such as solar photovoltaic panels or small-scale wind systems, selling local, organic, or recycled products that will reduce impacts on the environment, and much more. What you do is up to you. Keep in mind: going green means that you are actively seeking ways to reduce your business's impact on the environment and preserving the environment for future generations.

What are some of the economic benefits of Going Green?

- Becoming independent of fuels such as oil, which can spike in price or even become more heavily regulated
- Achieving cost savings from energy reductions
- Becoming a viable place for advancing and alternative fuels
- Attracting new and interested stakeholders and patrons

I want to go green! What do I need to do?

Basically, making your gas station "Green" can be achieved by looking at the following areas:

- Alternative Fuels/Emissions Reduction – Converting to or making available alternative fuels such as biodiesel and ethanol.
- Energy Efficiency – Energy efficiency involves the reduction of energy usage of a facility and its operations.
- Renewable Energy – Incorporating alternative energy sources such as solar, wind, or geothermal for the facility and its operation.
- Resource Conservation – Reduce, reuse, and recycle! Through resource conservation, your gas station can help in preserving natural resources by reducing the amount of waste generated, reusing storm water runoff for landscaping around your gas station, and providing recycling bins for customers, for example.

As you can see, there are a number of simple and economically affordable ways to go green. However, some options for going green can be quite substantive and expensive. The following is an overview of a variety of ways to go green.

Alternative Fuels/Emissions Reduction

BIOFUELS

One way to green a gas station is to consider selling alternative fuels such as biofuels (biodiesel and ethanol). These biofuels are cleaner burning and substantially reduce greenhouse gas emissions into the atmosphere. More environmentally friendly fuel alternatives help reduce or even prevent greenhouse gas (also called GHG) emissions which contribute to overall climate change on the Earth. These biofuels are made by converting biomass such as corn or animal fat into liquid fuels. These fuels can be used as replacements or additives for gasoline or diesel.

BIODIESEL

Biodiesel is an alternative fuel that is produced from agricultural crops such as soybeans or canola but can also be made from various other oils such as animal fats. Currently, most biodiesel in the United States is produced from soybean oil, but animal fats from

processing plants or recycled grease from restaurants are also used. Biodiesel contains no petroleum, but can be blended at any level with petroleum diesel to create a biodiesel blend. A blend of 20% biodiesel with 80% petroleum diesel is known as B20. Low level biodiesel blends such as B2-B5 are a popular fuel in the trucking industry because biodiesel has good lubricating properties. In fact, biodiesel can be used in compression-ignition (diesel) engines with little or no modifications. Therefore usage of these blends can be beneficial for engine performance. And, biodiesel has virtually no sulfur content, making it a popular additive for low- and ultra-low-sulfur diesel fuels required by the U. S. Environmental Protection Agency.

In New Mexico, there are currently only nine gas stations that sell biodiesel. The map (Figure 1) shows the location of gas stations that provide biodiesel throughout New Mexico.

The table below (Table 1) lists these businesses and the blends of biodiesel provided for sale.

Figure 1: Map of State of New Mexico

Name	Address	City	Blend
Amigo Mart	1229 Cerrillos Road	Santa Fe	B20
Amigo Mart/Baca Street Biofuels	1229 Cerrillos Road	Santa Fe	B20
Every-Ready Oil	1200 1st Street NW	Albuquerque	B20
Love's Country Store #22	703 South 1st Street	Clayton	B5
Love's Travel Stop #210	2200 6th Street NW	Albuquerque	B5
Love's Travel Stop #262	1900 Mountain Road	Tucumcari	B5
Love's Travel Stop #329	4700 Mabry Drive	Clovis	B5
Nambe Falls Travel Center	17730 US 84/285	Santa Fe	B20
Rio Valley Biofuels, LLC	1940 Anthony Dr.	Anthony	B99

Table 1: Gas Stations Selling Biodiesel

As shown above, there are very few gas stations selling biodiesel and there is room for more in New Mexico's market. If you are interested in selling biodiesel, the following website will have the latest listing of the biodiesel marketers and producers throughout the United States.
http://www.biodiesel.org/buyingbiodiesel/producers_marketers/default.aspx

Additionally, if you are considering selling biodiesel, please check with your local environmental regulatory agency about underground storage tank (UST) requirements for biodiesel blends. However, a good rule of thumb is to ensure that the UST is compatible with the biodiesel; and as with any UST, you must ensure there is corrosion protection, leak detection, and spill and overfill prevention. The website below offers additional guidance on tank conversion; please go to:
http://www.epa.gov/oust/altfuels/biocnvrt.htm.

Ethanol

Ethanol is also an alternative fuel that is produced from biomass. Ethanol is a clear, colorless alcohol and is made from starches or sugars found in various agricultural crops, such as corn, barley, and sugar cane, or from cellulosic residues from woody biomass such as bark or switchgrass. In recent years, the usage of ethanol has gained market share due to the Renewable Fuel Standard requirements of the Energy Policy Act of 2005. Today, a little more than half of the gasoline in the United States has some amount of ethanol blended into it, and these blends are named by their ethanol content; a blend of 90% gasoline and 10% ethanol (by volume) is known as E10. And, likewise, a blend labeled E85 is 15% gasoline and 85% ethanol. Like biodiesel, ethanol-gasoline blends burn cleaner and emit fewer GHGs. For more information on Ethanol blends go to http://www.afdc.energy.gov/afdc/ethanol/.

Studies have estimated that ethanol and other biofuels could replace 30% or more of U.S. gasoline demand by 2030. Table 2 below shows the current gas stations and locations throughout New Mexico that use or offer an E85 blend. Currently, most gas stations selling Ethanol-gasoline blends are in the Midwest, but increasingly gas stations across the country are offering this alternative fuel.

Name	Address	City	Type of Access
Ever-Ready Oil Company	1200 1st Street NW	Albuquerque	Public - credit card after hours
City of Albuquerque	1801 4th Street	Albuquerque	Private - government only
Kirtland Air Force Base	3300 Lowry Ave SE	Albuquerque	Private - government only
Sandia National Laboratory		Albuquerque	Private access only

White Sands Test Facility		Las Cruces	Private - government only
Pic Quik #72	4675 Sonoma Ranch Blvd	Las Cruces	Public - see hours
Nambe Falls Travel Center	State Highway 285/84	Pueblo	Public - see hours
Amigo Mart	1229 Cerrillos Road	Santa Fe	Public - credit card after hours
Nambe Falls Travel Center	17730 US 84/285	Santa Fe	Public - see hours
Amigo Mart	4354 Cerrillos Road	Santa Fe	Public - see hours

Table 2: Gas Stations Selling E85

Once again, there is a clear and open market for selling ethanol-gasoline blends in New Mexico. Like biodiesel, the market is projected to grow. More and more gas stations across the country are adding ethanol to their product line. For more information about marketers and suppliers of ethanol and a comprehensive guide on the storage and handling of ethanol, please go to http://www.e85fuel.com/promoitems/forsuppliers.php.

In general, when converting from gasoline to an ethanol-gasoline blend, you are strongly urged to consider the compatibility of the tanks with ethanol and the absolute removal of water from the tank. Ethanol is highly soluble in water and can contribute to the corrosion of a UST. The following website offers a wealth of information and guidance about the conversion of a gasoline UST to an ethanol-gasoline blend UST or the installation of a new UST.
http://www.afdc.energy.gov/afdc/ethanol/fueling_options.html

Reducing Vapor Gas Emissions

According to the California Air Resources Board, hydrocarbon emissions from gasoline USTs can result in ozone-forming smog and health-related problems. Although many newly constructed gas stations have these installed, an effective way to reduce gasoline vapor emissions from escaping into the open air from underground storage tanks is to install pressure vent valves.

For the customer, providing a low emission gas can or portable fuel container (PFC) will prevent the release of hydrocarbon vapors into the atmosphere. The California Air Resources Board notes that a significant amount of hydrocarbon vapors are released into the air on a daily basis from gas cans--nearly 87 tons a day in California. Furthermore, low-emission gas cans or PFCs can prevent small spills and leakage. For more information on low-emission gas cans go to the following website:
http://www.arb.ca.gov/consprod/fuel-containers/pfc/pfc.htm

Energy Efficiency

Another great way to be a green gas station and save your business a little money is to consider having the facility audited. An energy audit will help your business conserve energy. A thorough assessment of your gas station facility might reveal a number of ways to reduce your facility's energy usage. Your local utility provider may offer a free energy audit or have recommendations as to how you can perform your own assessment on your business. Some utility providers offer rebates for upgrading your building or buying more energy efficient appliances and other incentives. Contact your local utility provider to see what you're eligible for. You can also consider having a consultant perform the audit for a fee. There are a number of private consultants who can help you assess your energy usage and identify ways to reduce energy waste and improve your business's overall energy efficiency.

Additionally, if your gas station includes a convenience store, definitely consider the following:

- Assess, replace, or upgrade your building's heating and cooling systems and the water heating for the building (particularly if your facility is a travel center and offers shower facilities).
- Assess, replace, or upgrade refrigeration and/or freezer appliances. Nearly half of the energy consumption of a convenience store is due to refrigeration. Replace refrigeration and freezer appliances with Energy Star-rated or energy efficient commercial appliances. To learn more about Energy Star and other energy efficient appliances you can go to http://www.energystar.gov. For specific information on commercial refrigerators and freezers and other commercial-grade appliances, go to http://www.energystar.gov/index.cfm?c=commer_refrig.pr_commercial_refrigerators
- Consider installing waterless urinals and dual flush commodes
- Assess, replace, or upgrade the lighting of your facility, both indoors and out (parking lots and at dispensing stations). Change out any incandescent light bulbs to compact fluorescent light bulbs. If your building already has fluorescent lighting but is older, consider upgrading your indoor lighting system to newer, more energy efficient fluorescent lamps and ballasts.
  For example, Public Service of New Mexico (PNM) recommends the replacement of T12 fluorescent lamps with newer T8 fluorescent lamps. The T12 lamp uses more energy and the T8 lamp, which produces the same amount of lumens as a T12, uses less power. Another benefit of switching to the T8 is that it appears brighter due to the fact that it has a higher "surface brightness" and a higher color-rendering index than the T12. This can provide even more savings because it may be possible to reduce the number of lamps.

Another new and emerging alternative to fluorescent lighting is LED lighting. LED lighting can be even more energy efficient than fluorescent lighting and have a substantially longer life, nearly 2.5 times longer than a compact fluorescent light and 25 times longer than incandescent light.

Additionally, LED and fluorescent lighting fixtures generate less heat than incandescent lights; therefore, both LED and fluorescent can reduce building cooling costs in the warmer summer months. Again, for more information on LED lighting and other energy efficient lighting alternatives go to http://www.energystar.gov/index.cfm?c=business.bus_index.

Consider using daylighting if your roof system is compatible. Use appropriate shading for windows facing north, and making sure that southern exposure windows are uncovered to take advantage of any solar gain. This includes eliminating any overhand that shades those windows. Also, certain flooring (such as brick or concrete) is amenable to capturing and storing heat from sunlight.

A "green" roof or a roof garden can also help to reduce energy use and costs. Green roofs consist of a vegetative layer of plants that help to remove heat from the air through evapotranspiration. Some green roofs can support trees and the additional shading helps to reduce the building temperature. Further, the reduction in surface temperatures of the roof can equate to reduced energy costs as excessive cooling of the building isn't necessary. In the winter months, green roofs absorb heat and act as insulators for buildings, thus further reducing energy costs for heating. For more information on green roofs visit the following website: http://www.epa.gov/heatisland/mitigation/greenroofs.htm

Renewable Energy Sources

Currently, the United States primarily depends on fossil fuels such as oil, natural gas, and coal to supply its energy needs. In fact, fossil fuels account for more than 85% of all the energy sources (coal for electricity and oil for transportation uses) that we use in the U.S. But fossil fuels are non-renewable and will one day run out. For years we have known this and slowly there has been a growing interest (even more so today) in alternative energy sources. In particular, one of these alternatives is renewable energy.

Renewable energy resources are constantly replaced and will never run out. Therefore, implementing renewable energy sources such as wind or solar to power the operation of the gas station can be another option to pursue in greening a gas station.

The following sites are extremely comprehensive and can provide answers to your questions about renewable technologies, particularly for those who are new to the alternative energy arena. Nonetheless, below is a brief overview of solar photovoltaic (PV), passive solar design, solar water heating, and wind energy.

- Photovoltaic (solar cell) systems: Solar energy is a truly fascinating way to save money and energy. It can be a reliable and pollution-free producer of electricity. There are a number of PV solar systems to choose from, but an onsite evaluation of your facility will need to be performed. Research shows that other gas station facilities that have opted to install PV solar systems have elected to install the arrays as part of the canopies. Others have mounted PV solar panels on the roof. http://www1.eere.energy.gov/solar/photovoltaics_program.html

- Passive Solar Design: Building orientation such as south-facing entrances, windows, walls, floors, or landscaping (placement of trees) can all help in maintaining a building's temperature. Using solar energy to help heat in the winter is another example. In the summertime, the same elements act to keep heat from penetrating the building. This can translate into lower heating and cooling costs. http://www.energysavers.gov/your_home/designing_remodeling/index.cfm/mytopic=10250

- Solar Water Heating: Using the sun to heat water is an exciting way to save and has economic payoff. Solar water heaters are manageable systems to install and maintain. And, if your gas station is also a travel center that offers shower facilities, this may be a great alternative to other conventional water heating systems. Solar heating systems are generally composed of solar thermal collectors, a fluid system to move the heat from the collector to its point of usage. The system may use electricity for pumping the fluid, and have a reservoir or tank for heat storage and subsequent use. The systems may be used to heat water for a wide variety of uses, including home, business and industrial uses. Heating swimming pools, underfloor heating or energy input for space heating or cooling are more specific examples. In many climates, a solar heating system can provide up to 85% of domestic hot water energy, so it would be a definite asset at your green gas station. http://www1.eere.energy.gov/solar/sh_basics_water.html

- Wind Energy: Wind energy is becoming one of the most popular alternative forms of energy generation. It is particularly attractive for homeowners and small businesses in rural and remote areas. Wind energy has the potential to significantly help in the reduction of electricity costs. If your locale meets minimum wind energy standards, installing a wind turbine can help reduce electricity costs for your station and can also serve as an attraction, thus drawing more like-minded customers to your business. http://www.awea.org/smallwind/toolbox2/drawer_1_installation.html

Resource Conservation

Recycle, Reuse, Reduce

A relatively simple way to green a gas station is to provide recycling bins for customers. Plastic bottles, glass bottles, aluminum cans, paper and other plastics are now all recyclable and do not need to end up in a landfill. Here in New Mexico, there are a number of recycling facilities in the greater Albuquerque/Santa Fe area that will take recyclables. For more information on recycling facilities, you can visit the New Mexico Recycling Coalition's website, which maintains a comprehensive list of facilities and other information on recycling. http://www.nmrecycle.org/nmoro.htm

Become Environmentally Proactive

Environmental landscaping, capturing rain in a Rain Garde, establishing a storm water collection system or even creating an educational 'kiosk' at your gas station can make a great difference not only to adults but to children, who are the future of "Going Green."

Buy and Sell Locally

Look at working with distributing companies that are green also. If possible, consider doing business with local distributing companies to reduce fuel and shipping costs and impacts to the environment. Set up agreements with local farmers or other small local businesses to sell their products or produce in your gas station.

A Ready Resource

www.doe.gov

In short, it's easy Being Green!