Volume 5, Special Issue, June 2018 ISSN: 2348-8565 (Online)
International Journal of Modern Engineering and Research Technology
Website: http://www.ijmert.org Email: editor.ijmert@gmail.com

National Conference on
Advances in Mechanical Engineering and Nanotechnology (AMENT2018)
29-30 June, 2018
Organized by
Department of Mechanical Engineering, University College of Engineering (A), Osmania University, Hyderabad, TS, India

The Effect on Environment with the use of Alternate Fuels

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ABSTRACT

Air pollution is a problem of growing importance and its long term effects have serious consequences. Air Pollution is the contamination of air by smoke and harmful gases, mainly oxides of carbon, sulfur, and nitrogen. All around the globe, air pollution is a part of day to day life. This type of pollution is usually invisible and the effects tend to occur over a long period of time, thus it is easy to forget how present this issue is in all of our lives. Air pollution is a huge worldwide issue. Air pollution is defined as the contamination of air by smoke and harmful gases, mainly oxides of carbon, sulfur, and nitrogen. These types of pollution generally can exist as exhaust, smog, factory emissions, or dust. In all over the world, the largest source of air pollution comes from the burning of fossil fuels in vehicles and factories. The combustion of fossil fuels is most often classified as incomplete combustion, which allows for the release of particulate matter into the atmosphere. This is the type of air pollution that is usually visible, such as that produced by a automobile tail pipe. Air pollution is both an environmental concern as well as a health issue. When pollutants are pumped into the air, they do not affect just the atmosphere but also can make their way into ground water and soil. Thus, air pollution can be harmful even to the most unlikely organisms such as plants, birds, fish and mammals. Humans too are no exception to these effects. Air pollution can cause horrible health conditions such as lung cancer, asthma and heart disease. Although pollution can affect anyone, young children and the elderly are at the highest risk for these problems. Air pollution can also affect the built world by degrading buildings and damaging important crops. It is clear to scientists that if humans continue to pump so many harmful chemicals and particulate matter into the atmospheric air, the issue of climate change will only continue to grow. The present work is aimed to study such

effects on atmosphere by u sing alternate fuels comparison to fossil fuels.

Keywords:—*Alternate Fuel, Environment, Air Pollution, Atmospheric Balance, Earth.*

I. INTRODUCTION

Air Pollution can be defined as anything that causes a reduction in purity. Therefore, air pollution can be defined as the reduction in purity of the air. (Air on Earth is what is contained in the atmosphere – the layer nearest to the Earth's surface.) Most of the Earth's air pollution is caused directly as a result of emissions from fossil fuels. The process of combustion (which occurs when a fossil fuel runs through an engine and is "burned" in order to create energy/heat) releases gases and minute particles (found in fossil fuels) into the air. All life on Earth depends on air for the basic respiratory processes. Plants, animals and humans all depend on balanced amounts of the following gases found in the air: oxygen (O_2), water vapor (H_20), and carbon dioxide ($C0_2$) – as a basic requirement of life. Since the gases and particles released from fossil fuel emissions are not naturally present in the air, they are, therefore, not compatible with the basic respiratory processes that all forms of life have developed over millions of years. When foreign substances are introduced into the air, it is obvious that the natural balance of life on Earth will be affected as the respiration processes of all life on the planet are not adapted to these "pollutant" gases. Gases released from fossil fuel emissions that cause the greenhouse effect are also polluting the air. Carbon dioxide, nitrogen oxides, and methane – the three most prevalent greenhouse gases – are also responsible for lowering the quality of the air that we breathe. Particulate matter, although not a greenhouse gas, is also an air pollutant released from fossil fuel emissions. Ozone is a gas that is created in the atmosphere by reactions between several of the gases released from fossil fuel emissions and is considered a pollutant because it is a powerful irritant to the human respiratory system. (Ozone gas, found in the lower atmosphere, is a completely different subject from the destruction of "ozone layer" which is located in the stratosphere.) Carbon dioxide, produced from fossil fuel emissions, is not a poisonous gas. It is, however, dangerous to the Earth's natural climate system because when excessive quantities are produced it forms a blanket in the lower atmosphere and traps harmful radiation from the Sun's rays near the Earth's surface. This occurs because CO_2 does not disperse into the upper zone of the Earth's atmosphere. Nitrogen oxides contribute to smog generation. Particulate matter is comprised of tiny particles that remain in the emissions of fossil fuels.

From the past years, Developed and also developing countries have begun to research and utilize different forms of fuel to reduce the amount of pollution produced by burning fossil fuels. These newly developed fuels include ethanol, biodiesel, natural gas, propane, and hydrogen. Each of these fuels has advantages and drawbacks, but all of them burn cleaner than fossil fuels. If the world can begin to depend less upon fossil fuels and more upon alternative energy sources, better health and air quality could be just around the corner.

II. WHY USE ALTERNATIVE FUELS

Environmental Damage Fossil fuel emissions from vehicles damage the environment and contribute to air pollution. Several major environmental problems most are caused by the use of fossil fuels : Global Warming, also known as the "Greenhouse Effect", is caused by an accumulation of carbon dioxide (CO_2) emissions that do not leave the Earth's lower atmosphere. CO_2 is the gas responsible for keeping the Earth's

climate warm because it abs orbs radiation that would otherwise leave the Earth's atmosphere and disperse into the upper atmosphere. CO_2, in moderate amounts, is necessary in order to maintain a certain temperature that supports life on Earth. However, an excess amount of CO_2 in the Earth's atmosphere is build up due to fossil fuel emissions that contain large quantities of CO_2. The CO_2 has formed a thick blanket that traps heat near the Earth's surface. As Fossil fuels are the largest producer of CO_2 emissions and the significant use of fossil fuels is thickening the CO_2 blanket over the Earth. This blanket traps ultra-violet (UV) rays (which are essentially heat) that have been originally received by the Earth from the Sun. The Natural Process of Heating and Cooling of the Earth's surface: UV rays coming from the Sun hit the Earth's surface and warm the Earth. These UV rays, after hitting the Earth's surface, should then be bounced back up into the atmosphere. The Greenhouse Effect: The unnatural accumulation of CO_2 in the lower atmosphere is forming a thick blanket that is preventing the second part of the natural process - UV rays leaving the Earth's atmosphere from occurring. The UV rays travelling from the Sun are able to penetrate the CO_2 blanket and arrive at the Earth's surface but they are unable to penetrate the CO_2 blanket after they are radiated back up from the Earth's surface. Therefore, they remain trapped near the Earth's surface and are constantly being bounced back and forth by the Earth's surface and the CO_2 blanket. It is important to note that the warming and cooling process of the Earth is a delicate process. The Sun's rays are the main source of warmth for the Earth's surface. However, these rays are extremely strong and are hot enough that they only need to have contact for a brief period with the Earth's surface in order to warm it. These rays, after hitting the Earth, are then supposed to bounce back into the atmosphere and this allows the Earth to remain at an optimal temperature that is comfortable for all life on the planet and ideal for the established global climate. With the occurrence of the CO_2 blanket and the accumulation of UV rays near the Earth's surface, the temperature on Earth is rising because the natural process of the rays only remaining long enough to warm the surface has been disturbed. The trapped UV rays are remaining near the Earth's surface and are burning human, animal and plant issue. This is reflected in the increased incidence of cancer among the world's population. The additional heat that is now being trapped near the Earth's surface is also causing a general rise in global temperatures and a melting of million year old glaciers. As a result, a significant increase in the water table is occurring. The increase in water tables mixed with heat is creating excess humidity in the Earth's lower atmosphere and this is causing an increase in heavy precipitation and storms. As a result, weather patterns are being affected. A shifting of weather patterns will cause storms, heat waves and droughts that will lead to possible crop failures and famines. Tropical diseases will increase due to the increase in temperature. Rising ocean and lake levels will lead to coastal flooding. The economy will be affected by all of this environmental disruption and the delicate balance of ecosystems will be disrupted resulting in the eradication of plant and animal life. All of this may sound very dramatic but it is not just a possibility – it is already taking place! We need to take immediate action to try and stop this process that we have set in motion.

Oil Spills : An oil spill is a major environmental disaster and it occurs when an oil tanker transporting oil to shore from an ocean-based oil rigs inks and the oil cargo is released into the ocean. An oil spill

can also occur when an oil rig, located in the ocean, accidentally leaks or explodes. It is also important to note that when an oil s pill occurs on water it is extremely difficult to prevent the oil from spreading. It is also impossible to clean up an oil spill that occurs in water. Pollution to oceans is extensive and countless fish, other valuable and beautiful forms of marine life, and coastal lines (where the oil eventually washes up) are disastrously affected. Oil spills may not appear to be a major threat to the environment because they normally occur in very remote areas. However, the oil that is released into the ocean from an oil spill spreads very far and affects large areas of ocean life. Eventually, the oil reaches coastal land and destroys the animal and plant life that are part of the coastal ecosystem. Oil is a toxic and poisonous substance. It is important to remember that oil is retrieved from deep below the Earth's surface. It is not meant to be exposed directly to the environment because human, animal and plant life, plus the natural functioning of the atmosphere, are not adapted to deal with the chemical composition of fossil fuels.

Acid Rain: This is an after-effect of the use of oil and coal. When oil or coal is burned through combustion in an engine, sulfur contained in the oil is released through the emissions of the combustion and produces gaseous sulfur dioxide. The amount of oil and coal used each day around the world produces a large quantity of sulfur as a result of the fuel combustion that takes place. Even though the sulfur content of fossil fuels is so low, millions of tons of sulfur are released into the air each year due to the heavy use of fossil fuels. Globally, sulfur dioxide emissions are about 100 million tons annually and are increasing due to sudden Third World industrialization. Acid rain occurs because sulfur dioxide and nitrogen oxide are released through fossil fuel combustion. Due to complex chemical reactions that take place in the atmosphere, sulfur dioxide is trans formed into sulfuric acid and nitrogen oxide is trans formed into nitric acid. These acids are found in rain clouds and disseminated back to the Earth's surface through precipitation (i.e. rain, snow). Polluted precipitation is acid-rich and is collected in groundwater and released into rivers, lakes and oceans. Not only does secondary pollution contaminate water on Earth, it also causes other harm to the environment such as the destruction of valuable forests (the acid in the precipitation "burns" trees and changes the sediment content of soils) and contaminates human-grown crops (through contamination of the soil). As well, fisheries and other animal life that create their habitat in/near water systems are affected because marine life cannot thrive in waters that are heavily acidic. This, in turn, affects other animals that rely on fish and water for sustenance.

Health Threat of Fossil Fuel Us e Carbon dioxide (CO_2) and nitrogen oxide (NO_x) are poisonous gases that are dangerous to humans when inhaled. These gases are produced mainly from mobile source emissions i.e. vehicle exhaust emissions. Exposure can result in upper respiratory illnesses such as asthma and emphysema. Increased rates of respiratory illnesses in urban centers, areas where fossil fuel exhaust emissions are highest have been documented for the pas t several years. Children and the elderly are the most susceptible to developing asthma and other respiratory illnesses as a result of exposure to fossil fuel emissions. Cases of asthma and respiratory illnesses are increasing at alarming rates among the entire population because of the increase in the concentration of carbon dioxide, nitrous oxide and particulate matter (PM). Particulate matter (PM) is released in fossil fuel emissions

alongside carbon dioxide (CO_2) and nitrogen oxide (NO_x).

When fossil fuels are used, their emissions contain residual chemical matter that is very, very fine. The smoke, also called soot, contains fine particles that are the result of chemical components being released from a substance called, fossil fuels. The worst type of particulate matter comes from coal and from diesel fuel. Dies el fuel, the cheapest and crudest form of gasoline, is the most hazardous fuel because it emits 10 times more particulate matter per mile than conventional gasoline engines. Particulate matter (PM) is essentially a mixture of solid particles and liquid droplets. These particles are so minute that we cannot see them but they are in the air that we breathe. They are dispersed through vehicle emissions and remain suspended at low levels, so that when we breathe, these particles enter our nose and mouth and become embedded in the deepest recesses of the lungs. Numerous scientific studies have connected particulate matter with the following health dangers such as Premature Death, Cancer, Acute Respiratory Illnesses such as asthma, chronic bronchitis, painful breathing, Shortness of Breath, Heart Disease, Lung Damage.

III. Types of Alternative Fuels

The major alternative fuel sources for the future will be: Natural Gas Natural gas, although a fossil fuel, is considered to be an alternative energy source because it is a preferable alternative to oil natural gas is a fossil fuel but it is different from gasoline, petroleum and coal because it does not contain the same harmful compounds found in other fossil fuels. Unlike gasoline, petroleum and coal, natural gas has negligible sulfur dioxide content, does not contain lead, and has low nitrogen dioxide content, a low particulate content and low carbon monoxide content. As well, natural gas does not require carcinogenic (cancer causing) additives to boost octane levels because natural gas is naturally high in octane. In addition, natural gas is still abundantly available which means that it is practical to rely on its continued supply for hundreds of years into the future. Natural gas has not been used very much and, as a result, abundant supplies still exist. Not only is natural gas plentiful in supply, it is also a clean source of energy. However, it is not renewable which means that supply, although plentiful at this time, will eventually be depleted. That is why it is so important to develop other sources of alternative fuels. Bio-Fuels from the natural gases found in plants and organic matter, Ethanol is the main bio-fuel used today. It is made from an alcohol derivative that is obtained from the cooking and fermenting process of grain usually corn. Most ethanol available is called E-85 and this is a combination of 85% ethanol and 15% gasoline.

Electricity is used to power vehicles by an electric motor. The electricity is provided to the vehicle by batteries that store electricity. These batteries are re-charged every day normally in the evening hours when the vehicle is not being us ed. The owner of an electric vehicle (EV) must recharge the vehicle from home using as mall re-charging station because, currently, no infrastructure for re-charging stations exists. The major limitation with EVs cannot be used for travelling long distances as there is difficulty in locating re-charging stations.

Hydrogen as an energy source for vehicles is s till being developed but is extremely promising. Hydrogen is a gas that can be created through electrolysis – the process of combing water and oxygen. Therefore, hydrogen is not only clean; it is also a renewable energy source, no fear of its

depletion. In a vehicle powered by hydrogen, hydrogen fuel cells are contained in the vehicle and are replenished with hydrogen, just as gasoline is replenished into the tank of a traditional vehicle. Consumers may even be able to fill up at home if an appliance that generates hydrogen is developed so that it is small enough and safe enough to store in a garage. No distribution system currently exists for hydrogen as a vehicular fuel source. This is because hydrogen powered vehicles are not being marketed to consumers at this time. The "Big Three" US auto manufacturers as well as the Japanese and Europeans are working to further develop and refine hydrogen powered automobiles. Once these vehicles are consumer ready, there will be development of a hydrogen distribution system.

Biodiesel is a fuel that is similar to diesel fuel which is derived usually from vegetable sources. Biofuels are made from biomass. Biomass is material from living or recently living organisms. Examples of biomass are grass, wood and algae. Both macro algae and microalgae are involved in the production of biofuel. The word biofuel means fuel that is made from biomass. Biofuel is a term used to describe biodiesel, bio ethanol which is used in petrol and methane gas which is found in biogas.

Biofuel feed stocks and other food and agricultural crops should be treated similarly. The environmental concerns over biofuel feeds tock production are the same as for the impacts of increased agricultural production in general; therefore measures to ensure sustainability should be applied consistently to all crops.

Good agricultural practices, such as conservation agriculture, can reduce the carbon footprint and the adverse environmental impacts of biofuel production just as they can for extensive agricultural production in general. Perennial feeds tock crops, such as grasses or trees, can diversify production systems and help improve marginal or degraded land.

IV. CONCLUSION

The production of different biofuels to reducing fossil-fuel consumption varies extensively when the fossil energy used as an input in their production is also taken into account. The fossil energy balance of a biofuel mainly depends on the factors such as characteristics feeds tock, production location, agricultural practices and the source of energy used for the conversion process. Different biofuels contributes differently in performance to reduce greenhouse gas emissions.

In some possible ways the Biofuel production can affect wild and agricultural biodiversity The first pathway for biodiversity loss is habitat loss following land conversion for crop production, for example from forest or grass land.

In general, wild biodiversity is threatened by loss of habitat when the area under crop production is expanded, whereas agricultural biodiversity is vulnerable in the case of large-scale monocropping, which is based on a narrow pool of genetic material and can also lead to reduced use of traditional varieties, many current biofuel crops are well suited for tropical areas. This increases the economic incentives in countries with biofuel production potential to convert natural ecosystems into feeds tock plantations (e.g. oil palm), causing a loss of wild biodiversity in these areas. While oil palm plantations do not need much fertilizer or pesticide, even on poor soils, their expansion can lead to loss of rainforests.

The second major way is loss of agro biodiversity, induced by intensification on croplands, in the form of crop genetic uniformity. Most biofuel feeds tock plantations are based on a s ingle species. There are also concerns about low levels of genetic diversity in grasses used as feeds tocks, such as sugar cane, which increases the susceptibility of these crops to new pests and diseases. Conversely, the reverse is true for a crop such as jatropha, which possesses an extremely high degree of genetic diversity, most of which is unimproved, resulting in a broad range of genetic characteristics that undermine its commercial value.

REFERENCES:

[1] Teresa M. Mata, Antonio A. Martins, Nidia. S. Caetano Renewable and Sustainable Energy Reviews 14 (2010) 217–232, ELSEVIER.

[2] Lalitesh Chaudhary, Priya Pradhan, Nishant Soni, Pushpendra Singh, Archana Tiwari International Journal of ChemTech Research April-June 2014

[3] Robert J. Winwood Recent developments in the commercial production of DHA and EPA rich oils from micro - Algae

[4] allaboutalgae.com/biodiesel/

[5] http://www.biomara.org/biofuel

[6] Jasim M. Salman1, Maysam A. Mohammed Ali2Asian Journal of Natural & Applied Sciences Vol. 3(3) September 2014

[7] M.H. Sayadi1, S. D. Ghatnekar, M. F. Kavian Proceedings of the International Academy of Ecology and Environmental Sciences, 2011, 1 (2):112 -124

[8] A Realistic Technology and Engineering Assessment of Algae Biofuel Production Energy Biosciences Institute University of California Berkeley, California, October 2010.

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