

The Effect of Smoke from Factories, Electricity Generator and Vehicles on Human Health and Environment. A Review

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Abstract

The environmental challenges that the world faces are to provide clean water and air which is crucial for human been, but they are under pressure due to the growing population and human demand on Earth's resources. The main influences of environmental and health of energy are examined by to the standard in which they happened. Almost most of the households of the world utilize solid fuels and oil (biomass and charcoal) for their daily living and main activities such as Transportation for vehicles, cooking and warming in natural appliances that result in large quantities of pollution of air that may be accountable about 4-5 % of the global encumbrance of illness. Major ecosystem influences associated with the production of charcoal and firewood harvesting. This review addresses the environmental effect of chemical in the structure of factory smoke; electricity generator exhausts gases, vehicle exhaust, and provides an overview of legislation limiting their maximum permissible emissions.

Keywords: Environment, Air Pollution, Transportation Vehicles Smoke; Factories; Exhausts Gases; Transport Phenomena, Emissions.

1. Introduction:

Because of the economic and technological developments around the world, request for energy is increasing significantly [1]. Harvester, handling, allocation, also utilize of fuels and other energy origins have significant environmental impacts. Insults involve main changes in land utilize because of cycles of fuel as coal, biomass and hydropower, which have impacts on the natural environment also the environment of human. Probably the most importance of insult from systems of energy is the habit and occasional pollutants emission. Actions of human distribute a assortment of bioactive and climatically energetic elements and compositions are dispersed in the atmosphere, surface water, and soil at averages far exceeding the natural flows of these materials [1]. Man causes comprehensive harm to the atmosphere, water, land, various environments' elements, and the ecosystem itself. There is much caused by human

being pollution and degradation of environmental that the next nightmare is sufficient stress to harm us all [2]. The meaning of the term “Pollution” is the preface by humans into the environment of materials or energy that may reason of risks to life of human, damage functional resources and environmental systems, disadvantage the structure or suitability, or interfere with the legal utilizes of the environment[2], [3]. In general the pollution of environmental can be distributing by: (1) Natural pollution which often pollutes the environment due to natural phenomena, as earthquakes, floods, drought, hurricanes, etc.; (2) Pollution resulting from actions of human. The pollution of environmental may be filed as well as: pollution of Air [4,5] , pollution of water [6], land pollution [7], food pollution, pollution of noise [2], [3] and pollution of radio-active [8-10], etc. unfavorable practices’ human on the planet result in the resources earth depletion and threaten the safety and continuity of life on this planet, and probably the most evident of these dangers and affecting the health of humans, animals, and plants is environmental pollution, mostly pollution of air resulting from industrial smoke, car exhaust and generators, The release of harmful chemicals and nuclear materials into the air, fires, and many others [4].In this paper we will cover a review summary about the resulting damages to the smoke of factories and generators and the accompanying pollution to the air and thus its negative impact on living organisms.

Today, most cities suffer from a lack of advance planning and meticulous engineering planning of road patterns in the cities, and a lack of environmental considerations, whether natural or human, which in turn lead to major or partial disruption of the traffic system within cities. There is no doubt that the risks of pollution increase, and the negative effects of which increase within cities, especially in congestion traffic street in which vehicles are forced to stop due to congestion or in front of traffic lights as it increases the risk of pollution. Also, there is another type of pollution beside the air pollution, and it is danger of high noise pollution which result from car engines, alarms, and motorcycles that roam the city streets which lead to severe psychological and health disturbances within cities. To reduce pollution in large cities, it is preferable to encourage public transport, as the use of public transport reduces 30% of air and noise pollution. The public transport is considered as the one of the means of sustainable transportation when planning and construction cities. As most developed countries, rely on public transport for environmental purposes, as well as to reduce road congestion and to ensure the provision of a safe and comfortable travel for passengers.

2. Air Pollution and Types of Air Pollutants:

Air pollution happen when particles of dust; gases; odour or smoke (or fumes) inserting through the atmosphere which produces it hurtful to all creatures. Pollution of air threatens human’s health and other living beings in our planet. It causes haze and acid rain, lead to occurrence illness of cancer and respiratory, minimizes the layer of ozone of atmosphere and share in warming of global. In the processing development, air pollution mayn’t removal totally, but gradually it may be reduced [11, 12].

An air’s material that may be hurtful to living creatures and the environment is familiar as a pollutant of air. The pollutants may take shape of solid particles, droplets of liquid, or gases. Additionally, they may be naturally or made by human [12], [13]. Pollutants may distribute as preliminary or secondary. Typically, the production of primary pollutants instantly from the process, like an ash resulted by a volcanic outbreak, gas of carbon monoxide from exhaust of vehicle or sulfur dioxide emitted by factories. Secondary pollutants are not released immediately. Instead, they formed in the air when preliminary pollutants react or interact [13]. A significant instance of a secondary pollutant is ozone on ground level

one of the many secondary pollutants that industrial photochemical smog. As well as contaminants are considered as preliminary and secondary: i.e., it release instantly and consists of other primary pollutants [13].

Main primary pollutants generated by effectiveness of human involve [11-14]: as Sulphur oxides, Nitrogen oxides (NO_x), Carbon monoxide (CO), compounds of Volatile organic (VOCs), Particulates, and others. Sulphur oxides (SO_x) that is the outcome from different industrial processes and it is one of the major outputs by fuels which causes air pollution. NO_x naturally generated by electric discharge, and the most prominent pollutants of air is NO_2 ; while CO is more likely from Vehicles exhaust. However, VOCs are a significant external air pollutant. In this domain they are usually split into sectioned classes of methane (CH_4) and non-methane (NMVOCs). Methane is highly effective gas of greenhouse that increases warming of global. Other hydrocarbon VOCs are also considerable gases of greenhouse through their function in the formation of ozone and in extending the methane's life through atmosphere, in spite of the impacts different consisting on goodness of topical air. Particulates, as another option point to as particles matter (PM), atmospheric particles matter, or fine particles, are accurate particles of solid or liquid hanging in a gas. In compare, aerosol point to both particles and the gas. Particles sources may be natural or manufactured. Some particles are occurring by natural, arising by volcanoes, dust storms, forest fires, grasslands, live plants and spraying of sea. Actions of human; as fossil fuels combustion in vehicles, power plants and different processes of manufacturing also produce considerable quantities of aerosols. By the globe averaged, anthropogenic aerosols those resulted by actions of human actually represent about 10% of the total quantity of aerosols in our atmosphere. High scale of fine particles in the air is related to hazards of health as illness of heart, altered action of lung and cancer of lung. Moreover, fixed free radicals attached to fine particles of airborne can result in heart and lung disease. Toxic metals, like a lead and mercury particularly their complexes. Odors result from sewage, garbage, and processes of industrial. In addition, particulates resulted from gaseous preliminary pollutants and complexes in photochemical smog. One of a type of pollution of air is smog; that is a source of smoke and fog. Classical smog is caused by the combustion of big quantities of coal in an area due to a smoke mixture and sulfur dioxide. Regenerated smog does not often result by coal; also from vehicle and industrial releasing that are acted on in the atmosphere by the light of ultraviolet from the sun to form secondary pollutants that also merge with the primary releasing to compose photochemical smog. On top of that, ground level ozone (O_3) it is caused by nitrogen oxides and volatile organic compounds. Ozone (O_3) is a major component of the troposphere; it is an important component of confirmed regions of the stratosphere familiar as the layer of ozone. The reactions of chemical and photochemical involved in them drive much chemical procedure that takes place in the day and night of atmosphere. At abnormal high concentrations resulting from actions of human (significantly fossil fuels burning), which is a pollutant and component of smog.

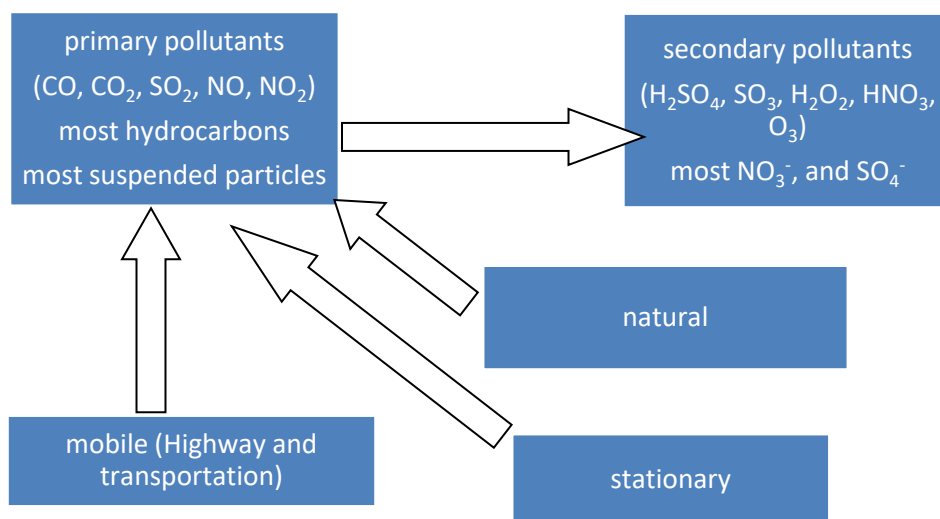


Figure 1. Sources and types of pollution of Air.

2.1 Pollutants Result from Factories, Electricity Generators and Vehicles Exhaust

Factories result beneficial outcomes, however they produce waste; too. Unluckily, owners of factory do not usually spread the waste safe mode. Factories sometimes set risky chemicals and other hazards substances through the air, water, and ground [7]. Pollution by waste of factory results in many real health troubles for all in the society, and when it flies in air and water, may also result in disease to people who live hundreds of a mile away that makes many people suffer from heart problems and even using pacemakers to regulate their heart plus [15]. The products of factory may be harmful to our health especially at they are designed in poor manner; or not allow to recycled or get rid of in safe mode [16]. The most pollutants of air from factory are gases of greenhouse by the combustion of fuels of fossil. The contribution of factories to pollution of water and the land is by acidifying rain, chemical spills and disposal of toxic waste [15, 16]. Many authors work on using sustainable material to remove wastes from the polluted water such as Broad Bean Peels [17], Orange Peel [18], Walnuts Shell [19], Lemon Peels [20-21] Rice Husk [22] sand media [23] Nano Zeolite [24] olive stone [25].

Pollution of air that hurts people may also harm other organisms. For instance, it can be caused by engine exhaust smoke of soot that covers the plant leaves and variation the way of plant growth, or cause production is less than the amount of fruit, or even death [26].

Pollution by factory waste results in many real health troubles for everyone in the society, and when it flies in air and water, may also result in illness for people who live hundreds of miles away. Factory products can be dangerous to our health when they are poorly designed or cannot be recycled or disposed of safely. Pollution of air that hurts people may also harm other organisms. For instance, it can be caused by engine exhaust smoke of soot that covers the plant leaves and change the way of plant growth, or result in production is less than the amount of fruit, or even death [26].

Electricity generators are utilized to produce power but then product releases of poisonous air pollutants like a Particulate Matter (PM) and Oxides of Nitrogen (NO_x) which are dangerous to peoples and the environment [27]; A result of the formation of fuel; an engine of diesel produces more NO_x than an

engine of gasoline. An engine of diesel produces nitrogen around 222 pounds/1,000 gallons; while an engine of gasoline produces fuel around 113 pounds/1,000gallons [28-29]. Both sources of pollutants contribute to an increase in the harmful impact of humans and other organisms, as these releases cause acid rain, level of ground of ozone and decreased vision [28]. Prolonged-exposure to fine particulate matter is considered extremely harmful because it is related by an increased prolonged risk of cardiopulmonary death by (6-13%)/ $\mu\text{g}/\text{m}^3$. Also, the part of black carbon of PM which produces by incomplete burning has harmful impacts on health and on climate [29]. According to WHO [30], It is estimated that the output of solid fuel burning smoke is accountable about 1.6 million deaths each year in the poorest countries of the world; it is a caused by insufficient burning which happens because of lack of oxygen [30].

Sulphur dioxide (SO_2) and Nitrogen Oxides (NO_x) are the major reasons of acid rain; it happens when these gases interact with water in the atmosphere, oxygen and other chemicals to configure different acidic complexes. Light of Sun result in high the average of common of these reactions. The outcome is a reasonable solution of sulphuric and nitric acids. These acids fall out of the atmosphere by wet (acidic rain or fog) or dry (acidic gases or particles) precipitation. General winds can blow the complexes resulting both wet and dry precipitation over hundreds of kilometers [31]. Acid rain does not often destroy trees instantly. In spite of, it is more similar to weaken trees by destroying their leaves, limiting the nutrients obtainable to them, or exposing them to dangerous materials slowly emitted from the soil. Completely oftentimes, damage or death of vegetation is the main impacts of acid rain in incorporation by further threats [32]. SO_2 and NO_x react in the atmosphere to create fine sulphate and nitrate particles that could transferred long range by winds and inhaled deeply through lungs of people. Many scientific studies connect high levels of these fine particulates to raised diseases and premature death from lung and heart troubles like an asthma and bronchitis [32].

3. Organizing against Factory, Electricity Generators Pollution and Vehicles Exhaust

When new factories were built near cities or villages, people welcomed the jobs they brought. , so no one concerned on pollution; but after a period, some people began having sick with cancer and other dangerous sickness. Smog emitted by factories represents a threat of existence to both of the health of human and environment. During the years various governments around the world having imposed measures to minimize the toxic level of releases from industrial procedure like a minimizing the quantity of hurtful chemicals utilized in these procedure and utilizing technologies to catch them before the entrance of chemicals through the atmosphere of Earth. For instance; China considered as a one of the largest world producers of carbon dioxide since 1990 [32].

Pollution that results by the factories smoke, and generators has a negative impact on biodiversity in the past two centuries and is still increasing globally, the impact most related to the lack of ecosystem services is the poisoning sites of environmental, where the ecosystem's organisms are destroyed due to the toxic origin of some pollutants; Since many toxic substances can function although by minimum exposure it is often impossible and economically feasible to element absolute pollution from the environment with new methods of technical [33, 34]. One of the ways to treat smoke pollution from factories and generators:

Green industries: Part of the government's effort to minimize industrial air pollution includes supporting or imposing renewable and sources of clean energy instead of coal and fossil fuels, for example about

85% of US energy produced by fuels of fossil more than from comparatively clean and renewable resources as solar energy or energy of wind, where other industries such as the generation of chemicals in factories may emitted gases of greenhouse likely to those in the sector of energy despite the presence of a large number of hazardous chemicals emitted as formaldehyde. As a new technologies allow these plants to utilize various materials and are potentially less hurtful, industries may find it difficult to utilize the favorable resources of environmental which given that it is considerably simple to utilize hurtful counterparts with a long history of industrial usage, other companies as such. It can outperform environmentally conscious companies economically [34].

Programs of Chemical isolation: Modern technologies, occasionally named "scrubbers", filter carbon from gases emitted through the processes of industrial. Then companies tracking this curriculum take isolated gases of greenhouse and site them in areas with less damage, such as deep underground. Scientists have not yet applied this tactic to other chemicals emitted by manufacturing. However, this manner is expensive and increasing the cost of goods of many consumer and services such as energy. Only spatial and temporal pollution can be effectively eliminated through efforts of human and these methods are already used in projects as the program of Superfund; which is a program perform by the Environmental Protection Agency (EPA) to have harmful pollution and restore contaminated places. Low in aquatic systems efficiently through efforts of human, as big areas are affected and thus should be removed by natural biodegradation [16], [17].

Transportations System: The lack of interest in the urban transport planning and studies in the city has a negative impact on making the urban transport network suffer from a clear rise in the rates of transport and traffic problems. Therefore, the most problem which is the traffic jams occurring in the main intersections, most of which are devoid of traffic signals, which is negatively reflected in the increase and the emergence of other problems that It comes in second place, such as traffic accidents and environmental pollution. This requires us, as researchers and specialists in urban transport studies, to develop immediate and future plans and strategies to address transportation problems in Iraqi cities to create sustainable urban transport in line with environmental standards.

So the gathering information about pollution from factories and other source must be taken as a sample for asking some questions around the area, or involving formal interviews and scientific studies [11].

4. Conclusion

1. The generality significant step is to share all the information about the type and the source of pollution in order to assess the severity of the pollution and its risks. However, we have to put in place rules that set strict regulations on manufacturing and dealing with energy supply and industry. Regulations should be projected to more reduce hurtful releases through the atmosphere of Earth in order to reduce the negative effects on the environment.
2. The using public transportation lead to reducing energy consumption and reducing environmental impacts by reducing congestion in residential neighborhoods and reducing exhaust emissions and fuel consumption due to congestion. In addition, achieving the high level of traffic safety, which includes reducing the number, severity and cost of accidents, reducing vehicle theft and reducing the number of deaths.
3. Therefore, sustainable transportation help passengers to travel easily and comfortably. Moreover, it is provided indications about country development in economic, social, and environmental.

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Reference

1. Rahman S., Mohammad R.I., Nasrudin A.R., K.H., Solangi. Environmental impact of wind energy. 2011. *Renewable and Sustainable Energy Reviews*. vol.15, pp.2423–2430.
2. Ramamohana R.A., Environmental Pollution Causes and Consequences: a Study. 2017. North Asian International research Journal consortiums. Vol.3, no. 8, pp. 151-161.
3. Mehta, A. and Hawkins, 'Integrated Pollution Control and its Impact: Perspectives from Industry', *Journal of Environmental Law*, 10(1), 1998, pp.65.
4. Murtadah, I., Al-Sharify, Z. T., & Hasan, M. B. (2020, June). Atmospheric Concentration Saturated and Aromatic Hydrocarbons Around Dura Refinery. In IOP Conference Series: Materials Science and Engineering (Vol. 870, No. 1, p. 012033). IOP Publishing.
5. Al-Mashhadani, S. H., Al-Sharify, Z. T., & Kariem, N. O., 2020. Investigating The Spread Of Coronavirus (Covid-19) At Airports And Methods Of Protection. *Journal of Engineering and Sustainable Development*, (Special), 38-44.
6. Rzajj, D. R., Al-Jaaf, H. J., Al-Najjar, S. Z., Al-Sharify, Z. T., Al-Moameri, H. H., & Mohammed, N. A. (2020, June). Studying the Concentrations of Nitrite and Nitrate of Tigris River Water in Baghdad and Their Suitability to the Conditions Permitted Internationally. In IOP Conference Series: Materials Science and Engineering (Vol. 870, No. 1, p. 012025). IOP Publishing
7. Hamad, H. T., Al-Sharify, Z. T., Al-Najjar, S. Z., & Gadooa, Z. A. (2020, June). A review on nanotechnology and its applications on Fluid Flow in agriculture and water recourses. In IOP Conference Series: Materials Science and Engineering (Vol. 870, No. 1, p. 012038). IOP Publishing.
8. Al-Sharify, Z. T., Faisal, M. L., Hamad, L. B., & Jabbar, H. A. (2020, June). A Review of Hydrate Formation in Oil and Gas Transition Pipes. In IOP Conference Series: Materials Science and Engineering (Vol. 870, No. 1, p. 012039). IOP Publishing
9. Al-Sharify, Z. T., Al-Sharify, T. A., Al-Sharify, N. T. & Naser H.Y (2020, June). A critical review on medical imaging techniques (CT and PET scans) in the medical field. In IOP Conference Series: Materials Science and Engineering (Vol. 870, No. 1, p. 012043). IOP Publishing.
10. Al-Sharify, N. T., Al-Sharify, Z. T., Al-Sharify, T. A., Al-Sharify, M. T., & Al-Sharify, A. T. 2020. A Technical Overview and Comparison between PET and MRI Scanning. *Systematic Reviews in Pharmacy*, 11(1), 35-41.
11. Philip, S., Martin, R.V., van Donkelaar, A., Lo, J.W., Wang, Y., Chen, D., & Macdonald, D.J. (2014). Global chemical composition of ambient fine particulate matter for exposure assessment. *Environmental Science & Technology*, 48(22), 13060-13068.
12. Anil J.S., Mutalik V.G, Chate V.R., and Siddu H., 2015. Air Pollution Monitoring & Control at Foundry Clusters in Belgaum- A Case Study. *Civil and Environmental Research*. Vol.7, No.5, pp. 63-69.
13. Air Pollution, M N Rao & H V N Rao, Tata McGraw-Hill, 2007.

14. Ambient air pollution: a global assessment of exposure and burden of disease. Geneva: World Health Organization; 2016
(<http://apps.who.int/iris/bitstream/10665/250141/1/9789241511353-eng.pdf?ua=1>, accessed 17 July 2018).
15. Al-Sharify, N. T., Rzaij, D. R., Nahi, Z. M., & Al-Sharify, Z. T. (2020, June). An Experimental Investigation to Redesign A Pacemaker Training Board for Educational Purposes. In IOP Conference Series: Materials Science and Engineering (Vol. 870, No. 1, p. 012020). IOP Publishing.
16. <https://sciencing.com/environmental-pollution-caused-by-factories-12071269.html>
17. Nadia Matter Almhana, Seroor Atallah Khaleefa Ali, Shahad Z. Al-Najjar and Al-Sharify, Z. T., 2020, Assessment of Cobalt Ions Removal in Synthetic Wastewater using Broad Bean Peels. Journal of Green Engineering, 10 (11), 10157-10173.
18. Lahieb Faisal M.A, Shahad Z. Al-Najjar and Al-Sharify, Z. T., 2020, Modified Orange Peel as Sorbent in Removing of Heavy Metals from Aqueous Solution. . Journal of Green Engineering, 10 (11), 1600-10615.
19. Rushdi S., Hameed K. K., Jana H & Al-Sharify, Z. T., 2020. Investigation on Production of Sustainable Activated Carbon from Walnuts Shell to be used in Protection from COVID-19 Disease. Journal of Green Engineering, 10 (10), 7517-7526.
20. Zainab Abdulrazaq, Salih Rushdi, Gadhban M. Y., Shahad Z. Al-Najjar, and Al-Sharify, Z. T. 2020. Possibility of Utilizing the Lemon Peels in Removing of Red Reactive (RR) Dye from Simulated Aqueous Solution. Journal of Green Engineering, 10 (10), 7343-7359.
21. Al-Qaisi, M. Q., Faisal, L., Al-Sharify, Z. T., & Al-Sharify, T. A., 2018. Possibility Of Utilizing From Lemon Peel As A Sorbent In Removing Of Contaminant Such As Copper Ions From Simulated Aqueous Solution. International Journal of Civil Engineering and Technology (IJCIET), vol 9, pp 571-9.
22. lahieb, F. M., Al-Sharify, Z. T., & Farah, F. M. (2020, June). Role of Rice Husk as Natural Sorbent in Paracetamol Sorption Equilibrium and Kinetics. In IOP Conference Series: Materials Science and Engineering (Vol. 870, No. 1, p. 012053). IOP Publishing
23. Al Jaaf, H. J. M., Al-Ubaidy, M. I. B., & Al-Sharify, Z. T. (2020, June). Removal of Cd (II) from polluted water by filtration using iron oxide coated sand media. In IOP Conference Series: Materials Science and Engineering (Vol. 870, No. 1, p. 012077). IOP Publishing
24. Gadhban, M. Y., Abdulmajed, Y. R., Ali, F. D., & Al-Sharify, Z. T. (2020, June). Preparation of Nano Zeolite and its Application in Water Treatment. In IOP Conference Series: Materials Science and Engineering (Vol. 870, No. 1, p. 012054). IOP Publishing.
25. Al-Sharify, Z. T., Faisal, L. M. A., Al-Sharif, T. A., Al-Sharify, N. T., & Faisal, F. M. A. (2018). Removal of analgesic paracetamol from wastewater using dried olive stone. Int. J. Mech. Eng. Technol., 9(13), 293-299.
26. Rogge WF, Hildemann LM, Mazurek MA, Cass GR, Simoneit BRT. Sources of fine organic aerosol. 6. Cigarette smoke in the urban atmosphere. Environmental Science and Technology. 1994. Vol.28, No.7, pp.1375–1388.
27. Stanek L.W., Attributing health effects to apportioned components and sources of particulate matter: an evaluation of collective results. Atmospheric Environment, 2011, 45:5655-5663.

28. Chameides, W.L. and E.B. Cowling, The state of the Southern Oxidant Study (SOS): Policy-Relevant Findings in Ozone Pollution Research, 1988-1994. North Carolina State University, April 1995.
29. Beelen R., Long-term effects of traffic related air pollution on mortality in a Dutch cohort (NLCS-AIR Study). *Environment Health Perspectives*, 2008, 116(11): 1480-1486.
30. ARI http://www.who.int/fch/depts/cah/resp_infections/en/print.html.
31. Tong Z., and Zhang K.M. 2015. The near-source impacts of diesel backup generators in urban environments. *Atmospheric Environment*. Vol. 109, pp. 262- 271.
32. Greene N., and Hammerschlag R., 2000. Small and clean is beautiful: exploring the emissions of distributed generation and pollution prevention policies. *Electr. J.* Vol.13, No.5, pp. 50-60.
33. "Actions You Can Take to Reduce Air Pollution", www3.epa.gov, Retrieved 23-3-2020. Edited.
34. "Air Pollution", www.epi.envirocenter.yale.edu, Retrieved 23-2-2020. Edited