

CHAPTER - 11

ENVIRONMENTAL IMPACT OF NATURAL GAS

Natural gas is the energy of the 21st century and it has worldwide reserves. It is not only a potential source of energy but also a clean fuel and is environmental friendly. The very nature and composition of the fuel is acceptable to domestic, commercial and industrial users. Moreover, it is not only the cheapest fuel, but also a boon to the atmosphere and environment, above all to the biosphere.

The proposed partner countries of AGG like Afghanistan, Bangladesh, China, India, Iran, Kazakhstan, Myanmar, Pakistan, Turkmenistan, Russia, etc. are all crippled by environmental pollution. All these countries will be interested to use natural gas from the environment's point of view.

Natural Gas and Pollution

Natural gas is the cleanest of all fossil fuels. It is predominantly methane, and after combustion produces carbon dioxide and water vapor. On the other hand, coal and oil with higher carbon ratio and higher nitrogen and sulfur contents release higher levels of carbon dioxide; nitrogen oxide and sulfur dioxide (refer Table 11.1). Moreover, coal and fuel oil also release ash particles into the environment and contributes more to pollution. Natural gas on combustion releases very small amounts of sulfur dioxide and nitrogen dioxides, no ash or particulate matter, and lower levels of carbon dioxide, carbon monoxide, and other reactive hydrocarbons.

(Pounds of air emissions produced per billion BTU of energy)

Pollutant	Natural gas	Oil	Coal
Carbon Dioxide (CO ₂)	117000	164000	209000
Carbon Monoxide (CO)	40	33	208
Nitrogen Oxide (NO)	92	448	457
Sulfur Dioxide (SO ₂)	1	1222	2591
Particulates	7	84	2744
Mercury	0.000	0.007	0.017

(Source: Energy Information Administration)

Table 11.1: Pollutants from NG and other fuels

Pollutants emitted out of fossil fuels, have led to many emerging environmental problems. Natural gas, being environmental friendly, can help to mitigate the following factors:

Greenhouse Gas Emission

Greenhouse effect is an environmental issue that deals with the potential for global climate change. There are certain gases in our atmosphere that serve to regulate the amount of heat close to the Earth's surface. These greenhouse gases i.e. water vapor, carbon dioxide, methane, nitrogen oxides, and chemicals like chlorofluorocarbons will translate into increased temperatures around the globe, and can result in many disastrous environmental effects. As per the study by the Intergovernmental Panel on Climate Change (IPCC), the global average temperature will rise by -16.4 to -12 degrees C (2.4 to 10.4 degrees F) within next 100 years.

The entire world is concerned about green house effect. One of the major contributors of green house gases is carbon dioxide. For example, 81.2 percent of greenhouse gas emissions in US in the year 2000 were due to carbon dioxide from fossil fuels. This can be which can be reduced drastically by use of natural gas.

Smog, Air Quality and Acid Rain

Smog and air quality play a crucial role in the environmental problems in cities. Smog, the primary constituent of which is ground level ozone, is formed by a chemical reaction of carbon dioxide, nitrogen oxide, volatile organic compounds, and heat from sunlight. Smog and ground level ozone contribute to respiratory problems and several health hazards. The use of natural gas does not contribute significantly to smog formation.

Particulate emissions also cause degradation of air quality. High air particulates not only add to health hazards but may also lead to premature deaths. Natural gas helps to reduce air pollution hazards, as emission of particulates from its combustion is 90 percent lower than that of fossil fuels.

Acid rain is another environmental hazard which damages crops, forests, loss of lives and causes illnesses in humans. Acid rain is formed when sulphur dioxide and nitrogen dioxide react with water vapor and other chemicals in the presence of sunlight to form various acidic compounds in the air. As, natural gas produces 80 percent less of these two gases, it controls acid rains.

Industrial and Electric Generation Emissions

The use of natural gas to power industrial boilers and processes and generation of electricity can significantly improve the emissions profile as compared to other fuels. Natural gas fired electric generation and natural gas powered industrial application offer a variety of environmental benefits such as: fewer emissions, reduced sludge, re-burning, cogeneration, combined cycle generation and fuel cells.

Pollution from Transportation Sector

The transportation sector (cars, trucks, buses) is one of the greatest contributors to air pollution. Emissions from vehicles contribute to smog, low visibility and various green house gas emissions. Natural gas used in the transportation sector drastically reduces the level of pollution as compared to petrol, diesel driven vehicles. There are fewer toxic and carcinogenic emissions form natural gas vehicles and virtually no particulate emission.

Details of the environmental benefits of using natural gas in lieu of coal in the proposed AGG are calculated as shown in Table 11.2 to 11.4 based on air emission data given in Table 11.1

Country	Gas Consumption per day from AGG (SCM)	Gas Consumption per day (billon BTU)	CO2 Emission per day in case of Coal (ton)	CO2 Emission per day in case of Gas (ton)	%Reduction in CO2 emission
India	140,000,000	5,555	527091	295070	44%
China	280,000,000	11,111	1054278	590194	
Pakistan	95,000,000	3,769	357625	200201	

(Note: 1 billion BTU = 25200 SCM)

Table 11.2 Reduction in CO2 Emission

Country	Gas Consumption per day from AGG (SCM)	Gas Consumption per day (billon BTU)	CO Emission per day in case of Coal (ton)	CO Emission per day in case of Gas (ton)	%Reduction in CO2 emission
India	140,000,000	5,555	524	100	81%
China	280,000,000	11,111	1049	201	
Pakistan	95,000,000	3,769	356	68	

Table 11.3 Reduction in CO Emission

Country	Gas Consumption per day from AGG (SCM)	Gas Consumption per day (billon BTU)	NO Emission per day in case of Coal (ton)	NO Emission per day in case of Gas (ton)	%Reduction in CO2 emission
India	140,000,000	5,555	1152	232	80%
China	280,000,000	11,111	2305	464	
Pakistan	95,000,000	3,769	782	157	

Table 11.4 Reduction in NO Emission

Conclusion

Natural gas is the energy of future for all countries the world over in view of

- (1) Reduced hazards to living organisms, plants, human life from fossil fuels including nonliving structures;
- (2) Abundant availability and
- (3) Cost economics.

These environmental compulsions would perhaps give birth to the AGG.