Mobil

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ATMOSPHERIC GREENHOUSE EFFECT: IS BURNING OF FOSSIL FUELS AFFECTING WORLD CLIMATE?

INTRODUCTION

In theory, increasing levels of carbon dioxide produced by burning fossil fuels could alter the world's climate by raising the earth's temperature. This warming might occur because carbon dioxide in the air acts like glass in a greenhouse--trapping the sun's heat at the earth's surface--heat that would normally escape back into space.

The "greenhouse" effect is an emerging environmental issue characterized by considerable scientific uncertainty. But, some scientists argue that plans to cope with the greenhouse effect need to be made soon, because of the extremely long lead time for any conceivable corrective actions. Such plans could affect the energy industry by dictating what fuels could be marketed.

This report summarizes the background and status of the greenhouse effect, indicating possible impacts on Mobil operations.

DISCUSSION

Plants consume carbon dioxide during growth, and release it back to the atmosphere when they decay. There is a relationship between carbon dioxide in the air and carbonate salts in the oceans. Before 1850, man had little influence on the carbon dioxide cycle. There appears to have been a balance between carbon dioxide in the air and carbon compounds in the land and seas.

However, since the industrial revolution human activities, such as fossil fuel combustion and forest clearing, may have altered the carbon cycle. The net effect of these activities could add carbon dioxide to the atmosphere more rapidly than it can be removed by oceans and plants. Since 1850, carbon dioxide in the air has increased about 18 percent--reaching a level today of 335 parts-per-million. The most reliable atmospheric carbon dioxide monitoring programs-- established in 1957--show an 8 percent increase in just

Some people, perhaps realistically, believe society cannot react in time to prevent major climate changes. However, they suggest that society will adapt to the changes that will occur over a 100 year period.

MOBIL ACTIVITIES

Given the current lack of knowledge, additional research is needed and government programs to study this issue should be supported. Mobil's response should be to follow these research developments. Mobil participates in API sponsored research projects to improve climate models. Corporate Environmental Affairs and Mobil Research and Development Corporation monitor research activities in this area, and Mobil participation in Conservation of Clean Air and Water-Europe keeps us informed of European thinking and approaches to this problem.

the past 25 years. Based on future world energy demand, many scientists believe that carbon dioxide levels could double within the next century.

The effects of such an increase are controversial. For example, using global climate theories, some scientists predict that a two-fold increase in atmospheric carbon dioxide could warm the earth's surface from 3° to 6°F. Temperature increases of 12°-18°F are predicted at the poles. If these estimates are correct, melting of the arctic ice packs could occur, and sea levels could rise 15 to 20 feet, inundating many of the world's coastal cities.

This large temperature change could bring on drought which might drop crop yield in the major grain growing areas of the northern hemisphere. On the other hand, the change in climate in equatorial and northern countries, where growing conditions are presently poor, could improve agricultural productivity. If these projections are accurate, Third World countries would have little incentive to control carbon dioxide emissions by restraints on fossil fuel consumption.

The scenario described offers one view of potential long-range climate impacts of increased carbon dioxide levels. But the climate response predicted by theory cannot yet be detected. Moreover, there are other plausible forecasts that suggest a completely different effect.

For example, some scientists say that more carbon dioxide will stimulate plant growth--partly offsetting projected warming trends. Still other scientists claim that more carbon dioxide will increase humidity and cloudiness, block incoming sun rays, and moderate the trend toward higher temperatures.

IMPACT ON INDUSTRY AND MOBIL OPERATIONS

The magnitude and timing of carbon dioxide-greenhouse effects could be closely tied to future energy consumption, with particular focus on coal and synfuels.

On an end-use energy equivalent basis, the production and combustion of coal and synfuels releases more carbon dioxide into the atmosphere than does production and combustion of natural gas or oil. Compared to oil, coal contributes about 25% more carbon dioxide, shale syncrude contributes about 25% more, and direct coal synfuel liquids contribute about 70% more. On the other hand, production and combustion of natural gas contributes about 25% less carbon dioxide than oil.

The greenhouse effect will continue to receive attention by government agencies charged with balancing energy and environmental policies. If the greenhouse effect should become an urgent national concern, restrictions on fossil fuel and land use might be established. Such restrictions could require changes in supply and distribution of oil, coal, and gas. Increased forest preservation could also be required.