Global climate change

Issues, impacts and solutions

Mobil The energy to make a difference

You probably are familiar with the current debate over global climate change. As you know, this is an issue that affects all of us as world citizens and as Mobil employees and shareholders. The products Mobil produces and markets — oil and gas — are at the center of debate on this sensitive issue.

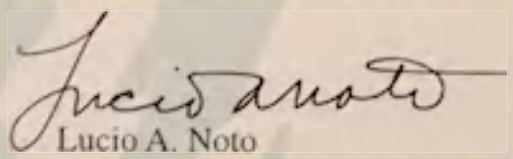
In December 1997, negotiators from more than 160 countries will be meeting in Kyoto, Japan. It is possible the industrialized nations will agree to a legally binding international treaty to reduce emissions of greenhouse gases — gases produced in part by the combustion of oil and gas. Such a treaty could have a severe impact both on Mobil's business and on the world's economy.

At Mobil, we take our environmental stewardship seriously and believe there is potential reason for concern about global climate change. But we also believe there isn't enough reliable information yet to justify taking the drastic actions that some other parties in this debate are contemplating.

Yet, despite the uncertainty, we're taking action. In the course of our business operations, Mobil is already taking many voluntary steps to reduce the levels of greenhouse gases in the atmosphere. This brochure describes some of these steps, explains the facts about global climate change, and illustrates the consequences of a treaty with binding targets and timetables.

I hope that reading this brochure will give you an appreciation for the seriousness of the global climate change debate. You can participate in the policy debate by discussing it with your family and friends, and contacting your senators and representatives in the U.S. Congress or the policy-makers in your country.

Mobil has been and will continue to be a leader in environmental protection. Climate change proposals, however, should be dictated by sound science and economics. Please take the time to read this brochure and enter into the policy debate.



Lucio A. Noto

Chairman, President and Chief Executive Officer

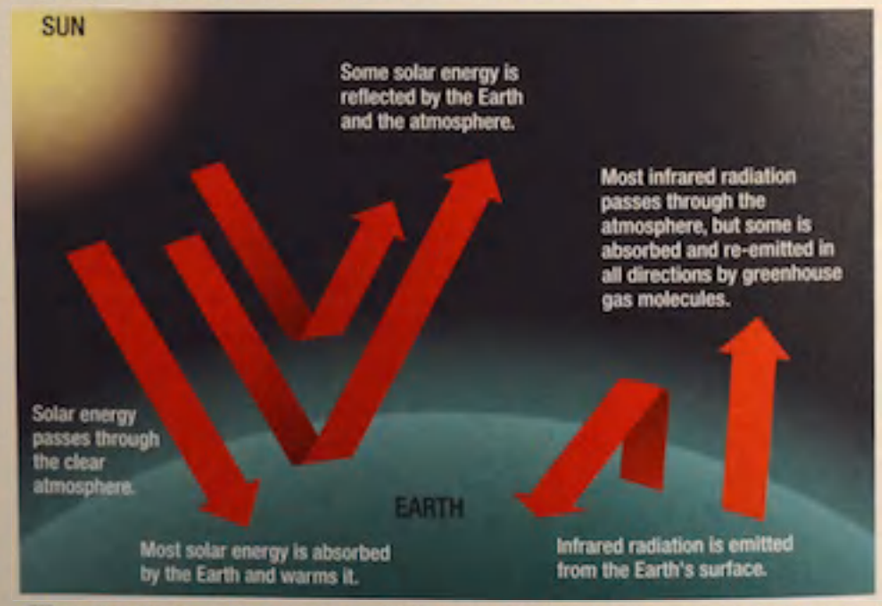
The issue of global climate change has tremendous meaning for Mobil. As a world leader in the energy industry, Mobil makes and markets products—oil and natural gas—that are at the center of the debate on this sensitive issue. Legally binding agreements to reduce emissions of greenhouse gases could have a serious negative impact not just on Mobil's businesses but on the world economy as a whole. That's of vital significance to all of Mobil's stakeholders—especially the 43,000 employees and thousands more contractors and business partners.

The issue of global climate change also involves more than business imperatives; it touches very important quality-of-life issues on the planet we share. This booklet is intended to offer a picture of this complex issue, what's at stake and what Mobil is doing to affect the outcome.

What is global climate change?

Various gases—among them water vapor, carbon dioxide, methane and nitrous oxide—have the ability to trap heat in the atmosphere, producing a phenomenon known as "the greenhouse effect."

Most of these gases occur naturally, and the natural greenhouse effect is what keeps the Earth warm enough to sustain life. In fact, carbon dioxide, which is at the center of the debate, shouldn't be considered a pollutant. Without it, life on Earth would not be possible. Certain human activities, however, increase the concentration of greenhouse gases; for example, when we burn fossil fuels—coal, oil or natural gas—we emit carbon dioxide.

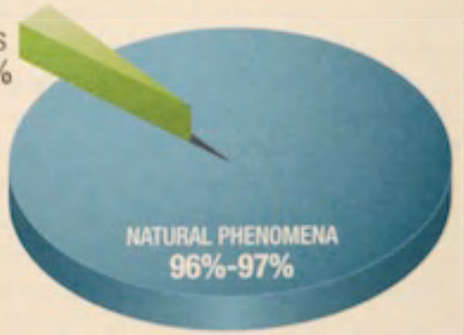


The greenhouse effect occurs when gases like carbon dioxide trap heat in the atmosphere.

As a result, scientists and policy-makers have increasingly begun to focus on the small percentage of greenhouse gases that are produced by human activities. Their concern is that we may be increasing the natural greenhouse effect and changing our climate in significant and potentially harmful ways.

Carbon dioxide emissions

Carbon dioxide is the most significant of the man-made greenhouse gases, contributing 60 percent to the total human contribution to the greenhouse effect. (Methane and nitrous oxide contribute smaller amounts.) Virtually all the debate on controlling greenhouse gases has focused on limiting carbon dioxide emissions.



As the chart indicates:

- Ninety-six to 97 percent of all carbon dioxide emissions come from natural phenomena such as plant decay and respiration — about 190 billion metric tons of carbon a year.

- Human activities account for only 3 to 4 percent of total emissions — around 7 billion metric tons of carbon per year. Most of this (roughly 6.2 billion metric tons) results from the combustion of fossil fuels; the rest is from deforestation.

- Mobil's products and operations (oil and gas) represent a very small fraction of the total man-made carbon dioxide emissions.

Since the Industrial Revolution, human activities have increased the concentration of carbon dioxide in the atmosphere by more than 25 percent. Carbon dioxide emissions are projected to grow to 20 billion metric tons of carbon per year by 2100. Most of this growth will come from developing countries, as nations such as China, India and Brazil increase their populations and industrial capacities.

Some of this increase in carbon dioxide will be absorbed by plants and oceans, but roughly half is projected to accumulate in the atmosphere, raising the atmospheric concentration of carbon dioxide from its current level of about 360 parts per million to more than 700 parts per million.

Are we really changing our climate for the worse?

Unfortunately, the answer is far from clear. Various computer models have predicted that if humanity continues to emit greenhouse gases at the projected rate — which increases every year — by 2100, the average global temperature could rise by 1.8 - 5.4 degrees F (1 - 3 degrees C) and sea level could rise by 6 - 37 inches (15 - 95 centimeters).

The range of these estimates indicates both uncertainty about the input and the differences among the current climate models. While these models incorporate the best available scientific information, they have some built-in limitations, including the use of "correction factors" many times larger than the changes they are trying to measure. It is clear that further research will be needed to enhance the scientific understanding of the Earth's climate systems and to understand the interaction of these systems with greenhouse gases.

What is Mobil doing?

Mobil believes there is potential reason for concern regarding the buildup of greenhouse gases. As a result, we voluntarily have initiated several measures both to reduce emissions and to gain a better understanding of the impact of increased emissions on the climate. Steps like these allow for emission reductions to be realized while very important scientific initiatives are undertaken.

Mobil's concern about current climate change proposals reflects our understanding of the situation, and our actions reflect our responsibility as corporate citizens. Despite current scientific uncertainty, Mobil is taking steps now. These efforts include:

- **Reducing emissions at Mobil facilities.** Mobil has installed energy-saving technology at refineries, undertaken energy management audits, and worked to reduce gas flaring in our offshore producing fields and to eliminate methane leaks. We are also participating in government-sponsored programs to promote energy savings through lighting upgrades and systems that maximize energy efficiency in our office buildings. Our work is clearly paying off: In the last three years, Mobil has cut its carbon emissions by more than 1 million metric tons, and we're committed to accelerating the pace of our reductions.

- **Helping customers use energy more efficiently.** Since 1990, the use of Mobil synthetic lubricants has improved engine efficiency and reduced vehicle carbon emissions by 1 million metric tons.

- **Funding research.** During the past five years, we have added to the science and economics of climate change by sponsoring research at such institutions as the Massachusetts Institute of Technology (MIT), Columbia University, the Harvard-Smithsonian Astronomical Observatory and the Australian Bureau of Agricultural and Resource Economics.

- **Improving technology.** Through business/university consortia, we are supporting the development of refining and hydrocarbon fuel technologies that will provide higher process efficiency and lower emissions.

- **Supporting reforestation projects.** Working with leading conservation groups, Mobil will underwrite several projects around the world to protect and plant trees. Trees absorb significant amounts of carbon dioxide.

We are proud of our voluntary efforts to reduce greenhouse gas emissions. We believe that if these and other initiatives are implemented by nations, businesses and individuals worldwide, the planet can make major progress in reducing emissions—without widespread economic disruption.

The Climate Change treaty

Since 1992, more than 160 countries have ratified the Framework Convention on Climate Change, which calls on developed nations to voluntarily reduce greenhouse gas emissions to 1990 levels by the year 2000.

In 1995, the convention's signatories agreed to negotiate binding commitments for developed nations to reduce greenhouse gas emissions beyond the year 2000. The agreement, known as the Berlin Mandate, required industrialized countries to meet in Kyoto, Japan, in December 1997 to reach a consensus on legally binding targets and timetables.

The impacts of proposed emissions reduction plans

Some of the most prominent current proposals at the upcoming Kyoto meeting for setting legally binding targets for reducing carbon emissions are:

- **the European Union proposal,** which calls for developed nations to reduce emissions to 15 percent below 1990 levels by the year 2010;

- **the Japan proposal,** which calls for developed nations to reduce emissions to 5 percent below 1990 levels between 2008 and 2012; and

- **the U.S. proposal,** which calls for developed nations to reduce emissions to 1990 levels between 2008 and 2012, along with further unspecified reductions. It also calls for the participation of key developing nations in reducing emissions.

According to the U.S. Energy Information Agency, simply reducing emissions to 1990 levels by 2010 would require the citizens of industrialized nations to reduce their fossil fuel consumption by almost 30 percent. Charles River Associates, an independent economic research company, has projected that meeting this emissions reduction target in the United States alone would require the equivalent of a $200/ton carbon tax. This would:

- **raise gasoline prices** 50 cents per gallon (a 40-percent increase);
- **raise home heating oil prices** 50 cents per gallon (a 50-percent increase);
- **raise electricity rates** 2 cents per kilowatt hour (a 25-percent increase); and
- **raise natural gas rates** $2.25 per thousand cubic feet (a 50-percent increase).

Further, a study conducted by the U.S. government's Argonne National Laboratory indicated that such a proposal would cause "significant reductions in output and employment" in six key industries: petroleum refining, chemical, aluminum, cement, paper and pulp, and steel.

Regardless of the dates fixed for compliance, the proposals currently on the table would have uniformly severe economic consequences not just for industrialized nations but for developing nations that depend on industrialized nations for export markets. Oil exporting nations such as Saudi Arabia, Venezuela and Mexico would be among those hardest hit.

What's wrong with imposing binding targets and timetables?

- **The science is still uncertain.** Scientists cannot tell us with certainty how much and where temperatures will increase — or if they will increase at all. Neither can they tell us what impact such increases would have or what positive impact the proposed remedies will have.

- **It will have significant impact on our lifestyle.** As fuel and electricity costs go up, families worldwide will feel the pinch and many jobs at energy-intensive industries will most likely be lost.

- **The environment won't get better.** By 2035, the emissions from developing countries will exceed the combined emissions of the United States, the European Union and other developed countries ... yet the proposals being tabled at Kyoto exempt developing countries. This means that, even with the treaty in place, global emissions will continue to grow.

Mobil's position

■ We agree that the possible impacts of human emissions of greenhouse gases are a source of concern. However, there is still a high level of uncertainty about the timing and magnitude of these potential impacts. More scientific studies and time are needed. We believe that in five to 10 years a lot more will be known about the science of climate change.

■ We oppose legally binding targets and timetables at this time. We don't believe we should rush to a potentially damaging solution based on an uncertain premise. Economic studies by reputable organizations like Charles River Associates, MIT and Argonne National Laboratory indicate that the proposed emissions reduction policy initiatives would have a large negative impact on gross domestic products and jobs. This impact will be felt not only in industrialized nations like the United States, but also in developing countries.

■ The Berlin Mandate specifically excludes developing nations from commitments to reduce greenhouse gas emissions. While legally binding the United States and other industrialized nations to future emissions reductions, the suggested proposals will do little or nothing to stabilize atmospheric concentrations of greenhouse gases. Developing nations, which will soon produce more than half of the world's greenhouse gases, should be part of any agreement.

Because the issue of global climate change affects us all, and despite the scientific uncertainty, we support taking action now, including:

■ participation in voluntary, economically viable opportunities to reduce greenhouse gas emissions, such as Mobil's programs to reduce emissions at our facilities and help our customers use energy more efficiently;

■ research — like programs we've supported at leading institutions worldwide — to better understand the science and economics of climate change and greenhouse gas control strategies;

■ research and development of low greenhouse gas emissions technologies, such as those we're helping develop through business/university consortia; and

■ programs that help absorb carbon dioxide, such as the reforestation projects we're underwriting around the world.

GLOBAL CLIMATE CHANGE

Harmonizing Regional and International Efforts

A Thematic Session
November 16, 1997

Prepared by: Anthony R. Corso
General Manager
Government Relations
Mobil Corporation

Introduction

Global climate change is a complex issue with political, economic and social impact on every nation.

The debate surrounding proposals to stabilize emissions of greenhouse gases is being taken seriously around the world. Many nations are placing a high priority on finding a solution to the global climate issue.

The possible impacts of human emissions of greenhouse gases on climate are a source of concern to Mobil and other members of industry and the global business community. However, there is still a high level of uncertainty about the timing and magnitude of these potential impacts and more scientific and economic studies are needed.

In the next decade, a lot more will be known about the science of climate change. Therefore, we need to take the time to resolve uncertainties and to choose the optimal solutions to the potential climate change problem.

Background

While much uncertainty remains about global climate change, there is agreement in some areas.

The greenhouse effect -- the ability of certain gases to trap heat in the atmosphere and warm the Earth -- is an integral aspect of the climate system. Greenhouse gases (e.g., water vapor, CO_2, methane, nitrous oxides) raise the average temperature of the Earth's surface by about 30°C. Without this effect, the Earth would be uninhabitable.

Atmospheric concentrations of greenhouse gases have risen over the past 100 years. Since the Industrial Revolution, human activities have increased the concentration of CO_2 in the atmosphere by more than 25%. These CO_2 emissions are expected to grow in the future, with most of the growth coming from developing countries such as China, India and Brazil, as they increase their population and industrial capacity.

This observed increase in concentrations of greenhouse gases is the result of a wide range of human activities, including the burning of fossil fuel. CO_2 is the most significant of the manmade greenhouse gases, contributing 60% of the

human contribution to the greenhouse effect. Methane and nitrous oxide contribute smaller amounts.

Manmade emissions of CO_2 account for only approximately 3% of total CO_2 emissions into the atmosphere. The other 97% is accounted for by naturally occurring phenomena such as the product of respiration, plant decomposition and oceanic CO_2 cycling. (See Figure 1).

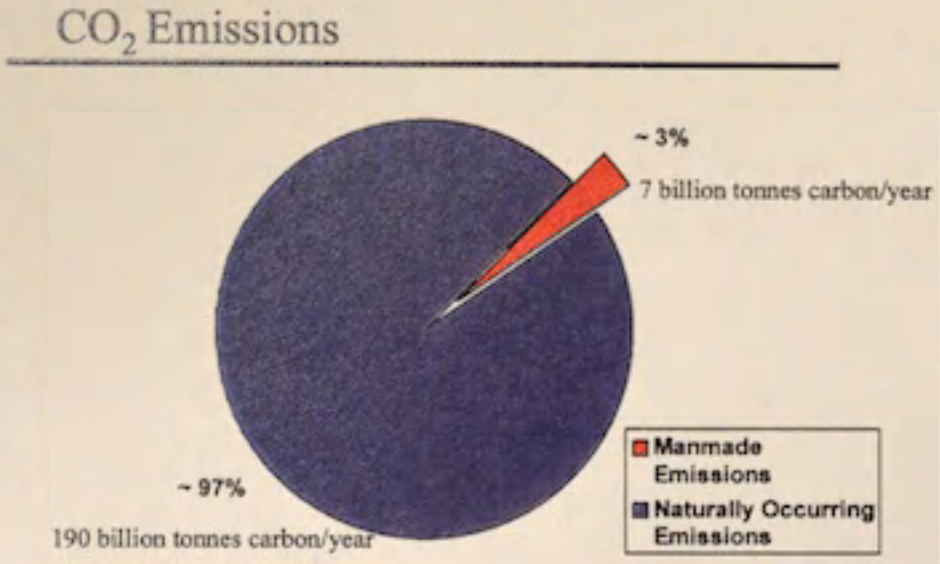


Figure 1.

The foregoing facts raise the key issue. Is mankind changing climate for the worse? Unfortunately, the answer is far from clear. Various computer models have predicted that if humanity continues to emit greenhouse gases at the current rate, by 2010 the average global temperature could rise by 1.8-5.4°F (1-3°C) and sea level could rise by 6-37 inches (15-95 centimeters).

The range of these estimates indicates both uncertainty about the data, and the differences among the current climate models. While these models incorporate the best available scientific information, they have some built-in limitations, including the use of "correction factors" many times larger than the changes they are trying to measure. It is clear that further research will be needed to enhance scientific understanding of the Earth's climate systems, and to understand the interaction of these systems with greenhouse gases.

It is imperative that nations negotiating global climate change not race past the science in an effort to find quick solutions or satisfy an artificial deadline, such as

the Kyoto conference. Within a decade, science is likely to provide more answers on what factors affect global warming, thereby improving the decisions of policy makers. Armed with more precise calculations of temperature fluctuations around the globe, as well as a better understanding of such factors as clouds, oceans and solar variations, nations could design more efficient and effective solutions.

Main Proposals

Recently concluded meetings in Bonn ended in a stalemate with the parties failing to reach an agreement on a proposal to be negotiated in Kyoto in early December. There was no significant movement on the major issues of targets and timetables, emissions trading, joint implementation and developing country commitments.

The main proposals to be negotiated at Kyoto are:

1. The United States would set legally binding emissions targets at 1990 levels by the years 2008-2012 for developed countries, with further reductions by later dates. The proposal would also require meaningful participation from key developing countries.

2. The European Union proposes a 15% reduction from 1990 levels by 2010. A group of ministers from the 15 European Union member states agreed to provide assurances that the European Union will be jointly responsible for the failure of any of its member states to meet its defined target.

3. Japan proposes a 5% reduction from 1990 levels by 2008-2012.

4. The Group of 77 (G-77), comprised of China and developing countries, objects to any limitations of developing countries' emissions, arguing that such restrictions would hinder the economic growth of such countries. The G-77 insists that any sacrifices to reduce emissions be made by developed nations, and that a compensation mechanism be implemented for developing nations.

A summary of the proposals follows:

Country	Target	Date
United States	1990 Levels	2008-2012
European Union	15%< 1990 Levels	2010
Japan	5% < 1990 Levels	2008-2012
G-77	7.5%<1990 Levels	2005
	15% <1990 Levels	2010
	35% <1990 Levels	2020

There are three significant problems with the proposed emissions reduction plans which will be negotiated at Kyoto.

First, *the science is still uncertain.* Scientists cannot tell us with certainty how much and where temperatures will increase -- or if they will increase at all. Nor can they tell us what impact such increases would have, or what positive impact the proposed remedies will have.

Second, *binding targets and timetables will be costly for economies worldwide.* Fuel and electricity costs will rise, and many jobs in energy-intensive industries will likely be lost.

Finally, *the environment will not improve.* By 2015, greenhouse gas emissions from developing countries will exceed the combined emissions of the United States, the European Union and other OECD countries. Unless developing countries are included in the treaty resulting from the Kyoto conference, global emissions will continue to increase.

Because greenhouse gas emissions are continuously rising, reaching targeted levels will be increasingly difficult. In the United States, greenhouse gas emissions rose 3.4% in 1996. Just to return to 1990 emissions levels by the year 2010 in the United States will require a 30% emissions reduction.

Economic Impacts

If adopted at Kyoto, stringent greenhouse gas reductions mandates will have a large negative impact on the world's economy. This impact will be felt not only

in the industrialized nations like the United States and the European countries, but also in the developing nations and oil exporting nations where trade will be adversely affected.

According to the Energy Information Agency, simply reducing emissions to 1990 levels by 2010 would require the citizens of industrialized nations to reduce their fossil fuel consumption by almost 30%.

These impacts will not be shared equally. Energy producers and energy intensive industries will be hardest hit. In the United States alone, meeting emissions reduction targets would require the equivalent of a $200/ton carbon tax. This would:

- raise gasoline prices 50 cents per gallon (40% increase);
- raise home heating oil prices 50 cents per gallon (50% increase); and
- raise natural gas rates $2.25 per mcf (50% increase).

Gulf states, which had over $100 billion in energy exports in 1996, will be economically impacted as much as industrialized nations which are legally bound to reduce emissions. Industrial countries could attempt to reduce greenhouse gas emissions by energy taxes and strict regulatory regimes controlling the use of fossil fuels, particularly for industry and transportation.

A reduction in the use of fossil fuels would cause the price of oil to drop almost 8% by 2030. The LNG business, anticipated to grow rapidly by the end of the decade, will also be impacted.

Charles River Associates, an independent economic research company, has projected that under the European Union's emissions reduction proposal, Qatar's GDP would decrease $0.5 billion, or almost 3%, by 2010. Oil exports from the country would decline almost 5% in the same time frame.

As another example, Oman would experience a drop in GDP of $0.8 billion, or almost 3%, by 2010, and a projected decline in oil exports of almost 6% during the same period.

In Saudi Arabia, GDP is expected to fall $8.5 billion, almost 3%, by 2010, while oil exports would decline nearly 6%.

In the area of international trade, countries that choose to adopt carbon taxes may impair the global competitiveness of key industries like steel and aluminum.

Developing nations will also suffer as markets within the OECD to which these nations sell a large share of their exported goods will shrink. Also, imports from OECD countries will become more expensive. In short, an emissions treaty could have a large negative impact on developing countries.

What is Mobil Doing?

Mobil agrees that the possible impact of human emissions of greenhouse gases is a source of concern. As a result, we have voluntarily initiated several measures both to reduce emissions and to gain a better understanding of the impact of increased emissions on the climate. Steps such as these allow for emissions reductions to be realized while very important scientific initiatives are undertaken.

Mobil's concern about current climate change proposals reflects our understanding of the situation, and our actions reflect our responsibility as global corporate citizens. Despite current scientific uncertainty, Mobil is voluntarily taking action now. These efforts include:

1. Reducing emissions at Mobil facilities - At Mobil, most of the fuel we consume supplies energy for our refining and petrochemical processes, in which we have improved energy efficiency by 10% in just a decade. Additionally, Mobil is taking advantage of economically viable opportunities to substantially reduce flaring in production operations.

2. Helping customers use energy more efficiently - Mobil invented and pioneered the use of synthetic lubricants and today is the world's leading producer of premium synthetic lubes, which have been proven to save energy in applications from vehicle engines to power plants.

3. Funding research to increase the understanding of the science and economics of global climate change - Over the past five years we have funded scientific and economic studies at The Massachusetts Institute of Technology, the Lamont-Dougherty Geophysical Observatory of Columbia University, the Harvard-Smithsonian Astrological Observatory, and the Australian Bureau of Agricultural and Resource Economics.

4. Improving technology that will provide higher process efficiency and lower emissions - Between 1990 and 1996 Mobil installed equipment in

the United States which prevented the emissions of over 15,000 metric tonnes of methane per year.

5. Managing energy use - Mobil's first major effort in this area was participation in the US Environmental Protection Agency's Green Lights program, developed in 1991 to promote energy efficient lighting. Mobil's participation in the program has reduced lighting energy consumption in facilities in the United States by 54%. This experience in the United States will be transferred to Mobil operations worldwide.

6. Supporting reforestation projects around the world - Working with leading conservation organizations, Mobil will underwrite projects to plant and protect trees that absorb significant amounts of CO_2. Current plans call for projects in South America, Southeast Asia, and the United States.

The success of the voluntary programs mentioned above rests upon two key principles:

First, the programs are *voluntary* and *economically viable*, ensuring that resources and technology are applied in the most efficient manner possible and are driven by free market forces.

Second, the *roles of industry and government are clearly outlined* and mutually supportive with government uniting diverse parties toward a common objective with a forum for public recognition and sharing of information.

Mobil is proud of its voluntary efforts to reduce greenhouse gas emissions. If initiatives of this type are implemented by nations, businesses and individuals worldwide, the planet can make major progress in reducing emissions -- without widespread economic disruption.

Conclusion

At Mobil we believe that the possible impacts of greenhouse gas emissions are a source of concern. However, the high level of uncertainty about the timing and magnitude of potential impacts and the large economic risks associated with the policy mandates being considered require an answer. Because of the scientific and technological uncertainty, action and objectives for dealing with the prospects of

climate change can only be determined as additional knowledge is gained and uncertainties are minimized.

Mobil believes that the prudent course of action is to encourage and accelerate cooperative research on climate change, while harnessing the power of free markets and voluntary measures to deliver optimum emissions reductions and preserve sustained economic growth.

In recognition of the uncertain science surrounding the climate change debate, a global research partnership should be established, including governments, scientific institutions and industry, to fill in the wide gaps in knowledge, with the goal of achieving a consensus view on critical issues within a defined time frame. After all, one reason the parties are so far apart today is the elusive nature of the facts.

During this period of concentrated and focused research, voluntary efforts should expand with the encouragement and promotion of governments. As Mobil's experience indicates, these voluntary programs would be economically justified.

We all need to help establish a credible theoretical basis for action, and to support fact-based measures that may be needed to ensure sustainable growth for the benefit of future generations.