PEAK OIL -- (House of Representatives - February 06, 2007)

The SPEAKER pro tempore (Ms. /Jackson-Lee/ of Texas). Under the Speaker's announced policy of January 18, 2007, the gentleman from Maryland (Mr. /Bartlett/) is recognized for 60 minutes.

Mr. BARTLETT of Maryland. Madam Speaker, there are three different groups in our country and indeed worldwide at least for some of these issues that have common cause in campaigning for a reduction in the use of fossil fuels. These three groups come from very different perspectives, but as you will see from our discussions this evening they really do have common cause. Because to solve the problems that brings them to this dialogue, all three of these groups are advocating essentially the same thing. That is, a reduction in our use of fossil fuels.

The first of these groups is a very large group which has genuine concern about national security interests. Probably 2 years ago now, or nearly that, 30 of our prominent Americans, Boyden Gray, McFarland, Jim Woolsey and 27 others, some of them senior retired military people, wrote a letter to the President saying: Mr. President, the fact that in our country we have only 2 percent of the known reserves of world oil and we use 25 percent of the world's oil, importing almost two-thirds of what we use, represents a totally unacceptable national security risk.

The President himself recognized this in his State of the Union a year ago when he noted that we get some of this oil from countries, as he said, that don't even like us very much. That is a bit of an understatement for some of those countries.

The next chart shows a recognition of this on the part of our Secretary of State. This was April 5 of last year. We do have to do something about the energy problem.

I can tell you that nothing has really taken me aback more as Secretary of State than the way that the politics of energy is, I will use the word, ``warping'' diplomacy around the world. We have simply got to do something about the warping now of diplomatic effort by the all-out rush for energy supply.

I am sure that in her head she had a mental picture of this really interesting map of the world. This shows what our world would look like if the size of each country was determined by its reserves of oil. And you can see how in America right here, tiny on this map of the world, we represent about less than 5 percent of the people of the world and we have only about 2 percent of the oil in the world, but we are using 25 percent of the oil.

Look how small we are. We would fit many times in Saudi Arabia. We are about the size of Qatar here. We would fit four times in Kuwait, if the size of Kuwait, if the land mass of Kuwait was relative to how much oil they have.

Russia up there, they are a big exporter now, but they can be a big exporter because they aren't using anywhere near as much as we have. You see Russia is two or three times as large as we are.

Well, that large community in our country which is genuinely concerned about national security interests understands our problems that come from this distribution of oil. Many of these oil reserves are in countries that, what we call the royal families. They are really dictatorships, aren't they? And Kuwait and the United Arab Emirates and Saudi Arabia. And then in Iran, that is run as a theocracy pretty much totally controlled by the Mullahs. And here we have Venezuela, a Communist state.

The President very wisely said in that State of the Union message a year ago that we are getting oil, many of the reserves are in countries that don't even like us very much.

Now, fortunately, our imported oil doesn't come from the mix as we see it here, because we are getting oil where it is cheaper to ship it and so forth. So a lot of our oil comes from Canada. They are pretty tiny in terms of total reserves, but there aren't many people there, so they are an exporter. We get oil from Mexico, and we get oil from Venezuela simply because of economics. It is just cheaper to ship it the short distances around the world.

So this is one group that has common cause in wanting to reduce our consumption of fossil fuels, particularly oil, because we are so dependent on the rest of the world which, as Condoleezza Rice says, presents a very real national security problem.

A second group that is interested in reducing our use of these fossil fuels, particularly oil, is the group that believes that, whereas the United States reached its maximum production of oil in 1970, that the world is about to approach that point now. And if you aren't concerned about national security risks and if you aren't concerned about climate change, which is going to be the third one that we talk about, you would really be concerned about oil if you recognized that there is not going to be enough of it in the future. It is going to be a real economic problem.

What we have here, it says here, the United States production Hubbert versus Actual. This is a report from CERA, the Cambridge Energy Research Associates, who were trying to point out that M. King Hubbert was not very accurate in his prediction of what the United States would do, and therefore you shouldn't take him very seriously when he predicted the world would be peaking about now.

The average person looking at this would say that they were kind of nitpicking, because this is the Hubbert's Lower 48 Projection, this yellow line here, and the red is the actual. And of course added to the Lower 48 was our big discovery in Dead Horse and Prudhoe Bay, Alaska, and our oil discoveries in the Gulf of Mexico. Well, I think that these two curves here run pretty darned close together; and for that growing community of people that have a genuine concern about the availability of oil in the future, this chart has real meaning.

I might look at the next chart here before we move to those who are concerned about climate change. This is a chart which presents the challenge that we face from what is called peak oil, and these bars here represent the discoveries of oil. You note that the big discoveries were back in the 1960s and 1970s; and ever since 1980, on average, the discoveries have been reducing, going down, down, down.

Now, anyone who has had any math and charting and so forth in school knows that if you draw a smooth curve over this, the area under the curve will represent the total amount of oil that we have found. Indeed, each of these represents a reservoir of oil. If you add up all these little bars, why you have the total; and that is what you do when you smooth them out. You, in effect, add them all up.

The solid dark line here represents the amount of oil that we have been using. We started out really rich, didn't we? We found this much oil, and we are just using this tiny bit down here.

It looked like oil was going to be forever. When would it run out? Look at how little we are using and how much there is out there.

But now look what happened. We continued to use more and more as the industrial revolution grew and as our population grew and we found more ways to use energy to make our lives comfortable. The use continued to grow and grow, but the discovery started falling off.

In 1965 or so, they started falling off, down, down, down, and that is in spite of ever better techniques for finding oil, computer modeling, 3-D seismic and so forth. We now have a pretty good idea of what the geology of the world looks like, and we will find gas and oil in only very unique geological formations. Maybe a little later this evening we will have a little chance to talk about those so you have some expectation of what we might find in the future.

Here we are now, and this is about 2007, and we have been using more oil ever since about 1980 than we have been finding. Of course, we have had lots of reserve, and we have been eating up that reserve now, until we have taken some of this to fill in this space.

Now you look to the future, and what does the future look like? We have some options of what the future looks like. One of the options we do not have, though, is pumping oil we have not found. So unless you think we are going to find more oil than this chart indicates, and of course it will not be a smooth, down curve like that. It will be up and down but generally it will be down most people recognize. Well, we can use all sorts of enhanced oil recovery techniques and pump it sooner, and you may get a little more from those enhanced recovery techniques, but you cannot pump what you have not found.

So this shows you very graphically. If you had only one graph to look at to help you understand what we are facing in terms of peak oil, this would be the graph. So you

understand now why this second group is really concerned about our use of fossil fuels, particularly oil, because it is very probable that the world is going to reach its maximum production of oil, maybe has already, but if not now, very soon, and the demand for oil, which has been going up at a roughly 2 percent per year growth is going to continue. So it is going to be an ever increasing difference between the available oil and the demand for oil.

Of course, when that happens, of course when demand exceeds supply, price goes up, and we have seen oil prices go up relatively few years ago from $10 a barrel to $60 a barrel now. It was just a few months ago $78 a barrel. Kind of fear factor in that way, it went away, and it dropped very quickly $18 a barrel. But very volatile market, up and down $1 or more a day. Another fear factor, it could jump another $18.

The next chart I have here is one that shows the concerns that this third group has, and that is those who are concerned about climate change. I have something I want to read here. This chart comes from this document by the way, ``Stern Review: The Economics of Climate Change.'' It says here, ``The scientific evidence is now overwhelming: climate change presents very serious global risks, and it demands an urgent global response.

``Climate change is global in its causes and consequences, and international collective action will be critical in driving an effective, efficient and equitable response on the scale required.''

This international cooperation reminds me of a visit we just made. I came back just about a month ago from China. Nine of us, nine Members of Congress went over and the primary reason of the trip was to talk to them about energy. I was surprised and pleased when they began their discussion of energy by talking about post-oil. Gee, I says, they get it. Somehow a civilization that was a golden civilization when my Fore Fathers were barbarians running around Europe has a longer view of things than we seem to have. We have trouble seeing beyond the next quarterly report in our industry. We have real trouble here seeing beyond the next election. But they are looking post-oil they say. They recognize that there will be a post-oil period.

A thousand years of recorded history, we have been in the age of oil about 100, 150 years. If it is half gone and if it follows a bell curve, as it did in our country and it probably will in the world, you have probably got another 100, 150 years of oil, with ever increasing costs and ever decreasing amounts as we get the oil, which is harder and harder to get.

Climate change presents a unique challenge for economics. It is the greatest and widest ranging market failure ever seen. The benefits of strong, early action on climate change outweigh the costs they say.

So this is a little chart that shows where these gases come from. Just a moment of explanation as to why the use of oil and so forth produces climate change.

When you go out into your car this evening, if you go out, if it is parked outside and the sun is shining in, and if you go out before dark, your car will be very much warmer inside than it is outside, and we call that the greenhouse effect. What happens is the light from the sun comes in in a very broad wavelength spectrum from very long waves to very short waves, and they go easily through your car, most of them through the car window, and then that sun heats up the material inside your car, and that reradiates in the infrared. Well, the glass is relatively impervious to infrared so it simply reflects it back, and that is called the greenhouse effect, and your car then gets warmer and warmer. You see it especially on a summer day when it may be 80 outside and 120 inside your car which is why you should not leave your children and animals inside the car when you leave it.

Well, there are gases in the atmosphere that essentially do the same thing as the glass in your automobile. You may remember riding in the airplane and you are very comfortable sitting in there at 38, 40,000 feet and the pilot tells you it is minus 40 degrees centigrade outside. That is really cold. The reason you could be so warm down here and you are so cold up here is the reflection of all this heat which is radiated back from the earth, long infrared rays, and they are reflected back. One of the things that reflects them back are gases up in the atmosphere. There a number of those gases, methane, and carbon dioxide is one of the major ones.

Of course, carbon dioxide, absolutely essential for plant life, and they are so efficient. Our oxygen is about 21 percent. We can do with maybe half of that. If you are at 18,000 feet, that is all you have got because of the atmospheric pressure there. But these plants make due on .04 percent. Do you not wish you could be as efficient as these plants? You could get by on the top of Mt. Everest very easily. You would not need to pressurize the cockpit in the aircraft you are riding in.

What stunned me in this report was when I read that our earth now is only 5 degrees centigrade, that is 9 degrees Fahrenheit, warmer than it was in the last ice age. Wow, what a huge change in climate, a relatively small change in temperature makes, just 9 degrees cooler Fahrenheit, and we had glaciers that came down to southeast Ohio. They came down that far, scooping up the dirt and from it you can see where it melted and left the mounds of gravel and dirt there where they came down that far.

Well, I am very pleased to be joined by one of the Nation's leading voices and authorities on climate change, my colleague, also from the great State of Maryland, Congressman /Gilchrest/.

Mr. GILCHREST. I thank the gentleman from Maryland (Mr. /Bartlett/) for yielding and for having this time we can discuss these issues of energy, its ramifications to national security, the environment and to the economy. I would like to reiterate some of the comments that Congressman /Bartlett/ has made as far as energy use, and it is< a single issue, energy use, the ramifications of our energy use now is to our economy, to our national security and to our environment.

Our energy use is dependent on fossil fuel, and our whole economy then is dependent on fossil fuel. Our national security to a great extent is the ramifications of national security are as a result of where we get our fossil fuel sources from throughout the world, and fossil fuel burning has a pretty big impact on the environment. So our energy policy affects our economy, affects our national security and affects our environment.

Each of these, because it is fossil fuel, because like Mr. /Bartlett/ said, two-thirds of our energy sources for oil come from foreign sources, that makes our economy fragile. That makes our national security much more difficult, and the ramifications to our environment is that it degrades our environment.

What I would like to discuss here is the legacy of oil to our environment, and the environment, in particular, is our climate. The air, sea and land, upon which life exists on the planet depends to a great extent on the atmosphere, and the atmosphere, in order to support life as we know it, as Mr. /Bartlett/ described, has a certain heat balance to it in order for life to exist.

That heat balance that we talk about is the greenhouse effect which keeps the planet and its heat at a certain temperature in order for us to live, vegetation to grow, life in the sea to exist and life on the land.

The greenhouse effect is as a result of the chemistry of the atmosphere and the chemistry of the atmosphere, whether it is carbon, whether it is methane, whether it is oxygen or whether it is water vapor, does hold the heat of the sun's rays enough for us to have life the way we know it, the greenhouse effect.

The greenhouse effect has had huge fluctuations over the eons of time that the earth has existed. We have ice ages, we have warming trends. So throughout earth's history we have had a natural range of fluctuation to the temperature, to CO2, to other greenhouse gases. That is a natural range. No huge rapid fluctuations in that natural range of chemicals that make up the atmosphere to hold on to the greenhouse effect.

The question is, when we debate this issue in Congress or in other political situations, are humans impacting the climate? Are humans the cause of a warming trend?

Well, let us take a look at that. Right now, is there a warming trend? I would say that every single scientist in the United States, throughout the planet who is a meteorologist or an atmospheric chemist or anybody in that scientific community, every single one of them will say that, yes, we are in a warming trend and we have been in a warming trend for the past 10,000 years.

If you could go back 10,000 years using ice cores drilled into the glaciers in Greenland or the Antarctic, then you could see that 10,000 years ago, as Mr. /Bartlett/ mentioned earlier, the temperature of the planet was about 5 degrees centigrade cooler than it is now, and the value assessment of that is evaluated by the makeup of the chemistry of the atmosphere 10,000 years ago.

One of those elements in the atmosphere was carbon dioxide. If you look at carbon dioxide, you would see that 10,000 years ago, there was about 180 parts per million of CO2 in the atmosphere.

Now let us come ahead almost 10,000 years to 1890 or 1900 and you evaluate CO2 in the atmosphere at that point. You would see that in 10,000 years, you increased the amount of CO2 in the atmosphere from 180 parts per million to 280 parts per million. It took the earth in its natural range of fluctuation 10,000 years to increase 100 parts per million of CO2.

Now, let us project the next 100 years, which is essentially the industrial age. We have increased another 100 parts per million. We are now at 380 parts per million. So what took the natural forces in a natural range of fluctuation over a period of 10,000 years to increase 100 parts per million, in the industrial age we have done it in 100 years.

Now some people will say that has nothing to do with human activity, that is volcanoes, that is the natural decaying of matters, that is nature producing that 100 parts per million. The answer to that is this. You can distinguish between the kind of CO2 that comes from volcanoes or forest fires or other natural sources from burning fossil fuel. Every human being has their own DNA marker.

You can tell one human being from another human being by their DNA. Carbon dioxide has a DNA; it has a marker. It is a radioactive isotope, so you can determine where this CO2 in the atmosphere comes from. Is it coming from your automobile, or is it coming from a volcano in southeast Asia, or is it coming from a forest fire in California or Brazil?

The radioactive isotopes are markers for CO2. It is very easily discerned that an extreme increase in CO2 has come from human activity. What do we see as a result?

We see warmer air temperatures and warmer sea temperatures. What are some of the results of that? Sea water is warming; the atmosphere is warming. Fuel for hurricanes is warm air and warm sea water. So we are seeing a fairly dramatic increase in stronger hurricanes.

What are some of the other implications of increasing temperatures as a result of burning fossil fuel, human activity? That is sea level rise.

Sea level rise from the melting of the Arctic ice, Arctic glacier such as Greenland and the Antarctic has the potential, in this century, to raise sea levels by 3 feet. What will that do to New York or Baltimore or Miami or all the other low-lying communities throughout the world, the Thames River in London? Sea level rise would flood the City of London. Coastal erosion, coastal communities. The insurance industry in the United States, as a result of climate change, global warming and potential increasing violent storms and sea level rise, and the insurance companies in the United States are beginning to stop their homeowners insurance coverage for these communities at risk along the gulf and Atlantic

Coast. The insurance companies of the United States and Lloyd's of London, the only reinsurance company that I know of in the world that is continuing to cover these homeowners, have doubled, tripled and quadrupled their premiums to look at the risk.

The other problem with increasing CO2 and other greenhouse gases is what it does to the actual chemical make-up of our oceans. Our oceans have a certain balance in their Ph. It is just a little bit above 7, and it has been that way for aeons of time. How long have the sharks been in the ocean? You hear on shows in television that sharks have been around for millions of years. Other creatures on our planet have been around for millions of years.

Some of the best habitat in the world for ocean creatures are coral reefs. Increasing CO2 into the atmosphere and the world's oceans have absorbed fully half of the CO2 that we have put into the atmosphere. The result of that, the legacy of oil, burning fossil fuel, is it makes the oceans more acidic. Ocean chemistry would change, be more acidic and more corrosive. It could destroy the vast resources we get from coral reefs by destroying the very fabric of the beginning of the ecology of the world's oceans.

Warmer temperatures we have already begun to see cause more forest fires, more infestations, more problems with agriculture. Weather patterns become more violent in some places. They become more unpredictable. The storm cycles are more violent and unpredictable. Shifting vegetation zones, we have already talked about sea level rise, habitat loss.

The Arctic ice cap at the top of the world in the last 50 years has lost 40 percent of its ice volume, 40 percent. The list of dramatic ramifications of not addressing one of the problems of the legacy of oil and our dependence on it is climate change, is global warming.

What are some of the answers to this? Well, Mr. /Bartlett/ has made some comments about this, but we have a bill on the Senate side, on the House side. Mr. /Bartlett/ is a cosponsor. /John Olver/ from Massachusetts is a cosponsor. A number of our colleagues have gotten on this bill to try to understand the nature of this problem, at least part of our dependence on fossil fuel, which is global warming, climate change.

We think the debate is over. The debate is over because the science is clear that human activity is causing the climate to change and all those other problems or ramifications of increasing carbon dioxide in the atmosphere. We need to take action now to stop global warming. We subject our economy, our national security, our way of life to great risk and catastrophic harm. We have a bipartisan bill that will reduce the Nation's greenhouse gas emissions substantially and in a timely fashion.

We have a series of Fortune 500 companies from Alcoa to BP to Caterpillar to Duke Energy to DuPont to a number of environmental groups that support the Federal Government making a goal of reducing greenhouse gases by the year 2050 to 70 percent below 1990 levels, creating a regulatory structure to do that.

Then these companies that I just read say that the market can resolve the issue. It would create a cap and trade program with large tax incentives to unleash the ingenuity of the American free marketplace to capture the technology, which will make us much more economically viable to use efficiency, technological advances, alternative fuels. This will reduce over a period of decades not only our dependence on fossil fuel from foreign sources, not only improve our economy, not only improve our national security situation with the rest of the world, but drastically begin to improve our environment. The U.S. can take the lead in finding solutions to this seemingly intractable problem.

The Federal Government sets a goal with the regulatory structure, the market produces the results, and human ingenuity, once again, solves some of the problems. I want to thank Congressman /Bartlett/ for the time and for his enormous interest in this issue and his skill and expertise.

Mr. BARTLETT of Maryland. I want to thank my colleague very much for joining us here. Congressman /Gilchrest/ mentioned market forces. They are, indeed, very powerful. They have served us very well in this country. They have provided for us the highest quality of life of any place in the world. But market forces are limited. They cannot do what they cannot do.

As I noted somewhat humorously, there are even some things that God cannot do. God can't make a square circle, for instance. The market forces are very powerful. As long as there are unlimited forces, market forces will work. I remember mentioning to one of our very high government officials the problem of limited oil supply in the future. The response was, gee, I guess the market will take care of that.

I guess when oil gets more expensive, we will use less of it, and then we will find alternatives. That is true. When oil prices get higher, we will use less of it, and we will look for alternatives.

But when you look at the potential for exploiting these alternatives, you see that a large amount of time and energy must be invested in these alternatives before they yield any meaningful amount of replacement for the fossil fuels, which are so abundant and so energy rich.

Let me give you just one little example of some of the unintended consequences of trying to do this. This is a big push to make ethanol from corn in our country. We have noted that the Brazilians are making ethanol from sugar cane, and they now don't have to import any oil. We would like to emulate them and make enough ethanol from corn that we will not have to import oil. That, by the way, is the impossible dream. That will not happen.

With the relatively small amount of ethanol that we are now making, and there aren't very many E-85 pumps or blends of ethanol in gasoline in this part of the country, there are in the Midwest, but with the relatively small amount of ethanol that we are making, the

demand for corn raised the price of corn from $2.11 a bushel in September to $4.08 in December. That is causing a huge problem for our people that raise animals.

We are having a meeting in a few days with a number of our dairy people from Maryland. Unless milk goes up to more, I think it is about $14 per 100, now it needs to be at least $18 before they can break even.

With this kind of a price for food for their animals, they will go bankrupt. So the relatively small demand for corn to make the relatively small amount of ethanol that we are making now has essentially doubled the price of corn.

What this does is to reflect the enormous amount of energy that is in these fossil fuels. There they are really energy dense. This chart shows something about what has happened to our world as a result of the incredible energy density in these fossil fuels.

Hyman Rickover, and let me get a copy of his paper, it was not really a paper, it was a talk that he gave to a group of physicians 50 years ago. The anniversary of that will be May 14 of this year, and that was at a banquet of the annual scientific assembly of the Minnesota State Medical Association. This talk had nothing to do with medicine. He apologized for that at the beginning of his talk. But he thought that the physicians might enjoy some diversion.

He was talking about the enormous fossil energy in these fuels. Hyman Rickover, of course, is the father of our nuclear submarine. I had no idea that he had given this talk. It just appeared in the Energy Bulletin December 2 of last year, 2006. So it has only been out in the general public for these couple of months.

I noted this the other night that we need to hear this again, because this is just so revealing as to what this energy has done for us. With high energy consumption goes a high standard of living. Does the enormous fossil fuel energy in this country which we control feed machines which makes each of us a master of an army of mechanical slaves? Now at that time we didn't import any, so he could say we controlled it. Now we import almost two-thirds of what we use.

Another writer has indicated the incredible amount of energy in fossil fuels in oil. Let me give you the analogies he uses, and then I will read the ones that Hyman Rickover gave in that speech 50 years ago. One barrel of oil produces the energy equivalent of 12 men working all year for you.

If you figure the price that you could hire a man, the equivalent a man to work for you, by buying $10 of fossil fuel, of oil, it will work a full year for you. Now let me read what Hyman Rickover said 50 years ago and more so today. Man's muscle power is rated at 35 watts continuously, \1/20\ of a horse power. That is 24/7. You can do a little better than that when you are working, but you have to eat, sleep, so forth.

Machines, therefore, furnish every American and industrial worker with energy equivalent to that of 244 men. Wow. How many man-months of work without any energy from fossil fuels would it have taken to build your automobile?

While at least 2,000 men push his automobile along the road and his family is supplied with 33 faithful household helpers. Each locomotive engineer, he says, controls energy equivalent to that of 100,000 men. Each jet pilot of 700,000 men.

You know, thinking of that jet pilot in that plane up there just the other day, and I look at those contrails and sometimes they are the only cloud-like things in the sky, it finally occurred to me the dynamics of this CO2 thing that Congressman /Gilchrest/ was talking about, carbon; and that is what is in these fuels, is largely carbon and hydrogen. *

Carbon has a molecular weight of 12, and hydrogen has a molecular weight of 1. It is the lightest element in the universe. When you burn this carbon, it combines with oxygen, one molecule of carbon with two molecules of oxygen. Oxygen weighs 16. So what that says is, Congressman /Gilchrest/, that if you weigh the gasoline that goes in your car, you produce three times that weight in carbon dioxide. That is incredible.

Now, all of that carbon dioxide was taken out of the atmosphere a very long time ago. I didn't know, as a little boy, where oil came from; but I did know where coal came from, because we had a coal furnace in our house, and I would have to break those big lumps of coal. We bought it just as it came out of the mine.

When I would break a lump of coal open, there would be a fern leaf. Nobody had to tell me where coal came from. I knew very well where it came from. It came from plants that grew a very long time ago, they fell over under pressure and in time and they became coal.

So we were releasing incredible amounts of carbon dioxide, which is a greenhouse gas, which will change the acidity of the ocean. Fortunately carbon dioxide is very soluble in water. But it still changes the pH of the water because it forms a very weak acid, carbonic acid, when it gets in the water.

Truly, the humblest American, Admiral Rickover says, enjoys the services of more slaves than were once owned by the richest nobles, and live better than most ancient kings. In retrospect and despite wars, revolutions and disasters, the 100 years just gone by, that was 1950, that is right here, the 100 years just gone by, may well seem like a Golden Age.

And what this chart shows here is the history of the world, energy wise, for only about 400 years out of that 8,000 years that Admiral Rickover talks about. And the industrial revolution began with wood, the brown curve here, and it did not produce very many quadrillion BtUs of energy, and then coal, and boy did the economy grow with coal and trains and so forth. But then look what happened. It exploded when we found gas and oil.

And that is because gas and oil are so easy to change into compounds that we can readily get energy from.

And they are much more adaptable and flexible than coal. Although you can get gas and oil from coal. Hitler had to do that when we cut off his oil supplies, and under embargoes South Africa had to do that. We may be turning to that again shortly.

As I mentioned, Madam Speaker, there are three groups that really have common cause in talking about the use of these fossil fuels. One is that very large and growing group of people, including our Secretary of State, who are concerned that our growing dependence on foreign oil is a very serious national security risk.

Well, what do we do? We obviously need to use less of it. The President says we are hooked on it, we need to use less of it. And we can use less of it two ways. One. We can simply conserve and be more efficient. And we have done some of that. We can do a great deal more of that.

The second thing that we can do is to get energy from alternatives. As this chart shows, and as Dr. Rickover mentioned, there will come a time when the world will be getting less and less energy from fossil fuels, and finally at some point in history down the road, we will be getting essentially no energy from fossil fuels, because obviously they are not infinite in their supply and they will not last forever.

In 8,000 years of recorded history, the Age of Oil will represent but a blip in terms of energy production, a pretty big blip. But we are probably about halfway through the age of oil. In another 100, 150 years if M. King Hubbert is correct and we are now at the peak, and it will be tailing off and going down the other side of what is commonly called Hubbert's Peak, oil will be ever more difficult to get and ever more costly.

In another 100, 150 years we will have transition to renewables, we will be steady-state, having used up the coal we have, having gotten all of the energy we can from these unconventional oil sources, like the tar sands of Canada and the oil shales of the United States.

The next chart looks at what obviously we need to be about. And that is addressing this problem. Now, whether you believe that we need to reduce our use of fossil fuels because it is a national security problem, whether you believe we need to reduce our use of fossil fuels because it is causing climate change, or whether you believe we need to reduce the use of fossil fuels because they are just not going to be there in the quantities that we are using today in the future, you still must do the same things.

Well, the first thing that you need to do is to buy some time. We now, knowing that we should have known at least by 1980 that we were going to be here today, because we were already 10 years down the other side of our Hubbert's Peak in this country, and M. King Hubbert had already predicted that the world would be peaking about now.

For these last 27 years, we should have been addressing this problem and investing energy and time in alternatives. Unfortunately, we in large measure have not done that. And so today we are faced with a problem. We have no excess oil, no excess oil energy to invest in alternatives. If there were any excess it would not be $55, $60 a barrel. And we have essentially run out of time.

Now, we can buy some time and free up some oil with an aggressive program in conservation. And you really can do that. Europe is using half the energy that we use. It would be hard to argue that they do not live as comfortably as we do. The average Californian uses 65 percent of the electricity that we use. And there are 50 some of those in our Congress. I doubt that any would agree that they live less well than we do, and they still use a lot less energy than we use.

What we need to do then is use it wisely. What will we do with this energy that we freed up and the time that we have bought by this aggressive conservation program? We have to invest that wisely in alternatives.

Now whichever of these camps that you come from, whether it is the climate change camp, or the camp that is concerned that we are too dependent on foreign oils, that is going to be a big national security risk, or whether you believe that we need to move from fossil fuels to alternatives simply because there are going to be less and less, and more and more expensive fossil fuels in the future, you still want to do essentially the same thing.

Enormous benefits can accrue from this. Congressman /Gilchrest/ mentioned the enormous creativity and entrepreneurship of our people. We put a man on the moon in less than a decade. When you realize where we started from, that was a really big feat. We can do this. We were challenged to do that.

Today, the average American does not know that oil is probably limited in its future supply. They probably are unaware, today is an interesting day to talk about the potential for global warming, because it is the coldest day that we have had this winter. But I understand it is 20 degree above normal in Alaska and 20 degrees above normal today in Russia.

I just wanted to make a comment about some of the potentially unexpected consequences of this climate change. If you look at a globe, you will see that England is way up there, about mid Canada. And I had to stop for a refueling flight in Ireland. That really is the Emerald Isle, it is so green. And that has a climate like, what, South Carolina. How can you have a climate like South Carolina at a latitude of central Canada?

The reason for that is a huge conveyor belt that carries heat from the tropics to the British Isles and Europe. And that huge conveyor belt is called the Gulf Stream. And the Gulf Stream picks up heat in the Gulf area near the equator, and it then carries that like a giant conveyor belt up to the British Isles and Europe.

They have a very moderate climate compared to what they would have in the absence of the Gulf Stream. Now, water is not piling up up there around Europe and England, so it is obvious that if it flows up there and carries that heat up there, it has got to come back.

It comes back by going down. And why does it go down? We will talk about that in just a moment. Then it comes back flowing in just a large as volume and just as fast, it comes back to the lower part of this big conveyor belt. Again in the tropics, picking up more heat, and continues this transfer of heat to the British Isles and England.

Well, a very interesting thing is happening to this conveyor belt. The waters as they flow north, they are warm. And the sun shines on them, and water evaporates. And when the water evaporates, it leaves the salt there. And that makes the water more salty and heavier. And of course that is what produces the rains that then drops in our mountains and produces the indirect solar energy from the waterfalls that we use the turbines in to produce electricity.

Well, two things are happening. A major one is the fact that the polar ice cap is melting. And a lot of that fresh water, water without saline in it, very light compared to this heavy water, it is in addition to the general global warming of the oceans, it is the effect of this polar ice cap melting. And strangely the melting of the polar ice cap may so dilute the waters in the Gulf Stream that they do not become dense enough to drop down to continue this conveyor belt on back down to the tropics.

The Gulf Stream could stop. If the Gulf Stream slows down appreciably, or if it stopped, the climate in the British Isles and in Europe would be very, very different than it is today.

Now, if we were in Siberia talking about global warming and so forth, we may have a very different view of it. It might be hard to convince me that a little global warming might not be good if I lived in Siberia. But noting that just this 9-degree Fahrenheit, 5 degrees Centigrade change from the Ice Age has produced the incredible climate changes that we see from that time to this, you see the potential for really devastating climate changes as a result of very modest changes in temperature. Congressman /Gilchrest/.

Mr. GILCHREST. If the gentleman would yield just for a second on the issue of the Gulf Stream and the conveyer belt. As Mr. /Bartlett/ described the conveyor belt, it is part of this whole system of the climate that we are used to, because it creates this heat balance that humans over the last thousands of years have become used to in North America and especially Europe and England.

Mr. /Bartlett/ talked about Ireland being just about on the same latitude as northern Labrador, but has a much warmer climate. That is partly based on the fact that ocean currents bring warm air to that particular region.

With global warming, the ice cap on Greenland, which is about 600,000 square miles. The ice cap about 20 years ago was melting at a rate of about 20 cubic miles on an annual basis. About 5 years ago, it was melting at the rate of about 50 some cubic miles.

Today, it is 80 cubic miles of free water flowing into the northern part of the north Atlantic Ocean, putting what Mr. /Bartlett/ described, more fresh water, less likely to sink or drop and create the pump that drives the conveyor belt.

So the unexpected climate changes, instead of the potential for a much warmer climate in Europe, especially northern Europe, there is a slight chance because of global warming that you could have a much colder climate in northern Europe, the British Isles as a result of the fresh water pouring into the north Atlantic from the melting of the glaciers to stop this conveyor belt from functioning, the unpredictability of this climate change as a result of our dependance on foreign sources of oil and burning fossil fuel.

Mr. BARTLETT of Maryland. Madam Speaker, Congressman /Gilchrest/ and I have both been twice to Antarctica. One of those trips we made together. We are on the Science Committee. We have a large experiment station down there right at the pole. When you go to Antarctica, that is a continent that nobody owns. I think Argentina claims they own it, and Russia claims they own it, but nobody honors those statements. It is an international area.

It has got ice piled nearly 2 miles high. So high and so heavy that it has actually pushed the continent down a little bit under it. 90 percent of all the world's ice is in Antarctica, and 70 percent of all the world's fresh water. You take our Great Lakes and all of the relatively thin ice at the North Pole and Greenland, that is relatively thin compared to nearly 2 miles in Antarctica.

So we have 90 percent of the ice down there and 70 percent of the fresh water. And Congressman /Gilchrest/ mentioned that the oceans would rise maybe 3 feet with the melting of the glacial cap in Greenland and so forth and in the Arctic. If all of the ice melted, that would take a very long time, that is not going to happen tomorrow because there is a whole lot of it there.

But if all of the ice melted in Antarctica, I am told that the oceans would rise 200 feet. Now, that would really, really change our world because I don't know what percent of our population lives within 200 feet altitude of the ocean. I suspect it is more than 50 percent, if you look around the world of the people that live at less than 200 feet altitude.

Now, there is an interesting ocean current that goes around Antarctica, talking about ocean currents and their affect on climates, that is the circumpolar current. And what it does is it keeps the, like our gulf stream, it will either let the cold air down if it is further south or keep it from coming down if it is further north. This circumpolar stream around the Pole keeps the northern, down there, of course, it is northern waters that are warm, it keeps the northern waters from coming down into Antarctica. And if something happened

that stopped that circumpolar stream, the Antarctica polar ice cap might melt much more quickly than we anticipate that it might melt.

As an indication of how much these ocean currents affect climate, about 5 years ago, I guess it was, an iceberg broke off down in Antarctica, which was the size of Delaware. And in spite of the circumpolar current, some northern warm waters do get through it and down there to temper the climate a little, and that usually melts the sea ice enough so that they could get a boat in that is full of diesel file to McMurdo, which is where the main station is. You fly from there to the Pole. And because that big iceberg the size of Delaware blocked the flow of this water that year, and that was 4 years ago, it was so cold there that the sea ice didn't melt, and the closest they could get, with the help, by the way, of a Russian ice-breaker, the closest they could get was 3 miles out, so they laid a hose 3 miles across the ice to fill their tanks at McMurdo.

By the way, Congressman, one of the things that amazed me there, when I was down there the sun was shining all day long and the wind blew incessantly. I didn't see any solar panels down there, and I didn't see any wind machines down there. In the summer down there, in their summer, our winter, they could clearly make all of their energy from the wind and from solar. It just reflects the President's wise observation that we are hooked on oil. We are so hooked on oil that we are really quite irrational in our use of it. You had a comment?

Mr. GILCHREST. Mr. /Bartlett/ and I have been down there twice, the first time I went was probably about 10 years ago, and the supply ship to get to McMurdo station had to break ice. I believe it was about 12 miles from open water to McMurdo. And then after the ice shelf or that huge chunk of the glacier broke off about the size of Delaware, it was close to 30-something miles that they had to break that ice from open water all the way to McMurdo station. So a few degrees, a few changes have some pretty significant dramatic events.

On just a lighter note, on one of those trips, I can't remember which one it was, we went to watch the penguins. The first time I was in the Antarctic they didn't have that far to go to get to open water. The Adelie penguins, the second time, as a result of the increasing ice because it was blocked, had to go miles and miles and miles, and unfortunately it really reduced the population of those Adelie penguins in that part of the Ross ice shelf.

Mr. BARTLETT of Maryland. They have a very interesting rookery down there; we enjoyed seeing it. Both times I was down we went out to the rookery to see the penguins. The big Emperor penguins, they didn't like us; they waddled off. And they scoot along on their bellies when they are moving fast, by the way, rather than marching.

I am very pleased to have been joined by Congressman /Gilchrest/. And again I want to emphasize that we have three groups that have a common cause: those that are concerned about oil and national security, those that are concerned about the excessive use of fossil fuels and the climate change that may very well result from that, and those of us, and I am with all of those groups actually, but I am particularly concerned about the fact that

we may muddle through the national security thing and somehow God may save us from the global warming, but nothing is going to save us if there really is a limited supply of oil.

So, I am very pleased to be joined by my colleague, and I join all of those in these three camps. We really do have common cause. Please join and help us do the right thing.

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