The Kyoto-2 Climate Meeting, Dec 2005, in Canada

- Protesters target global warming, big polluters (like USA)
- The nature of the problem of Kyoto-2
- News during the Kyoto-2 meeting
- Some news stories after the meeting
- Will countries cut CO₂ as promised?
  - Not Europe, not Japan, not US or Canada
- Consider China, India, and Indonesia
  - They will need to use lots more energy
- Opinions about Kyoto and Kyoto-2
  - Mostly cautious and reality statements
  - There are frustrations with the typical Kyoto talk
- In 2003 the UK planned for huge CO₂ cuts by 2050
  - Now they know it is not that easy

Ready to scan May 30, 2006 (93 pages) Doc RJ0390
To find documents:
http://dss.ucar.edu/docs/papers-scanned/papers.html

The National Center for Atmospheric Research Data Note RJ0390.
PO Box 3000, Boulder CO USA 80307
The opinions expressed herein are those of the author.
# The Kyoto-2 Climate Meeting, Dec 2005 in Canada

**Roy Jenne**  
*Jan 18, 2006*  
*Rev May 23, 2006*

## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>3</td>
</tr>
<tr>
<td>2. Protesters target global warming, big polluters (2 p)</td>
<td>5</td>
</tr>
<tr>
<td>3. Six energy issues follow (13 p)</td>
<td>7</td>
</tr>
<tr>
<td>3.1 Nature of the world energy and carbon dioxide issues (4 p).</td>
<td></td>
</tr>
<tr>
<td>3.2 Could China stop releasing more CO$_2$?</td>
<td>12</td>
</tr>
<tr>
<td>3.3 The world energy situation in 2060 and 2080 (3 p).</td>
<td></td>
</tr>
<tr>
<td>3.4 Factors that lead to more energy use.</td>
<td></td>
</tr>
<tr>
<td>3.5 The UK plan in 2003 to cut UK CO$_2$ by 60% by 2050 (bad plan).</td>
<td>17</td>
</tr>
<tr>
<td>3.6 Climate research needs economics (1 p).</td>
<td></td>
</tr>
<tr>
<td>4. News during the Kyoto-2 meeting (16 p)</td>
<td>20</td>
</tr>
<tr>
<td><em>Held in Canada (Nov 28 – Dec 9, 2005)</em></td>
<td></td>
</tr>
<tr>
<td><em>Please see “On Climate Change, a Change in Thinking (by <em>New York Times</em> )</em></td>
<td>23</td>
</tr>
<tr>
<td>5. Some news stories after the meeting (7 p)</td>
<td>36</td>
</tr>
<tr>
<td><em>Neither the <em>New York Times</em> nor the <em>Washington Post</em> reported a key put down of Kyoto ideas by Blair (UK). Very strange. Are we trying to develop strategy or just do politics?</em></td>
<td></td>
</tr>
<tr>
<td>6. Three news stories from Jan 2006 (5 p)</td>
<td>43</td>
</tr>
<tr>
<td>7. How to cope with global warming (opinions of four scientists) (2 p)</td>
<td>48</td>
</tr>
<tr>
<td>8. Will countries cut CO$_2$ as promised for Kyoto-1? (6 p)</td>
<td>50</td>
</tr>
<tr>
<td><em>No, not Europe, not Japan, not US or Canada.</em></td>
<td></td>
</tr>
<tr>
<td>9. Consider China, India and Indonesia (5 p)</td>
<td>56</td>
</tr>
<tr>
<td><em>They still have lots of poor people.</em></td>
<td></td>
</tr>
<tr>
<td><em>Their economies need to grow (and use more energy).</em></td>
<td></td>
</tr>
<tr>
<td>10. World use of energy, 1971 – 2030 (10 p)</td>
<td>61</td>
</tr>
<tr>
<td><em>And oil and gas use to 2080</em></td>
<td></td>
</tr>
<tr>
<td>11. Opinions about Kyoto and Kyoto-2 (11 p)</td>
<td>71</td>
</tr>
<tr>
<td><em>Some of these are almost too hot to handle.</em></td>
<td></td>
</tr>
<tr>
<td><em>I kept them in a drawer for a while.</em></td>
<td></td>
</tr>
<tr>
<td><em>But too much is at stake for world planning to hide these ideas.</em></td>
<td></td>
</tr>
<tr>
<td><em>Stories like these are very rare in newspapers and magazines.</em></td>
<td></td>
</tr>
<tr>
<td>12. In 2003 the UK planned for huge 60% cuts in CO$_2$ emissions by year 2050 (6 p)</td>
<td>82</td>
</tr>
<tr>
<td><em>Experts criticized the report.</em></td>
<td></td>
</tr>
<tr>
<td><em>Now they know that reducing CO$_2$ is not easy.</em></td>
<td></td>
</tr>
<tr>
<td><em>In 2005 the UK appealed to Europe, saying that the UK needed to emit more CO$_2$.</em></td>
<td></td>
</tr>
<tr>
<td>13. A few more pages (6 p)</td>
<td>88</td>
</tr>
</tbody>
</table>
Introduction (Kyoto-2 Climate Meeting)

Roy Jenne
May 25, 2006

The Kyoto-2 climate meeting was held Dec 2005 in Canada. A number of people hoped that it would call for huge reductions in greenhouse gases (mainly CO₂) after the present Kyoto-1 agreements end in 2012. This would mean that either much less fossil fuels would need to be burned, or a practical way would need to be found to remove the CO₂ resulting from burning the fossil fuels.

1. The world will need more energy
   Energy use is critical for economic growth, reducing poverty, and handling many other problems (transportation, water supply, health, etc.) It would be unreasonable for countries to promise big cuts in carbon emissions unless there were technical capabilities to have a good energy supply at affordable costs. This does not yet exist without fossil fuels. And some of the partial energy solutions such as nuclear energy and putting carbon into the deep ocean are still actively fought by much of the environment community.
   - We must solve energy supply problems; we must also consider the climate change issues.

2. World population
   The world’s population was 1.2 billion in 1850, 6.057 billion in 2000, and is expected to be 7.5 billion by 2020, and 9 bil in 2050. Since there will be more people and much economic growth, the need for more energy, water, lumber, and metals will be large.

3. Use more fossil fuels
   The world will need to use lots more fossil fuels. The use of oil will likely come to a peak about 2035-40, and natural gas use may peak about 2065. But world politics could cause supply problems before then. If the world burns all of its oil and natural gas, this would increase the year 2000 amount of CO₂ in the atmosphere by about 30%. This amount of increase would not damage the climate. But there is much more coal than oil and gas. Some countries such as China, India, Australia, and the US have large deposits of coal, but not oil and natural gas. They will need to use more coal. They at least need to displace part of the coal use by developing more nuclear power.
   - We should act to take the pressure off of oil and gas to help it last longer. And prepare substitutes that are affordable.

4. Nuclear energy
   The US and the world will need both nuclear fission energy and fusion energy (later on). It is not yet clear that fusion energy can be achieved in a way that gives practical energy.

5. Solar energy
   Solar energy (heat collection and PV cells) can produce some energy, but these technologies release enough energy (albedo effects) that they likely do not help to cool the planet. Also, most of the solar energy is now too expensive. Cheap PV cells with much higher efficiency would help a lot, but is not clear that this is possible.
6. Biomass
Biomass is an important energy source to develop more, but by itself it is not even close to a complete solution to the energy supply issue. At some point, land used for energy starts to compete with land for food.

7. Energy strategy and political problems
Strategy: In spite of the fact that complete energy solutions do not now exist, there are some practical energy tasks to do. We should more ahead with these.

Problem: In the present atmosphere, it is perfectly possible to spend huge amounts of money on ideas that do not offer a significant help to solving the energy problems. We need to achieve a situation where more of the proposed solutions have a good technical analysis to see if they make sense.

8. Kyoto agreements: The spirit of Kyoto needs to be retained but wasting lots of time making agreements that no one can achieve is not a help.

9. Will countries achieve their Kyoto promises to reduce CO₂ by 2012?
No, almost no one will meet the promises. But then why does 98% of the news imply that most countries will be able to satisfy the promises?

10. An Asian-Pacific partnership on clean development and climate as signed Jan 2006.
This pact includes US, China, India, and Japan, Australia, and S. Korea. This pact may be a good way to develop technologies and strategies to help cope with energy and climate issues.

11. The UK planned in 2003 to reduce CO₂ by 60% by 2050.
The UK plan for the 60% reduction by year 2050 (and without more use of nuclear), was quickly questioned by experts. It was not a realistic plan. During 2005-06, the UK realized that the original plan will not work. They now plan to develop more nuclear. This is wise, but I think that the policy (and technical) fights will probably continue for another 5-10 years.

12. Future cost of energy from wind, solar, biomass to oil, coal to oil, etc.
It is useful to try to estimate the future cost of energy from selected sources. However, we need to realize that the results are very uncertain. In some cases, people put equations into price models that say that the cost of a process will decrease by 5% per year. But there are usually some limits to how efficient a technology can become. These limits need to be evaluated. I have noted that many enthusiastic estimates of the capability and cost of future technology are much too optimistic. Also, we need to realize that development work does cost money, but just flooding in money is not the answer to good development strategy.

13. So we hope to do this:
- Create better analyses of technical facts and costs for energy conversions.
- Do projects that are practical to help energy supply and development now.
- Make sure that buildings are as energy efficient as possible.
- Monitor changes in climate and in the 20 to 30 year up and down cycles of climate.
- Help more people to become aware of the facts of the energy situation.
Protesters target global warming, big polluters

Thousands take to the streets worldwide to demand action

By Phil Couveture

MONTREAL — Thousands of protesters took to the streets in cities worldwide Saturday to demand urgent action on global warming as delegates continued their work at an international climate change conference to review and update the Kyoto Protocol.

Police said about 7,000 people marched in downtown Montreal — some dressed up as polar bears. Five environmental groups, including Greenpeace and the Climate Crisis Coalition, delivered a petition signed by 600,000 Americans to the U.S. consulate in Montreal urging President Bush and Congress to help slow global warming.

“We’re worried about climate change, about ways of life in the Canadian Arctic disappearing,” said Sarah Binder, of Montreal’s Urban Ecology Center.

Organizers said 10,000 people marched through London, passing Prime Minister Tony Blair’s home on Downing Street, where they delivered a letter demanding the government reaffirm its commitment to Kyoto with legally binding targets on emissions reductions.

Chanting and blowing whistles, the marchers denounced Blair and Bush for their perceived environmental failings. Some held banners depicting Bush as “Wanted — for crimes against the planet” and advising “Ditch Blair, not Kyoto.”

At a protest in Boston, speakers called on Massachusetts to join with seven other Northeast states that are putting limits on carbon dioxide emissions from power plants. Gov. Mitt Romney has not signed on because he is concerned that the pact could mean increased utility rates.

In Washington, drivers of hybrid cars planned to rally around the White House. In New Orleans, residents intended to hold a “Save New Orleans, Stop Global Warming” party in the French Quarter.

Canadian Inuit traveled to Montreal from the isolated Arctic north to join the protest there. Indian leader Jose Kusugak told The Associated Press that he brought along hunters, trappers and elders to reassure them that people from the south were not indifferent to their plight.

“It was important to show there are a lot of people in the world who care,” he said.

Canada’s Environment Minister Stephane Dion, who is presiding over the 10-day U.N. Climate Change Conference in Montreal, also took part in the march and said final negotiations next week involving some 120 environment ministers and other government leaders would be crucial to improving the Kyoto agreement.

Bush has been widely criticized for pulling out of the treaty, which binds industrialized nations to lower greenhouse gas emissions. The United States — which spews out nearly 25 percent of the world’s carbon emissions — was the target of many demonstrators Saturday.

Note: The US gets the criticism. But the record of emissions per person of CO2 is somewhat worse for Canada than for the US.
LOCAL NEWS Thu Dec 1, 2005

Health expert discusses climate change

U.N. conference is ongoing; protests set for Saturday

By Lauren Glendenning
For the Camera

The United Nations Climate Change Conference, which began Monday and runs through Dec. 9, has prompted local and international demonstrations on the effects of global warming.

A research associate from the Johns Hopkins School of Public Health will be in Boulder tonight to discuss the human health effects of climate change. Dr. Cindy Parker, an expert on public health, will give a talk at 6:30 p.m. at the George Reynolds Library, 3595 Table Mesa Drive.

"The big issues for Colorado are water and some infectious diseases," Parker said.

Parker will discuss a variety of health topics including air quality, infectious disease, water quality and quantity, extreme weather events and sea level change.

Climate activist Leslie Gustrom said she is excited about Parker’s visit because the issue is becoming a huge problem for the United States.

“Our country is not taking a leadership role in climate change," Gustrom said. "This is not something to be played around with anymore.”

Demonstrations also are being coordinated around the world for Saturday to promote the ratification of the Kyoto Protocol, an international treaty on climate change mainly targeting industrialized countries.

Countries that ratify the treaty commit to reduce their emissions of carbon dioxide and other greenhouse gases. Australia and the United States, the world’s largest greenhouse gas emitters, have refused to ratify the treaty that more than 150 countries have already signed and ratified.

A recent report in Science magazine shows that three important heat-trapping greenhouse gases have reached new atmospheric levels due to human activities. James White, a geology professor at CU, said research has shown current levels of carbon dioxide in the atmosphere to be at its highest in 650,000 years. He said the Earth's higher climates are associated with higher levels of carbon dioxide, and lower levels are associated with lower climates.

Humans, he said, have caused a climate change in the last 50 years that would have taken the Earth 1 million years to reach naturally.

“What (humans) are doing to the climate system is by no means trivial," White said. "We are by far the biggest thing this planet has seen in climate change.”

- Demonstrations are being coordinated around the world for Sat Dec 3, 2005
- The 650,000 years of carbon dioxide changes changed the climate in a big way. All of these changes caused changes in CO2.
- In turn, the CO2 made a little change in the climate. The big change was due to the natural orbital effects

Roy Jones Dec 2005
Six Energy Issues Follow (13 pages here)

2.1 Nature of the World Energy and Carbon Dioxide Issues

(4 pages)

Roy Jenne
Jan 20, 2006

2.2 Could China Stop Releasing More CO₂?
(The answer is "No.")

(1 page)

Roy Jenne
Jan 19, 2006

2.3 The World Energy Situation in 2060 and 2080

(3 pages)

Roy Jenne
Feb 6, 2006

2.4 Factors that Lead to More Energy Use

Roy Jenne
April 2006

2.5 The UK Plan in 2003 was to cut UK CO₂ by 60% by 2050
(But it was not a plan that would work)

(2 pages)

Roy Jenne
Jan 25, 2006

2.6 Climate research needs economics.

Warming to economics

(1 page)

Roy Jenne
May 25, 2006
Nature of the World Energy and Carbon Dioxide Issues

Roy Jenne
Jan 20, 2006

The world will need to use a lot more energy. The supply of oil will become more limited by about 2040, followed by gas 20 to 25 years later. One big world problem will be to have enough affordable energy supply in useful forms, such as liquid fuels.

For some years I have been using part of my time to assemble a selection of information about energy, Kyoto, and climate. I keep hoping that a better selection and development of key facts will help to document the recent history of energy and climate issues, and perhaps lead to better solutions, and less politics. So far the politics have become worse.

1. Many rich countries promised to reduce CO₂ emissions (but most promises are not being kept). For Kyoto, many countries made promises to cut CO₂ emissions without having any clear idea of how they would do it. The politics have been heavy, but most countries will not meet their promises to reduce CO₂ by 2012. Now there are demands to make much bigger reductions in CO₂. But it is becoming clear that no one knows how to do this. The experience of the UK is documented elsewhere in this text. In 2003 they thought that they could reduce the UK CO₂ emissions by 60% by 2050. In 2005 they found that those claims were based on faulty studies.

There are now several hundred pages of text that document part of what has happened in Kyoto discussions and arguments. I hope that this document about Kyoto-2 may help to improve the world’s future planning for energy and climate issues.

2. There are some useful actions to take on energy problems. There are many useful things to do about energy now, but no one has an affordable magic bullet that will solve all possible problems and do it fast.

Achieve more energy efficiency.

The world growth in energy use is as slow as it is because some gains in energy efficiency are happening, and because 2 or 3 billion people are still quite poor. But the economy is growing and the population is increasing. The economic growth will cause more energy use, but we can still do more work to achieve an increasing rate of more energy efficiency that will help to control the problems of energy supply and environmental effects.

3. A good country tries to help its people. Many countries in the world are still poor, but their economy is growing. That means that they will need to use more energy even if they improve their energy efficiency. A better economy will help them solve their problems (such as food, water, energy, health, etc.)

A country needs several things for its people:
• Housing and food
• Adequate health and water
• An adequate supply of affordable energy
• An adequate environment
• When countries develop more wealth, the people want to travel more.
• Handle other needs of society such as education, roads, etc.
• A growing economy will help a country to meet its needs and desires.

4. The demand for oil and gas will increase a lot.
The demand for oil (liquid fuels) will increase, driven by world economic growth and more people (Table 1 has the history and forecast of petroleum use).

_The supply of oil._

The supply of oil will become more limited (not gone) by about 2040, and natural gas may follow this pattern (more limited) by about 2065. One world problem will be to have enough affordable _energy supply_ in useful forms. A number of activities will be needed to prepare substitute liquid fuels, and to remove some of the huge pressure for the increasing rate of use of conventional oil and natural gas. Natural gas became expensive because huge amounts of it were being used to generate electricity. The motives were lower costs and less carbon dioxide from gas. But when the price of gas increased a lot in 2005, electricity from gas was no longer cheap. Natural gas is a very important fuel and it should not be wasted. It is better to use nuclear and coal to make electricity.

<table>
<thead>
<tr>
<th>Year</th>
<th>Mil bls/day</th>
<th>Year</th>
<th>Mil bls/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>10.3</td>
<td>2000</td>
<td>75.0</td>
</tr>
<tr>
<td>1960</td>
<td>21.3</td>
<td>2010</td>
<td>88.8</td>
</tr>
<tr>
<td>1970</td>
<td>46.8</td>
<td>2020</td>
<td>104.0</td>
</tr>
<tr>
<td>1980</td>
<td>63.1</td>
<td>2030</td>
<td>120.0</td>
</tr>
</tbody>
</table>

- Forecasts are from World Energy Outlook 2002 by IEA (Paris).
- See plots of energy use in Doc RJ0389
- The price of oil increased since these forecasts in 2002. That may reduce demand from these figures.

5. Problem solving methods for energy and climate.
The energy and climate issues have become _far too politicized_. When the situation gets too political, the ability to analyze problems becomes worse. In this situation, too many groups can jockey for money and power. The politics may create a big flow of money, but most of it may be wasted.

6. Will countries act to hurt their economy?

_No country is going to significantly hurt its economy to limit CO₂._
(from Blair of UK, Dec 2005).
• A country could limit CO₂ by becoming poor (who will want this??)
7. Severe problems can be caused by a bad energy supply or high prices. An inadequate supply of oil and gas can be caused either by the inability of the world to produce increasing amounts to satisfy demand or by political instability in some energy producing regions (or both). For several decades, there have been many research reports that claim (with many news headlines) that the year of the world’s “peak oil” will come within 2 to 8 years. I have surveyed this issue enough (with the help of the important USGS-2000 report; plus US Dept of Energy work; and IEA, Paris forecasts) to convince myself that we can likely keep producing more oil until about 2040 and more gas until about 2065. This helps a lot, but 35 years will go by quickly. Energy substitutes will be needed, based on hard facts and good analyses of problems and costs.

8. Political instability: There is a real concern that instability could cut off a serious amount of energy exports and imports. The economic and social effects could be very bad. The US needs to reduce our dependence on imports (not eliminate imports).
   - We need to reduce our dependence on oil imports.
   - And we need to do what we can to keep world politics fairly stable.

9. Most climate models warm the earth by about 2°C by 2080. Results from 16 of the world’s main climate model runs were published Jan 2005 (see Bull. AMS). The different models warmed the earth by 1.5 to 2.5°C during 2000-2080. But these models added CO₂ at the rate of 1% more each year. This is most likely too fast. Thus the real model warming by 2080 would be less than 2°C.

   The world will have to adapt to some climate change no matter what we do. Tony Blair (head of UK) wanted to know how much warming might start to get quite serious. In 2005 a group estimated that about 2°C of warming (from 2000) might be the answer. So we likely have about 80 or 90 years to reach this level of warmth. That would be a warming rate of about 0.2°C per decade. Some people think this warming rate is too fast. Others imagine scenarios to make warming still faster.
   - The main point here is that we likely have at least 70 to 100 years before the earth warms by 2.0°C (if it does).
   - This gives us time to keep monitoring the climate and to do sensible things to head off big energy problems, and to reduce some of the CO₂ growth.

10. Sea level rise
    The peak of the last ice age was during 22,000 to 18,000 years ago. At that time there were huge amounts of ice piled up over North America and northern Eurasia. Sea level was 120 meters (394 feet) lower than now. Then the ice melted due to changes in the way that the earth orbits the sun.

11. A big tank of oil
    We will now present some information about the volume of oil to help people visualize the amount of oil that the world is using (it is a huge amount).

   a. A tank to hold the world’s oil for 1995.
      In 1995 the world used 22.3 bil barrels of oil. This would fit in a tank 1000m by 1000m by 3545m high (or 3280 feet x 3280 ft x 11,630 ft).
b. A huge tank to hold a decade of world’s oil use:

In the 1970s and 1980s, the world used oil at the rate of about 200 bil barrels (bbl) per decade. During the 2010s to 2040s, petroleum used will be about 400 bbl/decade (or double the 1970 rate).

How large a tank would hold 400 bil barrels? One cubic meter holds about 6.29 barrels of oil. Therefore 400 bbl is about 63.59 billion cubic meters of oil.

A tank 5 km by 5 km and 2.54 km high would hold this much oil (or 3.1 miles x 3.1 miles x 1.57 miles high). This huge tank is 8343 feet high, about the same height as 8 skyscrapers, each with 100 stories. Another comparison: A tank 50 km by 50 km in size would be 83 feet deep with petroleum! Miles: This tank is 31 miles by 31 miles by 83 feet deep. We also note that the oil for one year would be a tank 31 miles by 31 miles by 8.3 feet deep. This is a huge amount of oil!

c. Conversions:

- One cubic meter holds about 6.29 barrels of oil.
- There are about 7.33 barrels of oil in one metric ton of oil. Note that the main energy unit used by the International Energy Administration (Paris) is MTOE (millions of metric tonnes of oil equivalent).

Note: Available “oil” (or petroleum) in the world includes crude oil, natural gas liquids, and oil from oil sands. The densities of these, or of products like gasoline or diesel oil are all different. The conversions are approximate.

12. How much remaining oil was there in Jan 2000?

The USGS has done the best work of evaluating the total amount of world crude oil and natural gas liquids that we have for future use. It is also economical to produce oil from oil sands (so that is counted below). Oil shale is not yet counted because no one knows whether it will become economical to produce.

- So in Jan 2000, the world had about 2900 billion barrels of future supply of “oil.” See online NCAR documents RJ0389, p 30 and RJ0386 for more information.
- During 2010-2040, petroleum will be used at the rate of about 400 bil barrels per decade.
- Bad world politics or wars could upset the supply of oil long before the supply gets low.
Could China Stop Releasing More CO$_2$?
(The answer is “No.”)

Roy Jenne
Jan 19, 2006

Most of the stories about Kyoto-1 and Kyoto-2 criticize the US for using lots of energy, and for not doing enough to use less energy and to limit emissions of carbon dioxide. It seems odd that the news stories do not point out that on the basis of energy use per person, countries like Canada and Australia are very similar to the USA. Yet the criticism is directed at the USA.

China uses more energy.

More people are now recognizing that China is using much more energy and that their economy is growing rapidly, which helps to reduce the number of poor people. But we see more and more news stories that criticize China for using more energy and for emitting more carbon dioxide.

The main news could help by talking about what is really happening and why.

I have not seen even one of these stories that points out that China must grow its economy to meet the needs of the Chinese people. The authors do not ask just how China would limit energy use. Criticism is cheap and easy, but it solves few problems.

Actually, I have noted that China is doing quite a lot to meet its energy needs while reducing the growth of CO$_2$:
- They are building many nuclear power plants.
- They are installing more water power.
- But China’s main national energy resource is coal. It is hard to conceive of any way that they could avoid using still more of their coal. And that gives more CO$_2$.
- The clean energy group: China is a member of the group of six nations who are working toward better technology. The nations are the US, Japan, China, South Korea, India, and Australia. Let us wish this initiative good success. They started the group in mid-2005 and first met in Jan 2006.

Table 1. Total primary energy use in 6 areas.
The units are millions of tones of oil equivalent (MTOE).
Note the rapid increase in energy use in each country.

<table>
<thead>
<tr>
<th>Country</th>
<th>Population in 2000</th>
<th>Total Energy Use in MTOE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1971</td>
</tr>
<tr>
<td>China</td>
<td>1272m</td>
<td>241</td>
</tr>
<tr>
<td>S. Korea</td>
<td>47m</td>
<td>17</td>
</tr>
<tr>
<td>Indonesia</td>
<td>210m</td>
<td>9</td>
</tr>
<tr>
<td>India</td>
<td>1007m</td>
<td>62</td>
</tr>
<tr>
<td>Russia</td>
<td>145m</td>
<td>--</td>
</tr>
<tr>
<td>Latin America</td>
<td>516m</td>
<td>140</td>
</tr>
</tbody>
</table>

Source: Report WEO 2002 from IEA. Observed data for 1971, 2000; then energy forecasts.
We have made projections of the world use of oil and natural gas out to 2080. These are similar to forecasts out to 2030 made by the International Energy Agency (Paris) and the US Dept of Energy. For later years the estimates recognize that many countries are still poor and will need large amounts of energy to escape poverty. But the forecasts also use the best estimates (mostly from USGS) of the remaining supply of oil and gas in Jan 2000. The forecasts take some account of energy from more nuclear, biomass, wind, water power, etc. But more could be done to take the huge pressure off of the use of oil and gas so that those fuels can last longer.

1. The world energy situation in 2060

   We have estimated that the world had resources of petroleum (oil, gas liquids, and recoverable oil from oil sands) of about 3100 bil barrels (bbl) in Jan 2000. This is mainly based on USGS estimates.

   By 2030 the world will have used an estimated 1053 bbl of this 3100 total oil and there will be about 2260 bbl used from 2000 to 2060. The total use through 2080 is expected to be about 2800 bbl. The peak year of oil production will likely come about 2035 to 2040. It depends on world economic growth and on efforts to take the pressure off of oil use. Plots of the rates of use for petroleum (1940-2080) and natural gas (1970-2080) for one year each decade are given in this document. By 2060, we will have used about 251 trillion cubic meters (tcm) of natural gas from the total supply of about 390 to 500 tcm existing in year 2000. The peak ability to produce gas may come about 2065. After that the ability to produce gas will decrease.

2. Energy status for year 2080

   The world will have used about 2800 billion barrels of petroleum from year 2000 through 2080. In Jan 2000 the estimate of total world future recoverable oil (in crude oil, gas liquids, and oil sands) was 3100 bbl. This was based on USGS estimates plus the reasonable addition of 580 bbl from oil sands from which oil production is already economic. The estimate of 3100 bbl of resources was about 1100 bbl higher than previous estimates which also did not include oil sands. The previous scientists worked with resource estimates of only about 1400 bbl (instead of the better estimate of 3100 bbl). Thus nearly all of the research papers kept calling for the peak world production to come within a decade. This would cause big problems with oil supply and prices. Fortunately, these research papers were much too pessimistic. The sources for these oil estimates are described in an online document (RJ0386) “Survey of Energy and Climate Issues, Oct 2005.”

   The larger oil estimates by USGS in the USGS-2000 report did not come from finding lots more oil in underground oil pools. The increase mainly came from an improved ability to extract a higher percentage of the oil from the existing pools.

   The world has been using an increasing amount of oil, so we must figure out how we can cope with a future when supplies are more difficult to obtain. In the 1950s the world used oil at the
rate of 54 bil bl/decade. For the 1970s and 1980s this rate was about 210 bbl/decade. For 2010s through 2040s the rate will be about 400. Wow!

In 2080, oil and gas liquids will be much harder to get. There will be liquid substitutes from gas and coal and biomass. But around 2060, the production of natural gas will also become more difficult to increase. Therefore the production of oil from gas will be less economical. By 2080 (or before) we hope that there may be practical methods to extract 1000 or 2000 bil bl from oil shales. This is not certain because it may require too much energy to extract the shale oil. Also, water may be needed.

During the past 10 years, a large amount of natural gas has been used to produce electricity. It makes sense to use more nuclear for the task of producing electricity so that supplies of natural gas will last longer and the price will be less.

- World remaining oil in year 2000 was about 3100 bil bl.
- We will use 1053 bbl of this by 2030.
- And use 2260 bbl by 2060, leaving 840 bbl.
- By 2080 we will use 2800 bbl, leaving 300 bbl.
- We need to slow down the increase in the rate of use, and we need to use more substitutes to extend the age of oil.

3. Biomass

The efficiency of photosynthesis to produce biomass is limited. Therefore it takes a lot of land area (and water) to obtain biomass. Land is also needed to grow food, build cities, and for other uses. I think that biomass will become an increasingly important energy source, but there are limits to how much we can obtain. By 2080 the world will likely have 50% more people than in 2000 and they will each be richer (if we can continue to solve critical problems). The gathering of biomass requires energy and the process to convert biomass to liquid fuels takes much energy. All of these issues must be carefully analyzed to avoid too many cases where actions taken to solve energy problems do not make sense because they require too much input energy.

A review paper about biomass

A good editorial and review of biomass is in *Science*, 27 Jan 2006. They say that credible studies with plausible tech developments indicate that biofuels may be able to supply about 30% of global demand, while still producing enough food. This estimate seems rather high.

4. An action plan for energy efficiency

We need to keep making our use of energy as efficient as possible, especially in the areas of transportation, buildings, motors and appliances. There will be a lot more buildings and travel, so this work on efficiency is doubly necessary. The work on improvements will always have constraints such as available technology, available materials, and costs.
5. The action plan for energy supply

We need to get serious about using more nuclear energy to take part of the pressure off of the use of oil, gas and coal. This will permit the fossil fuels to last longer, and it will slow down the increase of carbon dioxide in the atmosphere.

Biomass: It appears that we can obtain considerably more energy from biomass by using it only in the best way. We also need land for food, parks, cities, etc; we should not forget about these constraints. Some use of biomass requires more input energy than we get back.

There are other options for more energy such as dams on smaller rivers, solar, wind, etc. We have to make realistic studies for the various options.

Subsidies: Any subsidies must be used carefully. A lot of people want big subsidies coming to them. People claim that a big subsidy creates a big market and reduces prices. Sometimes this is true. But it often happens that the big subsidy will help to lock in the higher prices. The people talking to the government about policy will often be mostly wanting huge subsidies and only a few wanting to make the solid analysis needed to achieve balanced and sensible systems. Guess who will win?

6. Most of the oil and gas resources will be used by 2080; CO₂ effect

By 2080 most of the year 2000 inheritance of oil and gas will have been used. Unless methods become practical to capture much of the resulting CO₂, then the amount of CO₂ in the atmosphere (due to burning the oil and gas) will have increased by just 28% over the CO₂ in year 2000 (Doc RJ0386, p 159). The use of coal before 2100 will give a further increase in CO₂.

The addition of CO₂ to the atmosphere by burning oil and gas will not cause a significant climate problem by itself. The resources of these two important fossil fuels are just not large enough to cause big greenhouse problems.
Factors that Lead to More Energy Use

Some factors that lead to more energy use and more emissions of CO₂ follow.

1. More countries are moving from poor to middle income.
   • That takes much more energy.

2. More people are traveling a lot more than before.
   • More cars, more airplanes, etc.
   • Transportation will need more energy.

3. Many more buildings are being constructed.
   • Takes more energy for heating and cooling.
   • We need more work to make buildings efficient and healthy too.
   • Need good insulation and better windows.

4. A developing economy needs more electricity.
   • One choice will be: Use more nuclear power, or have more CO₂.

5. World population will go up from 6 billion in 2000 to ~9 billion in 2050.
   • That takes more food and energy.

6. Raise more biomass for energy. At some point this competes with land used for food.

7. Sequester CO₂ from coal power plants. It will likely require about 35% extra energy to do this.
   • We also have an energy supply problem, so this is difficult.
The UK Plan in 2003 was to cut UK CO\textsubscript{2} by 60% by 2050
(But it was not a plan that would work)

Roy Jenne
Jan 25, 2006

1. Introduction

The Kyoto-1 agreements are planned to end in 2012. Blair (head of UK) was very interested in doing something about global warming now and after 2012. The UK assembled experts in 2002 to draw up a plan to make large reductions in the amount of CO\textsubscript{2} that the UK would release. A story is included here.

- Plan (Feb 2003): The UK will reduce its CO\textsubscript{2} emissions by 60% by 2050, a huge reduction. And they would do this while shutting down the existing 20 or so nuclear plants and not building any new ones. (Help! Help!)
- Some called the plan unreliable at the time (I agree), but it was not until 2005 that they realized that the plan was not going to work.

2. The UK will have to emit more CO\textsubscript{2}.

In 2005 the UK applied to Brussels for permission to emit an increasing amount of CO\textsubscript{2}. At first this request was denied, but then the European judge granted the UK request (see story here).

3. Blair (chief of UK) said that no country will cut economic growth to cut energy use (Dec 05).

Blair (Prime Minister of UK) said (in Dec 2005):

"No country is going to cut its growth." Forbes adds: Since no country knows how to reduce emissions without cutting growth, those words have to be taken as a confession of failure (Forbes, Jan 9, 2006, p 130)

Very few news stories have repeated this message from Blair. But it is likely a true statement and it has big implications.

4. Two observations

- It is still not very hard to find an expert panel that will claim there is a good way to make huge reductions in carbon dioxide emissions while using only renewable energy.
  - The UK had bad experience with this sort of advice. Now they are changing directions.
- But no one yet has a practical and affordable way to make huge CO\textsubscript{2} reductions and not use nuclear energy.

5. Strategy now (year 2006)

It is best to do the energy work that makes good sense now. And we need to keep monitoring the climate. Fast action on huge plans that cost a lot without significant benefits is usually counter-productive. While doing the first tasks, we have at least 25 to 40 years to make gains in technology, and time to let the energy politics settle down (we hope the politics will become better).
6. The problems we will face about 2050-2060

In 2060 the world will still need adequate affordable energy and a good climate.

Conventional crude oil will be beyond its peak and more expensive. But the production of liquid fuel substitutes will be larger. Much more natural gas and coal will be used. It is also possible to make liquid fuels from either coal or natural gas, but the process requires energy and gives off CO₂. The period when we can keep producing increasing amounts of natural gas will be drawing to an end. Thus that energy source will be more limited and costly. It makes sense to be using more nuclear energy to take the pressure off of fossil fuels. More biomass will be used, but the amount will not be enough to solve many problems by itself. The world will be using even more fossil fuels to produce materials (plastics, etc.)

Some oil may be obtained from the large deposits of oil shales in the USA. To be practical, the output oil has to be produced at an affordable cost and the input energy needed must be limited and practical. And there may be water issues. No one yet knows if these problems will be solved.

More info about the UK (6 pages) is on page 82 here.
Warming to economics

Climate research can only gain from closer collaboration with economists.

Unfortunately, for the purposes of its impending fourth assessment, the IPCC won't manage to incorporate the economists' latest thinking on these different 'emissions scenarios.' The 'Special Report on Emissions Scenarios' that will accompany the assessment was developed in the late 1990s and rests on a number of assumptions that many economists view as outdated or simplistic.

For example, it assumes direct 'cause-and-effect' correlations between factors such as population growth and technological change, instead of the more complex, two-way relationships that economists have established beyond reasonable doubt. It also makes macroeconomic assumptions, such as a rapid convergence between the per-capita income of rich and poor nations, that ought really to be discarded as wishful thinking.

Common-sense adjustments to, the report on emissions scenarios could incorporate the best understanding that we have regarding the interaction of such variables in complex economic systems. They will not remove uncertainty, which is fiercely ingrained in economics. Increasingly empirical approaches to economic assessment and modelling, many of them borrowed from the 'hard' sciences, will, one suspects, never lead to a mechanistic understanding of economic forces. The development of such approaches is welcome nonetheless, and has an important role to play in the assessment of emissions scenarios.

The IPCC has initiated the development of an improved set of such scenarios for completion by the end of the decade, in time for incorporation into its fifth climate assessment, due in 2013. Such are the slow wheels of progress at an organization designed to forge painstaking consensus. The delay need not undermine the authority of the IPCC's work, but it will doubtless lend ammunition to its vocal and well-financed critics when the fourth assessment is released.

Some Comments:

1. "A lack of progress report on the IPCC." The Economist (Nov 8, 2003, p 76) came out with this story. (See report RJ0337, p4)
   On Feb 15, 2003, they had reported on the criticisms of the IPCC emission scenarios by two senior economists. The emissions forecasts used by IPCC were too high (and thus too much warming was predicted).

2. The IPCC Fourth Assessment will be published in early 2007. The story above says that the latest economic thinking will not be reflected in this report (so wait until 2013).

3. I see no valid excuse for this much delay.

Roy Jenne
Feb 16, 2006
News during the Kyoto-2 Meeting
(Held Nov 28 – Dec 9, 2005, in Canada)

- Kyoto-1 will expire in 2012. This meeting was to discuss what happens next.

- On Nov 28, 2005, a no-confidence vote toppled the Canadian government.
  - But the climate meeting went on.

- On climate, a change of thinking.  \textit{(N. York Times)}
  - The Kyoto-1 methods are not working.  \textit{- Good test}

- Kyoto questioned as US moves on coal.

- Bill Clinton talks to the conference
  - Invited to put pressure on the US delegation.

  \underline{climate talks edge toward twin-track future.}

\textit{(16 pages here)}

\textit{Roy Jenne}
\textit{Jan 2006}
The heat is on

A successor to the Kyoto Protocol on climate change must involve mandatory emissions caps.

Talks about a climate accord to succeed the Kyoto Protocol when it expires in 2012 begin in earnest next week in Montreal. They will take place amid concerns that nations who backed the protocol are retreating from its central principle: the imposition of mandatory caps on greenhouse-gas emissions.

No national leader still in office is more strongly associated with the Kyoto agreement than Britain's prime minister, Tony Blair, and his recent pronouncements on Kyoto II have worried supporters of mandatory caps. In a series of speeches earlier this month, Blair made no mention of targets and echoed US President George W. Bush by stressing the role of technology development in cutting emissions. Blair also said that something "better and more sensitive" than the initial agreement was needed to convince major developing nations such as India and China, which do not have to limit emissions under the current protocol, to sign up to a new version.

That seems fair enough. But if European leaders such as Blair fail to insist on targets as part of Kyoto II, there is a danger that the entire exercise could become meaningless. Technology, in the shape of cleaner fossil-fuel power stations, renewable energy sources and perhaps nuclear power, ought to form an important element of nations' climate-change strategies. But these technologies need to be nurtured through financial incentives produced by mandatory caps and carbon-trading arrangements.

Following criticism of his initial remarks, Blair has been talking up targets again, stating that "targets, sensitively and intelligently applied over the right timeframe" are needed after 2012. But it will take remarkable ingenuity to bridge the chasm between developed countries, such as the United States and Australia, that have done little to cut their own emissions, and developing ones, such as China and India, that want rich nations to act before they do.

That said, there are already ideas in circulation about how to bring on board all these parties, including the United States, where a new administration elected in 2008 may take a more constructive approach. Specific industrial sectors might, for example, be asked to accept targets. China might agree to set targets on its energy-intensive cement industry, which has substantial greenhouse-gas emissions, in return for more technical support from overseas companies, who would earn credits that they could trade off against the emissions commitments at home. Similar schemes already operate on a small scale under the Kyoto Protocol.

Other sectors could be regulated on an international basis. Governments might agree to establish national targets on vehicle fuel emissions and efficiency, for example. This would offer nations the chance to sign up to agreements in sectors in which they know they can improve without losing their competitive advantage.

Working out how these ideas can be combined with the existing carbon-trading system will be an immense challenge. The last thing the process needs is for nations already committed to emissions targets under the original Kyoto protocol to turn their backs on them now. It was relatively painless for some nations — notably Britain and Germany — to meet tight Kyoto targets, because local events had sharply reduced emissions shortly after 1990, the baseline date against which the protocol's targets were set.

Now new circumstances, including greater electricity demand in southern Europe and steady economic growth, are making it harder for the European Union to stay within the Kyoto caps. Its leaders must redouble their efforts to restrict emissions and to vigorously pursue as strong a successor agreement as is practicable.
Martin, Liberals out in Canada

Corruption scandal results in a vote of no-confidence

By Rob Gillies
Associated Press

TORONTO — A corruption scandal forced a vote of no-confidence Monday that toppled Prime Minister Paul Martin's minority government, triggering an unusual election campaign during the Christmas holidays.

Canada's three opposition parties, which control a majority in Parliament, voted against Martin's government, claiming his Liberal Party no longer has the moral authority to lead the nation.

The loss means an election for all 308 seats in the lower House of Commons, likely on Jan. 23. Martin and his Cabinet would continue to govern until then.

Opposition leaders last week called for the no-confidence vote after Martin rejected their demands to dissolve Parliament in January and hold early elections in February. Monday's vote follows a flurry of spending announcements in Ottawa last week, with the government trying to advance its agenda ahead of its demise.

Martin is expected to dissolve the House of Commons on Tuesday and set a firm date for the elections. Under Canadian law, elections must be held on a Monday — unless it falls on a holiday — and the campaign period is sharply restricted.

The Conservative Party leader Stephen Harper joined with the New Democratic and Bloc Quebecois parties to bring down the government — prompting the first Christmas and winter campaign in mostly Christian Canada in 26 years.

Recent polls have given the Liberals a slight lead over the

Please see CANADA on 3B

Canada to see winter campaign

Continued from 1B

Conservatives, with the New Democrats in third place.

The same surveys suggest the Bloc Quebecois would sweep the French-speaking province of Quebec, making a majority government unlikely.

Harper would become prime minister if the Conservatives receive the most seats in Parliament. He favors tax cuts and opposed Martin's successful bill to legalize same-sex marriage throughout Canada.

Martin has had frosty relations with the White House, standing by the Liberal Party decision not to support the U.S. invasion of Iraq. He also declined to join in Washington's continental ballistic missile shield, infuriating the Bush administration, has been called weak on terrorism, and was vocal in his opposition of high U.S. tariffs on Canadian lumber.

Martin is widely respected worldwide for Canada's neutrality and open arms toward immigrants and minorities.

Canada's Conservatives, by contrast, are seen as much more receptive to improving relations with Washington.

The opposition is banking on the public's disgust with a corruption scandal involving the misuse of funds targeted for a national program in Quebec.

An initial investigation absolved Martin of wrongdoing, but accused senior Liberal members of taking kickbacks and misspending tens of millions of dollars in public funds.

The government ran into peril this month when it lost the support of the New Democratic Party. New Democrat leader Jack
On Climate Change, a Change of Thinking

By ANDREW C. REVKIN

In December 1997, representatives of most of the world's nations met in Kyoto, Japan, to negotiate a binding agreement to cut emissions of "greenhouse" gases.

They succeeded. The Kyoto Protocol was ultimately ratified by 156 countries. It was the first agreement of its kind. But it may also prove to be the last.

Today, in the middle of new global warming talks in Montreal, there is a sense that the whole idea of global agreements to cut greenhouse gases won't work.

A major reason the optimism over Kyoto has eroded so rapidly is that its major requirement — that 38 participating industrialized countries cut their greenhouse emissions below 1990 levels by the year 2012 — was seen as just a first step toward increasingly aggressive cuts.

But in the years after the protocol was announced, developing countries, including the fast-growing giants China and India, have held firm on their insistence that they would accept no emissions cuts, even though they are likely to be the world's dominant source of greenhouse gases in coming years.

Their refusal helped fuel strong opposition to the treaty in the United States Senate and its eventual rejection by President Bush.

But the current stalemate is not just because of the inadequacies of the protocol. It is also a response to the world's ballooning energy appetite, which, largely because of economic growth in China, has exceeded almost everyone's expectations. And there are still no viable alternatives to fossil fuels, the main source of greenhouse gases.

Then, too, there is a growing recognition of the economic costs incurred by signing on to the Kyoto Protocol.

As Prime Minister Tony Blair of Britain, a proponent of emissions targets, said in a statement on Nov. 1: "The blunt truth about the politics of climate change is that no country will want to sacrifice its economy in order to meet this challenge."

This is as true, in different ways, in developed nations with high unemployment, like Germany and France, as it is in Russia, which said Mr. Benedick, the Reagan administration's chief representative in the talks leading to that agreement.

"That agreement was a success, but a misleading one in the context of climate," Mr. Benedick now says, to "years wasted in these annual shindigs designed to generate sound bites instead of sober contemplation of difficult issues."

"While it was relatively easy to phase out ozone-harming chemicals, called chlorofluorocarbons, which were made by a handful of companies in a few countries, taking on carbon dioxide, the main climate threat, was a completely different matter, he said.

"Carbon dioxide is generated by activities as varied as surfing the Web, driving a car, burning wood or flying to Montreal. Its production is woven into the fabric of an industrial society, and, for now, economic growth is inconceivable without it."

Developing countries — China and India being only the most dramatic examples — want to burn whatever energy they need, in whatever form available, to grow their economies and raise the living standard of their people.

And the United States — by far the world's largest producer of greenhouse gases — continues to say that emissions targets or requirements would stultify economic growth in both rich and poor nations. All this has turned the Montreal meeting, many participants have conceded, into, at best, a preliminary meeting on how to start over in addressing the threat of global warming.

Indeed, from here on, progress on climate is less likely to come from mega-conferences like the one in Montreal and more likely from focused initiatives by clusters of countries with common interests, said Mr. Benedick, who is now a consultant and president of the National Council on Science and the Environment, a private group promoting science-based environmental policies.

"The only real answer at the moment is still far out on the horizon: nonpolluting energy sources. But the amount of money being devoted to research and develop such technologies, much less install them, is nowhere near the scale of the problem," many experts on energy technology said.

Enormous investments in basic research have to be made promptly, even with the knowledge that most of the research is likely to fail, if there is to be any chance of creating options for the world's vastly increased energy thirst in a few decades, said Richard G. Richels, an economist at the Electric Power Research Institute, a nonprofit center for energy and environment research.

"The train is not leaving the station, and it needs to leave the station," Mr. Richels said. "If we don't have the technologies available at that time, it's going to be a mess."

Dec 4, 2005

New York Times
On Climate Change, a Change of Thinking

By ANDREW C. REVKIN

In December 1997, representatives of most of the world's nations met in Kyoto, Japan, to negotiate a binding agreement to cut emissions of "greenhouse" gases. Looking energy appetite, which, largely because of economic growth in China, has exceeded almost everyone's estimates, the world fell short of a commitment to that agreement. That agreement was a success, but a meeting in Copenhagen this month could be a chance to make Kyoto the beginning of a much broader effort.
U.S. stands alone on climate

White House’s policies on global warming isolating nation from world

By John Heliprin
Associated Press

WASHINGTON — Melting glaciers, the shrinking ice cap, warming oceans and rising sea levels — all are urgent concerns around the world, and cause for frustration among many nations that believe the United States has set a glacial pace toward reversing the onset of global warming.

Critics said the Bush administration’s isolation at the United Nations-brokered international climate talks that ended last week in Montreal doesn’t make much sense. The White House acknowledged Sunday that it holds “a different view” from most other nations, but said it is nonetheless providing global leadership on heat-trapping “greenhouse” gases.

Eileen Claussen, president of the private Pew Center on Global Climate Change and a former U.S. climate negotiator in the Clinton administration, said the current U.S. position reflects an unhealthy tendency toward unilateralism, mistrust of international treaties and a belief that the only things that will make any difference are investments in new technologies.

“I think most of the rest of the world doesn’t believe that for a second,” she said. “It’s something else that’s driving this, and it’s not rational. I think it’s ideology.”

More than 150 nations, including nearly every industrialized country except the United States, agreed Saturday to negotiate a second phase of mandatory cuts in greenhouse gas emissions. Those include carbon dioxide, methane and other gases accumulating in the atmosphere from fossil-fuel burning. A 1997 treaty negotiated in Kyoto, Japan, covers the first phase through 2012, but the United States, whose pipelines and smokestacks are responsible for one-quarter of the world’s greenhouse gases, won’t participate.

Claussen said: “If you really want results, you have to do something that’s mandatory. It’s not going to happen with voluntary approaches.”

White House spokeswoman Dana Perino said the Bush administration favors voluntary efforts, and bilateral and regional arrangements to tackle climate change, including $3 billion a year in U.S. government spending on research and development of energy-saving technologies.

“If you only focus on debates
Please see U.S. on 2B
Go to 4

U.S. stance stalling climate talks

Continued from 1B

about binding emissions caps, more specifically the Kyoto Protocol, then yes, we have a different view than the participants that have signed onto Kyoto,” Perino said. “However, when you consider the real actions that will be needed to address the issue, there is no doubt that we are leading the world in a global and long-term effort.”

Others see a different type of leadership. Alden Meyer, strategy and policy director for the Union of Concerned Scientists, said the Bush administration arrived in Montreal “determined to prevent the rest of the world from extending and deepening their commitments under Kyoto.”

The administration failed, he said, because Europe, Canada, Russia and Japan “understand that mandatory limits on global warming pollution, combined with market-based emissions trading mechanisms, are essential. ... The Bush approach of relying solely on voluntary efforts and long-term R&D simply won’t get the job done.”

Only in the final hours of the Montreal talks did the U.S. delegation, led by State Department and White House officials, accept a weaker agreement to join a preliminary discussion on future steps to slow global warming, and then only on condition that it ruled out “negotiations leading to new commitment” to reduce greenhouse gases.

The Bush administration committed itself to slowing down the growth rate of those gases, not reversing the trend. But the United States was included in the talks because it is among 189 nations that signed onto a 1992 agreement, negotiated under the first President Bush, that set voluntary goals for cutting greenhouse emissions. The 1997 Kyoto Protocol grew out of the 1992 agreement.

The Montreal meeting was the first annual climate conference to be held since that 1997 accord took effect last February, mandating cuts in gases in 35 industrialized countries. President Bush rejected it in 2001, saying mandatory energy cuts would harm the U.S. economy and major developing countries also should be covered.

Despite the U.S. opposition, the head of the Montreal talks, Canadian Environment Minister Stephane Dion, said the “Kyoto Protocol has been switched on, a dialogue about the future action has begun, parties have moved forward.”
Global gabfests can be fun, which may explain the paradox of the 12-day U.N. conference on climate change that ended yesterday in Montreal. On the one hand, the conference spelled out the fine print that will make the 1997 Kyoto Protocol, which has been ratified by 156 countries, "fully operational," according to conference chairman Stephane Dion.

On the other hand, even those who support radical cuts in carbon-dioxide emissions are realizing that the Kyoto Protocol is a failed instrument for achieving their goals. "The blunt truth about the politics of climate change is that no country will want to sacrifice its economy in order to meet this challenge," says British Prime Minister Tony Blair.

He can say that again. India and China, which are exempt from Kyoto’s emissions cuts, have no plans to submit to those mandates any time soon, though China is the world’s second-largest emitter of greenhouse gases. The U.S. has also consistently rejected Kyoto. This has been true throughout the Bush years, but it was equally so during the Clinton ones. In 1997, the U.S. Senate adopted the Byrd-Hagel Resolution by 95-0, urging the Clinton Administration not to sign any climate-change protocol that "would result in serious harm to the economy."

In 1998 Al Gore signed the Protocol. Yet President Clinton, who was in Montreal yesterday to scold the Bush Administration for its inaction, never submitted it to the Senate.

And then there is the performance of Kyoto’s signatories in meeting their own targets. Kyoto requires developed nations to bring their total greenhouse-gas emissions to 5% below their 1990 levels by 2012. Yet in 2003, emissions were above the 1990 baseline by more than 10% in Italy and Japan, more than 20% in Ireland and Canada, and more than 40% in Spain.

Germany and Britain have met their Kyoto targets, but this is the result of one-time events: The collapse of British coal and the shuttering of much of the former East Germany’s industrial base. Given Germany’s anemic economy and Britain’s reduced growth forecasts, the appetite in either country for costly environmental virtue is not likely to increase.

Nor should it. For even as the Montreal crowd treats man-made global warming as established fact, the science behind the long-term forecasts remains ambiguous and sketchy, while the benefits of “doing something about it” are by no means clear.

Consider a few recent developments. In 2003, Canadian researchers Stephen McIntyre and Ross McKittrick demonstrated that the “hockey-stick” analysis—a key element of global-warming dogma that purports to demonstrate that global temperatures held steady for centuries until rising sharply in the last 100 years—was riddled with “collation errors, unjustifiable truncation or extrapolation of source data, obsolete data,” and so on. The Canadians found that the Medieval warm period had indeed occurred, suggesting that periods of warming and cooling were natural trends unrelated to the number of SUVs on the road.

In 2004, a conference of leading economists met in Copenhagen to prioritize the world’s environmental needs, and they put global warming at the bottom of the list. “The benefits [of dealing with climate change] are far into the future and the substantial costs are up front and immediate,” wrote Nobelist Douglass North. “Given the uncertainties associated with both the projections and the consequences, climate change cannot compete with other urgent issues we confront.”

A year ago, scientists were grappling with data distortions caused by the 1991 eruption of Mount Pinatubo in the Philippines. That eruption initially caused ocean temperatures to cool; now temperatures are rising as the “Pinatubo Effect” unwinds and distorts the long-term trend data. Scientists have also noted weakensings in Atlantic currents that move cold waters south and warm waters north, leading to predictions that Britain may experience Siberia-like temperatures in the coming decades. Whatever else that is, it isn’t “warming.”

The lesson we draw from all of this is that the uncertainties in climate forecasting remain huge. And given the costly and fraudulent scares we have just lived through—mad-cow disease, genetically modified foods—the End-Is-Nigh crowd should be held to a higher standard of proof than it has been before. The needs of the world’s poor and sick are too pressing to squander limited economic resources on what could be another false alarm.

Fortunately, there’s another game in another town. Next month, the U.S., Japan, China, South Korea, India and Australia—collectively accounting for nearly half the world’s population—will meet in Sydney to launch the Asia-Pacific partnership. Unlike Kyoto, which pits developing countries against developed ones, the Partnership is a collaboration to develop cleaner energy resources.

Unlike Kyoto, too, it is a voluntary partnership that seeks to address environmental issues through economic growth and technology, and not by targets and command-and-control mechanisms. Some of the technological fixes—zero-emissions power plants, efficient hydrogen fuel cells—may be decades away. Then again, so are the real-world consequences of global warming, if they materialize at all.

So many politicians and activists have committed so much to their faith in man-made global warming that events like Montreal will continue regardless of the evidence. But anyone who cares seriously about the needs of the poor—and of the environment—needs to get out from under Kyoto’s dead hand.
Climate Change Fiction in Montreal Is Fact in Ottawa

There was much to celebrate in Montreal on Monday as Canada kicked off a massive United Nations climate-change conference designed to resurrect the Kyoto protocol.

German guests reveled in balmy 30-something Montreal temperatures, while back home in the fatherland a massive snowfall broke records dating back to 1888. Quebeckers enjoyed the rare moment of weather schadenfreude too, as the American Midwest plunged into a deep freeze.

Montreal imkin keepers rejoiced at the arrival of 10,000 representatives of 190 nations for two weeks of bureaucratic "dialoguing," a ritual that has a way of taking place over lots of food and many beverages. In American parlor, shopkeepers and hoteliers were seeing greenery that has nothing to do with saving trees.

There was cause for Canadian national pride too, with the "hockey stick"—a graph in that shape which purports to predict global warming—now not only a national sports symbol but also the international symbol of planetary doom and gloom.

That was Canada's future on Monday morning. But then the kiljoys from the opposition in Parliament got loose. While the Green hoedown was getting underway in Montreal, Conservative Party leader Stephen Harper was organizing a coup against the Liberal government of Prime Minister Paul Martin in Ottawa. Monday evening, with the help of the left-of-center New Democrats and the Bloc Québécois, Mr. Harper's no-confidence vote brought down the minority government, throwing Canadian environment minister and U.N. conference chair Stephane Dion out of a job. In the end, even the most sincere promises of Liberal allegiance to carbon, Canadian "culture" and Kyoto could not save the government.

To call the end of this Liberal government a "toppling" is hyperbole. It was more like a slow 17-month meltdown from rising temperatures inside Parliament. Mr. Martin's party won a scant 135 seats in the last election—June 2004. That was nearly 20 fewer than needed to govern as a majority and far fewer than the 173 seats it won in 2000.

Minority governments are characteristically short-lived so the end of this one is no surprise. But it is worth noting what brought about the Liberals' poor showing 17 months ago as well as the party's inability to gain traction since then, despite a fairly robust economy.

In a word it is "Sponsorship-gate," a massive corruption scandal that occurred under former Prime Minister Jean Chrétien, when Mr. Martin was finance minister. The political effects of the scandal—also called Adscam—showed up somewhat in the 2004 elections when charges were flying about. But they have grown exponentially since an official inquiry known as the Gomery commission began its work to learn what actually happened.

From Sept. 7, 2004 until June 17, 2005 the commission took testimony from 172 witnesses. Some of that testimony made it into the public arena since the spring. But the final report, detailing the efficiency with which the Liberal Party was running a kickback scheme to generate funds for its own cause, was only released to the Canadian public on Nov. 1.

Sponsorship-gate grew out of a Liberal Party effort to promote "Canadian unity" in Quebec. To boost the image and importance of a unified Canada, the government set about to contract with private sector advertising firms. Instead, according to Gomery, millions of dollars worth of phony invoices were filed and paid by Ottawa. Ezra Levant, publisher of Canada's Western Standard magazine reported in May: "Senior advertising executives were the key to the whole heist.

A threat to "break your jaw." Is this Canada?

They received the padded payments from the government on the expectation that they'd kick back enormous sums to the Liberals. As Jean Carle, the senior aide to [Mr.] Chrétien admitted when he took the stand in February, it was little more than a money-laundering scheme.

There were also some unseemly methods that Adscam allegedly employed. According to Mr. Levant's May reporting, one vice president of a large ad agency claimed that shortly before he was supposed to testify, his doorstep rang at 4 a.m.

"There was a message on my doorknob, saying, if I talk too much, I'm going to die." Mr. Levant also reported that "a senior Montreal public relations consultant, who received huge payments," told the inquiry that the chief of staff of the minister in charge of Adscam threatened him "that his business 'adversaries' would break your jaw" if he didn't increase the cut the Liberals got from the shake down." And that he would "lose government contracts if he didn't play ball."

Canada now goes into campaign mode with elections set for Jan. 23. Early polls suggest that the chance of any party winning a majority of the 308 parliamentary seats is unlikely. But polls also suggest that there is the possibility that the Conservatives could form a minority government. If that happens it won't be on the issue of global warming or even Canadian health care. A defeat for the Liberals would be a direct consequence of a deep-seated Canadian sense that 12 years of Liberal power in Ottawa has wrought an intensely corrupt establishment and that a house cleaning is in order.

No confidence vote in Canada's government (May 2006 - A new gov't in power)
Clinton Lends His Voice to Climate Control

By CHARLES J. HANLEY
AP Special Correspondent
Dec 09 10:37 AM US/Eastern

MONTREAL - A contentious U.N. climate conference entered its final day Friday with the long-term future undecided in the fight against global warming, and with a surprise visitor on tap to rally the "pro-Kyoto" forces. Bill Clinton, who as president championed the Kyoto Protocol clamping controls on "greenhouse gases," was scheduled to speak at the conference Friday afternoon _ in an unofficial capacity but potentially at a critical point in backroom talks involving the U.S. delegation.

The U.S. envoys, representing a Bush administration that renounced the Kyoto pact, were said to be displeased by the 11th-hour surprise, although there was no formal protest, according to an official in the Canadian government, the conference host.

This official spoke on condition of anonymity because as a civil servant _ not a politician _ he is barred from the public light during Canada's current election season.

The U.S. delegation was meeting late Thursday and had no immediate public comment, said spokeswoman Susan Povenmire.

Clinton, who was invited here by the City of Montreal, will speak in the main conference hall between the official morning and afternoon plenary sessions, said U.N. conference spokesman John Hay. Despite its unofficial nature, the speech was sure to attract hundreds of delegates from the more than 180 countries represented.

A city spokesman said the ex-president will be representing the William J. Clinton Foundation, which operates the Clinton Global Initiative, a program focusing on climate change as a business opportunity.

Clinton's vice president, Al Gore, was instrumental in final negotiations on the 1997 treaty protocol initialed in the Japanese city of Kyoto. It mandates cutbacks in 35 industrialized nations of emissions of carbon dioxide and five other gases by 2012.

A broad scientific consensus agrees that these gases accumulating in the atmosphere, byproducts of automobile engines, power plants and other fossil fuel-burning industries, contributed significantly to the past century's global temperature rise of 1 degree Fahrenheit. Continued warming is expected to disrupt the global climate.

In the late 1990s, the U.S. Senate balked at ratifying Kyoto, and President Bush in 2001 formally renounced the accord, saying it would harm the U.S. economy.

The Montreal meeting, attended by almost 10,000 delegates, environmentalists, business representatives and others, was the first annual U.N. climate conference since Kyoto took effect in February.

The protocol's language requires its member nations to begin talks now on emissions controls after
2012, when the Kyoto regime expires. Those governments appeared near agreement Thursday on a process for completing such talks by 2008.

But the Canadians and others also saw Montreal as an opportunity to draw the outsider United States into the emission-controls regime, through discussions under the broader 1992 U.N. climate treaty. The Americans earlier this week rejected the idea of rejoining future negotiations to set post-2012 emissions controls. But the Canadians continued to press for agreement Thursday, presenting the U.S. delegation with vague language by which Washington would join only in "exploring" "approaches" to cooperative action. The Canadians hoped the wording was sufficiently noncommittal to gain U.S. approval.

The Bush administration says it prefers to deal with climate issues on a bilateral or regional basis, not through global negotiations, and favors voluntary approaches. As a demonstration of U.S. efforts to combat climate change, it points to $3 billion a year in U.S. government spending on research and development of energy-saving technologies.

Copyright 2005 The Associated Press. All rights reserved. This material may not be published, broadcast, rewritten or redistributed.

The U.S. spends $3 billion a year on R+D work to develop energy-saving methods.
Kyoto Questioned as U.S. Moves on Coal

Diplomats Consider Carrots To Draw Major Emitters Into Global-Warming Pact

By JEFFREY BALL

MONTREAL—Diplomats trying to salvage international efforts to curb global warming say they will have to dangle more financial carrots and play down the sticks to win support from nations that have so far spurned agreements to cut greenhouse-gas emissions.

A system that offers financial rewards is likely to prove particularly crucial in curbing emissions growth in developing nations such as China and India, which are unlikely to accept binding emission-reduction targets.

Spurring a push in those countries for cleaner energy sources ranging from state-of-the-art coal-fired power plants to higher-mileage cars will be crucial for the world to put a meaningful dent in global warming, say experts and diplomats meeting here this week to discuss climate change.

The shift in their thinking underscores increasing skepticism about the Kyoto Protocol, which requires industrialized nations that ratified it to collectively cut their emissions of the gases believed to be causing global warming by 5% below the 1990 level by 2012 or face tougher targets. So far, they say, the global agreement has failed to spur enough investment in clean-energy technology to make the technology broadly affordable. Many of the countries that signed up for cuts under Kyoto are emitting more greenhouse gases than they did in 1990.

Even if those countries met their Kyoto targets, that wouldn’t do much for the atmosphere. The world’s two biggest global-warming emitters, the U.S. and China, haven’t signed up for emission cuts under the treaty. The U.S. has rejected the treaty, saying it would hurt its economy. Developing nations aren’t subject to targets under the accord, and they are making clear they aren’t about to take on mandatory targets when the U.S. won’t either.

“You must remember: India has 17% of the world’s population but just 3% of the world’s emissions. And that fundamental proposition is not going to change for a very long time,” said Prodipto Ghosh, India’s environmental secretary and member of the country’s delegation at the conference.

Far from falling, global greenhouse-gas emissions are projected to jump 50% over 1990 levels by 2030, according to the Paris-based International Energy Agency. “We are not on track, by far,” the IEA chief, Claude Mandil, said in an interview. He plans today to issue a call in Montreal for greater investment in everything from nuclear energy to energy-efficient machinery.

One idea gaining favor is to cobble together customized regional agreements. Industrialized countries would continue Kyoto-style quotas while developing countries would be given financial incentives to lure them into something approximating a unified effort.

Mr. Mandil thinks the “carrot without stick” approach might work for China. The country could accept a non-binding emission target, he says. If it outperformed that target it could generate revenue by selling so-called pollution credits to countries having a harder time meeting their own quotas.

If it missed the target it would suffer no penalty. Mr. Mandil says he isn’t making a formal proposal, but just showing “there is room to be clever and imaginative.”

Energy Department Teams With Consortium to Build Model ‘Clean-Coal’ Plant

By JOHN J. FIALKA

WASHINGTON—The Department of Energy has signed an agreement with an international consortium to build a $500 million prototype for a new generation of coal-fired power plants that remove pollutants including carbon dioxide and produce hydrogen as well as electricity.

The plant, called FutureGen, is scheduled to be built by 2012. If it works, it will further tests of the Bush administration’s main policy goals: to reduce reliance on imported oil and natural gas by using technology to clean up and increase the use of coal, a fuel the U.S. has in abundance.

The agency is set today to announce that a group of eight companies, including major coal and electricity producers, will contribute $250 million toward the project. The plant will produce 250 megawatts of electricity—the output of a medium-sized power plant—as well as hydrogen, which could be sold to power future cars and trucks or sent to oil refineries to upgrade petroleum products. And some of the pollutants removed from the coal, which would be gasified, may also be sold as byproducts, according to the agency.

Sulfur dioxide and nitrogen oxides, which cause acid rain and urban smog, can be turned into fertilizers and “soil enhancers,” the department stated. The plant will separate carbon dioxide, a gas thought to be one of the major causes of global warming, and inject it into deep underground rock formations.
ized nations that ratified it to collectively cut their emissions of the gases believed to be causing global warming by 5% below the 1990 level by 2012 or face tougher targets. So far, they say, the global agreement has failed to spur enough investment in clean-energy technology to make the technology broadly affordable. Many of the countries that signed up for cuts under Kyoto are emitting more greenhouse gases than they did in 1990.

Wine Enthusiast

Ho-Ho-Holds Over 100 Bottles!

EuroCave Premier 100 Wine Cellar

Sophisticated technology meets handcrafted quality:
- Years of smooth, quiet, vibration-free service
- Holds up to 117 bottles

In Stock for Immediate Delivery

Imported from Europe

800-377-3330 • wineenthusiast.com • FREE Catalog: mention code WSJ1205
Visit our New York showroom—directions on our web site.

CORRECTIONS & AMPLIFICATIONS

Readers can alert The WALL STREET JOURNAL to any errors in news articles by e-mailing wejcontact@wsj.com or by calling 888-410-2067.

THE DEFENSE DEPARTMENT'S weapons procurement budget for fiscal 2007 is expected to be around $32 billion, based on a five-year plan stemming from the 2006 budget. A page-one article yesterday incorrectly gave the figure as $27 billion. The Army, which has increased re-enlistment bonuses, exceeded its overall goals for retaining active duty and reserve soldiers in fiscal 2006. The article incorrectly implied that the Army didn't make its retention goals.

VALEO MEDICAL is based in Burlington, Mass. An article last Tuesday about endometriosis incorrectly stated that the company is based in Burlington, VT.

THE MARKETS summary yesterday on page A1 that was labeled as Friday's stock, bond, dollar and commodity activity was incorrect. Instead of a weekly summary of these markets, it carried old data for a previous Friday. The Dow Jones Industrial Average, for example, actually fell 36.06 points on Friday and 54.11 points for the week. The correct
The climate in Montreal

To hear them talk, you would think that the Bush administration officials attending the international climate change conference in Montreal this week were deeply committed to cutting emissions of the greenhouse gases that cause global warming. One Associated Press story said that the lead Montreal negotiator claimed the president had committed to cutting greenhouse gases some 18 percent by 2012. Another State Department official in Montreal said that the United States had already cut greenhouse gas emissions by 0.8 percent between 2000 and 2003.

Unfortunately, neither of these figures stands up to examination. In fact, the president’s easily misunderstood 18 percent pledge referred not to reduction of actual emissions but to the reduction of “emissions intensity,” a number that reflects a country’s greenhouse gas emissions relative to its gross domestic product. “Emissions intensity,” so defined, has in fact been declining in this country for 20 years. If it were to decline by 18 percent between now and 2012, that would simply reflect business as usual. It would not necessarily require any environmental policy change, nor would it ensure any reduction in the amount of greenhouse gases that economic activity produces.

The second figure is no less dubious. The government’s own statistics, as they appear on the Energy Information Administration and Environmental Protection Agency Web sites, do show a drop in the nation’s overall greenhouse gas emissions between 2000 and 2001—a year of economic recession. (In fact, the EPA attributes the change not to environmental policy but to a slowdown in economic growth.) More to the point, both sets of statistics also show that emission rates climbed again in 2002, as the economy recovered, and then again in 2003, by which point they were climbing at the same average rate they had climbed throughout the 1990s. According to the EIA, in 2003 they had already surpassed 2000 levels, and there is no reason to think that the numbers won’t show the same trend for 2004.

So the Bush talk on numbers is just that and, not surprisingly, it turns out that so is the Bush talk on international cooperation. One of the goals of the Montreal summit is to start moving beyond the unsuccessful Kyoto Protocol and to begin negotiating another, more flexible, climate change and emissions reduction treaty. U.S. representatives in Montreal have stated quite clearly that they want no part of any such formal negotiations and may try to prevent them from happening at all. Instead, the administration is promoting voluntary emissions reduction and technology investments, nice ideas that only a handful of businesses have bothered to adopt.

The administration’s decision to remain on the sidelines runs counter to U.S. tactical interests as well as to the Earth’s future. It will hamper the efforts of friendly countries, notably Britain, to write a new climate change agreement that includes the developing world and eschews inflexible emissions targets in favor of a basket of economic and environmental goals. It also goes against the grain of the bipartisan consensus on climate change emerging in the Senate: Sens. Richard Lugar, R-Ind., and Joe Biden, D-Del., chairman and ranking Democrat on the Senate Foreign Relations Committee, have called on the administration to participate in new climate negotiations. Sadly, instead of promoting a climate change treaty the United States can live with, the administration is preparing, once again, to sit out the game altogether.

A growing scorch leads to more CO₂.

Note: Nuclear does not give CO₂.
The original treaty — since ratified by 189 nations, including the United States — has no binding restrictions. The Kyoto pact does impose mandatory limits on industrialized nations, but they do not apply to developing nations, including China and India. The United States and Australia have rejected that pact.

On Friday, countries bound by the Kyoto Protocol were close to agreeing on a plan to negotiate a new set of targets and timetables for cutting emissions after its terms expire in 2012.

But under pressure from some countries that were already having trouble meeting Kyoto targets, the language included no specific year for completing talks on next steps, instead indicating that parties would "aim to complete" work "as soon as possible."

Early in the afternoon, former President Clinton gave a hastily arranged speech to the thousands of delegates in which he sketched a route around the impasse that included gentle rebukes of those seeking concrete targets and also of the Bush administration.

Mr. Clinton said that given the impasse over global targets for emissions, countries might do better to consider specific, smaller initiatives to advance and spread technologies that could greatly reduce emissions in both rich and poor countries.

"If you can't agree on a target, agree on a set of projects so everyone has something to do when they get up in the morning," he said.

In a comment clearly directed at the Bush administration, he declared to waves of applause that just as the United States had taken a precau-

Emission Treaties

Two international agreements on reducing emissions of greenhouse gases have been reached. The United States has signed on to the Framework Convention, but has rejected the Kyoto Protocol. Below, a timeline.

<table>
<thead>
<tr>
<th>Framework Convention on Climate Change</th>
<th>Kyoto Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>The pact is signed by 166 nations in Rio de Janeiro to work to limit harmful human interference with the climate. The treaty has goals, but not binding limits on emissions.</td>
<td>An amendment to the Framework Convention, the treaty mandates that ratifying countries commit to reducing emissions of greenhouse gases.</td>
</tr>
<tr>
<td>In Berlin, a decision by a United Nations climate conference seeks binding commitments beyond the 1992 Rio agreement. It is a precursor to Kyoto.</td>
<td>President Bush rejects the Protocol, saying that it would be too costly to the American economy.</td>
</tr>
<tr>
<td>The Kyoto pact is ratified by 140 countries. It requires reductions in emissions by three dozen industrialized countries from 2008 to 2012.</td>
<td>In meetings in Montreal over the last two weeks, countries bound by Kyoto plan for a new set of targets for cutting emissions after 2012. Countries bound by the 1992 pact also mull changes.</td>
</tr>
</tbody>
</table>

The New York Times
Under Fire, U.S. Won’t Shift on Emissions at Climate Talks

CLIMATE CHANGE: THE PODCAST

Audio reports by Andrew C. Revkin from the United Nations climate conference are online as podcasts: nytimes.com/science.

Bill Clinton rebuked both those seeking concrete targets for reducing greenhouse gas emissions and also the Bush administration.

The Montreal talks have yielded significant new signs that developing countries are beginning to consider ways to promote economic growth without increasing emissions.

Papua New Guinea, Costa Rica and Brazil all proposed ways to add incentives for reducing destruction of rain forests to the climate agreements.

China agreed to additional discussions under both the 1992 and Kyoto treaties about ways to involve big developing countries in projects that could curb the heat-trapping pollution — as long as they did not involve binding limits.

But even if new talks under the Kyoto treaty lead to new targets for industrial nations, some scientists said Friday that they would be insufficient to stem harmful warming without much broader actions by the biggest and fastest-growing polluters.

In a statement from London, Lord Martin Rees, the new president of Britain’s Royal Society, an independent national scientific academy, said the disputes among wealthy nations over how to reduce emissions were distracting them from carrying out steps to make the cuts.

Environmental campaigners insisted that the Kyoto process would eventually force other countries, particularly the United States, to act. These advocates predicted a growing market for “cap and trade” credits, in which businesses acquire credits by reducing their greenhouse gas emissions below a required level, then sell those credits to other businesses or even other countries, which can then increase their output of emissions above the target level.

“As Kyoto deepens and broadens, U.S. business and industry will mount irresistible pressure on United States leadership to re-engage in the process rather than be shut out of markets of the future,” said Alden Meyer of the Union of Concerned Scientists, a private group that supports binding reductions in heat-trapping gases.

But lobbyists and groups associated with businesses that oppose such restrictions scoffed at the prospect of a meaningful carbon market.

The National Center for Public Policy Research, one such group, worked the halls, distributing mock emissions credits printed, in five languages, on rolls of toilet paper.

But environmental groups did not sit idle. The National Environmental Trust distributed custom-printed noise-making rubber whoopee cushions printed with a caricature of President Bush and the words “Emissions Accomplished.”

cont.
Climate talks edge towards twin-track future

MONTREAL

For many of the delegates from nearly 200 nations meeting in Montreal this week to discuss how to prevent climate change, the key question is how to get the United States to talk about limiting greenhouse-gas emissions.

As Nature went to press, the halls of the Palais des Congrès were rumbling with a report that the conference president, Canada's environment minister Stéphane Dion, would propose structuring climate-change strategy through the United Nations Framework Convention on Climate Change. Such an approach would be in addition to the Kyoto Protocol, which limits greenhouse-gas emissions for developed countries. The United States is a party to the convention, but not the protocol.

Such a strategy could free countries to pursue a range of options for fighting global warming, says Elliot Diringer, director of international strategies for the Pew Center on Global Climate Change, based in Arlington, Virginia. These options might include technologies such as carbon capture and storage, or fuel-economy standards for the automobile industry. "There's a rich array of thinking out here right now," says Diringer. "What we need is some window to introduce that-thinking into the formal process."

The gathering is the convention's first twin-track meeting. One track addresses the parties to the convention, and the other addresses the 157 nations that have ratified the Kyoto agreement. In the first week of negotiations, delegates finalized the rule book for the Kyoto Protocol, known as the Marrakesh Accords.

Australia and the United States are some of the holdouts from the Kyoto agreement. Developing countries such as China and India — some of the world's fastest-growing emitters — are not bound by emission caps, although they are parties to the protocol. The first commitment period for reducing emissions under Kyoto expires in 2012.

Some delegates welcome twin-track talks as a step towards a process outside Kyoto, which many feel has had an inauspicious start. The Clean Development Mechanism, for example, an arm of the protocol intended to promote sustainable development in developing countries, has been slow to gain momentum. Few countries are expected to meet their current targets, making it less likely that they will take on bigger emissions cuts in the next commitment period.

But some countries could stall any forward-looking process. In a statement on 29 November, Harlan Watson, lead negotiator for the US delegation, said that his country is opposed to discussing commitments beyond 2012. Watson reaffirmed the US position to engage instead in technological innovations on the home front and partnerships with smaller clusters of countries.

Such an approach does not please many. "They are clearly not moving forward on long-term cooperative action," says a spokesperson for the European Union presidential delegation, who asked to remain anonymous.

Many observers feel that a good finish for the conference, which runs until 9 December, would be a green light to discuss future options under the convention. "The most that we can hope for here is some decision to allow for parties to begin thinking about these options in a formal context," says Diringer. "It's an incremental step, but it's an essential step."

Amanda Haag
Some News Stories after the Meeting
(Held Nov 28 – Dec 9, 2005, in Canada)

- Some triumph---
  What did Montreal really deliver?

- Bye-Bye Kyoto (Forbes)

- Convention sets next steps on climate change (EOS/AGU)

- New York Times:
  America’s shame in Montreal

- Hot air and disappointment in Montreal

Roy Jenne
Jan 2006

Note: The government of Canada will not be able to deliver on its promise to cut CO2 emissions by 2012. See page 53.
Some triumph... In the cold light of day what did Montreal really deliver?

AS DAWN heralded Saturday morning in Montreal, the latest international climate conference closed in a mood of euphoria. There were tears in the corridors. The UK’s environment secretary Margaret Beckett proclaimed a “diplomatic triumph” in which she had achieved all that she had hoped for. Even normally hard-boiled environmental campaigners and journalists were misty-eyed. “Historic,” said Greenpeace. “A big step forward... the US has been shamed,” said The Guardian in London (see page 4).

Get a grip. Last-minute deals are always exciting, especially after overnight negotiations. But in the cold light of day we have to ask what exactly was achieved. The answer looks like little more than an agreement to carry on talking – and even that is hedged in places by promises to talk about very little that is meaningful.

Meanwhile, every square metre of the planet’s surface is absorbing about 1 watt more heat than it can release into space. That may be only slightly more than the power of a Christmas tree light bulb. But it matters.

So what was decided? First, the meeting shifted a backlog of technical matters that will allow the Kyoto protocol to come into force, such as letting rich countries earn carbon credits by financing green schemes in poor nations. Victory has been declared on these matters so often in the past that it is hard to be sure. But since there is now agreement on penalties for countries that miss their targets for the first compliance period, from 2008 to 2012, it probably is a done deal. So the talks moved on to what happened after 2012. Countries that have ratified the Kyoto protocol agreed to begin talks aimed at reaching agreement “as soon as possible” on targets for a post-2012 compliance period. This was vital, not least because it signals to industry that it can profit for the foreseeable future by cutting carbon dioxide emissions and trading carbon credits. But it is hard to justify it as a “diplomatic triumph” when the protocol had already committed signatories to beginning those talks before 2006.

Third, and most tortuously, the meeting agreed to begin an “open and non-binding dialogue” on those without Kyoto targets – ranging from opt-outs in Washington and Canberra to fast-developing countries like Brazil and China – that might contribute to cutting greenhouse gas emissions. This was the bit that nearly derailed the Montreal talks. The US walked out because it feared being pressured during this “dialogue” to make commitments on emissions. It rejoined not because of a change of heart, nor even because of a lecture by Bill Clinton, but after winning a stipulation that the dialogue “will not open any negotiations leading to new commitments”.

“We have at most 10 years to make the drastic cuts in carbon emissions that will head off climate convulsions”

The White House wasn’t shamed: it won. The Montreal talks were no disaster, it is true. But they were certainly no triumph. It was sad to see environmentalists who have been on the case longer than most of the politicians getting caught up in the euphoria. Greenpeace’s Steve Sawyer echoed Beckett in claiming the talks had delivered “just about everything” he wanted. What kind of world does he advocate?

With green groups playing politics, scientists seem to stand alone. In recent months, they have reported compelling evidence that climate change is a real and present danger, and that the global climate system may be on the brink of dangerous positive feedbacks. We may face runaway melting of Arctic sea ice, a shutdown of global ocean circulation systems, massive methane releases from melting permafrost, stronger hurricanes and “megadroughts” from northern China to the American west.

These are not abstract outputs from computer models but things that are starting to happen. At this magazine we regularly meet climate and Earth-system scientists who harbour real fears for themselves and their families about what the 21st century will bring. Jim Hansen, director of NASA’s Goddard Institute for Space Studies and George Bush’s top climate modeller, is not alone in thinking that we have, as he said last week, “at most 10 years” to make the drastic cuts in emissions that might head off climatic convulsions.

Back in 1997, the newly agreed Kyoto protocol was correctly hailed as a first step to a safer world. Eight years later we still await the second step. Montreal, for all the tears and supposed triumphs, was not it.
Environmental Meltdown

Bye-Bye, Kyoto

One thing George W. Bush got exactly right was Kyoto. The treaty isn’t working, and a lot of folks who bought into it are now looking for an exit strategy | By Dan Seligman

The year just ended was a fateful time for the Kyoto Protocol. It was the year in which the treaty, negotiated in 1997 as a way to slow global warming, formally took effect. That was in February. It was also the year in which Kyoto became operational, i.e., a whole bunch of rules were adopted at a conference in Montreal. That was in November. Finally, 2005 was the year in which it became painfully obvious that the treaty was a fiasco.

Possibly you missed this news, which somehow failed to garner 32-point headlines and in some cases was simply suppressed. One spectacular case of suppression involved the performance of Britain’s Tony Blair at an event billed as the Clinton Global Initiative. Held in a New York Sheraton in September and organized by the ex-President, who was himself onstage much of the time, it drew not only Blair but also UN Secretary-General Kofi Annan, the king of Jordan, Condoleezza Rice and swarms of big-league reporters, including representatives of the New York Times and Washington Post. Neither paper reported the Kyoto put-down by Blair, who had previously been identified as an out-front supporter of the treaty. What he said on the stage of the Sheraton was that his thinking has changed in the past three or four years. He added: “No country is going to cut its growth.” Since no country knows how to reduce emissions without cutting growth, those words have to be taken as a confession of failure.

Also heavily hinting at failure was the final surrender to developing countries that had been adamant about refusing to sign on to Kyoto. When the Clinton Administration agreed to the protocol, it was widely understood that it could never be ratified by the U.S. Senate so long as the deal exempted countries that were both major polluters and trade competitors. Even the New York Times editorialized at the time that without the participation of China and India “any scheme to limit greenhouse gases will be a farce.” That was six months before the treaty was signed. After it was signed, without China and India, the Times said that the President must “spend the next year enlisting the participation of developing countries” before the deadline for ratification expired. How Clinton was supposed to sweet-talk those countries into signing a contract that was clearly against their economic interests the paper never explained. In the event, China and India stood pat and gave no indication that they planned to sign up in the future. That still appears to be their position, and early last year their decision was accepted by the signatories.

The final capitulation surfaced in a UN agenda document put forward by Kofi Annan in March. It indicates that the present treaty will not cover the developing countries but proposes wishfully that they will elect to come aboard the follow-on treaty, after Kyoto expires in 2012. (“We strongly endorse Mr. Annan’s agenda,” said the Times farcically.)

For the time being, then, Kyoto is essentially a western European proposition. With the Bush Administration and Australia opting out and the developing world no longer being asked to join, the European Union stands as the default supplier of signatories who are in a position to make significant reductions in carbon emissions. This seems anomalous, as China and India together send more tons of carbon into the atmosphere than all of western Europe combined, and the U.S. accounts for more than China and India together.

And yet it appears that even western Europe is not reducing emissions. The Kyoto rules say that western Europe must get their emissions to a level 8% below those prevailing in 1990. But virtually all those countries—the only significant exception is Germany—are going in the wrong direction. The latest available data, covering emissions through 2003, tell us that in the years since the treaty was negotiated, carbon dioxide levels increased by 7% in France, 11% in Italy and 29% in Spain. The increase for western Europe as a whole was 5.4%.

After many years of European chatter about the monstrous evil perpetrated by George W. Bush in rejecting Kyoto, it is of possible interest that the increase in carbon emissions in the U.S. during those years was slightly lower (4.7%).
Convention Sets Next Steps on Climate Change Efforts

Delegates from more than 180 countries have adopted rules for implementing the Kyoto Protocol to the United Nations Framework Convention on Climate Change and also have agreed to two separate decisions that set in motion the next steps for international efforts to mitigate climate change.

More than 9000 participants discussed the future of the Framework Convention and the Kyoto Protocol at the United Nations Climate Change Conference, which was held 28 November through 10 December in Montreal, Canada.

The 1992 Framework Convention, which has been ratified by 189 countries including the United States, set the objective of reducing global levels of greenhouse gas emissions but did not include any goals or provisions for enforcement. The 1997 Kyoto Protocol, which came into effect in February 2005, sets targets for the reduction of greenhouse gas emissions for about three dozen developed countries. It has been ratified by 157 countries, and only two developed countries—the United States and Australia—have chosen not to participate.

During the conference, countries that have committed themselves to the Kyoto Protocol formally adopted the Marrakech accords, which establish operating rules for such practices as emissions trading; the Clean Development Mechanism, which allows developed countries to meet emissions targets through projects in developing countries; and crediting of carbon sinks activities. These rules also launch a system for reviewing and reporting national emissions.

These rules are "the completion of a decade of negotiation bringing the Kyoto Protocol to life," said Elliot Diringer of the Pew Center on Global Climate Change.

Two other decisions reached during the conference set the next steps for international efforts. The first decision, made under the Kyoto Protocol, starts a process to consider further commitments to reduce greenhouse gas emissions beyond 2012, when current emission targets expire.

The second decision, made under the Framework Convention, establishes a two-year, "non-binding" dialogue to "analyze strategic approaches for long-term cooperative action to address climate change" but will not lead to any negotiations of commitments to reduce greenhouse gas emissions.

The U.S. delegation, which had stated its opposition to any discussions of the post-2012 process and at one point walked out on the talks, eventually agreed to the non-binding dialogue.

Climate change science—including topics such as adaptation, deforestation, and carbon capture and storage—was highlighted in sessions separate from the government negotiations. "From the science community's perspective, we had a lot more attention to science than we have seen in previous meetings," and the science was having an impact on the dialogue and discussions at the conference, said Robert Corell, a senior fellow in the American Meteorological Society's policy program and an affiliate of the Washington Advisory Group.

The discussions on deforestation were requested by Costa Rica and Papua New Guinea and were among several ideas, including suggestions for voluntary efforts by which developing countries could address climate change, that were put forward during the convention by the developing countries themselves. The Kyoto Protocol previously received some criticism for only setting emission targets for developed countries.

The use of smaller, more regional agreements for initiating efforts to slow climate change, such as those being created by U.S. northeastern and western states, also got legitimized at the conference, Corell said. He explained that these agreements will allow for experimentation and a mixture of ways to approach climate change under the umbrella of broad, international-level guidance.

A summary report from the convention is available at http://www.lisd.ca/climate/cop11/

—Sarah Zielinski, Staff Writer
Glacial Gains in Global Talks on Cleaner Air

Continued From Page 1

The two-week United Nations conference that ended here on Saturday was no exception. And as the delegates depart, with only a modest, last-minute agreement to keep talking about how to proceed, many scientists and others who keep track of climate change say much more urgent action is needed.

James Hansen, director of the NASA's Goddard Institute for Space Studies, told a conference in San Francisco this week that a continuation of “business as usual” would result in so much warming as to “constitute a different planet.”

In Montreal these past two weeks, progress was measured in the tiniest of increments. While the European Union and Japan continued to favor voluntary restrictions on emissions of the greenhouse gases, especially carbon dioxide, the United States remained resolutely opposed, saying such limits would block economic progress. 

No one expected these positions to change. But if the talks were to produce any sort of agreement, they would need to overcome objections to a statement calling for continued discussions on enhancing the United Nations' 1992 climate treaty, which aims for, but does not require, cuts in the emissions.

That hurdle was surmounted in the wee hours of Saturday, but at the insistence of the United States and others the statement retained a huge escape clause: the dialogue, it said, would be “open and nonbinding,” and it “will not open any negotiations leading to new commitments.”

There is a climate treaty that requires limits on emissions — the Kyoto Protocol of 1997 — but big developing countries like China and India are not covered by it, and the United States and Australia have refused to take part. It expires in 2012.

In Montreal, the parties to the Kyoto treaty agreed to start talking about what comes next. But they did not set themselves a deadline, only a goal of finishing talks “as soon as possible.”

In news conferences Saturday, weary warriors, led by Margaret Beckett, Britain's environment minister and head of the European Union delegation, defended their proclaimed success, saying that a bigger, subtler shift had occurred behind the scenes — a shift in tone from obstruction to cooperation.

“For those who actually take part in these negotiations, this is a substantial achievement,” Mrs. Beckett said.

But many scientists who keep track of global warming are increasingly convinced that diplomacy may be insufficient to the task. A particular problem is the standard-off between the largest developing nations — China and India — and the established industrial giants.

The developing countries have repeatedly refused to commit themselves to greenhouse-gas limits until the established industrial states make progress; and the United States, the biggest source of the heat-trapping gases, insists on movement from the emerging economic competitors before it considers cuts.

Although the United States Senate passed a resolution this year calling for mandatory limits, the House has not moved. Longtime observers of the legislative arena, including some lawmakers, see a very long path ahead before federal curbs on carbon dioxide become law. As Senator John McCain, the Arizona Republican who has been pushing for modest curbs on greenhouse gases, put it recently, “Democracy isn’t very good at addressing incremental problems.”

In the United States, groups of cities and states have pushed ahead with carbon limits, while others resist — essentially in a small-scale variant of the global map of nations accepting and rejecting caps.

Some environmental campaigners see this bottom-up action as the prelude to broader changes. Industry lobbyists predict that the costs of limiting emissions will simply cause commerce to migrate to the places where emissions are unfettered.

Scientists and engineers have called for far more aggressive investments in technologies that could generate clean energy. But they are unlikely to make a dent soon.

Meanwhile, emissions rise, and so does the globe’s average temperature. It peaked in 1998 when the Pacific Ocean had one of its periodic natural hot spells, El Niño.

Now, even with no Niño in sight, 2005 is likely to be the warmest year in recorded history, according to the Goddard Institute.

All of this does not bode well for, even with so many well-meaning people convened periodically to confront the issue, some experts said.

“How can 10,000 people come together on anything useful?” said Vaclav Smil, an expert in energy, population and the environment at the University of Manitoba.

As the meetings under the treaties roll on through 2012 and beyond, he said, the pace of growth in Asia, both in terms of energy consumption and the use of coal and oil, the main source of carbon dioxide emissions, will be explosive.

“Even if everybody adhered perfectly to Kyoto, China could wipe that out in maybe six months, nine months,” Dr. Smil said. “We’re cooked.”
The New York Times

America's Shame in Montreal

The best that can be said of the recently concluded meeting on climate change in Montreal is that the countries that care about global warming did not allow the United States delegation to blow the whole conference to smithereens. Washington was intent on making sure that the conferences required no more of the United States than what it is already doing to restrain greenhouse gas emissions, which amounts to virtually nothing.

At least the Americans’ shameful foot-dragging did not bring the entire process to a complete halt, and for this the other industrialized countries, chiefly Britain and Canada, deserve considerable praise. It cannot be easy for America’s competitors to move forward with costly steps to reduce greenhouse gas emissions while the United States refuses to carry its share of the load. Nevertheless, the Europeans and other signatories to the 1997 treaty limiting greenhouse gas emissions — a treaty the Bush administration has rejected — promised to work toward new and more ambitious targets and timelines when the agreement lapses in 2012.

For its part, the Bush administration deserves only censure. No one expected a miraculous conversion. But given the steadily mounting evidence of the present and potential consequences of climate change — disappearing glaciers, melting Arctic ice caps, dying coral reefs, threatened coastlines, increasingly violent hurricanes — one would surely have expected America’s negotiators to arrive in Montreal willing to discuss alternatives.

They did not. Instead, the principal negotiators, Paula Dobriansky and Harlan Watson, continued to tout the benefits of an approach that combines voluntary reductions by individual companies with further research into “breakthrough” technologies.

That will not work. While a few companies may decide to proceed on their own, the private sector as a whole will neither create new technologies nor broadly deploy them unless all countries are required to do their share under a regime that combines agreed-upon targets with strong financial incentives for reaching them. To believe that companies will spend heavily to reduce emissions while their competitors are not doing the same is to believe in the tooth fairy.

The Europeans are finding solace in the fact that the Americans — after much kicking and screaming, and after public rebukes by Canada’s prime minister and a surprise visitor named Bill Clinton — finally agreed to join informal “nonbinding” discussions that will try to entice developing countries like China and India into the process. It’s certainly true that without the developing nations on board, any effort to keep greenhouses gases at manageable levels will be for naught. China, for example, is building coal-fired power plants at a rapid clip and is expected to overtake the United States as the biggest producer of greenhouse gases in 20 years.

But talk is cheap, and nonbinding talk is even cheaper. And talk alone will not get the developing world into the game. Why should India and China make major sacrifices while the United States, in effect, gets a free ride? The battle against global warming will never be won unless America joins it, urgently and enthusiastically. Our grandchildren will look back with anger and astonishment if we fail to do so.
Hot air and disappointment in Montreal

Knight Ridder/Tribune News Service

The following editorial appeared in the St. Louis Post-Dispatch on Wednesday, Dec. 14:

XXX

We're drawing to the close of what some scientists predict will be the warmest year on record. Yet the best that could be achieved at an international summit on global warming in Montreal last week was an agreement to continue non-binding talks.

Hot air isn't good enough. The longer the world waits to begin curbing emissions of greenhouse gases, the worse the situation will become. Even sharp cuts in greenhouse gas emissions may not be enough to forestall global disaster.

Voluntary emissions targets alone, such as those favored by President Bush, are unlikely to achieve the reductions necessary to counteract global warming and stabilize the planet's weather systems. Nor is it possible for developed countries - the worst offenders - to address this issue by itself. A study published this month by the federally funded National Center for Atmospheric Research showed the folly of this approach, which is the preference of fast-growing countries like China and India.

Researchers working for the center calculated that the growing trade imbalance between the United States and China resulted in a net increase in carbon-dioxide emissions between 1997 and 2003. Because Chinese industry relies more heavily on power generated by burning coal, and because it faces fewer emissions restrictions, the researchers found that the shift of manufacturing jobs increased the release of this key greenhouse gas by 700 million metric tons during that six-year period.

Neither the United States nor China are parties to the Kyoto Protocol, which limits emissions of greenhouse gases. But even countries that have signed that agreement are failing to meet its targets. Japan, Canada and 11 European Union countries have either increased their emissions or failed to reach their Kyoto targets.

Meanwhile, the costs of inaction are becoming alarmingly apparent. Earlier this year, scientists predicted that the number and severity of storms will increase along with ocean temperatures. Work by an MIT scientist that focused on Atlantic hurricanes was in the headlines this summer, but other researchers have documented similar effects in the Pacific and Indian oceans.

The United States, the world leader in technical innovation, should also be leading the way in combating global warming. Instead, the Bush administration has repeatedly balked at addressing the problem. Only last July did Bush grudgingly concede that global warming is real. At the Montreal summit American delegates very nearly scuttled the call for even non-binding talks.

The United States leads the world in greenhouse gas emissions. It must also lead the world into a new agreement that will reduce them, an agreement that takes into account the effects of international trade. A system of enforceable targets, coupled with expanded emissions trading, would seem to be the fairest approach.

As with all international agreements, the final product won't be perfect. But without U.S. leadership, it is unlikely to arrive before a global environmental crisis forces desperate measures.

© 2005 KRT Wire and wire service sources. All Rights Reserved.
http://www.fortwayne.com

12/19/2005
Three news stories, Jan 2006

(Capital to Kyoto-2 meeting)

• Partners on clean development meet in Australia
  - US, Japan, China, India
  - and S. Korea, Australia

• Promises to clean up industry fail to convince

• Kyoto's big con (Jan 19, 2006, Wall St.)

• Lab tries to capture CO₂ in rock.
  - One method: use up to a third of
    - its power to capture CO₂
    - This would double the cost of electricity

  - Another method: use only about 6% of
    - the energy; increase the cost of power
    - by maybe one third

(5 pages here)
More hot air

BANGKOK
Asia's latest contribution to global warming

It's catching. David Letterman, an American comedian, joked last year that George Bush would like to respond to global warming by convening "a blue-ribbon committee to explore innovative ways of ignoring the problem". Now environmental groups are accusing several Asian countries of doing the same thing, in the Asia-Pacific Partnership on Clean Development and Climate. The members of this new outfit—America, Australia, China, India, Japan and South Korea—insist it will complement other efforts to combat global warming, such as the Kyoto Protocol. But critics dismissed the club's first meeting, which ended in Sydney on January 12th, as a fig leaf, a smokescreen and a "coal pact", among other terms of derision.

Environmentalists would be delighted if they thought the members of the partnership were serious about taking action on climate change. After all, they account for roughly half of the world's population, economic output and greenhouse gases blamed for global warming. They include both the countries with the biggest total emissions (America and China) and the country with the biggest emissions per person (Australia). Moreover, of the six, only Japan is currently trying to cut down its gaseous output in accordance with the Kyoto Protocol, which sets mandatory reductions for rich countries. Both America and Australia refuse to sign the treaty, while China, India and South Korea, as developing countries, are exempt.

But critics claim that the partnership is designed precisely to reduce the pressure on these countries to join whatever pact follows Kyoto, which is due to expire in 2012. They note that, unlike Kyoto, the partnership explicitly rejects mandatory caps or reductions as a useful way to cut emissions. The group's founding charter actually states several times that none of the commitments it contains is legally binding. Instead, the six will simply try to promote greener technology. America and Australia, for example, pledged $1.28bn to fund research in such fields as cleaner coal-burning power stations and safer nuclear plants.

Coal

Such technology will certainly be an element of any strategy to reduce greenhouse gases. America, Australia, China and India all have abundant supplies of coal, and rely on it to generate much of their power. For Australia, it is also a valuable export. China and India alone already account for roughly a fifth of the world's greenhouse gases, and their share is growing along with their economies. They are also worried about energy security. Unless some method can be found to reduce the carbon-dioxide emissions from coal-fired power plants, then any successor to Kyoto will be meaningless. No wonder, then, that much was made at the summit of an Australian pilot project now under way to capture emissions of carbon dioxide (the main greenhouse gas) and store them underground, one version of a process known as sequestration.

It is hard, however, to imagine private firms adopting fancy—and expensive—new techniques without clear financial or regulatory incentives to do so. When questioned about this, Samuel Bodman, America's energy secretary, lamely replied that high-powered executives, like everyone else, have children and grandchildren and so care about the future of the planet.
Promises to clean up industry fail to convince

SYDNEY
Some of the world’s biggest polluters and energy consumers met last week under a scheme trumpeted by organizers as a “complement” to the Kyoto Protocol. Members of the Asia–Pacific Partnership (AP6) on Clean Development and Climate promised to provide practical solutions to climate change, by driving industrial partnerships and encouraging new, cleaner technologies. But with voluntary participation, no emissions targets, no deadlines and little new money, environmental groups are somewhat sceptical. Can industry really be counted on to clean up its act?

The inaugural meeting of the AP6, held in Sydney on 11 and 12 January, was attended by senior government and business representatives from Australia, China, India, Japan, South Korea and the United States — countries that together are responsible for around half of the world’s greenhouse-gas emissions.

But environmental groups are not impressed by AP6’s unwillingness to set targets or adopt carbon trading. “It’s incredibly disappointing that AP6 isn’t prepared to put in place financial mechanisms to reward those who invest in cleaner energy and penalize those who don’t,” says Erwin Jackson of the Australian Conservation Foundation, based in Melbourne.

Many industry representatives see it differently. “I don’t think the first step should be to create an unequal playing field by putting carbon-trading mechanisms in one place and not in another,” counters Oscar Groeneveld, chief executive of the Rio Tinto Aluminium group.

So the meeting focused instead on garnering a range of softer commitments from industry — to share knowledge, develop technology and improve operating practices. The main achievement was the establishment of eight government–industry task forces to focus on power generation; coal mining; building and appliances; the production of cleaner fossil energy, renewable energy, steel, aluminium and cement. The groups will meet separately to formulate priorities, action plans and progress indicators, before reporting back to the next AP6 gathering, probably in January next year.

Supporters insist this will bring significant gains. “There are some low-hanging fruit,” says Groeneveld. “If we lift the performance of the bottom half of class, we can improve the whole industry and substantially reduce emissions.”

Both the Australian and US governments committed new funds: AU$100 million (US$75.5 million) over five years, and a one-off US$52 million respectively. But industry is largely expected to foot the bill. Details of exactly what will change are lacking, however, as industry groups say they will essentially continue their ongoing investment into research and development.

Advocates of AP6, including US Secretary of Energy Samuel Bodman, point to the aluminium industry as evidence that the voluntary approach can work. The industry set a series of “voluntary objectives” in 2003, such as reducing perfluorocarbon (PFC) emissions, which Groeneveld claims have been “collectively reduced by 75% since 1990”.

That doesn’t impress the critics. “There is not much new money on the table and we already have a large number of technology-transfer mechanisms in place,” says Iain McGill, an engineer who is researching energy markets at the University of New South Wales in Sydney.

“You have to question how significant the initiative is,” says McGill. He and others are sceptical that things will change fast enough without government regulation.

“Even if you develop the most whiz-bang technologies, you still have to get them in place,” he says. “It might happen — but you wouldn’t want to bet the climate on it.”

“The scale of the climate changes being projected for 2050 are so substantial that to say, ‘there will be a technological fix’ is inadequate,” adds Andy Pitman, a climate scientist at Macquarie University in Sydney. “As scientists, we haven’t managed to get across the urgency of the problem.”

Even the petroleum giant BP seems unconvincingly by the voluntary approach. “Low-emission technologies are available now,” points out a spokesman for BP Australia. But to ensure their uptake “market pull is essential,” he says, adding that to “reduce the costs of low-carbon technologies to parity with conventional power sources”.

Perhaps this incentive, if unspoken, was felt at the AP6 meeting. “If industry doesn’t act responsibly, governments will have to intervene and regulate,” says John White, chairman of the Perth-based company Global Renewables. “No one wants to talk about it, but that was definitely a take-home message.”

Carina Dennis
The Kyoto environmental protocol committed nations to reduce greenhouse gas emissions. By this standard, the pact's biggest fans, the Europeans, are failing. And what about the U.S., the global villain for withdrawing approval of the accord in 2001? It's doing very well, thank you.

Let's go to the latest numbers from the European Environment Agency in Copenhagen. Most European countries have seen an increase in greenhouse gas emissions since signing Kyoto with great fanfare in 1997. No fewer than 13 out of the 15 original EU signatories are on track to miss their 2010 emissions targets—by as much as 33 percentage points, in the case of Spain.

Or consider Denmark, home of the EU's environmental watchdog. Rather than reduce levels by 21% as the accord stipulates, Denmark has so far notched a 6.3% increase in emissions since 1990, the base year used in Kyoto. The likely gap between its Kyoto commitment and its emissions levels projected for 2010 is 25.2 percentage points.

The U.S. dropped its signature from Kyoto because arbitrary emissions targets are both pointless and economically damaging. No proof exists that lower emissions reduce global warming. The idea that human activity influences climate change one way or another is far from proven, given the overwhelming role nature itself plays in atmospheric changes. And if the warming trend of recent decades continues—by no means a certainty—it might well be a boon to humanity.

The Bush Administration has continued a longstanding U.S. policy of pushing states, municipalities and private industry to reduce emissions that actually lower the quality of air and water. The U.S. thus saw a modest decline in greenhouse emissions of 0.8% between 2000 and 2002, according to data from the U.S. Department of Energy. Overall since 1990, American greenhouse emissions are up 15.8%, but this still puts the U.S. far ahead of many of its European and Asian critics. And this despite U.S. economic growth (and increasing energy demand) that has far exceeded Europe's.

Some countries—like France and Germany—are being pressed to implement additional measures. These are going to be proposed later this year as part of each country's National Allocation Plans required under the EU Emissions Trading Scheme. The Trading Scheme allows individual countries to allocate limited "emissions allowances" to their industries that can then be traded on secondary markets.

Alas, no one is talking about reducing the amount of hot air produced by politicians. At the U.N.'s environmental summit in Montreal last year, EU Environment Commissioner Stavros Dimas of Greece spoke grandly of Europe's continuing leadership in the reduction of greenhouse gases. Prime Minister Paul Martin of Canada, another Kyoto diehard, chimed in that America lacked a "global conscience." For the record, Greece and Canada saw emissions rise 23% and 24%, respectively, since 1990, far above the U.S. rate.

The nonsense that passes for debate at U.N. gabfests isn't news. But it is newsworthy that Kyoto's arbitrary targets were mainly cant. Countries that reduce those emissions potentially damaging to health or property do so by investing in cleaner technology. That is possible because of policies that promote economic growth and business investment. Unhampered by Kyoto targets, America's economy is more nimble and better able to adapt to changing technology. We knew Kyoto was bad for the global economy. It turns out it's bad for the environment as well.

Jan 19, 2006 Wall St Journal
Lab tries to capture CO2 in rock

Researchers seek to reduce power plant emissions

By Shannon Dininny 1-15-06
Associated Press

RICHLAND, Wash. — Millions of years ago, lava repeatedly spewed from giant fissures in the Earth’s crust, engulfing more than 60,000 square miles of the Pacific Northwest. The floods left behind layers of dark gray basalt thousands of feet thick.

The basalt still lies beneath the surface in much of the region, and researchers now believe they have found a key use for the porous rock: storing carbon dioxide emissions from power plants.

Called carbon capture and sequestration, the process involves capturing the emissions, separating the carbon dioxide and sequestering it for commercial use or for injection back into the Earth.

The technology isn’t entirely new. In the North Sea, carbon dioxide has been injected into a saline aquifer in order to avoid European taxes on carbon emissions. In other places, the gas is injected into oil fields to push more oil out of the ground.

If pure enough, carbon dioxide can even be sold for commercial or industrial uses, such as to carbonate soda.

But there’s “not enough soda pop in the world” to make a dent in the level of carbon dioxide emissions from power plants, said Stuart Dalton, director for generation at the Electric Power Research Institute in Palo Alto, Calif., a research and development collaborative sponsored by the country’s electric utilities.

For thousands of years, carbon dioxide levels in the atmosphere hovered at about 250 parts per million. Since the onset of the industrial revolution, levels have risen to more than 375 parts per million.

Whether basalt will prove to be ideal for long-term storage on a large scale remains a “big if,” said Peter McGrail, a researcher at Battelle Pacific Northwest Division, a U.S. Department of Energy supported science lab and partner in the Big Sky Carbon Sequestration Partnership, a regional study into carbon capture and sequestration technologies.

As the lava cooled, pockets of trapped gas created a porous structure ideal for injecting carbon dioxide. Also, the basalt reacts with the carbon dioxide to create a solid mineral that doesn’t damage the structure or integrity of the entire rock, McGrail said.

McGrail’s researchers now are investigating sites for a pilot test slated to begin in 2007. Carbon dioxide would be injected into basalt at about 3,000 feet, where the water is not suitable for drinking or irrigation.

The key is to prove the technology is both environmentally viable and cost-effective.

“The opportunities for basalt are substantial in our region, but also, there are substantial opportunities in other parts of the world,” said Susan Capalbo, an economics professor at Montana State University and director of the partnership. “We really need to make sure this is affordable, at the same time it isn’t damaging the environment.”

The biggest cost associated with the technology centers on capturing the carbon dioxide. A traditional power plant can use up to a third of its power capturing carbon dioxide, which could more than double the cost of that power for consumers, Dalton said.

The impact is far less significant for what’s called an integrated gasification combined cycle plant. Such plants generally use coal or petcoke, the waste product from oil refineries, which is then turned into a gas to be burned to generate power.

They use only about 6 percent of their power to separate the carbon dioxide, increasing the cost of power by perhaps a third, Dalton said.

Already, one Northwest utility is planning to take advantage of that technology. Energy Northwest, a joint agency comprising 19 public utilities and municipalities, last year announced plans to build a plant in Kalama, west of the Cascades in southwest Washington.

The company already operates a nuclear plant, a hydropower project and wind, solar and biomass power projects. Its Kalama project will be designed to capture carbon dioxide emissions for potential injection into the region’s basalt, at an added cost of $35 million, spokesman Brad Peck said.

“We didn’t choose the Port of Kalama for this project at random,” Peck said. “There was some very specific considerations, and one of those is that it sits atop basalt formations.”

But a great deal of research into the technology still needs to be done before the company commits to the process, he said.
How to Cope with Global Warming
(Opinions of four scientists)

- Bob Corell was head of the GEO directorate at NSF during the 1990s. GEO has the 3 divisions: Atmosphere, Earth, and Ocean Sciences.

- John Christy lived in Africa during 1973 – 1975. These were the years of the oil embargo. “If you thought it was bad in the US, it was terrible in Africa.” He has been at UAH, Alabama during 1987 – 2006.

- Tom Wigley worked on climate issues in East Anglia, UK, for many years. He has worked at NCAR from 04/1993 – 2006.

- Richard Somerville at Scripps

Roy Jenne
May 2006
How to Beat The Global Heat

When delegates from 189 nations met in Montreal in December to discuss climate change, they accomplished little more than agreeing to more talks. The Kyoto treaty to cut carbon emissions does not yet include the United States, and faith in the protocol has eroded. So what is an enlightened world leader to do? Discover associate editor Susan Kruglinski asked some of the leading climate experts.

ROBERT W. CORELL, senior fellow at the American Meteorological Society: “Even if we reduce greenhouse gases, it is going to take about 300 or 400 years for the planet’s temperature to stabilize. Renewable energy is one of the long-term solutions, but I think the missing agenda is adaptation—conservation, for example. We are going to go through a period of increased climate change, increased sea levels, and increased temperature, so we are going to need to adapt.”

JOHN R. CHRISTY, director of the Earth Systems Science Center at the University of Alabama at Huntsville: “What I fear is the command-and-control notion of dealing with climate change, because that will reduce productivity and create more poverty. I’ve lived in the third world and seen what the lack of energy does to people. I don’t think we would be spending resources wisely by dealing with an issue that we don’t know that much about and that we can’t really control anyway. I do wholeheartedly support research to find new sources of energy that don’t involve burning carbon.”

TOM WIGLEY, senior scientist at the National Center for Atmospheric Research: “My opinion is that Kyoto, with its targets and timetables, isn’t the right way to go. We developed the atom bomb in a massive technological research program over a very short period of time. If we can do that sort of bad stuff, why can’t we put our minds to it and develop alternative technologies that are competitive with fossil fuels?”

RICHARD SOMERVILLE, professor of meteorology at the Scripps Institution of Oceanography: “We really need a massive cut in greenhouse gases—60, 70, or 80 percent. I think we have to appeal to the economic side. We need incentives to develop a wide range of energy sources, like renewables, plus nuclear and systems of the future, like fusion. This problem, if it is successfully tackled, is going to have a solution that resembles the ozone-hole solution, which was to get governments, industry, the public, and the scientific community all on the same page.”
Will Countries Cut CO$_2$ as Promised?

1. No.
   Not Europe
   Not Japan
   Not US or Canada

2. Big increases in emissions are expected for 2000 – 2025.
   These increases are expected for almost all countries who signed Kyoto, or not.

Roy Jenne
Jan 2006

(Six pages here)
Europeans missing their Kyoto targets

By Barrie Clement

Published: 27 December 2005

Britain and Sweden are the only European countries honouring their Kyoto commitments to cut greenhouse gasses, according to a think-tank report.

Although the US is portrayed as the ecological villain for refusing to sign up to the agreement, 10 out of the 15 European Union signatories - including Ireland, Italy and Spain - will miss their targets without urgent action, the Institute for Public Policy Research found.

France, Greece and Germany are given "amber warnings" and will only achieve the objectives if planned policies are successfully carried out.

Tony Grayling, the institute's associate director, said the world was near the point of no return on climate change. "We have little time left to start reducing global greenhouse gas emissions before irreparable damage is done. It is vital that EU countries keep their promises to cut pollution. They must take action now to get back on the Kyoto track, including energy saving and investment in renewable energy."

EU countries would have to adopt tougher limits on emissions from power stations and heavy industry in the new year as part of the second phase of the EU Emissions Trading Scheme, he said.

Recent figures show carbon dioxide emissions increasing in 13 out of the 15 countries, including Britain, the report says.

The British Government was condemned by its own guru on global warming earlier this month for failing to meet its targets on climate change.

Ministers set themselves the target of reducing CO₂ emissions by 12.5 per cent from their 1990 levels by 2012, but Britain's production of the gas has increased by 9 per cent since 1999.

In his first report as head of the Commission for Sustainable Development, Sir Jonathon Porritt gave colour-coded ratings for the Government's performance on climate change. CO₂ emissions were given red, as were the performances on reducing waste, lowering water consumption and achieving sustainable development. All other targets were given amber lights. Ministers failed to achieve a green light for any if their objectives and the Government's own Whitehall departments were criticised in the report for wasting energy and water.

© 2005 Independent News and Media Limited
EU Wrestles With Business Over Emissions

Europe Leads Charge On Global Warming; Devil Is in the Details

By GEOFF WINESTOCK  
Staff Reporter of THE WALL STREET JOURNAL  
BRUSSELS—As the European Union wages an international battle against the U.S. to save the Kyoto Protocol on global warming, it faces an equally tough internal struggle over how to meet its own commitments to cut greenhouse-gas emissions.

Countries within the 15-member bloc are proceeding in different directions, and the tension recently forced the European Commission, the EU’s executive arm, to delay indefinitely a proposal for EU emissions caps and a Europe-wide emissions-trading system.

The commission and environmentalists want the EU to set mandatory emissions limits even before details are ironed out on the 1997 Kyoto Protocol, which commits ratifying countries to reduce their net greenhouse-gas emissions to well under 1990 levels by 2012. The commission argues that, without limits, it will be impossible to start emissions trading, which is potentially the most efficient and simplest way of reducing the discharge of greenhouse gases.

“We must lead by example,” says Margot Walstrom, the EU’s environment commissioner.

On the other side are companies that consume a lot of energy, and thus produce high levels of greenhouse gases—such as carbon dioxide that accumulate in the atmosphere and contribute to global warming.

These companies fear high penalties under a program of emissions restrictions. They want more time to work out the cheapest solution to their pollution problems, and worry about their ability to compete with companies in countries that don’t restrict emissions.

“What we are against is the exaggerated ecological leadership which ... the European Union wants to administer,” says Joachim Hein, environmental adviser for the Federation of German Industries.

That internal debate is likely to intensify whatever the results of a meeting next week in Bonn, which is supposed to work out details of the Kyoto Protocol. At that meeting, the EU will try to persuade Japan and other rich countries to proceed with the Kyoto plan, despite the Bush administration’s opposition to it. Japan has said it won’t support the treaty without U.S. participation. To take force, the accord must be approved by 55 countries representing at least 55% of total emissions.

Already, most EU countries have raised energy taxes and slapped on tougher emissions regulations. As a whole, the EU registered a 4% drop in greenhouse-gas emissions between 1990 and 1999, compared with increases of 16% in the U.S. and 7.8% in Japan. The EU has been helped over the past decade by a switch away from coal to cheaper, cleaner natural gas, which is readily available in Europe, and by the one-time but significant impact of the collapse of smokestack industries in eastern Germany.

Greenhouse-Gas Targets

The greenhouse-gas emissions record for the U.S., Japan and several EU countries

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>23.2%</td>
<td>22.1%</td>
<td>13.0%</td>
<td>Change in emissions 1990-1999</td>
</tr>
<tr>
<td>Ireland</td>
<td>15.0%</td>
<td>16.0%</td>
<td>-1.0%</td>
<td><em>Target for reductions increases by 2008-2012</em></td>
</tr>
<tr>
<td>U.S.</td>
<td>-7.0%</td>
<td>-6.0%</td>
<td>-1.0%</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>-6.0%</td>
<td>-5.0%</td>
<td>-1.0%</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>-6.0%</td>
<td>-4.4%</td>
<td>-1.6%</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>-6.5%</td>
<td>-5.0%</td>
<td>-1.5%</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>-21.0%</td>
<td>-19.0%</td>
<td>-2.0%</td>
<td></td>
</tr>
<tr>
<td>E.U.</td>
<td>-8.0%</td>
<td>-6.0%</td>
<td>-2.0%</td>
<td></td>
</tr>
<tr>
<td>Britain</td>
<td>-14.0%</td>
<td>-12.5%</td>
<td>-1.5%</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>-18.7%</td>
<td>-16.0%</td>
<td>-2.7%</td>
<td></td>
</tr>
</tbody>
</table>

Sources: European Commission; European Climate Network  
*Under the Kyoto Protocol and E.U. burden sharing

But in order to comply with the Kyoto accord, the EU must cut emissions even further. Officials in Brussels believe the simplest way to do that is to set rigid caps on the amounts of greenhouse gases that specific industries can produce. Britain and Denmark have already started moving in that direction, albeit with different methods; Germany, Spain and Italy have all recently expressed doubts.

Denmark this year launched the world’s first program for capping and trading the rights to greenhouse-gas emissions. Power companies are hit with a penalty tax for each ton of carbon dioxide emitted above a certain low limit that will decline in years to come. But they can discharge above the limit and avoid the penalty by buying emissions credits from other companies whose emissions are below the maximum. The problem, Danish power companies say, is that Denmark has too few places such as the U.S. that don’t have caps and taxes. The commission now says it will make further consultations before submitting any bill.

Many companies would prefer a system of caps based on meeting pollution-efficiency targets, rather than a limit on the number of tons of emissions. Britain offered that option this year when it introduced a system of emissions-limits and trading. For instance, Blue-Circle Group PLC, a cement maker that is one of Britain’s biggest industrial producers of carbon dioxide, opted to cap the tons of gas it emits per ton of cement it makes, enabling the company to increase production as long as it meets its efficiency targets. Nell Jenkins, environment manager for Blue Circle, acknowledges that the risk in this flexible approach is that overall emissions may not actually fall—but he argues that is unlikely. "It would be very embarrassing to us and the government," he says.
Will Countries Meet Kyoto Promises for 2012?
(Promises to reduce or limit CO₂ emissions)

✖ No: 13 of 15 main Kyoto signers will not meet promises

✖ Expected CO₂ emission increases:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>13.3%</td>
<td>40.7%</td>
<td>-7.0%</td>
</tr>
<tr>
<td>Canada</td>
<td>18.1%</td>
<td>42.9%</td>
<td>-6.0%</td>
</tr>
<tr>
<td>UK</td>
<td>9.9%</td>
<td>25.1%</td>
<td>-12.5%</td>
</tr>
<tr>
<td>Germany</td>
<td>2.8%</td>
<td>17.0%</td>
<td>-21.0%</td>
</tr>
<tr>
<td>Japan</td>
<td>8.9%</td>
<td>19.2%</td>
<td>-6.0%</td>
</tr>
<tr>
<td>Russia</td>
<td>14.1%</td>
<td>39.2%</td>
<td>0%</td>
</tr>
</tbody>
</table>

NOTE: These are increases from year 2000.

✖ See next page for similar numbers for other countries

Canada on Kyoto: What a Gas
Two weeks after Canada’s new Conservative government terminated a package of programs designed to reduce greenhouse gas emissions, Canadian Environment Minister Rona Ambrose calls Canada’s Kyoto Protocol commitments “unachievable.”
In a formal submission to the United Nations last week, the government explained that energy-exporting countries such as Canada “provide other countries with opportunities to switch to cleaner sources of fuel.” Ambrose plans to unveil new emissions controls this fall, but activists say Ottawa is abdicating its responsibility.

—PAUL WEBSTER

Can not do the CO₂ promise
not achievable
from: 19 May 2006
Page 985

Note: The previous Canadian law also could not do the promise.

Roy Jenne
Sep 15, 2005
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industrialized Countries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td>5,769</td>
<td>6,731</td>
<td>6,613</td>
<td>7,677</td>
<td>8,255</td>
<td>8,876</td>
<td>9,659</td>
<td>1.6</td>
</tr>
<tr>
<td>United States(^a)</td>
<td>4,989</td>
<td>5,787</td>
<td>5,692</td>
<td>6,597</td>
<td>7,028</td>
<td>7,556</td>
<td>8,142</td>
<td>1.5</td>
</tr>
<tr>
<td>Canada</td>
<td>473</td>
<td>581</td>
<td>569</td>
<td>686</td>
<td>734</td>
<td>776</td>
<td>830</td>
<td>1.6</td>
</tr>
<tr>
<td>Mexico</td>
<td>308</td>
<td>364</td>
<td>352</td>
<td>433</td>
<td>492</td>
<td>565</td>
<td>687</td>
<td>2.8</td>
</tr>
<tr>
<td>Western Europe</td>
<td>3,412</td>
<td>3,442</td>
<td>3,465</td>
<td>3,567</td>
<td>3,682</td>
<td>3,832</td>
<td>4,022</td>
<td>0.6</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>600</td>
<td>553</td>
<td>563</td>
<td>608</td>
<td>642</td>
<td>665</td>
<td>692</td>
<td>0.9</td>
</tr>
<tr>
<td>France</td>
<td>374</td>
<td>401</td>
<td>396</td>
<td>390</td>
<td>398</td>
<td>400</td>
<td>412</td>
<td>0.2</td>
</tr>
<tr>
<td>Germany</td>
<td>995</td>
<td>828</td>
<td>819</td>
<td>851</td>
<td>874</td>
<td>943</td>
<td>969</td>
<td>0.7</td>
</tr>
<tr>
<td>Italy</td>
<td>415</td>
<td>443</td>
<td>445</td>
<td>486</td>
<td>504</td>
<td>522</td>
<td>540</td>
<td>0.8</td>
</tr>
<tr>
<td>Netherlands</td>
<td>211</td>
<td>228</td>
<td>248</td>
<td>263</td>
<td>272</td>
<td>279</td>
<td>266</td>
<td>0.6</td>
</tr>
<tr>
<td>Other Western Europe</td>
<td>816</td>
<td>989</td>
<td>994</td>
<td>969</td>
<td>992</td>
<td>1,021</td>
<td>1,123</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Industrialized Asia</strong></td>
<td>1,280</td>
<td>1,526</td>
<td>1,556</td>
<td>1,694</td>
<td>1,770</td>
<td>1,840</td>
<td>1,962</td>
<td>1.0</td>
</tr>
<tr>
<td>Japan</td>
<td>987</td>
<td>1,138</td>
<td>1,158</td>
<td>1,239</td>
<td>1,274</td>
<td>1,300</td>
<td>1,356</td>
<td>0.7</td>
</tr>
<tr>
<td>Australia/New Zealand</td>
<td>294</td>
<td>387</td>
<td>398</td>
<td>455</td>
<td>497</td>
<td>541</td>
<td>605</td>
<td>1.8</td>
</tr>
<tr>
<td>Total Industrialized</td>
<td>10,462</td>
<td>11,699</td>
<td>11,634</td>
<td>12,938</td>
<td>13,708</td>
<td>14,548</td>
<td>15,643</td>
<td>1.2</td>
</tr>
<tr>
<td><strong>EE/FSU</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Former Soviet Union</td>
<td>3,798</td>
<td>2,338</td>
<td>2,399</td>
<td>2,600</td>
<td>2,840</td>
<td>3,118</td>
<td>3,393</td>
<td>1.5</td>
</tr>
<tr>
<td>Russia</td>
<td>2,405</td>
<td>1,570</td>
<td>1,614</td>
<td>1,792</td>
<td>1,913</td>
<td>2,059</td>
<td>2,186</td>
<td>1.3</td>
</tr>
<tr>
<td>Other FSU</td>
<td>1,393</td>
<td>767</td>
<td>785</td>
<td>808</td>
<td>927</td>
<td>1,059</td>
<td>1,207</td>
<td>1.8</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>1,104</td>
<td>756</td>
<td>748</td>
<td>797</td>
<td>827</td>
<td>888</td>
<td>920</td>
<td>0.9</td>
</tr>
<tr>
<td>Total EE/FSU</td>
<td>4,902</td>
<td>3,094</td>
<td>3,148</td>
<td>3,397</td>
<td>3,667</td>
<td>4,006</td>
<td>4,313</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Developing Countries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developing Asia</td>
<td>3,994</td>
<td>5,709</td>
<td>6,012</td>
<td>7,647</td>
<td>8,863</td>
<td>10,240</td>
<td>11,801</td>
<td>2.9</td>
</tr>
<tr>
<td>China</td>
<td>2,262</td>
<td>2,861</td>
<td>3,050</td>
<td>4,063</td>
<td>4,824</td>
<td>5,693</td>
<td>6,666</td>
<td>3.3</td>
</tr>
<tr>
<td>India</td>
<td>561</td>
<td>914</td>
<td>917</td>
<td>1,141</td>
<td>1,341</td>
<td>1,575</td>
<td>1,834</td>
<td>2.9</td>
</tr>
<tr>
<td>South Korea</td>
<td>234</td>
<td>425</td>
<td>443</td>
<td>563</td>
<td>620</td>
<td>662</td>
<td>720</td>
<td>2.0</td>
</tr>
<tr>
<td>Other Asia</td>
<td>937</td>
<td>1,509</td>
<td>1,602</td>
<td>1,881</td>
<td>2,078</td>
<td>2,310</td>
<td>2,581</td>
<td>2.0</td>
</tr>
<tr>
<td>Middle East</td>
<td>846</td>
<td>1,262</td>
<td>1,299</td>
<td>1,566</td>
<td>1,729</td>
<td>1,910</td>
<td>2,110</td>
<td>2.0</td>
</tr>
<tr>
<td>Turkey</td>
<td>129</td>
<td>184</td>
<td>184</td>
<td>249</td>
<td>280</td>
<td>309</td>
<td>340</td>
<td>2.8</td>
</tr>
<tr>
<td>Other Middle East</td>
<td>717</td>
<td>1,078</td>
<td>1,115</td>
<td>1,317</td>
<td>1,448</td>
<td>1,601</td>
<td>1,770</td>
<td>1.9</td>
</tr>
<tr>
<td>Africa</td>
<td>656</td>
<td>811</td>
<td>843</td>
<td>971</td>
<td>1,110</td>
<td>1,259</td>
<td>1,413</td>
<td>2.2</td>
</tr>
<tr>
<td>Central and South America</td>
<td>703</td>
<td>961</td>
<td>964</td>
<td>1,194</td>
<td>1,358</td>
<td>1,578</td>
<td>1,845</td>
<td>2.7</td>
</tr>
<tr>
<td>Brazil</td>
<td>250</td>
<td>343</td>
<td>347</td>
<td>451</td>
<td>531</td>
<td>617</td>
<td>720</td>
<td>3.1</td>
</tr>
<tr>
<td>Other Central/South America</td>
<td>453</td>
<td>618</td>
<td>617</td>
<td>744</td>
<td>827</td>
<td>961</td>
<td>1,125</td>
<td>2.5</td>
</tr>
<tr>
<td>Total Developing</td>
<td>6,200</td>
<td>8,744</td>
<td>9,118</td>
<td>11,379</td>
<td>13,060</td>
<td>14,987</td>
<td>17,168</td>
<td>2.7</td>
</tr>
<tr>
<td>Total World (CO₂)</td>
<td>21,563</td>
<td>23,536</td>
<td>23,899</td>
<td>27,715</td>
<td>30,435</td>
<td>33,541</td>
<td>37,124</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Notes: EE/FSU = Eastern Europe/Former Soviet Union. The U.S. numbers include carbon dioxide emissions attributable to renewable energy sources.

Table 17. Quantified Emissions Reduction Targets Under the Kyoto Protocol by Country

<table>
<thead>
<tr>
<th>Country</th>
<th>Reduction Target (Percent)</th>
<th>Country</th>
<th>Reduction Target (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>+8.0</td>
<td>Liechtenstein</td>
<td>-8.0</td>
</tr>
<tr>
<td>Austria (F)</td>
<td>-13.0</td>
<td>Lithuania (F)</td>
<td>-8.0</td>
</tr>
<tr>
<td>Belgium (F)</td>
<td>-7.5</td>
<td>Luxembourg (F)</td>
<td>-28.0</td>
</tr>
<tr>
<td>Bulgaria (F)</td>
<td>-8.0</td>
<td>Monaco</td>
<td>-8.0</td>
</tr>
<tr>
<td>Canada (F)</td>
<td>-6.0</td>
<td>Netherlands (F)</td>
<td>-6.0</td>
</tr>
<tr>
<td>Croatia</td>
<td>-5.0</td>
<td>New Zealand (F)</td>
<td>0.0</td>
</tr>
<tr>
<td>Czech Republic (F)</td>
<td>-8.0</td>
<td>Norway (F)</td>
<td>+1.0</td>
</tr>
<tr>
<td>Denmark (F)</td>
<td>-21.0</td>
<td>Poland (F)</td>
<td>-6.0</td>
</tr>
<tr>
<td>Estonia (F)</td>
<td>-8.0</td>
<td>Portugal (F)</td>
<td>+27.0</td>
</tr>
<tr>
<td>European Community (FR)</td>
<td>-8.0</td>
<td>Romania (F)</td>
<td>-8.0</td>
</tr>
<tr>
<td>Finland (F)</td>
<td>0.0</td>
<td>Russia</td>
<td>0.0</td>
</tr>
<tr>
<td>France (F)</td>
<td>0.0</td>
<td>Slovakia (F)</td>
<td>-8.0</td>
</tr>
<tr>
<td>Germany (F)</td>
<td>-21.0</td>
<td>Slovenia (F)</td>
<td>-8.0</td>
</tr>
<tr>
<td>Greece (F)</td>
<td>+25.0</td>
<td>Spain (F)</td>
<td>+15.0</td>
</tr>
<tr>
<td>Hungary (F)</td>
<td>-6.0</td>
<td>Sweden (F)</td>
<td>+4.0</td>
</tr>
<tr>
<td>Iceland (F)</td>
<td>+10.0</td>
<td>Switzerland (F)</td>
<td>-8.0</td>
</tr>
<tr>
<td>Ireland (F)</td>
<td>+13.0</td>
<td>Ukraine</td>
<td>0.0</td>
</tr>
<tr>
<td>Italy (F)</td>
<td>-6.5</td>
<td>United Kingdom (F)</td>
<td>-12.5</td>
</tr>
<tr>
<td>Japan (F)</td>
<td>-6.0</td>
<td>United States</td>
<td>-7.0</td>
</tr>
<tr>
<td>Latvia (F)</td>
<td>-8.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(R) = Country has ratified, accepted, approved, or acceded to the Kyoto Protocol.

European Union member countries renegotiated their individual targets under the EU Shared Burden Agreement, which
was agreed to in 1998 and reaffirmed in the ratification of the Kyoto Protocol in 2002.


Comments:

It is interesting that Spain gets to increase its greenhouse emissions by 15%, Sweden up 4%, Australia up by 8%, but Canada must decrease by 6%. One wonders why Canada agreed to this.

Actually, many countries are now well above their 1990 emissions, and will not be able to make their agreements to reduce carbon dioxide, etc.

If the population of a country goes up, and the economy goes up a lot, and people travel more, then it is especially hard to reduce the emissions of carbon dioxide.
Consider China, India, Indonesia

- Their economic output has grown rapidly
- The use of electricity has grown by huge amounts
- They travel a lot more
- Oil use by China and India, 2002 – 2030
- The total use of energy is growing fast

Roy Jenne
Apr 2005

5 pages here
Table 7.5: Total Primary Energy Demand in China (Mtoe)

<table>
<thead>
<tr>
<th></th>
<th>1971</th>
<th>2000</th>
<th>2010</th>
<th>2030</th>
<th>Average annual growth 2000-2030 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>192</td>
<td>659</td>
<td>854</td>
<td>1,278</td>
<td>2.2</td>
</tr>
<tr>
<td>Oil</td>
<td>43</td>
<td>236</td>
<td>336</td>
<td>578</td>
<td>3.0</td>
</tr>
<tr>
<td>Gas</td>
<td>3</td>
<td>30</td>
<td>57</td>
<td>151</td>
<td>5.5</td>
</tr>
<tr>
<td>Nuclear</td>
<td>0</td>
<td>4</td>
<td>23</td>
<td>63</td>
<td>9.3</td>
</tr>
<tr>
<td>Hydro</td>
<td>3</td>
<td>19</td>
<td>29</td>
<td>54</td>
<td>3.5</td>
</tr>
<tr>
<td>Other renewables</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>6.8</td>
</tr>
<tr>
<td>Total primary energy demand</td>
<td>241</td>
<td>950</td>
<td>1,302</td>
<td>2,133</td>
<td>2.7</td>
</tr>
</tbody>
</table>

Table 7.7: Electricity Generation Mix in China (TWh)

<table>
<thead>
<tr>
<th></th>
<th>1971</th>
<th>2000</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>98</td>
<td>1,081</td>
<td>1,723</td>
<td>2,509</td>
<td>3,503</td>
</tr>
<tr>
<td>Oil</td>
<td>16</td>
<td>46</td>
<td>51</td>
<td>53</td>
<td>54</td>
</tr>
<tr>
<td>Gas</td>
<td>0</td>
<td>19</td>
<td>74</td>
<td>209</td>
<td>349</td>
</tr>
<tr>
<td>Nuclear</td>
<td>0</td>
<td>17</td>
<td>90</td>
<td>163</td>
<td>242</td>
</tr>
<tr>
<td>Hydro</td>
<td>30</td>
<td>222</td>
<td>333</td>
<td>511</td>
<td>622</td>
</tr>
<tr>
<td>Other renewables</td>
<td>0</td>
<td>2</td>
<td>10</td>
<td>16</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>144</td>
<td>1,387</td>
<td>2,282</td>
<td>3,461</td>
<td>4,813</td>
</tr>
</tbody>
</table>

Figure 7.4: Oil Balance in China

From WEO 2002 (by IEA)

Econ

Year    Value (m USD) PPP method
1971    4.937 b 1971
2000               4.861 b
2030   19.753 b 2030

Population

Year    People (m)
1971    845 m
2000               1272
2030   1481 m
### Table 6.11: Primary Energy Demand in Korea (Mtoe)

<table>
<thead>
<tr>
<th></th>
<th>1971</th>
<th>2000</th>
<th>2010</th>
<th>2030</th>
<th>Average annual growth 2000-2030 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>6</td>
<td>42</td>
<td>58</td>
<td>79</td>
<td>2.2</td>
</tr>
<tr>
<td>Oil</td>
<td>11</td>
<td>104</td>
<td>126</td>
<td>165</td>
<td>1.6</td>
</tr>
<tr>
<td>Gas</td>
<td>-</td>
<td>17</td>
<td>33</td>
<td>61</td>
<td>4.4</td>
</tr>
<tr>
<td>Nuclear</td>
<td>-</td>
<td>28</td>
<td>45</td>
<td>65</td>
<td>2.8</td>
</tr>
<tr>
<td>Hydro</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Other renewables</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>7</td>
<td>4.0</td>
</tr>
<tr>
<td>TPES</td>
<td>17</td>
<td>194</td>
<td>264</td>
<td>378</td>
<td>2.3</td>
</tr>
</tbody>
</table>

*From: WEO 2002*

### Figure 6.9: Total Primary Energy Demand in Korea

- A huge increase

### Table 11.3: Total Primary Energy Demand in Indonesia (Mtoe)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>0</td>
<td>14</td>
<td>24</td>
<td>40</td>
<td>63</td>
<td>5.2</td>
</tr>
<tr>
<td>Oil</td>
<td>8</td>
<td>53</td>
<td>73</td>
<td>96</td>
<td>118</td>
<td>2.7</td>
</tr>
<tr>
<td>Gas</td>
<td>0</td>
<td>28</td>
<td>45</td>
<td>64</td>
<td>78</td>
<td>3.4</td>
</tr>
<tr>
<td>Hydro</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>Other renewables</td>
<td>0</td>
<td>2</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>6.7</td>
</tr>
<tr>
<td>TPES*</td>
<td>9</td>
<td>98</td>
<td>152</td>
<td>213</td>
<td>276</td>
<td>3.5</td>
</tr>
</tbody>
</table>

*Excludes biomass.
Saudis Woo India on Oil Projects

Possible Ventures Illustrate A Shift in Energy Markets Toward Big Asian Nations

Saudi Arabia proposed a partnership with India in a series of big energy deals, underscoring how global petroleum markets' center of gravity is shifting toward the vast and fast-growing Chinese and Indian markets.

The Asian overture by Saudi Arabia, the world's largest oil exporter, comes as another big energy provider—Canada—has signaled its eagerness for energy-investment deals with China.

The Saudis pitched in meetings that oil minister Ali Naimi and other Saudi officials held with counterparts in New Delhi. The Saudis proposed that Indian companies join them in building an oil refinery in Saudi Arabia and bid in the next round of natural gas-exploration contracts to be offered by the kingdom. "The Saudis are very keen on setting up an export-oriented refinery with Indian companies in Saudi Arabia," Indian Petroleum Secretary S.C. Tripathi said.

He said senior officials of Saudi Aramco, the Saudi state-owned oil giant, will visit New Delhi this month for talks with Oil & Natural Gas Corp. and Indian Oil Corp. to finalize a joint venture. "We may invest in India, and we would welcome investment by Indian companies in Saudi Arabia," Mr. Naimi said.

The move comes as China, which accounted for more than half the increase in world oil demand in the past two years, looks abroad to secure supplies of oil and other raw materials to feed its booming economy. Canadian and Chinese government officials have been discussing China's oil interest in recent months, with Canada saying business decisions must be made by Canadian companies rather than by the government, said a person familiar with the matter.

Philippe Reicher, a spokesman for Terasen Inc., a Vancouver, British Columbia, pipeline concern, said the company has held recent discussions with a Chinese state-owned oil concern Sinopec and China National Petroleum Corp. concerning the Chinese companies' interest in shipping Canadian oil on a proposed pipeline expansion.

Enbridge Inc., of Calgary, Alberta, a Terasen rival that is proposing to build a pipeline from northern Alberta to British Columbia, hopes soon to sign memorandums of understanding with Asian parties, which the company declined to identify, concerning commitments to ship oil.

Oil sands, gritty deposits of tar-like substance that can be processed into crude oil, have been of particular interest to China, according to Canadian oil executives. But that oil is heavier and more difficult to refine.

China has been seeking oil opportunities in Venezuela and Ecuador. China has also been seeking mining assets, with China Minmetals Corp. in talks to acquire Canada's Noranda Inc. But that potential deal has sparked political debate in Canada. Major foreign investments in Canada are subject to government review, and some politicians have argued that Ottawa should block a takeover by state-owned Minmetals.

The moves by Saudi Arabia and Canadian companies to shift focus to Asia from the U.S., which remains the No. 1 market for oil, is the result of fast-growing demand in the region. The International Energy Agency estimates that China and India together will consume 3.6 million barrels a day more oil by 2010 than they did in 2002, accounting for a large portion of the global demand increase of 13.4 million barrels a day expected during that period.

The Saudis also floated the idea of building a joint venture refinery in India, which is fast becoming a major customer of Saudi Arabia. A Saudi official said the idea was to "cement the relationship" with India, whose companies have lately become aggressive in seeking to expand their operations.

Diplomatic niceties apart, the Saudi proposals also make business sense, according to oil-industry officials. For the first time in more than two decades, refining operations have become profit centers for oil companies because capacity constraints to produce gasoline and other transportation fuels have pushed up prices. High refinery margins are expected to last for years, in part because it has become difficult to obtain permits to build refineries in rich countries, notably in the U.S. The world's largest consumer of gasoline, the U.S. hasn't built any refineries since the 1970s and now needs to import gasoline to meet its needs.

World demand for oil grew by about 4.5 million barrels a day in 2003 and 2004, but global refining capacity is estimated to have grown by as little as one-fifth of that.

To capture more of the world-wide increase in oil prices, Saudi Arabia apparently has decided to build export refineries to process more of its crude oil and export the resulting products, according to industry officials.

"The concept of refineries is anathema to major oil companies," said Lawrence Goldstein, president of the industry-funded Petroleum Industry Research Foundation in New York. But Saudi Arabia alone, or in cooperation with the emerging but feisty oil companies of India and
China to Look Abroad for Natural Gas

By Xu Yih  June 23, 2004

SINGAPORE—China’s plan to build as many as 10 liquefied-natural-gas terminals in the next few years will prompt Chinese companies to amass stakes in gas fields abroad or to tie up long-term supply contracts in Asia, Russia and the Middle East.

While there should be enough supplies of LNG to meet the expected increase in Chinese demand, in the short or midterm at least, China will have to compete with other major consumers such as Japan, South Korea and Taiwan to get the best possible LNG purchase deals.

“China is set to buy more [natural-gas assets]. It has been looking for acquisition opportunities in Asia, the Middle East and Russia in order to reduce geopolitical risks,” said Gordon Kwan, an analyst at Kingsway Financial Group in Hong Kong.

“I don’t think supply is a problem in short term,” because the region has plenty of gas resources, but there is a need for investment to develop them, Mr. Kwan said.

China in recent years has moved similarly to secure oil sources around the world, spurred by the country’s voracious appetite for energy. Its state oil companies have been investing billions of dollars in exploration projects in Kazakhstan, Sudan, Venezuela and elsewhere. Jeffrey Logan, a China program manager for the International Energy Agency in Paris, noted that “the money they are throwing out is very big. . . . They can match the bids anywhere.”

Likewise, the amount of money involved in supplying China with all the LNG it will need is huge. China’s demand for the fuel over the next decade will require supply agreements valued at $60 billion with foreign companies, said Fu Chengyu, chairman of China National Offshore Oil Corp., or CNOOC, which is leading the country’s search of overseas gas assets.

CNOOC already has upstream investments in Australia’s North West Shelf and, potentially, its Gorgon field, as well as a 12.5% holding in the Tangguh project in Indonesia.

China expects to sign an agreement, possibly this week, committing Indonesia to sell five million tons a year of LNG to China, according to Indonesia’s Energy and Mineral Resources Minister Purnomo Yusgiantoro.

Competition for assured LNG supplies is fierce. “This is because gas suppliers or reserve owners will only offer deals to companies which provide the most competitive bids,” said Zhang Kang, a senior geologist of China Petrochemical Corp., or Sinopec.

Two weeks ago, Sinopec initiated talks with Russia’s Sakhalin Energy Investment Co., seeking possible natural-gas-development opportunities in Russia’s Sakhalin-2 Project.

Ivan Chernyakhovski, an official with Sakhalin Energy, said that while China is one potential market for his company’s LNG exports, Sakhalin Energy also is looking toward Japan and South Korea for future deals. The company already has signed LNG sales contracts with four Japanese companies and is expected to sign more with Japan later this year, Mr. Chernyakhovski said.

Yesterday, Reuters News Service reported that BP PLC’s Russian venture expects to clinch a deal with gas monopoly Gazprom on a giant East Siberian field in July in a move that may speed gas sales to China. “We hope to have an agreement on the principles of our cooperation on Kovyktan by the end of July,” TNK-BP Chief Executive Robert Dudley said.

The Kovyktan field, controlled by TNK-BP via Russia Petroleum, has reserves of more than two trillion cubic meters, or 2.6 trillion cubic yards, of gas—almost equal to the world’s entire annual gas output. BP had for years opposed Gazprom’s participation in the $18 billion project, which would involve building a 3,000-mile pipeline from Siberia to China and Korea.

Sinopec also has started talks with the National Iranian Gas Export Co. and the National Iranian Oil Co. to buy LNG from Iran. This follows a memorandum of understanding signed in March by Zhu Hai Zhenrong Corp., one of China’s four state-owned oil traders, to import 110 million tons of LNG from Iran over 25 years at a cost of $20 billion, starting in 2008.

According to a survey conducted by CNOOC, 12 Chinese coastal provinces and cities to be served by the 10 LNG terminals will cause natural-gas demand to rise to 74.4 billion cubic meters a year by 2010. That will account for about 92% of China’s total demand then, up from 33.7 billion cubic meters a year by 2006.

Natural-gas demand in the coastal provinces will further rise to 108 billion cubic meters a year by 2015 and 133 billion cubic meters a year by 2020, CNOOC’s survey shows.

—From Dow Jones Newswires
World Use of Energy, 1971 to 2030
(AND USE OF OIL AND GAS TO 2080)

- World energy use, 1971 to 2030
  - And amount used for electricity and for transport

- World energy use by fuel type and application, 1971-2030

- Petroleum consumption, 1940-2080
  - And use for transport

- Use of natural gas, 1970-2080

- Electric power use by select countries, 1930-1990

- World population by regions and ten countries, 1990-2025

Roy Jenne
Feb 10, 2006

10 pages here
World Energy Use to 2030, and Access to Electricity

Lots of poor people:
- with no electricity & no energy to cook

- The world will need 67% more energy in year 2030 than was used in 2000.
- In year 2000, 1.64 billion people did not have electricity.
- In year 2000, 2.39 billion people relied on traditional biomass for cooking and heating.  (elec or gas is a lot easier)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Energy</th>
<th>Amount for Electricity</th>
<th>Use by Transportation</th>
<th>Other Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>4999</td>
<td>1209</td>
<td>851</td>
<td>2939</td>
</tr>
<tr>
<td>2000</td>
<td>9179</td>
<td>3636</td>
<td>1775</td>
<td>3768</td>
</tr>
<tr>
<td>2010</td>
<td>11132</td>
<td>4608</td>
<td>2220</td>
<td>4304</td>
</tr>
<tr>
<td>2020</td>
<td>13167</td>
<td>5559</td>
<td>2749</td>
<td>4859</td>
</tr>
<tr>
<td>2030</td>
<td>15267</td>
<td>6535</td>
<td>3327</td>
<td>5405</td>
</tr>
<tr>
<td>2030/1971</td>
<td>3.05</td>
<td>5.41</td>
<td>3.91</td>
<td>1.84</td>
</tr>
</tbody>
</table>

Source: WEO 2002 (World Energy Outlook) by IIEA, Paris

Roy Jenne
Oct 2, 2003
Figure 3. Observed world energy use by application for years 1971 and 2000. Projections go out to 2030. Categories are: the amounts for electricity, transport, and other use. “Other” includes industry (factories, etc.), homes and commercial buildings (grocery stores, other sales, and office buildings). Numbers are from World Energy Outlook 2002 published by the International Energy Agency in Aug 2002.
Figure 1. Observed world petroleum consumption 1940 to 2000; then estimates to 2080. Includes crude oil, gas liquids, and part of the oil from oil sands.

Sources:
1940 – 1950: *Intl Resources and Natl Policy* (Houzon, 1959)
2040 – 2080: My estimates, as constrained by a peak about 2036 and limited by total supply. Part of the sand oil is included. Shale oil not included.
Figure 79. World Total Transportation Energy Use by Mode, 1980-2020


1980

Figure 83. Road Vehicle Populations by Region, 1980-2020

World Use of Natural Gas, 1970 - 2080

Use of Gas in World (from Table 1, Dec 2004)

<table>
<thead>
<tr>
<th>Years</th>
<th>tcm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970 - 1999</td>
<td>44.2</td>
</tr>
<tr>
<td>2000 - 2029</td>
<td>97.9</td>
</tr>
<tr>
<td>2030 - 2060</td>
<td>152.8</td>
</tr>
<tr>
<td>2061 - 2070</td>
<td>53.9</td>
</tr>
<tr>
<td>2071 - 2080</td>
<td>49.2</td>
</tr>
</tbody>
</table>

\[353.8 \text{ tcm of gas}\]

NOTE: We will use 354 tcm of gas 2000 - 2080. From 2081-on, we will probably use ~90 tcm. Therefore we will use about 444 tcm from 2000-on and 454 (1996-on). This is more than we have (386) according to the USGS.

Estimate of remaining world gas in year 2000

- ~262 tcm (a 1992 est.)
- ~386 tcm (USGS est., 2000), as of Jan 1, 1996
- ~500 tcm (Intl Gas Center est. in ~2000)

India’s Plague Of Power Outages Crimps Business

By SUMATHI VAIDYANATHAN
Dow Jones Newswires

NEW DELHI—On May 1, authorities in Bombay took the unprecedented step of killing the lights in the office district and on 3,000 neon billboards, unable to insulate India’s commercial capital from a power crunch that already had triggered violence in other parts of the state.

The crisis in India’s Maharashtra state spotlights the faltering pace of India’s electricity overhauls, more than 13 years after opening power generation to private investment and two years after passing a landmark act to liberalize distribution. Problems such as theft, heavy subsidies and consumer defaults still deter private investment, weigh on economic growth and threaten the country’s goal of power for everyone by 2012.

While India isn’t the only country to face shortages—China, for one, also suffers blackouts and brownouts—India’s problems are big enough to raise worries that the country may not catch up with its giant neighbor in the race for economic growth and foreign investment. Access to reliable power at reasonable prices is the single most significant constraint facing Indian businesses, according to an investment-climate survey for India conducted by the World Bank and the Confederation of Indian Industry, or CII.

“You cannot escape the fact that we don’t have enough power,” said Harry Dhaw, director general of the Independent Power Producers Association of India.

Maharashtra needs 3,700 megawatts more power to meet its peak demand of 12,700 megawatts right now, according to state government estimates, a deficit of 29%. For the next two months, parts of Bombay will be without power for four hours every evening, while the city of Pune, a hub for automobile manufacturing, and other smaller towns will have cuts of as much as eight or nine hours.

World net electricity use

<table>
<thead>
<tr>
<th>Year</th>
<th>billion kilowatthours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>10,546</td>
</tr>
<tr>
<td>2002</td>
<td>14,275</td>
</tr>
<tr>
<td>2010</td>
<td>18,875</td>
</tr>
<tr>
<td>2020</td>
<td>23,677</td>
</tr>
<tr>
<td>2025</td>
<td>26,018</td>
</tr>
</tbody>
</table>

May 10, 2005

Need 10% more each year.

### Table A14. World Population by Region, Reference Case, 1990-2025
(Millions)

<table>
<thead>
<tr>
<th>Region/Country</th>
<th>History</th>
<th>Projections</th>
<th>Average Annual Percent Change, 2002-2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mature Market Economies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td>364</td>
<td>417</td>
<td>423</td>
</tr>
<tr>
<td>United States</td>
<td>253</td>
<td>286</td>
<td>289</td>
</tr>
<tr>
<td>Canada</td>
<td>28</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Mexico</td>
<td>83</td>
<td>100</td>
<td>103</td>
</tr>
<tr>
<td>Western Europe</td>
<td>376</td>
<td>391</td>
<td>392</td>
</tr>
<tr>
<td>Mature Market Asia</td>
<td>144</td>
<td>150</td>
<td>151</td>
</tr>
<tr>
<td>Japan</td>
<td>124</td>
<td>127</td>
<td>127</td>
</tr>
<tr>
<td>Australia/New Zealand</td>
<td>20</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Total Mature Market</td>
<td>884</td>
<td>959</td>
<td>966</td>
</tr>
<tr>
<td>Transitional Economies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Former Soviet Union</td>
<td>290</td>
<td>289</td>
<td>288</td>
</tr>
<tr>
<td>Russia</td>
<td>148</td>
<td>145</td>
<td>144</td>
</tr>
<tr>
<td>Other FSU</td>
<td>141</td>
<td>144</td>
<td>144</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>122</td>
<td>121</td>
<td>121</td>
</tr>
<tr>
<td>Total Transitional</td>
<td>412</td>
<td>410</td>
<td>408</td>
</tr>
<tr>
<td>Emerging Economies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emerging Asia</td>
<td>2,791</td>
<td>3,288</td>
<td>3,355</td>
</tr>
<tr>
<td>China</td>
<td>1,155</td>
<td>1,285</td>
<td>1,300</td>
</tr>
<tr>
<td>India</td>
<td>846</td>
<td>1,033</td>
<td>1,059</td>
</tr>
<tr>
<td>South Korea</td>
<td>43</td>
<td>47</td>
<td>48</td>
</tr>
<tr>
<td>Other Asia</td>
<td>746</td>
<td>923</td>
<td>949</td>
</tr>
<tr>
<td>Middle East</td>
<td>193</td>
<td>247</td>
<td>255</td>
</tr>
<tr>
<td>Africa</td>
<td>622</td>
<td>814</td>
<td>844</td>
</tr>
<tr>
<td>Central and South America</td>
<td>358</td>
<td>428</td>
<td>437</td>
</tr>
<tr>
<td>Brazil</td>
<td>149</td>
<td>174</td>
<td>178</td>
</tr>
<tr>
<td>Other Central/South America</td>
<td>210</td>
<td>254</td>
<td>260</td>
</tr>
<tr>
<td>Total Emerging</td>
<td>3,865</td>
<td>4,777</td>
<td>4,891</td>
</tr>
<tr>
<td>Total World</td>
<td>5,261</td>
<td>6,145</td>
<td>6,266</td>
</tr>
</tbody>
</table>

*Includes the 50 States and the District of Columbia.

Opinions about Kyoto and Kyoto-2

- Mostly cautious and reality statements.
- Samuelson (economist) says that what we have now is a respectable charade.
- One "The fight of the decade"
- One is a pro-Kyoto statement
- The national press has to be about 95% pro-Kyoto (Kyoto-1 and Kyoto-2)
- We need a better debate than has happened so far.
  - But I think that the debate is a little better than in year 2000.

Roy Jenne
Jan 2006

= 11 pages here =
Rhettoric, Reality Must Be In Line When Climate Change Is At Issue

Robert J. Samuelson

Almost a decade ago, I suggested that global warming would become a “gushing” source of political hypocrisy. So it has. Politicians and scientists constantly warn of the grim outlook, and the subject is on the agenda of the G-8 summit of world economic leaders.

But all this sound and fury is mainly exhibitionism—politicians pretending they’re saving the planet. The truth is that, barring major technological advances, they can’t (and won’t) do much about global warming. It would be nice if they admitted that, though this seems unlikely.

Europe is the citadel of hypocrisy. Considering the Europeans’ contempt for the United States and for President Bush because they have not embraced the Kyoto protocol, you’d expect they would have made major reductions in greenhouse gas emissions—the purpose of Kyoto.

Well, not exactly. From 1990 (Kyoto’s base year for measuring changes) to 2002, global emissions of carbon dioxide (CO2), the main greenhouse gas, increased 16.4%, reports the International Energy Agency. The U.S. increase was 16.7%, and most of Europe hasn’t done much better. Here are some IEA estimates: France, plus 6.9%; Italy, plus 8.3%; Greece, plus 8.2%; Ireland, plus 40.3%; the Netherlands, plus 13.2%; Portugal, plus 55%; Spain, plus 46.9%.

It’s true that Germany (minus 13.3%) and Britain (minus 5.5%) have made big reductions. But their cuts had nothing to do with Kyoto. After reunification in 1990, Germany shut many of the East’s inefficient coal-fired plants; that was a huge one-time saving. In Britain, the government had earlier decided to shift electric utilities from coal (high CO2 emissions) to plentiful natural gas (lower CO2 emissions).

On present course, many European countries will miss their Kyoto targets for 2008-2012. To reduce emissions significantly, Europeans would have to suppress driving and electricity use; that would depress economic growth and fan popular discontent. It won’t happen.

Political leaders everywhere deplore global warming—and then do little. Except for Eastern European nations, where dirty factories have been shut, few countries have cut emissions. Since 1990, Canada’s are up 23.6%, Japan’s 18.9%.

We are seeing similar exhibitionism in the United States. The U.S. Conference of Mayors recently endorsed Kyoto. California and New Mexico have adopted “targets” for emission cuts, reports the Pew Center on Global Climate Change. All this busywork won’t much affect global warming, but who cares?

The real purpose is for politicians to brandish their environmental credentials. Even if rich countries actually curbed their emissions, it wouldn’t matter much. Poor countries would offset the reductions.

What we have now is a respectable charade. Politicians and advocates make speeches, convene conferences and formulate plans. They pose as warriors against global warming. The media participate in the resulting deception by treating their gestures seriously.

First, we should tackle some energy problems. We need to reduce our use of oil, which comes increasingly from unstable or hostile regions (the Middle East, Russia, Central Asia, Africa). But this is mainly a security issue, though it would modestly limit greenhouse gases. What should we do?

Even with today’s high gasoline prices, we ought to adopt a stiff oil tax and tougher fuel economy standards, both to be introduced gradually. We can shift toward smaller vehicles, with more efficient hybrid engines. Unfortunately, Congress’ energy bills lack these measures.

Second, we should acknowledge that global warming is an iffy proposition. Yes, it’s happening; but no, we don’t know the consequences — how much warming will occur, what the effects (good or bad) will be or where. If we can’t predict the stock market and next year’s weather, why does anyone think we can predict the global climate in 75 years? Global warming is not an automatic doomsday. In some regions, warmer weather may be a boon.

Third, we should recognize that improved technology is the only practical way of curbing greenhouse gases. About 80% of CO2 emissions originate outside the transportation sector — from power-generation and from fuels for industrial, commercial and residential use. Any technology solution would probably involve some acceptable form of nuclear power or an economic way of removing CO2 from burned fossil fuels. “Renewable” energy (wind, solar, biomass) won’t suffice.

Without technology gains, adapting to global warming makes more sense than trying to prevent it. Either way, the Bush administration rightly emphasizes research and development.

What we have now is a respectable charade. Politicians and advocates make speeches, convene conferences and formulate plans. They pose as warriors against global warming. The media participate in the resulting deception by treating their gestures seriously.

One danger is that some of these measures will harm the economy without producing significant environmental benefits. Policies motivated by political gain will inflict public pain. Why should anyone applaud?

Samuelson is a syndicated columnist.
Saying ‘Sayonara’ To Kyoto

Environment: If nothing else, last week’s Group of 8 meeting in Gleneagles, Scotland, made one thing utterly clear — the economy killer masquerading as the Kyoto global warming agreement is history.

Thanks in large part to President Bush, the G-8 leaders couldn’t agree on either timetables or targets for reducing so-called greenhouse gases. This is great news. Though Prime Minister Tony Blair vows to put the topic back on the agenda at a special conference set for November, Kyoto is, for all intents and purposes, kaput.

This will sadden many who have indefatigably marketed the treaty as a solution to harmful climate change. It isn’t. Our own polling this week shows that most Americans — 52% — support Kyoto while just 30% oppose it. But that support turns out to be highly qualified: 57% favor a technological solution, not Kyoto-like cutbacks in emissions. And 56% say Kyoto is pointless unless it also applies to fast-growing, high-polluting countries like China and India.

Americans, it turns out, aren’t fools. They hear the litany of Kyoto’s supposed “benefits.” But they realize its costs would fall hardest on them. The Energy Information Agency estimates that complying with Kyoto would cost the U.S. economy $225 billion to $400 billion a year and put millions of Americans out of work.

That may be why 43% in our poll felt Kyoto would damage the economy and 37% thought it was based on faulty research. Fact is, Kyoto was a bad idea from the start — economically and scientifically.

Estimates put the cost of meeting Kyoto in the U.S. at trillions over the next two decades. Worth it? You tell us. U.N. forecasters see one to two degrees of warming over the next century. Even if every nation that signed on to Kyoto followed it slavishly, the expected warming would be trimmed by less than one-fifth of a degree.

Besides, from reading the newspapers, you’d think that humans were the sole source of CO2, dumping huge amounts into the atmosphere. Not so. Human sources account for 0.3% of the total; the rest — 99.7% — comes from nature.

But what about all the scientists who have reached a “consensus” on global warming? Well, professor Dennis Bray of Germany’s GKSS Forschungszentrum recently surveyed 530 top climatologists — experts with the most direct scientific knowledge about warming. Just 9.4% strongly agreed that “climate change is mostly the result of (human) causes.” Nearly a third were described as skeptical, while 9.7% “strongly disagreed.” In short, there is no consensus.

Not that those who pushed Kyoto were serious about it in the first place. As much as anything, Kyoto was a hypocritical attempt by European nations to impose global controls over the U.S. economy, and regulate it to death.

After excoriating the U.S. for failing to ratify Kyoto, they failed to follow it themselves. The European Union is supposed to cut greenhouse gases 8% by 2010. But the European Environment Agency recently reported that emissions increased 1.3% in 2003, and that 12 of 15 EU members are out of compliance.

Nevertheless, the EU’s parliament in May called for trade sanctions against the U.S. for not cutting back its CO2 emissions. How’s that for chutzpah?

Bad science equals bad economics. Kyoto embodied both. Good riddance, we say.

July 11, 2005
Investors Business Daily, ed.

1. People need to look at costs and benefits. A few people have noted that society has other problems that should not be ignored (bad sanitation, health, clean water, adequate & easy - low cost energy, etc).

2. This one is not a good argument. Each year, lot of biomass burns or rots and gives off CO2. But lots more biomass grows and takes CO2 from the atmosphere. These two roughly balance, leaving fossil fuel CO2 as the main effect.

3. Most countries will not meet Kyoto goals, yet talks go on as much more severe Kyoto will start Dec 2005.

4. The technical ability to solve CO2 is not available now. We should only take steps that are practical now. And then hope that more reasoned planning will later happen. R. Jone
The Theology of Global Warming

By James Schlesinger

Almost unnoticed, the theology of global warming has in recent weeks suffered a number of setbacks. In referring to the theology of global warming, one is not focusing on evidence of the earth's warming in recent decades, particularly in the Arctic, but rather on the widespread insistence that such warming is primarily a consequence of man's activities—and that, if only we collectively had the will, we could alter our behavior and stop the warming of the planet.

It was Michael Crichton who pointed out in his Commonwealth Club lecture some years ago that environmentalism had become the religion of Western elites. Indeed it has. Most notably, the burning of fossil fuels (a concomitant of economic growth and rising living standards) is the secular counterpart of man's Original Sin. If only we would repent and sin no more, mankind's actions could end the threat of further global warming. By implication, the cost, which is never fully examined, is bearable. So far the evidence is not convincing. It is notable that 13 of the 15 older members of the European Union have failed to achieve their quotas under the Kyoto accord—despite the relatively slow growth of the European economies.

The drumbeat on global warming was intended to reach a crescendo during the run-up to the summit at Gleneagles. Prime Minister Blair has been a leader in the global warming crusade. (Whether his stance reflects simple conviction or the need to propitiate his party's Left after Iraq is unknown.) In the event, for believers Gleneagles turned out to be a major disappointment.

On the eve of the summit, the Economic Committee of the House of Lords released a report sharply at variance with the prevailing European orthodoxy. Some key points were reported in the Guardian, a London newspaper not hostile to that orthodoxy:

- The science of climate change leaves "considerable uncertainty" about the future.
- There are concerns about the objectivity of the international panel of scientists that has led research into climate change.
- The Kyoto agreement to limit carbon emissions will make little difference and is likely to fail.
- The U.K.'s energy and climate policy contains "dubious assumptions" about renewable energy and energy efficiency.

Most notably, the Committee itself concluded that there are concerns about the objectivity of the IPCC (Intergovernmental Panel on Climate Change) process and about the IPCC's crucial emissions scenario exercise. Their lordships' conclusions were probably not welcomed at No. 10.

Also, on the eve of the summit, the Royal Society issued a press release, supposedly on behalf of the national academies of science (these eve-of-the-summit announcements are not entirely coincidental). It was headlined:

"Clear science demands prompt action on climate change" and included this statement, "The current U.S. policy on climate change is misguided. The Bush Administration has consistently refused to accept the advice of the U.S. National Academy of Sciences." A sharp riposte from the president of the National Academy of Sciences followed. Space does not permit full discussion of the rebuke. A few key phrases, however, are revealing: "Your statement is quite misleading. . . . By appending your own phrase, "by reducing emissions of greenhouse gases" to an actual quote from our report, you have considerably changed our report's meaning and intent. . . . As you must appreciate, having your own misinterpretation of U.S. Academy work widely quoted in our press has caused considerable confusion both at my academy and in our government."

Though the issue of global warming and, indeed, the summit itself were overshadowed by the acts of terrorism in London, the final communiqué from Gleneagles was closer to the position of the House of Lords (and the position of the Bush administration) than it was to the Royal Society. President Chirac had the gall (no pun) to suggest that the Europeans had brought President Bush around to their point of view. Closer to the truth was the comment of Philip Clapp of the National Environmental Trust, who called the agreement "utterly meaningless—the weakest statement on climate change ever made by the G8."

An additional setback occurred three weeks after the Gleneagles Summit, when the United States entered into the "Asia-Pacific Partnership on Clean Development and Climate" with Australia, China, India, Japan and South Korea. The focus will be on technology to cope with concerns about global climate as well as pollution. It responds to President Bush's earlier call for a "post-Kyoto era." Greenpeace immediately denounced the agreement stating, "the pact sounds like a dirty coal deal."

The issue of climate change urgently needs to be brought down from the level of theology to what we actually know. It is, of course, quite likely that the greenhouse effect has to some extent contributed to global warming—but we simply do not know to what extent. The insistence that global warming is primarily the consequence of human activity leaves scant room for variation in solar intensity or cyclical phenomena generally.

Over the ages, climate has varied. Generally speaking, the Northern Hemisphere has been warming since the end of the Little Ice Age in the 17th century. Most of the global warming observed in the 20th century occurred between 1900 and 1940, when the release of greenhouse gases was far less than later in the century. Between 1940 and 1975, temperatures fell—and scientists feared a lengthy period of global cooling. The reported rise in temperatures in recent decades has come suddenly—probably too suddenly given the relatively slow rise of greenhouse gases in the atmosphere.

We must always bear in mind that the earth's atmosphere remains a highly complex thermodynamic machine. Given its complexities, we need to be modest in asserting what we know. Knowledge is more than speculation.

* * *

Much has been made of the assertion, repeated regularly in the media, that "the science is settled," based upon a supposed "scientific consensus." Yet, some years ago in the "Oregon Petition" between 17,000 and 18,000 signatories, almost all scientists, made manifest that the science was not settled, declaring:

"There is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gases is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate."

Several additional observations are in order. First, the "consensus" is ostensibly based upon the several Assessment Reports of the IPCC. One must bear in mind that the summary reports are political documents put together by government policy makers, who, to put it mildly, treat rather cavalierly the expressed uncertainties and caveats in the underlying scientific reports. Moreover, the IPCC was created to support a specific political goal. It is directed to support the U.N. Framework Convention on Climate Change. In turn, the Convention calls for an effective international response to deal with "the common concern of all mankind"—in short, to reduce the emissions of greenhouse gases. Statements by the leaders of the IPCC have been uninhibitedly political.

Science

Second, science is not a matter of consensus, as the histories of Galileo, Copernicus, Pasteur, Einstein and others will attest. Science depends not on speculation but on conclusions verified through experiment. Verification is more than computer simulations—these conclusions mirror the assumptions built in the model. Irrespective of the repeated assertions regarding a "scientific consensus," there is neither a consensus nor is consensus science.

Mr. Schlesinger, the first secretary of energy, launched the Department of Energy's Carbon Dioxide Efforts and Assessment Program shortly after the creation of that department in 1977.
Kyoto Update -- by Lynn Elsey, ed

The much-debated Kyoto Protocol went into force on February 15, 2005. However, without the participation of the United States and developing countries, the protocol's goal of stemming the tide of global warming by reducing greenhouse gas emissions remains questionable.

The Kyoto agreement sets binding targets on the signatory nations to reduce greenhouse gas emissions by an average of 5.2 percent below 1990 levels during the commitment period of 2008-2012. Critics contend that the reductions are insufficient to have a meaningful impact. And, more importantly, that without the inclusion of developing nations, who are responsible for a growing level of emissions, and the United States— which currently leads the world in greenhouse gas emissions—the agreement will have little, if any, effect on reducing global warming.

Nuts and Bolts

The industrial nations that have signed the agreement have a variety of targets for reducing their greenhouse gas emissions below 1990 levels. For the European Union overall, the target is 8 percent, but the actual figures vary by country. The United Kingdom's reduction target, for example, is 12.5 percent. Germany elected to take on a larger burden and committed to a 21 percent reduction. In the southern hemisphere, New Zealand has a target of reducing just to 1990 levels during the protocol's timeframe.

The protocol includes a system of trading and credits, so that those who exceed their targets can purchase extra credits from those who reduce their emissions by more than their allocated amount. Companies can obtain extra credits by partaking in various environmentally friendly projects, such as helping developing countries build "clean" power plans or becoming involved in reforestation projects.

Outside the Box

The lengthy and sometimes acrimonious discussions leading up the passage of the Kyoto Protocol may have prompted a number of businesses, states, and even nations to voluntarily enact individual greenhouse gas and other harmful emission cuts, whether as a preemptive action—assuming that some type of emissions cuts would be inevitable—or from basic financial savvy. For example, DuPont pledged to reduce greenhouse gas emissions by 65 percent of their 1990 levels by 2010; by 2002 the company had actually reduced them by 67 percent. In 2002 the Royal Dutch/Shell Group also met its goal of reducing greenhouse gas emissions by 10 percent from their 1990 levels.

As Massachusetts Governor Mitt Romney has noted, "the same policies that protect the climate also promote energy efficiency, smart business practices, and improve the environment in which our citizens live and work.

In 2003, the Commonwealth of Massachusetts enacted its "no regrets" policy toward climate change: rather than becoming bogged down in the debate about the causes and impact of human activity on climate change, the Commonwealth decided to focus on action.

The plan involves coordination between the state's energy, environment, housing, and transportation agencies. Goals include reducing greenhouse gas emissions to 1990 levels by 2010, and below 1990 levels by 2020. Other targets include a commitment by the state to spend up to $17 million to purchase renewable energy; to acquire clean, fuel-efficient vehicles for the state fleet; to promote low energy traffic signals; and more efficient night lighting; to create a CO2 registry with other states; and to create an emissions banking and trading program.

"If we learn decades from now that climate change isn't happening, these actions will still help our economy, our quality of life, and the quality of our environment," Governor Romney said.

The Fallout

Enactment of the Kyoto Protocol has already created new fissures in the international arena. Concerns were recently raised in Australia that the country's decision to opt out of Kyoto could have a negative impact on business. Fears have been raised that exporters, for example, could be saddled with extra taxes from countries that are part of the pact. Additionally, Australian financiers have complained about potential loss of economic benefits, claiming that exclusion from the agreement inhibits Australians from reaping any monetary benefits from actions, such as planting trees, which would otherwise be eligible for carbon credits.

The backlash against the United States for its refusal to take part in Kyoto continues. Lord May, the president of Britain's Royal Society, and former chief scientific adviser to the British government, recently said that the Royal Society had calculated that the 13 percent rise in greenhouse gas emissions from the United States be-
The focus must now be on setting targets for the period beyond the first phase of the Kyoto Protocol, and which include all countries, both in the developed and developing world," May said during a presentation at the British Embassy in Berlin in March 2005.

May also called on the United States and other governments to accept the need for making cuts in greenhouse gas emissions and warned against political leaders acting as "modern day Nero's over climate change, fiddling while the world burns.

"It is essential that the G8 summit scheduled to take place in Scotland in July focuses on securing from the United States an explicit recognition that the case has now been made for acting urgently to avoid the worst effects of climate change by making substantial cuts in greenhouse gas emissions," May added.

**What Next?**

Presently, there are no plans for action after Kyoto expires in 2012. And, according to numerous reports, the prognosis for a continuing international cooperative agreement is not good.

Following a recent global conference on climate change in Argentina, Nigel Purvis, a scholar at the Brookings Institution and a senior climate change negotiator in the Clinton and Bush administrations, reported that "the Buenos Aires gathering, however, turned into something of a wake as it became apparent that few nations are prepared to extend Kyoto's targets beyond their 2012 expiration date. Like Washington, D.C.'s cicadas, Kyoto took years to hatch, received enormous attention, and will be short-lived."

Purvis and other observers feel that one of Kyoto's biggest legacies will have nothing to do with reducing greenhouse gas emissions; but rather, with altering the relationship between the United States and the parts of the world that are actively supporting Kyoto and climate change action. "Kyoto demonstrates that America's allies are increasingly shaping the international agenda without it," Purvis said in the International Herald Tribune. "Kyoto also illustrates the fact that the international community questions more than ever America's moral authority and its commitment to universal values."

---

Some Comments on the Above Article

1. The typical Kyoto article (like this one) does not discuss the difficulty of making big cuts in carbon dioxide.

2. Countries that signed Kyoto are having **great difficulty** in doing Kyoto. (Most will **not** meet the targets. This is another unpleasant fact that is **typically not stated**.)

3. If all of the richer countries (including the US) lived up to Kyoto rules, the difference in future climate would be only **5%**. This is an inconvenient fact that will **not** be stated in most Kyoto articles (like this one).

4. The talk about climate cooling in the 1970s helped to document all of the problems caused by a climate that gets colder than now. Thus a little greenhouse warming is likely good (but not a lot).

5. If the literature does not openly discuss critical questions, then it is **not time** for Kyoto.
   - Reason: You tend to get lots of politics and high costs rather than working solutions.

6. Good problem solving does not require that all issues be solved up front.
   - But it does require that the **show stopper** issues be recognized and taken into account.

7. Some actions such as if we use more nuclear energy, more energy efficiency, and some soft energy, can help this problem and these should be done when practical.

---

Some Comments on the Above Article

1. The typical Kyoto article (like this one) does not discuss the difficulty of making big cuts in carbon dioxide.

2. Countries that signed Kyoto are having **great difficulty** in doing Kyoto. (Most will **not** meet the targets. This is another unpleasant fact that is **typically not stated**.)

3. If all of the richer countries (including the US) lived up to Kyoto rules, the difference in future climate would be only **5%**. This is an inconvenient fact that will **not** be stated in most Kyoto articles (like this one).

4. The talk about climate cooling in the 1970s helped to document all of the problems caused by a climate that gets colder than now. Thus a little greenhouse warming is likely good (but not a lot).

5. If the literature does not openly discuss critical questions, then it is **not time** for Kyoto.
   - Reason: You tend to get lots of politics and high costs rather than working solutions.

6. Good problem solving does not require that all issues be solved up front.
   - But it does require that the **show stopper** issues be recognized and taken into account.

7. Some actions such as if we use more nuclear energy, more energy efficiency, and some soft energy, can help this problem and these should be done when practical.
COMMENT

Does Oil Have a Future?

Even the industry has its doubts

BY CLIVE CROOK

The energy bill that emerged from Congress this past summer could be the last of its kind. Certainly it ought to be. Missing the point at such an inordinate expense of effort, words, and dollars is plain bad government.

At only a little under 2,000 pages, the new legislation is exhausting but, surprisingly, by no means exhaustive. Somewhere in the vast spaces of the Energy Policy Act, you might think, room could have been found for actions that actually addressed the two main energy-policy challenges of the next decade: global warming and the national-security implications of dependence on imported oil. But no, the authors of this purportedly comprehensive law mostly chose to concentrate on other issues. Severely pressed for time (remember, they had been working on this for years), they had urgent battles to win on subsidies and tax breaks for their respective energy-producing constituencies.

None of this is new, admittedly. Energy bills have been that way for as long as anybody can remember. So why are things likely to be different when the next energy bill gets written? Because, for the first time, economics and politics are starting to align.

Economics starts with the price of oil. When this sits at around $50 a barrel or higher—and, more important, is expected to stay there—ambitious efforts to conserve the stuff look attractive. Businesses and consumers economize. Firms invest in oil-saving technologies, including new fuels. Oil producers respond as well, adding to refining capacity (the chief bottleneck of late), spending more on exploration, and, as the frontier of profitable extraction advances, bringing previously marginal sources on-stream. In the past demand and supply have both responded to higher prices even more powerfully than expected.

This raises the question whether future increases in price will merely be curbed, or whether the price might even drop sharply again—say, to $20 a barrel or less. In such a strange nonmarket this is always possible. At the moment, oil traders are contemplating the potentially awesome appetites of China and India, and betting against it.

The prospect of expensive oil for the foreseeable future, and the risk that the price will go far higher yet, have put the industrial economies, including the United States, in the mood to save oil.

What is interesting is that thanks to shifting politics, this is no longer regarded as bad news. Moderating America’s thirst for oil...
is widely seen nowadays as a good thing, regardless of price. Security is one reason. Dependence on imported oil exposes America to political risk in the most turbulent part of the world. Whatever one’s views about the war in Iraq—or about 9/11, for that matter—oil dependence is part of what lies behind those events, and the connection is widely understood. Geopolitical types, including some from the right, increasingly want to pursue energy efficiency, and oil efficiency in particular, as a matter of national security.

These voices are now oddly in harmony with those of environmentalists, mostly on the left, who are calling for drastic measures to curb emissions of greenhouse gases. The science of global warming is nothing like as settled as the environmental movement’s spokesmen and media followers would have people believe: projections of future warming are still uncertain, and exactly what one ought to do about greenhouse-gas emissions, even if those uncertainties go away, would be hard to say. Nonetheless, a political alliance of greens and geostategists has formed, and continues to grow, around the idea that America must use less oil.

It is telling that many oil and other old-energy companies are already working on this assumption, and trying to spread their risks. They are big investors in clean or renewable fuels such as wind, solar, hydrogen, and biomass. Anticipating a new carbon-constrained economy, they are also throwing money at research on “sequestration”: ways to remove carbon from the air and store it underground. Nuclear power, assisted by heavy subsidies, is making a comeback. This transformation of the energy business would be less of a gamble for the firms concerned if they could be sure that a year from now the world will not be seeing another oil glut. And that is why some big energy companies are leading rather than resisting calls for a new policy—a coherent, stable blend of taxes, public spending, and regulation—to lessen America’s demand for oil.

Devising such a policy will be the challenge for the next energy bill, which is needed soon. Is it simply a matter of America’s deciding to follow Europe’s lead—to accept the Kyoto treaty on greenhouse-gas emissions and mandate abrupt cuts in oil consumption? With luck, no. That is a bad model. Europe’s commitment to the Kyoto process is shallow. Most countries are likely to miss their Kyoto targets, and the few that reach them will do so because of changes (such as Britain’s switch from coal to natural gas in power generation) that predate Kyoto and were made for other reasons altogether.

Kyoto is not a good plan for the United States or for any other country. Europe’s superior virtue on the issue is mostly affectation. The fact is, attitudes are converging, and policies are likely to follow. Speaking at the Aspen Ideas Festival in July (an event co-sponsored by The Atlantic), Bill Clinton said that the greatest threat facing mankind this century is not nuclear, biological, or chemical terrorism but global warming. He was warmly applauded, and—right or wrong—this is no longer a distinctively European point of view. Responding intelligently to the danger, such as it is, calls not for crushing, top-down controls, as Europe is finding out, but for a more pragmatic blend of private innovation and supportive public policy.

However, the right policies are not in place. Subsidies to encourage oil production, the mainstay of the energy bill, would be wrong even if oil were cheap and industry margins thin. Work on new fuels is worthier of support (but not ethanol, another big energy-bill beneficiary, which isn’t very clean). Best and cheapest of all is oil conservation, including the use of hybrid vehicles and other technologies. Supporting such efforts with subsidies, however, is complicated and—given the ingenuity of those seeking subsidy—often wasteful.

There is a simpler way. Burning petroleum imposes costs (insecurity, carbon) on society at large. It is a perfect case of externality—and the best remedy, whatever the price of oil may be, is a tax that pushes those costs back to the consumer. It would raise some badly needed revenue at the same time. That is correct: a gas tax. Its time is coming.
Kyoto? Mamma Mia!

By Antonio Martino

ROME—The devastating hurricanes that hit the United States recently offered "eco-doomsayers"—who like to blame human activities, preferably of the industrial kind, for all sorts of natural disasters—yet another chance to lash out at the Bush administration. America's "failure" to ratify the Kyoto Protocol—regularly held responsible for extreme weather conditions around the globe—was quickly found guilty of the destruction brought about by Katrina and Rita. As usual, the eco-doomsayers care very little for the small fact that their sweeping accusations have absolutely no basis in modern science.

First of all, it is not true that President George W. Bush is alone in opposing the Kyoto agreements that his predecessor Bill Clinton signed. In fact, when Kyoto was submitted to the U.S. Senate for ratification on July 27, 1999, the result was 95 nays and zero yeas. Not a single senator, not even from the most liberal fringe, voted in favor of Kyoto. (The ratification of international treaties requires the support of at least two-thirds of the Senate.)

Mr. Bush's position, in other words, is not simply the product of a supposedly archconservative president who arrogantly imposes his radical views on a nation held hostage by religious zealots—as a rather popular myth here in Europe would have it. It is instead a view shared widely on both sides of the aisle in Congress and supported by the vast majority of the American public.

Second, there is no scientifically sound link between rising global temperatures and an increase in the frequency and intensity of hurricanes. Nor are the events of the recent weeks unprecedented: As Max Mayfield, Director of the National Hurricane Center, pointed out, a comparable series of hurricanes of similar intensity has already been observed in 1915.

Third, and most important, while a scientific consensus about the true nature of climate change is still lacking, we know for certain that the impact of Kyoto on the average global temperature will be negligible at best. The U.N.'s Inter-governmental Panel on Climate Change forecasts that without the ratification of Kyoto, the average global temperature will rise about one degree Celsius by 2050. The same panel predicts that after the implementation of Kyoto, the temperature will still rise 0.94 degrees. In other words, the benefits from Kyoto amount to about 0.06 degrees in half a century. Remarkably, this is even the most optimistic estimate: S. Fred Singer—the climatologist who developed the method for measuring the ozone layer—reckons that it may be as small as 0.02 degrees. This is a difference so minuscule that our available instruments wouldn't even be able to notice it!

Moreover, the U.S. is not the only country that did not ratify the Kyoto Protocol. Both China and India, major and growing producers of so-called "greenhouse gas emissions," are not required to abide by its terms. The EU countries, including my own, ratified Kyoto. That the EU would still insist on implementing the protocol must be seen as an institutional form of collective self-flagellation. Kyoto will severely penalize the European economy without bringing any real progress toward the noble aims proclaimed by the EU. As Carlo Stagnaro, environmental director at the Istituto Bruno Leoni, Italy's free-market think tank, observes, the Earth's atmosphere cannot tell European carbon dioxide emissions from the rest of the world.

What's more, the limitations imposed by Kyoto will make our current energy problems worse. The relative slowing of oil prices after the steep rise of the last weeks must not deceive us—the world's energy demand is bound to grow in lockstep with the breathtaking economic growth of China and India.

Those countries, such as Italy, that for decades steered clear of building new power plants and gave up on nuclear power—the cleanest, safest and cheapest energy source available today—will need to face up to a harsh reality: Compliance with the Kyoto Protocol will punish even the existing energy-producing capacity by capping emissions. The cost of energy in Italy, already higher than the European average, let alone that in the U.S., will go up even more. Given the country's lack of competitiveness, that can only be described as a self-inflicted wound.

Perhaps the problems of our times are man-made, after all. But rather than being caused by those "neocons in Washington, they stem from the noble intentions of environmentalists so bent on "saving nature" that in the process they wage an unremitting war against mankind and its endeavors.

Mr. Martino is Italy's defense minister.
The Fight of the Decade

At the inauguration of the United Nations (UN) World Environment Day 2005 Conference in San Francisco on 2 June, California Governor Arnold Schwarzenegger did an astonishing thing in his opening speech. Such occasions normally invite specimens of banal hospitality: “We welcome this distinguished gathering of international leaders to our great state...” Well, the Governor wasn’t having any of that. Instead, he talked about global warming, laying out a real challenge to climate policy as it is practiced in Washington, DC, today. His talk has set up a heavyweight bout between two powerful Republican leaders over the proper role of science in politics. Best of all, we won’t even have to pay to watch it!

So imagine that it’s Fight Night. Before the action begins in the ring, I’ll set the scene and report some of the background. In the lower right corner is President George Bush, the champion by virtue of his office as leader of the world’s largest economy. He’s wearing the red trunks. In various pre-fight interviews he has said that he thinks the climate may be changing, but his seconds are instructed to talk about “climate variability” and avoid the phrase “climate change” at international meetings. He didn’t want to sign the Kyoto Protocol, which would have set targets for timed reductions in greenhouse gas emissions to below 1990 levels. As a White House official now explains, signing it would have cost jobs and raised energy prices. Bush’s Climate Change Science Program, at first criticized by a National Academies report, now gets better reviews from the Academies. It focuses heavily on long-range research, but it contains no targets for reductions in greenhouse gas emissions, the primary cause of global warming. In a pre-fight meeting with reporters, the champ praised the virtues of fuel cells and the hydrogen economy envisioned in his climate plan, and added that his critics are “disassembling.”

In the upper left corner is the challenger, representing the world’s fifth-largest economy: California Governor Arnold Schwarzenegger, in the green trunks. Sportswriters who have visited his training camp report that the weight machines sit unused in a corner, and that the governor spends all his time reading journals like Science, Climatic Change, and the Journal of Atmospheric Chemistry. That may be why he selected the UN conference to stake out his pre-fight position, in which he asserted: “We know the science, we see the threat, and we know that the time for action is now.” The plan he announced sets tough targets for reducing California’s emissions of greenhouse gases: to 2000 levels by 2010, to 1990 levels by 2020, and to 80% below 1990 levels by 2050. These will require stringent regulatory measures, building on California’s existing commitments to reduce automobile emissions. But the governor said: “We have no choice but to meet this challenge. We must leave a better world for our children and their children.”

Early pre-fight commentary has produced newsworthy partisans on both sides. Representative John Dingell of Michigan, who represents the “Big Three” automakers in Congress, is said to be forming a Democratic Transportation Caucus to offer its crossover support to the president. The mayors of over 100 U.S. cities, who earlier had declared their own intentions to reduce emissions, voiced their enthusiasm for the challenger’s plan. The mayor of Seattle, a prime mover in that effort, has offered to wager a 40-pound Washington salmon against an equivalent stake put up by a backer of the champ. Famed Bush strategist Karl Rove promptly designated a small striped bass, claiming that it’s worth more than its 8-pound weight because it’s a celebrity fish, having been baited by the president in an event pictured on the front page of the New York Times.

Folks, this promises to be the Fight of the Decade in this division, so keep your dial where it is. The charismatic California challenger has a lively rooting section, including soccer moms and children, some carrying signs saying “Stop Polluting Our Greenhouse.” On the other side, NASCAR dads and numbers of elegantly dressed older gentlemen are voicing enthusiastic support for the president. We asked for quick pre-fight statements from each contestant. The champ said that everything was just fine with the climate. His challenger, in a comment directed at his constituency or perhaps his opponent, merely said, “Hasta la vista, baby.”

Donald Kennedy
Editor-in-Chief
10.1126/science.1115705

17 June 2005
Did you know we have something of a socialist in the White House? The Group of Eight countries have given their imprimatur to an anticapitalist energy plan. George W. Bush signed off on it. The news about the July G-8 meeting in Genoa focused on the fellow with the fire extinguisher. Less noticed was the G-8's blueprint for funneling subsidies and tax breaks to solar, geothermal and wind power. What about those devilishly dirty fossil fuels? All government support for them should be removed, the G-8 concluded.

Maybe it should be. But this woolly-headed declaration ignores the principles of the free market: If an energy source like biomass is so great, it should be able to prove itself without handouts. Remember the expensive alternative energy debacle launched by Jimmy Carter?

What's insidious about the G-8's energy communiqué is that it calls on international lending agencies to expand renewable energy in developing nations. So we're just a step away from having the World Bank and the International Monetary Fund demanding that, as a condition for a loan, poor societies waste resources building windmills.

You would think that Bush and Dick Cheney would know better than to countenance this nonsense. That's especially true given the genesis of the report that the G-8 rubber-stamped in Genoa. The G-8 manifesto is replete with the rhetoric of left-leaning nongovernmental organizations, known as NGOs, which had a major hand in drafting the thing. Strangely, these NGOs get major funding from the very companies and governments they seek to undermine (see my Aug. 6 column).

Some of these NGOs, like the World Wildlife Fund and the European Network on Debt & Development, were allowed into the G-8 communiqué-drafting tent because they sound moderate. World leaders on the order of Bill Clinton, Britain's Tony Blair, France's Lionel Jospin and Germany's Gerhard Schroder have parroted their lines about fostering public/private partnerships aimed at enhancing environmentally correct economic development that is fairly distributed.

The Third Way approach of Clinton, Blair and their gang is eerily reminiscent of the Fabian Socialism of the late 1800s, which sought to win over ordinary folk by making socialism appear reasonable. Prime Minister Jospin updates Fabianism nicely when he says France is "delighted to see the emergence of a planetary citizens' movement." The goal, he says, is "to put in place a lasting system of regulation that makes the planet a common asset exploited in an equitable manner."

The inspiration for the energy portion of the Genoa manifesto originated at a closed-door meeting at 10 Downing Street on Nov. 11, 1999 with a bunch of greens Blair wanted to appease. He carted their ideas to the G-8's July 2000 summit in Okinawa. There he won approval for a renewable-energy task force made up of government reps, industry figures and NGO types. The task force's final report was to be unveiled at the Genoa 2001 conclave, where Blair assumed Al Gore, a committed green, would be on hand as President to help shepherd the thing through. Well, Blair didn't need to worry. Even though his man didn't end up occupying the U.S. chair in Genoa, it mattered not a bit because Bush went along with the report.

The scary aspect of the President's G-8 acquiescence is that his own energy plan for the U.S. has a spiritual kinship to the Genoa document, relying less on the invisible hand of the marketplace than on the heavy hand of government. In fact, the plan, as approved by the Republican-controlled House, has outdone Bush in its extravagance with government subsidies.

True, the greens are upset about the Bush-Cheney domestic energy program and its endorsement of oil drilling in the Arctic National Wildlife Refuge. The greens want it all. They want to take government handouts for themselves while also killing subsidies for coal, oil and nuclear fission. Bush is different in that he wants to subsidize everything, renewable or nonrenewable. Instead of letting capitalism sort out energy needs and sources, he wants his government to sort them out. He has become a Third Way kind of a guy.
In 2003 the UK Planned for Huge Cuts in CO₂ by 2050

(But the plan was not good)

◆ In Feb 2003, the UK promised to reduce carbon dioxide emissions by 60% by year 2050.
  • This is a huge cut and an amazing promise.
  • See the story about this plan (2 pages ahead).

◆ This plan was written by a group of people who believed it was possible to make these enormous cuts in CO₂ by using more renewable energy and increasing the energy efficiency. They would stop using coal and nuclear.
  • Other people in the UK did not believe that the plan was realistic (I agree).
  • Other countries have similar groups of “experts” who would write a similar plan for energy and CO₂. Help.

◆ The US president advised the UK to keep the nuclear option open because it would probably be needed.

◆ Now (Aug 2005) the experience and opinion in the UK seems to be moving toward the idea: “We must use nuclear.”

◆ Most of the countries will not achieve their promises for carbon release in 2012.

◆ Let us hope that better energy and CO₂ plans will gradually emerge.

◆ Senior advisors in the UK speak for nuclear (next page).
The threat of global warming and high fossil fuel prices have inspired talk of a revival of nuclear power, but skeptics say it is a poor investment and a worse security risk.

Is the Friendly Atom Poised for a Comeback?

"Nuclear power faces stagnation and decline." So warned a group of scientists in a sweeping review published 2 years ago by the Massachusetts Institute of Technology (MIT) in Cambridge. Led by chemist John Deutch and physicist Ernest Moniz, both of MIT, the study concluded that nuclear power was in trouble and deserved a helping hand from government. Despite high construction costs, the authors argued that the United States should triple the number of nuclear power plants by midcentury because they can deliver electricity without emitting greenhouse gases such as CO₂.

Although a few Asian countries never got off the nuclear bandwagon, new ones are now climbing aboard to meet rapidly growing electricity demand. India, with the most reactors under construction in the world, is planning a unique system that relies mainly on thorium rather than uranium fuel (see p. 1174). Japan continues work on fast neutron reactors that can "breed" plutonium (see p. 1177). And China announced in April that it will more than quadruple its nuclear electric capacity by 2020, buying among other designs a new "pebble bed" reactor that shuts down if it overheats. Nuclear advocates in the West also hope that advanced reactor designs can help overcome the lingering memories of Three Mile Island and Chernobyl (see p. 1172).

"I entreat my friends in the movement to drop their wrongheaded opposition to it." A few others, such as Greenpeace co-founder Patrick Moore, have made similar statements. But environmental advocacy groups are not following.

"It is difficult to see how we can reduce our dependence on fossil fuels without the help of nuclear power." —ROBERT MAY, PRESIDENT OF THE ROYAL SOCIETY, U.K.

David King, science adviser to the U.K. government, has spoken publicly about the need to keep nuclear power as a clean energy option. Britain, the world's most visible campaigner for action on global warming, faces a common dilemma, as King explained to the Independent newspaper in May. He described a looming "gap" in clean energy production. About 27% of U.K. electricity now comes from nuclear power, he noted, but without a "new build," only one reactor unit (Sizewell B) will still be running in 2025, producing an estimated 4% of the needed electricity. King said he was "not a great fan of nuclear" but was willing to consider it because "the climate change issue is so important."

A recent U.K. government forecast lends weight to King's analysis: Solar panels, windmills, and wave-driven generators cannot pick up the slack anytime soon. An electricity strategy issued in May by the U.K. Council of Science and Technology, which reports to King, notes that "the existing policy to reduce CO₂ will not be sufficient... since the nuclear stations are likely to be replaced by carbon-based technology (e.g., gas) in the short term."

And even the United Kingdom, which has championed the international effort to curb CO₂ emissions, is failing to meet its self-imposed CO₂ reduction goals. Physicist David Wallace, vice president of the Royal Society in London, warned in May that "our emissions are clearly going in the wrong direction," and that U.K. government forecasts of achievable CO₂ reductions have been "frankly unrealistic." Royal Society president Robert May has written that "it is difficult to see how we can reduce our dependence on fossil fuels without the help of nuclear power."
Britain aims to reduce carbon dioxide emissions by 60% by 2050 from today’s levels.

They plan for a decline in nuclear energy (now 26%) as the 33 nuclear plants are retired over the next 30 years.

Several science bodies and key government scientists advised against abandoning nuclear power. This was before the plan was printed.

The Energy White Paper is taking heavy flak from energy experts.

One engineer believes that a 20% share of renewable energy is wishful thinking.

**MY COMMENTS:** Credible energy plans must be based on real numbers, and a good analysis of energy possibilities, costs, and tradeoffs. Present day planning often does not do a good job of this. Why is this?
ENGLAND

Snub of nuclear power may end, Blair says

LONDON—Prime Minister Tony Blair announced Tuesday that Britain may reverse its current reluctance to build new nuclear power plants, despite opposition from environmental groups.

Blair's announcement reflected a nascent European debate that could presage a significant shift in energy policies. Finland, in particular, has already broken ranks with the opposition to nuclear power that has seized much of the continent since the Chernobyl disaster in 1986.

UK gearing up for nuclear revival

IN A clear sign that the UK is gearing up to build more nuclear power stations, a £6.1 million research programme has been launched to investigate reactor designs.

Research Councils UK wants to find ways of making reactors safer. The programme will also look at smarter ways of monitoring existing reactors and technologies for safely disposing of nuclear waste. Researchers will study the pebble-bed reactor being pioneered in South Africa, in which an inert gas such as helium circulates through hot fuel pebbles and is then used to drive a turbine. Japan's high temperature reactors will also be considered.

The research councils also plan to develop ultrasound monitors to check for reactor cracks and radiation-proof sensors that can transmit key data from deep inside reactor cores.

CANADA

U.S. comes under fire over greenhouse gases

MONTREAL—The U.S. came under renewed criticism Tuesday as thousands of environmentalists and international officials hammered out rules for a global treaty to cut greenhouse-gas emissions.

U.S. comments that it would resist commitments to curb global warming by capping industrial emissions irked environmentalists, who said the U.S. was trying to derail the U.N. Climate Change Conference.

"There's only one real problem, and that's the United States," said Greenpeace International's Bill Hare.
EU Greenhouse-Gas Flexibility Backed by Court

BY ADAM COHEN
Dow Jones Newswires

BRUSSELS—A European court ruled that European Union regulators must be more flexible on greenhouse-gas limits, saying national governments can increase the amount of emissions allowed to help support their industries.

The decision by the European Court of First Instance could weaken Europe’s role as a global leader in preventing pollution, climate-change experts said. It also could undermine an innovative emissions-trading program that went into effect in Europe this year.

The British government brought the case, challenging a European Commission-enforced quota limiting Britain’s carbon-dioxide emissions to 736 million metric tons in 2005 to 2007. After consulting with manufacturers and power producers, Britain told the commission its provisional quota was too low and asked to raise its carbon-dioxide allowance to 756.1 million tons.

The commission said Britain wasn’t allowed to change its initial quota. It argued that a higher quota would destabilize the EU’s emissions-trading system, allowing countries and companies to sell their unused pollution allowances.

The court disagreed, saying the commission’s decision didn’t respect the results of government consultations with industry in determining acceptable emissions levels. The court found the commission failed to prove that a higher British quota would destabilize the entire emissions-trading system, because Britain wanted to raise its emissions quota by only 2.7%.

The European Commission has two months to appeal the ruling. The commission will study the findings before making a decision, EU spokeswoman Mireille Thom said.

Britain, Europe’s second-largest economy after Germany, accounts for 11% of the single-market’s carbon-dioxide emissions. The commission is still reviewing other EU countries’ emissions quotas.

Britain raised its quota because rising oil prices forced the country to use more power from coal-fired power plants, which produce more pollution, according to Abyd Karmali, an emissions expert at ICF Consulting, an energy-consulting firm.

By 2012, the EU wants to cut its combined 1990 greenhouse-gas emissions levels by 8%. So far, the bloc has reduced emissions by 2.9%, according to the latest report by the European Environment Agency, published in December 2004.

Fri Nov 25, 2005 Wall St J ourn Page A9

- This is a very big story
- It will have a large impact on any plans for a Kyoto-2 for what happens after 2012.
- As of Wed Nov 30 I have not seen this story in any other place.
- This story will not be popular in groups that want big, mandatory CO2 cuts for Kyoto-2 - so it is best for them not to tell the story.

Ray Janno
Nov 30, 2005
Wind power takes a battering

ROWAN HOOVER

Wind power enthusiasts have been a little flustered this week. An energy analyst has claimed that the UK government’s plans to derive a fifth of the nation’s energy from renewable sources by 2020 are not feasible.

The majority of this power, some 20 gigawatts, is to come from wind energy, but Hugh Sharman, principal of the energy consulting and brokering company IncoTec in Hals, Denmark, argues that the UK’s energy grid will not be able to handle more than 10 gigawatts (Proceedings of the Institute of Civil Engineering, vol 158, p 161).

The report comes at a time when environmentalists are already more than usually worried. Comments from UK prime minister Tony Blair on 1 November suggested that he was drawing back from emissions targets as the way to tackle climate change. And a report on 10 November on the looming “energy gap” caused by the shutdown of nuclear power stations recommended building more nuclear plants.

Now Sharman says we can’t rely on wind power. The problem, he says, is that the wind doesn’t blow when we most need electricity. Typically turbines start generating energy at wind speeds of 4 metres per second and reach full capacity at 14 metres per second. They shut down again at around 25 metres per second (above gale force 9) to protect the drivetrain and gearbox.

West Denmark, a region one-seventh the size of the UK, has 2.4 gigawatts of wind capacity delivering over 60 per cent of the region’s power. This is only possible because of well-established connections with Sweden and Norway that allow the country to import or export electricity to balance supply with demand. The UK does not have equivalent links and so would not be able to do this.

What is more, Sharman says that Germany’s turbines, which have a capacity of 17 gigawatts or 14 per cent of the total energy demand, shut down so frequently that averaged over a year they only generate around 15 per cent of their notional capacity.

Should the UK be concerned by the experiences of Denmark and Germany? Not really, says Robert Gross of the UK Energy Research Centre in London, a publicly funded research organisation. The clustering of both countries’ wind farms makes it difficult to extrapolate to the British situation, he says. Denmark’s farms are concentrated in the west, and Germany’s in the north-west. The wind speed and direction are also more variable in Germany because of its continental climate.

"It means the potential swings that the system needs to cope with can be much greater than they would be in the UK," says Gross. If turbines are dotted more evenly around the UK as is planned, there will be a "smoothing" effect on the energy from wind. When wind farms at one end of the country are not generating electricity, the chances are turbines elsewhere will be running.

Even so, Sharman thinks that dealing with the variable supply from wind will mean building excess capacity into the system in the form of gas-fired power stations, for example, reducing the climate gains. But arguably this is not a problem unique to wind. All forms of generation need to be backed up to cater for unexpected power outages caused by faults. And although wind speeds do vary, they can be predicted pretty accurately over the timescale of a few hours.

In short, it is not valid to extrapolate from the Danish or German experience, says Graham Sinden of the Environmental Change Institute at the University of Oxford. "It presents a more negative view than UK data would suggest."
A few more pages

- Amazon land use (Dec 2005)
- Market crash of CO$_2$ in Europe
- Pact of 6 Asian, Pacific countries
  - About energy & climate -- p. 91
- Global Warming --
  can we live with it?
- California climate debate (Jan 2006)

(6 pages here)
Model shows how Amazon land use may change Southwest U.S. climate

By Jim Erickson
ROCKY MOUNTAIN NEWS

In the coming decades, continued deforestation of Amazon jungles could strengthen the summer monsoon in the Southwest U.S. — including southwestern Colorado — and offset some of global warming's effects.

That's one of the surprising results of a computerized climate study by researchers at the National Center for Atmospheric Research in Boulder.

The study's authors say it is the first to incorporate land-cover changes — caused by agriculture, deforestation and other human activities — in climate simulations using advanced global computer models.

"Land cover has long been one of those issues that really hasn't been included, because it's much more difficult to incorporate," said University of Kansas researcher Johannes Feddema, lead author of the study published in today's edition of the journal Science.

Feddema worked on the project while on sabbatical at the Boulder center. Six NCAR researchers are co-authors.

The enhanced Southwest monsoon is one example of what climate researchers call teleconnections: A change in one part of the world can have unanticipated effects on the climate thousands of miles away.

Each year, about 50,000 square miles of forest — an area about half the size of Colorado — is cleared worldwide, according to the United Nations Food and Agriculture Organization. Between 2000 and 2005, South America suffered the greatest losses, largely because of conversion of forest to pasture and farmland.

If significant Amazon deforestation continues in coming decades, tropical air-circulation patterns will shift, allowing summer moisture to drift farther north and be captured by the Southwest U.S. monsoon, according to the study.

As a result, southwestern Colorado could see an extra 2 inches or so of annual precipitation — mostly in the summer — and summer temperatures could cool by a couple of degrees Fahrenheit by 2100.

Those changes could help offset anticipated warming because of the buildup of heat-trapping "greenhouse" gases from automobile tailpipes and smokestacks.

A recent study led by NCAR's Gerald Meehl suggests that Colorado can expect a temperature increase of 3.6 to 7.2 degrees Fahrenheit by 2100.

But Feddema stressed that there is "still a lot of uncertainty" in the land-use models and that today's Science paper is just a first step. The study does not account for the effects of urbanization or irrigated agriculture, for example.

And overall, regional climate variations resulting from land-use changes tend to cancel out each other, resulting in little change to the global average temperature.

"Compared to global warming, land use is a relatively small influence," Feddema said. "However, there are regions where it's really important."

A main point of the study is that climate modelers need to pay more attention to land-use changes in their simulations of 21st-century climate, he said.

That's a position Colorado State Climatologist Roger Pielke Sr. has held for several years.

In a commentary accompanying the Science report, Pielke chides the Intergovernmental Panel on Climate Change, the main international body that assesses climate-change research, for failing to adequately address land-use change.

The panel, "which has yet to appreciate the significance of the full range of phenomena that drive climate change, risks rapidly falling behind the evolving science if this effect is not included," Pielke wrote.

ericksonj@RockyMountainNews.com
or 303-892-5129
GREENHOUSE GASES

Price Crash Rattles Europe’s CO₂ Reduction Scheme

LONDON—Dumping carbon into the atmosphere became very cheap last week. Or so it seemed, as the cost of licenses to emit carbon dioxide came tumbling down in Europe on May 15. The price crash in the Emissions Trading Scheme fed doubts about the setup of this new market, launched in 2005 to help meet targets for CO₂ in the Kyoto Protocol on greenhouse gas emissions. Experts are now discussing what went wrong and what can be done to shore up the system.

The European Union (E.U.) invented the market to create incentives for cutting CO₂ emissions. Companies can meet specific targets by investing in green technology that lowers CO₂ emissions directly or by buying permits that allow them to emit CO₂. In theory, those with the best technology will have surplus credits, which they can sell to the laggards—making a profit while improving the environment. Under this scheme, the price of one allocation unit—equivalent to 1 metric tons of CO₂—soared to an all-time high of $31.5 in April. Then in a matter of days, it dropped to €8. Prices were on the rise again as Science went to press but seem unlikely to climb back to where they were. The heaviest impact of the crash, ironically, may fall on developing countries, which had begun to benefit from investments in clean technology encouraged by the European CO₂ market.

CO₂ trading prices fell after the European Commission announced that industries had emitted more than 50 million tons of greenhouse gases less than predicted. With more than enough emissions allowances to go around, demand vanished. The event confirmed what had been suspected for some time: European governments may have been too generous in granting credits.

“We know for sure that one of two things happened,” says climate policy expert Michael Grubb of Imperial College London. “Either industrial emissions were never going to be as high as projected or they would be, or it turned out to be far easier for industries to cut back on emissions than they had been saying.”

The general consensus favors the first theory. Before the E.U. launched its trading scheme last year, its governing body, the European Commission, agreed on a total number of emissions allowances. To come to this number, nations tallied up estimates of their own CO₂ emissions, subtracted a portion to create an incentive for industries to reduce their emissions, and handed over these targets in National Allocation Plans to the commission. Many governments, it appears, relied on company estimates of historical emissions.

In April, news started to trickle out that various countries had not only met their targets for 2005 but also had allowances to spare. Drawing up allocation plans based on industry projections “inflated the trading system and sent out the signal that industries just have to lobby to get what they need,” says Grubb. But backers of the E.U. trading scheme point out that it is still in a teething period that runs from 2005 to 2007. The real deal begins in Phase II, from 2008 to 2012, corresponding to the time when the European Union must fulfill its Kyoto Protocol pledge to reduce greenhouse gas emissions to 8% below 1990 levels.

Member nations must give the European Commission their National Allocation Plans for the second phase on 30 June. This time, estimates will be based on real emissions data, installation by installation. According to Shell carbon trader Garth Edward, they are the one tool policymakers have to ensure that the movements of the market translate into reduced global emissions.

For Grubb, there’s still a significant problem. The E.U. trading scheme covers slightly less than half of all E.U. emissions. Not included, for example, are the transport and domestic sectors. Countries need to justify how they will meet their Kyoto Protocol commitments both through their National Allocation Plans and by using technology and other measures such as taxes to reduce emissions in those nontrading sectors. “This is not a simple cut matter,” says a European Commission official. “It requires an in-depth review of emissions trends across all sectors and all measures being used to limit them.” But Grubb believes it has been too easy for countries to claim they will achieve their Kyoto commitments by reducing emissions in sectors not covered by the trading scheme; he hopes the next allocations under the scheme will be more stringent.

Some policymakers see the drop in the price of allowances as potentially good news. Says Halldor Thorgeirsson, deputy executive secretary of the United Nations Framework Convention on Climate Change, many “will be looking to the market for indicators of the cost” when negotiating post-2012 climate change policy. “The price drop is a bonus as far as post-2012 goes,” agrees Benito Müller, director of Oxford Climate Policy in the U.K. “The message is: ‘See? It’s not that expensive; we can tighten the limits.’”

Ultimately, developing countries may lose the most from the recent price crash. Investment soared in 2005 and 2006 in green projects in the south, partly stimulated by the high price of E.U. emissions allowances. Through a Kyoto Protocol instrument known as the Clean Development Mechanism (CDM), these projects offer companies in developed countries an opportunity to offset emissions at home by reducing emissions abroad. According to a World Bank report, CDM allowed approximately $2.5 billion in investments, or 350 million tons of reduced emissions, last year. More than half the volume was from European investment in developing countries.

When CO₂ emission prices were high in Europe, governments seemed ready to allow their industries to clean up southern skies as much as they wished. Now that prices have dropped to what most agree is a more realistic level, governments may decide to cap the external credits.

—CATHERINE BRAHIC

Catherine Brahic is a writer for SciDev.Net.
Bush Aide Fan of Research

Reading the tea leaves, science advocates are hoping that White House Chief of Staff Andrew Card's endorsement of a high-profile National Academies report on U.S. science presages a surprise funding bonus in the 31 January State of the Union address or subsequent 2007 budget. Recommendations from the October report, entitled Rising Above the Gathering Storm, include an annual extra $10 billion to fund physical sciences and expansive new science education and training efforts (Science, 21 October 2005, p. 423).

Speaking to the U.S. Chamber of Commerce last week, Card called the report "compelling." He said the report had many "appropriate suggestions, but we have to put them in the context of [White House Budget Director] Josh Bolten's budget." —ELI KINTISCH

France's Basic Science Agency Hopes New Lineup Will Resolve Crisis

PARIS—France's leading basic research agency, CNRS, is struggling to get back on course after the abrupt loss of two top managers. CNRS President Bernard Meunier resigned on 5 January; 4 days later, the number two, Director Bernard Larrotourou, was fired. This ended a damaging standoff at CNRS over the selection of department directors, according to Research Minister François Goulard, who told Science that Prime Minister Dominique de Villepin approved his decision to replace Larrotourou. It had been an open secret for months that the two Bernards were at loggerheads (Science, 27 May 2005, p. 1243).

Larrotourou, meanwhile, vigorously defended his tenure at a press conference on Tuesday and in a letter to the CNRS staff. (A handout for reporters listed 12 frequent criticisms of the agency and declared each of them "FALSE!".) In the letter, Larrotourou said that the decision to fire him was "reactionary" and that the disagreement between Meunier and him was "deliberate and organized" to thwart the reform plans (www.cnrs.fr/Lettre_aux_personnels_01051.pdf).

Most of the CNRS management team backed Larrotourou in a public statement last week. The research unions and the protest movement Sauvons La Recherche (SLR) also objected to his ouster, even though they had opposed his plans for CNRS and continue to oppose the government's science reform bill that will become law this month. SLR decried the government's "hostile decision" to remove Larrotourou, saying that

Pact Seeks Climate Volunteerism

Nations representing half the world's greenhouse emissions cemented a voluntary technology-sharing pact last week in Sydney, Australia. The Asia-Pacific Partnership on Clean Development and Climate, which includes the United States, China, India, Korea, Japan, and Australia, agreed to examine technologies to allow cleaner cement production and coal burning. U.S. President George W. Bush plans to ask Congress for $52 million to promote and deploy technologies "off the shelf" through voluntary exchanges among companies, says Energy Department official Karen Harbert. Critics say mandatory emissions caps better stimulate technologies. —ELI KINTISCH
New Bird Flu Jitters • The Enron Fallout

GLOBAL WARMING

CAN WE LIVE WITH IT?

Plus: Al Gore on His Chilling New Movie and How Bad Things Really Are

Adapt to climate change (p 36-43)
Comment and analysis

Cool thinking

The White House may be reluctant to cut greenhouse emissions, but that hasn't stopped California blazing a trail, as governor Arnold Schwarzenegger explains:

SINCE becoming California's governor in 2003, I have travelled the world promoting my great state, meeting with government officials, business leaders and ordinary citizens. There are many challenges that confront this international community, but one in particular was on the minds of nearly everyone: global warming.

They all wanted to discuss it with me, especially since I recently committed California to leading the worldwide effort to fight global warming. By 2010, we will reduce greenhouse gases to the levels we produced in 2000; by 2020, we will cut back to 1990 levels; and by 2050, to 80 per cent of 1990 levels.

The science shows that human-made pollution has added more than 50 per cent to the natural level of carbon dioxide in our atmosphere. In California, we are already seeing potentially severe impacts: shrinking of our snow pack in the Sierra Nevada mountains, which reduces our annual water supplies; erosion of our coastline; flooding of farmlands in the Central Valley; and a wide variety of health impacts related to changes in seasonal temperatures.

That's why I say the debate is over. We know the science and we see the threat. Most of all, I say that the time for action is now. Global warming, and the pollution and burning of fossil fuels that cause it, threatens every person in the world.

Those are the main reasons I take global warming so seriously, but to be honest I have 10 million more reasons: the children of California, including four of my own. While we already face impacts from global warming, it is our children who will be harmed the most if we don't act aggressively and promptly to reverse these trends. But having set bold goals, how do we hope to accomplish them, especially in a way that strengthens our economy?

The good news is that experience shows that reducing carbon emissions is profitable for companies doing business in California. Hundreds of companies have reduced energy consumption, saving money in the process. My programmes for a million solar roofs, the Hydrogen Highway initiative (which aims to catalyse a move towards hydrogen-fuelled transport in the state), and obtaining more energy from farm waste and other biomass will significantly reduce greenhouse gas emissions, while simultaneously making us more energy-independent. And these measures save money too.

We will also make our 70,000 state vehicles the cleanest, greenest in the nation, and thanks to our landmark greenhouse gas law, from 2009 all new vehicles sold in California will emit significantly lower levels of greenhouse gases than today's vehicles. Other states and nations are following this example and adopting our standards.

But this is only the beginning. The California Public Utilities Commission recently launched the largest energy-efficiency investment programme in the history of the US utility industry, with some $2 billion committed over just the next three years aimed at saving the equivalent of three giant coal-fired power plants. This should cut CO2 emissions by more than 3 million tonnes per year - equivalent to taking 650,000 cars off the road.

We also have the nation's most ambitious plans for renewable energy and expect that by 2010 we will get at least 20 per cent of our electricity supply from clean renewable sources, and a third by 2020. But traditional power sources such as coal must be cleaner too. The California Energy Commission recently set a greenhouse gas performance standard, which requires that any new electricity plant emit no more greenhouse gases per kilowatt-hour than a new combined-cycle natural gas turbine. The challenge to the coal industry is clear: if you want Californian investment, you must take global warming seriously.

There is also our Green Building initiative, which aims to make state buildings among the most energy-efficient in the nation. I have also put the state on an energy "diet" as the largest consumer of electricity in California, the state government itself is on a path to reduce its energy use by 20 per cent within a decade.

But government programmes cannot accomplish anything without the full participation of the people. Each of us must take personal actions to lower our contributions of greenhouse gases. Everyone can reduce car trips and conserve energy in their homes and businesses - two things that will reduce greenhouse gases immediately.

Everyone can also join me in calling on the US federal government to double vehicle fuel economy. And everyone can call on their electricity provider to generate clean, renewable energy, and demand that coal power come only from the cleanest new technologies.

Our experience in California and my conversations with people around the world convince me that there is unity around the urgent need for action on global warming. Or, as President John F. Kennedy said: "In the final analysis, our most basic common link is that we all inhabit this small planet. We all breathe the same air. We all cherish our children's futures."

Let us unite around those simple, incontrovertible values and take action now. •