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Steel industry leaders pose plan for

Y PAT GRIFFITH
ADE WASHINGTON BUREAU

Group seeks increased U.S. investment in research

WASHINGTON — Two months before the Kyoto conference on global warming, Charles Carson, a vice president of USX, and several of his industry colleagues sat down with administration officials at the White House.

Only a few years ago, their mission would have been unthinkable. But on this mild Thursday in late September, what they had to say was merely improbable.

What the steel company executives dropped on the table was the industry's voluntary plan for achieving a 10 per cent cut in its emissions of greenhouse gases from 1990 levels by the year 2010.

It would be accomplished through continuing improvements in steel processing technology and more efficient use of energy, without any mandates imposed by government. The industry leaders did not want something from Washington, however: more federal investment in research and development, along with tax incentives to help bring new energy-efficient technologies.

The group, which included top executives from Bethlehem Steel, Inland Steel, North Star, and LTV, urged the Clinton administration to sign onto an agreement in Kyoto that would put binding limits on U.S. emissions while allowing other steel-producing countries as much as China, South Korea, India, Mexico, and eastern Europe to operate without restrictions.

They were warmly received by administration officials, only to be subsequently disappointed by what came out of Kyoto. They were dismayed that the United States agreed to reduce its output of greenhouse gases 7 per cent below 1990 levels by 2012 without any commitment, so far, from developing nations to curb their soaring output of carbon dioxide.

The White House has announced it does not expect to send the proposed treaty to a currently idle Senate for ratification until sometime in 1999, and then only if rapidly industrializing countries that were excluded in Kyoto make "meaningful commitments" to reduce polluting emissions.

In the meantime, it is working

on details of a \$5 billion package of tax cuts, research and development grants, and other incentives that President Clinton is expected to reveal in his State of the Union address in late January.

"We were disappointed," Mr. Carson said last week, citing in particular the failure of U.S. negotiators to bring China and other developing countries into the proposed accord. Mr. Carson, USX vice president for the environment, also chairs the global climate task force of the American Iron and Steel Institute, the industry's trade association.

New figures released by the Institute on Friday show that while U.S. steel exports through October are running 17.4 per cent higher than the same 10-month period in 1996, steel imports are also on the rise, up 13.8 per cent over a year ago.

The most dramatic jump has been in imports from Russia, up 201 per cent over a year earlier. That was enough to catapult Russia to third place behind the Euro-

pean Union and Canada for steel exports to the United States, putting it ahead of such traditional U.S. competitors as Mexico, Brazil, Japan, and Korea.

Overall sales by U.S. steel manufacturers are running about 3 per cent ahead of 1996, continuing an upward trend that should put total sales close to \$36 billion for the year.

Although the European Union, Canada, and Japan will be bound by the global warming treaty if they ratify it, the other countries are presently excluded. If they remain outside the agreement, they will be able "to operate under much less stringent laws and conditions than we do here," Mr. Carson said, "which will give them an additional competitive advantage on a global basis."

While making known its strong objections to the unfinished treaty that emerged from Kyoto, the Iron and Steel Institute is not backing away from its offer to achieve a self-set goal of 10 per cent in emissions reductions by 2010 if the

domestic political and climate is agreeable. From the industry's vantage point, the no punitive "carbon tax" that would force up steel prices by more than a ton, and no mandatory reduction from Washington that would outpace or even thwart the production of new technology.

It is the high cost of energy, rather than anxiety about global warming as such, propelling the steel industry to the forefront of environmentally friendly innovation.

Bruce Steiner, vice president of energy and environment at AISI, notes that energy represents 15 per cent of the cost of steel production. Since 1975 the industry has reduced its energy consumption by 45 per cent while, through the throes of mass reorganization and downsizing, it has transformed itself into a global pace-setter.

Mr. Carson readily ticks off a dozen efforts USX has undertaken to cut energy costs and raise efficiency. They range from co-

10% cut in emissions

tax incentives

tion and recycling of gases generated during the production process to more efficient furnaces and burners and much greater use of recycled steel and waste metallic particles. All these changes have the corollary advantage of reducing the greenhouse gases spewing into Earth's atmosphere.

In 1996, USX and Westinghouse Corp. shared honors as "corporate partners of the year" in the Department of Energy's "Green Lights" program that encourages businesses and industries to adopt more efficient lighting systems.

While the environmental kudos were welcome, the really "pleasant surprise" for USX, Mr. Carson said last week, has been the \$2 million to \$3 million in annual savings on utility bills the sprawling corporation has achieved since putting in new fixtures and operating procedures and switching to low-energy fluorescent bulbs.

All it takes is getting a "committed group of people" involved, he commented, and "they find these little nuggets (of savings) all over

the place.

"We're delighted by what the steel industry is doing," said Joe Romm, principal deputy assistant secretary of energy for energy efficiency and renewable energy, following a panel hosted by environmental groups last week on the outcome of the Kyoto conference. "Clearly if the steel industry thinks it can do a 10 per cent reduction by 2010, that's a big deal, and it's something we're going to hold up as an example for other major energy users. ... We're very bullish on what they say they can do."

While steel company executives say they can adapt to a "flexible" program for reducing emissions and remain globally competitive, the coal industry is digging in for what it is portraying as a life-or-death struggle against mandated reductions in the use of carbon-based fuels.

The Kyoto agreement is "the death knell for the coal industry," John Grasser of the National Mining Association protested last week. "There's no doubt that it has the potential to wipe out the U.S. coal industry."

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M. MULLIN, R. DUNAP



White House Climate Change Task Force

734 Jackson Place, N.W. • Washington, DC 20503

October 31, 1997

TO: DISTRIBUTION

FROM: Dirk Forrister 

SUBJECT: Path forward based on recent outreach meetings

Over the past few weeks, I have arranged with representatives of the Assistant Secretaries working group on climate change meetings with three industries--air transport, cement, and steel--to discuss climate change policy. I am attaching detailed reports on these meetings for your review. Each contain a set of recommended "next steps" that Assistant Secretaries should consider at an appropriate future meeting. And each produced insights about low cost emission reduction potentials--ranging from 5 to 15%--for technology strategies in those sectors.

For the airline industry, the main issue is whether the Framework Convention on Climate Change (FCCC) should defer to the International Civil Aviation Organization (ICAO) in addressing greenhouse gas emissions from airplanes. At the United States' suggestion, the FCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA) has already agreed to defer the issue temporarily while it requests a report from ICAO on how greenhouse gases should be addressed. Even though the U.S. government has already moved in the industry's direction, the industry is advocating a complete exemption of aircraft emissions in the Protocol, believing that emissions are more properly addressed by ICAO and its aviation experts. To that end, they will craft language for our consideration that would refer emission limitation responsibility for aircraft greenhouse gas emissions to ICAO in a way that (1) assures that action will be taken; and (2) respects the provisions of international law regarding what parties from one treaty can impose/request of parties to another treaty. They also plan to consult with other countries and with ICAO on this matter. On a particularly encouraging note, they provided a MITRE Corporation study indicating that improved air traffic control, measures could reduce emissions by about 12% worldwide. We agreed to convene a future meeting to discuss this study after government experts have reviewed it.

For our cement industry consultations, we held an initial meeting with Holnam (America's largest cement manufacturer). Holnam believes that we could achieve a 5-15% reduction in cement industry emissions, while reducing costs, by using more cement substitutes. While there are numerous institutional and market barriers to increasing this utilization, there are a number of things that the federal government could do to reduce these barriers. EPA has already begun to work on this through its labeling and federal procurement programs. NIST is working within the American Society of Testing Materials (ASTM) cement committee on possible updated cement specifications to allow more substitutes. The Assistant Secretaries should discuss additional actions that other agencies could take to encourage the use of cement substitutes, particularly in public education and federal procurement.

The steel industry claims it could reduce its emissions 10% below 1990 levels by the year 2010 using voluntary programs, but they oppose mandatory programs. The Assistant Secretaries may want to consider further discussions about mechanisms (e.g., a la the 33/50 program under EPA's toxics programs) whereby the steel industry could make a voluntary commitment that would prompt significant action by this sector. The steel industry also had a number of suggestions for things the government could do. The Assistant Secretaries may be interested in following up on these as well.

I have received requests from a few other groups interested in briefing us on their ideas, but I know your time is very limited. I will be in touch regarding scheduling additional meetings, and I'll promise not to over-burden you.

Finally, I hope you can help me make sure that all of these ideas receive appropriate consideration. Thanks for your interest.

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Meeting with Holnam, Inc.

September 5, 1997

Meeting Summary and Proposed Next Steps

Dirk Forrister welcomed the attendees from Holnam and several federal agencies. (See attached list of attendees.) Gary Sauer of Holnam presented background information on the cement industry and explained how CO₂ emissions could be reduced by 5 to 15 million tons per year from the U.S. cement industry by using blended cement. Holnam is a U.S. company, held by Holderbank, a global company. Holnam is also in the business of providing cement blending materials such as flyash, slag and limestone.

Sauer said that other countries are doing much more blending than the U.S. He said the barriers are antiquated standards; fragmented markets; and conservatism. Sauer argued that policymakers need to create incentives for reducing CO₂ emissions.

Gloria Jeff of FHWA said that the blended cement tends to take longer to reach maximum strength; and this can be an issue, especially in the construction industry. The price of blended cement is lower, but there is this tradeoff with setting up time, and quicker set-up times are important. She also said that all concrete uses some flyash--98 to 99% of concrete has some flyash. However, not much slag is being used because it is not widely available.

In Europe, the roads contain more substitutes and they are more durable, but they are rougher. FHWA is conducting a test case in Michigan using European road specifications. FHWA is willing to work with ASHTO to look at specifications for more flyash, and to try to get more research on optimizing strength, durability and set-up times. She is also willing to work on education and training of state highway personnel responsible for state specifications.

Jean Briskin suggested a performance based standard in lieu of a content based standard. Jeff said FHWA already has both performance standards and content standards. M.S. Chawla of the Navy said that the Navy already allows substitution of materials as long as the performance standard is met.

Geoff Frohnsdorff of NIST, and chair of the ASTM cement committee, said he has advocated broad cement substitution for its energy efficiency benefits for nearly 25 years. After decades of work, he expects a draft specification for blended cement to be out this year. He said the barriers to broader substitution are lack of familiarity and lack of data.

Briskin and Jeff pointed out that there are air quality benefits (in terms of Nox and particulates) as well as CO₂ benefits to using blended cement, and that non-attainment areas have an incentive to look at blending. Judi Greenwald suggested that Holnam might want to quantify these benefits.

Mark Bernstein suggested that we might want to consult with the Construction and Building Subcommittee of the National Science and Technology Council.

Tom Rutherford of DOD said that they use a lot of blended cement in construction, so the set up

time is often not a problem. He suggested a federal task force to set up federal purchasing standards as well as a non government standards.

M.S. Chawla of the Navy suggested that we could require blended cement but allow waivers. Thus the norm would become blended cement, but there would still be an "out" when necessary.

Jean Briskin suggested that EPA could work with the cement industry on an energy star labeling program.

PROPOSED NEXT STEPS:

To follow up on meeting suggestions, the Assistant Secretaries climate change working group should consider appointing

1. EPA (Jean Briskin) could work with Holnam (Gary Sauer) on an Energy Star Labelling program and voluntary corporate commitment to reduce emissions. EPA could value Energy Star program benefits as credits under Clean Air Act State Implementation Plans. (See attachment.)

2. PUBLIC EDUCATION AND OUTREACH: FHWA (Gloria Jeff), OSTP (Mark Bernstein) and Holnam (Gary Sauer) could work with ASHTO and NSTCto :

- develop an education and training program on blended cement for highways, housring and other applications

- develop a model state specification aimed at increasing the amount of flyash in highway cement

- develop a joint research program to optimize strength, durability, and set-up time for blended cement

3. FEDERAL PROCUREMENT: EPA (Jean Briskin); DOD (Tom Rutherford), GSA (?), and FHWA (Gloria Jeff) should develop an effective approach (e.g., an executive order) to encouraging agencies to purchase cement that meets the Energy Star labelling requirements to be developed by EPA.

4. NATIONAL STANDARDS: NIST (Geoff Frohnsdorff) should continue working with ASTM to develop a standard for blended cement that can be used by all of the other efforts.

Opportunities to Reduce Carbon Emissions Associated with Production and Use of Cement

September 10, 1997

1. Energy Star Concrete

EPA could label concrete that has low carbon content during its production and use. Low carbon content could be achieved by increasing the amount and frequency of use of mix-ins such as fly ash or slag. As is the case for all Energy Star products, the criteria would be set to assure that product performance was the same or better than non-Energy Star products. Energy Star labeling is an effective way to educate purchasers and the public about environmentally preferable products.

2. Energy Star Pavement

EPA could label pavement that has a high albedo -- reflects heat well. By reflecting rather than absorbing heat, Energy Star pavement could contribute to a reduced urban heat island effect. As part of a comprehensive set of Cool Communities Activities, Energy Star pavement would help slow the formation of ground level ozone (reducing local air pollution) while reducing energy needed for air conditioning in urban areas. The criteria would be set to assure that product performance was the same or better than non-Energy Star products, including assurance of driver safety through no increased glare. Energy Star labeling is an effective way to educate purchasers and the public about environmentally preferable products. EPA has already begun a Cool Communities effort, and is presently identifying communities who wish to test appropriate measures on a pilot basis.

3. Energy Star Pavement/Concrete Procurement Initiative

EPA could work with other federal, state and local agencies to assist them in specifying low carbon concrete and/or reflective paving surfaces through performance rather than content based specifications. EPA has much experience with using procurement initiatives to promote the use of environmentally preferable products by providing model procurement specifications and leveraging key actors to undertake mass procurements. Experience with the Energy Star Computers program has proven that a procurement initiative would be greatly assisted by an Executive Order for federal agencies to follow the procurement specifications where their performance criteria are met by the specified products.

4. Incorporate effects of Energy Star Pavement/Concrete into Clean Air Act State Implementation Plans (SIPs)

EPA has begun to work with states to improve the way in which energy efficiency and other measures are credited into State Implementation Plans (SIPs). By incorporating the effects of Energy Star Pavement /Concrete into SIPs, communities will have an increased incentive to accelerate their adoption of these environmentally preferable materials, because they can contribute to lower cost compliance with the National Ambient Air Quality Standards for ozone and particulate matter. Increased use of fly ash, blast furnace slag or other appropriate mix-ins reduces the combustion of fuel used to make clinker, thereby reducing the emissions of regulated air pollutants, while also reducing emissions of carbon dioxide. Increased use of reflective pavements can cool urban heat islands, slowing the formation of ozone and reducing the need for air conditioning, thereby allowing for more efficient use of electricity, and reducing emissions from power plants.

Sign In Sheet

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Meeting with Air Transport Association and Air Industries Association
September 17, 1997
Meeting Summary and Proposed Next Steps

Dirk Forrister, the Chair of the White House Climate Change Task Force, opened the meeting and introductions were made. (See attached attendees list). The business representatives asked about the outreach effort, and Dirk Forrister described the Task Force's activities. Richard Kettler of the ATA began the substantive discussion. He explained that returning to 1990 CO2 emissions levels would require a 25% reduction in air traffic. He said the industry is looking for some recognition in the climate negotiations that ICAO (International Civil Aeronautics Organization) needs to be the only worldwide agency for setting aviation standards. ICAO has been around for almost 50 years; they should remain in charge. Howard Aylesworth from AIA pointed out that there are tradeoffs between NOx and CO2 and between environmental performance and safety that ICAO is able to address. He also said that fuel use per passenger mile has been steadily declining. Airlines have an enormous incentive to reduce fuel costs by improving fuel efficiency, regardless of climate change. ATA's counsel said that it is very important that the climate treaty not conflict with the Chicago convention, which sets up an international regime for aviation regulation and provides a process for ensuring that nations comply.

Jonathan Pershing of the State Department explained that the United States had successfully inserted language into the Subsidiary Body for Scientific and Technological Advice (SBSTA) at the August negotiating session in Bonn. The language says that Parties should work through ICAO and report to SBSTA. Pershing said that this will essentially defer the issue until ICAO reports back. The industry representatives said that while this language is helpful, it is not sufficient. The industry wants complete deference to ICAO. Pershing said that the Europeans would object to that, and there was a risk that if the U.S. raised this matter and it was explicitly rejected, the aviation industry would be worse off. Pershing also explained that there were many things the U.S. wants that no one else wants and that a provision such as the airlines are suggesting could simply become a negotiating target--i.e., people would object because we want it. Pershing suggested that the aviation industry work with their counterparts in other countries and see if they can find support for this.

Judi Greenwald asked what happens if we defer to ICAO, and then ICAO doesn't do anything. The industry representatives responded that the U.S. is a major player in ICAO and that we would work through ICAO to ensure action. Cindy Newberg of EPA said that ICAO is a consensus based organization and that they might not be able to move forward on this, even if the U.S. takes an aggressive stance. Greenwald also asked whether ICAO could do something prior to Kyoto that would give the climate negotiators confidence that they were actually moving forward on this. The industry representatives said that they would work on that. The U.S. Government's representative to ICAO, James Erickson, said that ICAO is aware of this issue.

Jim Conley of the IAM (representing labor) said that the workers are in agreement with the industry on this matter, and that we in the government need to keep the job implications of this treaty in mind as we move forward.

Jonathan Pershing also handed out and discussed a report, "Special Issues in Carbon/Energy Taxation; Carbon Charges on Aviation Fuels" by the Annex I Expert Group on the UNFCCC. He said that the report describes the difficulties inherent in raising aviation fuel taxes, and thinks the report makes it less likely that aviation fuel taxes would be adopted as a common policy and measure. The U.S. position is to oppose any common policies and measures.

At the close of the meeting, industry provided a brief summary of a "MITRE study" that finds substantial greenhouse gas reductions available from air traffic control improvements.

NEXT STEPS

1. The industry will work on Protocol language for our consideration that would refer emission limitation responsibility to ICAO in a way that (a) ensures action will be taken and (b) respects international law regarding what parties of one treaty can impose/request of parties to another treaty. The industry will also meet with their international counterparts to identify other countries who would support complete deferral to ICAO on aviation greenhouse gases.
2. The industry and the U.S. ICAO representative will try to get ICAO to report to the parties on its greenhouse gas activities prior to the Kyoto negotiating session.
3. NASA and FAA will provide their comments on the MITRE study (on the greenhouse gas reduction benefits of air traffic control improvements) to Dirk Forrister.
4. Dirk Forrister will hold a follow-up meeting to discuss the MITRE study.

Sign sheet

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Meeting Summary

Thursday, September 25

Greenhouse Gas Reduction Opportunities in the Steel Industry

Continuing our outreach efforts on climate change, Agency representatives met with several member companies of the American Iron and Steel Institute (AISI). (See attached list of attendees). AISI requested the meeting to follow up on Bethlehem Steel's suggestions to the President regarding voluntary programs.

Dirk Forrister, Chair of the White House Climate Change Task Force, opened the meeting with introductions. Bruce Steiner made a presentation called "Global Climate Change and the Steel Industry." He said that this issue is important to steel. Steelmaking is energy intensive and largely coal-based (coal is not only an energy source but also a feedstock). The steel industry has made major investments in energy conservation, accomplishing a 45% reduction in energy consumption since 197, without decreasing production. But the pace of reductions is slowing and further reductions are more difficult to obtain. The economic consequences of climate change policy could be devastating to the domestic steel industry, based on studies by Argonne and ESI. The developing countries are major competitors for U.S. steel makers. 4 of the top 10 steelmaking countries--China, Korea, India, and Brazil--are not Annex 1 countries. The U.S. steel industry does not own facilities abroad.

The key issues for the steel industry are : (1) a global solution is needed; (2) maximum flexibility is needed (including voluntary commitments and recognition of progress to date; they applaud Administration's flexibility proposals, but have some questions); (3) taxes and energy reduction mandates should be avoided; and (4) science must lead policy.

The industry has already done a lot to reduce greenhouse gas emissions through more effective utilization of materials; improved energy efficiency in existing processes; other efforts such as Green Lights; development and implementation of new technology; employee and community awareness and education programs; and product-related remission reduction efforts (e.g., participation in PNGV).

THE OVERALL STEEL INDUSTRY EXPECTATION IS THAT THEY CAN ACHIEVE AT LEAST A 10% GREENHOUSE GAS EMISSION REDUCTION BELOW 1990 LEVELS BY 2010 THROUGH VOLUNTARY EFFORTS. This would be achieved through a wide variety of activities--from greater scrap utilization to fuel substitution to reducing plant traffic to replacement of existing units with more efficient new technologies.

AISI also pointed out that the government could do more. They want us to avoid overstatement of the science; work toward more cost-effective regulations; support electricity competition; promote voluntary programs; provide R&D assistance and incentives; promote CO2 sinks; promote joint implementation, technology transfer; and flexibility; promote energy efficiency labelling (taking into account materials and energy use over the whole life cycle); promote life-cycle analysis in procurement policies; develop safe, economical nuclear power; and

include all greenhouse gases.

Judi Greenwald of the WHCCTF commended AISI for their constructive suggestions regarding what the steel industry can do; as well as what the government can do. Denise Swink of DOE said that it is important to keep in mind that all of the technologies don't work all the time. She finds the estimate believable, and suggested that a few concrete examples of what technology has achieved in specific cases would be helpful.

Jean Briskin of EPA said that the steel industry could work with her office and/or DOE on labeling. She said another promising area would be the use of steel slags in cement. She also said that her office works on federal and state procurement guidelines for energy efficient equipment, and would like to work with the steel industry on this. Judi Greenwald asked whether EPA was working on life-cycle labeling in terms of materials, and Jean said no. Bruce Steiner said that the International Iron and Steel Institute is doing a study on life cycle analysis. Jean said that recycled content labelling would also have potential benefits. Jean also said that the federal advisory committee on clean air, energy and climate might be a useful forum for these ideas.

Denise Swink pointed out that in many states cogeneration facilities have one-stop permitting, which is a big advantage. Diane Regis talked about the Common Sense Initiative, where all the stakeholders have learned that technology is the key. The NGO participants would support targeted investment tax credits. Chuck Carson of USX said that it is important to keep in mind that for many years the steel industry wasn't profitable. Now they've done the hard work and sacrifice to become profitable again, but there still isn't enough capital to do all the things everyone wants them to do. Diane thinks CSI has had some success in raising the level of appreciation for these capital issues, and for things like plantwide performance standards. Diane also pointed out that there is a continuum between voluntary and regulatory approaches; it's not a purely either/or choice.

Judi Greenwald explained that she would be putting together a more detailed path forward as a result of this meeting. She asked for suggestions from Jean Briskin, Denise Swink and Diane Regis, and from AISI (if they decide they have anything more to add).

NEXT STEPS:

1. EPA (Jean Briskin) and/or DOE (?) could work with the steel industry on labelling (including of recycled content, encouraging the use of steel slags in cement; and on federal and state procurement guidelines for energy efficient equipment.
2. EPA (Diane Regis) could work with the steel industry through the Common Sense Initiative on one-stop permitting, investment tax credits, and plantwide standards.
3. DOE (Denise Swink) could work with the steel industry on coming up with illustrative real-world examples of the benefits of technology.

P. 02

TAA NO.

Opportunities to Reduce Carbon Emissions Associated with Production and Use of Steel

September 30, 1997

1. Label Star for Recycled Content

Using steel scrap consumes less energy and lowers the cost of producing new steel. EPA could label products made from steel (i.e. appliances) that contain a certain specified level of recycled material. Labeling can be an effective way to educate purchasers and the public about environmentally preferable products. Need to research current status of labeling efforts in this area.

2. Energy Star Steel Procurement Initiative

EPA could work with other federal, state and local agencies to assist them in specifying high efficiency equipment. This equipment could include motors which use a higher grade of steel that is more efficient and therefore uses less energy and emits less CO₂ into the atmosphere. EPA has considerable experience with using procurement initiatives to promote the use of environmentally preferable products by providing model procurement specifications and leveraging key actors to undertake mass procurement. Experience with the Energy Star Computers program has proven that a procurement initiative would be greatly assisted by an Executive Order for federal agencies to follow the procurement specifications where their performance criteria are met by the specified products.

3. Incorporate effects of Energy Star Steel into Clean Air Act State Implementation Plans (SIPs)

EPA has begun to work with states to improve the way in which energy efficiency and other measures are credited into State Implementation Plans (SIPs). EPA can work to understand the relationship between energy efficiency and air quality in steelmaking to assure appropriate accrediting of efficiency improvements undertaken by the industry. Mutually agreed upon measures may provide an increased incentive for the industry to accelerate their adoption of energy efficiency measures because they can contribute to lower cost compliance with the National Ambient Air Quality Standards for ozone and particulate matter..

<u>Name</u>	<u>Affil</u>	<u>Phone</u>	<u>Fax</u>
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GARY ALLIE	INLAND STEEL	219/399-3332	399-603
JIM SCHULTZ	CARGILL/NORTH STAR	612-488-1243	488-129
SCOTT SALMON	USX Corp.	202/783-6797	783-630
Charles Bell	DOC/ITA	202/482-0608	482-145
A.E. MOFFAT	Bethlehem Steel	610-694-7640	694-587
Moe Carino	Bethlehem Steel	202-775-6211	775-622
Alex Cristofaro	EPA	202 260-5523	260-0780
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CHUCK CARSON	U.S. STEEL	412-433-1174	433-201
Janice Swink	DOE	202 5869232	9234
Diane Rogers	EPA -water	202-260-5700	260-571
DICK FORESTER	Task Force	343-1060	343-1162

**White House Climate Change Task Force**

734 Jackson Place, N.W. • Washington, DC 20503

March 4, 1998

MEMORANDUM TO DISTRIBUTION

FROM: Dirk Forrister, Chair *Dirk Forrister*

SUBJECT: Meeting on Industry Outreach

I would like to remind you of the meeting **Thursday, March 5, from 3:00 to 4:30 p.m. in the White House Conference Center in the Lincoln Room (724 Jackson Place, NW)** for the first meeting of an Assistant Secretaries' Industry Consultation Council. I have attached several documents to help you prepare for the meeting.

The draft agenda is as follows:

- I. Overview of Project Goals and Approach
- II. Organizational Structure and Process
 - Industry's Role and Participation
 - Federal Role and Participation
- III. Timetable
 - Phase I Sectors
- IV. Next Steps

I hope to see you tomorrow. Please call me before selecting substitutes if you are not able to attend or if you would like to bring additional staff (space is limited). If you have any other questions, you may call me or Lisa McNeilly at (202) 343-1060.

Attachments:

- "Scoping Paper: Industry Consultations"
- "Addendum A: Industry Plans for Early Reductions"
- "Addendum B: Questions for Industry"

Distribution:

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Peter Orzag	NEC	456-2223
Bill Antholis	NEC	456-5334
Jeff Frankel	CEA	395-6947
Marty Spitzer	PCSD	408-1655

Total pages: 11

SCOPING PAPER: INDUSTRY CONSULTATIONS

Draft: March 4, 1998

"We must continue to encourage key industry sectors to prepare their own greenhouse gas reduction plans. And we must...remove the barriers to the most energy efficient usage possible. There are ways the federal government can help industry to achieve meaningful reductions voluntarily, and we will redouble our efforts to do so."

-- President Clinton, October 22, 1997

Background:

In his climate change address at the National Geographic Society auditorium on October 22, 1997, President Clinton challenged American industries to develop their own action plans, and he pledged for his Administration to work with state and local governments to remove any barriers to greater energy efficiency. In urging companies to take early action, the President also committed to ensure that firms receive appropriate credit for their achievements.

There are a number of industrial sectors that have expressed interest in working with the Administration on climate change policy, although some are more advanced in their thinking than others.

- The Task Force convened interagency meetings last fall with three sectors that were prepared to make proposals to the Administration: steel, cement and airlines. Natural gas, renewable and energy efficiency firms continue to want to play a key role.
- Task Force and agency staff had very productive individual meetings last fall with electric utilities, pulp and paper, natural gas and a couple of petroleum companies. Although they are still trying to evaluate their posture toward the issue in the wake of the Kyoto agreement, there are progressive companies in each sector that we should engage soon to help influence the evaluations others are making.
- Since the Kyoto Conference, other key sectoral players have stepped forward to express interest in being involved: appliance manufacturers, chemicals and aluminum.
- Additionally, the Administration has good relations with a set of industry leaders active in the President's Council on Sustainable Development, DOE's Industries of the Future and Climate Challenge programs and EPA's "Green" and Climate Wise partnerships.

Besides these groups, there are other important industries that are likely to be interested in participating as this effort matures.

L PROCESS

A. In General --

1. Goals The consultations should maintain a clear focus on enabling industries to

meet the President's challenge of developing early voluntary action plans within nine months. Industries will be encouraged to make commitments as close as possible to the Kyoto target. Also, firms will be the most forthcoming if meetings are designed to --

- strategize on removing barriers;
- assure early credit;
- and inform federal climate policy development (e.g. the \$6.3 billion incentive package; the emissions trading program design; federal energy use; and the ongoing international negotiations).

2. **CEO Vision** The consultations will be most successful if those active in the discussions have directions from their CEO's. (The alternative -- if they do not have CEO cover for what they are doing, they will be conservative.) Prior to sectoral meetings, a senior White House or Cabinet official [or a high-level former CEO] should speak with at least two key CEO's about the talks in order to assure their engagement.
3. **Crosscutting** There will be a crosscutting effort to cut across all groups on some overall design questions. This could assure that each group benefits from lessons of the others, and it could help us achieve a coherent overarching policy structure. The issue of credit for early action and perhaps emissions trading will be discussed in separate, expedited inter-agency forum.
4. **Agencies** From the onset, the effort needs to take advantage of agency expertise and abilities, particularly their strengths to carry out follow-up actions.

B. Operational Considerations

1. **Background Analyses** Documents will be prepared for each sector compiling background information currently available in the agencies. These papers will be used to inform the Federal teams and provide some basis for discussions with the private sector.
2. **Scoping Mtg.** We should convene a small "scoping group" to plan each consultation. It should contain a few select industry leaders combined with a few federal experts. This group can help strategize about the best way to frame questions, how the effort should be defined for that sector, and how to ensure the best outcomes.
3. **Attendance** We should be inclusive of as many companies as possible. Pending review of FACA requirements, the meetings would be more constructive if they were "off the record." It might also be useful to have a follow up meeting to vet any ideas with others involved with the sector (academics, labor leaders and public interest groups).

On the federal side, we should assemble expert teams from relevant agencies (Energy, EPA, Commerce, Agriculture, Transportation, Defense, Interior, NASA, State, USTR, AID) and White House offices (NEC, CEQ, OSTP, OMB, NSC). We should select a leader for each sectoral team to help focus activities, drive the process and serve as a point of contact.

4. **Guidance** Sectors will be asked to prepare in advance of the consultations information on industry historical emissions, future trends, and potential reductions. For example, they could determine what the industry's baseline was in 1990 (or 1995 for those gases), what the scenarios are for 2008 to 2012 and what actions could bring the greatest improvements on those scenarios. It could also be beneficial to review the industries' competitive situation in the international economy, its business trends (including energy and environment) and its research and development plans. The ultimate goal is to reach agreement on a voluntary reduction plan, either collectively or individually.
4. **Industry Kick-Off** After the scoping meetings, the next activity will be a kick-off meeting with industry. The wider industry membership and the Federal teams will attend to describe the process to the private sector and to set the timeline for action. When industry has had time to draft a preliminary commitment, the Federal teams will follow-up, review the plans and respond to agency requests.
5. **Follow Up** The federal team should ensure that ideas are submitted for expedited consideration in the policy process. Agencies should have primary responsibility to carry out follow-up activities, pursuant to their proper authorities, under coordination by White House offices.

C. Time Line

The following time line describes the actions and responsible parties for four major activities: initial preparation, scoping meetings, industry consultations, and agreements and follow-up.

1. Initial Preparations (*present -- early March*)

Goal: To prepare the Federal government to effectively engage the private sector.

(1) Prepare planning documents that will be used as templates to guide the consultations for all sectors.

- Finalize template for Sector Analyses; analyses will include sections on sector emissions, options for emissions reductions, current sector activities, and barriers to or opportunities for emissions reductions.

WHCCTF: 3/2

- Draft Sector Analyses for 1-2 sectors; assignments made for agency leads for remaining sectors

Agencies (DOE/EPA): 3/2

- Draft questions to be addressed in consultations

WHCCTF: 3/2

(2) Establish Federal leadership structure

- Assemble an Assistant Secretary Council, with representatives of each relevant agency, to give oversight and guidance.

WHCCTF/Agencies: late February/early March

- Establish technical teams from the agencies to be responsible for each sector

WHCCTF/Agencies: late February/early March

(3) While consultations will occur with the full list of industries categorized in the scoping paper, initial meetings will proceed in a phased manner to immediately address those industries who are already close to making voluntary commitments to reduce emissions.

- Narrow the list of industries to 6-8 for Phase I of scoping meeting and full consultations; determine broad strategy for remaining sectors on the list

WHCCTF/Agencies: early March

Preliminary list: steel, airlines, electric utilities, aluminum, pulp & paper and cement; possibly buildings, autos, chemicals, fleets, electronics

- Select a member of the Assistant Secretary Council to join each sector group

WHCCTF/Agencies: early March

- Draft Sector Analyses for 6-8 sectors prepared and approved

Agency leads: second week of March

(4) Present work to Assistant Secretaries Council for discussion

WHCCTF/Agencies: second week of March

2. *Scoping Meetings with Phase I Industry Sectors (March)*

Goal: To plan industry consultations in conjunction with representatives of each sector.

(1) Establish contact with selected sector CEOs through calls and/or meetings with Cabinet members or other senior White House personnel. Timing might vary from sector to sector and could be held before or parallel to scoping meetings.

- Contact at least two CEOs from each sector to assure their engagement.

WHCCTF: varies

(2) Hold a preliminary, scoping meeting with a subgroup of each industry sector leaders to help plan the full industry consultations. It will be important to have appropriate industry people at these meetings who have the ability to at least informally speak for their CEOs and/or industries.

- Identify a small number of principal players in each sector from the private sector

Agency leads: early March

- Draft agenda for scoping meeting to include discussions on the structure of the consultations (agenda, questions, etc.), participants, and review of draft sector analyses

WHCCTF: early March

(3) The scoping meetings could probably be done in two weeks, holding about three each week.

WHCCTF/Agency teams: 3/15 - 3/30

(4) Roll-out event to lay out plans (vision, scope, time table)

- Two parts: POTUS or VPOTUS meeting with CEOs followed by a larger briefing of DC representatives from key sectors

WHCCTF: mid to late March

(5) Input from labor and environmental groups is also highly desirable. Teams for these "sectors" will also be assembled, and their efforts will be incorporated into the industry consultations.

3. Industry Consultations (April -- August)

Goal: To encourage voluntary emissions reductions commitments from the industry sectors, improve understanding of technology opportunities, and identify and reduce barriers to these reductions.

(1) Before the start of the Phase I consultations, the input from the scoping meetings should be incorporated into the Sector Analyses.

- Finalize questions for industry and other inputs for consultations

WHCCTF/Asst Sec Council: 4/15

- Using the other documents, draft an options workbook matching barriers and potential opportunities with existing options available to sectors (inventory of Federal "carrots")

WHCCTF/Asst Sec Council: 4/15

(2) The actual industry consultations will involve as broad a participation within each sector as possible. The consultations will require a series of meetings. First, an industry kick-off to present charge to full industry membership. Second, meetings with Federal teams to review commitment plans and plan implementation.

Agency teams/WHCCTF: 1st set, end April - late May; 2nd set, July - early Aug.

(3) At the earliest appropriate time, the labor and environmental groups will be incorporated into the process. Their exact participation may vary from sector to sector.

(4) We will also convene consultations with industries offering technological solutions in a way that informs and enhances the emission reduction agreements with emitting industries. These may take the form of separate meetings, depending on what works best with a given sector.

(5) Industry teams will present draft agreements to the Assistant Secretary Council.

Agency leads: end August

4. Agreements and Follow-Up (September -- October)

Goal: To ensure agreements are finalized and set into motion.

(1) The draft agreements will include responsibilities/activities for both industry and Federal agencies. The industry section will include their commitments on emissions reductions. The Federal agency section would include the help already available to sectors and potential agency actions to address barriers identified. Ideally, endorsements from labor, environments and some relevant state agencies will be solicited.

Agency teams: September

(2) A roll-out event by senior administration officials with presentations by industry and by agencies.

Mid-October

(3) Continue work on remaining industries, beginning a second phase of scoping meetings and full industry consultations.

End of October

II. SPECIFIC GROUPS

There are specific players in key industries that can provide important inroads into most of the major emissions sectors. I would recommend that we begin consultations with the groups that have already expressed interest (Phase I). As we build a track record of success, it will be easier to bring others on board.

Phase I Sectors

Energy Intensive Industries

Seven industries emit 50 percent of the greenhouse gases from the industrial sector (which is a full third of the emissions from end use sectors). Four of these are being considered for inclusion in the first phase of consultations. In addition, the carbon dioxide released during the calcification process means that the cement industry is also included here.

1. Steel
2. Aluminum
3. Pulp and Paper
4. Chemicals
5. Cement

Electric Utilities/Fuels/Buildings

Electric utility emissions comprise one-third of U.S. source emissions. The fuels producer and building sectors crosscut all the industry sectors listed, but none of the fuels producers are likely to be addressed during this first phase.

- 6. Electrics
- 7. Buildings

Transportation

The transportation sector represents a final third of U.S. end use emissions. Especially in the case of automobiles, the presence of so many individual emitters will prove extremely challenging.

- 8. Airlines
- 9. Automobiles
- 10. Fleets

Future Growth Industries

Industry sectors whose emissions are projected to rise in the future also need to be a part of the consultations.

- 11. Telecomm/ Electronics

Phase II Sectors*Energy Intensive Industries*

- 12. Glass
- 13. Foundries
- 14. Refineries

Electric Utilities/Fuels/Buildings

- 15. Natural Gas
- 16. Renewables
- 17. Efficiency
- 18. Mining

Transportation

- 19. Railroads

Other

- 20. Appliances
- 21. Vendors
- 22. Agriculture

III. Addendum

- A: Industry Plans for Early Reductions -- A one-page summary description
- B: Questions for Industry -- Sample questions to be considered by industry

ADDENDUM A: INDUSTRY PLANS FOR EARLY REDUCTIONS

Draft: March 4, 1998

We must continue to encourage key industry sectors to prepare their own greenhouse gas reduction plans. And we must ...remove the barriers to the most energy efficient usage possible. There are ways the federal government can help to achieve meaningful reductions voluntarily, and we will redouble our efforts to do so."

-- President Clinton, October 22, 1997

GOAL:

Develop plans of action to achieve early voluntary reductions in greenhouse gas emissions in key sectors of the economy with the goal of making as much progress as possible toward the targets set in Kyoto.

RATIONALE:

To the extent that cost-effective reductions in greenhouse gases can be achieved in the near to medium-term through voluntary efforts, the burdens associated with meeting future targets will be reduced and the rate of build-up of greenhouse gases will be slowed.

INDUSTRY'S ROLE:

To develop a plan for reducing greenhouse gas emissions beyond "business as usual." Building on existing government-industry partnerships, the plan should identify:

- an emissions reduction goal;
- the path forward for achieving that goal using cost-effective measures;
- barriers to achieving reductions that could be removed;
- incentives that could be created to encourage such reductions;
- possible changes in federal procurement or practices;
- options for reducing emissions through trading or sequestration;
- opportunities for achieving reductions abroad; and
- a longer-term research and development strategy.

FEDERAL GOVERNMENT'S ROLE:

To facilitate the development and implementation of industry plans by:

- inventorying existing programs and resources with the potential to reduce greenhouse gas emissions;
- where appropriate, provide collaborative support to facilitate a broad based industry dialogue, to contribute technical and analytic assistance, and to provide other assistance in the development of industry plans for early action;
- working cooperatively, wherever possible, to remove barriers and create new incentives for reducing emissions; and
- developing guidelines for early credit for qualifying reductions.

WHY PARTICIPATE:

Participating industries will be able to jump start their search for low cost reductions, benefit from federal support in such efforts, and be poised to help shape and take advantage of credit for early actions.

TIMETABLE:

Kick-Off Meetings with Initial Sectors	March-April
Plan Preparation	April-August
Initial Sector Plans Presented	September-November
Additional Plans and Implementation.....	November and beyond

ADDENDUM B: QUESTIONS FOR INDUSTRY*Draft: March 4, 1998***BACKGROUND**

- Describe the nature of the industrial sector. Include number and size of firms, industrial output and sales, overseas investments and exports, and a general description of the economic forecast for the industry including future sales and any projected changes in structure, technology or market position of the industry.
- Identify current sources of greenhouse gas emissions. Where possible, include estimates of baseline emissions and of projected future emissions. Also, specifically identify energy use (total and per unit of output).
- Discuss technological options for greenhouse gas reductions (e.g. energy efficiency or renewable energy). This would include an estimate of relative cost effectiveness of options identified. Options that sequester greenhouse gases may also be included here. Include existing activities, especially those in partnership with government, to reduce emissions of greenhouse gases.
- Explore ways to include labor and environmental group leaders (or other relevant parties outside the industry) in the process.

EMISSIONS REDUCTION GOAL

- Describe in detail the emissions reduction goal in relation to the Kyoto baseline, including the time frame for achieving the reduction. Identify which companies within the industry are cooperating to achieve the goal.
- Identify emissions reductions that would be possible before the first Kyoto budget period if credit for early action was available.
- Include an action plan showing the actions to be taken by industry and how the goal will be achieved.
- Identify barriers to achieving reductions and who might remove them. Include potential incentives to encourage reductions that could be created and who might create them. Focus on possible changes in government (Federal, state or local) practices or procurement.
- Identify long term R&D needs to achieve additional reductions in greenhouse gas emissions for the industry.
- Identify the impacts on competitiveness, productivity, jobs, further environmental benefits or other auxiliary outcomes from meeting the greenhouse gas emissions reduction goal.



White House Climate Change Task Force

734 Jackson Place, N.W. • Washington, DC 20503

October 31, 1997

TO: DISTRIBUTION

FROM: Dirk Forrister 

SUBJECT: Path forward based on recent outreach meetings

Over the past few weeks, I have arranged with representatives of the Assistant Secretaries working group on climate change meetings with three industries--air transport, cement, and steel--to discuss climate change policy. I am attaching detailed reports on these meetings for your review. Each contain a set of recommended "next steps" that Assistant Secretaries should consider at an appropriate future meeting. And each produced insights about low cost emission reduction potentials--ranging from 5 to 15%--for technology strategies in those sectors.

For the airline industry, the main issue is whether the Framework Convention on Climate Change (FCCC) should defer to the International Civil Aviation Organization (ICAO) in addressing greenhouse gas emissions from airplanes. At the United States' suggestion, the FCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA) has already agreed to defer the issue temporarily while it requests a report from ICAO on how greenhouse gases should be addressed. Even though the U.S. government has already moved in the industry's direction, the industry is advocating a complete exemption of aircraft emissions in the Protocol, believing that emissions are more properly addressed by ICAO and its aviation experts. To that end, they will craft language for our consideration that would refer emission limitation responsibility for aircraft greenhouse gas emissions to ICAO in a way that (1) assures that action will be taken; and (2) respects the provisions of international law regarding what parties from one treaty can impose/request of parties to another treaty. They also plan to consult with other countries and with ICAO on this matter. On a particularly encouraging note, they provided a MITRE Corporation study indicating that improved air traffic control, measures could reduce emissions by about 12% worldwide. We agreed to convene a future meeting to discuss this study after government experts have reviewed it.

For our cement industry consultations, we held an initial meeting with Holnam (America's largest cement manufacturer). Holnam believes that we could achieve a 5-15% reduction in cement industry emissions, while reducing costs, by using more cement substitutes. While there are numerous institutional and market barriers to increasing this utilization, there are a number of things that the federal government could do to reduce these barriers. EPA has already begun to work on this through its labeling and federal procurement programs. NIST is working within the American Society of Testing Materials (ASTM) cement committee on possible updated cement specifications to allow more substitutes. The Assistant Secretaries should discuss additional actions that other agencies could take to encourage the use of cement substitutes, particularly in public education and federal procurement.

The steel industry claims it could reduce its emissions 10% below 1990 levels by the year 2010 using voluntary programs, but they oppose mandatory programs. The Assistant Secretaries may want to consider further discussions about mechanisms (e.g., a la the 33/50 program under EPA's toxics programs) whereby the steel industry could make a voluntary commitment that would prompt significant action by this sector. The steel industry also had a number of suggestions for things the government could do. The Assistant Secretaries may be interested in following up on these as well.

I have received requests from a few other groups interested in briefing us on their ideas, but I know your time is very limited. I will be in touch regarding scheduling additional meetings, and I'll promise not to over-burden you.

Finally, I hope you can help me make sure that all of these ideas receive appropriate consideration. Thanks for your interest.

DISTRIBUTION:

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	Joe Romm	586-9260	586-9220
	Mark Mazur	586-9626	586-7700
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	David Gardiner	260-0275	260-4332
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NEC	Peter Orszag	456-2223	456-5358
	Bill Antholis	456-5334	456-2198
CEQ/NSC	David Sandalow	456-2710	456-6224

Meeting with Holnam, Inc.

September 5, 1997

Meeting Summary and Proposed Next Steps

Dirk Forrister welcomed the attendees from Holnam and several federal agencies. (See attached list of attendees.) Gary Sauer of Holnam presented background information on the cement industry and explained how CO2 emissions could be reduced by 5 to 15 million tons per year from the U.S. cement industry by using blended cement. Holnam is a U.S. company, held by Holderbank, a global company. Holnam is also in the business of providing cement blending materials such as flyash, slag and limestone.

Sauer said that other countries are doing much more blending than the U.S. He said the barriers are antiquated standards; fragmented markets; and conservatism. Sauer argued that policymakers need to create incentives for reducing CO2 emissions.

Gloria Jeff of FHWA said that the blended cement tends to take longer to reach maximum strength; and this can be an issue, especially in the construction industry. The price of blended cement is lower, but there is this tradeoff with setting up time, and quicker set-up times are important. She also said that all concrete uses some flyash--98 to 99% of concrete has some flyash. However, not much slag is being used because it is not widely available.

In Europe, the roads contain more substitutes and they are more durable, but they are rougher. FHWA is conducting a test case in Michigan using European road specifications. FHWA is willing to work with ASHTO to look at specifications for more flyash, and to try to get more research on optimizing strength, durability and set-up times. She is also willing to work on education and training of state highway personnel responsible for state specifications.

Jean Briskin suggested a performance based standard in lieu of a content based standard. Jeff said FHWA already has both performance standards and content standards. M.S. Chawla of the Navy said that the Navy already allows substitution of materials as long as the performance standard is met.

Geoff Frohnsdorff of NIST, and chair of the ASTM cement committee, said he has advocated broader cement substitution for its energy efficiency benefits for nearly 25 years. After decades of work, he expects a draft specification for blended cement to be out this year. He said the barriers to broader substitution are lack of familiarity and lack of data.

Briskin and Jeff pointed out that there are air quality benefits (in terms of Nox and particulates) as well as CO2 benefits to using blended cement, and that non-attainment areas have an incentive to look at blending. Judi Greenwald suggested that Holnam might want to quantify these benefits.

Mark Bernstein suggested that we might want to consult with the Construction and Building Subcommittee of the National Science and Technology Council.

Tom Rutherford of DOD said that they use a lot of blended cement in construction, so the set up

time is often not a problem. He suggested a federal task force to set up federal purchasing standards as well as a non government standards.

M.S. Chawla of the Navy suggested that we could require blended cement but allow waivers. Thus the norm would become blended cement, but there would still be an "out" when necessary.

Jean Briskin suggested that EPA could work with the cement industry on an energy star labeling program.

PROPOSED NEXT STEPS:

To follow up on meeting suggestions, the Assistant Secretaries climate change working group should consider appointing

1. EPA (Jean Briskin) could work with Holnam (Gary Sauer) on an Energy Star Labelling program and voluntary corporate commitment to reduce emissions. EPA could value Energy Star program benefits as credits under Clean Air Act State Implementation Plans. (See attachment.)
2. PUBLIC EDUCATION AND OUTREACH: FHWA (Gloria Jeff), OSTP (Mark Bernstein) and Holnam (Gary Sauer) could work with ASHTO and NSTCto :
 - develop an education and training program on blended cement for highways, housring and other applications
 - develop a model state specification aimed at increasing the amount of flyash in highway cement
 - develop a joint research program to optimize strength, durability, and set-up time for blended cement
3. FEDERAL PROCUREMENT: EPA (Jean Briskin); DOD (Tom Rutherford), GSA (?), and FHWA (Gloria Jeff) should develop an effective approach (e.g., an executive order) to encouraging agencies to purchase cement that meets the Energy Star labelling requirements to be developed by EPA.
4. NATIONAL STANDARDS: NIST (Geoff Frohnsdorff) should continue working with ASTM to develop a standard for blended cement that can be used by all of the other efforts.

Opportunities to Reduce Carbon Emissions Associated with Production and Use of Cement
September 10, 1997

1. Energy Star Concrete

EPA could label concrete that has low carbon content during its production and use. Low carbon content could be achieved by increasing the amount and frequency of use of mix-ins such as fly ash or slag. As is the case for all Energy Star products, the criteria would be set to assure that product performance was the same or better than non-Energy Star products. Energy Star labeling is an effective way to educate purchasers and the public about environmentally preferable products.

2. Energy Star Pavement

EPA could label pavement that has a high albedo -- reflects heat well. By reflecting rather than absorbing heat, Energy Star pavement could contribute to a reduced urban heat island effect. As part of a comprehensive set of Cool Communities Activities, Energy Star pavement would help slow the formation of ground level ozone (reducing local air pollution) while reducing energy needed for air conditioning in urban areas. The criteria would be set to assure that product performance was the same or better than non-Energy Star products, including assurance of driver safety through no increased glare. Energy Star labeling is an effective way to educate purchasers and the public about environmentally preferable products. EPA has already begun a Cool Communities effort, and is presently identifying communities who wish to test appropriate measures on a pilot basis.

3. Energy Star Pavement/Concrete Procurement Initiative

EPA could work with other federal, state and local agencies to assist them in specifying low carbon concrete and/or reflective paving surfaces through performance rather than content based specifications. EPA has much experience with using procurement initiatives to promote the use of environmentally preferable products by providing model procurement specifications and leveraging key actors to undertake mass procurements. Experience with the Energy Star Computers program has proven that a procurement initiative would be greatly assisted by an Executive Order for federal agencies to follow the procurement specifications where their performance criteria are met by the specified products.

4. Incorporate effects of Energy Star Pavement/Concrete into Clean Air Act State Implementation Plans (SIPs)

EPA has begun to work with states to improve the way in which energy efficiency and other measures are credited into State Implementation Plans (SIPs). By incorporating the effects of Energy Star Pavement /Concrete into SIPs, communities will have an increased incentive to accelerate their adoption of these environmentally preferable materials, because they can contribute to lower cost compliance with the National Ambient Air Quality Standards for ozone and particulate matter. Increased use of fly ash, blast furnace slag or other appropriate mix-ins reduces the combustion of fuel used to make clinker, thereby reducing the emissions of regulated air pollutants, while also reducing emissions of carbon dioxide. Increased use of reflective pavements can cool urban heat islands, slowing the formation of ozone and reducing the need for air conditioning, thereby allowing for more efficient use of electricity, and reducing emissions from power plants.

Sign In Sheet

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GARY BACHULA	DOC	202-482-1091	202-501-2492
GLORIA J. JEFF	DOT	202-366 2240	202-366 9676
Joe Canny	DOT	202-366-4540	366-7127
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Meeting with Air Transport Association and Air Industries Association
September 17, 1997
Meeting Summary and Proposed Next Steps

Dirk Forrister, the Chair of the White House Climate Change Task Force, opened the meeting and introductions were made. (See attached attendees list). The business representatives asked about the outreach effort, and Dirk Forrister described the Task Force's activities. Richard Kettler of the ATA began the substantive discussion. He explained that returning to 1990 CO2 emissions levels would require a 25% reduction in air traffic. He said the industry is looking for some recognition in the climate negotiations that ICAO (International Civil Aeronautics Organization) needs to be the only worldwide agency for setting aviation standards. ICAO has been around for almost 50 years; they should remain in charge. Howard Aylesworth from AIA pointed out that there are tradeoffs between NOx and CO2 and between environmental performance and safety that ICAO is able to address. He also said that fuel use per passenger mile has been steadily declining. Airlines have an enormous incentive to reduce fuel costs by improving fuel efficiency, regardless of climate change. ATA's counsel said that it is very important that the climate treaty not conflict with the Chicago convention, which sets up an international regime for aviation regulation and provides a process for ensuring that nations comply.

Jonathan Pershing of the State Department explained that the United States had successfully inserted language into the Subsidiary Body for Scientific and Technological Advice (SBSTA) at the August negotiating session in Bonn. The language says that Parties should work through ICAO and report to SBSTA. Pershing said that this will essentially defer the issue until ICAO reports back. The industry representatives said that while this language is helpful, it is not sufficient. The industry wants complete deference to ICAO. Pershing said that the Europeans would object to that, and there was a risk that if the U.S. raised this matter and it was explicitly rejected, the aviation industry would be worse off. Pershing also explained that there were many things the U.S. wants that no one else wants and that a provision such as the airlines are suggesting could simply become a negotiating target--i.e., people would object because we want it. Pershing suggested that the aviation industry work with their counterparts in other countries and see if they can find support for this.

Judi Greenwald asked what happens if we defer to ICAO, and then ICAO doesn't do anything. The industry representatives responded that the U.S. is a major player in ICAO and that we would work through ICAO to ensure action. Cindy Newberg of EPA said that ICAO is a consensus based organization and that they might not be able to move forward on this, even if the U.S. takes an aggressive stance. Greenwald also asked whether ICAO could do something prior to Kyoto that would give the climate negotiators confidence that they were actually moving forward on this. The industry representatives said that they would work on that. The U.S. Government's representative to ICAO, James Erickson, said that ICAO is aware of this issue.

Jim Conley of the IAM (representing labor) said that the workers are in agreement with the industry on this matter, and that we in the government need to keep the job implications of this treaty in mind as we move forward.

Jonathan Pershing also handed out and discussed a report, "Special Issues in Carbon/Energy Taxation: Carbon Charges on Aviation Fuels" by the Annex I Expert Group on the UNFCCC. He said that the report describes the difficulties inherent in raising aviation fuel taxes, and thinks the report makes it less likely that aviation fuel taxes would be adopted as a common policy and measure. The U.S. position is to oppose any common policies and measures.

At the close of the meeting, industry provided a brief summary of a "MITRE study" that finds substantial greenhouse gas reductions available from air traffic control improvements.

NEXT STEPS

1. The industry will work on Protocol language for our consideration that would refer emission limitation responsibility to ICAO in a way that (a) ensures action will be taken and (b) respects international law regarding what parties of one treaty can impose/request of parties to another treaty. The industry will also meet with their international counterparts to identify other countries who would support complete deferral to ICAO on aviation greenhouse gases.
2. The industry and the U.S. ICAO representative will try to get ICAO to report to the parties on its greenhouse gas activities prior to the Kyoto negotiating session.
3. NASA and FAA will provide their comments on the MITRE study (on the greenhouse gas reduction benefits of air traffic control improvements) to Dirk Forrister.
4. Dirk Forrister will hold a follow-up meeting to discuss the MITRE study.

Sign in sheet

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Meeting Summary

Thursday, September 25

Greenhouse Gas Reduction Opportunities in the Steel Industry

Continuing our outreach efforts on climate change, Agency representatives met with several member companies of the American Iron and Steel Institute (AISI). (See attached list of attendees). AISI requested the meeting to follow up on Bethlehem Steel's suggestions to the President regarding voluntary programs.

Dirk Forrister, Chair of the White House Climate Change Task Force, opened the meeting with introductions. Bruce Steiner made a presentation called "Global Climate Change and the Steel Industry." He said that this issue is important to steel. Steelmaking is energy intensive and largely coal-based (coal is not only an energy source but also a feedstock). The steel industry has made major investments in energy conservation, accomplishing a 45% reduction in energy consumption since 197, without decreasing production. But the pace of reductions is slowing and further reductions are more difficult to obtain. The economic consequences of climate change policy could be devastating to the domestic steel industry, based on studies by Argonne and ESI. The developing countries are major competitors for U.S. steel makers. 4 of the top 10 steelmaking countries--China, Korea, India, and Brazil--are not Annex 1 countries. The U.S. steel industry does not own facilities abroad.

The key issues for the steel industry are : (1) a global solution is needed; (2) maximum flexibility is needed (including voluntary commitments and recognition of progress to date; they applaud Administration's flexibility proposals, but have some questions); (3) taxes and energy reduction mandates should be avoided; and (4) science must lead policy.

The industry has already done a lot to reduce greenhouse gas emissions through more effective utilization of materials; improved energy efficiency in existing processes; other efforts such as Green Lights; development and implementation of new technology; employee and community awareness and education programs; and product-related remission reduction efforts (e.g., participation in PNGV).

THE OVERALL STEEL INDUSTRY EXPECTATION IS THAT THEY CAN ACHIEVE AT LEAST A 10% GREENHOUSE GAS EMISSION REDUCTION BELOW 1990 LEVELS BY 2010 THROUGH VOLUNTARY EFFORTS. This would be achieved through a wide variety of activities--from greater scrap utilization to fuel substitution to reducing plant traffic to replacement of existing units with more efficient new technologies.

AISI also pointed out that the government could do more. They want us to avoid overstatement of the science; work toward more cost-effective regulations; support electricity competition; promote voluntary programs; provide R&D assistance and incentives; promote CO2 sinks; promote joint implementation, technology transfer; and flexibility; promote energy efficiency labelling (taking into account materials and energy use over the whole life cycle); promote life-cycle analysis in procurement policies; develop safe, economical nuclear power; and

include all greenhouse gases.

Judi Greenwald of the WHCCTF commended AISI for their constructive suggestions regarding what the steel industry can do; as well as what the government can do. Denise Swink of DOE said that it is important to keep in mind that all of the technologies don't work all the time. She finds the estimate believable, and suggested that a few concrete examples of what technology has achieved in specific cases would be helpful.

Jean Briskin of EPA said that the steel industry could work with her office and/or DOE on labeling. She said another promising area would be the use of steel slags in cement. She also said that her office works on federal and state procurement guidelines for energy efficient equipment, and would like to work with the steel industry on this. Judi Greenwald asked whether EPA was working on life-cycle labeling in terms of materials, and Jean said no. Bruce Steiner said that the International Iron and Steel Institute is doing a study on life cycle analysis. Jean said that recycled content labelling would also have potential benefits. Jean also said that the federal advisory committee on clean air, energy and climate might be a useful forum for these ideas.

Denise Swink pointed out that in many states cogeneration facilities have one-stop permitting, which is a big advantage. Diane Regis talked about the Common Sense Initiative, where all the stakeholders have learned that technology is the key. The NGO participants would support targeted investment tax credits. Chuck Carson of USX said that it is important to keep in mind that for many years the steel industry wasn't profitable. Now they've done the hard work and sacrifice to become profitable again, but there still isn't enough capital to do all the things everyone wants them to do. Diane thinks CSI has had some success in raising the level of appreciation for these capital issues, and for things like plantwide performance standards. Diane also pointed out that there is a continuum between voluntary and regulatory approaches; it's not a purely either/or choice.

Judi Greenwald explained that she would be putting together a more detailed path forward as a result of this meeting. She asked for suggestions from Jean Briskin, Denise Swink and Diane Regis, and from AISI (if they decide they have anything more to add).

NEXT STEPS:

1. EPA (Jean Briskin) and/or DOE (?) could work with the steel industry on labelling (including of recycled content, encouraging the use of steel slags in cement; and on federal and state procurement guidelines for energy efficient equipment.
2. EPA (Diane Regis) could work with the steel industry through the Common Sense Initiative on one-stop permitting, investment tax credits, and plantwide standards.
3. DOE (Denise Swink) could work with the steel industry on coming up with illustrative real-world examples of the benefits of technology.

Opportunities to Reduce Carbon Emissions Associated with Production and Use of Steel

September 30, 1997

1. Label Star for Recycled Content

Using steel scrap consumes less energy and lowers the cost of producing new steel. EPA could label products made from steel (i.e. appliances) that contain a certain specified level of recycled material. Labeling can be an effective way to educate purchasers and the public about environmentally preferable products. Need to research current status of labeling efforts in this area.

2. Energy Star Steel Procurement Initiative

EPA could work with other federal, state and local agencies to assist them in specifying high efficiency equipment. This equipment could include motors which use a higher grade of steel that is more efficient and therefore uses less energy and emits less CO₂ into the atmosphere. EPA has considerable experience with using procurement initiatives to promote the use of environmentally preferable products by providing model procurement specifications and leveraging key actors to undertake mass procurement. Experience with the Energy Star Computers program has proven that a procurement initiative would be greatly assisted by an Executive Order for federal agencies to follow the procurement specifications where their performance criteria are met by the specified products.

3. Incorporate effects of Energy Star Steel into Clean Air Act State Implementation Plans (SIPs)

EPA has begun to work with states to improve the way in which energy efficiency and other measures are credited into State Implementation Plans (SIPs). EPA can work to understand the relationship between energy efficiency and air quality in steelmaking to assure appropriate accrediting of efficiency improvements undertaken by the industry. Mutually agreed upon measures may provide an increased incentive for the industry to accelerate their adoption of energy efficiency measures because they can contribute to lower cost compliance with the National Ambient Air Quality Standards for ozone and particulate matter..

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Steel industry leaders pose plan for

Y PAT GRIFFITH
ADE WASHINGTON BUREAU

Group seeks increased U.S. investment in research

WASHINGTON — Two months before the Kyoto conference on global warming, Charles Carson, a president of USX, and several of his industry colleagues sat down with administration officials at the White House.

Only a few years ago, their mission would have been unthinkable. But on this mild Thursday in late September, what they had to say was merely improbable.

What the steel company executives dropped on the table was the industry's voluntary plan for achieving a 10 per cent cut in its emissions of greenhouse gases from 1990 levels by the year 2010.

It would be accomplished through continuing improvements in steel processing technology and more efficient use of energy, without any mandates imposed by government. The industry leaders did not mention anything from Washington, however: more federal investment in research and development, along with tax incentives to help spur new energy-efficient technologies.

The group, which included top executives from Bethlehem Steel, Inland Steel, North Star, and LTV, urged the Clinton administration to sign onto an agreement in Kyoto that would put binding limits on U.S. emissions while allowing other steel-producing countries as far as China, South Korea, India, Mexico, and eastern Europe to operate without restrictions.

They were warmly received by administration officials, only to be subsequently disappointed by what came out of Kyoto. They were dismayed that the United States agreed to reduce its output of greenhouse gases 7 per cent below 1990 levels by 2012 without any commitment, so far, from developing nations to curb their soaring output of carbon dioxide.

The White House has announced it does not expect to send the proposed treaty to a currently lame Senate for ratification until sometime in 1999, and then only if the rapidly industrializing countries that were excluded in Kyoto make "meaningful commitments" to reduce polluting emissions.

In the meantime, it is working

on details of a \$5 billion package of tax cuts, research and development grants, and other incentives that President Clinton is expected to reveal in his State of the Union address in late January.

"We were disappointed," Mr. Carson said last week, citing in particular the failure of U.S. negotiators to bring China and other developing countries into the proposed accord. Mr. Carson, USX vice president for the environment, also chairs the global climate task force of the American Iron and Steel Institute, the industry's trade association.

New figures released by the Institute on Friday show that while U.S. steel exports through October are running 17.4 per cent higher than the same 10-month period in 1996, steel imports are also on the rise, up 13.8 per cent over a year ago.

The most dramatic jump has been in imports from Russia, up 201 per cent over a year earlier. That was enough to catapult Russia to third place behind the European

Union and Canada for steel exports to the United States, putting it ahead of such traditional U.S. competitors as Mexico, Brazil, Japan, and Korea.

Overall sales by U.S. steel manufacturers are running about 3 per cent ahead of 1996, continuing an upward trend that should put total sales close to \$36 billion for the year.

Although the European Union, Canada, and Japan will be bound by the global warming treaty if they ratify it, the other countries are presently excluded. If they remain outside the agreement, they will be able "to operate under much less stringent laws and conditions than we do here," Mr. Carson said, "which will give them an additional competitive advantage on a global basis."

While making known its strong objections to the unfinished treaty that emerged from Kyoto, the Iron and Steel Institute is not backing away from its offer to achieve a self-set goal of 10 per cent in emissions reductions by 2010 if the

domestic political and economic climate is agreeable. From the industry's vantage point, the no punitive "carbon tax" it forces up steel prices by more a ton, and no mandate from Washington that outpaces or even thwarts the production of new technology.

It is the high cost of energy, rather than another global warming as such, propelling the steel industry to the forefront of environmentally friendly innovation.

Bruce Steiner, vice president of energy and environment at AISI, notes that energy represents 15 per cent of the cost of steel production. Since 1975 the industry has reduced its energy consumption by 45 per cent while, through the throes of mass organization and downsizing, has transformed it into a global pace-setter.

Mr. Carson readily ticks off a dozen efforts USX has undertaken to cut energy costs and raise efficiency. They range from co-

10% cut in emissions

tax incentives

tion and recycling of gases generated during the production process to more efficient furnaces and burners and much greater use of recycled steel and waste metallic particles. All these changes have the corollary advantage of reducing the greenhouse gases spewing into Earth's atmosphere.

In 1996, USX and Westinghouse Corp. shared honors as "corporate partners of the year" in the Department of Energy's "Green Lights" program that encourages businesses and industries to adopt more efficient lighting systems.

While the environmental kudos were welcome, the really "pleasant surprise" for USX, Mr. Carson said last week, has been the \$2 million to \$3 million in annual savings on utility bills the sprawling corporation has achieved since putting in new fixtures and operating procedures and switching to low-energy fluorescent bulbs.

All it takes is getting a "committed group of people" involved, he commented, and "they find these little nuggets [of savings] all over

the place.

"We're delighted by what the steel industry is doing," said Joe Romm, principal deputy assistant secretary of energy efficiency and renewable energy, following a panel hosted by environmental groups last week on the outcome of the Kyoto conference. "Clearly if the steel industry thinks it can do a 10 per cent reduction by 2010, that's a big deal, and it's something we're going to hold up as an example for other major energy-users. ... We're very bullish on what they say they can do."

While steel company executives say they can adapt to a "flexible" program for reducing emissions and remain globally competitive, the coal industry is digging in for what it is portraying as a life-or-death struggle against mandated reductions in the use of carbon-based fuels.

The Kyoto agreement is "the death knell for the coal industry," John Grasser of the National Mining Association protested last week. "There's no doubt that it has the potential to wipe out the U.S. coal industry."

TOUCO B. 12/22/97
M. MULLEN, R. DUNAP

**GLOBAL CLIMATE CHANGE:
TECHNICAL ASSESSMENT OF NEEDS
AND ISSUES**

**Prepared by the staff of
The Aluminum Association
900 19th Street, N.W.
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February 2, 1998

Global Climate Change: Technical Assessment of Needs and Issues

Background

In October 1996, then Secretary of Energy Hazel O'Leary and David Parker, president of The Aluminum Association acting on behalf of the aluminum industry, signed a collaborative agreement to work together under the Industries of the Future Program. This industry-led partnership enables the aluminum industry and the federal government to align their R&D efforts to achieve common objectives. The partnership focuses on the development of precompetitive efforts in the general areas of process, health and safety, enabling technologies, and the growth of new applications for aluminum.

In outlining its long-term vision, the industry established a goal "To maintain and grow the aluminum industry through the manufacture and sale of competitively priced, socially desirable and ecologically sustainable products."

Under the sponsorship of The Aluminum Association's Technical Advisory Committee, the industry worked collaboratively with stakeholders from the government, the national laboratories, the academic community and consultants to establish a technology roadmap for the next 25 years. Following a workshop in November 1996, the association published an Aluminum Roadmap Workshop Report in February 1997, and a more conventional Technology Roadmap in May 1997.

Technology Roadmap - Key R&D Activities

The production of aluminum utilizes an electrolytic process which is energy intensive. In fact, electricity accounts for about one-third of the cost of production and is one of the primary factors in product affordability. It is not surprising, therefore, that one of the key long-term issues identified in the technology roadmap is the development of technologies to reduce the amount of energy required to produce a kilogram of molten aluminum. This, in turn, would result in lower emissions of greenhouse gas, i.e. carbon dioxide. Specifically, the roadmap establishes an energy target of 11kWh/Kg (5kWh/LB) for the production of aluminum by the year 2020.

To achieve this target, it was envisioned that the industry would require improved process sensors, better models for cell operation and control, improved materials for cell insulation, and advanced anode and cathode technology which could be retrofittable into existing potlines. In fact, the development of an inert anode and/or a wettable cathode was considered the most critical.

Global Climate Change: Technical Assessment of Needs and Issues

Inert Anode Technology Workshop

The successful development of an inert anode technology would have other major benefits: it would eliminate the need to process carbon anode materials, which has related environmental issues, and it would eliminate the formation of PFCs during anode effects.

Adopting the format of a facilitated workshop, the association convened a panel of experts on December 11, 1997, to define the critical R&D needs for inert anode technology. A draft workshop report will be available in late January.

This report will define the key criteria for a successful anode material as well as establish a step by step program for the development of inert anode technology. The workshop participants concluded that once a program was started, the successful demonstration of inert anode technology could be achieved somewhere in a time frame of 9 to 14 years.

Wettable Cathode Technology

The development of a wettable cathode material is the other major advancement that would significantly improve the energy efficiency of aluminum smelting, and, hence impact global climate change. The cathode can be made wettable by the incorporation of refractory hard materials such as titanium diboride, TiB₂, into its structure. This can be achieved either as a monolithic or composite material. Such a material would enable the development of cell designs incorporating drained cathodes where the molten metal pad could be eliminated, the anode cathode distance significantly reduced without any adverse effect on current efficiency, and the energy efficiency improved.

Building on earlier work first by Kaiser and later by Martin Marietta Aluminum, it now appears that Comalco has made major progress in the development of advanced cathodes. It is understood that Comalco has achieved successful operation of low energy cells through the use of cells containing TiB₂ cathodes. No information is yet available on the economics of this development.

In the discussions of inert anode technology outlined above, the anode development was considered as a separate entity. However, it is likely that the cathode technology will precede the anode developments, and that some combined novel cell design will be possible. It has been estimated that the combination of a successful inert anode with a drained cathode technology could result in an energy efficiency improvement of approximately 25%. This would enable the industry to reach the roadmap target of 11kWh/Kg (5kWh/LB). Operation of this type of cell would also eliminate the formation of greenhouse gases, such as CO₂, CF₄, and C₂F₆.

Global Climate Change: Technical Assessment of Needs and Issues

A Potential Roadmap for Automotive Technologies

Based on the understanding that the industry/government partnership can result in the successful definition of integrated R&D plans, the Department of Energy, through its Office of Transportation Technology, is now requesting the development of a more specific technology roadmap for aluminum automotive applications.

This can be undertaken using the same workshop format. It will require the convening of several groups of technical experts in areas such as sheet formability, joining, simulation and modeling, design, etc., to define a roadmap. The Aluminum Association's Auto and Light Truck Committee endorses this activity. It is anticipated that the Auto and Light Truck Committee, working with the Department of Energy and USCAR, will sponsor this effort.

The use of increasing quantities of light weight aluminum in automotive applications could have a major beneficial impact on efforts to reduce the production of carbon dioxide from cars. An industry-wide program to address the increasing amounts of automotive scrap and its separation should also be developed.

The Need for Metrics

These potential developments, together with the debate on global climate change, underscore the need for a system of metrics to measure the energy efficiency of our processes and the environmental burdens created during production operations. In this regard, the study being conducted by the Life Cycle Task Force will be most timely in providing a comprehensive baseline of the present status of the industry.

Under Co-Chairs Ken Martchek (Alcoa) and Steve Pomper (Alcan), this task force has almost completed its life cycle inventory; only a peer review of the methodologies remains to be conducted. The analysis will provide the most comprehensive data base yet produced on energy and environmental issues for the industry from bauxite mining through the production of ingot and rolled and extruded products. It includes information from 10 companies and some 213 process/location sites out of a possible 253 sites.

Another excellent source of information concerning the industry is the recent publication by the Department of Energy entitled "Energy and Environmental Profile of the U.S. Aluminum Industry," which was published in July 1997.

Global Climate Change: Technical Assessment of Needs and Issues

Concluding Remarks

To date, two conclusions are apparent:

- The Industries of the Future Partnership has provided a vehicle for the precompetitive collaboration and definition of generic technology needs. A focused, long-term R&D agenda is emerging and is supported by the DOE.
- With the light weight and other properties of aluminum, the industry appears to have great potential to provide solutions to societal needs relating to climate change.

Government and industry efforts to address Global Climate Change should not be focused only on extending the limits of existing technologies. All industries should assess the theoretical limits of technological changes that could be made in their operations. In the aluminum sector, direct reduction of bauxite or a continuous smelting process are examples of revolutionary technologies that should be explored.

Politics**The New York Times**
ON THE WEB

February 5, 1998

Project Goal: Better Light-Truck Gas Mileage

By MATTHEW L. WALD

WASHINGTON -- The Clinton administration announced a research effort with automotive companies Wednesday to improve sharply the fuel economy of sport utility vehicles, pickup trucks and minivans, using techniques borrowed from the Pentagon.

Secretary of Energy Federico Pena said the goal would be to increase by 50 percent by 2004 the number of miles that these so-called light trucks can travel on a gallon of gasoline or diesel. With sales of light trucks rising quickly, improved fuel economy for them would conserve energy while curbing emissions of carbon dioxide, the main gas linked to **global warming**.

The plan announced Wednesday involves government work in partnership with the Big Three automobile companies and seven regional consortiums of component manufacturers and high-technology start-up companies.

The Energy Department and the Transportation Department will take over a research program on medium- and heavy-duty vehicles from the Defense Department. The research into heavy trucks will continue, with the goal of doubling the gas mileage of 18-wheel trucks. The military has already developed a Humvee that can go twice as far as previous models on a gallon of fuel, with better acceleration, quieter operation and less pollution.

"It's important for us to focus on light trucks and heavy trucks," said Pena, who said trucks were the fastest-growing segment of the transportation business. Gasoline consumption by cars is projected to show little change through 2020, while light-truck consumption of gasoline is expected to rise steeply, according to a chart that Pena displayed.

The new research effort into light trucks was mostly put together in the last two months, in response to rising sales of light trucks and growing public interest in them, federal officials said.

The government defines sport utility vehicles, pickup trucks and minivans as light trucks, though minivans and a few sport utility vehicles are actually based on car designs.

The administration has asked Congress for \$50 million for truck research, to be matched by at least \$50 million from the auto industry. But if Congress rejects that request, the administration plans to conduct light-truck research anyway, on a smaller scale. The auto industry has said it would only produce high-mileage vehicles if they

can be made for a price consumers would pay.

According to the Energy Department, about 2 million of the approximately 9.5 million barrels of fuel used daily for highway vehicles goes into trucks and buses, and nearly 3 million into "light trucks," many of which are household vehicles.

The United States agreed at an international conference last December in Kyoto, Japan, to curb its man-made emissions of carbon dioxide and other gases that are believed to contribute to **global warming**. According to a research paper last autumn by an Environmental Protection Agency official, light trucks will account for the biggest increase in so-called greenhouse gas emissions by the United States over the next two decades.

The new program is meant to do for heavier vehicles what the Partnership for the Next Generation Vehicle, begun four years ago, is expected to do for cars. That program, undertaken by the government, with Ford Motor Co., Chrysler Corp. and General Motors Corp., is meant to develop by 2004 a production-ready prototype of a five-passenger car that would get up to 80 miles a gallon with no sacrifice in safety, performance, convenience or cost.

The new research effort and the existing Next Generation partnership are likely to use similar technologies. The main one, demonstrated in the Humvee, involves switching from an internal-combustion engine to a hybrid system, in which a small engine, running on gasoline or diesel fuel, operates steadily to run an electric generator, and charge batteries or feed drive motors on the wheels.

When the vehicle needs extra power, it draws it from the batteries, and when it needs no power, for example, when it has stopped, the internal combustion engine keeps running to feed the batteries. Because the engine runs at nearly constant speed, it is cleaner and more efficient.

The Humvee, built by PEI Electronics, an independent company spun off by Chrysler earlier this year, will go approximately 18 miles on a gallon of diesel fuel instead of nine; accelerates from 0 to 50 miles an hour in seven seconds instead of 14, and can climb a 60 percent grade at 17 mph instead of six mph. It can also run 20 miles on batteries alone, which suits the Pentagon's needs, because in that mode it is nearly silent and is also hard to find with a heat-detection system.

Advanced Vehicle Systems of Chattanooga, Tenn., showed off a 22-foot hybrid electric bus at the press conference here, with a turbine that runs on natural gas for recharging the batteries. It has greatly reduced emissions of the pollutants that cause smog and the ones linked to **global warming**.

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Mini-Vans and Maxi-Polluters ^{P20}

LAST MONTH the Ford Motor Co. sold 11.4 percent fewer cars than during the previous December. But it sold a record number of sport-utility vehicles, pickup trucks and mini-vans—183,342, a 2.1 percent increase. Those figures are typical of what's going on throughout the auto industry: Sales of sport utility vehicles and mini-vans are soaring, to the point that they constitute almost half of all vehicles sold. That's good news for Ford and its Detroit competitors, which make huge profits on these "light trucks" and very small profits, or none at all, on smaller cars.

But what's good for the balance sheets of Ford, General Motors and Chrysler isn't so good for the environment. A typical sport utility vehicle or mini-van emits far more nitrogen oxides, the chief cause of smog, than even a full-size sedan. It also uses far more gasoline per mile and therefore emits far more carbon dioxide—a chief cause of global warming. And this isn't a question of making merely a marginal difference to the environment. Already in 1992, American cars and light trucks alone produced more carbon dioxide than all but three other countries of the world produced in total—with their industry, power plants and everything else thrown in. So Americans' growing taste for sport utility vehicles, and those vehicles' ever-growing size, will have a major impact on the environment, as well as on the nation's oil-import bill.

It might seem obvious that heavy vehicles like the Chevrolet Suburban or Lincoln Navigator would pollute more than cars. Pickup trucks originally were built sturdy so they could carry and tow loads for farms and businesses. As their appeal has broadened to families—which now account for 80 percent or more of sales—they're being given the souped-up engines and other features that consumers want for commuting and highway driving.

But these vehicles pollute more not just because they're heavy but also because car makers haven't tried very hard to make them more efficient. And they haven't tried very hard because the govern-

ment hasn't given them any incentive to do so. Federal standards allow most "light trucks," as mini-vans and sport utility vehicles are officially labeled, to emit more smog-causing agents than even big cars. Manufacturers are held to a far lower standard of fuel efficiency—and the biggest Suburbans and pickup trucks now are so big that, crazy as it sounds, they have graduated from having to meet any standards at all. Light trucks aren't hit with the gas-guzzler tax consumers must pay if they buy cars that get less than 22.5 miles to the gallon—even though few sport utility vehicles meet that standard.

These anomalies in regulation stem from the 1970s, when fuel-efficiency and pollution standards were first legislated. Back then, light trucks were a small part of the market, used mostly in agriculture and commerce. Now that they are becoming the suburban vehicle of choice, the exceptions don't make much sense.

The argument here isn't to deny consumers the right to buy mini-vans, or to sneer at people who buy monster four-wheel-drive vehicles even though they never drive off-road. By all means, let manufacturers build the vehicles people want to buy. But why should car buyers pay more toward a clean environment than light-truck buyers? More to the point: Why shouldn't manufacturers be encouraged to work toward the same progress in light trucks as they've accomplished during the past two decades in cars?

For several years now, engineers in the environmental community have argued that car makers could make light trucks more efficient without great cost, if given sufficient lead time. Ford's welcome announcement this week that beginning next year it will produce light trucks that emit far fewer smog-causing agents, and Chrysler's matching pledge, tend to confirm that view. If the government would provide some incentives to improve fuel efficiency, we don't doubt that the manufacturers could make great strides in that department, too—and help the United States do its part to reduce global warming.

Breaking News
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October 14, 1997

Toyota Introduces Gas-Electric Car

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Filed at 3:36 p.m. EDT**By The Associated Press**

TOKYO (AP) -- Toyota Motor Corp. rolled out the world's first gasoline-electric hybrid car Tuesday, promising double the mileage of gasoline engines and half the tailpipe emissions.

Toyota's determination to be the first out with a hybrid is a sign of its financial might as well as its aggressive drive to promote its brand worldwide.

The car is only being sold in Japan, but Toyota President Hiroshi Okuda said the company would consider selling it in the United States after six months. All major automakers, including Detroit's Big Three, are working on some type of hybrid.

Toyota has priced the Prius (pronounced PREEH-us), a four-door small sedan, at about \$17,700. Analysts say the company will lose money on the car, but Okuda said the company wants regular people driving the cars. Toyota says it plans to sell 1,000 hybrids in the first month, starting Dec. 10.

At lower speeds when tailpipe emissions are high, the car runs only on electricity. It then automatically switches to gasoline after it picks up speed. The gasoline engine also recharges the batteries and uses conventional gas.

Typical electric cars need to be recharged after 120 miles.

In tests by Toyota, the Prius got as much as 66 miles a gallon and recorded only half the carbon dioxide output of a regular gasoline engine while trimming other tailpipe emissions by about 90 percent.

The Prius is about 330 pounds heavier than a typical sedan. Half that weight is from the battery.

Ed Brogan, auto analyst with Salomon Brothers in Tokyo, said Toyota is more interested in image-boosting than big sales because it cannot produce many more

than the target of 1,000 a month.

"It can cloak itself in the mantle of an environmental leader," Brogan said.

In Japan, Toyota has been losing market share to Honda Motor Co., which has a reputation for technological innovation. Toyota also has ambitions to expand its tiny share of the European market.

"If you see the losses as an advertising expense to boost Toyota's image, it's worth it," said Hideaki Aonuma, an auto analyst for Societe Generale Securities in Tokyo.

"Being the first out with a product in the world has tremendous impact."

In December, Toyota plans to show off the Prius at an international conference in Kyoto on global warming.

The Japanese government is considering offering tax breaks and other subsidies for the hybrid, as it did with the electric car, which will make the Prius even more attractive to buyers.

Both Honda and Nissan Motor Co. have recently disclosed their own hybrid technology and say they plan to put a hybrid car on the market in the next year or so.

"There is a fear that Toyota may get to our customers first," said Masato Fukino, an engineer in the new technology section at Nissan.

Audi, the luxury division of Volkswagen, had planned to put out a diesel-electric hybrid this year, but recently postponed it to April 1998. The Audi hybrid will be limited in production and cost about \$34,000.

James Hall, an auto analyst in Detroit with AutoPacific, said the success of the hybrid with buyers remains to be seen, although there was an advantage to being first.

"By having the hybrid out there, Toyota can learn more about what people like or don't like about the car," Hall said.

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Subject: Detroit Turns a Corner

Date: Sun, 11 Jan 1998 19:07:00 -0500 (EST)

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New York Times - Editorial

Sunday, January 11, 1998

Detroit Turns a Corner

For anyone worried about global warming, last week's most heartening news came from an unlikely source -- the North American International Auto Show in Detroit. All three auto makers announced that they were nearing production of marketable cars that

will

rely less on gas-burning engines and more on exotic power sources like fuel cells. Because conventional engines account for one-third of America's output of carbon dioxide, the main global warming gas, this was a revelation of potentially enormous significance.

It was also, in a way, amusing, or so it must have seemed to President Clinton. Mr. Clinton has placed a heavy bet on the proposition that American technological know-how can counter the global warming threat at relatively low cost. For this he has been soundly bashed by the

auto

makers, the producers of coal and oil and other industries that spent millions of dollars last year belittling the threat of global warming

and

Clinton

warning that any serious effort to fight it, like the treaty Mr.

agreed to in Kyoto, Japan, would bankrupt the American economy. Yet here were some of the President's fiercest critics tripping over one another to tout their "green" cars and, in the process, suggesting

that Mr.

Clinton's faith in technology may not be misplaced.

the

Al Gore could also be forgiven a smile. In his 1992 book, "Earth in

his

Balance," the Vice President called for "eliminating" the internal combustion engine in the next 25 years -- a comment that reinforced

the

reputation in some circles as a dangerous thinker. Yet right there at

century

auto show, the chairman of the General Motors Corporation, John Smith, stated flatly that "no car company will be able to thrive in the 21st

Detroit-watchers,

if it re-lies solely on internal combustion engines." To

this seemed an epiphany,

historical

To anyone who has followed the big environmental struggles of the past quarter-century, Detroit's change of tune fit neatly into a familiar

who

pattern. There has always been a big gap between industrial leaders

out a

say they cannot do something and their engineers, who usually figure

way to do it. Before Congress passed the 1970 Clean Air Act, Detroit

argued that significant pollution reductions would be utterly impractical or prohibitively expensive. Then along came the catalytic converter that, at modest cost, eventually cut harmful tailpipe emissions by 95 percent. Likewise, the oil companies predicted economic doom when Congress mandated cleaner fuels in 1990. Their chemists, however, have since managed to produce such fuels without disturbing profits.

As the record suggests, American industry is not known for spontaneous acts of environmental virtue. But it will respond to timely regulation and commercial realities. One such reality is that Japan is moving quickly to develop low-emission cars. The Japanese caught Detroit flat-footed with their small cars during the oil-price shocks in the 1970's, and Detroit clearly does not wish to be left behind again. In this case, the Federal Government has become an active partner rather than a regulatory adversary. Many of the latest innovations have emerged from the Partnership for a New Generation of Vehicles, into which Washington has poured nearly \$400 million over the last four years.

One question now is whether the auto makers will continue to oppose the Kyoto treaty. The comment by G.M.'s Mr. Smith suggests that Detroit is beginning to see itself as a critical part of the eventual solution to global warming. If true, that would be the most hopeful news of all from the automobile show.



GENERAL MOTORS CORPORATION

General Motors Building, Detroit, Michigan 48202

NEWS

For Release Immediately, Tuesday, January 13, 1998 **Contact:** Greg Elliott
(313) 556-3214

GENERAL MOTORS VICE CHAIRMAN ADVOCATES BALANCED APPROACH TO OUR SHARED ENVIRONMENT

DETROIT -- Last night in a keynote speech to the 1998 *Automotive News* World Congress, General Motors Vice Chairman Harry Pearce called upon environmental and industry leaders to seek innovative solutions to address global-warming concerns that balance both environmental and economic interests.

Pearce acknowledged that while the debate continues within the scientific community on the global-warming issue, General Motors has concluded that there is enough data on global warming to have cause for concern and that the company accepts certain responsibilities with respect to its products and manufacturing processes. Pearce, however, cautioned leaders from overreacting to these concerns.

"We know people care deeply about the environment ... and are willing to make personal financial sacrifices to protect our shared environment," Pearce said. "Unfortunately, if we act precipitously, the economic costs could go well beyond most people's ability to pay, regardless of their commitment to the environment."

Pearce stressed that the effort to reduce emissions levels is more likely to succeed when driven by innovation, not regulation, but that the government can and should play a significant role in enabling the framework for the market to succeed

"Government can serve as a catalyst providing leadership and incentives, educating the public, creating rational tax and regulatory policies and supporting long-term research efforts," Pearce said. "In the end, however, corporate responsibility and resolve, not government regulations, will find the answers needed to protect the environment, and, in the process, business will prosper for having done so."

- more -

Underscoring his point, Pearce referred to General Motors' announcement last week at the North American International Auto Show that the company would have a production-ready hybrid by 2001 and a production ready fuel-cell vehicle by 2004.

"We do not believe that meeting market demand and protecting the environment are mutually exclusive goals," Pearce said. "As our chairman, Jack Smith, has often said, 'environmental success is critical to business success.'"

Pearce also pointed to the improvements the automotive industry has made in the last 25 years in increasing fuel-efficiency and reducing emissions.

"Fuel efficiency for GM cars has gone from an average 12 miles per gallon in 1974 to an expected 28 miles per gallon in 1997, while emissions have dropped a remarkable 96 percent for hydro-carbon and carbon monoxide and 90 percent for nitrogen oxides," said Pearce. "Fuel efficiency for GM trucks has gone from 11 miles per gallon in 1974 to an expected 20 miles per gallon in 1997, while emissions have dropped by 96 percent for hydro-carbon and carbon monoxide and 81 percent for nitrogen oxides."

According to Pearce, General Motors' new full-size pickups, the Chevy Silverado and GMC Sierra, along with their full-size sport utility derivatives are equipped with a more powerful engine, but also offer improved fuel economy and lower emissions than its predecessors'.

Technology, Pearce noted, can do much more than create new products. It also can create cleaner and more energy-efficient processes as well, from recycling to resource conservation.

"As a company, General Motors is committed to environmental leadership around the world in the development of our products and the operations of our facilities, and we will continue to use our unique talents and our international scope to promote global sustainable development."

However, Pearce commented that General Motors can't do it alone. Referring to the recent Kyoto environmental agreement, Pearce pointed out that the chasm that separates developed and developing nations on global warming is wide and very difficult to cross.

"By the end of the next century, the developing nations will account for 75 percent of all greenhouse gas emissions, and while we applaud the sincere efforts ... to find common ground, we remain committed to the principle that climate change is a global problem that demands a global solution."

Pearce concluded his remarks with a call to industry leaders to protect both the environmental and economic futures of the planet and future generations to come.

"If we act wisely and decisively, the shining blue marble that brought tears to the eyes of our first astronauts won't lose its luster nor will its inhabitants lose their dreams for healthy and prosperous lives. At General Motors, we believe that is a legacy worth leaving."

###

Transcripts of the speech are available upon request.

General Motors Vice Chairman, Harry Pearce

1998 Automotive News World Congress Speech

THANK YOU, KEITH, FOR THOSE KIND WORDS. AS THE HOLIDAY SEASON ENDS AND WE COMMENCE A NEW YEAR, I AM HONORED TO BE HERE TONIGHT TO PARTICIPATE IN WHAT HAS BECOME ONE OF OUR INDUSTRY'S MOST IMPORTANT GATHERINGS.

MANY OF YOU PROBABLY TOURED THE AUTO SHOW LAST WEEK. I CERTAINLY HOPE SO. IT'S A GREAT OPPORTUNITY TO SEE NOT ONLY TODAY'S AUTOMOTIVE TECHNOLOGY AND DESIGN, BUT THE "WORLD OF EXCITING IDEAS" THAT WILL TAKE US INTO THE NEXT CENTURY.

WHAT I'D LIKE TO TALK TO YOU ABOUT TONIGHT IS ONE OF THE CRITICAL DETERMINANTS OF OUR INDUSTRY'S FUTURE IN THAT NEXT CENTURY -- THE ENVIRONMENT.

BUT BEFORE I DO, I'D LIKE TO TAKE YOU BACK TO THE PAST FOR JUST A MOMENT. BACK TO ANOTHER HOLIDAY SEASON ALMOST 30 YEARS AGO -- CHRISTMAS, 1968, WHEN THE WORLD, AS WE KNEW IT, CHANGED FOREVER.

HUMANS, FOR THE FIRST TIME, SAW THE EARTH FROM THE VISTA OF THE MOON, AS THE ASTRONAUTS OF APOLLO 8 MADE THEIR HISTORIC ORBIT OF THAT DISTANT SATELLITE. LOOKING AT THE EARTH THROUGH THEIR EYES, WE SAW OUR WORLD AS A SHIMMERING BLUE MARBLE SHINING IN THE VAST DARKNESS OF SPACE -- BEAUTIFUL AND PRISTINE FROM 240,000 MILES AWAY -- PROTECTED ONLY BY ITS SEEMINGLY FRAGILE ATMOSPHERE.

BUT THIS ISN'T THE FIRST TIME THAT WE'VE BEEN CHALLENGED TO CHANGE THE WAY WE VIEW OURSELVES AND THE UNIVERSE IN WHICH WE LIVE.

WHEN COPERNICUS ASSERTED IN 1514 THAT THE EARTH WAS NOT THE CENTER OF THE UNIVERSE, HE SPARKED A REVOLUTION. INQUISITIVE SCIENTISTS OF THE TIME STORMED THE INTELLECTUAL BARRICADES OF CONVENTIONAL THINKING AND SET ABOUT EXPLAINING THE WORLD AROUND THEM BY OBSERVATION AND EXPERIMENTATION.

IN ESSENCE, THAT'S WHAT WE'RE TRYING TO DO TODAY AS SCIENTISTS STRIVE IN NEW WAYS TO UNDERSTAND THE COMPLEX ISSUE OF GLOBAL CLIMATE WHICH IS RAPIDLY BECOMING ONE OF THE GREAT CONTROVERSIES IN HUMAN HISTORY. UNLIKE THE OUTCOME OF EARLIER DEBATES, HOWEVER, THIS TIME THE WORLD MAY FACE POSSIBLE CATASTROPHIC CONSEQUENCES THAT KNOW NO BORDERS; AND, FOR THOSE OF US IN THIS ROOM, THE

**SECTOR EMISSIONS AND OPPORTUNITIES FOR MITIGATION
UNDER A CLIMATE CHANGE MITIGATION STRATEGY**

***A Pre-Decisional Draft
Do Not Cite or Quote***

June 30, 1997

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Introduction

In a June 27, 1997 speech to a United Nations environmental conference, President Clinton acknowledged that "concentrations of greenhouse gases in the atmosphere are at their highest levels in more than 200,000 years and climbing sharply." If that trend does not change, the President noted that the resulting climate changes would "disrupt agriculture, cause severe droughts and floods and the spread of infectious diseases." In underscoring the fact that no nation can escape the danger of climate change, the President stated that: "We must create new technologies and develop new strategies like emissions trading that will both curtail pollution and support continued economic growth. We owe that in the developed world to ourselves, and equally to those in the developing nations. Many of the technologies that will help us to meet the new air quality standards in America can also help address climate change. This is a challenge we must undertake immediately."

Drawing on the guidance of the President's statement to the United Nations, it is clear that any future climate change policies adopted by the United States should be anchored by a technology-based investment strategy. Such a strategy will focus on the diffusion of cost-effective technologies that are now available but underutilized, even as we continue efforts to develop new technologies. Yet, the sectors of the economy vary widely in how they produce goods and services. For that reason, the impact of future climate policies — as well as the technologies available to respond to those policies — will also vary widely. This is true for both the sectors as a whole and for the individual firms within those sectors. For policy makers and for business and labor leaders, it is important to understand these different impacts and opportunities.

Sources of U.S. Greenhouse Gas Emissions

Greenhouse gases include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and ozone (O₃). Chlorofluorocarbons (CFCs) and partially halogenated fluorocarbons (HCFCs), a family of human-made compounds, their substitutes hydrofluorocarbons (HFCs), and other compounds such as perfluorinated carbons (PFCs), are also greenhouse gases. Of these gases, CO₂ accounts for the largest share by far of all anthropogenic emissions and is primarily the result of fossil fuel combustion for energy use. The greenhouse gas emissions are typically measured in "carbon equivalents," according to their respective "global warming potential."

Total U.S. greenhouse gas emissions in 1995 were 1,557 MMTCe (million metric tons of carbon equivalent), with gross emissions of 1,674 MMTCe offset by 117 MMTCe of carbon sequestered by the nation's forests. Since 1990 energy-related carbon emissions have increased by about 10 percent to 1,467 MMT in 1997. They are expected to grow 1.2 percent annually, reaching 1,722 MMT by 2010.

Draft
U.S. CAR
reports
1,559 MMTC
and
1,676 MMTC

U.S. Carbon Emissions by Fuel

Petroleum products are the leading source of carbon emissions from energy use and nearly 80 percent of the petroleum emissions result from transportation. Coal is the second leading source of carbon emissions, with most of the projected future increases in emissions from coal result from electricity generation.

Table 1. U.S. Carbon Emissions by Fuel Type

? 32.5 ?

	1997	Percentage of Total 1997 Emissions	2010	Percentage of Total 2010 Emissions
Petroleum	613	42%	730	42%
Natural Gas	335	23%	412	24%
Coal	519	35%	579	34%
Other (Includes methanol and liquid hydrogen)	0	0%	1	0%
TOTAL	1467	100%	1722	100%

Source: EIA Annual Energy Outlook 1997

1997 figures are estimates

U.S. Carbon Emissions by End-Use Sector

End-use sectors include the following: residential and commercial (collectively called "buildings"), industrial, and transportation. Emissions from each of these sectors are roughly equally distributed among the three: buildings (35%), industry (33%), and transportation (32%). These shares are projected to remain fairly constant through the year 2010 and beyond. The most diverse of the end-use sectors is that of industry, which consists of farming, agricultural services, fisheries, forestry, mining, construction, and manufacturing.

Table 2. U.S. Energy-Related Carbon Emissions by Major End-Use Sector

	1997	Percentage of Total 1997 Emissions	2010	Percentage of Total 2010 Emissions
Buildings	512	35%	576	33%
Industry	471	33%	548	32%
Transportation	485	32%	598	35%
TOTAL	1467	100%	1722	100%

Source: EIA Annual Energy Outlook 1997

Energy End-Use Sectors

The Buildings Sector

Residential and commercial end uses combined to consume 35 percent of the nation's total energy requirements in 1997. The major components of energy use within the buildings sector are summarized in Table 3 on the following page.

Table 3. 1997 Building Energy Consumption by End-Use

End Use	Percentage of Total
Space Heating	26%
Space Cooling	9.4%
Water Heating	10.8%
Refrigeration	4.9%
Lighting	14.9%
Cooking	2.6%
Other Appliances	31.5%
Total	100%

Source: EIA Annual Energy Outlook 1997

Residential primary energy use per household has declined only two percent in the period 1979 to 1995. According to the Energy Information Administration's *Annual Energy Outlook 1997* (AEO97), total energy consumption in the residential sector is projected to increase by 9 percent between 1997 and 2010. Most of the growth in this sector is expected to occur in the "other uses" category, which includes items such as electronic equipment and small appliances. Not surprisingly, therefore, most of the increase in energy demand during this period is attributed to greater use of electricity.

Measured in terms of energy use per square foot of building space, the commercial sector has witnessed improvements in energy efficiency on the order of 30 percent between 1979 and 1992. However, total energy consumption has been rising over the past two decades as a result of overall growth of the commercial sector. Future energy demand is also predicted to increase by 9 percent in the period 1997-2010. As is the case with the residential sector, end-use products such as office equipment and consumer electronics account for the majority of net growth in energy demand through 2010.

Table 4 summarizes the category of end-use energy in the combined buildings sector for the years 1997 and 2015.

2010

Table 4. Total 1997 and 2010 Building Energy Consumption By End-Use (in Quads)

	1997	2010	Percent Change
Space Heating	8.77	8.85	0.9%
Space Cooling	3.17	3.09	-2.3%
Water Heating	3.63	3.69	1.5%
Refrigeration	1.67	1.42	-14.6%
Lighting	5.04	5.04	-0.2%
Cooking	0.87	0.89	2.3%
Other Uses/Appliances	10.62	13.84	30.3%
Total	33.77	36.81	9.0%

Source: EIA Annual Energy Outlook 1997

Table 4 shows that most of the growth in building energy demand will occur in the "other uses" category, growing by 30 percent in the period 1997 through 2010. This category currently accounts for nearly 32 percent of total building energy use and is expected to increase to 38 percent in 2010 as small appliances and office equipment continue to penetrate the market. In the residential sector, this category of end-uses includes personal computers, dishwashers, clothes washers, and dryers. For the commercial sector this includes office equipment such as personal computers, monitors, fax machines, copiers, printers, scanners and multifunction devices. Additional products included in the "other" category include new telecommunications technologies, medical imaging equipment and vending machines.

Factors Shaping Industry Response

Currently, ~~numerous~~ opportunities exist to improve the level of energy efficiency within the buildings sector. By tightening the building shell and installing properly sized, energy efficient heating and cooling equipment, consumers can experience ~~substantial monetary gains through greater savings as a result of lower~~ monthly utility bills. In addition to saving money, consumers can benefit from improved overall comfort resulting from better indoor air quality, superior lighting, and reduced noise levels. However, the savings are often hard to verify, sometimes varying from building to building. Although consumers have clearly accepted improved insulation levels and some other energy savings features, it is not clear whether or when the more complicated or advanced savings opportunities will achieve significant market penetration.

Technology Options

Cost effective technologies which are currently available in the buildings sectors include, but are not limited to, the following:

- Better insulation of building shells
- Better control systems for regulating the use of energy consuming equipment (time and temperature controls by zone, energy-use optimizers, energy management systems)

- High efficiency heat pumps
- Heat pump water heaters
- Decreased hot water requirements through better designed clothes washers and dishwashers
- Increased motor/compressor efficiencies for refrigerators
- High efficiency lighting – fluorescent fixtures, electronic ballasts, control systems
- Substitution of lower-carbon fuels (on a full fuel-cycle basis)
- Reduced air infiltration practices, including improved duct work
- Energy efficient windows
- Whole house design that allows for substantial equipment downsizing

Barriers to Adoption

these technologies Despite the ~~proven~~ ^{perhaps} cost effectiveness of these and other energy efficiency technologies, ~~it is clear that~~ ^{sometimes} they are not ~~widely~~ ^{widely} adopted by consumers. This is due to a number of institutional, organizational, and other barriers. The existence or availability of a financially attractive technology does not by itself mean the technology will be purchased and used in sizable quantities. For high rates of market penetration, a number of other key factors must be in place:

- Potential buyers of products need to know about the technology
- Potential buyers need clear, reliable information on the performance and economic benefits of the technology
- Potential buyers must be the ones to see the benefits of lower energy bills
- Service providers and users of the technologies must have expertise to appropriately design for, install, and operate the technology
- Sources of capital must understand the low-risk nature of these investments

The Department of Energy (DOE), the Environmental Protection Agency (EPA), and members of the financial community are developing innovative financing methods for energy efficiency investments. In addition, DOE operates a program of test procedures, energy conservation standards, and labeling for certain major energy using equipment in the residential and commercial sectors. These include refrigerators, freezers, air conditioners, water heaters, furnaces, dishwashers, clothes washers, clothes dryers and kitchen ranges, ovens, commercial heating and air-conditioning equipment, certain incandescent and fluorescent lamps, distribution transformers, and electric motors. The Energy Policy Act of 1992 (EPACT) also established maximum water flow-rate requirements for certain plumbing products and provided for voluntary testing and consumer information programs for office equipment, luminaires, and windows. Our nation has made significant progress in overcoming these barriers, but more needs to be done to meet the challenge of climate change.

The Industrial Sector

The industrial sector consists of an extremely diverse set of business enterprises — both in terms of products and processes. It includes agriculture, mining, construction and manufacturing. Even within individual subsectors, a range of activities exist that have vastly different energy use patterns and carbon emission profiles. Agriculture includes, for example, both ranching and farming. Mining includes the extraction of both energy and non-energy mineral resources. Construction ranges from the building of new homes, offices, highways, and power plants to the maintenance and repair of those same facilities. Finally, the manufacturing subsector incorporates a range of industries that produce beer, paper, and clothing on the one hand, and aluminum ingots, plastic resins, cars, and

computers on the other. Energy requirements for each of these industries are as different as the products they produce.

Trends in the Industrial Sector

Broadly speaking, industrial activity will grow by about 2.35 percent annually in the period 1997 through 2010. Yet, from the perspective of energy use and overall carbon emissions, there are significant differences within the many subsectors. For convenience, such activity can be categorized into those subsectors which are energy-intensive and those which are not. Output in the energy-intensive industries — including chemicals, petroleum refining, pulp and paper, glass, cement, iron and steel, and aluminum — will grow by 1.34 percent annually through 2010. The energy intensity of those subsectors will decline by only 0.53 percent. In contrast, output in the non-energy-intensive industries will increase by 2.65 percent annually while their energy intensity will decline 1.23 percent per year. Despite the more rapid decline in energy intensity, the more rapid growth in economic activity means that overall energy use (and, hence, increases in carbon emissions) will increase more quickly in the non-energy-intensive industrial subsectors.

Table 5. 1997 Comparison of Energy Intensive and Non-Intensive Industrial Subsectors

	Output (Billions of 1987 Dollars)	Annual Growth Rate	Energy Use (Trillion Btus)	Energy Intensity (1000 Btus per Dollar of Output)	Annual Change in Energy Intensity
Energy- Intensive	920	1.34%	17,197	18.7	-0.53%
Other	2,847	2.65%	17,224	6.1	-1.23%
Total	3,767	2.35%	34,421	9.1	-1.22%

Source: EIA Annual Energy Outlook 1997

Carbon emissions in the industrial sector are the result of two different types of processes. The first is the combustion of fossil-fuel resources while the second involves non-energy related production processes. The energy-related emissions, estimated to be about 471 MMT in 1997, account for about 96 percent of total carbon emissions. This includes emissions from electricity generation which are distributed across all the industrial sectors. According to the AEO97 forecast, this is expected to grow to 548 MMT by 2010, a 16 percent increase over 1997 levels. Unfortunately, emissions data for individual industrial sectors are not currently reported in any published sources.

In addition to emissions resulting from the combustion of fossil fuels, the primary industrial processes that generate carbon emissions include:

- the manufacture and consumption of limestone (e.g., in iron smelting, steelmaking, glass manufacture, flue gas desulfurization)
- dolomite consumption
- soda ash manufacture and consumption (e.g., in glass manufacture, flue gas desulfurization, and chemicals production)

- carbon dioxide manufacture
- aluminum production

One example of non-energy related process emission occurs in the production of cement. The calcination reaction which converts the limestone raw material into clinker generates direct emissions of approximately 11 MMT. This is based upon 1995 data, the latest available at this time. Total non-energy related processes contributed a total of perhaps 21 million MMT of carbon emissions in 1995.

Economic Modeling Results for the Industrial Sector

There are
models
that indicate
economic
losses!
⇒ IPCC

There are a variety of models and analyses which have been used to characterize the impacts of climate policies on the industrial sectors. A June 1997 study by a consortium of non-profit groups, for example, estimated that carbon emissions could be stabilized below 1990 levels with an overall net benefit to the economy. The reason is that cost-effective energy efficiency improvements and productivity gains were shown to offset the increased energy prices stimulated by proposed climate policies (*Energy Innovations*, 1997). The Interagency Analytical Team (IAT) also used aggressive technology investment assumptions in an analysis with the Markal-Macro model to show that the cost of energy services could actually be about 3.0 percent lower for all sectors in the year 2010 and beyond — despite the higher energy prices resulting from a cap in carbon emissions. This result contributed to a net positive (albeit small) GDP benefit showing up as early as the year 2000.

To analyze the impacts of climate policies on specific industries, however, the IAT employed the DRI/McGraw-Hill Inter-Industry Model. The model calculates production, detailed inter-industry transactions and trade for 246 industries, using production and trade data from the DRI Macroeconomic Model and detailed projections of changes in efficiency and productivity over time.

Under the "central stabilization case," which estimates the effects of stabilizing carbon emissions at 1990 levels from the year 2010 through 2020, direct emissions reductions in the industrial sector account for about 19 percent of total emission reductions (48 MMT) in 2010 and 21 percent (70 MMT) in 2020. Reductions in overall energy demand as well as improvements in industrial energy efficiency account for these reductions. Also under the central stabilization case, energy intensity across all industries initially declines at a rate of 2.6 percent per year vs. 1.5 percent in the base case and later slows to about 1.5 percent per year versus 0.9 percent in the base case.

One major area of concern is the effect of carbon constraints on the energy-intensive industries which account for only one-fourth of total industrial output but one-half of total industrial energy use. These concerns reflect both domestic demand, and international competitiveness.

The impact of climate stabilization policies on the demand for energy-intensive industrial products may be very sensitive to how the policy is implemented.

- *If emission permits are auctioned off and the revenues are used to reduce the budget deficit, the reduction in government borrowing will reduce real interest rates and, in turn, stimulate demand for consumer durables, new construction and business investment. Higher construction, investment, and durables demand raises the demand for such energy-intensive goods as cement, aluminum, and steel. Pulp and paper products, energy-intensive chemicals and other energy intensive products more closely tied to non-durable consumer good consumption -- pulp and paper products, and some chemicals -- fair less well under this scenario.*

Why we don't think this
will be bad for international competitiveness (but this

- In contrast, if emission permits are given to households (or the revenues from auctioned permits are returned to them through income tax reductions), the main effect is to stimulate household consumption expenditures rather than business investment. In this case, higher non-durables consumption stimulates the demand for paper and paperboard from the pulp and paper industry.

A second and central concern is the following: as higher energy prices raise production costs, U.S. energy-intensive producers might lose market share to competitors from non-Annex I countries under a climate treaty that affects Annex I but not ~~Annex II~~ ^{non-Annex I} countries.

The results of the DRI model provides a midpoint in the ranges of other studies, which either tend to predict that carbon stabilization policies would have only minimal impacts initially, and even a small positive in later years as energy-intensive industries begin to implement offsetting productivity investments, or which predict severe impacts that could perhaps drive large portions of these industries overseas, with little net effect on global emissions. The results from DRI analysis show that while a carbon stabilization policy would affect energy-intensive industries, the most dire predictions overstate the impacts of climate policies. For the policy cases, other than for oil and coal, the impacts on output for energy intensive industries relative to the base case are less than 1.9 percent assuming no international emissions trading, and less than 1.2 percent with international trading.

(those countries not characterized by advanced industrialized economies)

Geographic and regional shifts in global energy-intensive production are inevitable even without a climate policy. For instance, according to the DRI Baseline Forecast, the carbon and energy intensive industries in the U.S. will experience declines in their share of both U.S. employment and output. These industries are projected to employ only 2.9 percent of the U.S. workforce by 2010. This figure decreases to 2.3 percent by 2020. Similarly, the energy intensive industries share of output drops from 9.1 percent of GDP or 27.9 percent manufacturing output in 2010 to 7.2 percent of GDP or 23.3 percent of manufacturing output in 2020. Even in the baseline, emerging Asian countries share of basic metals exports is expected to increase from 11 percent to 17 percent by the year 2010, and chemicals and plastics exports are forecast to increase from 13 percent to 19 percent.

The IAT's DRI analysis did account for changes in terms of trade for U.S. industries. Under this analysis, non-Annex I producers (including China Mexico, Korea and Brazil), which currently account for about 40 percent of U.S. imports, would not be faced with energy price increases from a stabilization. If that were to occur, there would be an increase in imports from non-Annex-I countries and decreases of U.S. exports to the world market. Yet, the relatively rigid representation of substitution possibilities in production that characterizes the DRI model may overstate the effect of energy price increases on production costs. In contrast to the DRI model, models that have a more detailed and flexible representation of production technologies (such as general equilibrium models) or that represent technological shifts (i.e. from integrated steel mills to electrometallurgical mini-mills or from primary aluminum to secondary aluminum) would yield lower estimates of production cost increases. As the Markal-Macro results have shown, depending on the depth of technological substitution that is available to industries, the overall result may even show a slightly positive GDP benefit over time.

Factors Shaping Industry Response

Within the manufacturing subsector, several industries are substantially more energy intensive than others. And among these energy-intensive industries, numerous differences exist in terms of the products each industry produces and the processes they employ.

Aluminum

The aluminum industry has three major segments - primary materials, semifabricated materials, and finished products. The U.S. aluminum industry is globally competitive in all parts of the industry and is a net exporter of semifabricated aluminum products. The last greenfield smelter in the U.S. was built in 1980 and there are currently no plans to build any new facilities.

Unlike other basic industries, the U.S. aluminum industry is highly dependent upon the cost of electricity, such that any future changes due to restructuring would have major impacts on the competitiveness of this industry. The primary aluminum industry in the U.S. purchases electricity at approximately half the price of other industries, in part because of hydropower (Pacific Northwest) and in part because of long-term negotiated rates. The future of U.S. primary aluminum will depend on differences (if any) in the price and availability of hydro- and coal-generated electricity. These differences will have substantial regional impacts. Almost all the smelters in the eastern part of the United States rely upon coal-based electricity, whereas the smelters in the Northwest use hydro-based electricity. Should a policy be implemented based on carbon emissions, the eastern smelters in the United States would be impacted more than western smelters.

Technological change in the aluminum industry has been incremental. Continuous process improvements have reduced energy consumption per ton by approximately 25 percent between 1960 and 1994 and retrofit technologies with significant improvements in existing energy efficiency levels are expected to be in place by 2010. Increased use of recycled metal could also yield substantial energy savings. This depends on developing advanced scrap separation and smelting processes and on overall advances in process design.

Petroleum Refining

Petroleum refineries distill crude oil, crack the resultant intermediate products into smaller molecules, and then purify and blend the various fuels to produce a number of useful products. Gasoline is the principle refinery product, accounting for over half of industry sales. U.S. refining industry is the largest in the world with capacity at about 15 million barrels per day (bpd). However, no new refineries have been built in the U.S. for more than a decade and the number of refineries has decreased from about 285 in the late 1960s to about 175 currently.

In the petroleum refining sector, industry impacts will depend on sensitivities such as the extent to which prices of fuel used as an input are increased as opposed to policies that affect the overall demand for the refinery products produced. Other factors that will affect the petroleum refining industry include the price of marine bunker fuel which can account for 25 to 55 percent of transportation costs. The characteristics of individual refineries will also affect the response of the industry. The refineries most vulnerable are located in highly competitive regions, they are typically old, and they produce a standardized product subject to a high degree of competition. Many of the old refineries are only marginally profitable under existing conditions. Less affected refineries will be those that have been renovated and modernized in the last five years, or produce specialized products.

In the near to mid-term, process energy utilization can be reduced by 5-10 percent through utility system modifications, monitoring and maintaining equipment/process energy efficiency through development and adoption of advanced sensor/control technologies, and by minimizing and controlling heat exchanger fouling. In the mid to long-term, opportunities to improve energy efficiency include areas such as fired heaters, distillation catalytic hydrocracking, reforming and hydrotreating,

alkylation, and hydrogen production.

Glass

The manufacture of glass and glass products in the U.S. is a large, widely diversified, energy-intensive industry. The glass industry includes the following four segments: glass packaging, fiberglass, flat glass, and specialty glass. The diversified nature of the glass industry highlights the fact that competitive challenges faced by one sector will not always be applicable to the other sectors, and solutions must be tailor-made as well.

The two most pressing challenges for the glass industry are competition from other materials such as plastic and aluminum, and competition from foreign glass manufacturers with lower labor and environmental compliance costs. To meet these challenges the industry will need to improve manufacturing processes, create additional markets and uses for glass products, and reduce energy and waste disposal costs. Reduction in energy consumption, as well as the increased use of recycled glass, both support reduction in greenhouse gases through reductions in fuel combustion.

Options to improve energy efficiency in the glass industry include technological advances that accomplish the following:

- enable the use of oxygen rather than air to fire glass furnaces,
- increase the use of waste glass, or cullet, in glass manufacturing,
- lead to the new coatings and new structural components needed to enhance the performance of manufacturing equipment, and
- create new temperature sensors for furnaces to increase energy efficiency.

Steel

The U.S. steel industry is comprised of integrated producers, electric arc furnace (EAF) based mills, and specialty steel producers. Manufacturing processes for iron and steel production have changed considerably since the 1980s. The open hearth furnace, which was the workhorse of integrated mills in the 1950s, is now obsolete. The basic oxygen furnace (BOF), however, held on to a relatively constant share of total production during the same period, although this share has begun to fall gradually since 1992 with the rise of steel mini-mills. These mini-mills use electric arc furnaces which use 100 percent scrap metal and therefore require less energy per ton of steel produced. Mini-mills are highly dependent on the price and availability of electricity and scrap.

Over the next five years, steelmaking capacity in the U.S. is expected to increase significantly as many new EAF-based mills are scheduled to come on line. As the percentage of EAF-based steel production increases, the average energy intensity of steelmaking will decrease, with associated decreases in coal use and increases in electricity use (and corresponding changes in the amount and type of emissions). In addition, this increase in EAF capacity will likely affect steel imports and domestic scrap prices. Measures that increase coal prices would have a far more dramatic impact on integrated mills than on EAF facilities, while all of the industry will be affected by increases or decreases in electricity price. Deregulation of the electric utility industry is expected to benefit the industry by lowering electricity prices.

After a historical record of lagging technologically, the U.S. steel industry has begun to exhibit a high

rate of technological change, including direct smelting processes that replace the blast furnace and coke oven, and direct strip casting processes that replace the continuous caster and hot strip mill.

Chemicals

The chemical industry is more diverse than virtually any other U.S. industry. Chemicals are the keystone of U.S. manufacturing, essential to a wide range of industries, such as pharmaceuticals, automobiles, textiles, paper, electronics, agriculture, construction, furniture, paint, and appliances. The U.S. is the world's largest producer of chemicals. More than 9000 corporations develop, manufacture, and market over 70,000 chemical products. Investments in plant and equipment have tripled since 1985 and R&D spending has more than doubled from \$8.3 to \$17.7 billion.

The chemical industry has reduced energy intensity over the last decade and has made strides in reducing the environmental impacts of chemicals production. However, to remain at the forefront of the global market and to maintain its competitive position, the industry will need to continue to take steps to strengthen market share, such as increased development of markets where the U.S. has a technological advantage. Improvements to energy, resource and process efficiency will also play an important role in the future competitiveness of the industry. The U. S. chemical industry has an excellent opportunity to greatly reduce U.S. industrial greenhouse gas emissions through advances in current and emerging separation technologies. Advances in separations technology and chemical processes are anticipated to strengthen the U.S. chemical industry and ensure its competitive edge in the increasing globalization of markets. They will allow the chemicals industry to balance and sustain society's demands for higher environmental performance with industry's demands for increased profitability and capital productivity.

Pulp and Paper

The U.S. has the world's largest installed pulp, paper, and paperboard production capacity, some 86 million air-dry metric tons (ADMT) per year in 1993, or about 30 percent of global capacity. Manufactured products from the paper and allied products industry include newsprint, printing and writing paper, tissue, paper plates, card stock, corrugated cardboard, cartons, and construction-grade paperboard. The U.S. is home to close to 550 pulp and paper mills located in 42 states. Over the last twenty years or so, many of the smaller, older mills have been closed down and replaced with larger integrated mills. The integrated mills produce both pulp and paper and/or paperboard. The trend is toward larger size (over 2000 tons/day) plants with the capability to consistently process high-quality products at higher speeds.

The U.S. pulp and paper is both capital and energy intensive. New capital expenditures in the last decade have averaged 10.4 percent of revenues, making paper and allied products the most capital intensive of the manufacturing industries. This factor could conceivably restrain the ability of the industry to install new technologies -- especially technologies that will not significantly contribute to lowering production costs. However, because of the energy-intensive nature of the industry, rising fossil fuel costs would create additional incentives to increase reliance on self-generated energy and further increase the energy efficiency of pulp and paper production processes.

There are major opportunities for improving the efficiency of process energy use in the pulp and paper industry. A number of new energy-saving process technologies such as digesters and paper or pulp dryers, are under development or recently commercialized and process heat integration analysis

has been applied in several mills. Most process specific changes that bring energy efficiency improvements also bring productivity and other improvements. Advanced biomass-based cogeneration systems, which would provide major improvements in efficiency over existing systems, are currently undergoing rapid development.

Cement

The U.S. hydraulic cement industry consists of firms producing portland, masonry, prepared hydraulic, natural, lime, and oil well cements. Portland cement represents more than 95 percent of total hydraulic cement production; the remainder is mostly masonry cement. There are currently 47 cement companies operating close to 118 plants and 207 kilns in the U.S. Total industry shipments in 1995 were 75 million metric tons with total U.S. consumption of 86 million metric tons. There were approximately 11 million metric tons of finished cement imports and half a million metric tons of exports the same year.

Compared to world standards, the U.S. cement industry is characterized as aging and relatively inefficient. Plants continue to be shut down and others may be slated for closure due to technological or competitive obsolescence. Currently, there remains a need to replace and upgrade plants in order to increase productivity in domestic plants. Most major producers, however, are not in a good financial position to invest in extensive and expensive additional capacity. No new greenfield plants have been built in the U.S. in ten years.

Currently, 65-70 percent of U.S. cement capacity is foreign-owned — including three of the top five firms. Approximately 90 percent of cement imports are handled by domestic producers, who use imports to supplement domestic capacity, such that corporate profitability is not necessarily linked to the health of the domestic industry.

A number of opportunities exist to reduce emissions such as increasing the share of production using dry process technology, increasing the use of efficiency enhancing machinery such as particle classifiers which reduce grinding loads, increasing the use of mix-ins when making concrete, and fuel switching.

High-Growth Industries

Industries other than the energy-intensive subsectors discussed above also depend on energy and will likely be affected by climate change mitigation policy. Among the reasons for focusing attention on these sectors are that:

- Some of these industries are growing more rapidly than the energy-intensive industries. Most of the growth (64 percent) in industrial energy use from 1997-2010 will be by non-energy-intensive industry subsectors (3.4 of 5.3 quads).
- Service Industries employ 77% of the U.S. workforce and account for 74% of GDP. The distinction between service and manufacturing industries is becoming increasingly blurred.
- Opportunities exist for new technologies in high-growth sectors that have capital turnover rates that are higher than those of energy-intensive industries. With high rates of capital turnover, the opportunities to accelerate the diffusion and acceptance of energy efficient technologies are

substantial, and can collectively lead to significant reductions in carbon emissions.

- Under a climate change mitigation policy, industries involved in producing energy-saving products and providing energy services will benefit as demand increases for their products and services.

Non-Energy Minerals Industry

The non-energy mining includes the extraction of industrial minerals such as crushed stone, sand and gravel as well as metallic ores including iron, and copper. In 1992 the non-energy minerals industry had a production of \$32 billion dollars. As in coal mining (discussed more fully below), employment has been steadily declining since the early 1980s. Projections indicate that by the year 2000 this sector will employ 25 percent fewer people than in 1980, dropping from 236,000 to 176,000 jobs. As with other sectors, the minerals industry will be affected by rising prices resulting from efforts to stabilize carbon emissions. However, there are indications that the industry will be able to reduce overall energy consumption to at least partially offset increased energy prices. Among others, using high efficiency electric motors, incorporating new process improvements, increasing maintenance of motor vehicles, system conveyor belts, drives, and compressed air systems can each provide savings of 10 to 15 percent, conservatively.

Construction

The construction industry is as varied as it is large. It includes firms with thousands of employees and firms with just one. In 1992 there were just under 2 million construction establishments employing over 4.6 million persons. Combined, the construction industry performed business totaling almost \$582 billion in 1992. Although much of the construction industry rises and falls with fluctuations in the economy, the industry as a whole is likely to remain stable through the next 10 years, both in terms of employment and value of business.

Much of the construction industry is labor intensive. Most construction work involves using small trucks to transport workers and materials, and hand and power tools, and physical labor to complete work. It is one of the least energy intensive industries in the nation. Energy costs (including selected power, fuels, and lubricants) account for approximately 1.6 percent of each dollar of business done in the construction industry as a whole. Nevertheless, there are important opportunities to reduce energy costs within the industry. These opportunities range from using more efficient motor vehicles to incorporating the use new building materials (e.g., laminated beams, recycled products, engineered lumber products such as roof and floor trusses, insulated wall panels, and modular components) that reduce both construction waste and costs.

Motor Vehicle and Related Industries

The motor vehicle industry is much more diverse than the mere manufacture of new cars and trucks. It also includes road construction and maintenance, freight and passenger services, petroleum refining and wholesale distribution, and automotive sales and services. Total employment in these related industries approaches 7 million persons, providing about 7 percent of the nation's jobs.

Focusing only on the automobiles industry, most analysts see little or no change in the sales of cars and trucks over the next few years. This means that competition will be fierce among the 26 firms

that serve the major developed markets worldwide, including the so-called Big Three automakers — Ford, Chrysler, and General Motors. Within a decade some analysts project that, either as a result of sharing manufacturing resources, or as a result of mergers and acquisitions, as few as 10 “mega-manufacturing alliances” may serve all of the developed countries.

Continuing productivity gains among the U.S. automakers has strengthened its overall economic position. The number of employees per hundred vehicles sold, for example, has fallen 2.9 percent per year in the decade ending 1994. At the same time, the industry should be fairly unaffected by greenhouse gas emissions policies. This is due to the fact that the assembly of motor vehicles requires only about 15 million Btu of energy per car. If carbon prices rose as high as \$100 per ton, for example, this would add between 0.1 and 0.2 percent to the cost of manufacturing a new car. On the other hand, new car and truck sales might slip as the cost of driving increases as a result of climate policies. But new technologies can be incorporated into the design and construction of both light and heavy duty vehicles to reduce the overall cost of driving despite the prospect of initially higher gasoline prices. Technology improvements include engine designs that reduce friction and increase combustion efficiency and body designs that decrease the aerodynamic drag on the vehicle. Meeting the PNGV goals of an 80 MPG car that costs no more than today's vehicles (see the discussion on transportation below) will go a long way to minimize the impacts on both the auto industry and the many related industries.

Barriers to Adoption

~~From the above discussion, it is clear that~~ Numerous energy-saving technologies are available in the industrial sector — many of which offer additional benefits such as improved product quality. Despite this, however, many of these industries have historically avoided investing in energy efficiency technologies. Several factors help to explain why this may be the case.

For most industries, energy expenditures represent a minor portion of their operating costs, averaging less than two percent of value of shipments for the manufacturing sector. Industries such as primary aluminum, hydraulic cement and industrial gases are notable exceptions, with energy accounting for more than 20 percent of value of shipments. However, for some of the fastest growing industries, such as electronics and computers, energy expenditures represent only 1.2 and 0.6 percent of shipments respectively. In most industries, larger costs, such as labor and raw materials, receive attention before energy. For example, employee compensation averaged 24 percent of shipments in 1994.¹

Opportunities for energy efficiency improvements must compete with other issues for finite resources within a company. While capital is the most often cited resource, staff time may be of equal or greater importance. Downsizing is common when industrial companies undergo restructuring, resulting in fewer total personnel available to address all issues. When a choice must be made between addressing a potential emissions-compliance, production-reliability or product-quality problem, and identifying and implementing energy efficiency projects, the former receives the attention since failure to do so may result in the plant being shut down. One manifestation of this staffing constraint is the reduction in the number of corporate energy managers²

1. “Considerations in the Estimation of Costs and Benefits of Industrial Energy Efficiency Projects,” ACEEE/EPA

2. Ibid.

Many businesses operate with a tight constraint on their capital budgeting. Hence, the allocation of capital remains a significant barrier to achieving greater levels of energy efficiency. Given a choice between expanding existing production capability and introducing new products, and reducing energy bills, the production-related projects will invariably win out. Hence, presenting projects based on total benefits will likely be more effective than building a case on the energy savings alone.

The Transportation Sector

Trends in the Transportation Sector

Over the last decade, new light vehicle fuel economy has remained relatively flat in the U.S. This is due to both an absence of increased fuel-efficiency standards and a lack of consumer demand for greater fuel efficiency. As fuel prices declined following the oil shocks on the 1970s, consumers began turning away from fuel economy and looked more toward amenities such as speed, acceleration, size, and greater utility when making their purchasing decisions. Corporate average fuel economy of the new light vehicle fleets (i.e., cars and light trucks such as minivans, sport utility vehicles, and pickup trucks) grew along with increasing CAFE standards throughout the late 1970s until the mid 1980s. Since 1982, however, the average horsepower rating of the combined new light vehicle fleet (cars plus light trucks) has increased by 60 percent while the average fuel economy of the same fleet has remained unchanged. Had new cars sold in 1996 retained the same average acceleration performance and weight as new cars sold in 1984, the technologies actually incorporated into the fleet during this period could have increased new car fuel economy by about five miles per gallon, or close to 20 percent.

In addition, the share of light trucks is increasing, having gone from under 25 percent of the market in 1982 to almost 45 percent today. Light trucks face lower CAFE standards than cars (almost 7 mpg lower). Moreover, since light trucks tend to last longer than cars, they are likely to be driven more miles over their lifetime than cars.

Contribution to Greenhouse Gas Emissions

Passenger cars and light-duty trucks contribute the majority of transportation emissions. Emissions from light-duty vehicles alone accounted for 20 percent of total U.S. greenhouse gas emissions in 1990, and in the absence of new policy measures are expected to rise from about 250 MMTC in 1990 to 350-400 MMTC in 2010. Energy use in trucks used for commercial transport is only about 40 percent of energy used in passenger vehicles, but is growing significantly faster.

The major factors underlying the rapid increase in emissions from light-duty vehicles are growth in (VMT) stagnant new fleet fuel economy levels (miles per gallon, or mpg), and growth in the relative proportion of light trucks sold, which have lower (i.e., less stringent) CAFE standards than cars.

Actual growth in VMT since 1990 has averaged 2.4 percent per year. Growth in VMT is a function of a number of factors, including demographic changes (e.g., more women in the workforce; immigration), land use patterns, the cost of driving each mile (now at an all-time low on an inflation-adjusted basis), among others.

Factors Shaping Industry Response

With consumers continuing to exhibit preferences for performance, size, and utility rather than fuel economy, no significant increase in new fleet fuel economy is expected to occur absent a driving force such as policy changes or fuel price increases.

Technology Trends and Options

Three principal ways exist to reduce carbon emissions from light vehicles: (1) reduce vehicle miles traveled (VMT); (2) improve fuel economy; and (3) use fuels with lower life-cycle carbon emissions. Work developed for the "Car Talk" committee³ suggested estimated reductions of 445 to 585 MMT would be possible in the period 2005 to 2025 from a combined package of land-use and transit policies as well as efforts to improve overall fuel economy and reduce the carbon content of transportation fuels.

see earlier reference

Reducing VMT would involve a wide mix of policies. The goals would be to encourage land use away from auto dependency, and shift the relative (full) cost of driving versus other transportation/communication alternatives such as workplace parking subsidy reform, and shifting of state and local subsidies to cost-of-driving fees.

Improving fuel economy represents an important opportunity to reduce GHG emissions since only about 15 percent of the energy in gasoline is actually used to propel a typical vehicle. The Partnership for a New Generation of Vehicles (PNGV) builds on the prospect for an improved fuel economy. PNGV is a Federal-industry research partnership created in 1993 to encourage innovation in the US auto industry. The PNGV focuses on a research goal of tripling fuel economy of a typical 1994 family sedan by 2003-2004, while meeting or exceeding federal safety and emissions requirements, and without sacrificing performance, size, utility, or affordability. Most current PNGV work on this goal is focused on improving drive train efficiency, developing practical on-board energy storage systems, and reducing vehicle mass through the use of light weight materials. A pre-production prototype vehicle with a 100 percent improved fuel efficiency is expected in 2001; vehicles with 150-200 percent improved efficiency will be available in the 2005-2010 period.

Future technological innovations would come from technologies such as multi-valve engines, lighter materials, and next-generation tires, which have already been partially but not completely integrated into the new vehicle fleet. An additional component of the overall fuel economy improvement would be technologies such as direct injection engines and fully variable valve timing, still in the development stage.

Alternative fuels — such as biofuels — are another large opportunity for reducing transportation carbon emissions. Federal R&D has brought down the cost of biomass ethanol (from \$3.60 per gallon in 1980 to \$1.20 per gallon today). Further research has the goal further cost reductions to under \$0.70 per gallon by 2005, competitive with oil at its current price. Estimated carbon savings from use of ethanol largely as a gasoline blend is 20 MMTC in 2010.

3. The "Car-Talk" committee is the *Policy Dialogue Advisory Committee to Assist the President in the Development of Measures to Significantly Reduce Greenhouse Gas Emissions from Personal Motor Vehicles* formed in 1993 to see whether a consensus set of policies could be developed to return personal transport GHG emissions to 1990 levels by 2005, 2015 and 2025. The committee failed to agree on such policies, but substantial analytic results were developed by a team of government analysts working with several expert committee members.

Agriculture

Basic farm commodity production was about 0.9 percent of GDP in 1995 and accounted for about 1.2 percent of US employment. These numbers, however, belie the true importance of agriculture — the farm sector and agriculturally related industries in total account for about 13.5 percent of GDP and 17.3 percent of employment. Processing and distribution is the largest component and is relatively more labor intensive.

Contribution to Greenhouse Gas Emissions

Agricultural greenhouse emissions include methane, nitrous oxide, and carbon dioxide. Estimates of non-energy greenhouse gas emissions are relatively imprecise. While agriculture represents less than 5 percent of total national greenhouse gas emissions, it is a large source of methane and nitrous oxide.

The principle sources of agricultural methane are enteric fermentation (animal digestion) and manure management associated with livestock production. Applications of synthetic and organic fertilizers account for almost all of agriculture's N_2O emissions.

Globally, agriculture is a much more important source of GHG emissions than in the United States, accounting for about 20 percent of all greenhouse gas emissions. Agriculture's share of world emissions of CO_2 , CH_4 , and N_2O are estimated at 21-25 percent, 57 percent, and 65-80 percent respectively (excluding emissions from natural sources). Conversion of land to farm production (particularly tropical forests) is the major agricultural source of CO_2 emissions while rice and livestock production are the principle sources of CH_4 emissions.

Soil Carbon: Depletion or sequestration of soil carbon is a potentially important source of agricultural greenhouse gas emissions. Plants use photosynthesis to remove CO_2 from the atmosphere and convert it to carbon which is stored in plant biomass. Left undisturbed, soils accumulate some of this carbon as organic matter through root growth and decay of crop plant materials. Tillage is used to loosen surface soil and subsurface material, improve aeration and water infiltration, and control weeds. All benefit crop growth in the short-term. Tilling, however, also increases the exposure of soils to oxygen thereby accelerating the conversion of soil organic matter to CO_2 , which is released into the atmosphere. Over time then, tilling reduces both soil carbon levels and soil productivity.

Reductions in soil carbon levels in U.S. agricultural soil (between 30 and 50 percent over the last 100 years) may have been a significant component of the historic increase in atmospheric CO_2 levels.

Factors Shaping Industry Response

Agricultural production is an energy intensive industry. Agricultural chemicals, particularly nitrogen fertilizer, are energy intensive. Transportation of agricultural commodities to market would also be affected. Some components of the food processing sector are energy intensive but, overall, the sector is less energy intensive than overall manufacturing.

For every dollar of farm output, 12 cents is spent on energy with electricity accounting for 6 cents. This reflects the increasing reliance on electricity for operations such as grain handling and large-scale confined livestock production. Agricultural chemicals embody 6 cents of energy for each dollar of

output, spent mainly on natural gas and electricity. Nitrogen fertilizer is among the most energy intensive chemicals and its availability is a key to high agricultural productivity. Energy cost increases would directly increase both agricultural production costs and agricultural chemical manufacturing costs.

Technology Trends and Options

The Climate Change Action Plan for the U.S. identified tree planting, research and outreach to help farmers better manage nitrogen use, methane capture from covered manure lagoons, and increased ruminant feed efficiency as opportunities to sequester carbon and reduce emissions of agricultural greenhouse gases.

Opportunities for further sequestering carbon in agriculture would include the following:

- Conversion of marginal cropland and pasture to forest: Forest growth currently offsets about 8 percent of total annual U.S. greenhouse gas emissions on a carbon equivalent basis. A number of studies have outlined the costs and economic benefits to U.S. agriculture resulting from strategies to mitigate U.S. greenhouse gas emissions by paying farmers to convert cropland and pasture to forest. Pulling the necessary quantities of land out of production, however, would raise land prices and would increase the cost of bidding land out of production. 50?
- Promoting the use of management practices that increase the quantity of carbon stored in agricultural soils: Studies suggest that these sinks could technically offset a majority of U.S. greenhouse gas emissions, but economic analysis of such possibilities is limited.
- Using biofuels to replace fossil fuels: Because the carbon released in the burning of biofuels would be taken back up by the next crop, replacing fossil fuels with biofuels offers a means of increasing the amount of carbon that is recycled in the production and use of energy. The IPCC (1996) has estimated that for the world's temperate regions as a whole, carbon emissions could be reduced by 85 to 493 million tons per year by allocating 8 to 11 percent of their cropland to biofuel crops. While the United State's share of this is not addressed, the IPCC notes that the best mitigation opportunities are in areas with good agricultural land and surplus production.
- Further efforts to alter livestock management practices to reduce methane emissions: The most promising opportunities for reducing methane emissions in U.S. agriculture are in new management practices for the feeding of livestock and the handling of livestock waste (particularly cattle).

Energy Supply Sectors

Electric Power Generation

Historically, demand for electricity and economic growth have been closely correlated. Over the last twenty years, U.S. demand for electricity grew by approximately three percent per year, but this rate of demand growth is expected to decrease between now and 2010, averaging slightly more than one percent per year.

With several hundred billion dollars worth of combined capital investments, electric power generation

is one of the largest and most important economic sectors in the U.S. economy. The character of this industry has changed over time and is in the midst of another major restructuring. In 1995, FERC required open access to transmission for the purpose of wholesale competition. Currently over 80 percent of the states are moving toward electricity industry restructuring. Two broad trends can be noted. First, all the state decisions are leading to greater customer choice and second, there is a general trend to de-couple generation, transmission and distribution.

In addition to restructuring, the industry is undergoing a shift in the sources of generation. Nuclear energy is a carbon-free source of electricity that presently provides over 20 percent of U.S. electricity. Despite nuclear power's substantial contribution to today's electricity supply, no new nuclear power plants have been ordered by U.S. electricity generators since 1978. Although nuclear power generation was at an all-time high in 1995, the retirement of older plants and the lack of new nuclear projects will reduce nuclear in the future U.S. energy mix. Nuclear power plants are due to begin retiring in 2010 with most capacity retired by 2030. Fossil fuel power plants generated over 80 percent of U.S. electricity in 1970, but that share has fallen to about two-thirds as nuclear power's share has risen from virtually nil to about 22%; fossil generation is expected to return to about 80 percent over the next twenty years as the existing stock of nuclear plants are phased out.

Although the overall efficiency of fossil generation — the rate at which fossil energy is converted to electricity — has barely changed in the past 35 years, modest improvements are expected over the next twenty years as natural gas-fired generation doubles its share of total generation from about 15 percent today to over 30 percent. New natural gas-fired "combined cycle" power plants yield very high conversion efficiencies (> 50 percent) by generating steam from the waste heat of advanced combustion turbines and using it to drive steam turbines.

Renewable energy is forecast to have high growth but remain a small part of the base. Excluding hydroelectric power, whose expansion possibilities are very constrained, renewable electricity generation is expected to double over the next twenty years but will still account for less than 2 percent of total electricity generation. The hydro share of the energy market was 4.4 percent in 1996.

As state-by-state restructuring takes place, several states have already mandated minimum levels of renewable energy through "renewable portfolio standards," including Vermont, Maine, and Arizona. Many other states are considering similar measures to accelerate the adoption of renewable generation technologies. These technologies have become more competitive over the last twenty years. Photovoltaics have dropped from 90 cents per kilowatt-hr to under 20 cents per kilowatt-hour; wind technology has dropped from 25 to 5 cents per kilowatt-hr. Cost reduction ~~will continue to occur~~ through R&D advances and through economies of scale as production rates increase.

and is expected to continue

Contribution to Greenhouse Gas Emissions

The electric power industry is the largest direct energy consumer in the United States. Electric generators are responsible for 35 percent of national emissions of carbon dioxide, with over 85 percent of electricity-related emissions coming from coal-fired plants.

Table 6. Carbon Emissions from Electricity Generation (MMT)

	1997	Percentage of Total 1997 Emissions	2010	Percentage of Total 2010 Emissions
Petroleum	13	2%	12	2%
Natural Gas	55	11%	102	16%
Coal	454	87%	512	82%
Total	522	100%	626	100%

Source: EIA Annual Energy Outlook 1997

Factors Shaping Industry Response

Restructuring

Restructuring of the electric power industry offers a unique opportunity to mitigate future emissions of CO₂ from this sector. Many states are currently considering or adopting retail competition for their electric power markets. This trend may be accelerated with federal legislation. Retail competition may lower the price of electricity by as much as 20-25 percent in certain regions and change the fuel mix of generation. Restructuring without new environmental policies is expected to favor the expanded use of existing coal plants. These plants are largely depreciated, and hence can generate electricity for low incremental cost. To mitigate the environmental impacts of competition and maintain the environmental benefits of current state level renewable energy and demand side management programs, a number of options have been adopted or are under consideration. These include:

- **A "portfolio standard" for renewable energy:** This would require that all generators meet a specified level of renewable generation either by undertaking such projects themselves or purchasing "credits" from others who have.
- **A social benefit fund:** Revenues from a charge on transmission service are used to subsidize energy efficiency projects, renewable, R&D, or low income consumers. California has adopted this approach.
- **Information disclosure requirements:** Generators could be required to disclose the emission profiles of their generation, facilitating the marketing of "green" (or, less polluting) electricity.
- **Leveling of the playing field for air pollutant requirements:** Many states are hesitant to adopt retail competition because they perceive that differing regional environmental requirements put their electric industry at a competitive disadvantage and will result in more pollution being transported into their states. Thus, additional environmental provisions to "level the playing field" — which could include greenhouse gas emission reductions — are currently being debated. Adaption of fuel neutral standards would promote utilization of lower emission systems.
- **Special consideration for energy efficient and/or low emission technologies:** This includes advanced gas turbines and micro turbines for cogeneration and self-generation, fuel cells, and renewable technologies.

Distributed Generation

Distributed generation is the utilization of small power generation technologies dispersed through the distribution system to provide local power close to customers, thereby reducing investment in transmission and distribution resources and improving local reliability. This could include self-generation or cogeneration by industrial and building sectors and involve power sales back to the grid. Cost competitive technologies, such as smaller scale advanced gas turbines, are emerging which can compete economically with central station generation when full costs, including the avoided transmission and distribution expenditures, are considered. All of this will support the customer choice aspect of deregulation and lead to a reduction in cost of electricity for customers. The electric power producers will move from the concept of centralized power for economies of scale to providing energy services for customers. This will provide:

- economies of mass production of units
- smaller, cleaner generation
- fuel security through diversity of generation portfolio
- more options for customers to be green

Technology Trends and Options

Electric sector emissions can be reduced either by making generation less carbon intensive (e.g., conversion efficiency improvements, fuel switching, cogeneration, or renewables) or by reducing the amount of electricity demanded through increased penetration of more energy-efficient end-use technologies. Studies by the America Council for an Energy-Efficient Economy (ACEEE) show that there is a long-term potential to save about 25 percent of industrial electricity consumption at a cost that is significantly lower than the current cost of new generation units. For example, an industrial site which purchased coal-derived electricity generated at 35 percent efficiency could self-generate power in a cogeneration mode at 75-80 percent efficiency, selling power back to the grid and producing their own steam.

Many of the following technologies are projected to substantially increase their market share in the next decade.

- The next generation of natural gas technologies (including gas turbines and fuel cells) are projected to achieve energy conversion efficiencies of 70 percent or more by 2005.
- High efficiency coal-fueled power plants, such as integrated gasification combined cycle, are likely to realize efficiencies exceeding 55 percent and half the CO₂ emissions of current coal technologies.
- Renewable technologies — wind power, photovoltaics, solar thermal, and geothermal — have seen sharp cost reductions in the past two decades, some by a factor of ten.
- Options such as biomass gasification offer the ability to produce power with no net increase in CO₂ emissions. The growth of biomass offsets (sequesters) the CO₂ released in electric power production.

Petroleum

Contribution to Greenhouse Gases

Petroleum products are the leading source of carbon emissions from energy use. Petroleum accounted for 584 MMTC emissions in 1995, and this figure is predicted to increase to 718 MMTC by 2010. The majority (~80 percent) of petroleum emissions result from transportation use.

Factors Shaping Industry Response

Petroleum product demand is largely a function of the demand for transportation. Petroleum product consumption has been rising even though the amount of oil energy consumed per dollar of GDP has been falling since 1973. Oil energy per dollar consumed per dollar of GDP fell from 8,900 Btu/\$ in 1973 to an estimated 5,100 Btu/\$ in 1996, a drop of 43 percent. The ratio will remain at 5,100 Btu/\$ of GDP in 1997.

Coal

Electric utilities are the dominant consumers of coal. Overall consumption by utilities grew from 17 percent (84 million short tons) in 1949 to an 88 percent share (829 million short tons) in 1995. According to industry analysts, coal energy consumption will move up 1 percent in 1997 to 20.6 quads and coal's share of the energy market will remain at 22.7 percent. Coal consumption is expected to increase in future years along with the demand for electricity.

Contribution to Greenhouse Gas Emissions

Coal has the highest carbon content per unit of energy among fossil fuels — as well as being a source of pollutants such as sulfur dioxide. It is used primarily in the electricity sector, where coal-fired plants currently account for approximately 56 percent of total U.S. electricity production. Coal is the second leading source of carbon emissions, and is projected to produce 579 MMTC in 2010, compared to 507 MMTC in 1995. Even without consideration of the issue of greenhouse gas emissions, most analysts project that the great bulk of capacity additions to electric utility plants from now until at least 2010 will be fueled with natural gas rather than coal. Thus, while most existing coal-fired plants are highly competitive suppliers of power that are dispatched ahead of gas-fired plants on the basis of lower fuel costs, fuel cost advantages cannot offset the substantially higher capital costs of a coal plant when new capacity is needed.

Factors Shaping Industry Response

In the stabilization scenario, coal production is lower than in the baseline. In contrast, the NEMS stabilization scenario run under assumptions that allow for substantial "overbuilding" (early retirement) of existing coal capacity suggests a substantially greater decline in coal use than the DRI energy model analysis. The reduction in coal use from baseline in 2010 is twice as great — 58 percent vs. 29 percent.

Several factors contribute to the difference in perspectives. Most importantly, the large reductions in end-use energy demand in the DRI energy model provide "room" to use more coal that is simply unavailable in the NEMS stabilization scenario. In addition, the NEMS involves a larger reduction to reach stabilization, putting additional pressure on coal, the most carbon-intensive fossil fuel.

Changes in coal use due to greenhouse must be considered in the context of overall industry trends that are projected in the absence of any climate change action — despite output growth, employment in coal mining in 1995 is already less than half of 1980 levels. Therefore, notwithstanding rising coal consumption in the baseline case, national coal employment is projected to fall substantially — reflecting the fact that coal production productivity (tons per hour) rises at a much faster rate than EIAs coal consumption in all regions. There is also a continuing shift towards increased supply from regions where productivity is highest.

In the DRI energy model results, there is a smaller shift away from coal use (and production). However, DRI has even higher labor productivity growth assumptions than EIAs NEMS, which by itself reduces employment over time in both the base and mitigation policy cases.

Nuclear Energy

While the performance of existing nuclear electric power plants reached record levels in 1992, the number of operating reactors has leveled off. High operating costs, waste disposal difficulties, and other problems pose major challenges to the further expansion of nuclear electric power.

The future contribution of nuclear power depends on three factors: economic retirements of existing plants prior to the end of their license period, re-licensing of existing plants to extend beyond a 40-year service life, and level of new capacity builds.

Factors Shaping Industry Response

The baseline cases in the two energy models each project a modest level of economic retirements, operator decisions against pursuing relicensing, and no construction of new plants. As a result, the projected contribution of nuclear power in 2020 is slightly more than half of its 1995 level. While the base cases are similar, the two models differ substantially in the stabilization case. In the DRI energy model stabilization case, nuclear generation follows the DRI base case path. However, in the NEMS case, re-licensing of nuclear plants becomes economically attractive, and premature economic retirements do not occur. As a result, nuclear generation EIAs not fall from its 1995 level. In addition, the model suggests that new nuclear capacity could be added in the 2015 time frame given the modeled carbon permit values in the stabilization case.

It should be noted that the model does not account for issues of public acceptability and uncertainty regarding waste disposal that could present significant barriers to new nuclear investments. The anticipated shift to more competitive electricity markets, in which the cost of capital for new generation facilities will be higher than that applicable to regulated utilities, tends to make investment in capital-intensive technologies with long lead times, such as nuclear generation, less attractive. For these reasons, the prospects for new nuclear builds remain problematic. The models illustrate how different policy choices can lead to differing outcomes.

Natural Gas

Contribution to Greenhouse Gas Emissions

Of the fossil fuels, natural gas consumption and emissions are predicted to increase most rapidly through 2015, according to AEO 97. In 1995, carbon emissions from natural gas were 267 MMTC, and this figure is projected to increase to 310 MMTC in 2010 and 319 MMTC in 2015.

Factors Shaping Industry Response

Impacts of greenhouse gas emissions mitigation on the natural gas industry depend on the balance between the three available strategies in reaching the emissions reduction goal. Different modeling tools illustrate different possible futures:

- The DRI energy model shows a reduction in natural gas use relative to baseline on the order of 9 to 16 percent between 2005 and 2015.
- NEMS, despite simulating a somewhat larger reduction in carbon emissions from the energy sector, shows an increase in natural gas use relative to base of between 4 and 11 percent over this same period.

The dramatically different alternative futures illustrate the way in which emphasizing different energy strategies to reduce carbon emissions — energy efficiency versus fuel switching — will produce different results.

The key to cost-effective greenhouse gas reductions in 2010 lies in the large potential of developing and implementing energy efficiency technologies in each of the economic sectors. Within the industries which may be required to reduce their greenhouse gas emissions, there will be opportunities to gain competitive advantage through creatively meeting the environmental challenge. There will be opportunities for other industries as well. For example, companies and individuals in the architectural field can benefit as new building designs are needed to improve efficiency in both the residential and commercial sectors. In addition, industries that manufacture items such as heating and air conditioning equipment, office equipment, automobile parts, industrial equipment, and lighting, to name only a small fraction of potential industries, may also benefit under a climate change policy due to increased demand for these products. Finally, industries involved in the development of renewable energy technologies will also be at an advantage as interest in solar, wind and other sources of energy grows.

Conclusion

From the above discussion, it is clear that the way in which resources are used by individual industries within each economic sector varies widely. This is not surprising given the vast array of goods and services produced by these industries. Because sectors are unique, a climate change mitigation strategy must be designed and implemented in a way that reflects a solid understanding and appreciation of the differing circumstances faced by U.S. industries. This will give each industry the ability to respond to individual policies in a way that both minimizes potential impacts and maximizes possible opportunities. In order to achieve this goal, future climate change policies must be based on the continued development and diffusion of cost-effective, energy efficient technologies.



White House Climate Change Task Force

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FAX

To: Joe Aldy

Organization/Title:

Fax: 395-6870

Phone:

Pages (including cover): 12

Date: 3/3

From: Lisa McNeill

Phone: 343-1091

Message:

Per my voice mail. This is the document presented at an interagency meeting in September. The 10% reduction is mentioned at the bottom of page 2.

Call if questions.

Cement, Concrete and Greenhouse Gas

Gary Sauer

CGLI Second Roundtable on North American Energy Policy

April, 1997

The author is Senior Vice President of Manufacturing for Holnam Inc., the largest cement manufacturer in North America. Headquartered in Michigan, Holnam has manufacturing facilities, distribution centers and marketing offices spread throughout the United States. Holnam is a private company, wholly owned by Holderbank Financiere Glaris, which is the world's largest producer of cement and related construction materials. Holderbank is headquartered in Switzerland and is publicly traded on stock exchanges in Zurich and London.

Opportunity

The cement industry is a significant source of CO₂ emissions to the environment and will, as such, be affected by the current discussions about reducing those emissions eventually below 1990 levels. The industry, along with iron and steel production and manufacturing of glass, lime and some chemicals, belongs to the group of process industries that generate carbon dioxide not only by fuel combustion, but also by decomposition of carbonate raw materials. The U.S. cement and concrete industries are in a position to reduce the volume of CO₂ released into the atmosphere significantly (on the order of 5 to 15 million tons per year). Changes to public policy could cause those reductions to occur quickly (months, not years) and relatively painlessly (low capital investment).

About Cement and Concrete

Portland cement is a gray, finely ground manufactured mineral product which, when mixed with water, sand, gravel and other materials (sometimes including cement substitutes) forms concrete. This composite material is the most flexible and widely used construction material in the world. The cement is the "glue" which binds the other ingredients together.

The raw materials used to produce cement are primarily limestone, shale, clay and silica sand. These materials are crushed, proportioned to the correct chemical composition and ground to a fine consistency. Small quantities of iron oxide and/or alumina may be added to adjust the raw material mixture. The mixture is heated to about 2700 °F (1500 °C) in large rotary kilns. The clinker, a hard granular intermediate product, is discharged from the kiln and is ground with approximately 5% gypsum (which controls the setting time) to produce cement. Cement manufacturing is energy intensive, requiring between three and six million BTU's per ton of product produced.

Concrete contains 10%-15% cement, the remainder being crushed stone, sand or gravel and water (and sometimes, mineral admixtures). The cement reacts with the water to bind the mixture into a hard, durable mass. Because of the relatively small cement content, concrete is not energy intensive when compared to other construction materials:

Table 1. Relative Energy Requirements for Construction Materials⁽¹⁾

Extruded Aluminum	184
Plastics	92
Structural Ceramics	17
Steel	12
Glass	7
Concrete	1

How can the Industry reduce CO₂ ?

First, let's see where the CO₂ comes from. As mentioned above, cement manufacture is energy intensive. The majority of the thermal energy is required in the clinker producing process described above. A significant amount of electrical energy is also required (mainly in the finish grinding process, where clinker is ground with gypsum to produce cement). The CO₂ comes from two sources, both related to preparing the raw materials for the chemical reactions which form the compounds which cause portland cement to set up when water is added. Limestone in the form of calcium carbonate (CaCO₃) is the main raw material component (approximately 70-80%). Before the lime can react with other oxides of silica and alumina, the limestone must be broken down into free lime (CaO) and carbon dioxide (CO₂). The CO₂ is discharged to the environment. The CaO reacts with other oxides and becomes clinker. The breaking down of limestone into free lime and carbon dioxide is called calcination and requires heat. The heat comes from the combustion of fuels (coal, natural gas, tires, waste fuels), which produces combustion products, including CO₂.

On average, each ton of portland cement clinker produced results in one ton of CO₂ being released into the atmosphere. About 60% is the result of calcination, and the other 40% is combustion products from the fossil fuels which supply the energy for calcination. In 1997, approximately 100 million tons of cement (containing about 95 million tons of clinker) will be used in the United States, resulting in about 100 million tons of CO₂ emissions (about 85% produced domestically and the rest imported).

So, how to reduce emissions? Simple.....reduce the amount of clinker used to produce a unit of concrete by replacing it with flyash (a waste product from the coal fired utility industry), granulated blast-furnace slag (a waste product from the production of iron) or with limestone interground with clinker and gypsum in the finish grinding process. The flyash and slag may be introduced by the concrete producer as a replacement for portland cement, or interground with clinker by the cement manufacturer to produce a composite cement. Reduction in CO₂ results either way.....a five percent replacement of portland cement clinker with flyash, slag, limestone or other mineral admixtures (either blended by the concrete producer or using composite cements) yields about a five million ton reduction in CO₂ emissions resulting from the manufacture of clinker. Ten percent yields ten million tons. Fifteen percent.....fifteen million, and so on.

Look around...the rest of the world is doing it

It has been shown that intergrinding a moderate amount of limestone with clinker not only has no detrimental effect, but even improves some cement performance characteristics⁽⁶⁾. Many countries (Germany, France, Canada, Japan, Russia, Brazil.....) allow up to 5% limestone in portland cements. Permitted percentages vary in Europe all the way to 35% (although lower average percentages are more common). In the United States, the Standard Specification for Portland Cement, ASTM C150, does not allow any ingredients in cements except clinker, calcium sulfate and very small amounts of processing additions.

According to figures released by Cembureau (the European Cement Association), blended cement production in Europe during 1994 increased by 21 percentage points to 51% of total cementitious production (from 30% in 1992). Portland cement production during the same period declined to 37% (from 52% in 1992). That trend is very similar to the experience in the group of companies that mine belongs to. In the period from 1990 to 1995, the average "clinker factor" in a ton of cement (worldwide average) was reduced by more than 6%.

During that same period, the clinker factor in products produced by my company (which is typical of North American companies) did not change. The U.S. Portland Cement Association reports that less than 3% of all cements used in the United States are blended (or what the Europeans call composite) cements.

Why aren't we taking advantage of the opportunity?

Actually we are using some cement substitutes but not nearly enough. Even though blended cements have not gained significant acceptance in the U.S., some concrete producers are taking advantage of specifications which permit them to substitute mineral admixtures (principally flyash) for cement in concrete mixes. A 1996 PCA Market Research study concluded that approximately half of the concrete produced by ready mix concrete producers contains flyash. On average, those producers who use flyash are replacing 20% of the required cement with flyash. In a 100 million ton cement market, this suggests that about ten million tons of flyash is used in concrete. That number is consistent with figures published by the American Coal Ash Association, which tracks the supply and consumption of flyash. If PCA's research is indicative of the entire concrete market, the 50% of concrete produced with no flyash (or other substitute) suggests the potential for at least ten million tons (100 million tons x 50% = 50 million tons....@ 20% replacement = 10 million tons) of additional opportunity for cement / clinker replacement (i.e., CO₂ reduction).

There are a number of reasons that the opportunity remains untapped:

1. U.S. standards either do not encourage or specifically prohibit the use of extenders.

2. Consensus standard setting organizations which write the standards used by most specifiers of construction materials function in a way that makes changing standards very difficult. These organizations are composed of people and companies (or their representatives) with an economic stake in the standards. Change requires consensus, and it is possible for a small minority, committed to preventing change, to do so. All of this makes it very difficult to affect change to standards solely by demonstrating the technical attractiveness of the proposed change.
3. Unlike many countries around the world, the specification of construction materials in the U.S. is very fragmented. Several federal entities write specifications for cement and concrete. Each state has a Department of Transportation which writes specifications. Within a given state, it is not uncommon for local government entities to write their own specifications (different from those used by the state government). Construction materials suppliers attempt to supply products which will meet as many of the specifications used by these various entities as possible. This fragmentation makes it very difficult to affect change.
4. Absent some incentive to change a materials specification, the people who write these specifications for the multitude of agencies listed above tend to stick with solutions they are familiar with. It is doubtful that many specification writers will risk using a new product in today's environment based solely on the fact that doing so will reduce CO₂ emissions. Evidence of that truth is that a blended cement standard (C1157) has existed for several years and only a few states are willing to use it as an option in their specifications. The standard specification for concrete (C94) does not even mention the blended cement specification.

Conclusions

This paper begins with the assertion that we have in front of us an opportunity to significantly and painlessly reduce the volume of carbon dioxide emissions which result from the manufacture of portland cements. Seizing this opportunity would result in many winners and no losers. Everyone who cares about greenhouse gas emissions would be a winner. Utilizing mineral admixtures which would otherwise be landfilled is a "win" for the environment. Utilizing clinker substitutes improves the productivity of cement companies and gives them a chance to be competitive with global competitors in an increasingly global business. Concrete producers would benefit from the opportunity to reduce materials costs by replacing cement with low cost alternatives. Concrete producers would benefit from the increased availability of cement, as clinker substitutes extend the production capacity of the U.S. cement industry. And end users of cement and concrete (including the taxpayers who pay for public works) would also win, as the use of clinker and cement substitutes tends to reduce the cost of construction materials.

There are federal laws which require the use of flyash and slag on federally financed projects. Their effect has been limited because they do not have "teeth"....that is, they provide several, rather vague, circumstances where the law can be ignored.

It is painfully clear to those of us with an interest in the increased use of cement and clinker substitutes that further gains in the current environment will be difficult to achieve. I've suggested that some public policy initiative is necessary to allow the benefits listed above to be realized. The public interest is not advanced by a failure to take advantage of these benefits.

I do not have a specific public policy initiative to recommend today. I do feel that an appropriate initiative will be market based. That is, it should somehow create an economic incentive to produce and use construction materials which result in the reduction of greenhouse gasses.

References

1. Tresouthich, S.W. and Mishulovich, A., "Energy and Environmental Considerations for the Cement Industry," *Proceedings of the Energy and the Environment in the 21st Century Conference*, Cambridge, MA, 1990.
2. The Reduction of Resource Input and Emissions Achieved by Addition of Limestone to Portland Cement, Research and Development Department, Portland Cement Association, Skokie, Illinois, 1996.
3. Potential Reduction of CO₂ Emissions in the Manufacture of Portland Cement (R&D No. 2010), Research and Development Department, Portland Cement Association, Skokie, Illinois, 1996.
4. Properties of Concretes Made with Fly Ash and Cements Containing Limestone (R&D Serial No. 2082), Research and Development Department, Portland Cement Association, Skokie, Illinois, 1996.
5. The Use of Limestone in Portland Cement: A State-of-the-Art Review (PCA Serial No. 2052a), Research and Development Department, Portland Cement Association, Skokie, Illinois, 1996.
6. Livesay, P., "Strength Characteristics of Portland-Limestone Cements," *Construction and Building Materials*, 5(3), pp. 147-150, 1991.

Cement, Concrete and Greenhouse Gas

Gary Sauer

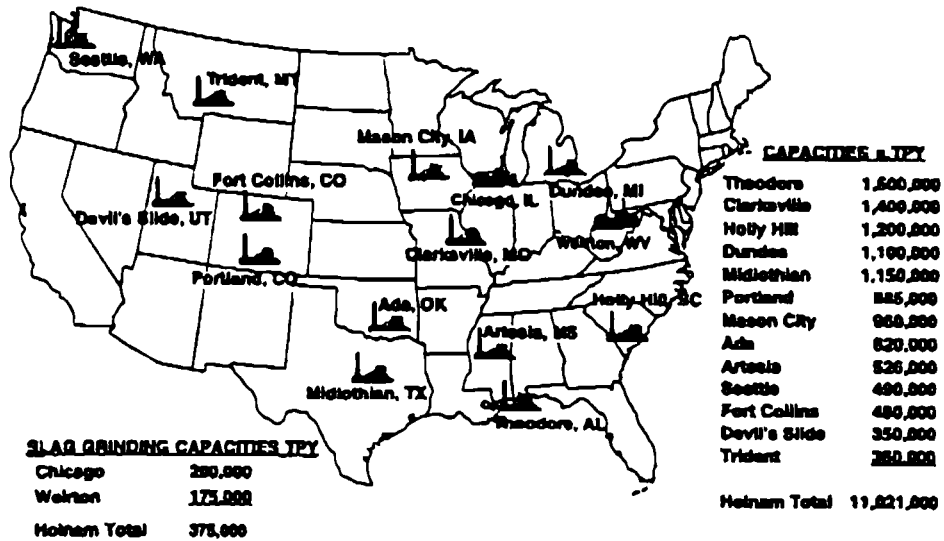
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Reduce CO₂ Emissions

- **By 5-15 million tons per year from U.S. industry**
- **Overnight!**
- **With very low capital investment**

HOLNAM Plant Locations

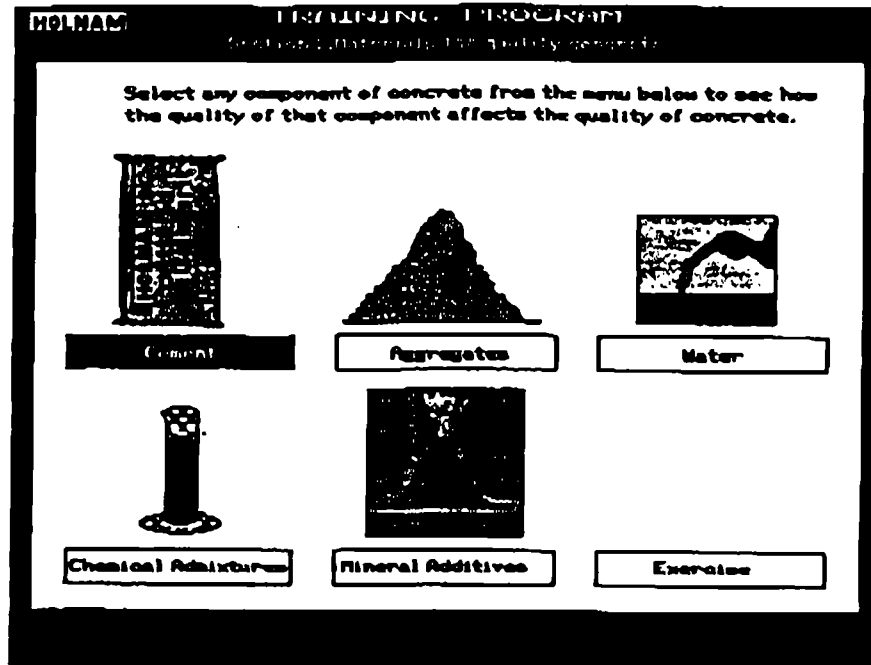


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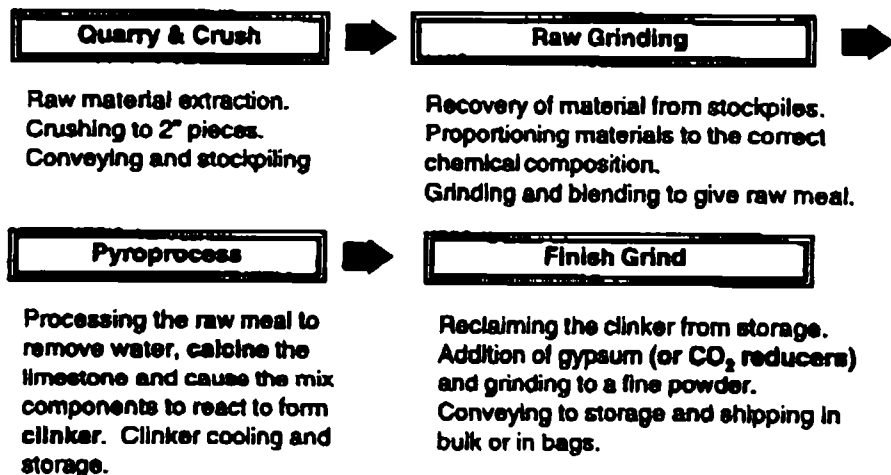


World
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The Cement Manufacturing Process



Cement Chemistry Lesson

- $\text{CaCO}_3 \rightleftharpoons \text{CaO} + \text{CO}_2$ (approx. 60%)
- Fuel for calcination combustion products (40%)
- About 1 ton of CO_2 is released to the atmosphere for each ton of clinker produced.

Reduce CO_2 Emissions

- By 5-15 million tons per year from U.S. industry
- Overnight!
- With very low capital investment

How ?

Easy . . . use more portland cement substitutes in concrete. For instance:

- Fly ash from coal fired power plants
- Granulated blast furnace slag from manufacture of iron
- Limestone intergrinding (5-15%)

Paving new ground here?....hardly

- Countries all over the world are already doing it
- Extensive research has demonstrated the wisdom
- Win, Win, Win Opportunity

What are we waiting for?

Barriers include:

- Antiquated standards which discourage or specifically prohibit reducing clinker factor in concrete.
- Consensus standard setting organizations which are bureaucratic and slow to change.
- Fragmented markets . . . many specifiers.
- Risk averse specifiers with no incentive to change.
- Individual stakeholders exercise veto power for parochial reasons.

The Opportunity

- This is a public policy issue which is too important to be ignored
- . . . or left solely to consensus standard setting organizations. Change standard or change standard.
- Mandates ? / Preferences ?
- Public policy requiring real preferences for suppliers of building materials who reduce CO₂ emissions.