



Office of Atmospheric Programs

1992 Accomplishments and Prospects for 1993



Volume 1: Global Change Division

Mission Statements

The Office of Atmospheric Programs is located within the U.S. Environmental Protection Agency's Office of Air and Radiation.

The **Office of Atmospheric Programs'** missions are:

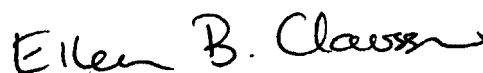
- To reduce greenhouse gas emissions.
- To protect stratospheric ozone.
- To prevent acid precipitation.

As an office we are dedicated to four guiding principles:

- Creating partnerships with the private sector.
- Finding profitable solutions.
- Using economic incentive mechanisms that create markets.
- Establishing the U.S. as a leader in global environmental issues.

The past year has been a fruitful one for our office. In three volumes of *Accomplishments for 1992, Prospects for 1993*, we describe our achievements and plans.

Our goal is to serve the American public. The purpose of these volumes is to assure strong communications. Listed on each accomplishment page is a contact person. Please don't hesitate to contact us. We believe in continual improvement and solicit your views, help, and perspectives.

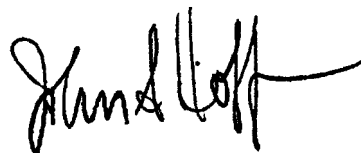


Eileen B. Claussen, Director
Office of Atmospheric Programs

The **Global Change Division's** mission is to profitably prevent pollution, including greenhouse gases, using voluntary market enhancing programs.

We seek partnerships and alliances with corporations, universities, producers, and consumers in order to increase investment and jobs in profitable pollution prevention through more productive investments in the supply and demand sides of the energy sector, agriculture, and industry.

This booklet of accomplishments and prospects is intended to stimulate inquiries, ideas, and greater cooperation. We hope you find it useful.



John S. Hoffman, Director
Global Change Division

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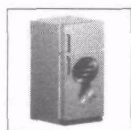
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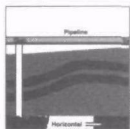
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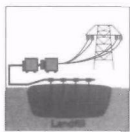
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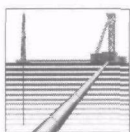
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The Global Change Division

The Global Change Division seeks to develop voluntary programs that stimulate profitable prevention of pollution, create jobs, and free up capital for investment in other sectors of the economy. The programs described in this booklet are part of a cohesive set of seven strategies for preventing pollution from the energy sector by increasing productivity. These strategies seek to:

- **Encourage corporate-wide purchasing.**
- **Identify energy-efficient products.**
- **Promote mass purchases.**
- **Encourage commercialization of resource-efficient technologies.**
- **Promote sensible utility regulation and legal frameworks.**
- **Create environmental best practices.**
- **Expand international markets for resource-efficient U.S. technologies.**

These strategies and the Global Change Division's programs are presented in greater detail in *The Climate is Right for Action: Voluntary Programs to Reduce Greenhouse Gas Emissions* (October 1992), and *EPA's Pollution Prevention Strategy for the Energy Sector*, a document that will be released in early February 1993.

Statement of Challenge



Green Lights

Lighting accounts for 20-25 percent of the electricity used in the United States. Inefficient lighting systems:

- Waste electricity.
- Increase ratepayer electricity bills.
- Cause air pollution and greenhouse gas emissions.

Energy-efficient lighting can:

- Cut lighting electricity use and the pollution caused by lighting by 50 percent.
- Free \$18.6 billion from ratepayer bills for investment.
- Allow \$60 billion of capital to be invested in new jobs rather than new power plants.

Only a tiny portion of the potential of efficient lighting has been achieved because of:

- Lack of organizational motivation.
- Lack of technical information.
- Inadequate financing.

Green Lights is an innovative program developed by the Global Change Division that encourages major U.S. organizations to install energy-efficient lighting. Under this voluntary, non-regulatory program, facilities are being upgraded with energy-efficient lighting wherever it is profitable and maintains or improves lighting quality. Corporations, state governments, and other institutions are organizing themselves to upgrade 90 percent of their facilities.

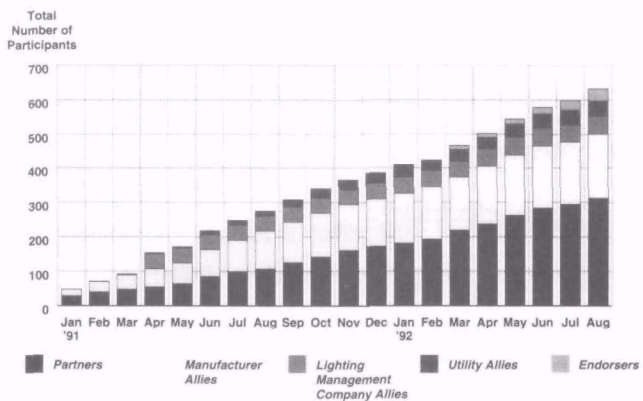


Marketing Accomplishments

HEADLINES:

- **668 organizations** join Green Lights as of November 2, 1992.
- Participants commit **2.9 billion square feet** of commercial, manufacturing, retail, and government facilities nationwide, or 3 percent of all commercial/industrial space.
- Green Lights receives **extensive media coverage** through editorials, articles, public service advertisements, endorsements, and television coverage.
- 1,000 institutions are considering joining Green Lights.
- Green Lights won the National Environmental Achievement Award.

Green Lights is Growing



Prospects for 1993:

- Recruit participants representing an additional 4 billion square feet.
- Living landmarks join Green Lights and begin informing the public of its benefits.
- Wider marketing by utilities and state organizations expand the circle of prospects.
- Launch residential Green Lights Program.

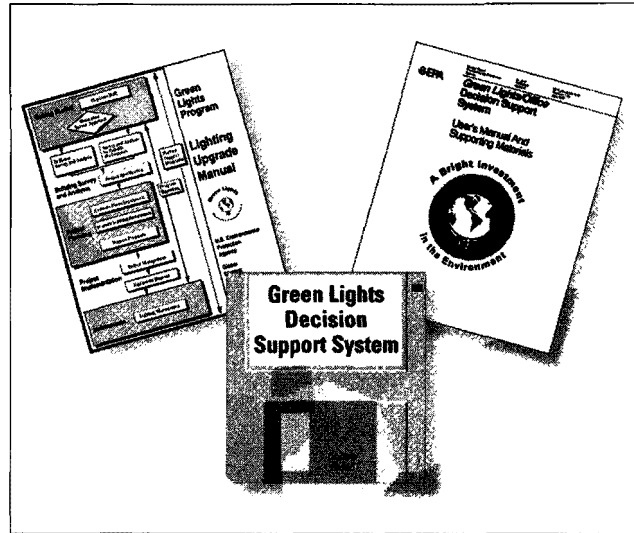
Lead Contact: Susan Bullard 202 233-9065



Implementation Accomplishments

HEADLINES:

- **Developed state-of-the-art software, documents, and hotline services** on energy-efficient lighting.
- Trained over 830 people on use of Green Lights software and lighting survey and upgrade practices.
- Facility upgrades have already prevented 133.5 million pounds of CO₂ emissions; 1.2 million pounds of SO₂ emissions; and 482,000 pounds of NO_x emissions (as of September 30, 1992).
- **Some participants achieve over 90 percent reductions** with innovative approaches.
- Initiated occupancy sensor program to expand use of this technology.



Prospects for 1993:

- Square footage in the upgrade pipeline increases as participants shift from surveys to action, expanding market for products, creating jobs and investment.
- New versions of tools such as the Lighting Upgrade Manual, lighting analysis software, financial analysis software, and the Green Lights Financing Data Base issued.
- Rate of occupancy sensor installation more than doubled.

Lead Contact: Bob Kwartin 202 233-9313

Statement of Challenge



Buildings

Buildings account for approximately 7 percent of all U.S. energy consumption. Few companies, governments, or other institutions are investing in efficient technologies. Inefficient technologies are:

- Wasting energy.
- Costing ratepayers money.
- Causing air pollution and greenhouse gas emissions

Total wasted resources exceed \$15 billion.

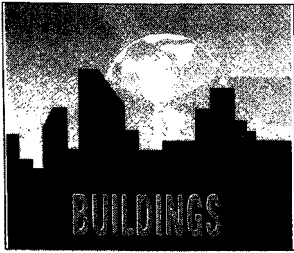
Proven energy-efficient technologies can reduce 30-50 percent of building energy use.

Upgrading existing buildings can:

- Save money.
- Reduce pollution.
- Increase comfort.
- Improve indoor air.

To capture these benefits, the Buildings program will:

- Create corporate commitment.
- Provide technical support for staged maximization of profitable reductions.
- Organize vendor industries to fully support this market expanding opportunity.



Variable Speed Drives Accomplishments

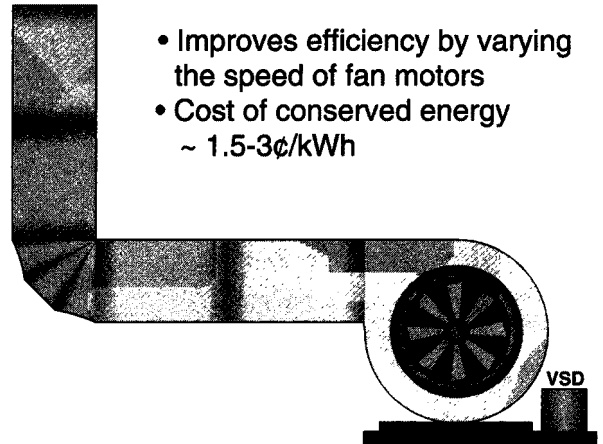
HEADLINES:

- **EPA initiates Phase 1 of Buildings program—Variable Speed Drive (VSD) Demonstration Study**—to verify energy savings and implementation for VSDs.
- Several Green Lights Partners agree to participate in program. EPA plans expansion.

Prospects for 1993:

- Complete VSD demonstration study.
- Organize mass purchase of VSDs by Buildings program participants to create economies of scale and increase market penetration of this energy-saving technology.
- Start phase-in of chiller program, pumps, and cooling towers.
- Sign up many Green Lights participants for staged implementation of Buildings program.

Variable Speed Air Handling Systems



- Improves efficiency by varying the speed of fan motors
- Cost of conserved energy ~ 1.5-3¢/kWh

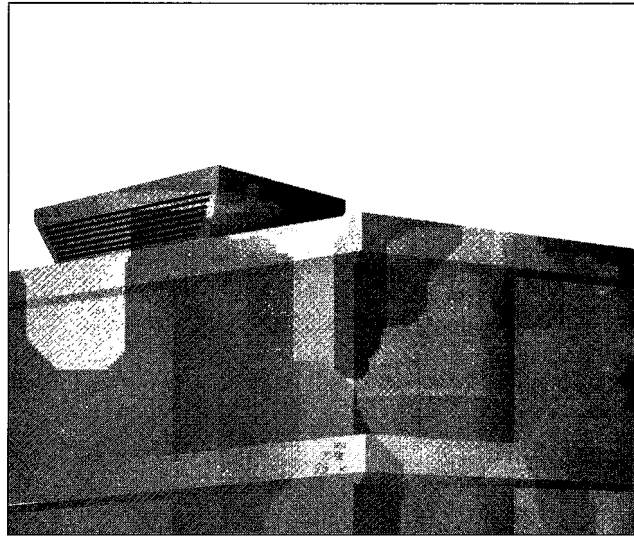
Lead Contacts: Tracy Narel 202 233-9145
Chris O'Brien 202 233-9146



Chillers and Cooling Systems Accomplishments

HEADLINES:

- Analysis concludes that **HCFC-123 is a safe substitute for CFC-11** in chillers.
- Studies indicate **HCFC-123 is the most energy-efficient** CFC-free building cooling system currently available.
- Surveys show that air conditioning units typically used on rooftops to cool small office buildings and shopping malls have the worst efficiency of all systems on the market.



Prospects for 1993:

- Hold national conference on Efficient Cooling Systems Without CFCs for building owners across the country. The conference will help building owners make optimum choices in selecting new CFC-free systems, and provide guidance in how to take advantage of incorporating new, efficient technology at a profit.
- A prototype "Golden Carrot™" rooftop air conditioning system will be designed for high efficiency.

Lead Contact: Bill Kopko 202 233-9124

Statement of Challenge



Efficient Office Equipment

Office equipment is the fastest-growing electricity load in the commercial sector:

- Computer systems account for 5 percent of total commercial electricity consumption.
- Energy consumption by computers may reach 10 percent of building energy by the year 2000.
- The vast majority of the nation's 30-35 million personal computers are left turned on while not in use.
- 30-40 percent of personal computers are left running overnight and on weekends.

To reduce wasted electricity, we must:

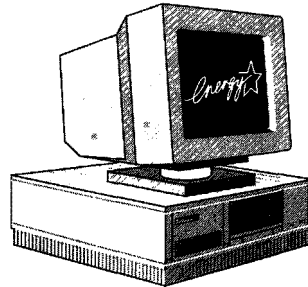
- Develop products which use less energy, especially when not actually producing work.
- Make consumers aware of energy-efficient products and their benefits.
- Create a new market for energy-efficient office equipment.



Energy Star Computers Accomplishments

HEADLINES:

- **EPA creates Energy Star Program.**
- Companies become members by agreeing to produce **PC's that use about 75 percent less energy than current products.**
- 13 leading manufacturers sign up, representing 40 percent of U.S. personal computer sales.
- World's leading supplier of computer microprocessors—Intel Corporation—announces support of Energy Star Program. **Intel to incorporate energy-saving technologies into all future microprocessors.**
- EPA works with General Services Administration and Department of Energy to develop federal procurement guidelines to promote energy-saving computers and office equipment.



Pollution Prevented by 2000:

- 20 million tons CO₂
- 140,000 tons SO₂
- 75,000 tons N₂O

Annual Electricity Bill Savings:

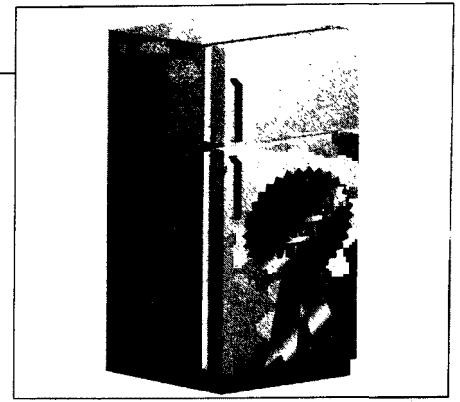
\$1.5-2 billion

Prospects for 1993:

- Partners introduce energy-efficient products by early 1993—**at no extra cost to consumers.**
- Bring printer manufacturers into the EPA Energy Star Program.
- Recruit all major computer manufacturers as EPA Energy Star Partners by June 1993.
- Expand Energy Star Program to other non-office products.

Lead Contacts: Brian Johnson 202 233-9114 (computers)
Diane Niedzialkowski 202 233-9167 (other technologies)

Statement of Challenge



CFC-Free, Energy-Efficient Refrigerator/Freezers

Household refrigerators:

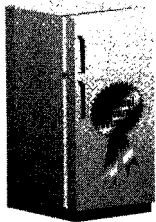
- Consume 15-20 percent of all electricity used in U.S. households.
- Use chlorofluorocarbons (CFCs)—ozone-depleting substances—that will be phased out of production by 1995.

The 1995 phaseout of CFCs presents a unique opportunity:

- For improving refrigerators design to be more efficient.

To increase efficiency, we must:

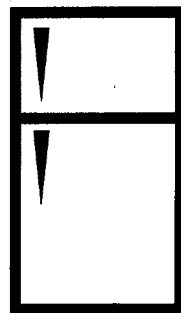
- Develop full information as to the impacts of the existing, emerging, and long-term options available for manufacturing refrigerators.
- Give the manufacturers freedom to develop the most cost-effective set of technologies.
- Overcome the unwillingness of customers to pay higher first costs even when economically warranted.
- Reduce the financial risks of introducing super-efficient technologies.



The "Golden Carrot"TM Super-Efficient Refrigerator Program (SERP) Accomplishments

HEADLINES:

- 25 utilities pool \$30 million in program to accelerate commercialization of super-efficient, non-CFC refrigerators.
- Manufacturer that can build best refrigerator the quickest, and at the lowest cost, will receive prize.
- Participating utilities pay prize to manufacturer as refrigerators are shipped to stores in their service territories, keeping prices as low as less efficient refrigerators.
- All but one major U.S. manufacturer enters SERP competition.



SERP
SUPER EFFICIENT
REFRIGERATOR
PROGRAM INC.

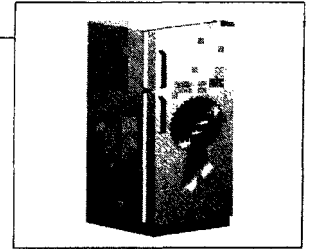
Over a refrigerator's lifetime, 300-400 kWh saved per year leads to:

- Electricity bill reductions \$500
- CO₂ reductions over 9000 lbs

Prospects for 1993:

- Two finalists build prototypes to support their bids.
- SERP determines the competition winner and awards the contract.
- EPA begins work on trade-in programs that take old energy guzzlers off the grid and replace them with "Golden Carrot"TM refrigerators.

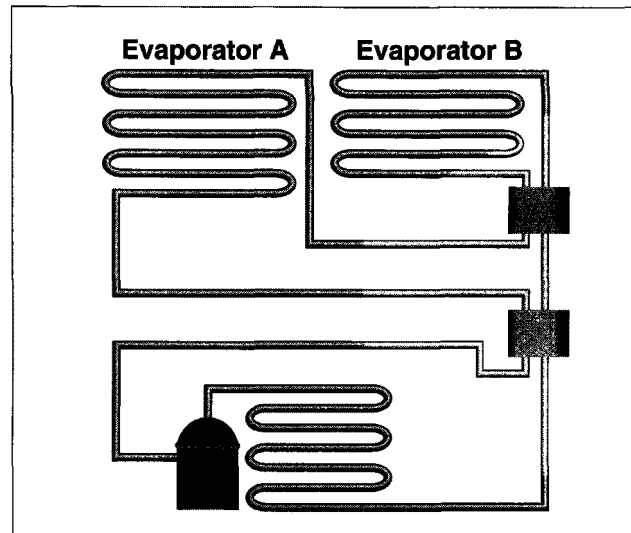
Lead Contact: Michael L'Ecuyer 202 233-9127



“Lorenz Cycle” Accomplishments

HEADLINES:

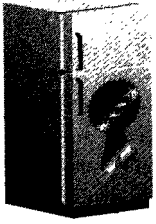
- CFC-free “Lorenz Cycle” refrigerators **reduce energy consumption by 8-16 percent.** EPA funded research at University of Maryland successfully demonstrates new technology.
- New technology optimizes temperatures in each section and reduces energy consumption by cooling freezer and fresh food compartments separately.



Prospects for 1993:

- Optimize the refrigerant blend for maximum energy efficiency and no ozone depletion potential.
- Identify and resolve barriers to commercialization.

Lead Contact: Bob Rose 202 233-9106



“KOPKO” Cycle Accomplishments

HEADLINES:

- EPA develops “KOPKO” cycle—achieves **20 percent energy savings over current CFC-12 cycle.**
- “KOPKO” cycle reconfigures current vapor compression cycle.

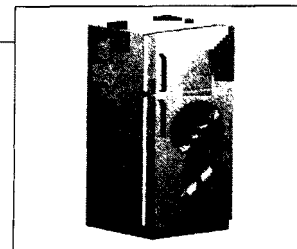
Prospects for 1993:

- Demonstrate savings with CFC-free refrigerant.
- Evaluate cost, reliability, and commercial feasibility.

Benefits of “Kopko” Cycle:

- Significant energy savings
- Single component refrigerants
- Simple controls

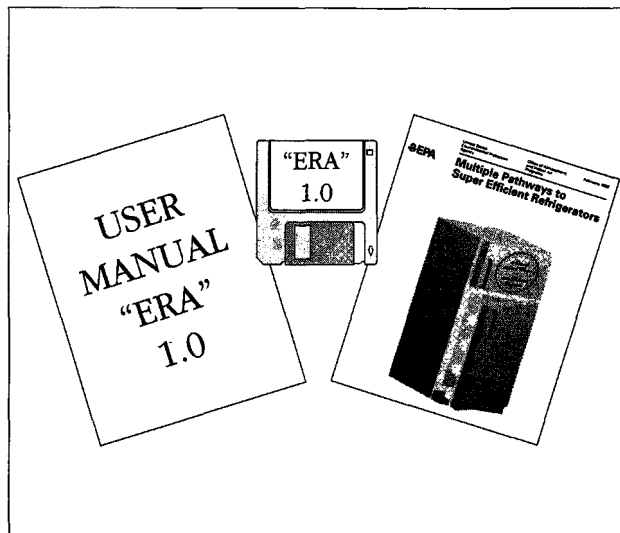
Lead Contact: Bill Kopko 202 233-9124



Refrigerator Technology Modeling Accomplishments

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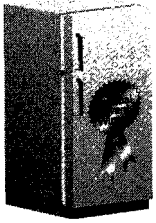
- **EPA releases software model**—"EPA Refrigerator Analysis" (ERA version 1.0)—**to predict energy consumption of household refrigerator/freezers** by simulating alternative technological configurations.
- EPA report evaluates technology options for producing super-efficient refrigerator/freezers.
- Computer software modified for Chinese refrigerator designs—supports Chinese efforts to evaluate CFC-free, energy-efficient technologies.



Prospects for 1993:

- Distribute software worldwide.
- DOE and appliance industry likely to use "EPA Refrigerator Analysis" as the basis for 1998 Appliance Energy Efficiency Standards revision.
- Final software version available for Chinese refrigerator designs. Modify version to simulate Indian refrigerator designs and conditions.

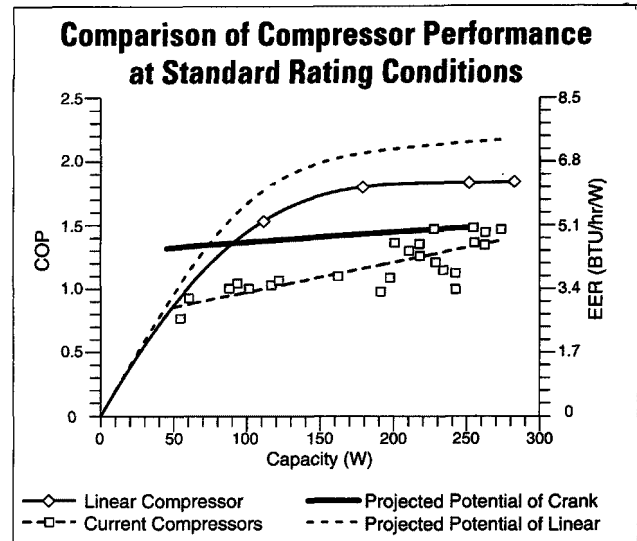
Lead Contact: Alan Fine 202 233-9094



Linear Motor Based Compressor Accomplishments

HEADLINES:

- EPA funds research at Sunpower Corporation. Research produces oil-free super-efficient compressor.
- Prototype testing confirms that **new compressor is 20 percent more efficient than most efficient compressor in the world.** The increased capacity control inherent in the compressor design should provide an **overall energy reduction of 30 percent.**
- Efficient linear design can be used with new non-CFC refrigerants.
- **Present value of new compressor exceeds \$14 billion** if commercialized in the United States.



Prospects for 1993:

- Validate savings in a working refrigerator/freezer.
- Prove cost-effectiveness and manufacturability.

Lead Contact: Bill Kopko 202 233-9124



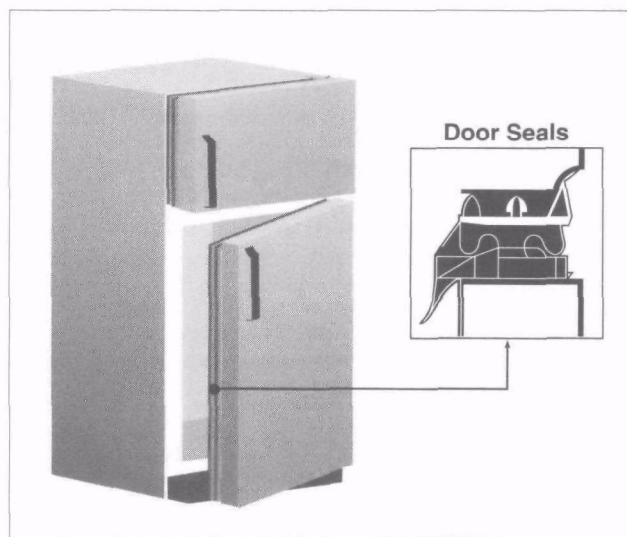
Improved Door Seals Accomplishments

HEADLINES:

- EPA concept for door seal modifications **increases energy efficiency by up to 8 percent.** Demonstrations verify results.
- Cost analysis shows door seal modifications provide savings at **cost of only \$0.02/kWh conserved.**

Prospects for 1993:

- Technology likely to be used in Super-Efficient Refrigerator Program model or 1993 refrigerator models.



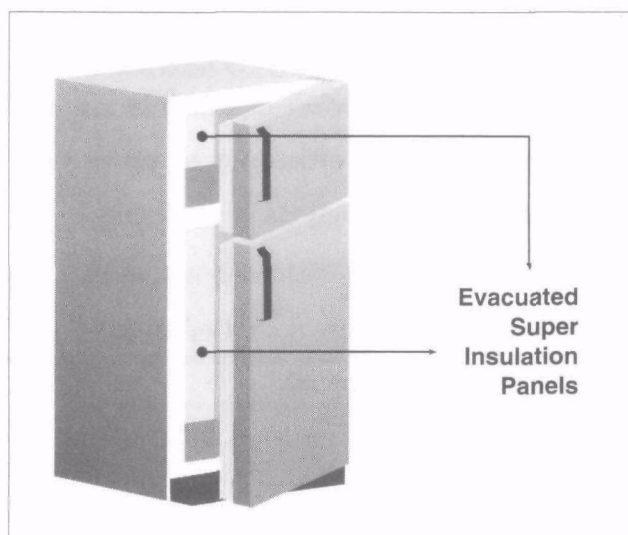
Lead Contact: Alan Fine 202 233-9094



Super Insulation Accomplishments

HEADLINES:

- EPA analysis shows **vacuum panel insulation saves money and energy** in large-volume refrigerator/freezers.
- Prototype testing shows advanced insulation can **increase efficiency by over 10 percent**.
- Thicker foam insulation cost-effectively reduces energy use. Studies indicate consumer acceptance.



Prospects for 1993:

- Publish analysis indicating competitiveness of thicker insulation and super insulation across a range of performance conditions for refrigerators of different sizes.
- Focus on marketing thicker walled units. Emphasize labeling with environmental benefits.
- Commercialize vacuum insulation panels.

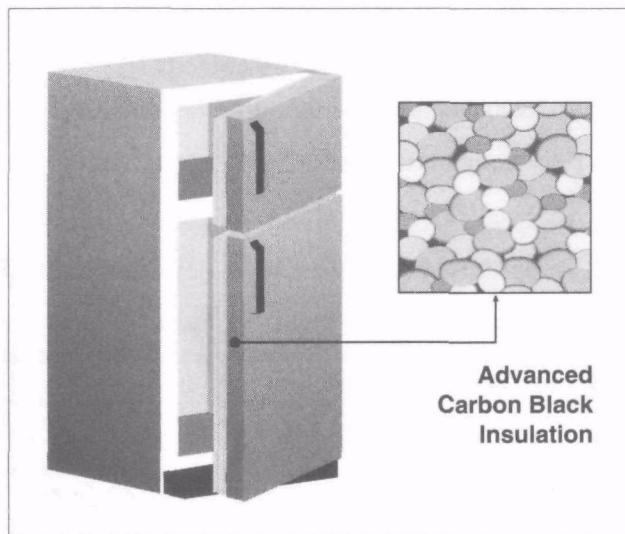
Lead Contact: Alan Fine 202 233-9094



Carbon Black Insulation Accomplishments

HEADLINES:

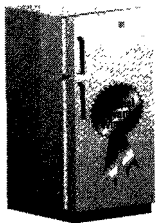
- Major foam supplier to adapt carbon black foam to appliance formulations. **New technology blocks heat and increases energy efficiency.**
- Tests show carbon black can **increase foam efficiency by at least 8 percent** in commercially available insulation products.



Prospects for 1993:

- Demonstrate energy savings in appliances.
- Test material compatibility with refrigerator liners.

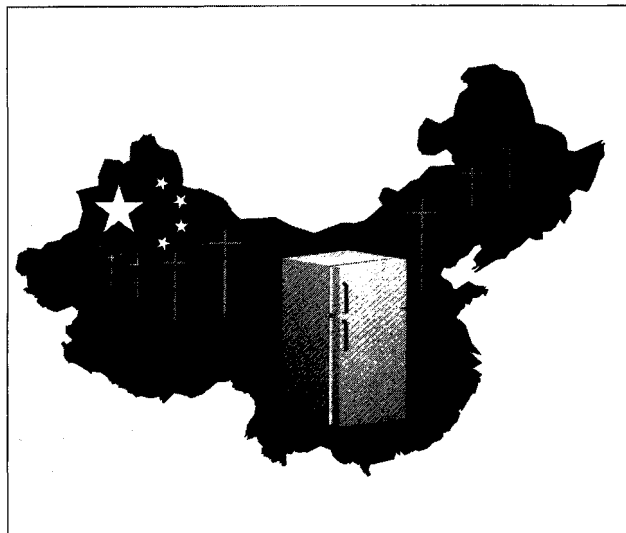
Lead Contact: Alan Fine 202 233-9094



Sino-U.S. Accomplishments

HEADLINES:

- Joint EPA/Chinese research evaluates CFC substitutes and increases energy efficiency of household refrigerator/freezers.
Research aids in securing Chinese participation in Montreal Protocol.
- Developed full testing program of all CFC alternatives. Results demonstrate that **refrigerant blends can produce 20 percent improvements in energy** with the “Lorenz Cycle,” and 7 percent without the cycle. Tests confirm thicker insulation is viable option for Chinese refrigerator designs.
- Chinese support development of super-efficient refrigerators.



Prospects for 1993:

- Convert refrigerator factory line in China to CFC alternatives.
- Conduct prototype demonstration of super-efficient refrigerator designs.
- Increase U.S. exports of CFC-free, energy-efficient technology.

Lead Contact: Jean Lupinacci 202 233-9137



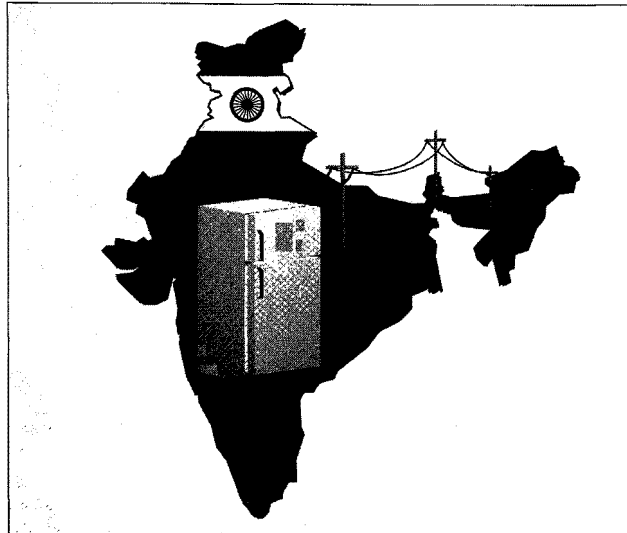
India-U.S. Accomplishments

HEADLINES:

- **CFC-free, energy-efficient refrigerator project in India** gains U.S. Department of State and Indian government approval.

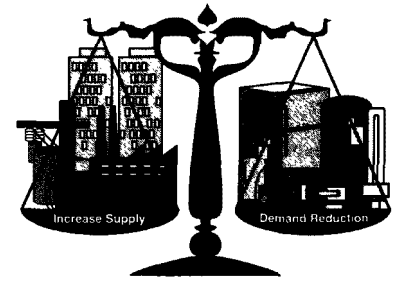
Prospects for 1993:

- Demonstrate CFC alternatives for Indian refrigerator designs and conditions.
- Modify "ERA" software model to simulate Indian refrigerators.
- Demonstrate energy-efficient technologies in India.



Lead Contact: Jean Lupinacci 202 233-9137

Statement of Challenge



Sensible Utility Investments

Utilities are being urged to meet growing energy service demands:

- At the least cost.
- Through the Integrated Resource Planning process.

Traditional regulation:

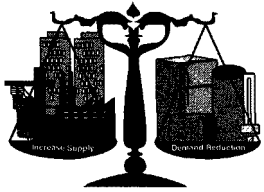
- Penalizes utilities that reduce demand through parallel losses in revenue.
- Provides few incentives for reducing customer bills.
- Provides few incentives for changing business culture.

To create incentives for the acquisition of least cost resources, we must:

- Decouple profits from sales.

Or at minimum:

- Provide lost revenue recovery.
- Create incentives such as shared savings.
- Improve utility capability to market, provide technical services, or aggregate demand.

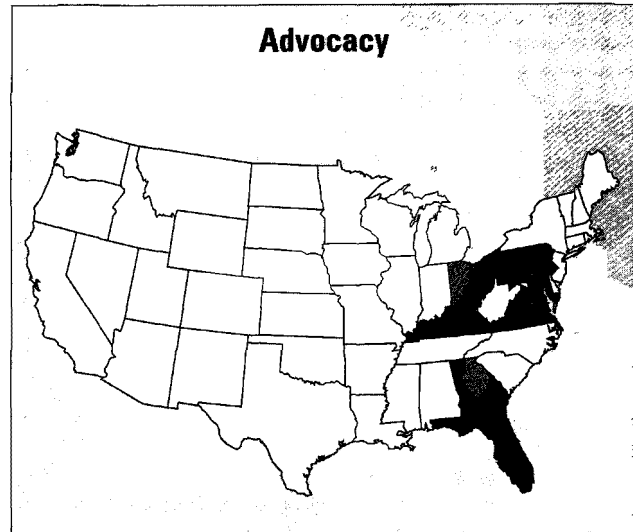


Reform Accomplishments

HEADLINES:

■ **EPA holds briefings and workshops, and testifies on utility reform** for regulatory commissioners in Washington DC, Georgia, Kentucky, Ohio, Pennsylvania, Virginia, Maryland, Florida, the National Association of Regulatory Utility Commissioners (NARUC), and the National Association of State Energy Officials (NASEO).

■ EPA offers seminars and workshops with consumer advocates to increase support for rate reform in several states and before the National Association of State Utility Consumer Advocates (NASUCA).

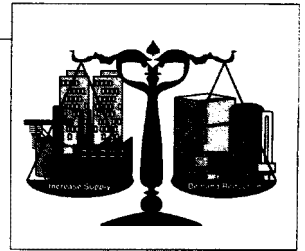


Prospects for 1993:

- Pursue aggressive outreach to commissions and consumer advocates in support of rate reform and favorable treatment of specific strategic DSM programs.
- Support tariffs that provide for strong customer bill reduction programs. Link tariffs to specific programs such as "Green Lights Super Ally Program."

Responsibilities for this program are shared by the Global Change Division and the Acid Rain Division.

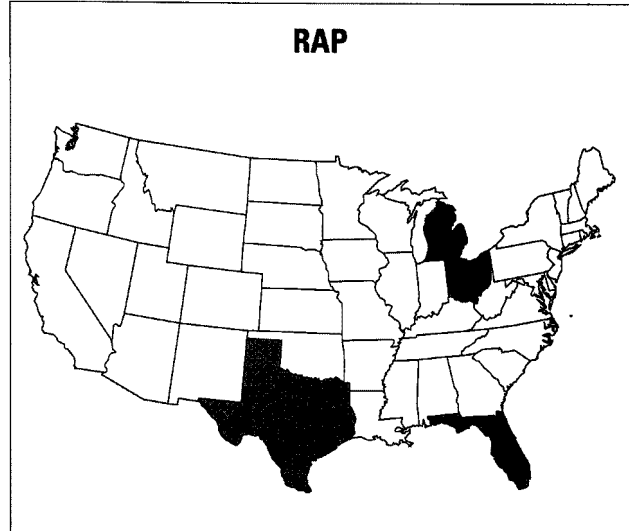
Lead Contacts: Michael L'Ecuyer 202 233-9127—Global Change Division
Rick Morgan 202 233-9143—Acid Rain Division



The Regulatory Assistance Program (RAP) Accomplishments

HEADLINES:

- EPA and Pew Charitable Trust fund RAP for \$400,000.
- RAP holds **intensive integrated resource management workshops** for public utility commission staffs in Ohio, Texas, Florida, and Michigan.
- RAP trains staff in key demand-side management areas: program analysis and evaluation, rate designs, IRP profitability and incentives, Clean Air Act Compliance, and consideration of environmental externality costs.

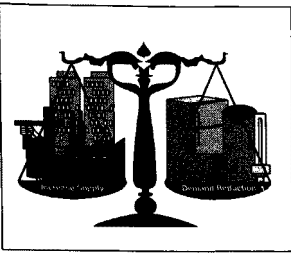


Prospects for 1993:

- Offer integrated resource management workshops in more states.
- Hold workshop for Federal agencies.

Responsibilities for this program are shared by the Global Change Division and the Acid Rain Division.

Lead Contacts: Michael L'Ecuyer 202 233-9127—Global Change Division
Rick Morgan 202 233-9143—Acid Rain Division



The Consortium for Energy Efficiency (CEE) Accomplishments

HEADLINES:

- CEE incorporated as national, public/private collaborative organization consisting of utilities, public agencies, and environmental groups.
- EPA provides start-up funding to CEE.
- CEE establishes mission to promote market penetration of technologies to cost-effectively conserve energy and prevent pollution.
- CEE plans to expand "Golden Carrot™" and similar strategic programs to other technology areas.

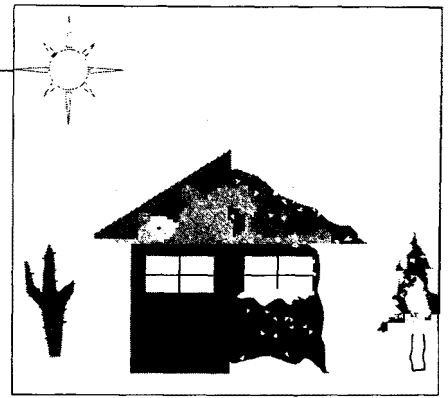


Prospects for 1993:

- Initiate several new "Golden Carrot™"-type programs, potentially including: commercial rooftop chillers; horizontal-axis, high-speed spin washers; and advanced heat pumps.

Lead Contact: Cathy Zoi 202 233-9178

Statement of Challenge



Efficient Space Conditioning Equipment

Heating and cooling homes:

- Accounts for 9 percent of U.S. energy consumption.
- Emits over 400 million metric tons of CO₂.
- Contributes to global warming.

Advanced electric and gas heat pumps and furnaces:

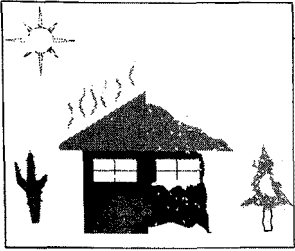
- Heat and cool homes efficiently.
- Save consumers money.
- Reduce air pollution and greenhouse gas emissions.

Nevertheless, advanced space conditioning technologies face significant market barriers:

- Higher installation costs.
- Consumers' unwillingness to pay more up front for long-term savings.
- Manufacturers' and dealers' lack of inventory or promotion of advanced technologies.
- Consumers' lack of awareness of efficient alternatives.

In order to move advanced space conditioning technologies out of niche markets and into the mass market we must:

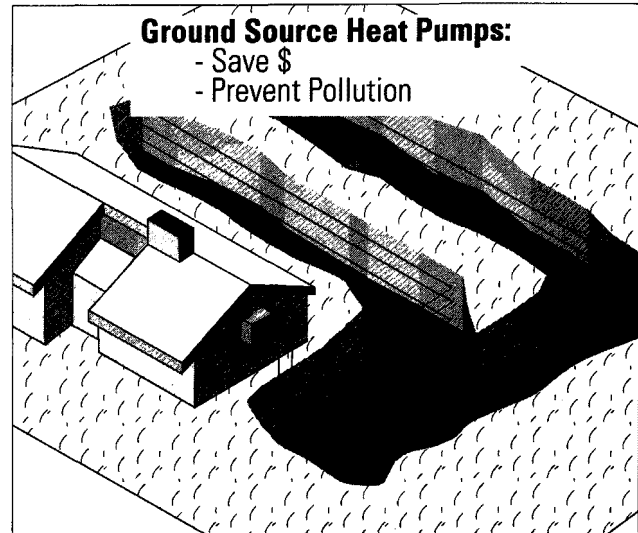
- Increase consumer awareness.
- Broaden dealer and installer networks.
- Increase utility investments that reduce first costs through rebates.



Space Conditioning Accomplishments

HEADLINES:

- EPA draft report compares costs and environmental impacts of residential space conditioning systems.
- EPA draft **study demonstrates cost-effectiveness of advanced space conditioning technologies.** Encourages utility promotion.
- EPA co-sponsors national Geothermal Heating and Cooling Teleconference '92. Research presented to utilities, regulators, and energy policy makers.
- EPA begins analysis of possible utility programs for capturing resource.

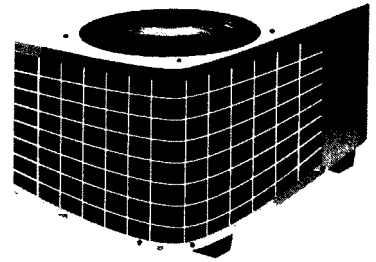


Prospects for 1993:

- Launch major national initiative to promote advanced heat pumps with a group of utilities.
- Co-sponsor additional national teleconferences aimed at architects and installers.

Lead Contact: Michael L'Ecuyer 202 233-9127

Statement of Challenge



Refrigerant Technology

Replacing CFCs in refrigeration technologies will have implications for:

- The energy efficiency of these technologies.
- The direct effects of refrigerant emissions and their greenhouse and ozone depletion contributions.
- The usefulness of existing equipment.

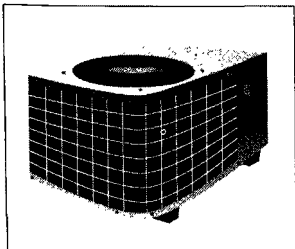
A variety of problems impede the rapid and efficient replacement of CFCs. For example:

- No replacements for HCFC-22 are available.
- Oils for new refrigerants are not always compatible with new equipment.
- Some replacements raise safety or toxicity concerns.

Replacement requires combined analysis and decision making for:

- Many industries.
- Safety organizations.

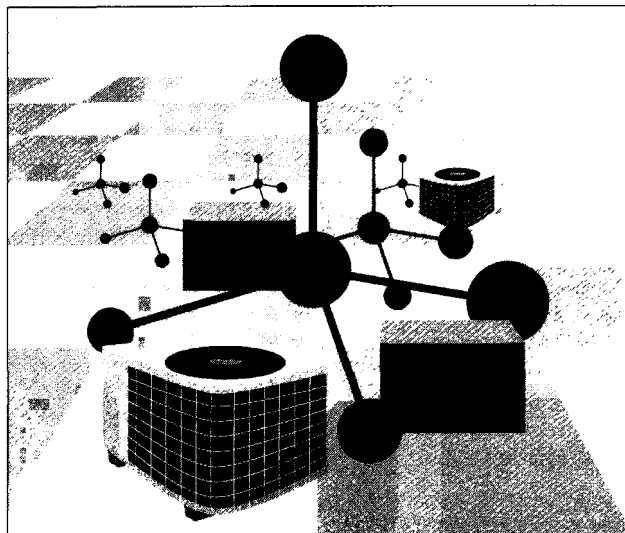
The Global Change Division's efforts to identify energy-efficient CFC substitutes are coordinated with the Stratospheric Ozone Protection Division's programs to phase out ozone-depleting chemicals and identify safe alternatives.



Residential A/C Accomplishments

HEADLINES:

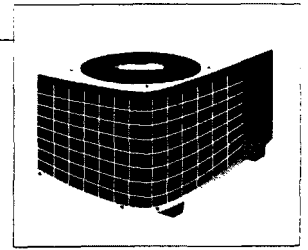
- EPA report confirms **efficiency gains** from **HCFC-22 replacements**.
- Results indicate some **refrigerant blends** can be used to **retrofit** existing systems.
- Testing of CFC and HCFC alternatives accelerated by EPA efforts to supply refrigerants and data to industry.



Prospects for 1993:

- Evaluate issues of compatibility, serviceability, and optimized performance.
- Conclude flammability risk assessment for refrigerant blends that are flammable or contain a flammable component.
- Optimize HCFC-22 alternatives in an EPA co-sponsored air conditioning laboratory at the University of Maryland.

Lead Contacts: Bill Kopko 202 233-9124—Global Change Division
Reva Rubenstein 202 233-9155—Stratospheric Ozone Protection Division



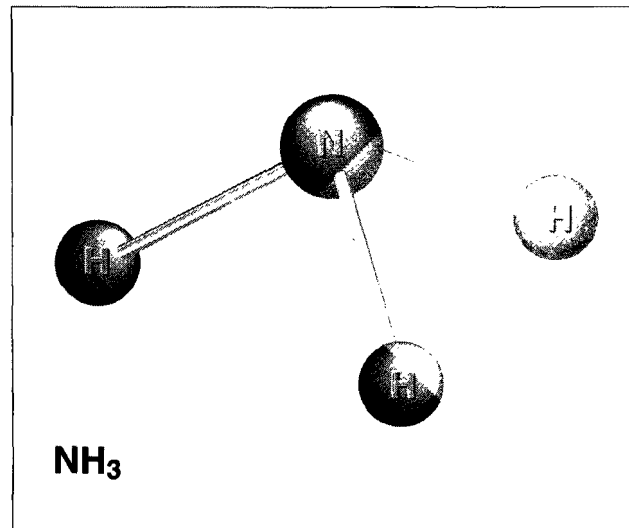
Ammonia Chiller Accomplishments

HEADLINES:

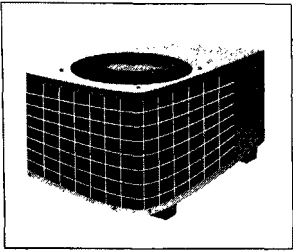
- Ammonia may replace CFC refrigerants and provide energy savings.
- EPA concludes agreement with U.S. Air Force to evaluate ammonia as refrigerant in building A/C applications.

Prospects for 1993:

- Complete site location, specifications, and engineering design for Air Force project to evaluate ammonia system.
- Achieve preliminary results from building and safety code evaluation.



Lead Contacts: Jean Lupinacci 202 233-9137—Global Change Division
Reva Rubenstein 202 233-9155—Stratospheric Ozone Protection Division

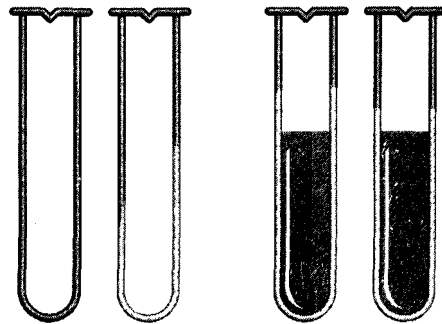


Refrigerant Additives Accomplishments

HEADLINES:

- EPA identifies lubrication problems with chlorine-free HFCs in new and existing A/C equipment.
- Chemicals identified for use as additives in existing mineral oil. **Resolved lubrication issue for HFC refrigerants.** (Initial application is for automobile A/C retrofits, but may prove applicable to household refrigerators and any refrigeration or A/C system using HFCs.)

Refrigerant Additives

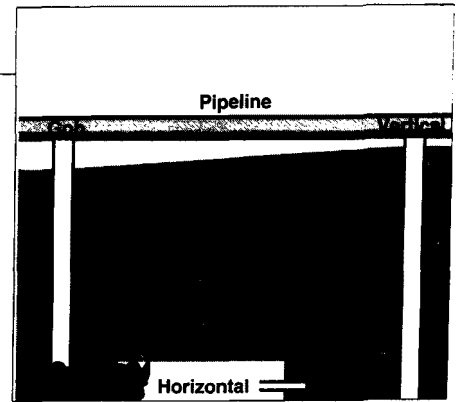


Prospects for 1993:

- Complete testing for automobile air conditioning retrofit systems.
- Complete preliminary testing in other applications.

Lead Contacts: Bill Kopko 202 233-9124—Global Change Division
Reva Rubenstein 202 233-9155—Stratospheric Ozone Protection Division

Statement of Challenge



Coalbed Methane

Coalbed methane is emitted to the atmosphere during mining. These emissions:

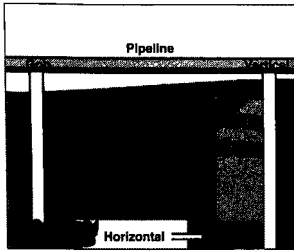
- Waste usable energy.
- Create worker safety hazards.
- Cause global warming.

Recovering the methane from coal mines provides:

- A low-cost, clean energy supply.
- Increased mine productivity.
- Increased worker safety.
- Opportunities for increased U.S. exports internationally.

To increase methane recovery we are working to remove barriers such as:

- Conflicting incentives.
- Lack of technology.
- Need for training.
- Lack of information concerning the extent and value of the wasted resource.



International Accomplishments

HEADLINES:

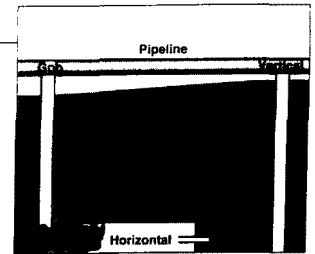
- **China:** EPA develops \$10 million project to demonstrate key methane recovery technologies at Chinese coal mines.
- **Poland:** EPA launches program to recover methane from Polish mines. Project opportunities publicized through clearinghouse.
- **Czechoslovakia, Russia, Ukraine:** Coalbed methane resources assessed.



Prospects for 1993:

- Demonstrate technologies, transfer information, and create U.S. business opportunities in China, Czechoslovakia, Russia, and Ukraine.
- Workshop on Coalbed Methane Investment Opportunities in China, Russia, and Ukraine to be held in Alabama, May 1993.
- Expand U.S. exports of methane recovery technologies and encourage international joint ventures.

Lead Contact: Dina Kruger 202 233-9039



U.S. Accomplishments

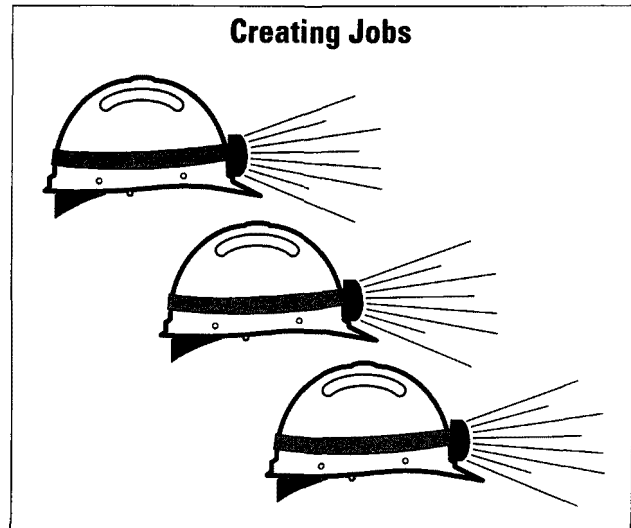
HEADLINES:

■ EPA study concludes Appalachian methane recovery could:

- Create jobs.
- Generate revenue.
- Profitably reduce emissions.

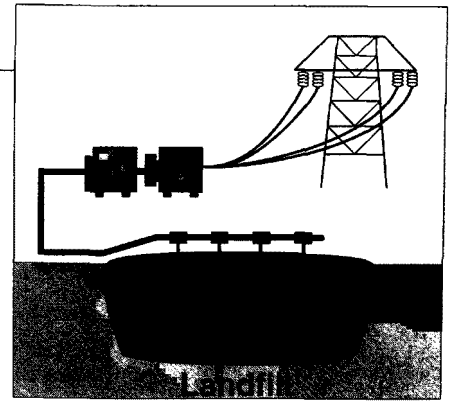
Prospects for 1993:

- Remove legal and regulatory barriers to coalbed methane development in West Virginia and Pennsylvania.
- Implement recovery projects at three to five gassy mines in Appalachia.
- Establish national program to encourage methane recovery from coal mines.



Lead Contact: Dina Kruger 202 233-9039

Statement of Challenge



Landfill Methane

Methane is emitted to the atmosphere when garbage in landfills decomposes. These emissions:

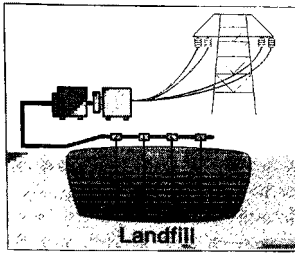
- Waste usable energy.
- Create hazards for the local community.
- Contribute to global warming.

Over 100 landfills in the U.S. collect methane and use it to produce electricity and fuel local industry. Recovery of methane from landfills provides:

- A low-cost, clean energy supply.
- Increased landfill and community safety.
- Control of non-methane pollutants, including toxic and smog-forming compounds.

In order to increase landfill methane recovery we must remove barriers such as:

- Limited technological understanding.
- Limited economic incentives.
- Lack of information regarding the extent and value of the potential methane resource.



U.S. Accomplishments

HEADLINES:

- **Landfills are largest anthropogenic source of U.S. methane emissions—**
EPA study confirms.
- Identified viable approaches to reducing and using landfill methane.
- **Proposed rule encourages energy recovery systems—**participated in development of proposal to reduce emissions of methane and other gasses from U.S. landfills.

Case Study: PG County Landfill

Size:	380 Acres
Energy Generated:	2.4 MW
Payback:	4.3 Years
IRR:	15%



Prospects for 1993:

- Rule goes final.
- Increase awareness of methane emissions from landfills and options for recovery.
- Work with industry and other agencies to encourage landfill methane recovery.
- Expand program to demonstrate benefits of landfill methane recovery internationally.

Lead Contacts: Kathleen Hogan 202 233-9312
Cindy Jacobs 202 233-9042

Statement of Challenge



Animal Waste Methane

Methane is emitted to the atmosphere when manures ferment. These emissions:

- Waste a usable energy supply.
- Produce odors.
- Cause global warming.

Recovering the methane from manure fermentation:

- Provides low-cost energy supply.
- Provides profitable regulatory alternative for producers.
- Destroys pathogens.
- Eliminates odors.

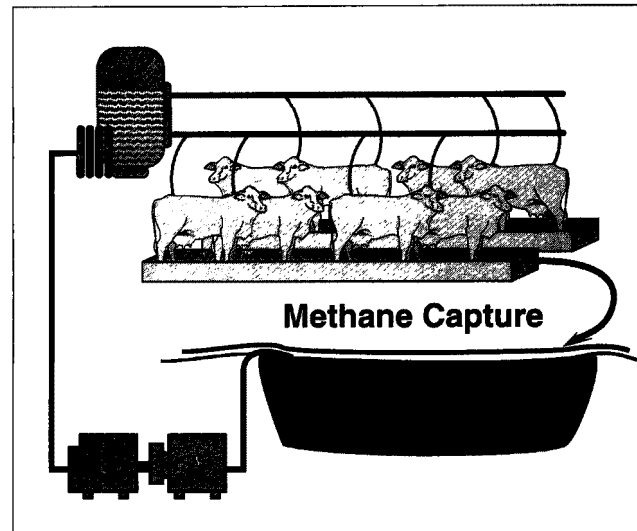
The challenge is to eliminate misconceptions, and to demonstrate the benefits of methane recovery.



U.S. Livestock Accomplishments

HEADLINES:

- EPA study confirms methane can be recovered from swine and dairy manure at a profit.
- Developed dairy methane recovery project in north central Texas, the fourth-largest U.S. dairy producing region.
- Initiated joint EPA/USDA methane recovery program.

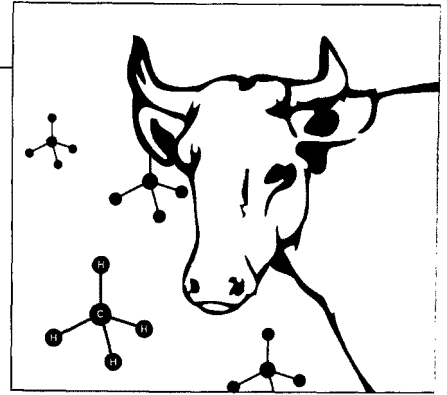


Prospects for 1993:

- Host national conference with USDA to present benefits of manure management and successful methane recovery projects.
- Obtain commitments from livestock facilities to install methane recovery systems.
- Expand demonstration projects to include other major swine and dairy areas including California, North Carolina, Florida, Georgia, and Arkansas.

Lead Contact: Kurt F. Roos 202 233-9041

Statement of Challenge



Ruminant Livestock Methane

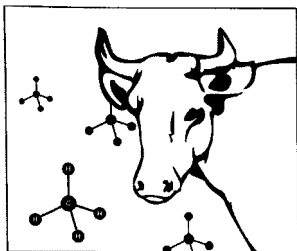
Methane emissions from ruminant livestock systems represent wasted dietary energy and contribute to global warming.

Reducing methane emissions through nutritional management:

- Increases meat and milk production.
- Increases farmer income.
- Increases crop production by increased draft power.
- Improves animal health.
- Is a more efficient use of scarce feed resources.

Obstacles to achieving methane reduction goals include:

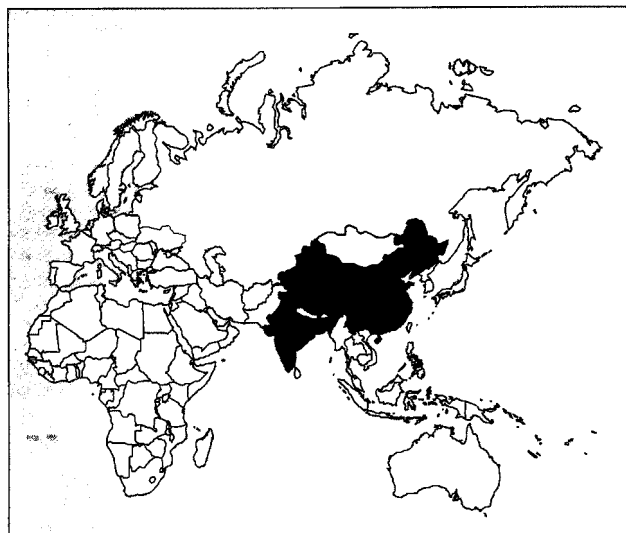
- Little experience with new technologies.
- Weak institutional extension service capacities.
- Lack of awareness of benefits of methane reduction strategies.



International Accomplishments

HEADLINES:

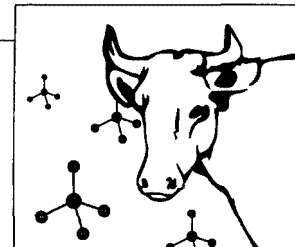
- **India: Dietary supplementation offers nutritional improvement of Indian dairy animals.** Cooperative project with India's National Physical Laboratory to measure methane emissions from Indian cattle under field conditions.
- **China: Identified methane reduction/productivity enhancement strategies** for China's ruminant livestock.



Prospects for 1993:

- Demonstrate technologies, train extension workers, and initiate a dairy development extension project in Gujarat State of western India.
- Conduct projects in India and China to measure emissions from cattle and buffalo, and develop appropriate strategies to enhance productivity and reduce methane emissions.
- Design a dairy development pilot project in Bangladesh.

Lead Contact: Mark Orlic 202 233-9043



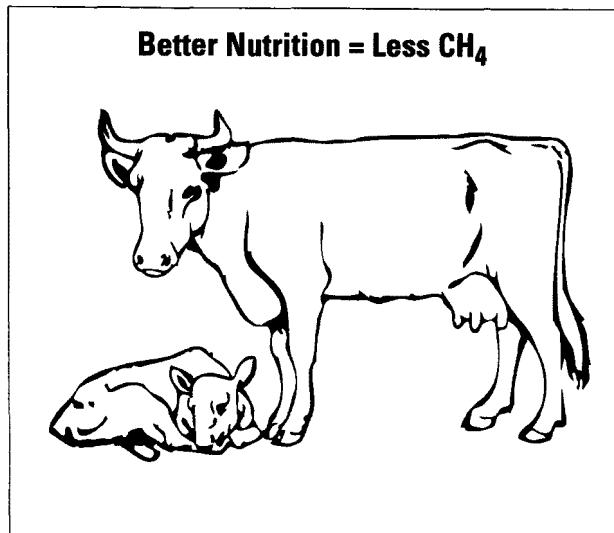
U.S. Accomplishments

HEADLINES:

- Studied options to **enhance efficiency and reduce methane emissions from U.S. beef and dairy industries.**
- Developed **new technology for measuring methane emissions** from ruminant livestock.

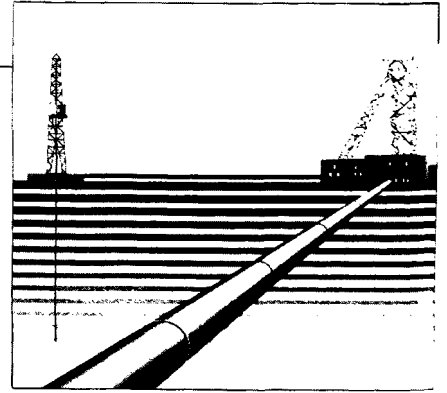
Prospects for 1993:

- Encourage beef industry to adopt technologies and practices to reduce methane emissions.
- Encourage dairy industry to adopt technologies and practices to reduce methane emissions.



Lead Contact: Mark Orlic 202 233-9043

Statement of Challenge



Oil and Natural Gas Systems Methane

Methane is released to the atmosphere from oil and natural gas systems due to system inefficiencies and pipeline leakage. These methane emissions:

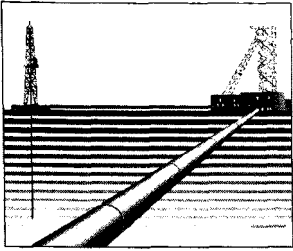
- Contribute to global warming.
- Waste valuable gas energy.

Capturing these emissions will:

- Improve system efficiency.
- Reduce operating costs.
- Increase public and worker safety.
- Conserve energy supply.
- Create opportunities for technological development and U.S. exports.
- Prevent greenhouse gas emissions.

In order to encourage the development and deployment technologies to reduce system losses we must overcome:

- Regulatory disincentives.
- A lack of appreciation for the source and magnitude of system losses.
- Capital cost pressures.
- A need for training and technology transfer.



International Accomplishments

HEADLINES:

- Russia: EPA works with Russian Gas Industry to **reduce methane releases from Russian gas system.**
- Russia: 15 technology **demonstration projects identified** as future Working Group initiatives.
- Project to demonstrate state-of-the-art gas production technology in Western Siberia.

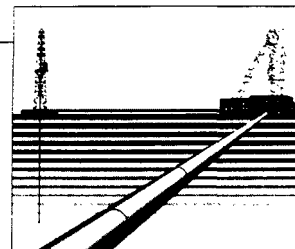


Prospects for 1993:

Russia:

- Execute projects to demonstrate emission reduction technologies and economic benefits from improved system efficiency.
- Create programs to replicate successful demonstration projects.
- Facilitate start-up of joint venture operations, technology transfer, and export opportunities for U.S. technologies.
- Complete co-development of a mobile monitoring device for emissions testing. Continue point source emissions surveys.

Lead Contacts: Kathleen Hogan 202 233-9312
Bruce Craig 202 233-9044



U.S. Accomplishments

HEADLINES:

- **Study identifies profitable emissions reductions strategies.**
- **Developed “EPA Natural Gas STAR” program** to promote technologies which economically reduce methane emissions.
- **American Gas Association (AGA) Board of Directors formally endorses “EPA Natural Gas STAR” program.**



Prospects for 1993:

- **Work with public utility commissions to reform rate structures to include incentives for efficiency gains, cost reductions, and methane emissions reductions.**
- **Sign up 40 percent of oil and gas system companies in the “EPA Natural Gas STAR” program by year end 1993, and 60 percent by 1995.**
- **Incorporate developing technologies in the “EPA Natural Gas STAR” program deployment efforts.**
- **Increase U.S. industry participation in international efforts to reduce system emissions.**

Lead Contacts: Kathleen Hogan 202 233-9312
Bruce Craig 202 233-9044

Statement of Challenge



Global Warming Treaty Negotiations

In order to assess options for reducing greenhouse gas emissions through analysis and rational decision making, we must consider:

- The technical potential of emissions reducing technologies.
- The projected market penetrations of these technologies.
- The appropriate balance of these two components.

Coming to agreement requires:

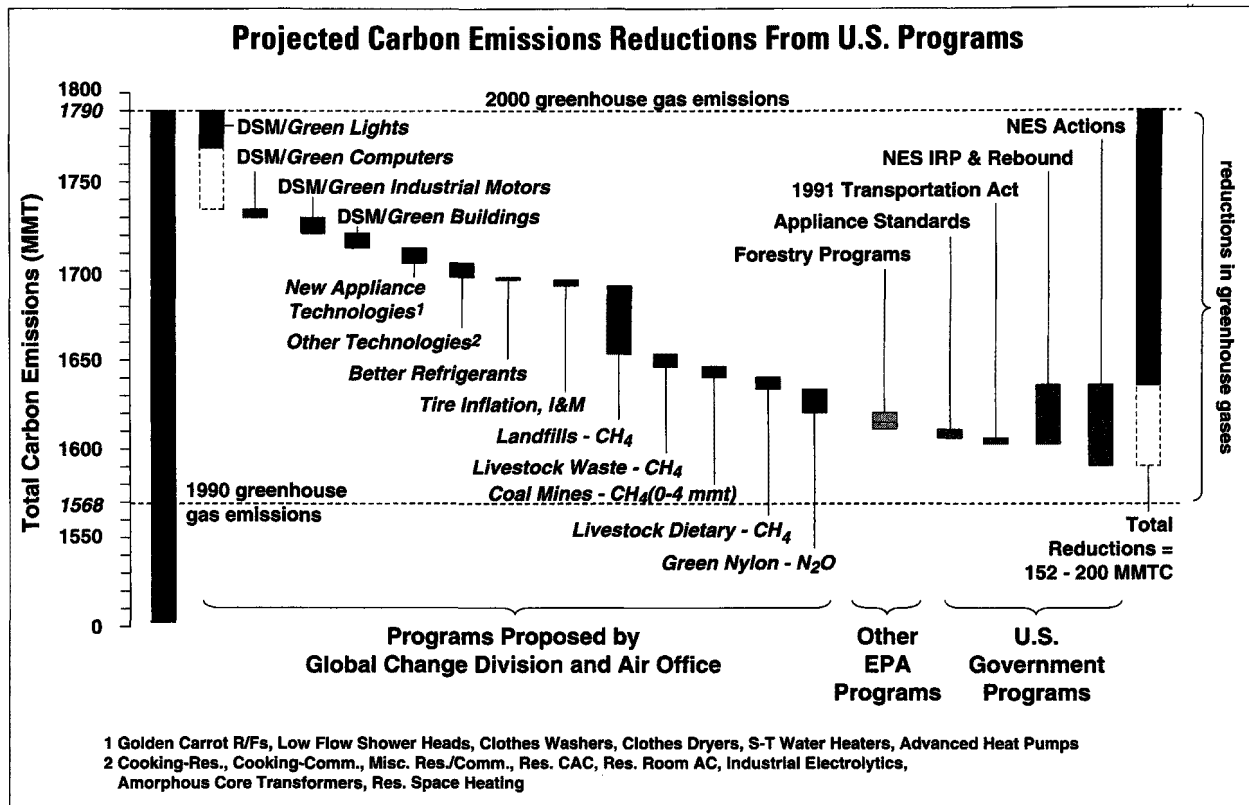
- Developing evidence.
- Working out differences.

In order to reach a consensus, we:

- Developed analysis.
- Engaged in a communication process to reach agreement.



Global Warming Accomplishments



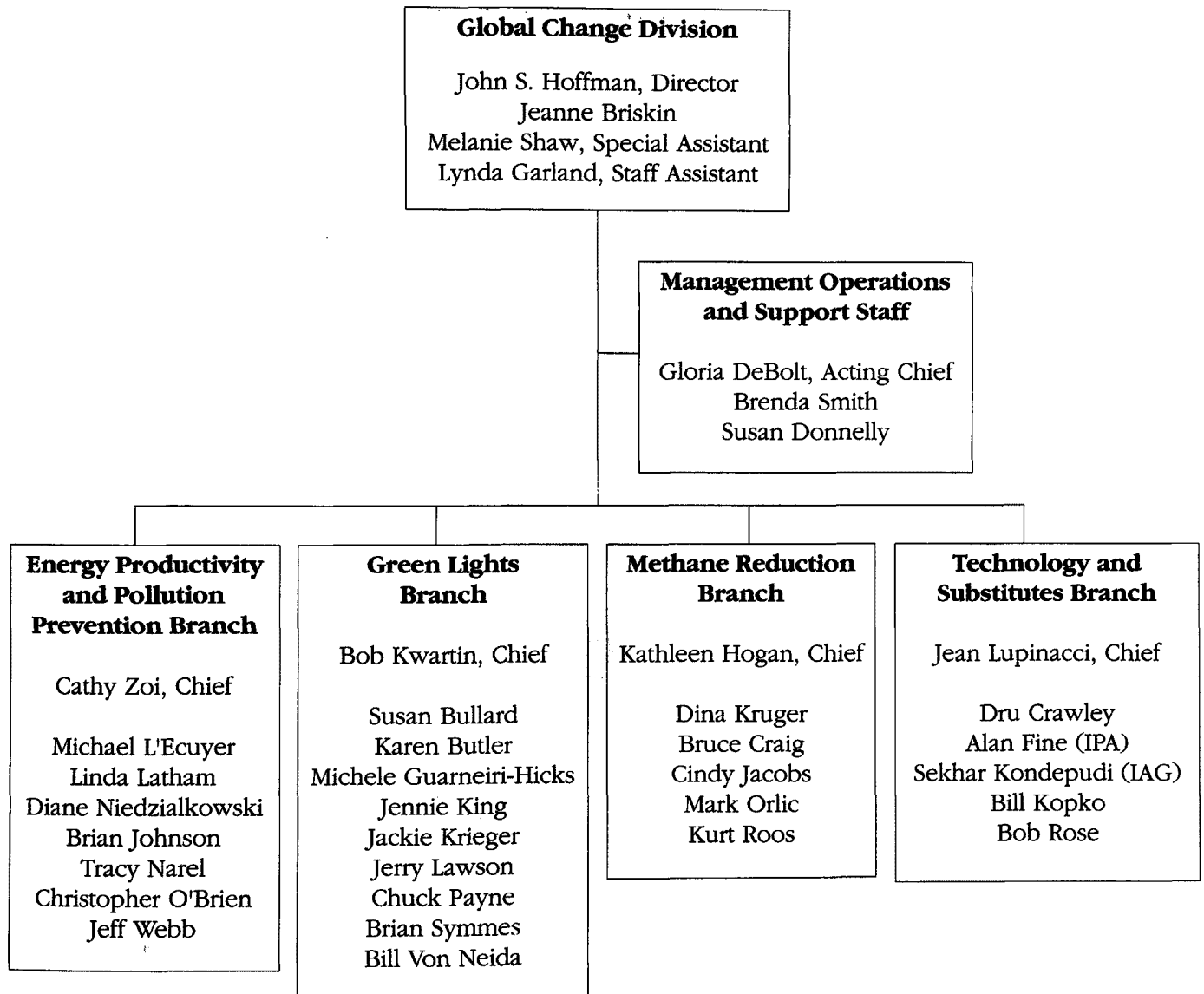
HEADLINES:

- U.S. State Department issues *U.S. Views on Global Climate Change*. Report includes **greenhouse gas emissions reductions proposed and supported by Green Programs of 123-166 million metric tons of carbon equivalent**.
- Green Programs, coupled with other Federal and state activities, produce a **strong basis for the U.S. action plan** to reduce greenhouse gas emissions.

Prospects for 1993:

- Add new programs to increase emissions reductions and to support those programs included in *U.S. Views on Global Climate Change* as resources made available.

Global Change Division Management Team and Staff



The Global Change Division is Making News

THE WALL STREET JOURNAL.

FORTUNE

Chicago Tribune

The New York Times

Los Angeles Times

San Francisco Chronicle
THE VOICE OF THE WEST

BusinessWeek



Green Lights

The New York Times

Wednesday, January 16, 1991

COMPANY NEWS

E.P.A. Urging Electricity Efficiency

By MATTHEW L. WALD

In a rare Federal venture into electricity efficiency, the Environmental Protection Agency began a campaign yesterday to convince the nation's 1,200 largest businesses that they can reduce pollution and increase profits by buying better lights.

The voluntary program will seek to persuade chief executives that investments in more efficient lighting in offices, stores and factories will return bigger profits than any other use of the money, while providing better working conditions and good public relations. The agency even plans to hand out "environmental" hero awards to executives who take part in the program, called *Green Lights*.

If all businesses adopted cost-effectively available high-efficiency lighting techniques, the agency said, that would save about 11 percent of all the electricity used in this country, would save about \$15 billion a year, and would reduce the nation's need for water, the prime cause of acid rain, would fall 7 percent, and reduce of carbon dioxide, which is believed to cause global climate change, would fall 1 percent.

A Different Approach

This is a completely different way of approaching environmental problems, John S. Hoffman, director of the Global Change Division of the Environmental Protection Agency, said in an interview. When the Government wants to clean up the air, he said, it usually orders car makers to install catalytic converters or utilities to build scrubbers for smoke stacks.

The idea of saving money through efficiency has largely been a province of the utilities and the states that regulate them, and while many utilities have reported progress, most say they are only scratching the surface.

Last week, the New York Power Authority, the largest state-owned power agency, announced a \$60 million program to improve the efficiency of its electricity customers, which are other government agencies and nonprofit institutions.

Raising Energy Efficiency

For the utilities, the goal has been to avoid having to build multimillion-dollar power plants — largely a growing customer population satisfied with a fixed amount of electricity — by squeezing more light, more heat and more mechanical power from each kilowatt-hour. State utility commissions, eager to avoid the rate increases that often come with new power plants, have been prodding the utilities to do more, and concern over the environment has been added.

Better Lights, Bigger Savings

Los Angeles Times

State Switches On to High-Efficiency Lighting Program

By RUDY ABRAMSON
Times Staff Writer

WASHINGTON — The U.S. Environmental Protection Agency and the state of California today entered a five-year energy conservation program, preventing what is expected to be more than \$250 million through the use of high-efficiency lights in state facilities.

Signing a memorandum of understanding, a television hookup between Washington and Sacramento, EPA Administrator William K. Reilly and Gov. Pete Wilson hailed the agreement as a significant contribution to improving energy efficiency and a harbinger of relief for taxpayers.

The agreement calls for the state to install high-efficiency lighting in all new state buildings and to retrofit existing buildings.

The agreement also calls for the state to conduct energy audits of all state buildings and to install energy-efficient lighting in all new state buildings.

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THE WALL STREET JOURNAL

TECHNOLOGY & MEDICINE

Light Bulb Is Transformed

Simple as the common light bulb may appear, it has undergone some technological changes in recent years, and hundreds of engineers and scientists are still trying to improve it.

Last year, General Electric Co. introduced a family of incandescent bulbs that use 40% less electricity than standard bulbs. GE and NY Edison have jointly taken the traditional long-burn bulb and have turned it into a bulb that lasts longer.

The new bulbs cost more and generate less light, but they are a major step toward energy conservation, says a spokesman for GE's Lighting Research Center.

Although the new bulbs cost more, they are the long-term payoff for customers to pay more to front "savings," he said.

The new bulbs are expected to be available in stores by next year.

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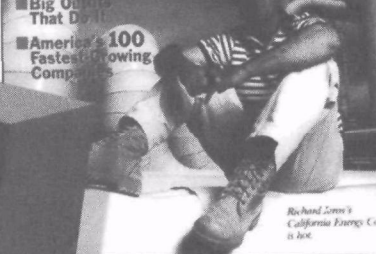
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THE DUMBEST MARKETING PLOY/SPECIAL REPORT ON ASIA'S FUTURE

FORTUNE

THRIVING in a Lame Economy

Big Outlets That Do It
America's 100 Fastest Growing Companies



Richard Zorn's California Energy Co. is hot.

David Kerner says

ENVIRONMENTAL REVOLUTION FROM TOP TO BOTTOM.

Smoking, drinking, eating, taking drugs, it's how people live that's the real environmental revolution. It's not just about the air we breathe, the water we drink, the food we eat. It's about the way we live.

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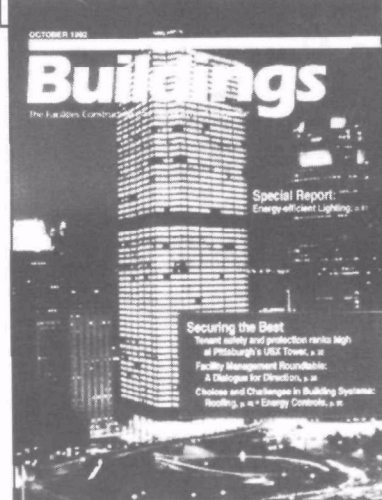
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Corporate America and the Environment: A Win/Win Situation through Light

Green Light



How science can finally make it happen

Environmental Protection

A special editorial supplement to BUILDINGS magazine. Linda R. Mason, Editor, Green Light, and Robert P. Mason, Editor, Green Light, are the authors of the book "Green Light: A Guide to Energy-Efficient Lighting." The book is available for purchase from the U.S. Environmental Protection Agency's Green Light program.

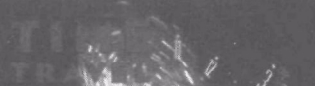
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Discover



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STRIKE A BLOW FOR THE ENVIRONMENT.

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Energy Star Computers

THE WALL STREET JOURNAL

Intel Takes Step To Get Computers To Save Energy

By JOHN L. LORE

WASHINGTON—Intel Corp. said it will incorporate energy-saving technology into its microprocessors starting a major step toward making computers more energy efficient.

At a recent news conference, Intel's Environmental Protection Group said the new technology would allow personal computers to enter a "sleep" mode when the user is not using the machine. In this mode, the computer's power consumption would be reduced to about 10 percent of its normal operating level.

Intel's new technology would be phased in during 1991, the company said. The technology would be available on the company's 486 and Pentium processors. The technology would be available on the company's 486 and Pentium processors. The technology would be available on the company's 486 and Pentium processors.

The New York Times

Desktop Catnaps May Become a Trend

By MATTHEW L. WALD

For years, bosses have thought of automation as a way to replace doing workers with machines that never sleep on the job. But the Intel Corporation, the dominant producer of microprocessors for desktop computers, said yesterday that its next generation of chips is designed to let computers sleep when no one is using them.

Changing the user's behavior might seem simpler than reconfiguring the machines. But computers do not simply turn on like light bulbs. Switching on the power causes wear and tear on some components — it means to leave the machines running. Moreover, each time a computer is switched on, a user might wait several minutes for the machine to reload its software and connect to a network.

Intel says that the sleep circuitry will come first on the P5 chip, which is due early next year, and will then be added to most versions of the current generation of chips, the 486 processors. The goal is to create a "sleeping" computer that draws only 50 watts, with the sleeping monitor drawing an additional 30.

David L. House, senior vice president of Intel, said that besides putting idle computers to sleep, his company and others were working on machines that would use less electricity even while in operation. Computer use is proliferating so fast that older office buildings cannot handle the electric load, he said.

San Francisco Chronicle

BUSINESS

EPA Unveils 'Star' Program for Low-Energy PCs

By Don Clark

Personal computer makers soon may get a star from the federal government — if their machines sip rather than guzzle electricity.

The U.S. Environmental Protection Agency (EPA) announced today that it will launch a program to encourage manufacturers to produce energy-efficient personal computers. The program, called the Energy Star, will award a star to manufacturers whose computers meet certain energy efficiency standards.

Participation in the program is voluntary. Manufacturers who want to participate must submit their computers to EPA for testing. If the computers meet the standards, they will be awarded a star. Manufacturers who do not participate will be labeled as "non-participants."

The program is part of a larger effort by EPA to reduce energy consumption in the office. EPA estimates that the office sector consumes about 10 percent of the nation's electricity. Of that, about 5 percent is used by personal computers. By encouraging manufacturers to produce energy-efficient computers, EPA hopes to reduce energy consumption in the office.

San Francisco Chronicle

BUSINESS

EPA Unveils 'Star' Program for Low-Energy PCs

Such figures mean that PCs could indirectly boost pollution caused by energy production — including the generation of carbon dioxide believed to contribute to a rise in the earth's atmospheric temperature.

But several energy-saving technologies have been developed by makers of laptop computers, and the EPA wants to encourage manufacturers to apply them to desktop models. One promising feature is a so-called "sleep" mode, which turns off the display screen and reduces power to other key components until a user hits a key.

There seem to be really dramatic possibilities here," said Jeff Harris, a staff scientist at Lawrence Berkeley Laboratory that has studied the issue.

Companies could earn an Energy Star if their machines draw 30 watts of electrical current, a savings of about 50 percent. If it catches on, the EPA estimates the program could save utility companies \$1 billion in annual energy costs and reduce carbon dioxide emissions by 50 million metric tons, the amount emitted by 5 million cars.

The EPA already has succeeded with a similar labeling approach in its so-called Green Light program aimed at encouraging use of energy-efficient bulbs.

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Green Computing Saves Money and the Planet

四、美國環保署大力推動開發、採購省電之個人電腦

美國環保署 (EPA — Environmental Protection Agency) 於六月十七日發表「EPA Energy Star Program」，以節約能源並防治空氣污染問題。並已與八家主要電腦公司簽定一項合作協定，共同發展省電之個人電腦 (Energy efficient PC)。此八家電腦公司包括 Apple、Compaq、DEC、HP、IBM、NCR、Smith Corona 與 Zenith 公司。

INFO WORLD

BUSINESS

MARKETS • HIGH TECH • ECONOMY

A plan to save \$1 billion on PC power use

By Bruce C. COOPER

The federal government is planning to save \$1 billion on PC power use by encouraging manufacturers to produce energy-efficient personal computers. The plan, called the Energy Star, will award a star to manufacturers whose computers meet certain energy efficiency standards.

The plan is part of a larger effort by the federal government to reduce energy consumption in the office. The federal government estimates that the office sector consumes about 10 percent of the nation's electricity. Of that, about 5 percent is used by personal computers. By encouraging manufacturers to produce energy-efficient computers, the federal government hopes to reduce energy consumption in the office.

Corporations mobilize to save power

Several major corporations are mobilizing to save power by encouraging employees to use energy-efficient computers. The corporations include Apple, Compaq, DEC, HP, IBM, NCR, Smith Corona, and Zenith.

POWER/121

Corporations mobilize to save power

Several major corporations are mobilizing to save power by encouraging employees to use energy-efficient computers. The corporations include Apple, Compaq, DEC, HP, IBM, NCR, Smith Corona, and Zenith.

The "Golden Carrot™" Super Efficient Refrigerator Program

The New York Times

Utilities Offer \$30 Million for a Better Refrigerator

By MATTHEW L. WALD

Electric utilities are turning up the heat in search of a better refrigerator by offering a \$30 million reward to the first company to build it.

A group of utilities that serve one-fifth of the households in the United States is offering the prize.

couraging increased efficiency in electricity use, as a cheaper way to balance supply with demand. The alternative is building new power plants and adding to pollution.

The prize, which the utilities are calling a "golden carrot," represents a new approach—one that rewards

In offering the prize, "we're buying the production and delivery of super-efficient refrigerators into the service territories of the participating utilities," said Gary B. F.

supervisor of residential appliances at the Pacific Company and the chair of the utility consortium that will administer the prize. The 23 utilities, scattered throughout the United States but with a concentration in the Northeast, serve a total of

Continued on Page

Chicago Tribune

Consider the Future Fridge

Twenty-three utility companies are dangling \$30 million before refrigerator manufacturers in the hope that one of the makers can develop a much more efficient, environmentally friendly fridge.

Through the Super Efficient Refrigerator Program (SERP), the utilities (now including Commonwealth Edison) hope to introduce a vastly improved machine by the mid-1990s. They are pooling funds for a \$30 million prize to be awarded to the developer.

A state-of-the-art fridge would run on 25 percent to 50 percent less electricity than current models use. And it would contain no chlorofluorocarbons in its coolant or condenser—CFCs are on their way out because they harm the ozone layer.

Best-case refrigerators and freezers use about 20 percent of the electricity generated in the United States, it is estimated for energy savers to zero in on them.

The presumption is that if super-efficient refrigerators come into widespread use, power consumption will drop, consumers will save money on their electricity bills and utilities will be more likely to attack demand without building expensive new power plants, which, like CFCs, can add to air pollution.

Although there is some doubt an advanced refrigerator will be economically feasible on the consumer market, the utilities' SERP looks like a good thing.

—AN AP Wire Service

Thinking about refrigerators—an enterprise with limited traditional rewards, to be sure—may lead to other innovations as part of a parallel SERP (Savvy Environmentally Responsive to People).

A refrigerator brought to market in this program would be of service in several wonderful new ways. For one thing, it not only would destroy itself but also would keep all surfaces clean, even to the extent of making walls magically disappear.

A Future Fridge also would automatically send a

Los Angeles Times

A Cool \$30 Million

14 Entries Vie for the Prize in Super Refrigerator Contest

By MICHAEL PARRISH
Times Staff Writer

A team of three engineers, under tight security in Sacramento on Thursday, will make the first cut among 14 entries from appliance manufacturers and inventors in a \$30-million nationwide contest to build a super-efficient home refrigerator.

There's a lot at stake beyond the multimillion-dollar prize being offered by a group of 24 energy utilities serving 15% of the nation's households. The winner may also get a leg up in a potentially lucrative new corner of the \$4-billion U.S. refrigerator market.

Major refrigerator makers, including Admiral, Amana and Whirlpool, won't confirm that they've entered the race—in the

The purpose of the contest—announced in July—is to develop a household refrigerator that would use the energy of today's average model. The contest sponsors hope to get those machines to market faster than manufacturers would on their own, perhaps as early as 1990. Utilities are encouraging development of more efficient refrigerators as federal and state regulators pressure them to meet future energy demand mostly through conservation instead of building new power plants.

The contest rules also require that the super refrigerator use ozone-damaging chlorofluorocarbons, or CFCs, which have been banned in 1995. The contest is being organized by Consortium for Energy Efficiency Inc., a group of environmentalists, government regulators and electric utilities.

Federal standards have already reduced home refrigerator energy use by two-thirds since 1972, and the super refrigerator would use power consumption again by half. The contest sponsors estimate a super refrigerator would use \$40 worth of electricity a year, compared to \$80 for a comparable current model. In recent years, regulators have offered incentives to

—Times Staff Writer

San Francisco Chronicle

THE VOICE OF THE WEST

A Better Ice Box

THE \$30-MILLION-REWARD being offered for a more efficient refrigerator is only part of the story. The state's utilities have come so far in conserving the use of electricity that they are expected to handle California's population growth without building a single large power plant in the next 10 years.

The 125 million refrigerators and freezers in the United States are a special case. In recent years, there have been improvements in efficiency over the 1970s-style models commonly in use—appliances so energy-hungry that they account for about one-fifth of all the electricity used in the home.

What this means, according to Arthur Rosenfeld, physics professor and energy authority at UC Berkeley, is that old-fashioned refrigerators and freezers require enough power to consume the entire output of 43 large power plants. He says efficient design could reduce this figure by 75 percent.

SINCE UTILITIES are now being rewarded by state commissions for conserving electricity, rather than selling more of it, the prize being offered by 23 of the nation's largest power companies makes excellent business sense. Pacific Gas & Electric Co., considered the U.S. leader in the energy conservation field, is putting up \$7 million as its share of the reward.

Refrigerators are the most dramatic source of possible saving. The campaign for much-needed efficiency will also include widespread use of improved light bulbs, power-thrifty washing machines and office equipment that will require only a fraction of the power used by older models.

Icebox energy on the cheap?

Wanted: The world's most efficient refrigerator, one that's also free of ozone-eating chlorofluorocarbons. Reward: \$30 million.

That offer has just gone out to manufacturers around the country from a group of 23 electric utilities, among them the Sacramento Municipal Utility District. Together they supply electricity to one-fifth of U.S. households. Since the Arab oil embargo of the 1970s, utilities have learned that tapping into conservation is, in effect, cheaper than developing energy sources like coal, hydro, oil or natural gas. Thus they've offered subsidies to customers who want to better insulate their homes, reduce their use of air-conditioning or buy energy-efficient appliances. Some utilities, like SMUD, even pay for shade trees.

The twist in this new offer is that the subsidy goes to the manufacturer, not the consumer. That makes sense, too. Refrigerators are one of the most voracious consumers of

kilowatts in the home. Unlike the microwave, washer, dryer or air-conditioner, the refrigerator runs constantly. For each customer who buys the yet-to-be-invented energy-savvy fridge, a utility can save up to 2½ barrels of oil a year or 1,200 pounds of coal or 13,000 cubic feet of natural gas.

This quest for a super-efficient refrigerator is one of the positive outgrowths of a coalition formed two years ago between California utilities and environmentalists. Scientists from the Natural Resources Defense Council originally suggested the contest. The utilities embraced it. If it produces the desired result, everyone benefits: Consumers pay less in energy costs, utility shareholders get a slice of the savings in higher dividends, the environment is enhanced.

Other industries ought to follow the utilities' lead. There must be countless products waiting to be invented that can benefit the environment and save money, too. A \$30 million incentive couldn't hurt.

Coalbed Methane

The Washington Post

Long Feared, Methane Now Valued

Technology, Tax Credits Make Use of Coal-Bed Gas as Fuel Feasible

By Thomas W. Lippman
Washington Post Staff Writer

OAK GROVE, Ala. — For as long as men have mined coal, the methane gas that builds up in the seams has been a deadly enemy, threatening suffocation and explosions that can turn miners' beds into tombs.

Now they think of it as an asset. All across Alabama's Black Warrior basin, and in vast regions of the West, a new energy industry has sprung up in the past five years collecting and selling methane from coal fields. Industry experts predict a similar burst of development this year in Virginia. Major energy companies are investing hundreds of millions of dollars to build a production and distribution network for a gas that in the past literally has been blown away.

About 65 trillion cubic feet of coalbed methane is "economically recoverable" with current technology, according to a study by the Colorado School of Mines. Industry estimates put the total resource at more than 400 trillion cubic feet—enough to supply the entire country for more than 20 years at the current consumption rate, 19 trillion cubic feet a year.

Methane is virtually identical to the natural gas produced at conventional wells. Once gathered and compressed, it can be sent into any commercial gas pipeline. But only recently have technology and economics combined to make it commercially marketable. The economics includes a federal tax credit—due to expire at the end of this year—that the industry, supported by coal-state senators and the Environmental Protection Agency, is lobbying hard to extend.

"From EPA's perspective, this is a win-win situation," said Dana Rieger, a methane specialist in the Global Climate Change division. "The coal companies make money and we protect the environment" by capturing and selling methane—believed to be a significant contributor to "greenhouse" planetary warming—that would otherwise be expelled into the atmosphere by mine ventilators.

"Ten years ago nobody cared about coal-seam methane," said Richard A. McBride, technology project manager for the industry's Gas Research Institute. "But we

had a workshop on it out in Denver a couple of weeks ago and over 400 people signed up. We had oil companies, gas companies, academics, even people from Japan and China."

Here in Alabama's Black Warrior Basin, methane production is much more than an abstraction discussed at workshops. Amoco Corp. alone is investing \$40 million in a network of wells, pipes and compressors that covers thousands of rugged, deep-pine acres in Jefferson County. A few miles southwest, near Tuscaloosa, the Black Warrior Methane Corp. subsidiary Jim Walter Resources Inc. is drilling 25 to 30 wells a year to bring the methane up from its subterranean coal mines, according to president Jerry Sanders.

"As you mine coal, you liberate methane, and a lot to be hauled off before workers can enter," Sanders said. "The primary method is dilution with fresh air. That's an expensive process. You have these 14,000-horsepower electric motors for the ventilators—you can imagine the power costs. We were spending more than half a million dollars a month just for ventilation." The gas that comes up through vertical wells, he said, "is pipeline quality, so we're able to sell it" to a natural gas pipeline company that has a line nearby.

Gathering vented gas from degraded mines, however, is relatively rare, according to National Coal Association spokesman John H. Hester, who says the gas, but not produced coal, has relatively low value and would be at the end of the line. In fact, the gas, but not produced coal, has relatively low value and would be at the end of the line. In fact, the gas, but not produced coal, has relatively low value and would be at the end of the line.

"This is relatively drilling because the well shallower than conventional wells," said production Bob Raper. "We go down 2,500 feet. A gas well might go down 20,000 feet. The wells are operating at it all hooked up to a 4-inch commercial pipeline. It's a relatively simple message."

But development of

field such as this still requires a major investment.

"We've put in 100 miles of pipe and nearly 500 miles of pipe" to develop a 100-well field, Raper said. Output of each well is measured by a little solar-powered computer that sends data to his office. Only a big company such as Amoco can afford such an investment, he said, because the wells, once drilled, may take as much as six months to start producing marketable gas.

The reason is that in order to release the methane from the coal, it is necessary to reduce the pressure on the coal seams, which means pumping out all the natural groundwater. Each well has two pipes coming out of it: one for the gas, which is piped to a compressor and injected into a commercial pipeline, and one for the water, which has to be pumped to discharge ponds in a nearby creek under supervision of state environmental officials.

In a conventional gas well, Raper said, gas pressure and flow are highest when the well is first drilled. In a coalbed methane well, gas begins to flow only after the water is removed and the flow then increases for several years.

Amoco officials acknowledge that they can make money at this only because of the federal tax credit.

THE WALL STREET JOURNAL

New England Utility
Plans to Help Save
Trees in Malaysia

Company Hopes Logging Plan
Will Help Offset Its Emissions
Of Carbon Dioxide in U.S.

"A second offset project it's planning would extract methane from coal seams before they are mined. Methane, another greenhouse gas, is usually vented to the atmosphere as coal is mined."