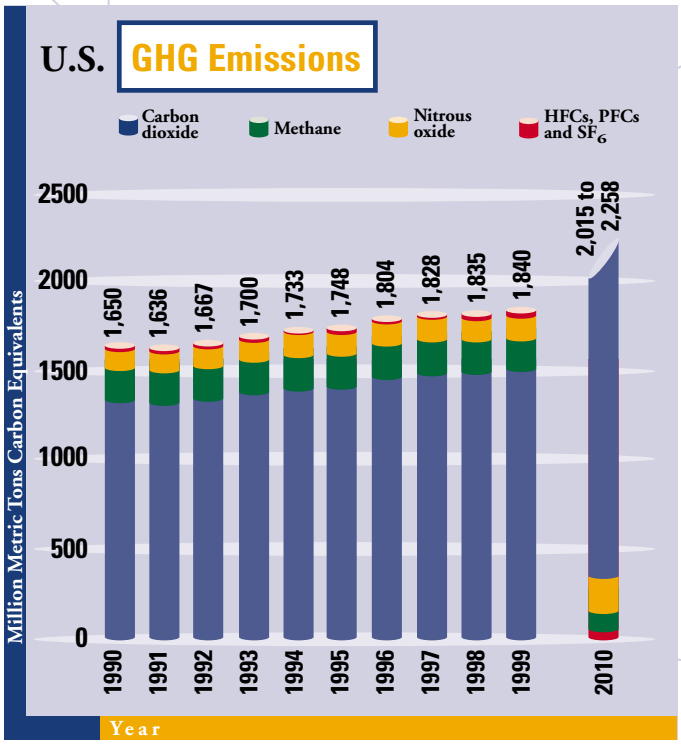
The U.S. Domestic Response to Climate Change: Key Elements of a Prospective Program

The United States is the world's largest emitter of greenhouse gases (GHGs), accounting for roughly 25 percent of global emissions. No strategy to address global climate change can ultimately succeed without substantial and permanent reductions in U.S. emissions. Voluntary efforts in a number of sectors over the past several years have failed to curb the overall growth in U.S. GHG emissions. A number of policy options are available to secure additional emissions reductions. However, to be effective and affordable, a long-term emissions reduction program must couple mandatory GHG reductions with technology development and market mechanisms.

To date, efforts to reduce U.S. GHG emissions have been limited almost exclusively to voluntary activities at the federal, state, local, and corporate level. Many of these efforts were spurred by the United Nations Framework Convention on Climate Change, which set a non-binding target of reducing emissions from industrialized countries to 1990 levels by 2000. Though some voluntary efforts have resulted in significant emissions reductions – some companies, for instance, have cut emissions 10 percent or more – in the aggregate, they have not succeeded in curbing the overall growth in U.S. emissions.[1] While technology has improved the energy intensity of products and processes over the last 50 years, this greater efficiency has been outpaced by increased demand driven by economic expansion, population growth, and changing consumer preferences. U.S. emissions rose roughly 12 percent over the past decade, and are projected to continue rising for the foreseeable future.[2] *(See Figure 1.)* Voluntary programs can make an important contribution to a domestic climate change program, and can provide valuable experience for designing future efforts, but they cannot stimulate the broad engagement that will be necessary to achieve the level of emissions reductions that will ultimately be required.

Climate change is a long-term challenge that will require sustained global action and investment over many decades. Ideally, a national strategy would be guided by a specific long-term emissions goal. It would also couple short- and long-term

Figure 1



Source: U.S. EPA. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1999. 2010 projections for CO_2 are from: U.S. DOE. Annual Energy Outlook 2000. 2010 projections for non-CO_2 gases are from: U.S. EPA. Annual Energy Review (2000).

measures – and both supply and demand elements – to signal markets to begin the transition toward that ultimate objective. More specifically, short-term measures are needed to improve energy efficiency and encourage the use of lower-carbon fuels; long-term measures are needed to encourage sustained investment in development of the technology and infrastructure needed to facilitate the transition to a low-carbon economy. Further, because energy consumption is an important component of GHG emissions, any domestic energy policy program must be geared toward long-term GHG emissions reductions. *(See Figure 2 for chart of emissions by sector in carbon dioxide equivalents [CO_2E].)*

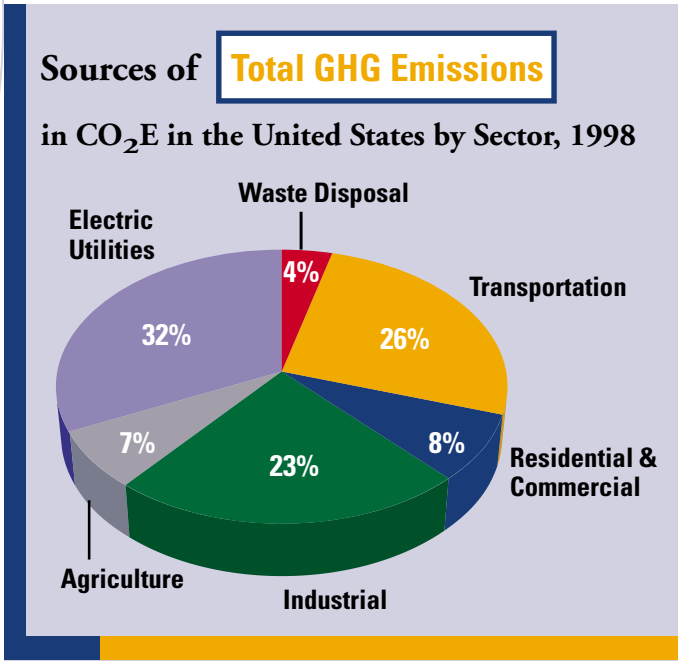
A domestic strategy ultimately must reflect any international commitments by the United States. However, its design and implementation should proceed now even if the United States is not yet prepared to enter into an international agreement. As domestic and international programs evolve, close coordination between them is critical. This is especially important for companies that operate and compete both domestically and abroad, and for U.S.-based companies that sell products abroad, as they will be subject to rules dealing with climate change in other countries. In addition, coordination is necessary to maximize the effectiveness of emissions trading and other flexibility mechanisms now being developed at the international level.

The cost of meeting a given emissions target can vary by orders of magnitude depending on the approach taken. In general, the most cost-effective approaches allow emitters flexibility in deciding how to meet a target or performance level; provide early direction so targets can be anticipated and factored into major capital and investment decisions; and employ market-based mechanisms such as emissions trading to achieve reductions where they cost the least. To ease the transition and enlist the broadest possible participation, early targets should be realistic and achievable without stranding major capital investments or imposing undue economic hardships. These could be followed over time by more stringent constraints that allow for the turnover of existing capital stock and the development of new breakthrough technologies and innovative measures for reducing GHG emissions.

This paper outlines possible elements of a comprehensive domestic strategy that couples short- and long-term measures. The proposed elements – some voluntary, others mandatory – aim to:

- **improve the tracking and reporting of greenhouse gas emissions;**
- **promote new technologies and practices; and,**
- **provide a foundation upon which to secure long-term emissions reductions.**

Figure 2



Source: U.S. EPA. Inventory of Greenhouse Gas Emissions and Sinks: 1990-1999.

Note: Emissions from electricity produced by industries but sold to the grid is included in the "Industrial" category. Emissions due to other industrial activities as well as residential and commercial use of electricity are included under "Electric Utilities." Excludes emissions from U.S. territories.

While each of these objectives can be pursued in a number of different ways (several options for securing emissions reductions are proposed), an effective strategy must address all three.

Tracking and Reporting Greenhouse Gas Emissions

No effort to reduce greenhouse gas emissions can succeed without the accurate measuring and tracking of emissions. Improved tracking and reporting of emissions reductions could provide the basis for government assurances that companies will not be penalized for their early reductions under a future climate policy. Public disclosure of emissions data can also serve as a powerful incentive for reductions.

A first step is establishment of a registration program to more accurately and reliably measure, report, and track GHG emissions. This could be done through legislation that builds on current efforts such as the Department of Energy's 1605(b) program. The current program has limited value because its reporting standards lack rigor, there are no verification requirements, and many companies choose not to report. In an improved registry program, a company would establish a baseline consisting of current aggregate emissions from all major GHG sources under its control in the United States. Gross emissions on an annual basis could be compared to this established baseline. In addition to accounting for emissions from a company's core operations, an improved registry should over time develop the means to measure, report, and track GHG emissions resulting from: the use of products manufactured by that company; offsets achieved through sequestration projects designed to store carbon in forests, soils, oceans, or underground; and offsets achieved through increased energy efficiency.

A reliable registry would make it possible to provide "baseline protection" for companies taking action now to reduce their emissions. These entities could be assured that – in the event of future controls involving the allocation of emissions allowances or requiring emissions reductions – they would not be penalized for reductions already achieved voluntarily. The improved registry program could also provide a mechanism to recognize the emissions reductions resulting from companies manufacturing more efficient or carbon-saving products. Finally, it could ensure that GHG reductions and sequestration offsets are of sufficient integrity that they can be traded and sustain their value in future years. This registry would include reductions and offsets achieved outside of the United States, in both developed and developing countries. In this manner, both gross and net (reductions and offsets) emissions would be recorded.

An additional step would be to require public disclosure of GHG emissions data for all facilities or companies whose emissions exceed a given threshold. At present, only electric generating sources must report their CO_2 emissions and, although publicly available, emissions data are not tabulated and disclosed in a manner that encourages companies to reduce their emissions voluntarily. To address these shortcomings, a mandatory GHG reporting program should apply to all major source categories of GHG emissions and require public disclosure as is now required under the federal Toxics Release Inventory (TRI) program. Disclosure reports would be subject to verification and reporting entities would face enforcement action if emissions were misrepresented. As with the TRI program, reported data would be aggregated and made available on facility-specific, company-wide, and source-category bases. Under the TRI program, such disclosures have encouraged companies to assess potential mitigation

opportunities and reduce emissions voluntarily, and the same is likely with a GHG reporting program. Gross emissions from an entity's U.S. sources as well as net emissions (after considering sequestration activities and trading) would be reported to encourage comprehensive mitigation strategies.

A mandatory GHG reporting obligation (and an improved registry) could be linked to a voluntary program for mitigating GHG emissions. Such linkage would likely increase the effectiveness of each initiative, judging by the success of the voluntary pollution prevention programs that were coordinated with mandatory TRI reporting.[3] Following the model used in EPA's 33/50 (Industrial Toxics) Project, the voluntary program could establish clear performance targets to be achieved by each sector within specified time frames. Although voluntary, participation in the program could be limited to only those companies willing to make corporate-wide commitments to achieve minimum reduction levels from their core business operations or prescribed performance levels for products sold in the United States. Setting minimum standards would likely increase the pressure for companies to step forward with voluntary commitments achieving substantial emissions reductions. The minimum standard approach could also be combined with a graduated scale of incentives for those who make voluntary commitments, rewarding those who exceed their emissions goals with greater financial or other incentives like tax credits.

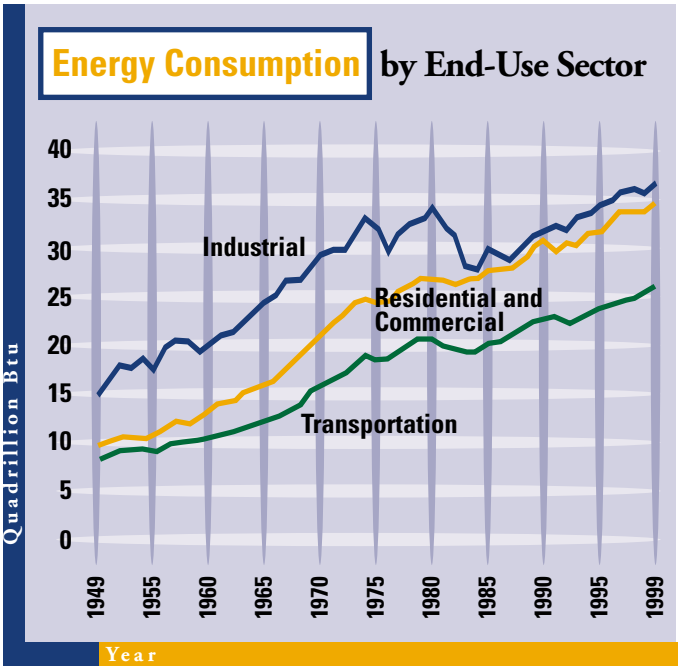
Finally, improved registries coupled with reporting requirements would also serve as an important foundation for mandatory approaches to reducing GHGs.

Promoting Clean Technologies and Practices

The ultimate success of a climate change strategy will hinge on the timely development and deployment of technologies that over time can substantially reduce the carbon intensity of the overall U.S. economy – including industry, the transportation sector, and residential/commercial activity. *(See Figure 3 for historic energy use of these sectors.)* In the short term, improved technologies can significantly enhance energy efficiency, provide opportunities to store – or sequester – carbon, and expand use of lower-carbon fuels (such as natural gas). In the long term, new technologies will be needed to develop non-fossil energy sources such as biofuels, wind, hydrogen, and solar, and provide opportunities for more permanent forms of sequestration.

A successful technology strategy demands sustained, coordinated investments at a very high level from all stakeholders. A variety of incentives and direct investment tools can be

Figure 3



Source: U.S. DOE. Energy in the United States: A Brief History and Current Trends (1999).

used to promote technological innovation, from basic research to deployment:

- **Targeted tax credits or low-interest loans can encourage the development and adoption of energy-efficient technologies (such as combined heat and power, and state-of-the-art lighting); clean fuel technologies (including advanced fossil fuel technology, hydrogen, fuel cells, and biofuels); and carbon storage in forests and agricultural soils, using innovative management techniques.**
- **Investment in basic research may be especially critical in inventing breakthrough technologies that will facilitate the transition to a low-carbon economy.**
- **Public-private partnerships, such as Industries for the Future and the Partnership for a New Generation of Vehicles, can team government and corporate researchers to accelerate technology gains.**
- **Basic research and tax credits could accelerate the development and diffusion of climate-friendly alternatives to non-CO_2 greenhouse gases or technologies and practices that reduce their emissions.**
- **Investment in training to improve agricultural practices can decrease the release of methane (CH_4) and nitrous oxide (N_2O).**
- **Public education through the use of required labeling and other means can help consumers reduce their contribution to climate change.**
- **Incentives to builders and landlords can encourage the use of energy-efficient materials and appliances in new construction and rental units.**

Finally, improved product efficiency standards – coupled with incentives to exceed minimum requirements – can achieve significant emissions reductions. Under the traditional command-and-control approach, the incentive is to meet, but not exceed, a government-set standard. A combined hybrid standard/incentive approach (e.g., one that combines a minimum efficiency standard with a sliding tax or emissions credit for those who go beyond the standard) would provide incentive to exceed minimum regulatory requirements. This approach should be added to existing product standards as they come up for review and employed for new products for which standards have not yet been set.

Securing Emissions Reductions

An especially critical element of a domestic climate change program will be the design of a market-based GHG emissions management framework to ensure significant long-term reductions in emissions. Also, an effective program ultimately will entail some form of mandatory requirements. The approaches that follow include voluntary activities that could be implemented in advance of, or alongside, mandatory emissions reductions:

Enter into agreements with companies willing to make significant, enforceable commitments to achieve net GHG emissions reductions in lieu of future GHG control requirements.

Securing regulatory certainty may be a powerful incentive for those willing to undertake substantial GHG reduction commitments. By committing to take action yielding specified reductions over an established period of time, a firm could receive a commitment from the government that (as long as its contractual obligations are met) it would not be bound by subsequently developed GHG controls over the same time period. For example, if a company were to commit to significant reductions over a 20-year period (e.g., a 20 percent reduction achieved either through steady declines of 1 percent per year or through a major capital investment at some point during this timeframe), the company could avoid additional mandatory GHG control obligations during the same 20-year period.[4] This approach would allow companies to move forward with substantial

Ultimately, the ability of the United States to achieve significant long-term GHG reductions depends on our success in the design and implementation of a mandatory program to reduce emissions.

capital investments that will secure significant emissions reductions.

Under this approach, reductions below company baseline levels (e.g., 1990 GHG emissions) could be achieved through meeting either rate-based or specified net targets. These commitments would provide baseline protection, and shelter firms from additional requirements developed during the term, in exchange for legally binding agreements containing measurement, verification, and reporting requirements. Such an approach would require enabling legislation authorizing the Executive Branch to enter into these agreements. This legislation should include provisions for public notice and comment. Companies also could be allowed to enter into similar agreements with respect to their services or products manufactured and sold in the United States.[5]

Additional features could include allowing program participants to trade emissions credits and allowing credit for reductions achieved through sequestration and offsets. In other words, companies that reduce their emissions beyond the levels specified in the agreement would be able to trade these additional emissions reductions with firms that were unable to meet their reduction targets under a future regulatory program. Similarly, credit for real, quantifiable, and verifiable sequestration activities could be granted towards the obligations and, when in excess of specified targets, could be sold in an emissions trading market.

Set voluntary emissions reduction targets for major industry sectors with a trigger mechanism for imposing mandatory requirements if a sector falls short of its targets.

A second approach would establish initial rate-based or specified reduction targets for major industry sectors, but impose stricter controls for sectors that do not meet their initial targets. The program, for example, could call for a sector to stabilize its emissions at year 2000 levels over the 2005-to-2010 period, while providing federal authority to impose stricter mandatory control requirements by a later date if the sector as a whole fails to achieve its reduction target. Similar performance targets could be set for products, such as automobiles and appliances. Companies would receive shelter from the stricter requirements so long as they achieve their proportionate share of the reduction target.

One advantage of this approach is that it would promote immediate action towards the reduction target, even while the details of the mandatory control program are being developed. Another advantage is that it would enable companies to coordinate their emissions control strategies for conventional air pollutants with their carbon dioxide reductions. This would be especially important for those sectors whose near-term control obligations for conventional air pollutants (involving major capital investments) may conflict with a long-term GHG control strategy for that sector.

New legislation would be required to either establish general criteria that apply economy wide or set out design elements specific to individual sectors. In the latter case, for example, the legislation could specify for the power generation sector: (a) the initial and "backstop" reduction levels, (b) the reduction timeframes, (c) allocation of emissions allowances through a generation performance standard, (d) the ability of participants

to trade emissions credits, and (e) the flexibility to "bank" allowances for future use.

In addition, if a sector that makes products fails to meet its target, those companies not doing a proportionate share could have tighter efficiency standards imposed.

Allow an opt-in for coverage of carbon dioxide emissions in conjunction with air regulatory programs.

Many companies – particularly utilities – are interested in addressing their CO_2 emissions in conjunction with new reduction obligations likely to be enacted for other pollutants. Many studies have documented substantial environmental and economic benefits of harmonizing the timing and reduction levels of multiple air pollutants.[6] An "opt-in" approach would permit these companies to consider reduction obligations and goals comprehensively, thereby minimizing the chance of stranding pollution control investments aimed at conventional pollutants without regard for CO_2. By providing an opt-in strategy, overall emissions (including GHGs) could be considered simultaneously – avoiding the now-common scenario that control strategies devised for reductions in traditional pollutants have little or no beneficial impact on GHG emissions. (Post-combustion controls aimed at reducing conventional pollutants, in fact, often increase GHG emissions. In contrast, all GHG reduction strategies that reduce fuel consumption – the largest GHG emissions source – also reduce conventional air pollutants.) Harmonizing time frames for achieving reductions could avoid piecemeal and uncoordinated implementation of conventional and GHG emissions.

At the same time, streamlining the existing New Source Review (NSR) program for changes in facilities could enable power plants, refineries, and other major stationary sources to improve their production efficiencies more easily. Such efficiency improvements directly translate into lower CO_2 emissions. Companies participating in this "opt-in" could be allowed to implement environmentally beneficial projects without triggering the NSR requirements.

Design and implement an economy-wide domestic emissions program to meet a mandated cap.

Ultimately, the ability of the United States to achieve significant long-term GHG reductions depends on our success in the design and implementation of a mandatory program to reduce emissions. Since such a program will take time to design and administer, the near-term approaches discussed above should be developed in such a way that they are consistent with important design elements of a future mandatory program. The most cost-effective method of obtaining such reductions is likely to come in the form of a domestic emissions trading program that could be integrated with an international trading regime.

Elements of an effective domestic trading program could include:

- **allocation of permits to existing and new sources based on historic emissions, output levels, auction, or – preferably – some combination thereof;**
- **creation of an independent authority to oversee the GHG registry and trading activity;**
- **providing for a declining cap in permitted GHG levels over time;**
- **including credit for other GHG emissions on a CO_2-equivalent basis;**
- **establishing a multi-year compliance period for meeting any GHG emissions reduction obligation; and,**
- **recycling revenues from auctioned permits to reduce other tax burdens, increase R&D, and provide transition assistance to affected workers and communities.**

Ideally, a domestic program should be compatible with trading programs in other countries to allow credit for reductions undertaken abroad. Also, with improved confidence in measuring and monitoring sequestration-related activities (both domestically and abroad), credit for carbon storage should be included.

Conclusion

To address global climate change effectively, the United States must actively pursue real reductions in GHG emissions at home and abroad. The steps outlined here chart a course for a sound, credible, and cost-effective domestic program. Starting now on a path to reduce these emissions is necessary both to meet the environmental objective of moderating human interference with the climate system and to avoid the need for more costly measures in the future.

For the complete text of this "In Brief" and other Pew Center reports or to order a free copy, visit our website at www.pewclimate.org.

[1] A significant investment has been made in a variety of federal programs to encourage voluntary reductions. Such programs include: the U.S. DOE's Climate Challenge Program for electric utilities; and U.S. EPA programs such as Climate Wise, the Landfill Methane Outreach Program, the Coalbed Methane Outreach Program, Energy Star, and the Green Lights Program, as well as the U.S. Initiative on Joint Implementation. In addition, DOE's Voluntary Reporting of Greenhouse Gas Program required by Section 1605(b) of the Energy Policy Act of 1992 records the results of voluntary measures to reduce, avoid, or sequester carbon. During 1999, a total of 201 U.S. companies and other organizations reported on 1,715 projects that achieved reductions and sequestration equivalent to 226 million metric tons of carbon dioxide, or about 3.4 percent of total 1999 greenhouse gas emissions. (*Voluntary Reporting of Greenhouse Gases*, 1999, DOE/EIA – 0608(99), February 2001.)

[2] In the United States, the transportation, industry, and combined residential/commercial sectors are each responsible for roughly one third of overall emissions.

[3] EPA enjoyed considerable success in encouraging substantial voluntary reductions of 17 toxic chemicals by linking the TRI reporting program with a voluntary pollution prevention program. Entitled the 33/50 (Industrial Toxics) Project, this entirely voluntary program established an interim goal of a 33 percent reduction by 1992 and an ultimate goal of a 50 percent reduction by 1995 in aggregate emissions of 17 high-priority toxic chemicals. Individual companies entered into voluntary, non-binding commitments to achieve specific reductions on a company or facility basis. In addition to achieving the ultimate goal in 1994 (one year ahead of schedule), the 33/50 Program enhanced the effectiveness of the TRI reporting program. Most importantly, participating facilities reported substantially more reductions of the 33/50 targeted chemicals than of other TRI chemicals.

[4] Similar relief has been provided for voluntary early reductions in other regulatory contexts. For example, section 112(i)(5) of the Clean Air Act provides a 6-year compliance extension from air toxic control standards set under section 112(d) for achieving early reductions of hazardous air pollutants (HAPs). The 6-year extension applies to those facilities achieving a 90 percent reduction in listed HAPs (95 percent reduction in the case of HAP particulates) before the proposal of the applicable HAP emissions standard(s). The reduction obligation must be federally enforceable and incorporated into the facility's permit issued under Title V of the Clean Air Act.

[5] In such cases, companies would make binding commitments to improve the performance of their products sold by specified amounts over the term of the agreement. Auto manufacturers, for example, could agree to meet declining GHG emissions budgets reflecting improvements in fuel efficiency of vehicle fleets sold for each model year during the agreement. Appliance manufacturers could commit to improving efficiency of their products by set amounts over a fixed period of time.

[6] See, for example, STAPPA/ALAPCO, *Reducing Greenhouse Gases and Air Pollution: A Menu of Harmonized Options* (October 1999); and EIA, *Analysis of Strategies for Reducing Multiple Emissions from Power Plants: Sulfur Dioxide, Nitrogen Oxides, and Carbon Dioxide* (December 2000).

Dedicated to providing credible information, straight answers, and innovative solutions in the effort to address global climate change.

Pew Center on Global Climate Change
2101 Wilson Blvd., Suite 550
Arlington, VA 22201
Phone: 703/ 516.4146
Fax: 703/ 841.1422
www.pewclimate.org