Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

March 19, 2007

Hon. John D. Dingell, Chairman
Hon. Rick Boucher, Chairman, Subcommittee on
Energy and Air Quality
Committee on Energy and Commerce
2125 Rayburn House Office Building
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Dingell and Chairman Boucher:

On behalf of the Union of Concerned Scientists, I want to thank you for the opportunity to respond to your thoughtful questions about global warming policy. Our responses are contained in the attached memo.

As you know, global warming is one of the most serious challenges facing us today, and its effects are already being felt around the country and the world. To protect the health and economic well-being of current and future generations, we must reduce our emissions of heat-trapping gases by using the technology, know-how, and practical solutions already at our disposal. Developing and implementing these solutions is UCS's top priority.

As such, we very much appreciate the process you are pursuing to gather substantive information about the scientific, technological and economic issues inherent in climate policy and to craft legislation accordingly.

UCS stands ready to assist you to ensure that climate legislation will ensure that we avoid the worst effects of global warming, while creating jobs, saving consumers money, and protecting our national security. If you or your staff has any further questions, please feel free to contact Alden Meyer, Director of Strategy and Policy for UCS, in our Washington office.

Sincerely,

Kevin Knobloch

Kevin Knobloch
President
Union of Concerned Scientists

www.ucsusa.org | Two Brattle Square · Cambridge, MA 02238-9105 · TEL: 617.547.5552 · FAX: 617.864.9405
1707 H Street, NW · Suite 600 · Washington, DC 20006-3962 · TEL: 202.223.6133 · FAX: 202.223.6162
2397 Shattuck Avenue · Suite 203 · Berkeley, CA 94704-1567 · TEL: 510.843.1872 · FAX: 510.843.3785

Response to Dingell Memo

1. Please outline which issues should be addressed in the Committee's legislation, how you think they should be resolved, and your recommended timetable for Congressional consideration and enactment. For any policy recommendations, please address the impacts you believe the relevant policy would have on:
(a) Emissions of GHGs and the rate and consequence of climate change; and
(b) The effects on the U.S. economy, consumer prices and jobs.

There is broad scientific consensus that the levels of greenhouse gases (GHGs) have increased markedly as a result of human activities, and that evidence of the climate's warming is now unequivocal, as is evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level. (IPCC, 2007). To avoid the worst impacts of climate change, steep reductions in GHG emissions are necessary and, as the source of one-fourth of global emissions, the U.S. must play an important role in these reductions. Forthcoming analysis from UCS shows that the U.S. needs to make emissions reductions on the order of 80% from 2000 levels by 2050.

While the challenge is considerable, the solutions for confronting climate change are available today and should be implemented without delay. A recent study by the American Solar Energy Society (ASES, 2007) shows that reductions of carbon emissions from fossil fuels on the order of 60-80% by 2050 are possible with policies that promote energy efficiency and the increased use of renewable energy. Federal legislation that is serious in intent should be based on a combination of an economy-wide cap and trade program and targeted sectoral policies. Neither set of policies will be sufficient on its own, and the combination will ensure that emissions reductions occur at the lowest cost[1]. In addition, federal policy should contain these elements:

- A stringent mandatory cap on emissions that will bring about the 80% reductions from 2000 levels by 2050. Allowances from the cap and trade program should be auctioned and revenues used for the public benefit (see answer to 2(l) for more detail).
- Effective and ambitious sector-based standards, including a renewable electricity standard (RES), increased fuel efficiency standards, a low-carbon fuel standard[2], and end-use efficiency standards for electricity .
- Other sectoral policies, such as incentives for greater use of combined heat and power (CHP) technology, enhanced building codes, policies to promote greater use of alternative-fuel vehicles and increased use of bioenergy, better land use policies, and incentives for research, development and deployment of clean technologies.
- "Just transition" provisions for segments of the population and sectors of the economy disproportionately impacted by emissions reduction policies

[1] Alison Bailie et al, 2003. "Analysis of the Climate Stewardship Act". Tellus Institute.
[2] Using fuels that are sustainably produced and used.

The overall effect of GHG reduction policies should be to "decarbonize" the economy and bring about a decoupling of emissions growth from economic growth. There is mounting evidence that strong climate policies will have a negligible impact on future economic growth, on the order of 1% (with a range of +/-3%) of global GDP by mid-century[4]. This should be seen within a context of a growing economy, so that a 1-2% reduction by mid-century would mean that the economy might expand 89% by 2050 instead of 91%, a negligible deflection in economic growth. On the other hand, the economic impact of climate change itself would be far higher if we did nothing at all, potentially a 5-20% loss of annual consumption by mid-century. Faced with this stark prospect, we have a responsibility to act now to ensure the well-being of our children, grandchildren and fellow global citizens.

Analysis from UCS[5] shows that a national renewable electricity standard of 20 percent by 2020 would:

- Save consumers more than $35 billion on their electricity bills through 2020, and another $14 billion in lower natural gas bills. Renewables protect consumers from the volatile natural gas market by reducing the demand for, and the price of, natural gas.
- Provide $16 billion in income to farmers, ranchers, and rural landowners for biomass energy supplies and wind power land leases. Landowners can receive lease payments of $2,000-$6,000 per year per turbine on their land.
- Produce a net gain of more than 157,000 new jobs in manufacturing, construction, and operations - nearly double the number of jobs from generating the same amount of electricity from fossil fuels.

UCS's Clean Energy Blueprint found that an investment of $13.4 billion per year in efficiency and renewable energy technologies in the electricity and buildings sectors would yield $440 billion in cumulative net present value savings between 2002 and 2020, while reducing carbon emissions by nearly 50% from 2000 levels.

UCS has also conducted analysis that quantifies the benefits of increased fuel economy[6]. We estimated the effect of moving existing technologies into cars and trucks over 10 years to reach an average of 40 miles per gallon (mpg) and found that:

- In 10 years, the benefits resulting from investments in fuel economy would lead to 161,000 more jobs economy-wide throughout the country, with California, Michigan, New York, Florida, Ohio, and Illinois topping the list.
- In the automotive sector, projected jobs would grow by 40,800 in 10 years.

A similar analysis done by the economic research firm Management Information Services (MIS) evaluated the potential job impacts of increasing fuel economy to about 35-36 mpg

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[4] Nicolas Stern, 2006. *The Stern Review on the Economics of Climate Change*. UK Treasury.
[5] Renewing America's Economy, 2004, available at http://www.ucsusa.org/clean_energy/renewable_energy_basics/renewing-americas-economy.html
[6] Friedman, 2004. *Creating Jobs, Saving Energy and Protecting the Environment*. UCS.

by 2015 and found even greater growth at more than 350,000 new jobs in 2015[7]. This job growth included all of the major auto industry states.

Preliminary macroeconomic analysis of California's Global Warming Solutions Act, which involves returning emission levels to 1990 levels, shows that the implementation of a comprehensive policy package will result in a net increase of 83,000 jobs and $4 billion in income by 2020, above and beyond business-as-usual growth (California Climate Action Team Report, 2006). In addition to the state's economic assessment, a UC Berkeley study[8] has also addressed the macroeconomic impacts of meeting the 2020 cap and also found net economic benefits to the state. The UC Berkeley study looks at two policy scenarios, with and without investment tax incentives. The study finds an economic benefit of an increase in Gross State Product equal to $60 – $74 billion with an increase in employment of 17,000 – 89,000 new jobs. The higher numbers come from a scenario that includes an investment tax incentive paid for by revenue generated from the sale of carbon allowances in a cap-and-trade program (or an equivalent carbon tax).

2. Cap and Trade

a. Which sectors should it cover? Should some sectors be phased in over time?

- The scope of the cap and trade program should be economy-wide, covering all major sources of emissions (the electricity sector, transportation sector and energy-intensive industries)
- Emission reductions from the agricultural, land use and waste disposal sectors could be phased in over time, or included via other policies such as offset projects, tax incentives and provisions in the Farm Bill.

b. To what degree should the details be set in statute by Congress or delegated to another entity?

The level of the cap should be set by statute and should include a provision for revising the cap as new scientific information on the impacts of climate change becomes available.

The details of the trading program (maintaining an inventory of emissions from sources, registering allowance trades and banking, monitoring and enforcement of the statute) can be administered by the EPA.

There should be provisions for establishing strong institutions for third party verification of emissions credits and offsets.

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[7] Bezdek, 2005. *Fuel Efficiency and the Economy.*

[8] David Roland-Holst, 2006. Economic Growth and Greenhouse Gas Mitigation in California. UC Berkeley. http://calclimate.berkeley.edu/Growth_Strategies_Full_Report.pdf

The statute should also include provisions for citizen suits to ensure the authorities are properly enforcing the statute.

Federal climate legislation should not preempt stronger state authorities and programs.

c. Should the program's requirements be imposed upstream or downstream or some combination thereof?

UCS recommends that a national cap and trade program should adjust the point of regulation by sector to achieve maximum leverage on producer and consumer actions; complementary policies to spur innovation and increase consumer benefits are also necessary.

The economic and environmental threat of global warming can only be addressed through aggressive efforts to limit emissions from all sectors of the U.S. economy. An upstream economy-wide cap offers a potentially simple and comprehensive approach. However, UCS believes that such a program would be sub-optimal, both from the perspective of efficiency and efficacy.

The transportation sector, particularly the passenger vehicle segment, offers the strongest rationale for the need to go beyond an upstream economy-wide cap. Accounting for about one-fifth of the nation's GHG emissions, US automobiles and light trucks are a major source of global warming pollution. Studies from the EIA have shown that upstream cap and trade programs would be ineffective in reducing passenger vehicle emissions[9]. This is because the modest increases in fuel prices due to a cap and trade program will not be sufficient to motivate the purchase of cleaner vehicles or motivate more efficient driving behavior of consumers. In contrast, raising the CAFE standards, providing incentives for the purchase of cleaner vehicles and providing incentives for the use of low-carbon fuels would be far more effective in boosting fuel economy and lowering emissions from the transportation sector.

A hybrid approach that adopts the most suitable point of regulation depending on the sector would be best. For example, for CO_2 emissions:

- from electricity at the point of load serving entities (LSEs), from where the electricity bought from different power generators is distributed to consumers. The LSEs have the greatest control over the investment portfolio for power and thus the GHG emissions from this sector. Additional policies like end-use efficiency standards and an Renewable Electricity Standard would greatly increase the cost-effectiveness of lowering emissions from the electricity sector.
- from energy intensive sectors at the plant level.
- from transportation at fuel refineries and/or vehicle manufacturers.
- from the residential and commercial (non-electricity) sectors, on the fuel producers/providers.

[9] EIA, 2004. *Analysis of Senate Amendment 2028, the Climate Stewardship Act of 2003*.
EIA, 2005. *Analysis of the NCEP Proposal.*

d. How should allowances be allocated? By whom? What percentage of the allowances, if any, should be auctioned? Should non-emitting sources, such as nuclear plants, be given allowances?

The initial allocation of allowances has both efficiency and equity consequences. Numerous economic analyses show that the use of auctions, combined with appropriate revenue recycling is welfare-improving[10]. Auctioning the allowances is optimal from an economic perspective because it does not distort the production incentives of firms. It will provide the greatest incentives for technological innovation and therefore for emissions reductions. Analysis by Milliman and Prince[11] and Fischer, Parry and Pizer[12] demonstrates that auctioning allowances increases the incentives to regulated industries for technological innovation, as compared to a system with grandfathered allowances. Auctions lead to early price discovery. This helps keep the allowance market robust by improving liquidity and lowering volatility. Auctioning also ensures that new entrants are handled easily and fairly.

Free allocation amounts to a windfall gain to pollution emitters and is highly regressive. Allocation based on historical emissions or updated baselines creates distorted incentives for firms on how much to produce. Free allocation is highly susceptible to rent-seeking activities by firms (trying to lobby for their "rightful share"). The experience of the European Union Emissions Trading System (EU ETS) shows that giving allowances away for free led to windfall profits to utilities, did not prevent electricity price increases for consumers and interfered with the efficient functioning of the market. A recent report from Deutsche Bank[13] confirms that if the EU ETS switches to a system of auctions (instead of the current method of free allocation of allowances), there would be major benefits. These would include an efficient, simplified and transparent allocation system, reduced influence of lobby groups and a more rapid changeover to lower carbon fuels.

A recent report by the National Commission on Energy Policy (NCEP)[14] clearly states that allocating most allowances for free to energy producers creates the potential for large windfall profits because they do not bear most of the costs of the cap and trade program.

> *"Economic analysis and experience with Europe's trading system suggests that energy companies can and will pass most program costs through to consumers and businesses at the end of the supply chain. If the same companies get a large allocation of free allowances, the value of those allowances is likely to substantially exceed any actual net costs they incur as a result of the policy."*

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[10] Ian Parry, 1995. "Pollution Taxes and Revenue Recylcing." *Journal of Environmental Economic and Management*, 29, pp. 64-77; A. Bovenberg and L. Goulder, 1996. "Optimal Taxation in the Presence of Other Taxes: General Equilibrium Analyses." American Economic Review, 86, pp 985-1000 .

[11] Scott R. Milliman and Raymond Prince, 1989. "Firm Incentives to Promote Technological Change in Pollution Control," *Journal of Environmental Economic and Management,* 17.

[12] Carolyn Fischer, Ian Parry and William Pizer, 1999. "Instrument Choice for Environmental Protection when Technological Change is Endogenous," RFF Discussion Paper 99-04.

[13] Deutsche Bank Research, March 2007. *EU Emissions Trading: Allocation Battles Intensifying*.

[14] NCEP, 2007. "Allocating Allowances in a Greenhouse Gas Trading System."

Auction revenues can be used to further improve economic efficiency by reducing other distortions in the economy (reduce taxes on labor such as payroll taxes, increase expenditures on efficiency and renewable energy, provide transition assistance to low-income families and sectors disproportionately impacted by energy price increases, etc.) An excellent analysis of the costs and benefits of such transition assistance is contained in Barrett et al[15]. The Deutsche Bank report referenced above also states that a crucial advantage of auctions is the potential to use auction revenues for beneficial expenditures such as research and development in the environmental technology sector and measures to combat the consequences of climate change (such as infrastructure improvements). The position taken by New York, Massachusetts, Vermont and Connecticut in supporting 100% auction of allowances in the RGGI process is exemplary[16].

If the Congress decides to allocate some allowances on a transitional basis, it should limit the duration of such allocations and move to a full auction relatively quickly. In such a case, non-emitting sources, like nuclear power, should not be given allowances. They are already advantaged by the fact that they do not need to purchase allowances.

e. How should the cap be set (e.g. tons of GHGs emitted, CO2 intensity)?

The cap should be set unequivocally in terms of absolute levels of GHGs emitted. The threat posed by changing climate is in direct proportion to the absolute levels of GHGs accumulating in the atmosphere which are reaching dangerous levels. The future well-being of our nation and the world depends on rapidly lowering these absolute levels of emissions. Intensity targets are not equal to the task at hand.

f. Where should the cap be set for different years?

The long term cap should be set at a level requiring an 80% reduction from 2000 levels by 2050. An intermediate benchmark that requires a return to 1990 levels of GHG emissions by 2020 should also be set to ensure that the U.S. moves quickly to get on the path to the longer term reductions. There should also be provisions to adjust the cap if necessary, based on updated scientific evidence.

g. Which GHGs should be covered?

Comprehensive inclusion of all major GHGs – Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydroflurocarbons (HFCs), Perflurocarbons (PFCs) and Sulfur hexafluoride (SF_6) – would be best. This would ensure that reductions are made in the most cost-effective manner in all sectors of the economy, as shown by several studies[18].

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[15] James P. Barrett, J. Andrew Hoerner, Steve Bernow and William Dougherty, 2002. "Clean Energy and Jobs, A Comprehensive Approach to Climate Change and Energy Policy," for the Economic Policy Institute.

[16] See, for example, http://www.massclimateaction.org/RGGI/SpitzerStatement050206.pdf

[18] For example, F.C. de la Chesnaye & J.P. Weyant (eds), 2006. Multigas Mitigation and Climate Policy. *The Energy Journal, Special Issue*.

h. Should early reductions be credited? If so, what criteria should be used to determine what is an early reduction?

There is an automatic incentive for early reductions in a cap and trade program with auctioned allowances. Sources that make early reductions will have to purchase fewer allowances than would have otherwise been required.

i. Should the program employ a safety valve? If so, at what level?

No, the program should definitely not employ a safety valve. A safety valve would interfere with the efficient functioning of the market, undermine the environmental integrity of the cap and reduce incentives to invest in clean technologies. Additionally, weakening the U.S. federal cap and trade program by including a safety valve would prevent linkage with other trading regimes, such as the EU-ETS. Such linkage would provide additional flexibility to regulated entities and help reduce the costs of compliance.

Safety valves are often proposed to diffuse concerns from industry about potentially high costs of compliance and price volatility. UCS strongly believes that these concerns are more effectively dealt with using other cost-containment measures such as banking of allowances, borrowing with stringent payback criteria, limited use of high quality offsets, linkage with other trading regimes world-wide and complementary sector-based policies.

j. Should offsets be allowed? If so, what type of offsets? What criteria should govern the type of offsets that would be allowed?

While the use of offsets can lower compliance costs and allow uncapped sectors/geographic areas to be part of the overall goal of emissions reductions, they can also be a potential loophole to avoid real near-term emissions reductions in high-emitting sectors. Given the scale of the problem, any serious solution for climate change must include real reductions from high-emitting sources in the U.S. Therefore we propose the following criteria for offsets:

- Offsets must be limited to a modest fraction of required reductions (note that this is a percentage of ***required reductions***, not a percentage of ***total emissions***)
- A strong independent institutional framework to monitor offsets is required
- Offsets must be real, verifiable, additional and guaranteed permanently
- Offsets must be limited to projects within the U.S. until a strong international monitoring and verification system is in place
- There should be no net environmental or social risks from offset activities

k. If an auction or a safety valve is used, what should be done with the revenue from those features?

There should be no safety valve. There should be an auction for all or a substantial majority of the allowances. Auction proceeds can be used to improve efficiency in the economy by reducing distortionary taxes such as payroll taxes. Such proceeds should also be used to counteract the negative societal impacts of a carbon price and to amplify the GHG-reduction impacts of a cap and trade program. This could include:

- Rebates to low-income consumers disproportionately affected by higher energy prices.
- Investments in efficiency and renewable energy.
- Transitional assistance to workers and regions disproportionately impacted by carbon legislation (e.g. coal mining).
- Assistance to state and local governments to cope with the impacts of climate change.

l. Are there any special features that should be added to encourage technological development?

The development and deployment of new technologies will be motivated by targeted sector-based policies and by establishing a robust economy-wide price for carbon.

Cap and trade programs use the power of the market to deliver emissions reductions in an economically efficient way and spur investments in clean technologies. Auction revenues should be used for incentives for investment in clean technologies.

However, multiple market failures mean that a cap and trade program for GHG emissions will not be sufficient on its own to deliver the necessary level of emissions reductions. These market failures include:

- High up-front costs of new technologies that are borne directly by one consumer though the benefits are spread out society-wide. From an individual's perspective the new technology may not be cost-effective even though from society's perspective it is.
- High costs of research and development of new technologies that may not be considered worthwhile in a business environment with a focus on short-term profits.
- Lack of information about efficiency opportunities and new technologies
- Split incentives, where the costs are borne by one entity and the benefits received by another
- Lack of accounting for the co-benefits of carbon reduction policies, such as lower air and water pollution and reduced health costs.

To confront these and other market failures, complementary sector-based policies are necessary. They will help motivate the implementation of the full range of clean technologies and in doing so will lower the compliance costs of a cap and trade program. A 2004 study by RFF concluded that:

> *Market failures associated with environmental pollution interact with market failures associated with the innovation and diffusion of new technologies. These combined market failures provide a strong rationale for a portfolio of public policies that foster emissions reduction as well as the development and adoption*

of environmentally beneficial technology. Both theory and empirical evidence suggest that the rate and direction of technological advance is influenced by market and regulatory incentives, and can be cost-effectively harnessed through the use of economic-incentive based policy[19].

For example, in the electricity sector, an RES policy that requires electricity suppliers to gradually increase their use of renewable energy offers a simple market-based incentive to encourage the development and deployment of new carbon-free energy sources. The RES is market-friendly, requiring competition among a variety of renewable resources to meet the standard at the lowest cost. By assuring a slow but steady growth of the market for such technologies, it mobilizes private capital to invest in these technologies and lower their costs over time.

The RES will also reduce the cost of a carbon cap by diversifying the resource portfolio and reducing the demand for and price of natural gas. The downward pressure on natural gas prices is especially important in carbon cap scenarios where there will be an incentive to substitute gas for coal and reduce emissions. The EIA studied the effect of combining an RES with caps on NOx, SO_2, mercury and CO_2 and found that increasing the use of renewables would "lead to lower prices for natural gas and for CO2 allowances…"[20] According to the July 2001 EIA study, including an RES with a four pollutant approach would save consumers $72 billion by 2020. (Because the EIA used natural gas prices roughly a third of present day prices, we believe that actual savings in 2020 would be even higher.) A number of subsequent analyses, reviewed in a recent Lawrence Berkeley National Laboratory study, have confirmed that an RES will reduce the demand for and price of natural gas[21].

The overall fuel economy of the U.S. car and truck fleet in 2006, 24.6 mpg, was lower than it was in 1986. Legislation introduced in the Senate calls for an increase in the fuel economy standards for cars and trucks to 35 mpg by 2019, which would meet President Bush's 2006 State of the Union promise to save as much as 8.5 billion gallons of gasoline by 2017 through fuel economy. Automakers already have the technology to make cars with better fuel economy. But for the past 20 years, they have used these tools to double power and increase vehicle weight by 25 percent. With off-the-shelf technology, automakers could produce a fleet of cars that reaches more than 40 mpg over the next 10 years. More fuel-efficient vehicles would match the performance and size of vehicles on the road today and have the same or better safety. Investing in technologies to increase fuel economy will create more domestic jobs, save consumers thousands of dollars at the pump, and both cut global warming pollution and the size of America's oil addiction.

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[19] Adam Jaffe, Richard Newall and Robert Stavins, 2004. "A Tale of Two Market Failures: Technology and Environmental Policy," RFF Discussion Paper 04-38.

[20] EIA, 2001. *Analysis of Strategies for Reducing Multiple Emissions for Electric Power Plants: Sulfur Dioxide, Nitrogen Oxides, Carbon Dioxide and Mercury and a Renewable Portfolio Standard.*

[21] R. Wiser et al. 2005. *Easing the Natural Gas Crisis: Reducing Natural Gas Prices Through Increased Deployment of Renewable Energy and Energy Efficiency*. LBNL-56756.

The deep emissions reductions necessary to avoid dangerous climate change will ultimately require innovations that help move the world toward a post-carbon economy. The emerging evidence suggests that a cap and trade policy alone will not be sufficient and sector-based policies will be required to spur innovation[22]. UCS strongly advocates for a comprehensive policy approach as the most effective and efficient way to reduce GHG emissions.

m. Are there design features that would encourage high-emitting developing countries to agree to limits on their GHG emissions?

A stringent cap on US emissions would send a very positive signal to developing countries that the world's largest GHG emitter is stepping up to the plate and taking on a responsible leadership role on one of the biggest challenges facing the world. This is a necessary step to bring them on board and encouraging them to do their part as well. Conversely, a continued failure by the US to act (or adoption of very weak climate legislation) would have a negative effect in encouraging global cooperation on this issue.

At this juncture, it is not equitable or necessary for any but the most wealthy developing countries to take on binding national caps on their emissions. Rather, they should be encouraged to undertake sector-based policies to improve energy efficiency and increase the use of renewable forms of energy; some major emitting countries such as China are also implementing such policies. One way to encourage this would be through increased linkage with the emerging global carbon markets, in the form of "no-lose" sectoral targets or other new mechanisms.

By broadening the market for and thereby lowering the cost of clean, low-carbon technologies, cap and trade, standards, and other US policies will also accelerate the deployment of these technologies world-wide, including to high-emitting developing countries. Such technology transfers are a necessary condition for bringing about economic growth that is decoupled from higher emission levels. Linkage to a global climate regime will facilitate greater investment in clean technologies in developing countries, while also allowing U.S. companies access to business opportunities in these growing markets and holding down the overall costs of emissions reductions world-wide.

3. How well do you believe existing authorities permitting or compelling voluntary or mandatory actions are functioning? What lessons do you think can be learned from existing voluntary or mandatory programs?

President Bush's Global Climate Change Initiative, announced in 2002, called for a voluntary target for the U.S. to reduce emissions *intensity* by 18% between 2002 and 2012 with no regard to absolute emission levels. It is clear that the current U.S. policy on curtailing GHG emissions is a failure. The latest data from the EPA shows that GHG

[22] For example, Rubin, Taylor and Nemet, "The Role of Technological Innovation in Meeting California's GHG Emissions Targets" and Burtraw, Farrell, Goulder and Peterman, "Lessons for a Cap and Trade Program" in Hanemann and Farrell (eds), *Managing Greenhouse Gas Emissions in California*, UC Berkeley, 2006.

emissions have risen 16.3% % from 1990 to 2005. We cannot afford to allow emissions of GHGs to continue to increase if we hope to avoid the worst effects of global warming. As such, future climate change policies must include mandatory hard targets for absolute GHG emissions reductions. Every year of delay in reducing emissions will necessitate steeper reductions later on – which will not only be more difficult, but also extremely costly.

Several states, including California, Maine, New Jersey, New Mexico, and Oregon, have set strong GHG emissions targets. Regions, such as the western states that are part of the Climate Action Initiative and the northeast states that are part of the RGGI coalition, have come together to establish strong cap and trade systems. Some 23 states and the District of Columbia have adopted renewable electricity standards. These initiatives are indicative of the potential for action if there is political will. These examples also show that a broad array of solutions to confront climate change exists and they are within our reach. Analysis done for these state initiatives shows that they do not impose an economic burden and in fact there are many benefits from taking action. California has undertaken several energy conservation measures over the last 35 years and as a result today the average Californian consumes 40% less energy than the average American, all while maintaining a strong economy with a large high-tech sector.

Some of the main lessons that can be learned from existing climate change policies are:

- There are a wide range of policies that can work together to reduce emissions; no one policy on its own is sufficient.
- Energy efficiency and the increased use of renewable energy have the greatest potential to reduce emissions. For example, UCS estimates that state-level renewable electricity standards will reduce total annual CO_2 emissions by 105 MMT by 2020; much greater reductions could be attained with a national renewable electricity standard.
- Targeted sectoral policies should be implemented in concert with an economy-wide cap and trade program. These complementary policies will lower the costs of compliance and accelerate the development and deployment of new technologies.
- Market barriers to research and development of new clean technologies are considerable and must be confronted directly.
- U.S. experience with the SO_2 and NOx cap and trade programs show that these programs can work successfully to reduce emissions at a lower cost than was initially estimated. Participants in the market were quickly able to understand the incentives and respond accordingly.
- The EU ETS carbon trading program already underway shows that the technical barriers to setting up a wide-scale trading program are not insurmountable. The EU was able to get the program up and running in record time.
- However, experience from the EU ETS also shows that giving allowances away for free leads to windfall profits to utilities, does not prevent electricity price increases for consumers and interferes with the efficient functioning of the market.

4. How should potential mandatory domestic requirements be integrated with future obligations the U.S. may assume under the 1992 United Nations Framework Convention on Climate Change? In particular, how should any U.S. domestic regime be timed relative to any international obligations? Should adoption of mandatory domestic requirements be conditioned upon assumption of specific responsibilities by developing nations?

The overriding imperative for the U.S. is to implement serious policies to bring about reductions in our GHG emissions without delay. This will be in keeping with our own national interests (to avoid the worst impacts of climate change, improve our energy security and take advantage of new economic opportunities in the clean technology industry) and in compliance with our current obligations under the UNFCCC.

Having reneged on our commitment to join the international community in implementing the Kyoto Protocol, we should make international cooperation a central part of our climate change policy framework going forward. To that end, caps on carbon emissions and reduction targets chosen should be at least as stringent as those proposed by other industrialized countries. In this regard, it should be noted that the European Union has recently committed to reducing its GHG emissions by 20% from 1990 levels by 2020 irrespective of action by other countries, and is willing to increase this to 30% reductions by 2020 if other industrialized countries (such as the U.S.) also agree to undertake comparable emissions reductions.

A domestic economy-wide cap and trade program should be designed with a view to linkage with other cap and trade programs world-wide. As discussed earlier, that should rule out "safety valves" or other provisions that could undermine the integrity of the program and prevent such linkage.

The UNFCCC, to which the U.S. is a signatory, clearly specifies "common but differentiated responsibilities" for nations, recognizing the different historical responsibilities for emissions and the differential ability to pay for emissions reductions. By adopting binding targets and implementing climate change policies, the U.S. will be taking a leadership role and sending a positive signal to developing countries. But we should not expect developing countries to assume the binding emissions targets that are incumbent upon the U.S. and other developed countries any time soon, and we certainly should not condition our own action on theirs.

Over time, major developing countries will have to slow, stop and reduce their overall GHG emissions, if the world is to succeed in addressing the threat of climate change. The best way to ensure this is for the U.S. to join other major industrialized countries in spurring the transfer of clean technologies on a large scale to developing countries, through development of robust global carbon markets, together with targeted assistance programs. Future economic growth, in both the developed and the developing world, must be based on access to abundant clean sources of energy.

Developing countries will be most vulnerable to the impacts of climate change and many are already starting to experience its effects including storms, floods, droughts, lack of access to drinking water and increased incidence of pests and diseases. Therefore, the U.S. should also increase its contribution to the substantial adaptation costs faced by the world's most vulnerable populations.