

Frequently Asked Questions on Global Climate Change

1. What is global climate change?

Human activities, primarily the burning of fossil fuels and changes in land use, have drastically increased the concentration of heat-trapping gases in our atmosphere. Present concentrations of carbon dioxide and methane far exceed their natural range in the past 650,000 years. This thicker blanket of gases traps extra energy in the earth's atmosphere, warming the planet. The most recent report from the Nobel-prize-winning Intergovernmental Panel on Climate Change (IPCC), which represents the work of more than 1,200 scientists, concluded that evidence of climate warming is now "unequivocal," and that it is more than 90 percent likely that human activities have caused "most of the observed increase in globally averaged temperatures since the mid-20th century." The extra energy trapped in the atmosphere not only increases the global temperature ("global warming"), but also changes the amount and distribution of rainfall, increases severe weather and heat waves, melts polar and mountain ice caps, and causes sea levels to rise. Because many of these gases stay in the atmosphere for hundreds of years, much of their impact would be essentially permanent.

2. Why does the United States need to reduce greenhouse gas emissions?

The early impacts of climate change are already being seen worldwide, and unchecked growth in emissions will only make the future effects of climate change more severe. According to the IPCC, the specific impacts of continued warming in North America include the following:

- Hot extremes, heat waves and heavy precipitation will become more frequent.
- "Coasts are projected to be exposed to increasing risks, including coastal erosion, due to climate change and sea-level rise, and the effect will be exacerbated by increasing human-induced pressures on coastal areas."
- Warming in North America's western mountains is projected to cause "decreased snowpack, more winter flooding and reduced summer flows, exacerbating competition for over-allocated water resources."
- "Disturbances from pests, diseases and fire are projected to have increasing impacts on forests, with an extended period of high fire risk and large increases in area burned."
- Heat waves increasing in frequency mean the "growing number of the elderly population is most at risk."

These impacts would have significant costs, both financial and otherwise, for Americans.

Internationally, the impacts of climate change may be even more severe. In Africa, the IPCC predicts that, by 2020, 75 million to 250 million people will be exposed to increased water stress as a result of climate change, and that the yield of some crops could decline by up to 50 percent. In Asia, climate change, combined with other factors, could lead to water stress for more than one billion people. Millions more worldwide will experience coastal flooding. These changes have the potential to cause a humanitarian crisis and significantly destabilize many regions of the world. The Stern Review on the Economics of Climate Change estimates that the cost of inaction would be an average 5-20 percent loss in global GDP.

With our history of environmental leadership and technological innovation, the U.S. is the nation best-equipped to lead the world in developing new solutions to climate change. As the country responsible for the largest share of greenhouse gases presently causing global climate change, we also have an ethical responsibility to combat this problem. Taking the steps to reduce greenhouse-gas emissions will also reduce our dependence on foreign oil, reduce air pollution and drive new industries (see below).

3. What are the primary manmade greenhouse gases and their typical sources?

The three most important greenhouse gases emitted by human activities are carbon dioxide, methane and nitrous oxide. Carbon dioxide - by far the most important - is emitted from the combustion of fossil fuels, industrial processes and changes in land use. U.S. methane emissions come primarily from landfills, livestock and leaks of natural gas from pipelines and coal mines. Nitrous oxide is produced by various agricultural practices and industrial processes. Other greenhouse gasses include hydrochlorofluorocarbons, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. These gases are only emitted in small quantities, but their high greenhouse-warming potential means that they are still important.

4. What is a cap-and-trade system?

Cap and trade is a regulatory mechanism that harnesses market forces to find the most cost-effective approach to reducing pollution. The program begins by creating a limit on the total amount of pollution that can be emitted, also known as "a cap." The emissions allowed by the cap are divided into permits that give the owner the right to emit certain amounts of pollution into the atmosphere. Over time, the size of the cap is reduced to produce the desired reductions in pollution. Companies are free to buy, sell, bank and trade permits to gain enough credits at the end of each compliance period to account for their emissions. Rather than directing companies to use a predetermined route to reducing emissions, this approach gives companies the flexibility to find the most cost-effective way to reduce emissions. The result is a program that fosters innovation and reduces costs.

Cap and trade was pioneered in the U.S. in the 1990 Clean Air Act Amendments to combat acid rain. While initial estimates of the cost of the sulfur dioxide emission reductions ranged from \$3 billion-25 billion per year, the actual cost of compliance over the life of the program is expected to be some \$1 billion-\$1.4 billion per year.

5. What is an example of how a company would cap and then trade?

Imagine two companies, originally producing the same amount of electricity, with the same amount of greenhouse gas emissions. Each year, they must submit allowances for the carbon dioxide emitted from burning fossil fuels. As the cap tightens, companies begin to look for ways to emit fewer greenhouse gasses. Company A finds a way to make its equipment more efficient, producing the same amount of power with lower emissions. It can sell extra allowances to Company B, so that both have enough allowances to comply. Each company will continue to make the most cost-effective choices regarding whether to make changes to power plants, buy allowances from others, or use allowances it has saved from previous reductions. This flexibility allows each company to find the best solution for its particular circumstances.

6. Why use a cap-and-trade system to reduce U.S. greenhouse-gas emissions instead of implementing a carbon tax?

The primary purpose of climate legislation is to reduce greenhouse-gas emissions, protecting both the environment and the economy. Because a cap-and-trade system has, at its core, a reduction in the amount of greenhouse gasses that are emitted (the cap), it guarantees that emissions will be reduced. A carbon tax cannot guarantee that a program will achieve the necessary environmental protection. If a carbon tax is set too low, companies will simply pay the tax without reducing emissions. If a tax is set too high, unnecessary costs will be imposed upon businesses and consumers. Cap and trade allows market forces to find the lowest-cost solution for the desired level of environmental protection.

7. What are the benefits of reducing greenhouse-gas emissions?

- **Climate Security** - The primary benefit of reducing greenhouse-gas emissions is that it would help prevent the most severe impacts of climate change. The reductions in this bill, combined with strong U.S. leadership on international climate agreements, will keep greenhouse-gas levels below dangerous thresholds and prevent burdening generations of Americans with a drastically altered planet.
- **National Security** -- Addressing global climate change will help keep Americans and American interests abroad secure. One recent report conducted by retired military dignitaries at the Center for Naval Analysis found that “climate change can act as a threat multiplier for instability in some of the most volatile regions of the world, and it presents significant national security challenges for the United States.” Our bill includes an International Climate Change Adaptation and National Security Fund to protect the national security of the U.S.
- **Energy Independence** - Americans have become increasingly aware of the risks of dependence on foreign sources of fossil fuels. The cap-and-trade scheme in our bill, combined with the low carbon fuel standard and incentives for renewable energy, cellulosic biofuels, mass transit and advanced vehicle technology, will help put America on a solid path toward energy independence.
- **Technological Innovation** - A key strength of the American economy has always been the development and deployment of new technology. The largest proportion of proceeds from the auction of permits goes to the development of new technologies. Over the lifetime of the legislation, this bill will direct hundreds of billions of dollars to develop and deploy innovative technology. Further, by placing a price on greenhouse-gas emissions, it will generate strong incentives for massive private-sector investment in new, clean technologies. The result will be the transformation of many existing sectors and the creation of whole new industries and green jobs.
- **Air Quality** - Because the combustion of fossil fuels also results in the creation of other forms of air pollution, including smog, particulates and mercury, reducing greenhouse-gas emissions would also improve air quality. By developing and

deploying low-emissions technology, the Act will result in cleaner air, fewer asthma attacks, and fewer deaths from air pollution.

8. What is the Kyoto Protocol?

In 1992, the world's nations developed the United Nations Framework Convention on Climate Change (UNFCCC) treaty to "prevent dangerous anthropogenic interference with the climate system." The treaty was ratified by Congress and signed by President George H.W. Bush. The resulting negotiations led to the development of a treaty for mandatory greenhouse-gas reductions by developed countries (but not developing countries such as China or India) that was completed in 1997 in Kyoto, Japan. The Kyoto Protocol calls for developed countries to reduce emissions by at least 5 percent below 1990 levels by 2012. The treaty was ratified by 174 nations – but not the United States – and went into effect in 2005. Kyoto signatories are collectively projected to be in compliance with the treaty, while U.S. emissions are already 16 percent higher than 1990 levels.

9. What is the Bali roadmap?

In December 2007, parties to the United Nations Framework Convention on Climate Change met to discuss the next phase of international treaties to confront climate change. The result of that meeting was a "Bali roadmap" for a new global agreement in 2009. The roadmap involves consideration of emissions reductions by all developed countries and actions by developing countries to reduce climate impacts. Many nations pushed for reductions at least as stringent as the most stringent IPCC stabilization scenarios, which would require a 50 percent-85 percent reduction below 2000 emissions levels by 2050.

10. Why aren't voluntary measures adequate to control global climate change?

While a wide variety of voluntary measures have been put in place in the U.S., greenhouse-gas emissions have continued to rise. Emissions rose 16 percent from 1990 to 2005, and are predicted to rise to 55 percent above 1990 levels by 2030 under current policies.

Frequently Asked Questions on the Lieberman-Warner Climate Security Act

1. What is the Lieberman-Warner Climate Security Act?

The Lieberman-Warner Climate Security Act (S. 2191) is the first global climate-change bill to be passed by a Senate committee, and would establish the core of a federal program to reduce U.S. greenhouse-gas emissions substantially enough between 2008 and 2050 to avert catastrophic global warming. The bill does this by imposing a declining cap on greenhouse-gas emissions on nearly 87 percent of heavy emitters. S. 2191 is modeled after the highly successful Acid Rain Program's cap-and-trade system.

2. How will the Lieberman-Warner Climate Security Act address the issue of climate change?

If the U.S. achieves emissions reductions along the order of what is called for in the bill (up to 66 percent below 2005 levels by 2050), even making conservative assumptions about the pace of the rest of the world's emissions reductions, the concentration of greenhouse gases in the atmosphere will remain below 500 parts per million (ppm) at the end of this century.

3. If a facility is "covered," what will it be required to do?

If a facility is covered under the act, it will be required to comply with a declining cap on an annual basis. A covered facility will be granted a portion of free allowances based on its historic emissions. In addition, it can take efficiency measures, buy additional allowances from auction, use banked allowances saved from previous years, purchase certified offsets or otherwise reduce its greenhouse-gas emissions to stay under the cap. At the end of the compliance period, a covered facility must submit to Environmental Protection Agency (EPA) the allowances necessary to demonstrate a reduction in greenhouse-gas emissions.

4. What companies or industries will be required to obtain allowances, and how do they obtain them?

Covered facilities include coal-burning power plants and industries, natural-gas processing plants and importers, petroleum- or coal-based fuel producers and importers, and facilities that produce or import (for sale) greenhouse gases such as sulfur hexafluoride or perfluorocarbons. All allowances will be created and monitored by the EPA. but are issued to covered facilities, entities such as states, and to a climate-change credit corporation that auctions credits. Companies can purchase extra allowances from the auction or from nonregulated entities that have received allowances. They can also purchase a portion of their compliance.

5. Under the act, do these companies have to pay for allowances?

Covered facilities will be given a percentage of allowances for free. Whether they need to buy more will be based upon whether they are making energy-efficiency reductions, reducing greenhouse-gas emissions through use of technologies. Companies will only have to pay for allowances when their reductions, plus the number of free allowances, falls short of their greenhouse-gas emissions that given year.

6. Where does the money go from the auction of allowances?

The money from the sale of allowances will go into the Climate Change Credit Corporation, a non-federal 501(c)(3), which will then distribute the funds in accordance with the Act.

7. How much money will there be from the purchase of allowances?

Funds generated from the sale of allowances will depend on the allowance price. At \$13/ton of CO₂, more than \$17 billion will be generated by the auction in the first year of the auction. In the program's first 18 years, the auction may cumulatively generate \$1 trillion in funds for clean technology, worker training, adaptation and low-income-consumer protection.

8. Who gets the money from the sale of allowances and how must those funds be spent?

The money is distributed as follows: 52 percent for the Technology Deployment Fund; 18 percent for the Low Income Energy Consumers Fund; 18 percent for the Wildlife Adaptation Fund; 5 percent for the International Adaptation and National Security Fund; 5 percent for the Workforce Training Fund; and 2 percent for Advanced Energy Research.

9. Why are allowances being distributed for free to nonregulated entities?

Some 19 percent of the total emissions budget is distributed for free to nonregulated entities (5 percent to U.S. farmers and foresters, 2.5 percent for international forest protection, 1 percent to coal mines and landfills, and 10.5 percent to state governments) as incentives for those entities to reduce greenhouse-gas emissions or sequester carbon dioxide, even if they are not regulated by the bill. Another 11 percent goes to offset costs of the program to consumers (9 percent for electricity consumers and 2 percent for natural-gas consumers).

The value of these allowances will help further the overall goal of reducing greenhouse-gas emissions while minimizing the impact on consumers. By creating a large number of participants in the allowance market, it also helps ensure a fluid trading market.

10. How do environmental benefits of the act compare to the emissions reductions that may be necessary based on the work of the Intergovernmental Panel on Climate Change?

The most stringent IPCC reduction scenario, which would keep global temperatures from rising much more than 2.0 °C-2.4 °C, requires reductions of 50 percent-85 percent below 2000 levels by 2050. The table below compares that amount to the reductions that the Act requires of covered facilities, and to the estimated amount that the Act would reduce total US emissions (according to an analysis by NRDC and the World Resources Institute):

Emissions Reductions	IPCC Recommendation	S.2191 Covered Facilities	S.2191 Total US Emissions
Relative to 1990	43 to 83%	66%	56 to 60%
Relative to 2000	50 to 85%	70%	61 to 65%
Relative to 2005	51 to 85%	71%	62 to 66%

11. How will Lieberman-Warner reduce our dependence on foreign oil?

The act contains a number of provisions to reduce dependence on foreign oil. First, it implements a Low Carbon Fuel Standard. This standard would reduce the greenhouse-gas emissions of transport fuels 5 percent by 2015, and 10 percent by 2020, by replacing foreign oil with fuels – such as cellulosic ethanol - that have lower net greenhouse-gas emissions. California recently passed a similar standard to displace 20 percent of gasoline consumption by 2020. Second, the act funds the development of cellulosic biofuels, electric vehicles, hybrid or plug-in electric cars, fuel-cell-powered cars and advanced diesel. Third, the act provides states with funds to develop and improve mass transit. These steps, combined with the recently enacted CAFE standards, will create real progress toward increasing America’s energy independence.

12. How will Lieberman-Warner impact home energy prices?

Modeling conducted by the Clean Air Task Force, using a model created by the Department of the Interior, projects that the cost of electricity per KWH will increase from 8.2 cents per KWh in 2006 to 9.5 cents in 2030. However, energy usage drops considerably, due to the energy-efficiency incentives included in the bill. As a result of the drop in energy consumption, residential and commercial customers will see lower monthly electrical bills.

13. How does the Lieberman-Warner Climate Security Act address cost impacts on low-income families?

The Lieberman-Warner bill creates a safety net to protect low- and middle-income consumers. Some 11 percent of the total emission-allowance account is set aside to be used as rebates to low- and middle-income energy consumers and to promote energy efficiency. The bill also establishes an “energy assistance fund”, using 18% of the auction proceeds, that provides additional funding to the existing LIHEAP and Weatherization Assistance Programs, and a new Rural Energy Assistance Program.

14. How does Lieberman-Warner allow states to deal with their own regional challengers for climate change?

S. 2191 guarantees that 4.5 percent of the emission-allowance account be directed to states, which then must use 90 percent for a list of eligible activities such as promoting energy efficiency, improving public transportation and relocating communities displaced by the impacts of climate change. This list of eligible activities is broad and is meant to allow states to best address their regional concerns and impacts. Another 1 percent of the emission-allowance account is available for mass transit projects. Finally, states can access another 5 percent of the emission allowance account if they adopt climate-friendly policies like green building standards and utility decoupling.

15. What happens to coal usage under Lieberman-Warner?

According to economic modeling, U.S. coal usage levels off - but does not decline significantly - for nearly a decade, then increases again with the deployment of carbon-capture and storage technology for coal-fired power plants. Between now and 2030, the bill would inject more than \$150 billion into accelerating and expanding commercial deployment of that technology and other advanced coal-power technologies.

At present, uncertainty caused by the absence of a mandatory, comprehensive climate law is resulting in difficulties for power companies that are securing financing for new coal-fired power plants. Wall Street and industry needs regulatory certainty now. The Climate Security Act provides that certainty. It will launch the nation onto a path that would ensure the long-term viability of coal. And coal power will coexist with a reduction in global-warming pollution.

16. What happened when the European Union began to regulate greenhouse gases, and how will Lieberman-Warner be different?

The European Union had two major pitfalls in the initial stages of its emissions trading system. The first is that it did not have a baseline, or registry of emissions, on which to base allowance allocations. S. 2191 contains a robust registry that requires the certification of emissions from regulated entities. In addition, the E.U. distributed nearly 100 percent of the allowances to regulated entities for free, which resulted in windfall profits for the electricity sector and, with too many emissions in the market, a steep downward fluctuation in the price of an emissions allowance.

S. 2191 balances the need to provide transition assistance to regulated entities with the need to provide technology incentives and incentives for nonregulated entities to reduce greenhouse gases and to use funds generated from auction to begin mitigating the impacts of global climate change. The U.S. has the benefit of learning from the E.U.'s experiences as we begin to regulate greenhouse gases.

17. The Acid Rain Program and other trading programs have distributed virtually all allowances to regulated companies for free, based on historic fuel use or emissions. Why did Lieberman-Warner not use this approach?

S. 2191 balances the need to provide transition assistance to regulated entities with the need to provide technology incentives and incentives for nonregulated entities to reduce greenhouse gases, and to use funds generated from auction to begin mitigating the impacts of global climate change.

18. Why does the act place the obligation to submit allowances on “upstream” producers or processors in the case of natural gas and petroleum, and on “downstream” users (electric power generators and large industrial users) in the case of coal?

The selected point of regulation must weigh several competing factors, including maximization of environmental benefit and minimization of the complexity of regulation. Because coal is primarily burned in large quantities by a small number of facilities (mostly power plants), it is most practical to regulate carbon dioxide emissions “downstream,” where the fuel is burned. Most such facilities are already reporting carbon dioxide emissions under the Clean Air Act, minimizing the creation of new regulatory burdens.

On the other hand, emissions from the combustion of natural gas and petroleum are distributed across hundreds of millions of sources (cars, trucks, households, businesses). As a result, it makes sense to regulate the carbon content of these fuels “upstream” at the refinery or processing plant. This strategy helps to ensure that the relevant greenhouse-gas emissions are covered, but that the number of directly regulated entities is minimized.

19. How will the Lieberman-Warner Climate Security Act lead to the development and deployment of low- and non-carbon energy technologies?

The bill drives technology deployment in two key ways. First, by placing a cost on greenhouse-gas emissions, the act gives the private sector the necessary certainty to invest in low- and zero-carbon technologies. Second, the act creates an Energy Technology Deployment Fund – with investment exceeding the Apollo Program and the Manhattan Project combined – to drive the domestic development and deployment of new energy technologies. The fund provides a variety of funding incentives to zero- or low-carbon generators, manufacturers of high-efficiency consumer products, manufacturers of zero- or low-carbon generation technology, advanced coal technology, fuel from cellulosic biomass, advanced vehicle technology and sustainable energy.

20. How does the Lieberman-Warner Climate Security Act provide incentives for farmers and foresters to sequester greenhouse gases?

The act provides two provisions that reward farmers and foresters for their continued environmental stewardship. First, farmers and foresters engaged in projects to reduce greenhouse-gas concentrations (altered tillage or fertilizer practices, improved manure management, reforestation, etc.) can certify those emission reductions through the EPA/USDA, and sell the value of those reductions as offsets to covered facilities. Second, 5 percent of allowances are allocated to the secretary of agriculture to reward U.S. farmers and foresters who adopt practices that increase the storage of CO₂ in plants and soils or reduce the emissions of other greenhouse gases.

21. How does the Lieberman-Warner Climate Security Act impact jobs and U.S. competitiveness?

The bill strives to create a workforce of high-paying innovative jobs in the U.S., while protecting U.S. manufacturing jobs and the nation's competitive position. To do this, the bill includes two provisions. One would require U.S. manufacturing plants that shut down to forfeit their allowances if they do not open a comparable facility in the U.S. The second would impose an International Reserve Allowance Requirement, under which a major trading partner not taking commensurate action to limit greenhouse-gas emissions and that is importing GHG-intensive goods into the U.S. must purchase allowances to cover its product's embedded emissions content.

To promote a new generation of green-collar jobs, the bill also directs 5 percent of auction revenues into the Worker Training Fund. These funds would be used to train workers in renewable energy fields, and to supplement university programs that provide education opportunities for alternative energy professions. Money from the significant technology deployment fund is also directed at domestic companies to ensure domestic job creation.

22. How will the Lieberman-Warner Climate Security Act promote effective international efforts to address the global challenge of climate change?

The first way is to provide clear leadership on this issue. The U.S. has a proud history of leadership on environmental issues such as acid rain, and, as the largest historical emitter of greenhouse gases, an obligation to lead on climate change. To encourage other countries to reduce emissions and minimize unfair competition for affected companies in the U.S., the act calls for America to intensify its efforts to convince other nations to begin reducing greenhouse-gas emissions. If a major emitting nation has not taken comparable action within eight years, the president is authorized to require importers of greenhouse-gas-intensive manufactured products to submit emissions credits of equivalent value to credits the U.S. system effectively requires of domestic manufacturers. Countries that develop systems of comparable integrity will be able sell international emissions allowances to U.S. companies as offsets. Some 20 percent of global greenhouse-gas emissions are due to deforestation and land-use change. The act creates a special fund to help countries take steps to reduce deforestation and degradation of forests. Finally, the bill will also help forge a global solution by using American innovation to develop new, clean technologies that can be sold to other countries to help reduce their emissions.

23. How does the Lieberman-Warner Climate Security Act regulate rural electric cooperatives?

In S. 2191, rural electric cooperatives would qualify for allowances from the allocation to the electric power sector. In addition, 1 percent of the Emission Allowance Account is set aside for rural electric cooperatives. To disburse that extra 1 percent, the bill creates a pilot program. One state in the east (Virginia) and one state in the west (Montana) qualify for 15 percent of that 1 percent set-aside, with a report due every three years on whether the extra allowances have resulted in benefits to ratepayers and led to the use of advanced, low greenhouse-gas-emitting electric generation technologies by those rural co-ops. The remaining 85 percent of the 1 percent is distributed to rural co-ops in proportion to the sales of each rural electric co-op.

24. Why does the bill subject hydrofluorocarbons, one type of greenhouse gas, to its own separate cap-and-trade system, rather than including it in the cap-and-trade system that applies to all five of the other greenhouse gases?

Hydrofluorocarbons (HFCs) are chemicals used in refrigerators and air conditioners. They were developed to replace chlorofluorocarbons (CFCs), the primary gases responsible for the hole in the ozone layer. While HFCs do not damage the ozone layer, they are a potent greenhouse gas, up to 14,800 times more potent than carbon dioxide. Because of this high greenhouse warming potential, one ton of HFCs in the same trading system as carbon dioxide would cost several thousand times more than a ton of carbon dioxide. This high cost could force companies to close their HFC facilities. Because one way to make more efficient air conditioners and refrigerators is to use larger quantities of HFCs, prohibitively high costs for HFCs could interfere with energy efficiency gains in those appliances. The separate market for HFCs ensures that emissions of this gas will be reduced in a way to minimize disruption to the industry and maximize efficiency gains in appliances.

25. What are the next legislative steps for the Lieberman-Warner Climate Security Act?

The bill passed 11-8 in the Senate Environment and Public Works Committee on Dec. 5, 2007. It awaits action by the full Senate. There is presently no companion climate-change bill moving through the legislative process in the House of Representatives.