GLOBAL CLIMATE CHANGE:
RISKS, CHALLENGES, OPPORTUNITIES
AND A CALL TO ACTION
THE NEED FOR ACTION IS URGENT.
Dear Stakeholder:

Leaders at PG&E have taken an in-depth and detailed look at the climate challenge and its implications for our company and our world. Our goal has been simple: to arrive at an informed and earnest assessment reflecting the latest and best research, and to use this information as a basis for us to make decisions as leaders in the energy industry.

Through a series of discussions, we actively reached out to engage—and challenge—the scientific experts. We consulted with leading economists and policy thinkers. And we exchanged ideas with other business and environmental leaders.

Our findings have been fascinating and foreboding, illuminating and inspiring, and ultimately, for us, clear and compelling. The link between greenhouse gas emissions and the Earth’s warming climate is convincing, the potential consequences are serious and the need for action is urgent.

Because the burning of fossil fuels is the single largest contributor to global climate change, energy is at the forefront of this issue. Today, the United States is the world’s largest energy user and the largest emitter of greenhouse gases. It also is the world’s wealthiest and most innovative economy. As such, we are in a unique position: No other country bears a greater responsibility—or possesses a greater capacity—to lead the global response on this issue. We recognize that the challenges of solving this problem are great, but with timely action, so too are the opportunities for our industry and our nation.

What does it mean to be a leader on climate change? Certainly, it means proactively taking serious, concrete measures to reduce greenhouse gases and working for the development and implementation of responsible policies. At PG&E, we are firmly committed to doing this, and we are backing our commitment with real action. For example, we have pursued opportunities to reduce greenhouse gas emissions from our operations, and have helped our customers do the same. And, we have worked with California and federal officials on programs, initiatives and policies that provide real climate benefits.

Leadership also means that we must actively work to inspire, engage with and convince others to take action. Perhaps no other issue has ever demanded the kind of long-term, cooperative and multidimensional effort that will be required to overcome this challenge. Yet, despite its enormity, the challenge can be met. The technologies exist today to make significant reductions in greenhouse gases.

We believe the solution to climate change must ultimately be driven by a shared global commitment that sparks the collaboration and creativity needed to contain this problem. But we differ with those who argue against acting until the rest of the world responds. PG&E is not waiting—and we ask you and others to join us in taking a leadership role.

With that in mind, we designed this document to provide more information on climate change. We hope it gives you insight into PG&E’s view on this issue, and perhaps even helps to shape your views and inspires you to act.

Thank you.

Sincerely,

Peter A. Darbee
Chairman, CEO and President, PG&E Corporation
Chairman, Pacific Gas and Electric Company
PG&E’s Stance on Climate Change
At PG&E, we accept the scientific consensus that climate change is occurring and threatens to significantly alter the environment for current and future generations. This consensus has been articulated by the Intergovernmental Panel on Climate Change (IPCC) and other scientific organizations, representing the world’s leading climate scientists.

We also recognize that human activities are largely responsible for the increasing concentrations of greenhouse gases (GHG) in the Earth’s atmosphere. Because the electric and natural gas industry is one of the largest contributors to these emissions, we believe that our industry has a responsibility to help find effective solutions to the threat posed by climate change and take action.

What the Experts Are Saying About Global Climate Change
The IPCC, the National Academy of Sciences (NAS), the U.S. Environmental Protection Agency (EPA), and other world and national scientific bodies have long studied the relationship between human activities and their effect on the Earth’s climate. Extensive research and analysis has concluded that human activities (e.g., fossil-fuel burning and land-use changes) are warming the Earth’s warming world and other changes in the climate system.”
– IPCC, 2001

“The scientific understanding of climate change is now sufficiently clear to justify nations taking prompt action.”
– G8 Joint Academies Statement on Climate Change, 2005 (NAS was a signatory)

“Scientists know for certain that human activities are changing the composition of [the] Earth’s atmosphere. Increasing levels of greenhouse gases, like carbon dioxide (CO2), in the atmosphere since pre-industrial times have been well documented. There is no doubt this atmospheric buildup of carbon dioxide and other greenhouse gases is largely the result of human activities. It’s well accepted by scientists that greenhouse gases trap heat in the Earth’s atmosphere and tend to warm the planet. By increasing the levels of greenhouse gases in the atmosphere, human activities are strengthening Earth’s natural greenhouse effect.”
– U.S. EPA website, 2006

PG&E is committed to leading by example when it comes to climate change. That means more than just minimizing the greenhouse gas emissions from our operations. It also means maximizing the opportunity we have to lead on efforts to establish responsible policies and programs to address global climate change.”
– PG&E’s Formal Climate Change Commitment

U.S. Greenhouse Gas Emissions by Sector 2004

- Electricity Generation - 33%
- Transportation - 28%
- Industry - 20%
- Agriculture, Residential, Commercial - 19%
What Scientists and Others Are Observing Today

Scientists and other researchers around the globe are observing and documenting significant changes to the environment, which they believe are linked to the Earth’s rising temperatures. As time goes on, and greenhouse gas concentrations and global surface temperatures continue to increase, the impacts are expected to become even more severe.

- Scientists observed an approximate 0.6°C (or about 1.1°F) increase in

with some seal species, may face extinction without the ice cover.
- Threats to indigenous cultures and existing infrastructure may intensify as a result of melting permafrost.
- Worldwide sea level is projected to continue to rise, as a result of glacial melt, flooding low-lying coastal areas.

Glaciers in Montana’s Glacier National Park are melting at a rate that could lead to their disappearance by the middle of this century.

Sea level rise in the Chesapeake Bay, America’s largest estuary, has increased from approximately 3 feet per millennium (over the past 5,000 years), to approximately 1 foot per century; with climate change accounting for up to 50 percent of this increase. By 2100, the rate of sea level rise in the Chesapeake could average almost 3 feet per century. This current trend is resulting in dwindling marsh environments, a decline in habitat for migratory shorebirds, and the loss of small islands that once dotted the landscape.

Munich RE, an insurer of weather-related damage, has observed a global trend since 1980 of an increasing number of weather-related events and a growing cost of weather-related damage.

What Scientists Are Projecting for California

In 2005, “recognizing that global warming will impose compelling and extraordinary impacts on California,” Governor Schwarzenegger set greenhouse gas emission reduction targets for the state and directed the California Environmental Protection Agency (Cal/EPA) to evaluate the impacts of climate change on California. The study projected impacts for California, based on a range of potential scenarios (temperature increases of 3°F to 10.4°F by 2100), which include:

- Reduction in snowpack in the Sierra Nevada Mountains by 10 to 40 percent later this century, and by as much as 90 percent by 2100, with adverse consequences for hydroelectric production, water resources and winter recreation.
- Increasing sea levels on California’s open coast and estuaries, stressing existing infrastructure, marine life and habitats.
Increasing risks of large wildfires statewide, on the order of 35 percent by mid-century and 55 percent by 2100.

- Increases in electricity demand resulting from more intense heat-related weather and increased use of air-conditioning.

**Momentum Is Building to Respond**

Momentum is building in favor of legislative and regulatory action to mitigate the risk of climate change, as policymakers increasingly take note of rising public awareness, scientific consensus, and the heightened attention of the business and financial communities.

- According to one poll, most Americans (71%) believe that global warming is real and a majority (60%) believe that it poses a serious problem.
- Shareholders, pension fund managers and institutional investors have been asking companies to disclose more information on the risks of global warming and how they plan to respond. Investors are increasingly recognizing that a company’s carbon footprint represents a potentially significant regulatory risk, and they are incorporating this uncertainty into their valuations.
- In 2002, California passed a law directing the California Air Resources Board to adopt the nation’s first greenhouse gas emission standards for automobiles.
- In 2005, seven Northeastern states announced an agreement to implement the Regional Greenhouse Gas Initiative, which mandates power plants in those states to reduce greenhouse gas emissions through a regional cap-and-trade program.

**PG&E’s Climate Change Policy**

Consistent with our company values, we will be accountable for all of our own actions as they relate to protecting the environment, and we are committed to working together, as a team, to pursue excellence and promote innovation. These values form the basis of who we are and drive our actions every day. With regard to climate change, this means that we have an obligation to act responsibly and to lead by example. We will do this by:

- maintaining a greenhouse gas emissions profile for our utility’s delivery mix that is among the lowest in the nation,
- developing and investing in robust customer energy efficiency programs,
- in 2005, Governor Schwarzenegger announced aggressive climate change targets for California and created a Climate Action Team, which developed a plan to meet these targets.
- In 2006, the California Legislature passed legislation that mandated broad-based greenhouse gas emission reductions and set definitive targets and timetables for achieving them.
- On June 22, 2005, the U.S. Senate passed a Resolution expressing its sense that Congress should “enact a comprehensive and effective national program of mandatory, market-based limits and incentives on emissions of greenhouse gases that slow, stop and reverse the growth of such emissions at a rate and manner that will not significantly harm the United States economy and will encourage comparable action by other nations that are major trading partners and key contributors to global emissions.”

“I say the debate is over. We know the science. We see the threat. And we know the time for action is now. Global warming and the pollution and burning of fossil fuels that cause it are threats we see here in California and everywhere around the world.”

— Governor Arnold Schwarzenegger (R-CA), June 1, 2005 at the World Environment Day Conference in San Francisco, Calif.

“Polar ice caps are shrinking, glaciers are melting and coastlines are being swallowed by rising sea levels. The culprit? Global warming caused by burning fossil fuels… If we do not slow, stop, and reverse global warming soon, we will do irreparable harm to the world around us…. Congress must step up to the plate and address global warming in a comprehensive way.”

— Senator Dianne Feinstein (D-CA), quotes from the introductory letter of Senator Feinstein’s publication, “Global Warming: A Growing Problem in California and Around the World”
supporting innovative fleet management practices,
identifying and pursuing alternative ways to generate, procure and deliver vital energy resources, including renewable energy and clean distributed technologies,
being transparent about our emissions sources and certifying our emissions data,
helping our customers minimize their greenhouse gas emissions footprint, and
sharing “best practice” policies and programs with others in our industry and encouraging them to take action.

While we have worked cooperatively with local, state and federal partners to achieve greenhouse gas reductions and avoid emissions, we recognize that voluntary initiatives alone will not be enough.

PG&E believes effectively combating global climate change will take sustained and coordinated international action, cooperation and investment over the long term. In the meantime, however, PG&E believes that it is important for the makers to create successful programs to minimize the environmental impacts of energy production and usage. Collectively, they have led to dramatic improvements in energy efficiency, increases in renewable energy supplies, the creation of effective demand response programs, and the promotion of alternative fuel vehicles. These efforts continue today.

A fundamental policy shift in California—with support from PG&E—held the key to clearing a path for many of these successes. Historically, utility revenues had depended on sales volumes—rewarding companies for selling more power and penalizing them for selling less. This created a strong financial disincentive for utilities to encourage energy efficiency and conservation. California removed this barrier by instituting an approach called “decoupling”: utilities would be allowed to collect a fixed amount of revenues, independent of higher or lower sales volumes. The result of this simple, but profound, change has been that utilities have been free to aggressively help customers reduce energy usage without doing financial harm to their business.

As a direct result of decoupling and the programs it made possible, California’s per capita energy usage has remained flat over the past 30 years, compared with an increase of 50 percent for the rest of the country. PG&E’s energy efficiency programs alone have avoided the release of more than 61 million tons of CO₂ into the atmosphere over this same time period (equivalent to taking 8.6 million cars off the road for a year). Today, PG&E is
Putting Efficiency First. In keeping with California’s Energy Action Plan, before PG&E builds or purchases new power supplies for customers, we give first priority to maximizing the benefits of cost-effective energy efficiency and demand reduction programs. Energy efficiency is the lowest-cost way to meet customers’ energy needs. PG&E is investing an additional $1 billion in customer energy efficiency and demand response programs.

Facilitating the Deployment of Clean Distributed Generation, Including Rooftop Solar. We support California’s efforts to aggressively pursue and implement clean distributed generation technologies. An industry leader in facilitating distributed solar generation, we have connected more customer-owned solar installations to the electric grid than any utility in the country, including 51 percent of all solar facilities installed nationally in 2004. PG&E is also working with our customers and communities, through our Solar Schools Program, Solar Habitat Program and Self-Generation Incentive Program, to “right size” these facilities to optimize their impact and value.

Increasing Supplies of Renewable Energy. After optimizing gains from energy efficiency, we focus on adding renewable resources. PG&E is aggressively increasing its supplies of renewable power, with new contracts for wind, solar and other generation. The company expects to meet California’s requirement that 20 percent of electric sales come from qualifying renewable energy resources, which emit no or minimal greenhouse gas emissions, by 2010.

Leveling the Playing Field for Low-Emissions Sources. PG&E voluntarily adopted, before California regulators ordered it more broadly, ENERGY STAR-qualified compact fluorescent light (CFL) bulbs use 66% less energy than a standard incandescent light bulb and last up to 10 times longer. According to the U.S. EPA, if every U.S. household replaced one light bulb with an ENERGY STAR-qualified CFL, it would have the same environmental benefit as removing one million cars from the road.

The following are actions that PG&E is taking now that will continue to yield benefits in combating climate change and reducing energy consumption:

58 percent less than the average among utilities nationwide.

PG&E’s 2005 Retail Electricity Sales by Fuel Type

- Natural Gas - 42%
- Nuclear - 24%
- Large Hydroelectric - 20%
- Total California Renewable - 12%
- Coal - 1%
- Other - 1%
an approach to analyze the greenhouse gas emissions implications of competitive bids for long-term electric contracts by third party suppliers. This so-called greenhouse gas “adder” monetizes the greenhouse gas emissions associated with the electricity so that we can determine the relative financial risks associated with greenhouse gas emissions from various generation resources.

Proposing New Customer Programs. PG&E developed and is seeking approval of a program to allow our customers to become “climate neutral” by voluntarily paying a small monthly premium to mitigate the greenhouse gas emissions associated with their electric and natural gas use. The premiums collected during the first 3 years will be invested in independent projects aimed at removing 2 million tons of greenhouse gases from the air.

Using Innovative Technology. PG&E is installing 10 million Smart Meters™ throughout its service area to provide the infrastructure that will eventually offer new capabilities to help customers reduce energy usage.

Forming Partnerships. PG&E is working with other leading companies and organizations to advocate forward-thinking, pragmatic policy solutions and incentives to address greenhouse gas emissions. For example:

- PG&E is a member of the Clean Energy Group, a group of progressive energy companies advocating for a national, mandatory, market-based program to reduce greenhouse gas emissions.
- PG&E is a Charter Member of the China/U.S. Energy Efficiency Alliance, which facilitates the transfer of information and technologies aimed at improving the energy efficiency of the Chinese economy, reducing their greenhouse gas emissions and creating opportunities for U.S. business.
- PG&E is a Charter Member of the California Climate Action Registry—becoming the first investor-owned utility to certify its CO2 emissions inventory.
- PG&E is a Charter Member of U.S. EPA’s Sulfur Hexafluoride (SF6) Reduction Partnership—through which we have reduced our SF6 emissions by more than 65 percent since 1998.
- PG&E is an active member of U.S. EPA’s Natural Gas Star Partnership—through which

### Benchmarking PG&E’s CO2 Emissions Rate (Lbs CO2/MWh)

- PG&E Owned Electric Generation - 44
- PG&E’s Electricity Delivery Mix - 570
- California Electric System Average - 804
- U.S. Electric Generation Average - 1,342

In 2005, we grew our fleet of natural gas vehicles to 910 vehicles. Together with PG&E’s electric vehicles, we operate the largest low-emission vehicle fleet among U.S. investor-owned utilities. PG&E also continues to work with our customers, automakers, local governments and others to deploy cleaner, more efficient motor vehicle technologies, including plug-in hybrids.
PG&E’s Recommendations for U.S. Climate Change Policy

PG&E supports the June 22, 2005, U.S. Senate Resolution to enact a national, mandatory program to “slow, stop and reverse” the growth of U.S. greenhouse gas emissions. We believe that such a program should be adopted as soon as possible. Action in the near term preserves response options in the future and should lower overall mitigation costs and the costs associated with adapting to inevitable changes to our environment.

Current scientific studies suggest that in order to stabilize greenhouse gas concentrations in the atmosphere at a safe level, global surface temperatures should not exceed 2°C (3.6°F) above pre-industrial levels. These studies also suggest that CO₂ concentrations in the atmosphere should be limited to between 400 and 450 parts per million by 2100 to limit warming to this 2°C (3.6°F) increase. To meet this target, studies suggest that CO₂ emissions must be below approximately 7 billion tons, and that a significant portion of these emissions reductions must occur by 2050.

Because greenhouse gases, most notably CO₂, remain in the atmosphere for a long time, some for more than a century, a lag occurs between a reduction in emissions and a reduction in atmospheric concentrations. As a result, atmospheric CO₂ concentrations will increase for decades.

Making the changes necessary to achieve significant reductions in greenhouse gas emissions, and ultimately mitigate global climate change, will require a new energy paradigm for the U.S. and the world. The burning of fossil fuels is the single largest contributor to greenhouse gas emissions. Therefore, using fossil fuels more efficiently, reducing the emissions associated with their combustion, and identifying and deploying alternative energy sources are critical. This will require thinking differently about energy policies than we have in the past; it will require a realignment of incentives, a reallocation of resources, a commitment to research and development of low- and non-emitting technologies, new processes and practices and clear direction and leadership.

Technologies and other measures exist today to enable the U.S. to slow and ultimately stabilize its greenhouse gas emissions, creating the opportunity for the development and deployment of new technologies, processes, and practices that will allow the U.S. to cost-effectively reverse our current emissions trends. We believe the U.S. can be a leader in developing advanced technology solutions to climate change and creating the new energy infrastructure to support them, which will diversify our nation’s energy resources, enhance our overall energy security, and provide economic opportunities and benefits.

To achieve the objectives of the Senate Resolution, spur innovation, provide economic opportunity, enhance overall energy security, and position the U.S. as a leader, PG&E recommends the following guiding principles for legislation:

- Mandatory greenhouse gas reductions are necessary. Voluntary programs alone are insufficient and will not send the appropriate price signal to U.S. industry to make a measurable impact on global climate change. Only a mandatory, national reduction program is capable of stimulating sustained action and investment on the scale required to meaningfully reduce emissions and establish the U.S. as a leader in the response to global climate change.

- Market-based programs minimize costs and maximize innovation. Market-based strategies—such as cap-and-trade, efficiency and performance standards, and tax reforms—provide the economic incentive and the flexibility to cut emissions in the most innovative, cost-effective ways. This approach is key to driving development of the next generation of clean, highly energy-efficient technologies and practices.

Links to helpful websites:

United Nations Framework Convention on Climate Change
http://unfccc.int/2860.php

Intergovernmental Panel on Climate Change
http://www.ipcc.ch

U.S. Environmental Protection Agency
http://www.epa.gov/climatechange

California Climate Action Team
http://www.climatechange.ca.gov/climate_action_team

California Public Utilities Commission
http://www.cpuc.ca.gov

California Energy Commission
http://www.energy.ca.gov

CalEPA
http://www.caepa.ca.gov

California Climate Action Registry
http://www.climateregistry.org
Near-term opportunities for cost-effective, verifiable greenhouse gas reductions should be pursued. Policies should encourage this action, regardless of the geographic location or from where in the economy these greenhouse gas reduction/avoidance opportunities originate. At the same time, a rigorous system must be developed to ensure the environmental credibility and integrity of these reductions. Taking this approach can help to encourage actions by other countries, spur technological innovation, reduce overall compliance costs, and offer ancillary benefits.

Broad-based participation leads to better, more cost-effective results. Multi-sector participation creates efficiencies. A national program should eventually encompass all major sectors that emit greenhouse gases, each responsible for its fair share of reductions. Sector-specific programs can be a starting point for creating the infrastructure on which to base a broader program.

Energy efficiency should become a top priority. Improving energy efficiency is one of the lowest-cost ways to meet growing energy demand while eliminating greenhouse gas emissions. Policies and incentives should encourage and maximize improvements in energy efficiency throughout the economy. For example, utilities are empowered to aggressively pursue energy efficiency and demand response programs when regulators set fixed revenue levels and eliminate the financial incentive to sell more energy. In addition, efficiency and performance standards can be established in a way that rewards companies for exceeding standards, through either the use of tradable emission credits or some other system.

Investment in low- and zero-emission electric generation and other technologies is critical. Policies should lower barriers and create incentives for investment in nuclear energy, renewable power, advanced coal technologies with carbon capture and storage, distributed generation, advanced transportation options such as plug-in electric hybrid vehicles, and other low- and non-emitting technologies. Driving investment in these technologies, along with aggressively supporting energy efficiency and demand response, will reduce greenhouse gas emissions, enhance and improve the efficiency and reliability of the nation’s energy infrastructure, create economic opportunities for American businesses, reduce reliance on fossil fuels, and support overall U.S. energy independence and security.

Early action deserves to be rewarded—not penalized. Policies must recognize and provide credit to responsible companies that have proactively cut emissions before being required to do so. Ignoring prior efforts puts these companies at a competitive disadvantage, forces them and their customers to “pay twice” for emissions reductions, and discourages similarly responsible initiatives in the future. Conversely, it rewards companies that refused to act.

Long-term greenhouse gas targets provide a basis for action. Addressing climate change eventually requires stabilizing greenhouse gas concentrations in the atmosphere. Setting ambitious, but achievable, targets now is important because it establishes a clear objective and sends the appropriate price signals, from which incremental objectives and action plans can be created as technologies emerge and scientific understanding progresses.

Standardized emissions reporting is an essential first step and must form the basis of any mandatory program. Developing consistent and coordinated greenhouse gas emissions inventories, protocols for standard reporting, and accounting methods for greenhouse gas emissions is fundamental to establishing a credible reduction program that is capable of tracking and verifying progress toward emissions goals and facilitating a tradable emissions credit system.

Quick glossary of terms:

Greenhouse Gas:
Any gas that absorbs infrared radiation in the atmosphere: water vapor, carbon dioxide, methane, nitrous oxide, halogenated fluorocarbons, ozone, perfluorinated carbons and hydrofluorocarbons.

Atmosphere:
The mixture of gases surrounding the Earth.

Greenhouse Effect:
The effect produced as greenhouse gases allow incoming solar radiation to pass through the Earth’s atmosphere, but prevent part of the outgoing infrared radiation from the Earth’s surface and lower atmosphere from escaping into outer space.

Greenhouse Gas Adder:
Voluntarily adopted by PG&E before the California Public Utilities Commission ordered it more broadly, this tool monetizes the greenhouse gas emissions associated with long-term electric contract bids from third-party suppliers, allowing PG&E to determine relative levels of financial risk associated with greenhouse gas emissions from various generation resources.
In producing this report, we took steps to minimize environmental impacts, promote supplier diversity and support businesses in our Utility service area. With these goals in mind, we selected the following products and vendors:

- Low-VOC soy-based inks and process chlorine-free paper manufactured from 100% post-consumer waste. This paper is produced using wind-generated energy and is certified by Green Seal and by SmartWood, an affiliate of the Rainforest Alliance.
- A printer and graphic designer that are WMDVBE-certified businesses.
- An environmentally sensitive printer that is a Pacific Gas and Electric Company gas customer.

**Sources**


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