

2006 ENERGY RESOURCES POLICY

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I. Context

Our society now faces a fundamental challenge greater than any in history. Dependence on fossil fuels is causing global warming, the depletion of energy resources, and severe damage to human health and the environment. The impacts of burning fossil fuels threaten the security of our nation, the survival of species, and the Earth's very capacity to sustain life.

Converging events, including rising energy prices, increasingly powerful hurricanes and melting glaciers have raised growing concerns, and our national fossil fuel addiction leaves us dependent on imports from unstable regions of the world.

Responding to these changes before they overwhelm us is often described as requiring sacrifice and hardship. Instead, the Sierra Club believes the most effective response will rely on determination, forward thinking, and hard but rewarding work to achieve a stable global climate and a sustainable energy system. The Sierra Club's strategy reduces all forms of pollution, not just greenhouse gases, and promotes species protection, environmental justice and security.

Guided by the conservation ethic, the Sierra Club has crafted this comprehensive Energy Resources Policy to promote a positive vision of a sustainable energy future. The Sierra Club's clean energy strategy will wean us from oil, coal and other fossil fuels, eliminate energy waste, work in harmony with natural systems, and define the technologies and smart energy solutions that will meet our nation's energy needs.

As these changes unfold, other important benefits will follow. For example, bringing home and work closer together through better land-use planning will not only save energy, but also build a greater sense of community and allow us more time to enjoy it.

The path to a sustainable energy future starts by promoting energy conservation, tapping the enormous resource of energy efficiency, directly reducing dependence on non-renewable fuels and maximizing the benefits of renewable energy. At the same time, energy efficiency and renewable energy will be the engine of new economic growth, saving money and creating jobs. The result will be lasting improvements for our economy and our environment, more livable communities, more productive manufacturing, less wasteful use of materials, and less pressure on the natural systems of the Earth that sustain us.

Increased conservation, energy efficiency and use of renewable resources will not happen through new laws and policy alone. While those are necessary, there also must be a fundamental shift in awareness, attitudes and values that connects directly to experience, learning and thoughtful consideration of a better way to live on our planet.

The Sierra Club's ranking of energy resources set forth in this policy provides initial guidance, but this roadmap is only a first step. The journey cannot be perfectly mapped out before we begin moving forward. The Sierra Club's strategy incorporates the best "no regrets" strategies for the economy and the environment, whether fossil fuel depletion and global climate change advance rapidly or not as quickly as expected.

Although this document often refers to the United States, the challenge we face is a genuinely global one, and confronting it requires efforts on an international scale. The Sierra Club will promote energy conservation and efficiency and the development of appropriate energy production alternatives described in this policy in a manner that builds a humane global society, honors human rights and dignity, and restores and protects the natural environment. All persons require safe and affordable sources of energy at levels sufficient to provide for human needs and sustainable livelihoods. This policy supports that goal with effective action.

II. Global Climate Change and Energy Resource Depletion

Emissions of greenhouse gases from human activities are causing a measurable increase in global average temperatures. To stabilize the Earth's climate, this increase must be halted.

Stabilization of the global climate is an urgent matter requiring an immediate and effective response. International scientific consensus, confirmed by the most respected national scientific bodies in the U.S. and worldwide, indicates that continuing "business as usual" for even a few more years will greatly increase the risk of harmful and irreversible climate change, affecting the productivity of natural systems, the survival of species, and the safety and well-being of all human societies on Earth.

Our society's actions within the next decade will determine the level of eventual success. Starting quickly and decisively is the most important element in our climate stabilization strategy, because greenhouse gases emitted now will persist in the atmosphere and have effects for centuries to come.

At present, the world's climate scientists believe that carbon dioxide (CO₂) levels above 450 ppm would result in severe climate impacts. To keep below that level, greenhouse gas emissions must be reduced substantially to stabilize the global climate. Most importantly, CO₂ from fossil fuels must be reduced 70% to 90% by the middle of this century.

As the nation with the largest emissions of greenhouse gases, the U.S. has a moral obligation to respond vigorously. To reach levels at which climate stabilization is more likely, U.S. greenhouse gas emissions must be reduced at least 2% per year – well within reach as the U.S. economy shifts to a clean energy path. Because the precise level for avoiding dangerous climate change cannot be determined in advance, the Sierra Club places primary emphasis on making substantial cuts in CO₂ emissions as soon as possible. There is no time to lose.

Fossil fuels contribute a large part of greenhouse gas emissions, but at the same time supplies of cheap and easily available oil, gas and coal are diminishing, leading the energy industry to explore and produce these resources from increasingly remote areas. This results in higher costs, more unconventional techniques and greater environmental damage. Production of oil and gas in the U.S. using conventional drilling techniques has been in decline since the early 1970s, and the industry has turned increasingly to offshore production in the Gulf of Mexico, foreign sources of oil, and unconventional natural gas techniques such as coalbed methane. At the same time, new discoveries of oil and gas worldwide have been falling, and peak production globally may soon occur. The dependence of our society on these cheaply priced fossil resources, along with their

impact on the global climate, accelerates the need to phase them out and turn to clean energy alternatives.

Together with the wide availability of renewable energy resources that can replace fossil fuels, the availability of very large energy savings through conservation practices and efficiency measures offers a substantial opportunity to decrease greenhouse emissions, improve the economy and protect the environment.

We can achieve a stable climate and sustainable energy system through continuous improvement in energy use, technology choice, and public policy, economic decision-making that fully incorporates environmental values and protects communities, and individual conservation commitments that every person can make.

III. Findings

The Sierra Club finds that:

- A. Fossil fuel use is increasing carbon dioxide (CO₂) and other greenhouse gas emissions to levels that are changing our climate substantially, threatening human health and harming natural systems.
- B. The current use of fossil fuels causes serious damage to public health. Nitrogen and sulfur compounds, soot, smog precursors, radionuclides, and toxic substances such as mercury from the combustion of coal affect the health of all people and contribute to tens of thousands of premature deaths in the U.S. each year. All too frequently this damage is concentrated locally, putting the health and livability of entire communities at risk.
- C. Significant environmental damage will result from greenhouse gas emissions already in the atmosphere, and further increases in emissions will accelerate the harm. Without immediate action to reduce these emissions, degradation of the world's climate and natural systems, including the risk of widespread habitat destruction and species extinction, will dramatically increase within our lifetimes.
- D. Global average temperature increases must be limited to not more than 2°C above pre-industrial levels to minimize the possibility of dangerous climate change. Atmospheric CO₂ was 275 parts per million (ppm) before 1800. It is now 380 ppm and increasing more than 2 ppm per year. Scientific assessment shows that atmospheric CO₂ must not exceed 450 ppm in order to maintain the global average temperature within the 2°C limit.
- E. With less than 5% of the world's population, the United States produces 25% of the world's greenhouse gas emissions. Our nation has an obligation to lead the world in cutting fossil fuel use. Emissions of CO₂ in the United States must be reduced at least 2% per year, resulting in levels 70% to 90% below the present (2006) by 2050.

IV. Transition to a Clean Energy Future

The Sierra Club envisions that within this century the world energy system will use almost no fossil fuels, and will instead rely on the efficient use of abundant renewable energy from the sun, the wind, water, biomass, and the Earth's own heat. To achieve this, the nations of the world must immediately and decisively shift to building a clean energy future.

The way forward will involve a transition period during which new and improved technologies are developed, old systems are replaced, and society moves toward a more sustainable form. While there will be breakthroughs in technologies, policies and public attitudes, change must primarily come through incremental progress, because it takes time to replace existing infrastructure and practices.

Only a broad portfolio of options can achieve these ambitious objectives. The Sierra Club supports moving quickly to make major reductions in CO₂ emissions and build the momentum for much broader improvements. It may prove impossible to cut CO₂ much faster than a few percent per year, because doing so depends on many factors: the rate at which buildings and equipment can be upgraded or replaced, efficiency measures and renewable technologies can be developed and brought to market, and a shift from waste and overuse to conservation can occur.

To accomplish this energy transition, the United States and the international community must take the following actions:

- Seek to change individual behaviors and attitudes about energy consumption.
- Adopt public and private policies that support reductions in energy usage.
- Invest in research and development of new technology.
- Emphasize efficiency as the most plentiful and cost-effective energy resource.
- Choose existing energy options that will reduce, and eventually eliminate, the use of fossil fuels and other sources of greenhouse gases, while recognizing that all energy use has adverse environmental consequences.
- Ensure the equitable availability and affordability of critical resources for all people, now and in the future.
- Remove subsidies, incentives and tax benefits for resources that create pollution and greenhouse gas emissions.
- Promote change in energy use and production in deference to the need for healthy ecosystems, protecting human health, and providing for environmental justice.

Success also requires progress on a long list of concerns outside the scope of this Energy Resources Policy. These issues are addressed in existing and forthcoming Sierra Club policies. They include moving toward sustainable land use and agricultural practices, considering energy and carbon taxes and incentives, reducing ecosystem impacts from energy and fertilizer pollution, addressing a host of equity and environmental justice issues, and much more. In particular, because population relates to energy use and carrying capacity, every effort must be made to foster the social and economic changes that reduce population growth throughout the world and achieve a sustainable level.

Innovation

Innovation in technology and methods of energy use is a key to achieving a sustainable energy future. Human ingenuity, imagination and strategic investment in research and development of new technologies will usher in a new energy era. However, experience shows that support for innovation must be tempered with thorough review of new practices and technologies which often have unanticipated consequences.

V. The Essential Role of Energy Conservation

Energy conservation is a top priority for the Sierra Club. Energy conservation – the set of practices that reduces and eliminates the unnecessary use of energy and materials – guides the Sierra Club in all our actions and energy-source related decisions. The Sierra Club is committed to an array of conservation strategies that, when combined with efficiency measures, will reduce energy consumption.

Along with the savings generated by widely available renewable replacements for fossil fuels, the expected large energy savings from conservation practices offer the quickest and least expensive opportunity to decrease greenhouse gas emissions, improve the economy and protect the environment. These savings will be achieved through a combination of individual action, public policy and business technology choices.

Americans collectively use more energy than any other nation, so we have the greatest opportunity and responsibility to conserve. Telecommuting, recycling, living closer to work, and making more efficient use of vehicles, buildings and equipment are all examples of possible conservation actions by individuals. Improved community design, land use and transportation modes are examples of policy areas where conservation can be achieved.

The Sierra Club itself can provide a model for the energy use of our society as a whole. The Sierra Club commits to reducing its own energy use to the greatest degree feasible. Sierra Club members are called upon to take action in their homes, workplaces, and communities and to minimize the energy impacts of their travel and transportation choices.

Individual commitments and actions must be accompanied by public and private sector policies that help reduce over consumption of energy and materials and hasten the transition to a clean energy future.

VI. Consideration for Special Designations

The Sierra Club opposes energy development on public and private lands and in waters that are currently protected by legislative or administrative designations or that the Sierra Club has proposed for special designation based on specific environmental or wilderness criteria. Exceptions are allowed only where the proposed development can be shown to have insignificant effect on the resources for which the special designation was, or would be, established. This overarching consideration applies to all energy resources covered in this policy.

VII. Resources for the Transition to a Clean Energy Future

The Sierra Club analyzed available and potential energy options and ranked them according to the pollution they cause, their global warming emissions, their effect on the land, the energy used to produce them and the waste they create. The Sierra Club also assessed the ability of these options to reduce the use of fossil fuels, speed the transition toward an affordable energy economy and minimize damage to human health and natural systems. Many technologies and programs are ready to make a major contribution now, but others need time for significant research and development.

A. Energy Efficiency

Energy efficiency – using improved technology and operations to deliver the same energy services with less fuel – is the foundation on which all of our other recommendations are based. The efficiency programs outlined below can be implemented now and make a substantial, immediate contribution to reducing energy use and greenhouse gas emissions. Moreover, they can save money and provide high-quality jobs. Programs already exist in some states, but they must be expanded without delay. The Sierra Club identifies these key approaches for immediate action:

1. Clean, Efficient Vehicles

Decrease CO₂ emissions from passenger vehicles through application of the California vehicle emissions standards. Increase vehicle efficiency by raising Corporate Average Fuel Economy (CAFE) standards for cars and light trucks to intermediate levels of 40 mpg as soon as possible, then to 55 mpg or higher.

While streets, highways, railroads and delivery networks for oil products are basic and very slow-changing components of the built landscape, vehicles of all kinds have a relatively short life cycle and offer the potential for rapid improvement.

In addition to improvements in engines, bodies, drive trains, low-rolling resistance tires and other components of conventional autos, hybrid gasoline-electric cars now have a foothold in the market. Electric and plug-in-hybrid vehicles may prove to be an important new option.

2. More Efficient Transportation Modes

Adopt a concerted national program to enhance the rail system to shift freight and intercity passenger transportation away from highway use and aircraft. Railroads move freight much more efficiently than trucks and aircraft. Transportation produces one-third of all CO₂ emissions in the United States. Effective and affordable transportation is essential to a modern society, so substantial changes will be needed to reduce energy use and dramatically decrease CO₂ and other greenhouse gas emissions. These changes must occur in four basic areas: vehicles, fuels, alternative modes and changes in travel patterns. The heavy transportation industry is very sensitive to energy prices and has already invested substantially in energy efficient trucks, trains,

airplanes and watercraft. There is much greater opportunity for improvement in the average fuel economy of the U.S. passenger vehicle fleet, which has not increased for 25 years.

3. Clean Energy Funding

Dedicate 3% to 5% of electric, heating oil and gas utility retail revenues to well-managed programs to fund energy efficiency and increase market reliance on new renewable energy.

4. Building Efficient Communities

Reduce the need to drive passenger vehicles by shortening the distance between workplace, home, shopping and school, using “smart growth” planning and improved transportation options. Provide convenient options for walking, bicycling and mass transit, including light rail passenger trains, which will reduce vehicle trips, emissions, fuel consumption, and the demand for new roads and pavement. Well-designed mixed-use communities create long-term reductions in energy usage. Appropriately designed public transportation systems are an essential component of a sustainable energy society.

Appropriate pricing for parking and highway access and better planning for distribution of goods can also achieve energy savings. Expansion of alternatives is directly tied to land use and transportation planning, as shown in the success of new developments such as the light rail systems in many U.S. cities.

5. Building and Appliance Efficiency Standards

Adopt a three-step market transformation strategy: (a) significantly tighten building energy codes and appliance efficiency standards; (b) promote programs to encourage above-code energy efficiency and sustainable building construction such as the LEED program (Leadership in Energy and Environmental Design); and (c) develop mechanisms that spread the use of best practices going beyond current building energy codes.

6. Distributed Clean Energy

Reduce the distance needed for transmission and distribution of power to decrease transmission losses and improve grid stability and reliability. Many opportunities exist in our communities for the local, small-scale application of renewable technologies (such as rooftop solar) or for efficient use of waste heat from fuel use (combined heat and power). Distributed clean energy involves the entire community in energy solutions, and reduces transmission impacts and disruptive transmission bottlenecks. The Sierra Club supports properly sited and designed local and district energy projects, and calls for measures to ensure that local, smaller-scale projects have access to the transmission and distribution system.

B. Resources Preferred by the Sierra Club

The Sierra Club prefers the following energy supply options. Combined with conservation and efficiency measures, these resources have the greatest potential to decrease greenhouse gas

emissions, contribute to a stronger economy, and reduce environmental damage and harm to human health. Our society should seek maximum reliance on these technologies.

It is especially important to provide support for renewable energy resources through the use of renewable portfolio standards, advanced renewable tariffs, public benefit funding, tax-based incentives, and other policy tools at the local, state and national level.

However, the Sierra Club recognizes that all energy resources have adverse impacts, since each one requires materials, manufacturing and construction, and most require land for facilities. Resource siting and deployment must always take into account the specific conditions of each location and minimize the damage to natural systems, flora and fauna, wild places and nearby communities.

Sierra Club entities may support or remain neutral on projects employing these resources. They may oppose sites or projects that would cause significant environmental harm or projects where the public can't get adequate information for a full assessment and review. Decisions to oppose a specific facility listed as a preferred resource must be justified with a detailed description of the significant environmental harm. When the Sierra Club opposes a particular project in the preferred category, it should always make clear that opposition is based on the location or other project-specific characteristics, and that the Sierra Club generally supports reliance on these energy resources.

1. Onshore and Offshore Wind

Wind power is widely available and the industry has matured rapidly in the last decade. While output from individual wind turbines varies based on daily and seasonal weather, at the regional scale wind power is a clean, consistent, reliable and safe energy resource. The Sierra Club strongly supports direct use of wind energy.

Wind energy systems may have noticeable visual impacts and can disturb sensitive or endangered plants and wildlife. Existing wind energy systems with significant impacts on avian and bat populations should be modified to mitigate those impacts; if modifications prove to be ineffective, turbines should be curtailed or dismantled. Locations with lesser impacts should be sought for new projects. Offshore sites may have access to a superior wind resource, but may disturb coastal and marine environments. In general, the environmental impacts of wind energy systems should be reduced through careful technology choice, siting, reliable pre-construction monitoring, and operations. The Sierra Club supports further research, both general and site-specific, and development of new technologies, to minimize and mitigate impacts of wind energy systems. (The Sierra Club's Wind Siting Advisory contains further guidance.)

2. On-Site Solar

Small scale photovoltaic (PV) electric power and solar domestic water heating systems are already used widely. On-site solar can provide substantial residential and commercial energy even in high latitudes and cloudy climates, and reduces transmission and land use requirements.

Active and passive solar design and siting can be used to provide heating and cooling in residential and commercial buildings and can play a key role in industrial processes.

3. Central Station Solar

There are several types of utility-scale solar electric generation including photovoltaic, high-temperature concentrating solar trough and tower systems, and low-temperature solar thermal. Solar energy is well matched to daily and seasonal energy demand. As costs continue to drop, solar generation will become a prominent national energy resource.

4. Combined Heat and Power

Efficient CHP systems produce both electricity and steam or other useful heating or cooling services, providing the most value and least pollution from a fuel source. Use of the waste heat from industrial processes decreases on-site energy requirements for grid power and may provide off-site supply. In conjunction with smart development of city and town centers, district energy systems can provide both electricity and usable heat. Note: Sierra Club support for CHP does not change our opposition to new coal-fired power plants.

5. Low-Temperature Geothermal

Low-temperature geothermal energy uses the Earth's own heat for building and district heating and cooling, and can be provide an effective residential and neighborhood energy supply.

C. Resources Generally Acceptable to the Sierra Club

Resources in this category should play a role in a clean energy future, but they have larger potential environmental costs than resources in the preferred category. Sierra Club entities may support or remain neutral on projects employing these technologies. Sierra Club entities always may oppose an inappropriate site or project. Since the resources in this category are less desirable technologies, criteria may be more restrictive than for preferred resources. However, when the Sierra Club opposes a particular project, it should always be made clear that opposition is based on the location or other project specific inadequacies, and that the Sierra Club generally supports further reliance on these energy resources.

1. New Small Hydroelectric Plants

Small-scale hydroelectric projects can produce power from water stored behind a dam for regulated flow, use the natural streamflow without an impoundment ("run of river"), or divert the flow through a pipe or canal. Microhydro is generally considered to be up to 100 kilowatts of capacity, and small hydro is up to 10 megawatts.

While significant numbers of sites could be developed for small-scale hydro, each site must be considered for its local and cumulative effects on water quantity and quality, minimum streamflow, habitat, and fish passage. All installations must provide full mitigation for any detrimental effects. Some stream segments should not be developed at all in order to preserve

the benefits of free-flowing rivers. The Sierra Club opposes installations in stream segments proposed for listing as federal or state Wild and Scenic Rivers or in roadless areas.

The Sierra Club generally does not support small-scale hydro development requiring new dams and impoundments. Retrofit of existing dams that are unlikely to be removed may be appropriate provided river impacts are minimized and both upstream and downstream fish passage addressed. Run-of-river and channel diversion projects must minimize river impacts and provide fish screening, and minimum streamflows must be maintained in the natural channel.

2. Ocean Energy Resources

The ocean energy resource is very large, widely available and renewable, but the available technologies for capturing the energy are still in development and their environmental impacts are not well characterized, but could potentially affect marine and coastal resources. Careful development with tight controls over siting and operation will be necessary for commercial-scale facilities.

3. High Temperature Geothermal

Geothermal energy is a resource with almost no greenhouse gas emissions. For conventional hydrothermal (steam or hot water) resources, modern re-injection designs nearly eliminate toxic emissions, particularly hydrogen sulfide, and sustain the resource for far longer. Since geothermal resources are often associated with significant surface features such as geysers, volcanoes and hot springs, and tend to be in sensitive areas, siting criteria are crucially important. The potential for geothermal energy from hot dry rock resources is much larger than hydrothermal resources, but the technology to extract energy from these resources has not developed beyond the pilot stage.

4. Biodiesel

Biodiesel is diesel fuel made from vegetable oil or animal fat. The available recyclable quantity of waste animal and vegetable oil is approximately 2% of U.S. diesel consumption. Even a low fraction of biodiesel mixed with petroleum based diesel fuel produces lower emissions and other environmental benefits. Using this waste for fuel appears to be a benign and cost-effective form of recycling. Sierra Club supports the development of biodiesel fuel resources in order to allow the industry to mature and clearly demonstrate sustainability.

5. Cellulosic Ethanol

The Sierra Club encourages development of cellulosic ethanol from sustainable feedstocks because it promises significant advantages over corn ethanol production, including higher energy return, lower cultivation inputs, and soil conservation benefits. Switchgrass is one of many potential feedstocks. Cellulosic ethanol production mixing ethanol feedstocks with conventional agricultural produce should be explored. However, production of some cellulosic ethanol feedstocks may pose unacceptable environmental impacts, and the Sierra Club may oppose specific feedstocks.

A Note on Biofuels

Oil and gasoline have been the predominant transportation fuels for many decades, but a more diverse mix is starting to emerge as a result of depletion of cheap fossil fuels.

Biofuels comprise the major renewable alternative for transportation fuel, but there is no single way to characterize them. There are many feedstocks for biofuels, including agricultural and forest products and residues, as well as recycled materials such as cooking oil. Biofuels are produced with a wide variety of production methods.

Numerous criteria must be considered for each type of biofuel, including the source of the raw materials, the associated land, air and water impacts of large-scale extraction and use, the ecosystem pressures of using exotic or invasive plant species, the effects of non-sustainable cultivation including chemical fertilizers and pest control, and the elements of the fuel manufacturing process, including the energy inputs.

The net energy benefit of all biofuels is highly variable, and the potential for competition between farming for food and for energy products must also be considered. Whether a specific type of biofuel is truly sustainable depends on many factors, but most biofuel types are not sufficiently mature to provide a clear assessment.

There are drawbacks to many biofuel categories, including the use of pesticides and synthetic fertilizers made from fossil fuels, soil depletion, potential risks from genetically modified crops, encouragement of poor forestry and land use practices, low net energy balance, subsidies that outweigh rational energy choices, and competition with the use of agricultural land to grow food.

As with agriculture in general, for biofuels the Sierra Club supports the use of reduced or no chemical inputs, crop rotation to enhance yield, good soil conservation practices, operating processing plants with renewable energy where possible, and local distribution of fuel supplies. Refining some biofuels, especially corn-based ethanol, requires large quantities of fossil fuels, primarily natural gas, diesel and coal. Sustainably produced biomass is a preferred energy resource in biofuel production in order to create a closed-loop fuel cycle.

The Sierra Club supports the import of biofuels only when a certification process is established internationally to eliminate the conversion of endangered rainforests, native grasslands and other endangered ecosystems to biofuel crops.

D. Resources Considered Transitional by the Sierra Club

These resources will play a transitional role, but are not supported by the Sierra Club as elements of a long-term sustainable energy system. These resources may be used during the clean energy transition to minimize reliance on the even more damaging resources that the Sierra Club opposes. Sierra Club entities should not support projects relying on these technologies, but may accept comprehensive energy supply proposals that include them and may intervene to influence

siting and technology. Even as the U.S. continues to use these resources, we should be planning to reduce and eliminate reliance upon them as the transition to a clean energy system progresses.

1. Existing Oil Fields; Advanced Oil Recovery

The Sierra Club is not opposed to production from existing oil fields using best practices during the transition away from oil dependence. To the extent that recovery of oil from existing well fields reduces the need for new drilling, this option has value. However, actual management practices in existing fields are below acceptable levels and must be improved, environmental damage must be remediated, and production in environmentally sensitive locations should be curtailed as soon as possible.

2. Existing Natural Gas Fields

North American production of natural gas from conventional onshore sources peaked more than three decades ago. Even with the expansion of offshore drilling and unconventional sources such as coalbed methane and “tight sands,” domestic natural gas production may soon reach its peak and then decline. Despite supply and price concerns, it is still a much cleaner fuel than coal and emits less CO₂ per unit of energy produced. During the transition to a clean energy future, the Sierra Club is generally not opposed to continued production from existing fields following best practices to limit environmental damage.

3. Liquefied Natural Gas (LNG)

LNG is a technology for storing natural gas in liquid form. It has long been used for “peaker” storage facilities throughout the U.S. and occasionally as a fuel source for trucks and busses. Since the 1960s, it has also been used on a much larger scale for transporting natural gas from overseas sites using special ships. The LNG is then regasified at a shipping terminal and transferred into the gas pipeline system. With a tightening supply/demand balance and increasing natural gas prices, a wave of new LNG import facilities has been proposed since 2002.

The Sierra Club opposes poorly-sited LNG terminals and connecting pipelines with serious environmental impacts or major public safety threats. The Sierra Club also opposes imported LNG from any existing gas fields with unacceptable environmental practices or human rights abuses, or from frontier gas fields. To the extent possible, LNG facilities should obtain gas that otherwise would be flared at existing oilfields. In general, onshore siting is less preferable than offshore siting for both safety and environmental protection reasons, and closed loop processing is preferred over open loop because it substantially reduces the volume of intake water and minimizes the temperature change in the effluent. The Sierra Club supports concurrent state and regional planning to determine the need for new LNG facilities, and shared federal, state and local siting authority for both offshore and onshore facilities.

The role of natural gas in the transition to a clean energy future varies by region. The Sierra Club supports regional planning to develop future scenarios for natural gas use and assess all available supply and efficiency resources using full-cost accounting, including environmental

costs and benefits. Such planning on a regional basis is needed to assess the size and timing of necessary new gas resources, if any, whether from domestic or LNG supply, as well as investment in cost-effective efficiency resources. Broad positions by Sierra Club entities, including chapters, concerning LNG must be based on in-depth regional analysis and include the participation of all affected chapters.

4. Ethanol from Starch and Sugar

Ethanol produced from corn is the dominant biofuel in the U.S. today and has been granted increasing government subsidies. The net energy and CO₂ impacts of current ethanol fuels are difficult to assess; however, the industry currently relies on environmentally destructive and unsustainable practices to provide its feedstock and dispose of waste streams. The corn-ethanol industry in particular must conclusively demonstrate its sustainability, or move on to other resources. Ethanol from other sustainably grown crops such as sugar cane and beets may eventually displace that from corn and other grains. There are serious concerns about land use, water consumption and toxic emissions regardless of feedstock which must be resolved if ethanol is to be a part of a sustainable future. The Sierra Club opposes the use of coal as an energy input for ethanol production.

E. Resources Opposed by the Sierra Club

The Sierra Club generally opposes additional development of these resources, and supports phasing out existing uses quickly during the clean energy transition. Sierra Club entities may support public policy proposals that include these resources only if they find that the overall balance of the proposal strongly favors efficiency, renewable energy and greenhouse gas reductions, and that the environmental impacts are insubstantial. The Club will support research designed to minimize the environmental impacts of these technologies if funding is not disproportionate to more promising technologies.

1. Combustion Coal Power Plants

Coal provides about 50% of all electric power in the U.S.; coal-fired power plants alone are responsible for about 10% of global greenhouse gas emissions. The U.S. has the largest coal reserves in the world and an ethical obligation to ensure that it does not increase greenhouse emissions and other harmful impacts of its reliance on coal.

There is no such thing as “clean coal.” The coal fuel cycle, from mining to coal sludge impoundments and disposal of tailings and fly ash, causes extensive pollution of air, water, land, the food chain, and local communities. Damage is caused by all forms of mining, whether underground, longwall or the various forms of “mountaintop removal.” While toxic and particulate emissions are significantly lower in new coal fired power plants, and regulation and legal action have forced the retrofit of some older facilities, the industry has consistently undermined efforts to reduce the worst polluting practices and avoided responsibility for cleanups.

It is possible that much cleaner coal plants, in regions where it is the dominant fuel, could displace older, very polluting plants as a transitional strategy. This approach carries significant risks, but may be necessary to promote a harm reduction strategy for coal. In no case should coal be justified solely on the unavailability or cost of natural gas. Mountaintop removal coal mining must be stopped, and other existing mining practices must be significantly improved. Any new coal plants should be linked to the permanent shutdown of older, dirtier plants in order to decrease net lifetime toxic, particulate and CO₂ emissions, and should employ maximum available control technology.

New coal technologies such as integrated gasification combined cycle (IGCC) may reduce CO₂ emissions compared to conventional combustion coal. While IGCC designs may be more compatible with carbon capture and storage (CCS or "sequestration"), no approach currently exists to do so on a commercial basis. Due to the prevalence of coal and the importance of reducing its CO₂ emissions, research efforts on effective CCS technologies should receive priority, recognizing that a great deal of energy efficiency and renewable power is cheaper. All new coal plants should be built with the potential to sequester CO₂.

2. Coal-to-Liquids, Oil Shale, Bitumen and Tar Sands

Increasing gasoline prices have revived interest in unconventional techniques to convert coal, oil shale and bitumen into liquid fuel. Such conversion operations require substantial fossil fuel inputs (usually natural gas), spoil land permanently, consume large quantities of water, and unavoidably create substantial pollution in addition to the pollutants and greenhouse gases from the use of the fuel.

3. New Oil Production

The Sierra Club opposes any development of new "frontier" oil fields, especially in pristine areas such as the Arctic National Wildlife Refuge (ANWR). Oil from foreign sources, especially from politically unstable areas, jeopardizes security and distorts both foreign and domestic policies.

4. New Onshore Natural Gas

As conventional oil fields in the United States are depleted, there is a strong push to open up sensitive areas, particularly in the mountain west, that have been restricted for natural gas production. Given the availability of substantial efficiency and renewable resources, the Sierra Club opposes development of new conventional "frontier" gas fields that cause significant environmental damage and all coalbed methane (CBM), a very destructive gathering method which forces gas and groundwater out of seams of associated coal.

5. New Offshore Natural Gas

Onshore natural gas production in the US peaked in 1973. Offshore production in the Gulf of Mexico has filled the gap, though it has caused substantial damage to marine resources. The Sierra Club strongly supports the longstanding moratorium on exploration and production on the Outer Continental Shelf of the east and west coast of the U.S., the coast of Alaska, and the

Florida Gulf Coast. We also join the Sierra Club of Canada in support of moratoria off the Canadian coasts.

6. Nuclear Power Plants

Although nuclear power produces less CO₂ than fossil alternatives, nuclear power is not safe, affordable, or clean with currently available technology and practice. Mining uranium risks workers' health and creates toxic residues. All current plant designs are complex, prone to accidents and have severe security vulnerabilities. Nuclear waste transportation, storage and disposal problems remain unsolved. The industry is heavily subsidized by public payments, incentives and liability shielding everywhere it operates, dependencies that dramatically increased in the 2005 Energy Policy Act. The nuclear fuel cycle increases weapons proliferation and risk among nations and non-state entities.

The Sierra Club will continue to oppose nuclear power unless these deficiencies are eliminated. While it is possible that a different approach to nuclear power might substantially address these issues, the likelihood is remote given the decades of research and investment already made. Clean energy resources are sufficient to address climate change and are cheaper than nuclear power. In addition, the huge investment to bring additional nuclear facilities online would siphon capital from much more cost-effective uses of financial resources, especially investments in efficiency.

Existing nuclear plants should be frequently inspected and thoroughly monitored. They should be retired upon the expiration of their licensed operating period, and should be shut down immediately if significant safety, security or environmental threats are found.

7. New Large Hydroelectric Plants

While few if any large hydro sites still remain for development in the U.S., Canadian sites that could serve the U.S. market are being actively explored. Of additional concern are efforts in developing countries, often with the support of international finance institutions, to build large dams in the few remaining natural sites. The well-known drawbacks of large hydro include inundation of large natural areas, substantial damage to fish and wildlife, interference with fish migration and reproduction, and displacement of human and natural communities. Some reservoirs fill up prematurely and are rendered useless for power generation due to siltation. There is also evidence that large dam impoundments, especially in the tropics, emit significant amounts of methane and CO₂.

8. Forest Biomass

The Sierra Club opposes the unsustainable exploitation of forest ecosystems. Typical practices use waste wood from harvest operations to run semi-portable milling equipment, undermining efforts to restrict forest cutting in remote, pristine and fragile areas. The use of forest residues from logging or forest fires is widely proposed as a source of renewable energy with limited or no net greenhouse gas emissions. However, there is little likelihood that the current energy

resource provided by forest biomass can be increased sustainably. The Sierra Club opposes biomass energy projects that use federal lands as a source of supply.

The Sierra Club supports efforts to protect communities from wildfires and restore natural fire cycles. Removal of small-diameter hazardous fuels around forested communities where the natural fire cycle has been suppressed may contribute to restoration, and some local biomass-to-energy projects may be acceptable under strictly controlled conditions. But generally, the use of this material as biomass for commercial energy production creates demand for the byproducts of poor forest management and logging practices, and increases the pressure to disturb wild forest ecosystems. Sierra Club entities may support small-scale forest biomass-to-energy projects on non-federal lands where they are carefully monitored and designed as part of a sustainable system similar to that required for Forest Stewardship Council certification.

9. Incineration of Municipal Solid Waste

The Sierra Club strongly opposes combustion of municipal solid waste. It has proven impossible for industry to develop a combustion process, even with a large biomass proportion, that does not produce unacceptable toxic and hazardous air emissions. Combustion of biomass or wood waste even with a dedicated acceptable fuel supply is problematic because economic pressures on plant operators may cause them to accept solid waste when the intended fuel is in short supply.

VIII. Direction to Sierra Club Entities on Implementation of this Policy

All actions and statements by Sierra Club entities with regard to energy policy and facilities shall be in furtherance of and consistent with this policy. Additional guidance can be found in the Energy and Economics Policy, the Energy Facility Siting Policy, and the One-Club Policy, as well as in various energy guidelines and advisories. This policy takes precedence over any earlier energy policies, guidelines, advisories or positions. It does not change jurisdictions for establishing positions as set forth in the Policy on Policies.

Adopted by the Sierra Club Board of Directors, September 16, 2006